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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

OCT. 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	62	54	62	62	53	48	69	125	122	130	134	118	114	119	120	116	107	99	91	87	77	64	65	64
2	54	61	54	63	58	58	85	120	132	142	131	126	123	116	111	110	104	104	93	85	80	66	66	64
3	52	57	60	58	56	61	83	88	117	132	130	125	120	117	116	115	109	111	89	86	82	66	66	63
4	54	58	55	52	48	55	88	106	126	120	130	127	123	118	115	120	110	107	92	84	84	71	66	66
5	57	57	57	C	C	C	C	C	C	128	128	126	119	118	113	114	110	108	91	90	84	82	74	74
6	67	53	59	67	66	63	110	110	130	132	127	126	121	120	122	122	118	108	100	97	88	79	74	74
7	64	60	60	52	50	68	85	123	134	144	134	127	122		122	115	126	119	99	82	78	77	74	72
8	64	66	61	61	57	54	85	119	138	142	131	130	129	128	120	120	122	106	N	82	80	77	72	73
9	62	66	60	63	64	63	85	132	124	136	134	132	130	126	122	111	120	110	91	89	82	79	76	77
10	64	67	65	64	67	66	87	124	138	141	132	128	127	126	120	128	124	113	97	88	84	67	79	66
11	70	71	68	65	62	54	112	128	135	146	143	144	134	130	128	126	122	118	100	90	79	73	79	68
12	74	66	67	70	67	68	90	128	135	142	147	147	145	134	131	133	132	123	85		87	70	65	64
13	66	66	66	66	58	64	98	126	137	143	127	141	142	137	135	134	138	122	106	91	82	72	63	67
14	66	64	63	64	63	58	86	108	128	136	134	142	135	128	127	126	128	106	99	87	74	79	66	64
15	64	62	81	59	62	56	80	116	138	140	141	131	127	132	127	131	126	113	91	91	80	66	84	62
16	54	54	50	57	59	60	83	116	141	148	140	140	135	134	138	137	132	121	98	88		66	62	60
17	79	55	54	63	55	52	85	125	146	143	157	140	157	146	146	142	137	122	101	87	86	78	77	77
18	76	72	66	64	62	66	78	118	140	144	142	142	144	137	140	142	127	106	90	80	76	63	59	53
19	58	62	56	50	48	50	88	110	139	141	141	134	141	143	136	128	123	108	99	86	67	62	65	66
20	58	52	55	53	51	56	71	114	137	136	146	148	147	143	127	141	137	126	91	84	67	52		34
21	29	34	30			A	A	64	74	106	112	120	118	127	127	125	108	91	72	49	47	24	25	26
22	29	30	35	34		33		58	65	68	57	60	67	64	61	66		63	57	50	54	39	39	37
23	38	39	31	36		28	53	86	88	100	98	103	110	110	94	92	95	88		54	57	39	40	43
24	44	47	44	51	42	43	60	90	116	122	130	128	122	123	117	125	121	90	85	72	58	56	56	54
25	56	52	52	51	52	51	76	110	127	134	138	133	135	126	128	126	125	107	86	84	84	73	66	66
26	52	54	53	45	52	51	64	80	127	134	138	141	142	128	127	127	121	100	88	73	67	51	55	
27	52	A	41	43	37		54	88	122	125	136	133	150	138	135	131	127	110	84	81	67	62	56	51
28	60	58	51	55	57	54	64	104	135	134	145	145	141	136	140	133	132	103	87	82	66	60	47	42
29	43	40	46	36	39	40	54	88	118	132	145	138	140	142	134	132	116	105	84	79	60	52	52	52
30	54	53	51	53	40	35	56	102	117	134	140	142	147	135	135	126	125	108	100	84	74	62	60	58
31	63	53	58	56	51	51	66	101	124	144	147	135	147	137	138	132	123	103	86	75	66	57	57	42
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	30	31	29	27	28	28	30	30	31	31	31	31	30	31	31	30	31	29	30	30	31	30	30
MED	58	57	56	57	56	54	83	110	129	136	134	133	134	128	127	126	123	108	91	84	78	66	65	64
U Q	64	64	62	63	62	62	86	123	137	142	142	141	142	137	135	132	127	113	99	88	82	73	74	67
L Q	52	53	51	51	50	50	65	90	122	130	130	126	122	120	120	116	116	103	86	80	67	57	56	52

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT WAKKANAI

OCT. 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		28	G	G	29	G	G	G	G	70	G	67	G	G	G	G	40	51	70	G	G	G	G	G
2	G	G	G	G	G	G	G	G		G	G	G	G	G	G	G	G	G	32	40	31	G	G	G
3	G	G	G	G	36	33	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
4	27	27	G	G	G	G	G	61	46	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
5	G	G	G	C	C	C	C	C	C	G	G	G	G	G	G	G	G	54	49	28	38	G	G	G
6	G	G	37	37	28	G	G	G	G	G	G	G	G	G	G	40	G	G	G	35	11	G	G	G
7	27	39	28	G	G	G	G	G	G	G	G	G	54		G	G	G	G	G	G	G	36	G	G
8	G	G	G	G	G	28	G	N	G	G	G	G	G	G	G	G	G	29	G	G	28	30	G	G
9	G	G	G	G	G	G	30	G		64	G	68	G	G	47	G	G	45	30	G	33	26	G	G
10	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	36	40	31	G	69	66	38
11	37	33	28	30	40	30	36	G	G	42	G	51	G	G	46	42	G	G	28	G	G	G	G	G
12	G	G	G	G	G	30	G	G	G	G	G	G	G	G	G	G	G	G	28		28	G	G	G
13	G	G	G	G	G	G	G	G	G	G	46	48	G	G	48	G	57	48	G	28	39	34	G	G
14	G	G	28	26	28	35	34	G	G	G	G	G	G	G	G	G	G	G	G	32	28	28	G	G
15	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	36	G	28	G	G	G	G	G
16	G	G	G	G	G	G	G	G	G	G	G	G	G	G	50	39	G	27	31	29		G	G	G
17	G	38	28	11	G	G	G	G	G	48	46		G	G	G	G	46	32	32	36	34	30	G	G
18	30	46	51	48	58	G	G	38	45	57	60	83	G	G	44	47	36	G	44	38	30	29	G	36
19	39	35	40	28	33	34	G	G	54	84	G	G	G	G	G	G	G	34	G	28	G	G	25	G
20	G	30	31	28	27	29	G	G	40	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
21	G	G	G			31	34	38	40	44	G	G	G	G	G	G	34	42	28	28	G	G	G	23
22	26	26	29	37	45	42	37	36	56	G	G	G	G	G	G	G	G	G	G	24	G	G	G	11
23	G	G	G	27	33	G	G	G	G	G	G	56		G	G	G	G	38		G	G	G	G	G
24	G	G	26	28	35	29	G	40	44	97	G	53	59	78	G	56	G	58	58	73	60	37	27	G
25	29	G	G	27	27	28	G	G	G	G	G	G	G	G	45	G	G	131	96	G	23	G	36	32
26	32	50	40	33	30	26	30	48	45	43	45	G	53	46	46	45	41	77	57	G	41	35	G	33
27		66	G	66	G	G	G	58	44	41	G	58	69	66	G	40	37	32	28	44	65	38	46	39
28	30	36	29	27	31	G	G	G	G	G	51	54	G	G	G	G	G	27	28	27	33	48	40	29
29	28	G	G	33	G	G	G	G	G	G	48	50	G	G	G	G	G	G	48	31	30	G	G	G
30	G	G	G	G	25	G	G	G	G	G	G	82	44	G	G	G	G	G	G	G	G	G	43	33
31	55	G	G	G	26	28	26	G	G	66	123	141	G	60	58	G	G	G	G	36	28	29	G	G
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	31	31	29	29	30	30	29	28	31	31	30	30	30	31	31	31	31	30	30	30	31	31	31
MED	G	G	G	11	26	G	G	G	G	G	G	G	G	G	G	G	G	27	28	28	26	G	G	G
U Q	28	33	28	29	32	29	G	18	42	44	G	54	G	G	44	G	34	42	40	32	33	30	G	23
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT WAKKANAI

OCT. 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	18	18	15	16	17	16	23	28	22	23	42	39	39	39	34	26	21	18	16	17	17	16	16	16
2	15	15	14	16	15	17	23	21	22	27	38	40	39	39	38	22	20	21	18	17	16	16	17	17
3	17	15	16	16	16	18	18	18	21	22	22	26	39	23	36	20	18	21	16	16	17	16	16	18
4	20	20	15	16	16	17	24	21	27	37	40	26	41	39	38	33	20	21	16	18	17	16	15	16
5	16	15	15	C	C	C	C	C	C	38	26	39	42	39	24	22	20	18	16	20	15	16	15	16
6	15	15	16	16	20	15	24	18	20	37	26	40	35	27	27	22	23	21	16	18	20	16	16	16
7	16	17	15	14	15	16	18	33	24	24	50	42	39		38	26	18	20	15	16	18	18	16	15
8	17	15	15	15	15	18	17	18	34	38	39	40	39	39	27	32	28	20	16	16	17	16	16	15
9	16	15	16	18	14	15	18	30	21	38	38	37	40	24	24	23	28	17	15	15	15	16	16	15
10	15	15	15	15	15	15	22	29	22	24	40	26	39	26	23	20	28	20	17	16	16	16	16	15
11	15	16	17	14	15	16	21	18	23	35	28	27	40	36	27	22	28	24	16	16	16	16	16	17
12	17	15	15	15	15	16	22	18	23	40	26	42	39	38	35	21	26	17	16		17	15	16	15
13	15	16	15	15	15	15	22	30	22	39	35	40	37	33	23	35	20	17	15	15	16	16	16	16
14	15	14	16	14	15	15	15	28	27	29	39	41	40	38	36	20	26	17	16	18	18	18	17	20
15	17	21	20	16	15	14	22	18	24	36	42	39	39	36	24	21	20	17	17	23	17	16	16	28
16	17	15	23	16	21	16	20	28	21	26	38	38	38	26	26	21	18	15	17	17		24	16	16
17	15	24	17	26	24	16	23	20	22	23	24	23	23	24	22	29	17	17	15	16	18	14	18	14
18	17	15	15	14	15	15	21	22	18	24	38	44	44	40	27	21	22	16	17	15	16	16	15	15
19	15	15	15	15	15	17	21	22	22	24	29	36	37	34	33	28	24	17	15	16	15	16	15	16
20	16	16	14	17	17	16	20	26	22	24	36	28	38	38	26	28	24	17	15	16	15	17	16	N
21	N	16	22			17	16	22	21	26	28	42	28	34	33	22	21	17	15	17	N	N	N	N
22	17	17	15	15	16	15	15	18	23	49	N		36	35	26	23	23	18	17	17	17	17	17	15
23	16	15	17	17	17	20	20	26	21	24	32	34	26	34	34	33	24	15		16	16	17	18	14
24	16	16	16	17	17	16	18	22	21	26	44	30	42	35	22	20	24	17	17	17	17	17	18	14
25	18	16	15	15	16	17	21	29	34	35	38	39	42	24	22	18	23	17	18	17	20	18	17	15
26	16	16	17	16	18	17	18	26	22	24	24	24	27	22	26	20	17	16	20	23	24	20	17	18
27	21	22	21	21	N	N	22	23	20	39	39	30	27	24	22	21	18	16	16	16	18	18	17	17
28	17	15	17	16	15	17	18	27	32	34	33	34	24	34	32	30	24	18	17	18	17	17	17	18
29	17	16	17	17	17	16	18	26	30	36	42	29	36	41	43	29	24	20	20	17	18	15	17	15
30	16	15	15	15	15	16	17	28	30	34	40	32	30	33	23	21	22	16	17	17	15	16	18	20
31	16	16	16	15	15	17	17	24	22	26	32	32	36	28	23	21	23	16	16	17	18	20	16	16
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	31	31	29	28	29	30	30	30	31	30	30	31	30	31	31	31	31	30	30	29	30	30	29
MED	16	16	16	16	15	16	20	24	22	29	38	36	39	34	27	22	23	17	16	17	17	16	16	16
U Q	17	16	17	16	17	17	22	28	24	37	40	40	40	38	34	28	24	20	17	17	18	17	17	17
L Q	15	15	15	15	15	15	18	20	21	24	28	29	35	26	23	21	20	17	16	16	16	16	16	15

HOURLY VALUES OF FOF2 AT AKITA

OCT. 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		54	67	64	58	45	73	115	127	133	127	115	122	124	123	119	111	90	88	88	66	66	62	62
2	61	62	61	61	63	58	85	123	140	137	132	126	118	123	114	118	114	114	102	86	66	76	66	64
3	65	63	61	62	57	58	86	116	130	135	133	125	122	122	121	120	113	107	88	80	79	78	64	58
4	47	51	58	50	50	53	88	122	120	118	138	118	124	120	119	110	111	110	88	79	80	74	71	64
5	63	58	61	58	57	58	101	122	122	133	133	128	128	118	120	114	116	115	91	86	88	79	84	66
6	72	64	65	68	68	54	88	121	120	129	123	120	119	120	113	114	115	115	104	88	87	79	66	72
7	66	52	64	51	52	65	103	121	127	137	132	130	125	130	118	111	113	114	107	84	76	78	86	C
8	78	64	67	68	59	57	86	121	132	133	130	132	129	127	C	121	118	108	88	84	80	66	84	76
9	69	63	64	70	66	66	C	110	133	134	129	C	129	119	118	113	118	113	91	A	79	78	76	76
10	63	66	67	72	65	65	87	131	137	130	129	126	128	122	123	118	119	113	88	83	86	80	76	72
11	70	71	70	62	67	68	105	127	132	137	136	133	135	129	129	121	N	113	96	86	82	78	84	80
12	69	68	67	67	64	67	88	126	133	134	138	138	139	136	134	135	136	118	105	90	86	81	80	73
13	68	67	68	71	63	57	86	111	126	137	138	139	138	137	134	136	137	122	104	83	83	79	66	74
14	68	67	67	67	65	60	81	103	120	122	133	133	133	132	131	126	117	113	87	87	86	74	52	60
15	62	63	52	61	60	49	74	109	131	130	132	128	131	133	136	137	120	115	92	89	83	79	68	62
16	52	53	54	51	58	51	83	110	129	130	132	137	138	137	138	136	135	108	104	88	84	78	72	66
17	64	54	44	53	59	52	82	110	146	140	146	143	142	142	141	138	136	120	109	91	81	79	65	70
18	63	73	60	58	64	63	86	122	144	144	138	136	138	138	138	139	138	114	102	84	83	81	69	63
19	62	62	52	58	54	53	81	121	134	140	137	137	134	137	137	120	130	111	111	92	68	78	69	72
20	62	59	53	58	56	58	77	111	134	140	144	138	138	138	138	137	137	129	90	82	74	73	52	52
21	44		47	30			A	79	110	128	142	136	138	136	144	131	115	103	75	61		52		
22	A		A		48			69	82	77	73	77	74	81	73	72	72	67	58	56	51	46	32	34
23	43	43	43	42	40	46	52	87	115	101	108	120	117	114	114	94	91	97	86	62	A	44	46	
24	47	42	44	46	45	47	74	102	120	127	136	138	130	117	131	120	116	97	84	A	71	54	54	52
25	A	52	52	49	44	50	86	116	131	129	132	137	136	N	124	120	121	110	88	88	84	79	68	61
26	51	52	51	48		50	73	110	128	130	134	138	137	134	134	131	116	110	85	86	63	58	56	54
27	60	54	47	42	42	33	58	105	121	129	136	142	138	135	137	137	136	117	103	81	86	51	A	
28	58	58	N	54	53	52	72	116	132	134	134	137	138	138	137	137	130	118	88	78	69	51	50	
29		52	34	42	44	42	68	88	108	132	141	145	139	137	136	130	119	A	83	78	66	50	50	59
30	A	48	50	53	43	38	61	104	126	127	136	136	138	140	135	131	111	116	87	91	74	66	66	66
31	66	64	53	50	47	50	75	102	127	136	136	138	138	134	134	136	129	101	81	79	76	67	67	
	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	29	29	30	29	29	28	31	31	31	31	30	31	30	30	31	30	30	31	29	29	31	29	25
MED	63	59	58	58	57	53	82	111	128	133	134	136	134	132	132	121	118	113	88	84	80	76	66	64
U Q	68	64	66	64	63	59	86	121	133	137	138	138	138	137	137	136	130	115	103	88	84	79	74	72
L Q	58	52	50	50	47	49	73	104	120	129	132	126	125	122	120	118	114	108	87	79	70	58	55	59

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT AKITA

OCT. 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		G	G	29	G	29	G	36	43	51	G	G	G	G	G	G	49	41	58	58	30	G	G	G
2	G	G	24	G	G	G	G	G	53	G	G	G	G	G	G	G	G	G	31	G	31	38	G	G
3	G	G	G	G	G	G	G	G	G	G	G	G	50	54	46	50	53	39	47	30	30	G	G	G
4	G	G	G	G	G	G	G	37	G	49	48	60	48	46	46	G	37	28	32	G	G	G	G	G
5	G	G	G	G	G	G	G	G	44	G	52	54	55	G	G	G	G	G	38	34	32	G	30	G
6	G	G	G	G	35	38	52	G	G	51	G	58	G	G	46	G	36	50	53	32	29	27	29	G
7	G	G	G	G	G	G	G	G	G	44	G	G	G	G	G	G	37	31	28	G	G	38	31	C
8	G	G	G	G	G	G	30	G	47	50	G	50	47	G	C	42	35	G	G	G	G	G	G	G
9	G	G	G	G	G	G	C	G	45	G	G	C	G	G	G	55	44	37	36	71	30	G	G	G
10	G	28	27	24	G	G	G	G	G	G	57	G	G	G	G	G	47	30	30	28	G	G	G	G
11	G	G	G	G	G	G	116	36	68	50	54	G	G	46	60	40	34	40	42	G	30	30	G	G
12	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	29	G	G	28	G
13	G	G	G	G	G	G	G	48	G	G	49	G	G	G	G	G	G	31	37	39	G	G	G	G
14	G	G	G	30	G	27	29	36	44	G	G	G	G	G	G	G	33	34	G	G	G	G	G	26
15	G	G	G	G	G	G	G	G	G	G	G	G	48	G	G	G	46	49	40	33	G	G	G	G
16	G	G	G	G	23	27	G	G	G	49	51	49	47	50	G	G	G	33	G	29	29	G	G	G
17	G	G	G	G	G	G	G	41	G	45	54	G	46	G	G	48	G	G	G	52	G	38	26	30
18	28	G	G	G	G	G	G	G	G	46	45	50	57	49	50	G	39	36	31	G	G	G	30	G
19	27	35	30	23	23	G	44	34	44	67	44	55	56	53	G	G	37	24	G	G	G	G	G	G
20	G	G	G	G	G	G	G	G	G	46	47	52	50	62	G	G	G	G	G	G	G	G	G	G
21	G		32	27			46	40	45	48	50	G	G	G	48	39	G	30	26	26	G	G	G	G
22	28	35	26	31	34	86	44	41	44	G	G	52	48	52	45	43	G	G	G	G	G	G	24	26
23	G	23	G	G	G	29	33	G	G	46	G	G	45	75	58	G	G	G	49	71	54	G	G	32
24	G	G	G	G	G	G	G	G	G		G	61	70	68	G	G	G	26	G	58	79	34	58	69
25	50	33	33	G	G	G	28	G	G	G	53	51	53	G	G	G	G	G	36	52	54	50	58	34
26	G	30	26	36	40	44	41	G	43	G	G	57	G	43	42	74	38	58	46	46	50	G	30	34
27	35	29	G	G	G	G	G	G	52	G	52	G	G	G	G	G	G	G	26	40	G	58	70	55
28	33	35	30	31	30	26	G	G	G	52	68	92	64	109	51	61	49	36	59	90	57	G	30	45
29	34	26	25	G	29	G	29	G	G	G	G	54	56	127	59	83	60	121	65	58	G	G	32	29
30	32	G	G	G	G	G	G	G	G	G	G	45	G	G	G	G	32	29	G	G	25	G	G	G
31	41	33	37	27	26	27	G	G	G	G	G	G	G	G	G	G	G	31	38	G	G	G	30	
	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	31	31	30	30	30	31	31	30	31	30	31	31	30	31	31	31	31	31	31	31	31	29
MED	G	G	G	G	G	G	G	G	G	G	G	23	45	G	G	G	33	30	31	29	G	G	G	G
U Q	28	28	26	24	23	27	30	36	44	49	51	54	50	52	46	42	39	37	42	52	30	27	30	29
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT AKITA

OCT. 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		18	15	15	15	18	23	20	20	21	30	26	46	29	21	21	21	16	16	18	18	18	18	18
2	16	17	15	17	15	18	23	18	20	22	23	44	40	26	22	21	20	23	16	18	18	16	17	16
3	21	15	16	15	15	17	17	20	20	24	23	23	24	35	23	21	20	16	16	17	17	16	17	17
4	18	15	15	15	15	16	18	20	23	22	24	24	26	24	23	21	16	22	20	17	17	18	17	18
5	17	15	15	15	15	16	23	18	20	23	23	26	27	27	22	21	20	20	17	16	16	16	16	18
6	16	15	15	15	15	18	16	17	18	21	24	23	23	24	18	18	18	15	15	18	18	18	16	16
7	16	16	15	15	15	17	24	17	20	22	29	24	24	44	24 C	22	18	17	16	21	16	16	16	C
8	18	16	15	15	15	16	16	20	21	22	21	23	26	27		20	17	22	15	16	15	18	18	17
9	15	15	15	15	15	16	C	18	20	21	22	C	24	23	18	15	17	17	17	16	17	17	16	16
10	18	15	15	15	15	17	22	16	21	23	24	41	24	23	22	22	18	18	16	17	16	16	17	16
11	16	16	15	15	15	15	22	21	21	21	23	23	24	26	21	18	18	16	16	17	16	16	18	16
12	18	15	16	15	15	16	22	18	21	21	24	26	24	22	23	21	18	22	20	18	16	20	18	17
13	16	15	17	16	18	16	23	18	20	44	26	44	46	27	23	40	32	22	15	17	16	16	16	16
14	18	15	16	15	18	16	21	16	18	22	21	42	45	27	20	20	17	16	17	20	16	16	17	18
15	16	15	15	15	15	16	21	20	20	24	43	45	29	23	36	21	20	16	16	17	16	21	18	17
16	18	15	15	15	15	16	21	30	20	21	23	28	15	20	23	20	15	16	17	18	18	20	15	16
17	17	15	N	15	15	21	22	18	21	21	21	21	18	21	20	22	15	20	17	16	20	16	16	15
18	16	15	15	15	15	16	22	18	18	21	46	44	40	34	26	21	20	16	16	18	17	16	16	20
19	18	16	17	15	15	18	21	15	20	22	22	21	22	22	21	17	20	20	17	16	16	16	17	16
20	18	15	15	15	16	15	20	18	18	23	22	21	23	22	22	17	15	21	16	16	16	17	20	N
21	N		15	15			16	16	18	20	23	46	26	24	21	20	27	15	17	16	17	16		N
22	16	15	15	15	15	15	15	18	18	49	36	24	23	24	23	21	16	20	16	16	16	18	21	20
23	18	15	15	15	15	16	16	18	16	20	38	39	24	27	22	18	26	18	16	16	16	18	21	17
24	15	15	15	15	15	16	18	21	17	22	22	23	22	21	22	17	26	16	16	17	16	16	17	16
25	18	15	15	15	15	20	20	22	26	28	32	28	27	18	27	22	20	18	17	16	20	18	18	16
26	17	15	16	15	14	16	15	16	20	22	22	24	24	23	21	20	16	15	15	15	16	18	16	16
27	16	15	15	15	15	N	21	18	18	38	24	23	23	21	20	32	27	16	18	17	15	16	16	16
28	16	15	15	15	15	17	18	18	18	23	22	23	24	22	23	21	17	15	16	16	16	20	17	16
29	15	15	16	16	15	20	21	30	21	21	20	24	34	38	43	26	18	18	17	17	17	16	17	16
30	17	16	15	15	15	17	17	30	22	22	24	24	39	36	35	33	18	20	16	17	18	17	18	16
31	15	16	15	15	15	18	17	26	20	22	24	27	28	26	23	23	26	16	16	17	18	18	17	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	30	30	31	30	29	30	31	31	31	31	30	31	31	30	31	31	31	31	31	31	31	30	27
MED	17	15	15	15	15	16	21	18	20	22	23	24	24	24	22	21	18	17	16	17	16	17	17	16
U Q	18	16	15	15	15	18	22	20	21	23	26	39	29	27	23	22	20	20	17	18	18	18	18	17
L Q	16	15	15	15	15	16	17	18	18	21	22	23	23	22	21	20	17	16	16	16	16	16	16	16

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT KOKUBUNJI

OCT. 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	71	63	66	70	56	54	81	106	136	135	163	119	134	134	127	126	123	107	93		97	75	61	61
2	60	68	62	58	59	58	86	122	144		116	135	133	129	125	125	125	119	110		78		77	82
3	71	73	70	65	62		84	120	130	125	130				131	127	125	115	105	79	83	79	71	
4	67	62			48	60	97	127	126		129	129	131			131	115	105	95	78				67
5	69	74	75	59	60	60	93	128		132	132	132	131				125	124	104	94	90			
6		80	70	69	64	74	97	119	128	139	118		126	125	116	118		121	111	95	97	94	92	85
7	82	73	55	56	58	67	101		129		137		138			122			112	91		85	96	91
8	81	73	76	73	61	58	82	123	126	126	130	131	132	132	128	130	120	115	101	89		88	86	82
9	98	82	74	64	74	64	87	112	131	137	128	131	127	131	131	122	120	119	114	96	90	101	109	75
10	75	72	70	71	65	74	102	125	133		127	134	131	130	128	130	123	120	105	89	88	93	92	76
11	77	94	83				86	126	131	140	143	138	137	137	135	124	125	116	100	97	89	93	84	92
12			68	74	66	68	94	120	136			144	142	141	146				110	94	97	91	85	99
13	81	84	70	72		N	99	105	118	134		139	140	142	135	136	128		107	92	91	92	88	82
14	82	73	76	72	82	53		105	116	128	132	132		136	135	131		126	112	102		88	87	64
15		77	73	73		45	81	110		127	127		136	142	142	141	134		108	92		85	80	71
16	70	48	54	63		52	77	107	127	117		137	142	137	142	141	136	121	111	103	97	93	83	82
17	76	54	52	67		52	80		140	141	151	145	138	146	145			127	114	101				
18	70	72		57	73	58	88	127	138	151	140	138	141	142	145	144			110	98	88	87	82	74
19	68	70	74	57		51	82	123	137		136	147	140	148	137	133	128	128	114	100	90	79	79	
20		63	58	70	56	58	92	109	133	141	140						144	131	111	92	88	79	66	
21		54	58	48	55	39		85	129	140	151	118		147	141	136	118	115		76	88	102		92
22	47	52	A	A	56		58	94	97	90	93	94	83	72			81		62	72		54	44	60
23	47		55	46		50	72	87	132			135	137	119			91		98	66	49		57	55
24		46	50	57	46	47	72	114	125	136	131		136	136	136	130	118	110	A	84	82	61	A	
25	60		52		46	50	78	117	128	132	130				127	124	124	116	97	85	85	80	72	
26	57	52	54	52	51	51	83	108	130	129	141	142	138	145		133		118	102	92	72	62	57	60
27		57	50	47	44	42		114	108	118	134	144	144	142	138	136	138	127	113	91	N	68	55	60
28	54	52	50	55	53	49	66	118	134	132	134													
29																								
30											134	138	145	146	145	144	134		108	106	81	78	75	70
31	71	73	64	51	43	48	76	114	119	128	138	144	145	142	138	134	128	107	89	86	81	81		67
	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	26	26	25	22	25	26	27	27	22	26	22	24	23	22	23	22	21	27	27	21	24	23	22
MED	70	71	65	63	57	53	84	114	130	132	133	136	137	137	136	131	125	119	108	92	88	85	80	74
U Q	77	73	73	70	64	60	93	123	134	139	140	142	140	142	142	136	128	125	111	97	90	92	87	82
L Q	60	54	54	55	51	49	78	107	126	127	129	131	131	131	128	125	120	115	100	85	81	78	66	64

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT KOKUBUNJI

OCT. 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		28	G	G	G	G	G	39	46	79	48		G		G	G	42	48	31	37	58		29	25
2	28	28	G	G	G	G	G	G	41	G	G	G	G	G	G	G	G	30	36		31	32		G
3	G	G	G	G	G	G	G		55	47	G	G	52	50	G	G	54	54	57	50	29	G	G	G
4	G	G	G		G	G	G	38	43		52	54	50	50	G	G		37	45	28	G	75		G
5	G	G	31	24	G	28	G	G		48	51	51	48	G		G	G	36	33	30	33		G	G
6		G	G	G	G	G	G	G	43	56		59	51	52	55	48	67	37	41	24	34	25	26	
7	G	G	G	G	G	G	32	44	G	G			G	G	G				50	46		34	30	31
8	25	G	G	G	G	G	G	37	47	47	55	50	53	50	47	43	40	62	31		37	27	30	27
9	G	G	28	G	G	G	30	G		G	50	G	G	G	G	G	41	47	34		90	33	29	25
10	G	26	26	G	G	G	G	G	43	46		G	G	G	G	G	65	54	43	48	49	34	27	G
11	G	G	G	G		G	G	G	49	50	50	57	54	49	G	G	G	32	48	34	52	G	G	G
12	G	G	G	G	G	G	G		42	43	G	G	G	G	G	G	G	G	G	G	34	29	G	G
13	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G			24	24	29	G	G	G
14	G	G	G	G	G	G	G	G	G	G	G	48	G	49	G	43		34		24		G	G	G
15	G	G	30	29	G	G	G		41	G	G	G	G	G	49	47	48	61	54	30	30	G	G	G
16	G		G	G	G	29	28	G	G	49	47	48	59	G	47	G	38	40	33	G	37	26	G	
17	G	G	G	G		G	G	G	44	78	G	G	52	G	G		G		26	G	G		G	
18	36	G	23	G	G	G	28	G		50	G	G	G	G	G	G	39		36	25	28	48		40
19	33	35	31	29	25	G	27	G	46	44	45	G			G	G	40	32		28	26	G	G	G
20	G	G	30	G	G	G	G	G		G	G	G					N	23	G	G	26	G	G	27
21	G	G	G	28	24	27	37	37	50	60	56	G		G	64	65	44	62	64	G	47	G	G	32
22		45	59	50	57	59	33	41	41		G	46	75	53		44		38	31	29			40	22
23	25	24	38	45			35		58		45	G	G	G			N		28	51	34	48	39	G
24	29	G	G	G	G	G		G	50	44			47	G	45		34	48	95	61		54		35
25	37	59	51	48	G	30	28	G	G	G	G				G	G	37		24	26	37	28	40	59
26	50	G		27	29	30	25		G	G	G	G	G	48	48	41	G	34	31	31	30	G	G	29
27	30	32	30	28	G	G	G	G	G	42	G	G	G	G	G	57	34		G	43	29	34	58	56
28	55	28	34	32	29	29	30	G	G	49	70													
29																								
30											G	G	G	G	G	G	G	35	28	44	32	28	40	26
31	G	G	G	G	G	G		34			G	G	49	49	43	G	34	34	43		30	G		29
	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	28	26	28	27	24	24	25	26	25	25	25	25	24	22	22	27	25	25	25	24	26
MED	G	G	G	G	G	G	G	G	42	44	G	G	G	G	G	G	38	37	33	29	32	27	G	24
U Q	29	27	30	28	G	14	28	35	46	49	50	48	51	49	46	43	42	48	45	43	37	34	30	29
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	34	28	24	29	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT KOKUBUNJI

OCT. 1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	15	15	14	15	14	15	15	15	16	21	23	24	24	24	24	17	16	14	14	14	14	14	15	15
2	15	14	14	15	14	14	17	16	18	14	43	29	24	27	21	17	16	14	15	15	15	14	15	15
3	14	14	14	14	14	14	23	15	17	17	26	33	23	32	26	20	17	15	14	14	15	14	14	23
4	15	14	14	14	14	14	15	17	18	14	22	32	23	24	14	18	18	14	14	15	16	15	16	15
5	14	14	14	14	14	14	16	16	14	18	22	34	29	30	14	14	17	16	14	15	14		15	14
6	14	15	14	14	14	14	23	15	18	20	21	24	27	22	16	16	15	15	14	15	14	16	15	15
7	14	14	16	15	14	15	16	15	18	14	23		24	14	14	18	14	14	14	14		15	15	14
8	15	17	14	14	15	14	18	15	18	18	22	20	27	28	22	17	16	15	15	14	14	15	15	15
9	15	14	14	14	15	14	15	16	17	18	26	30	14	23	20	16	14	14	14	14	15	15	14	15
10	14	15	14	14	14	15	18	15	16	17	14	27	43	32	18	17	15	15	14	15	15	15	14	14
11	14	14	14	14	14	14	21	30	18	18	26	30	23	27	14	18	18	14	15	14	15	14	15	15
12		15	16	14	14	15	16	16	17	22	14	28	24	30	22	14	14	14	15	15	15	15	16	15
13	15	14	14	14	15	16	15	15	17	40	28	33	41	24	14	38	20	14	16	15	15	15	14	15
14	14	14	14	14	14	15	20	15	16	20	20	24	14	29	23	18	15	15	15	15	15	14	14	15
15	15	14	14	14	14	14	21	14	14	28	45	32	27	23	20	17	16	14	17	14	15	15	15	15
16	15	16	14	14	14	14	15	18	16	18	14	32	20	43	18	14	16	15	15	14	15	15	15	15
17	14	14	14	14	14	14	18	15	24	17	20	18	15	28	20		15	18	16	15	22		24	
18	15	14	15	14	15	14	15	15	14	20	40		43	41	35	17	16		14	15	16	15	15	15
19	15	14	14	14	14	15	18	15	16	14	21	22	22	20	14	20	15	16	15	16	15	15	15	15
20	15	14	14	14	14	14	20	18	17	20	14	14					15	16	15	16	15	15	14	15
21	16	16	14	14	17	18	14	15	16	18	26	38		22	18	16	14	15	14	14	15	15	15	14
22	14	14	14	14	14	15	15	15	16	36	20	39	23	34		14	15	14	14	14	15	14	15	15
23	15	14	14	14	14	14	15	15	16	18	29	30	22	26			17		15	14	15	14	15	14
24	15	14	14	14	15	15	21	16	17	18	22		27	20	18	14	16	14	14	15	15	15	14	14
25	14	14	14	14	14	15	15	20	27	38	30				20	16	15	15	16	15	15	20	16	15
26	15	15	14	14	14	15	17	15	17	18	26	22	27	21	21	18	38	14	15	15	14	15	15	17
27	15	16	14	14	17	15	26	15	17	35	27	26	26	20	18	18	15	16	15	16	15	15	15	15
28	15	15	14	14	14	15	14	16	16	17	21													
29																								
30											21	22	22	21	22	18	16	14	15	15	15	15	14	15
31	14	14	15	14	15	15	17	15	16	20	22	22	26	22	21	22	16	14	16	16	15	15		15
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	29	29	29	29	29	29	29	29	29	30	25	26	27	26	26	29	27	29	29	28	27	28	28
MED	15	14	14	14	14	15	17	15	17	18	22	28	24	24	20	17	16	14	15	15	15	15	15	15
U Q	15	15	14	14	15	15	20	16	18	20	26	32	27	30	22	18	16	15	15	15	15	15	15	15
L Q	14	14	14	14	14	14	15	15	16	17	21	22	22	22	16	16	15	14	14	14	15	14	14	15

