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

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

b. Sudden Phase Anomaly (SPA) at Inubo

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

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

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

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

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

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

HOURLY VALUES OF FOF2 AT WAKKANAI

FEB. 1990

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	53	54	52	56	44	52	50	68	106		139	141	130	121	114	114	102	91	90	60	40	43	37	40
2	42	37	37	32	28	28	30	66	108		121	127	136	138	134	122	90	90	86	66	55	52	46	37
3	50	43	42	42	36	35	44	62	88	128	127	140	136	124	125	122	120	91	91	74	58	52	56	55
4	52	54	50	52	48	37	38	62	108	110	132	140	132	130	127	116	122	90	86	66	53	46	48	49
5	43	51	45	44	38	38	31	66	88	118	140	131	140	135	145	146	130	103	97	89	62	58	64	52
6	62	62	58	56	49	53	54	79	100	123	137	147	142	144	133	130	114	96	66	66	52	52	56	55
7	55	58	52	52	56	57	52	70	97	N	119	133	121	127	120	121	95	97	86	56	53	53	51	37
8	52	46	A	A	A	21	34	63	98	128	137	136	130	117	105	97	87	84	61	38	A	39	43	39
9	43	44	47	52	50	39	52	61	94	98	107	116	111	107	108	100	90	74	64	50	47	43	43	43
10	45	40	41	44	42	42	45	62	102	110	114	116	113	98	102	90	85	82	70	61	42	44	44	42
11	42	42	47	51	52	39	34	62	101	114	103	113	114	104	92	90	89	80	57	58	47	38	38	42
12	46	38	36	37	36	42	38	69	88	109	120	112	115	114	98	102	91	76	66	57	44	47	46	38
13	45	46	47	44	50	40	37	66	104	112	112	110	112	110	108	102	90	82	66	42	32	38	A	41
14	39	42	37	37	32	34	32	73	104	98	117	119	116	124	116	103	117	115	83	58	50	55	29	38
15	50	45	47	45	44	52	53	83	88	106	111	124	123	121	120	114	101	86	84	61	53	46	41	44
16		37	36	41	38	22	39	65	84	120	119	116	126	123	121	120	101	86	78	53	43	53	54	53
17	42	44	49	50	42	34	32	66	103	121	111	115	117	113	116	108	102	96	73	63	58	63	52	53
18	59	61	49	52	49	54	44	88	83	110	129	133	125	116	115	110	90	93		61	56	54	40	46
19	46	39	47	52	40	41	44		93	112	116	134	127	128	122	115	108	102	84	75	64	58	55	53
20	47	41	48	43	46	30	37	74	109	120	136	135	128	124	119	121	118	97	87	66	66	54	53	52
21	55	52	50	49	50	47	48	85	N	114	112	121	134	120	114	108	117	101	85	66	56	57	59	56
22	56	45	58	55	49	48	58	93	111	127	134	137	135	127	120	122	108	101	90	82	77	66	58	57
23	54		42	55	49		54	90	130	137	137	125	N	126	114	114	107	N	98	88	74	66	63	52
24	56	54	55	60	51	54	57	90	106	124	146	150	136	136	128	120	114	108	90	78	63	64	64	60
25	52	52	47	51	N	49	51	70	110	129	131	138	134	132	128	121	107	108	97	90	85	69	42	54
26	55	52		39	36	37	43	85	122	142	144	134	133	126	123	114	118	110	97	83	64	63	56	55
27	54	55	58	43	38	35	43	84	118	132	132	135	130	124	120	117	100	98	103	91	78	63	61	52
28	61	56	62	52	40	36	50	94	119	136	137	138	135	133	124	124	133	124	111	90	65	57	57	61
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	26	27	26	27	28	27	27	25	28	28	27	28	28	28	28	27	27	28	27	28	27	28
MED	52	46	47	50	44	39	44	70	103	120	128	133	130	124	120	114	104	96	86	66	56	54	52	52
U Q	55	54	52	52	49	49	51	85	109	128	137	137	135	129	124	121	117	102	91	80	64	60	57	54
L Q	45	42	42	43	38	35	37	65	93	110	115	117	117	116	114	105	90	86	70	58	47	46	43	41

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT WAKKANAI

FEB. 1990

LAT. 45.4N LON. 141.7E 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	G	G	G	37	51	G	G	G	G	G	36	34	28	28	G	G	G	G
2	G	G	G	G	G	G	G	G	33	G	G	41	43	42	G	G	35	G	G	G	G	G	G	G
3	G	G	G	G	G	G	24	G	G	G	G	G	G	48	47	44	35	59	G	G	28	G	G	G
4	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
5	G	G	G	G	G	G	G	30	36	G	G	G	G	G	G	G	36	36	30	G	G	G	G	G
6	29	34	34	G	24	24	G	G	37	44	50	G	59	54	45	38	35	G	G	G	G	G	G	28
7	24	G	28	27	G	G	G	G	G	G	G	G	G	G	45	G	76	31	42	28	25	G	29	31
8	G	G	37	44	31	G	24	31	38	40	G	G	G	G	G	G	G	G	34	38	60	G	32	27
9	28	28	26	G	G	G	G	44	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
10	G	G	G	G	G	28	29	G	G	G	G	G	G	G	G	G	33	G	G	G	G	G	G	G
11	G	G	29	28	G	G	G	G	34	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
12	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	27	G
13	G	G	G	G	G	G	28	G	G	G	G	G	G	G	G	G	33	33	34	45	37	G	24	G
14	G	G	G	G	G	27	G	30	50	G	G	G	G	G	G	G	G	G	G	G	G	32	29	G
15	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	36	33	41	42	31	G	G	G
16	G	G	G	G	G	G	34	39	68	G	G	G	G	G	G	42	38	G	G	G	G	G	G	G
17	G	G	G	G	24	24	23	33	45	46	48	G	G	G	44	40	46	34	G	G	G	G	24	G
18	G	G	G	G	G	G	G	G	G	G	G	51	51	51	G	G	G	G	38	47	28	26	G	24
19	G	G	G	G	G	G	G		G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
20	G	G	G	G	G	G	G	G	G	G	G	G	57	53	G	48	43	44	33	G	G	G	G	G
21	G	G	29	G	G	G	G	G	G	G	G	59	G	G	53	38	38	G	28	28	58	29	G	G
22	G	G	G	G	G	G	G	G	G	G	51	G	G	G	G	G	G	G	G	G	30	G	G	G
23	29	G	G	G	G		G	G	G	G	G	G	G	G	G	G	G	G	G	G	38	54	58	26
24	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	38	66	50	G
25	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	31	G	G
26	G	G		G	G	G	G	G	42	G	G	G	G	G	G	G	G	G	G	G	G	G	40	36
27	36	G	28	G	G	G	G	G	G	G	G	G	G	G	42	G	G	G	G	G	G	28	28	34
28	27	G	G	G	28	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	33	28	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	28	28	27	28	28	27	28	27	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
MED	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
U Q	G	G	26	G	G	G	G	G	35	G	G	G	G	G	G	G	36	32	29	14	29	27	28	12
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. 1990

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	15	15	15	15	15	16	20	16	22	21	23	26	26	23	29	18	16	15	15	15	16	15	16
2	15	15	18	N	N	N	16	20	18	20	20	29	24	27	18	27	20	16	15	15	14	16	16	16
3	15	15	17	16	16	16	16	18	18	23	22	23	39	24	22	21	20	17	15	15	16	16	15	16
4	15	15	16	15	16	15	16	18	18	24	27	24	27	27	24	27	23	17	15	15	16	15	15	15
5	15	15	15	15	15	15	20	16	20	29	22	24	34	18	20	20	17	17	15	15	15	16	15	15
6	17	15	14	15	15	16	16	20	23	18	20	21	21	22	20	18	20	17	15	16	15	15	15	16
7	15	15	15	15	15	15	15	20	18	21	22	22	21	34	22	18	16	16	16	16	15	16	15	17
8	16	14	15	15	15	16	15	16	20	24	32	35	33	35	26	21	27	17	16	16	17	15	17	16
9	17	17	16	16	15	15	15	16	21	30	34	27	36	36	33	28	26	17	15	16	16	17	15	15
10	16	15	15	15	17	16	16	22	27	32	26	28	33	26	23	18	18	17	17	15	15	15	16	14
11	15	15	17	17	16	15	17	21	18	32	32	26	26	22	23	20	24	17	16	15	15	16	16	16
12	15	18	14	15	15	16	15	21	18	20	27	27	24	27	21	18	17	17	15	16	15	16	17	15
13	16	15	15	15	16	15	15	20	18	22	20	22	22	22	23	20	18	17	15	16	16	17	16	15
14	15	15	15	16	15	15	15	16	17	21	17	38	17	21	20	20	26	22	16	15	16	16	15	18
15	16	16	16	17	15	15	16	22	20	24	22	23	35	26	21	20	21	17	17	20	17	15	16	16
16		15	17	15	15	N	16	16	21	32	33	21	39	34	20	20	17	18	15	15	16	16	16	15
17	15	16	15	14	14	18	15	16	26	17	26	34	23	22	23	18	18	18	14	16	16	16	15	16
18	15	15	14	16	16	17	16	23	28	18	21	23	23	30	22	18	26	18	15	16	17	17	17	17
19	17	16	16	16	15	17	15		27	23	23	27	27	23	22	21	26	20	20	15	15	16	15	20
20	18	15	15	16	15	17	20	23	21	23	24	40	28	35	36	23	20	20	17	16	17	17	16	16
21	18	15	15	15	15	15	16	23	21	23	23	28	27	24	24	23	20	21	15	18	16	18	17	16
22	16	16	18	15	16	16	15	23	29	22	22	39	41	23	24	21	18	21	15	17	17	15	15	16
23	17	15	17	17	15		15	24	29	23	36	23	39	40	38	23	28	22	15	18	17	18	17	17
24	17	17	16	16	15	16	17	23	33	38	36	39	42	39	35	22	29	21	15	15	16	16	17	17
25	20	17	16	18	15	N	15	29	34	39	39	40	43	40	40	22	32	21	15	17	15	16	15	20
26	20	15		18	16	N	17	23	20	35	39	39	39	36	35	33	29	26	17	16	16	16	17	18
27	18	15	17	14	20	15	17	18	22	22	23	39	39	40	23	22	21	21	16	16	16	16	16	15
28	17	17	15	15	17	15	17	24	22	24	46	40	40	39	39	38	30	22	15	15	16	16	18	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	28	27	27	27	23	28	27	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
MED	16	15	15	15	15	15	16	20	21	23	24	27	30	27	23	21	20	18	15	16	16	16	16	16
U Q	17	16	17	16	16	16	16	23	26	29	32	38	39	35	29	23	26	21	16	16	16	16	17	17
L Q	15	15	15	15	15	15	15	18	18	21	22	23	24	23	21	20	18	17	15	15	15	16	15	15

HOURLY VALUES OF FOF2 AT AKITA

FEB. 1990

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	53	52	52	49		42	48	76	112	131	136	135	136	120	110	116	107	100	86	78	44	39	43	36
2	43	46	44	35	27	25	37	73	101	121	140	136	133	139	131	118	102	102	86	82	58	45	52	48
3	42	49	52	41	44	49	46	71	87	108	127	136	134	126	118	120	110	85	87	84	64	51	A	52
4	47	43	49	50	49	42	41	71	103	109	117	146	138	125	126	116	112	95	83	78	57	47	46	54
5	50	52	47	52	40	43	35	66	102	116	138	136	130	137	136	138	128	88	88	86	79	60	54	51
6	52	56	52	49	49	48	53	80	106	118	131	140	138	134	121	124	114	93	78	63	56	A	A	46
7	53	53	52	54	55	51	44	81	88	116	123	133	131	114	120	114	104	90	84	65	53	53	54	49
8	52	54	49	40	A	A	32	70	125	132		141	136	134	124	111	100	92	80	64		A	A	A
9	38	42	42	35	31	28	32	68	94	110	126	128	131	114	113	110	90	81	66	54	51	32	34	32
10	40	38	35	43	38	38	39	71	83	105	108	114	110	110	106	104	91	77	78	51	49	34	52	42
11	42	40	43	43	41	35	34	50	110	124	111	114	111	114	104	90	82	71	64	66	53	41	44	28
12	44	48	38	38	38	32	36	68	87	107	107	118	114	110	111	103	94	75	66	57	51	35	44	48
13	46	44	44	48	43	32	35	69	94	112	112	115	116	118	110	106	91	77	68	48	40	41	A	35
14	40	39	48	41	47	32	41	74	101	108	108	114	118	121	111	102	109	109	84	49	48	53	46	45
15	52	48	44	47	46	48	52	C	83	102	112	113	126	120	116	117	90	83	77	72	54	45	A	49
16	40	38	42	42	42		39	69	82	N	126	114	121	124	121	116	103	85	79	66	42	37	47	52
17	31	44	47	51	N	30	38	73	107	112	122	113	117	121	121	108	111	85	79	63	A	58	52	53
18	56	52	50	47	50	58	61	86	112	123	122	137	126	124	120	118	108	90	83	68	64	A	53	A
19	53	53	54	50	40	38	48	84	110	106	114	131	131	120	124	118	110	102	86	79	70	62	54	56
20	53	45	50	53	49	32	37	78	124	130	122	136	137	116	121	112	111	101	84	81	52	52	62	A
21	53	52	48	51	47	48	62	102	121	120	116	114	N	121	118	118	115	114	N	80	66	67	66	A
22	57	57	47	53	50	44	62	84	122	135	131	136	132	130	120	117	112	103	92	85	82	68	52	63
23	53	52	49	57	53	46	52	102	131	128	130	124	135	129	118	114	114	110	91	88	78	75	64	57
24	61	A	52	59	54	53	66	108	133	130	136	141	137	136	124	132	122	115	93	79	72	68	67	62
25	A	51	45	50	48	37	62	88	110	121	136	138	134	133	130	125	113	107	94	98	84	70	68	60
26	58	62	63	54	54	52	61	100	132	134	140	140	132	118	116	115	116	116	93	85	82	72	64	51
27	59	66	68	62	44	42	50	88	138	138	136	130	134	121	124	116	109	111	103	89	66	64	64	51
28	50	64	60	54	42	52	65	106	134	134	139	137	140	130	130	117	131	122	86	84	84	64	69	78
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	28	28	25	26	28	27	28	27	27	28	27	28	28	28	28	28	27	28	26	25	23	24
MED	52	51	48	50	46	42	45	76	108	120	126	134	132	121	120	116	110	94	84	78	58	53	53	51
U Q	53	53	52	53	49	48	57	88	123	130	136	137	136	130	124	118	113	108	88	84	72	65	64	55
L Q	42	44	44	42	40	32	37	70	94	109	114	114	121	118	114	110	101	85	78	63	51	41	46	45

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT AKITA

FEB.1990

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	44	G	44	58	G	G	G	G	31	G	G	G	G	31
2	28	G	G	28	G	G	G	G	49	G	G	44	G	G	G	38	G	31	28	32	28	G	G	G
3	G	G	32	G	G	G	G	G	G	G	G	51	49	G	51	45	36	31	34	31	11	32	38	G
4	G	G	G	G	G	G	G	G	37	47	47	G	50	45	43	G	35	31	G	G	G	G	G	G
5	30	26	G	G	G	G	G	29	G	G	G	48	50	48	45	41	G	36	27	G	G	G	G	G
6	G	G	32	31	G	G	G	G	G	G	G	46	47	45	50	50	G	G	G	30	35	61	55	28
7	24	25	G	G	31	G	G	G	G	G	G	G	51	52	47	42	36	G	G	32	30	31	G	G
8	G	G	23	37	57	42	G	G	41	43	G	G	G	49	46	47	G	G	91	54	40	37	38	41
9	30	30	30	32	G	G	G	G	G	60	59	G	G	G	G	G	G	G	G	33	24	25	25	G
10	G	G	G	G	G	G	G	G	G	G	G	G	G	G	47	G	G	G	G	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	26	G	G	G	G
12	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	29	30	G	G	G	G	G
13	G	G	G	G	G	G	G	G	G	G	46	G	48	G	G	G	G	33	G	G	36	G	33	G
14	30	G	26	G	G	24	28	30	36	G	G	G	G	G	G	40	G	29	28	30	G	32	G	G
15	G	G	G	G	G	G	G	C	G	G	G	G	G	G	50	58	58	60	30	51	36	34	28	24
16	G	G	G	G	G		G	34	59	41	67	G	G	48	48	G	39	40	49	G	28	G	G	G
17	G	G	G	G	G	G	G	G	G	G	G	G	50	50	46	42	37	G	G	37	49	G	G	G
18	G	25	G	G	G	26	G	G	G	G	G	54	52	55	65	54	41	36	29	32	68	49	28	41
19	30	28	G	G	G	G	G	G	G	G	50	54	54	78	46	55	G	34	G	G	G	G	G	G
20	G	G	G	G	G	G	G	G	G	G	G	55	48	G	59	G	52	84	41	58	72	29	30	36
21	G	27	G	G	30	G	G	G	G	45	G	50	54	56	47	47	50	37	29	G	28	G	56	85
22	G	G	29	G	G	G	G	G	G	G	G	G	G	G	G	40	G	G	G	G	G	G	31	26
23	G	G	G	G	G	G	G	G	G	G	G	G	G	55	50	53	36	G	G	G	G	G	G	G
24	38	47	33	G	G	G	G	G	G	G	G	G	G	G	G	40	G	G	G	G	24	G	G	35
25	58	40	G	28	31	G	G	G	39	G	G	G	G	G	G	40	G	37	32	30	G	30	40	32
26	27	26	26	24	G	G	G	G	G	G	74	68	G	G	G	G	36	G	29	G	G	49	G	G
27	G	G	G	G	G	G	G	36	40	G	G	G	G	G	G	G	G	G	G	G	32	G	G	31
28	25	G	G	G	G	G	G	G	58	G	G	G	G	G	G	G	56	G	34	51	68	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	28	28	28	28	27	27	28	27	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
MED	G	G	G	G	G	G	G	G	G	G	G	G	G	G	44	40	G	15	28	14	24	G	G	G
U Q	27	25	24	G	G	G	G	G	36	G	22	47	49	49	47	46	36	35	30	32	35	31	30	31
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. 1990

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	15	15		15	17	22	17	18	20	22	24	22	20	16	27	20	16	18	16	16	16	16
2	18	15	15	15	N	N	16	22	15	16	22	22	22	23	20	20	26	16	16	16	17	20	16	17
3	18	15	15	15	15	15	16	20	28	16	16	20	20	20	15	16	16	15	17	17	16	16	16	16
4	17	15	15	15	15	16	16	20	18	16	20	21	21	20	18	21	17	18	20	17	17	17	17	16
5	18	15	15	15	N	18	17	22	22	18	21	22	21	22	21	18	16	16	16	16	17	17	17	16
6	16	15	15	15	15	15	16	21	17	17	16	20	22	20	22	20	26	20	16	16	16	16	15	15
7	15	16	16	15	15	16	16	22	17	17	18	21	22	22	17	20	16	20	16	17	16	16	16	16
8	16	15	15	15	15	15	16	21	16	20	22	21	21	22	20	17	16	20	16	15	16	16	15	15
9	16	15	15	15	15	17	16	21	28	20	23	23	23	23	23	18	17	21	15	17	16	17	18	17
10	16	15	15	15	15	16	16	21	16	20	20	22	21	22	20	17	17	20	16	16	16	15	16	16
11	16	15	15	15	15	16	17	22	17	16	22	20	20	22	18	16	17	20	15	16	16	16	16	20
12	17	15	15	15	15	16	16	22	20	18	20	21	22	21	22	16	17	16	17	16	18	16	17	17
13	16	15	15	15	15	18	16	16	17	18	22	23	22	24	23	18	16	16	15	16	16	16	15	21
14	16	15	16	15	15	17	16	16	16	15	16	21	22	16	16	17	17	18	16	16	16	16	16	16
15	17	15	15	15	15	15	16	C	16	16	21	20	20	22	20	17	16	16	16	16	15	16	17	16
16	16	15	16	15	15		16	15	16	16	17	18	17	18	16	22	16	15	16	16	17	17	17	16
17	18	15	15	15	15	20	17	23	16	20	20	21	20	23	18	21	16	22	16	16	16	17	17	16
18	17	16	15	15	17	16	16	23	15	17	20	18	22	21	21	21	16	16	15	17	16	16	17	16
19	15	16	16	15	16	16	16	23	17	17	22	21	22	21	20	18	16	17	16	16	16	15	16	16
20	16	15	17	15	15	15	15	21	17	18	22	22	21	21	22	18	20	18	20	17	16	15	15	16
21	17	15	15	15	15	16	15	20	20	21	20	36	23	21	21	21	20	17	15	16	20	17	17	16
22	16	15	15	15	15	16	16	23	22	17	20	39	27	23	21	21	17	16	16	17	16	16	16	15
23	16	15	15	15	15	17	16	26	18	18	27	24	22	24	26	20	20	23	16	16	15	16	16	17
24	16	15	15	15	16	16	16	26	17	22	21	26	26	24	21	20	20	22	16	16	16	16	16	15
25	16	15	15	17	15	20	16	16	21	22	23	24	40	43	21	22	16	16	16	16	16	16	16	16
26	16	15	16	15	15	15	16	23	18	18	22	22	26	24	18	22	18	23	16	16	17	16	20	18
27	16	15	15	15	15	18	16	15	17	16	20	22	24	23	22	20	22	23	17	16	15	16	17	16
28	17	16	16	15	15	16	16	18	18	36	23	23	46	42	46	28	20	23	15	16	16	16	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	28	28	28	28	25	26	28	27	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
MED	16	15	15	15	15	16	16	21	17	18	20	22	22	22	20	20	17	18	16	16	16	16	16	16
U Q	17	15	15	15	15	17	16	23	19	20	22	23	23	23	22	21	20	20	16	17	16	16	17	16
L Q	16	15	15	15	15	15	16	20	16	16	20	21	21	21	18	17	16	16	16	16	16	16	16	16

HOURLY VALUES OF FOF2 AT KOKUBUNJI

FEB. 1990

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	54	51	54	48	34	40	45	78	104	132		138		128	115	116	118	103	92	80	52	42	44	42
2	50	46	50	38	29	26	43	74	92	118	145	140	120	138	142	128	116	110	105		59	52	60	54
3	52	53		42	43	49	46	73	101	118	126	141	136	130	118	118	116	97	86	83	71	61	50	49
4	46	42	46	50	51	37	46	78	106	115	128	138	142	130		127	122	107	87	84	67	54	50	50
5	48	48	52	56	40	44	42	62	99	123	145	130	126	141	142	136	130	104	83	88	90	64	64	67
6	51	54	50	43	45	47	50	79	103	114	137	142	140	130	125	122	118		85	73	60	54	54	51
7	A	A	47	46		52	51	81	100	115	127	131	129	115	124	126		98	90	78	58	52	54	50
8	51	51	68	32	A	A	34	77	132	140	N	148	145	143	134	124	111	97	86	72	52	47	48	42
9	45	46	41	35	36	34	37	68	92	112	129		134	126	118	117	103	80	79	57	48	37	26	32
10	33	46		37	38	34	38	70	104	104	108	114	115	112	108	111	104	82	82		54	47	48	44
11	44	39	46	42	34	28	31	58	105	126	114	125	117	116	116	103	86	79	80	70	59	56	47	51
12	49	44	43	40	38	35	36	70	94	112	117	132	116	108	115	108	97	83	68	60	55	48	48	54
13	48	44	44	52	34	32	41	73	95	106	120		122	120	114	110	96	73	70	47				41
14	41	41	39	40	32	32	36	71	97	105	112	117	123	126	120	105	98	110	80	50	51	54	48	56
15	47	49	48	46	47	47	54	80	82	93	118		128	130	121	117	110	94	80	80	51	48	47	51
16	39	42		47	38	30	32	81	106	114	121	125	124	129	125	120	107	100	78	63	50	50	54	54
17	54	52	54	67	26		39			111	119	120	128	126	127	110	111	93	90	68	62	59	58	58
18	60	58	59		52	60	68		116		135	138	137	132	139	137	124		92	85	78	64	53	52
19	53	58	58	49	40	41	51	81	115	120	113	127	140		122	122	116	111	104	97	76	71	64	68
20	55	55	54			36	46	76	126	132	116		144	140	122	117	118	110	91	81	86	63	A	64
21	60	59	68	50	48	42	54	102	124	129	120	119	140	144	131	126	122	122	110	105	92	80	84	76
22	64	44	58	52	55	48	53	86	117	140	130	137	135	130	126	121	118	108		100	87	77	63	64
23	63	57	52	55	52	48		101	133	125	116	127	132	132	120	116	120	116	102	106	85	75	71	64
24	63	62		56	56		66	104	130	138	141	145	144	146	145	141	138	124	103	92	87	81	78	78
25	65	58	53	50	52	51	63	97	114	125	136	144	140	138	134	94	120	113	105	100	86	75	71	A
26	63	62	67	57	50	54	58	101	135	135	145	144	142	136	131	126	122	121	108	91	84	85	76	54
27	64	60	68	61	42	42	53	104	146	141	126	132	137	136	125	120	111	114	107	94	81	73	68	60
28	62	64	61	52	46	47	53	111	131	136	145	145	142	140	137	135	134	120	107	91	87	66	76	82
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	24	26	25	25	27	26	27	27	26	24	27	27	27	28	27	26	27	26	27	27	26	27
MED	52	51	52	48	42	42	46	78	106	120	126	134	135	130	125	120	116	106	90	82	67	59	54	54
U Q	62	58	58	52	50	48	53	97	126	132	136	141	140	138	134	126	122	113	104	92	86	73	68	64
L Q	47	44	46	42	35	34	38	73	99	112	117	126	124	126	118	113	107	94	80	70	54	50	48	50

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT KOKUBUNJI

FEB. 1990

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G	G	G	G	G	G	G	G	G	51	G	G	G	G	30	34	24	G	G	G
2	32	32	G	G	G	G	G	48	G	G	G	45	G	G	G	G	G	G	G		G	G	G	G
3	G	G		G	G	G	G	28	G	G	G	G	51	52	G	46	38	G	29	30	25	G	G	32
4	26	G	G	G	G	G	G	44	G	44	57	50	48	44	G	G	G	G	G	G	G	79	79	56
5	G	G	G	25	G	56	G	G	G	G	G	49	50	50	44	42	G	G	27	31	G	G	G	G
6	G	G	G	27	23	G	G	G	G	G	G	49	51	48	78	47	42		58	29	48	38	33	24
7	58	58	G	G		G	G	G	G	G	54	45	52	G	49	G	G	G	G	G	G	G	G	G
8	G	G	G	24	53	37	G	G	G	G	G	44	G	G	46	50	G	56	56	56	56	56	56	24
9	29	28	33	32	26	56	56	79	80	G	59		G	G	G	G	G	30	31	33	25	G	56	G
10	56	56		56	G	G	G	G	G	G	G	48	49	55	79	49	78	G	24		56	56	G	G
11	79	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
12	G	G	G	G	G	G	G	G	G	G	G	G	48	G	G	G	G	G	G	G	G	G	G	G
13	56	G	56	G	G	G	G	30	G	G	G	G	G	G	G	79	40	28	29	G				G
14	G	G	G	31	G	G	G	G	G	G	46	48	50	G	G	G	G	G	24	G	G	33	25	G
15	G	30	28	G	G	G	G	G	G	G	G	G	48	G	51	48	38	34	50	G	81	40	34	24
16	G	G		G	G	G	G	G	G	G	G	47	G	50	46	47	44	34	27	26	63	35	G	G
17	G	G	G	G	G		G			42	G	47	G	48	44	58	37	G	G	G	G	24	55	27
18	G	27	G		G	G	G		G	G	G	G	G	45	54	44	36		29	23	28	G	G	G
19	41	36	24	34	G	G	G	G	G	G	G	53	68	G	44	42	G	G	43	G	G	G	26	24
20	24	G	30			G	G	G	G	G	G	G	G	53	50	59	48	G	29	54	26	60	94	40
21	G	26	25	G	G	24	G	32	G	46	50	55	54	G	G	G	G	G	G	G	G	G	G	G
22	33	46	G	G	30	G	G	49	G	G	G	G	50	G	47	44	37	G		G	G	G	G	G
23	G	29	25	24	G	G		G	G	G	G	G	G	50	47	47	38	G	24	G	G	G	G	G
24	G	G		G	G		G	G	G	G	G	54	47	46	G	G	37	30	31	G	G	G	G	G
25	G	G	28	27	G	G	G	32	G	47	48	G	69	G	44	50	43	34	32	26	G	G	35	40
26	38	30	24	G	G	G	G	G	G	G	G	G	G	46	44	41	40	32	G	G	23	26	25	28
27	G	G	G	G	G	G	G	33	54	G	49	G	46	G	44	G	44	30	38	34	G	30	24	24
28	G	25	26	25	G	G	24	G	G	G	G	57	G	G	G	G	G	48	45	56	36	32	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	28	28	24	26	26	26	27	26	27	28	28	27	28	28	28	28	28	26	27	26	27	27	27	28
MED	G	G	G	G	G	G	G	G	G	G	G	44	46	G	44	42	36	G	29	G	G	G	G	G
U Q	32	29	25	25	G	G	G	32	G	G	23	49	50	49	47	47	40	30	32	31	28	35	34	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 KOKUBUNJI

FEB. 1990

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	15	14	14	14	21	15	15	22	17	17	14	23	14	26	20	18	16	16	15	15	14	15	15	15
2	15	14	14	14	N	N	15	24	16	16	20	21	24	22	21	16	15	21	15		15	15	15	16
3	15	15		14	15	15	15	16	16	16	17	17	26	18	17	18	16	22	15	15	16	14	16	15
4	15	15	15	14	14	16	14	22	16	16	17	20	18	20	14	17	16	21	14	16	15	15	15	15
5	15	16	15	15	14	15	15	15	16	16	17	21	21	20	21	17	15	21	15	15	15	15	15	15
6	15	14	14	16	16	15	15	22	16	18	18	20	22	20	20	17	16		16	14	15	15	15	15
7	15	14	16	15		15	15	22	16	16	18	20	21	22	18	18	14	21	14	15	15	15	15	15
8	15	15	14	14	14	15	15	21	18	18	18	18	21	22	20	17	15	21	15	15	15	15	15	15
9	15	14	15	14	15	14	15	22	17	18	21		21	20	20	16	15	15	14	16	15	15	17	16
10	15	14		15	14	15	16	17	16	15	18	22	21	21	17	16	15	21	15		15	16	15	15
11	15	15	14	14	15	15	16	22	16	16	20	21	24	20	20	16	16	22	15	15	15	15	15	15
12	15	15	15	14	14	15	15	23	16	16	17	22	21	24	18	16	15	21	15	15	14	15	15	15
13	15	15	14	14	14	15	15	21	16	16	22	14	23	22	20	18	16	15	15	15				20
14	20	17	16	15	16	16	15	15	16	16	16	21	18	15	15	16	17	16	15	15	15	15	16	15
15	16	15	16	15	15	15	15	23	15	15	17	14	21	20	20	16	15	16	14	15	15	15	15	15
16	15	15		14	14	17	15	24	15	16	18	20	16	16	17	18	15	15	15	15	15	15	16	15
17	15	16	15	14	N		15			15	16	18	21	22	17	18	16	20	15	15	15	15	15	16
18	16	14	15		16	15	15		17	14	23	21	21	21	22	17	16		15	15	15	15	15	16
19	15	14	14	14	16	15	15	22	16	16	18	22	23	14	21	20	16	21	15	14	15	15	16	15
20	15	14	14			15	15	23	17	17	21	14	39	27	23	22	18	24	14	16	15	14	15	16
21	16	16	16	16	15	15	15	18	17	18	23	21	23	24	21	21	18	18	14	14	15	15	16	15
22	15	16	15	15	14	15	15	18	16	17	18	21	21	35	22	18	18	23		14	15	15	14	15
23	15	15	17	15	15	15		24	18	17	20	40	28	23	21	20	16	23	15	15	14	15	15	15
24	15	15		15	15		16	16	16	21	21	23	24	26	23	20	16	17	14	15	15	15	15	15
25	16	14	16	15	14	15	16	16	17	22	23	41	23	20	18	17	15	15	15	16	15	15	15	15
26	15	14	15	14	15	14	16	23	15	16	20	23	32	26	21	18	17	15	16	15	15	15	15	15
27	15	15	15	14	14	14	16	15	15	16	18	23	20	17	20	18	16	16	16	14	15	16	16	15
28	16	17	15	15	17	15	16	15	16	24	22	23	32	28	46	29	17	15	16	15	15	14	15	16
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	24	26	24	25	27	26	27	28	28	27	28	28	28	28	28	26	27	26	27	27	27	28
MED	15	15	15	14	15	15	15	22	16	16	18	21	21	22	20	18	16	20	15	15	15	15	15	15
U Q	15	15	15	15	15	15	16	23	17	17	21	23	24	24	21	18	16	21	15	15	15	15	16	15
L Q	15	14	14	14	14	15	15	16	16	16	17	20	21	20	18	16	15	16	14	15	15	15	15	15

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT YAMAGAWA

FEB. 1990

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	45	53	53	44		28	30	58	88	108	138	139	140	132	120	125	122	121	121	110	85	80	71	62
2	54	53	47	43	36	26	42	73	86	106	138	145	150	153	148	140	138	142	142	111	106	81	78	63
3	54	59	64	54	46	38	68	58	90	110	125	140	136	134	125	121	120	113	98	88	85	78	58	48
4	43	38	37	40	42	47	42	54	84	105	130	136	144	133	136	140	137	138	132	108	111	88	87	76
5	82	54	62	59	N	32	48	52	88	125	126	122	134	141	147	138		111	106	104	108	92	70	77
6		46	N	40	40	40	47	63	88	114	132	150	144	137	125	122	127	124	108	87	86	80	66	59
7	A	30	26	46	47	54	34	51	88	106	114	131	132	127	124	131	130	134	120	100	85	77	66	N
8	43	58	65	38	36	31	32	54	107	144	164	160	161	162	157	153	142	134	124	112	108	86	66	66
9	53	53	A	A	35	34	N	48		126	137		156	147	138	142	140	127	97	86	86	54	32	34
10	49	31	41	40	43		30	41	86	111	112	125	130	130	128	130	129	134	103	112	87	84	68	52
11	45	48	32	55	N	N	N	32	84	124	128	122	135	124	124	116	96	108	106	86	84	78	66	66
12	67	66	53	47	48	38	30	52	86	109	121	141	135	121	121	114	104	94	86	78	68	63	63	54
13	72	54	49	52	38	26	30	48	84	105	134	153	164	N	155	151	127	110	85	78	70	63	59	46
14	50	44	48	41	40	30	30	51	86	100	114	128	131	137	136	121	117	121	103	77	70	63	59	42
15	34	48	32	50	49	48	42	52	80	87	114	130	134	145	138	137	128	114	100	85	80	63	63	61
16	36	A	A	63	30	A	36	64	104	104	112	134	138	143	144	142	126	121	122	105	86		70	67
17	66	52	N	63	N	26	N	52	90	102	116	126	134	131	135	117	114	112	110	104	82	76	76	63
18	63	48	55	44	43	52	55	68	106	131	141	134	138	142	150	154	151	146	142	142	110	111	84	62
19	64	70	68	54	A	36	38	68	100	114	111	114	135	127	128	126	128	125	134	132	108	106	105	84
20	71	64	51	64	57	26	37	52	111	119	120	137	160	153	141	126	133	130	123	123	130	108	77	83
21	68	26	66	52	47	47	40	80	108	125	130	135	150	154	145	135	128	132	130	128	127	110	108	86
22	76	62	61	52	54	43	44	67	102	122	138	145	136	140	139	135	132	126	126	110	116	106	81	77
23	86	67	62	63	48	36	40	72	130	122	114	129	140	139	126	130	136	134	120	119	113	88	86	76
24	76	67	63	64	63	52	64	90	112	141	146	146	156	158	159	162	162	155	146	146	146	130	109	87
25	87	79	69	60	44	39	42	83	98	112	136	146	145	144	140	141	132	125	117	107	87	86	77	75
26	74	64	62	54	43	42	50	80	112	127	138	151	153	153	161	154	145	143	144	135	143	144	124	108
27	86	83	85	80	48	37	34	76	127	132	114	126	141	142	134	122	119	121	122	101	88	88	80	73
28	82	78	78	50	47	35	41	88	126	134	144	148	155	164	158	167	N	N	126	111	110	88	90	102
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	26	27	24	27	23	25	25	28	27	28	28	27	28	27	28	28	26	27	28	28	28	27	28	27
MED	65	54	58	52	44	37	40	58	90	114	129	136	140	141	138	135	128	125	120	108	88	86	74	66
U Q	76	66	64	60	48	45	45	72	108	125	138	146	151	153	147	142	137	134	128	115	110	106	85	77
L Q	49	48	47	44	40	30	33	52	86	106	114	128	135	132	127	123	122	114	104	87	85	77	66	59

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT YAMAGAWA

FEB. 1990

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	G	G	G	G	G	G	G	45	45	G	G	32	32	G	25	G	G
2	G	G	G	G	G	G	G	G	48	G	G	G	48	G	G	G	G	G	33	G	27	G	30	32
3	25	G	G	G	G	G	G	G	G	G	G	G	59	51	G	43	40	G	G	24	G	G	G	G
4	G	G	G	G	G	26	G	G	G	G	G	G	52	55	G	43	G	G	G	G	G	G	G	G
5	G	G	G	G	G	G	G	24	G	G	46	51	51	54	46	47	G	G	26	24	G	G	G	G
6	G	38	G	G	G	G	G	G	G	G	G	G	G	53	57	46	64	36	29	28	G	G	G	22
7	44	38	30	26	G	G	G	G	G	G	G	48	49	47	53	G	53	57	G	25	G	G	G	G
8	G	G	G	G	G	G	G	G	G	G	G	G	G	50	G	43	G	36	G	31	G	G	24	G
9	G	G	33	42	26	25	G	26		G	43		50	49	52	50	G	G	26	G	G	G	G	G
10	G	G	G	G	G		G	G	G	G	G	G	52	G	51	44	40	G	G	G	G	G	G	G
11	G	G	G	G	G	G	G	G	G	G	G	48	56	47	48	44	G	G	G	G	G	G	G	G
12	G	G	G	G	G	G	G	G	G	G	G	G	49	G	G	50	43	38	50	G	33	G	G	G
13	G	G	G	G	G	G	G	G	G	G	G	49	51	G	G	G	G	34	28	36	40	G	G	G
14	G	G	G	G	G	G	G	G	G	G	G	48	49	G	51	45	40	G	G	G	34	34	G	G
15	G	G	G	G	G	G	G	G	G	G	G	G	G	G	50	G	G	G	G	G	G	G	25	G
16	41	32	48	34	G	58	24	G	G	G	G	G	G	G	G	G	G	G	46	29	G	G	G	40
17	G	G	G	G	G	G	G	G	G	G	85	47	55	54	48	45	40	G	G	G	G	G	24	G
18	G	G	G	G	G	24	G	G	G	G	G	G	G	54	48	54	58	38	39	32	G	G	G	G
19	G	G	27	38	31	28	G	G	G	G	G	49	G	53	61	44	48	G	32	35	26	24	G	G
20	G	G	G	30	G	26	G	G	G	G	G	G	G	G	51	68	50	37	G	G	G	G	G	G
21	34	G	G	G	G	G	G	G	G	G	G	G	55	58	50	47	40	G	G	G	G	G	G	G
22	G	G	G	G	G	30	28	G	G	G	G	G	G	G	G	46	42	G	G	26	G	G	G	G
23	G	G	G	G	G	G	G	G	G	G	48	G	56	G	50	50	47	40	41	32	G	G	G	G
24	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	44	G	38	G	G	G	G	G	G
25	G	G	G	G	G	G	G	G	G	G	G	49	G	G	G	G	G	35	G	33	G	G	30	30
26	31	27	G	G	27	25	24	G	G	G	46	46	50	G	51	51	48	44	46	40	G	G	32	G
27	44	33	26	G	G	G	G	29	G	45	50	52	G	G	G	G	G	38	36	33	59	41	25	44
28	43	G	35	30	26	G	G	28	G	G	G	G	G	G	G	G	42	G	G	24	G	55	34	31
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	27	27	28	28	27	28	28	27	28	28	28	28	28	28	28	28	28	28	28	28
MED	G	G	G	G	G	G	G	G	G	G	G	G	48	G	47	44	40	G	G	24	G	G	G	G
U Q	13	G	G	G	G	25	G	G	G	G	G	48	51	52	51	47	45	37	32	32	G	G	24	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. 1990

