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IONOSPHERIC DATA IN JAPAN

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CONTENTS

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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

JUN. 1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	87	77	67	74	71	67	72	74	67	82		81	84	90	83	79	84	82	76	89	90	86		82
2	84	84	80	72	71	84	90	90	81	75	78	84	84	84	83	84	81	82	52	89	88	89	88	76
3	65	73	71	62	66	67	74	72				N			50	A	66	65	79	66	66	84	83	78
4	77	67	67	63	57	58	62	70	A	A	A				76	77	79	73	71	66	76	80	77	78
5	71	65	76	75	72	88	84	A		A	A	89	94	92	82	81	84	79	83	86	86	80	84	78
6	79	80	67	63	77	77	86	89	80	81	N	85	83	85	86	80	83	79	77	79	82	74	82	70
7	73	80	73	61	67	81	90	86	84	90		65	87	90	90	91	81	87	74	80	87	89	75	86
8	80	67	70	68	72	79	84	93	90	91	93	95	91	96	94	91	84	95	91	90	84	73	90	90
9	87	96	92	84	81	87	84	84	A	A	A	A	A	71	56	58	61	62	67	A	68	67	69	77
10	76	64	63	54	55	60	66	71	69	59			79	71	82	84	80	81	82	89	74	76	85	77
11	60		54	55	50	51											70	68	66	66	64	68	73	69
12	83												A	A	46	56	50	69	62	66	62	A	59	63
13	54	63	60	58	58	66	78	A	A	A	A			54	A			A	67		79	65	66	87
14	78	62	66	74	67	71	66	A	A	A						A		A			A		70	65
15	N	N			A		A	89		A	A	A	A	A	A	A	A	51	54	63	62	71	66	54
16	71	66	66	58	54	59	65		65	75	66	71	65		A		72	62	75	74	62	63	79	69
17	66	80	81	73	66	72	80	68	71	A	A	64	65	77	70	83	68	79	80	62	79	80	77	85
18	85	85	82	80	71	76	82	83	75	79	66	66		A		A			A	68	74	82	85	88
19	82	86	82	79	66	91	88	A	91	95	A		74	85	68	72	81	78		77	86	N	86	86
20	91	87	66	84	83	106	105	93	A	A	A	N	N	69	55	71	77	A		63	66	86	66	76
21	79	75	74	66	72	78	85	92	61	56	A	50	50	75	74	74	72	72		78	81	67	66	77
22	76	73	65	71	80	84	84	83	84	82	87	83	81	68	77	73	75	74	80	88	83	79	78	81
23	84	84	79	79	79	90	89	104	104	89	86	86	86	87	86	86	83	86	81	88	85	85	86	84
24	79																	59	62	66	66	77	93	60
25	66	83	68	71	71	82	84	62	A	63	A	50	55		56	56	58	64	63	65	64	66	66	77
26	69	77	76	68	66	68	71	81	56	73	76	73	78	74	76	78	80	81	79	76	68	84	86	85
27	89	84	84	70	69	62	74	74	77	A	A	A	A	60	56	68	62	66	67	72	A	78	85	81
28	77	76	77	71	76	78	84	86	90	84	A	90	91	86	84	84	N	72	84	86	88	86	84	72
29	80	66	78	77	58	81	84	88	95	85	90	90	84	75		A	84	82	84	82	76	80	84	90
30	84	74	68	67	82	78	87	97	90	96	82	A	A	85	85	75	A			77	84	85	86	84
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	29	26	27	27	27	27	26	22	18	17		16	17	20	22	21	23	25	24	27	28	27	29	30
MED	79	76	71	71	71	78	84	85	80	82		82	83	80	76	78	79	74	76	77	78	80	82	78
U Q	84	84	79	75	76	84	86	90	90	89		87	86	86	84	84	83	81	80	86	84	85	85	85
L Q	71	67	66	63	66	67	74	74	69	74		65	69	71	56	71	68	65	66	66	66	71	69	72

HOURLY VALUES OF FES AT WAKKANAI

JUN. 1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	29	35	33	G	G	G	G	G	57	55	G	G	G	G	G	G	G	46	37	G	27	35	34	G
2	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	32	G	G	G	G
3	G	G	G	G	32	45	50	51	60	46	49	56		70	67	67	G	62	73	48	34	G	36	37
4	29	G	G	G	G	G	39	54	60	85	70	56		G	46	G	G	G	G	35	27	29	26	37
5	77	70	59	29	32	G	59	94	152	104	80	57	G	G	G	G	42	51	59	44	44	36	G	31
6	31	28	G	G	G	41	54	74	63	58	68	76	G	60	59	G	G	G	46	55	40	61	32	46
7	34	G	G	G	G	G	45	41	46	46		G	G	G	G	G	56	78	36	44	G	42	40	36
8	G	G	G	G	G	G	60	96	70	79	85	73	62	117	58	74	G	G	70	73	49	44	74	31
9	33	78	69	44	46	46	58	60	82	70	77	135	124	G	G	54	58	44	56	77	95	107	91	G
10	31	G	G	G	G	G	G	63	G	62	G	58	69	G	G	G	G	G	G	44	37	29	G	G
11	G		25	26	32	G	38	60	59	62	62	60	50		G	G	G	G	46	63	66	G	27	27
12	36												106	47	G	G	G	G	47	67	29	70	68	92
13	91	28	39	28	36	39	49	73	72	59	75	146	93	G	111	162	115	91	73	168	71	68	55	G
14	G	G	G	G	G	G	53	80	74	70	69	62	74	61	62	69	195	179	110	146	104	144	127	109
15	58	33	40	33	65	68	68	74	115	74	92	93	140	47	58	48	85	G	G	35	30	G	32	28
16	G	G	G	G	32	42	52	58	75	58	70	57	66	G	85	G	G	48	63	59	32	60	128	70
17	58	58	54	31	G	G	G	64	62	80	75	G	G	G	G	G	58	46	44	41	65	28	30	37
18	31	28	34	28	32	34	65	69	60	58	59	G	G	72	G	90	98	96	177	91	G	32	G	G
19	G	G	G	G	G	G	45	59	45	46	101	71	G	G	52	G	G	64	96	37	60	57	82	36
20	28	27	31	28	G	44	90	71	82	75	63	58	49	G	G	44	75	109	114	90	63	69	G	G
21	G	G	G	32	G	40	45	G	47	57	63	54	58	G	G	58	G	47	94	70	36	46	28	G
22	35	39	G	G	G	G	G	43	58	67	66	48	80	G	G	G	G	G	G	30	28	G	G	23
23	G	G	G	G	G	G	G	G	G	60	49	71	56	G	G	G	G	G	38	31	34	29	44	28
24	37									46	G		G			G	G	45	44	57	G	26	26	G
25	30	G	27	29	G	40	57	57	93	60	57	G	G	G	G	G	58	G	37	33	27	65	31	27
26	G	G	G	G	G	G	G	G	55	58	56	70	66	60	G	G	G	45	43	59	59	58	83	59
27	68	28	G	29	G	G	G	62	65	136	86	77	65	63	71	G	68	45	52	58	69	60	58	26
28	G	28	30	30	G	G	G	G	92	70	86	71	98	96	78	60	63	62	48	137	38	25	G	25
29	G	G	G	G	G	34	G	G	57	56	74	73	59	65	173	95	56	44	G	G	36	31	33	36
30	G	G	G	G	46	G	59	88	62	46	73	116	70	81	G	G	81	125	144	108	41	58	57	63
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	30	27	28	28	28	28	28	28	28	29	28	28	28	28	29	30	30	30	30	30	30	30	30	30
MED	29	G	G	G	G	G	45	60	61	60	68	59	58	G	G	G	G	45	46	56	36	39	32	28
U Q	35	28	32	29	32	40	57	72	74	72	76	73	72	62	60	58	63	62	73	73	60	60	58	37
L Q	G	G	G	G	G	G	G	21	56	55	56	51	G	G	G	G	G	G	37	35	28	28	26	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT WAKKANAI

JUN. 1989

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	15	15	16	14	18	26	20	36	38	38	40	54	43	56	55	32	39	23	20	20	17	17	18	16
2	18	15	16	16	20	27	22	36	40	42	47	52	42	53	52	54	43	40	27	18	16	15	15	16
3	16	15	15	15	17	21	24	34	38	80	42	48		40	48	37	29	22	18	17	17	16	15	15
4	16	16	16	15	18	70	23	35	39	40	43	44		57	38	70	39	24	33	18	16	16	17	15
5	15	16	17	15	18	21	23	40	38	39	42	48	62	55	48	41	48	28	23	18	15	15	17	17
6	17	15	14	14	18	20	34	45	39	42	44	43	46	40	36	42	46	35	23	18	15	15	15	18
7	16	15	16	17	20	21	26	40	38	39		110	70	90	100	51	38	33	18	17	18	16	15	17
8	15	15	14	16	20	23	35	36	40	39	42	44	52	40	48	41	39	34	20	18	18	16	14	17
9	17	16	16	16	18	18	34	38	36	40	60	45	43	54	80	48	33	36	18	22	16	16	16	17
10	17	16	15	16	22	20	32	39	90	42	90	45	42	80	50	90	40	45	20	18	16	17	18	15
11	18		16	20	16	23	30	35	38	40	46	45	80		100	42	80	33	17	17	16	16	16	16
12	15												43	80	42	100	80	N	21	17	16	18	17	17
13	16	17	15	15	20	20	26	34	29	42	42	43	42	48	42	46	36	32	18	17	17	15	15	14
14	15	15	15	15	21	20	26	36	39	42	46	43	43	46	42	39	40	23	18	18	14	16	16	17
15	16	16	16	18	18	20	28	36	43	40	45	50	44	80	45	40	39	39	22	17	17	17	14	17
16	17	15	14	15	17	20	24	29	39	42	42	43	48	80	50	110	53	40	20	17	16	17	16	18
17	18	18	18	17	21	20	35	39	40	45	46	100	80	100	49	46	35	32	20	22	18	15	16	18
18	18	15	16	16	16	18	24	29	40	43	45	100	110	44	100	45	33	30	18	18	16	16	16	14
19	15	15	17	15	21	30	22	35	51	42	43	42	49	80	45	100	47	28	21	18	18	15	17	14
20	16	18	16	17	21	18	24	36	38	40	43	40	42	80	48	36	37	35	20	16	16	16	16	16
21	17	15	15	16	22	17	24	49	80	43	48	80	42	100	100	40	90	24	22	17	15	17	16	16
22	16	16	14	15	21	18	34	35	39	40	40	42	43	39	80	80	38	33	29	23	18	16	15	16
23	16	15	15	15	21	20	20	40	48	41	42	49	40	100	90	90	41	21	29	20	17	18	16	16
24	16									38	90		80			37	28	26	18	16	17	15	16	16
25	15	16	16	18	23	18	27	39	39	40	39	80	90	100	80	38	34	52	18	17	18	17	16	14
26	16	15	15	14	21	21	34	26	38	39	40	40	40	40	100	90	26	23	18	17	17	18	17	17
27	16	16	14	17	20	18	32	28	38	42	40	42	44	46	38	40	40	23	18	16	17	15	16	14
28	16	15	15	18	18	27	35	39	40	38	40	50	42	39	39	36	28	30	24	17	16	15	16	15
29	14	16	16	15	20	18	26	23	27	39	40	42	42	50	42	40	34	26	18	20	16	15	17	17
30	17	15	14	15	17	20	30	40	39	38	44	43	48	39	90	38	42	33	23	20	17	14	16	18
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	30	27	28	28	28	28	28	28	28	29	28	28	28	28	29	30	30	29	30	30	30	30	30	30
MED	16	15	16	16	20	20	26	36	39	40	43	45	44	54	49	42	39	32	20	18	16	16	16	16
U Q	17	16	16	17	21	22	33	39	40	42	46	51	57	80	85	70	43	35	23	18	17	17	17	17
L Q	15	15	15	15	18	18	24	34	38	39	41	43	42	42	42	39	34	24	18	17	16	15	15	15

HOURLY VALUES OF FOF2 AT AKITA

JUN. 1989

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

HD	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	87	85	85	82	68	70	77	85	79	83	84	91	93	99	90	88	88	90	90	87	88	81	85	88
2	88	86	84	66	72	84	102	88	93	83	82	98	106	119	90	94	100	91	91	90		88	84	84
3	86	87	85	73	70	71	77	72	A	A		N	76	77	A	76	72	A		A	A	85	84	84
4	84	78	67	62	50	67	71	A	60	74	77	84	A	82	86	85	94	86	83	76	78	80	76	75
5	66	73	76	70	71	83	83	95	99	97	A	106	114	107	98	87	89	92	92	90	88	84	79	84
6	81	85	78	70	78	82	88	93	A	A	85	90	100	92	99		95	91	A	89	87	81	52	81
7		76	72	68	70	83	90	88	91	94	C	71	72	93	N	98	91	86	81	86	80	88	85	86
8	88	82	72	77	77	84	94	95	94	92	100	112	100	94	99	93	93	92	90	90		A	85	86
9	87	87	86	80	76	80	85	103	A	A	A	A	A	A	A	87	76	A			A	A	79	78
10	79	74	67	66	61	67	75	A	A	A	A	77	A	A	86	A	86	87	84	84	84	75	85	83
11	71	78	67	66	54	59		A	A	A	A	A	A	A	A	A	80	80	80	80	68	72	72	80
12	73	76	67	60	49	65	73	A	A	A	A	A		A	56	75	67	71	A	A	68	70	A	65
13	62	66	64	66	N	83	87	86	86	83	A	88	88	A	A	A	80	77	77	77	79	86	86	A
14	A	70	A	75	67	66	80		A	A	A	A	A	A	62	73	69	73	A	61	66		A	A
15	A	A	A	64	68	A	80	A	A		A	A	A	A	64	A	A	39	63	A	66	57	67	66
16	78	66	74	64	54	54	72	64	A		80	85	65	A	A	77	82	85	80	A	70	73	53	82
17	88	86	83	67		78	82	86	87	84	A	86	89		87	90	90	85	84	84	78	N	87	A
18	80		87	N	75	74	84	87	A		83	76	A	A	A		87	80	79	79	A			87
19	84	88	52	84	82	87	88	98	98	95	91	90	87		72	90	88	81	85		84	88	A	85
20	90	98	91	85	86	106	108	A	A		88	A	A	A		85	80	79	80	86	86	78	67	86	86
21	84	86	82	74	74	78	85	106	88	84	A	A		85	86	84	80	82	85	84		78	88	84
22	86	80	78	75	78	85	88	90	87	90	94	92	91	86	83	87	87	90	88	86	77	75	85	79
23	85	83	85	84	84	84	91	102	93	88	A	86	91	91	A	A	92	90	87	90	87	86	86	85
24	84	78	74	74	76	88		90	82	67					A		A	61	A	67		77	66	68
25	67	79	83	64	69	84	85	84	A		A	A	A		A		59	72	67	67	69	79	77	76
26	66	70	75	73	66	75	87	93	A	78	80	A	A	84	84	75	86	86	82	84	85	88	87	91
27	85	88	88	74	74	73	80	84	79	A	A	A	N	A			A	75	75	A	A	78	78	A
28	73	82	84	84	79	78	88	92	86	A	97	A		A	86	90		90	91	A	90	79	A	
29	79	85	84	76	86	88	96	105	94	94	90	87	95			A	94	92	88	80	66	85	79	
30		85	81	79	80	84	87		108	102	96	A		189		88	90	87			A	92		84
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	28	28	29	28	29	28	22	17	19	13	15	13	13	18	19	26	28	22	22	21	25	24	23
MED	84	82	80	73	73	80	85	90	88	84	85	88	91	92	86	87	87	86	84	84	78	80	84	84
U Q	86	86	84	78	78	84	88	95	94	94	95	92	100	103	90	90	91	90	88	87	86	86	85	86
L Q	73	76	72	66	67	70	80	86	84	83	81	84	87	84	77	80	80	78	80	77	68	75	77	78

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT AKITA

JUN. 1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	34	36	32	32	32	34	51	60	59	58	60	69	70	G	G	G	43	53	83	33	31	36	32	57
2	25	G	G	G	G	G	40	46	51	G	G	G	57	65	74	G	60	82	69	60	115	58	24	G
3	G	G	27	35	46	58	55	61	72	68	62	60	59	73	53	55	52	92	81	92	91	58	110	30
4	G	33	G	G	G	31	50	80	65	66	84	74	133	78	54	82	60	66	44	49	42	44	31	24
5	G	29	51	69	G	38	37	58	79	96	93	91	53	G	G	G	G	57	74	91	59	58	32	G
6	24	36	37	35	G	G	56	82	84	136	97	49	G	49	G	52	71	58	96	58	70	72	34	54
7	39	49	34	26	32	G	37	59	64	59	C	G	G	58	58	G	G	43	52	40	43	74	45	69
8	32	29	32	G	G	33	G	59	74	98	92	82	60	74	56	46	G	57	60	60	145	115	58	115
9	90	115	92	85	58	44	67	80	121	83	168	132	195	195	170	73	55	72	64	70	94	93	106	82
10	58	28	30	31	24	40	54	69	74	99	94	57	90	109	51	117	G	G	40	30	30	G	G	33
11	G	G	25	24	34	41	47	83	70	62	97	70	58	72	89	84	56	58	42	46	33	55	33	G
12	G	G	G	G	26	52	57	61	91	120	110	74		59	59	53	52	58	82	60	44	54	85	72
13	92	70	58	51	54	32	37	81	58	64	103	G	58	82	74	112	76	68	85	55	30	91	86	93
14	80	53	60	44	36	33	64	166	180	106	93	58	99	133	69	G	91	54	76	41	66		125	83
15	92	92	59	37	38	78	59	68	130	98	185	111	96	92	G	56	86	39	G	59	47	G	G	37
16	31	34	85	54	50	43	50	56	70	80	G	G	85	93	51	G	G	G	91	70	72	34	58	69
17	38	36	23	G	G	G	37	41	54	54	121	72	85		64	G	50	51	42	G	24	30	58	109
18	69		72	51	44	G	53	72	96	59	73	139	182	151	104	79	76	49	57	62	169		144	32
19	30	25	G	G	G	G	G	57	60	61	47	66	67	58	48	G	G	56	65	108	59	128	136	30
20	58	50	52	46	G	G	72	94	108	84	106	94	94	128	52	50	59	49	39	32	36	55	72	33
21	G	G	G	G	32	44	44	G	58	77	97	118	104	49	58	67	59	82	71	40	92	58	35	58
22	31	35	38	G	G	G	G	57	60	66	58	91	57	54	51	57	43	40	42	41	37	G	27	G
23	G	G	32	30	G	G	39	57	62	57	82	58	G	84	96	91	45	45	57	71	58	38	37	58
24	32	29	33	32	38	G	G	64	72	65	G	G	74	65	88	63	58	42	58	43	65	50	30	37
25	24	26	24	23	G	32	48	62	179	116	92	81	84	G	50	G	G	G	35	35	25	26	37	32
26	36	41	33	24	G	58	54	50	113	66	74	97	116	56	50	56	44	56	58	43	40	37	43	70
27	34	38	77	54	53	40	40	56	85	86	91	147	118	113	83	86	79	58	48	77	79	58	72	82
28	72	35	35	59	50	43	40	46	70	92	83	179	84	176	58	46	62	G	51	72	29	112	92	142
29	90	38	91	73	59	57	55	60	82	82	63	58	74	106	89	139	110	82	44	81	48	59	58	180
30	90	107	91	73	45	48	39	70	83	114	72	136	116	179	179	91	85	94	134	40	127	116		113
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	30	29	30	30	30	30	30	30	30	30	29	30	29	29	30	30	30	30	30	30	30	28	29	30
MED	33	35	34	32	32	34	48	60	73	78	91	73	84	74	58	56	56	56	58	56	53	56	45	58
U Q	69	45	59	51	45	44	55	72	91	98	97	97	101	111	83	82	71	66	76	70	79	73	85	82
L Q	24	25	25	G	G	G	37	57	62	62	62	58	58	57	51	G	43	43	44	40	36	36	32	32

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT AKITA

JUN. 1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	17	15	15	15	15	18	17	20	27	26	28	26	35	33	32	23	24	16	17	16	16	16	17	16
2	17	15	15	15	15	16	16	20	23	26	26	62	35	39	53	62	27	20	20	16	16	16	18	16
3	17	17	16	15	15	18	20	23	23	26	39	38	38	39	33	24	22	21	16	15	16	15	16	17
4	17	15	17	16	28	16	18	20	24	27	29	38	54	36	35	22	24	22	24	16	15	16	16	16
5	16	15	15	15	18	16	16	38	21	26	39	39	36	34	30	27	21	21	20	15	15	16	15	18
6	16	15	14	15	16	17	18	38	27	35	38	61	45	34	26	24	24	18	22	16	17	16	16	16
7	16	15	15	15	14	26	17	22	24	39	C	100	100	27	40	53	23	21	17	17	15	15	15	15
8	16	15	15	15	17	17	20	20	26	26	38	39	39	29	30	24	23	18	16	15	16	17	16	15
9	15	15	15	15	15	16	17	22	23	39	48	47	44	39	35	32	27	34	17	17	16	16	16	15
10	17	15	15	16	17	16	20	21	50	38	45	44	38	38	80	43	27	22	18	16	16	20	17	16
11	17	15	16	15	15	18	17	20	24	38	27	40	42	38	34	29	24	18	16	15	17	17	16	17
12	18	15	17	16	20	21	20	26	26	38	45	49		48	39	39	28	20	17	18	16	16	16	16
13	16	15	15	15	15	16	18	22	24	39	44	70	48	45	42	27	27	21	16	17	15	16	16	16
14	16	15	15	15	15	17	17	21	29	35	45	39	43	35	34	35	24	18	17	17	16		16	15
15	16	15	15	15	15	16	18	21	23	28	40	44	43	44	90	29	24	24	24	17	15	17	17	16
16	16	15	15	15	15	18	18	24	24	27	90	90	45	43	45	100	27	52	20	16	16	15	16	15
17	16	15	15	15	21	18	20	35	27	35	44	40	38		38	29	26	23	22	22	16	16	16	16
18	15		15	15	14	16	18	23	30	45	34	42	39	39	35	28	26	24	20	16	15		15	16
19	16	16	15	15	16	27	20	20	23	26	40	40	35	41	34	64	22	20	17	16	16	16	15	17
20	16	15	15	15	17	22	21	24	24	26	39	30	41	36	27	23	23	22	18	17	16	16	16	16
21	16	15	16	15	15	16	18	48	44	43	44	44	46	40	41	38	27	21	20	17	17	15	16	16
22	17	15	15	16	20	26	22	26	24	28	30	39	43	35	30	35	21	20	16	15	18	18	18	16
23	16	15	15	15	17	17	18	23	26	27	38	27	100	39	35	30	22	18	16	15	17	16	16	15
24	16	15	15	16	15	26	16	20	21	26	28	39	36	42	32	26	22	16	17	16	15	16	16	16
25	16	16	17	15	16	16	15	22	23	23	33	39	38	26	80	24	28	21	15	15	16	15	16	16
26	15	15	15	15	16	16	17	20	22	23	27	30	26	26	30	24	22	20	16	15	15	16	17	16
27	16	15	15	15	15	17	18	26	22	27	36	26	45	28	28	28	24	21	17	16	17	16	16	16
28	16	15	15	15	15	16	20	21	27	24	41	39	32	38	39	39	20	22	20	16	16	16	15	16
29	15	15	15	15	15	16	20	20	21	23	41	39	38	44	26	24	23	20	16	15	15	16	16	16
30	16	15	15	15	16	18	16	26	27	39	33	26	39	28	26	24	24	24	20	16	16	18		16
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	30	29	30	30	30	30	30	30	30	30	29	30	29	29	30	30	30	30	30	30	30	28	29	30
MED	16	15	15	15	15	17	18	22	24	27	39	39	39	38	34	28	24	21	17	16	16	16	16	16
U Q	17	15	15	15	17	18	20	26	27	38	44	44	45	40	40	38	27	22	20	17	16	16	16	16
L Q	16	15	15	15	15	16	17	20	23	26	31	38	37	33	30	24	22	20	16	15	15	16	16	16

HOURLY VALUES OF FOF2 AT KOKUBUNJI

JUN. 1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1																99	98		102		91		88	85
2	94	93	92	76	72	83	104	103	93	90		102	114	102	99	103	107	100	105			92	91	86
3	87	91	97	96	80	80	81	92		A		86	79					78	84			80	85	
4	77	79	68	70	68	68	69			79	85	89	86	92	95	95		99	91	79	76	80	81	74
5	76	71	70		72	77	86	92	101	92	A	106						A						96
6	83	84	75	77	77	87		90		85		89		92			106	112	102	99				
7	84	88	77	72	75	90	93	91		101	91	86	91	N	110	105		91	88		88	92	90	95
8	106	93		87	81	97	102	90	98	96	104		111	114	111	107		102			A	85	92	97
9	98	100		80	76	86	94	89		159			A		97	92	85	80	98					
10		89	71			67	74		A				82	91		96	94	95		88	87		96	90
11	88	87	69			71	65		A		A	A		78	78		100	86	88	84	89	76	84	83
12	77	81	73	65	54		71	A	A				62	81	78	88	91		90	84	74	78	A	A
13			68		61		93	87		91			99	90	83	86	90		91	84	92	86	84	92
14	86	80	65	70	72						A	A	A			79	81		73	70	89			75
15	73	77	71	68	70	77	84	99	A	A	A	A	A					89	70	72		N		
16		77	81	70	58	65	74					81	87	85	85	88	90	90	79	76	N		85	
17	84	92	80	71	72	79	88	102	106	90		94	96	96	101			95	89	86	80		90	92
18	90	85		80	72	85	85	88				82	88	82		82	87	90	85	81	81			85
19	92	97	99	90	84	92	95	92	90	98	97	95	91	94	98	100	93	87	78	86	83	90	88	
20	101	91	92	85	92	94	100	104	N	90	89		97		94	92	88	88	98	86	97	88	92	N
21		85		71	75	81			107	93	A	90			95	95	90	87	94	90		81		90
22		92	87	82	83	85	92			93	97	98	96	94	96	97	102	103	92	87	89			87
23	109	89	88	92	84	88	88	97	100	85	82	86	88	91	98	101	90	102	95	95	87	96	92	88
24		85	81	86	86	90	112	98	84						A		N		66	65	70	72	81	76
25		84	84	71	69	78		93			A	A		72		74	72	72	76	71	78	78	79	78
26	80	78	81	75		73	94	106	88		85	92	90	A	97	95		90	A	81				98
27	102	99	93	82	75	76	86	101	92	90	86		86	85	A	84	80	82	78	79	75	78	86	83
28	82	84	85	82	85	82	89	90	91	93	98	90	92	100	92	100	98	103		104	90	95	91	89
29	96	84		74	91	85	97	102	103	95			104	107	108	107			92	A	85	84	90	94
30	87	89	84	84	88	91	113	104	110		A	A	102		105			100	91	85	90	N		96
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	22	28	24	25	26	26	25	21	13	17	10	15	20	18	19	22	19	23	25	22	20	17	19	22
MED	87	86	81	77	75	82	89	93	98	92	90	90	91	92	97	95	90	90	90	84	87	84	88	88
U Q	96	91	87	84	84	88	96	102	104	95	97	95	98	96	101	100	98	100	94	87	89	91	91	94
L Q	82	82	71	71	72	77	82	90	90	90	85	86	86	85	92	88	87	87	78	79	79	78	84	83

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT KOKUBUNJI

JUN. 1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1																52	54	58	91	106	72	56	G	33
2	58	58	54	48	32	33	43	46	52	55	79	76	59	G	G	78	61	65	60	118	G	45	90	90
3	44	58	G	36	G	34	70	90		86	67	76	60	59	51		58	70	59	94	111	99	93	110
4	38	30	G	G	G	30	38	63	64	105	94	58	G	78	85	98	83	81	80	56	64	59	44	36
5	25	28	25	G	G	32	54	61	65	90	108	106		59	72		134	171			60	65		28
6	G		G	35	30	G	44	74	95	92	89	128	80	G	56		74	80	58	57	96	96		33
7	44	G	40	45	34	34	45	58	58	61	53	G	51	62	56	G		61	64	50	47			59
8	60	50		G	24	G	44	56	72	63	82	87	89	58	48	G	80	116	120		146	91	50	115
9	84	116	131	91		G	45	63	86	90	58	96	150	106	62	55	G	51		155	68		102	116
10	118	69	73	55	48	34	50	78	84	98	121	74	62	74	86	G	62	67	69	47	33		G	28
11	26	28	33	24	24	55		59	61	110	89	177	56	56	56	73	69	57	46		41	25	73	58
12	28	33	30	27	G	G	58	95	81	62	67	58	68	70	69	66	50	70	46	38	63	54	80	86
13	60	48		60	37	G	41	66	56	61	104	57	93	82	G	80	92	115	70	46	27	32	59	93
14	59	60	60	71	46	34	58	86	G	118	154		136	50	G	50	G	103	56	58	66	42	70	85
15	60	60	50	28	G	49	57	59	104		108	144	89	57	50	55	53	G	58	70	52	55	32	24
16	80	G	G	37	39	G	56	68	74			62	55	55	59	54	59	60	71		143	133		68
17	38	30	G	21	G	G	37	G	54	57	59	66	67	56	70	52	43	54	52	42	26	33	28	26
18	G	89			58	58	57	74		97	61	64	57	72	G	G	49	44	50	46	59	124	150	72
19	55	37	G	23	G	G	44	54	70	76	82	72	G	G	48	G	55	58	60	58	61	32		
20	59	48	32	24	G	32	44	94	150	105	70	58	G	63	101	G	57	68	76	83	60	59	59	60
21	48	23	32	32	60	48	56	80	50	86	103	72	81	126	92	67	62	82	67	32	G	40		29
22	38	30	31	30	28	G	41		59	64	58	58	66	52	61	53	50	39	G	G	G		28	28
23	26	29	30	G	G	51	37	46	58	60	60	72	56	60	80	50	44	G	G	28	32	G	32	38
24	35	60	41	30	27	G	37	56	69	89	81	80	66	54	96	79	75	44		28	28	34	68	60
25	45	40	24	29	27	G	43	60	106	92	120	93	124	74	96	G	46	58	46	54	33	34	33	37
26	24	26	31	30		G	43	46	59	91		92	56	111	69	G	91	61	102	59				G
27	26	31	59	43	33		46	48	66	73	61	74	61	62	103	58	52	51	57	37	59	45	55	79
28	80	112	109	46	34	86	G	61	55	54	76	100	59	69	64	74	G	G		30	G	59	94	93
29		82		58	35	G	56	68	86	89		149	93	96	66	60	117	92	61	101	60		58	59
30	57	32	32	33	33	30	61	66	87	94	128	193	54	54	106	136	62	72	50	58	27	60	105	93
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	25	28	27	28	28	28	27	27	26	28	28	29	29	27	29	30	26	26	29	24	23	29
MED	44	38	32	31	28	30	44	62	66	89	82	75	62	60	64	54	58	61	60	55	59	54	59	59
U Q	59	60	52	45	35	34	56	74	86	94	104	98	85	74	85	73	74	80	70	70	65	62	90	88
L Q	27	29	12	24	G	G	42	56	58	62	61	63	56	54	50	G	49	51	50	38	27	34	32	31

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT KOKUBUNJI

JUN. 1989

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

HD	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1																35	23	18		15	15	14		15
2	14	14	14	14	14	15	14	18	28	33	33	30	41			45		23	18	16	16	14	15	15
3	15	14		15	14	16	17	18	22	28	38	34	35	40	38			17	18	16	14	15	15	14
4	15	14	15	15	14	16	17	18	39	33	34	39		43	49	32	22	21	22	14	15	15	15	15
5	16	14	15	18	14	16	17	34	23	14	40	37	35	33	30	32	22	21		14	16	15		15
6	17	16	14	14	14	26	20	29	26	34	34	38	33	35	38		28	23	17	15	15	15	15	15
7	17	14	15	14	15	21	17	18	39	38	37		38	40	39	40		18	20	15	14	14	14	15
8	15	15	14	14	15	20	23	20	35		42		35	34	34	24	28	18	17	16	14	14	15	15
9	15	15	14	14	14	16	18	20	27	40	50	44	48	39	38	38	21	24	20	14	17	14	14	14
10	14	14	14	14	14	15	17	18	50	33	33	45	43	35	35	32	29	20	16	15	14	14	16	15
11	15	14	14	15	16	16	16	18	21	27	33	38	43	34	33	14	21	18	15	15	15	15	15	15
12	15	15	15	16	16	18	18	21	30	32	42	44	44	43	32	30	24	34	17	15	15	14	15	15
13	15	18	15	14	14	17	16	20	22	28	42	42	44			33	24	18	18	16	14	14	15	15
14	15	15	14	15	14	16	15	21	22	28	36	42	38	42		43		18	18	15	14	15	15	15
15	16	15	14	18	15	16	16	18	22	40	35	38	42	43	38	28	21	22	21	16	14	15	15	15
16	15	15	14	14	14	18	17	18	24			40	42	38	39	44	26	38	20	15	15	15	14	16
17	15	15	15	14	16	17	16	27	35	28	42	39	38	36	34	28	23	18	16	14	14	14	14	14
18	15	15	14	15	14	16	17	23		32	35	40	45	45	N		26	21	16	14	14	15	15	14
19	14	14	15	14	16	24	18	21	23	29	36	42	38	35	34	64	29	18	17	15	16	15	15	15
20	15	15	14	15	15	18	16	24	23	29	40	40	40	36	33	27	22	18	17	15	16	15	15	14
21	17	14	14	14	14	14	16	36	39	41	42	40	42	40	41	34	20	18	17	14	23	14		14
22	16	14	14	15	14	24	20	14	41	29	35	38	39	33	36	32	23	15	16	15	15	23	15	15
23	16	15	14	14	15	16	16	20	22	29	36	33	34	38	34	30	14	18	15	15	14	15	15	16
24	16	16	14	16	15	23	17	20	14	29	33	38	36	33	36	23	20	17	15	15	14	15	14	14
25	14	15	15	14	14	16	15	16	17	24	41	38	33	38	33	27	23	16	16	14	14	15	15	15
26	16	15	14	14	17	16	16	17	22	26	33	40	42	39	32	32	35	20	16	15				17
27	15	15	15	16	15	17	21	21	22	30	35	32	40	35	30	27	20	18	17	14	14	15	15	15
28	15	14	14	17	14	15	16	20	22	28	27	33	35	35	27	32	22	16	26	15	15	14	15	15
29	15	14	14	15	15	20	16	17	20	27	32	34	42	44	35	30	27	18	16	15	15	14	14	15
30	15	14	14	15	14	16	15	27	24	29	28		36	36	32	23		26	17	14	15	16	15	15
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	29	29	28	29	29	29	29	29	28	27	28	26	28	27	25	27	25	30	28	30	29	29	26	30
MED	15	15	14	15	14	16	17	20	23	29	36	38	40	38	34	32	23	18	17	15	15	15	15	15
U Q	16	15	15	15	15	19	17	22	32	33	40	40	42	40	38	35	26	21	18	15	15	15	15	15
L Q	15	14	14	14	14	16	16	18	22	28	33	37	35	35	32	27	21	18	16	14	14	14	15	15

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT YAMAGAWA

JUN. 1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	87	87	88	86	83	76	83	88	103	93	94	102	A	116	121	126	116	120	115	A	A	87	84	110
2	110	105	86	78	71	74	86	106	94	90	90	105	112	112	109	118	116	112	106	90	98	86	84	92
3	88	88	106	86	84	80	67	77	A	86	A	106		120	113	109	114	108	109	106	87		A	82
4	86	86	84	71	58	62	70	76	A		A	A		N	115	110	113	109	104	90	87	84	80	79
5	74	80	76	78	75	66	82	90	88	87	85	99	113	118		115	113	114	110	105	85	86	84	108
6	88	98	89	85	82	82	87	98	91	83	90	106	A	A	127	132	141	147	136	120	106	84	86	90
7	89	88	84	80	82	82	86	87	97	99	92	89	93	107	116	115	112	105	103	98	90	102	105	88
8	88	88	81	78	78	86	87	94	88	94	100	110	109	120	118	120	120	121	119	109	88	86	88	88
9	97	87	87	86	86	86	81	86	92	93	85	84	93	105	107	110	101	96	84	A	A	A	A	73
10	A	84	A	67	74	67	75		A	A	A		A	A	102	112	115	114	110	111	98	90	105	110
11	110	109	88	82	61	66	75		A	A	A	A		A	A	A	108	107	103	101	88	83	85	86
12	76	80	72	68	A	54	63	64	61	A	A	A		90	96	110	107	105	107	100	88	88	86	80
13	88	84	76	64	63	64	76	81	76	86	88		104	100	92	101	102	90	92	86	89	87	86	86
14		A	87	85	77	77	78	A		75	64	89	95	98	86	88	90			A	A	A	A	84
15		83	A	66	65	63	83	86	88	84	A			A	A	77	64	77	75	75	65	66	73	77
16	79	82	79	64	54	52	66		75	86	91	91	88	91	94	97	97	95	87	82	85	85	87	88
17	86	88	85	79	71	65	80	102	88	86	85	96	102	108	111	107	105	103	102	90	88	90	88	103
18	102	101	98	80	79	A	84	88	92	90	88	82	85	95	34	95	97	94	N	90	A	A	87	A
19	111	116	101	88	85	85	86	92	95	94	90	A	95	A	97	94	92	91	A	99	88	86	83	88
20	90	87	88	83	72	80	84	86	100	97	95		A	106	101	106	107		102	99	88	78	90	N
21	88	86	104	83	80	72	78	86	104		A	97	A	97	97	101	102	100	103	A	79	78	79	88
22	83	87	88	59	83	85	84	86	99	99	100	105	106	110	112	124	124	122	104	86	80	82	85	85
23	84	87	87	86	C	C	C	C	C	C	86	A	95	A	101	107	108	111	103	102	A	86	75	84
24	90	90	86	85	86	88	88	104	100	91	A	A	A	A	A	A		A	75	71	66	65	83	84
25	74	80	89	74	66	64	85	92	86	85	86	88	91	A	100	A	111	A	88	82	78	80	79	86
26	86		86	80	78	77	86	96	87	77	79	91	94	98	103	104	100	92	88	91	90	88	84	101
27	A	87	86		74	75	86	90	62	82	85	95	101	103	101	103	106	98	85	90	88	84	85	84
28	90	85	88	79	74	N	77	86	91	91	88	92	97	96	100	105	108	114	111	108	90	89	96	103
29	106	84	82	84	88	86	98	101	A	A	91	95	105	A	116	116	111	103	101	97	90	90	84	84
30	102	102	94	80	84	83	85	104	94	89	N		A	121	118	114	106	108	A	90	89	89	84	87
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	28	28	29	28	27	29	25	23	23	21	19	18	20	26	27	29	26	26	26	25	26	27	28
MED	88	87	87	80	78	76	83	88	91	89	88	95	96	106	102	109	108	106	103	94	88	86	85	86
U Q	97	89	88	85	83	83	86	97	97	93	91	105	105	114	115	115	113	114	109	102	90	88	87	91
L Q	86	84	84	72	71	65	76	86	87	85	85	89	93	97	97	101	101	96	88	90	85	83	83	84

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT YAMAGAWA

JUN. 1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	36	39	33	28	G	G	38	48	54	84	82	58	116	106	107	148	104	56	84	93	86	53	28	30
2	24	24	G	G	G	G	32	40	58	58	56	G	G	G	G	G	G	52	48	92	92	59	41	40
3	43	39	30	28	G	G	40	69	109	56	94	89	115	102	109	54	45	40	43	56	45	62	93	91
4	58	93	88	91	65	50	41	67	91	128	144	175	92	101	82	53	79	49	42	60	58	59	46	90
5	33	41	39	38	33	30	35	51	83	97	68	78	131	88	G	G	45	48	50	46	83	40	142	48
6	44	26	37	37	38	G	37	51	94	80	86	89	153	185	96	73	68	47	36	35	92	174	90	92
7	57	36	37	34	24	44	59	62	61	92	73	G	G	61	56	54	G	47	58	34	43	30	G	G
8	G	54	37	29	G	G	37	50	72	95	68	G	68	118	60	G	44	53	58	72	58	40	40	66
9	77	72	72	40	29	28	36	58	57	53	G	72	G	63	69	86	45	59	108	180	180	94	106	93
10	151	82	92	72	40	G	45	68	59	117	160	147	122	152	64	82	G	66	40	86	141	41	48	37
11	31	25	G	38	G	29	46	58	73	118	95	130	88	185	174	103	75	87	48	44	40	25	G	G
12	G	G	34	38	67	G	33	50	63	66	78	91	74	G	G	53	44	44	39	G	40	40	37	37
13	36	33	35	28	28	G	33	G	50	72	49	107	61	64	63	69	45	63	41	32	30	57	46	24
14	79	90	95	93	81	60	41	112	113	68	59	94	82	G	49	59	70	97	90	65	86	69	92	49
15	90	72	72	59	49	40	68	66	93	86	95	78	93	167	85	55	G	44	42	40	27	G	38	38
16	92	54	34	24	30	24	40	G	46	49	G	50	62	60	G	G	48	G	G	G	G	G	G	24
17	44	30	24	G	G	G	G	45	50	56	65	61	61	64	63	59	49	48	43	33	32	33	25	28
18	23	G	G	43	85	92	44	46	43	52	56	58	G	G	G	G	58	54	57	44	166	92	43	92
19	58	79	32	42	G	38	40	59	63	69	72	103	108	98	92	88	G	50	110	37	G	38	G	33
20	38	G	25	G	G	G	39	60	68	77	96	170	151	142	88	89	G		61	66	94	69	72	78
21	70	61	59	58	31	25	G	54	90	132	90	70	76	81	78	71	77	67	60	88	93	38	40	59
22	32	27	32	26	G	G	G	46	65	67	84	88	92	82	70	56	94	56	54	38	28	28	24	30
23	G	G	G	G	C	C	C	C	C	C	G	100	80	135	55	54	69	91	72	57	94	G	24	40
24	32	G	25	G	32	29	G	41	70	66	106	110	144	148	146	118	73	85	38	41	57	32	G	G
25	41	33	32	24	30	G	33	45	69	82	62	62	74	106	72	130	92	87	74	91	70	42	39	38
26	38	28	33	28	27	23	35	37	62	84	66	72	77	82	52	96	82	60	91	48	48	87	41	92
27	76	90	107	88	68	29	69	84	68	82	74	101	67	55	59	G	49	G	G	59	33	35	37	40
28	92	59	45	37	37	40	32	41	57	64	59	82	72	90	63	53	G	G	42	44	33	36	34	92
29	80	92	54	32	G	46	39	64	95	98	79	92	74	143	78	84	73	63	47	52	44	38	39	34
30	71	59	37	29	24	G	33	47	73	150	98	G	125	72	G	61	82	50	117	54	59	49	49	38
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	30	30	30	30	29	29	29	29	29	29	30	30	30	30	30	30	30	29	30	30	30	30	30	30
MED	44	39	34	33	29	24	37	51	68	80	74	85	78	89	64	59	49	53	49	50	58	40	40	39
U Q	76	72	54	42	39	39	41	63	86	96	94	101	115	135	85	86	75	64	72	66	92	59	48	78
L Q	32	26	30	26	G	G	33	45	57	65	59	61	67	63	52	53	44	47	42	38	33	33	25	30

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT YAMAGAWA

JUN. 1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	15	15	15	15	15	15	15	16	20	30	33	34	38	39	36	35	22	17	16	15	15	15	15	15
2	15	15	16	15	15	15	15	16	17	20	33	35	34	35	56	52	44	23	17	15	15	15	15	15
3	15	15	15	16	15	15	16	17	20	24	38	38	38	36	35	33	20	22	16	15	15	15	15	15
4	15	16	15	15	15	15	16	17	20	29	34	33	56	38	35	27	24	34	33	17	15	15	15	15
5	15	15	15	15	15	15	16	24	20	22	35	36	34	32	34	27	26	22	22	15	15	15	15	15
6	15	15	15	15	15	15	16	24	24	32	35	40	36	36	35	33	29	22	17	16	15	15	15	15
7	15	15	15	15	16	15	16	18	21	35	37	100	100	45	40	35	32	24	18	14	15	15	15	15
8	15	15	15	15	15	16	16	17	24	32	34	36	35	35	32	34	32	22	16	15	15	15	15	15
9	15	15	15	15	15	15	16	20	24	32	52	45	55	43	42	40	35	39	22	15	15	15	15	15
10	15	15	15	15	15	16	16	20	48	35	40	42	42	44	43	43	41	22	16	15	15	15	15	15
11	15	15	16	15	15	15	16	20	21	32	44	43	35	40	36	35	30	22	17	15	15	15	15	15
12	15	15	15	14	14	16	17	18	22	29	35	38	44	49	36	33	27	36	17	15	15	15	15	16
13	15	15	15	15	15	15	16	17	21	28	42	43	40	45	46	35	29	20	17	16	15	15	15	15
14	15	15	15	15	15	15	16	17	20	30	42	39	42	48	80	43	24	23	17	15	15	15	15	15
15	15	15	15	15	15	15	16	18	21	24	30	40	43	43	38	39	30	36	18	16	15	15	15	15
16	15	15	15	15	15	15	16	21	22	24	36	50	46	48	100	100	39	54	22	24	15	15	15	15
17	15	15	15	15	15	17	16	20	26	32	39	40	40	35	39	33	32	24	17	15	15	15	15	15
18	15	15	16	15	15	15	16	18	23	24	36	40	56	49	70	80	34	27	17	16	15	15	15	15
19	15	15	15	16	16	17	17	18	21	27	39	43	43	43	38	53	32	28	20	16	15	15	15	15
20	15	15	15	15	15	15	16	20	21	26	32	39	40	35	36	35	26		16	17	15	15	15	15
21	15	15	15	15	15	17	16	35	38	38	40	46	43	45	44	35	33	23	18	15	15	15	15	15
22	15	15	15	15	15	16	17	21	22	34	38	40	44	39	39	36	32	24	18	15	15	15	15	15
23	15	15	15	15	C	C	C	C	C	C	44	38	36	41	40	40	23	21	16	16	15	17	15	15
24	15	15	15	15	15	15	16	18	17	26	30	39	40	39	35	29	23	18	18	15	15	15	15	15
25	15	15	15	15	15	15	15	16	18	27	30	36	38	43	33	32	23	80	16	15	15	15	15	15
26	16	15	15	14	15	15	16	17	18	21	29	36	39	38	33	32	18	18	16	16	15	15	15	15
27	15	16	15	17	16	15	16	16	21	23	34	35	42	34	34	33	27	23	15	15	15	15	15	15
28	15	15	15	15	15	15	16	16	21	24	35	29	39	33	36	26	39	21	17	15	15	15	15	15
29	15	15	15	15	15	15	15	16	22	23	34	35	39	45	41	34	30	22	16	15	15	15	15	15
30	15	15	14	15	15	15	15	21	27	33	33	44	39	34	50	39	39	36	18	15	15	15	15	15
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	30	30	30	30	29	29	29	29	29	29	30	30	30	30	30	30	30	29	30	30	30	30	30	30
MED	15	15	15	15	15	15	16	18	21	28	35	39	40	40	38	35	30	23	17	15	15	15	15	15
U Q	15	15	15	15	15	15	16	20	23	32	39	43	43	45	43	40	33	31	18	16	15	15	15	15
L Q	15	15	15	15	15	15	16	17	20	24	33	36	38	35	35	33	24	22	16	15	15	15	15	15