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT YAMAGAWA

OCT. 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	74	78	76	71	59	48	49	97	131	137	108	116	142	145	141	140	137	133	108	87	88	78	73	66
2	68	68	66	64	64	52	65	112	127	116	110	128	142	141	145	145	144	141	130	107	99	89	88	87
3	84	74	68	67	63	56	70	111	126	125	116	130	136	142	145	146	150	146	131	109	90	88	86	84
4	78	75	70	64	58	59	79	112	124	132	140	132	140	145	N	147	145	136	126	86	88	104	110	88
5	85	71	64	66	62	57	71	111	122	130	132	130			145	146	137	130	128	108	109	138	126	111
6	106	87	86	85	84	71	71	102	122	126	126		141	138	140	142	140	133	136	134	146	144	142	107
7	104	86	79	77	68	68	83	108	132	137	145	148	147	147	148	147	141	132	128	111	111	110	108	108
8	86	84	79	78	63	59	67	111	118	121	127	135	136	138	142	130	131	121	111	111	106	106	105	86
9	84	78	76	74	65	65	77	110	123	138	126	130	132	136	142	142	134	140	135	124	110	111	89	87
10	104	86	85	85	76	66	77	104	111	132	132	140	139	136	137	138	137	137	127	109	106	107	109	87
11	85	84	74	67	66	67	73	104	132	141	140	144	147		156	157	145	137	133	111	121	126	102	88
12	86	86	74	71	71	66	61	100	124	136	141	146	149	152	155	154	144	146	142	136	137	123	102	86
13	85	83	79	86	76	54	66	102	116	126	138	143	145	143	148	147	144	136	133	110	126	136	131	137
14	104	87	86	80	80	58	46	88	111	130	133	136	141	140	146	146	146	140	136	130	143	145	111	109
15	87	87	93	86	64	46	42	87	111	128	126	134	144	147	161	148	147	144	136	119	126	142	110	141
16	107	88	82	76	76	53	52	90	109	116	128	145	146	146	154	151	142	135	130	123	123	123	110	107
17	87	67	50	62	64	32	66	104	126	137	146	145	151	152	148	148	143	137	126	111	90	87	86	68
18	76		76	63	56	57	70	88	133	143		138	146	154	161	158	148	143	139	130	126	108	111	86
19	86	84	66	66	52	56	63	102	124	138	143	146	145	152	152	142	140	142	130	111	104	84	82	83
20	86	68	58	62	60	53	59	88	123	137	137	142	141	144	153	158	151	144	130	106	134	140	108	85
21	76	85	88	59	42	58	84	88	122	161	159	147	143	158	144	142	136	127	108	85	107	139	54	75
22	75	67	79	53	66	52	A	80	142	134	142	138	132	136	117	107	103	102	91	74	84	84	73	63
23	65	53	53	46	44	50	52		127	141	138	153	150	149	149	146	120	124	124	87	66	62	63	A
24	A	59	58	48	A	42	54	88	121	134	140	142	140	151	152	148	140	132	119	107	90	84	66	56
25	52	A	46	53	40	42	38	97	116	125	140	140	139	140	140	139	138		116	104	97	94	83	67
26	63	53	54	63	48	36	54	88	118	137	137	133	135	147	145	145	144	144	126	111	103	85	72	68
27	67	58	54	48	32	34	43	100	109	108	140	150	149	154	144	146	158	152	146	141	127	90	74	70
28	71	63	66	63	57	47	47	87	118	121	125	140	157	160	158	158	158	161	147	131	134	110	108	89
29	77	72	66	A	53	48	53	84	113	132	144	150	144	155	157	154	146		133	128	136	107	87	87
30	76	75	87	81	58	29	31	83	120	126	135	142	152	162	165	162	159		N	126	126	110	87	87
31	90	87	82	51	37	30	48	90	114	111	132	144	150	151	146	146	139	127	124	108	110	108	86	80
	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	31	30	30	31	30	30	31	31	30	30	30	29	30	31	31	28	30	31	31	31	31	30
MED	84	78	74	66	62	53	62	98	122	132	137	141	144	147	147	146	143	137	130	111	110	108	89	86
U Q	87	86	82	77	66	59	71	104	126	137	140	145	147	152	154	151	146	143	135	126	126	126	110	89
L Q	75	67	64	62	53	46	49	88	116	125	127	134	140	140	144	142	137	132	124	107	97	88	82	75

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT YAMAGAWA

OCT. 1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G	G	G	G	G	45	G	49	G	G	G	G	G	46	50	41	40	36	24	G
2	G	G	G	G	G	G	G	G	G	94	G	G	G	G	G	G	G	G	33	25	24	G	G	G
3	G	G	G	G	G	G	G	32	40	43	54	G	G	G	G	45	68	90	84	48	33	32	29	G
4	G	G	G	G	G	G	G	34	49	51	G	52	G	55	50	56	G	50	69	80	40	G	G	G
5	G	G	G	G	G	29	G	G	G	49	G	50	55		58	46	40	G	33	46	29	41	28	29
6	G	G	G	G	G	G	G	G	61	43	50	55	G	G	G	G	G	44	72	40	30	40	32	24
7	G	G	G	G	G	G	G	41	48	44	G	G	G	G	G	56	61	G	G	29	G	28	G	G
8	G	G	G	G	G	G	G	33	42	51	46	G	G	G	60	61	78	96	114	44	26	30	58	24
9	G	G	G	G	G	G	G	G	40	42	G	G	G	G	G	G	61	60	43	G	26	24	G	G
10	24	G	G	G	G	G	G	G	G	48	G	56	52	G	G	G	64	75	66	32	26	35	36	24
11	G	G	G	G	G	G	G	33	40	43	46	G	G		G	G	G	44	72	55	45	39	40	G
12	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
13	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	42	40	G	G	G	G	G	G
14	G	G	G	G	G	G	G	G	G	48	52	51	47	52	50	48	48	40	29	36	26	30	26	38
15	29	G	G	G	G	G	G	33	40	G	G	G	G	G	G	51	48	60	55	41	G	G	30	G
16	G	G	G	G	G	G	G	G	42	50	G	48	G	G	G	48	43	37	34	39	34	G	G	G
17	G	G	G	G	G	G	G	32	G	G	G	G	G	G	G	G	G	G	G	G	G	G	30	41
18	24		G	G	G	G	G	G	G	G		G	G	G	G	G	G	G	39	G	31	58	G	30
19	G	G	G	G	G	G	G	G	G	46	G	G	64	G	G	G	49	52	55	33	G	G	G	G
20	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	29	23
21	G	G	G	36	36	G	G	37	48	55	73	49	53	G	47	43	46	G	29	G	G	G	G	28
22	29	G	30	36	39	34		34	41	G	50	55	59	G	G	46	41	36	40	G	38	40	32	G
23	G	24	G	G	31	G	25	32	50	62	69	98	G	60	45	50	64	44	45	31	G	G	G	43
24	49	36	31	31	30	26	26	G	39	44	G	G	48	G	81	43	G	40	84	31	40	29	36	34
25	41	32	G	28	G	G	G	33	G	G	G	G	G	G	G	G	G	35	40	43	66	45	30	G
26	40	25	G	23	G	G	27	30	G	G	G	G	G	G	G	G	G	G	31	G	G	31	32	G
27	32	29	31	G	G	G	G	G	50	G	G	G	G	G	G	G	G	G	42	38	33	38	58	68
28	41	44	34	26	G	24	22	30	39	N	G	55	G	57	G	G	G	G	G	30	G	G	25	24
29	24	32	G	30	G	G	33	G	G	G	48	49	62	G	G	54	46		46	G	G	G	G	G
30	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	44	50		90	G	G	G	G	33
31	37	G	G	G	G	G	G	32	G	G	G	52	48	G	49	47	40	43	34	33	45	34	G	G
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	30	31	31	31	31	30	31	31	30	30	31	31	29	31	31	31	29	31	31	31	31	31	31
MED	G	G	G	G	G	G	G	G	G	43	G	G	G	G	G	G	40	40	40	31	26	28	25	G
U Q	29	G	G	G	G	G	G	33	42	48	46	51	48	G	45	48	49	48	66	41	34	36	32	29
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	29	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT YAMAGAWA

OCT. 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	18	34	30	44	33	43	43	40	36	23	16	15	15	15	15	16	15
2	15	15	15	15	15	15	15	17	21	23	39	46	48	44	43	39	20	15	16	16	16	15	16	15
3	15	15	15	15	15	15	15	15	17	23	33	34	45	45	44	27	18	16	15	15	15	15	15	17
4	15	15	15	15	15	15	16	15	23	29	35	34	36	35	35	27	17	15	15	15	15	16	15	15
5	15	15	15	15	15	15	15	16	23	29	41	38	38		34	33	26	18	15	15	15	15	15	16
6	15	16	15	15	15	15	15	16	18	26	38	35	44	45	42	39	21	16	15	15	15	15	15	15
7	16	15	15	15	15	15	15	16	24	22	40	44	44	44	45	35	17	16	18	15	15	15	15	15
8	15	15	15	15	15	15	16	16	16	22	36	46	47	39	36	24	20	16	15	15	15	15	16	15
9	15	15	15	15	15	15	16	15	16	23	34	43	44	45	42	27	18	16	15	15	15	15	16	16
10	16	15	15	15	15	15	16	15	16	34	36	38	38	44	42	23	33	17	15	15	15	15	15	15
11	15	15	15	15	15	15	15	16	20	29	34	42	40		43	38	20	16	15	15	15	16	16	24
12	15	16	15	15	15	15	15	15	18	24	40	40	43	42	42	24	17	20	17	15	15	21	15	15
13	15	15	15	15	15	15	15	15	16	39	36	43	48	36	39	44	40	26	17	15	15	15	16	15
14	15	15	15	15	15	15	15	16	17	28	36	39	40	43	42	24	17	16	15	15	16	15	15	15
15	15	15	15	15	15	15	15	15	16	38	40	44	44	42	42	27	17	16	15	15	15	16	15	15
16	15	15	15	15	15	15	15	15	16	24	26	33	43	42	39	27	34	24	15	15	15	15	15	16
17	15	15	16	15	15	15	15	16	18	35	24	42	43	43	18	36	20	17	16	15	15	15	15	15
18	15		15	15	15	15	15	16	16	17		49	55	43	43	38	24	17	15	15	15	15	16	16
19	15	15	15	15	15	16	15	16	16	22	24	26	29	24	39	17	18	16	15	16	15	15	15	16
20	15	15	15	15	15	15	15	16	16	36	40	41	43	39	39	35	18	16	16	15	15	16	16	15
21	15	15	15	15	15	N	15	16	16	24	36	42	38	40	34	26	24	17	15	15	15	15	15	15
22	15	15	15	15	15	15	15	15	17	42	36	38	38	41	40	33	18	16	15	15	15	15	15	16
23	15	15	15	15	15	15	15	15	20	26	35	36	34	36	33	26	24	35	15	15	15	15	15	15
24	15	15	15	15	15	15	15	15	18	32	38	40	35	32	27	24	17	16	15	15	15	15	15	15
25	16	15	16	15	15	15	15	16	26	42	42	42	46	44	42	35	24	18	16	15	16	15	15	15
26	15	16	16	15	15	15	15	15	15	23	36	39	16	39	39	24	32	26	15	16	16	15	16	15
27	15	15	15	16	15	15	15	17	16	40	38	39	39	39	38	27	18		15	15	15	16	15	15
28	15	15	15	15	15	15	15	15	16	23	23	33	29	38	37	38	35		15	16	15	15	15	16
29	15	15	15	15	15	15	15	15	18	22	22	36	39	56	55	36	35		15	15	15	15	15	15
30	15	15	15	15	15	15	15	15	20	20	38	42	40	39	38	24	21		15	15	15	15	15	15
31	15	15	15	15	15	15	15	17	16	20	38	26	33	40	30	34	20	15	15	15	16	15	15	15
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	30	31	31	31	30	31	31	31	31	30	31	31	29	31	31	31	27	31	31	31	31	31	31
MED	15	15	15	15	15	15	15	16	17	26	36	39	40	42	39	27	20	16	15	15	15	15	15	15
U Q	15	15	15	15	15	15	15	16	20	34	39	42	44	44	42	36	24	18	15	15	15	15	16	16
L Q	15	15	15	15	15	15	15	15	16	23	34	35	38	39	36	24	18	16	15	15	15	15	15	15

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT OKINAWA

OCT. 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	146	145	138	128	84	44	37	84	131	132	106	125	156	164	164	165	177	162	147	147	144	103	87	88
2	86	87	87	86	72	64	62	88	110	111	126	140	151	164	173	176	176	164	157	146	162	168	167	145
3	126	166	110	109	86	63	67	110	112	111	119	140	147	148	171	N	194		168	162	162	168	168	165
4	145	135	110	90	85	79	85	112	131	142	147	145	152	164	172	178	176	159	161	163	167	168	163	168
5	166	118	85	119	87	79	75	110	127	127	134	140	137	146	166	169	164	159	147	146	164	177	165	168
6	162		167	116	110	67	59	87	112	130	134	144	157	161	165	187	164	168	176	168	145	171	151	170
7	162	161	143	144	88	86	88	120	130	144	146	160	164		172	171	172	162	163	162	163	177	178	162
8	158	143	110	109	84	66	74	111	106	128	135	142	146	154	161	143	144		137	159	177	165	167	162
9	145	110	86	84	71	74	76	108	128	134	137	141	145	143	162	171	171		168	171	171	182	166	146
10	163	N	146	139	109	79	61	86	107	133	144	140	145	141	144	145	144	146	147	145	170	194	177	177
11	141	110	85	85	85	89	62	90	120	135	143	145	157	134	178		164	163	168	170	177	191	148	168
12	162	110	87	86	82	52	44	86	122	134	156	164	171	176	176	175	178	169	171	164	164	172	162	166
13	163	163	147	122	82	42	44	78	N	117	140	148		163	170	175	168	163	168	172	176	185	169	171
14	164	160	138	108	87	53		81	108	128	145	146	154	164	162	165	163	164	171	180	168	181	213	170
15	170	178	164	130	100	43	33	85	110	119	138	143	154	172	176	177	173	171	166	163	171	171	177	178
16	163	183	163	163	128	61	48	89	112	105	136	146	149	163	170	169	163	163	165	164	176	182	171	162
17	129	87	85	79	78	67	66	108	128	146	147	152	156	168	168	168	164	158	146	145	145	145	145	100
18	87	107	68	66	64	63	61	88	119	133	137	141	146	166	173	174	171	171	178	186	187	178	171	170
19	164	147	109	90	84	67	44	109	116	136	158	154	164	162	171	162	162	158		170	146	163	145	146
20	146	111	88	N	85	54	44	88	121	134	141	146	144	162	171	174	170	168	165	146	176	198	177	159
21	125	84	108	84	A	71	116	122	147	177	189	162	159	162	144	146	158	143	111	110	144	162	86	85
22	78	84	108		65	78	77	88	152	144	159	158	155	158	150	144	133	135	122	110	142	140	85	88
23	87	82	64	63	49	46	44	74	122	147	145	164	166	171	177	179	172	161	160	143	89	91	90	109
24	118	71	89	90	66	60	44	88	119	133	152	157	158	171	171	172	172	171	172	169	163	146	111	90
25	N	79	85	81	59	41	43	90	111	121	141	141	141	154	153	150	146	146	144	126	111	111	95	84
26	85	86	85	85	52		39	84	106	128	145	141	136	146	164	165	164	164	152	146	122	108	85	86
27	88	81	67	66	54	A	31	84	112	106	136	157	145	152	146	164	170	180	177	187	160	163	111	93
28	103	85	88	87	82	48	36	86	105	104	121	145	164	172	177	176	187	187	204	N	158	177	177	145
29			137	108	84	66	62	91	129	140	146	161	163	169	176	183	182	177	176	174	192	123	188	158
30	145	121	145	120	78			77	111	133	144	146	159	176	189	197	198	183	171	168	175	177	166	145
31	163	145	103	77	62	33	37	88	112	111	138	158	155	162	164	163	164	165	164	165	166	170		119
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	28	31	29	30	28	29	31	30	31	31	31	30	30	31	29	31	28	30	30	31	31	30	31
MED	145	110	108	90	83	64	59	88	118	133	141	146	154	162	170	171	170	164	165	163	164	170	166	158
U Q	163	146	138	119	86	72	70	108	128	136	146	157	159	168	173	176	176	170	171	170	175	178	171	168
L Q	110	85	85	84	66	50	43	85	111	119	136	141	146	154	162	163	163	159	147	146	145	146	111	100

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT OKINAWA

OCT. 1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G	G	G	33	G	49	G	G	G	G	G	G	60	72	67	48	40	27	G	26
2	G	G	G	G	G	G	G	G	40	G	G	G	G	G	G	G	45	43	36	28	24	G	G	G
3	G	G	G	G	G	G	G	G	39	47	60	58	70	G	G	G	49	82	61	41	43	40	39	32
4	G	G	G	G	G	G	G	36	47	49	56	54	57	52	52	G	48	51	86	34	30	G	G	G
5	28	G	G	G	G	G	G	34	41	43	52	G	53	G	G	G	G	42	58	59	26	G	G	G
6	G	G	27	G	G	G	G	37	G	G	52	67	59	G	63	52	61	69	54	29	31	42	30	31
7	G	G	G	G	G	G	G	G	45	G	G	G	G	G	G	46	49	51	50	48	G	G	G	G
8	G	G	G	G	G	24	G	34	60	50	51	80	57	G	57	59	41	58	38	61	G	57	28	40
9	30	G	G	G	G	G	G	G	39	44	G	G	G	G	G	52	57	56	49	48	G	G	G	G
10	G	G	G	G	G	G	G	34	G	48	G	G	G	G	G	G	65	72	72	56	92	67	56	39
11	32	G	G	G	G	G	G	40	42	46	G	G	50	84	53	G	G	52	36	34	46	G	G	G
12	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	58	G	G	G	G	G	G	G
13	G	G	G	G	G	G	G	G	40	G	84	G	G	G	G	G	G	43	33	48	28	G	G	G
14	G	G	G	G	G	G	G	G	39	G	G	G	66	56	51	G	G	G	G	26	31	40	64	24
15	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	47	41	48	81	33	44	28	31
16	32	26	G	G	G	G	G	G	44	47	G	G	54	G	G	G	G	G	G	44	24	G	G	24
17	G	G	G	G	G	G	G	31	66	47	G	G	G	G	58	G	41	42	47	G	G	25	24	G
18	40	29	25	G	G	G	G	G	G	G	G	G	G	G	G	G	G	34	29	G	G	G	G	40
19	40	30	26	G	28	G	G	G	41	70	G	48	G	G	G	G	43	50	32	34	32	25	25	30
20	33	34	27	37	G	G	G	G	G	46	G	51	G	G	53	44	G	G	G	G	G	G	G	26
21	G	G	G	28	72	36	28	39		71	80	90	138	99	72	51	54	37	G	G	G	G	42	33
22	G	35	37	38	32	32	24	G	G	G	51	58	52	56	70	54	42	37	31	30	26	24	G	G
23	G	G	32	34	31	G	G	G	G	G	G	G	55	52	48	58	46	41	34	32	28	G	G	G
24	G	38	26	G	G	G	G	G	38	48	50	61	52	58	81	46	50	G	25	28	G	33	40	25
25	G	G	G	G	G	G	G	G	G	G	48	G	G	G	G	48	72	74	54	41	G	G	34	G
26	G	32	G	G	G	G	G	G	G	G	G	G	G	G	G	G	40	G	34	29	G	G	G	G
27	G	G	G	G	G	27	G	G	39	G	G	52	50	60	100	84	58	40	49	59	56	G	G	25
28	G	27	G	G	G	G	G	G	G	58	48	G	77	G	G	G	G	G	33	39	29	58	G	G
29	G	G	G	G	G	G	G	G	40	46	49	51	54	G	84	64	86	61	36	55	48	32	G	G
30	G	G	G	G	25	G		G	G	43	46	G	G	G	G	G	42	34	G	G	G	G	G	G
31	G	G	24	G	G	G	G	32	44	G	48	G	G	G	49	50	46	G	29	28	G	24		G
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	30	31	30	31	31	31	31	31	31	31	31	31	31	31	31	31	30	31
MED	G	G	G	G	G	G	G	G	39	43	G	G	G	G	G	G	46	42	36	34	26	G	G	G
U Q	G	26	24	G	G	G	G	33	41	48	51	52	55	52	57	51	57	56	50	48	32	33	28	30
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	29	28	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT OKINAWA

OCT. 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	15	15	15	14	14	15	15	22	27	42	44	35	46	44	27	26	15	14	15	15	15	15	15
2	20	15	15	15	15	15	15	15	16	28	30	28	45	32	44	30	20	15	15	14	15	15	15	15
3	15	15	15	15	14	15	15	16	26	26	28	29	32	46	29	27	27	15	15	15	15	15	16	17
4	16	16	16	15	15	15	15	16	22	28	32	29	28	28	34	28	22	17	15	15	15	16	17	16
5	15	16	15	15	15	15	15	15	22	30	30	32	30	46	32	29	29	22	17	15	15	17	15	15
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7	21	15	15	15	15	15	15	16	18	28	29	29	29	33	33	30	26	28	14	15	15	15	15	15
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9	15	16	15	15	15	15	15	15	16	18	29	32	32	30	29	28	21	16	15	15	15	15	15	15
10	15	15	15	15	15	15	15	27	22	36	28	44	48	45	46	27	24	17	16	15	15	15	15	15
11	15	15	15	15	15	15	15	27	21	26	29	29	29	30	32	29	21	16	14	15	15	15	18	15
12	15	15	15	15	15	15	15	26	21	23	28	30	32	33	41	29	23	14	18	16	15	15	16	15
13	15	15	15	15	15	15	15	15	23	32	35	34	48	33	32	50	38	21	15	15	15	15	15	15
14	15	15	15	15	15	15	15	15	17	27	30	32	32	40	32	27	27	18	18	16	15	15	15	15
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16	15	15	15	15	15	15	15	17	16	24	29	33	30	32	30	32	23	18	15	15	17	15	15	15
17	15	15	16	15	14	15	15	16	16	30	32	40	34	35	30	29	27	17	15	15	15	16	15	15
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19	15	15	15	20	15	15	15	15	15	20	32	32	41	30	30	28	16	16	15	15	15	15	15	15
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22	15	15	15	14	15	15	15	16	32	40	26	38	39	40	32	33	22	15	14	15	15	16	15	15
23	15	15	15	15	15	15	15	15	33	35	29	32	30	32	33	27	27	18	15	16	15	15	15	15
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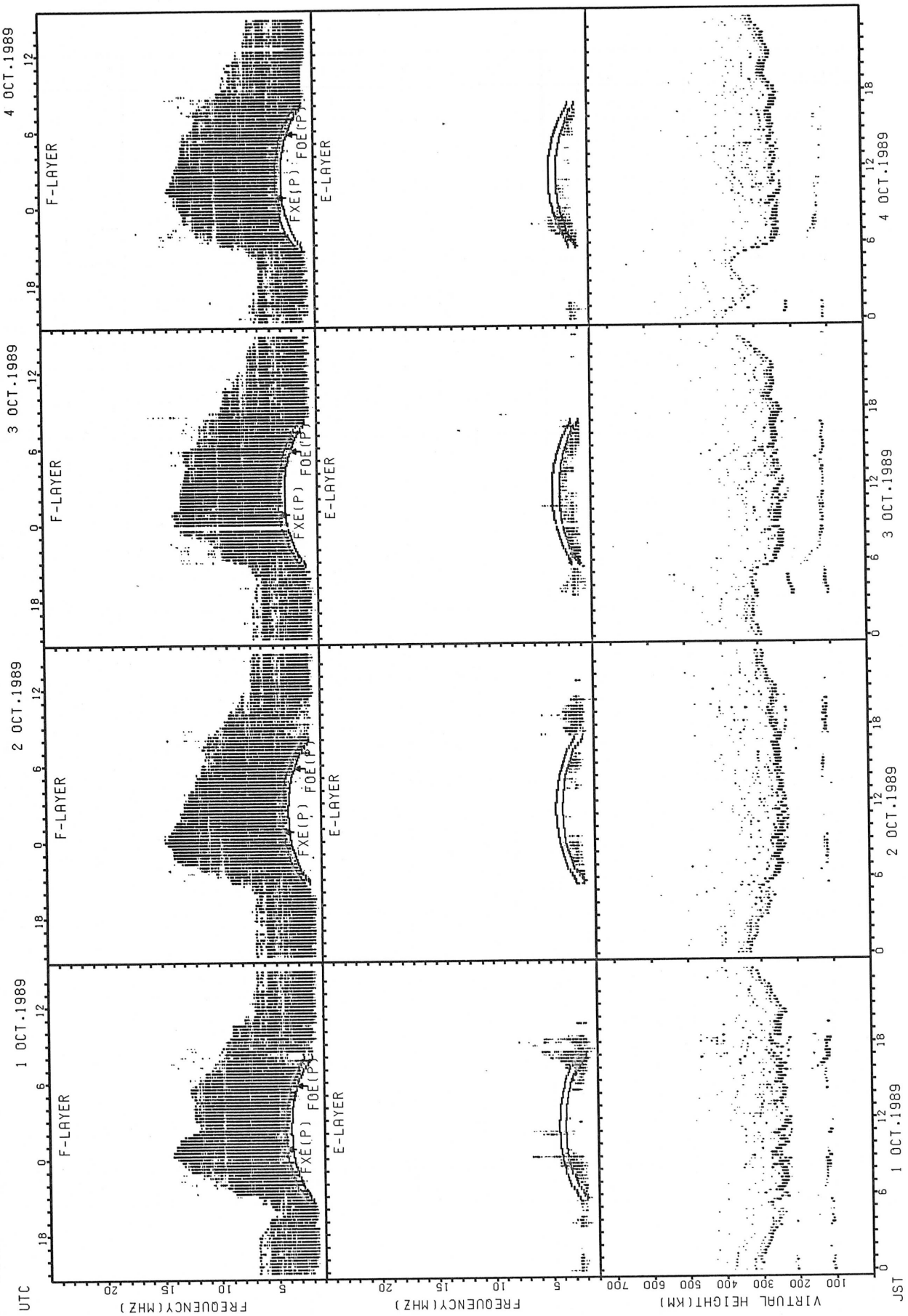
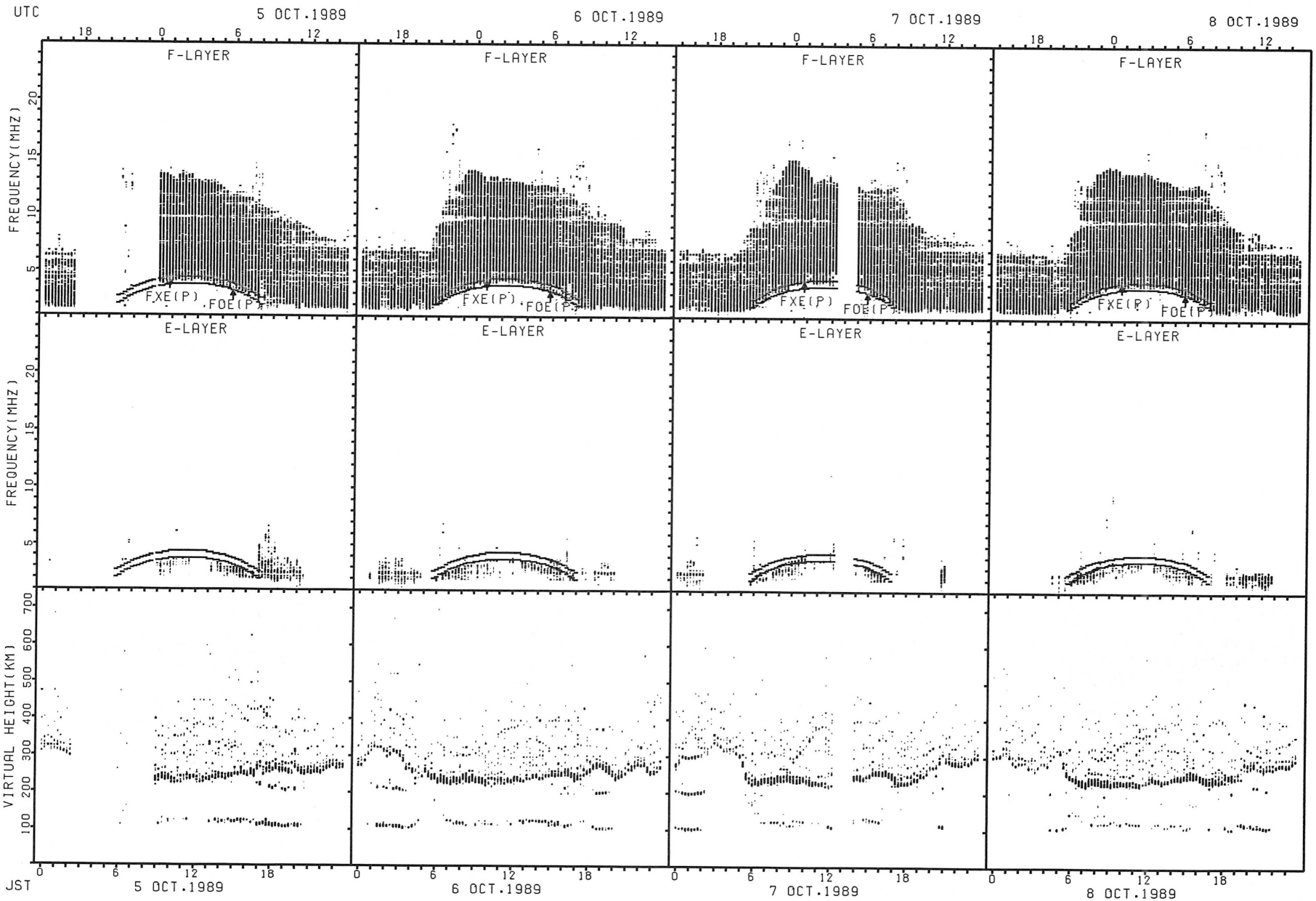
25	16	15	15	15	15	16	15	28	33	39	39	49	44	31	33	27	26	14	14	15	15	15	15	15
26	15	15	15	16	15	15	15	24	20	21	28	40	32	32	29	27	26	27	14	14	14	16	15	15
27	15	15	15	15	15	15	N	16	28	39	29	32	30	29	28	27	20	15	15	15	15	15	15	15
28	18	15	15	14	15	15	22	16	15	21	27	32	38	44	41	40	34	29	14	15	15	15	15	15
29	16	15	15	15	15	15	15	16	30	21	29	39	40	49	49	36	32	23	15	15	15	15	16	16
30	15	15	15	15	15	16		26	21	24	29	29	30	29	29	28	22	20	18	15	15	15	15	15
31	15	15	17	15	15	15	15	15	17	22	27	29	29	29	29	30	23	16	15	16	16	16		16
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	29	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	30	31
MED	15	15	15	15	15	15	15	16	20	27	29	32	32	33	32	29	24	17	15	15	15	15	15	15
U Q	16	15	15	15	15	15	15	17	23	32	34	40	41	42	41	30	27	21	15	15	15	15	15	15
L Q	15	15	15	15	15	15	15	15	17	23	28	30	30	30	29	27	22	16	14	15	15	15	15	15

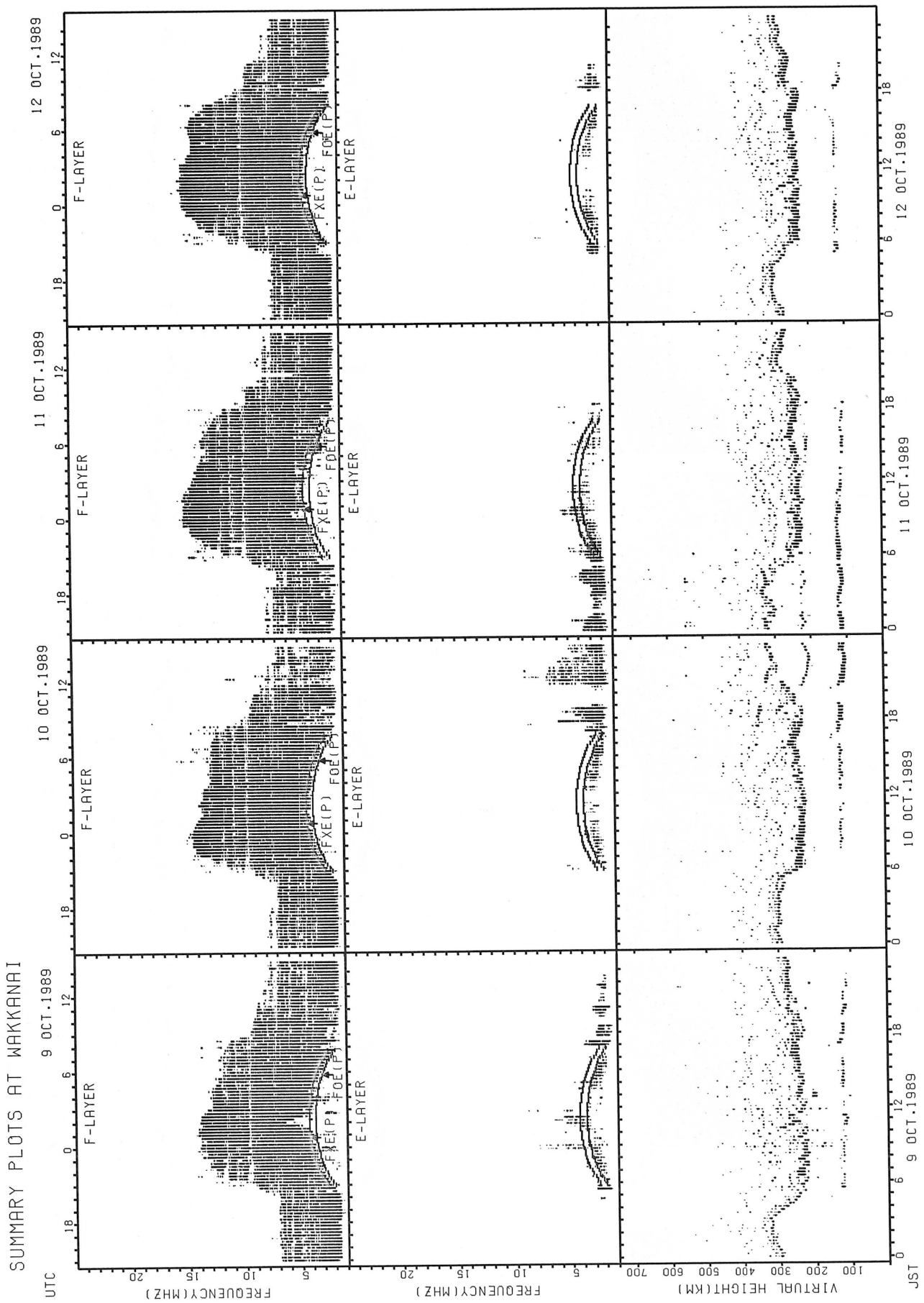
COMMUNICATIONS RESEARCH LABORATORY, JAPAN