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	15	15	15	15		15	15	15	16	17	16	22	24	26	30	22	20	17	15	15	15	15	15	15
2	15	15	15	15	15	N	15	15	15	16	21	23	21	28	24	20	17	15	15	15	15	16	15	15
3	15	15	15	15	15	15	15	16	18	15	16	23	22	35	26	23	17	16	17	15	15	15	15	15
4	15	16	15	15	15	15	15	16	15	16	18	22	22	23	23	18	20	15	17	15	16	15	15	15
5	15	15	15	15	15	15	15	16	15	16	22	20	24	22	20	17	15	16	15	15	15	15	15	15
6	15	15	15	15	15	15	15	16	15	16	18	21	24	23	22	17	17	15	15	15	15	15	15	15
7	15	15	14	15	15	15	15	16	16	16	17	20	23	23	22	18	15	17	17	15	15	15	15	15
8	15	15	15	15	15	15	15	16	15	16	18	20	27	22	21	17	16	20	15	15	15	15	15	15
9	15	15	15	15	15	15	15	16		18	21		21	24	20	18	15	14	15	15	15	15	15	15
10	15	15	15	16	15		15	16	15	16	17	38	21	38	16	18	18	15	17	15	15	15	15	15
11	15	15	15	15	15	N	15	15	15	16	17	21	24	21	23	17	16	15	18	15	15	15	15	15
12	15	15	15	15	15	15	15	16	16	16	18	23	27	24	22	17	16	15	15	15	15	16	15	15
13	15	15	15	15	14	15	15	16	15	16	20	22	23	38	24	18	15	16	15	15	15	16	15	15
14	15	15	15	15	15	15	15	16	16	15	16	21	30	26	22	24	20	16	17	15	15	15	15	15
15	15	15	15	15	15	15	15	16	15	16	20	22	24	24	22	21	16	16	18	15	15	15	15	15
16	15	15	15	15	15	15	15	18	16	15	16	20	39	21	20	15	15	15	15	15	15	18	15	15
17	15	15	15	15	15	N	15	17	16	15	18	18	23	24	24	18	16	15	20	15	15	16	16	15
18	15	15	15	15	15	15	15	18	16	17	20	32	23	26	24	26	16	16	15	15	21	16	15	15
19	16	15	15	15	15	15	15	20	15	16	18	20	22	28	22	23	20	16	15	15	15	15	15	16
20	15	15	17	15	15	15	15	17	17	17	18	23	28	41	32	21	21	18	21	15	16	15	15	15
21	15	16	15	15	15	15	15	21	17	17	24	40	38	38	36	33	18	17	21	15	15	15	15	15
22	15	15	15	15	15	15	15	20	16	16	21	24	34	30	24	21	18	16	20	15	15	16	15	16
23	15	15	15	15	15	15	15	22	16	16	21	26	40	34	27	24	18	15	17	15	15	15	15	15
24	15	15	15	15	15	15	15	23	17	35	23	42	38	42	23	22	18	16	18	15	15	15	15	15
25	15	15	15	15	15	15	15	15	15	21	22	29	24	35	32	26	15	16	22	15	15	15	15	15
26	15	15	16	15	15	15	15	22	15	16	20	20	24	34	23	23	20	15	15	15	15	15	15	15
27	15	15	15	15	14	15	15	15	15	15	17	33	35	42	24	21	18	16	15	15	15	15	15	15
28	15	15	15	14	15	15	15	15	17	35	39	30	42	41	47	40	21	17	20	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	28	28	28	28	27	24	28	28	27	28	28	27	28	28	28	28	28	28	28	28	28	28	28	28
MED	15	15	15	15	15	15	15	16	16	16	18	22	24	27	23	21	17	16	17	15	15	15	15	15
U Q	15	15	15	15	15	15	15	18	16	17	21	29	32	36	25	23	19	16	18	15	15	15	15	15
L Q	15	15	15	15	15	15	15	16	15	16	17	20	23	23	22	18	16	15	15	15	15	15	15	15

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT OKINAWA

FEB. 1990

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	77	77	85	67	43	29	N	55	112	112	137	145	144	140	137	139	137	142	145	140	122	105	108	100
2	85	86	80	55	46	52		78	103	111	139	143	143	160	145	153	162	168	176	163	146	163	146	110
3	86	86	90	80	51	44	42	53	96	133	144		137	142	119	136	130	124	122	108	108	103	85	58
4	54	34	34	41	51	24	37	55	78	105	137	140	134	135	138	162	171	182	184	184	188	177	177	147
5	142	110	110	85	79	51	52	38	84	145	119	119	133	145	147	137	122	123	129	105	138	143	102	86
6	76	59	61	42	34	37	34	54	90	128	148	145	137	138	147	139	129	136	138	116	106	146	108	87
7	78	72	56	48	54	63	35	37	88	108	126	130	140	144	141		142	147	146	147	142	107	103	65
8		60	73	58	A	27		58	103	144	162	170	162	163	172	170	168	174	170	164	164	146	111	103
9	87	50	44	31	35	A	A	44		119	137	162	162	174	172	178	177	168	145	145	127	102	86	79
10	84	80	84	68	60	40		38	88	108	121	142	144	160	161	160	164	170	163	145	160	145	107	85
11	65	65	63	64	34	26	27	31	88	120	136	142	145	144	146	141	130	140	137	119	113	138	90	86
12	94	86	80	66	54	32	22	43	86	117	120	148	146	140	145	122	110	109	104	103	97	88	108	102
13	118	87	79	84	38	32	26	42	82	106	135	164	170	171	171	172	158	146	143	121	104	103	90	83
14	86	82	74	57	42	39	32	42	83	104	119	137	137	155	163	158	144	153	130	108	103	82	66	66
15	61	60	52	58	54	38	31	37	82	100	111	138	139	145	145	158	157	145	140	104	90	85	85	82
16	66	53	50	52	52	31	25	60	107	105	104	144	145	158	166	165	147	146	162	146	145	110	82	109
17	109	85	83	79	24		32	54	89	111	121	134	135	143	146	146	137	144	157	164	145	142	139	85
18	80	64	56	42	45	38	44	62	112	125	136	125	138	141	162	167	170	176	182	182	194	199	167	108
19	104	104	88	52	40	A	37	66	106	108	120	111	121	133	126	135	139	144	158	176	180	176	182	168
20	140	88	86	85	58	39	37	62	104	132	136	154	172	172	161	162	166	165	162	171	180	174	120	109
21	97	74	80	64	38	34	31	66	108	122	143	146	144	162	158	148	145	143	157	167	190	162	167	164
22	162	85	90	83	77	42	44	66	87	111	138	147	149	146	151	150	153	153	145	145	163	175	146	145
23	150	88	86	86	65	31	25	66	122	121	120	134	146	146	144	142	149	151	140	145	144	138	128	86
24	87	88	86	84	71	60	67	88	88	141	156	150	N	169	171	177	169	163	161	163	177	165	162	145
25	128	109	85	74	53	50	37	83	89	108	142	154	156	162	164	161	154	145	138	135	104	121	90	87
26	87	80	66	64	43	36	31	73	100	123	143	163	160	171	178	172	170	179	N	165	171	177	170	170
27	156	130	86	90	62	43		66	131	133	111	127	146	142	140	138	130	127	121	103	90	111	87	87
28	93	85	78	62	42	A		76	109		144	154	169	169	172	174	169	170	N	158	162	142	120	127
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	28	28	28	27	24	21	28	27	27	28	27	27	28	28	27	28	28	26	28	28	28	28	28
MED	87	84	80	64	51	38	34	56	90	117	136	144	144	146	149	158	151	146	145	145	144	142	108	94
U Q	118	87	86	81	58	43	39	66	107	128	142	154	156	162	165	167	167	168	162	164	167	164	146	118
L Q	78	64	62	53	40	31	29	42	87	108	120	134	137	142	144	139	137	142	138	117	107	106	90	85

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT OKINAWA

FEB. 1990

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G	G	G	G	G	G	G	G	G	G	50	47	62	57	35	31	34	24	G	G
2	G	G	G	G	G	G	G	G	G	G	G	48	67	50	50	55	74	40	G	G	G	G	G	G
3	G	28	G	G	G	G	G	G	G	44	G	G	52	59	80	51	G	36	G	G	G	G	G	G
4	G	G	G	24	30	30	G	24	36	G	G	47	58	57	61	44	G	G	G	34	32	24	G	G
5	G	G	G	G	G	G	G	G	G	G	G	50	55	51	58	58	48	39	54	33	29	G	G	G
6	G	G	32	30	24	G	G	G	G	G	G	G	G	G	G	46	45	58	33	33	G	G	G	G
7	G	G	39	37	37	G	G	G	G	G	60	G	54	60	G	57	45	G	31	23	G	G	G	G
8	G	G	26	28	24	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	32	G	32
9	G	G	G	G	33	32	28	25	G	G	G	G	47	49	50	65	44	G	G	25	G	G	G	G
10	G	G	G	G	G	G	G	G	33	G	G	58	G	G	G	55	56	39	31	32	38	32	31	G
11	G	G	G	G	G	G	G	G	G	G	G	G	51	53	48	46	G	G	32	G	G	G	G	G
12	G	G	G	G	G	G	G	G	G	G	46	50	50	50	50	49	54	50	34	28	65	G	G	G
13	G	G	G	G	11	G	G	G	G	G	G	G	G	G	G	G	G	G	37	G	G	36	G	G
14	G	G	G	G	G	G	G	G	G	G	G	50	G	G	G	G	G	G	G	G	G	G	G	G
15	G	G	G	G	G	G	G	G	G	G	G	50	51	50	G	G	68	G	G	23	G	G	G	G
16	G	23	G	G	37	32	G	27	G	G	G	G	G	G	G	62	46	G	34	G	28	25	G	G
17	30	24	G	G	G		G	G	G	G	G	G	51	63	58	49	61	G	G	26	G	33	G	G
18	G	G	G	G	G	G	G	G	G	G	G	G	G	G	51	47	G	G	38	30	29	G	G	G
19	G	G	G	G	26	36	28	24	G	41	G	49	G	53	52	58	68	38	31	28	30	G	G	G
20	G	G	G	G	G	G	38	G	44	G	G	G	G	G	65	G	45	40	33	26	G	G	G	G
21	G	G	G	G	G	G	G	24	G	G	G	G	57	63	72	51	44	G	G	G	G	G	G	G
22	G	G	G	G	G	G	33	23	G	G	G	G	G	65	63	78	51	54	47	24	G	G	G	G
23	G	G	G	G	11	G	G	G	G	G	G	81	58	G	G	G	47	49	49	60	34	29	G	G
24	G	G	G	G	G	G	G	26	G	G	G	G	G	G	G	46	42	G	37	26	G	G	G	G
25	G	G	G	G	G	G	G	25	G	G	G	G	G	G	49	G	G	38	40	25	33	34	28	24
26	G	G	G	G	G	G	G	G	G	43	48	53	48	58	55	67	52	45	31	28	45	G	G	G
27	25	G	26	34	30	29	G	G	G	G	46	58	56	54	G	G	42	40	32	30	27	G	30	26
28	29	38	37	37	31	26		G	G		G	G	G	57	G	G	G	G	30	29	28	30	31	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	28	28	28	28	28	27	25	28	27	27	28	28	28	28	28	28	28	28	28	28	28	28	28	28
MED	G	G	G	G	G	G	G	G	G	G	G	G	24	50	50	47	45	18	32	26	G	G	G	G
U Q	G	G	G	G	25	G	G	23	G	G	G	50	53	57	56	56	53	40	36	30	31	27	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

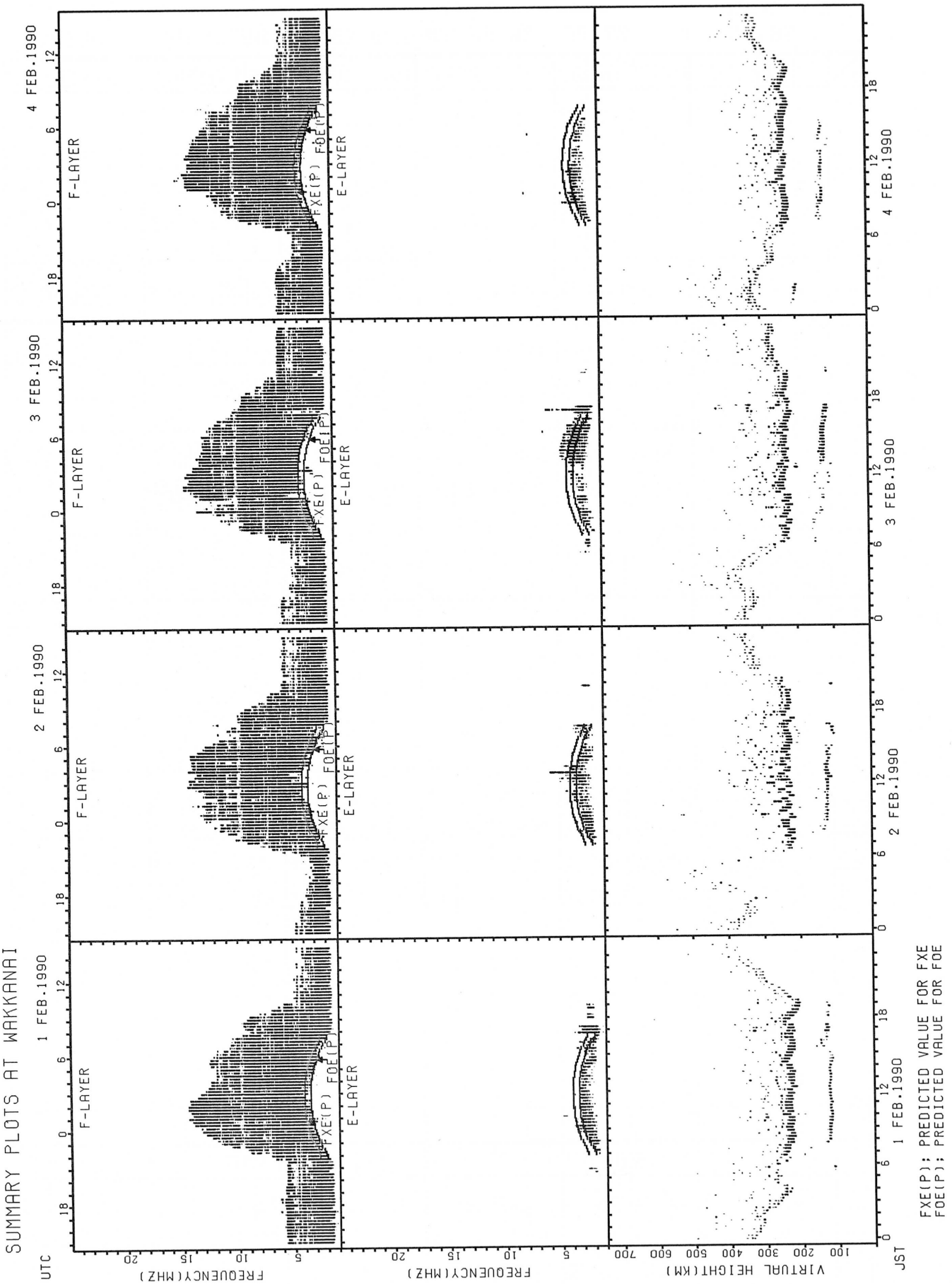
HOURLY VALUES OF FMIN AT OKINAWA

FEB. 1990

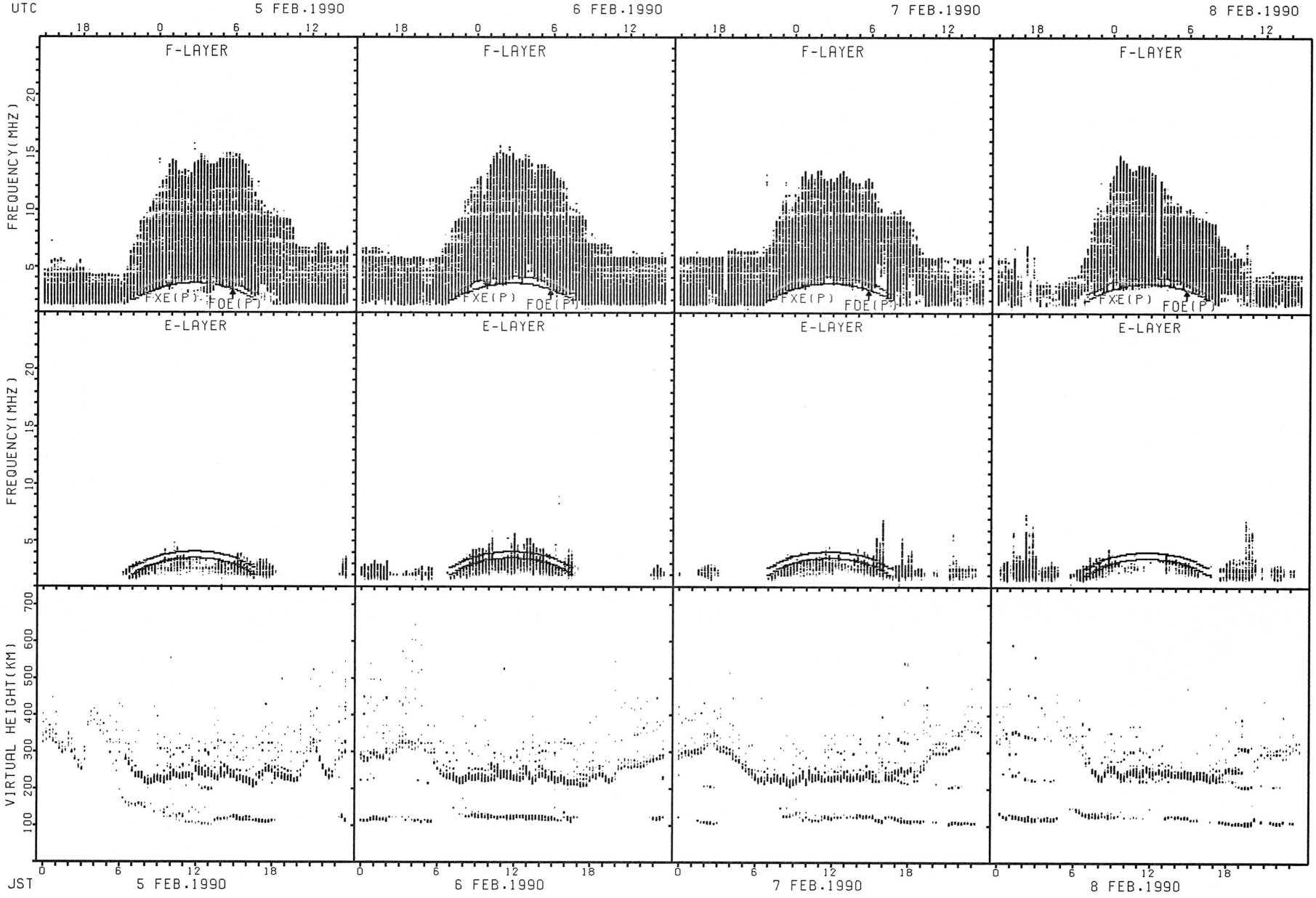
LAT. 26.3N LON. 127.8E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

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	18	15	15	15	17	21	23	23	24	26	24	22	18	16	14	15	15	15	15
2	14	15	15	15	15	N	N	16	15	18	22	26	26	26	27	24	22	18	15	15	15	15	15	15
3	15	15	15	15	15	15	14	15	15	16	20	N	23	24	27	23	21	15	21	15	15	15	15	15
4	15	15	15	15	14	15	15	15	16	15	17	23	22	22	24	18	16	15	21	15	15	15	15	15
5	15	15	15	14	15	15	15	15	15	23	21	26	26	23	26	22	17	16	15	14	15	15	15	15
6	15	15	15	15	15	15	15	15	15	16	17	23	26	26	27	24	24	15	15	15	15	15	15	15
7	15	15	14	14	15	15	15	15	15	17	24	23	24	24	22	22	20	29	15	15	15	15	15	15
8	15	15	14	15	15	15		15	15	20	20	22	22	26	24	22	18	16	18	15	15	14	15	15
9	15	15	15	15	15	15	15	15		16	20	27	23	27	23	26	21	15	21	14	15	16	15	15
10	15	15	15	15	15	15		16	27	15	20	24	26	26	26	17	16	16	15	14	14	15	15	15
11	15	15	15	15	15	18	17	15	15	18	21	24	24	27	27	26	16	15	15	15	15	17	15	15
12	15	15	15	15	15	15	15	15	15	14	24	27	26	27	21	21	20	15	15	15	15	15	15	15
13	15	15	15	15	15	15	15	15	16	22	26	23	22	24	23	23	16	16	15	15	15	15	15	15
14	15	15	15	15	15	15	15	15	15	17	27	22	24	26	24	23	20	17	22	15	15	15	15	15
15	15	15	15	15	15	15	15	16	15	16	20	23	27	28	26	24	17	15	15	15	15	15	15	15
16	15	14	15	15	15	14	N	14	15	15	18	20	40	27	26	18	18	15	15	15	15	14	15	15
17	15	15	15	15	15		15	17	15	16	23	27	26	27	24	23	22	16	17	14	15	15	15	15
18	15	15	15	15	15	14	15	17	16	23	24	27	27	30	27	24	22	17	15	15	17	15	15	15
19	15	15	14	14	14	14	16	15	16	18	22	26	26	27	26	23	16	15	15	15	15	15	15	15
20	15	15	15	15	15	15	14	17	16	18	24	26	26	29	29	24	23	21	16	15	15	15	15	15
21	15	15	15	14	15	15	15	16	16	22	26	28	26	28	26	27	24	17	24	15	15	15	16	16
22	15	15	15	15	15	15	15	16	20	23	24	28	32	29	27	24	23	16	15	15	15	14	15	15
23	15	15	15	15	15	15	16	18	15	21	27	30	30	30	28	26	17	15	15	15	15	15	15	15
24	15	15	15	15	15	15	15	15	16	22	26	29	28	29	27	26	23	16	14	15	15	15	15	15
25	15	15	15	15	15	15	15	15	15	17	22	24	29	30	27	26	22	16	14	15	15	15	15	15
26	15	15	15	15	15	15	15	18	15	15	21	24	24	24	23	21	20	15	15	15	15	15	15	15
27	15	15	15	15	14	15	15	15	15	15	27	32	29	30	28	26	22	17	15	15	15	15	14	15
28	15	14	15	15	15	15		15	16		24	26	26	29	49	42	24	16	15	15	15	15	15	16
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	26	23	28	27	27	28	27	28	28	28	28	28	28	28	28	28	28	28	28
MED	15	15	15	15	15	15	15	15	15	17	22	26	26	27	26	24	20	16	15	15	15	15	15	15
U Q	15	15	15	15	15	15	15	16	16	21	24	27	27	29	27	26	22	17	16	15	15	15	15	15
L Q	15	15	15	15	15	15	15	15	15	16	20	23	24	25	24	22	17	15	15	15	15	15	15	15

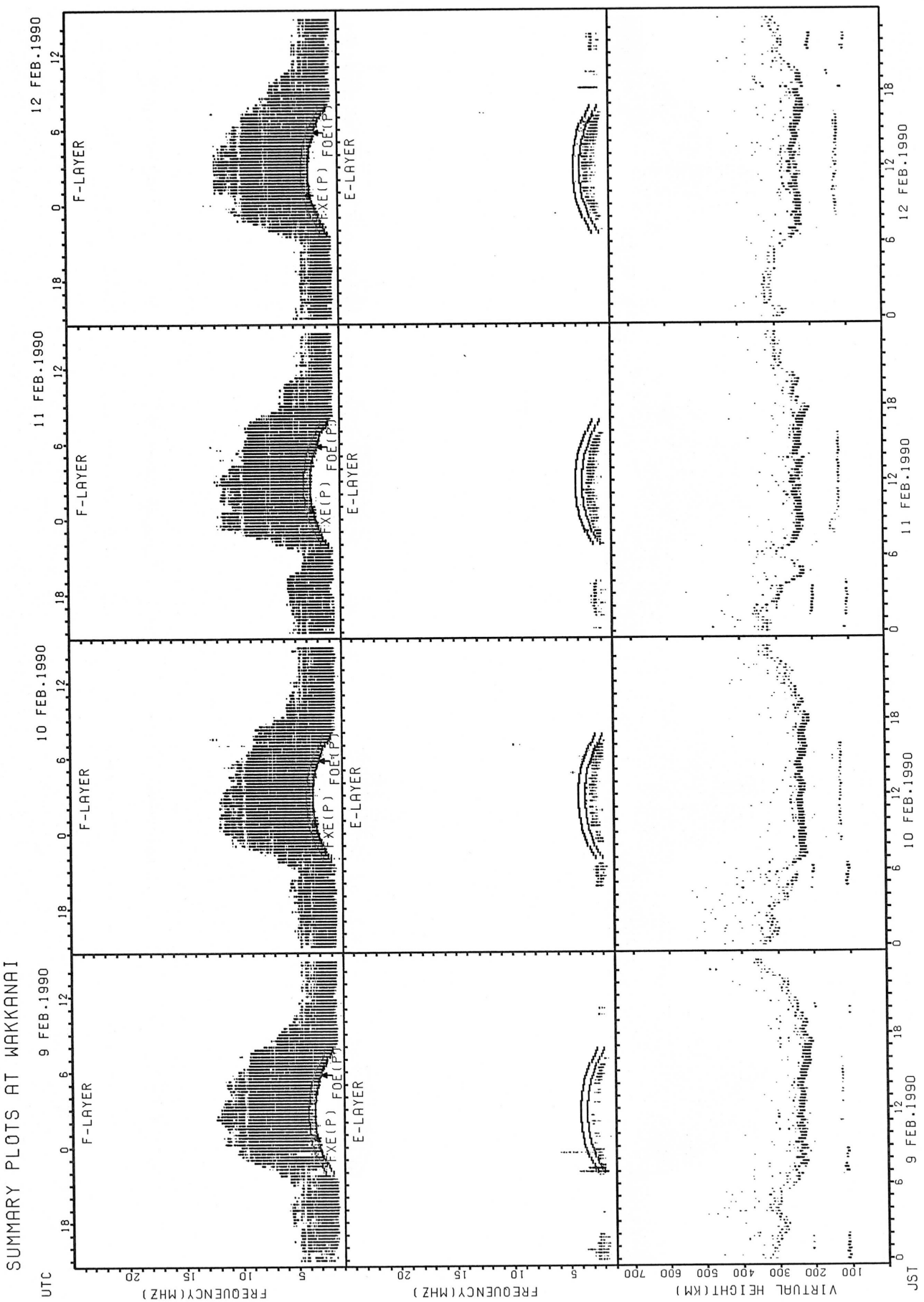
COMMUNICATIONS RESEARCH LABORATORY, JAPAN


SUMMARY PLOTS AT WAKKANAI
UTC
JST
1 FEB.1990
2 FEB.1990
3 FEB.1990
4 FEB.1990
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

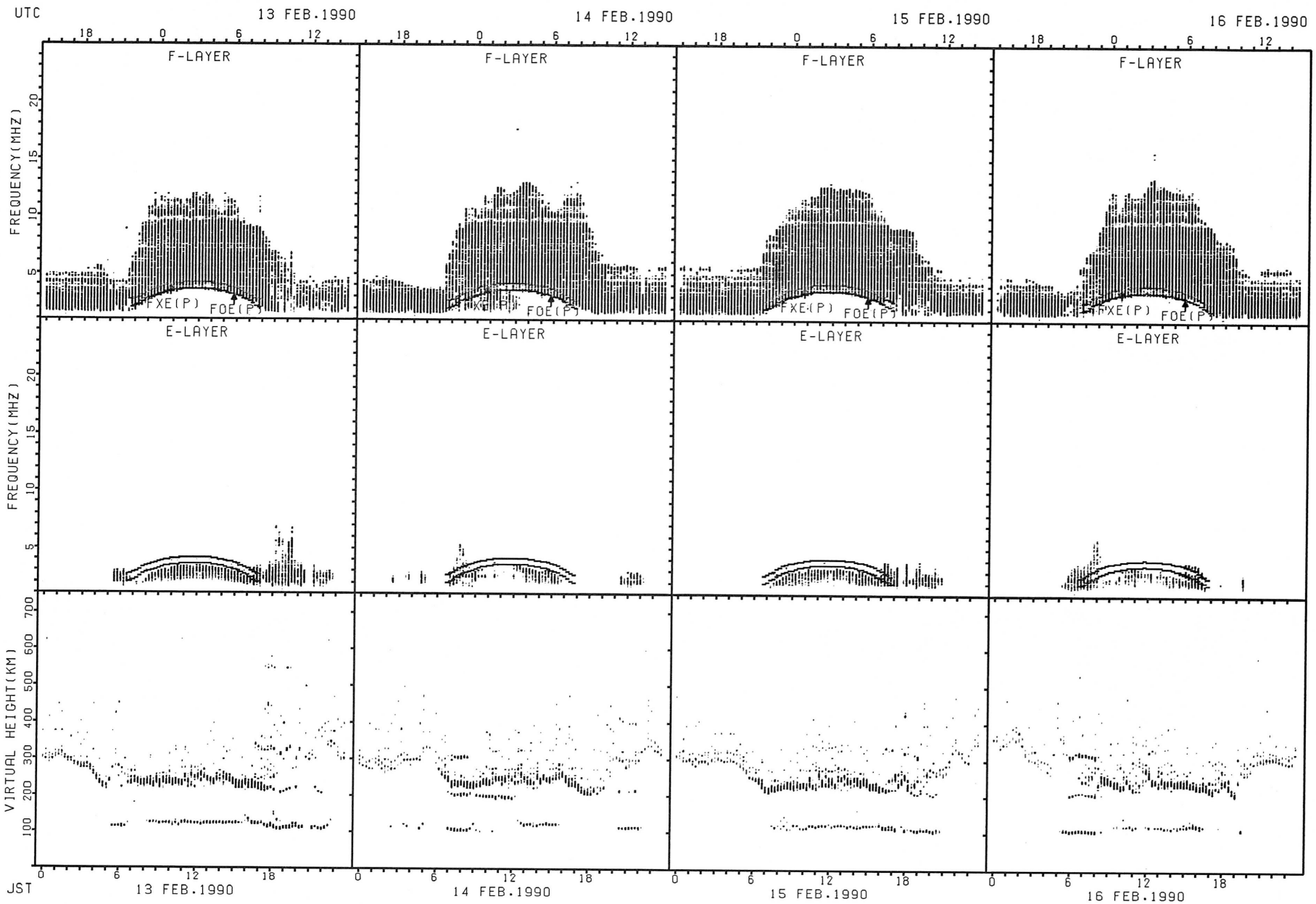
SUMMARY PLOTS AT WAKKANAI



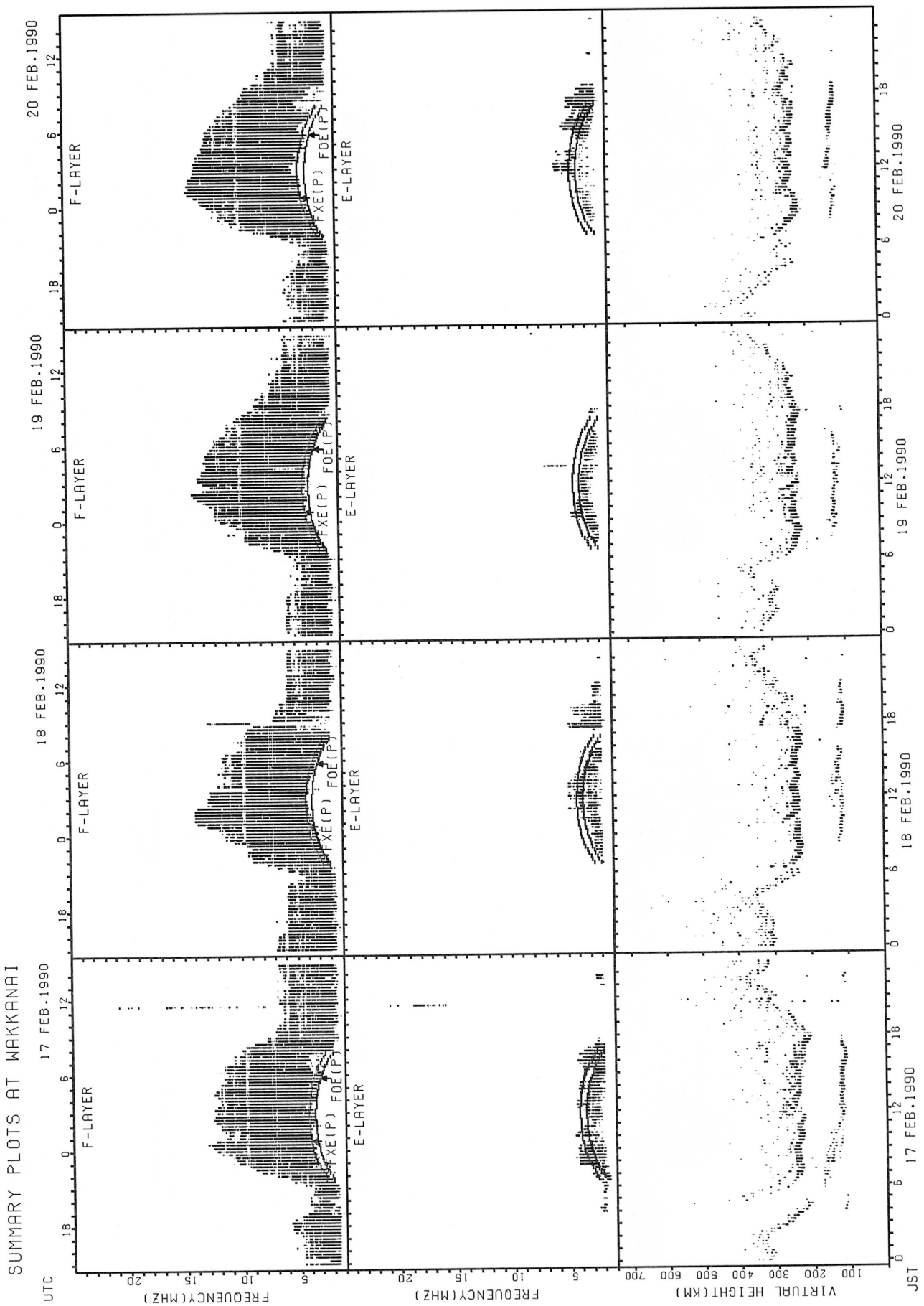
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
9 FEB.1990
10 FEB.1990
11 FEB.1990
12 FEB.1990
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 WAKKANAI