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT OKINAWA

JUN. 1989

LAT. 26.3N LON. 127.8E 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		109	95	89	78	76	76	88	A	90	97	112	114	134	138	140	140	140	129	A	110	141	164	170
2	144	164	86	101	80	71	85	104	86	93	96	104	121	128	134	141	140	121	108	103	86	85	83	85
3	87	76	97	86	78	66	62	76	84		103	121	118	140	140		156	155	144	130	104	82	80	86
4	84	84	82	74	64	65	73	78	A	A	A	A		A	142	141	121	N	130	112	88	83	86	86
5	84	79	81	74	65	72	75	82	77	A	84	85	104	121	131	141	142	140		105	88	84	79	87
6	90	86	88	71	64	81	87	88	80	85	78		121	136	145	145	160	172	166	164	142	106	88	89
7	85	87	87	85	62	76	77	90	80	91	85	A	93	118	128	130	123	121	121	104	88	89	137	66
8	87	82	74	77	75	79	89	88	80	88	90		127	138	141	141	141	142	141	128	88	107	87	88
9	90	85	78	80	80	66	80	88	92	95	88	A	104	N	109	104	105	106	104	102	88	77	A	A
10	78	79	A	A	A	66	73	73	76	76	85	97	A	121	A	133	141	136	146	140	139	136	139	170
11	145	144	110	85	91	86	80		A	A	A	A		A		A	A	142	146	145	127	90	87	87
12	84	82	80	66	59	50	63	75	58		70	76	100	105	120	125	141	144	146	141	122	133	140	90
13	119	130	97	80	68	66	72	80		86	91	96	112	112	115	120	124	122	122	128	104	90	103	87
14	86	86	75	66	71	A	80	85	A	78	81	91	111	111	106	95	107	102	95	87	A		A	A
15	72	62	55	62	60	63	77	81	A	A	A		104	100	105	104	98	89	86	86	76	71	84	81
16	78	83	88	72	60	52	62	74	82	93	91	95	95	96	106	93	102	98	104	98	90	84	90	87
17	86	90	85	81	65	66	77	88	86	82	87	N	116	126	128	124	126	138	139	143	130	131	144	140
18	145	144	106	87	87	86	87	104	93	A	86	97	97	97	N	103	N	103	96	90	75	86	85	89
19	A	A	85	81	78	74	85	96	91	87	88	A	A	A	A	104	105	110	103	103	90	A	85	88
20	86	88	85	80	41	66	84	94	90	93	86	91	A	A		117	121	119	121	A	A	90	89	90
21	102	104	111	N	75	74	73	86	92	85	A	104	105	98	112	110	112	110	111	92		88	84	87
22	106		106	108	88	80	76	88	102	A	87	A	N	127	144	104	153	148	126	104	90	91	85	87
23	86	84	88	84	80	74	80	95	88	84	84	91	99	94	111	95	114	125	108		88	78	88	95
24	98	104	87	84	80	73	85	90	86	94	A	91					A	A	84	A	76	76	82	79
25	76	78	87	80	60	59	66	85	82	84	84		102	A	A	115	103	121	121	98	88	88	87	97
26	86	88	102	100	85	86	89	89	87	60	84	A	106		104	103	106	102	116	103	106	104	87	79
27	86	85	85	84	72	61	71	81	A	91	87	A	100	109	107	121	121	68	107	104	103	90	85	85
28	83	87	86	78	68	66	71	85	92		92	95	104	106		111	130	145	146	135	109	143	139	N
29	89	86	90	82	86	84	87	88	88	83	84	A	A	120	A	A	123	106	106		85	90	74	N
30	103	128	122	86	86	87	89	108	88	91	A		124	126	129	125	122	118	109	107	A	89	88	88
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	29	28	29	29	30	29	23	21	24	15	22	22	21	26	27	28	29	25	26	28	28	26
MED	86	86	87	81	75	72	77	88	86	87	86	95	104	119	128	118	123	121	121	104	90	90	87	87
U Q	100	104	97	85	80	79	85	90	91	92	90	104	116	127	139	133	141	141	140	132	109	105	96	90
L Q	84	82	83	75	64	66	73	81	80	83	84	91	100	105	108	104	107	106	105	100	88	84	84	86

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT OKINAWA

JUN. 1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	23	G	G	G	36	44	48	81	59	56	95	88	56	56	G	62	76	168	82	33	45	28
2	26	G	G	G	G	G	30	42	49	50	56	49	52	55	51	63	G	71	62	51	54	92	72	48
3	36	28	G	G	G	34	49	66	88		150	94	88	77	62	77	50	46	47	58	48	47	40	40
4	58	39	35	30	35	32	33	60	134	163	147	147	145	170	73	100	86	62	64	73	40	25	44	39
5	32	28	26	G	G	G	G	G	72	87	90	101	80	G	G	G	G	G	G	38	27	25	24	G
6	46	41	38	32	G	55	34	51	76	80	89	127	57	74	G	G	G	47	91	60	26	40	82	91
7	58	90	40	37	33	24	42	40	47	53	76	100	88	79	58	57	58	58	160	58	66	42	36	24
8	24	G	G	G	G	G	33	42	56	79	105	164	G	G	49	G	G	48	42	G	40	G	58	46
9	39	33	32	G	G	G	G	G	59	58	64	89	G	G	G	G	G	G	45	38	31	23	152	58
10	41	59	146	144	69	60	40	56	G	115	138	146	170	94	76	65	75	105	42	48	84	58	38	32
11	22	G	G	22	G	G	33	46	85	88	123	184	170	132	145	150	113	177	114	55	56	40	26	24
12	G	G	G	G	G	24	G	42	65	65	66	65	G	62	55	64	76	60	45	52	33	30	28	23
13	30	26	G	25	G	G	G	39	G	G	G	G	G	G	G	G	G	49	40	G	32	G	29	26
14	G	G	G	27	G	65	G	50	127	72	63	57	G	G	70	66	64	66	61	60	109	72	70	110
15	36	38	90	50	44	40	33	46	179	96	110	151	75	58	57	54	G	44	48	40	G	40	59	46
16	40	40	30	26	G	G	36	38	42	G	G	G	G	64	G	G	G	G	41	30	23	24	25	G
17	G	25	G	G	G	G	32	44	69	82	72	68	64	69	G	84	60	54	41	47	28	31	G	G
18	G	G	G	G	G	G	34	40	49	111	61	50	55	G	52	G	G	51	62	44	29	42	58	85
19	139	152	46	33	G	G	G	44	57	74	85	95	110	169	133	78	53	68	39	36	34	65	37	G
20	G	23	26	G	G	G	32	41	41	56	74	90	148	184	92	89	G	62	61	92	117	59	40	28
21	34	43	39	31	28	23	34	G	G	G	96	68	63	83	56	64	78	71	57	58	92	59	40	34
22	28	38	38	28	23	G	G	42	54	103	84	111	58	90	90	117	110	78	66	66	96	29	G	G
23	G	G	G	G	G	G	32	41	42	G	G	G	G	G	78	67	64	48	40	33	37	24	33	92
24	33	40	38	33	33	38	G	50	52	72	90	84	76	78	66	69	107	99	58	85	61	39	31	31
25	G	G	G	G	G	G	G	42	46	67	70	66	52	118	143	68	84	59	66	58	57	38	23	26
26	32	30	G	G	G	G	G	42	47	65	68	91	66	90	78	G	65	42	92	65	59	34	27	G
27	G	32	40	G	G	G	30	65	142	49	80	104	94	57	66	66	46	60	54	48	83	39	24	40
28	40	G	92	45	40	40	31	41	44	G	63	62	55	69	145	90	120	42	44	30	26	26	29	G
29	G	G	G	G	G	G	30	57	64	66	80	105	114	77	120	151	93	84	67	116	69	39	G	28
30	25	G	G	G	29	G	G	44	59	68	107	166	67	68	91	84	94	51	61	73	116	35	44	34
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	30	30	30	30	30	30	30	30	30	29	30	30	30	30	30	30	30	30	30	30	30	30	30	30
MED	29	27	24	G	G	G	32	42	55	68	78	90	65	72	64	66	59	58	58	54	51	38	36	30
U Q	39	39	38	31	28	32	34	50	72	84	96	111	94	90	90	84	84	68	66	65	82	42	45	46
L Q	G	G	G	G	G	G	G	41	46	51	63	62	52	55	51	G	G	47	42	38	31	26	26	23

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT OKINAWA

JUN. 1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	15	16	15	15	15	15	15	16	26	28	30	32	32	34	33	30	27	23	16	15	15	15	15	15
2	14	15	15	15	15	15	16	16	20	28	29	28	34	32	35	48	44	32	23	15	15	14	15	15
3	15	14	16	16	15	15	15	16	21		32	34	33	36	34	59	28	21	16	14	15	15	15	15
4	14	15	15	15	15	15	16	22	27	28	30	30	59	42	34	34	29	29	29	14	14	14	14	15
5	14	15	15	15	15	15	17	33	24	28	28	32	34	33	33	30	30	34	22	15	15	15	15	15
6	15	15	15	14	15	15	16	29	26	29	29	39	36	45	32	32	30	27	20	15	15	14	14	15
7	15	14	15	15	15	17	15	21	27	28	32	52	45	44	45	30	29	26	18	16	14	14	15	15
8	15	15	15	15	15	15	15	15	27	28	30	46	48	50	33	28	29	26	17	16	15	16	15	15
9	15	15	15	15	15	15	24	30	27	30	49	45	49	35	35	44	28	38	22	15	14	15	15	15
10	15	15	15	14	15	14	15	21	48	32	32	36	42	45	34	32	30	28	17	15	15	15	15	14
11	15	15	15	14	15	16	16	23	23	29	32	34	33	35	35	32	30	27	18	15	14	15	15	15
12	16	15	15	15	15	15	16	16	26	27	30	41	48	38	35	30	29	23	16	14	14	15	15	15
13	15	15	15	16	15	15	27	18	N	28	30	48	49	49	50	50	30	26	14	16	15	16	15	16
14	15	15	15	15	14	15	16	21	22	29	30	35	52	50	34	32	29	22	16	16	14	15	15	15
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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	30	30	30	30	30	29	30	30	29	29	30	30	30	30	30	30	30	30	30	30	30	30	30	30
MED	15	15	15	15	15	15	16	21	26	28	30	34	38	38	34	32	29	26	18	15	15	15	15	15
U Q	15	15	15	15	15	15	16	24	27	29	32	41	48	45	35	34	30	28	23	16	15	15	15	15
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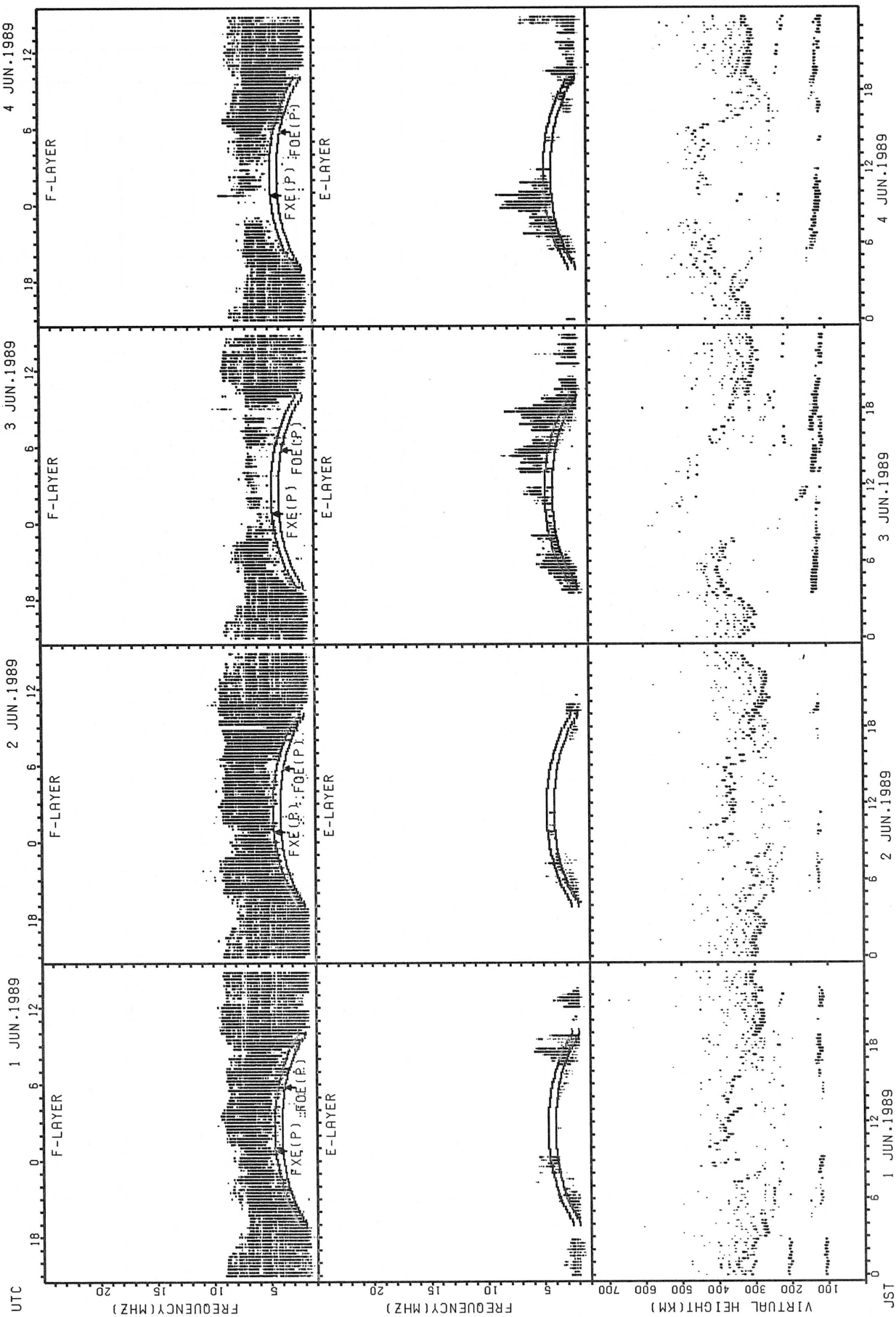
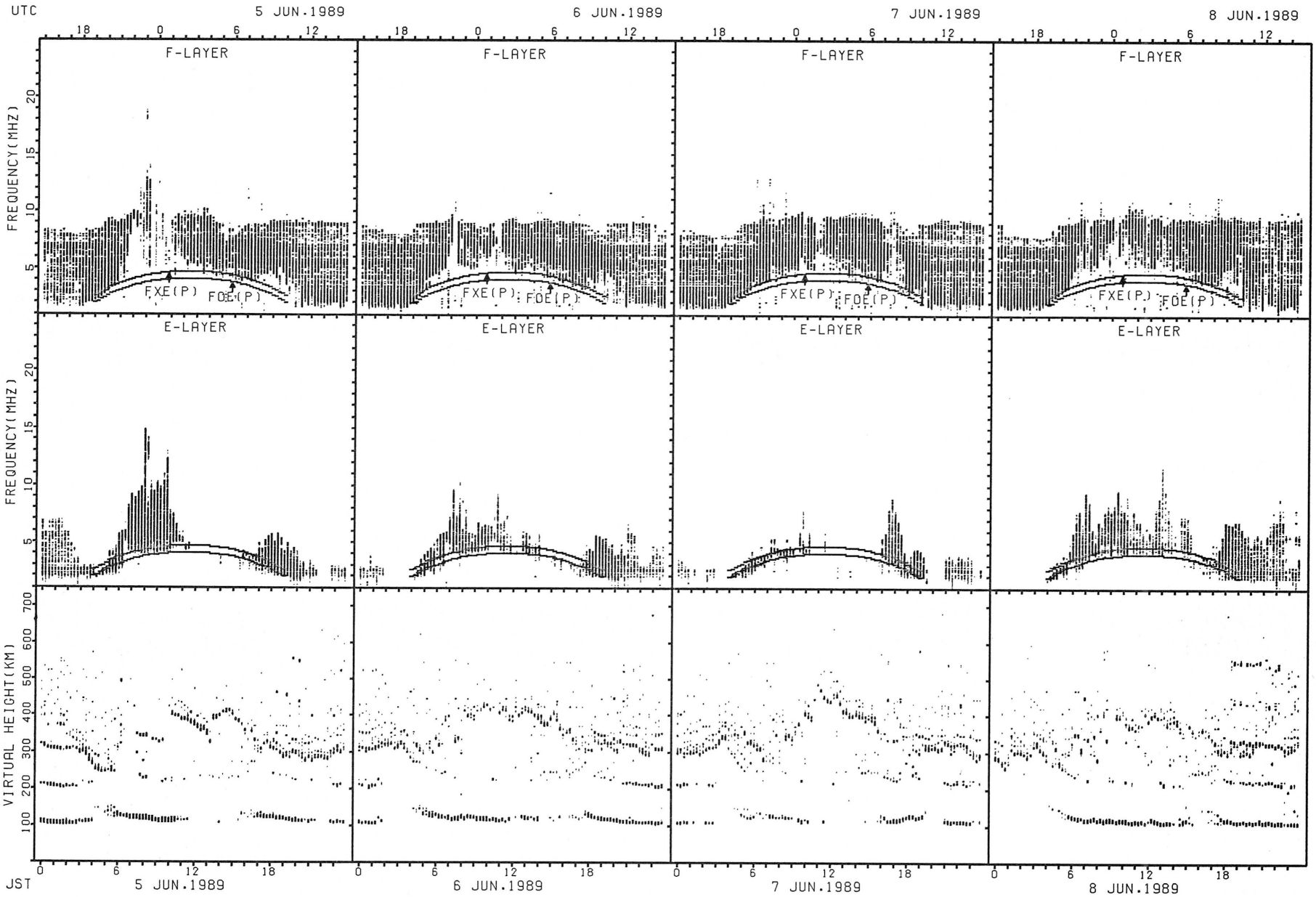
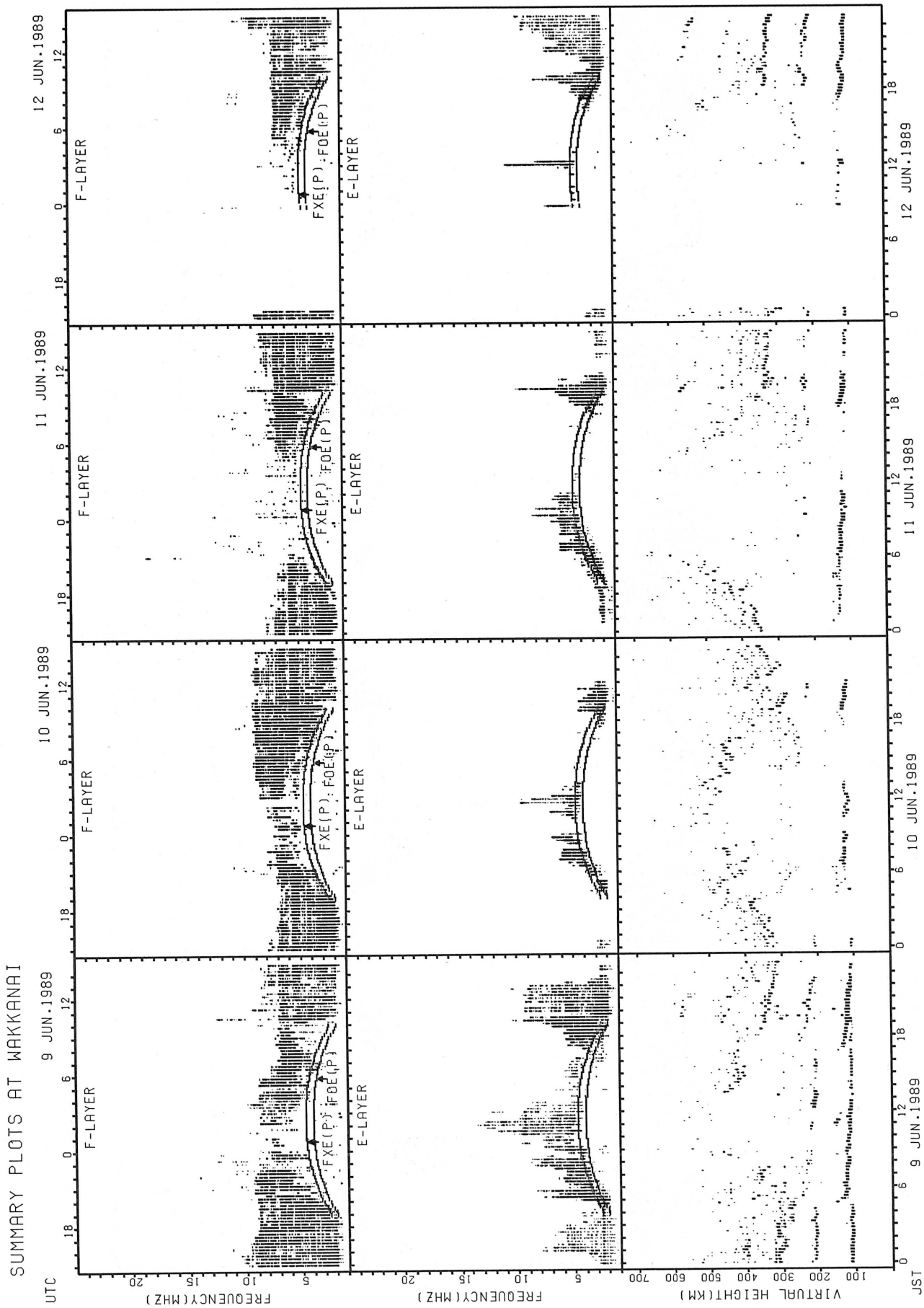
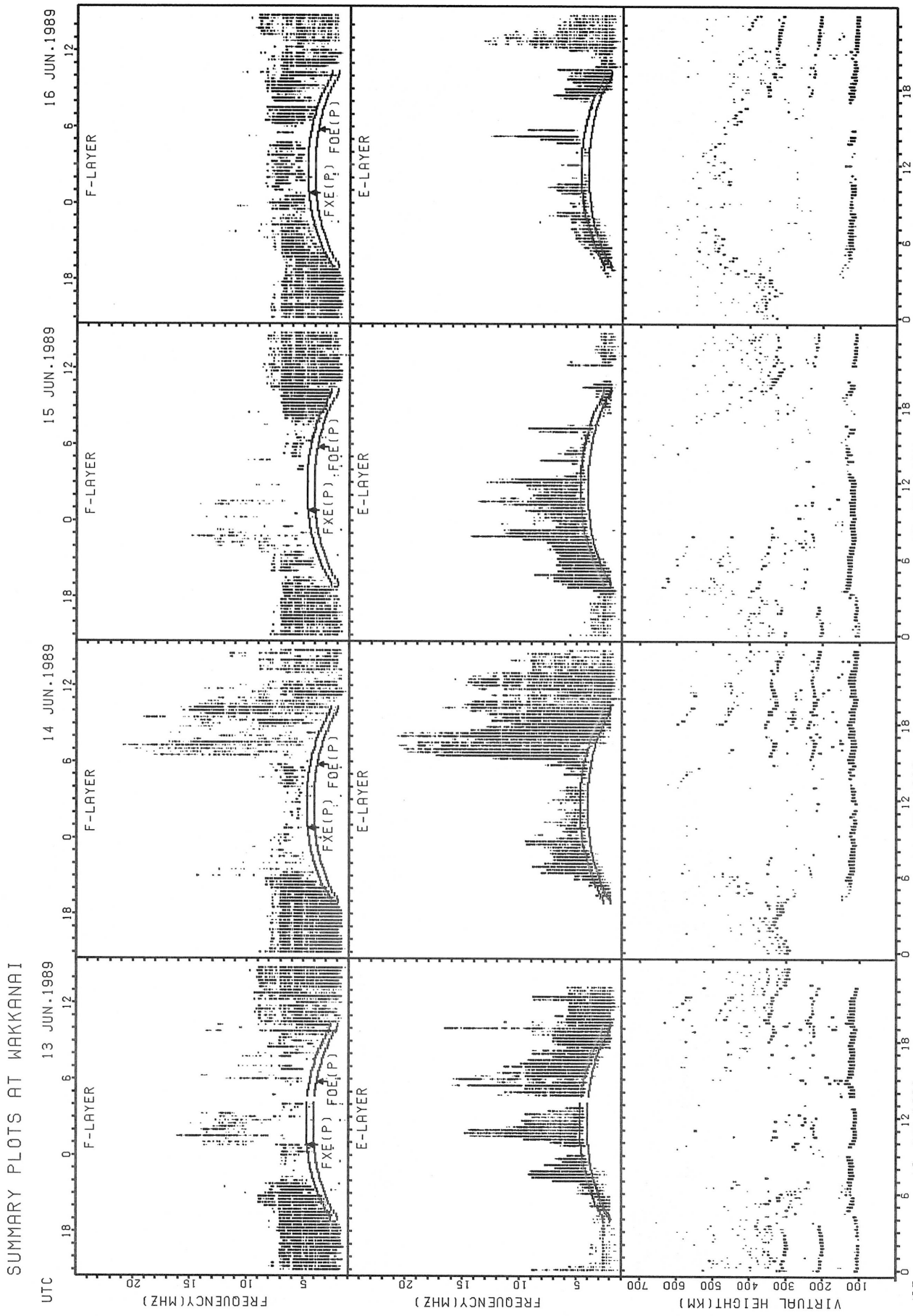

SUMMARY PLOTS AT WAKKANAI
UTC
JST
1 JUN.1989
2 JUN.1989
3 JUN.1989
4 JUN.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

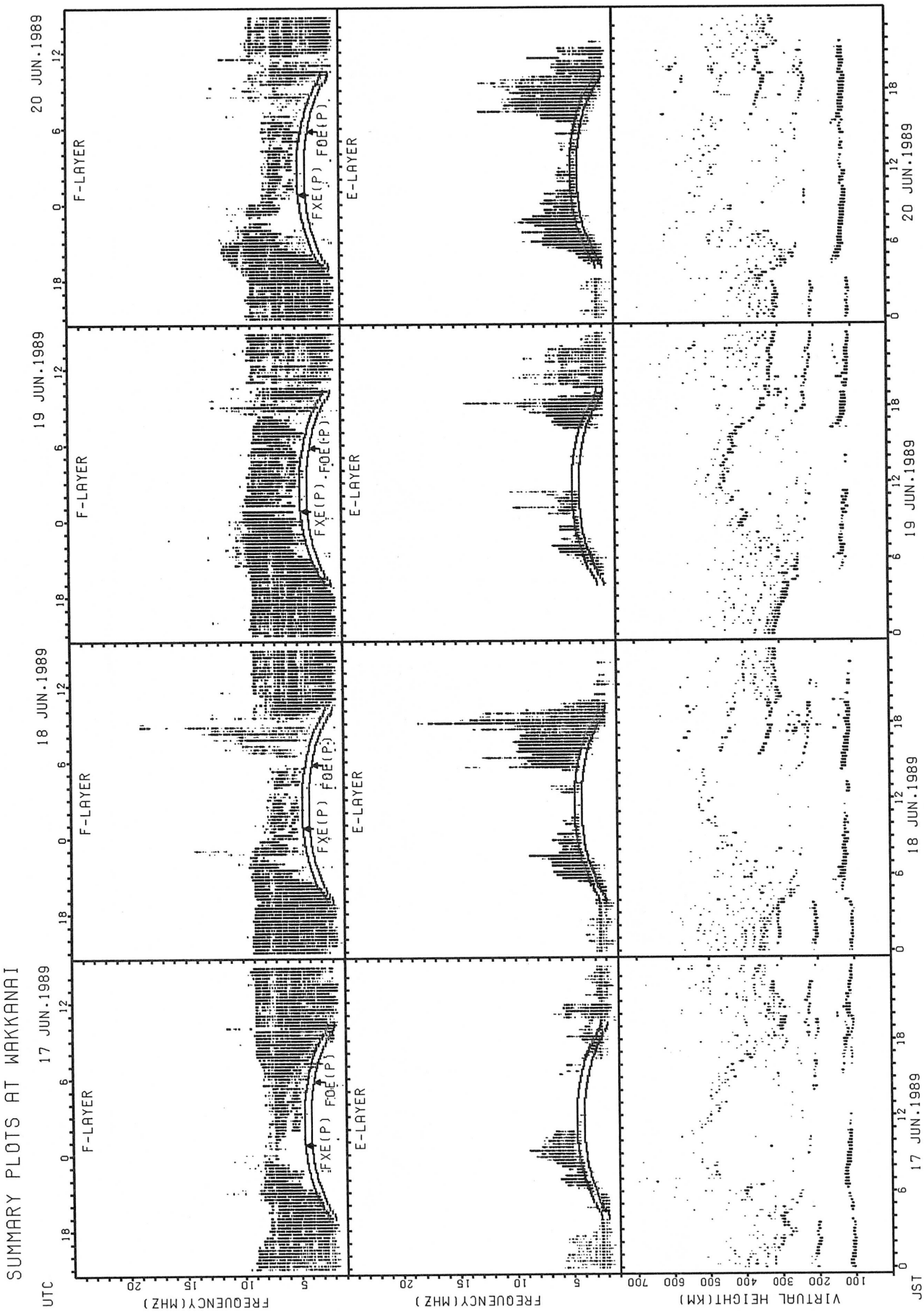
SUMMARY PLOTS AT WAKKANAI



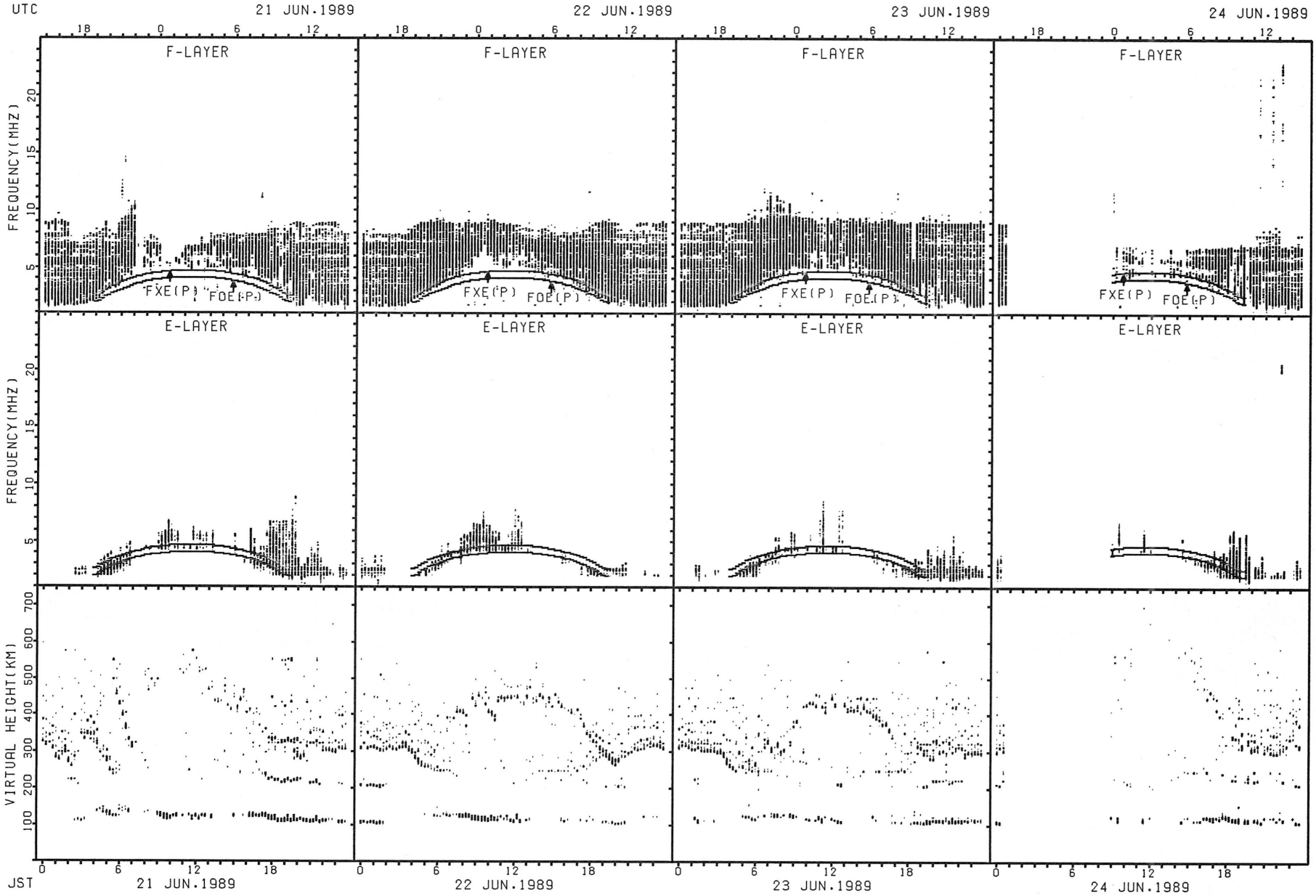
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


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

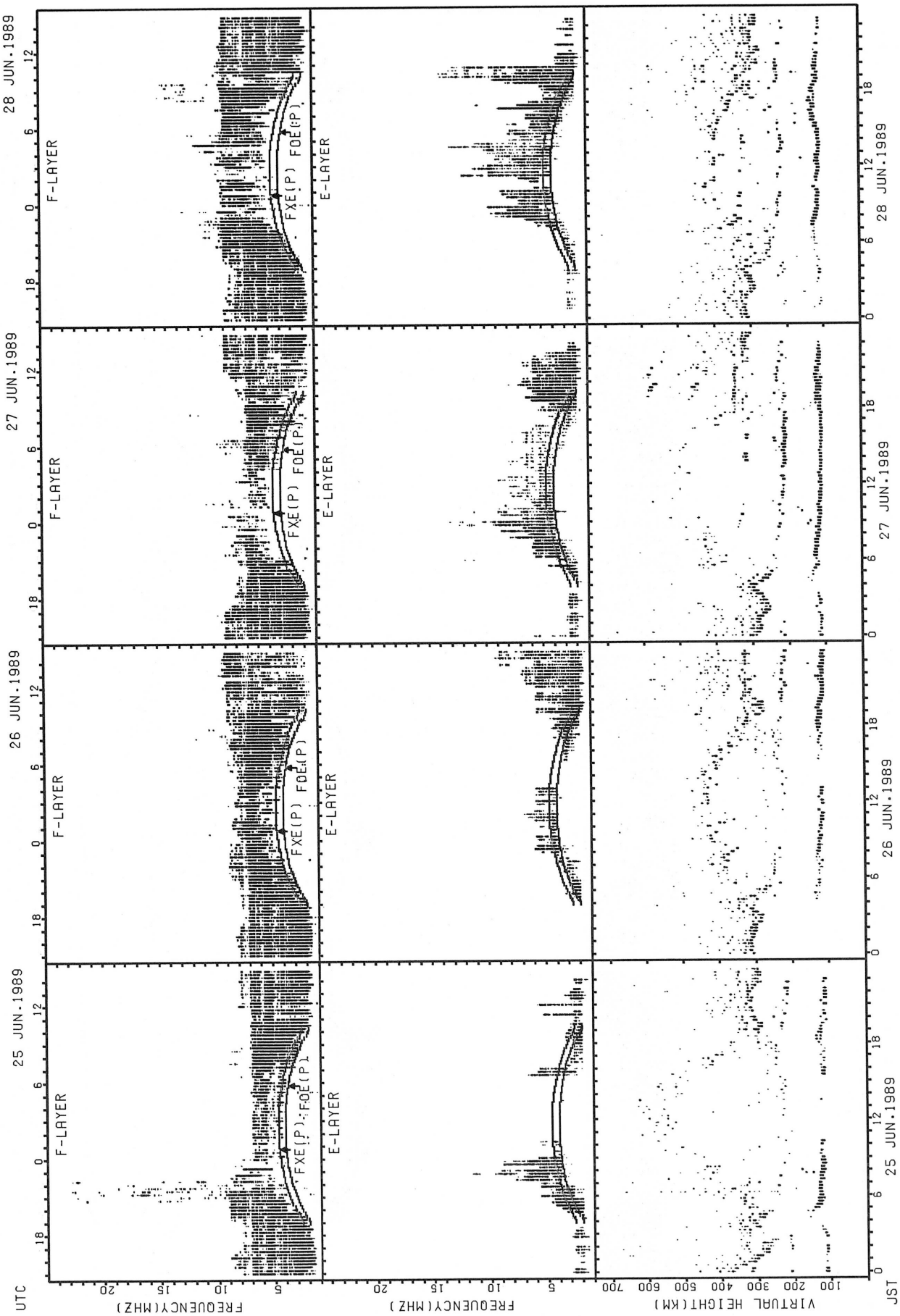

SUMMARY PLOTS AT WAKKANAI
UTC
13 JUN.1989
14 JUN.1989
15 JUN.1989
16 JUN.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


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

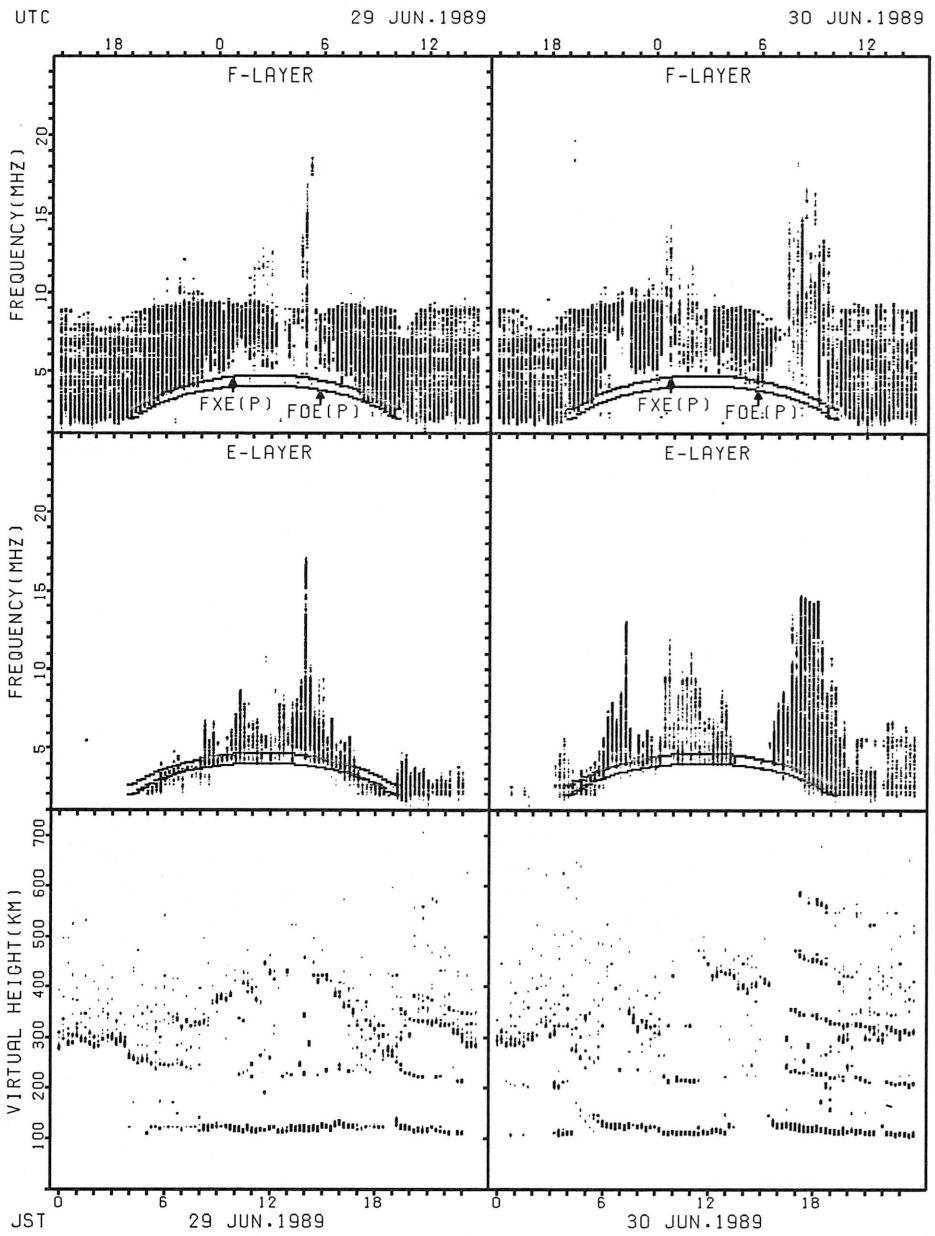
SUMMARY PLOTS AT WAKKANAI



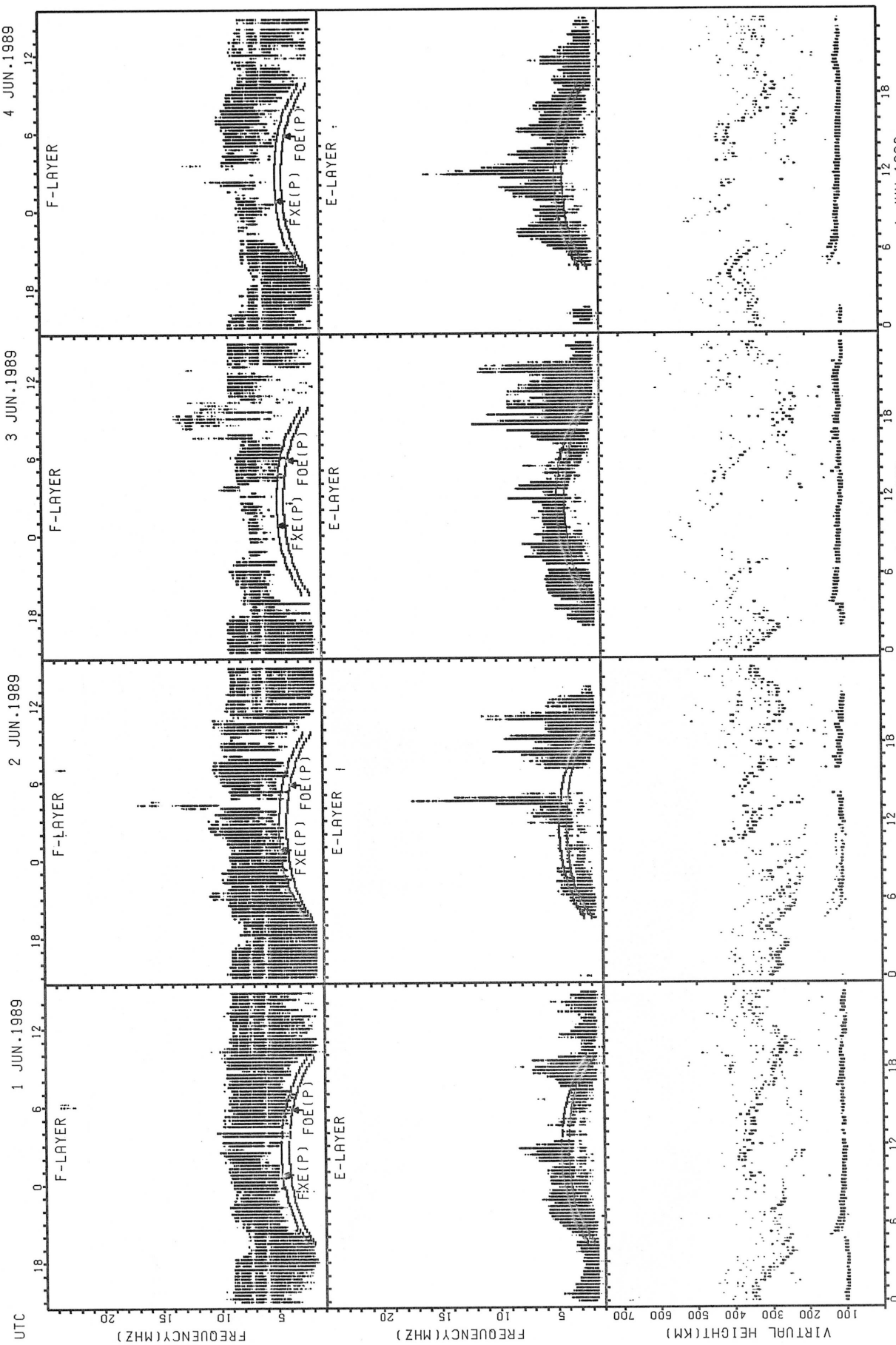
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