SUMMARY PLOTS AT WAKKANAI
1 OCT.1989
2 OCT.1989
3 OCT.1989
4 OCT.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

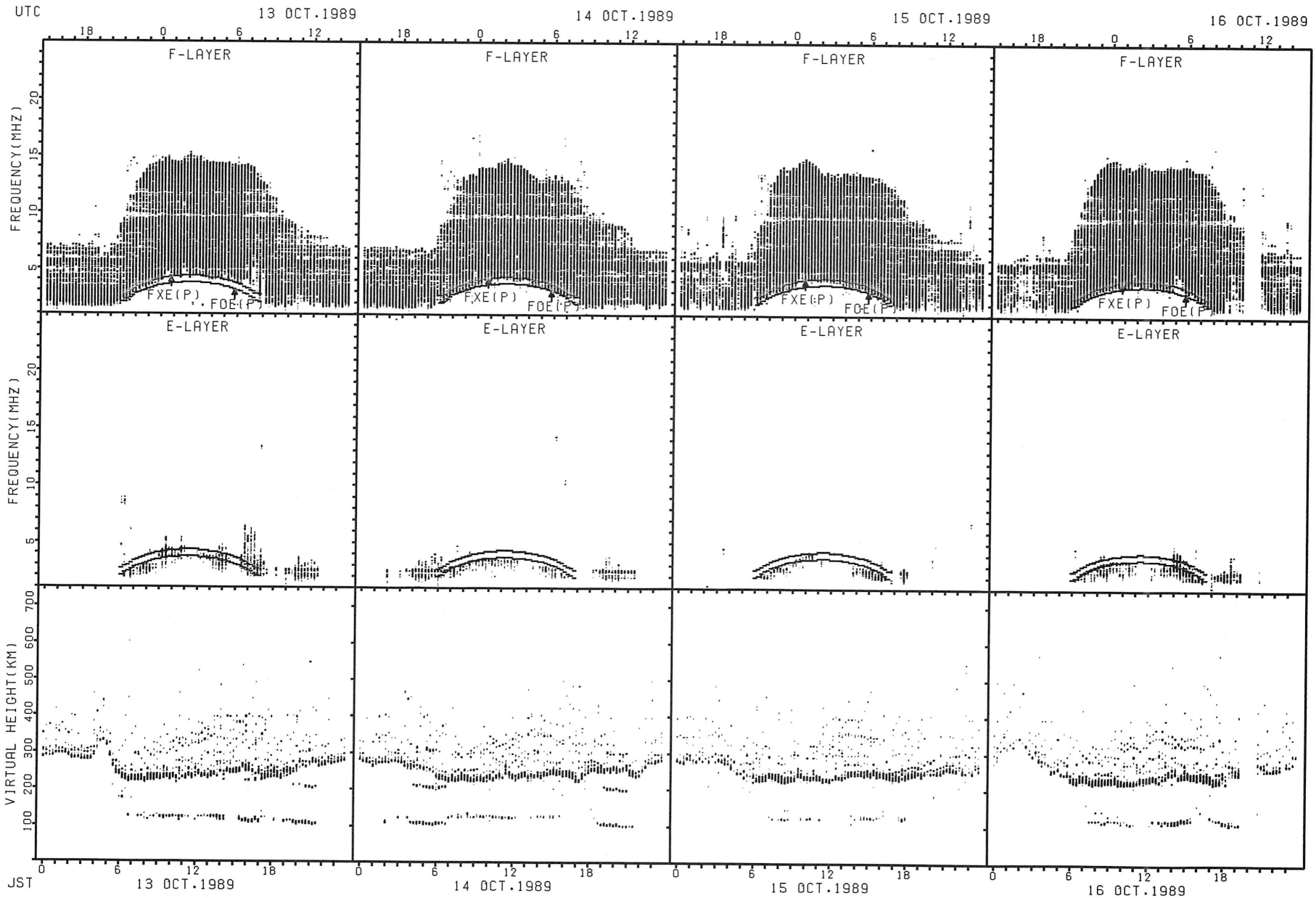
SUMMARY PLOTS AT WAKKANAI



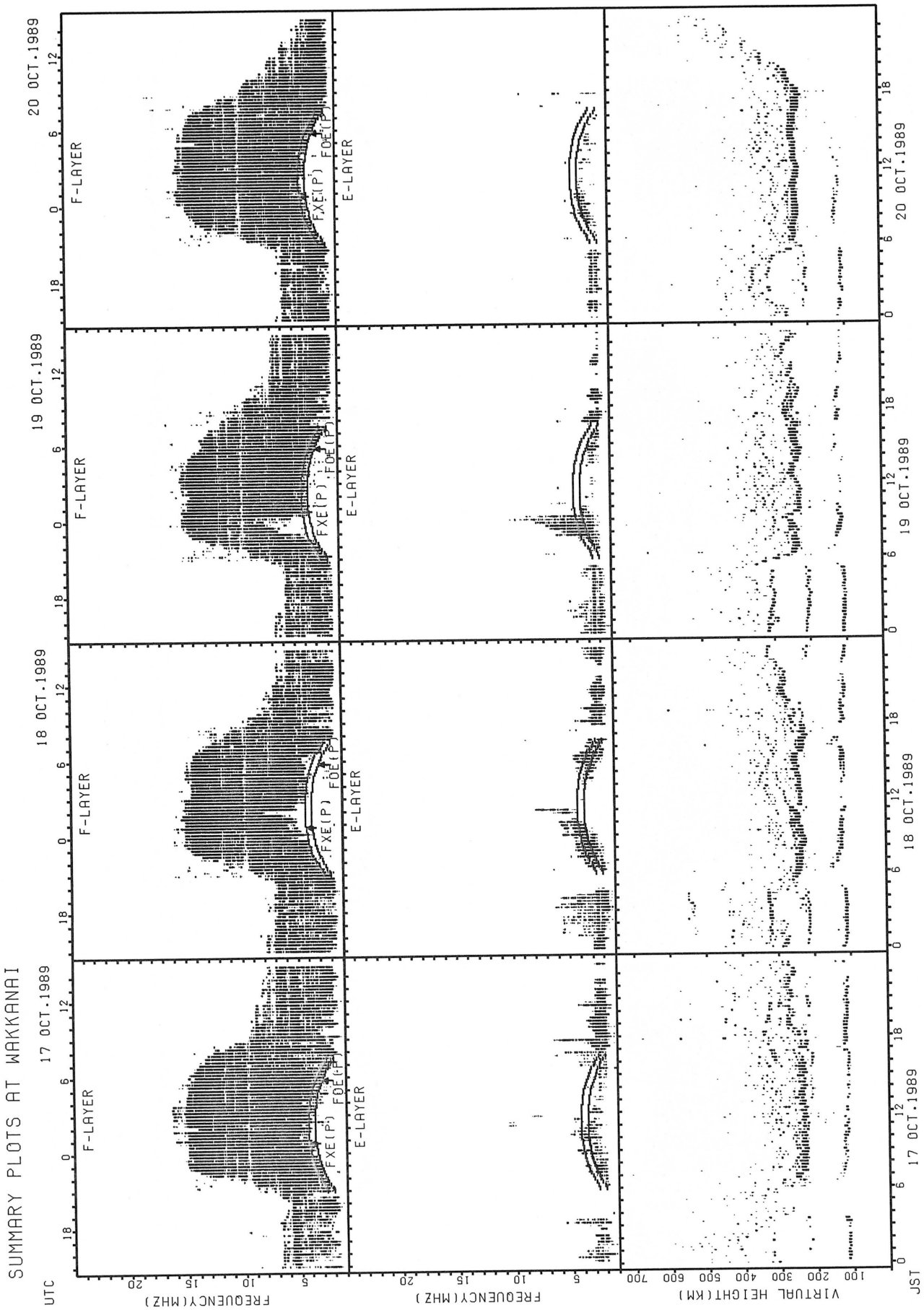
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


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

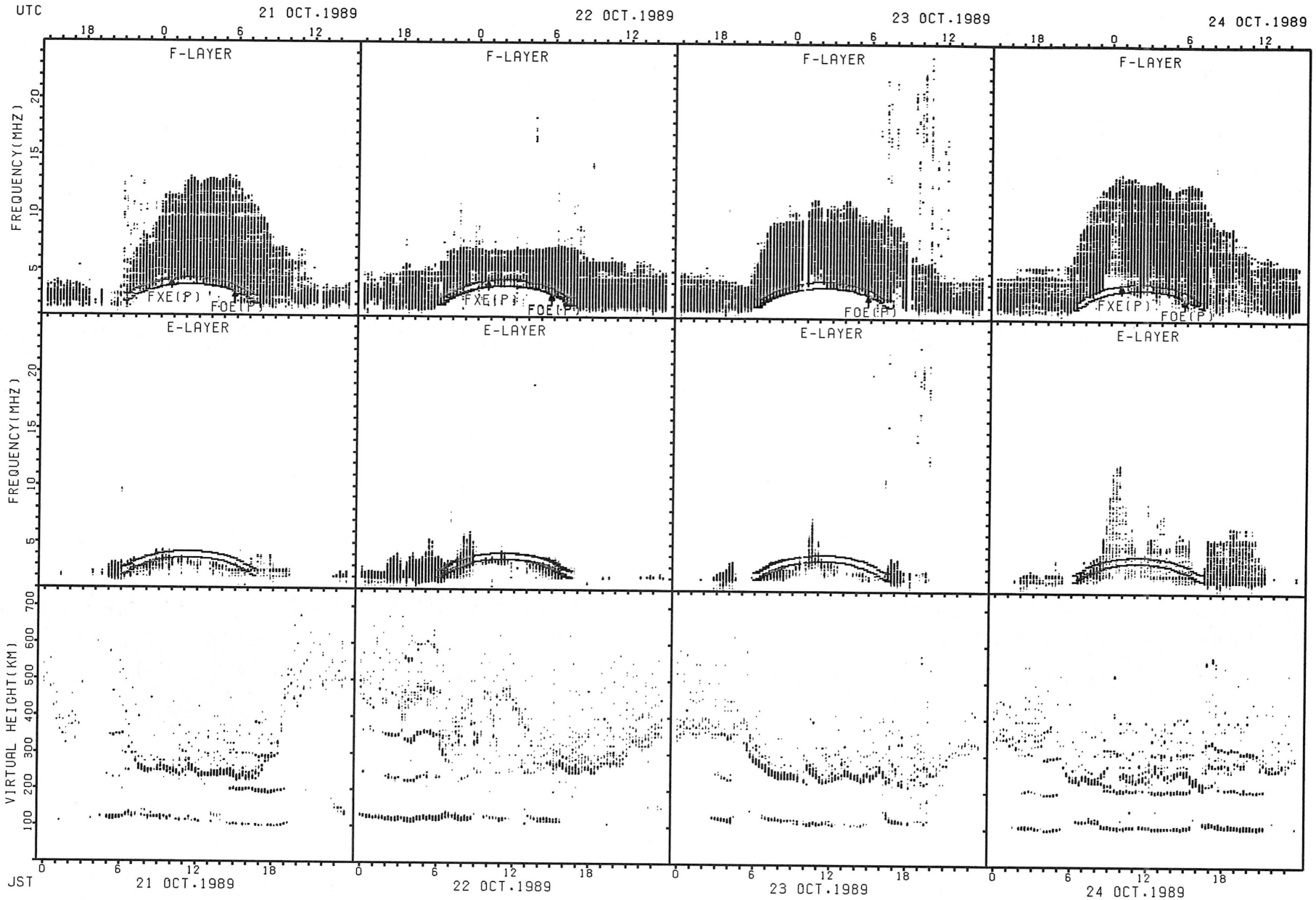
SUMMARY PLOTS AT WAKKANAI



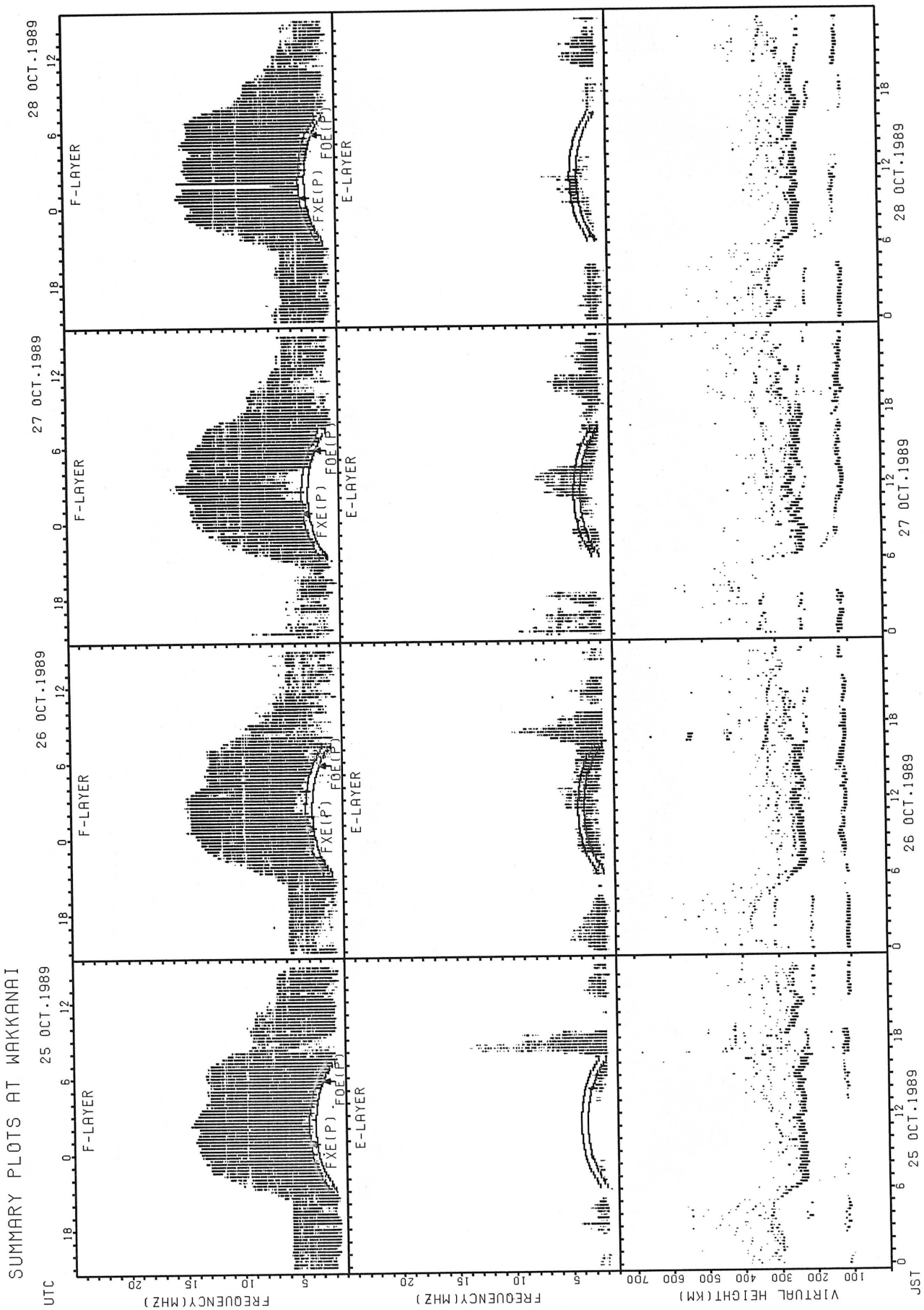
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
UTC
17 OCT.1989
18 OCT.1989
19 OCT.1989
20 OCT.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

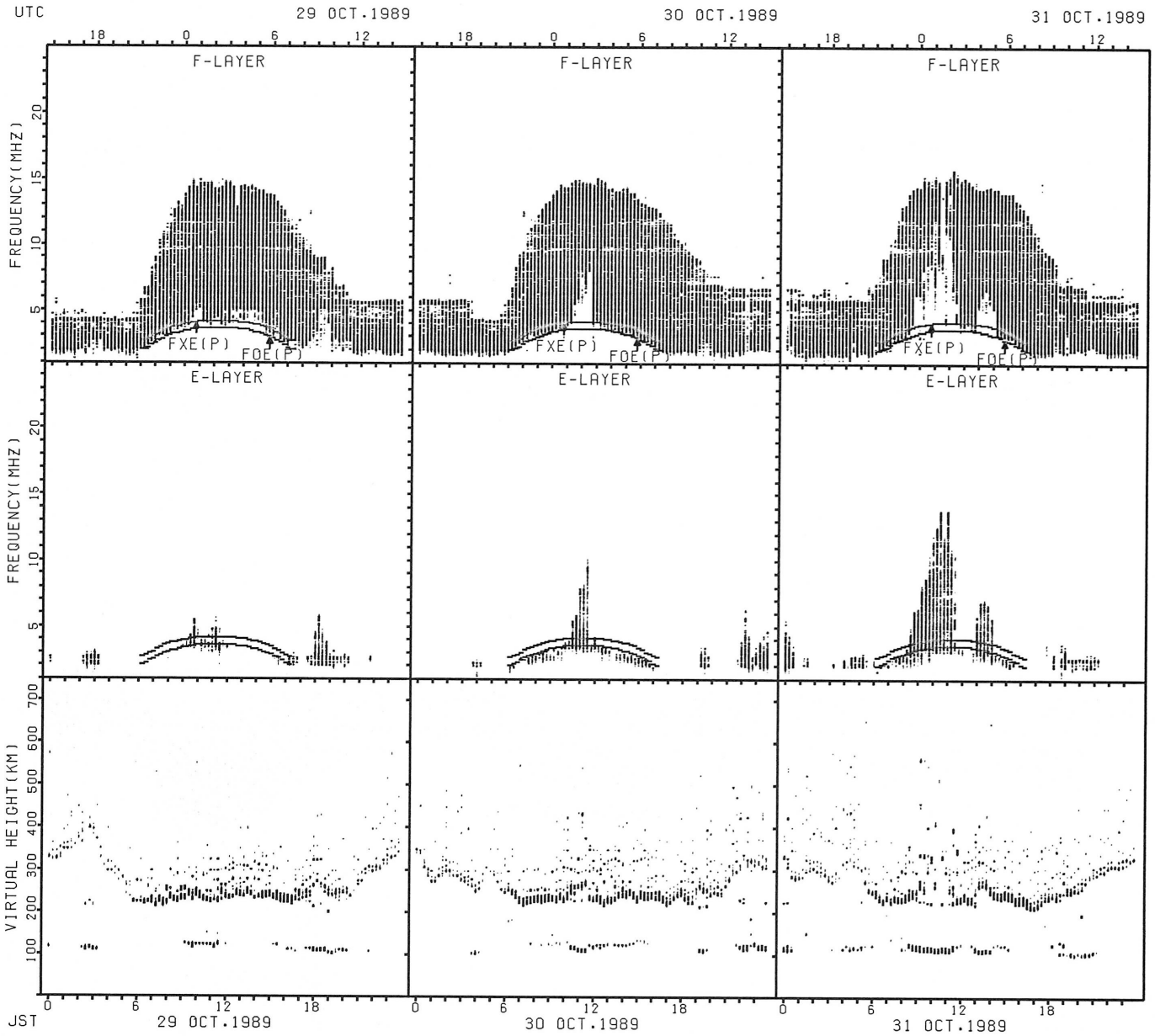
SUMMARY PLOTS AT WAKKANAI



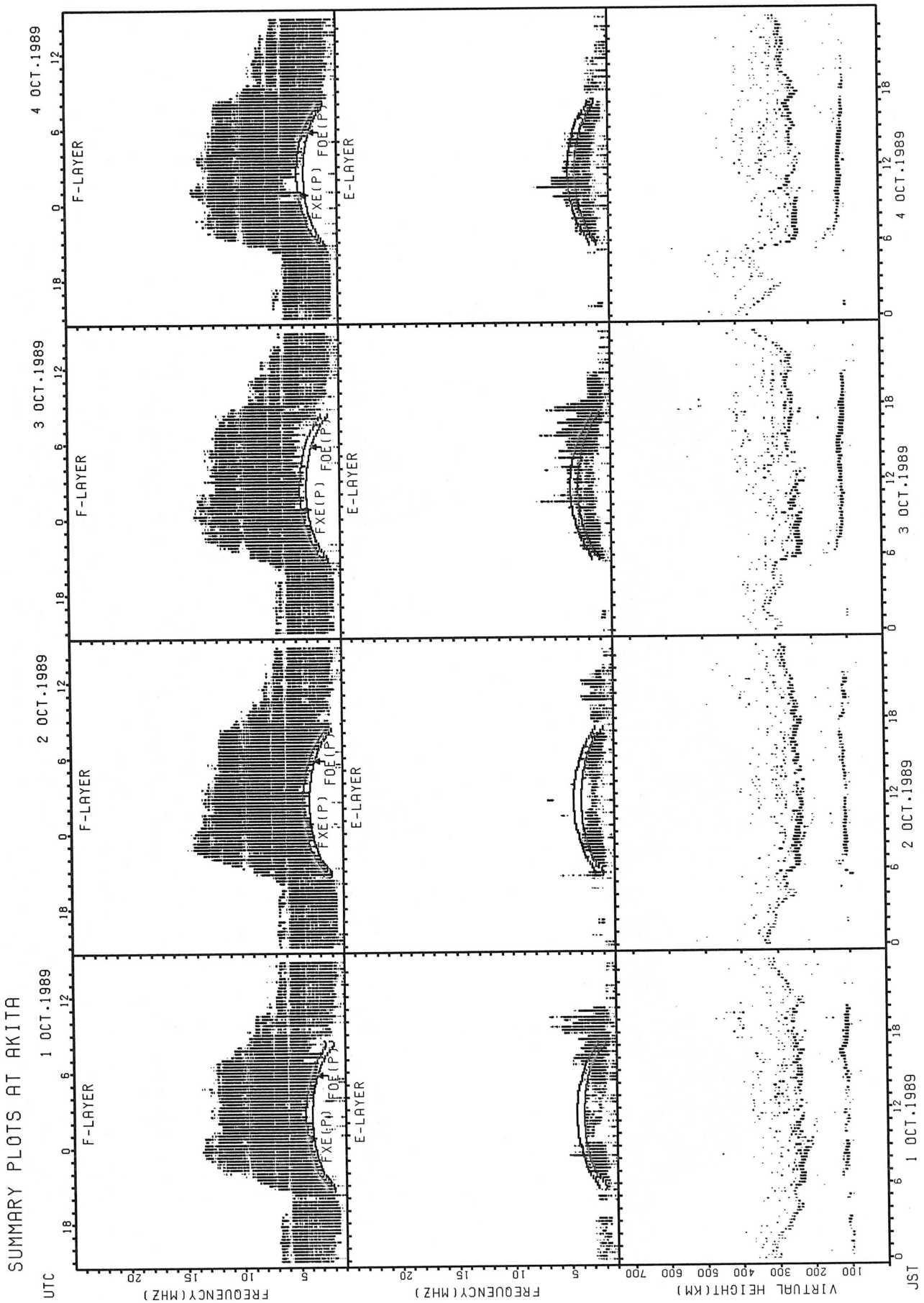
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

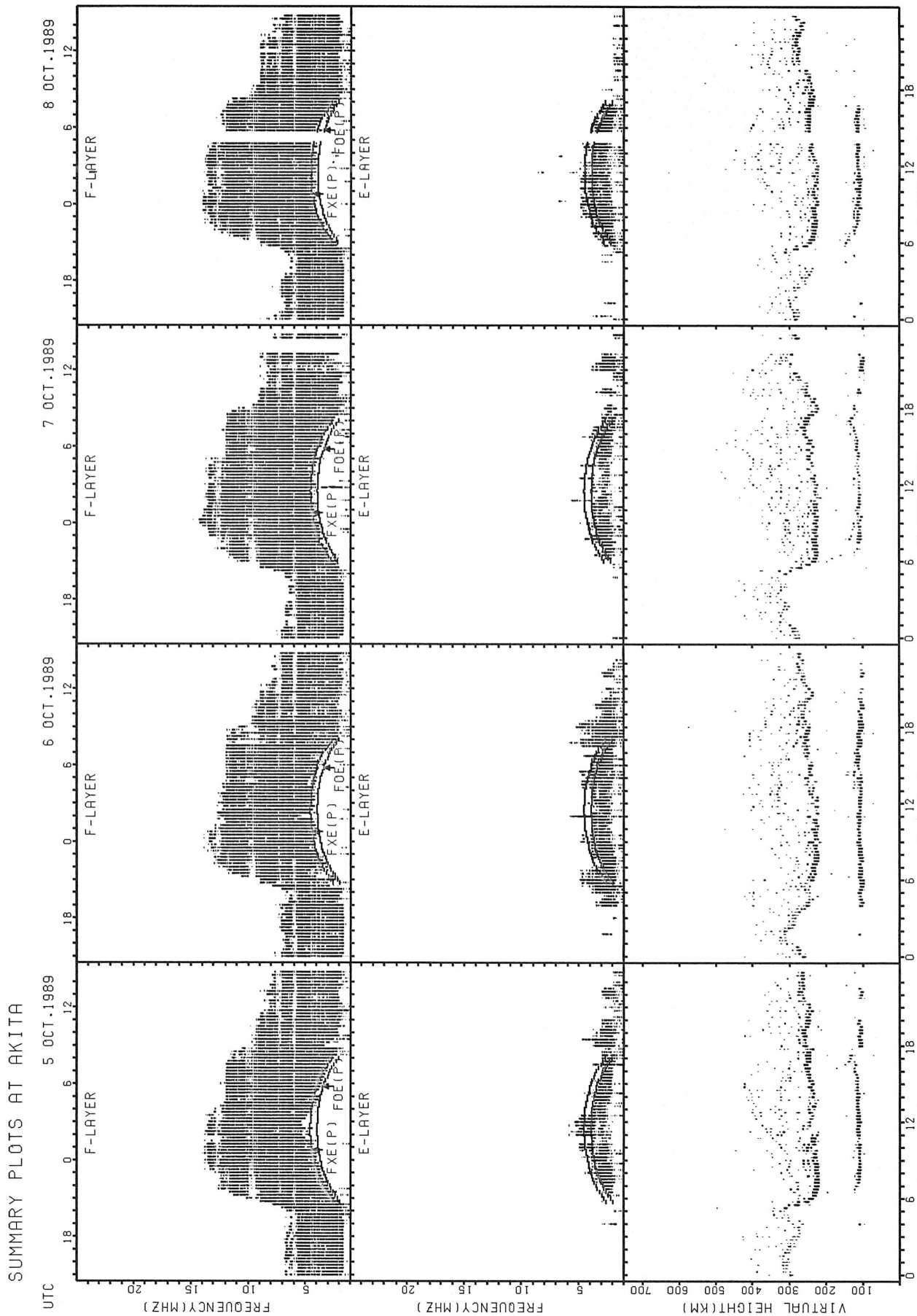

SUMMARY PLOTS AT WAKKANAI
25 OCT.1989
26 OCT.1989
27 OCT.1989
28 OCT.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
UTC
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

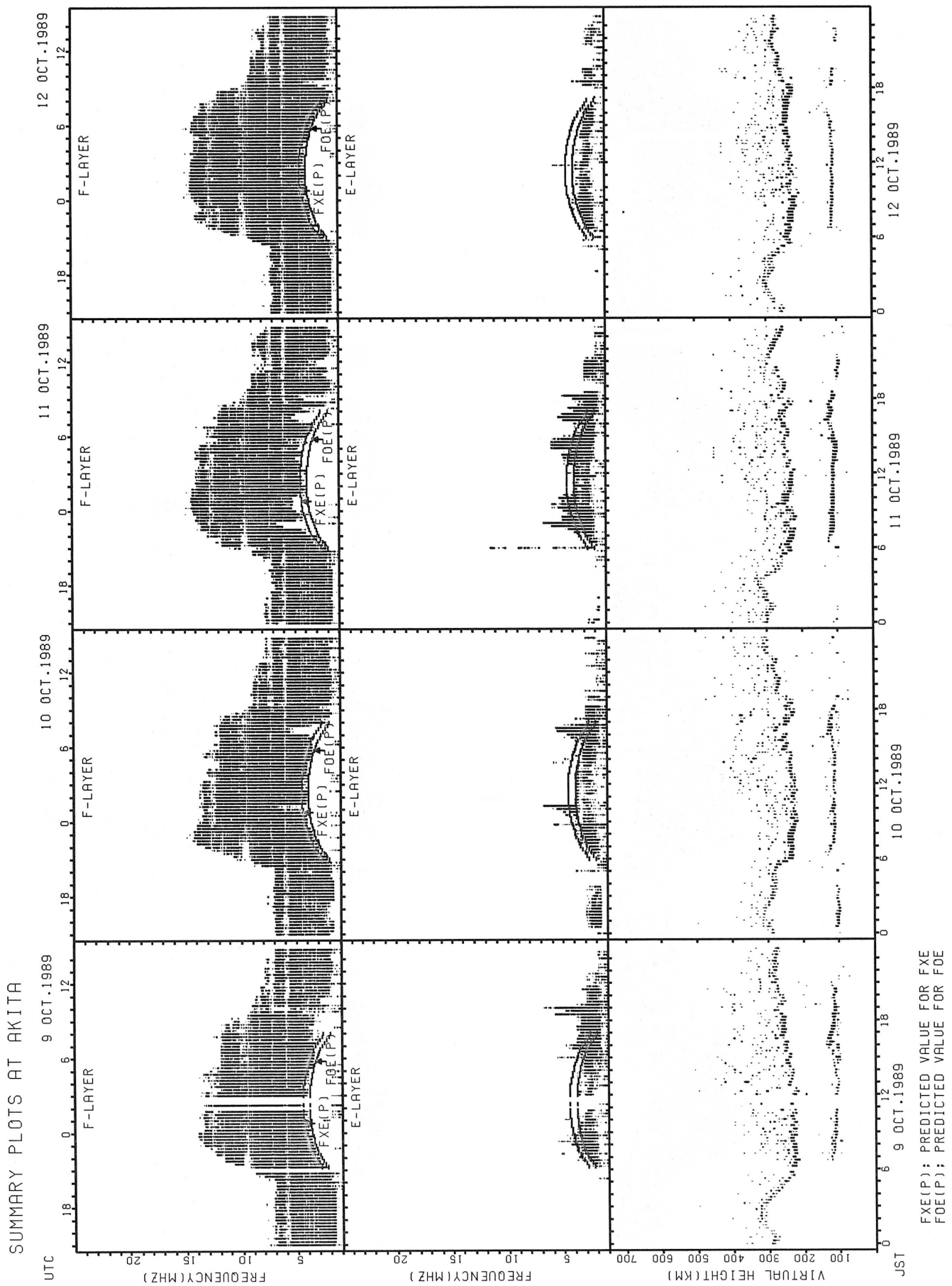
SUMMARY PLOTS AT WAKKANAI



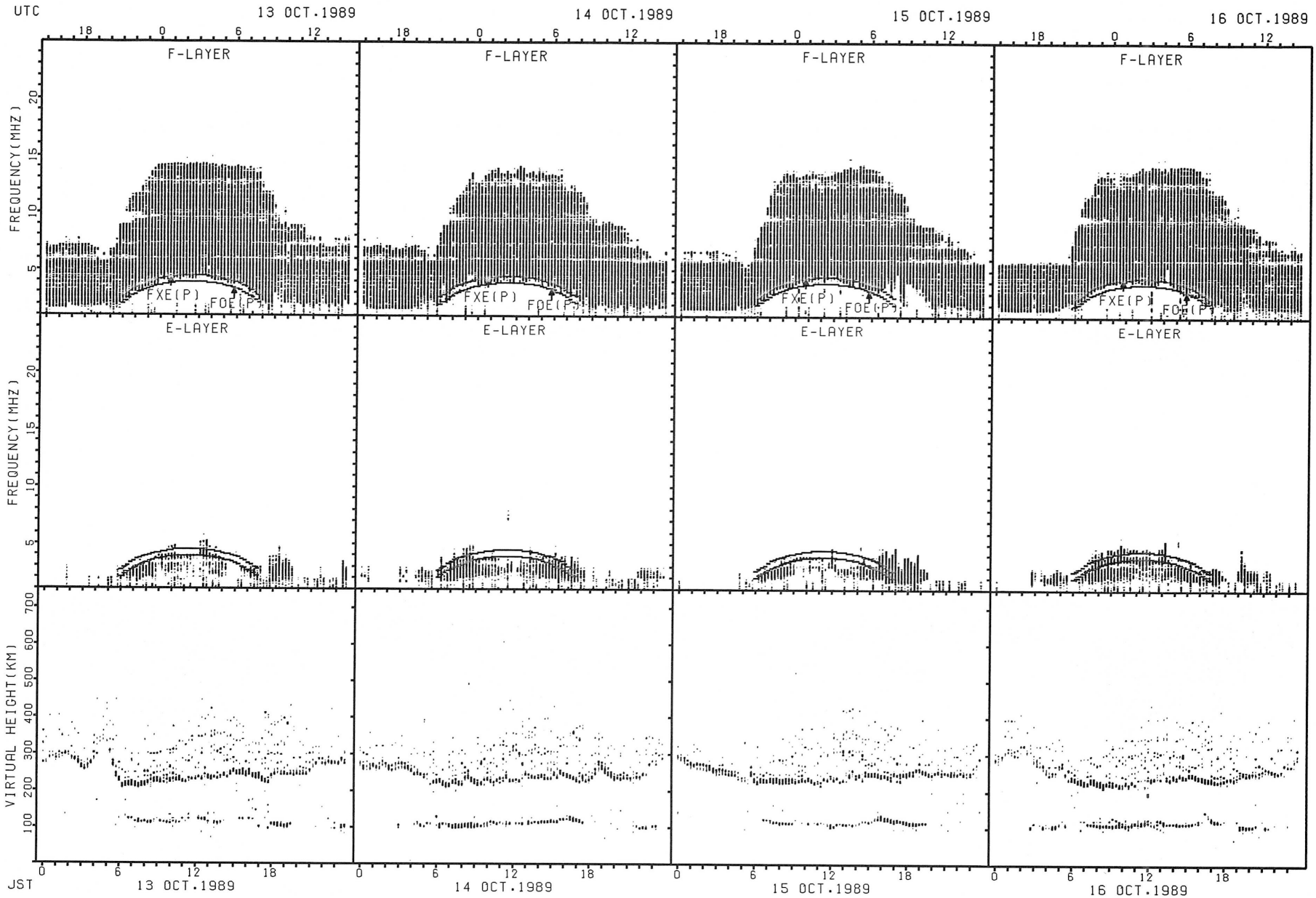
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT AKITA
1 OCT.1989
2 OCT.1989
3 OCT.1989
4 OCT.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