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


SUMMARY PLOTS AT WAKKANAI
17 FEB.1990
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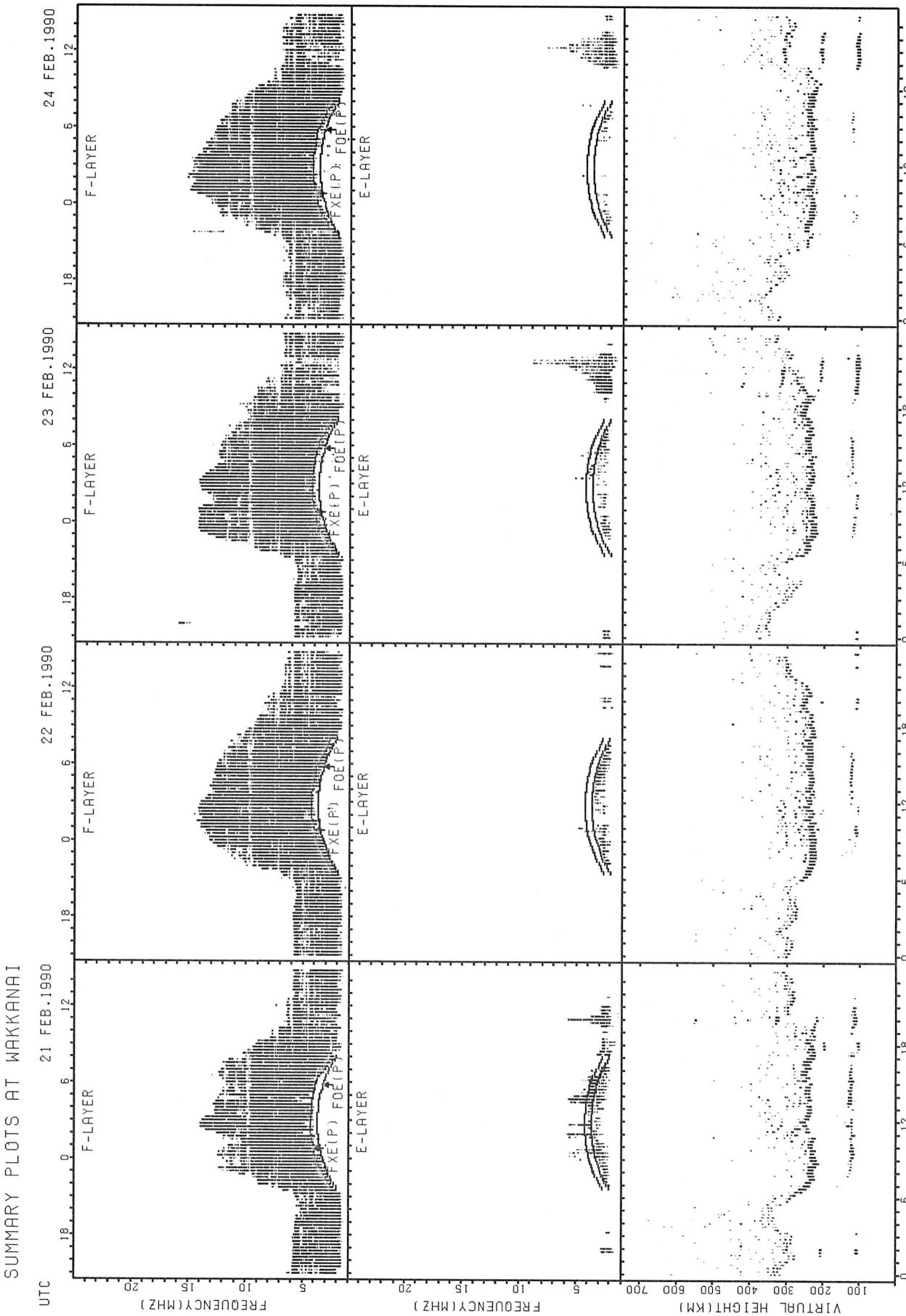
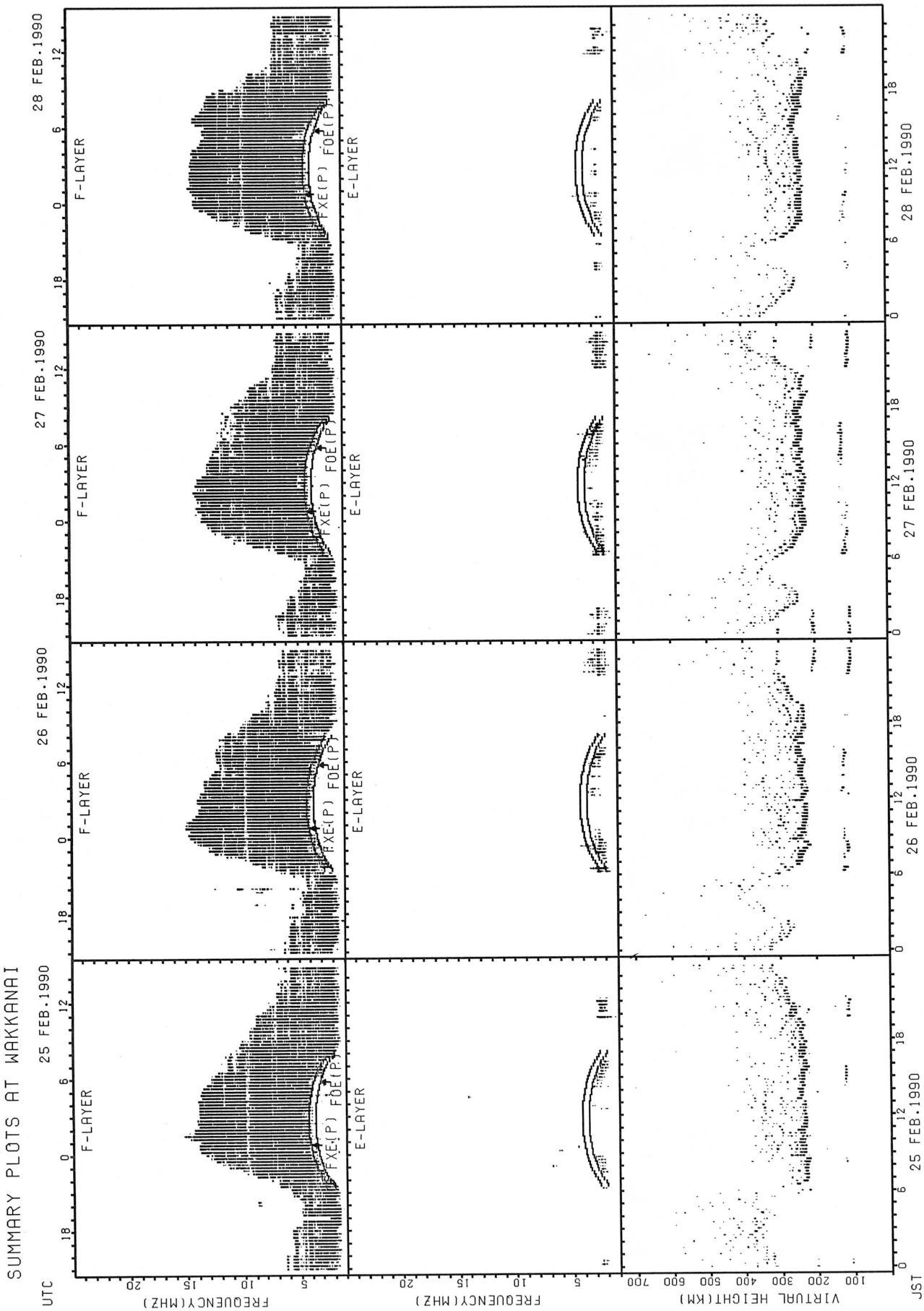
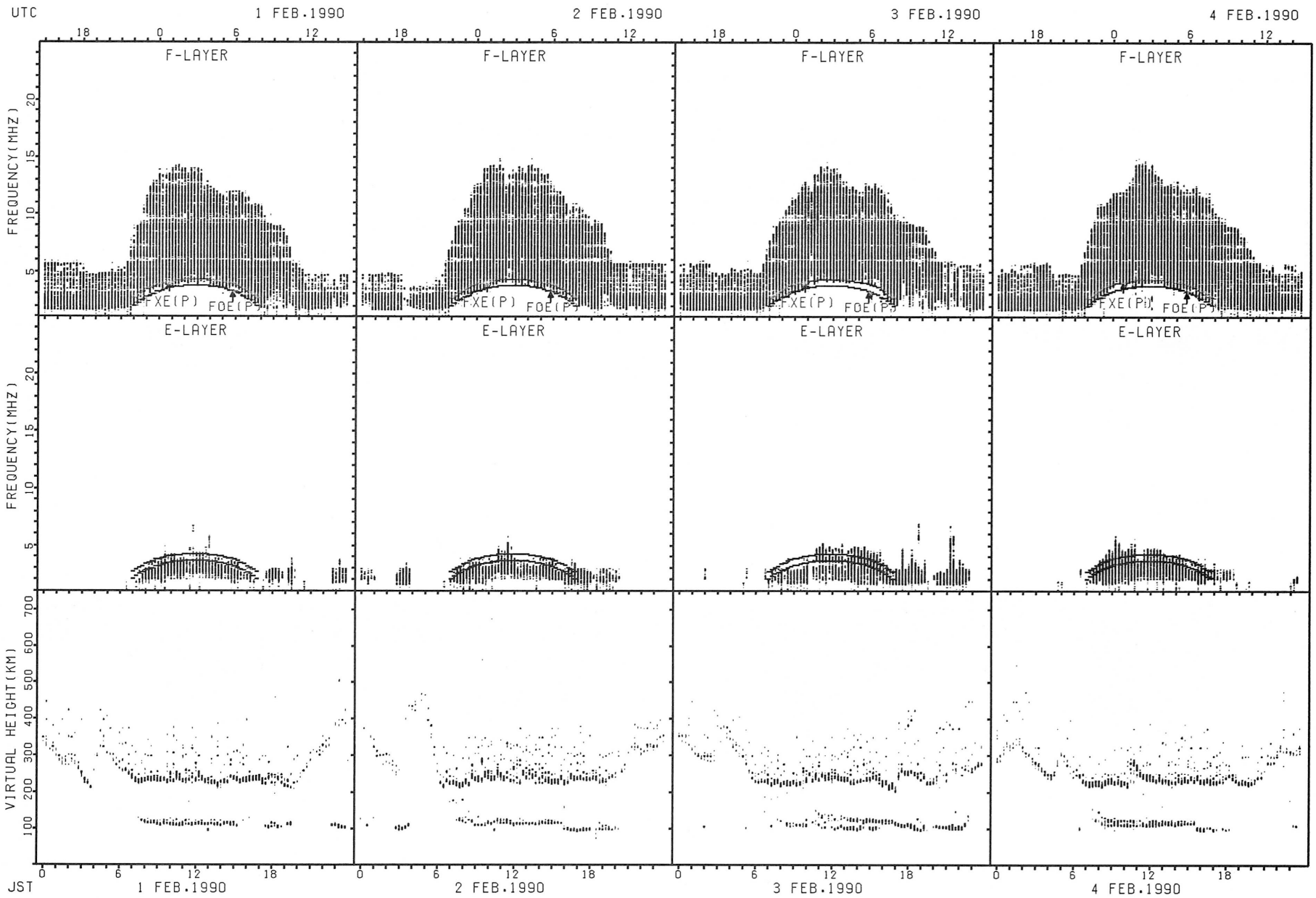
20 FEB.1990
UTC
JST
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
UTC
21 FEB.1990
22 FEB.1990
23 FEB.1990
24 FEB.1990
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
UTC
JST
25 FEB.1990
26 FEB.1990
27 FEB.1990
28 FEB.1990
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



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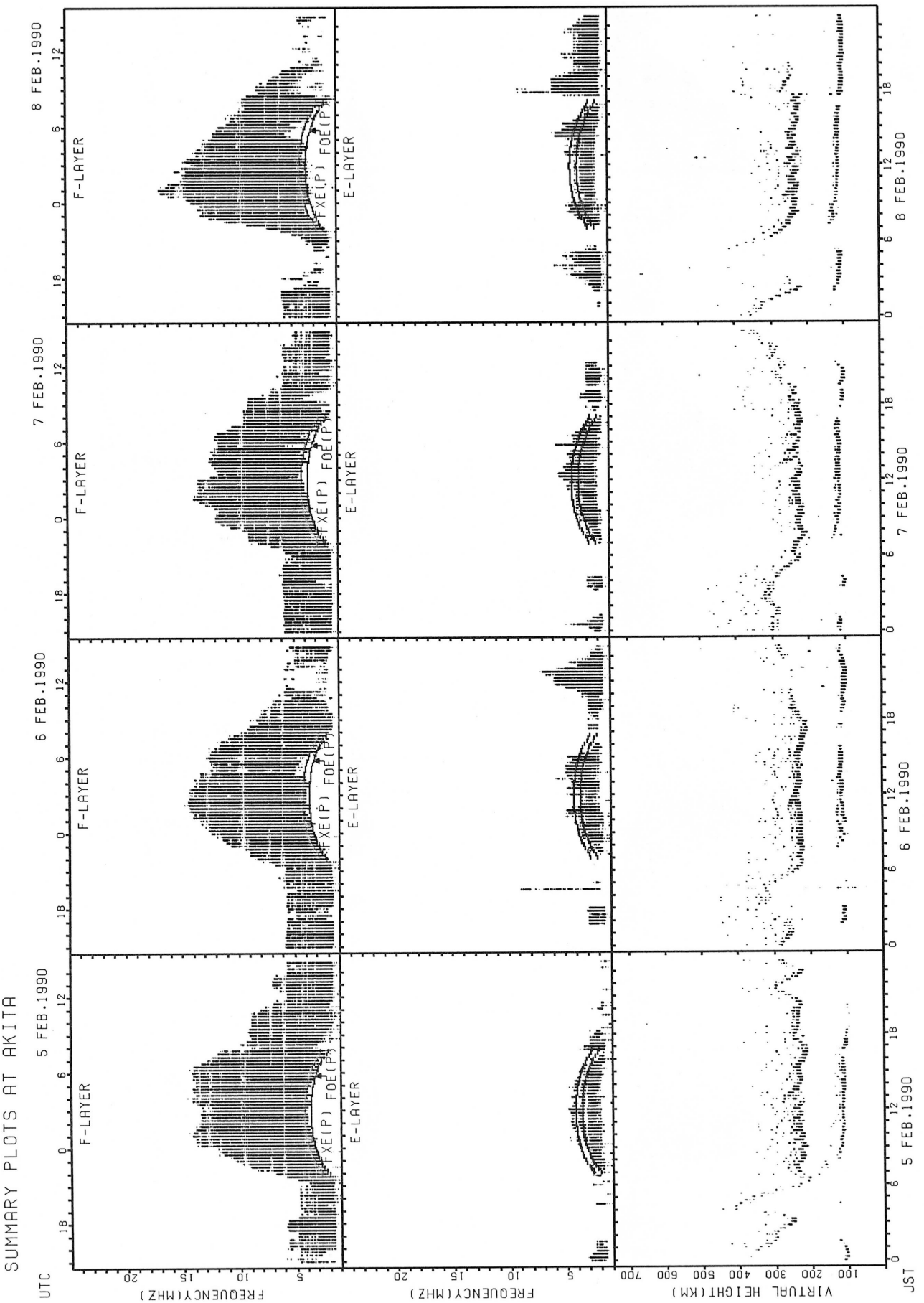
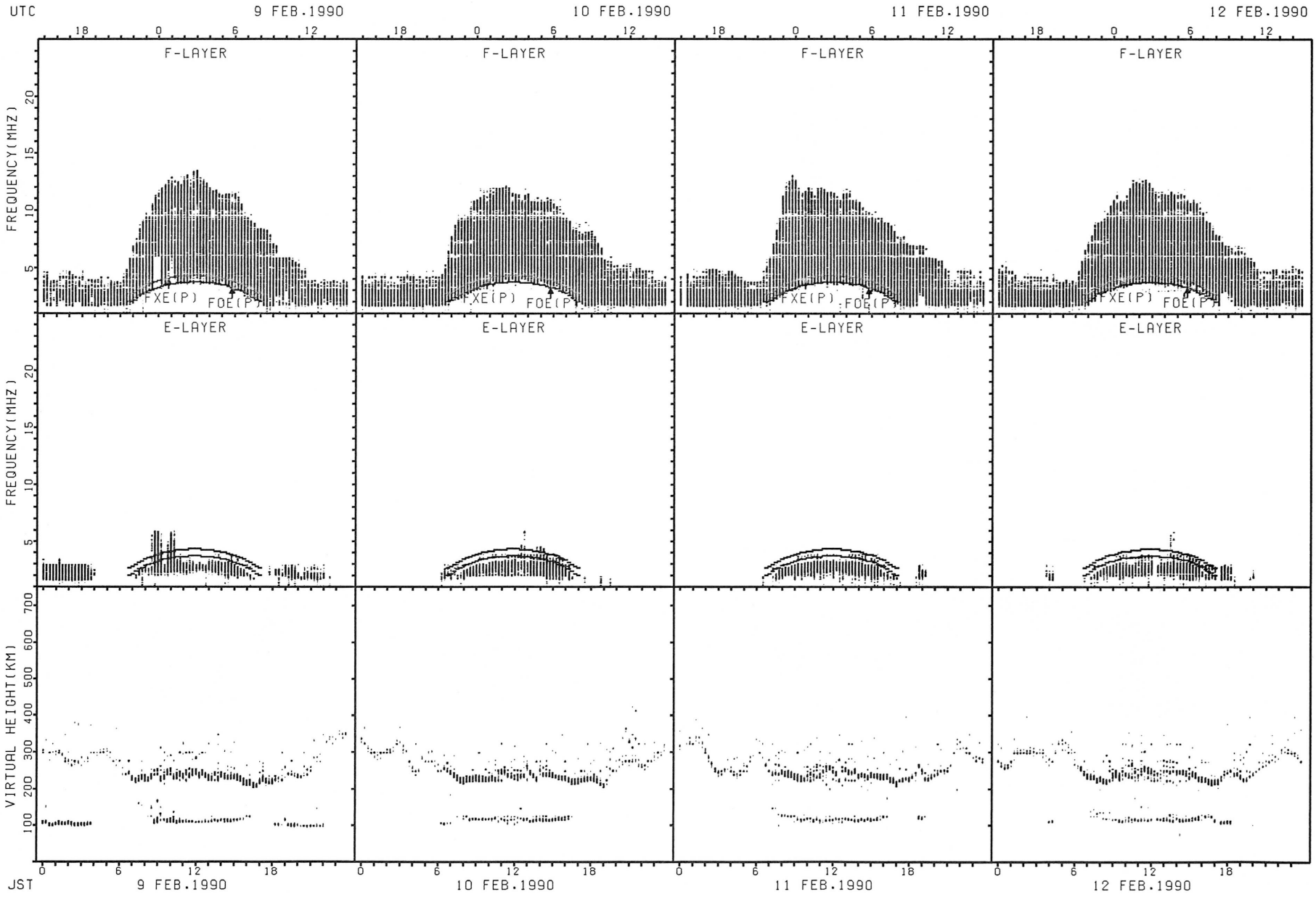
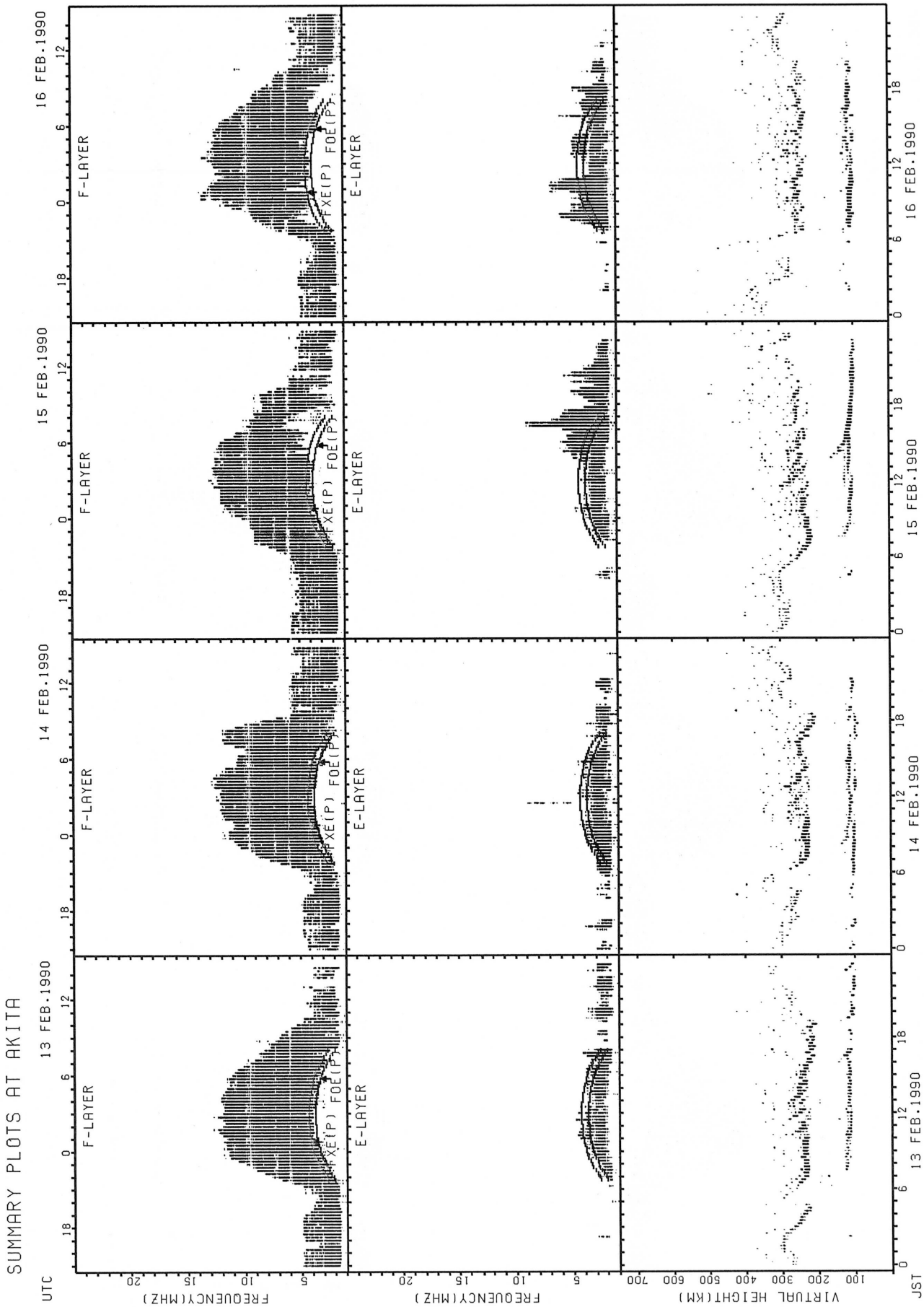
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT AKITA
UTC
5 FEB.1990
6 FEB.1990
7 FEB.1990
8 FEB.1990
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

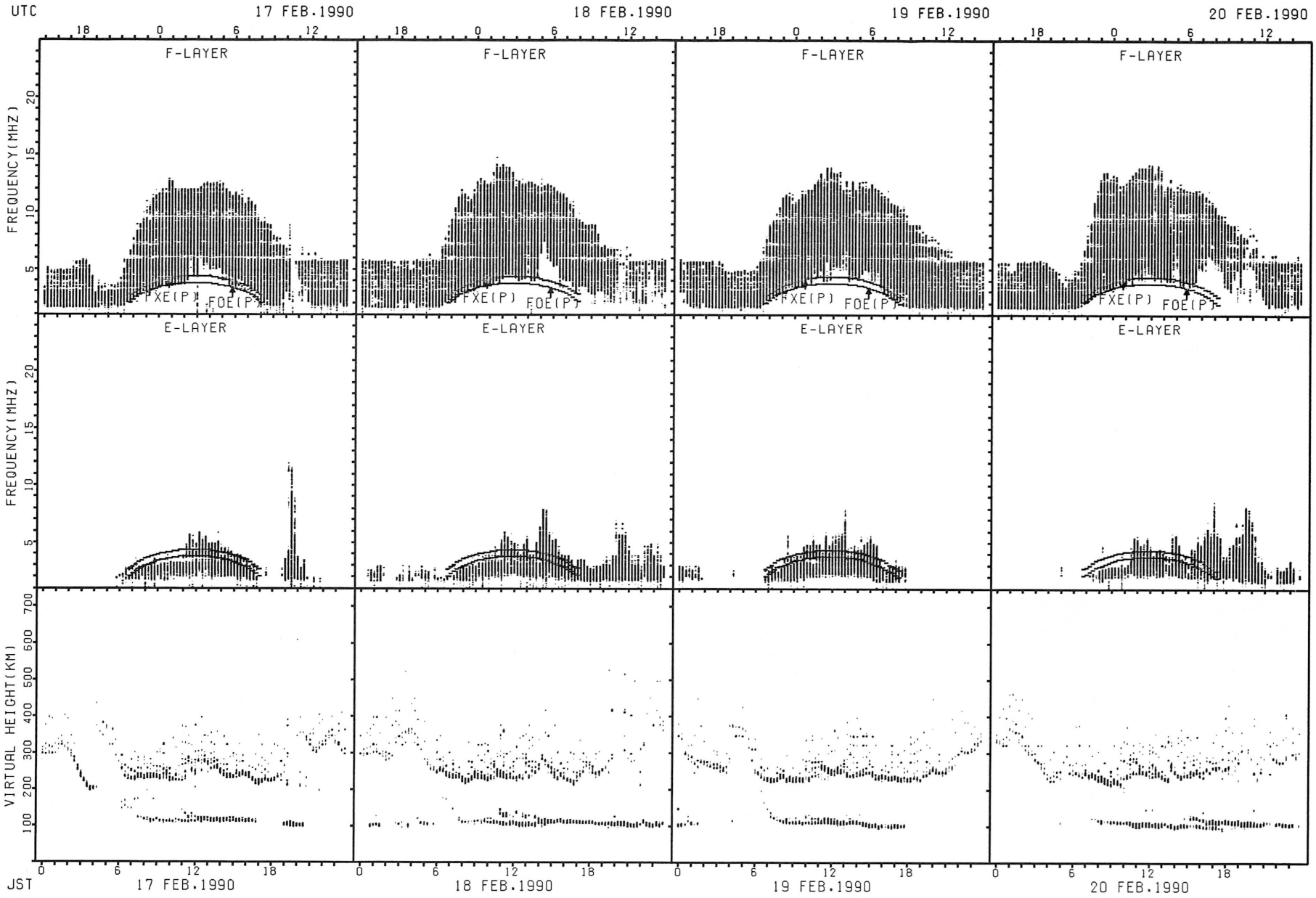
SUMMARY PLOTS AT AKITA



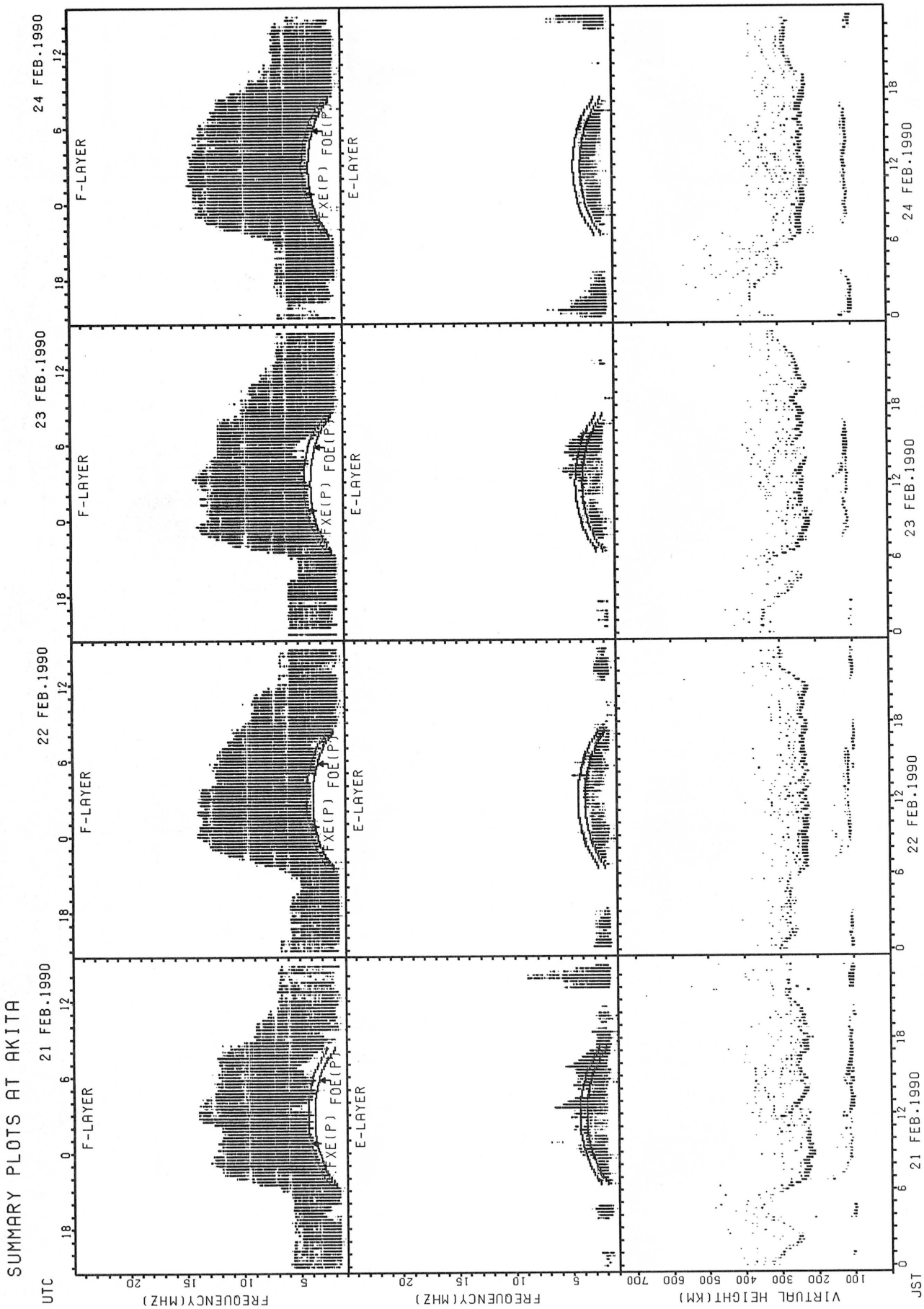
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT AKITA
UTC
13 FEB.1990
14 FEB.1990
15 FEB.1990
16 FEB.1990
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

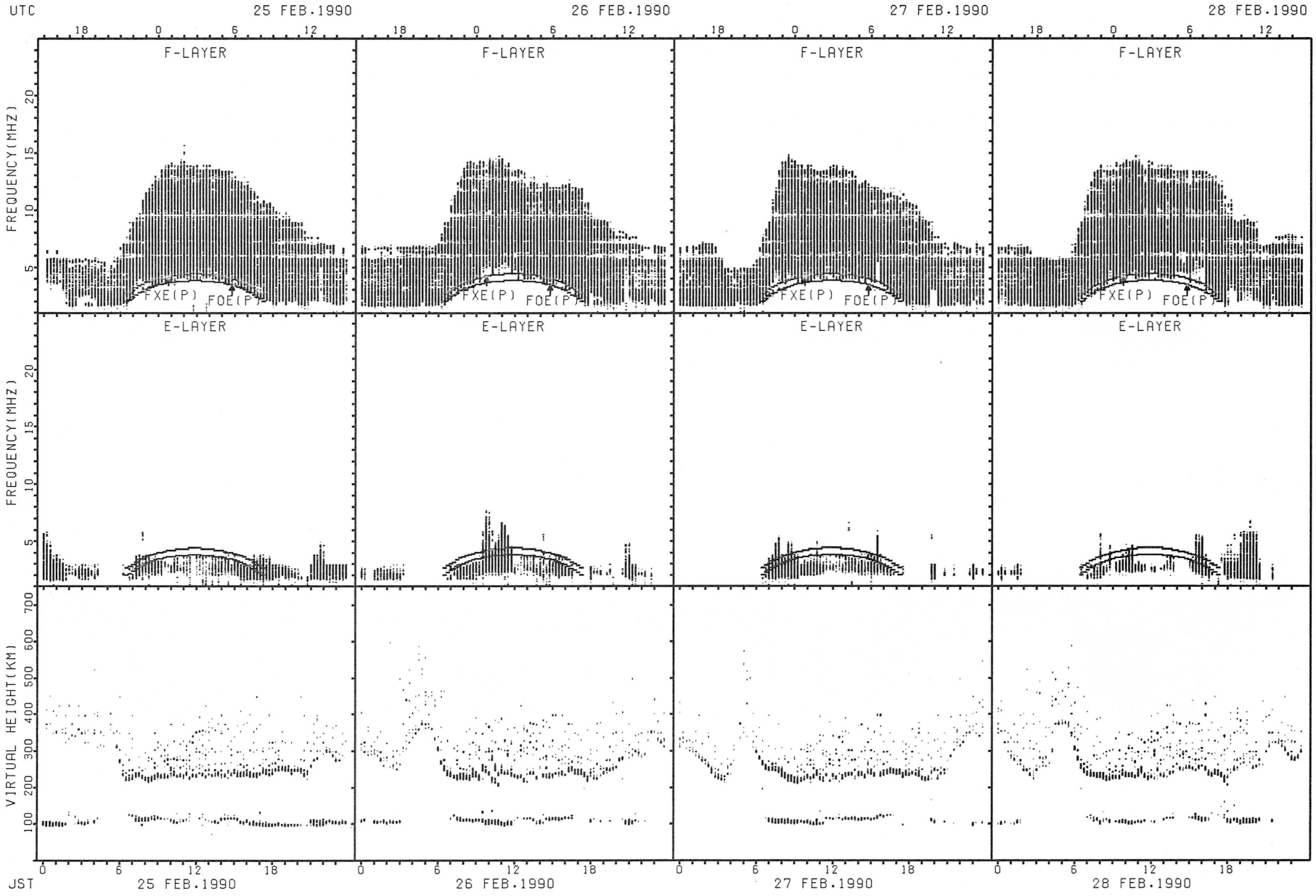
SUMMARY PLOTS AT AKITA



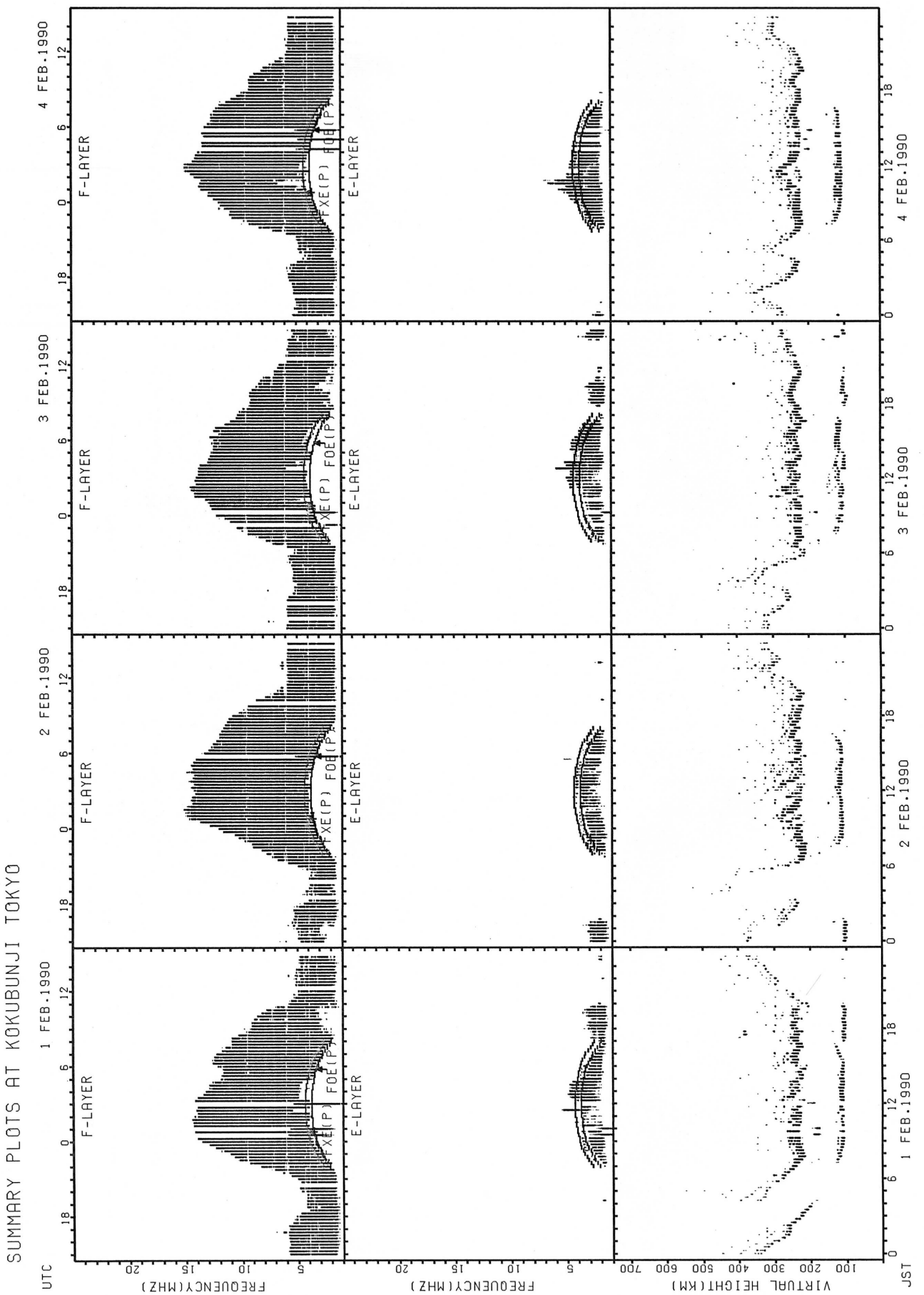
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT AKITA
UTC
21 FEB.1990
22 FEB.1990
23 FEB.1990
24 FEB.1990
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

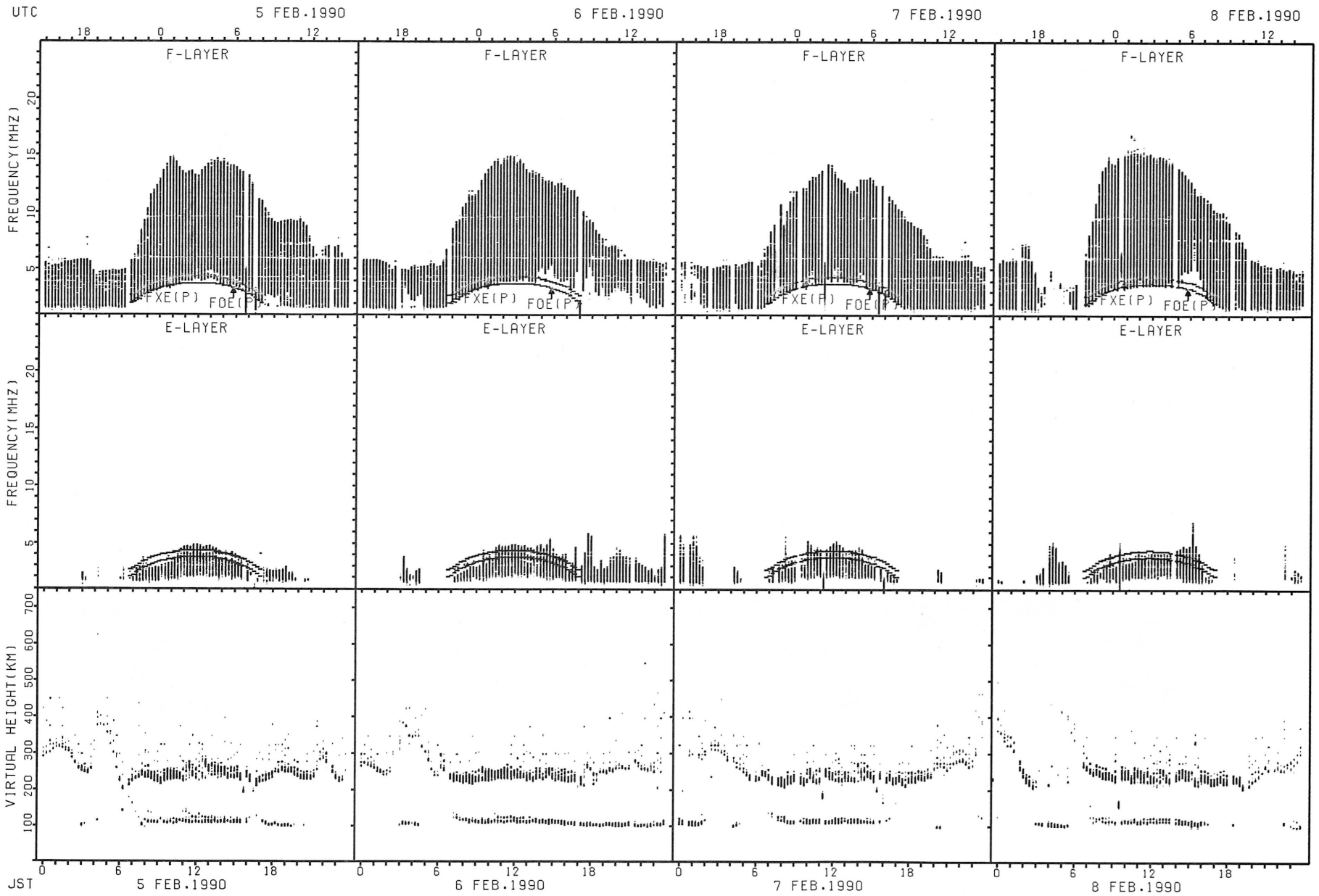
SUMMARY PLOTS AT AKITA



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

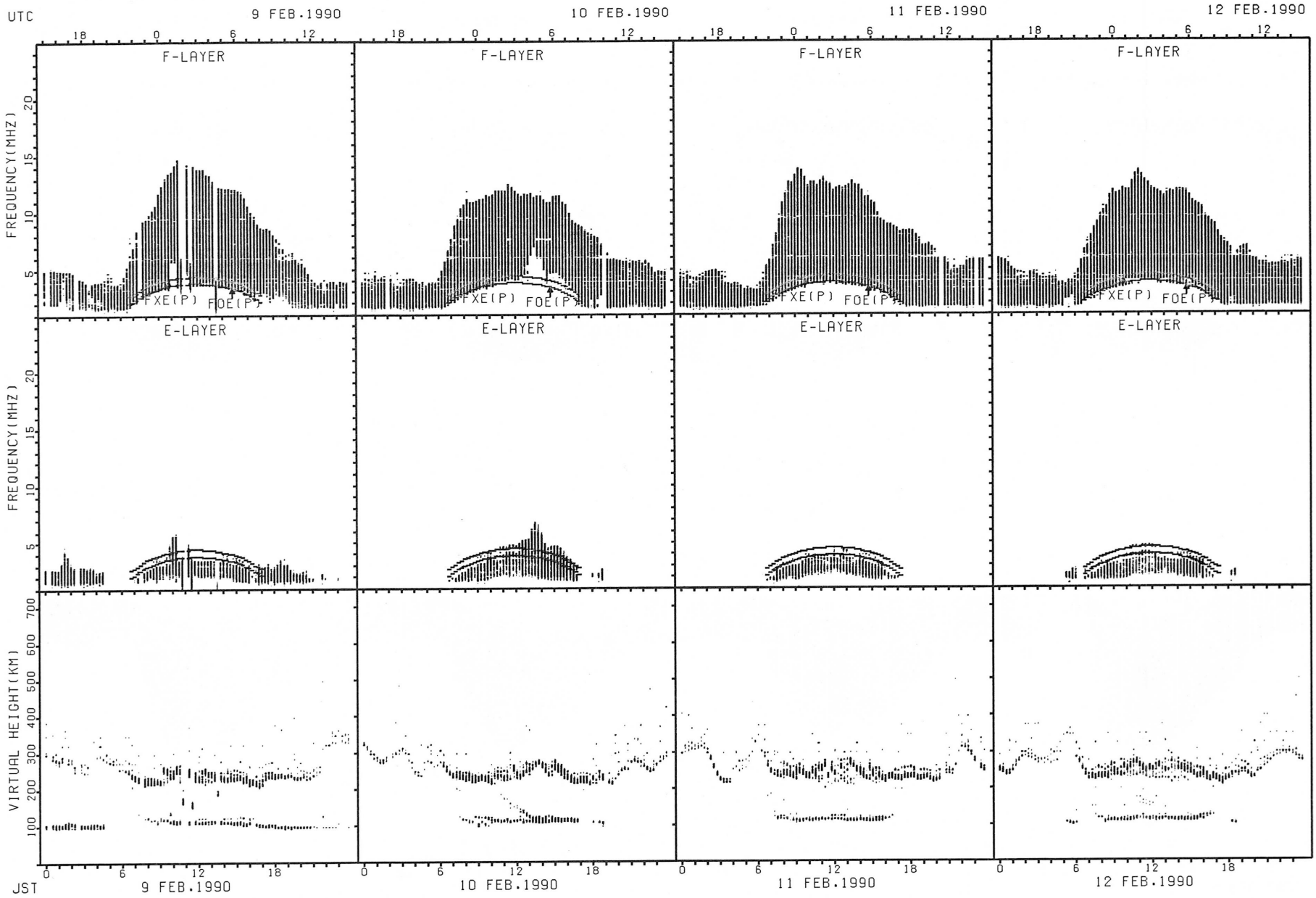

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
JST
1 FEB.1990
2 FEB.1990
3 FEB.1990
4 FEB.1990
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT KOKUBUNJI TOKYO