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

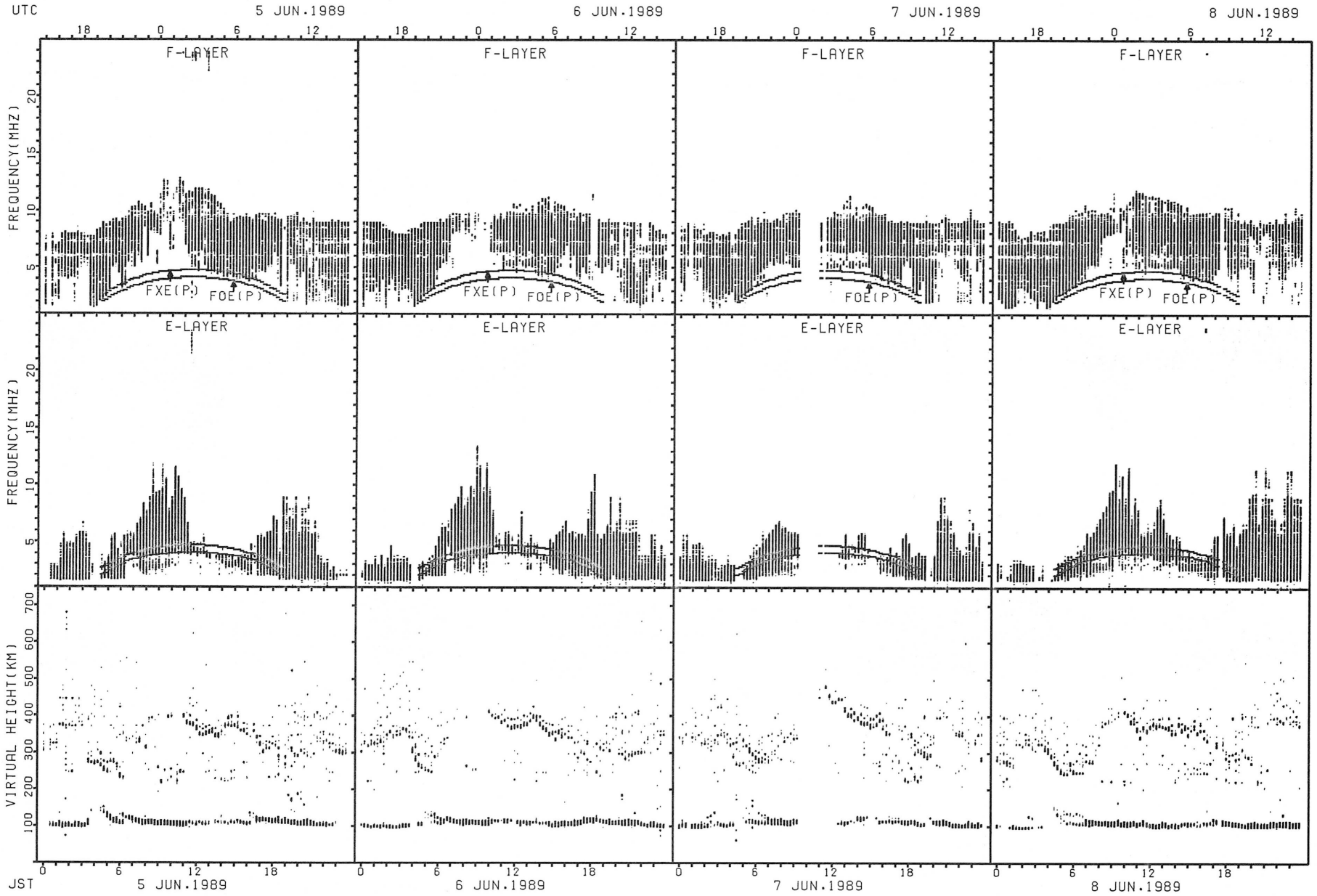
SUMMARY PLOTS AT WAKKANAI



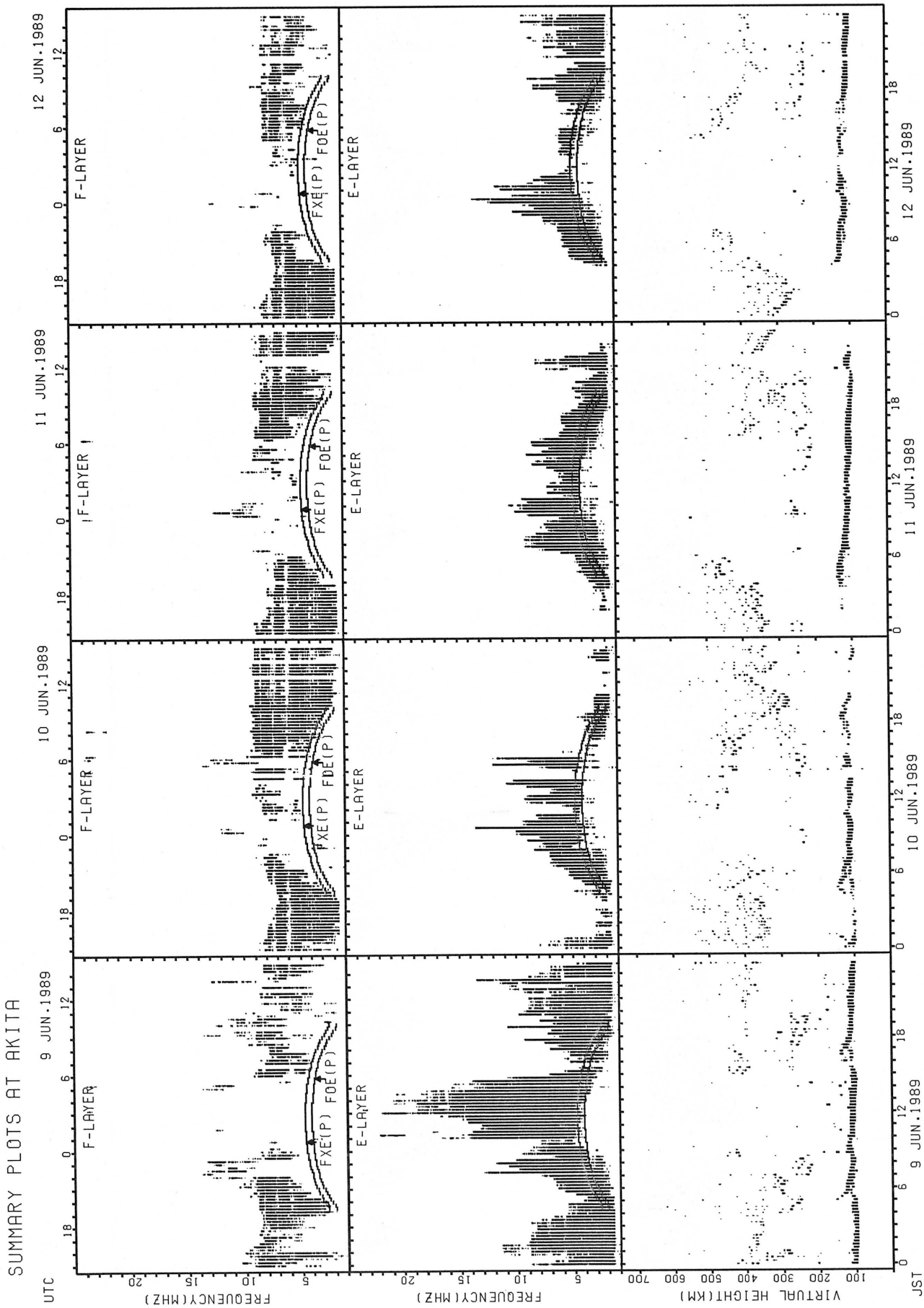
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

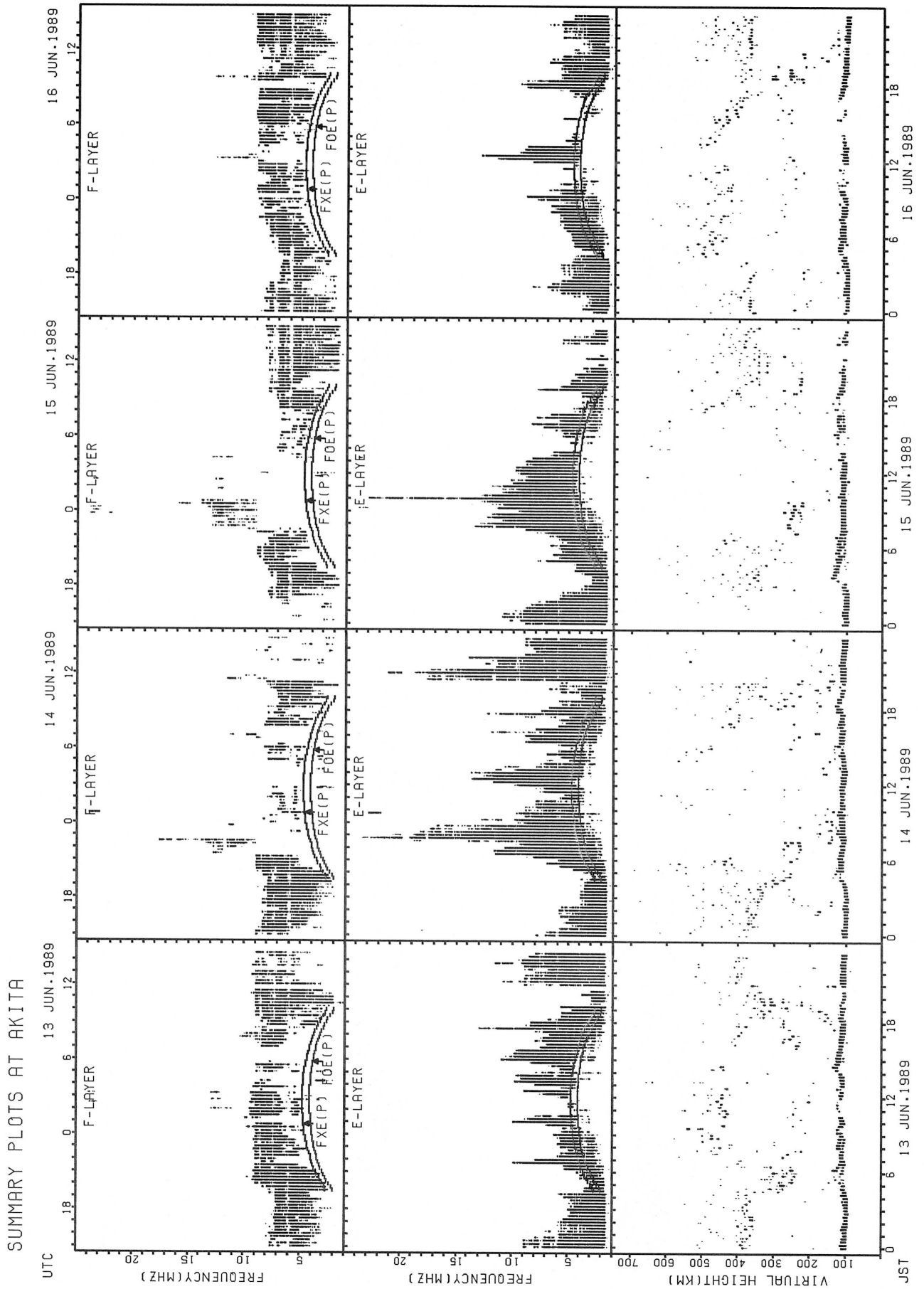

SUMMARY PLOTS AT AKITA
UTC
1 JUN.1989
2 JUN.1989
3 JUN.1989
4 JUN.1989
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

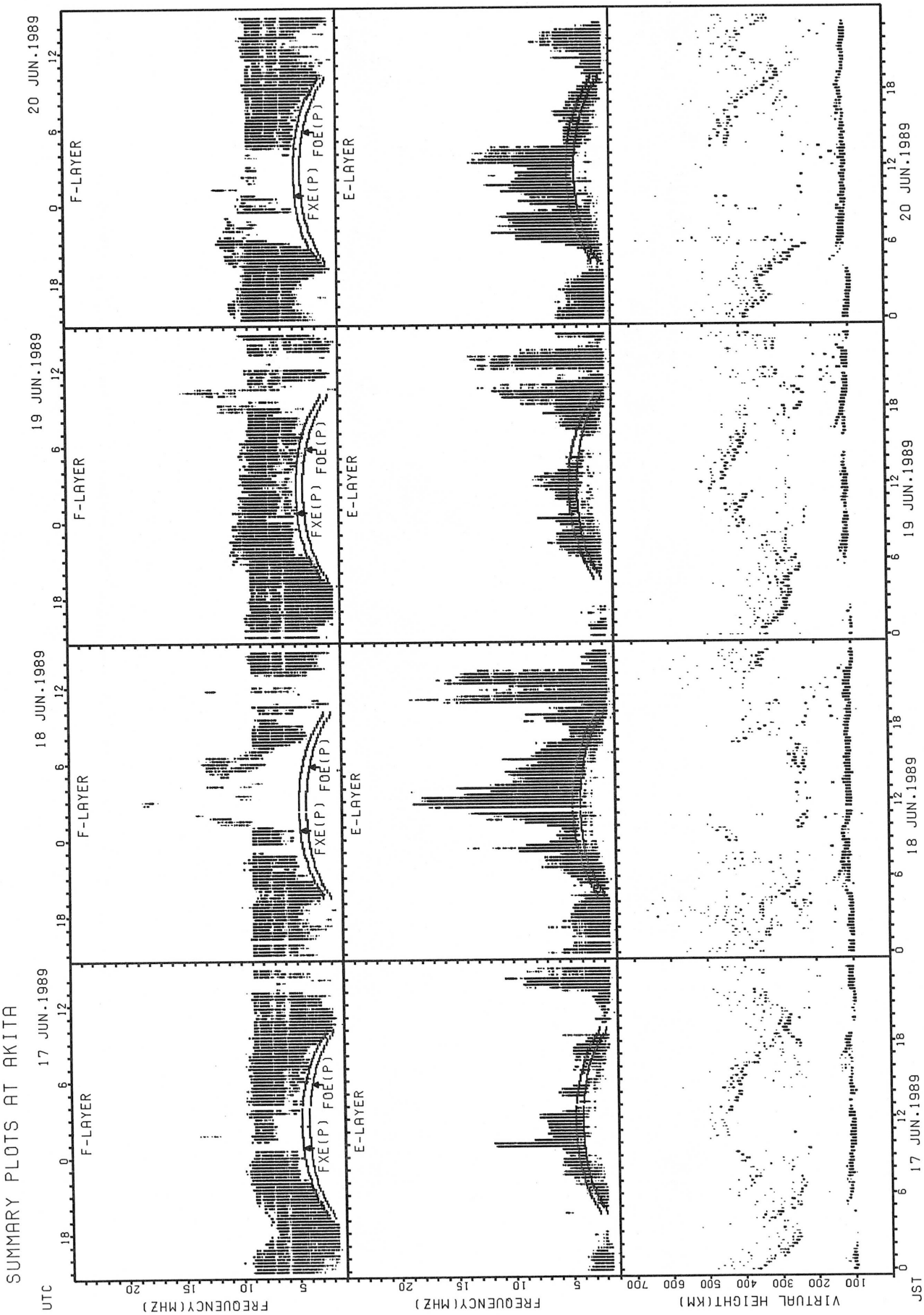
SUMMARY PLOTS AT AKITA

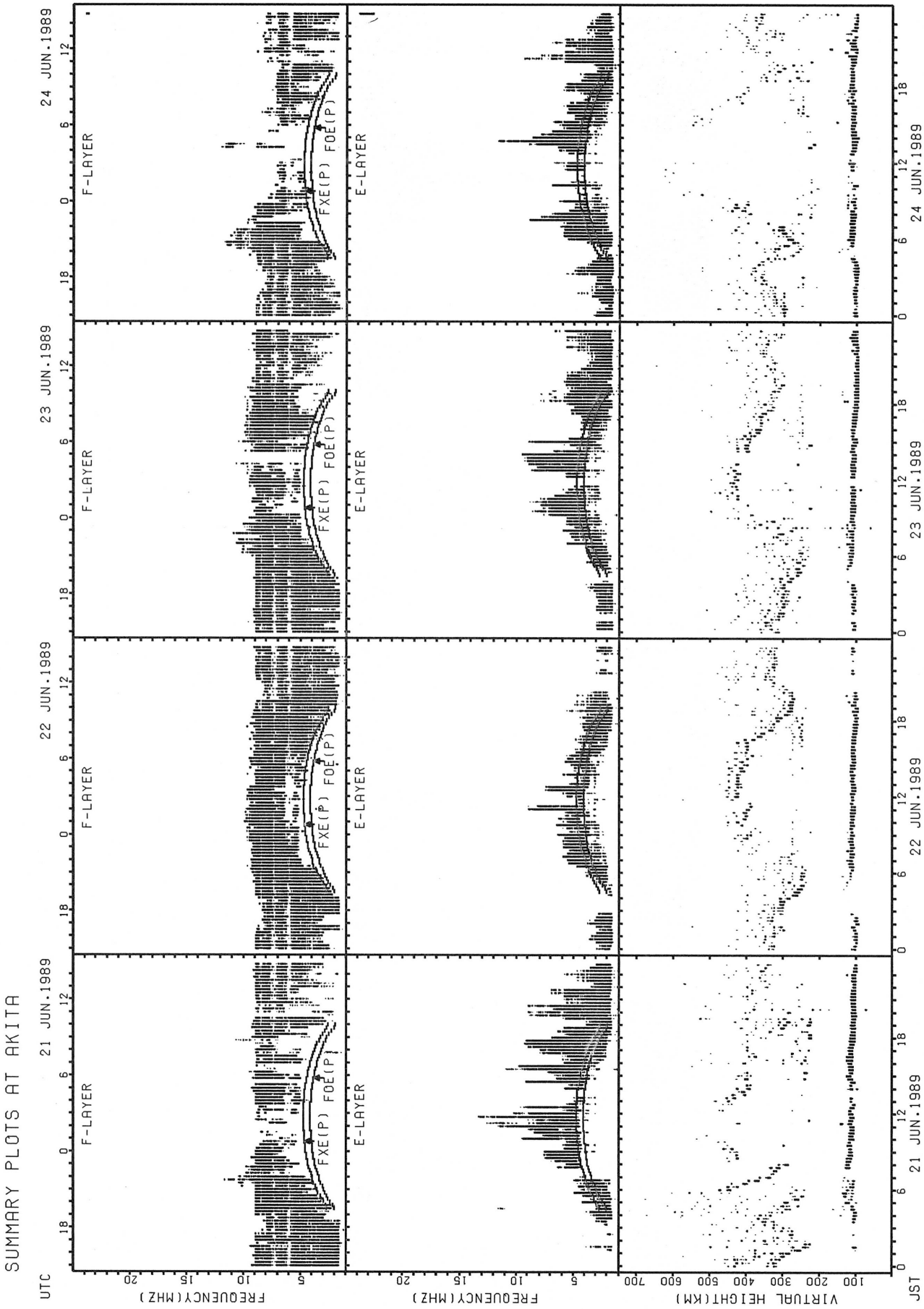


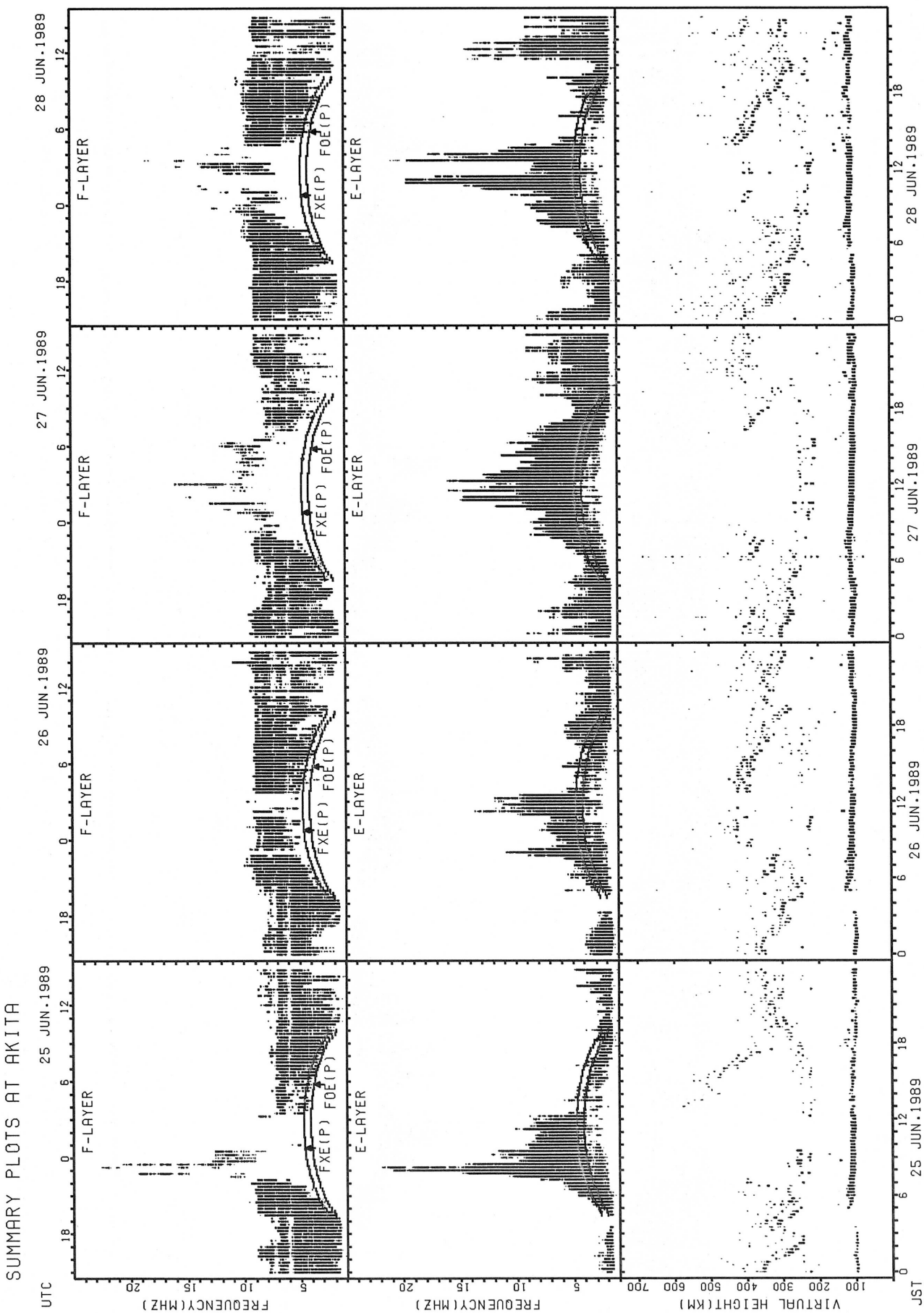
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


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

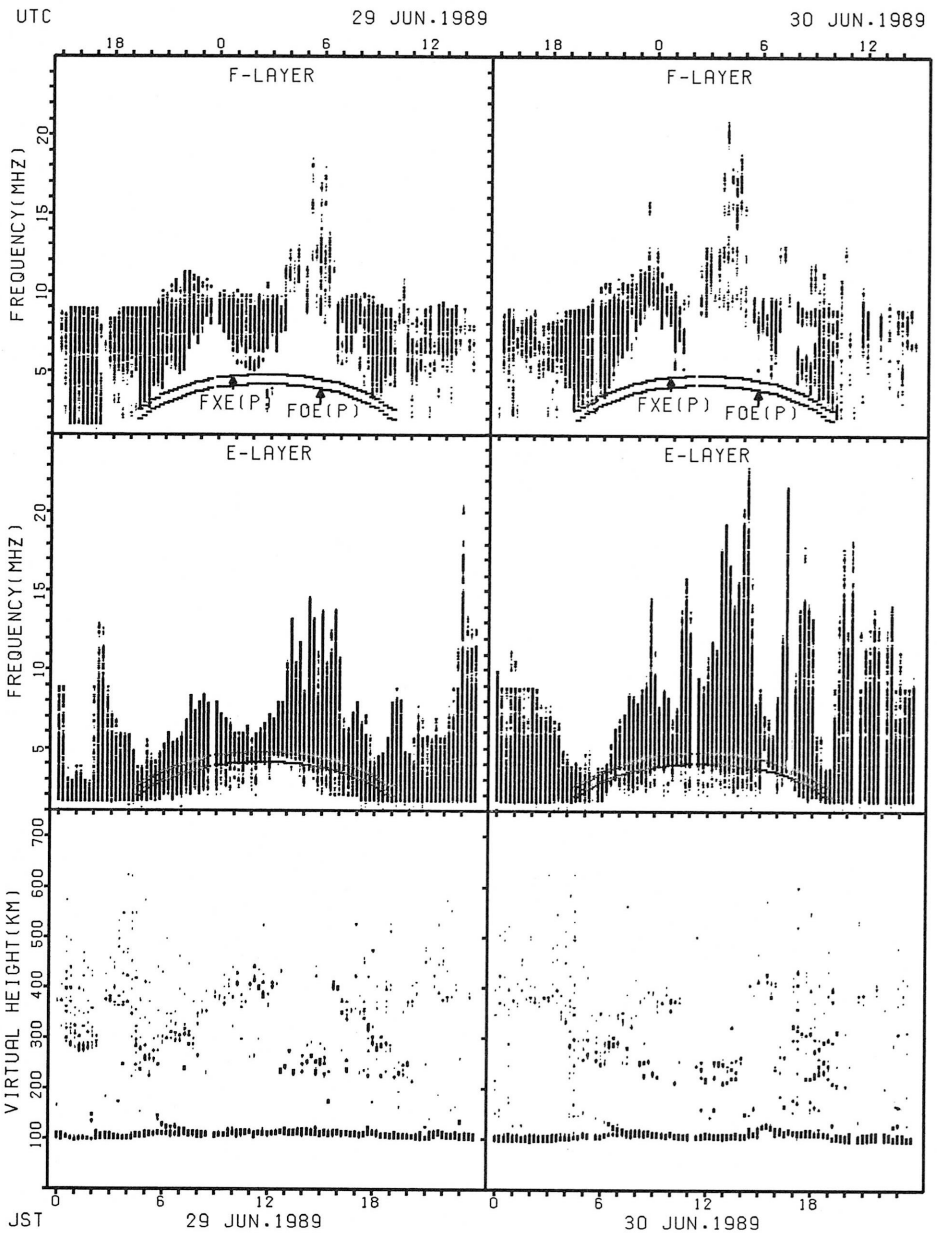

SUMMARY PLOTS AT AKITA
UTC
JST
13 JUN.1989
14 JUN.1989
15 JUN.1989
16 JUN.1989
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


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

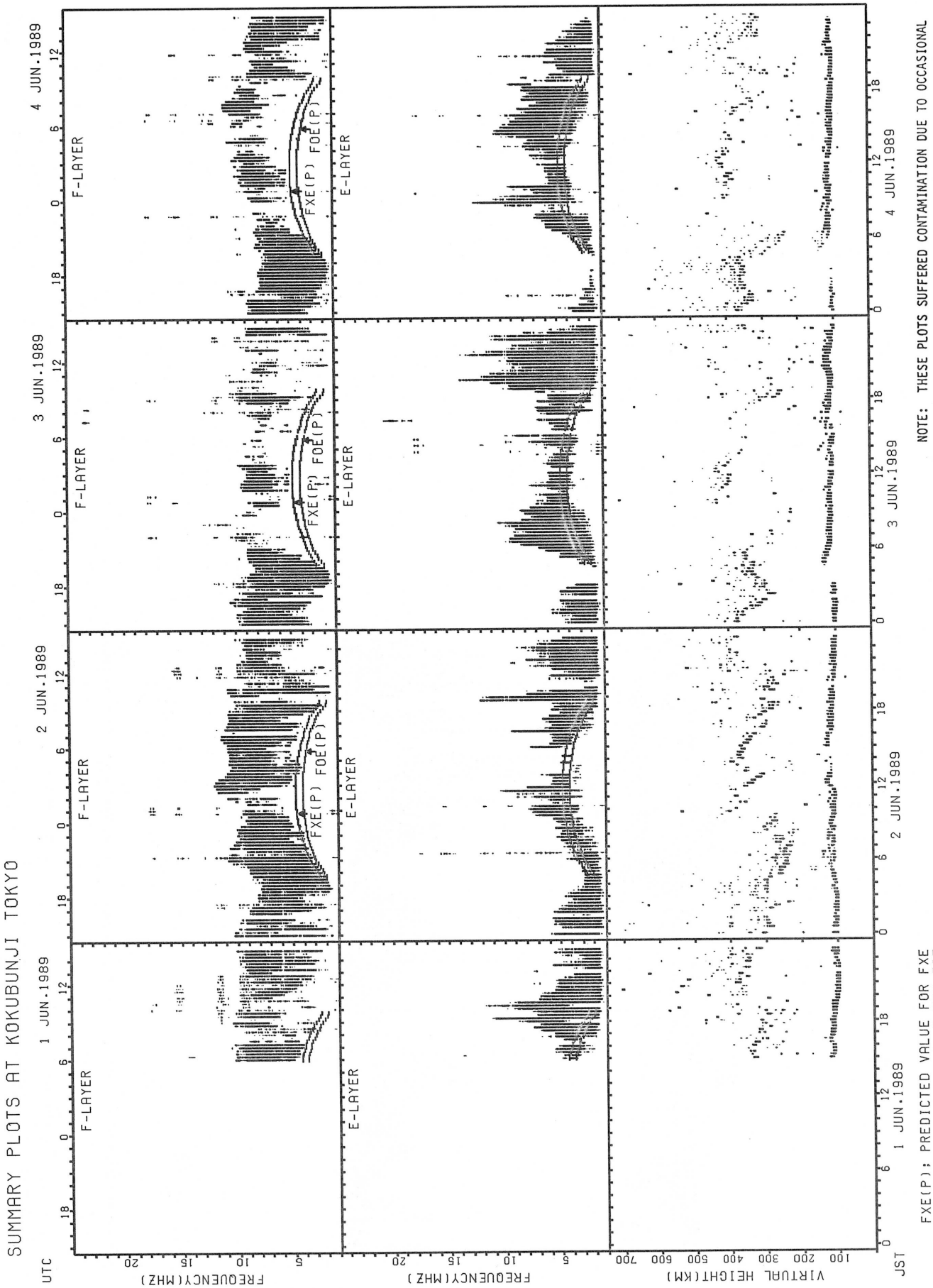

SUMMARY PLOTS AT AKITA
UTC
21 JUN.1989
22 JUN.1989
23 JUN.1989
24 JUN.1989
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


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

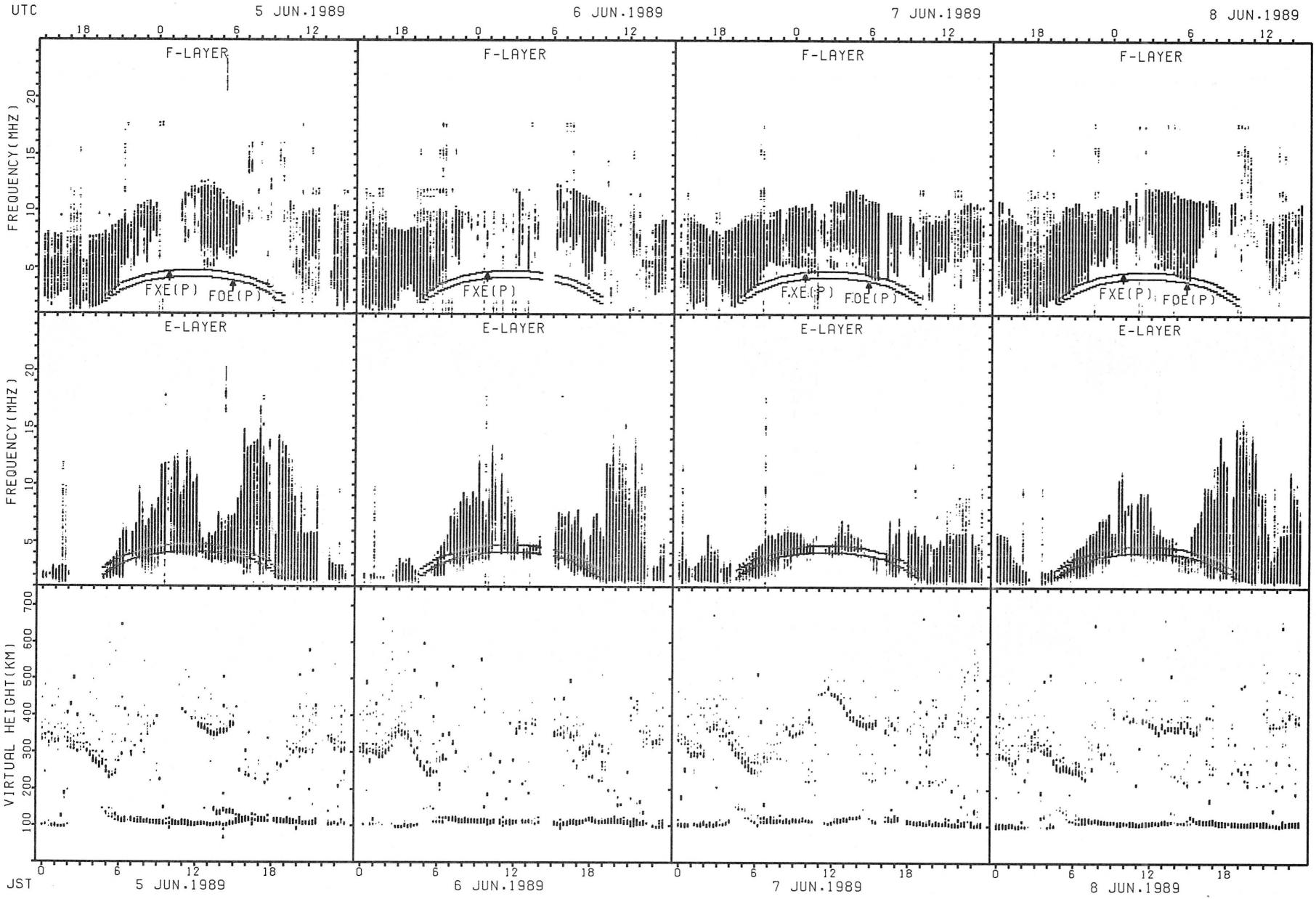
SUMMARY PLOTS AT AKITA



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

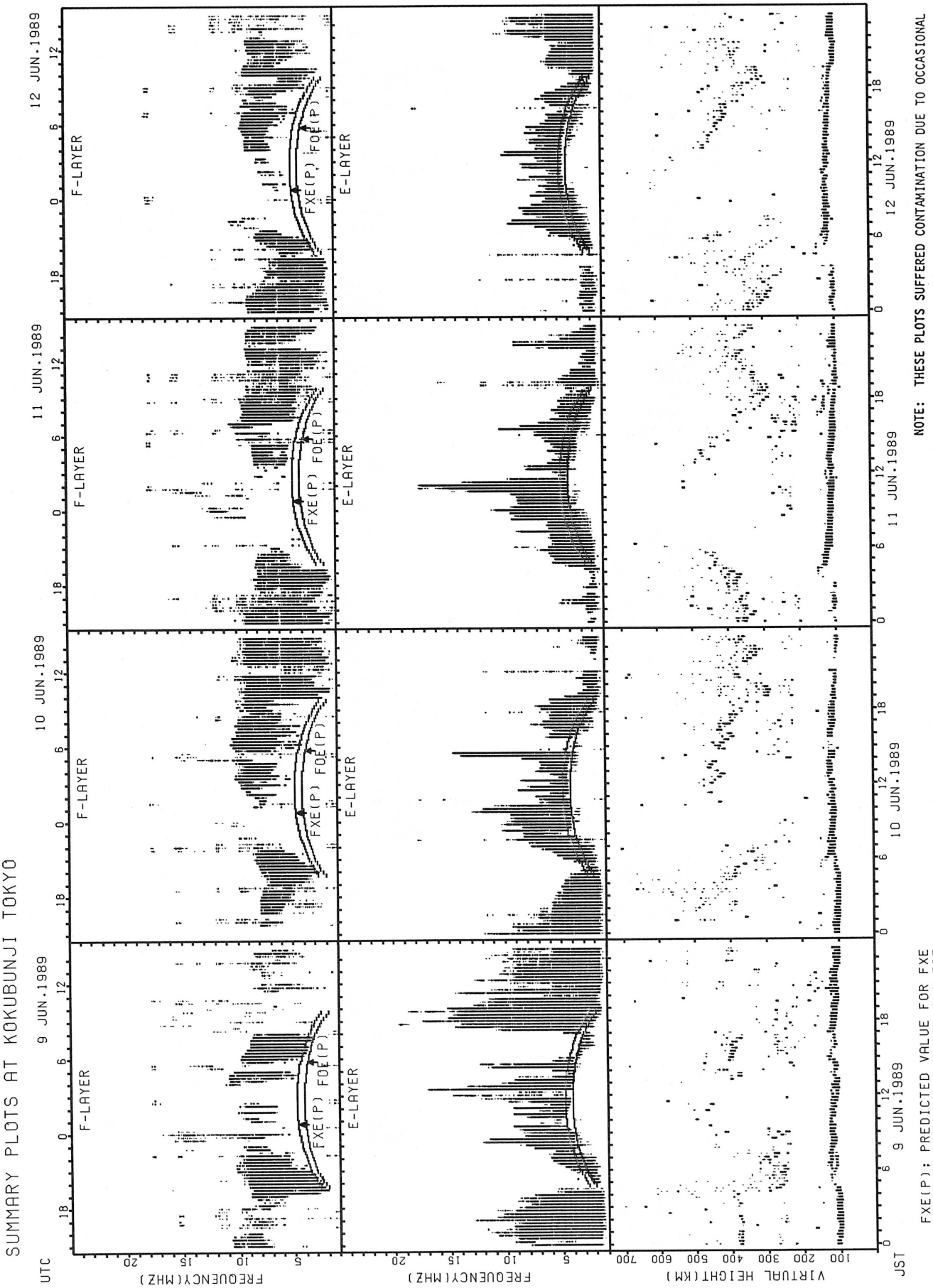

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
JST
1 JUN.1989
2 JUN.1989
3 JUN.1989
4 JUN.1989
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL
MALFUNCTION OF THE IONOSONDE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

SUMMARY PLOTS AT KOKUBUNJI TOKYO

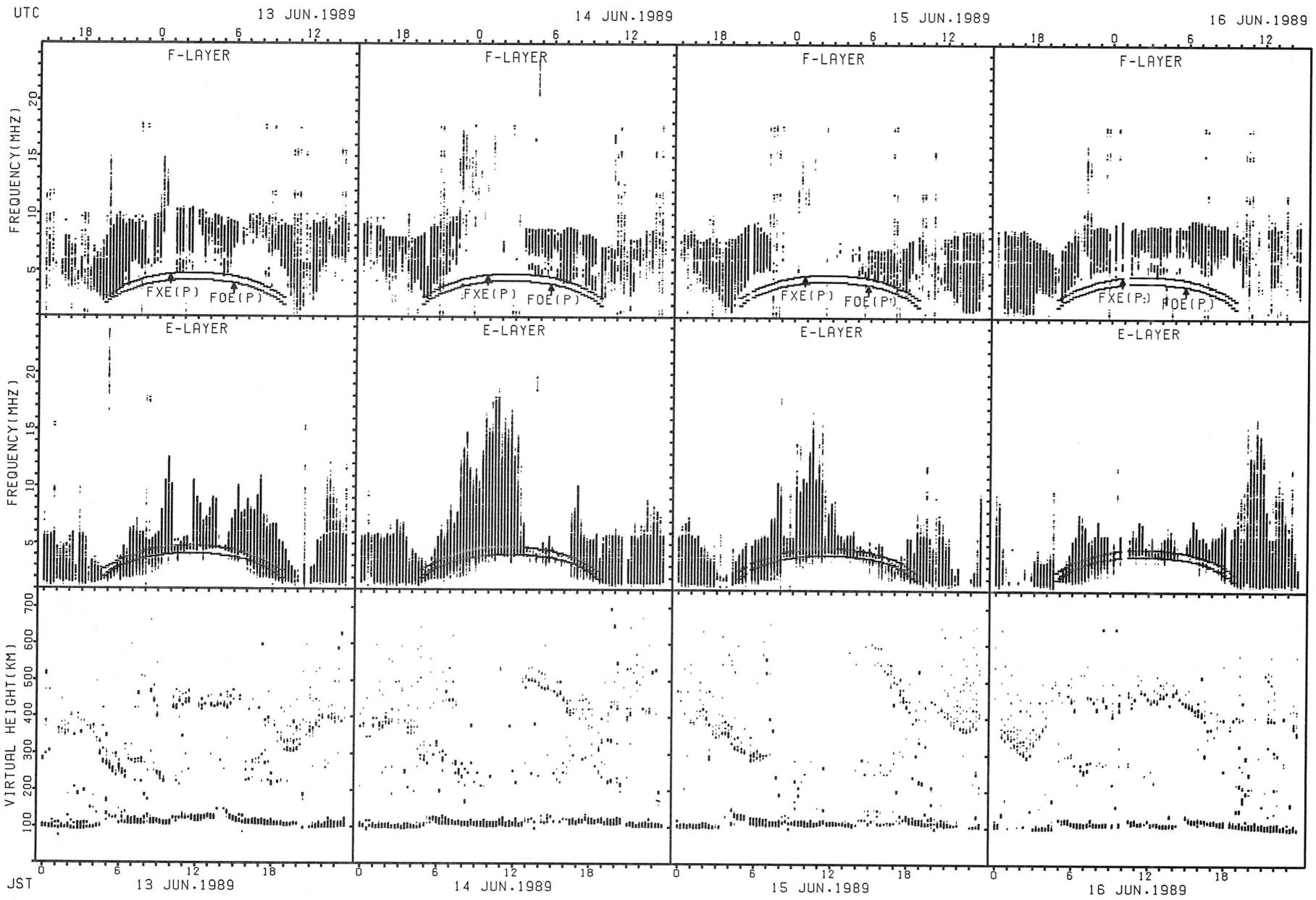


FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

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

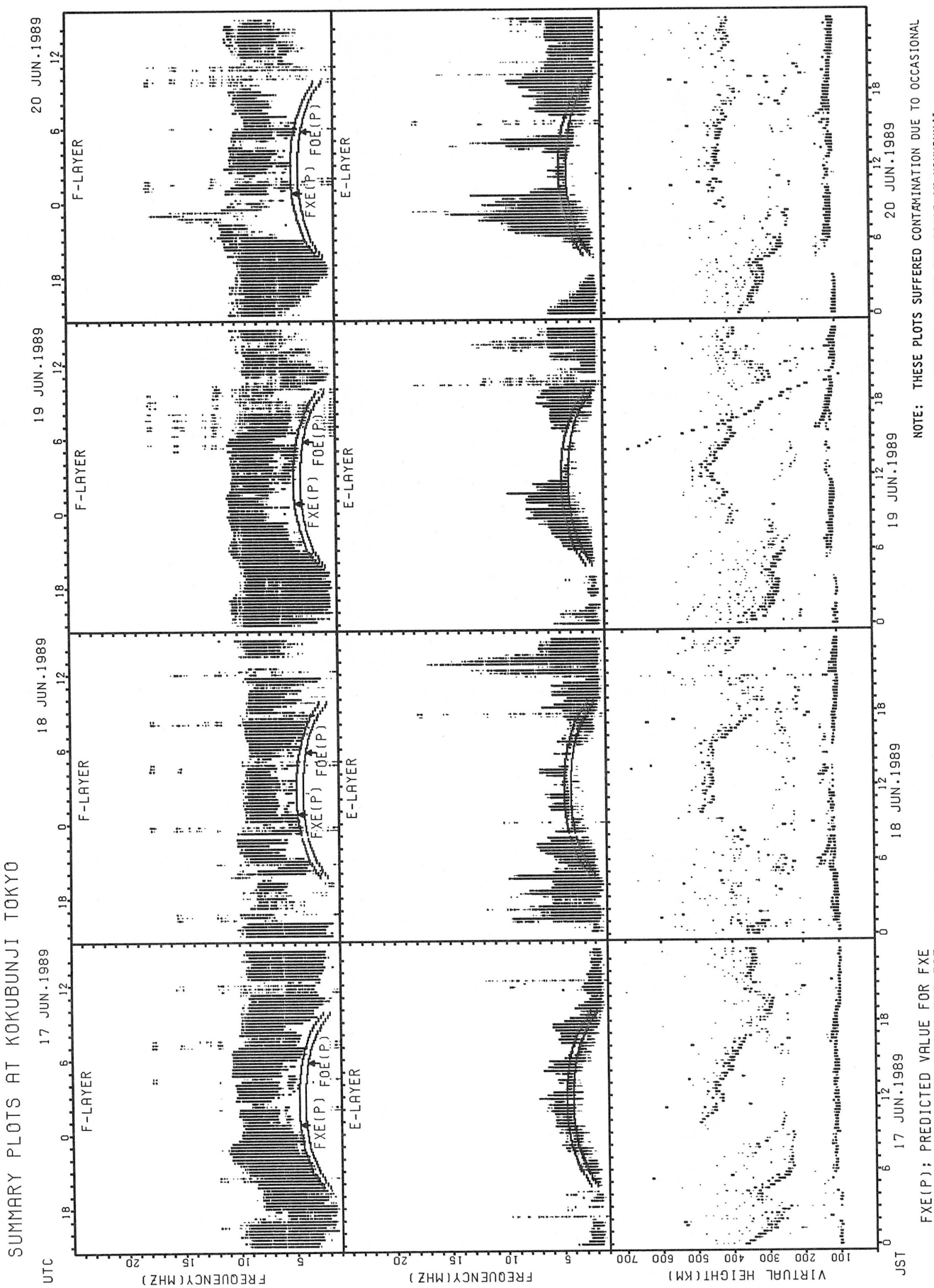

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
JST
9 JUN.1989
10 JUN.1989
11 JUN.1989
12 JUN.1989
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL MALFUNCTION OF THE IONOSONDE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

SUMMARY PLOTS AT KOKUBUNJI TOKYO

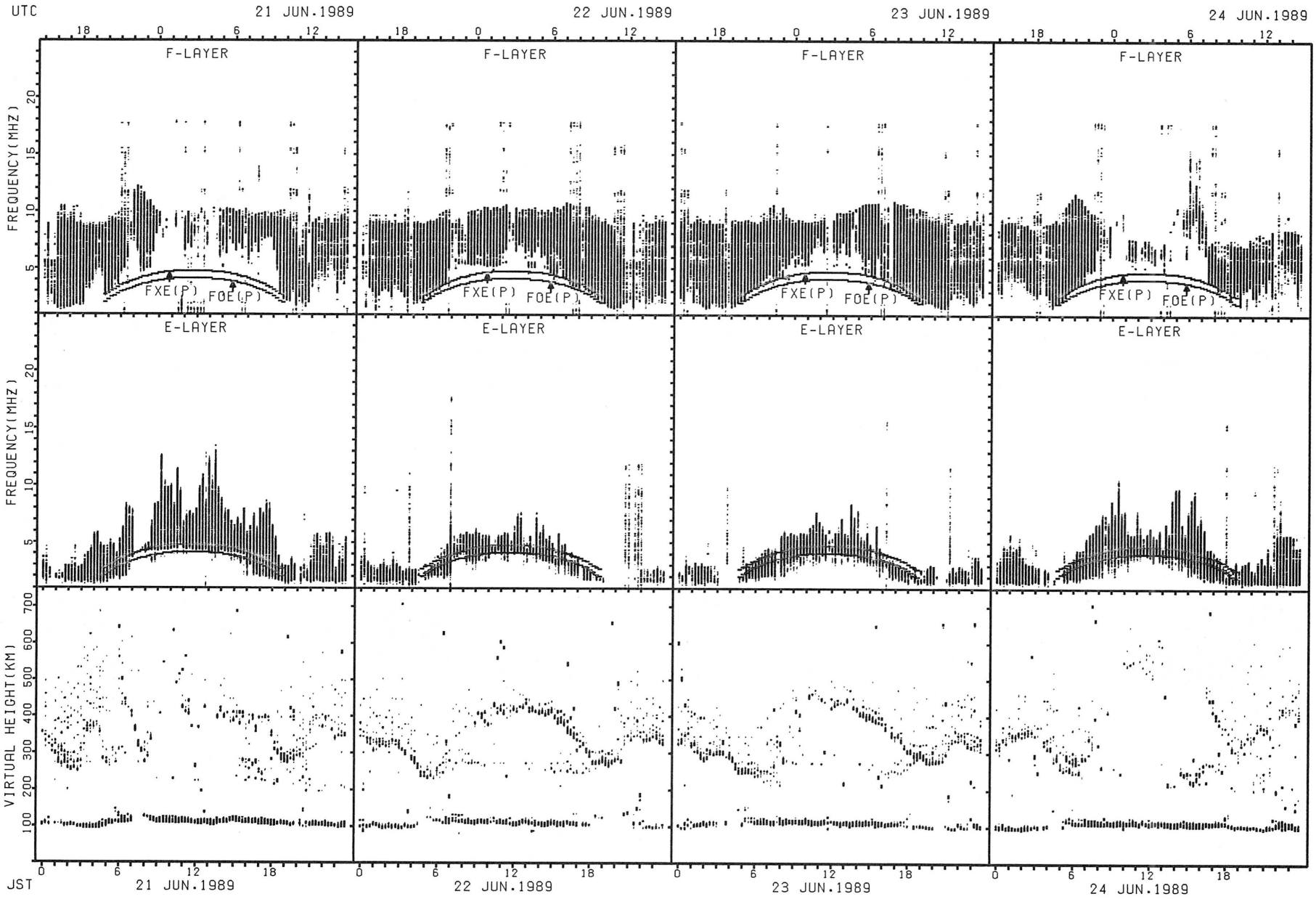


FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

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

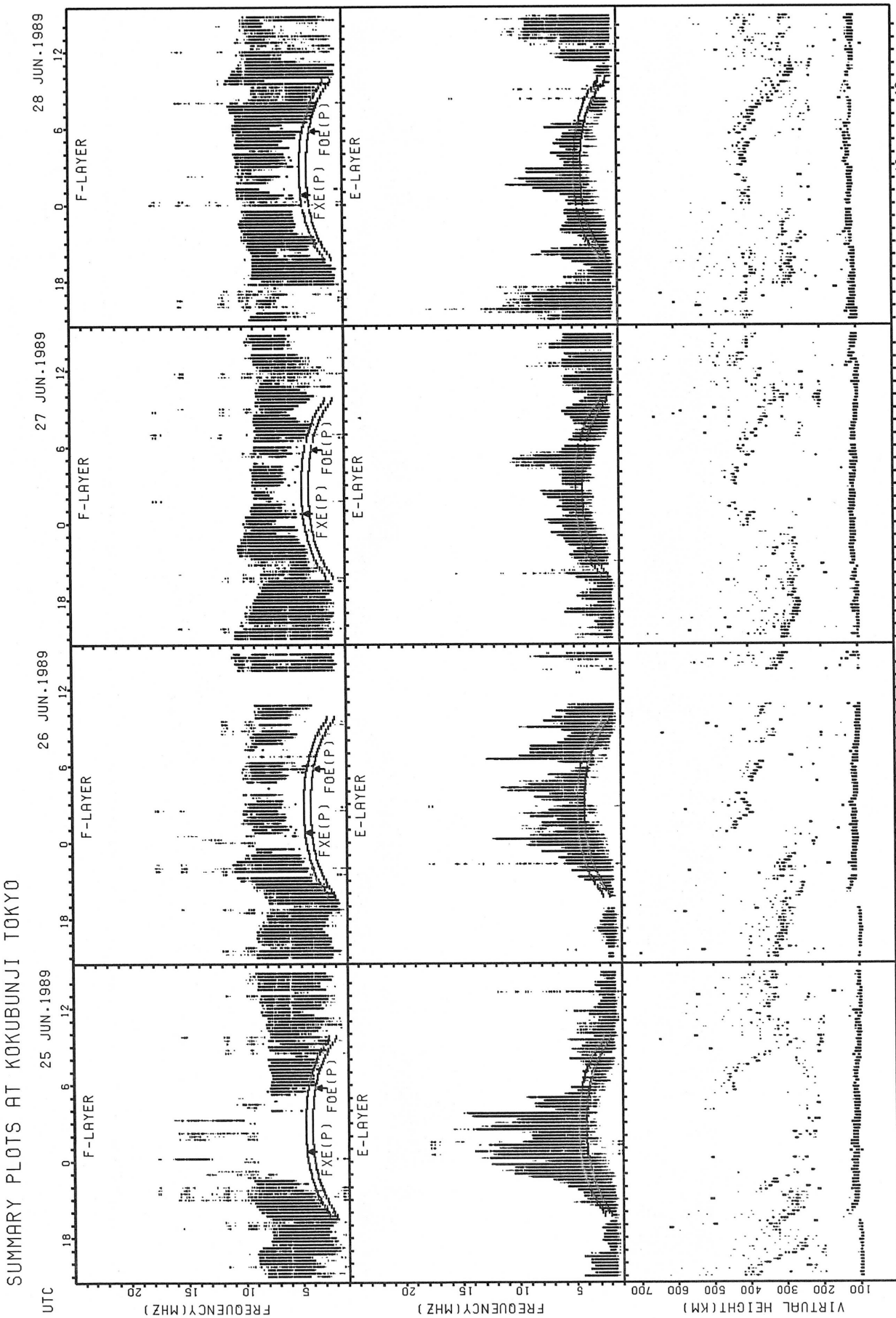

SUMMARY PLOTS AT KOKUBUNJI TOKYO
17 JUN.1989
18 JUN.1989
19 JUN.1989
20 JUN.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
UTC
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL MALFUNCTION OF THE IONOSONDE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

SUMMARY PLOTS AT KOKUBUNJI TOKYO



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

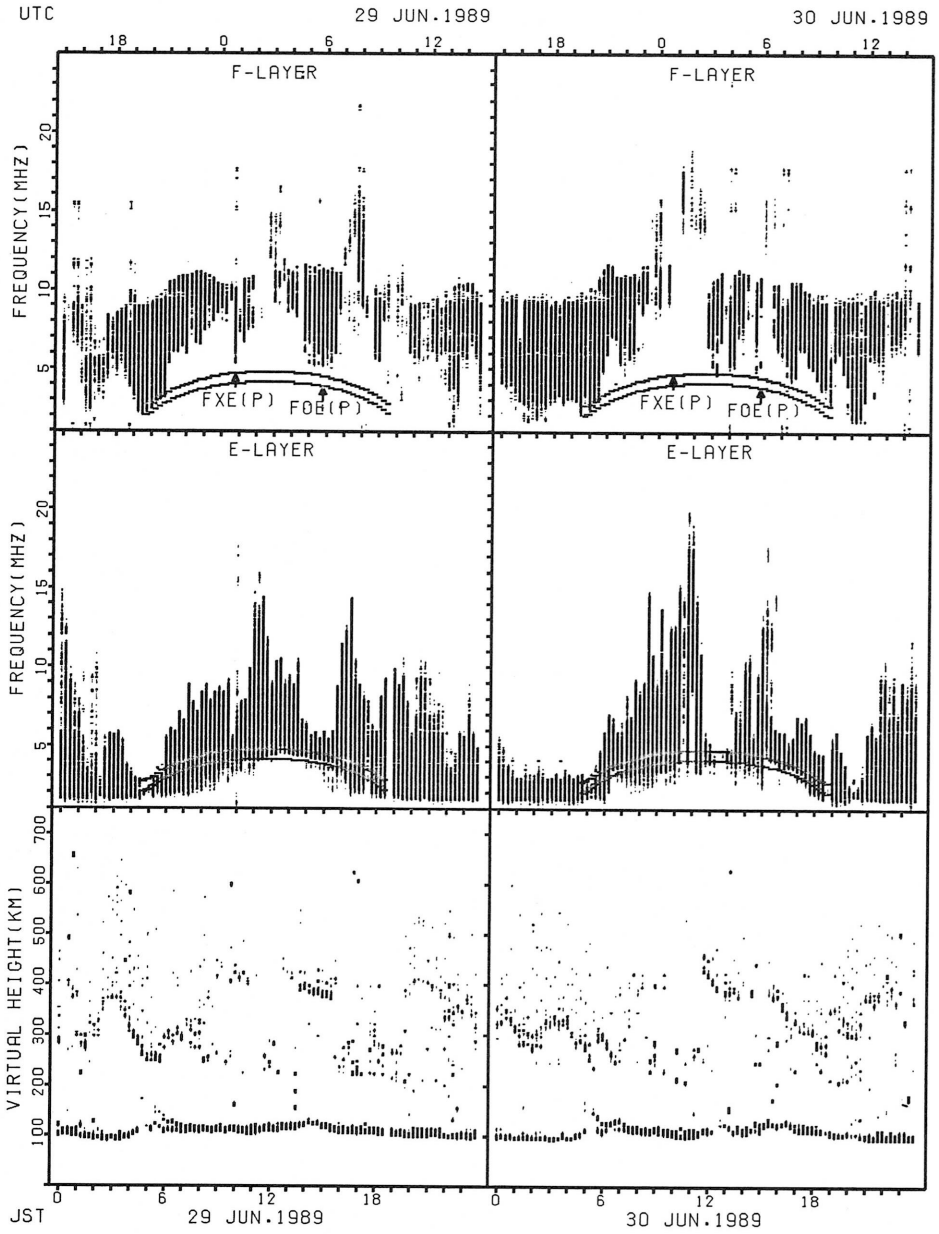
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.