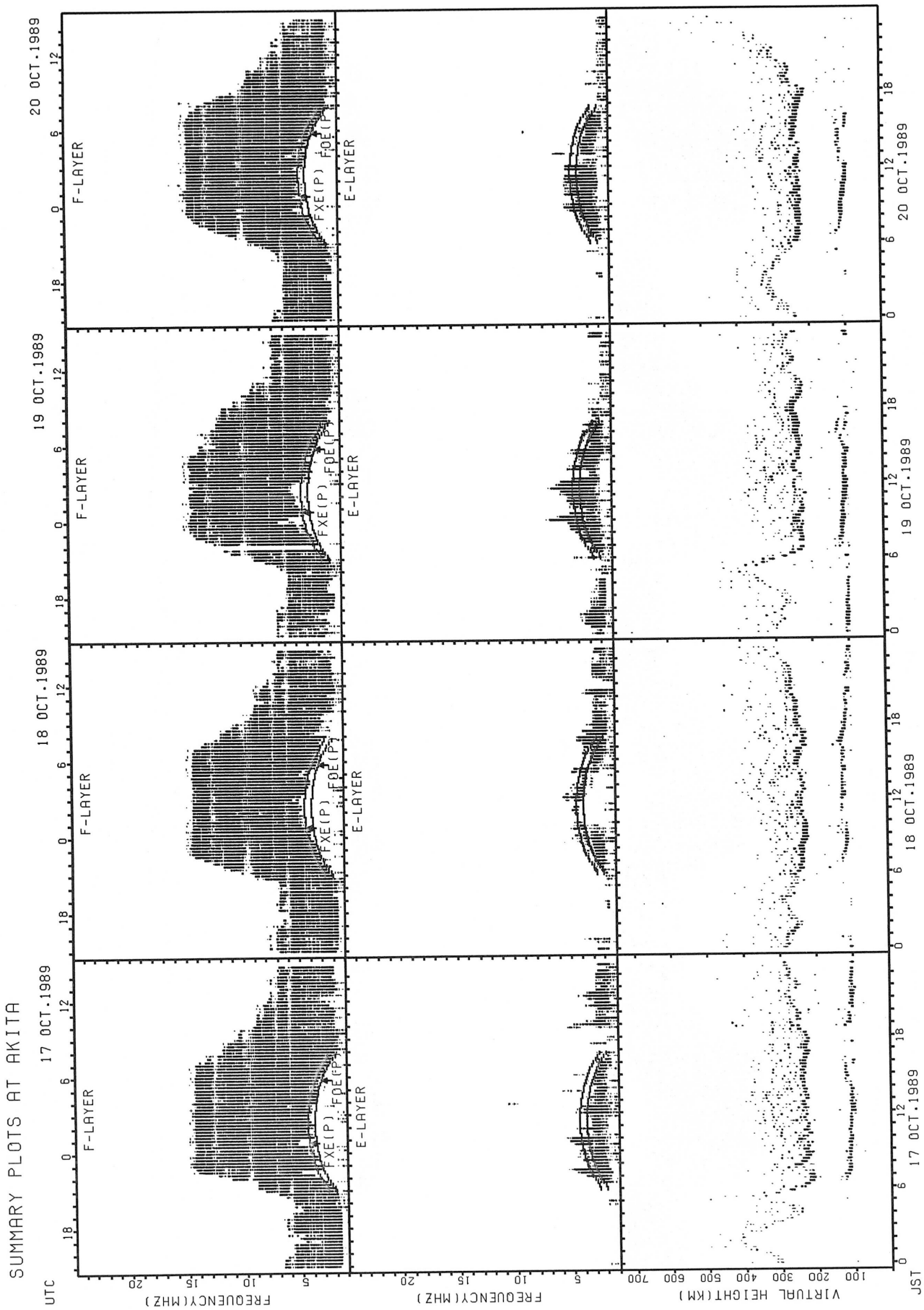

SUMMARY PLOTS AT AKITA
UTC
JST
5 OCT.1989
6 OCT.1989
7 OCT.1989
8 OCT.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT AKITA
9 OCT.1989
10 OCT.1989
11 OCT.1989
12 OCT.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

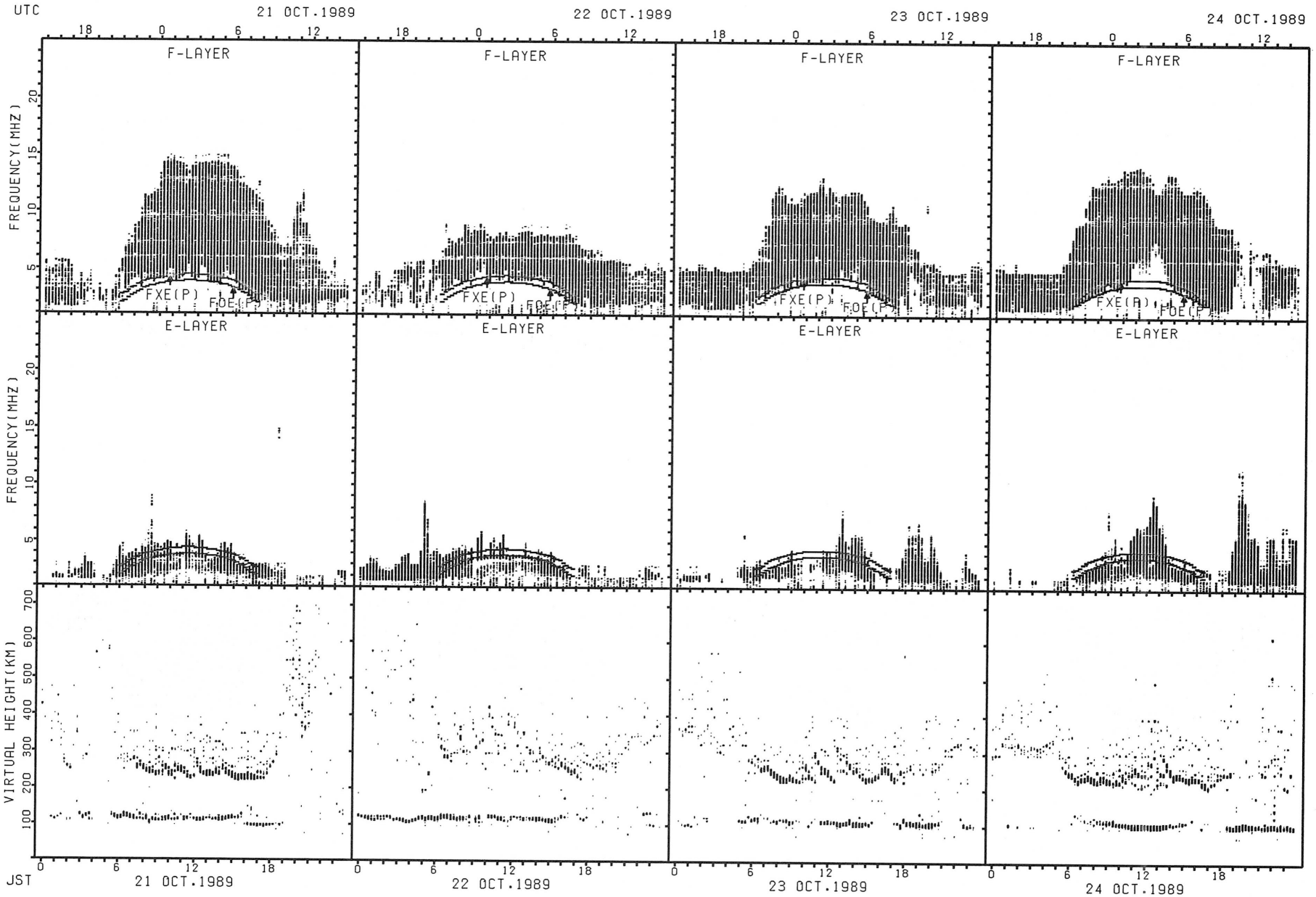
SUMMARY PLOTS AT AKITA



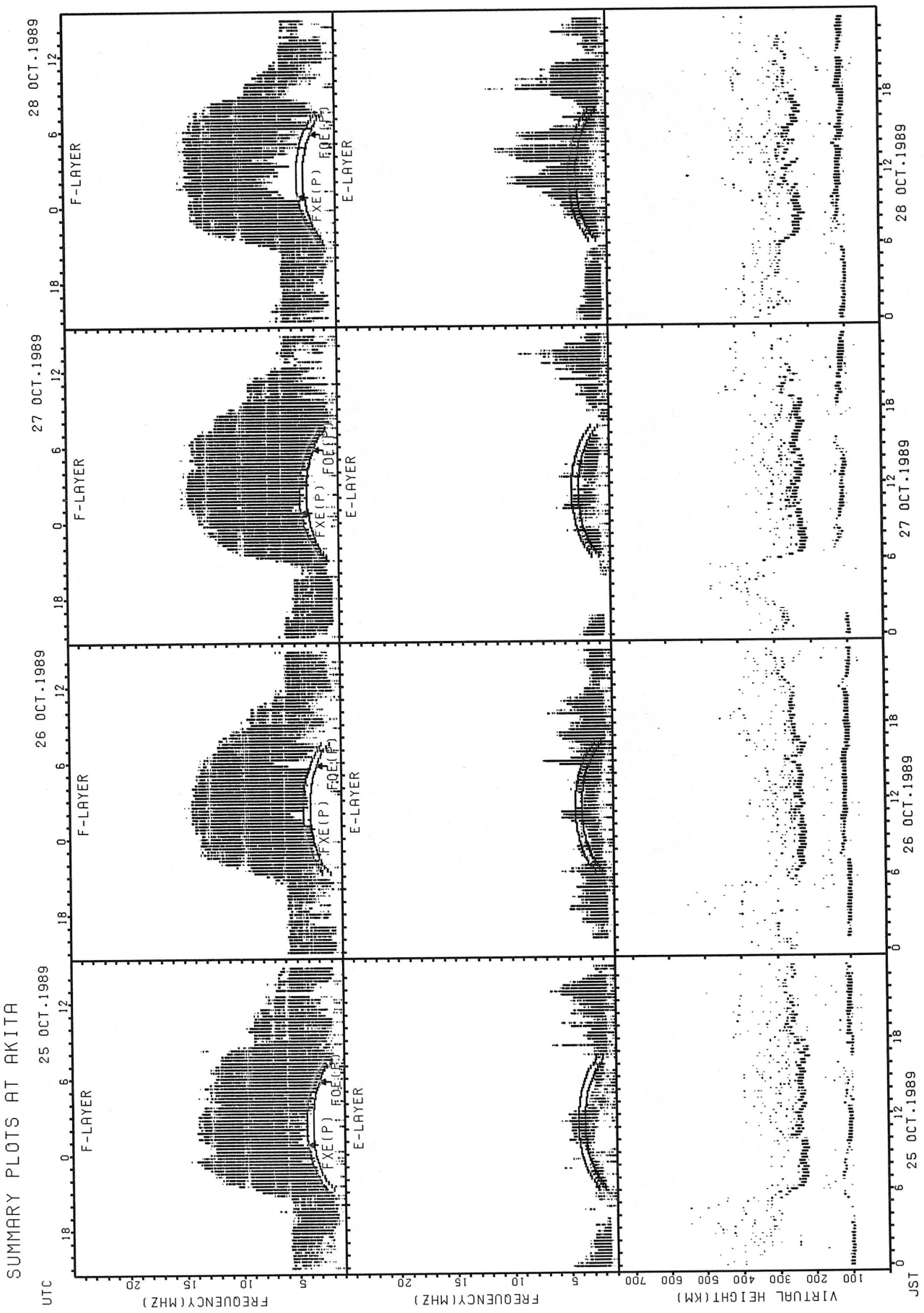
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT AKITA
17 OCT.1989
18 OCT.1989
19 OCT.1989
20 OCT.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

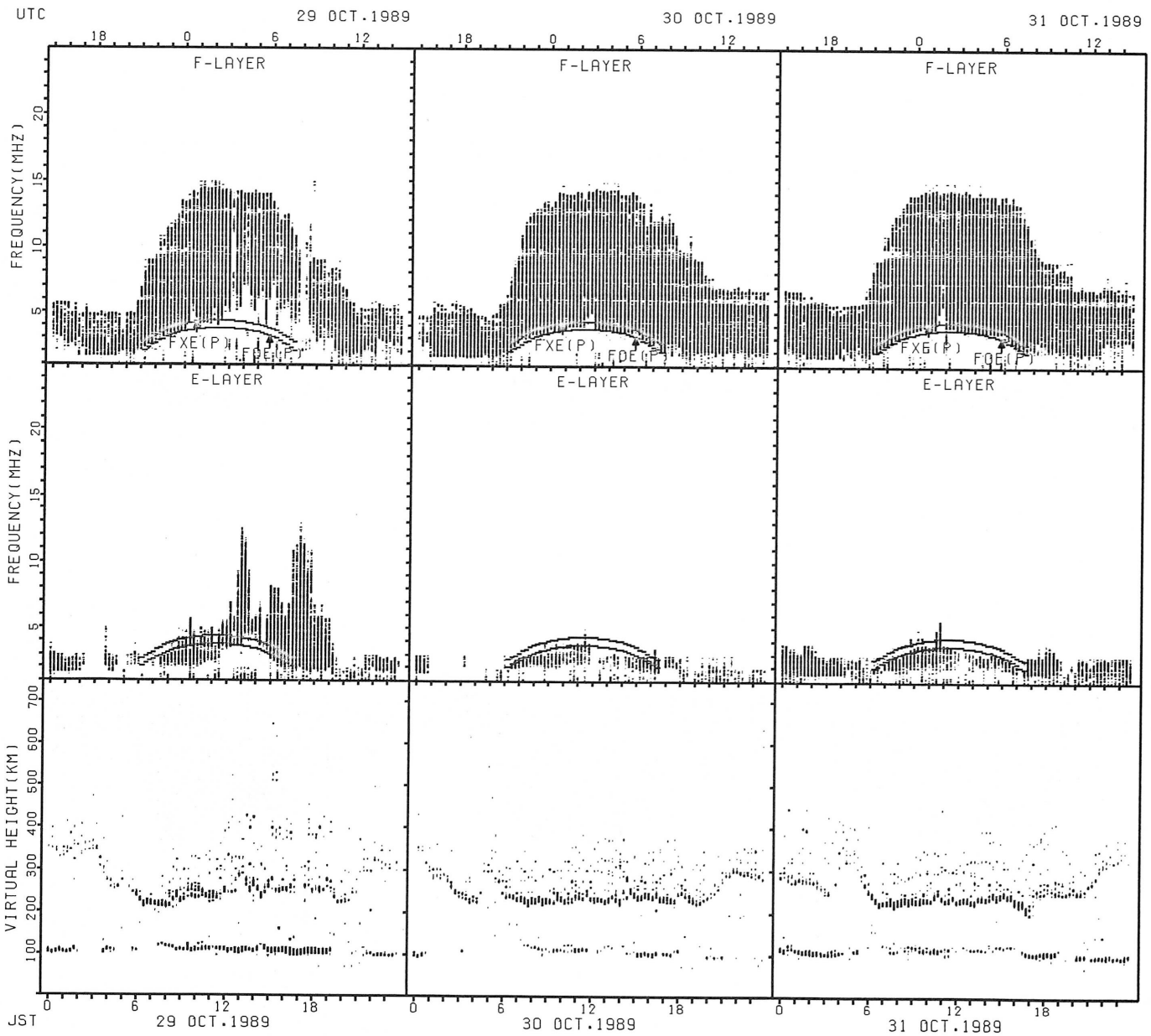
SUMMARY PLOTS AT AKITA



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

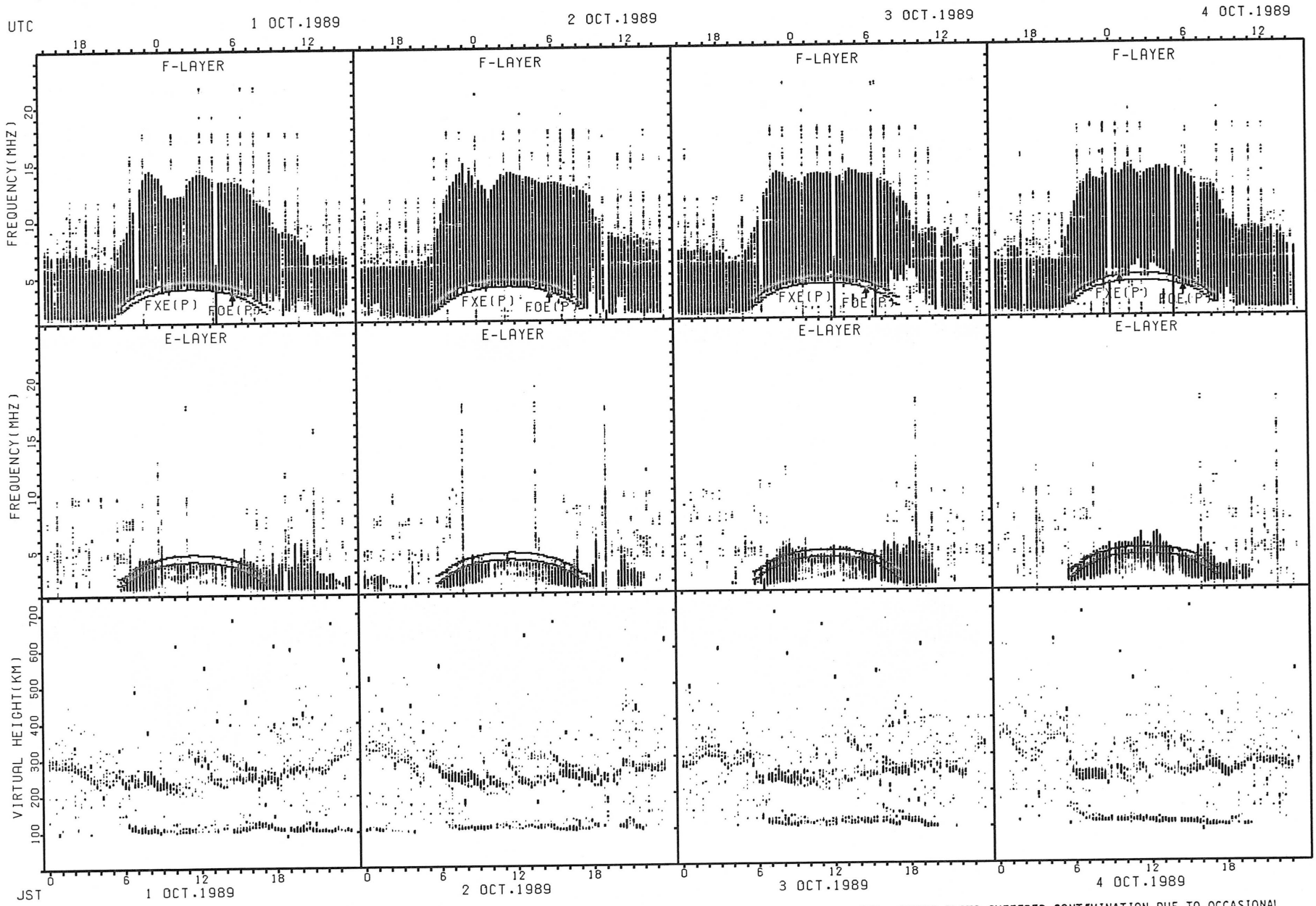

SUMMARY PLOTS AT AKITA
UTC
25 OCT.1989
26 OCT.1989
27 OCT.1989
28 OCT.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT AKITA



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

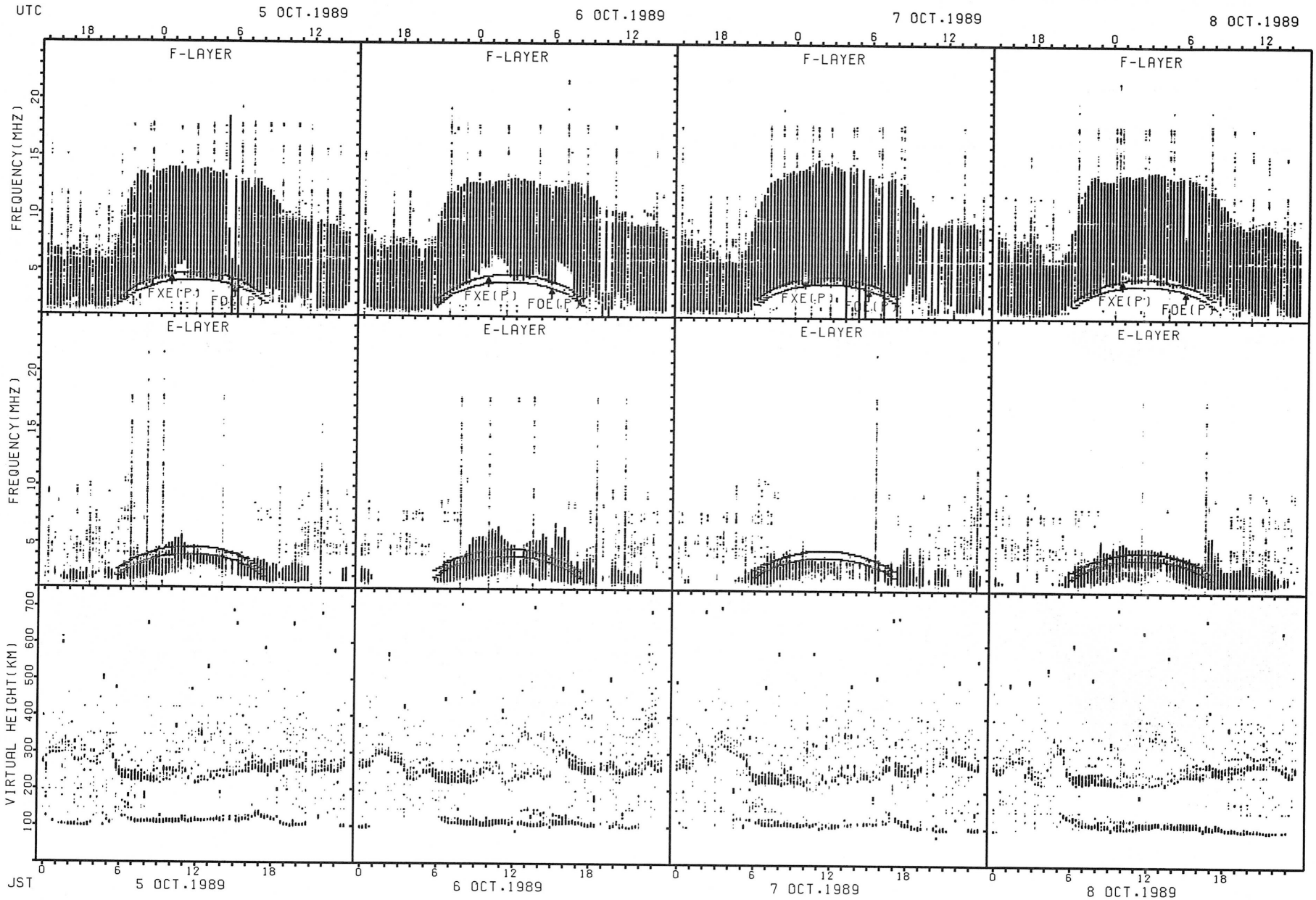
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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

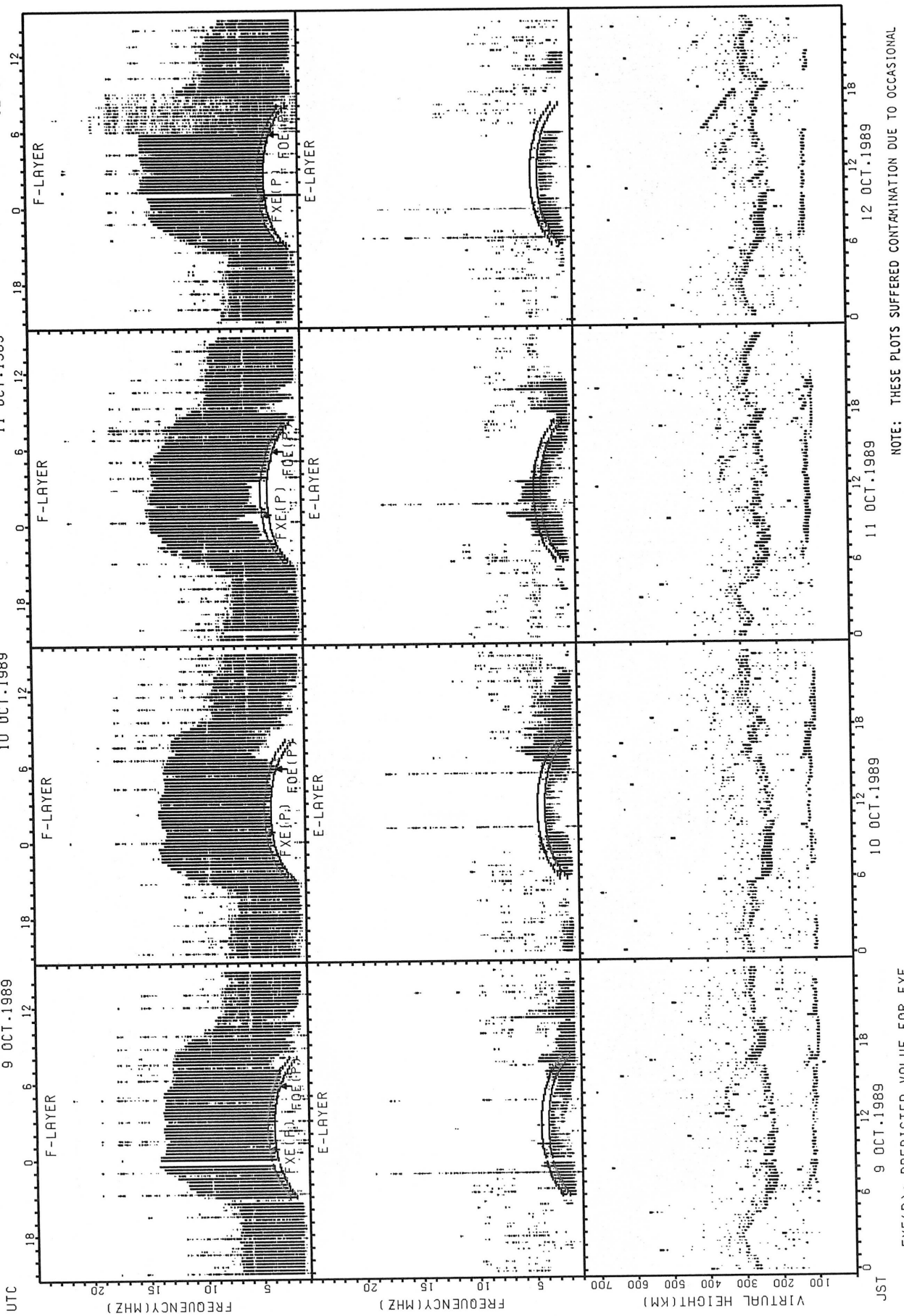
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.

SUMMARY PLOTS AT KOKUBUNJI TOKYO

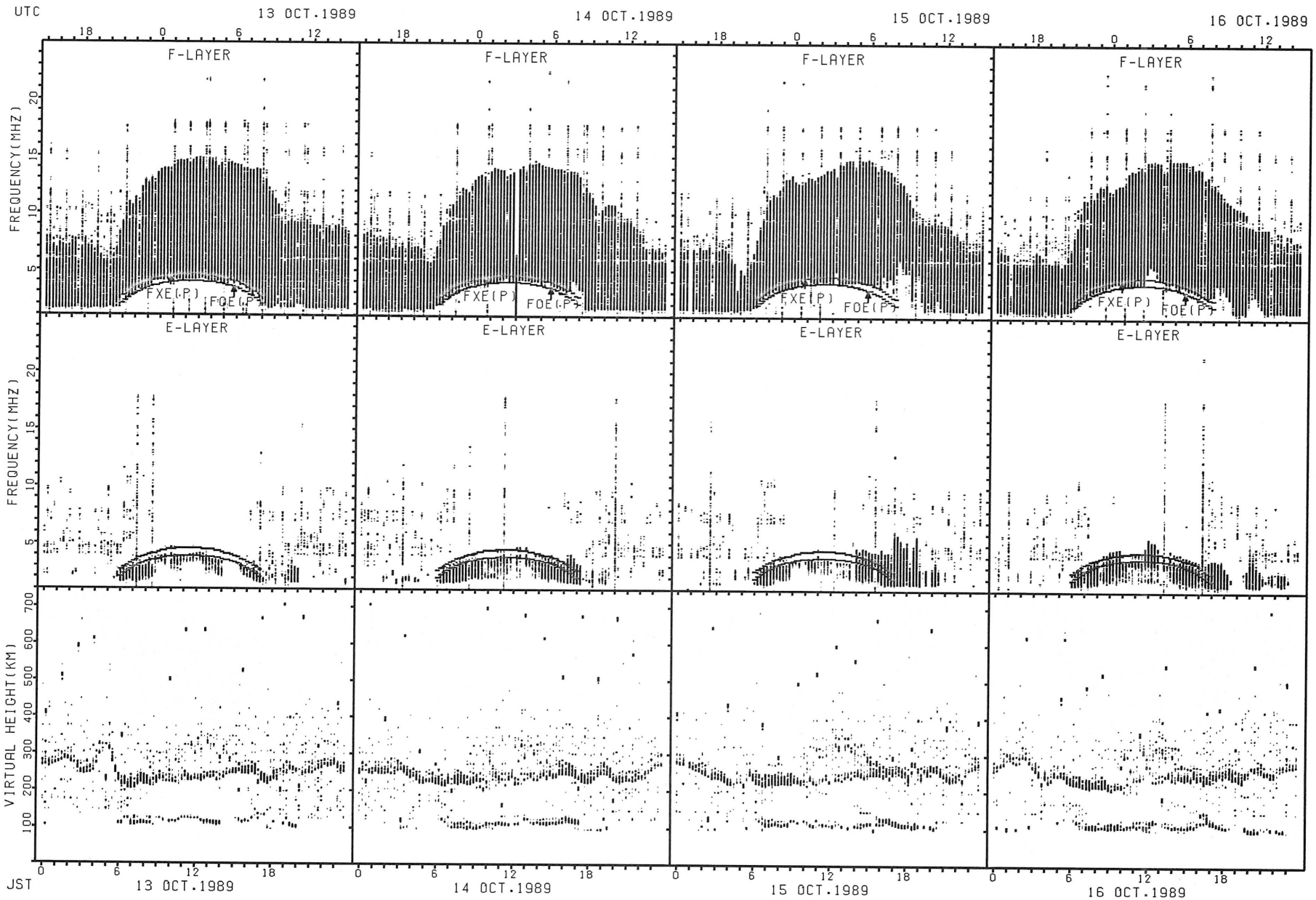


FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

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

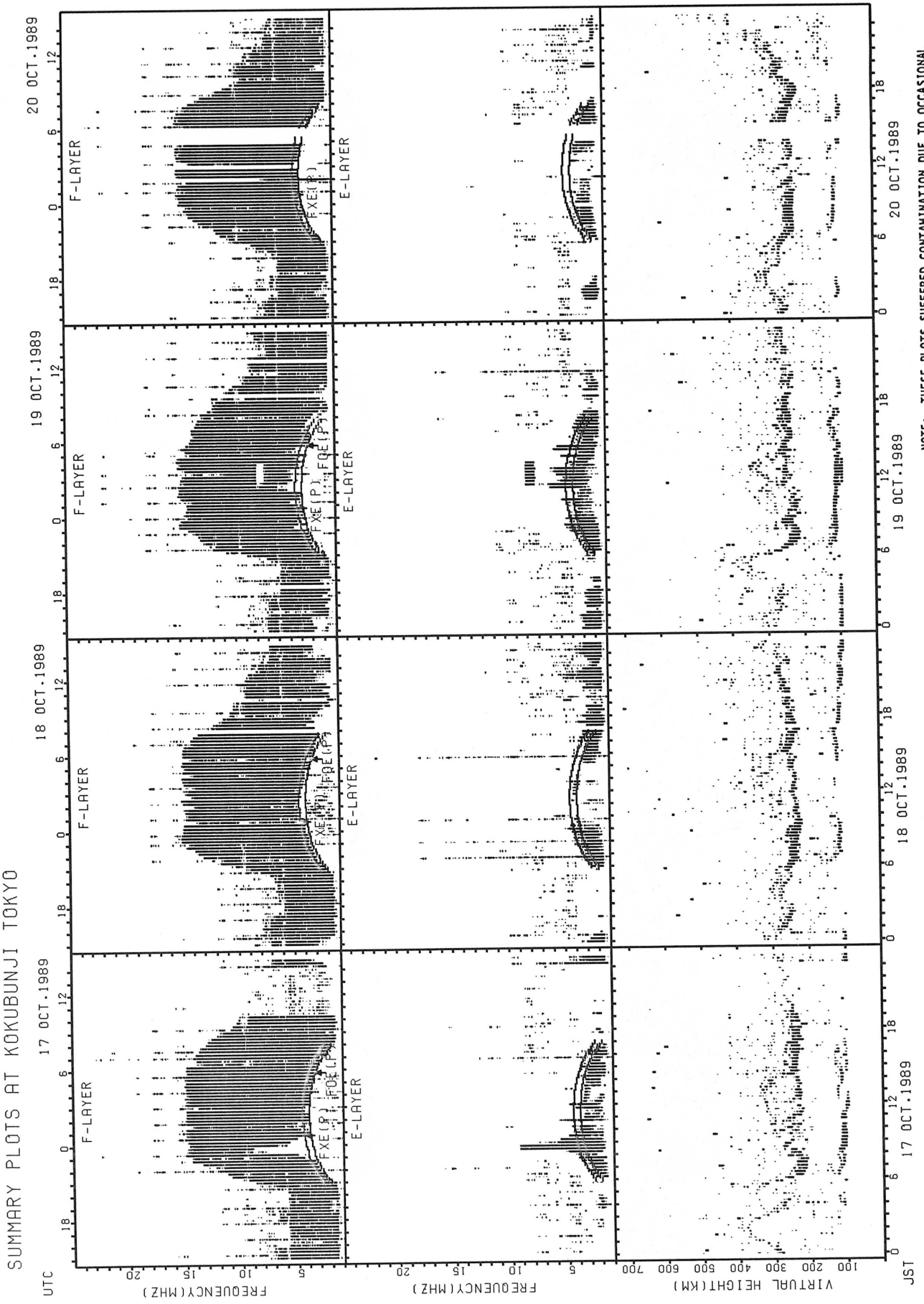

SUMMARY PLOTS AT KOKUBUNJI TOKYO
9 OCT.1989
10 OCT.1989
11 OCT.1989
12 OCT.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
UTC
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL
MALFUNCTION OF THE IONOSONDE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