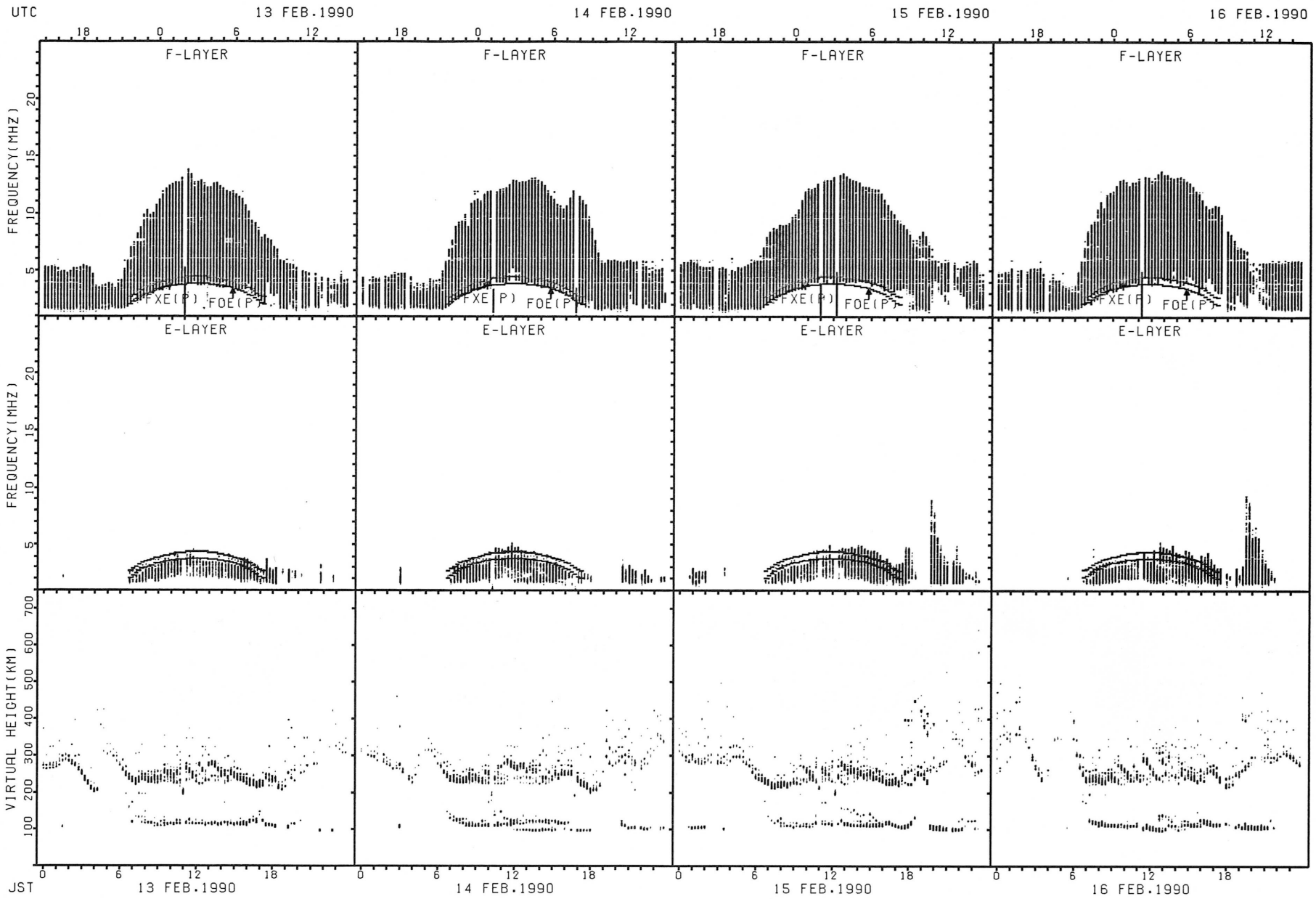
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT KOKUBUNJI TOKYO



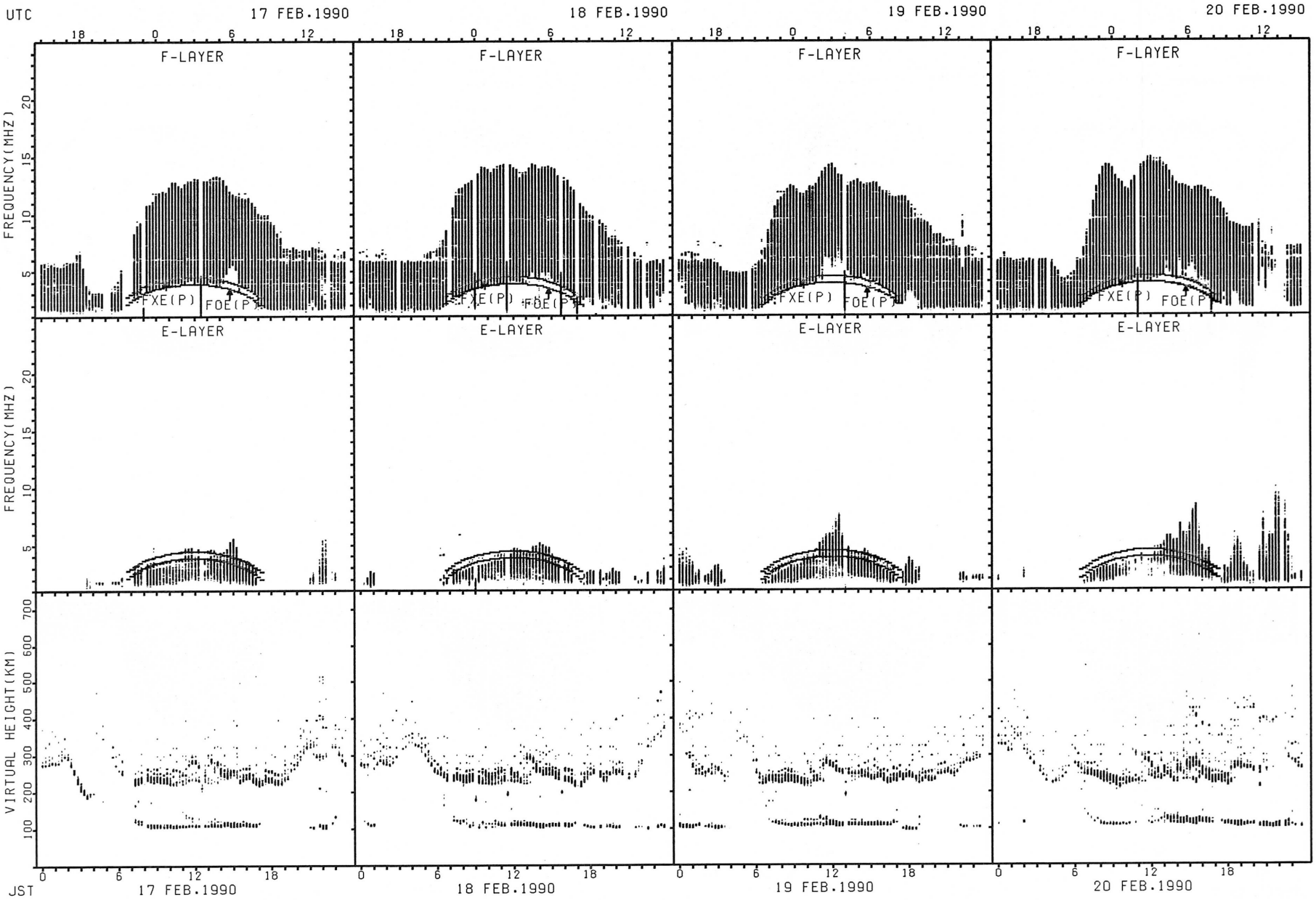
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT KOKUBUNJI TOKYO



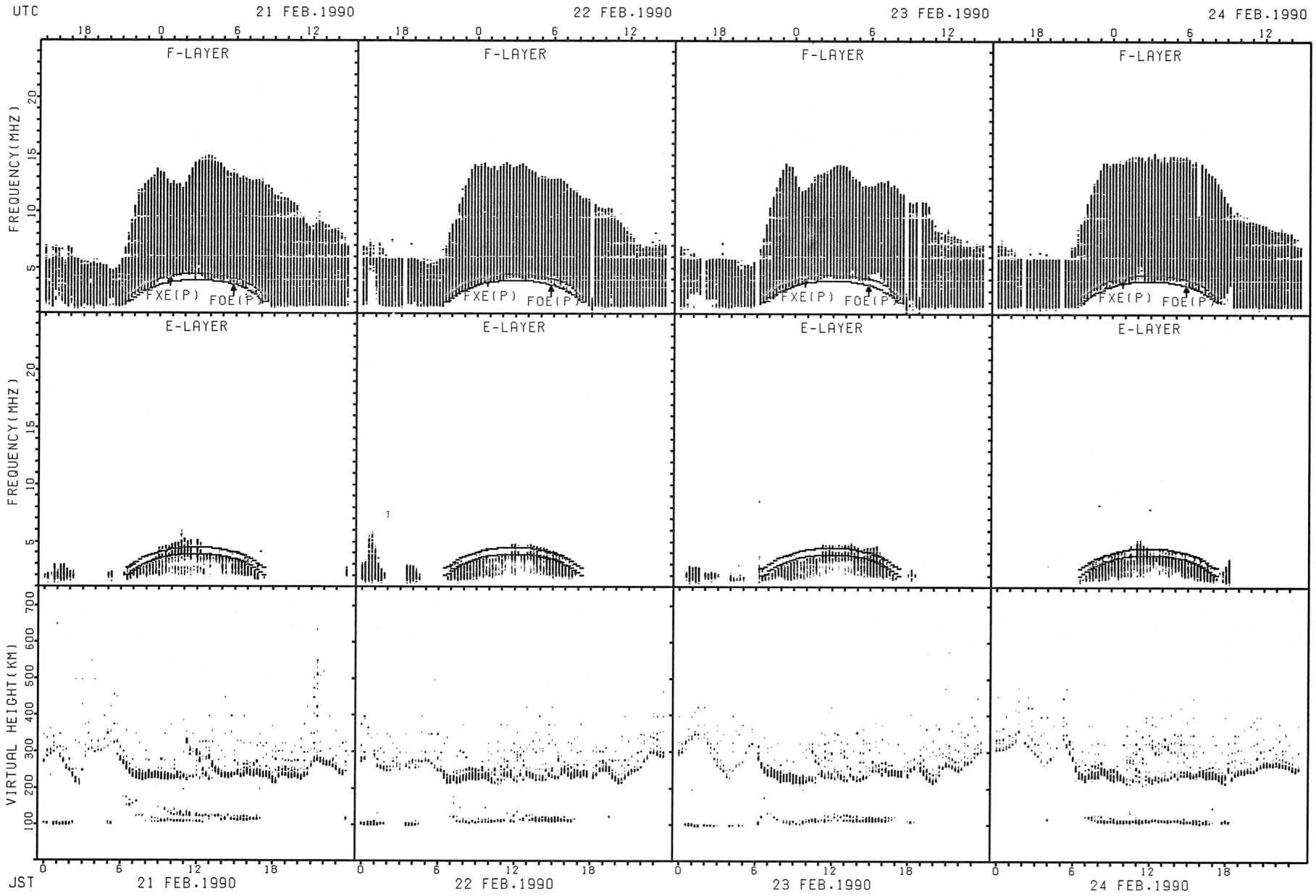
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT KOKUBUNJI TOKYO

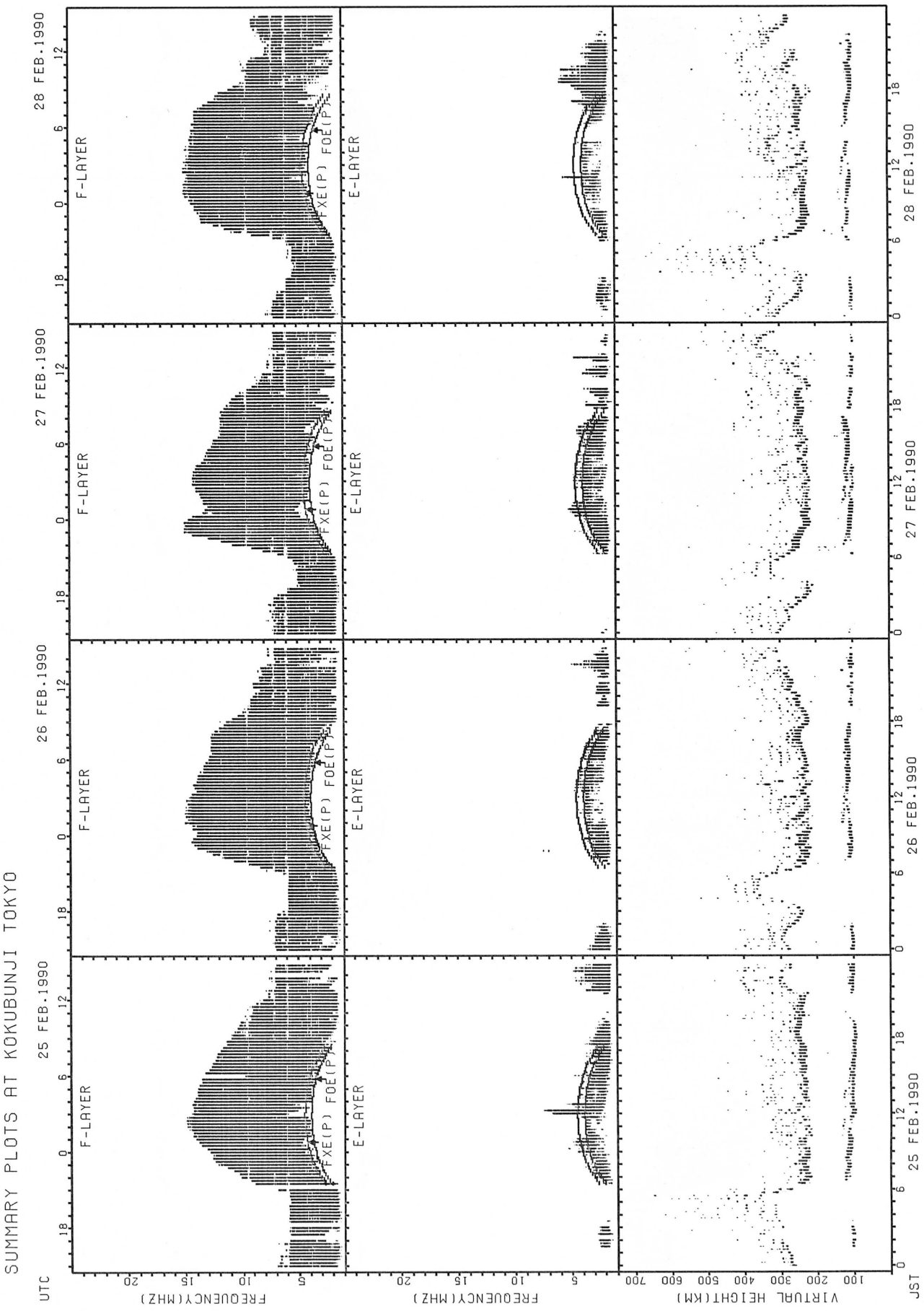


FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

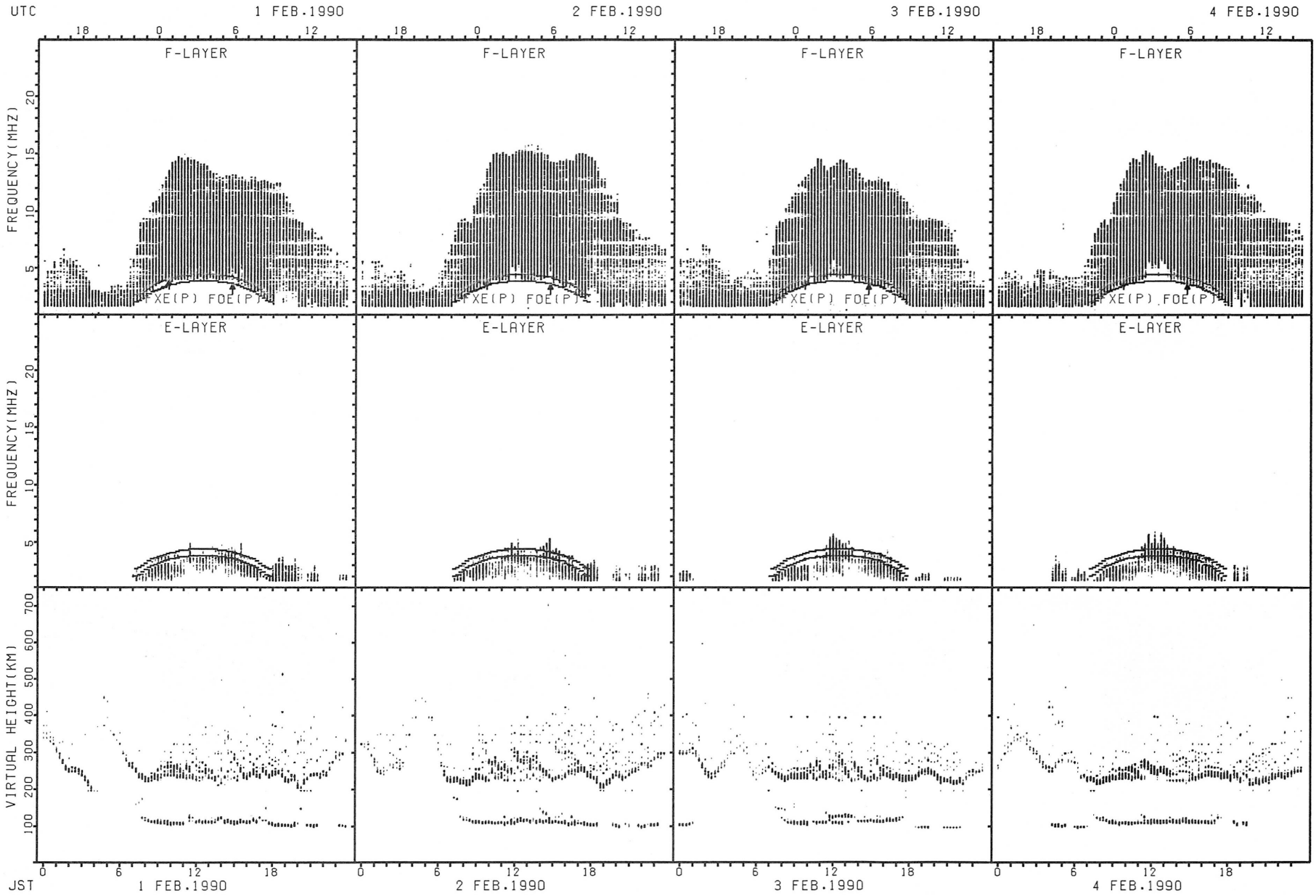
SUMMARY PLOTS AT KOKUBUNJI TOKYO



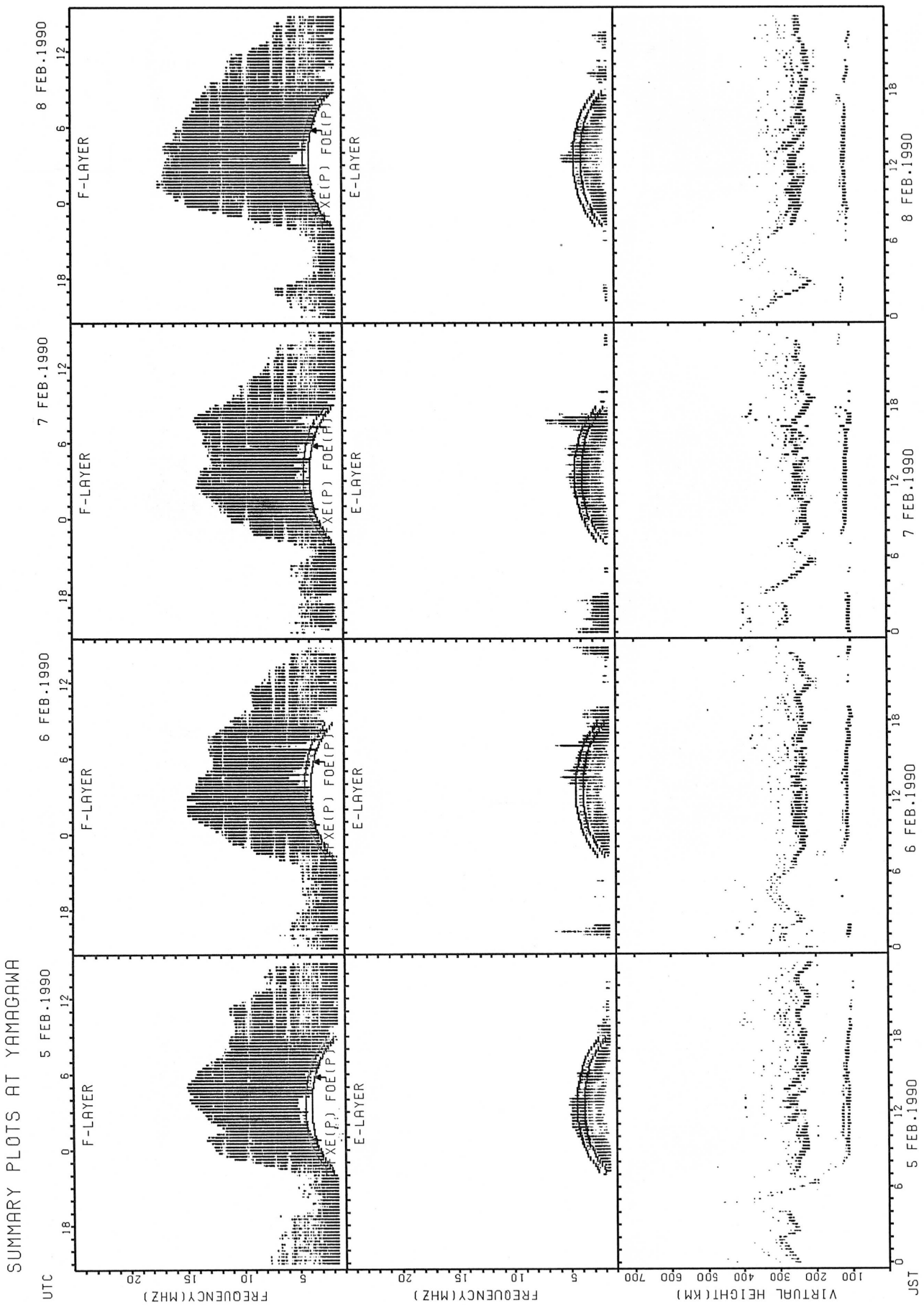
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
25 FEB.1990
26 FEB.1990
27 FEB.1990
28 FEB.1990
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

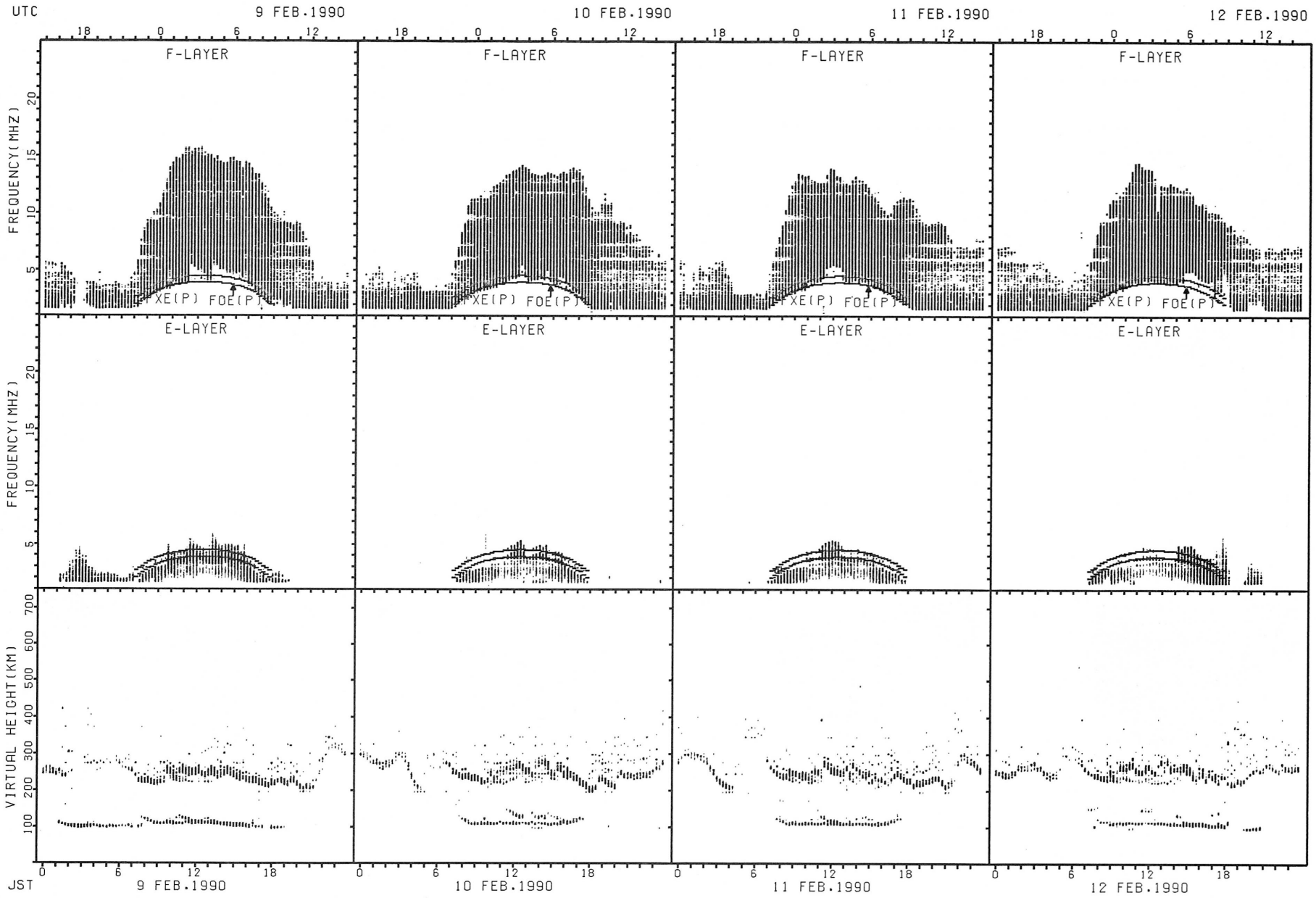
SUMMARY PLOTS AT YAMAGAWA



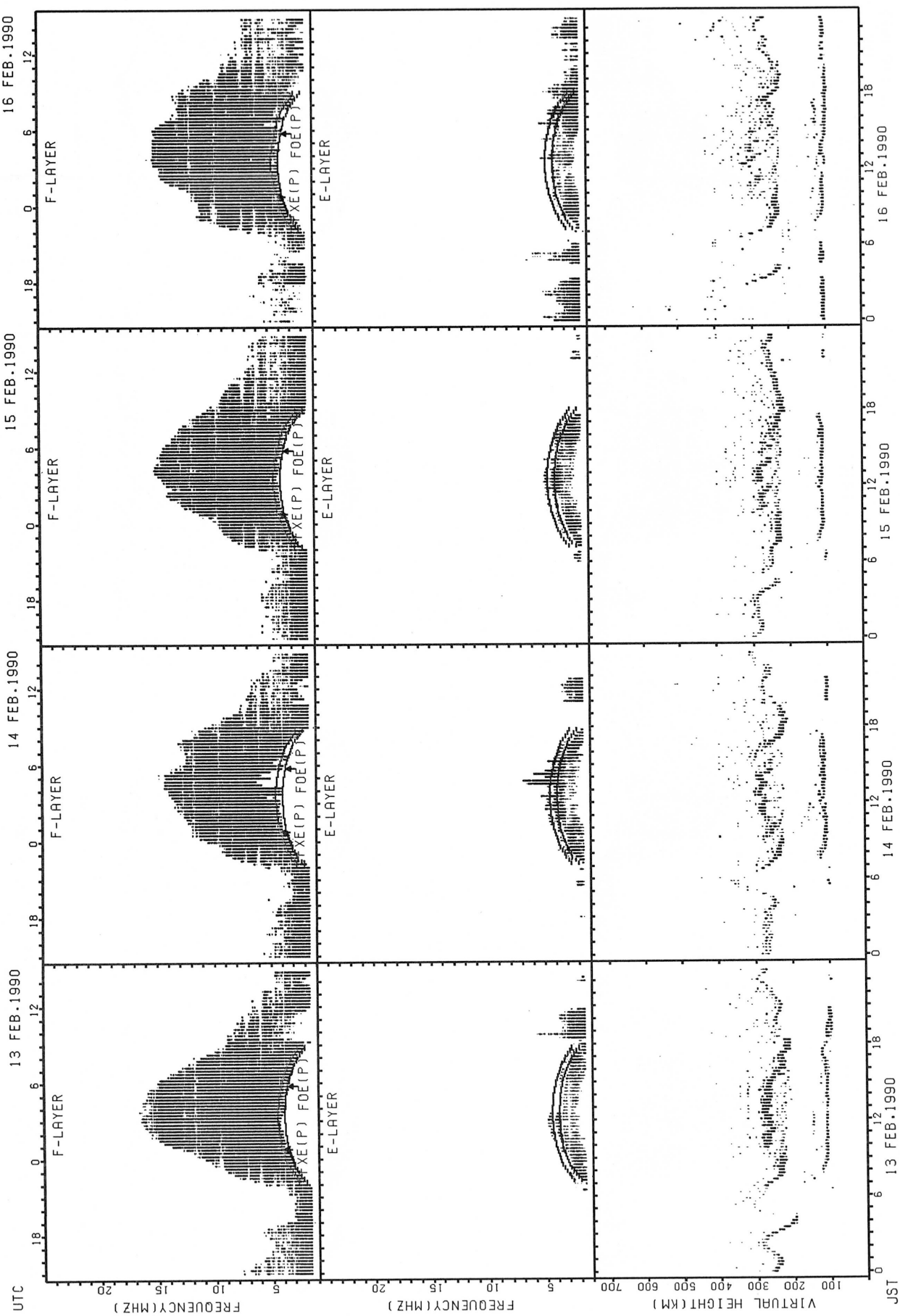
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT YAMAGAWA
UTC
JST
5 FEB.1990
6 FEB.1990
7 FEB.1990
8 FEB.1990
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

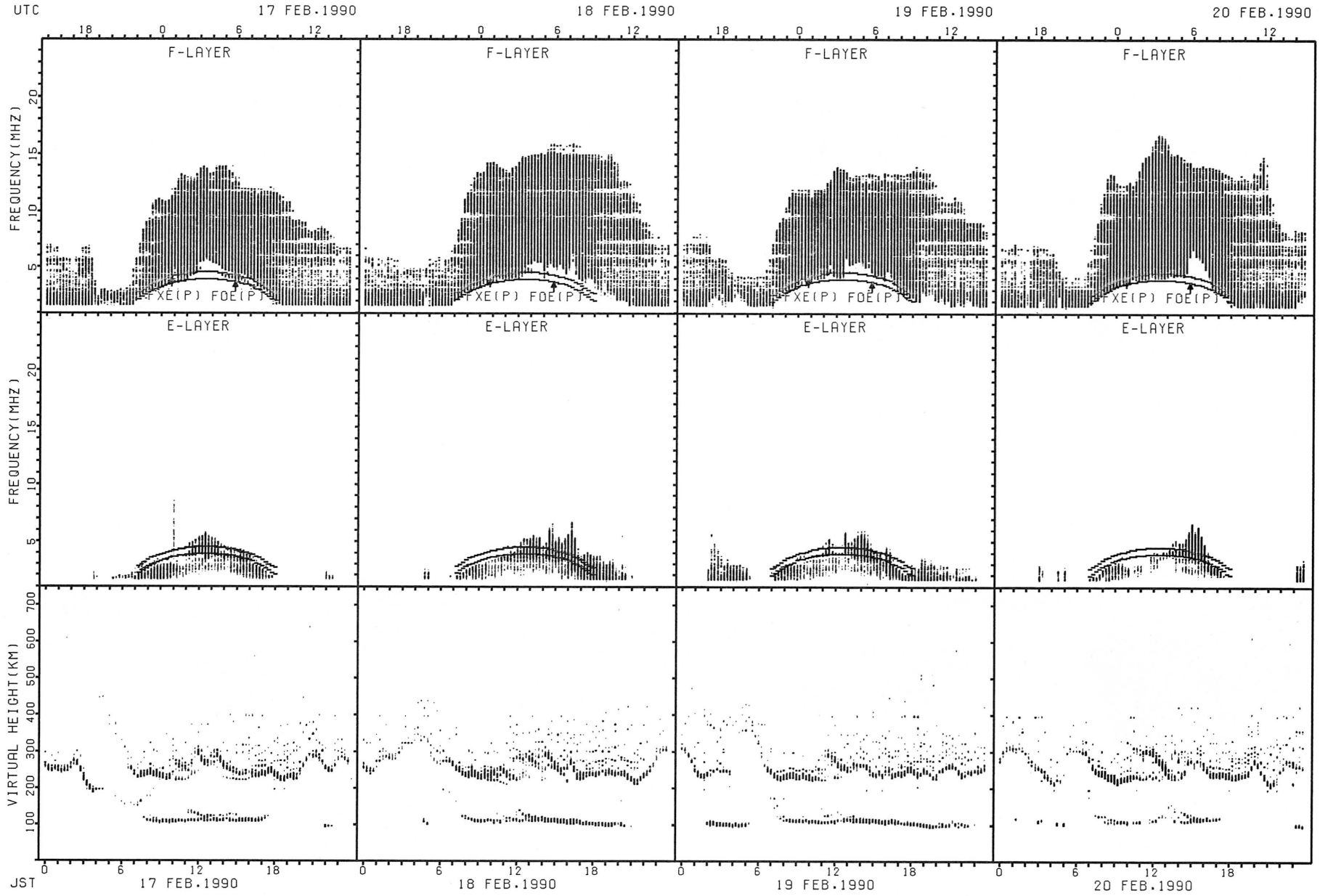
SUMMARY PLOTS AT YAMAGAWA



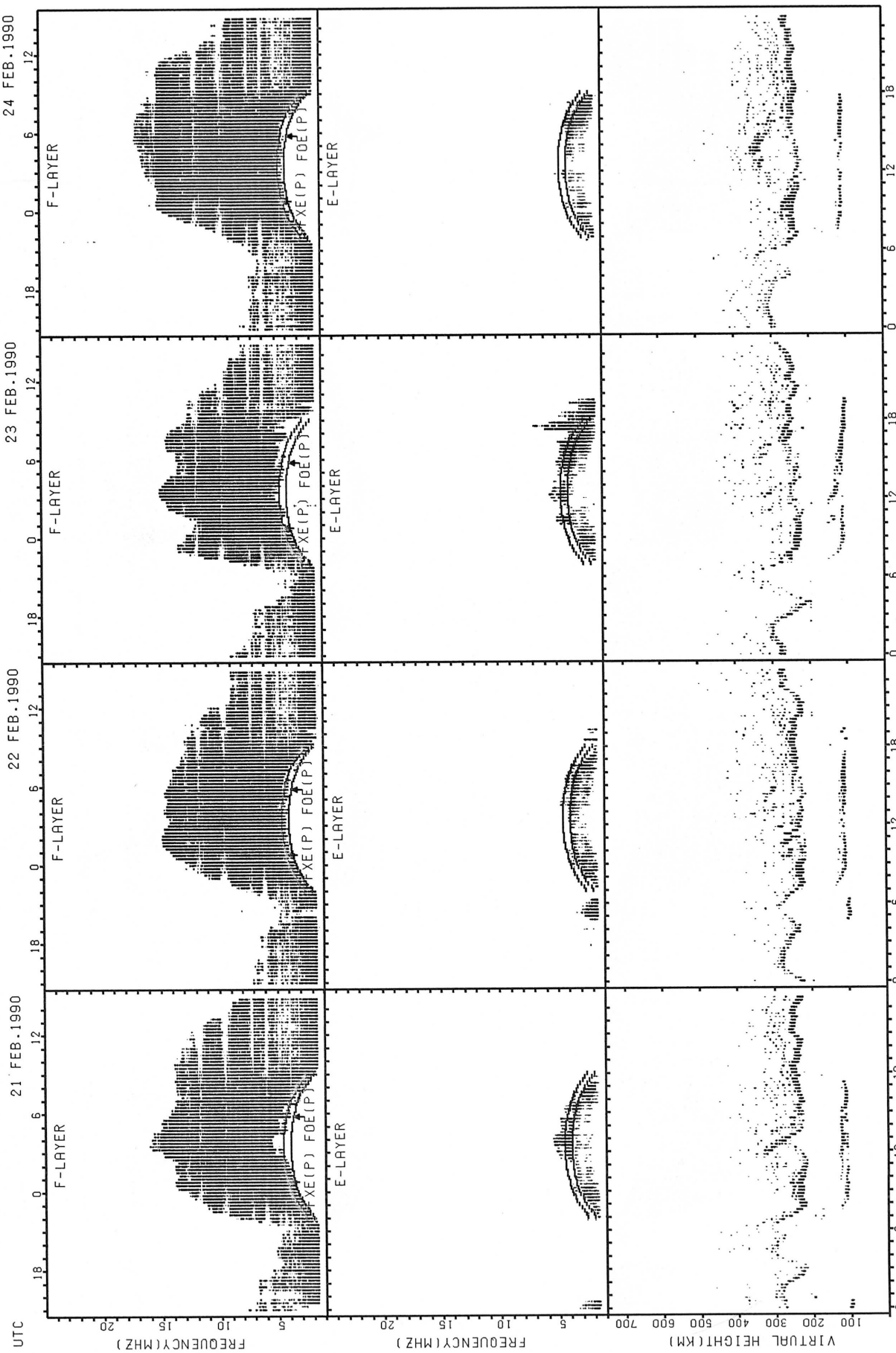
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT YAMAGAWA
13 FEB.1990
14 FEB.1990
15 FEB.1990
16 FEB.1990
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