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

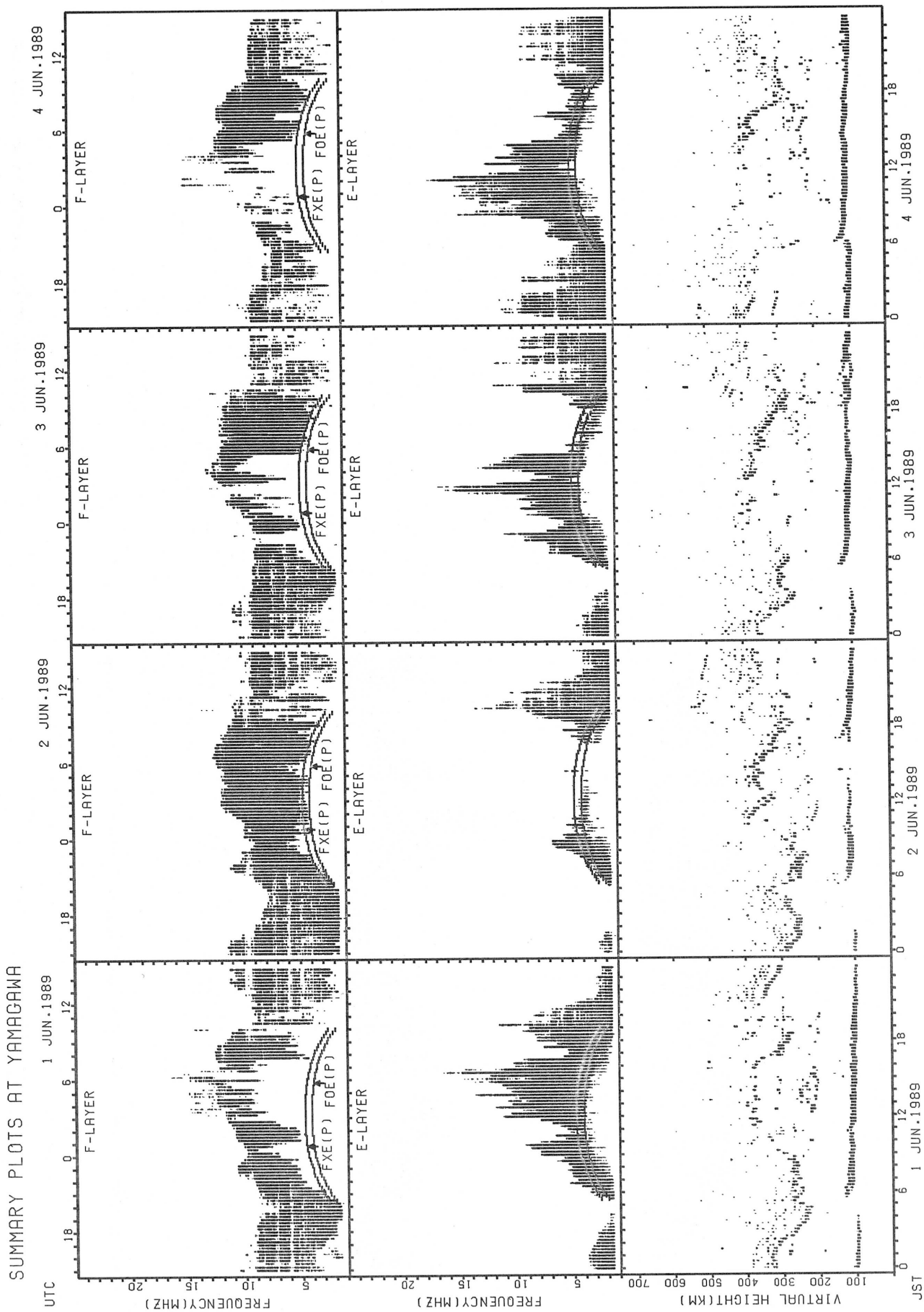
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.

SUMMARY PLOTS AT KOKUBUNJI TOKYO

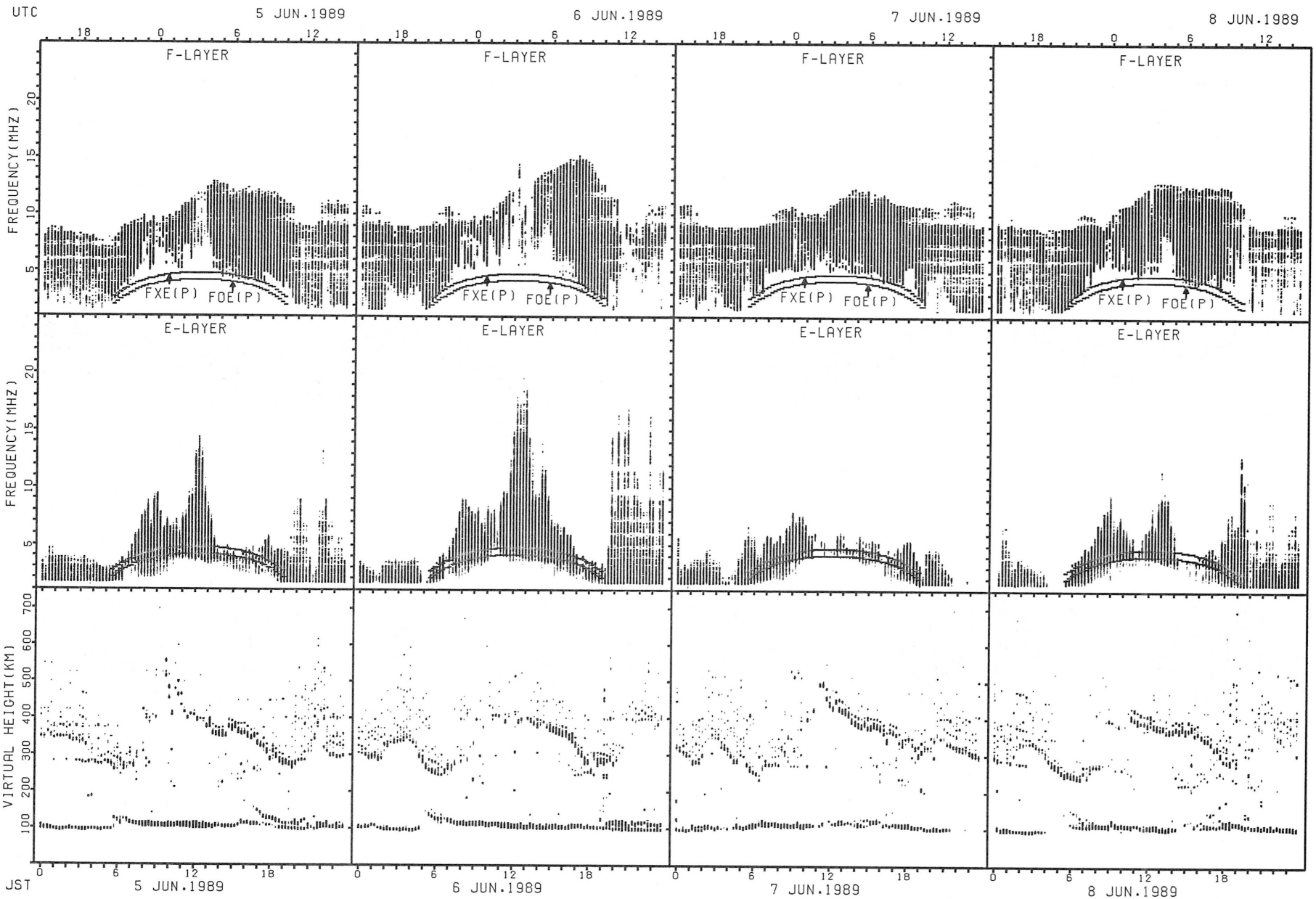


FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

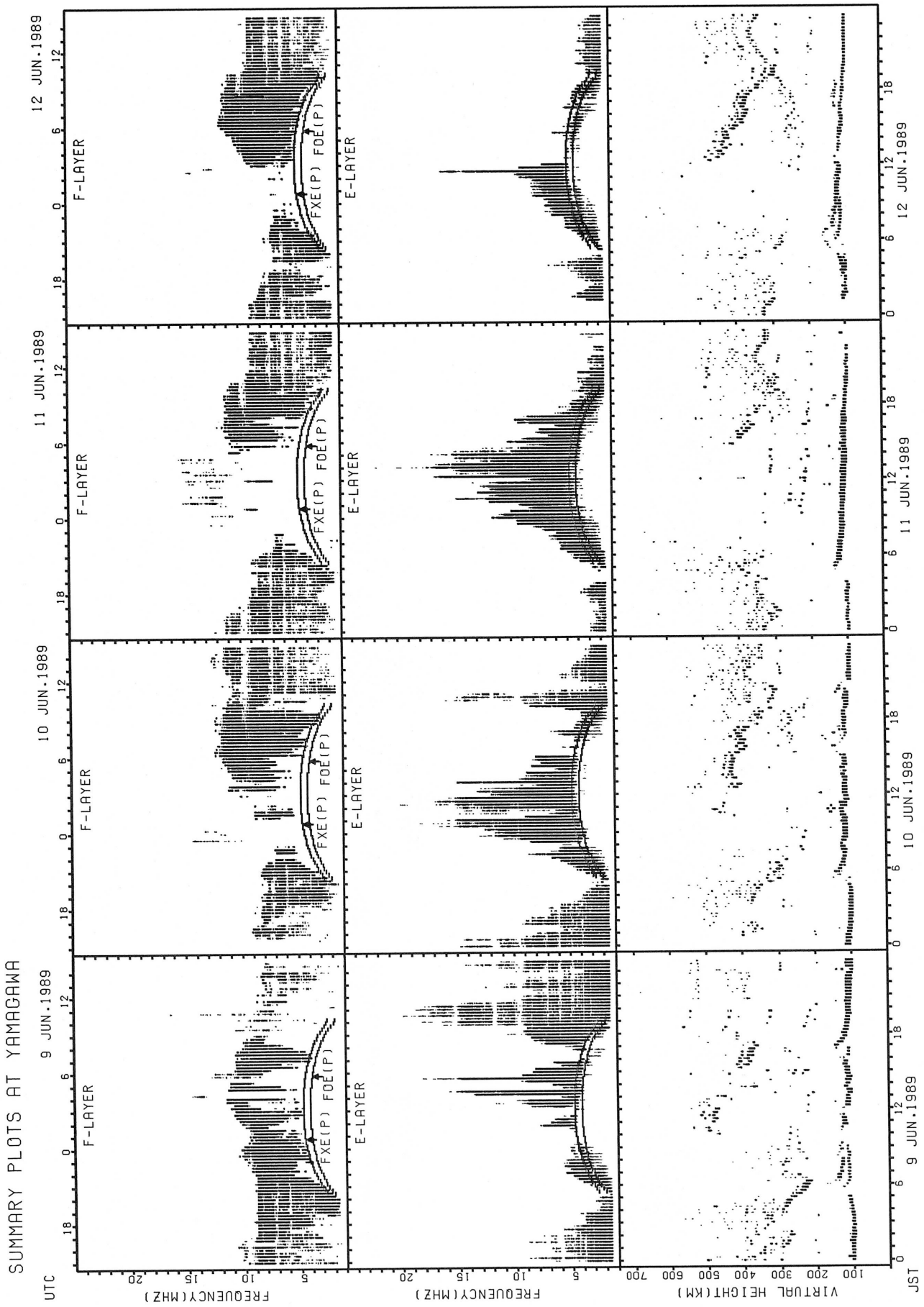
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.

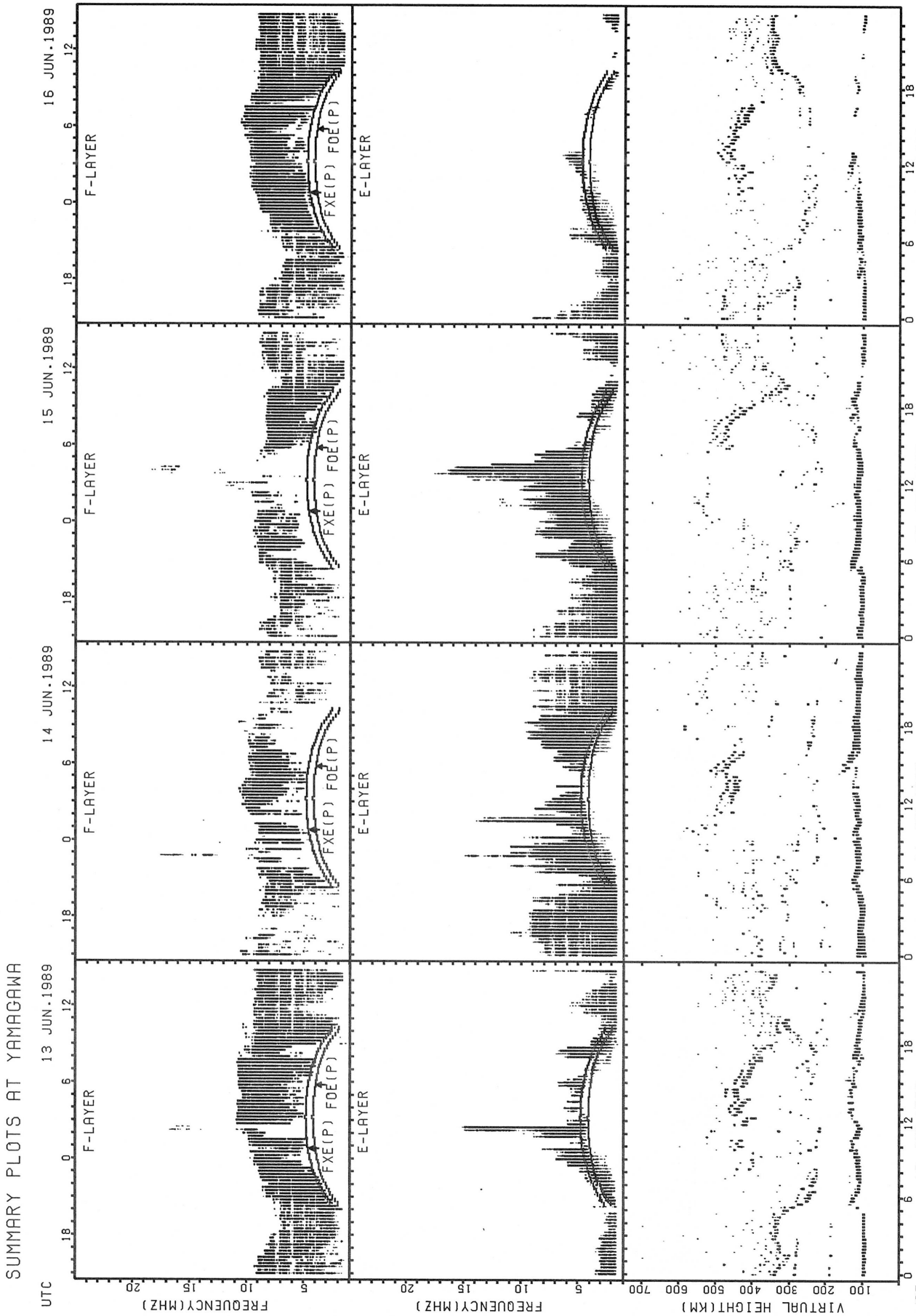

SUMMARY PLOTS AT YAMAGAWA
UTC
JST
1 JUN.1989
2 JUN.1989
3 JUN.1989
4 JUN.1989
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

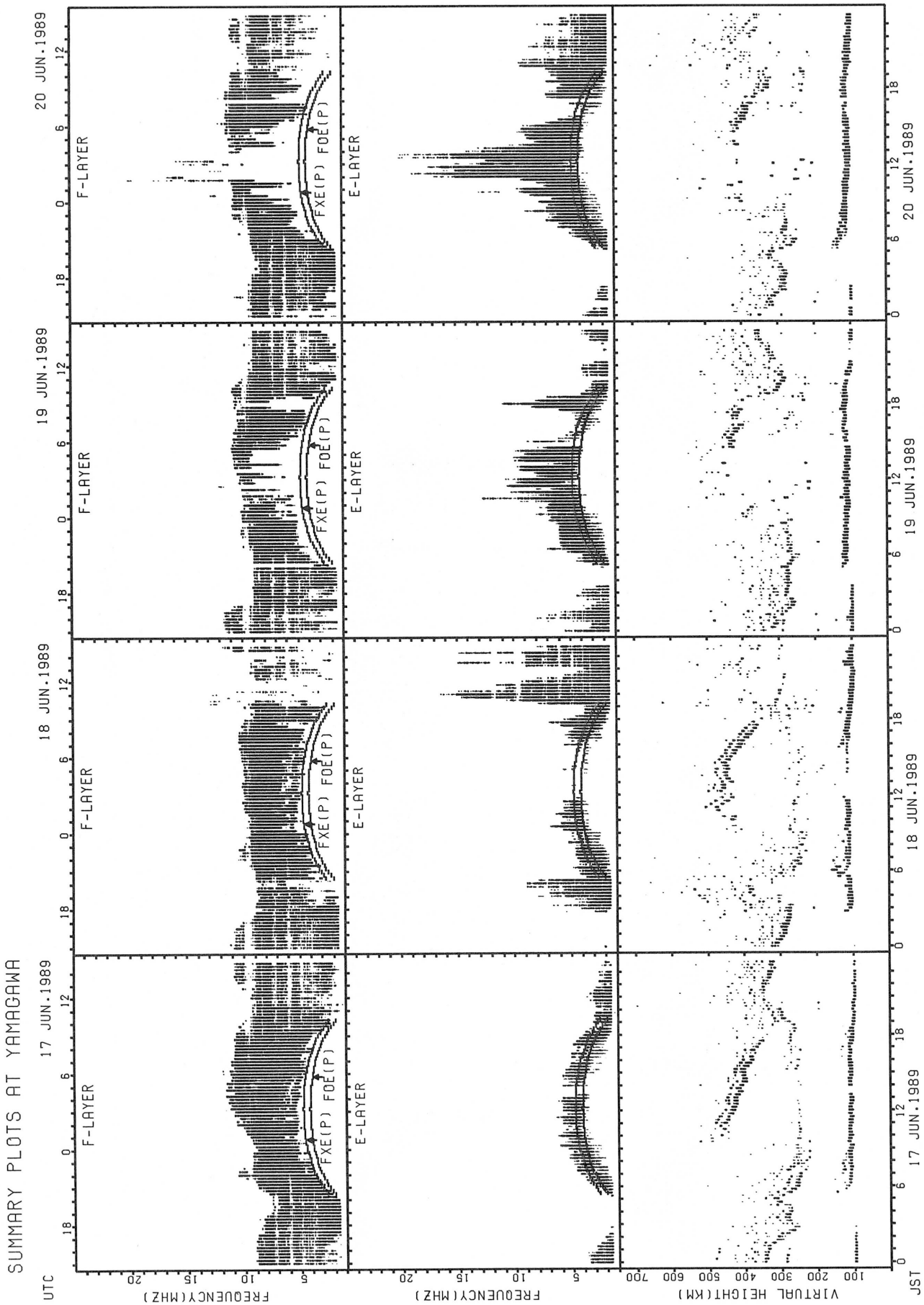
SUMMARY PLOTS AT YAMAGAWA



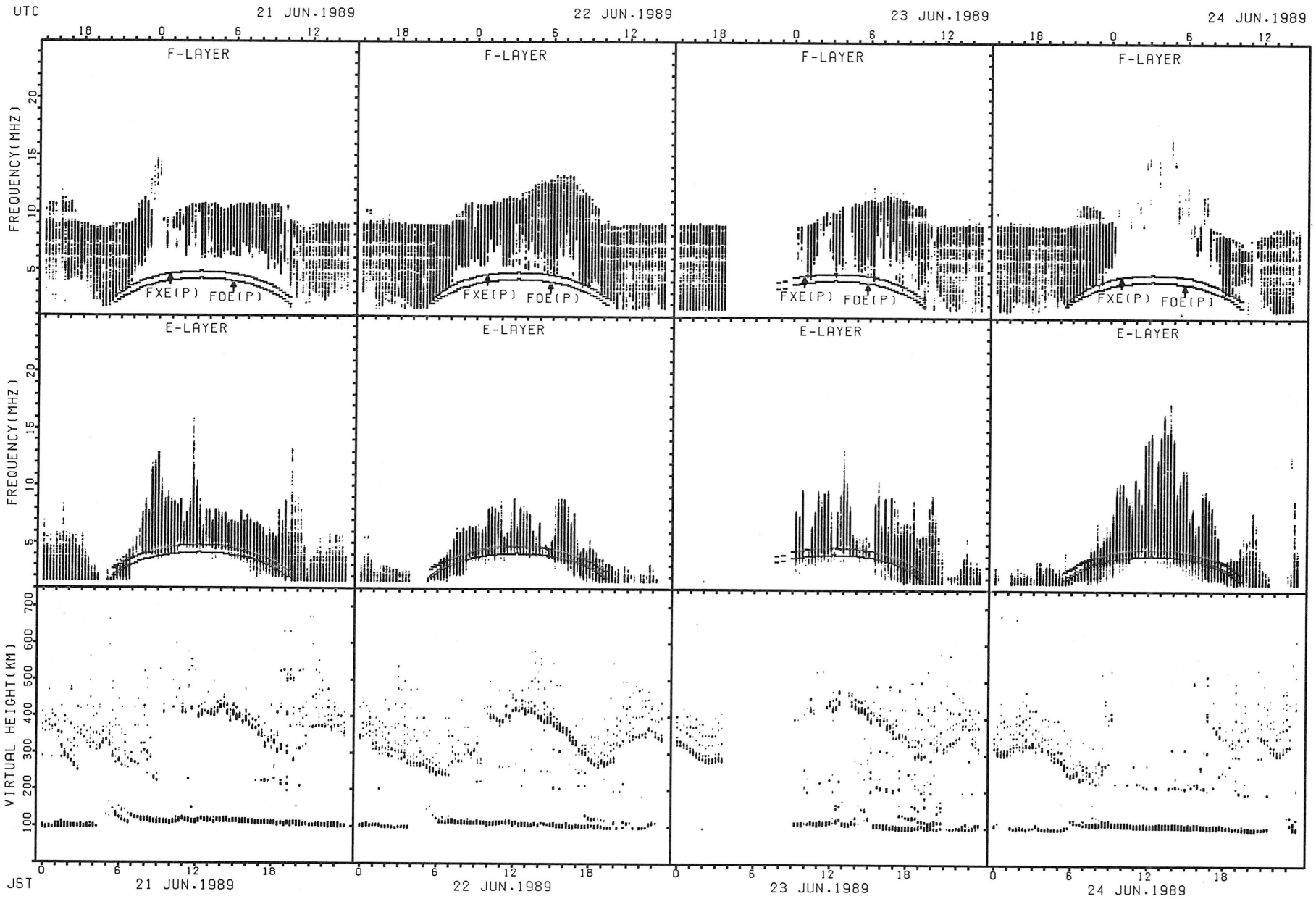
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT YAMAGAWA
9 JUN.1989
10 JUN.1989
11 JUN.1989
12 JUN.1989
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

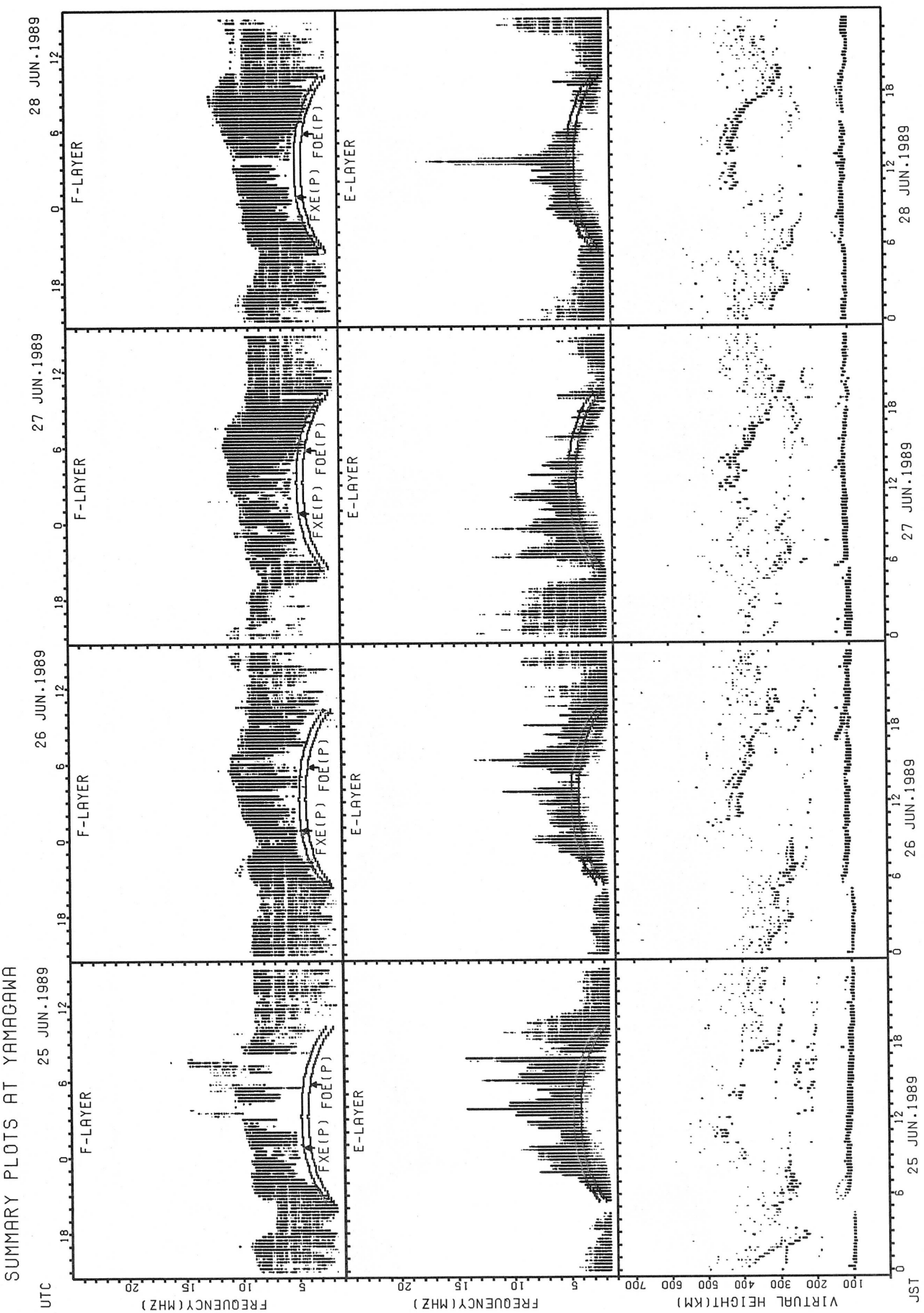

SUMMARY PLOTS AT YAMAGAWA
UTC
13 JUN.1989
14 JUN.1989
15 JUN.1989
16 JUN.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


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

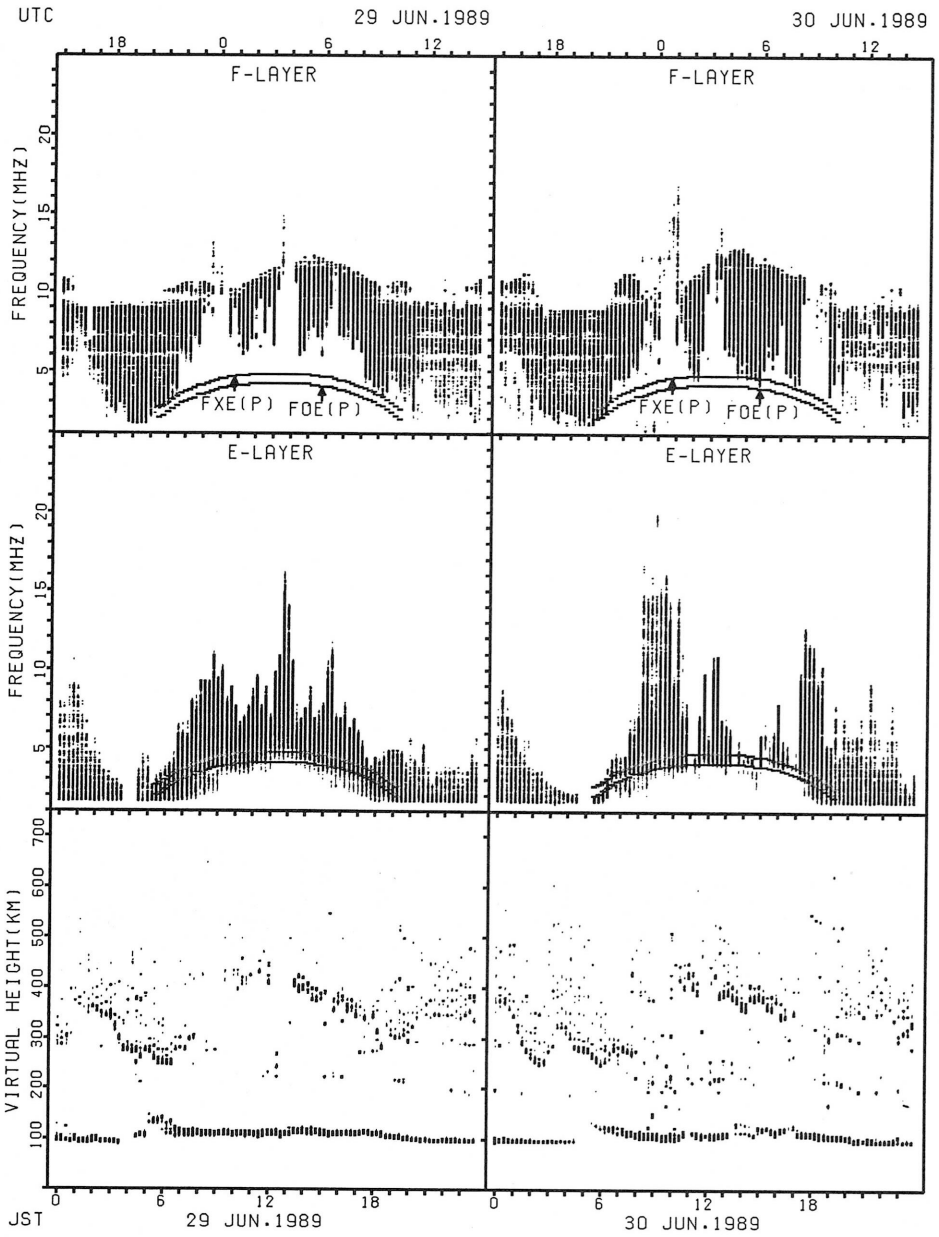
SUMMARY PLOTS AT YAMAGAWA



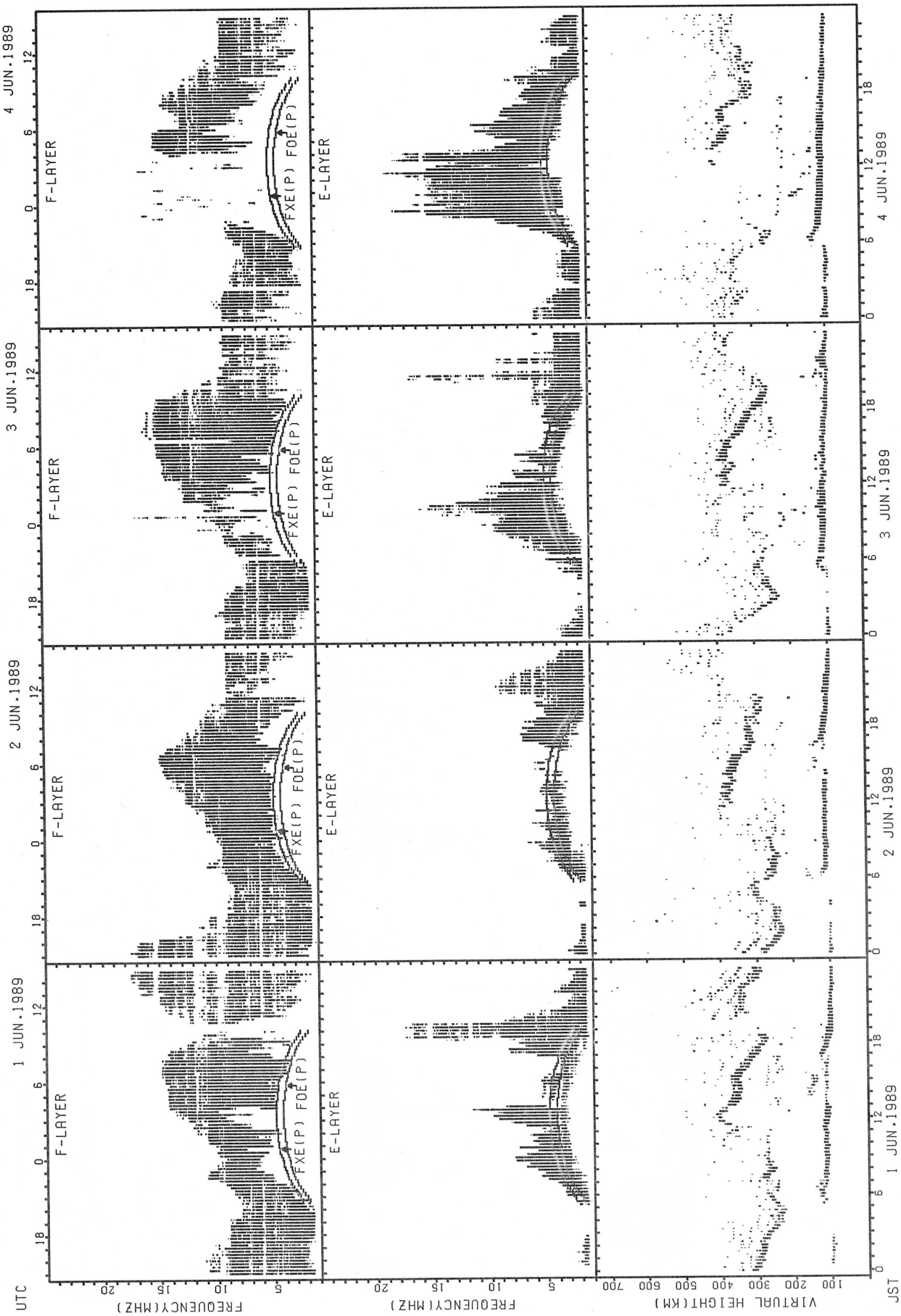
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

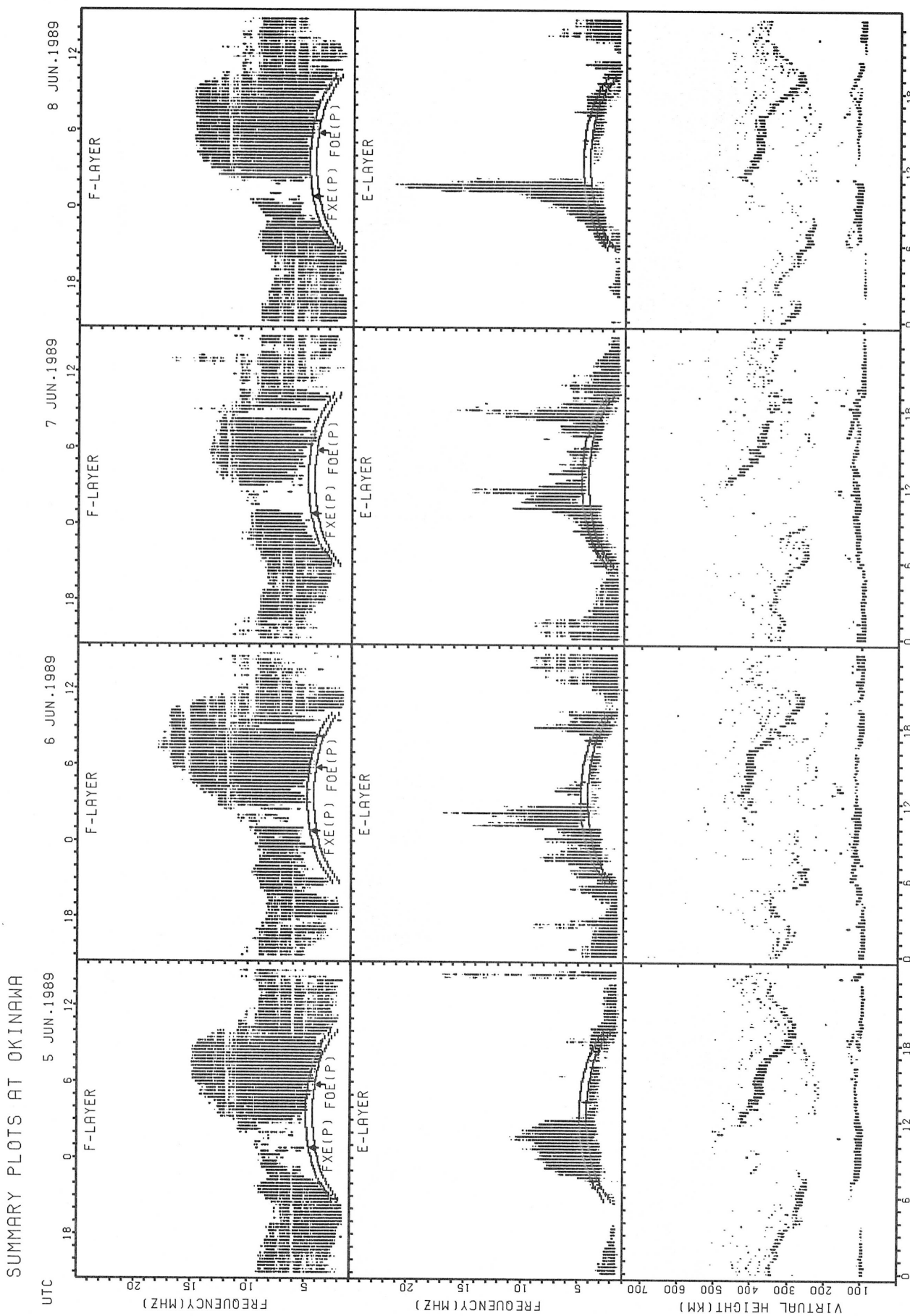

SUMMARY PLOTS AT YAMAGAWA
UTC
25 JUN.1989
26 JUN.1989
27 JUN.1989
28 JUN.1989
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