SUMMARY PLOTS AT KOKUBUNJI TOKYO

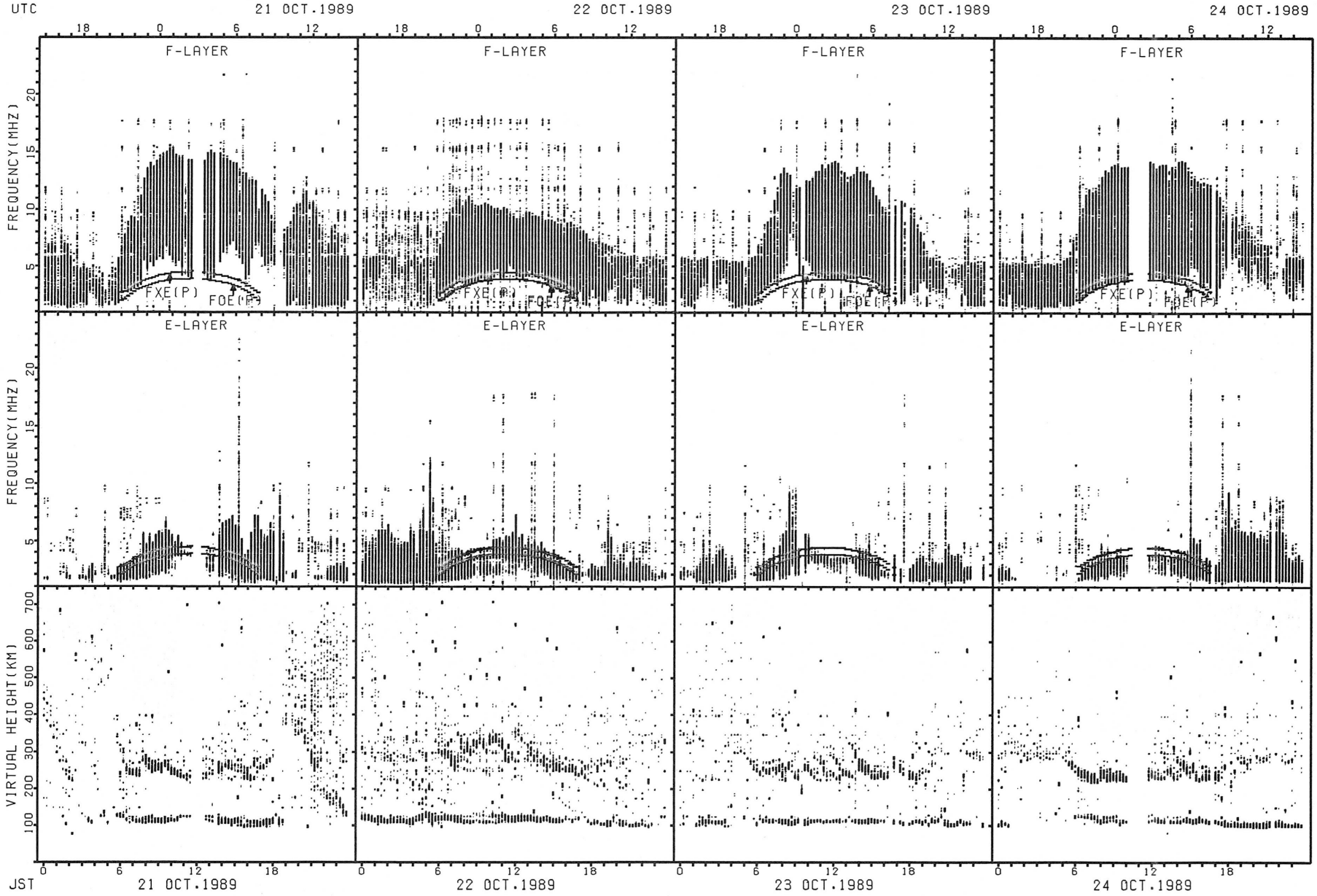


FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

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

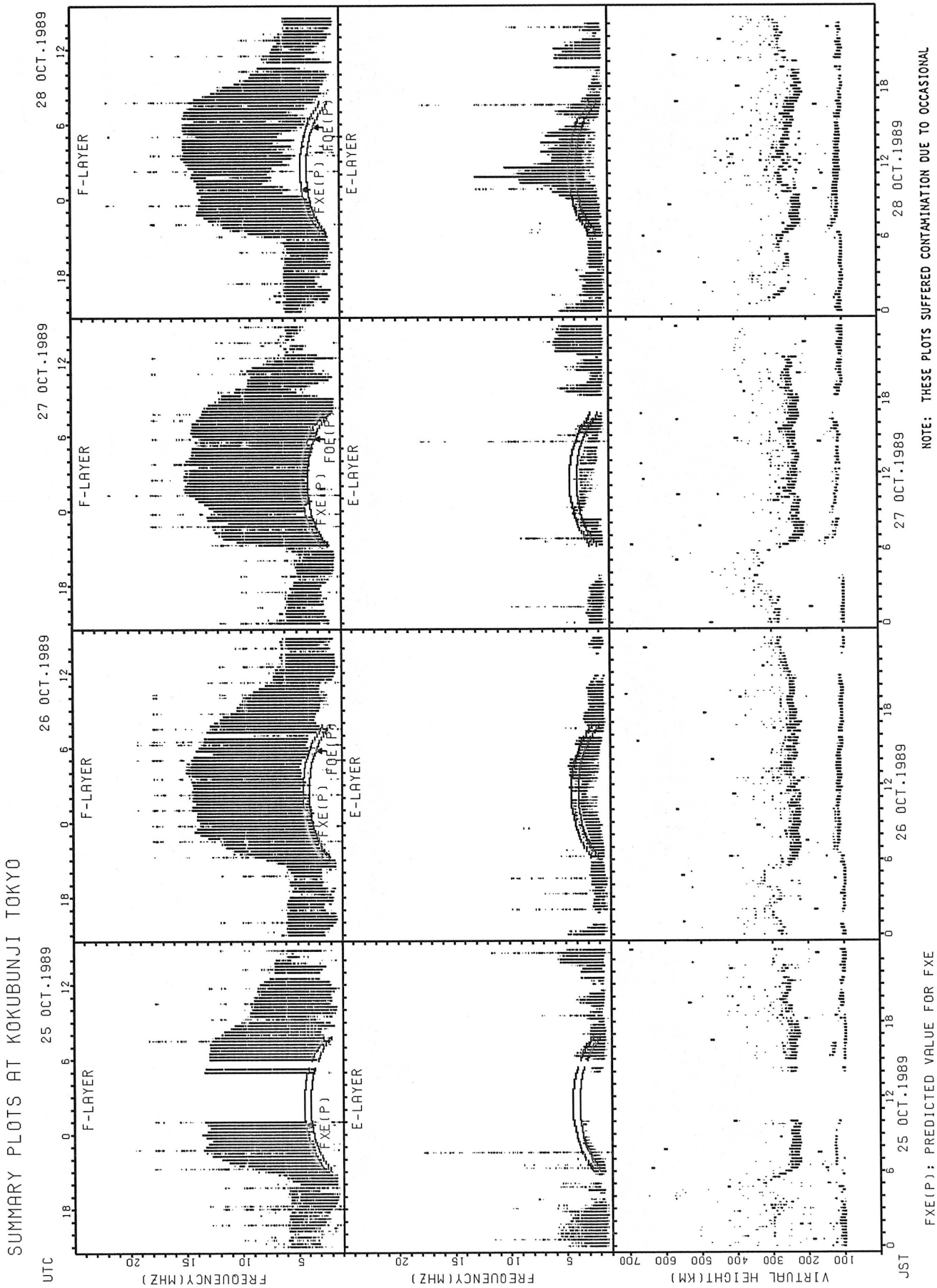

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
JST
17 OCT.1989
18 OCT.1989
19 OCT.1989
20 OCT.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL
MALFUNCTION OF THE IONOSONDE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

SUMMARY PLOTS AT KOKUBUNJI TOKYO

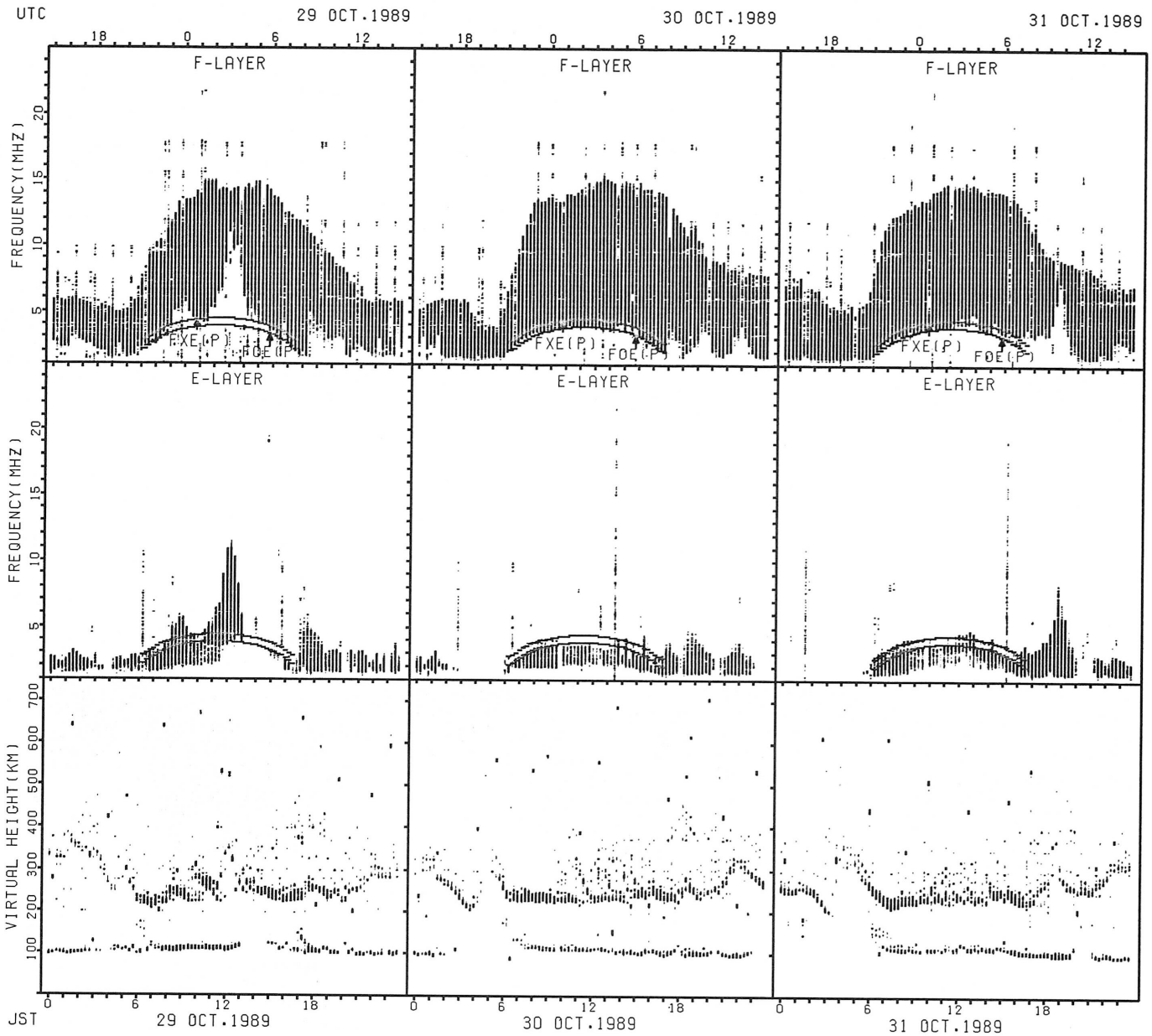


FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

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

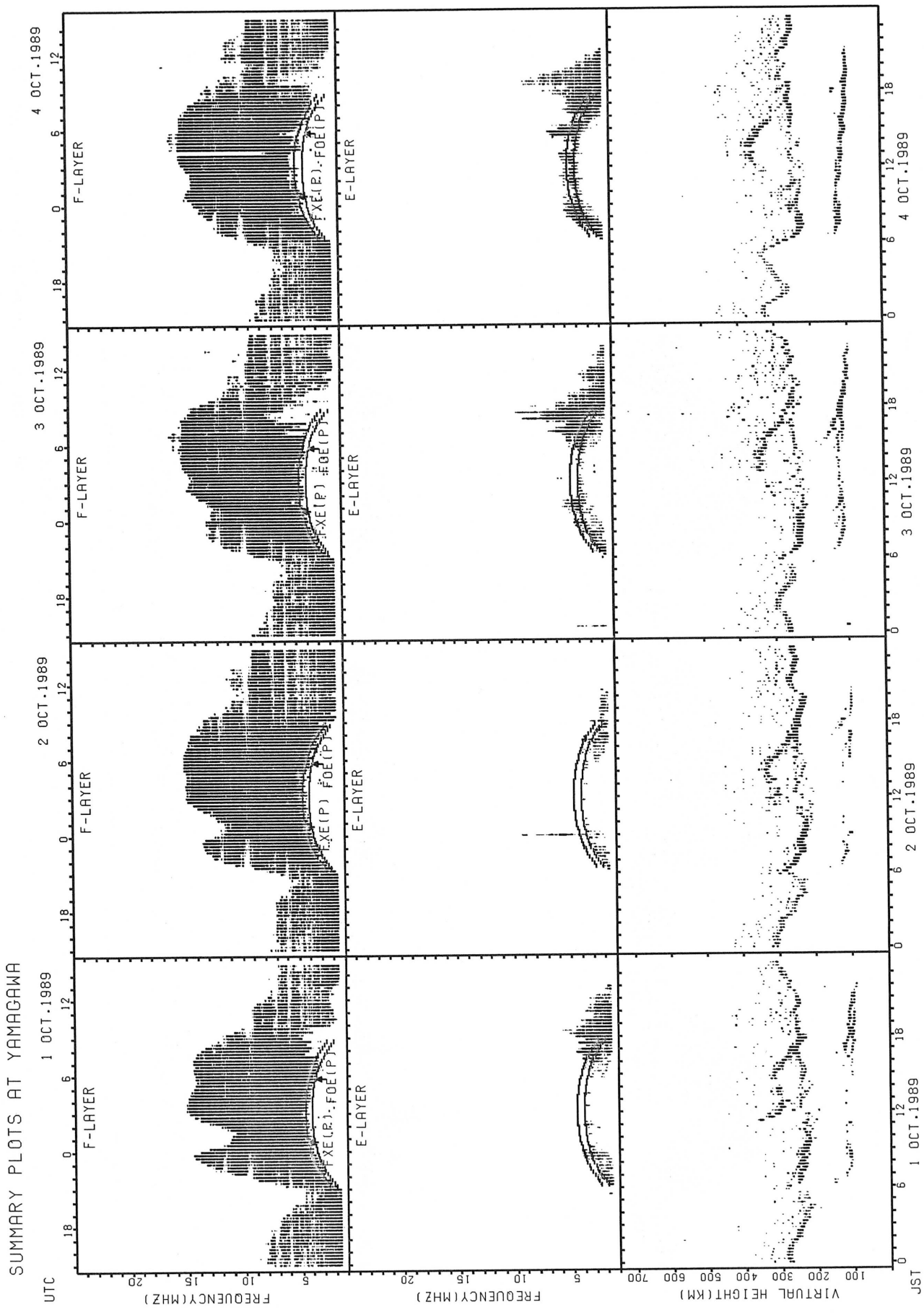

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
25 OCT.1989
26 OCT.1989
27 OCT.1989
28 OCT.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL
MALFUNCTION OF THE IONOSONDE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

SUMMARY PLOTS AT KOKUBUNJI TOKYO

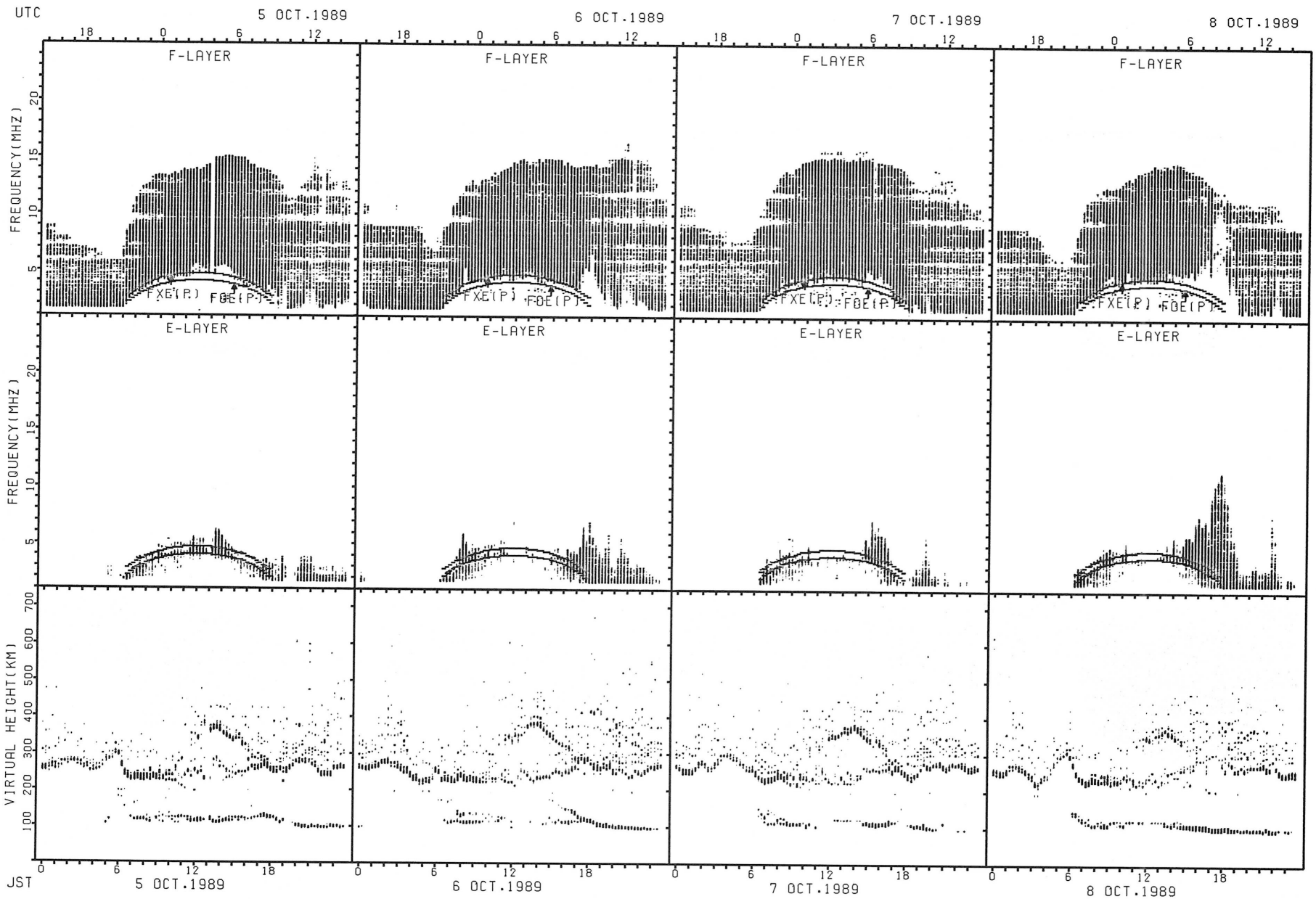


FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

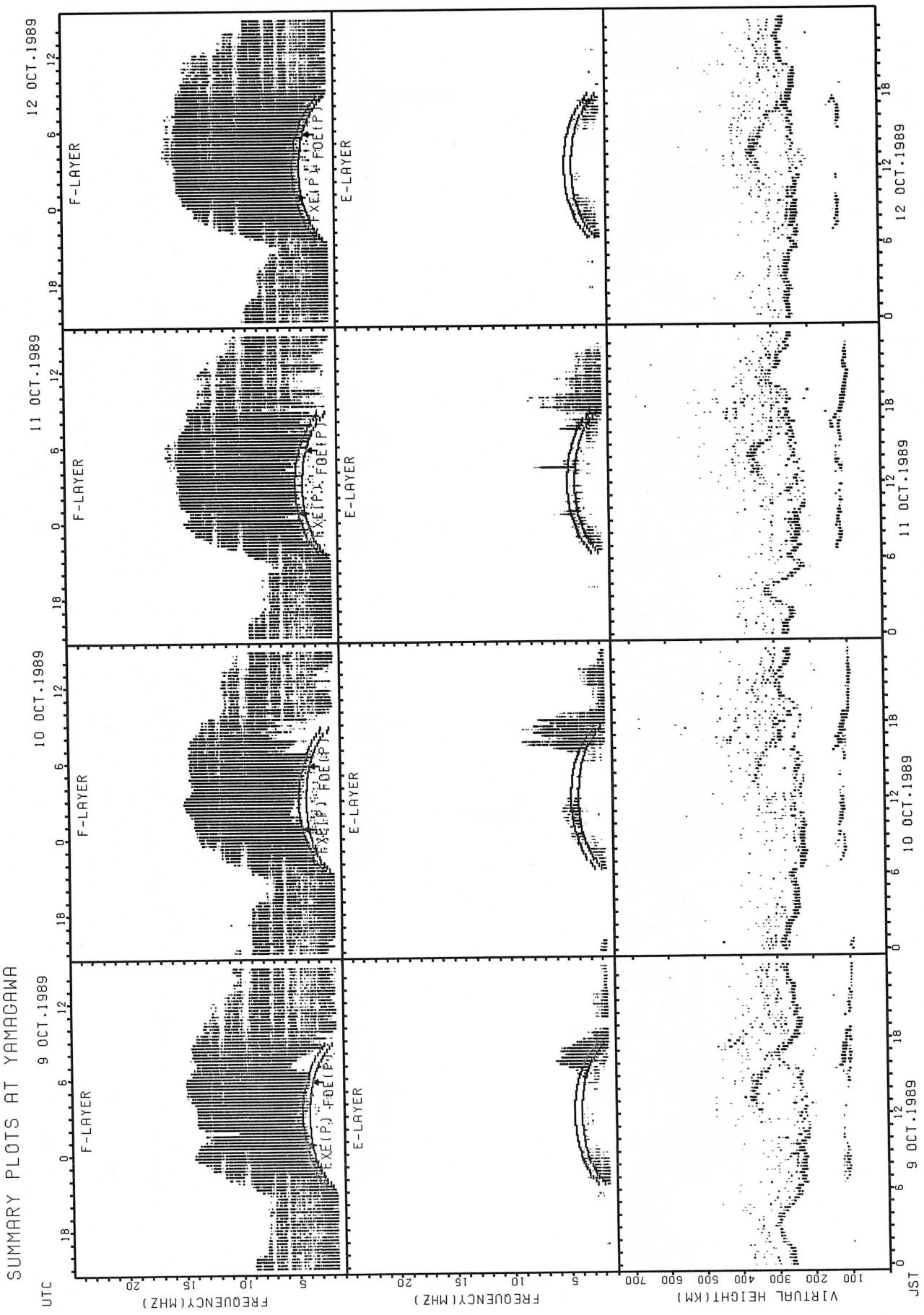
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.


SUMMARY PLOTS AT YAMAGAWA
UTC
1 OCT.1989
2 OCT.1989
3 OCT.1989
4 OCT.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

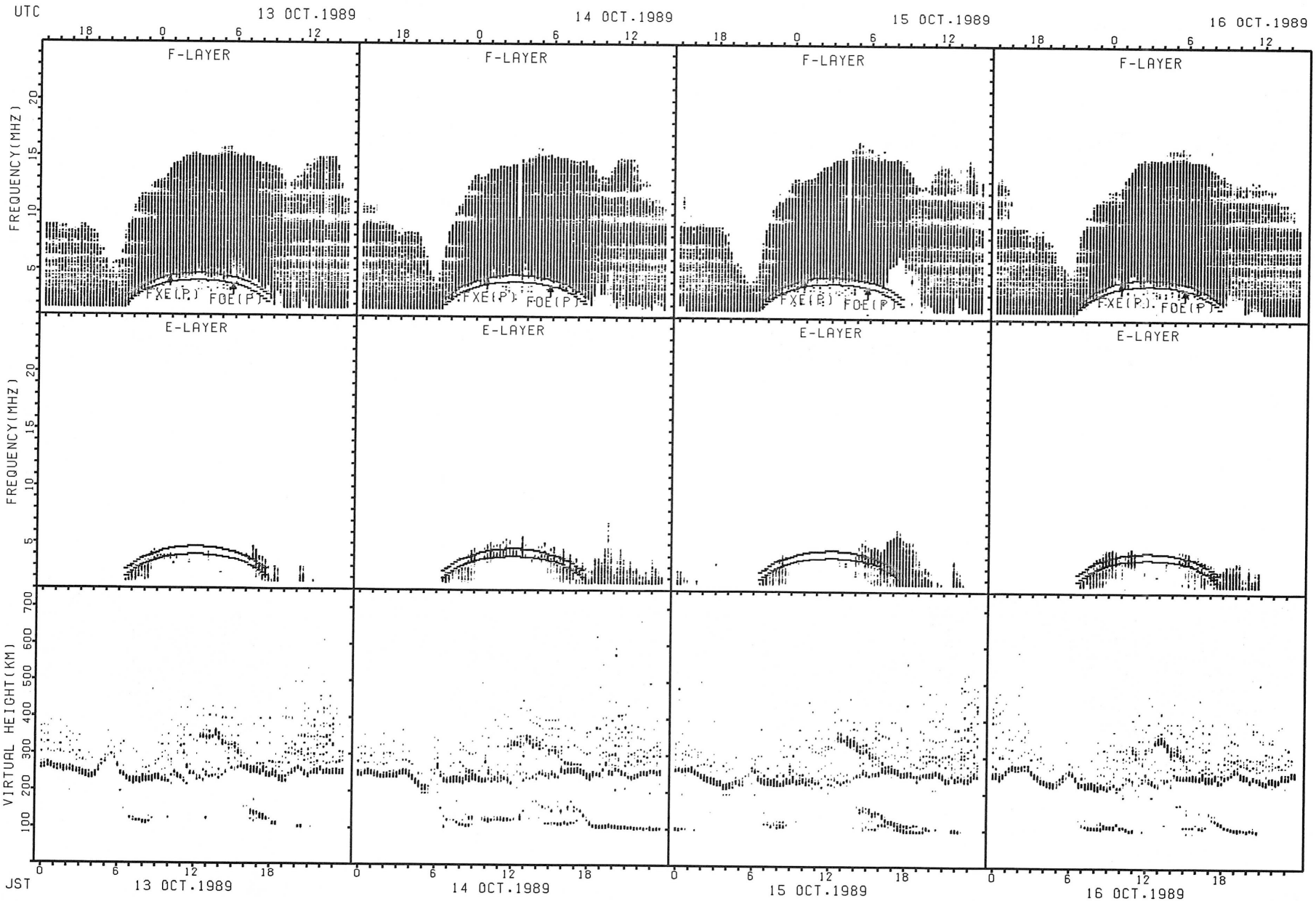
SUMMARY PLOTS AT YAMAGAWA



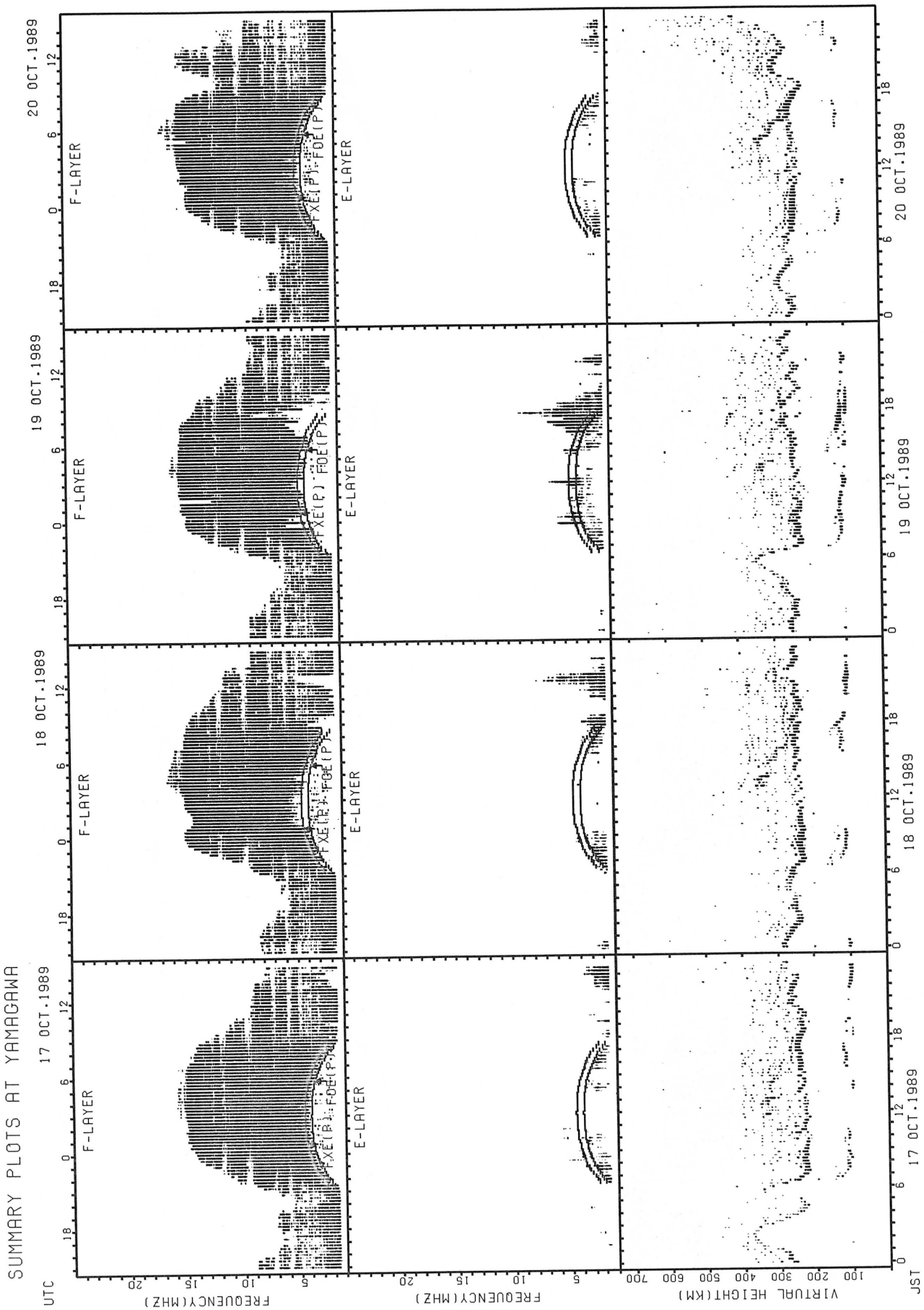
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT YAMAGAWA
UTC
9 OCT.1989
10 OCT.1989
11 OCT.1989
12 OCT.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