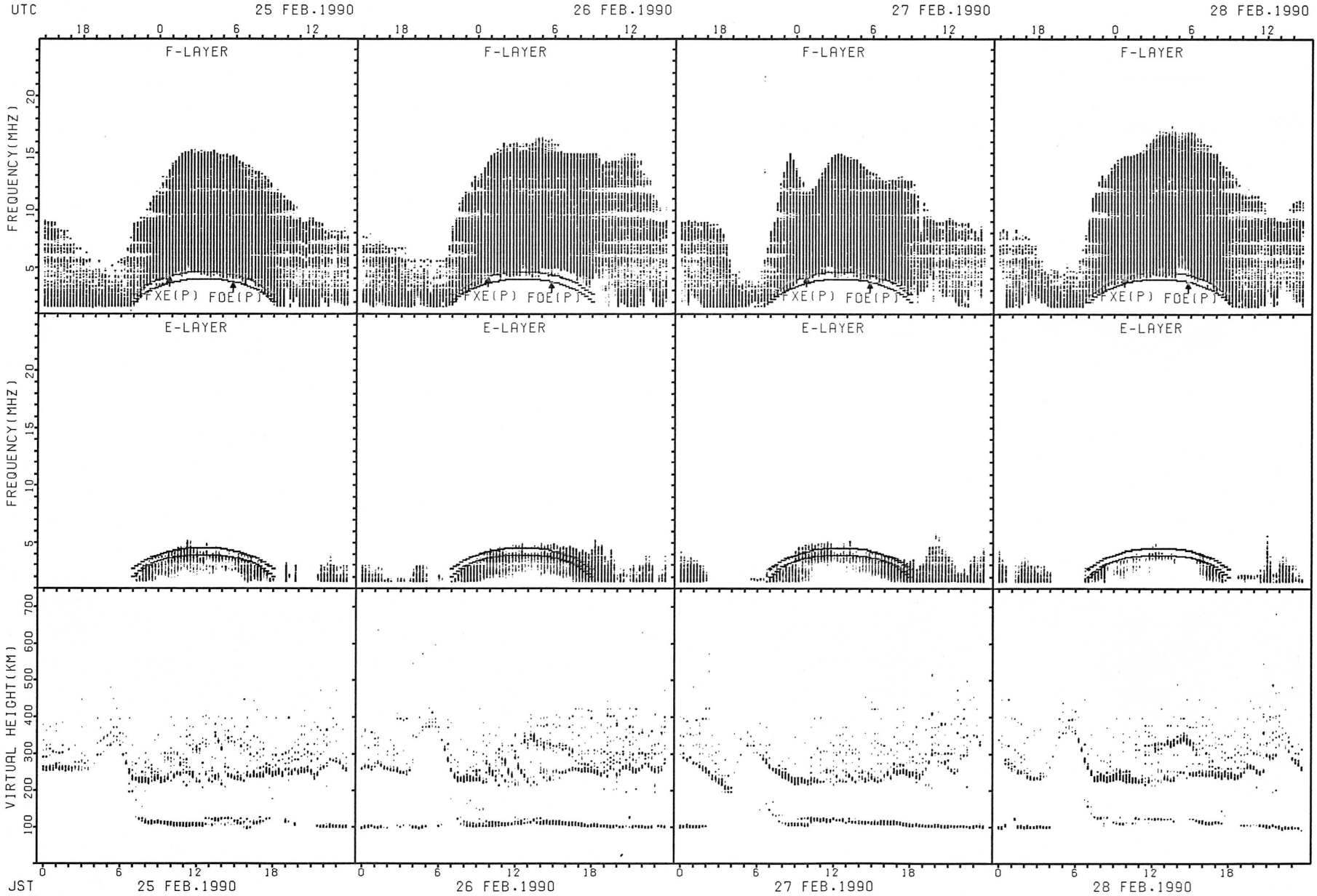
SUMMARY PLOTS AT YAMAGAWA



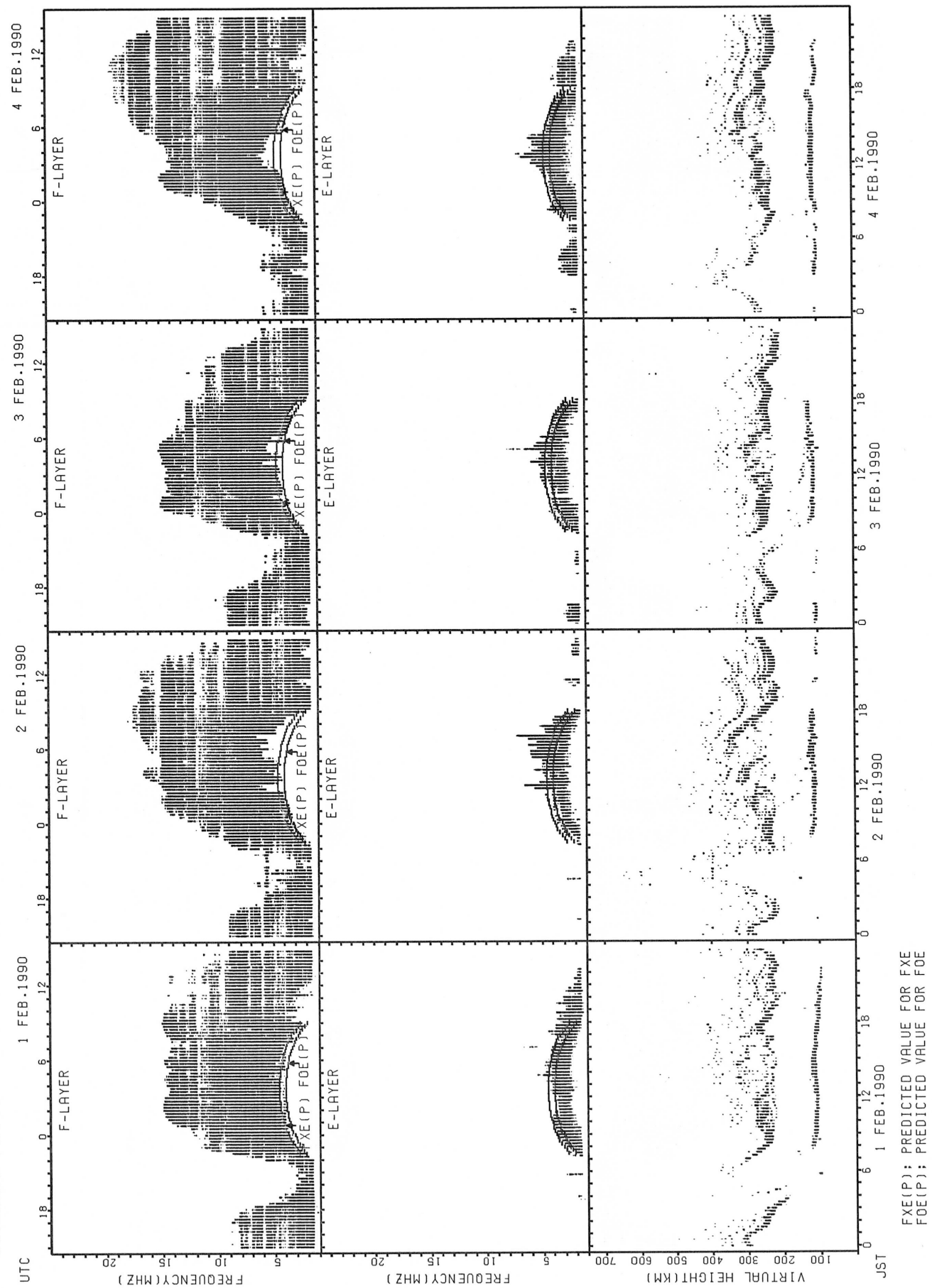
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT YAMAGAWA
21 FEB.1990
22 FEB.1990
23 FEB.1990
24 FEB.1990
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

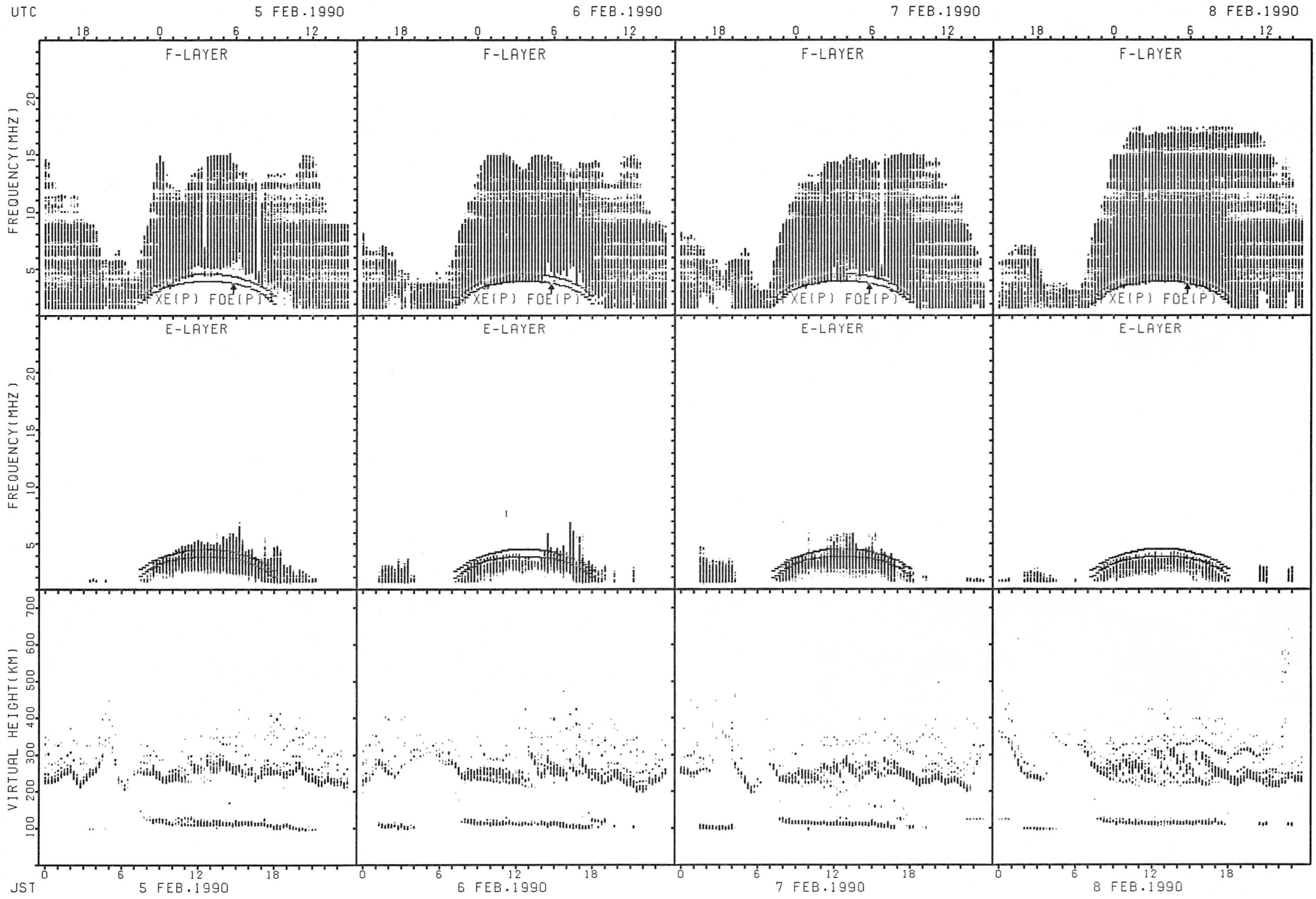
SUMMARY PLOTS AT YAMAGAWA



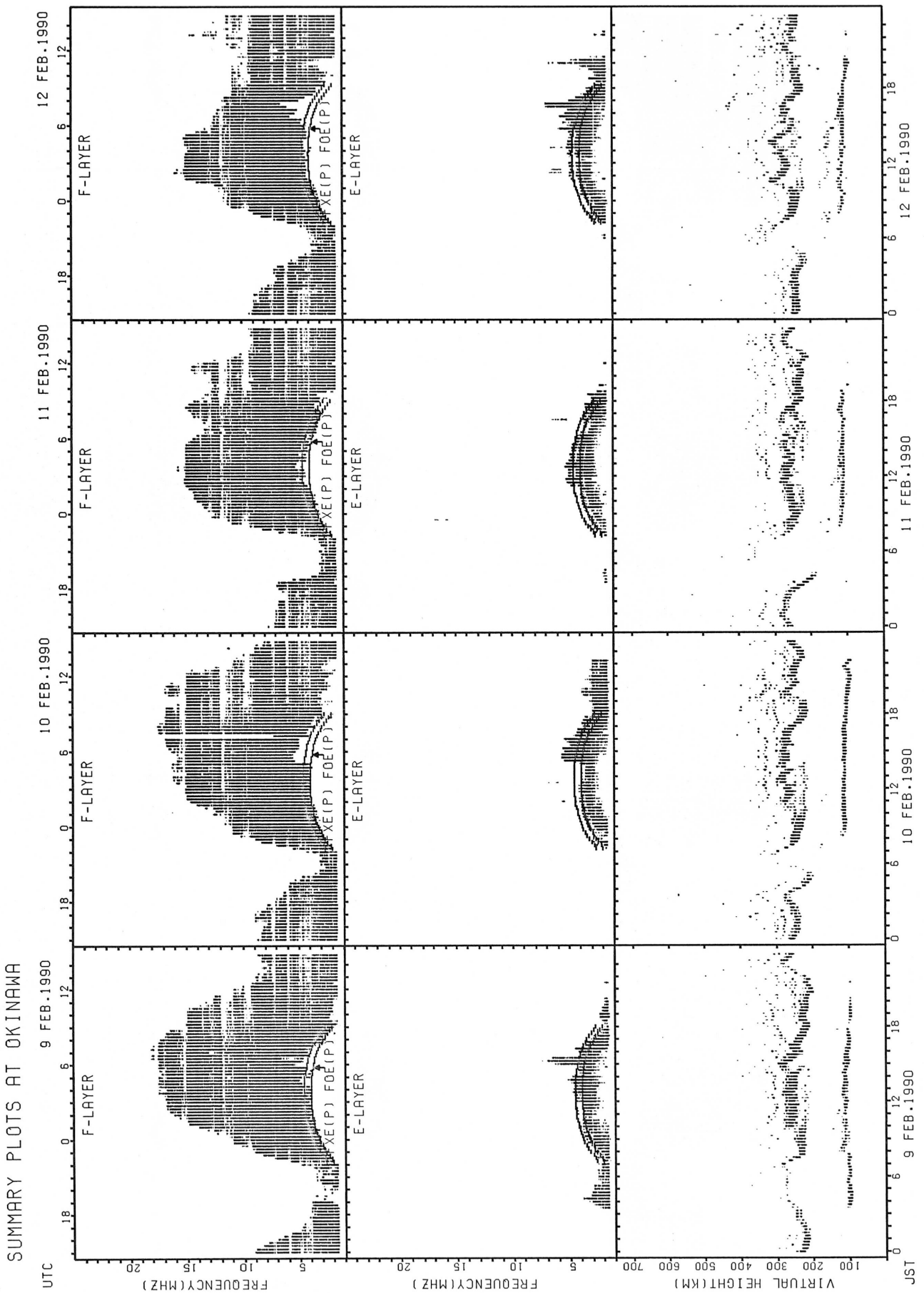
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
UTC
1 FEB.1990
2 FEB.1990
3 FEB.1990
4 FEB.1990
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

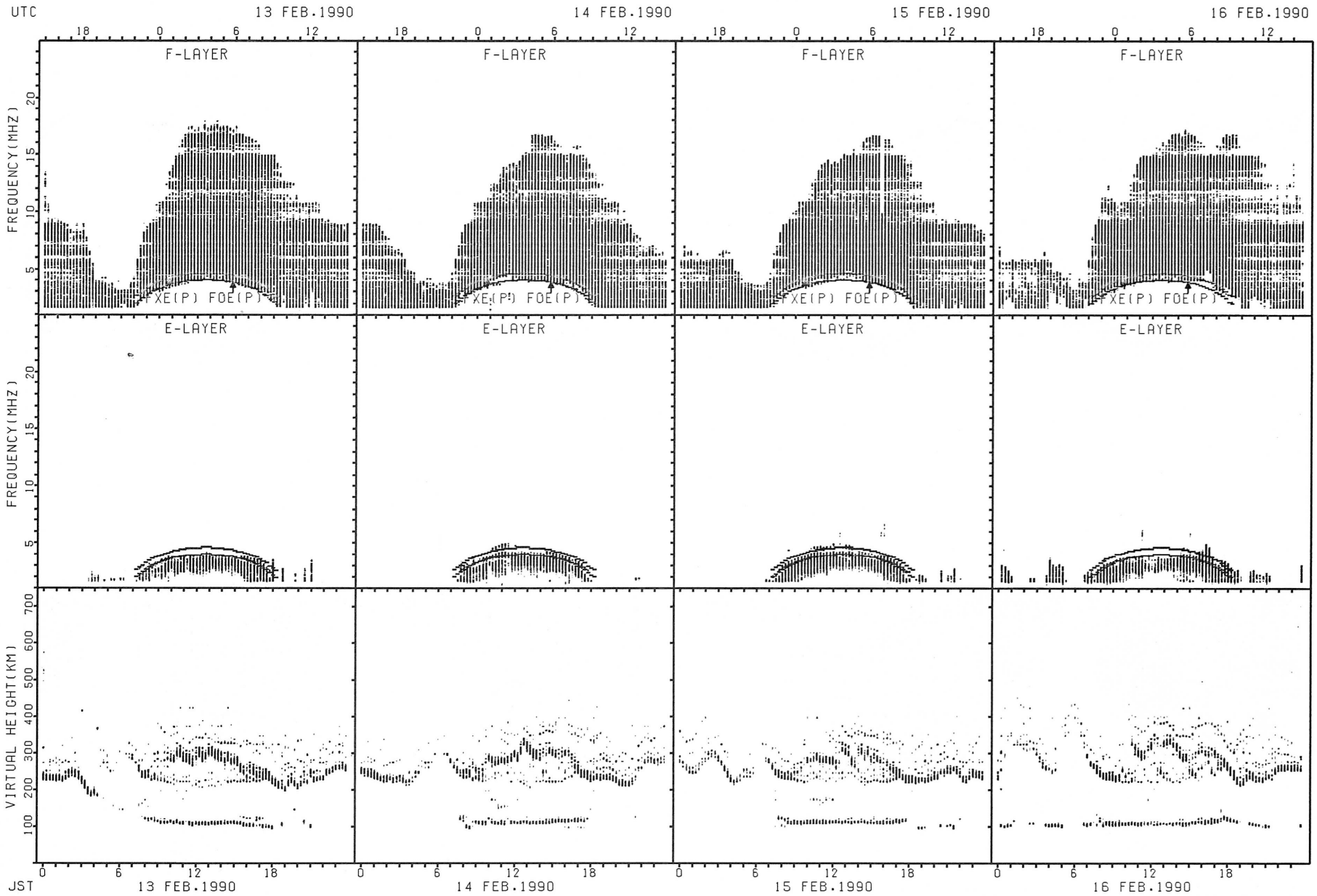
SUMMARY PLOTS AT OKINAWA



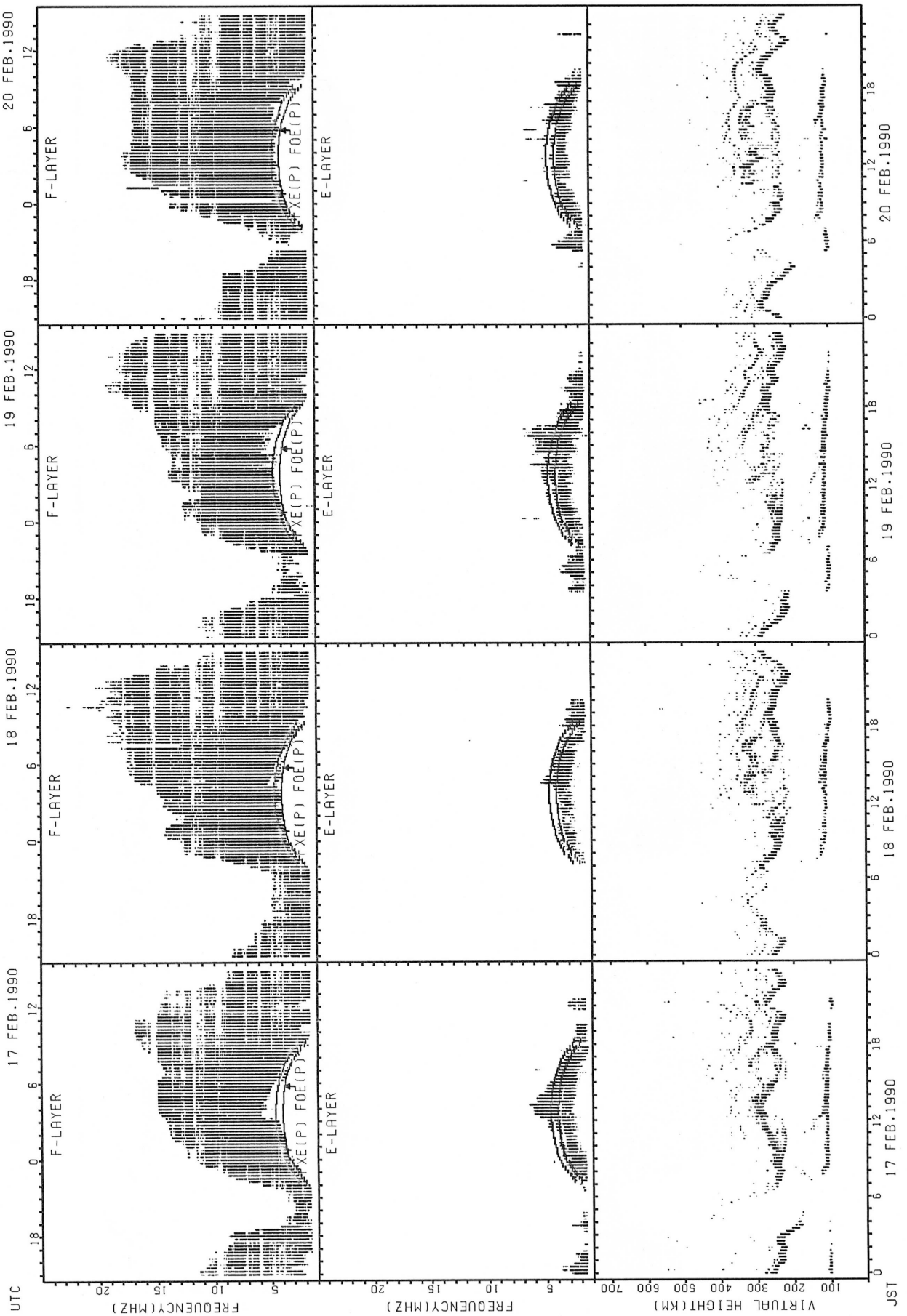
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
9 FEB.1990
10 FEB.1990
11 FEB.1990
12 FEB.1990
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

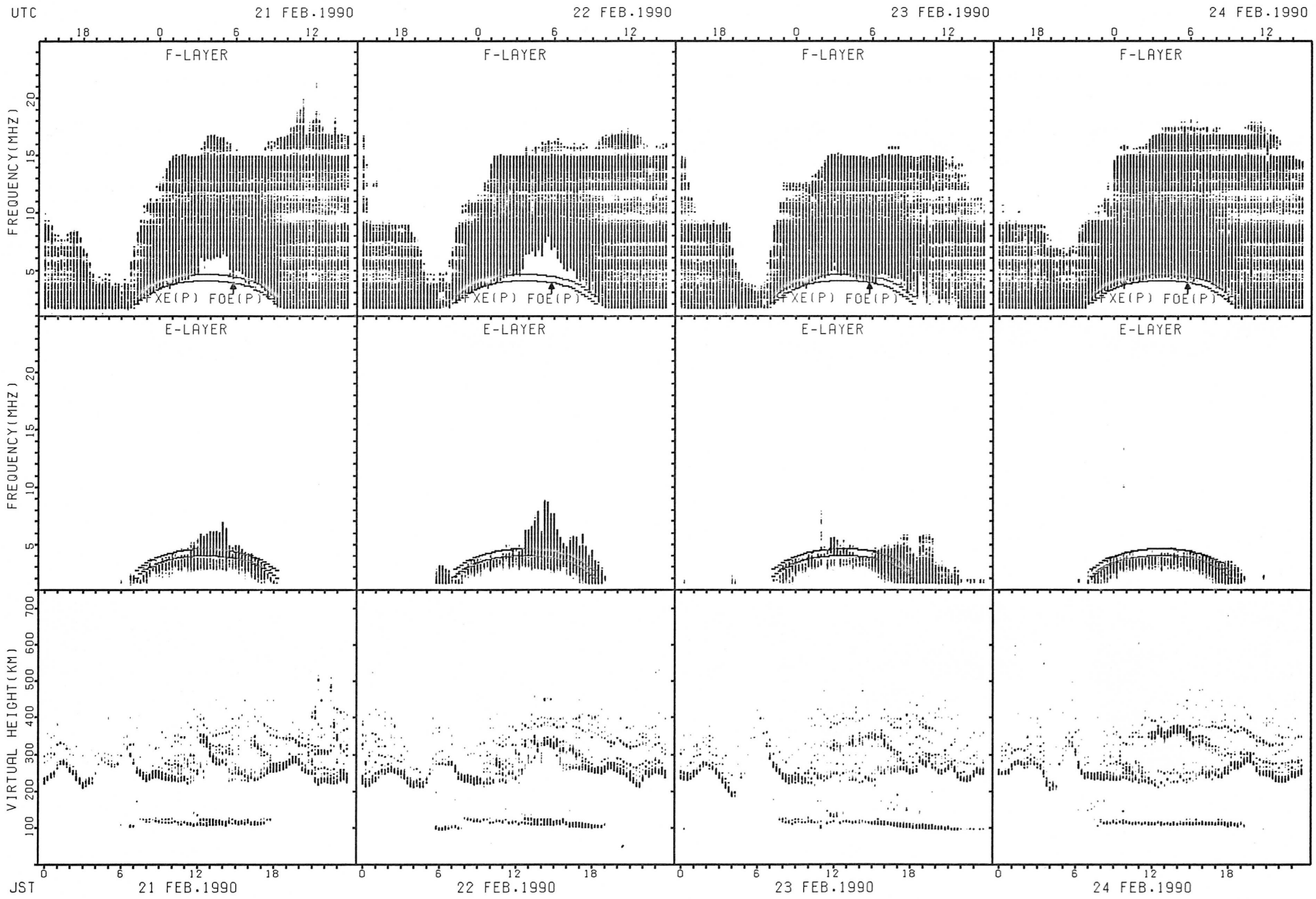
SUMMARY PLOTS AT OKINAWA



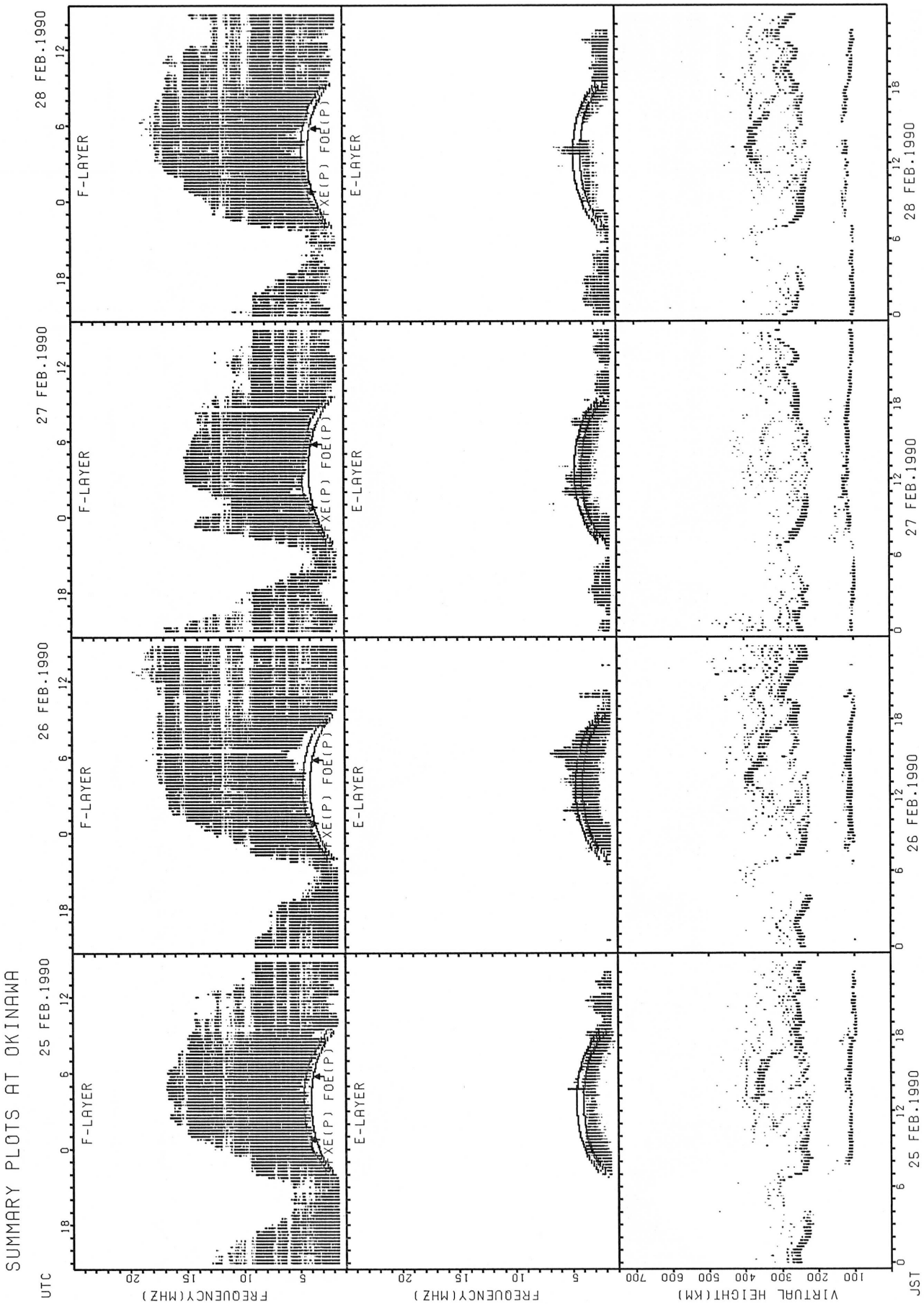
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
UTC
17 FEB.1990
18 FEB.1990
19 FEB.1990
20 FEB.1990
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 OKINAWA



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


SUMMARY PLOTS AT OKINAWA
UTC
25 FEB.1990
26 FEB.1990
27 FEB.1990
28 FEB.1990
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

MONTHLY MEDIANS OF H'F AND H'ES

FEB.1990 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								24	31	31	31	31	31	31	31	31	31	31	26	13				
MED								260	236	234	240	240	244	246	248	244	248	258	275	284				
U Q								272	242	248	246	246	254	250	254	254	254	266	288	306				
L Q								249	228	230	232	236	234	240	240	234	236	250	258	133				

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								16	11	12	10	13	11	14	10
MED			111					163	148								125	121	117	119	113	113	109	109
U Q			113					280	202								141	294	225	306	116	115	113	113
L Q			15					113	120								119	119	113	111	64	17	107	16

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								23	31	31	31	29	25	31	31	31	31	29	25	14				
MED								266	244	242	246	252	258	260	260	260	258	266	290	298				
U Q								278	252	250	256	261	270	276	268	272	266	278	306	314				
L Q								256	232	230	236	242	245	250	250	252	240	257	282	282				

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	13	12	11						11		10	12	15	15	18	19	15	17	18	17	19	14	14	14
MED	113	106	109						129		123	128	123	119	119	117	117	111	111	109	109	106	107	107
U Q	120	114	117						266		282	205	129	129	125	121	119	118	113	120	111	115	109	115
L Q	106	103	105						107		119	119	119	115	115	115	113	102	109	106	103	101	105	103

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								26	30	30	30	21	19	26	30	31	30	27	27	23	14			
MED								265	241	240	247	256	250	257	263	258	255	258	282	294	304			
U Q								276	254	250	260	270	270	310	268	270	274	270	292	316	316			
L Q								248	232	230	240	245	242	244	250	244	240	248	272	272	278			

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	12	12				12			10	17	18	16	19	19	18	12	21	14	13	13	13	13
MED	110	105	109	109				169			127	129	123	125	119	117	115	117	111	110	109	107	109	123
U Q	121	115	120	112				238			290	157	159	133	127	123	123	216	115	125	226	221	116	247
L Q	106	105	104	104				145			115	121	119	118	113	111	113	110	104	105	106	104	105	107

MONTHLY MEDIANS OF H'F AND H'ES

FEB.1990 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								10	30	31	31	30	19	20	31	31	30	31	31	30	26	22	15	10
MED								302	246	242	248	257	258	252	268	260	267	262	258	281	292	300	288	319
U Q								304	264	250	266	276	270	278	316	284	292	274	272	302	304	322	320	360
L Q								286	236	234	240	244	248	246	256	248	254	238	252	264	278	274	270	302

H'ES

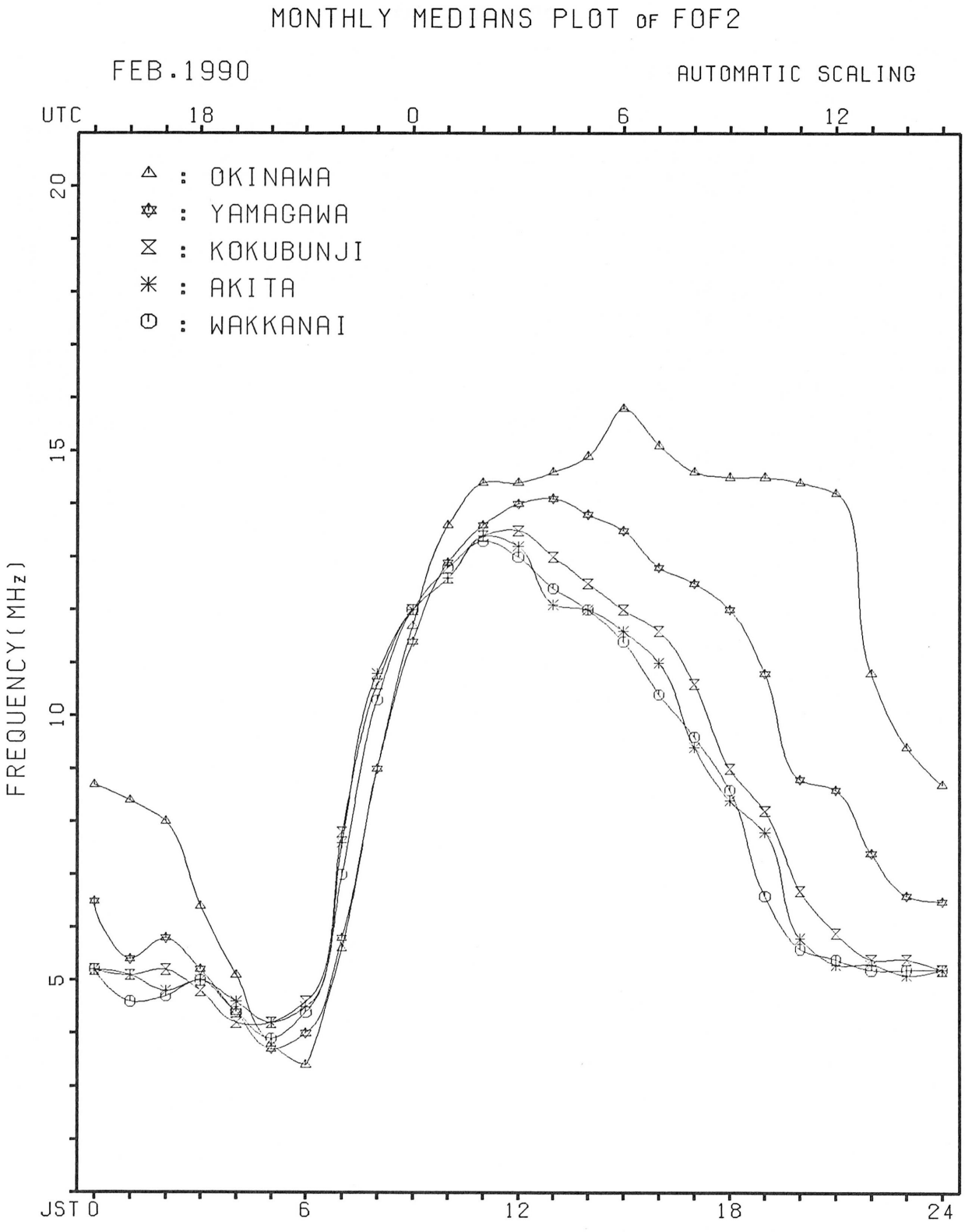
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	10					11						14	18	15	19	23	18	15	16	19			11	
MED	105					107						146	125	121	121	117	115	115	107	107			105	
U Q	294					119						244	147	127	137	119	117	125	112	117			354	
L Q	103					103						119	121	117	117	113	113	109	105	101			99	

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	20	17	13				10	30	31	31	30	20	16	24	31	31	31	31	31	31	30	30	27
MED	280	286	308	264				308	255	246	270	273	264	274	294	298	316	294	262	270	276	269	269	278
U Q	314	318	328	289				326	268	256	294	306	288	320	323	344	334	314	278	288	292	294	288	304
L Q	268	271	279	257				288	244	240	248	254	255	258	270	272	284	258	248	252	260	254	254	268

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			11				14	17	19	19	22	22	17	22	23	16	13		
MED					105			109				148	129	119	115	115	115	113	107	107	104	103		
U Q					112			326				173	160	127	131	121	119	134	113	111	110	226		
L Q					101			105				119	119	117	113	113	113	110	105	103	101	102		


MONTHLY MEDIANS PLOT OF FOF2
FEB.1990
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

FEB. 1990 | FXI (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	60	63	63	52	44	47	53												97	88	62	51	53	52
2	51	54	54	46	43	39	50												110	92	69	60	65	61
3	61	61	63	53	54	56	54												93	91	80	65	57	56
4	54	51	54	56	55	47	48												95	92	76	59	57	57
5	55	56	59	63	45	49	50												93	97	97	73	71	73
6	61	61	54	53	54	55	56												92	77	69	61	60	58
7	57	55	54	54	56	56	55												94	82	65	64	63	56
8	58	62	76	38	A	38	38												94	79	63	54	54	50
9	50	51	49	42	41	41	41												83	66	57	45	38	41
10	42	45	43	43	43	41	45												82	71	61	56	57	48
11	47	46	47	48	39	37	37												88	77	68	56	54	59
12	61	52	47	45	43	41	43												74	68	61	55	54	56
13	56	52	52	56	39	40	46												74	56	52	48	46	46
14	45	46	46	48	41	41	43												87	58	60	61	55	53
15	56	57	55	54	52	55	61												83	84	66	56	54	58
16	49	52	51	55	45	40	42												87	71	61	58	57	60
17	57	56	58	66	35	36	44												97	77	70	69	69	68
18	68	66	66	59	63	66	70												100	93	82	71	63	60
19	63	67	63	57	49	50	56												113	100	85	79	70	70
20	65	61	62	63	59	45	50												99	90	90	72	69	72
21	69	67	67	56	56	51	60												117	113	103	90	90	84
22	74	75	63	63	61	56	60												111	104	96	82	70	72
23	71	65	63	64	60	55	61												111	111	90	85	77	74
24	73	67	66	65	65	63	75												112	100	96	90	87	84
25	70	67	62	60	58	61	70												113	105	93	82	77	77
26	71	72	73	66	62	63	56												114	100	91	90	84	76
27	75	74	76	70	53	51	61												115	103	85	79	75	72
28	74	73	67	59	54	55	62												114	99	99	78	84	91
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	27	28	28												28	28	28	28	28	28
MED	60	61	60	56	53	50	54												96	90	73	64	63	60
UQ	70	67	64	63	57	56	61												112	100	90	79	73	72
LQ	54	52	53	50	43	41	44												88	77	62	56	54	56

FEB. 1990 | FXI (0.1 MHZ)