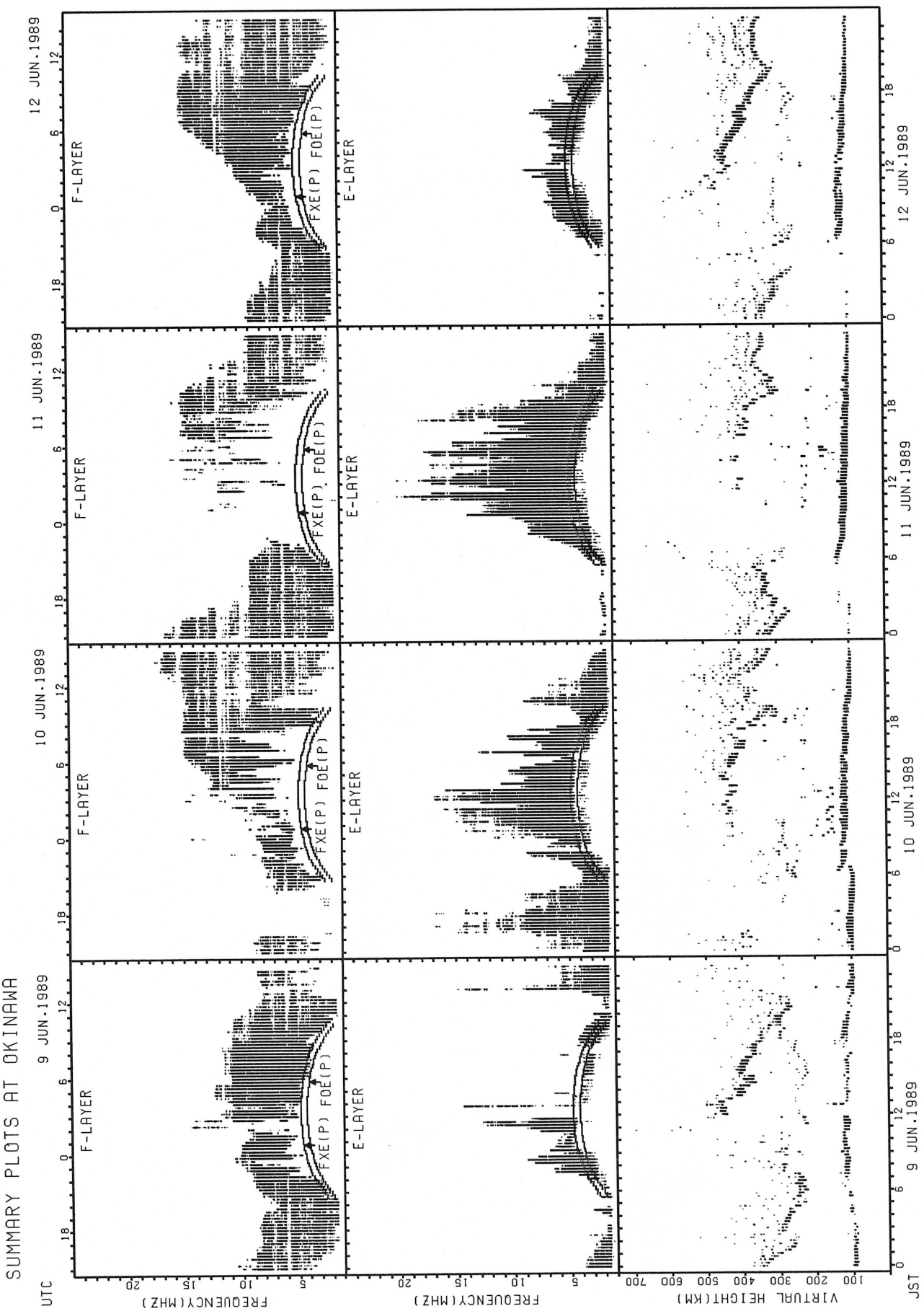
SUMMARY PLOTS AT YAMAGAWA



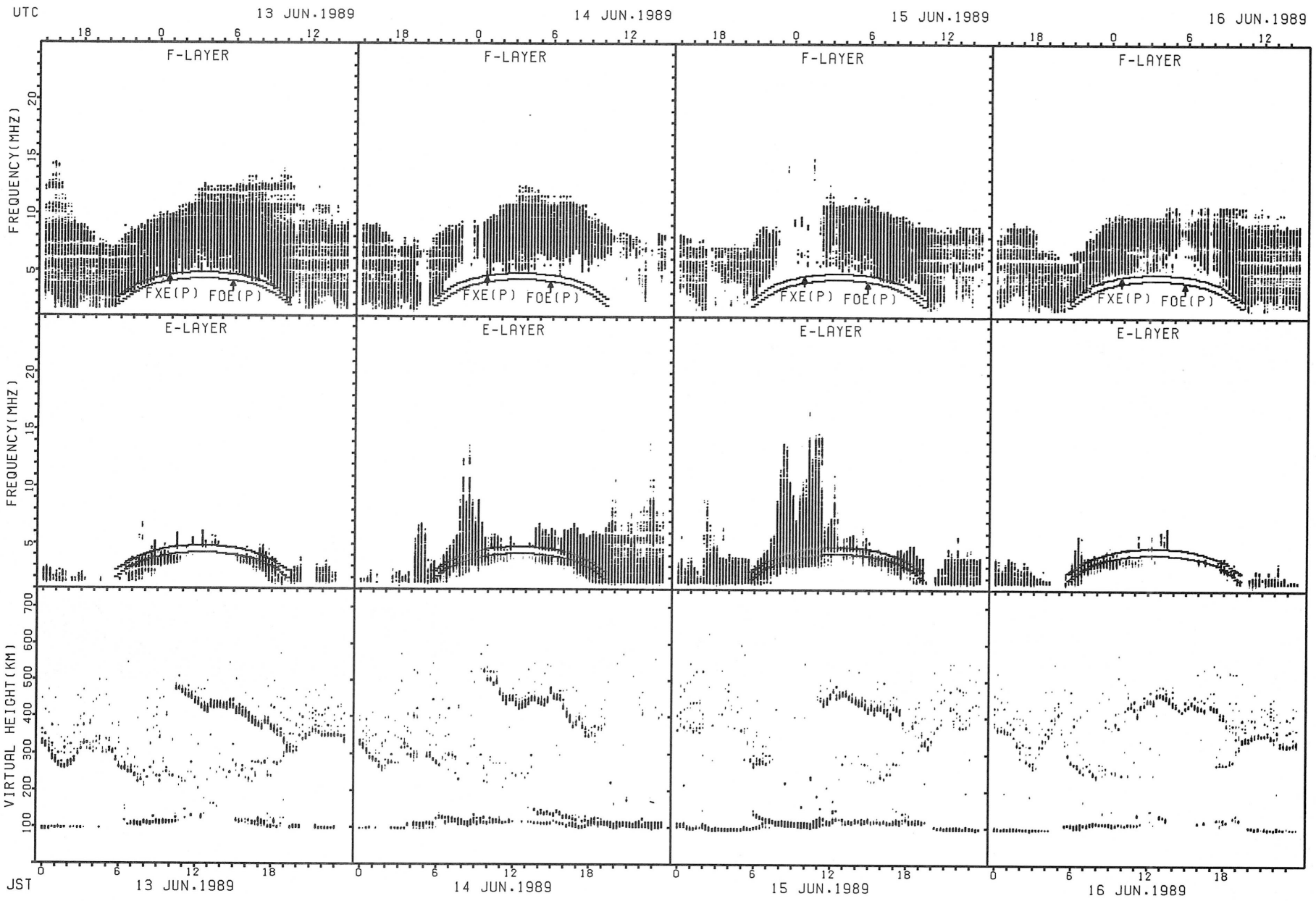
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


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

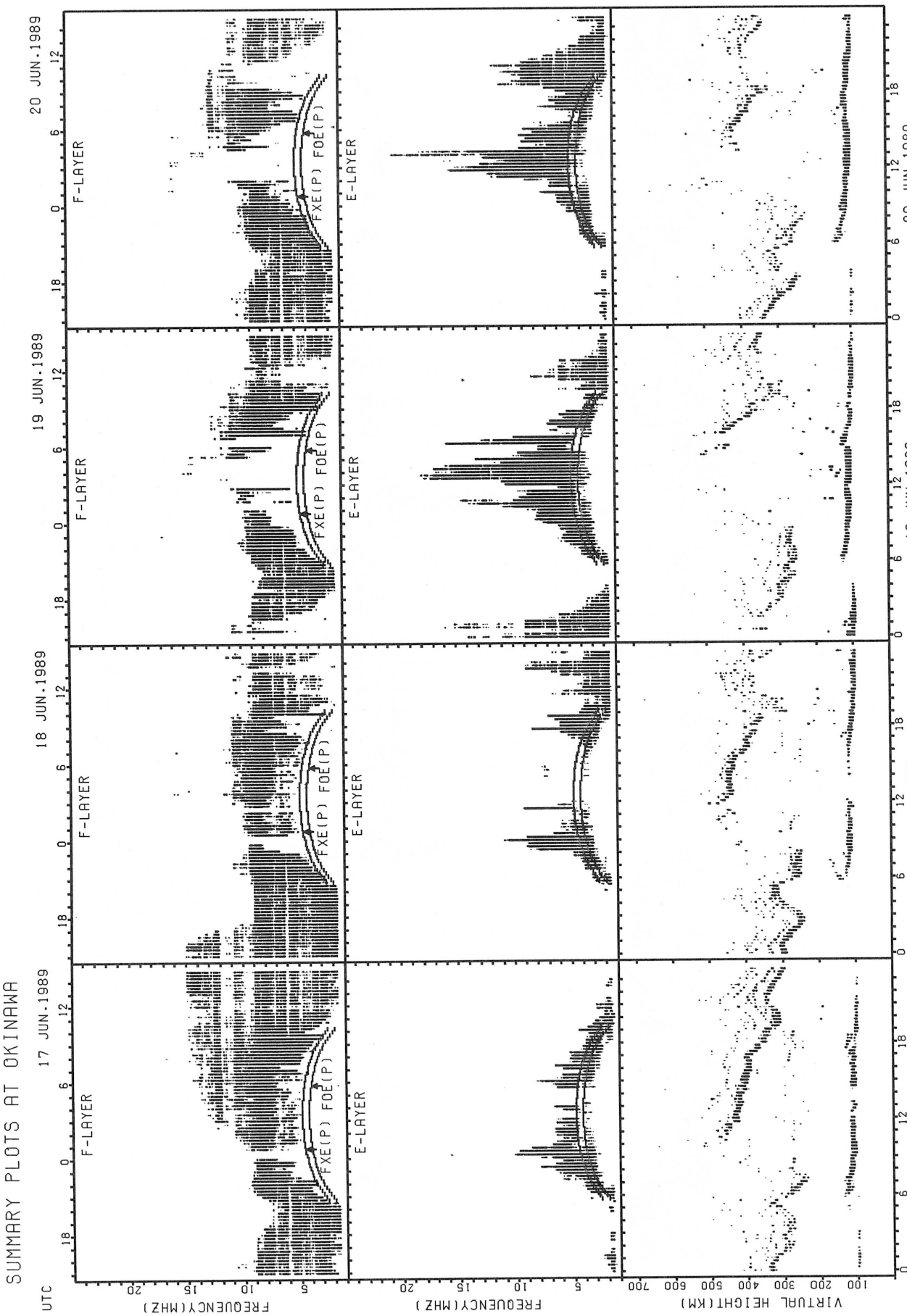

SUMMARY PLOTS AT OKINAWA
UTC
JST
5 JUN.1989
6 JUN.1989
7 JUN.1989
8 JUN.1989
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


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

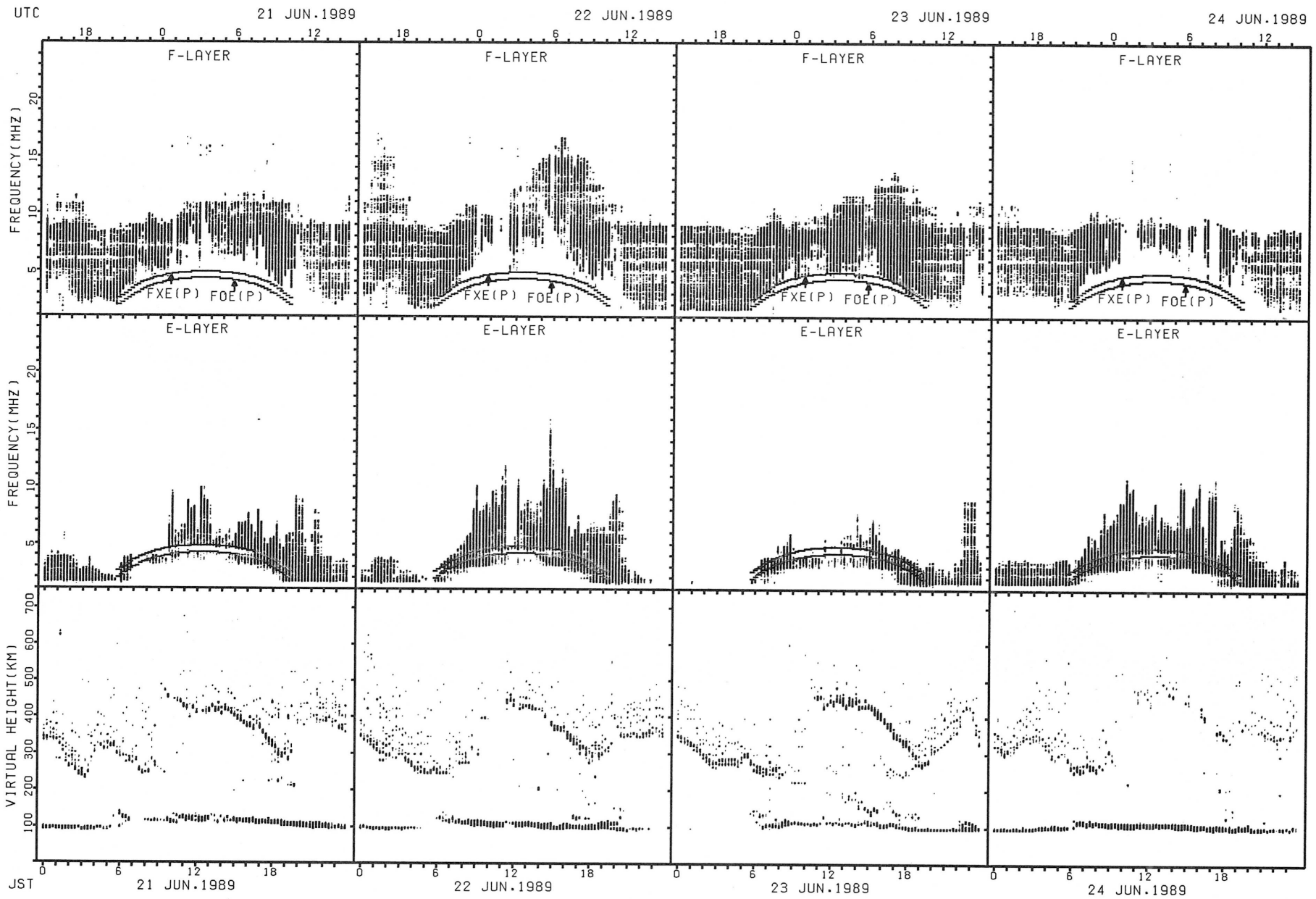
SUMMARY PLOTS AT OKINAWA



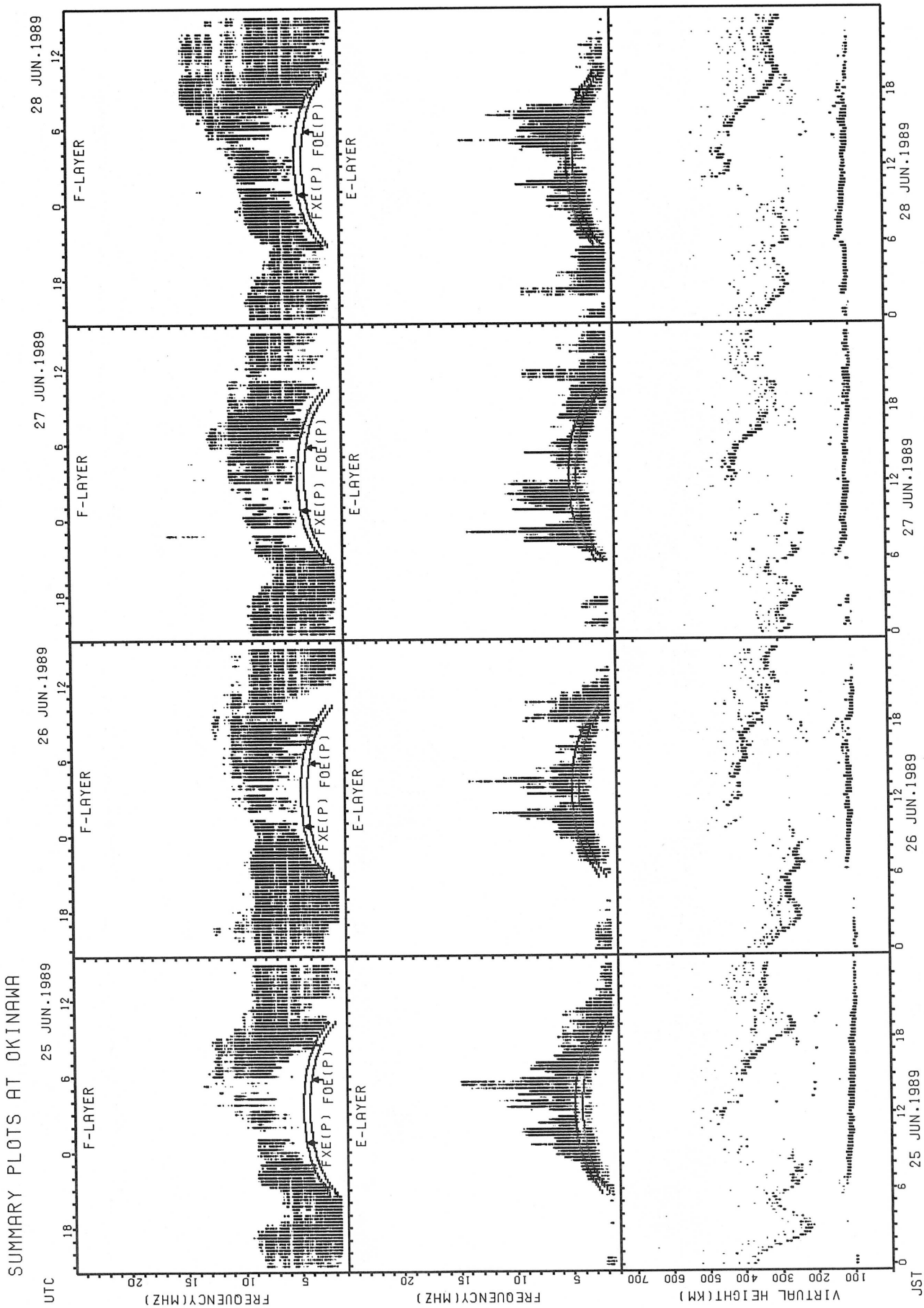
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


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

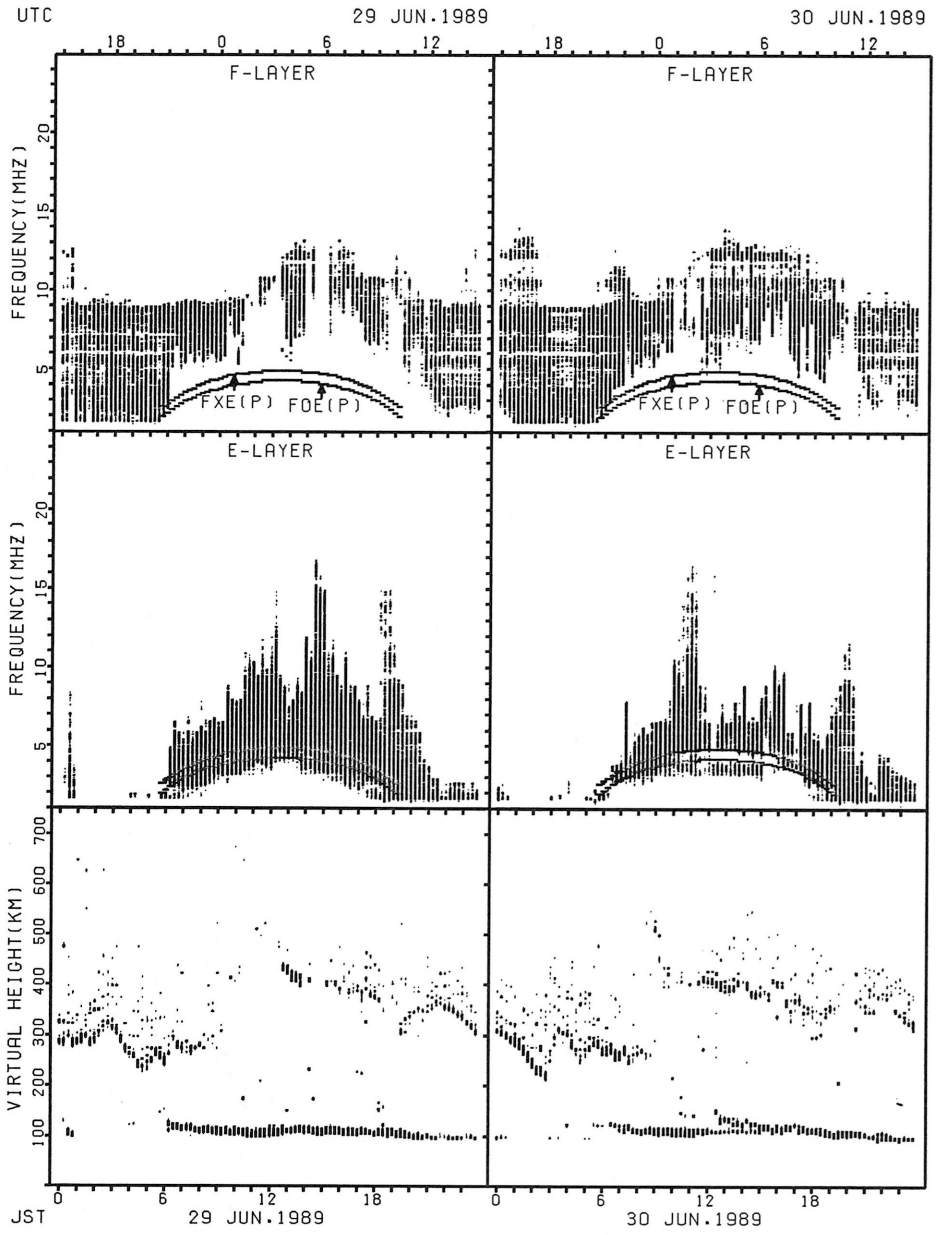
SUMMARY PLOTS AT OKINAWA



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


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

SUMMARY PLOTS AT OKINAWA



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

MONTHLY MEDIANS OF H'F AND H'ES

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

STATION WAKKANAI LAT. 45.4N LON. 141.7E

H'F

	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					16	18	11									11	12	14	22	13		11	10
MED	363					327	320	314									340	343	320	318	330		352	337
U Q	384					357	346	352									380	363	336	340	341		376	356
L Q	354					295	300	47									250	286	238	230	273		338	226

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	18	14	13	13	11	13	20	23	26	29	25	23	19	13	13	12	15	20	25	29	27	26	24	22
MED	112	111	111	115	119	133	129	125	123	123	117	119	121	121	119	125	125	129	123	121	121	119	115	115
U Q	115	115	125	118	135	136	135	127	127	127	119	123	123	133	134	134	135	133	129	127	127	125	120	117
L Q	111	107	108	110	113	128	127	123	119	118	115	115	115	115	115	121	119	121	120	116	117	117	115	113

STATION AKITA LAT. 39.7N LON. 140.1E

H'F

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT		14	13		11	17	21	20									17	19	21	17	10			
MED		356	362		360	334	314	307									354	348	312	308	302			
U Q		364	398		386	346	349	328									388	386	340	327	330			
L Q		346	349		344	302	294	293									247	298	242	253	274			

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	24	25	26	23	19	21	27	30	31	30	27	26	27	27	27	22	24	27	30	30	31	26	29	27
MED	107	103	103	105	107	125	125	118	113	113	111	110	111	111	113	110	115	115	114	112	111	113	111	111
U Q	112	106	107	109	125	136	127	121	115	115	113	113	117	113	121	121	124	123	119	117	115	119	121	123
L Q	104	101	101	101	105	112	119	115	113	111	109	107	107	107	105	105	109	109	107	107	107	109	107	105

STATION KOKUBUNJI LAT. 35.7N LON. 139.5E

H'F

	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	16	16	13	11	18	22	20	19								19	18	24	15	16			10
MED	351	360	349	366	370	305	298	296	284								266	316	291	312	357			364
U Q	373	374	384	385	382	320	334	344	328								400	334	334	354	400			392
L Q	332	349	321	322	342	274	286	276	238								236	264	245	258	274			348

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	27	27	20	25	19	16	28	28	28	28	27	28	26	27	26	20	27	28	25	26	27	25	23	29
MED	105	105	105	103	101	127	125	119	117	114	111	114	113	113	112	118	115	115	113	109	107	109	111	109
U Q	109	107	107	107	109	144	137	123	121	119	115	117	121	117	119	126	125	120	116	115	111	117	117	113
L Q	101	101	102	101	99	112	119	117	115	111	109	112	111	109	109	112	109	109	107	107	103	102	109	105

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

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	14	17	21	13	11	14	21	22	19	12							22	19	24	23	17			
MED	356	354	326	352	354	338	306	276	286	282							361	336	315	328	336			
U Q	382	368	359	369	362	376	321	294	320	358							388	368	341	340	359			
L Q	346	346	309	335	332	320	277	260	266	238							342	314	292	302	322			

H'ES

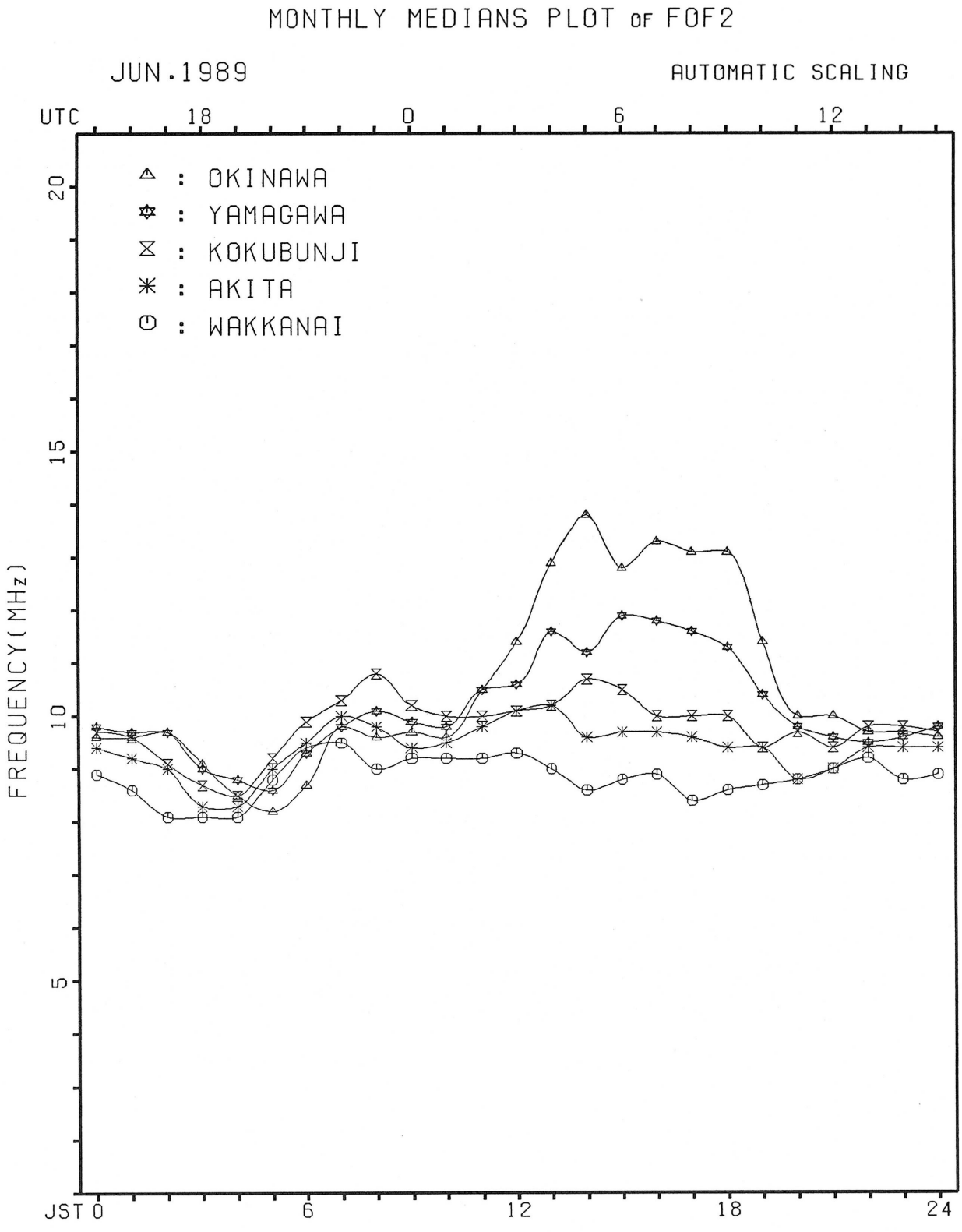
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	26	27	26	21	18	27	29	31	30	28	27	27	27	25	25	24	27	29	29	29	28	26	28
MED	105	105	99	101	105	111	127	119	115	113	112	111	111	111	111	113	111	115	113	109	113	103	103	106
U Q	112	109	105	103	108	123	137	125	119	117	115	117	117	119	116	123	120	125	120	115	118	110	113	111
L Q	101	99	97	97	99	99	121	117	113	111	109	109	109	107	107	107	107	109	107	105	103	101	99	100

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	15	20	25	16			13	26	18								13	22	24	24	22			
MED	348	333	334	348			296	290	285								378	351	342	327	346			
U Q	362	344	355	363			313	308	316								396	368	354	340	362			
L Q	334	316	302	317			277	262	270								336	328	303	301	328			

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	21	19	17	15	10	12	20	28	28	25	28	28	24	24	25	23	20	28	30	29	30	29	28	24
MED	99	97	97	97	101	103	134	119	116	115	113	114	113	116	113	117	112	114	114	107	107	101	101	101
U Q	105	105	113	103	107	108	139	126	119	120	121	119	120	132	133	127	119	124	127	116	113	104	107	106
L Q	97	97	96	97	95	97	122	117	113	111	110	107	110	111	109	109	105	107	109	101	103	99	99	99


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

IONOSPHERIC DATA

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

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	C	C	C	C															X 105	X 93	O X 95	X 98	X 102
2	X 105	X 101	X 92	X 86	X 83															X 107	X 107	X 98	X 102	102
3	X 101	C	C	C	C															X 91	X 90	91	93	X 92
4	93	90	82	80	73															X 87	X 85	X 89	X 89	X 86
5	X 84	X 82	X 80	X 77	X 79															C	C	C	C	X 108
6	C	X 96	89	88	X 88																S	X 91	X 93	X 97
7	X 96	X 97	X 87	X 83	X 86															X 98	X 99	X 105	X 106	X 110
8	X 111	X 100	X 91	X 88	X 89															A	A	X 97	S	106
9	X 109	108	Z 96	92	92																X 83	X 83	92	90
10	89	86	83	82	75																X 98	X 94	X 109	X 100
11	X 101	X 98	X 85	X 85																	X 91	X 89	X 94	X 90
12	X 88	X 91	X 78	X 73																	X 88	X 91	X 90	X 88
13	X 87	X 80	X 79	X 75	X 73																X 92	X 100	X 101	X 100
14	X 98	X 93	X 81	81																	X 81	X 82	85	X 85
15	X 82	X 86	X 79	X 79																	X 76	X 84	O X 86	X 87
16	X 92	X 88	X 90	X 80	X 71																X 87	A	X 98	S
17	X 101	X 102	X 93	X 83	X 82															X 101	X 95	X 94	X 99	X 97
18	101	101	S	X 87	X 85																X 90	X 96	X 96	98
19	102	X 105	X 108	X 99	X 96																X 99	X 100	X 101	X 102
20	X 108	X 103	X 105	X 100	X 99																O X 98	X 103	X 110	X 108
21	S	104	95	90	89		95							108							X 94	X 94	X 99	X 102
22	X 101	X 98	X 94	X 92	X 93																X 86	O X 91	O X 95	X 97
23	X 97	X 99	X 97	X 94	X 96																X 100	X 95	X 97	X 99
24	O S 98	X 96	X 91	X 89	X 94																X 81	X 81	S	X 86
25	X 85	X 92	X 92	X 79	X 79																X 83	X 89	X 88	X 90
26	X 90	X 91	X 90	X 86	O X 83																C	C	C	X 111
27	X 112	X 108	X 101	X 92	X 85																X 89	X 88	98	X 98
28	X 96	99	94	X 92	92	92															X 105	X 104	X 101	107
29	105	89	S 84	89	93	97															X 93	X 100	X 101	X 106
30	X 98	X 98	X 96	94	X 96																X 101	X 102	104	103
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	28	24	2	1							1						6	26	27	26	29
MED	X 98	X 98	X 91	X 86	X 87	94	95							108						X 100	X 92	X 94	X 98	X 99
UQ	X 102	X 101	X 94	X 92	X 93															X 105	X 98	X 99	X 101	X 103
LQ	X 91	X 90	X 84	X 80	X 80															X 91	X 86	X 89	X 93	X 90

JUN. 1989 | FXI (0.1 MHZ)

IONOSPHERIC DATA

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

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	99	101	98 R	103	99	87	89 U S	92	96 V
2	99	95	86	80	77	88	106	103	96	91	94	106	117	105	104 I C	107	111	105	106	101	101 S	92	96	94 F
3	95	C	C	C	C	83	84	A	A	A	84 R	91	87	93 R	C	37	80	83	87	85	84	82 F	84 F	86
4	81 F	83 F	73 F	71 F	65 F	72	74	73	78	86	90	93	94	103	101	96	103	102	92	81	79	83	83	80
5	78	76	74	71	73	80	89	99	105	99	A	114	C	C	C	C	A	A	C	C	C	C	C	102
6	I C 96	90 S	81 F	79 F	82	89	97	101	96	95	94	104 R	R 112	U R 114	I R 117	121	R 112	113	107	99	I S 94	85	S 87	91
7	90	91	81	77	80	91	95	94	95	102	102	97	106	114	115	107	I C 98	93	93	92	93	99	100	104
8	105	94	85	82	83	98	104	98	101	102	109	I R 115	118	116	111	109	107	105	S 102	A	A	91	I S 93	F 98
9	103	F 101	Z 90	F 83	F 82	89	98	95	93	92	93	100	A	109	101	95	89	81	88	81	77	77	F 78	F 82
10	F 81	F 75	F 77	F 75	F 66	73	79	78	A	72	81	87	94	96	93	100	98	99	98	96	92	88	103	94
11	95	92	79	79	79	78	71	59	A	A	A	A	77	79	81	89	91	90	92	90	85	83	88	84
12	82	85	72	67	63	64	76	A	A	64	67	70	77	85	86	90	89	89	89	88	82	85	84	82
13	81	U S 74	73	69	67	84	97	93	92	97	102	U R 101	100	97	93	89	90	91	89	91	86	94	95	94
14	92	87	75	F 73	73	82	87	92	91	89	A	81	A	84	84	83	84	80	77	70	75	76	F 71	79
15	76	80	V 73	73	74	85	90	81	A	A	A	A	A	70	71	67	67	68	74	76	70	78	U S 80	81
16	86	82	84	74	65	70	82	C	C	C	C	86	90	89	89	92	93	90	84	79	81	A	92	I S 95
17	95	96	87	77	76	83	93	104	107	95	95	99	100	102	103	C	C	96	95	95	89	88	93	91
18	F 91	F 89	I S 86	81	79	80	90	95	97	90	92	92	93	91	87	85	90	91	90	85	84	F 88	90	F 88
19	F 93	99	102	93	90	94	101	99	101	102	104	100	98	101	103	102	94	91	90	94	93	94	95	96
20	102	97	99	94	93	101	105	107	A	102	103	R 97	102	99	97	94	94	95	100	95	S 92	97	104	102
21	S	F 94	F	F 79	F 80	H 91	F 84	116	108	97	A	95	96	F 97	V 97	V 96	92	93	97	95	88	88	93	96
22	95	92	88	86	87	89	95	93	93	98	101	102	99	99	99	100	103	103	96	88	80	S 85	89	91
23	91	93	91	88	90	91	92	100	100	92	92	93	96	98	102	104	104	105	101	99	94	89	91	93
24	92	90	85	83	88	97	114	102	91	84	75	71	71	69	A	70	70	72	73	70	75	75	I S 80	80
25	79	86	86	73	73	83	93	97	85	76	A	A	75	76	77	76	73	76	74	75	78	83	82	85
26	84	85	84	80	77	80	99	R 103	94	84	90	101	95	A	96	98	R	93	A	87	C	C	C	105
27	106	102	95	86	79	83	91	102	97	96	90	88	88	88	A	85	83	86	82	84	83	82	F 89	92
28	90	F	F 86	86	F 83	F 83	93	95	94	94	103	99	101	103	100	103	103	106	R 108	108	99	98	95	F 96
29	F 93	F	U S 78	F 80	F 86	F 89	102	107	108	99	101	108	110	110	112	109	A	99	93	A	87	94	95	100
30	92	92	90	F 85	90	97	115	106	113	114	A	A	106	107	107	A	101	102	94	92	95	96	F 94	F 94
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	26	27	28	28	29	29	26	22	25	21	25	25	27	25	27	26	29	28	27	27	27	28	30
MED	92	90	85	80	79	84	93	98	96	95	94	97	96	98	99	96	94	93	92	90	86	88	92	94
UQ	95	94	88	84	84	91	99	103	101	99	102	101	102	104	103	102	103	102	99	95	92	93	95	96
LQ	83	85	78	74	73	80	87	93	93	89	90	91	90	88	89	88	89	89	88	82	80	83	84	85

JUN. 1989 | FOF2 (0.1 MHZ)

IONOSPHERIC DATA

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

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1							C	C C	C	C	C	C	C	C	C	U L 560	L	A	A					
2								L	L	L 530	L	640	L 600	U L 670	C	A	L	L	L					
3							L	A	A	A	580	600	620	L 650		C	C	C	A					
4							L	L	A	590	L 610	L	580	A	A	A	A	A	A	A				
5									L	L	A	A	610	C	C	C	C	A	A	C				
6								A	A	A	A	A	L 610	L	L	L	A	A	A	A				
7							L	L	A	L	L 590	L	B	640	R 610	620	580	C	U L 530	A				
8								L	L	L	A	A	610	L 650	630	H 620	A	A	A					
9							L		L	A	620	650	A	A	A	630	580	H 570	L 560	L	A			
10						U L 410		L	A	A	A	A	A	640	A	A	620	L 590	U L 590	A				
11							A	A	500	A	A	A	A	L 620	620	600	A	A	L	L				
12							L	440	A	A	550	A	600	A	U A 620	630	630	600	A	L				
13								L	L	R 710	580	A	650	A	A	640	A	A	A	A				
14									A	L	A	A	620	A	610	600	560	560	A	L				
15									620	A	A	A	A	A	580	580	570	520	H 500	L 430	A			
16							L	500	C	C	C	C	660	640	630	630	600	590	A	A	A			
17									L	U L 620	L	660	630	620	630	U A 590	C	C	L	A				
18									A	L	600	640	U A 620	600	U A 650	R 610	580	L 560	L 540	L				
19								L	L	650	L 610	A	L 670	610	620	570	580	L 620	L	A	A			
20								L	A	A	L 600	620	620	630	U A 590	A	Z 570	L 610	A	A	A			
21								L	A		A	A	U A 600	A	A	610	A	L	A	A				
22								L	A	L	L 650	L 630	640	630	610	590	590	570	L 510	L				
23									L	L	L	L	630	600	610	580	580	570	U L 510	L				
24								L	L	A	A	A	U A 570	U A 560	560	A	A	A	490	L 460				
25								L	540	550	A	A	A	U A 590	590	570	560	520	L 510					
26								L	L	L	A	600	A	R 600	A	A	560	A	A	A				
27								L	L	L	S 620	650	A	590	600	A	600	L 560	U L 540	A				
28									A	L	L 620	A	U A 600	620	A	580	A	560	510	L				
29									A	A	A	630	A	A	A	600	590	A	A	A	A			
30								A		L	A	A	A	610	L 630	A	A	570	A	A				
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	2	3	5	12	9	17	20	19	18	18	15	11	2					
MED						U L 410	470	540	620	L 605	630	620	610	620	600	580	570	L 510	L 445					
UQ								580	650	L 620	650	640	625	630	630	600	590	L 540						
LQ								520	590	585	620	600	600	605	580	570	560	510						

JUN. 1989 | FOF1 (0.01 MHZ)

IONOSPHERIC DATA

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

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1						C	C	C	C	C	C	C	C	C	C	A	A	310	A					
2						210	285	340	365	A	A	A	415	410	C	B	355	305	215					
3						210	290	335	370	385	395	A	A	A	C	C	C	C	A					
4						225	295	335	A	A	A	A	B	A	B	A	A	A	B					
5						220	300	A	375	370	A	A	C	C	C	C	370	320	C					
6						210	310	380	395	405	420	A	A	A	A	A	A	A	A	B				
7						215	305	365	B	380	A	B	A	440	420	390	C	A	A					
8						215	315	355	385	A	B	A	A	A	420	400	370	315	A					
9						H 235	305	355	385	405	B	430	B	A	A	400	370	340	245	A				
10						U A 230	300	350	B	405	400	B	430	430	425	405	380	315	A	B				
11					B	205	300	350	385	410	410	A	A	A	A	A	A	U A 340	A	B				
12					B	195	305	360	395	405	430	435	R 430	435	425	395	370	A	A	B				
13						220	310	350	390	390	420	440	445	440	435	410	385	330	A	B				
14					B	A 320	370		A	A	A	A	A	A	435	420	365	320	250	B				
15					B	225	305	355	390	A	430	440	430	425	A	400	370	330	275	B				
16						225	310	C	C	C	C	430	R 435	A	A	430	400	A	275	B				
17						230	300	365	395	A	A	A	A	A	A	C	C	340	A					
18						A	325	360	405	420	435	435	445	445	430	410	380	335	A	B				
19						220	300	355	385	405	A	A	A	410	A	B	385	330	270	B				
20						A	300	365	385	400	415	425	420	A	A	400	385	330	255	B				
21						A	310	360	A	410	430	440	435	420	400	410	375	320	A	B				
22						210	295	355	A	A	A	A	A	A	A	A	A	320	240	B				
23						215	305	A	A	A	410	420	430	A	A	A	A	315	250	B				
24						225	290	350	385	400	400	410	415	400	385	A	A	A	A	B				
25						215	295	340	370	400	A	425	425	A	A	380	320	A	A	B				
26						205	290	320	380	400	A	405	405	A	390	A	A	A	A	B				
27						A	A	A	A	A	420	A	A	A	A	A	A	A	A	B				
28						A	300	340	380	400	415	420	425	420	405	395	360	320	B	B				
29						210	295	355	A	A	A	A	425	420	420	400	380	305	A	B				
30						210	285	370	A	400	A	B	A	400	395	405	370	335	A	B				
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						23	28	25	18	18	14	13	15	13	13	16	18	20	9					
MED						215	300	355	385	400	418	430	430	420	420	400	370	320	250					
UQ						225	308	360	390	405	430	435	432	435	425	410	380	332	270					
LQ						210	295	350	380	400	410	420	422	410	400	398	370	315	245					

JUN. 1989 | FOE (0.01 MHZ)

IONOSPHERIC DATA

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

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

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	C	C	C	C	C	C	C	C	C	C	C	C	C	C	45	J A 50	J A 51	J A 89	J A 100	J A 68	J A 48	28	J A 29
2	J A 51	J A 50	J A 48	J A 42	J A 24	26	36	39	45	J A 49	J A 73	J A 69	53	42	C	77	J A 65	J A 58	J A 52	J A 112	J A 19	J A 35	J A 82	J A 82
3	J A 39	C	C	C	C	28	J A 65	89	J A 121	J A 82	J A 67	J A 71	J A 56	61	C	C	E C 70	E C 70	J A 53	J A 87	J A 106	J A 99	J A 85	J A 110
4	J A 32	J A 23	22	E B 15	E B 15	25	35	J A 57	49	J A 104	J A 96	51	J A 71	J A 73	J A 96	J A 92	J A 76	J A 74	J A 77	J A 48	J A 56	J A 51	J A 38	31
5	24	J A 21	26	E S 19	E B 14	27	J A 46	J A 54	J A 58	J A 84	J A 106	J A 105	C	C	C	C	J A 127	J A 166	C	C	C	C	C	J A 28
6	C	23	20	J A 26	J A 26	G	37	J A 68	94	J A 88	J A 85	J A 124	J A 73	J A 47	J A 51	J A 53	J A 67	J A 72	57	57	J A 99	J A 89	J A 46	J A 28
7	J A 37	J A 22	J A 33	J A 39	J A 30	27	38	J A 53	58	J A 54	J A 48	E B 71	45	J A 55	J A 50	G	C	J A 54	J A 67	50	45	57	J A 53	J A 52
8	J A 54	J A 42	27	21	24	25	37	J A 51	J A 65	J A 57	82	J A 80	J A 83	J A 51	48	J A 50	J A 74	J A 117	J A 116	139	J A 148	J A 86	47	J A 108
9	J A 78	J A 119	J A 124	J A 83	J A 74	G	38	J A 56	83	J A 86	58	J A 89	J A 147	J A 99	J A 54	47	G	43	J A 191	J A 149	J A 65	J A 69	J A 96	J A 100
10	J A 115	J A 67	J A 66	J A 53	J A 43	J A 28	42	J A 71	83	J A 99	J A 117	76	55	J A 67	84	44	J A 58	J A 61	J A 62	46	J A 26	29	20	J A 22
11	25	J A 22	J A 29	24	17	J A 48	J A 54	J A 52	J A 56	J A 107	87	J A 179	57	48	J A 48	J A 67	67	50	J A 42	J A 35	J A 35	24	J A 70	J A 37
12	26	J A 28	J A 24	J A 22	E B 16	27	J A 50	J A 89	J A 74	J A 55	61	57	61	63	J A 62	J A 58	43	70	J A 39	39	J A 58	J A 51	J A 80	J A 85
13	J A 59	54	J A 44	J A 53	28	G 19	35	J A 61	50	J A 53	103	50	92	J A 76	G	J A 74	J A 86	J A 111	69	J A 40	J A 23	J A 26	J A 54	J A 87
14	J A 59	J A 53	J A 54	J A 65	J A 41	J A 29	J A 52	J A 80	J A 133	J A 112	J A 149	J A 126	J A 132	48	47	49	G	J A 96	J A 49	J A 53	J A 57	J A 34	J A 61	J A 77
15	J A 60	J A 52	J A 42	J A 26	20	J A 42	J A 50	J A 53	J A 99	81	J A 102	J A 132	88	54	46	48	45	40	J A 55	69	J A 49	J A 51	J A 25	22
16	J A 71	20	17	J A 31	J A 37	28	J A 49	C	C	C	C	56	48	50	52	53	52	54	J A 65	72	J A 137	J A 138	J A 68	67
17	J A 34	29	E B 14	19	J A 16	G	31	G	47	J A 54	52	59	J A 60	48	J A 62	C	C	47	J A 45	J A 34	25	32	26	J A 18
18	20	J A 81	J A 74	J A 61	J A 51	J A 50	J A 50	J A 66	54	G	54	64	52	65	46	44	43	37	48	44	J A 52	J A 123	J A 156	J A 65
19	J A 49	J A 36	21	21	19	G	36	J A 47	J A 71	J A 70	J A 74	J A 65	45	45	J A 44	E B 52	49	50	J A 55	57	E B 16	J A 25	J A 31	J A 52
20	J A 52	J A 42	J A 26	J A 19	E B 14	24	36	J A 88	144	J A 101	J A 64	52	47	J A 57	J A 100	G	51	66	77	81	J A 54	J A 52	J A 52	J A 53
21	J A 42	22	J A 24	J A 24	J A 53	J A 43	J A 49	73	49	85	102	J A 67	80	J A 122	J A 87	65	J A 57	J A 75	J A 60	24	J A 21	J A 35	J A 48	J A 21
22	J A 33	J A 25	J A 25	J A 23	J A 22	24	32	J A 61	J A 52	J A 57	53	52	60	45	J A 53	J A 46	43	G 31	26	20	E B 13	E S 19	J A 21	J A 20
23	23	J A 23	J A 26	J A 20	J A 22	J A 49	G	39	J A 51	53	J A 53	J A 65	50	J A 54	J A 74	42	37	G 27	27	20	J A 25	19	J A 25	J A 41
24	J A 29	J A 53	J A 39	J A 23	J A 19	G	35	J A 50	J A 63	J A 82	J A 79	J A 74	J A 59	48	101	J A 73	J A 71	J A 38	23	J A 21	J A 22	33	J A 62	J A 53
25	J A 38	J A 33	22	27	J A 20	23	37	J A 54	J A 101	J A 87	J A 117	92	J A 120	J A 68	J A 100	40	39	J A 50	J A 50	42	31	30	J A 27	J A 31
26	22	25	30	29	E B 19	G	35	40	J A 53	J A 84	54	J A 84	50	J A 106	61	39	90	J A 54	J A 99	J A 55	C	C	C	E B 17
27	25	J A 25	J A 53	J A 38	J A 25	J A 53	J A 41	47	J A 60	J A 66	J A 55	J A 68	J A 55	J A 56	J A 98	J A 51	J A 45	J A 44	56	36	J A 51	37	J A 47	J A 74
28	J A 75	J A 113	J A 103	J A 49	J A 29	J A 82	32	J A 54	49	47	J A 69	J A 96	J A 57	62	58	J A 68	G	33	32	J A 24	23	J A 52	J A 88	J A 87
29	57	J A 76	J A 30	J A 51	J A 30	24	J A 48	J A 62	J A 79	J A 82	J A 72	J A 136	92	94	J A 60	54	105	90	60	100	58	71	J A 51	J A 51
30	J A 50	J A 29	J A 26	J A 26	J A 29	J A 24	59	J A 62	J A 81	J A 91	J A 122	J A 197	53	48	J A 101	J A 129	56	71	J A 43	J A 50	25	J A 54	J A 99	J A 86
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	29	29	28	28	28	28	29	28	28	26	27	28	30	29	29	28	28	28	30
MED	J A 40	J A 31	J A 28	J A 26	J A 24	26	38	J A 55	J A 62	J A 82	J A 74	J A 71	58	56	J A 59	50	53	54	J A 55	50	J A 47	J A 50	J A 52	J A 52
UQ	J A 58	J A 53	J A 46	J A 46	J A 30	J A 29	J A 49	J A 67	J A 83	J A 88	J A 102	J A 96	J A 82	J A 68	J A 87	J A 66	J A 70	J A 72	J A 67	72	J A 58	J A 63	J A 75	J A 82
LQ	28	J A 23	24	J A 22	19	23	35	J A 50	52	J A 54	J A 56	62	52	48	48	44	43	44	J A 45	36	24	31	J A 30	J A 28