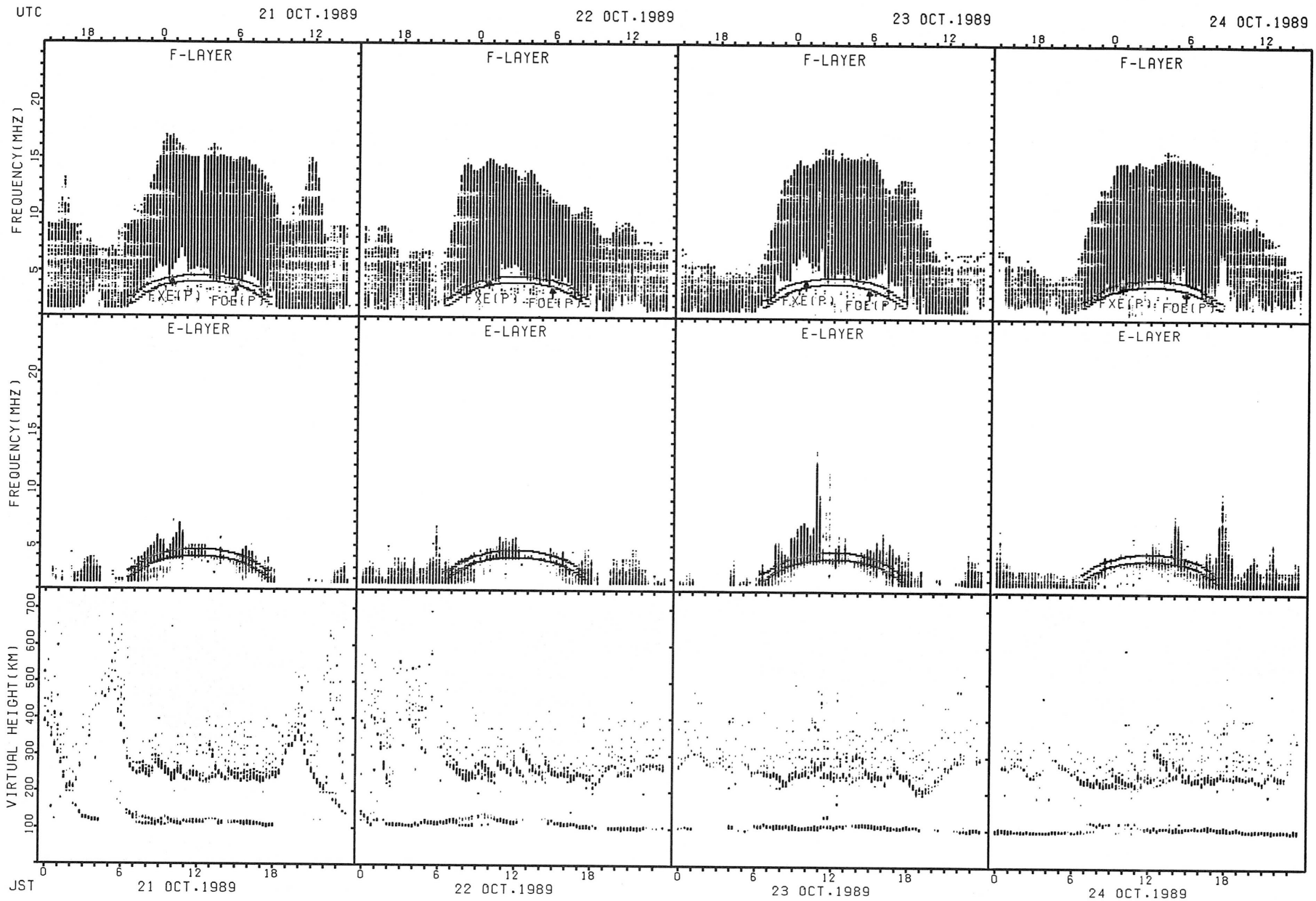
SUMMARY PLOTS AT YAMAGAWA



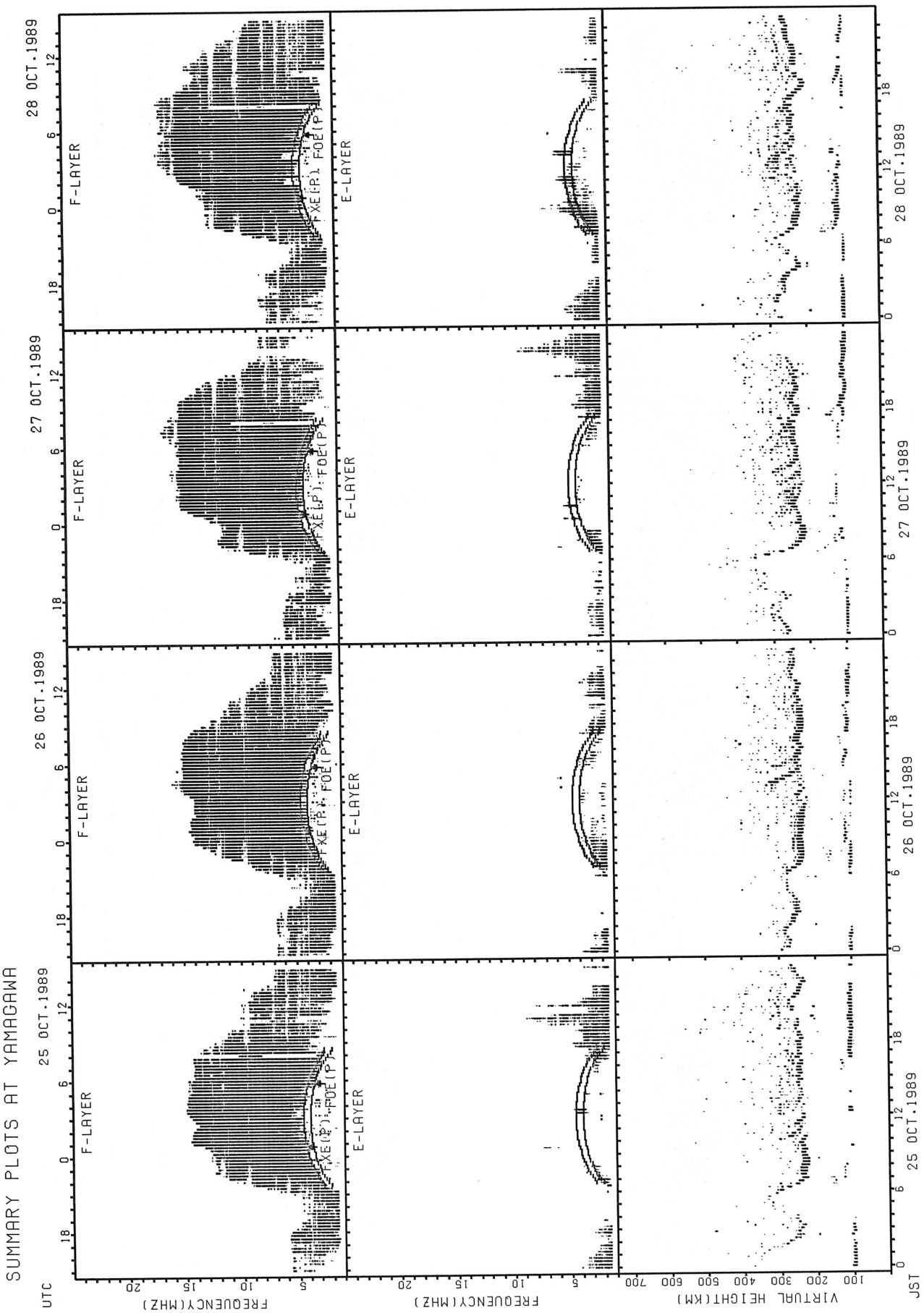
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT YAMAGAWA
17 OCT.1989
18 OCT.1989
19 OCT.1989
20 OCT.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

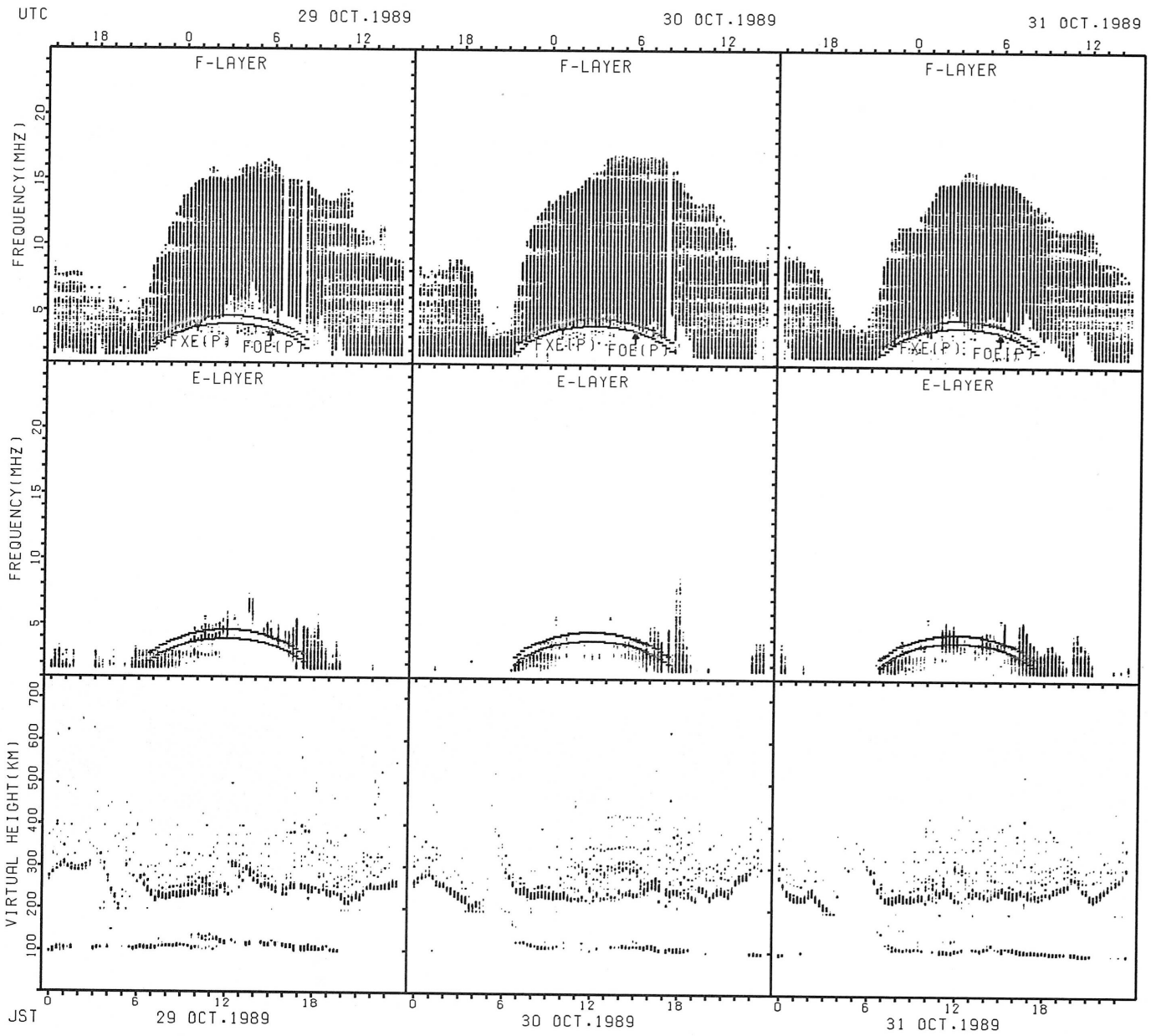
SUMMARY PLOTS AT YAMAGAWA



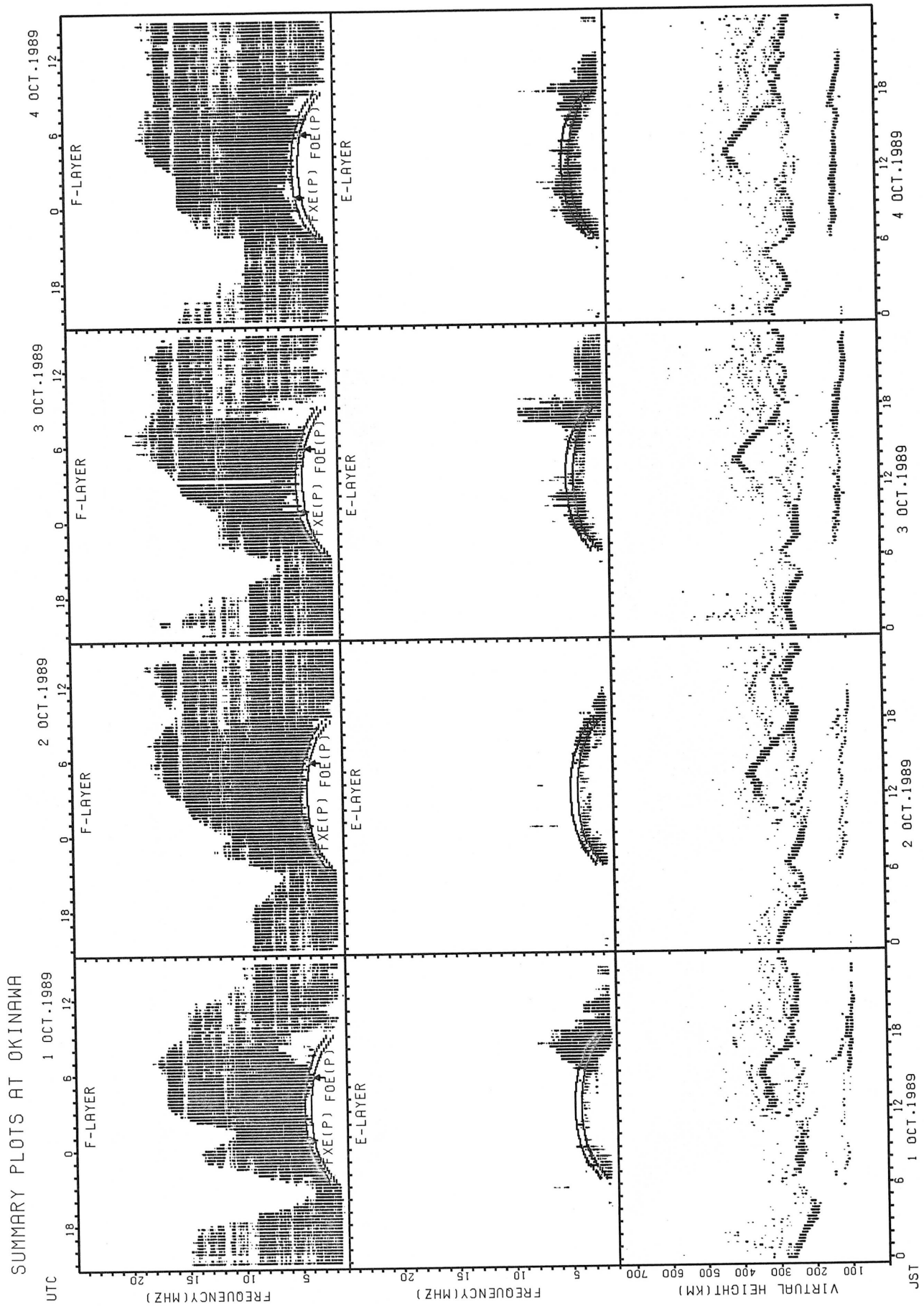
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT YAMAGAWA
UTC
JST
25 OCT.1989
26 OCT.1989
27 OCT.1989
28 OCT.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

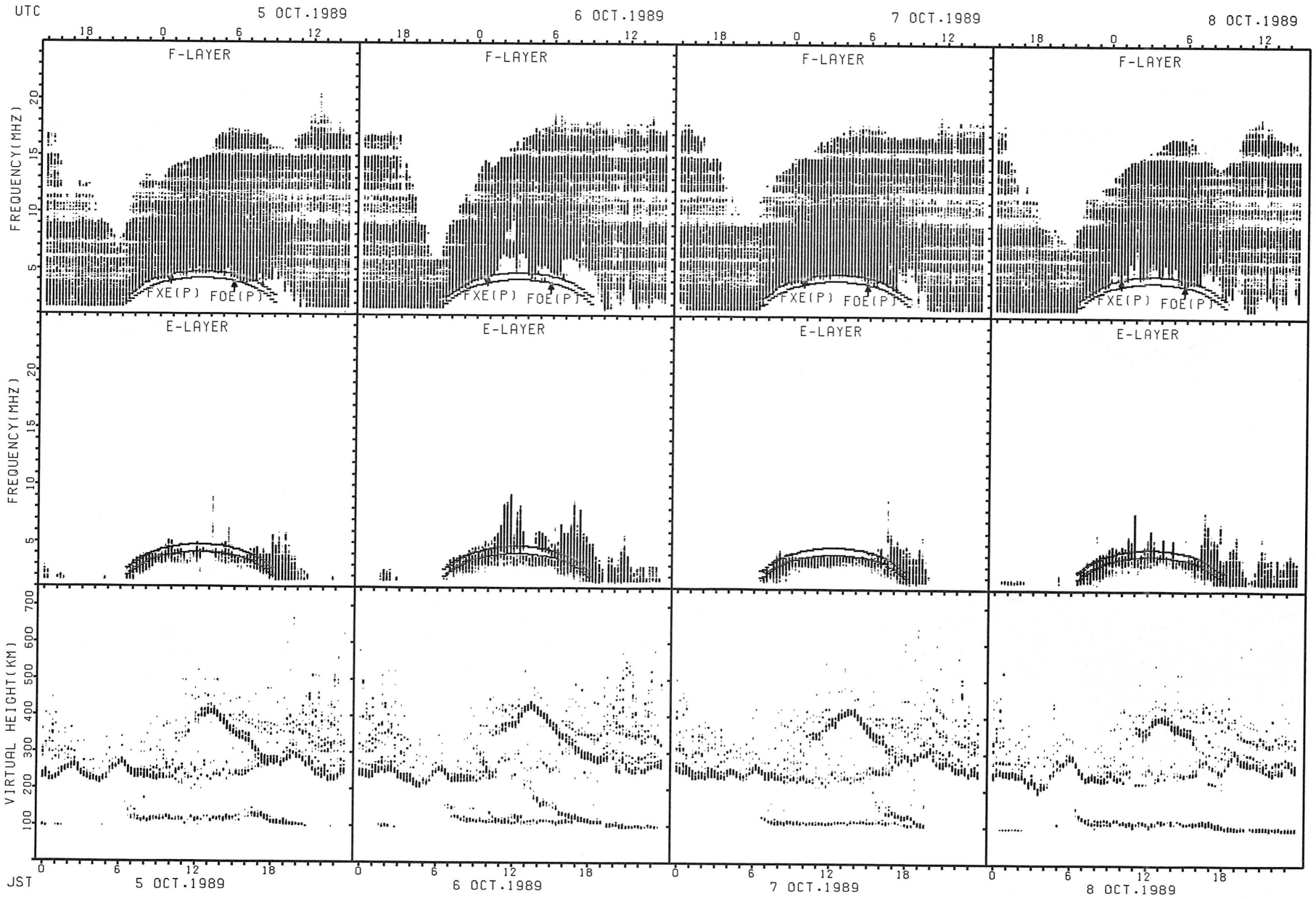
SUMMARY PLOTS AT YAMAGAWA



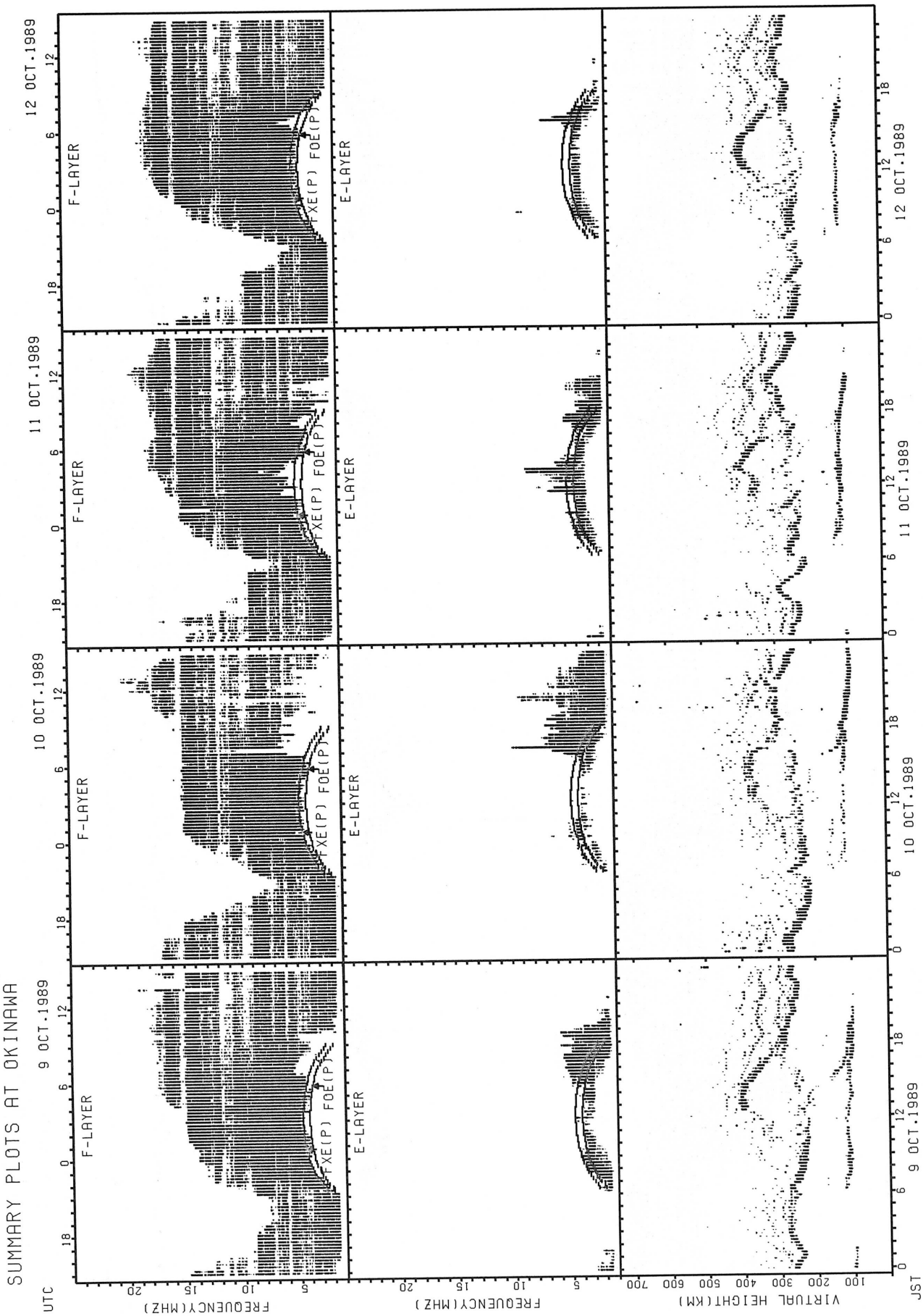
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
1 OCT.1989
2 OCT.1989
3 OCT.1989
4 OCT.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

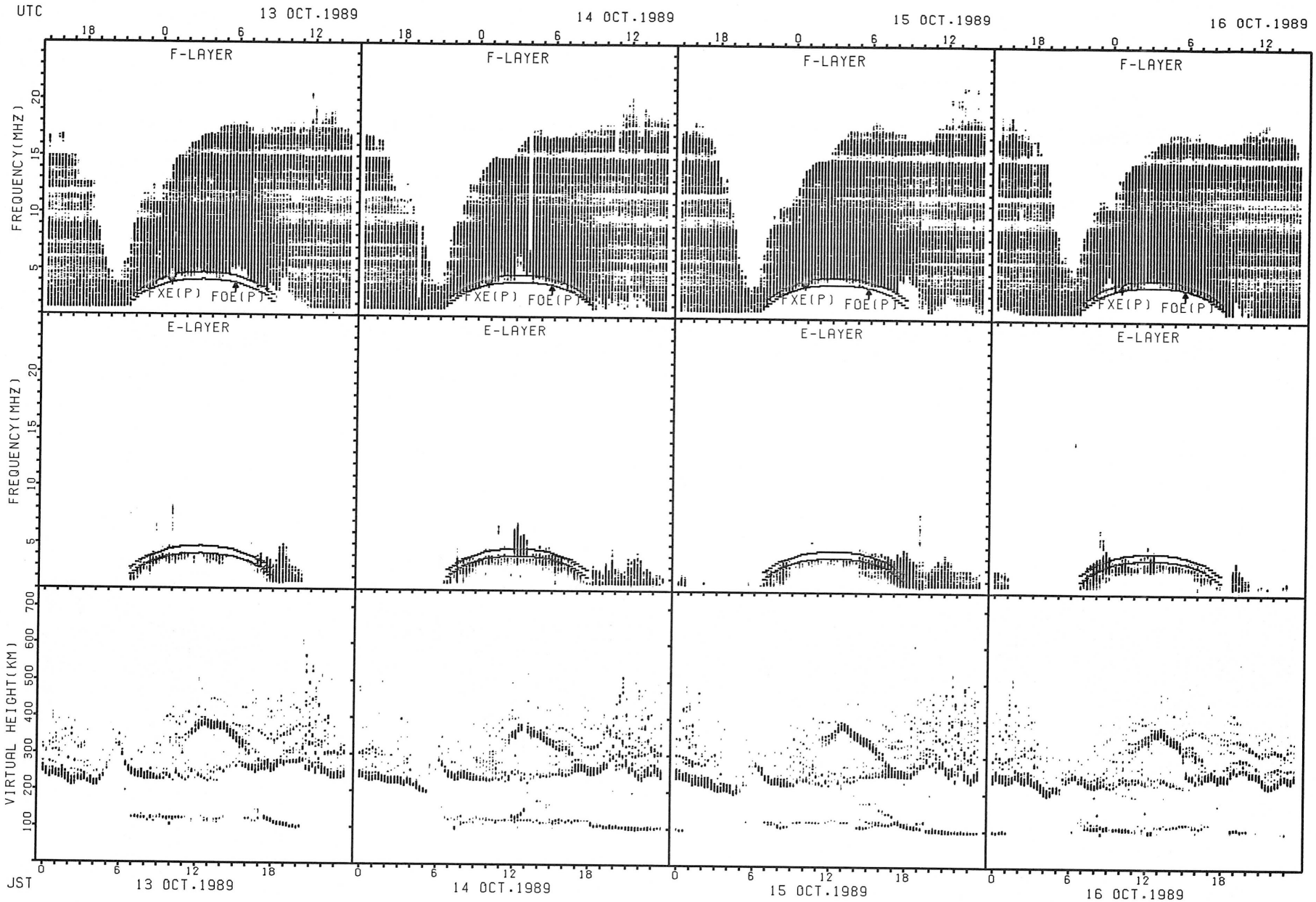
SUMMARY PLOTS AT OKINAWA



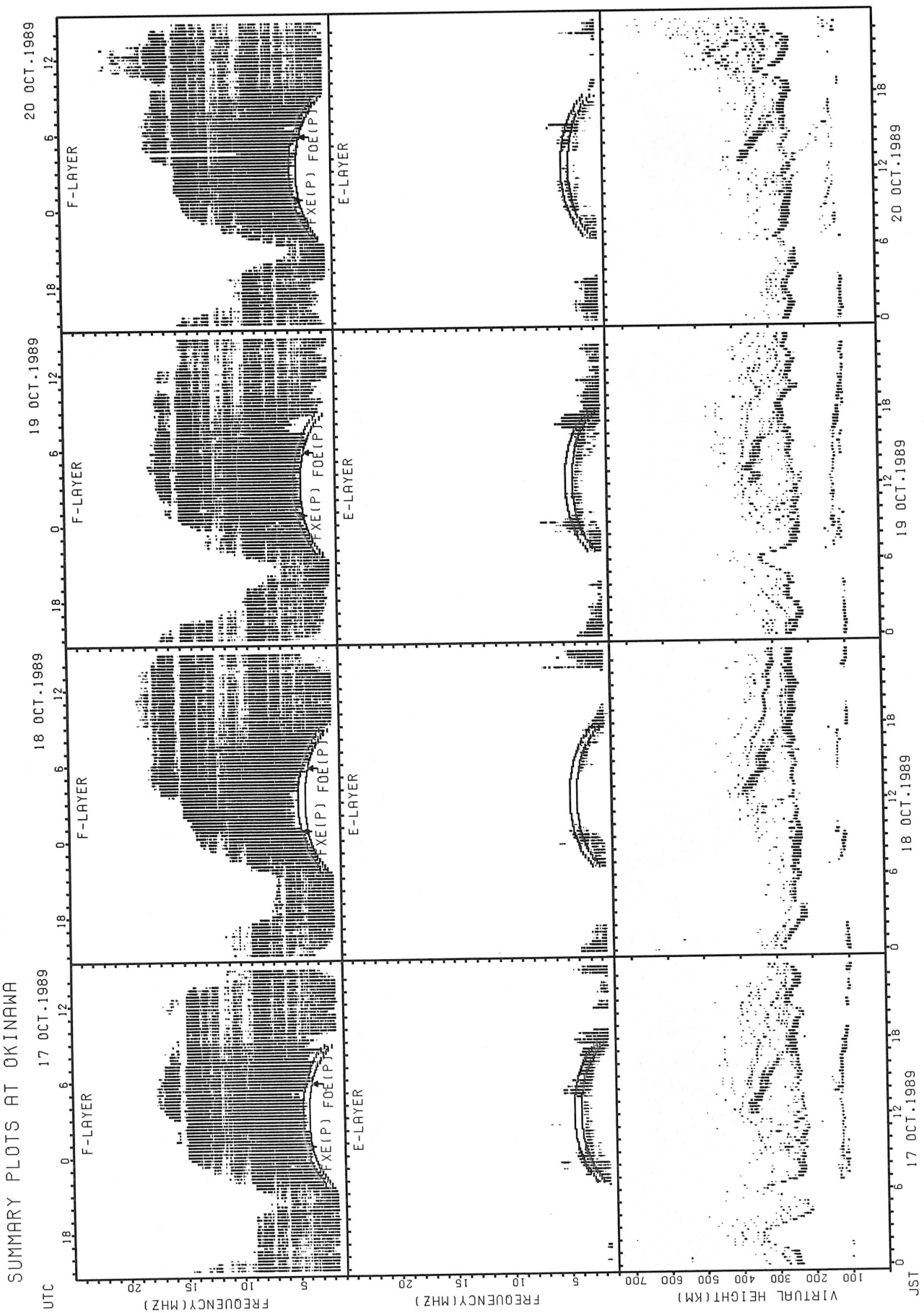
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
9 OCT.1989
10 OCT.1989
11 OCT.1989
12 OCT.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

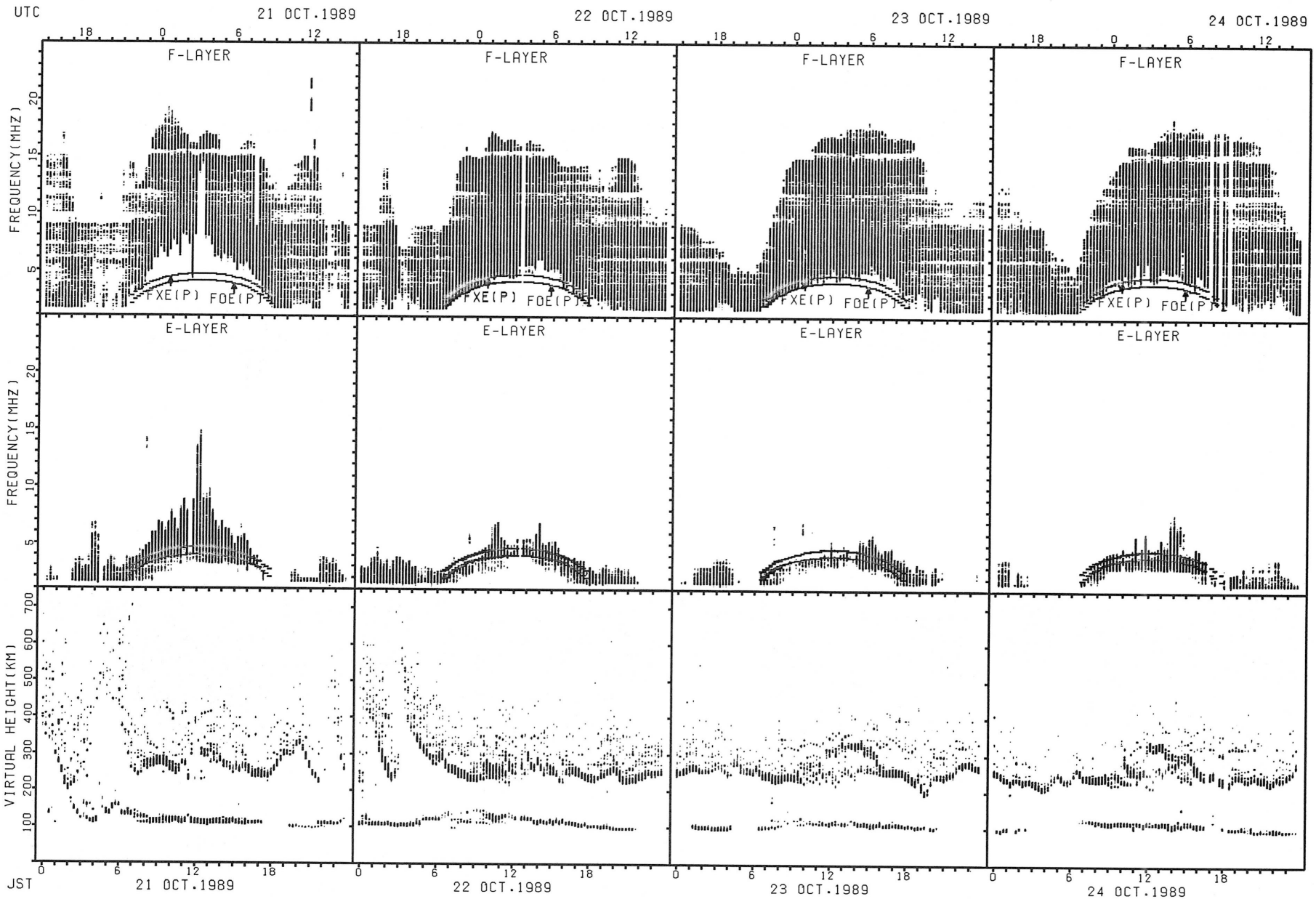
SUMMARY PLOTS AT OKINAWA



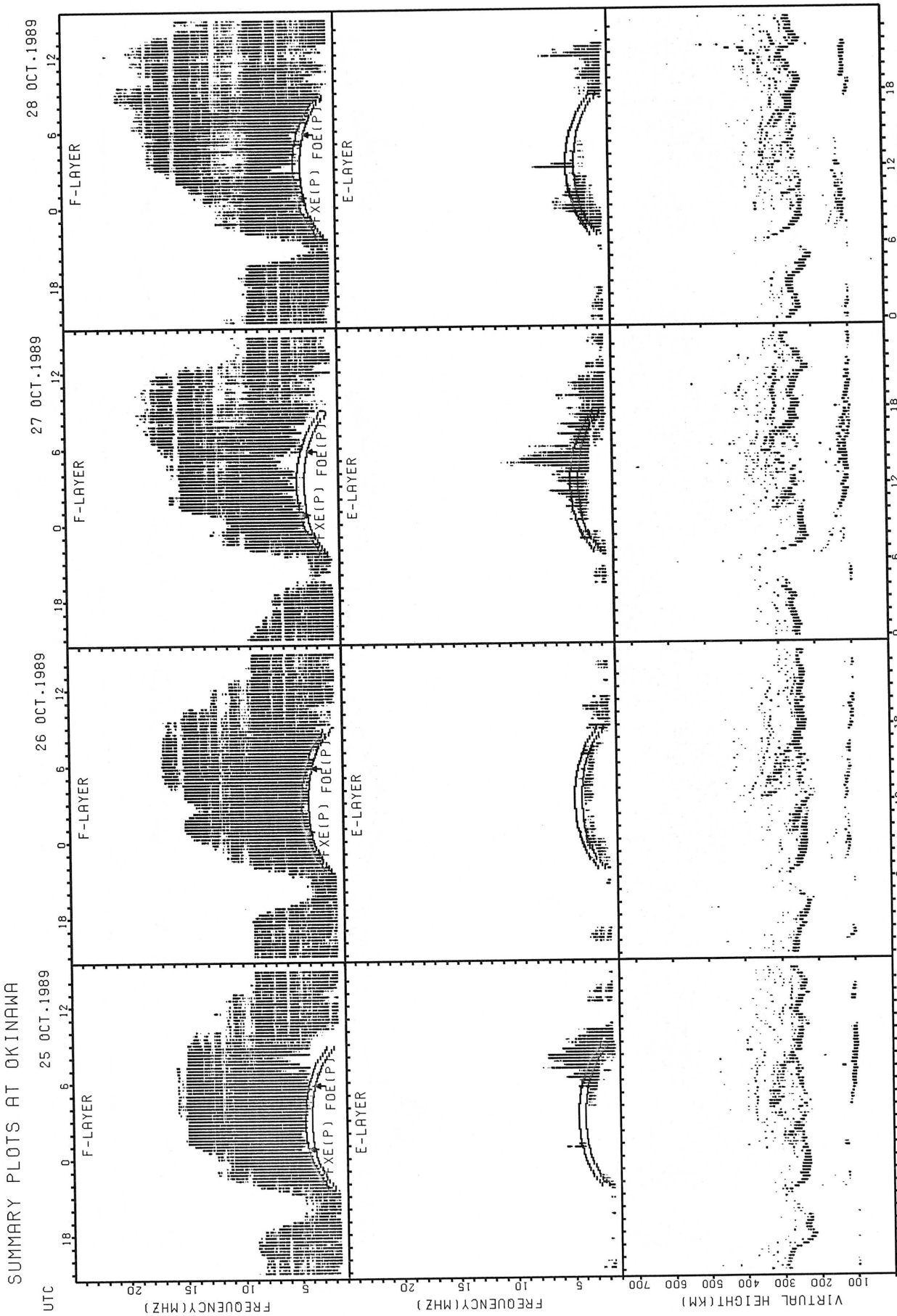
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
UTC
17 OCT.1989
18 OCT.1989
19 OCT.1989
20 OCT.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