IONOSPHERIC DATA

FEB. 1990 | FOF2 (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	54	57	57	46	H 39	42	47	79	106	132	137	140	134	128	115	118	119	106	91	82	56	45	47	46
2	45	48	48	40	37	33	44	73	93	117	147	140	143	145	142	130	118	112	104	86	63	56	59	56
3	55	55	57	47	48	50	48	S 74	101	117	124	141	135	131	121	121	118	98	87	84	S 74	59	51	50
4	48	45	48	50	49	41	42	78	105	115	130	138	149	132	127	126	122	108	89	86	70	53	52	51
5	R 49	50	53	57	39	43	44	60	99	125	146	132	129	139	143	136	129	105	87	91	91	67	65	67
6	55	55	48	47	48	50	50	81	103	116	136	144	146	132	127	121	118	102	86	71	63	55	54	52
7	51	S 49	48	48	50	50	49	80	100	114	123	133	131	118	125	124	114	99	88	76	59	58	57	50
8	52	56	69	32	A	32	32	76	134	140	R 168	U R 162	154	144	136	123	109	97	88	73	57	48	48	44
9	44	45	43	35	35	35	35	69	91	112	132	140	134	128	117	116	101	82	77	60	51	39	S 33	35
10	36	39	37	37	37	35	39	71	102	106	109	114	114	112	110	110	103	84	76	65	55	50	51	42
11	41	40	41	42	33	31	31	58	105	130	V 121	124	116	118	119	105	87	81	81	71	61	50	48	53
12	55	46	41	39	37	35	38	69	92	114	116	131	118	109	114	110	99	84	68	62	55	49	48	50
13	50	46	46	50	33	34	40	S 72	98	107	121	133	123	119	117	111	97	75	68	50	46	42	40	40
14	39	40	40	41	35	35	38	S 74	95	106	114	117	125	125	123	107	102	110	82	52	54	55	49	47
15	50	51	49	48	46	49	55	80	84	95	118	124	128	128	122	118	108	92	77	78	60	50	48	52
16	43	46	45	49	39	34	36	80	106	117	124	128	127	131	127	122	106	102	81	65	55	52	51	54
17	51	50	52	60	29	30	38	74	98	112	120	119	128	126	128	112	110	S 97	91	71	64	63	63	62
18	S 62	60	60	53	57	60	64	91	117	125	134	140	136	134	137	137	127	108	94	87	75	66	57	V 55
19	57	61	57	51	43	44	50	80	110	119	117	127	139	128	125	122	115	110	107	94	79	73	64	64
20	59	55	56	57	53	39	44	78	128	134	119	130	146	141	123	118	119	108	93	84	84	66	64	66
21	63	61	61	50	50	45	54	102	123	131	122	122	145	145	133	128	125	122	111	107	97	83	84	78
22	67	69	57	57	55	50	54	83	120	137	134	137	135	133	129	124	120	110	105	98	90	76	64	66
23	65	59	57	58	55	49	55	99	133	128	119	130	135	134	122	119	121	118	105	105	84	79	72	68
24	67	61	60	59	59	57	69	103	133	138	142	151	R 150	151	149	146	137	126	106	94	90	84	80	78
25	65	61	56	54	V 52	F 50	61	96	116	125	137	144	144	139	135	131	122	115	107	99	87	76	71	71
26	65	66	67	60	56	57	60	S 102	134	137	146	146	143	138	131	125	122	121	107	94	85	84	78	70
27	69	68	70	64	47	45	55	101	147	R 147	127	133	138	136	128	121	113	114	109	96	79	73	J S 69	66
28	68	67	61	V 52	48	F 48	55	108	131	137	146	148	146	144	140	138	135	124	108	93	93	72	77	85
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	27	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
MED	54	55	54	50	47	44	48	80	106	122	126	133	135	132	127	122	118	107	90	84	67	58	57	54
UQ	64	61	58	57	51	50	55	94	126	133	137	140	144	139	134	127	122	113	106	94	84	73	67	66
LQ	48	46	47	44	37	35	38	74	98	114	120	128	128	127	122	117	107	97	82	71	56	50	48	50

FEB. 1990 | FOF2 (0.1 MHZ)

IONOSPHERIC DATA

FEB. 1990 | FOF1 (0.01 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1										L	L	L	L			L								
2											L	L	L	L	L									
3										L		L	L	L	L									
4											L	L	L	L	L									
5											L		L	L	L									
6											L	L	L											
7											L	L	L	L	L									
8											L	L	L	L										
9										L		L	L	L										
10													L		L									
11										L	L	L	L	L	L	L								
12										L	L	L	L	L	L									
13										L	L	L	L	L	L									
14											L	L	L	L	L									
15											L	L	L	L	L	L								
16										L	L	L	L	L										
17											L	L	L	L	L									
18											L	L	L	L	L	L								
19											L	L	L	L										
20											L		L	L	L									
21												L	L	L	L									
22										L	L	L	L	L	L									
23											L	L	L	L		L								
24									L	L	L		L	L	L									
25											L	L	L	L	L	L								
26									L	L	L	L	L	U L 710	L	L	L							
27										L		L	L	L	L									
28												L	L	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										
MED														U L 710										
UQ																								
LQ																								

FEB. 1990 | FOF1 (0.01 MHZ)

IONOSPHERIC DATA

FEB. 1990 | FOE (0.01 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

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

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								195	270	310	345	365	A	370	340	310	270	U A 185						
2								H 200	H 275	310	340	355	370	365	A	305	H 265	B						
3								H 200	255	310	335	345	350	350	340	310	U A 235	180						
4								200	265	310	U A 335	340	A	355	U A 335	310	250	H 185						
5								H 200	270	305	335	355	355	340	330	285	245	B						
6								195	260	305	340	355	365	345	315	A 275	A	B						
7								200	260	315	355	A	370	355	330	320	265	H 185						
8								H 200	260	310	340	A	360	360	350	A	A	H 180						
9								205	H 275	310	A	360	360	360	345	305	250	A						
10								H 205	H 270	310	340	355	355	350	340	305	A	180						
11								H 200	260	305	340	350	360	340	340	305	250	170						
12								205	265	310	335	350	360	350	340	310	250	B						
13								H 210	H 290	335	355	370	370	355	340	315	U A 250	170						
14								200	275	325	345	365	360	365	340	U A 305	A	A						
15								H 210	270	310	355	375	370	370	345	310	255	B						
16								H 210	270	H 315	340	355	360	355	335	295	270	A						
17					K 135	J K 130		H 230	H 295	315	340	355	360	360	345	U A 310	A	A						
18								H 225	H 285	325	350	365	380	A	A	A	A	200						
19								H 230	275	325	360	370	360	A	A	A	270	200						
20								H 220	290	335	365	375	385	375	360	330	A 270	B						
21								H 250	290	340	365	380	380	375	360	345	285	170						
22								220	300	340	365	380	385	380	360	A	A	210						
23								H 230	295	335	370	385	380	375	355	330	A	195						
24								H 220	295	340	360	375	A	A	375	345	295	205						
25								235	A	A	A	385	A	385	370	340	275	A						
26								225	295	R 335	365	385	385	380	365	340	A	A						
27								H 240	300	340	375	390	395	385	375	345	280	215						
28								230	300	350	375	390	390	385	R 380	360	305	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	1		28	27	27	26	26	24	25	25	24	19	15						
MED					K 135	J K 130		H 210	275	315	348	365	368	360	345	310	265	185						
UQ								H 228	292	335	365	380	380	375	360	335	272	200						
LQ								200	268	310	340	355	360	355	340	305	250	180						

FEB. 1990 | FOE (0.01 MHZ)

IONOSPHERIC DATA

FEB. 1990 | FOES (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	E B 14	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	G	G	G	G	G	39	J A 43	G	G 29	G	J A 25	J A 24	J A 28	J A 22	E B 15	20	E B 13
2	J A 26	J A 26	E B 13	E B 12	E B 14	E B 14	E B 14	G	G	G	37	39	G	G	36	G	G	E B 14	E B 13	19	E B 13	E B 14	20	E B 14
3	E B 14	E B 14	E B 14	E B 13	E B 13	E B 13	E B 14	23	G	G	37	38	43	J A 48	38	38	32	G 18	J A 23	J A 24	J A 18	20	E B 13	E B 14
4	J A 21	E B 13	E B 13	E B 13	E B 13	E B 15	E B 13	G	G	36	J A 50	43	J A 41	G	39	G	G 25	G	18	E B 14	E B 13	E B 14	E B 12	E B 13
5	E B 13	E B 15	J A 18	J A 20	E B 12	E B 13	E B 14	G	G	G	36	43	45	43	38	35	G	E 16	J A 20	J A 21	20	E B 13	E B 15	E B 14
6	E B 13	E B 14	E B 13	J A 23	22	E B 13	E B 13	G	G	G	J A 39	J A 43	J A 46	41	J A 46	J A 41	J A 37	J A 34	J A 51	J A 21	J A 42	J A 32	J A 26	J A 18
7	J A 37	J A 51	20	E B 13	J A 21	E B 13	E B 15	G	G	G	J A 49	J A 42	J A 47	39	J A 43	G	G	G	E B 12	E B 13	19	E B 14	E B 13	E B 14
8	19	E B 13	E B 13	J A 19	J A 49	J A 31	E B 14	G	G	36	G	J A 41	G	G	41	J A 43	28	G	E B 13	E B 13	E B 13	E B 13	E B 14	23
9	J A 23	J A 21	J A 27	J A 25	J A 22	E B 13	E B 14	G	G	G	J A 54	J A 42	G	G	G 29	G	G 23	J A 26	J A 26	J A 26	J A 18	J A 17	20	21
10	E B 14	E B 13	E B 12	E B 13	E B 11	E B 13	E B 14	G	G	G 22	G 17	41	41	J A 48	J A 55	J A 42	J A 35	G 18	J A 17	J A 22	E B 13	E B 14	E B 14	E B 13
11	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	E B 14	G	G	G	37	38	39	38	G	33	G	G	E B 13	E B 13	E B 13	E B 13	E B 14	E B 14
12	E B 13	E B 13	E B 14	E B 13	E B 13	E B 14	20	G	G	34	38	40	41	40	G	G	G 25	E B 18	E B 13	E B 13	E B 13	E B 13	E B 14	E B 13
13	E B 14	E B 14	E B 13	E B 13	E B 13	E B 13	E B 14	J A 24	G	G	38	39	41	G	37	G	33	21	J A 22	E B 13	J A 20	E B 13	J A 23	22
14	E S 18	E B 14	E B 14	J A 24	E B 13	E B 13	E B 13	G	G	35	39	42	43	40	G 25	34	28	J A 21	24	E B 14	E B 14	J A 27	24	E B 13
15	J A 17	J A 23	J A 22	E B 13	E B 13	E B 15	E B 13	G	G	G 25	38	43	40	42	42	39	34	J A 28	49	E B 13	J A 76	J A 32	30	J A 21
16	E B 14	E B 14	E B 13	E B 12	J A 15	E B 14	E B 13	G	G	G	37	40	39	43	41	J A 40	J A 37	J A 28	J A 21	J A 20	J A 54	J A 32	E B 13	E B 13
17	E B 14	E B 14	E B 13	E B 12	K 14	K 13	J A 15	G	G	35	37	40	41	41	40	J A 51	J A 30	19	E B 14	E B 13	E B 14	J A 21	J A 51	J A 22
18	E B 14	J A 21	E B 12	E B 13	E B 13	E B 13	E B 13	G	G	G	G	G	42	39	J A 47	J A 37	29	G	J A 22	22	J A 21	J A 23	20	E B 15
19	J A 34	J A 32	23	J A 31	E B 14	E B 14	E B 13	G	G	35	G	45	J A 65	J A 43	J A 37	J A 36	28	G 20	J A 37	J A 21	J A 15	E B 14	J A 21	J A 19
20	J A 18	E B 12	J A 25	E B 13	E B 12	E B 14	E B 13	G	G	G	40	40	40	46	43	J A 54	J A 36	E B 19	J A 23	J A 48	J A 19	J A 46	J A 96	J A 26
21	22	25	24	E B 13	E B 13	E B 17	J A 14	G	33	40	42	48	46	40	G	G	G	19	E B 13	E B 13	E B 13	E B 14	E B 13	E B 14
22	J A 27	J A 41	19	20	J A 23	E B 13	E B 14	29	G 23	G 25	G	40	43	42	40	37	31	G	E B 13	E B 12	E B 12	E B 14	E B 13	E B 13
23	E B 13	J A 22	24	J A 20	J A 20	J A 21	E B 13	G	G	G	39	G	44	43	40	40	31	G	J A 17	E B 14	E B 12	E B 12	E B 13	E B 13
24	E B 14	E B 13	E B 13	E B 12	J A 27	E B 13	E B 14	G	G	G	G	J A 49	J A 42	J A 41	G	G	G 26	24	J A 25	E B 15	E B 13	E B 13	E B 14	E B 14
25	E B 16	E B 13	J A 22	J A 21	22	E B 12	E B 14	G 24	31	J A 41	J A 41	G	J A 63	G 31	G 29	J A 44	J A 48	J A 31	30	J A 22	20	E B 13	J A 29	J A 42
26	J A 32	J A 27	J A 18	E B 12	E B 13	E B 13	E B 14	G 19	J A 28	34	G	G	G	40	G	G	J A 33	25	18	E B 14	22	J A 20	J A 22	J A 22
27	J A 17	E B 13	E B 14	E B 13	E B 13	E B 13	E B 13	G	J A 31	G 34	J A 43	G	G 25	42	G	G	39	G 22	J A 32	33	J A 17	J A 23	21	22
28	J A 19	J A 20	J A 20	J A 21	E B 14	E B 13	J A 18	G	G 26	G 31	G 35	J A 51	G 25	G	42	G	G	J A 42	45	J A 48	J A 29	J A 27	E B 13	E B 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	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 E 16	E B 14	E B 14	E B 13	E B 13	E B 13	E B 14	G	G	E G 22	37	40	41	40	38	34	28	19	22	17	18	E B 14	18	E B 14
UQ	J A 22	J A 22	21	J A 20	20	E B 14	E B 14	G	G	34	40	43	44	43	42	J A 40	34	J A 25	J A 26	J A 22	J A 20	J A 23	22	22
LQ	E B 14	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	G	G	G	E G 17	38	39	34	E G 25	G	E G 23	E G 14	E B 14	E B 13	E B 13	E B 13	E B 13	E B 13

FEB. 1990 | FOES (0.1 MHZ)

IONOSPHERIC DATA

FEB. 1990 | FBES (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	E B 14	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	G	G	G	G	G	38	G 32	G	G 28	G	G 19	18	22	E B 14	E B 15	E B 14	E B 13
2	16	17	E B 13	E B 12	E B 14	E B 14	E B 14	G	G	G	36	38	G	G	35	G	G	E B 14	E B 13	E B 14	E B 13	E B 14	E B 14	E B 14
3	E B 14	E B 14	E B 14	E B 13	E B 13	E B 13	E B 14	G	G	G	35	37	40	42	37	37	32	G 17	16	18	16	E B 14	E B 13	E B 14
4	E B 14	E B 13	E B 13	E B 13	E B 13	E B 15	E B 13	G	G	35	39	40	36	G	34	G	G 24	G	E B 13	E B 14	E B 13	E B 14	E B 12	E B 13
5	E B 13	E B 15	E B 14	14	E B 12	E B 13	E B 14	G	G	G	G	40	40	40	37	33	G	E G 16	18	17	E B 14	E B 13	E B 15	E B 14
6	E B 13	E B 14	E B 13	E B 14	E B 15	E B 13	E B 13	G	G	G	G	38	38	39	41	38	33	29	33	19	25	17	23	E B 13
7	27	25	E B 12	E B 13	15	E B 13	E B 15	G	G	G	G	38	40	G	37	G	G	G	E B 12	E B 13	E B 14	E B 14	E B 13	E B 14
8	E B 14	E B 13	E B 13	E B 13	A A 49	27	E B 14	G	G	34	G	37	G	G	36	40	26	G	E B 13	E B 13	E B 13	E B 13	E B 14	E B 15
9	20	18	E B 13	16	E B 12	E B 13	E B 14	G	G	G	36	39	G	G	G 28	G	G 17	19	17	17	E B 13	E B 14	E B 15	E B 15
10	E B 14	E B 13	E B 12	E B 13	E B 11	E B 13	E B 14	G	G	G 20	G 16	39	40	44	42	40	30	G 17	E B 15	E B 13	E B 13	E B 14	E B 14	E B 13
11	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	E B 14	G	G	G	36	37	38	36	G	33	G	G	E B 13	E B 13	E B 13	E B 13	E B 14	E B 14
12	E B 13	E B 13	E B 14	E B 13	E B 13	E B 14	E B 13	G	G	34	37	39	40	40	G	G	G 23	E G 18	E B 13	E B 13	E B 13	E B 13	E B 14	E B 13
13	E B 14	E B 14	E B 13	E B 13	E B 13	E B 13	E B 14	G	G	G	38	39	39	G	37	G	30	20	20	E B 13	E B 13	E B 13	17	18
14	E S 18	E B 14	E B 14	16	E B 13	E B 13	E B 13	G	G	35	37	38	40	38	G 23	33	27	20	E B 13	E B 14	E B 14	24	17	E B 13
15	E B 14	19	15	E B 13	E B 13	E B 15	E B 13	G	G	G 23	37	39	39	40	38	36	33	25	19	E B 13	40	20	18	E B 13
16	E B 14	E B 14	E B 13	E B 12	E B 13	E B 14	E B 13	G	G	G	35	38	37	42	33	36	34	26	17	E B 13	32	16	E B 13	E B 13
17	E B 14	E B 14	E B 13	E B 12	K 14	K 13	E B 13	G	G	34	35	38	40	39	37	47	28	18	E B 14	E B 13	E B 14	E B 13	E B 14	E B 14
18	E B 14	17	E B 12	E B 13	E B 13	E B 13	E B 13	G	G	G	G	G	40	37	37	33	28	G	19	E B 14	18	E B 14	E B 15	E B 15
19	24	18	E B 13	16	E B 14	E B 14	E B 13	G	G	34	G	41	42	39	36	34	G 23	G 16	25	E B 13	E B 13	E B 14	E B 14	E B 13
20	E B 12	E B 12	E B 13	E B 13	E B 12	E B 14	E B 13	G	G	G	38	39	40	44	40	39	34	E B 19	19	20	15	27	57	E B 13
21	E B 13	19	16	E B 13	E B 13	15	E B 14	G	31	37	41	46	45	40	G	G	G	G 17	E B 13	E B 13	E B 13	E B 14	E B 13	E B 14
22	16	25	E B 13	E B 13	17	E B 13	E B 14	G	G 21	G 24	G	G 38	41	40	38	35	29	G	E B 13	E B 12	E B 12	E B 14	E B 13	E B 13
23	E B 13	16	18	E B 13	E B 12	E B 13	E B 13	G	G	G	39	G	41	41	39	39	30	G	16	E B 14	E B 12	E B 12	E B 13	E B 13
24	E B 14	E B 13	E B 13	E B 12	E B 13	E B 13	E B 14	G	G	G	G	41	40	40	G	G	G 24	23	22	E B 15	E B 13	E B 13	E B 14	E B 14
25	E B 16	E B 13	16	E B 13	E B 13	E B 12	E B 14	G 23	30	36	39	G	58	G 27	G 27	G 28	G 21	22	18	17	E B 14	E B 13	21	33
26	17	15	E B 13	E B 12	E B 13	E B 13	E B 14	G 17	G 23	G 26	G	G	G	40	G	G	31	23	16	E B 14	E B 13	E B 13	E B 15	E B 13
27	E B 13	E B 13	E B 14	E B 13	E B 13	E B 13	E B 13	G	G	G 29	G 36	G	G 23	41	G	G	36	G 18	28	19	E B 13	16	E B 14	E B 12
28	E B 13	E B 15	17	E B 14	E B 14	E B 13	16	G	G 24	G 30	G 33	G 32	G 24	G	42	G	G	36	35	26	16	E B 12	E B 13	E B 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	28	28	23	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 14	E B 13	E B 13	E B 13	E B 13	E B 14	G	G	E G 20	35	38	40	39	36	33	26	18	16	E B 14	E B 13	E B 14	E B 14	E B 14
UQ	E E 16	17	E B 14	E B 13	E B 14	E B 14	E B 14	G	G	34	37	39	40	40	38	36	30	21	19	17	14	E B 14	E B 15	E B 14
LQ	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 34	36	E G 27	E G 23	G	E G 17	E G 14	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13

FEB. 1990 | FBES (0.1 MHZ)

IONOSPHERIC DATA

FEB. 1990 | FMIN (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

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

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

FEB. 1990 | FMIN (0.1 MHZ)

IONOSPHERIC DATA

FEB. 1990 | M(3000)F2 (0.01) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	260	275	300	295	255H	265	290	325	325	310	310	305	290	295	285	285	305	305	295	315	320	270	265	255
2	255	270	290	320	240	240	315	350S	325	305	305	295	290	275	285	285	285	290	300	310	280	265	280	265
3	260	260	290	265	260	280	325	325S	325	320	310	305	305	305	305	300	310	310	305	320	325S	315	305	305
4	290	270	265	305	325	275	310	335	345	320	315	305	320	300	290	300	305	310	295	315	320	300	280	280
5	265	265	280	320	255	255	315	310	310	310	325	310	295	300	300	300	315	310	290	295	310	305	275	310
6	285	295	295	265	265	275	290	330	330	315	320	310	310	305	305	310	310	320	320	310	310	300	305	290
7	280	285S	275	275	285	310	330	330	350	335	315	315	320	315	305	320	320	315	315	320	290	280	280	280
8	250	265	330	340	A	260	275	300	325	310	320R	315OR	300	305	310	320	320	315	320	345	295	305	305	300
9	295	295	315	320	280	305	300	330	345	315	320	325	315	320	310	320	330	325	325	315	310	315	275S	270
10	285	295	285	275	285	295	300	330	335	335	320	315	315	315	320	315	335	330	315	315	280	295	295	295
11	280	280	280	335	305	295	290	310	315	325	320V	315	305	305	320	320	315	315	315	310	310	315	275	300
12	305	315	290	290	290	280	295	330	335	330	315	325	310	305	310	320	340	340	310	310	300	285	280	280
13	290	295	295	320	380	280	300	345S	345	320	320	310	300	300	310	320	335	325	330	305	300	295	285	280
14	280	290	300	310	330	280	295	330S	330	325	315	300	305	295	290	290	275	310	305	260	265	285	285	250
15	275	290	280	280	275	285	320	350	340	315	315	300	295	305	300	300	315	315	295	310	315	285	270	300
16	270	255	260	305	255	250	260	320	310	305	305	280	280	280	280	290	295	305	300	305	295	270	275	280
17	290	285	285	365	250	270	290	335	330	315	300	300	295	285	295	290	295	290S	300	295	270	270	260	260
18	285	275	285	265	245	275	305	320	325	310	315	300	295	285	290	290	290	295	290	300	295	290	270	250V
19	265	300	300	305	260	260	295	320	325	330	305	295	305	295	295	285	295	290	300	295	275	295	280	275
20	255	250	260	275	290	305	295	295	315	320	305	285	295	300	290	290	295	295	295	285	295	260	A	270
21	280	270	305	270	265	255	280	320	320	320	305	275	285	290	285	285	285	290	290	295	295	265	275	295
22	280	285	285	285	280	280	295	320	310	320	300	295	285	280	280	275	290	285	285	295	295	295	275	270
23	275	260	255	265	270	265	265	310	320	315	285	285	275	285	275	270	280	290	275	290	290	270	275	265
24	260	255	240	255	260	245	275	300	305	300	285	280	270R	265	275	275	285	290	280	280	275	270	280	285
25	280	270	255	260	260V	245F	285	315	305	290	280	280	280	270	270	270	275	280	285	290	280	290	270	270
26	265	260	275	285	245	240	265	310S	315	305	295	290	280	275	270	275	275	290	285	285	285	280	270	250
27	260	245	275	310	250	260	275	300	320	310R	290	285	280	280	275	270	280	285	285	295	275	275	255JS	245
28	255	280	270	285V	245	245F	275	320	310	310	305	285	275	275	270	265	270	275	280	270	285	255	250	270
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	27	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	27	28
MED	278	275	285	288	265	272	295	320	325	315	310	300	295	295	290	290	295	305	298	302	295	285	275	278
UQ	285	290	295	315	285	280	302	330	332	320	318	310	305	305	305	312	315	315	312	312	310	298	280	292
LQ	260	262	272	272	255	255	278	310	315	310	302	285	282	280	280	280	285	290	288	292	280	270	270	265

FEB. 1990 | M(3000)F2 (0.01)

IONOSPHERIC DATA

FEB. 1990 | M(3000)F1 (0.01)

135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1										L	L	L	L			L								
2											L	L	L	L	L									
3										L		L	L	L	L									
4											L	L	L	L	L									
5											L		L	L	L									
6											L	L	L											
7											L	L	L	L	L									
8											L	L	L	L										
9										L		L	L	L										
10													L		L									
11										L	L	L	L	L	L	L								
12										L	L	L	L	L	L									
13										L	L	L	L	L	L									
14											L	L	L	L	L									
15											L	L	L	L	L	L								
16										L	L	L	L	L										
17											L	L	L	L	L									
18											L	L	L	L	L	L								
19											L	L	L	L										
20											L		L	L	L									
21												L	L	L	L									
22										L	L	L	L	L	L									
23											L	L	L	L		L								
24									L	L	L		L	L	L									
25											L	L	L	L	L	L								
26									L	L	L	L	L	0 L 345	L	L	L							
27										L		L	L	L	L									
28												L	L	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										
MED														0 L 345										
UQ																								
LQ																								

FEB. 1990 | M(3000)F1 (0.01)

IONOSPHERIC DATA

FEB. 1990 | H*F2 (KM) | 135° E Mean Time (G.M.T. + 9 h)

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

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1										260	255	255	290L			305								
2											275	240	300	255	260									
3										255		265	260	260	260									
4											270	285	255	255	235									
5											250		255	260	255									
6											250	255	255											
7											260	260	235	240	275									
8											255	250	230	250										
9										260		250	240	240										
10													250		265									
11										255	230	260	240	260	255	235								
12										250	255	260	255	260	270									
13										255	255	275	260	280	255									
14											255	270	270	260	275									
15											260	275	275	265	255	255								
16										250	260	255	275	290										
17											260	260	285	305	260									
18											250	260	260	300	265	255								
19											285	295L	270	275										
20											255		265	265	270									
21												320L	305	290	305									
22										250	255	265	305	260	310									
23											305L	275	305	305		315L								
24									260	250	295L		335	335L	330									
25											310	305	315	335L	315L	310L								
26									255	255	280L	310	265	335	320L	305	305							
27										220		300L	290L	305L	325L									
28												305	320L	310	325									
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									2	11	22	24	28	25	21	7	1							
MED									258	255	258	265	268	265	270	305	305							
UQ										255	275	290	295	305	310	308								
LQ										250	255	258	255	260	260	255								

FEB. 1990 | H*F2 (KM)

IONOSPHERIC DATA

FEB. 1990 | H'F (KM) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	340	295	260	225	E B 215	320	275	245	220	H 210	230	230	225	230	225	215	240	235	225	A 225	215	265	300	330
2	345	310	265	230	410	435	260	210	220	230	225	230	225	230	220	235	230	230	230	230	230	270	305	310
3	315	315	260	260	340	290	215	230	225	230	230	230	225	230	220	235	225	225	225	235	225	230	245	255
4	260	305	330	250	230	295	260	220	220	225	225	220	245	230	225	230	235	220	220	230	220	235	280	300
5	290	320	305	255	305	350	220	225	230	220	225	225	230	235	225	230	235	220	230	250	230	235	290	230
6	265	260	240	310	330	305	235	230	220	220	225	235	230	225	230	235	225	220	A 250	240	255	250	260	255
7	A 315	A 305	300	315	280	250	230	230	215	230	220	220	230	220	225	235	230	220	220	230	255	260	280	270
8	365	320	240	210	A	A	340	260	240	230	230	220	225	220	230	230	230	220	220	220	220	260	260	260
9	305	280	260	250	290	275	260	230	220	220	230	230	230	220	225	230	210	210	225	225	230	230	305	345
10	320	280	280	310	240	270	270	235	225	225	215	230	230	250	E A 250	A 250	230	220	220	210	240	270	260	260
11	305	310	300	220	240	260	310	250	H 230	220	225	H 215	220	210	235	220	220	220	230	225	220	240	315	270
12	250	250	285	270	265	310	285	220	230	235	230	235	225	240	H 215	H 215	H 220	220	225	240	230	265	290	290
13	265	270	285	250	200	300	275	230	230	225	230	215	235	215	240	240	H 220	220	A 225	215	255	265	290	320
14	310	290	280	270	225	310	280	230	225	235	225	225	230	225	220	235	250	230	200	225	280	A 300	265	310
15	315	290	285	280	285	290	240	220	215	H 205	225	230	230	225	235	230	230	225	240	250	E A 265	285	305	265
16	310	345	350	265	H 250	B 340	350	230	H 230	235	225	240	230	230	235	235	240	255	215	235	E A 280	290	290	300
17	270	280	295	205	405	330	260	225	235	235	225	220	230	230	230	A 250	240	220	235	230	275	320	300	330
18	270	295	275	310	340	300	255	240	230	230	225	225	230	225	A 250	230	235	220	235	230	250	240	275	345
19	A 350	265	250	250	290	345	255	235	230	230	215	230	245	225	235	235	230	230	240	225	230	255	265	285
20	330	310	315	265	215	235	275	250	230	H 210	220	230	240	A 240	225	A 250	245	230	220	270	255	A 245	A	280
21	270	305	250	230	300	320	280	230	230	230	230	230	235	225	230	240	245	230	220	240	230	265	275	255
22	275	A 290	250	255	265	280	250	220	225	225	225	220	220	235	225	230	245	240	230	255	225	240	260	295
23	295	320	330	265	230	275	305	235	220	215	225	225	230	225	H 220	A 240	235	240	235	255	215	265	255	275
24	310	315	350	295	275	335	285	225	235	225	225	230	220	225	240	240	240	235	215	245	245	260	265	260
25	265	280	305	300	315	320	275	220	235	225	H 225	225	E A 255	225	H 230	230	240	235	250	250	235	240	285	E A 325
26	265	290	265	240	320	365	315	235	220	225	225	H 215	225	215	225	230	240	250	225	240	250	265	280	315
27	305	270	265	225	220	325	290	255	235	215	220	225	220	225	230	230	240	245	A 245	240	230	255	305	355
28	310	275	230	230	305	365	305	235	220	230	230	220	235	220	H 235	250	245	A 235	A 245	285	260	255	325	285
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	27	27	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	27	28
MED	305	292	280	255	280	310	275	230	228	225	225	225	230	225	229	235	235	228	225	235	231	260	280	286
UQ	315	310	302	275	310	332	288	235	230	230	230	230	231	230	235	240	240	235	235	248	254	265	300	315
LQ	270	280	260	230	235	285	255	225	220	220	225	220	225	222	225	230	230	220	220	225	228	240	265	262

FEB. 1990 | H'F (KM)

IONOSPHERIC DATA

FEB. 1990 | H'E (KM) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								E B 175	120	110	110	115	115	A 130	110	E A 130	120	A						
2								E B 155	110	110	110	110	115	115	A	115	115	B						
3								170	115	110	105	110	115	A 115	A 115	A 115	115	A						
4								B 150	115	110	110	110	110	110	115	115	E A 135	B						
5								E B 155	115	110	115	110	110	110	110	E A 125	110	B						
6								E B 155	115	110	110	115	120	110	115	110	A	B						
7								140	120	115	115	115	110	115	115	115	110	140						
8								140	120	115	115	A	115	120	115	110	A	135						
9								E B 140	120	115	110	115	115	115	A 120	115	A 120	A						
10								E B 155	115	A 120	A 120	115	120	115	110	115	115	A						
11								135	110	110	110	110	115	110	110	110	115	130						
12								E B 165	115	110	115	110	115	115	110	115	120	B						
13								135	115	110	115	120	115	115	115	110	115	E B 130						
14								130	115	110	110	110	110	110	A 115	A 115	A	A						
15								E B 135	110	A 120	110	120	110	115	110	110	110	B						
16								125	110	110	110	110	105	E A 120	110	110	115	A						
17					E B 190	B		130	110	110	110	110	110	110	115	115	A	A						
18								130	110	110	110	115	115	115	A	A	A	120						
19								125	115	110	110	115	115	A	A	A	A 130	E A 145						
20								135	115	110	110	115	115	115	115	120	120	B						
21								130	115	110	115	110	110	115	115	115	120	A						
22								125	A 120	A 120	115	110	110	120	115	115	A	130						
23								130	110	105	110	110	115	115	110	110	115	115						
24								125	110	115	110	115	110	110	115	110	A 120	E A 135						
25								A	110	115	110	115	A	A 115	A 115	E A 120	E A 115	A						
26								A 125	E A 125	A 125	110	115	120	115	115	110	115	A						
27								120	110	E A 130	A	115	115	A 115	110	110	110	E A 140						
28								120	E A 130	E A 130	E A 130	E A 130	120	115	E B 130	B 120	110	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	28	28	27	27	27	27	25	26	22	10						
MED					E B 190			130	115	110	110	115	115	115	115	114	115	125						
UQ								B 144	116	115	115	115	115	115	115	115	120	E A 140						
LQ								126	110	110	110	110	110	112	110	110	115	130						

FEB. 1990 | H'E (KM)

IONOSPHERIC DATA

FEB. 1990 | H'ES (KM) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	B	B	B	B	B	B	B	G	G	G	G	G	115	115	G	110	G	110	105	105	110	B	105	B
2	105	105	B	B	B	B	B	G	G	G	E G 135	135	G	G	115	G	G	B	B	110	B	B	120	B
3	B	B	B	B	B	B	B	120	G	G	E G 170	E G 160	125	125	140	120	115	115	100	110	105	105	B	B
4	110	B	B	B	B	B	B	G	G	130	115	115	115	G	120	G	115	G	100	B	B	B	B	B
5	B	B	110	100	B	B	B	G	G	G	E G 165	130	125	120	120	120	G	B	105	110	105	B	B	B
6	B	B	B	105	110	B	B	G	G	G	120	130	130	125	115	115	110	110	110	105	105	110	110	110
7	110	110	115	B	110	B	B	G	G	G	120	120	120	125	120	G	G	G	B	B	110	B	B	B
8	130	B	B	110	110	110	B	G	G	140	G	115	G	G	125	110	110	G	B	B	B	B	B	105
9	105	110	110	105	110	B	B	G	G	G	110	145	G	G	110	G	110	105	105	95	100	105	120	110
10	B	B	B	B	B	B	B	G	G	100	105	E G 160	145	130	115	115	120	115	110	115	B	B	B	B
11	B	B	B	B	B	B	B	G	G	G	E G 180	E G 155	E G 150	125	G	120	G	G	B	B	B	B	B	B
12	B	B	B	B	B	B	105	G	G	E G 195	E G 170	E G 155	150	E G 210	G	G	115	B	B	B	B	B	B	B
13	B	B	B	B	B	B	B	120	G	G	E G 170	E G 180	E G 185	G	E G 200	G	110	135	110	B	110	B	105	100
14	S	B	B	105	B	B	B	G	G	E G 200	E G 165	140	120	130	100	125	115	100	100	B	B	105	105	B
15	110	105	105	B	B	B	B	G	G	105	E G 185	135	E G 160	150	135	135	120	110	110	B	105	100	100	115
16	B	B	B	B	115	B	B	G	G	G	E G 170	145	E G 185	130	135	115	120	115	115	110	105	110	B	B
17	B	B	B	B	K 190	B	155	G	G	E G 155	E G 160	140	135	130	125	110	115	115	B	B	B	110	105	140
18	B	110	B	B	B	B	B	G	G	G	G	G	145	115	110	115	125	G	110	110	105	115	105	B
19	110	110	110	105	B	B	B	G	G	E G 180	G	130	115	110	110	110	110	115	100	125	110	B	110	105
20	110	B	120	B	B	B	B	G	G	G	E G 205	E G 190	E G 175	130	130	120	120	B	115	110	115	110	110	140
21	110	105	105	B	B	105	B	G	E G 165	140	135	125	125	140	G	G	G	115	B	B	B	B	B	B
22	105	110	110	110	105	B	B	110	110	110	G	E G 155	130	E G 135	120	125	120	G	B	B	B	B	B	B
23	B	100	100	105	100	105	B	G	G	G	E G 180	G	130	125	125	115	110	G	110	B	B	B	B	B
24	B	B	B	B	120	B	B	G	G	G	G	120	120	120	G	G	105	140	110	B	B	B	B	B
25	B	B	105	105	110	B	B	110	115	110	110	G	100	105	105	105	100	100	100	95	115	B	105	105
26	105	105	110	B	B	B	B	110	110	125	G	G	G	140	G	G	120	110	110	B	110	100	130	105
27	110	B	B	B	B	B	B	G	110	105	105	G	105	135	G	G	120	120	110	105	120	105	110	105
28	120	105	105	105	B	B	110	G	110	115	110	105	110	G	E G 150	G	G	110	105	105	110	105	B	B
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	13	11	12	10	10	3	3	5	6	14	21	22	24	22	21	17	21	17	20	14	16	12	14	11
MED	110	105	110	105	110	105	110	110	110	U 118	E G 160	Q 129	124	126	120	115	115	115	110	110	110	105	108	105
UQ	110	110	110	105	115	108	132	120	112	E G 155	E G 170	E G 155	Q 139	132	128	120	120	115	110	110	110	110	110	112
LQ	105	105	105	105	110	105	108	110	110	110	112	125	118	120	115	110	110	110	102	105	105	105	105	105

FEB. 1990 | H'ES (KM)

IONOSPHERIC DATA

FEB. 1990 | TYPES OF ES | 135° E Mean Time (G.M.T. + 9 h)

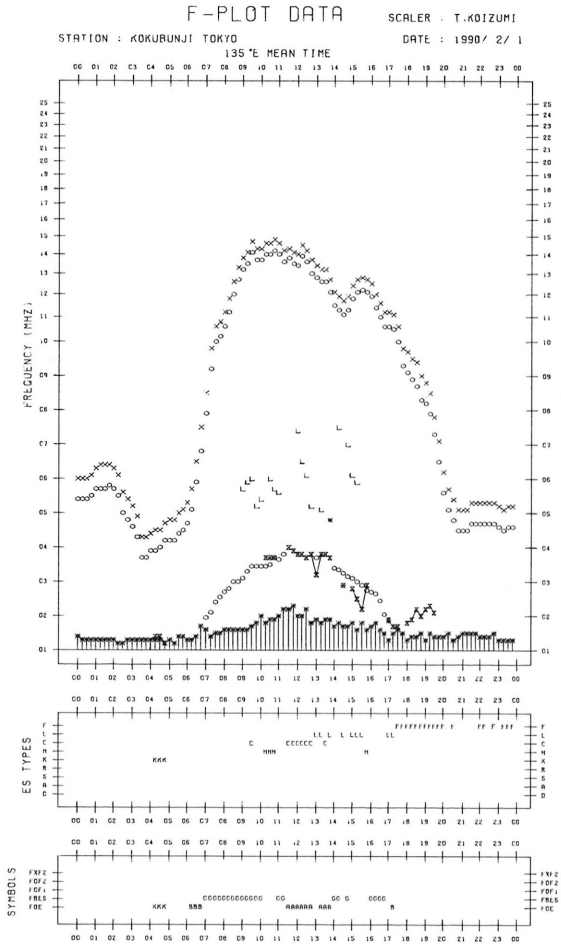
Station KOKUBUNJI TOKYO Lat. 35°42.4'N, Long. 139°29.3'E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