JUN. 1989 | FOES (0.1 MHZ)

IONOSPHERIC DATA

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

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

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	C	C	C	C	C	C	C	C	C	C	C	C	C	C	43	39	49	72	61	45	33	U S 28	19
2	20	34	31	33	23	25	32	37	40	43	60	54	48	42	C	73	41	39	34	73	E B 15	27	61	45
3	27	C	C	C	C	28	54	A A 89	A A 121	A A 82	46	51	46	60	C	C	E C 70	E C 70	48	64	66	60	33	64
4	24	20	E B 16	E B 15	E B 15	24	33	52	44	47	54	48	70	65	67	71	70	66	60	34	46	31	18	21
5	E B 16	17	E B 14	E S 19	E B 14	24	35	50	52	69	A A 106	52	C	C	C	C	A A 127	A A 166	C	C	C	C	C	17
6	C	E B 16	E B 14	18	19	G	33	67	88	73	78	76	48	44	50	52	66	71	44	54	75	77	28	19
7	25	E B 14	18	21	16	26	35	49	52	48	44	E B 71	44	55	50	G	C	41	47	32	40	23	24	25
8	24	20	23	E B 14	17	25	35	41	57	54	73	77	54	47	43	G	71	61	85	A A 139	A A 148	53	42	41
9	48	63	62	57	43	G	35	49	75	48	56	89	A A 147	68	52	43	G	41	34	70	45	26	58	38
10	42	41	31	31	33	G 22	39	54	A A 83	66	70	68	54	67	73	44	46	46	52	22	21	18	E B 17	22
11	17	17	23	17	17	44	46	42	A A 56	A A 107	A A 87	A A 179	53	46	45	65	58	46	35	25	27	17	16	32
12	19	17	18	18	E B 16	26	37	A A 89	A A 74	51	60	49	61	63	60	53	41	67	34	32	39	32	51	41
13	41	42	30	27	18	G 18	34	46	47	48	99	50	89	74	G	74	76	78	69	37	E B 15	18	35	28
14	35	38	34	39	32	26	44	56	61	72	A A 149	53	A A 132	48	46	45	G	62	31	27	39	22	21	44
15	51	31	17	18	E B 14	37	44	46	A A 99	A A 81	A A 102	A A 132	A A 88	50	46	45	43	35	31	34	18	18	18	E B 16
16	20	E B 14	E B 14	20	30	24	38	C	C	C	C	54	48	46	50	49	50	54	47	52	44	A A 138	30	U S 66
17	17	19	E B 14	E B 13	E B 14	G	31	G	45	G	50	56	58	46	59	C	C	44	44	32	17	23	18	16
18	E B 14	19	22	42	43	26	34	57	47	G	51	62	49	65	44	43	41	37	37	36	45	45	68	47
19	25	17	E B 14	E B 14	E B 14	G	35	41	47	53	70	53	45	44	42	E B 52	46	47	55	47	E B 16	22	20	21
20	35	23	20	E B 14	E B 14	24	36	77	A A 144	53	51	52	45	J A 57	61	G	47	63	67	73	45	35	32	28
21	22	E B 15	24	20	34	28	37	64	46	76	A A 102	60	73	70	48	61	55	63	38	22	18	24	22	18
22	27	E B 13	17	19	17	23	31	59	49	51	46	49	60	44	49	41	39	G 28	26	18	E B 13	E S 19	17	19
23	16	E B 14	E B 13	16	E B 14	G	G	37	42	49	51	58	48	52	46	42	37	G 25	27	18	18	E B 15	E B 15	18
24	25	33	20	19	16	G	32	40	61	80	60	57	57	45	A A 101	66	67	36	U S 22	18	16	24	42	37
25	25	26	18	20	16	23	34	47	51	65	A A 117	A A 92	59	48	50	39	39	35	30	31	27	21	18	22
26	E B 15	20	19	20	E B 19	G	G	G	45	72	52	60	49	A A 106	61	39	A A 90	48	A A 99	34	C	C	C	E B 17
27	20	24	20	21	20	39	35	37	48	53	52	63	50	55	A A 98	48	37	40	54	28	51	23	31	30
28	34	61	34	18	17	34	32	51	44	46	67	60	50	61	56	58	G	G	30	21	E B 16	20	19	48
29	27	36	25	38	23	24	42	58	74	75	52	90	82	89	56	54	A A 105	87	55	A A 100	44	47	30	20
30	20	19	18	23	17	G 18	50	49	60	70	A A 122	A A 197	44	48	83	A A 129	52	61	42	50	18	26	62	71
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	29	29	28	28	28	28	29	28	28	26	27	28	30	29	29	28	28	28	30
MED	24	20	20	20	17	24	35	49	52	54	60	59	54	54	50	46	46	47	44	34	33	24	28	26
UQ	30	34	24	25	23	26	38	58	74	72	93	76	66	65	61	60	67	63	55	54	45	34	38	41
LQ	20	17	16	17	E B 16	G 18	33	41	46	48	52	53	48	46	46	42	39	39	34	27	18	20	18	19

JUN. 1989 | FBES (0.1 MHZ)

IONOSPHERIC DATA

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

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	33	20	18	33	14	14	14	E S 21	13
2	14	13	14	13	12	14	13	17	23	31	31	29	31	30	C	41	22	18	16	16	15	14	14	15
3	14	C	C	C	C	16	17	17	21	26	26	25	25	36	C	E 35	E C 70	E C 70	18	16	13	13	14	13
4	15	15	16	15	15	17	17	17	36	29	26	32	53	38	44	28	20	20	20	13	15	13	14	13
5	15	14	14	E S 19	14	17	17	27	20	22	38	32	C	C	C	C	18	19	C	C	C	C	C	15
6	C	16	14	13	13	18	19	27	24	32	33	34	32	34	34	26	24	19	16	15	14	14	14	16
7	17	14	14	15	14	16	17	17	39	30	32	71	36	31	33	30	C	17	19	14	13	13	14	14
8	14	14	13	14	13	14	22	18	27	25	41	39	26	33	31	22	25	17	16	14	13	14	15	13
9	14	14	13	12	14	16	15	16	24	31	51	35	44	33	33	24	20	23	18	13	16	13	13	13
10	13	13	13	14	13	14	16	17	44	30	29	43	35	33	32	27	26	19	14	14	14	14	17	15
11	14	13	13	13	13	14	17	17	19	24	28	28	40	33	31	23	20	18	14	15	15	15	14	14
12	14	14	13	14	16	16	18	19	22	25	33	35	34	31	31	24	23	31	17	15	15	13	15	15
13	15	17	15	14	14	14	16	18	21	20	26	34	35	34	34	26	23	18	18	16	15	14	15	14
14	14	14	13	14	14	14	18	21	19	22	32	31	35	35	32	34	24	17	17	16	13	13	14	15
15	16	14	14	16	14	16	16	18	19	36	30	33	32	35	33	22	19	19	19	14	13	15	15	16
16	14	14	14	14	13	14	17	C	C	C	C	33	32	38	38	37	24	35	18	13	15	14	13	16
17	14	14	14	13	14	17	16	21	31	26	35	35	34	33	32	C	C	17	16	14	13	13	14	14
18	14	15	13	15	12	17	18	22	24	27	32	33	33	33	27	32	24	21	16	13	15	13	13	13
19	13	14	14	14	14	17	18	20	23	23	30	35	32	28	29	52	27	18	17	15	16	13	14	15
20	15	13	14	14	14	16	15	22	19	23	31	33	34	33	32	25	19	19	17	15	16	15	15	16
21	16	14	14	14	13	14	16	28	34	33	34	34	38	36	26	27	20	18	16	13	17	14	12	13
22	16	13	13	13	13	17	17	18	33	24	28	27	37	31	33	28	21	17	16	14	13	E S 19	15	14
23	14	14	13	12	14	15	15	18	21	25	30	29	28	35	29	25	21	18	13	13	13	15	15	15
24	15	14	13	16	12	17	17	17	17	22	26	32	27	31	31	21	20	17	16	14	14	15	12	13
25	13	14	13	13	13	15	13	15	17	21	26	33	29	33	26	23	19	17	16	14	13	14	15	15
26	15	14	14	15	19	18	18	18	19	22	30	31	34	40	30	30	31	17	14	12	C	C	C	17
27	15	14	13	16	13	18	20	17	21	25	28	25	35	32	26	24	18	18	17	13	13	13	15	15
28	14	14	14	14	14	15	16	17	18	25	25	30	31	33	24	26	20	16	25	14	16	14	15	15
29	15	13	13	15	15	16	16	18	20	22	25	29	32	35	32	30	25	18	18	14	14	12	14	14
30	14	14	13	14	13	14	13	21	21	25	22	51	26	27	27	22	25	24	17	13	12	16	15	15
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	29	29	28	28	28	28	29	28	28	26	28	28	30	29	29	28	28	28	30
MED	14	14	14	14	14	16	17	18	21	25	30	33	34	33	32	26	22	18	17	14	14	14	14	15
UQ	15	14	14	15	14	17	18	21	26	30	32	35	35	35	33	31	24	19	18	15	15	14	15	15
LQ	14	14	13	13	13	14	16	17	19	22	26	30	31	32	29	24	20	17	16	13	13	13	14	13

JUN. 1989 | FMIN (0.1 MHZ)

IONOSPHERIC DATA

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

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	280	275	R 285	295	290	285	U S 260	255	V 255
2	270	285	290	280	280	290	295	305	285	305	260	255	270	270	I C 270	265	280	275	285	280	S 290	280	265	F 255
3	250	C	C	C	C	265	280	A	A	A	R 265	260	255	R 270	C	270	C	C	290	A	270	F 250	F 270	265
4	F 275	F 265	F 250	F 250	F 250	270	300	310	245	255	265	260	255	265	260	255	270	285	290	285	265	255	270	265
5	260	270	270	270	285	320	290	285	265	265	A	240	C	C	C	C	A	A	C	C	C	C	C	265
6	I C 270	S 280	F 270	F 265	270	300	290	275	A	260	A	R 265	R 270	U R 265	I R 270	270	R 270	270	275	290	S	A	S 265	265
7	270	275	280	265	265	285	300	295	290	270	255	245	240	240	255	260	I C 260	265	270	285	260	255	255	265
8	270	285	270	265	275	290	290	265	280	250	250	I R 255	260	260	265	260	270	275	A	A	A	250	I S 260	F 265
9	265	F 280	Z 285	F 275	F 265	270	300	295	255	255	240	255	A	245	245	250	255	255	275	A	270	255	F 245	F 265
10	F 250	F 255	F 250	F 250	F 255	255	280	290	A	A	235	250	245	245	245	245	250	255	265	270	255	235	255	255
11	250	260	265	245	240	250	225	235	A	A	A	A	270	250	255	265	270	270	280	275	270	260	260	260
12	260	280	285	265	250	265	255	A	A	205	215	215	235	250	245	255	255	270	270	270	270	260	250	255
13	265	U S 270	265	255	260	285	315	260	235	250	A	U R 250	245	250	245	250	260	265	265	275	265	250	245	260
14	270	270	265	F 270	265	270	255	240	240	250	A	230	A	240	240	245	250	270	270	265	245	245	F 245	255
15	245	260	V 245	260	255	270	290	225	A	A	A	A	A	220	225	220	225	235	245	270	255	240	S 250	240
16	245	250	255	270	245	230	240	C	C	C	C	245	240	245	245	245	245	265	260	270	245	A	250	I S 250
17	255	275	285	275	265	285	285	265	270	250	230	240	245	240	250	C	C	270	270	210	265	260	255	255
18	F 255	F 275	I S 270	265	270	290	280	265	260	250	235	245	245	245	250	245	250	265	275	275	255	F 250	240	F 265
19	F 215	270	275	285	275	290	290	280	250	265	245	240	240	245	245	260	260	255	265	270	265	260	265	255
20	255	265	270	265	265	300	285	260	A	255	240	R 245	250	250	255	245	255	265	270	280	S 270	245	245	250
21	S	F 270	F	F 285	F 265	H 265	F 275	245	290	265	A	255	255	F 245	V 250	V 255	260	270	270	290	275	255	250	260
22	265	260	265	270	280	290	290	305	295	260	260	250	255	245	255	250	260	275	290	285	280	S 255	270	255
23	255	265	280	270	280	300	295	275	280	240	240	245	245	245	245	255	260	260	275	275	270	265	255	260
24	265	265	260	255	265	275	280	265	255	A	225	220	230	225	A	A	A	260	270	275	265	265	I S 260	245
25	245	260	290	270	270	285	295	275	260	235	A	A	235	240	245	250	255	C	290	270	260	260	270	265
26	270	265	285	295	290	275	270	C	280	A	260	C	265	A	265	270	R	270	A	270	C	C	C	265
27	270	275	290	280	275	280	265	275	280	250	250	245	250	260	A	250	265	265	275	285	270	255	F 250	255
28	265	F	F 270	280	F 285	F 285	290	285	275	260	255	255	245	255	260	255	255	270	R 275	285	275	270	275	F 275
29	F 290	F	U S 290	F 265	F 275	F 290	285	290	280	265	250	255	255	260	255	270	A	A	275	A	265	255	265	275
30	270	275	290	F 265	270	285	290	295	265	260	A	A	245	255	255	A	265	280	285	270	265	260	F 270	F 280
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	26	27	28	28	29	29	25	21	22	19	24	25	27	25	26	24	26	27	25	26	26	28	30
MED	265	270	270	268	268	285	290	275	270	255	250	248	245	245	250	255	260	270	275	275	265	255	255	260
UQ	270	275	285	275	275	290	290	290	280	265	258	255	255	258	255	265	268	270	282	285	270	260	265	265
LQ	252	265	265	265	262	270	280	265	255	250	238	242	245	245	245	250	255	265	270	270	260	250	250	255

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

IONOSPHERIC DATA

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

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1							C	C C	C	C	C	C	C	C	C	U L 365		L	A	A				
2								L	L	L 385	L	A	L 380	U L 380	C	A	L	L	L					
3							L	A	A	A	A	365	325	375		A		C	C	C	A				
4							L	L	A	355	360	L	360	A	A	A	A	A	A	A				
5									L	L	A	A	350	C	C	C	C	A	A	C				
6									A	A	A	A	A	L 365	L	L	L	A	A	A	A			
7							L	L	A	L	L 355	L	B	355	A	A	370	C	A	A				
8									L	L	L	A	A	A	L 355	360	H 390	A	A	A				
9							L		L	A	350	320	A	A	A	315	350	H 395	L 330	L	A			
10						U L 325		L	A	A	A	A	A	325	A	A	345	L 320	A	A				
11							A	A	325	A	A	A	A	L 345	370	360	A	A	L	L				
12							L	A	A	A	A	A	355	A	A	A	A	365	A	L				
13								L	L	R 365	350	A	365	A	A	380	A	A	A	A				
14									A	L	A	A	335	A	335	350	345	360	A	L				
15									350	A	A	A	A	A	350	350	350	350	H 365	L 305	A			
16							L	335		C	C	C	345	355	365	335	335		A	A	A	A			
17									L	U L 365	L	375	A	A	380	A	C	C	L	A				
18									A	L	370	335	A	360	A	R 345	365	L 350	L 335	L				
19								L	L	350	A	A	L 325	365	380	375	B	A	L	A	A			
20								L	A	A	A	350	A	375	A	A	Z 375	L 350	A	A	A			
21								L	A		A	A	A	A	A	340	A	L	A	A				
22								L	A	L	L 350	L 390	385	A	395	A	355	365	L 355	L				
23									L	L	L	L	A	335	325	365	350	365	U L 345	L				
24								L	L	A	A	A	A	A	350	A	A	A	360	L 350				
25								L	A	A	A	A	A	A	355	A	370	380	370					
26								L	L	L	A	375	A	365	A	A	370	A	A	A				
27								L	L	L	S 330	A	A	350	A	A	325	L 360	U L 345	A				
28									A	L	L 365	A	A	375	A	A	A	370	375	L				
29									A	A	A	A	A	A	A	A	A	A	A	A	A			
30								A		L	A	A	A	395	L 360	A	A	A	A	A				
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	2	4	9	7	9	15	13	11	15	12	9	2					
MED						U L 325	335	338	360	L 355	365	350	365	360	350	355	362	L 355	L 328					
UQ									365	L 365	375	360	375	380	362	370	368	365						
LQ									352	350	342	335	352	350	342	348	L 350	L 345						

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

IONOSPHERIC DATA

JUN. 1989 | H*F2 (KM) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1						C	C	C	C	C	C	C	C	C	C	330	350	315	320					
2							285		L 320	285	385	385	345	360	C	375	330	L 330	300					
3						360	335	A	A	A	405	405	430	390		E C 380	C	C	300					
4						L 345	L 290	A 315	470	405	L 390	390	425	385	385	405	A 355	325	E A 320					
5								310	L 320	E A 380	A	420	C	C	C	C	A	A	C					
6								A 355	A	E A 425	E A 465	390	370	370	390	355	340	A 345	305	310				
7						295	280	270	L 305	350	L 390	460	460	425	380	380	I C 365	370	A 350					
8								L	335	L 415	405	385	375	375	370	380	360	330	A					
9						L 325		310	E A 450	415	495	A	A	435	420	410	410	415	345	A				
10						400	L 340	325	A	A	E A 505	460	450	435	445	430	400	395	355					
11						405	E A 510	660	A	A	A	A	405	460	445	410	E A 340	L 340	L 335					
12						L 380	415	A	A	655	600	605	515	465	455	425	410	E A 390	360					
13							270	L	510	415	A	435	E A 475	E A 450	435	E A 450	E A 430	E A 420	A					
14								455	460	E A 465	A	530	A	485	490	470	455	A 400	360					
15								525	A	A	A	A	A	580	560	580	555	510	425	340				
16						480	455	C	C	C	C	455	460	465	465	440	420	370	A 355	E A 370				
17								L 350	335	H 290	485	450	430	450	405	C	C	L 335	A 320					
18								355	375	420	485	460	455	460	455	460	415	370	335					
19							295	L	395	365	415	435	445	440	420	390	415	L 395	A 380	320				
20							H 270	E A 380	A	390	435	435	420	420	420	420	410	E A 385	E A 365	A				
21							L 340	385		A 410	A	425	425	430	420	390	L 380	E A 355	A 335					
22							255	285	300	390	380	425	425	440	415	415	385	340	290					
23								325	325	445	L 430	460	430	445	425	400	385	350	310					
24							280	L 330	405	A	550	570	525	555	A	A	A	410	370					
25							280	360	395	E A 505	A	A	500	490	475	450	450	400						
26							325	310	L 280	A	445	95	405	A	400	380	A	A 330	A					
27							L 350	330	320	400	435	455	430	425	A	415	385	360	E A 350					
28								280	325	390	390	370	410	400	375	390	380	350	325					
29								290	E A 325	E A 400	425	E A 455	A 425	A	395	380	A	A	A 300	A				
30							295		360	365	A	A	420	390	E A 410	A	385	330	310					
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						8	18	21	20	22	20	24	25	26	24	26	24	27	25	4				
MED						370	294	328	332	396	426	435	428	436	420	405	385	352	330	322				
UQ						402	340	358	398	418	475	460	452	460	450	428	414	388	355	348				
LQ						335	280	310	320	372	398	398	420	400	395	380	362	335	310	315				

JUN. 1989 | H*F2 (KM)

IONOSPHERIC DATA

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

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

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	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	E A 245	E A 260	A	A	E A 320	E A 310	E A 365	S	330
2	305	A 300	A 280	A 310	305	250	250	230	215	215	A	A	225	220	C	A	E A 260	E A 270	280	A	270	A 275	E A 385	A
3	360	C	C	C	C	E A 295	A	A	A	A	E A 245	E A 295	240	A	C	A	C	C	A	A	A	A	E A 355	E A 395
4	350	A 335	335	350	H 360	275	245	A	E A 250	E A 250	A	A 250	A	A	A	A	A	A	A	E A 285	E A 375	E A 370	315	320
5	325	315	320	315	275	255	260	A	A	A	A	E A 265	C	C	C	C	A	A	C	C	C	C	C	310
6	I C 310	295	295	335	305	260	245	A	A	A	A	A	E A 255	215	A	A	A	A	A	A	A	A	325	310
7	315	290	295	335	330	270	250	A	A	E A 260	220	B	265	A	A	230	I C 250	A	A	315	E A 345	345	340	330
8	295	265	310	315	300	260	255	235	A	A 275	A	A	A	A 255	245	H 220	A	A	A	A	A	E A 410	E A 365	E A 355
9	A 360	E A 345	A	E A 375	E A 350	260	250	A	A	A 260	E A 310	A	A	A	E A 315	A 255	H 215	295	E A 315	A	E A 360	A 355	A	A 370
10	E A 420	A	A 390	A 415	E A 410	295	E A 285	A	A	A	A	A	A	A	A	265	A 305	A	A	290	310	365	340	340
11	345	335	345	365	390	A	A	A	A	A	A	A	E A 270	230	240	A	A	A	285	290	315	355	355	E A 350
12	320	290	285	255	355	295	A	A	A	A	A	E A 255	A	A	A	A	235	A	E A 280	A 310	E A 340	A 360	E A 415	E A 400
13	350	E A 340	E A 345	E A 350	340	265	A 260	260	255	A 250	A	E A 250	A	A	H	A	A	A	A	A 310	315	340	355	A 340
14	A 335	A 345	E A 345	A 360	E A 350	290	A	A	A	A	A	E A 265	A	265	245	E A 260	250	A	E A 275	335	E A 410	370	E A 435	E A 390
15	A	E A 355	360	330	355	E A 315	E A 285	A 270	A	A	A	A	A	E A 265	240	A 255	A 260	H 240	E A 325	A	330	360	370	375
16	370	345	310	315	E A 385	295	E A 275	C	C	C	C	E A 265	250	235	E A 275	E A 290	A	A	A	A	E A 410	A	A 375	A
17	340	300	270	245	320	275	245	240	A 240	230	240	A	A	230	A	C	C	A	A	A 280	290	E A 340	325	325
18	330	310	345	E A 350	E A 355	265	A 250	A	250	225	E A 275	A	240	A	245	235	250	260	A	E A 310	E A 365	A	A	E A 375
19	325	300	275	260	275	255	250	245	250	A	A	E A 285	240	215	220	B	E A 310	A	A	A	290	325	320	340
20	A 350	305	305	305	315	265	250	A	A	A	A 265	A	230	A	A	230	H 265	A	A	A	E A 350	A 390	A 360	360
21	325	290	275	275	E A 345	H 270	E A 285	A	E A 265	A	A	A	A	A	E A 270	A	A	A	A	275	285	330	340	325
22	340	310	310	300	285	240	240	A	E A 260	E A 260	215	225	A	195	A	250	H 235	240	250	280	285	335	335	335
23	320	315	285	300	290	250	245	230	215	275	E A 265	A	A	A	A 240	A 250	245	255	260	295	280	295	320	330
24	310	325	330	345	310	265	245	A 250	A	A	A	A	A	255	A	A	A	240	265	280	320	340	E A 360	E A 390
25	A 375	A 350	255	280	320	275	255	A	A	A	A	A	A	E A 260	A	230	230	250	A 270	E A 310	A 320	A 340	310	330
26	320	320	290	300	300	260	245	245	A 260	A	A 250	410	240	A	A	225	A	A	A	E A 320	C	C	C	315
27	295	290	260	260	275	A 280	255	255	E A 270	A	A	A	E A 265	A	A	E A 295	240	A 265	A	A 290	E A 370	330	E A 395	E A 355
28	350	A	355	280	270	A 270	250	A	E A 255	235	A	A	A 230	A	A	A	240	225	260	280	275	300	290	E A 325
29	280	E A 300	285	E A 355	300	260	A 275	A	A	A	A	A	A	A	A	A	A	A	A	A	E A 365	E A 380	330	315
30	300	300	270	310	315	270	A	E A 265	A	A	A	A	215	A 250	A	A	A	A	A	A	300	320	A	A
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	26	27	28	28	28	24	11	12	11	9	10	13	13	10	15	16	10	11	18	25	24	24	27
MED	326	305	300	308	309	266	250	245	U A 234	A 240	U A 232	E A 265	235	232	242	240	245	248	A 268	286	U 298	337	335	330
UQ	350	328	332	341	336	276	256	255	E A 260	A 260	E A 265	E A 285	248	A 252	E A 270	A 254	A 255	262	E A 282	A 302	E A 360	A 360	E A 368	E A 365
LQ	312	300	282	290	300	260	245	238	236	230	230	E A 250	230	220	240	230	238	240	261	280	290	329	325	325

JUN. 1989 | H'F (KM)

IONOSPHERIC DATA

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

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

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	C	C	C	C	C	C	C	C	C	A	A	120	A					
2						E A 155	115	115	115	A	120	A	120	120	C	B	115	120	125					
3						135	120	115	115	115	115	115	115	A	C	C	C	C	125					
4						145	115	115	A	A	115	125	B	A	A	A	A	A	B					
5						135	120	120	115	115	A	A	C	C	C	C	120	120	C					
6						E B 145	E A 140	120	115	120	115	120	120	A	A	A	A	A	A	B				
7						125	120	120	B	120	115	B	A	120	115	125	C	A	A					
8						130	125	115	120	115	B	A	A	A	120	115	115	115	A					
9						135	120	115	120	115	B	115	B	120	125	120	115	125	130	A				
10						A	E A 135	115	B	120	120	B	125	125	120	120	120	110	115	B				
11					B	130	120	115	115	115	120	115	A	125	A	A	A	A	A	B				
12					B	E B 135	120	125	125	115	120	455	120	120	115	120	115	A	120	B				
13						E A 135	115	115	115	120	115	125	125	120	120	120	115	120	A	B				
14					B	A	130	120	115	120	120	115	120	A	120	125	120	120	125	B				
15					B	140	115	110	110	A	120	120	120	125	A	115	120	120	E B 135	B				
16						A 125	120	C	C	C	C	115	120	A	A	120	120	A	120	B				
17						130	110	115	120	115	125	115	120	120	115	C	C	E A 135	A					
18						A	125	120	125	115	120	120	120	125	120	120	120	E A 135	A	B				
19						135	115	115	115	110	115	125	120	120	120	B	120	120	120	B				
20						A	120	120	120	115	120	120	115	A	A	120	120	120	125	B				
21						A	120	125	125	120	125	125	E B 135	120	115	125	115	115	115	B				
22						125	110	115	115	110	110	120	115	115	125	A	A	E A 140	E A 125	B				
23						130	125	110	110	115	120	115	115	A	120	A	A	E A 125	E A 120	B				
24						140	120	115	115	110	E A 120	120	115	120	115	115	115	110	A	B				
25						130	115	110	110	115	115	120	120	120	115	125	115	A	A	B				
26						130	120	115	110	110	A	120	120	A	B 125	A	A	A	A	B				
27						A	A	A	115	115	120	110	120	120	A	A	A	A	A	B				
28						A	120	120	115	120	120	115	120	115	115	115	115	110	B	B				
29						E A 155	E A 140	110	110	115	115	120	125	E B 125	125	B 125	120	B 120	A	B				
30						E A 160	115	120	115	110	110	B	115	115	120	115	115	120	120	B				
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						22	28	27	25	25	24	23	23	19	19	17	19	20	14					
MED						132	120	115	115	115	120	120	120	120	120	120	115	120	121					
UQ						138	121	120	120	120	120	120	120	121	120	125	120	121	125					
LQ						130	115	115	115	115	115	115	118	120	115	115	115	118	120					

JUN. 1989 | H'E (KM)

IONOSPHERIC DATA

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

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	120	115	125	120	115	110	110	105	115
2	110	105	105	100	110	160	140	125	115	115	115	110	130	E G 155	C	130	130	120	115	115	110	110	110	110
3	105	C	C	C	C	125	120	120	115	115	115	115	110	110	C	C	C	C	115	120	115	125	115	115
4	105	110	110	B	B	155	140	125	120	115	115	115	120	115	130	110	110	110	110	105	110	115	115	105
5	110	105	105	S	B	145	125	120	115	110	110	115	C	C	C	C	125	120	C	C	C	C	C	115
6	C	110	110	95	100	G	130	120	115	120	115	115	115	120	115	115	110	115	125	120	120	110	115	105
7	110	120	115	110	115	145	135	130	120	120	115	B	110	120	130	G	C	140	120	115	110	115	125	110
8	105	110	105	130	100	150	130	130	120	115	110	110	110	115	145	115	115	120	110	110	115	110	110	115
9	105	105	100	105	110	G	145	135	130	125	125	120	115	115	115	130	G	135	115	120	115	120	115	120
10	115	105	110	110	105	110	135	120	125	115	115	120	120	125	115	145	120	115	115	110	105	110	110	105
11	105	110	110	105	150	130	125	125	120	120	115	115	115	115	115	105	105	135	140	110	105	110	120	105
12	105	105	105	110	B	155	140	125	130	130	125	130	125	120	125	120	130	115	115	115	100	100	110	110
13	110	105	100	115	100	115	140	125	130	125	115	120	125	135	G	125	115	115	110	110	115	105	110	115
14	115	110	110	110	110	115	130	125	120	120	115	115	115	120	E G 160	135	G	125	120	125	115	115	115	110
15	115	110	110	110	125	135	125	125	125	120	115	120	115	115	155	140	145	155	135	120	130	115	115	110
16	110	110	105	105	105	130	120	C	C	C	C	110	125	110	110	135	130	125	115	115	120	115	120	100
17	100	100	B	100	100	G	E G 155	G	110	110	115	110	115	115	110	C	C	125	115	110	105	100	105	100
18	110	130	115	105	110	120	160	140	130	G	125	120	145	140	E G 165	145	130	125	105	105	105	125	115	110
19	105	120	110	100	105	G	120	130	120	110	110	115	120	125	120	B	140	125	120	110	B	105	105	115
20	105	100	100	110	B	145	140	120	115	115	115	115	120	110	115	G	140	125	120	120	115	110	110	115
21	120	105	105	105	100	115	140	120	125	110	115	115	115	110	120	120	115	110	110	105	105	100	105	105
22	100	110	100	95	100	E G 160	145	115	115	110	110	115	110	115	110	110	105	105	135	120	B	S	115	100
23	105	115	115	115	115	110	G	115	120	115	115	110	120	115	115	110	110	110	145	105	105	110	110	125
24	110	100	100	105	105	G	150	125	115	110	110	115	110	115	110	110	110	110	110	105	105	100	115	115
25	100	100	100	105	100	E G 170	135	120	115	115	110	115	130	110	110	125	115	110	105	105	110	100	100	105
26	105	100	100	100	B	G	120	125	120	110	110	115	120	110	110	120	110	105	110	105	C	C	C	B
27	100	105	115	105	105	115	115	125	115	115	115	110	115	110	105	115	110	105	105	100	115	105	115	110
28	115	115	110	110	105	110	E G 165	125	120	120	120	115	120	115	120	125	G	E G 150	120	115	115	110	110	110
29	105	110	100	100	105	155	140	125	115	115	120	110	115	120	130	120	115	110	110	110	105	110	120	110
30	105	100	100	100	100	110	135	135	125	115	110	105	115	125	115	125	125	120	115	110	110	105	115	115
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	26	23	23	28	27	28	27	28	28	28	28	25	24	24	29	29	29	26	27	28	29
MED	105	108	105	105	105	128	135	125	120	115	115	115	115	115	115	120	115	120	115	110	110	110	115	110
UQ	110	110	110	110	110	148	140	125	125	120	115	115	120	120	125	130	130	125	120	115	115	115	115	115
LQ	105	105	100	100	100	115	125	120	115	112	110	110	115	112	110	115	110	110	110	105	105	105	110	105

JUN. 1989 | H'ES (KM)

IONOSPHERIC DATA

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

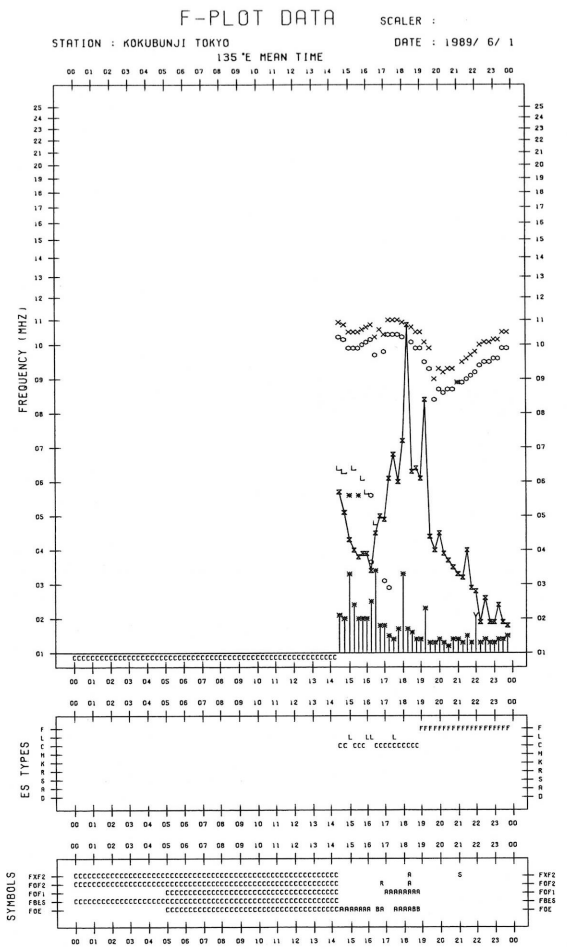
Station KOKUBUNJI TOKYO Lat. 35° 42. 4'N, Long. 139° 29. 3'E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

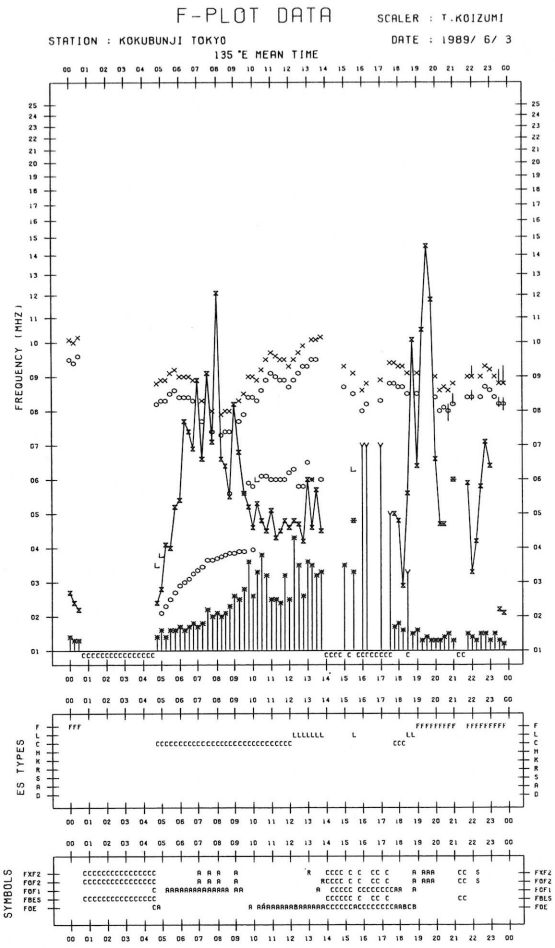
Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1																L 2	L 2	C 2	C 4	F 4	F 4	F 4	F 1	F 2
2	FF 23	F 5	F 5	F 3	F 5	HL 22	H 2	H 2	C 2	C 2	C 2	CL 21	H 2	H 1		H 1	H 2	C 3	C 3	F 4	F 1	F 3	F 5	F 4
3	F 4					C 3	C 4	C 3	C 2	C 3	C 1	C 2	C 1	L 1					C 4	F 2	F 5	F 6	F 4	F 5
4	F 5	F 3	F 2			H 1	H 2	H 3	C 1	C 2	C 2	C 2	L 1	L 2	CL 12	L 3	L 4	L 3	L 3	F 5	F 4	FF 34	F 2	F 4
5	F 2	F 3	F 2			H 1	C 3	C 2	C 2	C 4	L 2	L 2					C 4	C 4						F 2
6		F 1	F 1	F 3	F 2		HL 11	C 2	C 3	C 2	C 2	C 1	C 2	C 1	C 1	L 2	L 3	L 3	L 4	C 5	F 4	F 2	F 2	F 3
7	FF 13	F 2	FF 21	FF 31	F 2	H 2	H 2	H 3	C 1	C 2	C 1		L 1	C 1	C 1			HC 22	C 3	F 3	F 3	F 4	FF 24	F 5
8	FF 24	F 4	F 2	FF 11	F 2	H 1	H 1	H 2	C 3	C 2	C 2	C 2	L 2	L 1	H 1	LH 11	C 2	C 4	C 4	F 2	F 5	F 5	F 4	F 5
9	F 5	F 4	F 5	F 5	F 5		H 2	H 3	H 4	H 2	H 1	C 2	C 1	C 2	C 2	H 1		C 2	C 2	C 5	F 3	FF 34	F 5	FF 13
10	F 4	F 5	F 4	F 4	F 4	L 2	HL 21	C 3	C 2	C 2	C 2	C 1	C 2	C 2	C 2	H 1	H 2	C 4	C 4	C 4	F 4	F 2	F 1	F 3
11	F 3	F 3	F 2	F 2	H 1	H 3	L 3	C 2	L 2	L 3	L 3	L 3	C 1	L 2	L 2	L 2	L 3	HL 32	HL 32	L 2	F 3	F 2	FF 32	F 4
12	F 2	F 2	F 2	F 1		H 1	HH 12	H 3	H 3	H 2	H 2	H 1	C 2	C 2	C 2	C 3	H 1	C 2	C 4	L 3	F 5	F 4	FF 35	F 2
13	F 3	F 2	F 4	FF 24	F 2	L 1	A 1	C 2	A 1	C 2	C 2	C 2	HC 21	H 2		H 2	C 2	C 4	C 3	C 4	F 2	F 2	F 3	FF 23
14	F 5	F 5	F 5	F 4	L 4	LC 21	C 2	C 3	C 2	C 2	C 2	C 2	C 2	L 1	H 1	H 1		C 4	C 2	C 3	F 4	F 5	F 3	F 4
15	F 4	F 5	F 2	F 1	L 1	C 3	C 3	H 3	C 2	L 1	C 2	C 2	C 2	C 1	HC 11	H 1	H 2	H 1	H 3	C 4	FF 12	F 3	F 2	F 2
16	F 5	F 2	F 1	F 4	F 3	HL 11	C 3					C 2	C 1	L 1	L 1	H 1	H 2	H 1	C 4	C 4	FF 23	FF 24	FF 26	F 3
17	F 3	F 3		F 1	F 1		H 1		C 2	LC 11	C 2	C 2	C 2	C 1	C 2			C 3	CL 31	L 3	F 3	F 3	F 4	F 2
18	F 1	FF 23	F 3	F 5	F 7	C 3	H 2	H 3	H 2		C 2	C 2	H 1	H 1	H 1	H 1	H 1	HL 21	L 3	L 5	F 5	FF 24	FF 14	F 5
19	F 4	FF 12	F 2	F 2	F 1		C 1	H 1	C 2	C 2	C 2	C 2	C 1	C 1	C 1		H 1	H 2	H 3	C 2		F 3	F 3	FF 24
20	F 3	F 3	F 2	F 1		C 1	H 2	C 3	C 3	C 2	C 2	C 1	C 1	C 2	C 2		H 2	H 3	C 5	C 3	F 3	FF 31	FF 24	F 4
21	FF 13	F 2	F 4	F 2	F 4	CL 12	H 2	C 2	C 1	C 2	C 2	C 2	C 2	C 2	C 2	C 2	C 3	C 4	C 4	C 3	F 2	F 5	F 4	C 4
22	F 3	F 2	F 3	F 2	F 2	H 1	H 2	C 2	C 2	C 2	C 2	C 1	C 2	C 1	C 2	L 1	L 2	L 2	HL 11	L 1			F 2	F 2
23	F 2	FF 21	F 2	FF 21	F 2	LH 11		C 2	C 1	C 2	C 2	C 2	C 1	C 2	C 2	C 2	L 2	L 1	HL 12	L 3	F 3	F 1	F 2	FF 21
24	FF 11	F 5	F 3	F 1	F 1		H 1	H 2	C 2	C 3	CL 21	C 2	C 3	C 1	C 3	C 3	C 3	C 3	L 1	L 2	F 4	F 4	F 2	F 5
25	F 6	F 5	F 3	F 2	F 2	H 1	HL 12	H 1	C 3	C 2	C 2	C 3	HC 22	C 2	C 2	C 1	C 2	L 2	L 2	L 3	F 3	F 3	F 2	F 3
26	F 2	F 3	F 3	F 3			C 1	C 1	L 2	L 2	L 2	L 2	C 1	C 1	C 1	C 1	C 2	L 3	L 5	L 4				
27	F 2	F 3	FF 23	F 2	F 1	L 2	L 2	L 2	C 3	C 2	C 2	C 2	C 1	C 2	L 3	L 2	L 2	L 3	L 3	L 5	FF 47	H 5	F 5	F 5
28	FF 15	F 5	F 4	F 2	F 2	L 4	H 1	C 3	C 2	C 2	C 2	C 2	C 2	C 2	C 2	H 2		H 1	F 1	L 2	F 2	F 5	F 2	F 5
29	F 4	F 4	F 2	F 3	F 2	HL 11	HL 31	H 3	C 3	C 3	C 1	C 2	C 3	C 2	C 1	C 2	C 3	C 3	C 3	L 4	F 5	F 5	FF 15	F 5
30	F 4	F 2	F 2	F 3	F 3	L 1	H 2	H 2	C 3	C 2	C 3	L 3	C 1	C 1	C 2	C 2	H 2	C 2	C 3	L 3	F 3	F 4	FF 25	FF 35
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																								

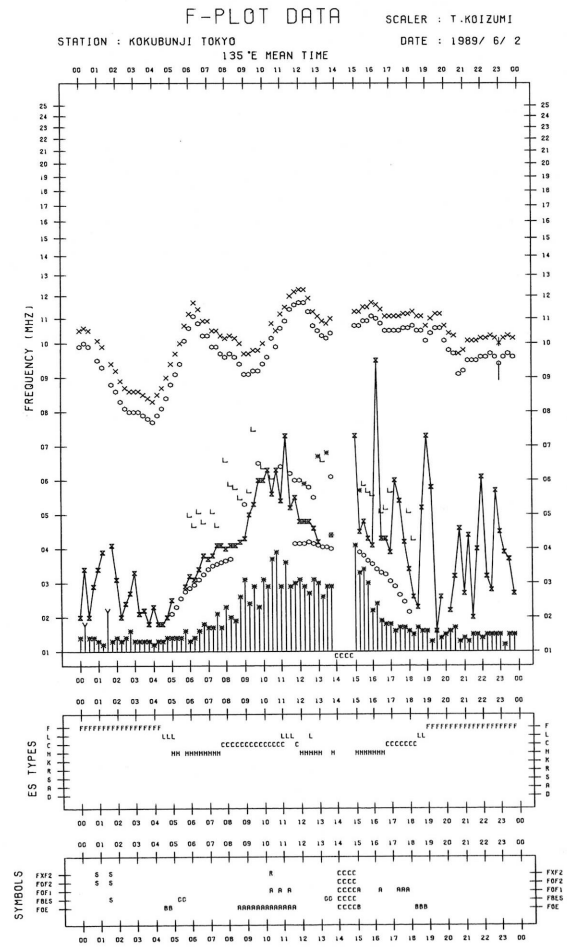
JUN. 1989 | TYPES OF ES

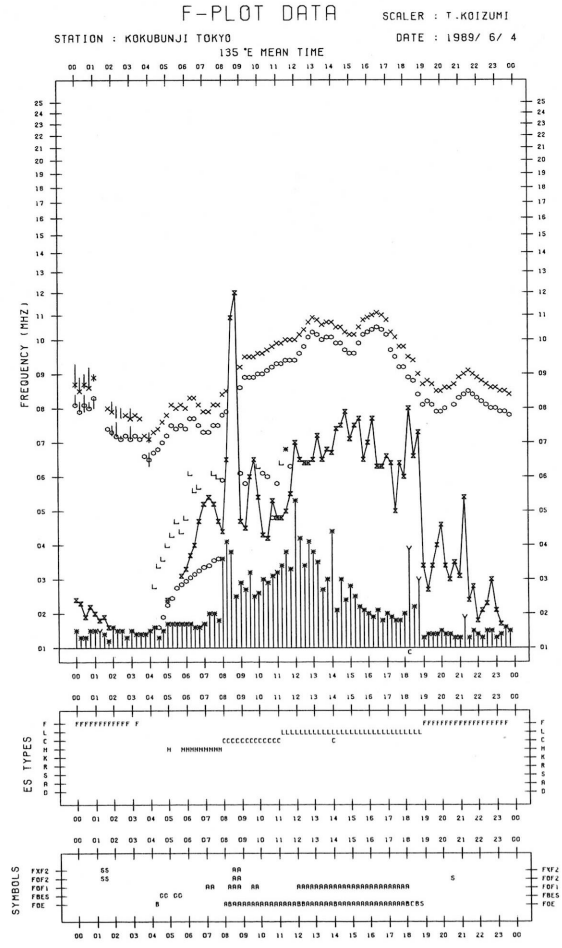
f-PLOTS OF IONOSPHERIC DATA

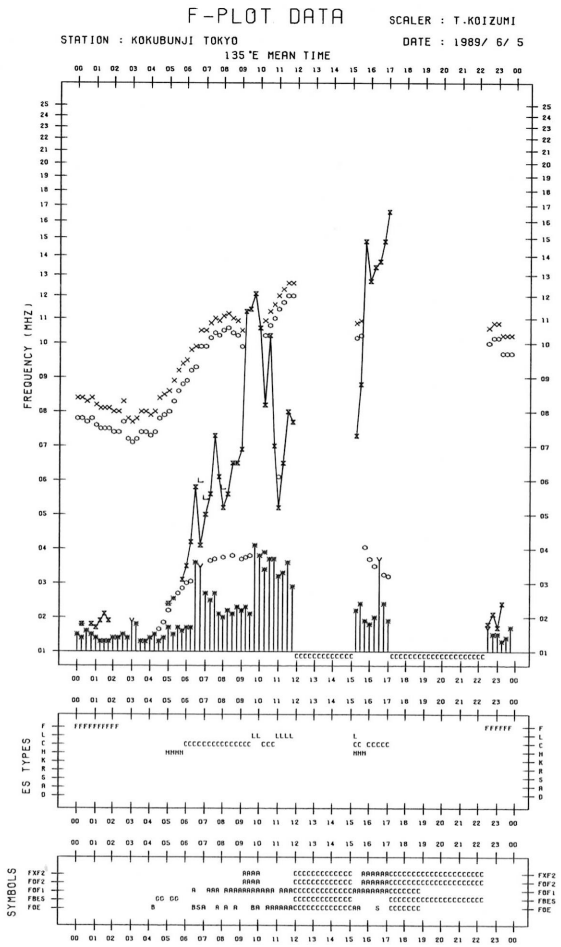
KEY OF F-PLOT	
!	SPREAD
⬡	FOF2,FOF1,FOE
×	FXF2
✳	DOUBTFUL FOF2,FOF1,FOE
⧖	FBES
⌊	ESTIMATED FOF1
↑,↓	FMIN
∧	GREATER THAN
∨	LESS THAN