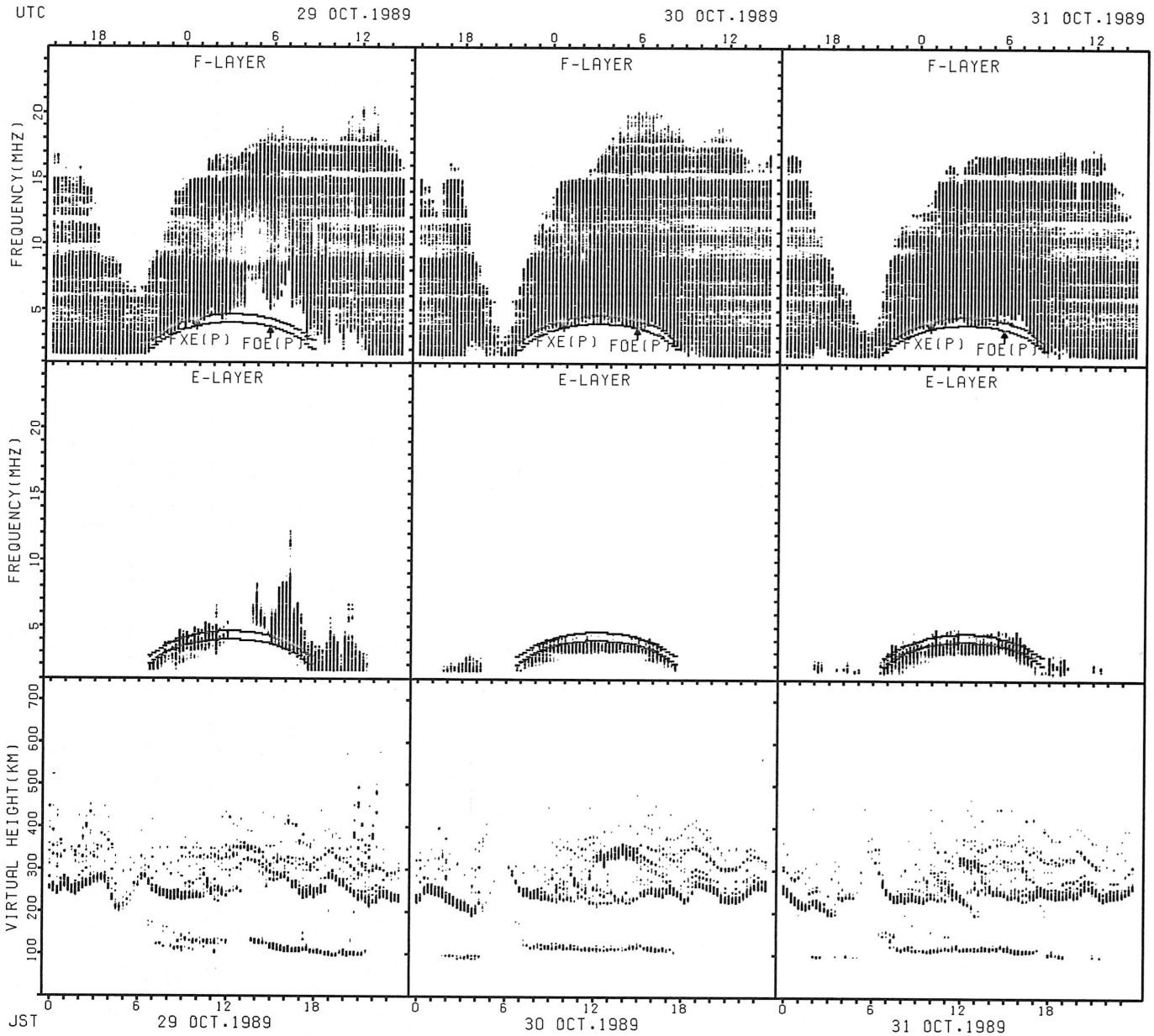
SUMMARY PLOTS AT OKINAWA



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


SUMMARY PLOTS AT OKINAWA
UTC
25 OCT.1989
26 OCT.1989
27 OCT.1989
28 OCT.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

MONTHLY MEDIANS OF H'F AND H'ES

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

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT							19	28	29	31	28	20	22	30	30	30	30	30	28	25	14	10		
MED							280	242	236	238	236	244	245	250	256	255	254	266	282	300	307	321		
U Q							290	250	246	250	240	267	266	276	282	274	266	282	292	311	336	342		
L Q							260	235	228	230	230	236	238	238	254	244	242	252	269	284	300	312		

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	11	12	12	14	16	13				11		12						16	19	18	17	13		
MED	113	111	110	113	112	119				123		115						122	119	114	115	117		
U Q	121	118	116	121	116	122				127		119						130	125	119	118	118		
L Q	111	111	109	109	109	109				117		115						116	115	109	109	110		

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT							21	30	31	30	28	28	22	29	29	31	31	29	27	18	10			
MED							278	242	236	237	248	252	251	274	280	278	260	264	280	299	324			
U Q							299	248	242	242	252	261	266	313	304	302	282	275	294	312	340			
L Q							262	234	230	230	242	238	242	254	259	258	250	256	268	284	314			

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT		10	10				11		12	14	14	16	16	13	12	10	17	21	21	19	14		14	11
MED		104	108				113		118	116	114	113	112	113	113	115	121	109	113	109	109		107	107
U Q		107	109				119		119	123	119	116	117	116	117	117	131	121	119	113	111		107	119
L Q		101	101				103		112	113	111	106	105	109	108	111	107	105	107	105	107		105	103

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	14	11	11	12	12		26	31	31	30	30	22	20	23	27	28	30	30	29	28	25	22	19	14
MED	329	340	342	304	296		261	230	232	230	244	243	245	290	276	264	261	248	264	287	308	321	318	312
U Q	388	382	408	348	404		280	238	238	238	256	254	263	334	330	290	286	260	277	306	344	362	344	372
L Q	304	306	280	206	207		250	226	226	226	238	238	241	260	240	247	248	236	253	261	286	286	216	232

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	12	11	14	12			13		18	18	12	11	14	11	11	13	17	25	26	22	25	18	14	16
MED	106	107	103	105			125		119	121	118	119	115	117	137	149	125	115	112	108	107	105	107	107
U Q	116	115	111	124			164		125	127	122	248	121	155	308	282	137	134	119	115	119	115	127	135
L Q	100	103	101	102			107		113	115	116	117	113	117	111	111	116	106	105	105	105	103	103	101

MONTHLY MEDIANS OF H'F AND H'ES

OCT.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	18	16	14	10				30	31	31	30	27	25	19	31	31	31	28	31	30	29	28	23	20
MED	309	313	316	307				245	238	236	242	248	250	270	314	302	282	264	258	282	310	300	298	304
U Q	318	342	352	328				262	244	242	252	254	260	320	354	332	304	278	272	300	319	312	306	322
L Q	302	306	292	284				234	232	234	238	238	245	258	262	256	254	256	252	262	285	277	286	294

H'ES

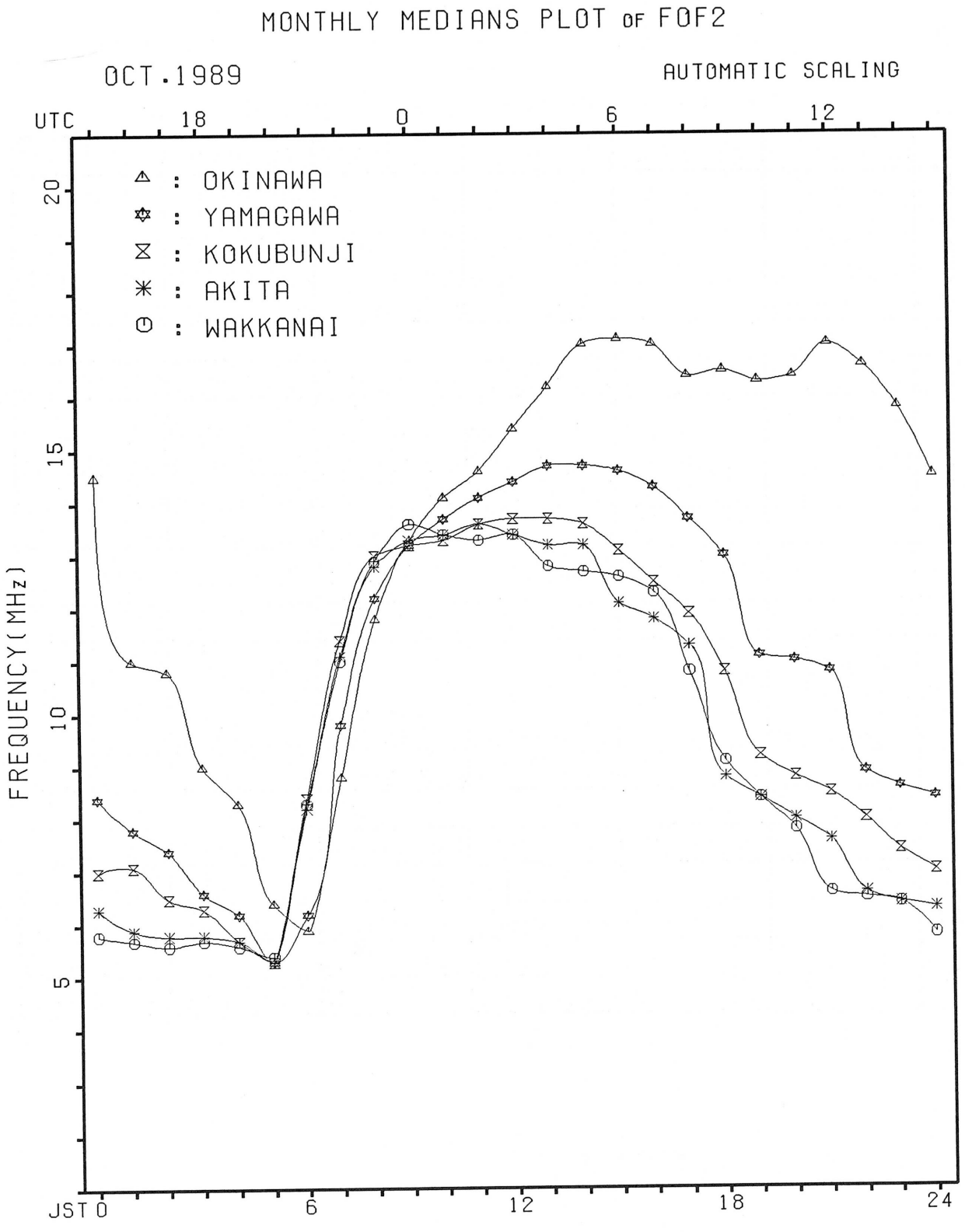
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	11							14	15	17		13				15	17	18	25	20	18	17	17	14
MED	101							125	119	119		117				119	121	120	113	105	103	103	101	101
U Q	103							137	123	122		123				123	132	127	121	108	105	107	105	105
L Q	97							121	117	115		111				113	113	109	110	101	101	99	101	101

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	28	26	17			30	31	31	31	23	12	11	28	31	31	31	31	31	30	31	30	30
MED	271	269	274	273	264			262	238	244	254	254	254	320	347	340	314	268	262	282	292	286	271	276
U Q	283	298	291	294	308			274	248	262	270	314	257	326	373	352	334	296	286	304	310	304	286	294
L Q	260	254	261	252	247			250	234	238	248	248	244	254	317	320	296	256	250	264	276	264	260	266

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								10	17	17	14	11	15		14	13	23	23	25	25	18	14	12	14
MED								136	123	121	120	117	117		120	117	125	119	113	107	103	100	101	99
U Q								155	139	127	131	127	129		133	140	137	125	116	111	107	103	104	103
L Q								131	119	116	117	113	115		113	115	111	113	106	104	101	99	99	99


MONTHLY MEDIANS PLOT OF FOF2
OCT.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

OCT. 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	X 75	X 73	X 73	X 72	X 64	X 61													X 101	X 95	X 86	X 74	X 69	X 70
2	X 70	X 68	X 69	X 67	X 67	X 65													X 118	X 97	X 88	X 87	X 86	X 81
3	X 76	X 71	X 72	X 70	X 68	X 66													X 110	X 88	X 88	X 87	X 76	S
4	X 67	X 71	X 69	X 65	X 64	X 64													X 105	X 87	X 86	X 86	0 X 91	X 77
5	X 72	X 69	X 69	X 68	X 68	X 67													X 114	X 103	X 100	X 96	X 96	X 89
6	0 X 80	S	X 77	X 78	X 73	X 72													X 121	X 106	X 106	X 100	X 93	X 92
7	X 84	X 76	S	X 68	X 68	X 74													X 122	X 102	X 96	X 96	X 99	X 98
8	X 89	S	X 80	X 78	X 65	X 67													X 110	X 97	X 92	X 96	X 95	X 88
9	X 77	X 75	X 75	X 75	X 74	X 75													X 123	X 105	X 95	X 87	X 84	X 83
10	X 82	X 80	X 80	X 79	X 73	X 74													X 113	X 99	X 97	X 93	X 91	X 86
11	X 85	X 82	X 78	X 75	X 75	X 76													X 109	X 100	X 98	X 95	X 96	X 93
12	X 84	X 77	X 76	X 77	X 74	X 74													X 123	X 103	X 100	X 99	X 94	X 87
13	X 79	X 77	X 78	X 77	X 71	X 65													X 115	X 100	X 95	X 92	X 89	X 91
14	X 88	X 81	0 X 76	X 76	X 75	X 60													X 117	X 109	X 103	X 95	X 84	X 73
15	X 71	X 75	X 73	X 70	X 63	X 50													X 117	X 99	X 96	X 94	X 82	X 77
16	X 74	X 64	X 64	X 69	X 66	X 60													X 117	X 108	X 94	X 93	X 84	X 82
17	X 77	X 67	X 64	X 68	X 65	X 62										C			X 120	X 105	S	S	S	S
18	X 77	X 79	X 76	X 66	X 68	X 66													X 115	X 103	X 98	X 95	X 84	X 77
19	X 74	X 77	X 75	X 65	X 60	X 63													X 122	X 108	X 95	X 87	X 80	X 78
20	X 82	X 71	X 65	X 68	X 64	X 65							C	C	C				X 115	X 98	X 96	X 88	X 79	X 72
21	X 65	X 67	X 64	X 53	X 45	X 48							C						X 91	X 88	X 105	X 109	X 72	Y
22	X 57	X 63	A	A	A	X 48													X 71	X 71	X 64	X 59	X 54	X 56
23	X 56	X 50	X 56	X 56	X 55	X 54												C	X 103	X 72	X 55	X 50	X 53	X 54
24	X 53	X 55	X 55	X 55	X 54	X 57													A	X 88	X 76	X 67	0 X 66	X 58
25	X 57	X 58	X 59	X 57	X 52	X 55						C	C	C					X 103	X 96	X 91	X 87	X 77	X 71
26	X 65	X 60	X 62	X 60	X 57	X 56													X 107	X 97	X 80	X 69	X 54	X 66
27	X 67	X 64	X 58	X 55	X 51	X 48													X 122	X 98	X 97	X 76	X 62	X 64
28	X 62	X 67	X 60	X 62	X 61	X 58													X 115	X 91	X 79	X 71	X 68	X 63
29	X 60	X 59	X 58	X 55	X 55	X 54													X 104	X 92	X 83	X 70	X 62	X 61
30	X 58	X 60	X 61	X 64	X 43	X 41													X 117	X 112	X 92	X 87	X 82	X 81
31	X 78	X 77	X 68	X 57	X 55	X 57													X 97	X 91	X 86	X 83	X 77	X 77
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	29	29	30	30	31													30	31	30	30	30	28
MED	X 74	X 71	X 69	X 68	X 64	X 62													X 115	X 98	X 94	X 87	X 82	X 77
UQ	X 80	X 77	X 76	X 75	X 68	X 66													X 118	X 103	X 97	X 95	X 91	X 86
LQ	X 65	X 64	X 62	X 60	X 55	X 56													X 105	X 92	X 86	X 76	X 69	X 68

OCT. 1989 | FXI (0.1 MHZ)

IONOSPHERIC DATA

OCT. 1989 | FOF2 (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	69	67	S 67	66	58	55	75	106	139	135	118	123	137	135	131	128	124	110	96	88	81	69	62	64
2	S 63	61	63	61	62	61	89	125	145	131	S 120	135	136	132	128	127	124	123	J S 112	91	82	81	79	74
3	69	65	65	64	61	59	86	118	133	127	131	133	133	R 131	136	131	127	116	104	83	82	80	70	I S 66
4	62	65	U S 62	58	58	58	95	124	126	134	135	133	133	138	134	132	U S 119	120	98	81	S 81	U S 82	U S 85	71
5	65	64	62	61	62	62	96	128	126	133	135	132	133	131	129	124	124	121	107	97	95	90	89	83
6	S 74	S	70	73	68	65	98	117	128	124	123	126	127	127	122	120	119	123	113	S 99	100	94	87	85
7	77	69	I S 65	62	61	68	101	124	128	134	141	144	140	138	139	129	127	128	115	95	90	90	94	93
8	82	I S 72	75	72	60	62	89	124	128	129	133	131	134	135	131	130	125	117	104	92	S 86	91	88	82
9	69	69	69	69	68	68	93	112	130	138	132	133	131	133	133	125	124	123	116	98	88	82	U S 78	77
10	76	74	74	73	68	68	R 100	125	134	130	131	136	136	132	130	131	125	123	107	93	91	87	85	80
11	79	76	72	69	69	70	95	130	130	141	145	142	137	138	139	129	130	121	103	94	92	89	90	87
12	78	71	70	71	68	68	96	118	137	135	145	147	143	146	147	S	S	S	117	97	94	93	88	81
13	73	71	72	71	65	59	92	110	121	135	138	143	145	144	142	140	134	129	109	95	88	86	82	84
14	81	74	70	69	68	54	U S 73	103	117	129	135	134	133	140	140	136	132	129	110	S 102	S 96	88	77	68
15	S 65	68	67	65	57	45	75	110	123	126	129	131	138	144	146	144	137	127	111	94	90	87	76	71
16	67	S 59	57	62	60	54	78	U S 110	123	119	130	139	145	144	146	144	136	125	111	J S 102	88	87	77	S 76
17	70	61	58	62	S 58	57	84	113	146	144	151	153	S 147	151	152	I C 146	139	126	113	99	S	S	S	S
18	70	72	70	60	61	59	87	126	146	147	142	R 144	146	147	150	149	141	128	109	96	92	90	78	70
19	68	70	68	59	U S 56	57	83	120	138	142	138	151	144	152	146	136	133	126	116	101	88	81	73	72
20	76	65	60	62	58	60	87	114	134	143	S 144	147	I C 146	I C 146	I C 146	151	147	133	109	S 92	90	82	72	65
21	59	U S 62	58	48	39	41	S 63	90	132	142	158	U R 134	I C 145	153	144	136	121	112	S 85	81	U S 97	U C 94	Y	Y
22	51	F 54	A	A	A	41	61	94	H 107	92	98	96	86	92	88	84	84	78	65	65	57	53	48	50
23	49	S 45	51	F 47	J S 46	U S 48	60	92	131	115	120	134	137	124	128	115	94	I C 100	96	65	49	44	47	48
24	S 47	49	49	49	48	51	74	113	125	135	133	143	136	135	138	128	119	112	A	80	70	60	U S 60	51
25	50	52	53	S 51	46	49	74	115	128	131	129	C	C	C	131	126	126	116	97	91	84	81	71	65
26	59	54	56	53	51	50	73	109	132	133	141	142	141	146	R 140	133	I S 126	119	100	92	74	63	58	59
27	61	58	53	49	45	42	S 59	115	122	121	136	147	147	145	138	138	136	128	115	92	S 91	69	56	59
28	56	S 62	54	56	54	52	73	S 120	134	132	133	142	U R 146	154	I S 149	148	144	134	109	84	74	65	62	55
29	54	53	52	49	S 49	48	70	96	114	131	141	R 152	R 141	142	147	134	120	111	96	86	76	64	55	54
30	51	54	55	57	38	34	61	103	131	133	137	140	149	154	149	145	137	130	110	105	85	80	S 75	75
31	73	S 72	S 63	50	49	51	S 72	115	122	128	139	146	147	144	140	136	127	106	91	85	80	77	71	70
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	30	30	30	30	31	31	31	31	31	31	30	30	30	31	30	30	30	30	31	30	30	29	29
MED	68	65	63	62	58	57	83	115	130	133	135	140	139	141	139	132	126	123	109	92	88	82	76	71
UQ	74	71	70	69	62	62	92	122	134	135	141	144	145	146	146	140	136	128	112	97	91	89	85	80
LQ	59	58	56	53	49	50	73	110	124	128	130	133	134	133	131	128	124	116	98	86	81	69	62	64

OCT. 1989 | FOF2 (0.1 MHZ)

IONOSPHERIC DATA

OCT. 1989 | FOF1 (0.01 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

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									L	L 540	L	L	L	L	L									
2									L	L	L	L		L	L	L								
3										L	L	L	L	L 650	L	L	L							
4											L	L	L	L	L	L								
5										L	L		L		L									
6										L	L	L	L	U L 730	L	L	L							
7											L		L	U L 750	L	L	L							
8									L		L	L	L	L	L	L								
9											L	L	L	U L 720	L 680		L							
10											L	L	L	L	L									
11											L	L	L	L	L		L							
12											L	L	L	L	L	L								
13												L	L	L	L	L								
14											L		L	L	L									
15									L	L	L	L	L	L	L	L								
16										L	L		L	L	L									
17										L	L	L		L	L	C								
18										L		L	L	L	L									
19									L		L	L	L	L										
20										L	L	L	C	C	C	L								
21										L		L	C	L		L								
22									L	U L 510	U L 510	U L 580	U L 580	A	L	L								
23												L	L	L	L	L			C					
24												L	L	L	L	L								
25											L	C	C	C	L	L								
26											L	L	L	L										
27											L		L	L										
28												A	L											
29									L	L	L	L	A											
30												L	L	L	L	L								
31										L	L	L			L									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									1	2	1	1		4	1									
MED									U L 510	L 525	U L 580	U L 580		U L 725	L 680									
UQ														U L 740										
LQ														L 685										

OCT. 1989 | FOF1 (0.01 MHZ)

IONOSPHERIC DATA

OCT. 1989 | FOE (0.01 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							H 205	A	A	360	385	R 405	400	400	380	345	295	220						
2							195	310	345	370	R	400	395	385	365	340	300	235						
3							210	285	340	370	385	405	A 385	380	390	340	285	A						
4							195	285	345	380	385	A	A 390	A	A	340	A	A						
5							195	290	340	365	375	A	A	385	370	340	295	215						
6							180	290	340	A	A	A	385	395	375	345	285	A						
7							185	290	350	375	410	400	R 405	390	380	350	290	185						
8							A	280	335	365	380	390	A 380	A	A	A	A	A						
9							170	270	340	360	A	395	400	380	350	320	270	B						
10							200	290	345	350	375	380	B	385	360	330	270	B						
11							185	R	A	A	A	A	A	A	370	335	270	U A 175						
12							170	275	A	365	390	390	390	380	355	R	R	S						
13							U A 155	270	330	390	385	385	395	390	365	R 355	285	B						
14							S 165	275	335	355	370	385	390	380	365	330	275	B						
15							S 160	285	335	360	390	385	390	375	360	335	270	A						
16							170	260	325	345	365	U A 355	360	S	360	325	270	170						
17							160	265	320	A	A	A	380	370	350	I C 320	270	B						
18							B	255	310	340	S	S	B	365	355	325	270	A						
19							175	270	U A 300	A	A	360	A	360	345	305	260	B						
20							165	250	305	340	360	370	I C 375	I C 370	I C 345	315	265	B						B
21	B		J K 130				A	245	295	340	355	B	I C 365	A	330	290	A	B					B	U B 160
22							A	220	285	B	345	350	360	350	330	A	255	B						
23							A	A	A	A	A	A	370	R 370	A	A	235	I C 175						
24							S	A	A	325	S 355	365	370	365	340	A	A	B						
25							B	275	340	I R 365	R	C	C	C	A	310	250	B						
26							B	245	300	U A 340	U A 350	U R 375	A	A	A	A	R	A						
27							S	260	305	U A 370	375	370	385	365	320	295	230	U A 150						
28							A	255	315	345	375	360	A	A	A	A	A	A						
29							B	240	A	A	A	345	A	A	I S 360	I R 305	235	U A 150						
30							U B 135	H 275	330	350	370	375	355	345	335	290	235	B						
31							B	H 250	305	340	370	370	A	A 355	A	R 320	A	B						
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT			1				19	27	25	24	21	22	21	22	24	24	23	9						1
MED			J K 130				175	270	330	360	375	378	385	378	360	328	270	175						U B 160
UQ							195	285	340	368	385	390	390	385	368	340	285	215						
LQ							165	255	305	342	365	365	370	365	345	312	258	U A 170						

OCT. 1989 | FOE (0.01 MHZ)

IONOSPHERIC DATA

OCT. 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	E B 15	E B 14	E B 13	E B 15	E B 14	E B 14	G	J A 32	J A 39	60	42	G 33	G 27	G	G	38	35	G	J A 24	J A 33	J A 51	J A 37	J A 23	24
2	J A 23	J A 23	J A 18	20	E B 13	E B 13	24	G	G 29	G 34	G	G	G	G	G 26	G	G	G	J A 29	E S 15	J A 24	J A 27	J A 22	E B 13
3	E B 13	E B 13	E B 13	E B 12	20	E B 11	G	G	J A 49	43	G	G	45	42	G	37	J A 47	J A 42	J A 49	34	J A 22	E B 14	E B 13	E S 15
4	E B 15	E B 13	E B 13	E S 13	E B 13	E B 13	26	34	41	43	45	49	J A 47	J A 45	J A 41	G 33	J A 37	J A 31	J A 25	J A 21	E B 15	E B 15	E S 15	E B 14
5	E B 14	E B 12	25	23	E B 13	J A 23	25	G	37	41	45	46	J A 44	G	G	G	G	J A 30	J A 27	J A 24	J A 28	23	E B 14	E B 13
6	J A 23	E B 14	E B 13	E B 13	E B 13	E B 13	G	G	37	J A 52	J A 60	J A 53	46	46	48	44	J A 60	J A 30	J A 35	24	J A 28	25	J A 18	E B 15
7	E B 15	J A 21	E S 15	J A 21	E B 13	E B 14	26	36	G	G	G	G 33	G	G	G	G	33	29	J A 44	J A 40	23	J A 26	J A 24	J A 24
8	J A 18	E S 16	E B 12	E B 13	E B 13	J A 19	27	37	J A 42	41	48	45	47	43	41	J A 37	J A 35	J A 54	J A 26	J A 27	J A 33	26	J A 23	J A 21
9	E B 13	E B 13	E B 13	E B 15	E B 12	E B 13	J A 49	G	G	G	45	G	G	G	G	G	35	J A 41	J A 28	J A 26	J A 80	J A 28	J A 23	J A 19
10	E B 15	J A 21	21	E B 14	E B 15	E B 15	G	G	36	39	G	40	E B 42	G	G	38	J A 58	J A 45	J A 37	J A 42	J A 40	J A 27	26	E B 13
11	E B 14	E B 14	E B 13	E B 13	J A 23	E B 12	G	28	J A 42	42	J A 42	J A 50	47	42	G	G	G 20	25	J A 42	J A 21	J A 47	E B 14	E B 15	E B 15
12	E B 13	E B 14	E B 15	E B 13	E B 14	19	G	G 26	36	G	G	G	G	G	G	G	G	E S 21	E B 15	E B 15	J A 27	J A 23	E B 17	E B 14
13	E B 14	E B 14	E B 13	E B 14	E B 14	E B 15	J A 20	G	G	G	42	41	43	G	G	G	33	25	24	J A 21	J A 23	E B 14	E B 13	E B 14
14	E B 14	E B 13	J A 20	20	21	19	G 17	G 20	G 23	G 29	G	42	G	43	G	36	32	29	22	J A 17	E B 15	E B 13	E B 13	E B 13
15	E B 14	E B 13	J A 27	19	E B 13	E B 14	G	G	G	G	G	44	G	G	42	41	41	J A 53	J A 49	J A 24	J A 24	E B 13	E B 14	E B 14
16	E B 15	E S 14	E B 13	E B 12	E B 13	J A 24	G	30	G	42	42	41	J A 52	G	39	36	32	J A 34	J A 28	E B 13	J A 32	J A 23	E B 14	E B 14
17	E B 14	E B 12	E B 13	E B 13	J A 21	E B 13	G	G	38	J A 73	J A 40	41	48	G	G	C	G 18	J A 22	18	E B 13	E S 16	S	E S 16	J A 23
18	J A 27	E B 12	21	E B 14	E B 14	E B 13	20	29	34	43	E S 40	E S 48	43	41	G	G 21	33	24	J A 28	J A 19	J A 21	J A 41	J A 21	J A 33
19	J A 27	J A 29	J A 24	J A 22	J A 19	E B 13	J A 22	G	J A 38	37	40	G 34	J A 42	J A 35	G	33	33	J A 26	J A 20	J A 22	J A 17	E B 13	E B 13	E B 13
20	E B 13	E B 12	J A 23	19	E B 13	E B 13	G	G	33	G	G	G	C	C	C	G 30	33	21	E B 13	E S 14	J A 20	E B 13	E B 13	17
21	E B 14	E B 13	G 13	E B 13	22	J A 21	22	29	J A 48	J A 53	J A 51	43	C	39	J A 57	J A 58	J A 39	J A 56	J A 54	E B 13	E B 14	E B 15	23	25
22	J A 20	J A 39	58	49	57	J A 54	J A 28	34	35	38	J A 41	41	74	46	J A 43	34	29	J A 23	J A 24	J A 22	21	J A 27	J A 25	E B 13
23	J A 19	J A 19	J A 43	J A 41	24	E B 14	J A 30	J A 30	J A 52	J A 61	J A 52	J A 41	G	G	J A 41	33	G 24	C	J A 21	36	J A 27	J A 39	J A 33	E B 13
24	29	21	E B 13	E B 13	E B 13	J A 17	E S 18	27	J A 44	37	G	41	41	40	38	J A 51	26	J A 24	J A 88	J A 55	J A 52	J A 47	J A 73	J A 29
25	J A 31	J A 49	J A 36	J A 31	22	E S 13	22	J A 29	G	G	G 38	C	C	C	J A 49	35	33	J A 26	24	J A 25	J A 33	J A 22	J A 33	J A 53
26	J A 42	23	J A 21	J A 20	28	J A 24	J A 22	G	G	G 34	37	G 37	37	40	J A 41	J A 35	G 30	J A 28	J A 24	J A 24	23	E B 13	J A 16	J A 22
27	J A 22	J A 26	J A 24	J A 21	22	E B 14	E S 18	G	G	42	G	G	G	G	G	J A 53	J A 27	J A 21	E B 14	J A 35	J A 24	J A 29	J A 53	54
28	J A 49	J A 23	J A 27	J A 26	J A 22	J A 22	J A 24	28	G	43	J A 67	J A 83	J A 57	J A 57	J A 61	36	J A 51	J A 29	J A 21	J A 19	E B 13	J A 53	J A 22	J A 26
29	J A 21	J A 21	J A 21	J A 26	20	24	J A 17	G	J A 39	J A 51	38	J A 53	110	J A 58	E S 38	G	G 24	J A 23	J A 44	J A 24	E B 14	33	25	J A 19
30	J A 22	J A 23	J A 19	E B 13	E S 14	E B 13	G	G	37	38	G	G	G	G	G 33	G 27	G 24	J A 30	J A 23	J A 42	J A 26	J A 21	J A 34	J A 20
31	E B 12	J A 20	E B 13	E B 13	E B 13	E B 14	E B 14	28	36	39	41	G	42	42	36	G	27	J A 28	J A 36	J A 65	J A 25	E B 13	J A 22	J A 22
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	30	28	29	30	30	31	30	31	31	31	30	31	31
MED	E B 15	E E 14	18	E B 15	E B 14	E B 14	18	G 20	36	39	40	41	42	35	U G 28	34	33	J A 28	J A 26	J A 24	J A 24	23	J A 22	17
UQ	J A 22	J A 22	J A 24	21	22	19	24	29	J A 39	43	44	44	47	42	41	37	35	J A 31	J A 36	J A 34	J A 30	J A 28	J A 24	J A 24
LQ	E B 14	E B 13	E B 13	E B 13	E B 13	E B 13	G	G	G	G 32	G	G	G	G	G	G	G 25	J A 23	J A 22	J A 19	20	E B 14	E B 14	E B 14

OCT. 1989 | FOES (0.1 MHZ)