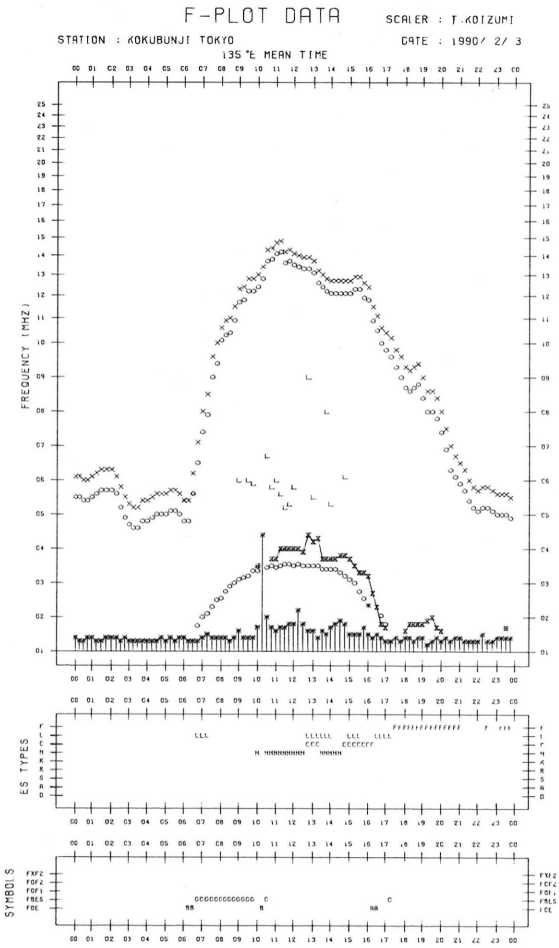
Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1													C 1	L 1		L 2		L 1	F 2	F 4	F 1		F 1	
2	F 3	F 3									A 1	A 1			C 1					F 1			F 1	
3								L 1			A 1	A 1	A 2	CL 21	HL 11	CL 21	C 3	L 1	F 1	F 2	F 1	F 1		
4	F 1									H 2	C 2	C 2	C 1		C 1		L 2		F 1					
5			F 1	F 2							A 1	A 1	A 1	C 1	C 2	CL 21			F 2	F 2	F 2			
6				F 11	F 2						C 1	H 1	H 1	C 1	C 3	C 2	C 3	L 3	F 4	F 3	F 4	F 4	F 4	F 3
7	F 4	F 4	F 3		F 2						C 1	C 1	C 1	C 1	C 1						F 1			
8	F 1			F 1	F 5	F 5				H 1		L 1			H 1	C 2	C 2							F 1
9	F 2	F 3	F 2	F 2	F 2						C 1	HL 11			L 1		L 2	L 2	F 3	F 3	F 2	F 1	F 1	F 1
10										L 1	L 1	A 1	A 1	C 2	C 3	C 3	C 3	L 2	F 1	F 1				
11											H 1	HC 11	H 1	H 1		C 1								
12							F 2			H 1	A 1	A 1	A 1	A 1			L 1							
13								L 1			A 1	A 1	A 1		H 1		C 2	C 1	F 3		F 1		F 2	F 1
14				F 2						H 1	A 1	A 1	HL 21	HL 11	L 2	HL 11	CL 21	L 1	F 1			F 2	F 2	
15	F 1	F 2	F 2							L 2	A 1	HH 11	H 1	H 1	H 2	H 2	C 2	C 3	F 4		F 4	F 3	F 2	F 1
16					F 1						A 1	A 1	H 1	HL 22	HL 11	C 2	H 3	C 3	F 1	F 2	F 4	F 2		
17					K 1	K 1	F 1			H 1	A 1	A 1	H 1	H 1	H 1	C 3	C 2	C 2				F 1	F 2	F 1
18		F 2											A 1	L 1	L 2	L 2	CL 22		F 2	F 2	F 3	F 1	F 2	
19	F 3	F 2	F 2	F 2						H 1		A 2	C 2	C 1	L 1	L 2	L 2	L 2	F 3	FF 11	F 1		F 1	F 1
20	F 1		F 1								A 1	A 1	H 1	H 2	H 1	H 2	C 1		F 3	F 3	F 1	F 5	F 5	FF 12
21	F 1	F 2	F 2			F 2			H 1	H 1	H 1	H 2	H 2	H 1				L 2						
22	F 2	F 4	F 1	F 1	F 2			L 1	L 1	L 1		A 1	A 1	A 1	H 1	C 1	C 2							
23		F 3	F 2	F 1	F 1	F 1					AL 11		A 1	A 1	H 1	C 2	C 2		F 1					
24					F 1							C 1	C 1	C 1			L 2	HL 12	F 3					
25			F 1	F 1	F 1			L 2	L 2	L 2	C 2		L 3	L 1	L 1	L 2	L 2	L 2	F 2	F 2	F 1		F 3	F 5
26	F 2	F 2	F 1					L 1	L 2	L 2				H 1			C 2	L 3	F 1		F 1	F 2	FF 11	F 2
27	F 1								L 1	L 2	L 2		L 1	AL 11			H 2	L 2	F 3	F 3	F 1	F 2	F 2	F 2
28	F 1	F 1	F 2	F 2			F 2		L 2	L 1	L 1	L 2	L 1		H 1			L 3	F 6	F 4	F 2	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																								
UQ																								
LQ																								

FEB. 1990 | TYPES OF ES

f-PLOTS OF IONOSPHERIC DATA

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


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 2/ 1
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS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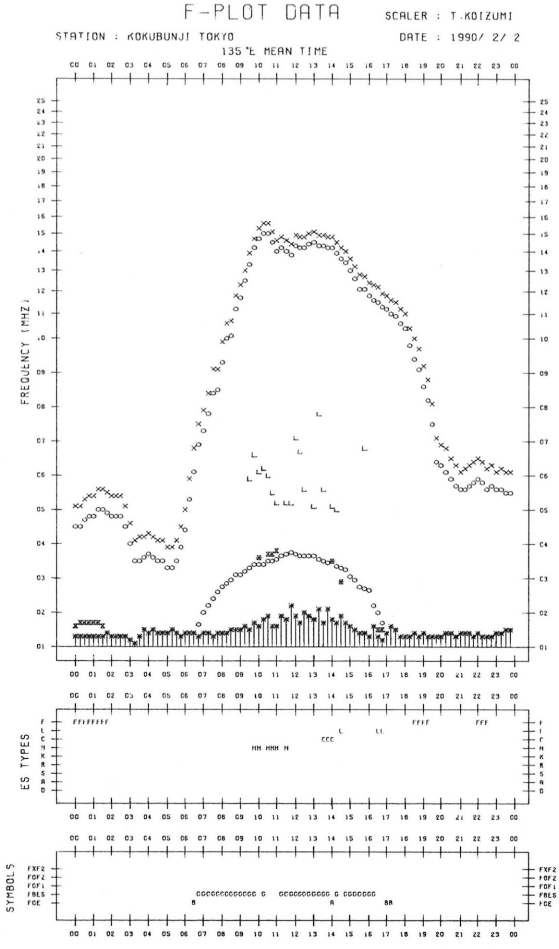
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 2/ 3
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS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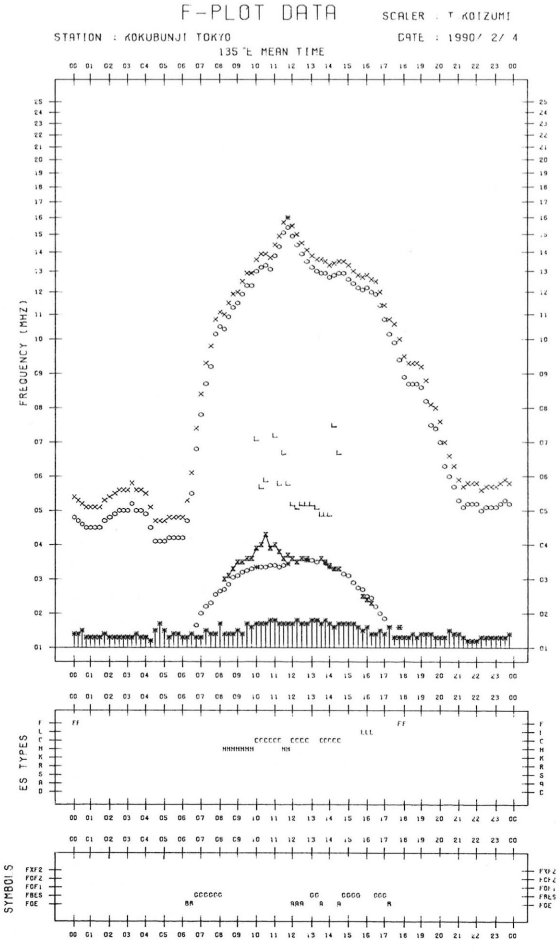
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 2/ 2
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS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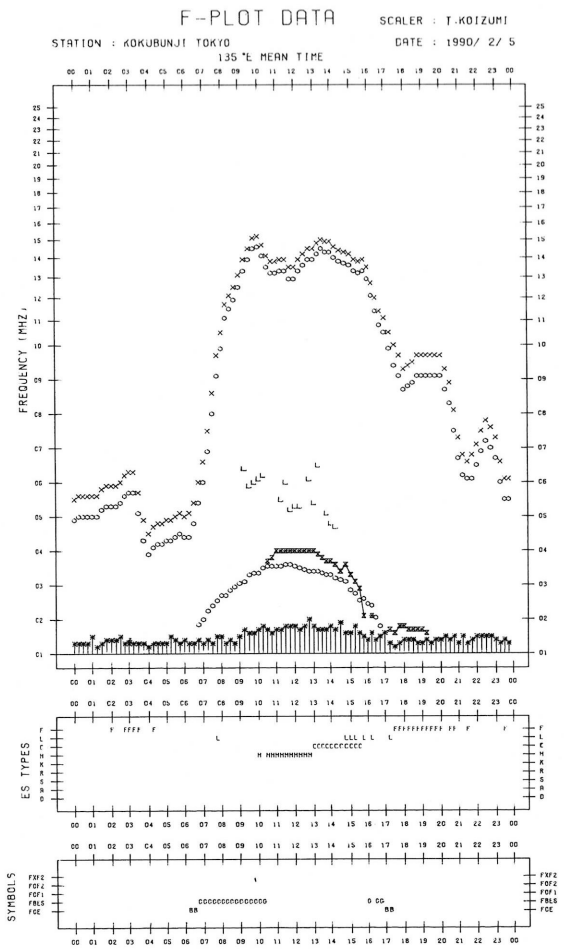
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 2/ 4
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS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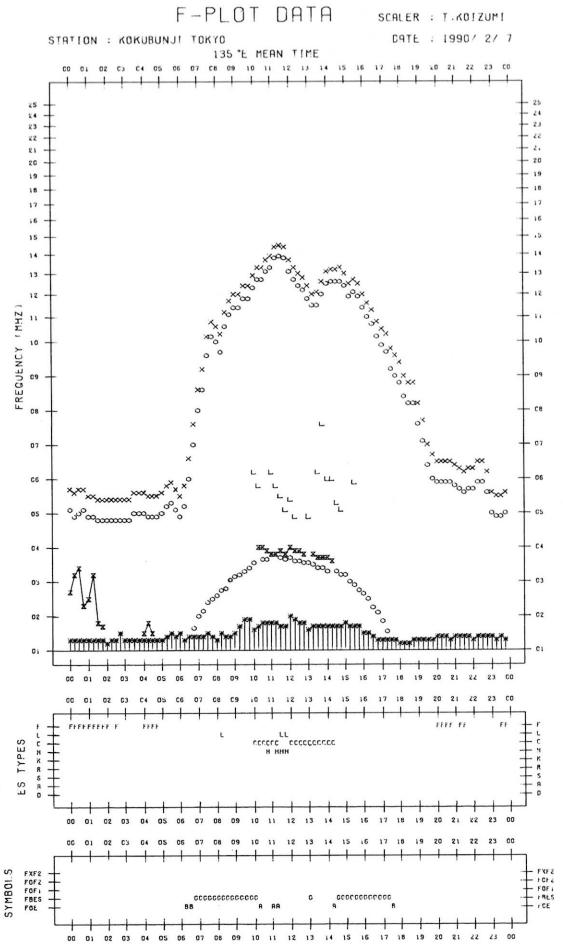
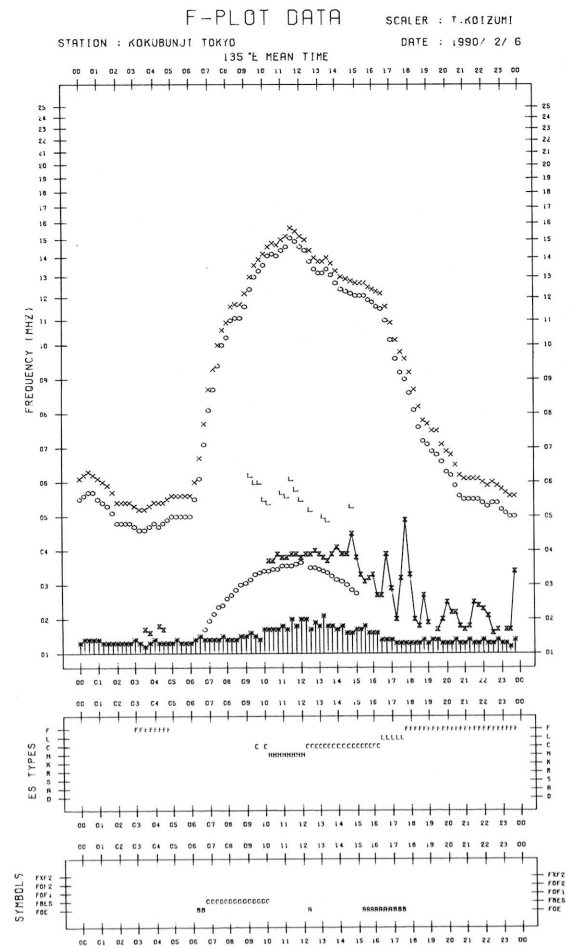
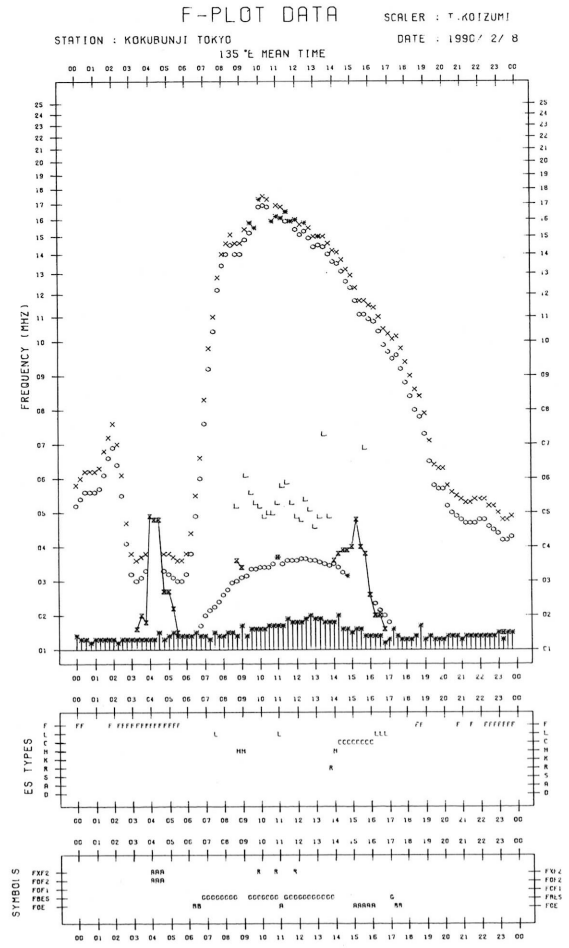
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 2/ 5
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 2/ 7
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 2/ 6
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS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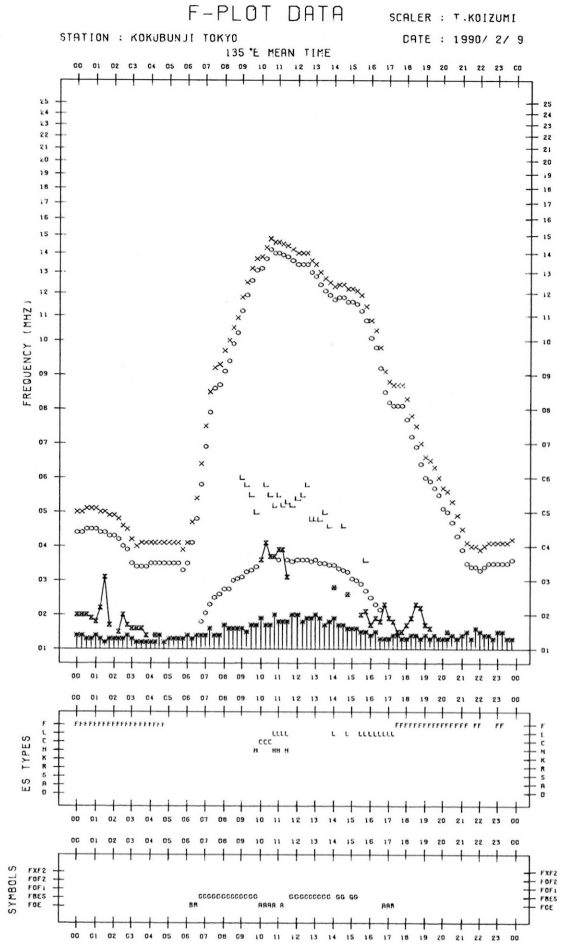
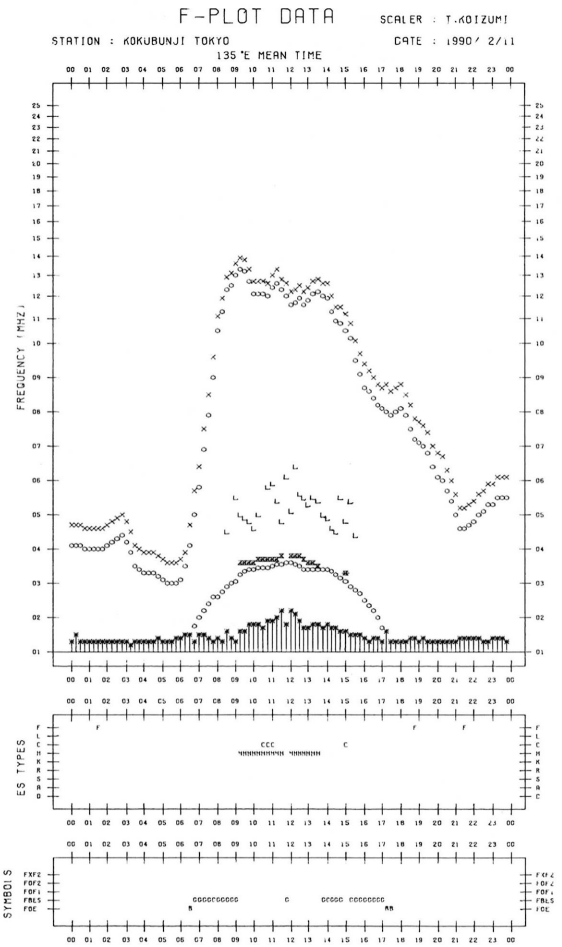
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 2/ 8
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 2/ 9
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS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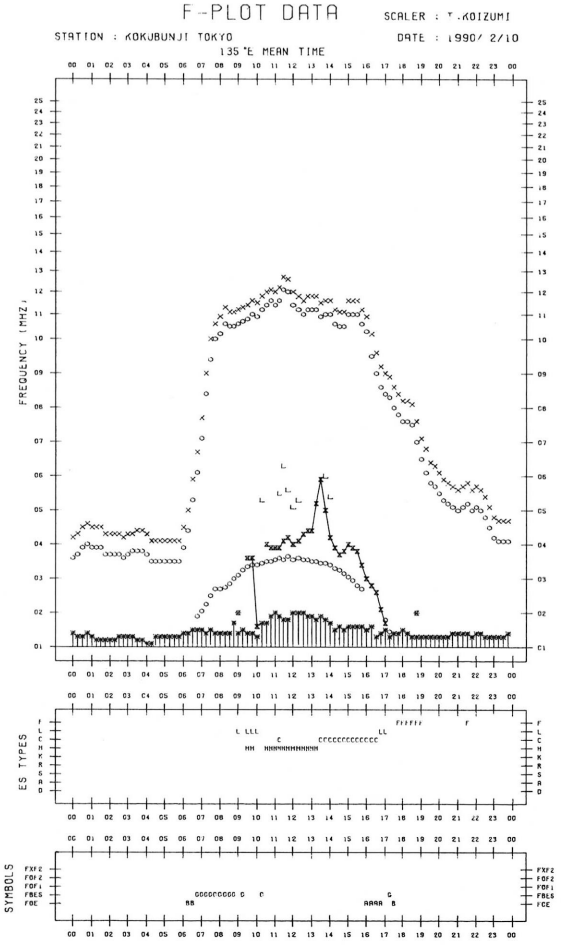
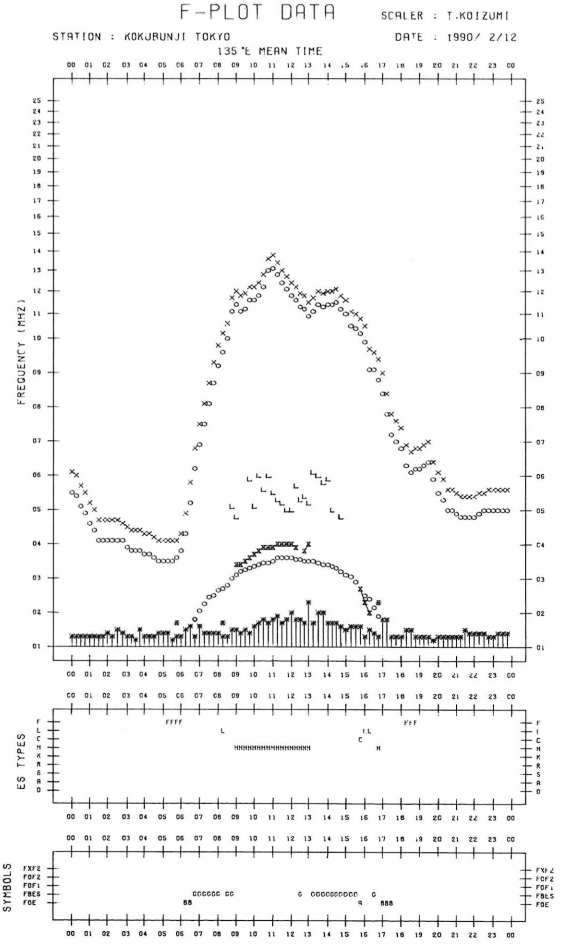
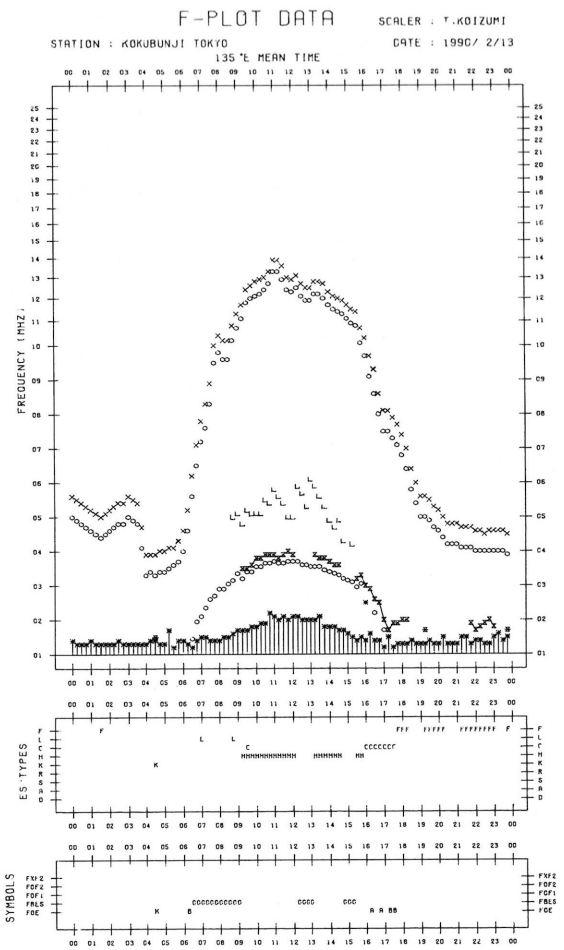
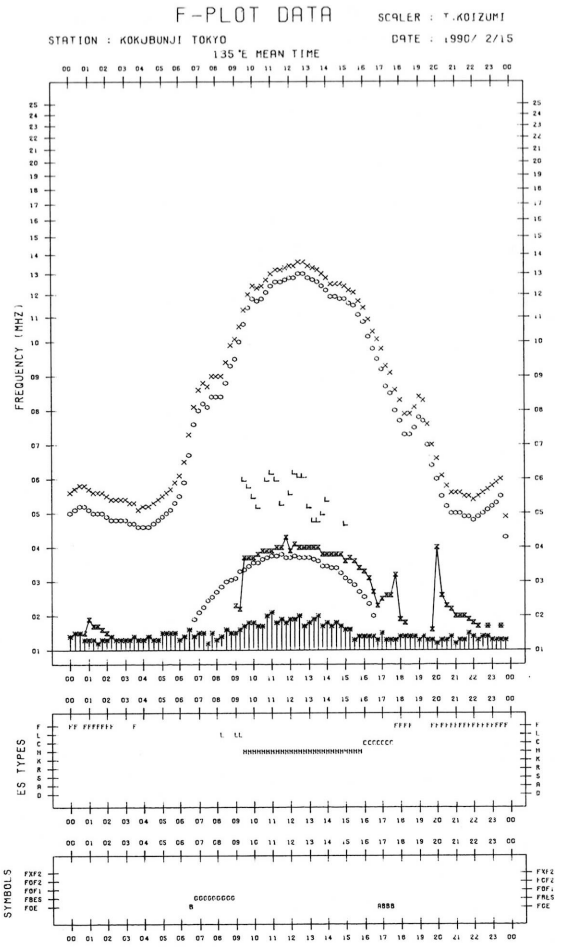
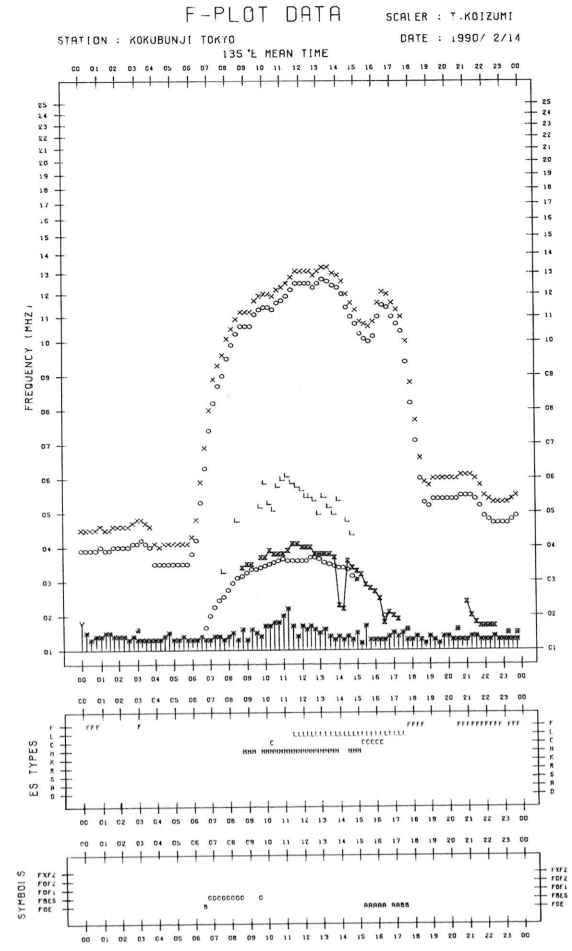
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 2/11
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

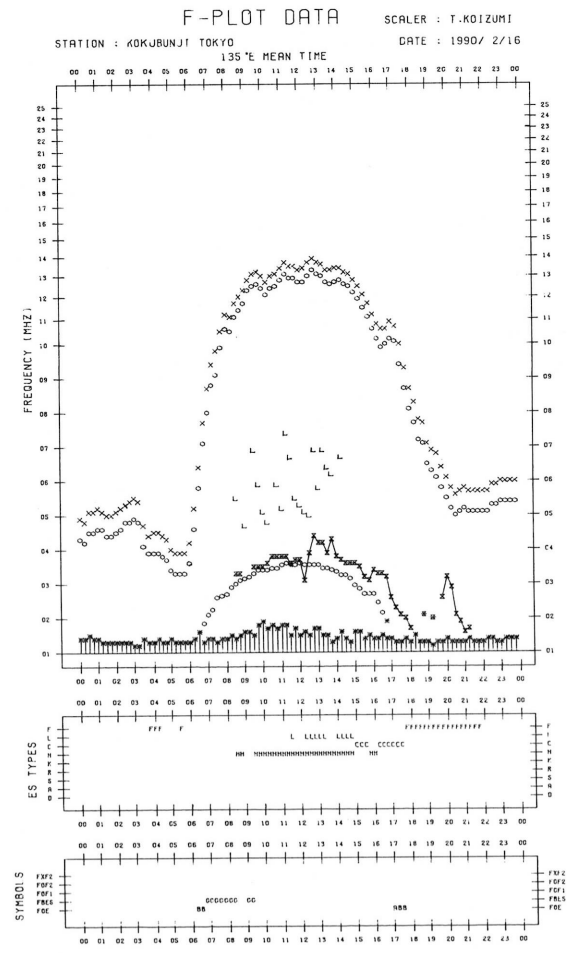

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 2/10
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

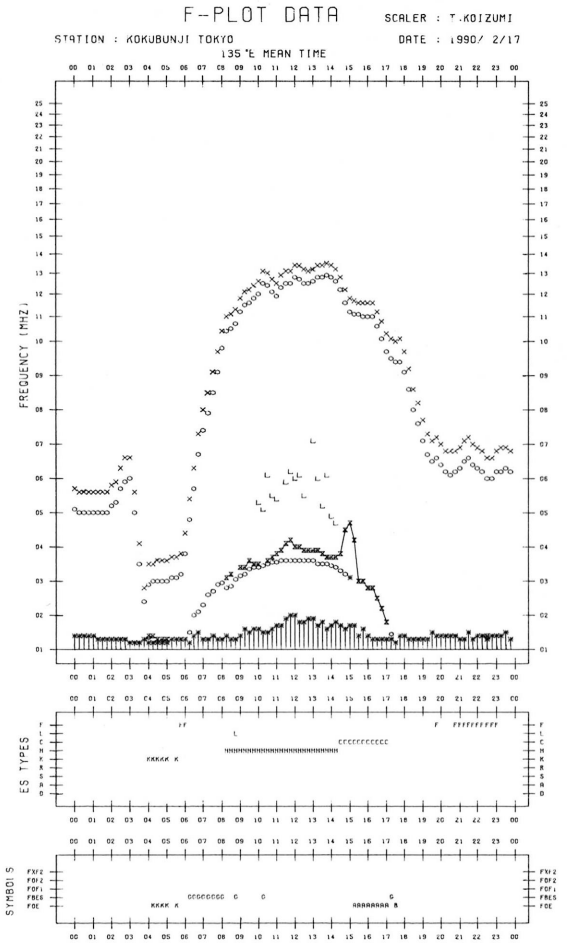

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 2/12
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

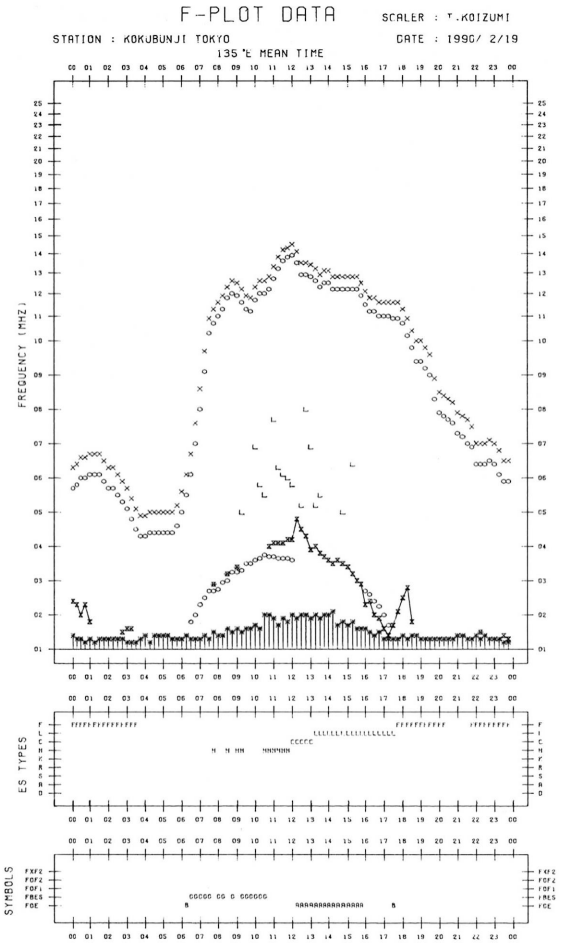

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 2/13
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

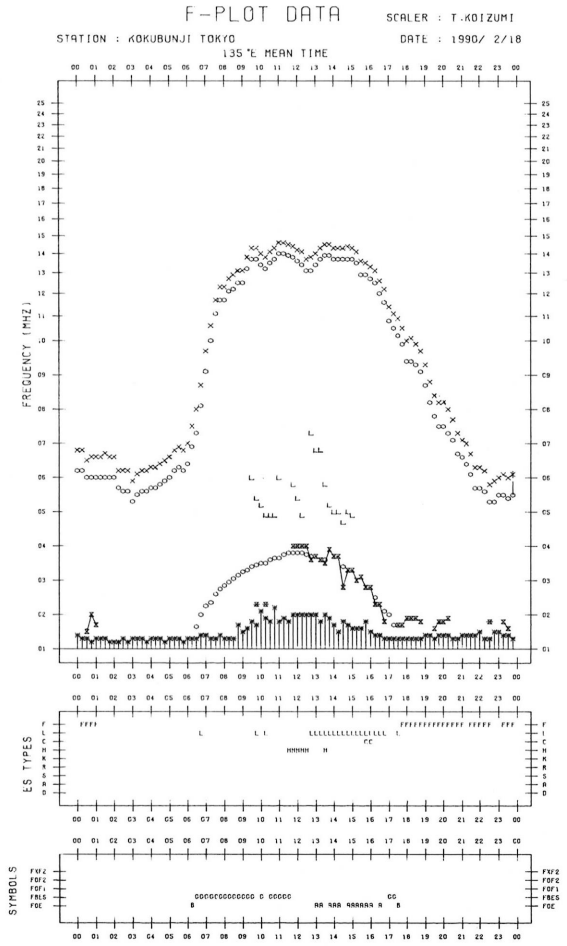

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 2/15
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

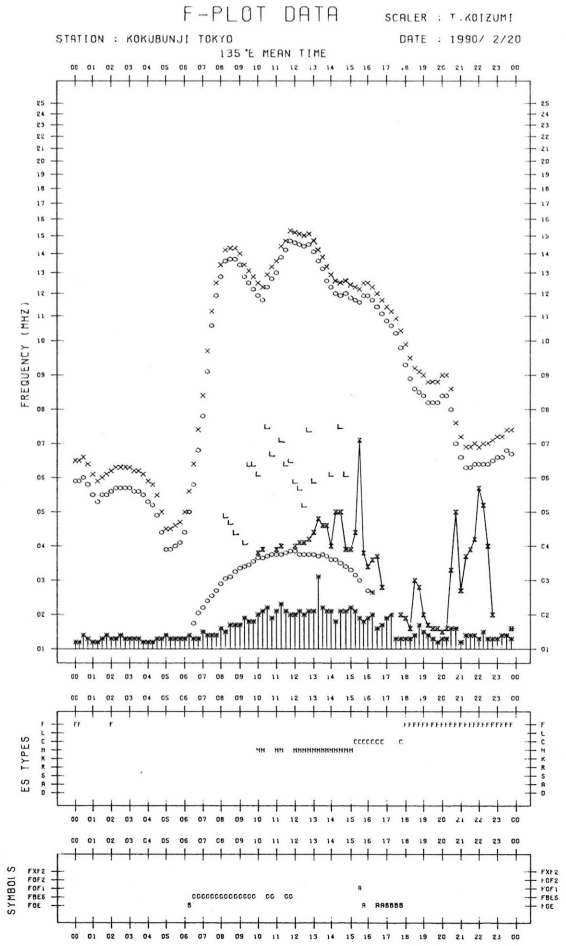

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 2/14
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

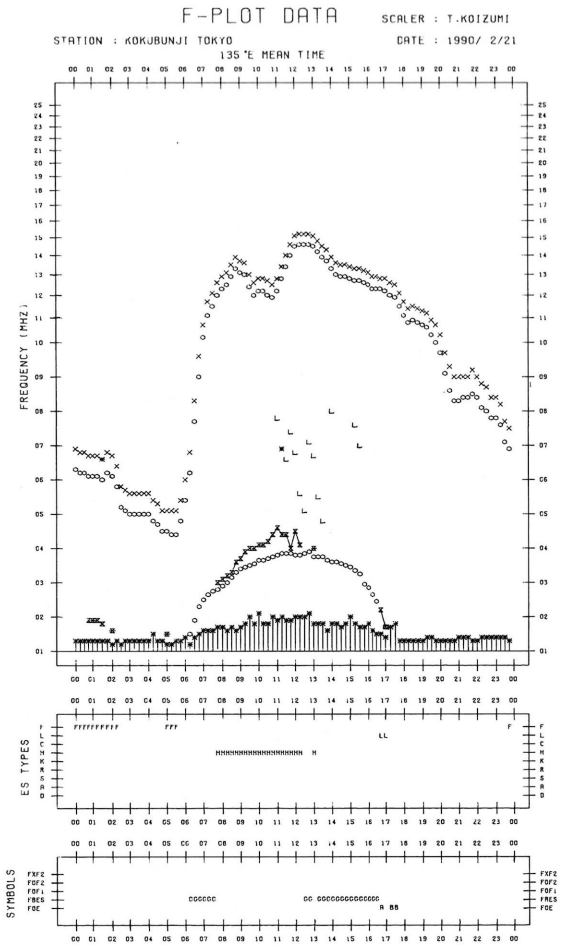

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 2/16
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

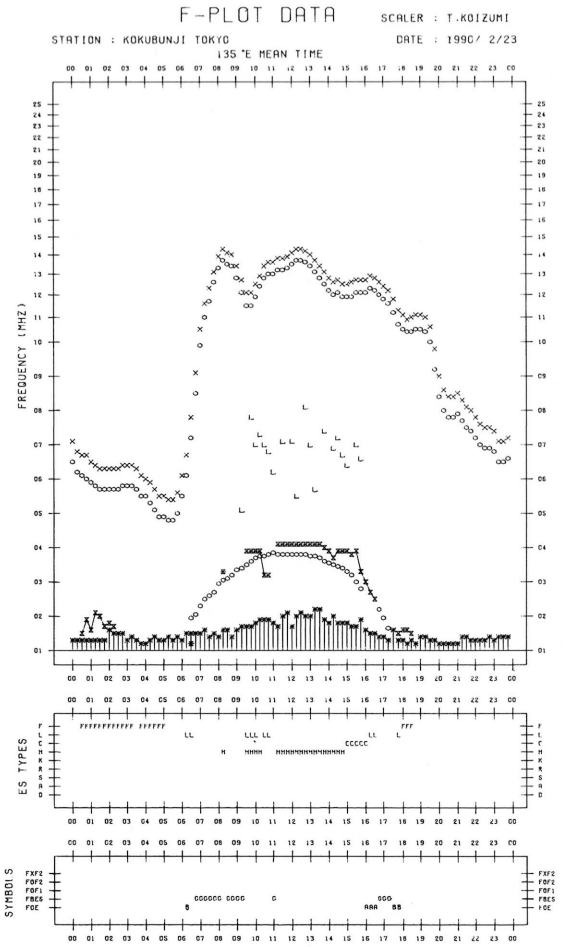

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 2/17
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

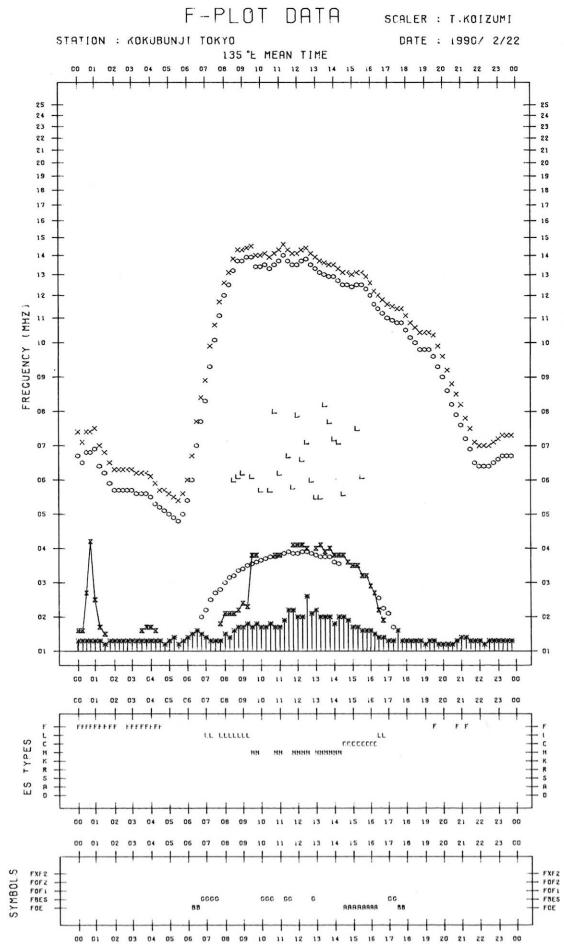

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 2/19
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