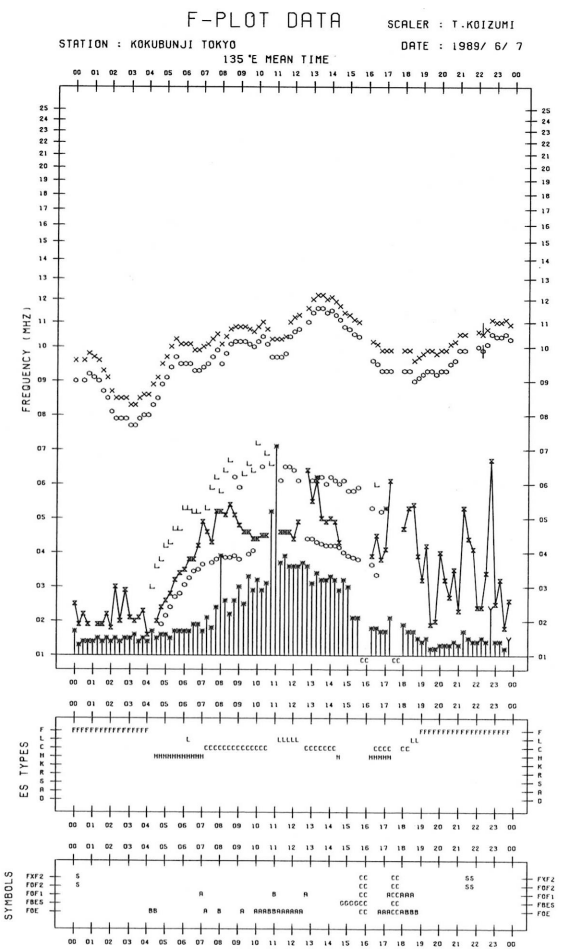

F-PLOT DATA
SCALER :
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 6/ 1
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

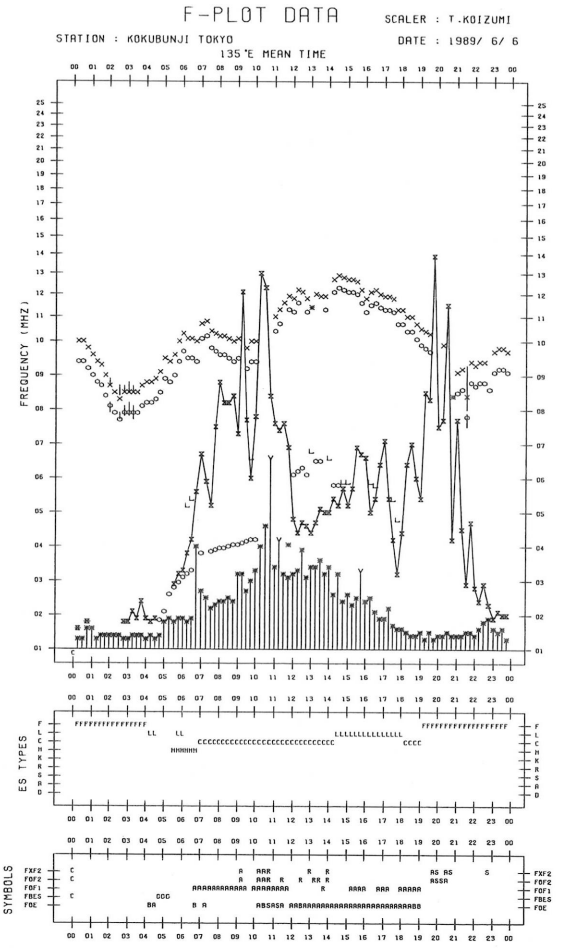

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 6/ 3
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

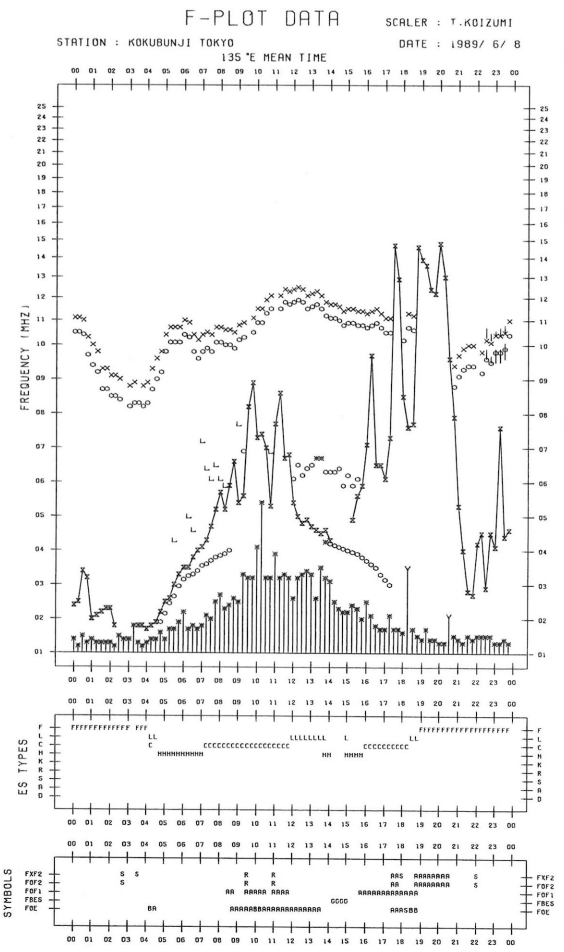

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 6/ 2
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

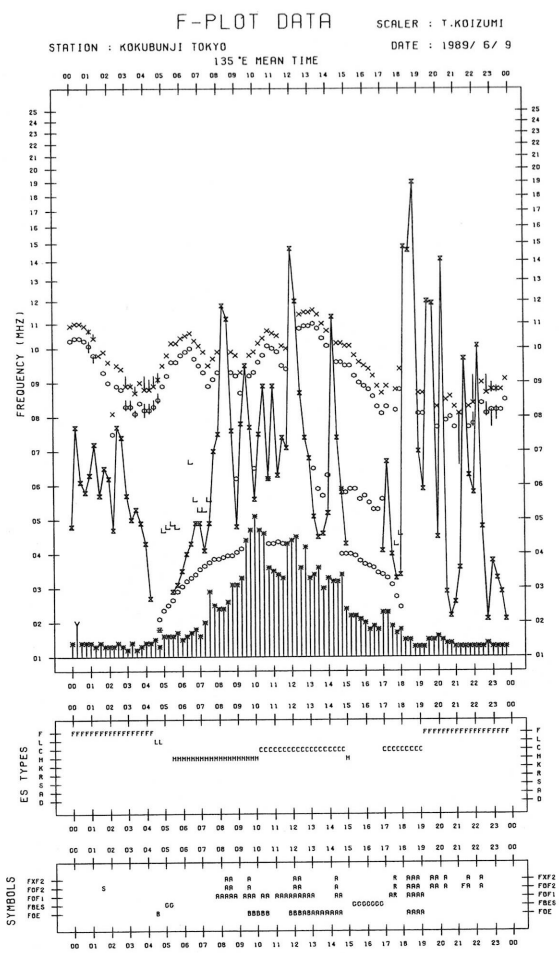

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 6/ 4
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

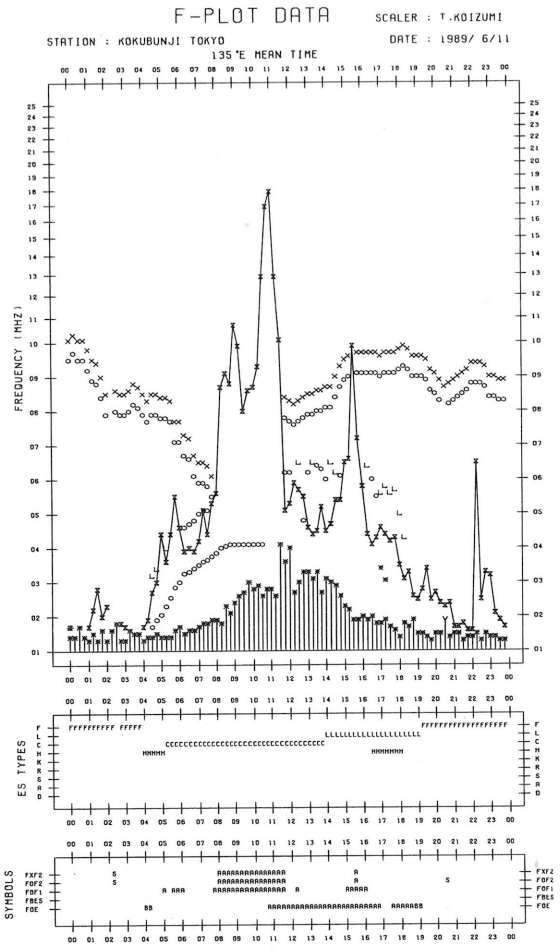

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 6/ 5
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

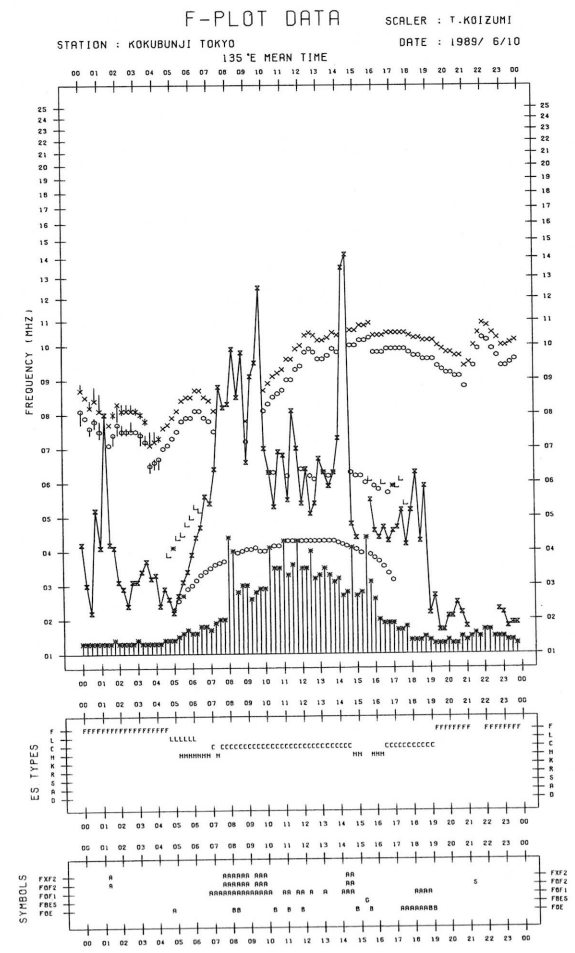

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 6/ 7
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

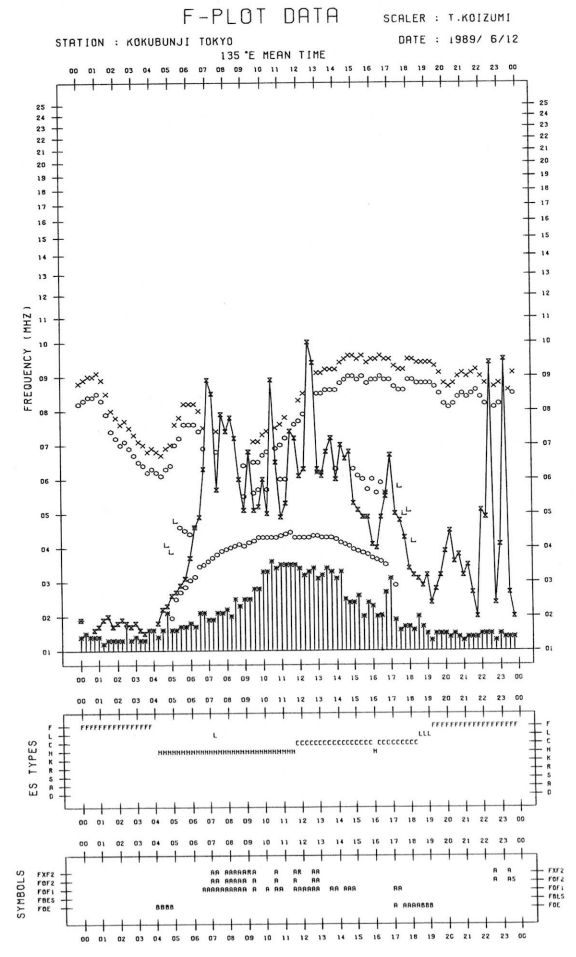

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 6/ 6
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

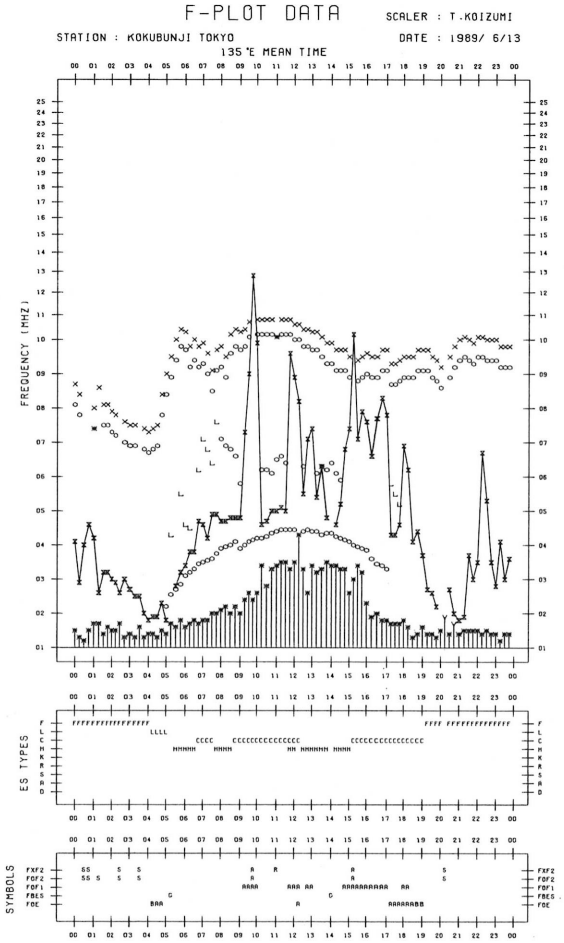

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 6/ 8
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

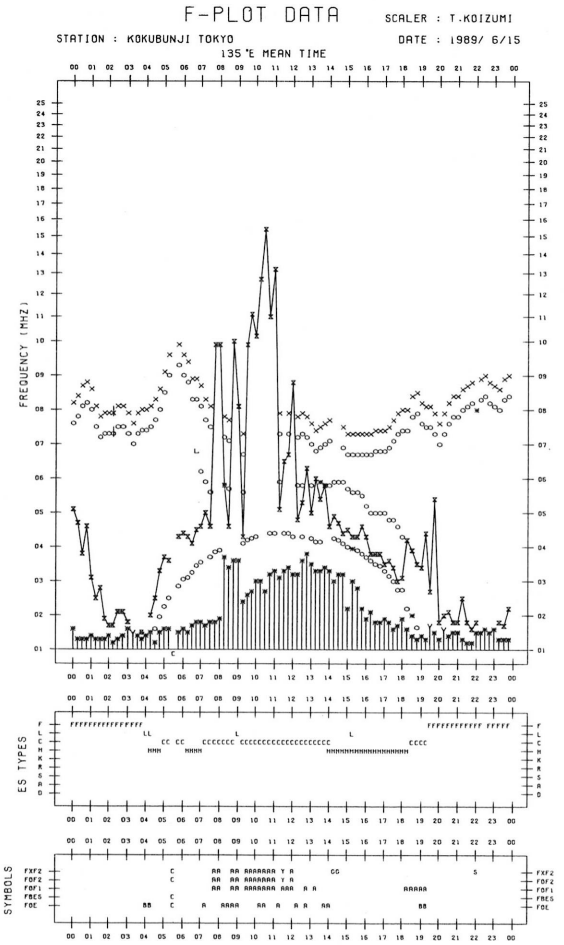

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 6/ 9
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FDE

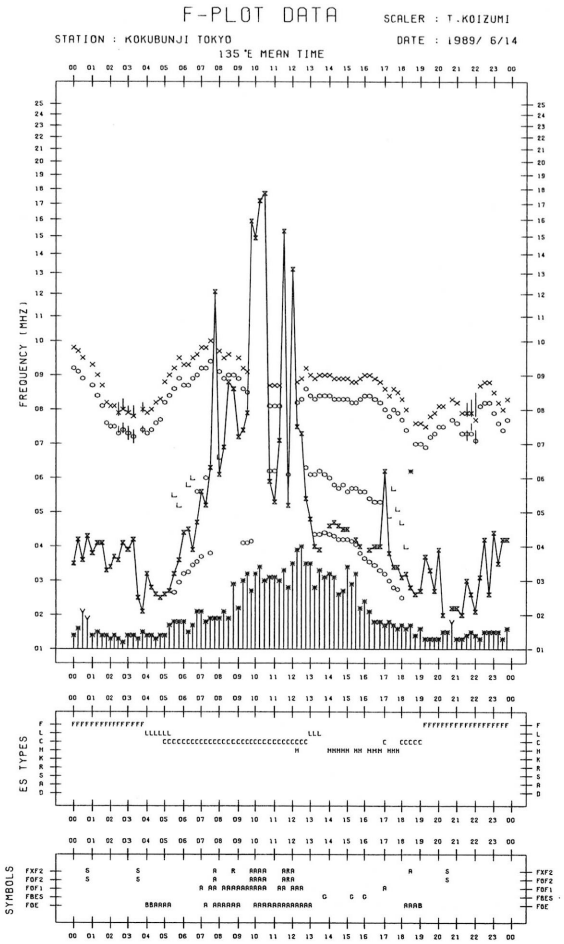

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 6/11
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FDE

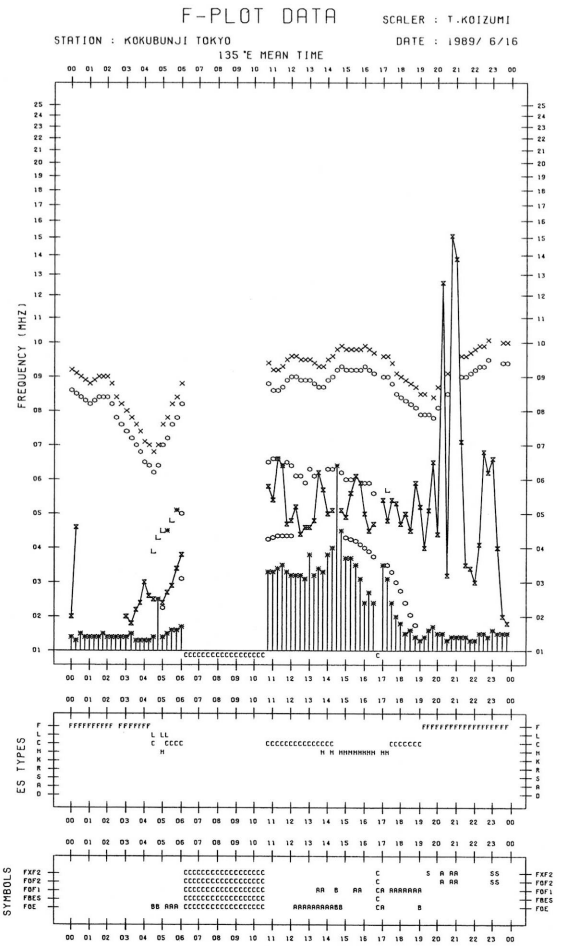

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 6/10
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FDE

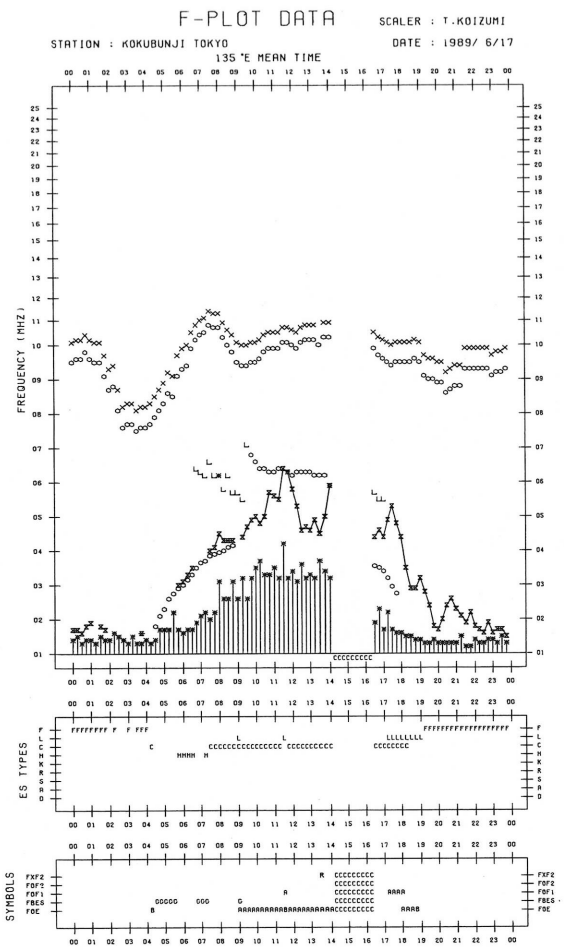

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 6/12
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FDE

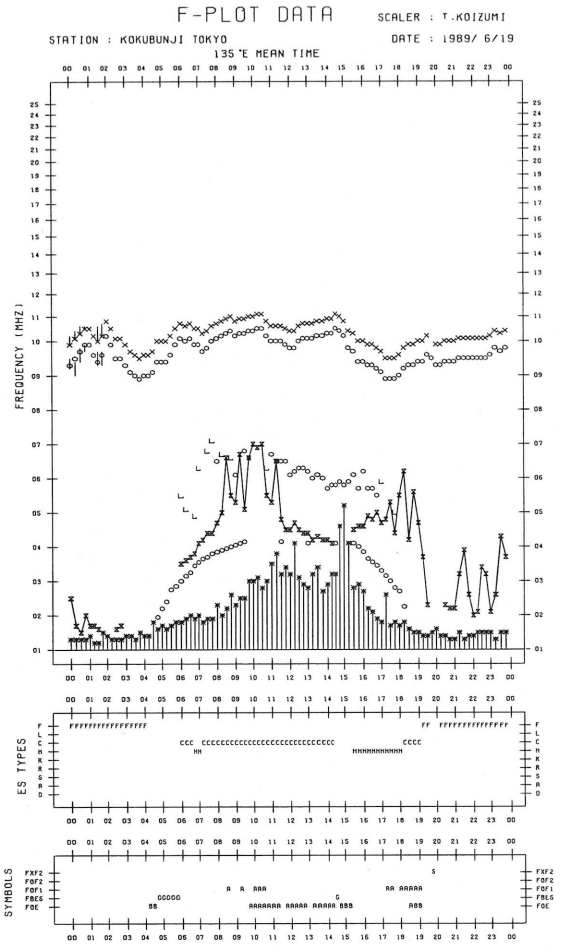

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 6/13
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

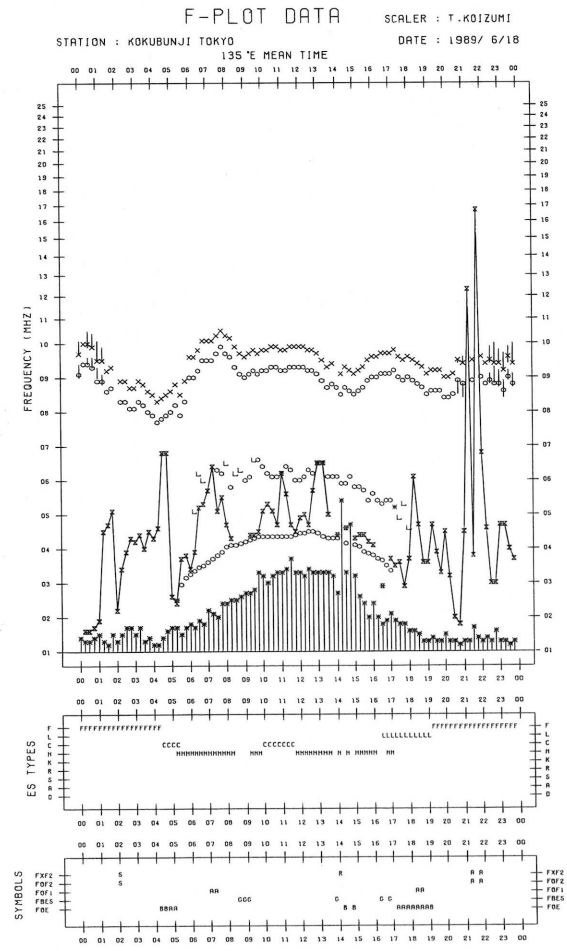

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 6/15
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

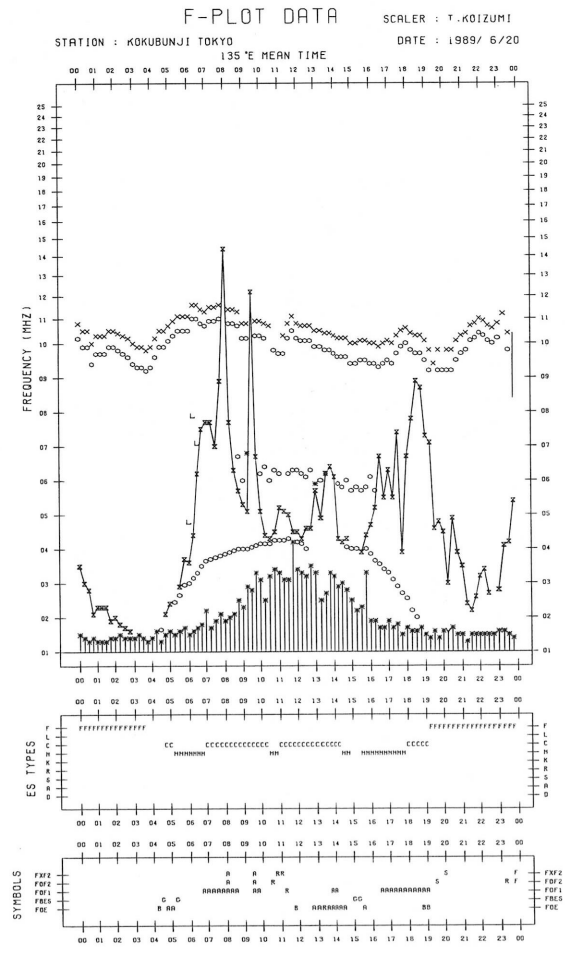

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 6/14
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

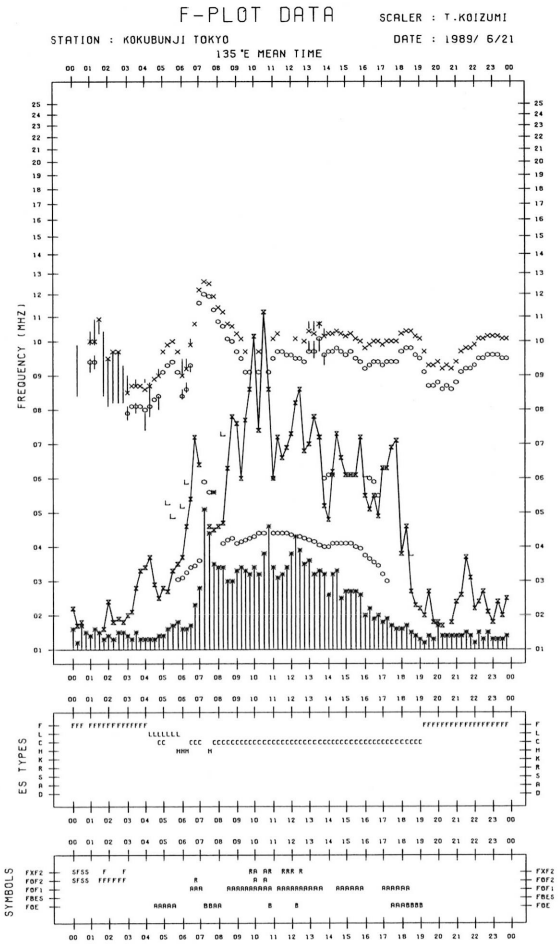

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 6/16
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

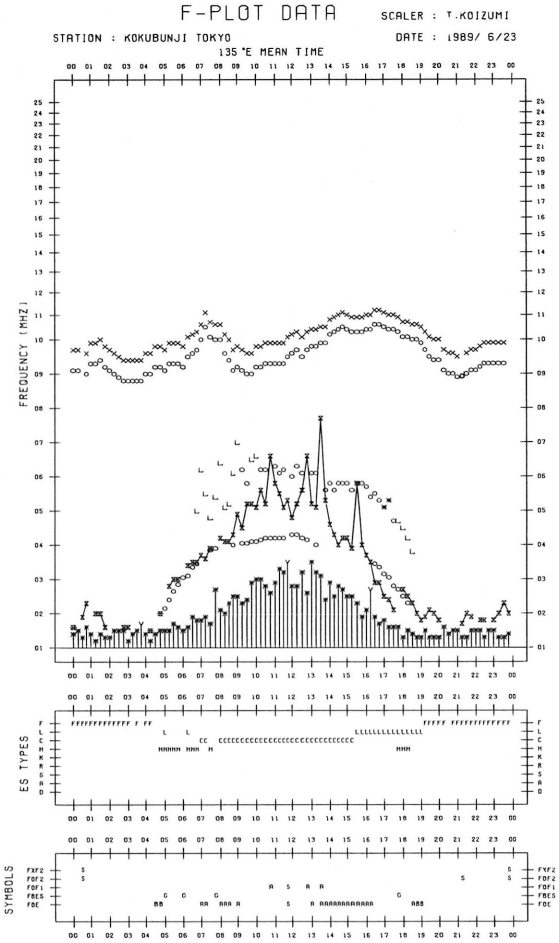

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 6/17
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

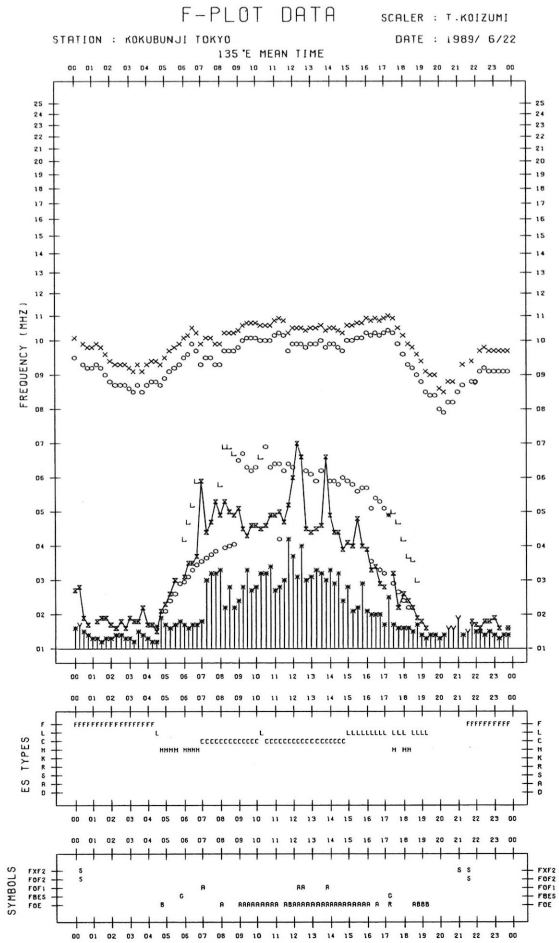

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 6/19
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

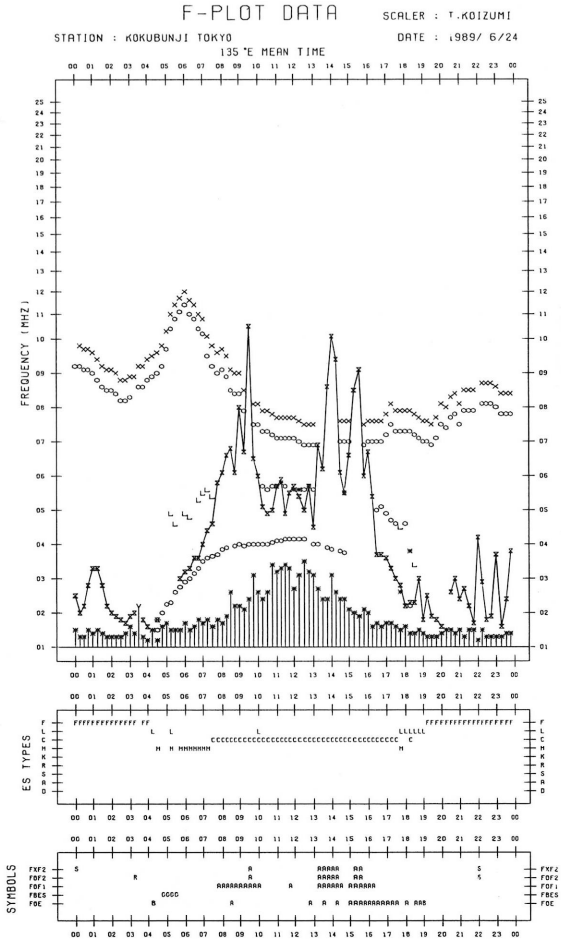

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 6/18
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

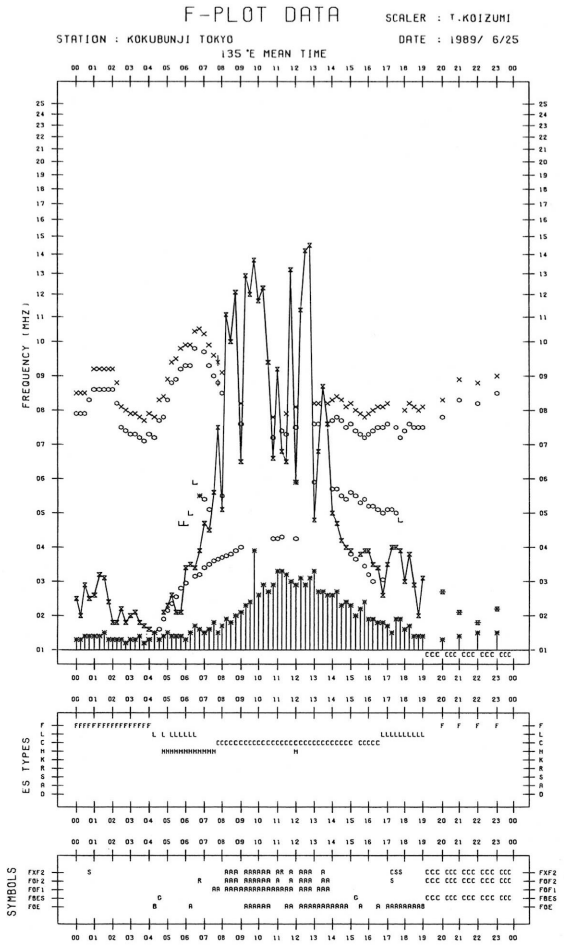

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 6/20
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

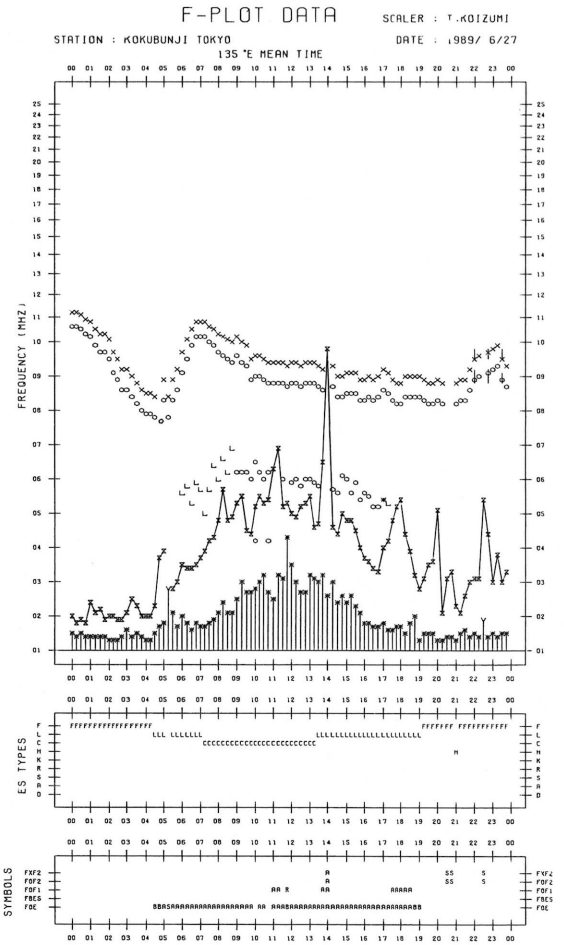

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 6/21
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

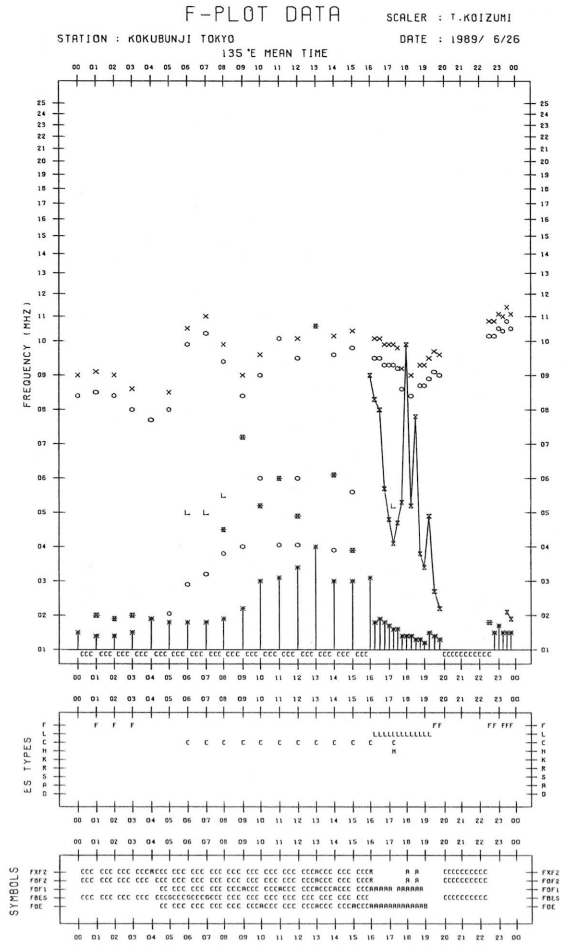

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 6/23
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

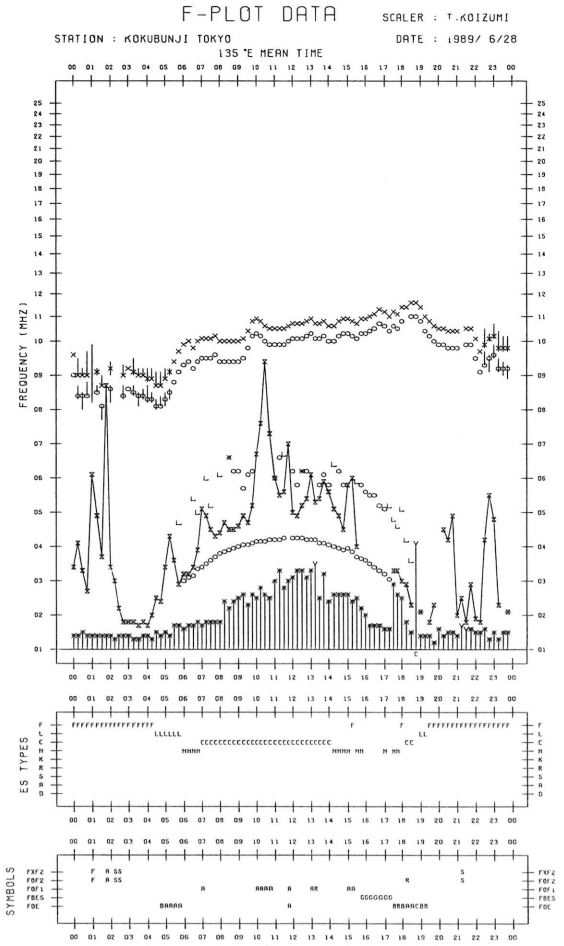

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 6/22
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

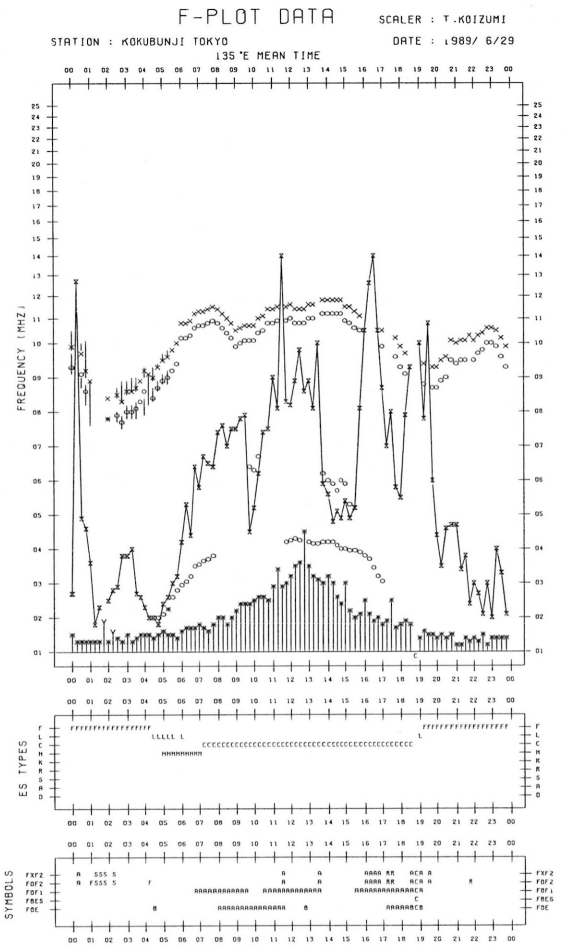

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 6/24
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

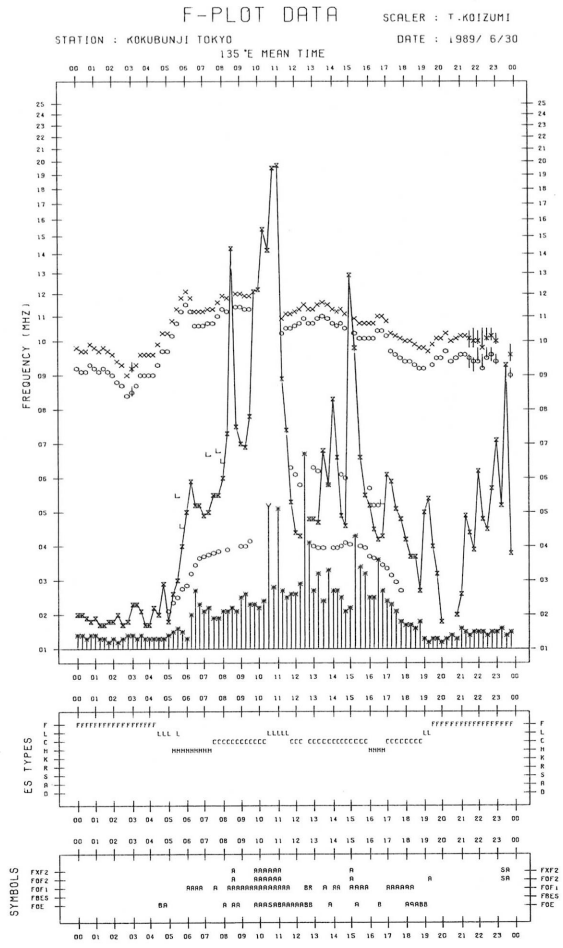

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 6/25
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 6/27
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 6/26
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 6/28
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 6/29
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 6/30
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

B.Solar Radio Emission

B1.Daily Data at Hiraiso

200 MHz

Hiraiso June 1989

Single-frequency total flux observations at 200 MHz

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

Note: No observations during the following periods.

none.