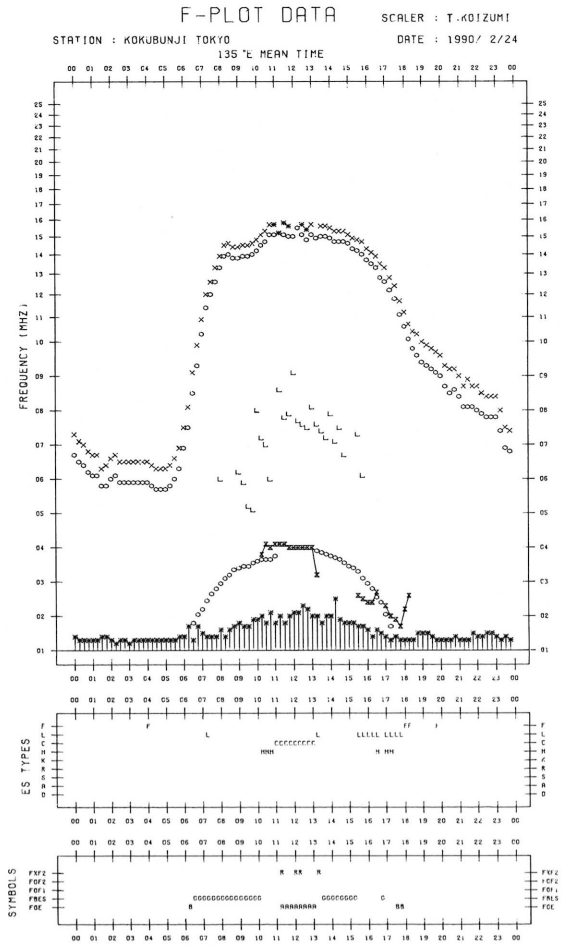

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 2/18
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

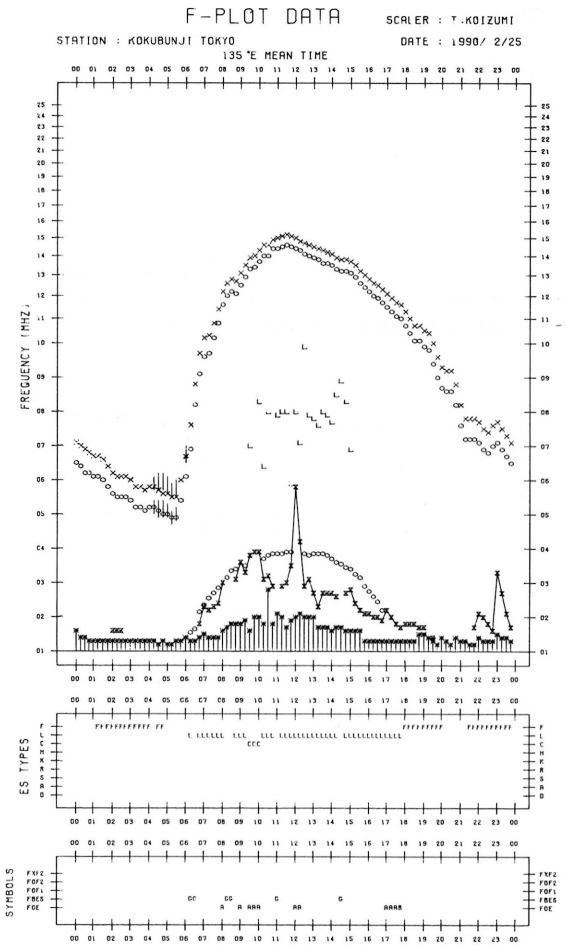

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 2/20
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

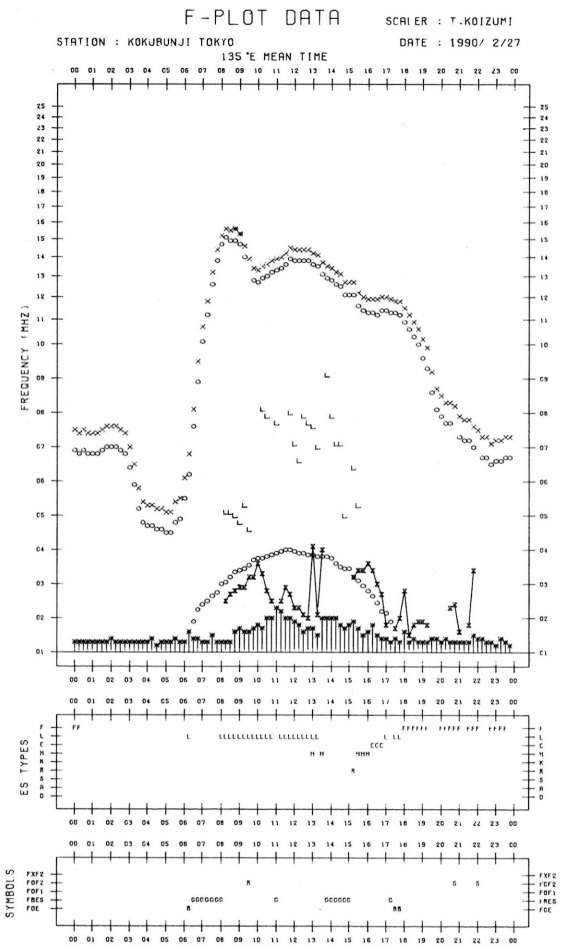

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 2/21
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

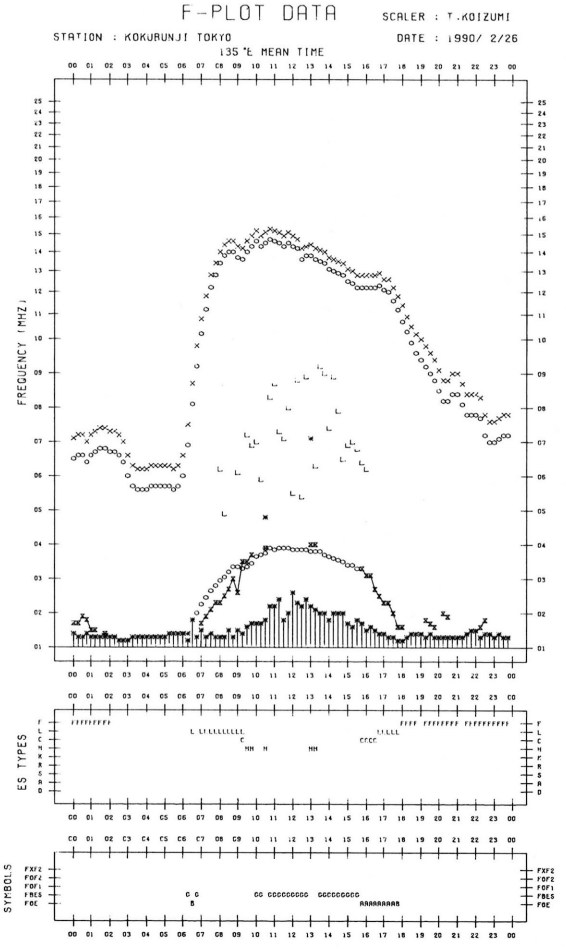

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 2/23
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

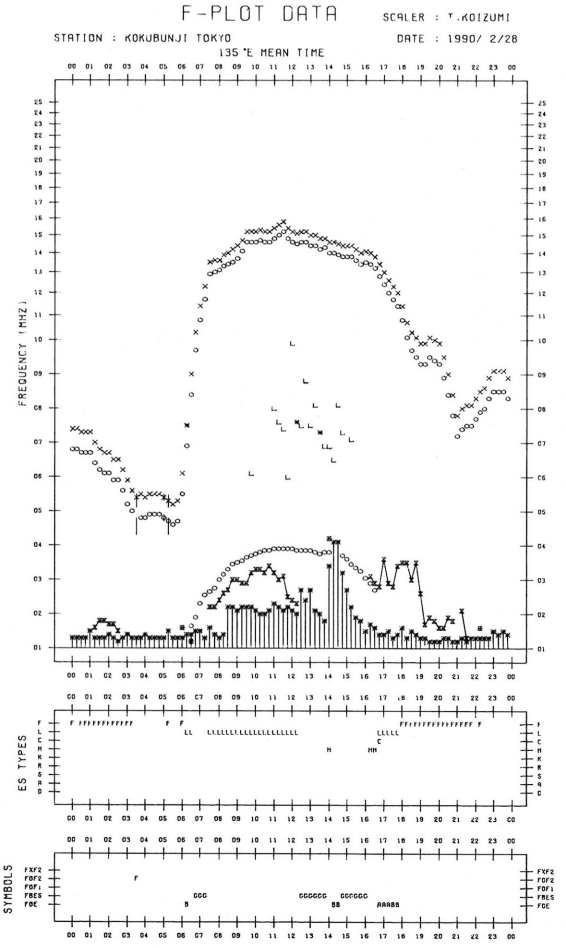

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 2/22
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 2/24
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 2/25
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 2/27
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 2/26
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 2/28
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

B.Solar Radio Emission

B1.Daily Data at Hiraiso

200 MHz

Hiraiso February 1990

Single-frequency total flux observations at 200 MHz

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

Note: No observations during the following periods.

15th 2127 - 2400

B.Solar Radio Emission

B1.Daily Data at Hiraiso

500 MHz

Hiraiso February 1990

Single-frequency total flux observations at 500 MHz					
FLUX DENSITY: 10^{-22} Wm^{-2}Hz^{-1}					
UT	00-03	03-06	06-09	21-24	DAY
DATE					
1	58	60	(59)	54	58
2	54	54	(54)	51	54
3	50	50	(51)	48	51
4	49	49	(49)	-	49
5	49	48	(47)	47	48
6	48	49	(48)	-	48
7	49	49	(48)	48	49
8	48	48	(47)	-	48
9	48	48	(47)	49	48
10	50	49	(48)	49	49
11	49	49	(48)	-	49
12	-	49	(49)	-	49
13	51	52	(52)	50	52
14	51	52	(51)	49	51
15	50	51	(50)	-	50
16	49	50	(48)	49	49
17	50	50	(50)	50	50
18	51	51	51	51	51
19	53	53	53	54	52
20	55	56	55	-	55
21	57	57	57	59	57
22	59	B	62	59	61
23	60	60	60	-	60
24	58	59	58	58	58
25	57	57	57	57	57
26	58	60	59	57	58
27	58	58	56	54	57
28	56	56	55	54	55

Note: No observations during the following periods:

4th 2136 - 2355 6th 2134 - 2350
8th 2134 - 2350 11th 2128 - 12th 0355
12th 2127 - 2350 15th 2123 - 16th 0009
20th 2120 - 2345 23th 2116 - 24th 0020

B. Solar Radio Emission

B2. Outstanding Occurrences at Hiraiso

Hiraiso — February 1990

Single-frequency observations

Normal observing period: 2130 - 0830 U.T. (sunrise to sunset)

FEB 1990	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
1	200	42 SER	0114.0	0129.7	24.0	1700	-	SR
	500	46 C	0201.0	0205.2	6.7	340	62	0
	500	4 S/F	0306.3	0306.9	1.7	22	-	WR
	200	44 NS	2140E	0219	615D	144	15	SR
2	200	46 C	0034.7	0036.0	1.8	375	-	SR
	100	42 SER	0228.4	0230.7	13.9	1800	-	WR
	200	42 SER	0229.7	0230.4	11.9	1600	-	WR
	500	42 SER	0230.0	0257.5	28.5	41	-	0
	100	46 C	0351.3	0353.1	4.0	1300	-	0
	200	46 C	0352.1	0353.1	2.2	620	-	0
	500	41 F	0352.5	0354.5	6.0	36	-	WR
	100	42 SER	0455.4	0457.4	41.6	440	-	-
	100	42 SER	0613.2	0652.0	79	470	-	-
	200	44 NS	2140E	2223	110D	11	4	WR
3	500	46 C	0107.5	0109.0	13.0	410	37	WR
	500	29 PBI		0120.5	47.5	6	2	0
	200	46 C	0107.6	0107.7	7.3	350	-	0
	100	48 C	0107.8	0107.9	8.6	4500	525	WR
	200	43 NS	0125	0244	132	13	3	WR
	200	41 F	0600	0642	76	195	-	WR
4	200	41 F	2218.5	2237.0	41.0	150	-	0
6	200	46 C	0218.5	0221.1	5.9	130	-	0
7	200	42 SER	0204.6	0250.1	46.9	44	-	0
	100	42 SER	0204.8	0251.4U	47.8	1000D	-	0
	200	42 SER	0628.4	0715.6	69	980	-	0
	100	45 C	0713.9	0715.8	3.1	2100	-	0
	200	42 SER	2250.0	2258.7	20.5	230	-	0
	200	42 SER	2342.7	2358.9	17.2	1700	-	0
9	100	46 C	0017.0	0018.6	5.7	630	-	-
	200	46 C	0017.5	0018.0	4.3	54	-	0
	200	43 NS	0617	0703	109D	6	3	WR
	200	42 SER	0621.8	0734.3	84	140	-	SR
	200	44 NS	2132E	-	102D	-	6	WR
	200	46 C	2227.4	2229.0	2.6	3400	-	SR
	100	41 F	2227.6	2229.0	4.0	810	-	-
	200	41 F	2344.9	2346.2	11.9	170	-	MR
10	200	42 SER	0037.6	0053.7	37.6	34	-	MR
	500	41 F	0236.5	0239.2	21.5	19	-	WR
	200	41 F	0238.9	0248.7	29.0	45	-	MR
	200	42 SER	0330	0350	150	135	-	SR
	200	43 NS	0712	-	52D	-	17	-
	200	44 NS	2130E	0020	640D	12	6	MR
	500	4 S/F	2208.7	2209.1	1.2	60	-	0
	500	42 SER	2356.5	0018.0	34.5	290	-	WR
11	100	41 F	0000	0017.8	19.8	1600	-	WR
	200	42 SER	0007.6	0018.2	25.7	485	-	WR
	200	41 F	0106.0	0126.4	40.0	86	-	MR
	500	4 S/F	0115.7	0116.4	1.8	13	-	WR
	100	42 SER	0545.7	0547.5U	30.0	1000D	-	-
	200	46 C	0545.9	0547.5	4.3	125	-	MR
	500	41 F	0545.9	0549.1	4.5	560	-	WR
	100	44 NS	2130E	0150	645D	370	240	-
	200	44 NS	2130E	0300	645D	90	74	SR

FEB	FREQ.	TYPE	START TIME	TIME OF MAXIMUM	DUR.	FLUX DENSITY (10^{-22} Wm^{-2} Hz^{-1})		POLARIZATION REMARKS
1990	(MHz)		(U.T.)	(U.T.)	(MIN.)	PEAK	MEAN	
12	500	41 F	0702.5	0703.0	7.5	19	-	WR
	100	44 NS	2128E	0700	645D	230	134	-
	200	44 NS	2128E	0709	645D	95	28	SR
	100	42 SER	2245.5	2317.2	48.2	470	-	-
13	200	42 SER	0018.5	0044.2	37.6	2300	-	WR
	100	42 SER	0018.5	0045.5	35.0	16000D	-	-
	500	42 SER	0019.3	0059.0	48.0	220	-	MR
	200	8 S	0058.0	0058.2	0.9	35000	-	WR
	100	8 S	0058.5	0059.1	0.9	11500	-	WL
	100	41 F	0133.4	0139.6	8.3	900	-	MR
	500	8 S	0139.4	0139.7	0.7	65	-	MR
	100	46 C	0316.2	0317.2	3.3	2700	-	WR
	100	42 SER	0529.0	0552.1	24.0	1000D	-	-
	500	42 SER	0530.0	0541.3	24.5	88	-	WR
	200	42 SER	0537.1	0540.6	16.5	570	-	WR
	200	44 NS	2127E	0025	645D	43	31	MR
	100	44 NS	2127E	0700	645D	120	33	-
14	200	45 C	0049.2	0049.8	1.2	325	-	SR
	100	46 C	0129.0	0129.5	1.5	1000D	-	-
	100	41 F	0642.2	-	10.6	1000D	-	-
19	200	42 SER	0549.2	0600.0	12.8	110	-	0
	200	41 F	2244	2255	51	3	2	0
20	200	42 SER	0047.5	0111.0	29.7	250	-	0
21	200	46 C	0411.2	0412.5	2.0	240	-	0
	100	46 C	0411.2	0412.9	2.6	780	-	-
	200	44 NS	2118E	0610	660D	19	7	MR
22	200	46 C	0503.0	0503.1	1.3	364	-	0
	100	46 C	0503.0	0504.3	2.1	1200	-	0
	200	44 NS	2118E	0007	660D	15	5	MR
23	100	41 F	0017.9	0019.4	2.2	400	-	0
	200	8 S	0248.7	0249.3	1.1	290	-	0
	200	44 NS	2115E	0345	660D	11	5	MR
	200	46 C	2237.8	2238.4	2.6	126	-	WR
	200	42 SER	2331.7	2347.5	30.0	140	-	WR
	100	42 SER	2346.2	2358.3	12.5	1200	-	0
24	100	41 F	0038.9	0040.3	9.8	780	-	-
	200	46 C	0038.9	0040.3	8.7	100	32	0
	500	46 C	0318.4	0319.5	5.3	38	-	0
	200	44 NS	2115E	0613	660D	11	5	WR
	200	42 SER	2232.3	2251.5	21.1	75	-	WL
	100	46 C	2250.8	2251.4	1.3	530	-	-
25	200	44 NS	2114E	0642	660D	14	8	WR
	200	42 SER	2205.3	2206.9	26	370	-	0
	100	41 F	2230.0	2230.4	2.3	550	-	-
26	100	8 S	0408.6	0409.0	1.1	6000	-	0
	100	42 SER	0425.6	0426.4	7.6	2100	-	WR
	200	42 SER	0425.7	0431.1	6.3	1300	-	0
	500	41 F	0430.2	0431.4	2.0	60	-	MR
	200	42 SER	0611.2	0624.6	28.4	790	-	WR
	100	42 SER	0623.6	0624.6	15.2	1700	-	WR
	200	41 F	0714.5	0721.5	11.9	2100	-	0
	100	42 SER	0716.5	0721.1	6.9	750	-	0
	200	44 NS	2113E	0313	670D	35	25	MR
27	200	42 SER	0248.8	0250.8	5.3	1100	-	WR
	200	42 SER	0354.0	0417.8	54.0	2600	-	0
	100	43 NS	0400	0531	180	240	70	-
	200	44 NS	2110E	0538	670D	48	19	ML
	500	41 F	2328.0	2334.7	15.5	35	-	0
28	500	42 SER	0225.0	0238.6	42.0	114	-	0
	100	46 C	0232.9	0233.0	5.3	1900	-	WR
	200	46 C	0233.0	0233.4	4.3	530	-	0
	500	42 SER	0403.4	0403.9	6.0	17	-	WL
	500	46 C	0459.5	0503.0	45.0	144	11	ML
				0514.5		24		WL
	200	24 R	2109E	0218	670D	8	5	0
	500	8 S	2326.8	2326.8	0.4	66	-	0

C. RADIO PROPAGATION

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

FEB 1990 FREQUENCY 15 MHZ BANDWIDTH 80 HZ RECEIVING ANTENNA ROD 4.5 M

MEASURED AT HIRAISO

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

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	-11	-9	0	2	2	-5	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	-11	-11
UD	-1	2	5	8	14	17	11	2	1	-6	-5	ES -20	-1	-2	11	5	1	6	0	ES -22	ES -20	-5	-1	-4
LD	ES -24	ES -23	-15	-4	ES -23	ES -23	ES -24	ES -24	ES -23	ES -23	ES -24	ES -24	ES -24	ES -24	ES -23	ES -24	ES -23	ES -23	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24

C. RADIO PROPAGATION

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

FEB 1990 FREQUENCY 15 MHZ BANDWIDTH 80 HZ RECEIVING ANTENNA ROD 4.5 M

MEASURED AT HIRAISO

UT DAY	00H 45M	01H 45M	02H 45M	03H 45M	04H 45M	05H 45M	06H 45M	07H 45M	08H 45M	09H 45M	10H 45M	11H 45M	12H 45M	13H 45M	14H 45M	15H 45M	16H 45M	17H 45M	18H 45M	19H 45M	20H 45M	21H 45M	22H 45M	23H 45M
1	7	2	4	17	18	28	26	28	30	20	1	-9	-10	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	4	4	2	2
2	8	7	11	11	28	20	28	23	30	21	4	-1	-5	1	-9	-7	-3	-9	ES -22	ES -22	13	7	8	9
3	5	4	7	14	20	21	25	25	27	14	-2	-5	-8	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	7	14	8	5
4	2	5	7	11	19	19	22	22	26	15	-2	-11	-14	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	7	11	6	7
5	6	12	7	17	18	20	27	21	31	16	6	9	7	ES -8	13	1	ES -23	ES -23	-9	ES -23	-8	7	7	9
6	5	5	6	8	16	19	22	26	20	-9	-9	-11	-11	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	11	4	4	5
7	2	4	5	11	17	17	8	25	17	16	-3	-11	-8	ES -23	ES -23	ES -23	ES -23	-9	ES -23	ES -23	-5	3	-2	-2
8	5	3	7	10	13	15	28	18	15	-1	-9	-11	-11	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	7	7	2	-3
9	3	5	6	11	19	17	19	17	-3	-6	-4	-9	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	7	12	9	3
10	1	4	8	11	17	19	21	13	2	7	13	-8	7	ES -23	ES -23	ES -23	ES -23	-11	ES -23	ES -23	9	13	5	5
11	1	8	8	17	18	19	19	19	12	-2	-2	-4	-6	-9	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	2	12	8	7
12	6	7	6	12	17	19	-2	11	-8	-11	-9	-11	-9	-9	-10	ES -23	ES -23	ES -23	ES -23	ES -23	0	0	-3	-5
13	-5	2	5	15	18	19	-5	18	10	-11	-11	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	-2	5	0	-4
14	-2	1	10	13	18	18	27	27	18	ES -23	-5	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	1	9	-2	-1	-9
15	-3	4	2	9	18	21	21	12	-5	-2	-9	-11	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	-11	2	-1	5
16	3	7	9	13	14	15	26	14	-3	13	6	-11	-11	-3	-4	ES -23	ES -23	ES -23	ES -23	ES -23	-11	0	1	5
17	2	0	6	15	19	21	24	21	19	13	-9	-9	-6	-5	-9	-9	ES -23	ES -23	ES -23	-3	12	5	2	-3
18	0	1	2	22	18	19	24	30	26	22	19	22	23	2	-5	-8	-11	-3	ES -23	ES -23	4	8	3	2
19	-1	0	7	8	17	21	20	26	20	5	-2	1	-4	-11	ES -23	ES -23	ES -23	5	3	1	2	5	4	0
20	-1	-4	5	11	17	20	20	32	22	24	22	15	3	17	ES -23	ES -23	ES -23	2	ES -23	ES -23	13	-2	-5	-6
21	0	0	2	7	15	17	24	38	34	38	26	21	20	28	24	ES -20	ES -20	35	ES -20	1	10	8	ES -20	9
22	4	2	4	14	17	24	26	27	23	24	25	16	-9	ES -24	-15	ES -24	ES -24	16	18	9	12	11	8	5
23	-2	1	4	10	18	25	26	38	32	30	33	30	28	-2	-11	-11	ES -23	15	26	0	15	5	8	8
24	-4	0	6	13	22	25	28	31	26	35	31	26	22	28	24	-3	0	-2	ES -24	1	12	5	2	-2
25	-9	-6	8	11	19	26	28	23	31	29	31	13	23	-9	-15	ES -24	ES -24	20	ES -24	ES -24	5	10	-1	-2
26	3	-2	4	7	19	20	26	31	30	28	28	17	6	3	5	-10	23	21	-12	-9	8	5	10	-1
27	-6	-15	1	12	18	22	24	25	29	34	32	ES -1	ES -24	ES -24	13	26	12	16	ES -24	-12	12	7	3	ES -24
28	-12	-6	10	8	17	12	23	27	31	26	25	20	19	15	22	23	7	31	31	15	14	11	9	0
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	2	2	6	11	18	20	24	25	22	16	2	US -4	-7	US -10	US -18	ES -23	ES -23	US -16	ES -23	ES -23	7	6	3	2
UD	6	7	10	17	20	25	28	32	31	34	31	22	23	17	22	1	7	21	18	1	13	12	9	9
LD	-6	-6	2	8	15	15	8	13	-3	-11	-9	ES -11	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -24	ES -23	-8	0	-3	-6

C. Radio Propagation

c2. Radio Propagation Quality Figures at Hiraiso

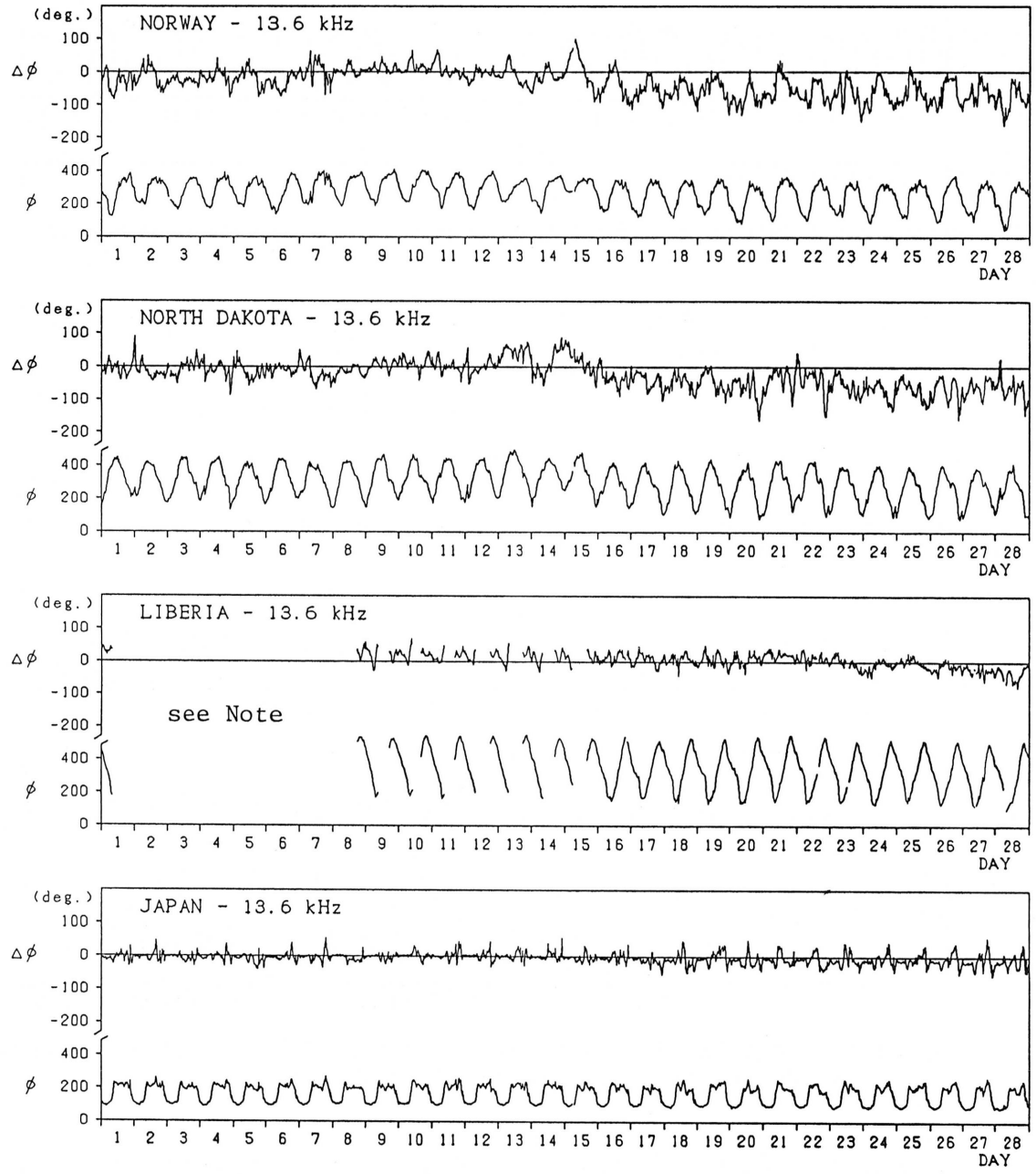
Hiraiso — Time in U.T

Feb. 1990	Whole Day Figure	W W V 00-06	W W V 06-12	W W V 12-18	W W V 18-24	W W V H 00-06	W W V H 06-12	W W V H 12-18	W W V H 18-24	Conditions 00-06	Conditions 06-12	Conditions 12-18	Conditions 18-24	Principal Geomagnetic Storms Start h	Start m	End h	Range nT
1	4o	5	S	S	5U	4	4	3U	4	N	N	N	N				
2	5-	5	5U	S	5U	4	4	5U	4	N	N	N	N				
3	4-	4	S	S	4U	4	4	3U	4	N	N	N	N				
4	4o	5	5U	S	4U	4	4	3U	4	N	N	N	N				
5	4+	5	S	5U	4U	4	4	4U	4	N	N	N	N				
6	4o	3	S	5U	5U	4	3	3U	4	N	N	N	N				
7	4o	4	S	S	5U	4	3	4U	4	N	N	N	N				
8	4-	4	S	S	4U	4	3	3U	4	N	N	N	N				
9	3+	3U	S	S	4U	4	2	3U	4	N	N	N	N				
10	4-	3	S	S	4U	4	4	4U	4	N	N	N	N				
11	3+	3	S	S	4U	4	3	3U	4	N	N	N	N				
12	3+	4	S	S	4U	4	2	4U	3	N	N	N	N				
13	3+	4	S	S	5U	3	2	3U	4	N	N	N	N	1715			109
14	4o	5	S	S	5U	4	3	3U	4	N	N	N	N	---		18	
15	4-	5	S	S	5U	4	2	3U	4	N	N	N	N	0626		---	121
16	4o	4	5U	S	4U	4	3	4U	3	N	N	N	N	---		---	
17	4o	3	5U	S	4U	4	4	4U	4	N	N	N	N	---		24	
18	4o	3U	S	S	3U	4	5	5	4	N	N	N	N				
19	4-	3	S	S	3U	4	4	4U	4	N	N	N	N				
20	4+	4	S	5U	3U	4	5	5U	4	N	N	N	N				
21	4+	4	5U	5U	3U	4	5	5	4	N	N	N	N				
22	4o	3U	5U	5U	3U	4	4	4U	4	N	N	N	N				
23	5-	4	5U	5U	4U	4	5	5	5	N	N	N	N				
24	4+	4	5U	5U	3U	4	5	5	4	N	N	N	N				
25	4+	4	5U	5U	3U	4	5	4	4	N	N	N	N				
26	4+	4	S	5U	3U	4	5	5	4	N	N	N	N				
27	4-	3	5U	5U	3U	3	4	4U	3	N	N	N	N				
28	4+	3U	5U	5U	3U	4	5	5	5	N	N	N	N				

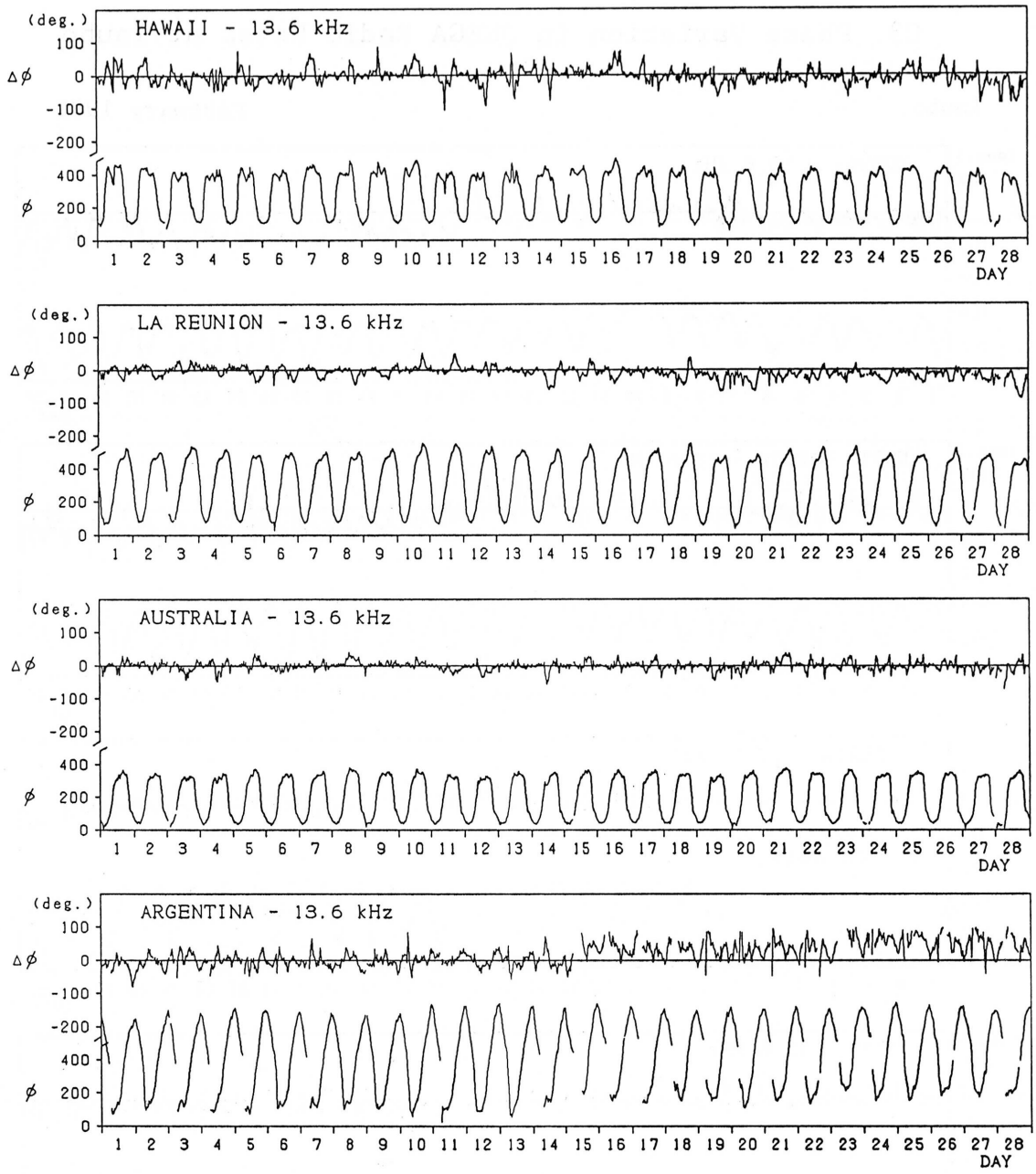
C. Radio Propagation

C3. Phase Variation in OMEGA Radio Waves at Inubo

Inubo February 1990



Inubo February 1990



Note: As for LIBERIA - 13.6 kHz, no record February 01 - February 08, 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. 1990	S W F								Correspondence	
	Drop-out Intensities(dB)					Start	Duration	Type	Imp.	Solar Flare	Solar Noise
	CO	HA	1)	2)	3)						
3	25	32	48	x		0108	24	SL	3+	x	x
9			15			0015	15	SL	1	x	x
20			18			0405	21	S	1+	x	
23		x	10			2346	20	SL	1-	x	x
24		x	15			0318	22	S	1	x	x
26			11			0427	21	SL	1-	x	x
27		35	18			2324	138	S	3+	x	x
28			22	x		0458	49	S	2-	x	x
28		x	13			2331	19	SL	1	x	

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

(b) Sudden Phase Anomaly (SPA) at Inubo

Inubo

Feb. 1990	S P A								
	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
1	10	14	35	43	24	15	0156	0328	0211
1		10	27	22	13		0353	0455	0400
1			14	6			0701	0751	0708
1		—	13	8			0900	0938	0905
2	11	—	20	18	8		0354	0436	0359
2	23	—	4	6			0532	0600	0538
3	60	—	171	166	149	88	0107	0257	0116
3	16	—	38	26			0642	0753	0656
3		—	9				0849	0923	0854
4		—		9	6		0104	0153	0110
4		—	15	14	8		0212	0252	0221
4		—	6	6			0528	0602	0531
4		—	7				0843	0905	0847
4	12	—			23		2150	2256	2157
4		—			8		2336	0023	2354
5		—	6	—			0751	0814	0756
5		—			6		2253	2315	2256
6		—		6	5		0222	0244	0227
6		—	7	8	5		0329	0400D	0337
6		—	6	8	5		0400E	0427	0405
6		—	10	8			0439	0527	0451
6		—	58	35			0657	0754	0704
6		—	10				0816	0836	0818
6		—	22	8			0903	0949	0907
7				18	6	18	0021	0050	0027
7				10	6		0123	0153	0127
7			9	6			0627	0727	0640
8			12	5			0659	0743	0711
8					40		2131	2215	2136
9	12	11	23	48	41		0019	0120	0024
9		—	10				1008	1034	1010
12		—	17				1115	1145	1121
12					12		2155	2219	2200
13				—	15		0045	0148	0057
13			8	—			0445	0521	0450
14			9	6			0653	0717	0658
14		—	5				1242	1312	1249
14				9	13		2258	2326	2303
17		13	8	18	71	46	2225	2343	2234
18				12	12		0010	0108	0020

Inubo

Feb.	S			P			A		
1990	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
18			20	14			0426	0526	0430
18			12	10			0830	0848	0836
18		61	36				1050	1148	1100
19				9	11		0017	0102	0030
19			18	10			0638	0708	0643
19			14				0729	0815	0738
19		36					1236	1311	1241
19					8		2323	2359	2328
20				25	26	33	0005	0049	0024
20	27			59	49		0057E	0241	0125
20	37	33	71	53	34	18	0403	0517	0410
20			19	—			0734	0802	0743
20			13				1024	1109	1027
21			52	—			0535	0649D	0557
21			15	—			0649E	0730	0702
21			13				0806	0849	0818
22			12	8			0540	0600	0545
22	30		60	37			0632	0713D	0647
22			28	13			0713E	0757	0723
22		33	25	10			0838	0919	0847
22		37	15				1022	1111	1033
22		72					1439	1608	1451
23		129	31				1254	1421	1307
23		26					1630	1722	1639
23	24	20	26	61*	65*		2335	0130	2353
24			6	12	4		0250	0304D	0255
24			12	25	8		0304E	0317D	0309
24	27	38	101	76	49	41	0316E	0449	0325
24		33	74	51	32	21	0504	0618	0515
24			7	12	17	17	2349	0051	2355
25				8	6	14	0158	0217	0204
25			11	7			0515	0551	0524
25			17	9			0738	0813	0746
26		14	27	—	14		0429	0508	0436
26			17	—			0551	0625D	0600
26			12	—			0625E	0707	0630
26			21				0719	0754	0725
26		23					1359	1510	1411
26		22					1621	1657	1628
27				—	13		0021	0121	0035
27			33	—	27		0128	0327	0157
27		43	78	49			0705	0819	0711
27		36	53	26			0837	0945	0843
27			12				1050	1110	1057
27		53					1516	1708	1543
27					10		2151	2222	2156
27	8			4	5		2306	2325D	2309
27	43	34	41	93	96	69	2325E	0200	2340
28	18		13	14	9		0213	0233D	0220
28		14	11	16	9		0233E	0310	0240
28			10	12	5		0320	0335D	0330
28			15	14	8		0333E	0412	0343
28	33	147	204	116	116	71*	0456	0839	0520
28		32	24				1003	1035	1017
28		39					1542	1630	1547
28	13		13	17	21		2335	0002D	2340

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