B.Solar Radio Emission

B1.Daily Data at Hiraiso

500 MHz

Hiraiso June 1989

Single-frequency total flux observations at 500 MHz					
FLUX DENSITY: 10^{-22}Wm^{-2}Hz^{-1}					
UT	00-03	03-06	06-09	21-24	DAY
DATE					
1	49	49	48	49	49
2	51	50	49	52	49
3	51	51	51	(52)	51
4	52	52	50	53	51
5	53	52	51	55	52
6	55	54	54	57	55
7	56	56	55	60	56
8	62	59	59	62	60
9	69	66	62	61	65
10	61	62	61	68	61
11	75	68	72	63	71
12	65	71	76	(73)	69
13	78	81	68	72	75
14	74	74	69	B	72
15	B	68	66	B	B
16	B	B	B	B	B
17	73	73	65	64	73
18	66	68	65	-	66
19	62	59	64	61	62
20	63	65	61	58	62
21	56	56	56	52	57
22	52	52	52	50	52
23	52	52	49	51	51
24	51	51	49	52	51
25	52	51	49	51	51
26	52	52	51	56	52
27	56	53	49	-	54
28	51	51	49	54	50
29	55	56	52	-	54
30	54	53	51	52	53

Note: No observations during the following periods:

3rd 2100 - 4th 0022 18th 1925 - 2335
27th 1925 - 2343 29th 1925 - 2335

B. Solar Radio Emission

B2. Outstanding Occurrences at Hiraiso

Hiraiso June 1989

Single-frequency observations

Normal observing period: 1925 - 0955 U.T. (sunrise to sunset)

JUN	FREQ.	TYPE	START TIME	TIME OF MAXIMUM	DUR.	FLUX DENSITY ($10^{-22}Wm^{-2}Hz^{-1}$)		POLARIZATION	REMARKS
1989	(MHz)		(U.T.)	(U.T.)	(MIN.)	PEAK	MEAN		
1	200	44 NS	1930E	2117	130D	6	2		WR
	200	46 C	2012.4	2014.5	4.6	235	-		0
	200	42 SER	2050.8	2130.8	42	295	-		0
2	500	42 SER	0417.5	0445.6	31.5	150	-		0
	200	42 SER	0417.8	0437.4	31.0	550	-		0
	100	41 F	0438.9	0445.5	7.9	1000D	-		-
	100	42 SER	0603.1	-	11.7	1000D	-		-
	200	42 SER	0603.2	0603.4	17.8	390	-		0
	100	42 SER	0711.5	0713.3	12.0	920	-		-
	500	46 C	0711.5	0713.8	3.5	60	-		0
	200	42 SER	0711.6	0714.5	16.5	620	-		WL
	200	41 F	0839.6	0856.1	19.8	380	-		WL
	100	42 SER	0840.3	0856.8	31.7	570	-		-
	200	41 F	2038	2118.1	61	130	-		ML
	100	41 F	2116.8	2118.3	3.2	365	-		-
3	200	46 C	0129.6	0130.0	1.3	688	-		0
	200	42 SER	0307.6	0310.3	27.7	3000	-		0
	500	46 C	0308.5	0312.9	12.5	550	60		ML
				0316.8		140			ML
	100	42 SER	0308.8	-	13.9	1000D	-		-
	200	42 SER	0707.3	0724.4	18.5	136	-		0
	200	42 SER	0856.2	0901.3	9.2	105	-		0
	200	43 NS	2128	0331	300	19	7		WL
	100	46 C	2304.6	2308.6	7.9	885	140		-
4	500	46 C	0210.8	0215.0	10.5	148	45		ML
				0218.7		87			ML
	200	46 C	0210.9	0213.7	22.4	195	23		WL
	100	46 C	0212.3	0214.5	9.2	1000D	-		-
	500	46 C	0741.5	0745.1	9.0	100	8		WR
				0749.0		12			0
	200	46 C	0743.6	0748.6	11.9	540	-		0
5	200	46 C	0742.9	0743.6	1.1	290	-		0
	100	46 C	0743.6	0744.0	1.3	740	-		-
	500	46 C	0744.0	0744.1	1.2	158	-		WL
	500	46 C	2341.3	2342.5	2.0	55	-		WL
6	200	42 SER	0609.1	0611.9	5.3	40	-		0
	500	21 GRF	2105.0	2138.0	95	14	4		WR
7	200	46 C	0037.6	0038.3	3.8	245	-		0
	100	46 C	0037.6	0042.9	10.6	294	-		-
	500	4 S/F	0649.1	0651.0	3.0	9	-		0
	200	27 RF	2200	2313	165	40	10		WR
	500	41 F	2220	2220.5	2.5	31	-		0
	500	21 GRF	2224	2246.0	163	8	4		0
8	500	42 SER	0807.6	0807.8	7.5	72	-		0
	500	46 C	0919.8	0920.5	1.4	47	-		0
	200	44 NS	1925E	-	860D	-	21		-
9	500	46 C	0002.5	0023.4	72.5	85	24		WL
				0106.3		45			ML
	200	46 C	0007.9	0106.0	76	90	47		ML
				0041.6		84			ML
	100	27 RF	0016.5	0100	105D	270	-		-
	100	46 C	0106.5	0106.6	1.5	460	-		-
	100	41 F	0231	0310	76	1000D	-		-
	200	41 F	0313.2	0317.8	51	65	-		ML
	500	42 SER	0315.0	0325.0	43	305	-		SL
	200	41 F	0623	0650.8	28	100	-		WL
	500	46 C	0756.3	0801.0	13.0	87	-		0
	500	42 SER	2245.5	2254.8	15.0	43	-		0
10	200	46 C	0622.6	0623.1	1.6	595	-		0
	200	46 C	0752.8	0753.4	1.3	615	-		0
	100	44 NS	1925E	2000	860D	300U	130		- SUNRISE
	200	44 NS	1925E	-	860D	-	44		-
11	200	24 R	0450	0836	300D	165	75		MR
	200	44 NS	1925E	0826	860D	90	23		WR
	200	46 C	2156.8	2156.8	2.2	95	-		0
	100	45 C	2156.8	2157.7	3.0	1000	-		-
	500	46 C	2157.0	2157.6	3.0	118	-		ML
12	100	44 NS	1925E	2036	860D	80	15		-
	200	44 NS	1925E	0328	860D	230	129		MR
13	200	44 NS	1925E	2029	860D	170	32		SR
	500	46 C	2345.0	2350.0	5.5	326	-		0
14	500	42 SER	0239.0	0239.0	42.5	205	-		WR
	200	8 S	0254.0	0254.8	0.8	1520	-		0
	500	46 C	0834.5	0838.0	6.0	292	-		WL
	200	44 NS	1925E	0055	860D	120	41		MR
	500	20 GRF	2110	2300	300	24	9		WR
	200	46 C	2312.1	2312.5	1.4	1830	-		0
	100	46 C	2312.5	2312.5	1.5	980	-		-
15	100	27 RF	1925E	2022U	336D	1000D	560D		-
	500	27 RF	1925E	2025	455D	595	174		SL
	200	27 RF	1925E	2035	235D	650	290		ML
	200	44 NS	2320E	-	620D	-	129		-
16	100	44 NS	0100E	-	525D	-	150		-
	100	41 F	0321.8	-	4.6	1000D	-		-
	200	46 C	0448.7	0449.6	1.5	620	-		0

JUN 1989	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
16	100	46 C	0448.8	-	2.2	1000D	-	-
	200	8 S	0643.8	0643.8	0.4	1250	-	0
	500	41 F	0740.0	0741.0	3.0	1350	-	WL
	500	27 RF	0746.0	0755.9	58	53	18	ML
	200	44 NS	1925E	2122	860D	140	46	WL
	100	44 NS	1925E	2200	290D	90	40	-
	200	42 SER	2357	0154	178	320	-	SL
17	200	46 C	0617.6	0617.8	1.5	435	-	SL
	200	44 NS	1925E	0237	860D	90	46	MR
	500	46 C	2256.5	2257.7	2.3	370	-	WR
18	500	27 RF	0430	0449	83	10	5	WL
	200	44 NS	1925E	2300	610D	74	28	MR
	500	46 C	2342.5	2344.5	6.5	9	-	0
	200	46 C	2347.3	2347.9	2.1	125	-	WL
19	500	46 C	0136.2	0139.5	5.7	260	-	0
	500	46 C	0527.5	0542.3	74	92	-	ML
	200	24 R	0532	0609	250D	270	90	MR
	100	43 NS	0536	0717	246D	380	110	-
	100	46 C	0606.6	0607.6U	2.5	1000D	-	-
	500	42 SER	0735.9	0736.2	1.8	200	-	0
	100	46 C	0744.9	-	1.5	1000D	-	-
	500	46 C	0745.0	0745.5	9.0	120	-	0
	200	46 C	0747.4	0749.5	4.0	440	-	WR
	200	44 NS	1925E	0019	860D	37	20	MR
	500	42 SER	2153.0	2153.5	2.7	170	-	0
	500	27 RF	2312	2336.5	40	6	3	WL
	500	41 F	2338.8	2339.5	2.0	143	-	WL
	100	46 C	2338.9	2339.7	1.8	630	-	-
20	200	8 S	0242.0	0242.1	0.9	175	-	SR
	500	45 C	2017.8	2019.3	3.5	13	-	WR
	500	46 C	2147.0	2200	54	33	-	WL
	200	27 RF	2156	2209.2	178	48	5	0
	100	27 RF	2206.9	2222	65	80	17	-
21	100	46 C	0135.6	0138.8	4.4	970	-	-
	200	41 F	0137.0	0138.9	2.8	385	-	0
	100	42 SER	0434.0	0440.3	50	1000	-	-
	200	42 SER	0438.3	0439.2	31	140	-	0
	500	41 F	0447.3	0448.0	2.5	18	-	WR
	200	8 S	2238.7	2238.9	0.7	65	-	0
22	200	46 C	0911.0	0911.9	7.9	180	-	0
	500	8 S	0914.0	0914.1	0.5	55	-	0
	200	46 C	2055.6	2056.4	1.4	94	-	0
	100	46 C	2055.8	2057.0	2.3	450	-	-
	100	42 SER	2307.1	2307.6	36	690	-	-
	200	42 SER	2307.3	2307.3	86	1800	-	0
	200	43 NS	2300	0435.6	640D	29	10	MR
23	500	41 F	0010.5	0010.8	2.5	20	-	WR
	200	8 S	0202.3	0202.4	0.7	850	-	0
	100	43 NS	0307.3	0328	158	340	25	-
	200	45 C	0456.0	0456.2	1.5	205	-	0
23	500	46 C	0456.7	0456.8	2.7	150	-	MR
	200	46 C	0801.0	0801.3	1.8	400	-	0
	200	44 NS	1925E	0743	860D	38	14	MR
	200	42 SER	2055	2105.9	36.3	95	-	SR
	200	42 SER	2214	2356	187	920	-	0
	200	8 S	2341.1	2341.6	0.8	2300	-	0
	100	42 SER	2352.1	2356.8	6.0	1000D	-	-
	500	41 F	2355.2	2356.7	3.5	15	-	0
24	200	42 SER	0213.9	0214.7	7.9	1370	-	0
	100	41 F	0213.9	0227.3	53.5	1000D	-	-
	200	42 SER	0507.3	0614.2	71	295	-	0
	200	42 SER	0731.7	0731.8	25	300	-	0
	200	42 SER	0841.2	0855.0	38	435	-	MR
	200	44 NS	1925E	2030	860D	145	26	SR
	100	44 NS	1925E	0825	860D	130	34	-
	200	46 C	2113.2	2113.7	2.6	1200	-	WR
25	200	45 C	0834.8	0835.5	1.3	230	-	SR
	100	44 NS	1925E	2120	860D	270	132	-
	200	44 NS	1925E	0814	860D	120	35	SR
26	100	46 C	0320.2	0320.7U	1.3	1000D	-	-
	100	8 S	0526.5	0527.1	0.8	700	-	-
	200	44 NS	1925E	2100	860D	185	80	SR
	100	44 NS	1925E	0015	860D	610	120	-
27	200	44 NS	1925E	2120	600D	16	5	MR
	100	44 NS	1925E	2200	340D	90	14	-
	500	8 S	2347.6	2347.7	0.2	650	-	0
28	200	46 C	0220.5	0220.7	1.5	138	-	0
	500	42 SER	0220.8	0221.6	5.5	17	-	WL
	100	42 SER	0310.6	0344.2	40.3	940	-	-
	500	41 F	0519.5	0520.0	5.0	80	-	WR
	500	46 C	0640.3	0641.0	1.2	850	-	0
	200	46 C	0918.5	0919.5	2.2	265	-	0
	100	46 C	0918.5	0919.8	2.6	850	-	-
29	500	42 SER	0207.0	0207.0	9.5	240	-	0
	500	46 C	0249.0	0305.3	80	34	11	WL
				0311.7		29		WL
	200	46 C	0251.5	0348.3	76.6	98	17	MR
				0313.2		63		0
	200	27 RF	0417.8	0435.0	52.8	37	11	0
	200	44 NS	1925E	2017	96D	7	3	WR
	200	46 C	2103.3	2108.6	83	240	18	0
				2127.5		25		0
				2152.1		20		0
	100	46 C	2105.9	-	33.7	1000D	-	-
30	200	41 F	0136.3	0137.0	50.8	84	-	WR
	500	41 F	0626.5	0642.3	35	16	-	0
	200	42 SER	0649.5	0730.4	70.6	23	-	0
	500	46 C	0705.0	0720.5	46.5	17	-	0
				0742.0		11		0
	500	41 F	0806.0	0808.5	3.0	2400	-	0

C. RADIO PROPAGATION

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

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

MEASURED AT HIRAISO

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

	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
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	29	29	29	29	29	29	29
MED	ES -22	ES -15	ES -24	ES -15	US -10	-4	4	6	6	1	US -3	US -4	12	10	6	2	1	-4	US -12	US -6	-15	US -15	ES -15	ES -23
UD	-1	-5	ES -3	-2	0	9	12	12	17	18	15	18	24	18	18	17	9	6	3	6	3	0	-3	-1
LD	ES -25	ES -25	ES -25	ES -25	ES -25	EU -24	ES -24	ES -24	ES -24	ES -24	ES -25	ES -24	ES -15	-6	ES -6	-9	ES -24	ES -24	ES -25	ES -26	ES -25	ES -25	ES -25	ES -26

C. RADIO PROPAGATION

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

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

MEASURED AT HIRAISO

UT DAY	00H 45M	01H 45M	02H 45M	03H 45M	04H 45M	05H 45M	06H 45M	07H 45M	08H 45M	09H 45M	10H 45M	11H 45M	12H 45M	13H 45M	14H 45M	15H 45M	16H 45M	17H 45M	18H 45M	19H 45M	20H 45M	21H 45M	22H 45M	23H 45M
1	-2	-6	0	5	10	21	19	23	24	25	27	18	28	23	25	21	24	18	12	14	6	-1	-4	-1
2	-8	-5	0	1	6	3	19	22	25	26	28	25	25	24	22	21	25	23	18	11	2	-5	ES -23	ES -23
3	-5	-1	4	10	18	20	20	25	30	27	26	29	28	32	30	24	25	24	-4	12	5	-2	-5	0
4	-1	1	-15	-5	9	17	26	21	19	22	26	23	25	24	28	17	18	16	13	8	4	-9	-2	ES -24
5	-6	-6	-2	3	10	19	22	21	20	23	24	24	18	19	16	12	24	14	6	8	-1	ES -25	-12	-13
6	-8	ES -25	-7	3	6	14	13	20	22	24	23	16	21	18	21	18	20	14	10	11	-1	-3	-12	-6
7	-11	ES -25	-5	-2	3	12	13	14	19	22	24	16	18	28	19	23	11	10	6	-2	-8	-2	-7	-2
8	-5	-3	-2	-2	8	15	16	17	18	21	18	22	17	17	17	19	16	9	9	11	2	-3	ES -25	-8
9	ES -14	ES -14	-8	-4	-1	11	16	15	21	21	15	16	20	15	18	21	16	0	-2	4	-8	-12	-18	-18
10	-13	-17	-13	-6	0	10	10	15	17	28	24	21	21	25	21	21	22	13	15	6	-7	ES -24	ES -24	ES -24
11	ES -24	ES -24	-5	0	2	17	17	14	24	23	26	26	19	26	26	22	16	20	-3	-4	-4	ES -24	ES -24	ES -24
12	ES -24	-5	-3	5	9	11	14	17	22	22	27	23	21	17	15	20	16	12	5	12	9	3	0	8
13	-1	-1	-16	-6	-3	8	13	16	21	23	14	24	22	22	23	16	11	20	18	12	0	-7	-4	-10
14	-5	ES -25	-1	-3	1	16	13	15	17	13	17	24	15	16	18	-6	9	13	0	14	0	3	-8	ES -25
15	ES -25	ES -25	-10	-12	5	5	10	16	24	20	18	16	29	28	20	19	24	11	5	-8	-12	-7	-13	-11
16	-7	-12	-9	-2	3	-4	11	8	20	16	17	15	13	18	18	14	22	30	-4	-7	-3	-1	-6	-12
17	-11	-11	-2	-2	4	19	18	21	22	21	29	24	26	20	20	16	21	19	15	8	4	-1	0	-2
18	-12	-5	3	-2	0	11	16	17	20	20	21	20	20	20	21	20	20	20	10	0	1	-2	-11	-12
19	-9	-2	-7	-3	5	-2	17	16	20	19	20	20	21	20	20	21	21	14	8	12	8	0	0	-9
20	-9	-3	-9	2	12	14	20	22	27	22	26	20	24	21	17	24	C	C	C	C	C	C	C	C
21	ES -24	ES -24	-7	-1	4	4	22	23	24	22	25	21	24	26	24	22	17	24	15	12	2	2	-6	-7
22	-5	-7	5	2	7	15	17	25	27	21	22	26	25	23	25	24	21	27	18	14	6	-1	-2	-9
23	2	-4	-1	2	11	14	19	26	28	22	24	22	28	27	17	16	1	23	0	10	7	18	-2	-1
24	0	-15	-6	-4	7	15	17	19	23	26	26	24	25	20	21	21	19	24	13	16	17	12	ES -6	-3
25	-3	-6	-3	2	9	13	17	17	23	25	21	24	36	34	32	34	39	39	32	27	19	13	17	16
26	-6	-3	1	-6	4	11	19	23	26	26	25	30	24	24	26	18	23	28	15	15	3	2	-5	-5
27	-15	-6	-3	4	2	9	16	19	23	26	26	19	19	21	20	21	20	21	7	4	3	-3	-1	-9
28	-6	-5	-6	-1	2	13	19	23	23	26	26	25	27	25	26	32	22	18	7	7	4	0	1	-5
29	-3	-12	-3	-2	8	12	19	24	26	26	24	25	22	24	22	18	24	22	-3	4	11	-15	-4	1
30	4	1	-5	9	5	16	16	17	21	23	26	28	24	27	21	19	20	11	20	-2	0	-3	-1	-9
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	29	29	29	29	29	29	29
MED	-6	-6	-4	-2	5	13	17	19	22	22	24	23	23	23	21	20	20	19	9	10	2	-2	-5	-9
UD	0	-1	3	5	11	19	22	25	27	26	27	28	28	28	28	24	25	28	18	15	11	12	0	1
LD	ES -24	ES -25	-13	-6	0	3	11	14	18	19	17	16	17	17	17	14	11	10	-3	-4	-8	ES -24	ES -24	ES -24

C. Radio Propagation

c2. Radio Propagation Quality Figures at Hiraiso

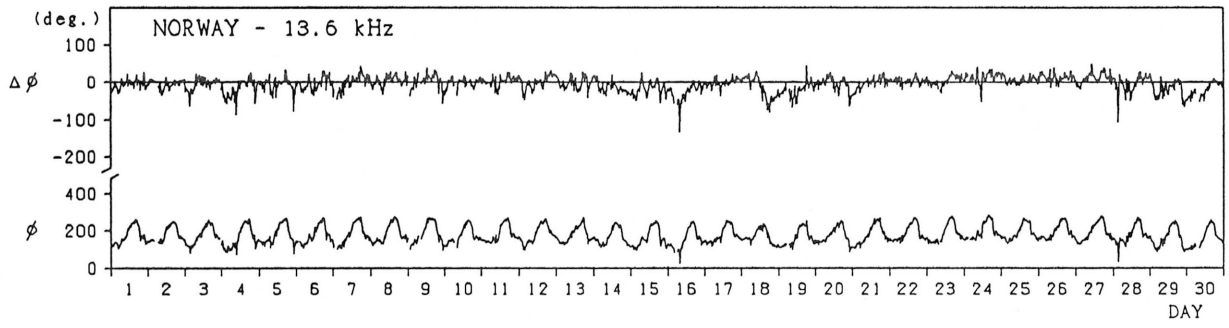
Hiraiso — Time in U.T

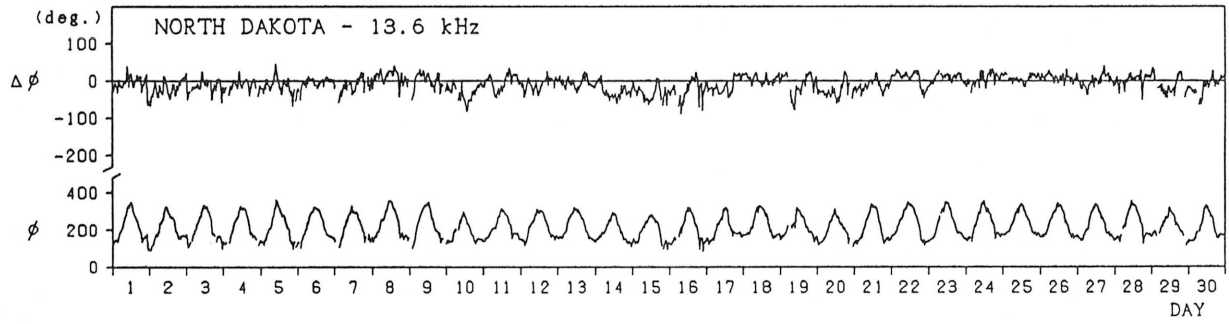
Jun.	Whole Day	W W V				W W V H				Conditions				Principal Geomagnetic Storms		
		00 06 12 18				00 06 12 18				00 06 12 18						
		| | | |				| | | |				| | | |						
1989	Figure	06 12 18 24				06 12 18 24				06 12 18 24				Start	End	Range
1	4o	5U	4	4	4U	4	4	4	4	N	N	N	N			
2	4o	5U	4	4	3U	4	4	4	4	N	N	N	N			
3	4+	5U	4	5	5	5	4	4	4	N	N	N	N			
4	4o	4U	3	5	5	4	4	4	4	N	N	N	N			
5	4o	5U	4	4	4U	4	4	3	4	N	N	N	N			
6	4o	4U	3	4	4U	4	4	4	4	N	N	N	N	2314	---	99
7	4-	4U	3	3	3U	4	4	4	4	N	U	U	U	---	14.0	
8	4o	4U	4	4	4U	4	4	4	4	N	N	N	N	1953	---	173
9	3+	4U	2	2	4U	4	4	3	3	N	N	N	N	---	---	
10	3o	3U	2U	2U	3U	3	4	4	3	U	U	U	U	---	---	
11	3-	2U	2U	2U	3U	3	4	4	2	U	N	N	N	---	15.0	
12	4o	4U	4	4	4U	4	4	5	4	N	N	N	N			
13	4o	3U	4	4	5U	4	4	4	4	N	N	N	N	1742	---	83
14	3+	4U	3	3	3U	4	3	3	3	N	N	N	N	---	---	
15	3o	2U	2U	3	3U	3	4	4	3	U	U	U	U	---	21.0	
16	3o	3U	3	3	4U	3	2	4	3	U	U	U	U			
17	4-	4U	4	4	4	4	2	4	4	N	N	N	N			
18	4-	4U	4	4	3U	4	2	4	4	N	N	N	N			
19	4o	4U	5	4	4	4	4	4	4	N	N	N	N			
20	4-	5U	4	2U	C	4	4	4	C	N	N	N	N			
21	4o	4U	4	4	4	3	4	4	4	N	N	N	N			
22	4+	5U	5	5	5	4	4	4	4	N	N	N	N			
23	4+	5U	4	4	5	4	4	4	4	N	N	N	N			
24	4o	4U	4	4	4	4	4	4	5	N	N	N	N			
25	4+	4U	4	5	5	4	4	5	5	N	N	N	N			
26	4o	4U	5	4	4	4	4	4	4	N	N	N	N			
27	4o	3U	4	4	4U	4	4	4	4	N	N	N	N			
28	4+	5U	5	5	4U	4	4	4	4	N	N	N	N			
29	4o	3U	4	4	4U	4	4	4	4	N	N	N	N			
30	4o	4U	4	4	3U	4	4	4	4	N	N	N	N			

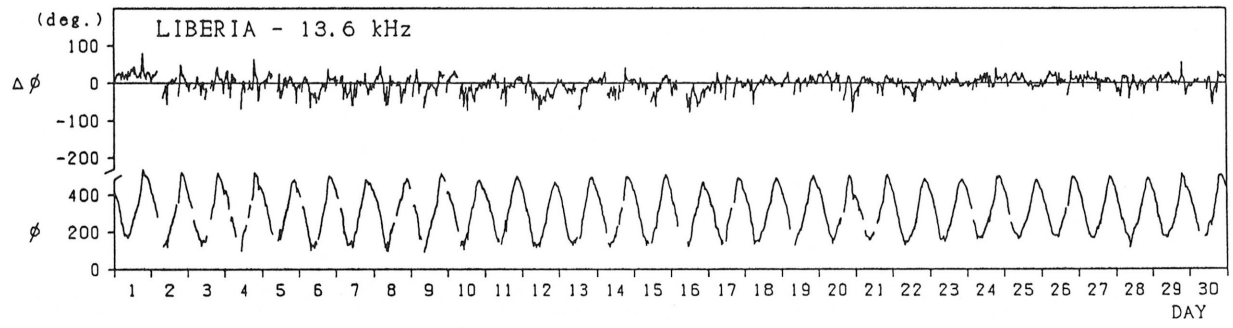
C. Radio Propagation

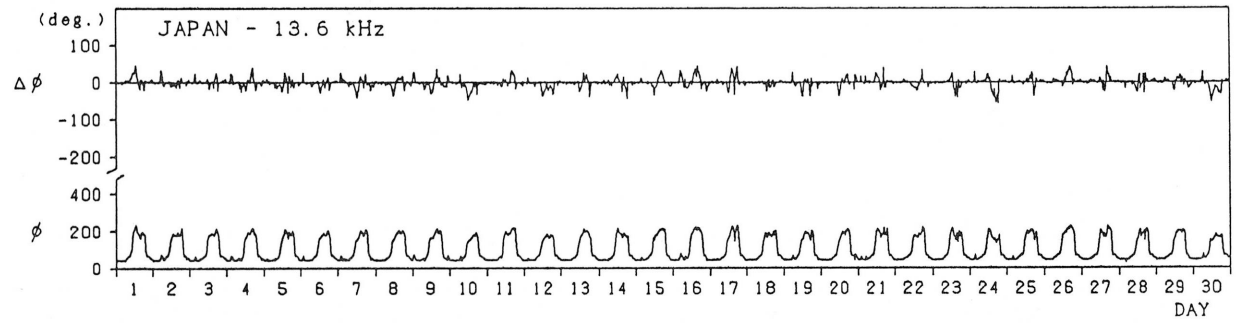
C3. Phase Variations in OMEGA Radio Waves at Inubo

Inubo June 1989

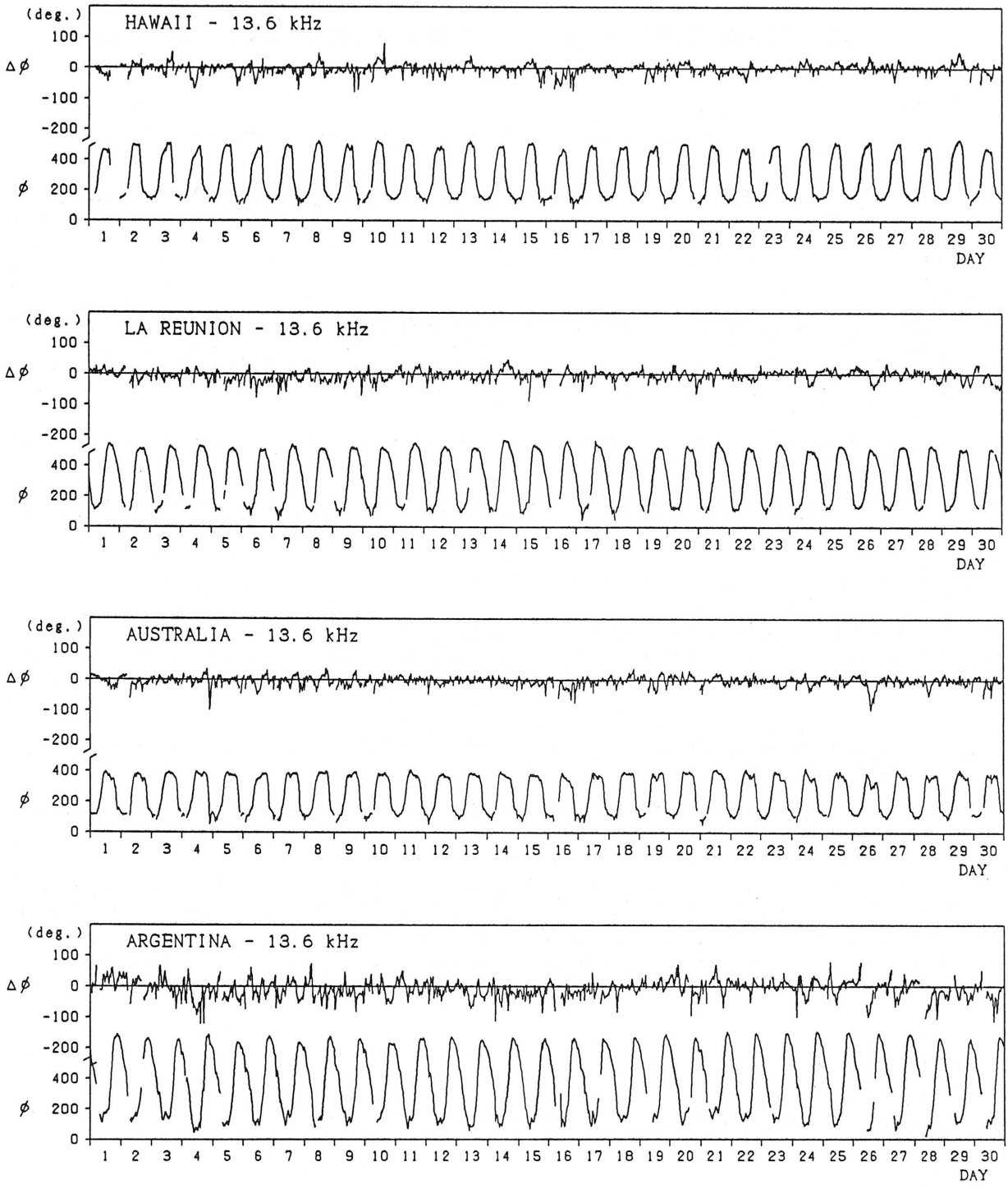








Inubo June 1989



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

Start (U.T.)	End (U.T.)	Max. (U.T.)	Max. Phase Deviation (negative value, deg.)
Jun.18/1323	Jun.20/0030	Jun.18/1832	82.8
Jun.20/2156	Jun.21/0730	Jun.21/0016	55.8
Jun.29/0308	Jun.29/1900	Jun.29/1111	57.6
Jun.29/2105	Jun.30/2035	Jun.30/0843	86.4
Jun.30/2230	Jul.02/1330	Jul.01/1634	57.6

C. Radio Propagation

C4. Sudden Ionospheric Disturbance

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

Hiraiso — Time in U.T.

Jun. 1989	S W F										Corresepondence	
	Drop-out Intensities(dB)						Start	Duration	Type	Imp.	Solar Flare	Solar Noise
	CO	HA	1)	2)	3)							
2			13	x			0443	19	SL	1	x	x
2	11	17	15	18	x		0520	80	SL	2		
2				8			1014	9	S	1-		x
2	x			25	x		1800	21	S	2-	x	
3	x	x	12				0309	32	S	1	x	x
3			x	10	x		1017	25	S	1-	x	
3			x	13	x		1217	18	S	1	x	
3			x	15	x		1317	28	SL	1	x	
3	x	x	x	5	x		1831	23	S	1-	x	
4	x	x	12				0214	12	SL	1	x	x
4	x	x	11				0249	35	S	1-	x	x
4	11	17	24	25			2118	23	SL	2	x	x
5	x	x	10		9		0130	14	S	1-	x	x
5			8				0307	14	S	1-		x
5			10	17	x		0720	15	S	1-		
5				19	x		1112	39	G	1+	x	
5		x	30	21	x		2134	20	S	2+		
6		x	24		x		0059	68	G	2	x	
6			x	14	x		0657	31	SL	1		
6				12	x		1058	18	SL	1-		
7	31	21	15		31		0133	54	SL	3-	x	x
7				5	x		1009	8	S	1-	x	
7		10					2038	44	SL	1+	x	
8			15				0001	14	SL	1		
8			5	8	x		0658	11	S	1-	x	x
8				11			0910	23	SL	1-	x	
8	x			17			1350	38	SL	1		
8	x	x	31				2359	181	G	2+		x
9			8		x		0750	32	G	1-	x	x
9				7			1631	17	S	1-	x	
10			8		x		0100	29	G	1-	x	
10			22		x		0815	21	SL	2-	x	
11	x			4	x		0857	85	SL	1-	x	x
12			5		x		0212	11	SL	1-	x	x
13				10			1105	8	S	1-	x	
14			17	3	x		0604	51	SL	1+		x
14				8			1352	5	S	1	x	
15				17	12		1002	22	S	1	x	x
15		27	6	11			1912	24	S	3-	x	
15		24			x		2208	40	SL	3-		x
16		21	5	10			0512	40	SL	2+	x	x
16			20	5			0738	83	S	2-		x
17		x	8		x		0415	20	SL	1-	x	x
17				8	x		0840	20	S	1-	x	x
17				8	x		1015	30	SL	1-		
17				23	x		1555	50	SL	2-	x	
19			10	23	6		0531	52	G	2-	x	x
19			13	5			0745	10	S	1	x	x
20				23			1455	98	SL	2-		
20				21			2159	39	G	1+	x	x
21			3				0138	22	S	1-	x	x
21			5		x		0437	23	SL	1-	x	x
24			10		x		0320	20	S	1-	x	x
25	x	x	10		x		0349	14	S	1-	x	
26				14	x		1548	31	SL	1	x	
28	25	x		8			1811	82	SL	2	x	x
29	27	32					2112	101	SL	3	x	x
30	36	SDI	12	17	14		0808	48	SL	3+	x	x
30	42		x		x		0713	52	G	3+		x

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

(b) Sudden Phase Anomaly (SPA) at Inubo

Inubo

Jun. 1989	S			P			A		
	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
1				6	—		0119	0133	0122
1			13	17	—	23	0334	0416	0340
1			12	7	—		0448	0538	0511
1	12			6	—		2335	0004	2338
2	11				7		0022	0116	0039
2	39	82	94	72	30	27	0442	0514D	0449
2	84	214	197	123	65	48	0514E	0852D	0540
2		42	26				0852E	0931	0900
2		54	55				1015	1105	1019
2		143				61	1600	1812	1612
2					8		2149	2237	2200
3	19		18	26	23		0035	0210	0045
3	48	192	141	106	70	63	0310	0406D	0318
3	17		29	32			0406E	0438D	0419
3			35	45		16	0438E	0550	0455
3		39	23				0758	0839	0819
3			13				0952	1017D	1001
3		71	52				1017E	1124	1023
3		35	12				1219	1259	1228
3		96					1319	1434	1340
3		39					1625	1733	1634
3		32			104	139	1827	2019	1838
3	15				14	17	2049	2124	2059
3			5		8	15	2245	2305D	2254
3	55	46	43	69	88	91	2305E	0032D	2317
4				8	7	22	0032E	0058	0039
4				8	5	24	0133	0153	0138
4	34	46	81	86	53	50	0215	0246D	0224
4	72	127	190	148	112	61	0246E	0452	0300
4	35	91	91	46			0743	0829D	0757
4	84	204	189*	94*			0829E	1033	0901
4		38					1225	1307	1237
4		39					1339	1407D	1352
4		88					1407E	1500	1421
4		60					1635	1753	1644
4	69	67	26	83	138	145	2115	2307	2128
5					4		0114	0129D	0119
5	43	54	66	86	68	56	0129E	0300	0137
5	23	32	49	43	22	28	0304	0437	0315
5			13				0538	0632	0559
5			12				0647	0711	0657
5	58	116	121	71		24	0717	0809D	0725
5	48	128	93	30			0809E	0847D	0823
5	49	168	100				0847E	0919D	0858
5	41	147	102				0919E	0950	0922
5	45	—	89				1111	1215	1122
5		32					1256	1344	1310
5					18	29	1920	1950	1928
5					40	55	2007	2123	2020
5	84	65	42	39	131	168	2129	2248	2141

Inubo

Jun.	S				P		A		
1989	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
5	21			10	7		2345	0008D	2353
6				—	8		0008E	0028	0013
6	65	82	106	—	95	85	0106	0253	0122
6	28	78	77	—			0652	0840	0708
6		36	26				0916	0943	0925
6	21	99	98				1056	1202	1107
6		31					1228	1321	1238
6		31					1635	1709	1639
6					26	17	2014	2125	2020
6				10	7		2239	2321	2245
7				32	28	18	0014	0121	0026
7	71					77	0100	0130D	0120
7	104	100	113	126	99	133	0130E	0249	0151
7			31	52	16		0311	0409D	0349
7			21	—	7		0409E	0438	0416
7	27	42	64	—	22	11	0444	0528D	0459
7			43	—	22		0528E	0620	0534
7	24	31	42	—			0649	0730D	0657
7		22	20	—		20	0730E	0810	0738
7			15				0817	0853	0822
7		16	27			47	0950	1010D	1005
7		60	62				1010E	1050D	1015
7		34	48				1050E	1139	1057
7		20					1716	1736	1721
7					38	57	1906	2007	1921
7					6	13	2009	2026	2015
7	33	23		—	71	91	2032	2158	2055
7					35	44*	2209	2347	2253
8	37	29	36	61	49	56	0002	0033D	0009
8	15	13	25	43	27	27	0033E	0139	0036
8			10				0618	0647	0630
8	40	90	84	53		10	0656	0748D	0708
8		42	26	10			0748E	0809D	0752
8		67	48	10			0809E	0856	0819
8	35	75	79				0915	1049	0922
8	30	111				30	1354	1452	1409
8		38				49	1721	1845	1749
8					14	27	1938	2054	1957
8		16		13	22	29	2230	2323	2239
9	66	70	87	98	86	103	0002	0242	0037
9	18	27	30	29*	23	52	0301	0400	0310
9	16	28	22	13			0516	0547D	0527
9	27	39	54	36	13		0547E	0647	0554
9	67	152	145	75		26	0749	0943D	0808
9		62	48			20	0943	1100	0950
9		24					1600	1631	1608
9		41					1632	1730	1641
9					18	33	1915	2005	1922
9	22				63	81	2026	2123	2032
9				8	24	32	2134	2208	2143
9	49	66	60	96	109	115	2239	2354D	2258
10		22		18	17	24	2357E☆*	0033	0002
10	21	28	37	51	27	31	0100	0212	0118
10	15		27	24	9		0208	0303	0225
10	16		18	27	9		0323	0408	0328
10	27		23	22			0522	0550D	0536
10	30		51	35	10		0550E	0613D	0556
10	121	—	235	129	43	55	0613E	0816	0625
10	14	36	41	9			0827	0915	0845
10	30	65	55				0939	1028	0952
10		27	17				1031	1109	1042
10		53					1154	1250D	1217
10		71					1250E	1340	1307
10		28					1409	1438	1419
10		21					1451	1521	1502
10		28					1650	1725	1704
10					24	31	1905	1953	1915
10					8		2056	2124	2100
10	15				11	20	2220	2255	2227
10				10	9	13	2338	0006	2344
11				8	5		0032	0101	0039
11				12			0137	0214	0153
11				6			0248	0310	0252
11				7			0434	0457	0438
11			9	6			0629	0652	0639
11			17	10		29	0657	0721	0703
11			25	8			0735	0815	0747
11	36	114	109	22			0900	1049	0918
11		52					1345	1436	1401
11					22	41	1854	1955	1903
11			9	8	13	11	2254	2319D	2259
11	10		9	14	20	13	2319E	0004	2325
12			17	—	8	11	0104	0135	0112
12				—	16		0151	0217D	0202
12	22	28	55	—	49	29	0215	0321D	0225
12			19	—	15	11	0321E	0354	0327
12	11		20	—	8		0435	0506	0441
12			20	—			0604	0640D	0625
12	25	33	44	—			0640E	0804	0650
12		30	23				0853	0924	0903
12	14	36	29				1050	1144	1100
12		24					1225	1302D	1241
12		30					1302E	1350	1310
12					13		2104	2150D	2119
12	17				19	13	2150E	2309	2200
13	19			7	7		0026	0042	0030
13	19		49	37	18	10	0202	0232D	0215
13	9		60	41	20	17	0232E	0316D	0239
13			27	18	7	13	0316E	0359	0322
13			23	16			0416	0658	0455

Inubo

Jun.	S				P		A		
1989	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
13			10	6			0811	0840	0820
13		82	37				1105	1155	1111
13		50					1230E	1415	1252
13					27	38	1942	2052	1953
13	51	20					2014	2144	2024
13					10	11	2319	2344D	2325
13					8		2344E	0025	2353
14				9	8		0039	0110D	0049
14				10	7	8	0110E	0141	0115
14	11			15	8	11	0150	0224	0200
14	23		41	36	19	18	0255	0416	0327
14			17	14			0550	0608D	0600
14	35	80	113	76	20	23	0608E	0727D	0620
14	32	57	53	25			0727E	0820D	0737
14		27	29				0820E	0900	0827
14		21	15				1043	1109	1049
14		24					1209	1244	1215
14	20	69					1355	1448	1402
14		20					1551	1610	1555
14		66					1630	1755	1645
14					35		1819	1946	1826
14					10		2000	2103	2018
14					23	21	2133	2227	2142
14				—	7		2237	2305	2243
14	20	21	17	35	42	33	2312	0053	2321
15	10		14	26	15	15	0133	0221	0139
15			9	8	4		0230	0256	0238
15	32	44	54	36	24	22	0323	0456D	0339
15	13	23	27	21	8		0456E	0540D	0511
15	21	33	42	31	11		0540E	0657	0551
15	12	33	30	10			0738	0856	0744
15		20	12				0913	0936	0919
15		46	35				0943	1001D	0949
15	48	165	139				1001E	1125	1012
15	17	53					1128E	1212	1135
15		20					1329	1420D	1343
15		33					1420E	1450	1427
15					135*	173	1851	2051	1918
15	31	22	17		—	33	2218	2253	2224
16				9	6		0053	0122	0100
16				12	5		0240	0334	0254
16	19	50	78	46	32	24	0415	0450D	0443
16	38	95	152	88	56	31	0450E	0514D	0455
16	81	176	242	130	95	55	0514E	0614D	0526
16	22	125	129	100		24	0614E	0700D	0619
16	20	—	89	47			0700E	0739D	0709
16	139	—	333	165		64	0739E	0916D	0746
16	26	79	95				0916E	1027	0925
16		38	7				1226	1356	1233
16		33				29	1658	1810	1708
16					80	109	1901	2033	1913
16	35	25	15		64	69	2150	2255D	2157
16	19		6	38*	27	20	2255E	0014	2301
17	14				17	10	0026	0058D	0037
17	24	19	27		39	33	0058E	0249	0106
17	28	40	73	100	24	28	0411	0633	0430
17	16	23	18				0815	0854	0821
17	18		12				0903	0938	0911
17	18	47	35				0942	1016D	0947
17	17	89	60				1016E	1100D	1023
17		46	21				1102E	1213	1106
17		145					1553	1758	1618
17	14		13	12	16	17	2246	0005	2257
18	23	40	35	20	15	19	0339	0506	0406
18	38	54	69	55	22	28	0537	0730	0555
18			10				0744	0842	0755
18					32	34	1853	1954	1909
18					19	20	1956	2045	2005
18					8		2046	2122	2052
18					6		2220	2251	2232
18	24	22	23	40	55	46	2342	0041D	2349
19			14	—	20	22	0041E	0152	0052
19	9		9	—	5	13	0311	0349	0319
19			10	—			0411	0457	0418
19	95	161	206	—	67	51	0527	0743D	0551
19	50	66	134	59		25	0743E	0851	0752
19				35			0830E	0949	0834
19					48	35	2139	2315	2205
19					7		2341	0003	2349
20				—	9	10	0029	0115	0043
20	22	22	41	—	25	15	0234	0312D	0246
20		20	27	—	13		0312E	0401	0316
20	22		13	10			0441	0527	0454
20	13	27	17	12			0600	0656	0610
20		24	15	8			0703	0730	0709
20	29	37	39	12			0815	0911D	0822
20		32	27				0911E	1012	0915
20		23					1345	1427	1353
20		166					1449	1711	1516
20	18				30	32	2015	2137	2025
20	83	65	60		105	158	2144	0138D	2211
21	36	42	56	55	58	44	0138E	0303	0143
21	40	62	90	62	29	34	0440	0709	0459
21			26	13			0808	0909	0822
21		22	11				1051	1132	1102
21	22	118	41				1133	1316	1152
21		24					1406	1447	1420
21		35					1720	1751	1737
21					24	20	1850	1938	1859
21					27	30	1957	2036	2012

Inubo

Jun.	S			P		A			
1989	Phase Advance (degrees)						Time (U.T.)		
Date	/N	/L	/LR	NWC	/H	/ND	Start	End	Maximum
21					22	26	2041	2147	2112
21	16		14		31	34	2200	2259D	2217
21	24			35	42	25	2259E	0048	2338
22	9			14	13	16	0059	0129D	0117
22	26	18	33	47	29	27	0130E	0222D	0143
22	12		19	14	10		0222E	0251	0229
22	19		23	22	12	12	0256	0325D	0311
22		17	23	26	15	17	0325E	0406	0336
22	21	26	24	—	14	16	0430	0534	0449
22			30				0620	0753D	0656
22			21	8			0753E	0850	0758
22		10	10				0914	0949	0917
22		24					1124	1208D	1143
22		9					1208E	1233	1224
22		24					1247	1338	1257
22		42					1348	1427	1358
22		41					1444	1510	1451
22		14					1601	1612	1604
22		14			29	20	2119	2213D	2130
22					6		2213E	2238	2220
22				9	9		2306	2335	2310
22			13	6	11	12	2339	0007	2350
23				5	6		0010	0032	0017
23				22	13	7	0037	0128	0050
23	—	27	—	6	—	—	0136	0149	0140
23		21		17*	12	13	0216	0253	0220
23				10			0304	0327D	0310
23		13	36	35	13	17	0327E	0415	0332
23			6	5	5		0429	0437	0432
23			10	6			0459	0546	0506
23	18		22	20			0553	0633	0600
23			18				0901	0959	0906
23		18					1530	1554	1543
23					5		2356	0021D	0000
24					7	10	0021E	0111	0033
24					5		0139	0221	0144
24			11	12	6		0229	0248	0236
24	74	81	144	104	69	68	0320	0519D	0329
24		19	19	6			0519E	0557D	0523
24	22	34	33	15			0557E	0651D	0609
24			10				0651E	0715	0655
24		29					1356	1452	1409
24		21					1604	1657	1616
24					24	38	1852	1954	1901
24					7		2115	2158	2124
24			11		22	29	2209	2323	2225
25				11	6		0107	0146	0119
25	44	48	97	75	40	46	0349	0515	0357
25		17	25	18			0538	0625	0544
25		24	13				0827	0930	0839
26			8	—	5		0357	0416	0403
26		88				22	1547	1727	1602
26					12		1938	2038	1957
26		16			31	27	2107	2157	2113
26		10		7	14	13	2301	0001	2314
27	13			17	19	17	0009	0136	0018
27				26	16	12	0203	0248	0214
27	14	14	25	30	17	17	0252	0336	0303
27			19				0538	0611	0551
27			12	8			0613	0638	0618
27			14				0803	0849	0811
27		22					1215	1300	1232
27		40					1337	1435	1348
27					15		2326	0038D	2345
28				5	13	17	0038E	0204	0054
28		22	21	24	12		0257	0402	0315
28		52	50	12			0832	1017	0854
28		41					0950E	1041	0954
28		21					1306	1330	1312
28					41	73	1816	2004	1835
29		23	19	14	16	51	0303	0511	0326
29			23	11	8		0405E	0425	0412
29	38	36			101	109	2103	0102	2126
30	51	—	206	113	47	55	0602	0715D	0616
30	40	68	156	78			0715E	0938	0743
30		28	9				1118	1138	1128
30		22					1234	1301	1239
30		14					1306	1332D	1312
30		34					1332E	1411	1346
30		38					1419	1446	1429
30		56					1459	1550	1509
30		44					1738	1813	1745
30					23		1835	1937	1843

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