IONOSPHERIC DATA

OCT. 1989 | FBES (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

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	E B 15	E B 14	E B 13	E B 15	E B 14	E B 14	G	30	35	41	41	G 32	G 26	G	G	36	32	G	22	20	23	23	17	E B 15
2	17	17	E B 13	E B 13	E B 13	E B 13	24	G	G 29	G 33	G	G	G	G	G 25	G	G	G	20	E S 15	E B 14	E B 13	15	E B 13
3	E B 13	E B 13	E B 13	E B 12	E B 13	E B 11	G	G	36	38	G	G	41	41	G	G	35	22	46	20	17	E B 14	E B 13	E S 15
4	E B 15	E B 13	E B 13	E S 13	E B 13	E B 13	23	G	38	42	43	47	42	42	37	G 29	33	22	20	16	E B 15	E B 15	E S 15	E B 14
5	E B 14	E B 12	16	E B 13	E B 13	E B 13	23	G	G	39	42	42	41	G	G	G	G	G	18	20	16	E B 13	E B 14	E B 13
6	18	E B 14	E B 13	E B 13	E B 13	E B 13	G	G	35	45	46	48	44	43	44	38	35	20	24	E B 14	19	18	16	E B 15
7	E B 15	E B 12	E S 15	E B 15	E B 13	E B 14	25	31	G	G	G	G 32	G	G	G	G	31	27	41	18	14	16	E B 14	17
8	18	E S 16	E B 12	E B 13	E B 13	E B 13	24	G	36	40	46	42	44	40	39	34	31	23	15	15	19	16	17	14
9	E B 13	E B 13	E B 13	E B 15	E B 12	E B 13	E B 14	G	G	G	41	G	G	G	G	G	34	23	26	20	42	19	18	16
10	E B 15	18	E B 15	E B 14	E B 15	E B 15	G	G	G	38	G	40	E B 42	G	G	35	37	29	E B 13	20	19	18	E B 14	E B 13
11	E B 14	E B 14	E B 13	E B 13	E B 13	E B 12	G	U R 27	38	42	42	47	46	42	G	G	G 18	21	40	E B 14	20	E B 14	E B 15	E B 15
12	E B 13	E B 14	E B 15	E B 13	E B 14	E B 14	G	G 25	34	G	G	G	G	G	G	G	G	E S 21	E B 15	E B 15	19	18	E B 17	E B 14
13	E B 14	E B 14	E B 13	E B 14	E B 14	E B 15	G 15	G	G	G	40	41	41	G	G	G	32	21	E B	E B 14	18	E B 14	E B 13	E B 14
14	E B 14	E B 13	E B 13	E B 13	E B 14	E B 14	G 14	G 19	G 22	G 29	G	40	G	41	G	36	30	26	E B 13	E B 14	E B 15	E B 13	E B 13	E B 13
15	E B 14	E B 13	E B 13	E B 13	E B 13	E B 14	G	G	G	G	G	42	G	G	41	39	39	33	41	E B 13	E B 13	E B 13	E B 14	E B 14
16	E B 15	E S 14	E B 13	E B 12	E B 13	E B 13	G	28	G	39	40	40	50	G	39	35	31	31	27	E B 13	19	16	E B 14	E B 14
17	E B 14	E B 12	E B 13	E B 13	17	E B 13	G	G	38	61	38	40	G 33	G	G	C	G 17	E B 18	16	E B 13	E S 16	S	E S 16	U S 21
18	24	E B 12	E B 14	E B 14	E B 14	E B 13	19	29	33	37	E S 40	E S 48	42	40	G	G 21	30	23	21	15	18	17	E B 13	20
19	17	21	18	17	E B 13	E B 13	E B 14	G	35	36	39	G 32	40	G 32	G	33	27	22	E B 13	17	E B 14	E B 13	E B 13	E B 13
20	E B 13	E B 12	16	E B 13	E B 13	E B 13	G	G	32	G	G	G	C	C	C	G 22	G 24	18	E B 13	E S 14	16	E B 13	E B 13	15
21	E B 14	E B 13	G 13	E B 13	E B 13	E B 14	19	28	39	51	44	42	C	38	55	58	32	55	42	E B 13	E B 14	E B 15	21	U Y 25
22	17	37	A A 58	A A 49	A A 57	E B 13	24	32	33	36	37	39	65	44	40	34	27	20	20	19	16	18	15	E B 13
23	E B 13	E B 13	22	28	E B 12	E B 14	20	27	36	43	42	38	G	G	34	31	G 21	C	17	19	15	18	15	E B 13
24	19	E B	E B 13	E B 13	E B 13	15	E S 18	26	33	36	G	38	41	38	36	39	25	16	A A 88	47	40	30	43	18
25	17	23	19	20	E B 13	E S 13	E B 15	G 18	G	G	G 36	C	C	C	36	33	32	19	18	E B 13	19	19	28	49
26	25	E B 15	16	18	19	20	E B 16	G	G	G 34	G	G 34	36	38	39	32	G 30	24	22	24	21	E B 13	E B 13	18
27	19	23	21	18	E B 15	E B 14	E S 18	G	G	41	G	G	G	G	G	G 23	G 18	G 16	E B 14	26	19	24	34	36
28	35	18	24	19	17	19	18	27	G	38	55	69	48	47	58	34	36	18	17	18	E B 13	32	17	E B 14
29	18	14	18	E B 13	E B 13	E B 13	E B 13	G	33	41	38	45	104	55	E S 38	G	G 20	G 14	17	17	E B 14	23	18	E S 16
30	16	17	E B 13	E B 13	E S 14	E B 13	G	G	G	G	G	G	G	G	G 30	G 27	G 20	18	E B 13	24	19	19	30	E B 13
31	E B 12	E B 13	E B 13	E B 13	E B 13	E B 14	E B 14	G	33	37	39	G	41	39	35	G	27	U A 22	33	42	E B 14	E B 13	18	20
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	30	31	31	31	31	31	31	31	31	31	30	28	29	30	30	31	30	30	31	31	30	31	31
MED	E B 15	E B 14	E B 13	E B 13	E B 13	E B 13	E G 14	G	33	37	38	39	40	G 32	G 26	30	30	21	20	17	17	16	E E 15	E B 15
UQ	18	17	16	E B 15	E B 14	E B 14	19	27	35	41	42	42	43	41	39	35	32	23	27	20	19	19	18	18
LQ	E B 14	E B 13	E B 13	E B 13	E B 13	E B 13	G	G	G	E G 29	G	G	G	G	G	G	G 20	17	15	E B 14	E B 14	E B 13	E B 14	E B 14

OCT. 1989 | FBES (0.1 MHZ)

IONOSPHERIC DATA

OCT. 1989 | FMIN (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	15	14	13	15	14	14	14	14	16	18	24	26	22	22	22	17	16	14	13	13	13	13	14	15
2	14	13	13	13	13	13	15	16	17	21	28	24	24	22	20	17	13	13	13	E S 15	14	13	13	13
3	13	13	13	12	12	11	18	13	15	17	21	24	22	20	20	17	17	12	12	13	15	14	13	E S 15
4	15	13	13	E S 13	13	13	14	17	17	21	21	27	23	22	19	18	16	13	13	15	15	15	E S 15	14
5	14	12	13	12	13	13	14	15	17	18	20	21	28	31	20	18	17	17	13	13	14	13	14	13
6	14	14	13	13	13	13	15	17	18	19	20	21	21	22	17	16	13	13	13	14	13	15	13	15
7	15	13	E S 15	14	13	14	14	15	17	18	21	25	25	23	24	18	17	15	13	13	14	13	14	13
8	14	E S 16	12	13	13	13	18	15	17	19	22	20	24	27	20	15	15	13	13	13	14	13	13	13
9	13	13	13	15	12	13	14	15	16	17	21	27	25	23	18	15	13	14	13	13	15	13	15	14
10	15	15	15	14	15	15	17	15	18	17	25	25	42	21	18	17	13	14	13	14	13	14	14	13
11	14	14	13	13	13	12	15	18	18	18	19	23	21	26	20	16	16	13	14	14	14	14	15	15
12	13	14	15	13	14	13	14	15	18	20	24	22	22	24	20	E S 25	E S 22	E S 21	15	15	14	14	17	14
13		14	13	14	14	15	13	15	16	26	27	32	34	23	19	30	19	15	17	14	13	14	13	14
14	14	13	12	13	13	14	13	14	17	20	19	22	23	20	19	18	14	16	13	14	15	13	13	13
15	14	13	13	13	13	14	E S 14	14	18	23	29	22	25	22	19	18	16	14	18	13	13	13	14	14
16	15	E S 14	13	12	13	13	13	17	16	17	17	16	20	E S 24	19	13	15	13	13	13	13	13	14	14
17	14	12	13	13	13	13	14	13	22	17	17	19	18	25	18	C	13	18	13	13	E S 16	S	E S 16	E S 17
18	13	12	14	14	14	13	15	14	15	17	E S 40	E S 48	39	33	25	17	16	13	13	14	13	13	13	14
19	13	14	13	13	13	13	14	13	16	20	20	20	21	18	18	17	14	16	13	16	14	13	13	13
20	13	12	13	13	13	13	14	15	17	18	20	E S 21	C	C	C	13	13	15	13	E S 14	13	13	13	12
21	14	13	12	13	13	14	12	15	15	17	25	38	C	21	13	13	13	14	14	13	14	15	15	16
22	13	13	13	13	12	13	13	13	15	35	19	20	20	24	20	17	15	15	13	13	14	13	14	13
23	13	13	13	13	12	E S 14	14	13	16	17	27	27	21	24	18	17	16	C	13	13	13	14	14	13
24	13	12	13	13	13	13	E S 18	15	16	17	18	22	24	19	18	17	15	13	12	16	13	13	13	13
25	13	12	13	14	13	E S 13	15	18	22	29	30	C	C	C	19	16	15	15	13	13	13	13	15	15
26	14	15	13	13	13	13	16	14	16	15	20	20	22	20	20	18	20	13	13	13	13	13	13	15
27	13	13	13	13	15	14	E S 18	14	16	33	23	19	22	20	17	17	13	14	14	14	13	15	14	15
28	13	13	13	13	13	15	13	15	17	18	19	24	23	19	20	21	16	14	13	15	13	14	15	13
29	13	14	13	13	13	13	13	13	15	17	18	19	34	E S 28	E S 38	25	17	13	14	14	14	14	14	E S 16
30	14	13	13	13	E S 14	13	14	18	17	18	20	21	21	21	20	18	14	12	13	14	13	14	13	13
31	12	13	13	13	13	14	14	15	16	18	22	21	22	22	20	21	14	13	15	16	14	13	13	14
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	31	31	31	31	31	31	31	31	31	31	30	28	29	30	30	31	30	31	31	31	30	31	31
MED	14	13	13	13	13	13	14	15	17	18	21	22	22	22	20	17	15	14	13	14	14	13	14	14
UQ	14	14	13	13	13	14	15	15	17	20	24	25	25	24	20	18	16	15	14	14	14	14	14	14
LQ	13	13	13	13	13	13	14	14	16	17	20	20	21	21	18	16	14	13	13	13	13	13	13	13

OCT. 1989 | FMIN (0.1 MHZ)

IONOSPHERIC DATA

OCT. 1989 | M(3000)F2 (0.01) | 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	285	280	290 S	300	305	305	325	305	310	320	280	275	280	275	275	280	295	295	300	290	285	280	280	265
2	275 S	275	265	265	280	275	300	320	315	310	280 S	285	280	280	280	285	290	300	300 J S	300	285	280	285	285
3	280	265	270	275	275	280	320	320	325	300	290	280	275	270 R	275	275	290	295	300	275	280	285	295	S
4	250	260	280 U S	255	255	250	315	320	310	295	270	280	265	265	260	270	280 U S	290	295	270	275 S	270 U S	265 U S	285
5	275	270	270	275	275	260	315	320	305	295	285	275	265	265	265	265	270	285	290	285	285	280	285	285
6	300 S	S	265	280	295	295	325	320	315	300	290	275	265	260	260	260	270	280	285	280	280	280	270	280
7	280	285	270 I S	255	260	260	315	320	300	290	275	270	265	255	260	260	265	280	285	275	265	260	275	285
8	290	275 I S	265	285	270	260	305	310	305	290	280	270	260	260	260	265	265	280	280	270	265 S	270	280	295
9	280	260	255	255	265	280	315	315	300	290	280	270	255	255	260	260	270	275	285	280	275	270	275 U S	275
10	280	270	275	275	280	275	290	300	310	290	280	265	265	255	260	270	275	285	295	270	275	280	280	280
11	275	285	280	270	285	295	320	315	305	295	280	270	260	255	270	265	280	290	285	280	285	280	280	290
12	290	285	290	280	295	300	320	320	300	290	290	280	260	260	265	S	S	S	305	290	280	285	280	295
13	285	280	285	300	295	265	325	320	310	300	290	280	270	270	270	275	280	295	285	280	280	280	280	290
14	280	295	300	300	315	320	325 U S	330	325	300	285	285	270	270	275	275	285	295	295	285 S	305 S	290	285	270
15	285 S	290	300	315	330	300	315	330	310	320	290	280	270	265	275	280	285	290	290	290	295	295	285	275
16	290	285 S	270	290	305	305	320	335 U S	310	290	275	275	270	275	275	280	285	285	285	295 J S	275	285	280	275 S
17	270	250	230	255	280 S	235	285	315	305	280	285	280	280 S	270	275	275 I C	280	290	290	295	S	S	S	S
18	270	295	305	270	275	280	310	320	310	320	295	280 R	270	270	275	280	290	295	295	295	295	290	290	265
19	260	285	290	280	270 U S	245	285	325	300	305	285	280	275	275	285	280	290	290	290	290	290	270	280	285
20	310	295	275	270	270	275	320	320	315	310	315 S	285	C	C	C	285	295	300	300	285 S	295	270	250	230
21	240	260 U S	310	240	215	200	285 S	305	310	300	305	305 U R	295 I C	285	285	290	295	305	290 S	235	250 U S	270 U F	Y	Y
22	220	250 F	A	A	A	240	265	300	250 H	280	275	290	280	290	300	300	300	300	285	290	290	290	265	275
23	265	265 S	265	270 F	265 J S	280 U S	310	300	335	315	300	300	295	280	295	300	290	300 I C	315	325	290	275	265	285
24	290 S	270	280	280	280	270	330	350	325	315	300	300	295	285	290	300	300	310	A	300	300	300	305 U S	295
25	290	270	285	290 S	270	260	310	330	330	325	305	C	C	C	280	290	290	300	295	285	295	305	295	305
26	295	270	285	290	270	275	310	330	315	310	310	295	285	290	295 R	300	300 I S	305	305	315	315	295	280	285
27	290	305	285	275	250	260	285 S	335	330	305	300	295	290	295	290	290	300	305	310	305	310 S	310	260	285
28	270	295 S	275	290	310	295	310	330 S	330	320	310	300	305 U R	295	295 I S	295	300	315	320	315	295	290	290	280
29	270	270	270	255	280 S	255	310	330	310	315	300	305 R	280 R	285	290	295	300	300	305	310	305	275	285	295
30	265	285	295	340	325	285	310	325	330	310	300	285	285	290	285	285	290	295	285	305	275	285	275 S	275
31	295	290 S	295 S	270	260	255	305 S	340	320	310	295	295	285	285	285	290	300	295	290	295	285	290	280	275
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	30	30	30	30	31	31	31	31	31	31	30	29	29	30	30	30	30	30	31	30	30	29	28
MED	280	278	280	275	278	275	310	320	310	300	290	280	275	270	275	280	290	295	292	290	285	280	280	285
UQ	290	285	290	290	295	290	320	330	322	312	300	295	285	285	285	290	295	300	300	298	295	290	285	288
LQ	270	270	270	270	270	260	305	315	305	292	280	275	265	265	265	270	280	290	285	280	275	275	275	275

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

IONOSPHERIC DATA

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

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									L	L 385	L	L	L	L	L									
2									L	L	L	L		L	L	L								
3										L	L	L	L	L 355	L	L	L							
4											L	L	L	L	L	L								
5										L	L		L		L									
6										L	L	L		U L 330	L	L	L							
7											L		L	U L 310	L	L	L							
8									L		L	L	L	L	L	L								
9											L	L	L	U L 320	L 335		L							
10											L	L	L	L	L									
11											L	L	L	L	L		L							
12											L	L	L	L	L	L								
13												L	L	L	L	L								
14											L		L	L	L									
15									L	L	L	L	L	L	L	L								
16										L	L		L	L	L									
17										L	L	L		L	L	C								
18										L		L	L	L	L									
19									L		L	L	L	L										
20										L	L	L	C	C	C	L								
21									L			L	C		L	L								
22								L	L	U L 330	U L 320	U L 320	A	L	L									
23											L	L	L	L	L				C					
24												L	L	L	L									
25											L	C	C	C	L	L								
26											L	L	L	L										
27											L		L	L										
28												A	L											
29									L	L	L	L	A											
30												L	L	L	L	L								
31										L	L	L			L									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT										2	1	1		4	1									
MED										L U L 353 320		U L 320		U L 325	L 335									
UQ														L 342										
LQ														U L 315										

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

IONOSPHERIC DATA

OCT. 1989 | H'F2 (KM) | 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									255	230	L	340	300	L 280	305									
2									245	H 225	235	310		310	310	295								
3										240	L 285	L 305	310	340	290	305	275							
4											L 345	L 280	340	340	360	305								
5										260	255		335		360									
6										255	270	335	L	360	360	355	330							
7											L 320		L	360	350	L 340	L 315							
8									240		305	L	330	L 335	L 360	305								
9											L 315	310	L 380	355	360		310							
10											320	335	335	355	335									
11											280	335	330	355	320		300							
12											285	255	L 345	345	320	320								
13												L 275	310	340	325	300								
14											L 310		330	310	290									
15									255	245	310	325	L 335	335	305	300								
16										L	L 320		315	320	305									
17										L	260	310		330	300	C								
18										230		310	L 350	330	305									
19									230		L 310	300	L 310	310										
20										255	260	L 305	I C 305	I C 305	I C 305	290								
21									270		250		I C 300	L 305		L 305								
22								285	305	320	340	330	A 365	325	270				C					
23											260	270	290	L 350	L 285									
24												260	255	290	285									
25											L 280	C	C	C	255	275								
26											270	280	L 305	300										
27											260		240	L 295										
28												275	310											
29									260	255	290	255	A 330											
30												L 295	L 290	290	310	270								
31										255	285	285			300									
	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	8	11	25	23	25	26	25	13	5							
MED								285	255	255	285	305	315	330	305	305	310							
UQ									265	255	L 310	318	335	345	335	305	315							
LQ									242	235	260	278	305	305	300	295	300							

OCT. 1989 | H'F2 (KM)

IONOSPHERIC DATA

OCT. 1989 | H'F (KM) | 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	290	290	275	260	230	245	230	235	240	220	220	H 210	H 205	240	230	250	245	240	A 235	270	255	260	270	310
2	315	315	310	295	255	280	250	245	225	215	210	210	235	220	230	230	245	245	230	240	255	260	270	260
3	275	285	305	280	270	285	225	230	230	220	220	H 205	230	225	240	245	260	240	A 260	245	265	255	240	310
4	345	325	285	290	340	350	240	230	230	230	220	230	220	235	240	240	250	255	225	240	270	270	265	260
5	275	295	300	275	270	310	240	225	225	220	220	215	215	220	235	240	255	255	240	260	260	245	255	255
6	265	280	300	280	235	255	240	220	225	230	225	230	225	240	250	240	250	260	245	260	250	240	255	270
7	265	265	310	310	320	300	235	230	225	230	220	215	220	230	230	240	255	260	A 250	245	260	285	285	270
8	265	275	290	245	245	310	245	230	230	230	225	225	230	230	245	245	250	245	240	255	275	280	280	260
9	265	285	310	310	290	250	235	220	230	230	225	220	H 215	225	240	240	250	250	250	240	E A 295	270	280	275
10	275	295	285	275	270	275	245	230	225	230	220	H 220	225	230	235	255	265	250	235	260	290	285	280	290
11	290	270	290	310	285	250	225	240	230	235	H 210	235	235	235	240	255	240	245	E A 260	265	270	265	280	255
12	250	270	280	285	265	255	240	225	235	225	205	220	225	H 220	235	250	250	260	225	240	265	275	285	260
13	270	275	285	255	255	325	230	215	230	220	220	225	230	240	230	250	250	240	230	240	250	250	265	270
14	250	250	250	260	240	220	225	225	225	225	H 215	225	230	225	230	250	250	240	225	250	235	230	240	260
15	275	270	255	240	225	230	240	220	225	220	220	H 210	225	235	250	250	250	235	A 240	245	250	240	235	260
16	265	290	290	270	245	250	230	220	220	H 210	220	A 210	A 245	235	240	240	245	235	A 240	240	240	260	250	275
17	290	335	380	320	255	305	250	220	230	A 235	205	230	230	230	235	I C 245	235	230	225	240	255	I S 270	255	I S 280
18	A 300	260	250	265	270	250	240	230	230	225	230	235	230	235	240	255	240	230	240	240	250	260	250	A 285
19	285	290	270	260	305	360	265	215	220	230	220	220	H 225	230	235	235	250	240	250	225	230	260	245	260
20	250	260	300	295	260	260	240	220	230	225	215	215	I C 215	I C 225	I C 235	245	240	220	210	265	250	290	315	400
21	400	305	225	320	465	505	300	240	250	250	A 235	235	I C 225	H 230	A 245	A 250	A 230	E A 255	E A 270	380	355	290	340	V
22	E A 400	A	A	A	A	350	315	275	260	250	240	A 240	A	E A 265	E A 260	A 250	250	250	240	270	255	275	305	300
23	335	330	E A 340	E A 375	300	300	250	245	245	230	240	220	235	H 235	H 235	230	230	I C 250	225	220	230	295	310	290
24	285	300	290	300	285	290	250	230	230	230	H 225	225	235	230	230	230	230	220	A	A 275	E A 295	A 280	E A 340	A 275
25	305	A 340	300	280	285	325	255	230	230	240	240	C	C	C	235	240	240	230	235	250	260	255	A 265	E A 310
26	A 265	280	300	280	A 315	310	240	225	230	230	220	225	H 215	H 235	240	240	235	220	230	240	230	255	265	270
27	285	280	280	310	380	335	275	215	210	230	225	235	220	230	240	235	230	230	225	A 240	250	240	E A 335	A 320
28	E A 365	285	A 285	285	240	270	265	220	225	220	A 240	A	A 225	A 255	E A 250	240	230	220	220	220	225	E A 270	270	275
29	320	310	335	320	265	H 260	225	210	220	A 225	220	A 245	A	A 260	245	240	225	230	230	225	225	A 250	290	280
30	295	295	270	235	220	280	260	230	230	230	H 230	225	H 220	235	230	240	245	230	225	245	235	260	A 310	290
31	255	250	250	210	285	320	260	225	220	230	230	230	235	235	230	245	230	A 215	A 270	E A 290	250	250	275	305
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	30	30	30	30	31	31	31	31	31	31	29	28	30	31	31	31	31	30	31	31	31	31	30
MED	280	285	289	280	270	285	240	225	230	230	220	225	225	231	235	240	245	240	234	245	252	260	270	275
UQ	297	300	300	305	290	315	252	230	230	230	228	230	230	235	240	250	250	250	A 242	260	262	275	285	290
LQ	265	270	275	260	245	255	235	220	225	222	220	215	220	230	232	240	235	230	225	240	245	252	255	260

OCT. 1989 | H'F (KM)

IONOSPHERIC DATA

OCT. 1989 | H'E (KM) | 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

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							H 145	A	A	115	E A 115	A 115	A 115	110	115	A 115	115	120						
2							135	110	E A 130	E A 130	120	115	115	115	120	110	115	110						
3							E B 160	115	110	110	115	115	110	115	120	115	120	A						
4							135	120	115	115	110	A	110	110	A	E A 125	A	A						
5							135	115	110	110	110	115	A	120	120	115	120	E B 140						
6							130	115	115	110	A	110	115	A	110	115	110	A						
7							E B 155	E A 140	115	110	110	A 115	110	115	120	115	120	E B 140						
8							A 135	115	115	110	110	110	110	120	A	A 110	A	A						
9							E B 150	120	110	110	115	115	115	110	115	110	A 120	B						
10							B	120	110	115	120	120	B	115	115	115	120	B						
11							130	A	115	115	230	A	A	A	120	120	115	A						
12							E B 160	E A 155	A	115	115	115	115	120	115	125	125	S						
13							A	120	120	110	110	120	120	110	110	125	120	B						
14							E A 145	A 120	110	A 115	110	110	110	115	115	115	115	B						
15							S 135	110	115	120	115	A 120	115	110	110	110	120	A						
16							E B 155	115	110	110	110	110	110	120	110	110	115	E B 130						
17							140	115	115	110	110	A	A	120	110	I C 115	A 120	B						
18							B	115	110	110	S	S	B	E B 130	125	115	115	A						
19							B 160	110	110	110	A	E A 130	A	E A 130	105	A 115	A 115	B						
20							140	110	110	110	110	110	I C 115	I C 115	C	E A 120	E A 115	B						B
21	B		B				A	115	110	110	115	B	I C 115		110	115	A	B					B	B
22							A	120	115	B	110	115	115	120	120	115	E A 135	B						
23							A	A	A	A	E B 120	A	115	120	A	A	E A 145	C						
24							S	A	115	120	110	115	120	115	115	A	120	B						
25							B	125	120	120	A	C	C	C	A	E A 125	E A 130	B						
26							B	115	115	A	120	E A 140	A	A	A	A	A	A						
27							S	120	115	A	120	115	115	110	115	A 130	E A 130	A						
28							A	125	115	110	115	120	115	110	115	A	A	A						
29							B	115	A	A	A	110	A	I S 120	I S 130	125	E A 130	A						
30							B	125	120	115	115	110	110	115	E A 130	E A 130	E A 135	B						
31							B	120	115	115	115	115	110	115	120	120	A	B						
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT							17	27	27	26	26	24	22	26	25	27	25	5						
MED							138	115	115	110	114	115	115	115	115	115	118	E B 130						
UQ							E B 155	120	115	115	115	116	115	120	120	118	A 122	E B 140						
LQ							135	115	110	110	110	110	110	110	110	115	115	115						

OCT. 1989 | H'E (KM)

IONOSPHERIC DATA

OCT. 1989 | H'ES (KM) | 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	B	B	B	B	B	B	G	115	120	110	120	105	110	G	G	E G 160	130	G	110	110	110	110	105	110
2	110	110	110	105	B	B	E G 160	G	110	110	G	G	G	G	110	G	G	G	115	S	110	120	110	B
3	B	B	B	B	135	B	G	G	130	135	G	G	115	120	G	E G 190	140	110	110	105	105	B	B	S
4	B	B	B	S	B	B	145	E G 145	130	120	115	115	110	110	105	105	105	100	105	115	B	B	S	B
5	B	B	105	105	B	115	150	G	E G 155	130	120	115	115	G	G	G	G	130	120	110	105	110	B	B
6	100	B	B	B	B	B	G	G	E G 155	125	110	120	130	145	140	135	130	110	110	110	110	110	105	B
7	B	110	S	110	B	B	160	155	G	G	G	110	G	G	G	G	E G 150	125	115	105	105	100	130	100
8	100	S	B	B	B	115	130	140	135	140	120	120	115	120	120	120	115	110	110	105	105	100	100	100
9	B	B	B	B	B	B	110	G	G	G	120	G	G	G	G	G	135	120	100	100	110	105	105	110
10	B	105	105	B	B	B	G	G	135	125	G	130	B	G	G	150	125	115	125	105	105	100	100	B
11	B	B	B	B	110	B	G	125	110	115	110	110	110	115	G	G	105	140	115	110	110	B	B	B
12	B	B	B	B	B	115	G	110	110	G	G	G	G	G	G	G	G	S	B	B	105	110	B	B
13	B	B	B	B	B	B	110	G	G	G	130	125	135	G	G	G	E G 185	140	100	110	105	B	B	B
14	B	B	105	105	110	105	110	105	105	100	G	125	G	130	G	E G 160	E G 155	115	100	95	B	B	B	B
15	B	B	110	100	B	B	G	G	G	G	G	125	G	G	E G 150	140	125	120	110	115	110	B	B	B
16	B	S	B	B	B	125	G	E G 160	G	125	120	110	110	G	E G 170	E G 160	E G 150	125	110	B	100	115	B	B
17	B	B	B	B	115	B	G	G	115	110	110	110	100	G	G	C	105	100	115	B	S	S	S	105
18	100	B	95	B	B	B	150	150	E G 145	130	S	S	125	125	G	100	140	120	110	110	110	105	110	100
19	100	95	100	100	100	B	110	G	120	115	110	110	105	105	G	E G 160	125	115	120	100	105	B	B	B
20	B	B	100	105	B	B	G	G	130	G	G	G	C	C	C	100	95	100	B	S	125	B	B	140
21	B	B	B	B	110	105	120	135	125	115	115	120	C	120	110	110	115	110	110	B	B	B	E G 200	170
22	125	115	110	110	110	125	120	120	120	130	130	125	115	120	115	120	155	120	105	105	105	100	110	B
23	110	110	115	110	120	B	105	115	110	110	105	115	G	G	110	110	115	C	105	110	115	105	115	B
24	105	110	B	B	B	105	S	125	110	130	G	120	130	120	120	115	115	110	105	105	100	100	105	100
25	105	105	115	105	110	S	110	105	G	G	115	C	C	C	110	E G 150	135	105	105	110	110	110	100	105
26	105	110	105	100	100	100	105	G	G	120	120	110	110	110	110	105	115	105	105	105	105	B	110	100
27	100	100	100	100	105	B	S	G	G	140	G	G	G	G	G	110	115	120	B	105	110	110	110	100
28	105	105	100	105	105	105	105	E G 165	G	130	115	110	110	110	105	110	105	105	100	105	B	105	110	110
29	100	105	100	130	115	110	100	G	110	110	110	115	110	115	S	G	115	110	105	110	B	100	105	110
30	105	105	110	B	S	B	G	G	135	135	G	G	G	G	110	105	110	105	120	105	105	105	100	110
31	B	105	B	B	B	B	B	155	135	125	130	G	120	120	120	G	110	105	105	105	120	B	110	100
	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	14	16	14	13	11	17	16	22	24	19	21	18	15	15	21	28	27	28	25	25	19	19	16
MED	105	105	105	105	110	110	110	124	120	125	115	115	112	120	110	U 112	118	110	110	105	105	105	108	105
UQ	105	110	110	110	115	115	U 138	145	132	130	120	120	120	120	119	E G 150	133	120	115	110	110	110	110	110
LQ	100	105	100	100	105	105	110	115	110	112	110	110	110	112	110	110	112	105	105	105	105	100	105	100

OCT. 1989 | H'ES (KM)

IONOSPHERIC DATA

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

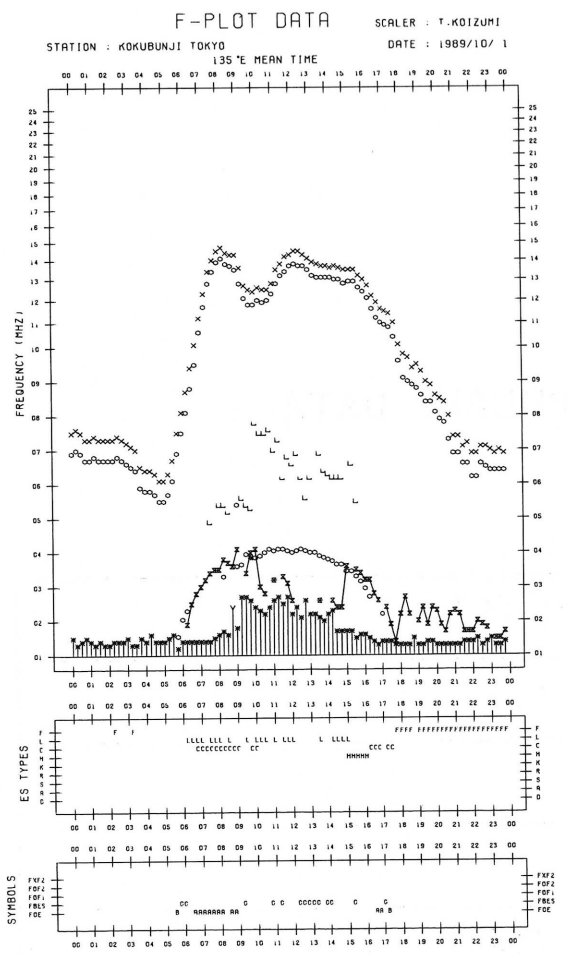
Station KOKUBUNJI TOKYO Lat. 35° 42.4'N, Long. 139° 29.3'E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

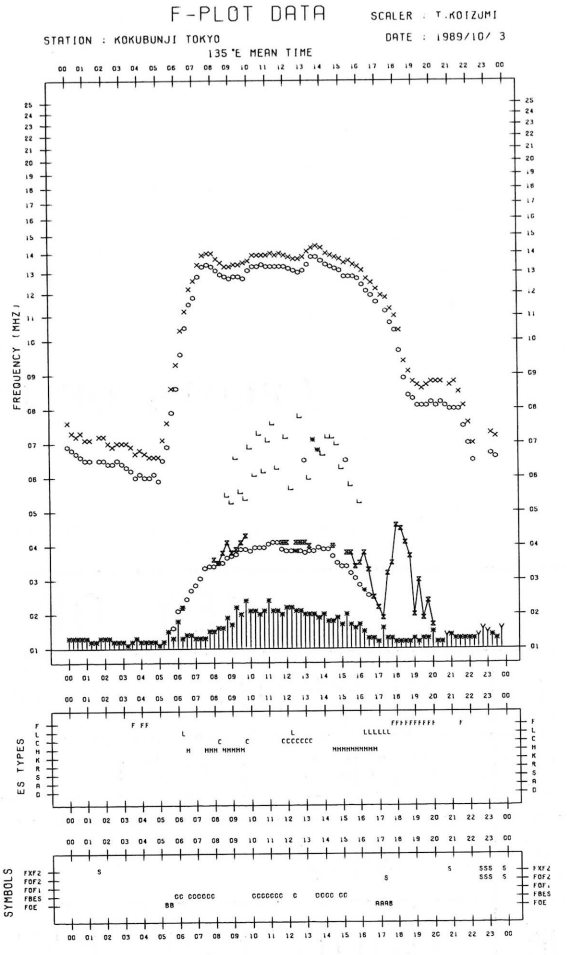
Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								CL 12	CL 12	C 1	CL 11	L 1	L 1			HL 11	H 1		F 2	F 3	F 3	F 3	F 3	F 1
2	F 1	F 2	F 1	F 1			H 1		L 1	L 2					L 1				F 2		F 2	F 1	F 2	
3					F 1				H 1	H 1			C 1	C 1		H 1	H 2	L 3	F 4	F 4	F 2			
4							H 1	H 1	H 1	C 2	C 1	C 2	C 1	C 3	L 2	L 2	L 3	L 2	F 3	F 1				
5			F 2	F 2		F 1	H 1		H 1	H 1	H 1	C 1	C 1					H 2	F 1	F 3	F 3	F 2		
6	F 4								H 1	C 2	L 2	C 3	C 2	HL 11	H 1	HL 21	HC 21	LH 21	F 4	F 1	F 3	F 2	F 1	
7		F 1		F 1			H 2	HL 21				L 1					H 2	H 3	F 5	F 3	F 2	F 2	F 1	F 2
8	F 2					F 1	C 2	H 1	H 2	H 2	C 2	C 1	C 1	C 1	C 1	L 1	L 3	C 2	F 1	F 2	F 3	F 2	F 2	F 1
9							LH 11				C 2						HL 21	CL 32	F 3	F 3	F 4	F 3	F 1	F 2
10		F 1	F 1						H 1	C 1		C 1				H 1	H 3	C 4	FF 12	F 3	F 3	F 2	F 2	
11					F 1			L 1	C 2	C 2	C 1	L 2	L 3	L 1			L 1	HL 12	FF 32	F 1	FF 21			
12						F 1		L 2	L 2												F 2	F 2		
13							L 1				H 1	H 1	H 1				H 1	H 1	F 1	F 1	F 3			
14			F 1	F 1	F 1	F 1	L 1	L 1	L 2	L 1		H 1		H 1		H 1	H 1	C 3	F 1	F 1				
15			F 1	F 1								HL 11			H 1	H 2	H 3	C 2	F 3	F 2	F 2			
16						F 1		H 1		H 2	H 1	C 1	CL 21		H 2	HL 11	H 1	C 4	H 3		F 2	F 1		
17					F 1				C 1	C 4	C 1	L 1	L 2				L 1	L 1	F 1					F 1
18	F 4		F 1				H 2	HL 11	H 1	H 1			C 1	C 1		L 1	H 1	C 3	F 2	F 1	F 2	F 3	F 1	F 4
19	F 2	F 4	F 3	F 3	F 1		L 1		C 2	C 1	C 2	L 1	L 2	L 2		HL 11	HL 12	CL 21	F 1	F 1	F 1			
20			F 2	F 1					H 1							L 2	L 2	L 2			F 1			CK 11
21	K 1		K 1		F 2	F 1	C 2	H 1	C 3	C 2	C 2	C 1		L 1	C 3	CL 41	CL 21	CL 42	F 3				HK 11	RK 11
22	F 2	F 6	F 5	F 6	F 6	F 3	L 5	C 3	C 2	H 1	H 1	H 2	C 2	C 2	C 1	C 1	HL 11	C 2	F 3	F 3	F 2	F 3	F 3	
23	FF 11	F 1	F 4	F 5	FF 22		L 1	LH 21	C 2	C 2	C 2	L 1			L 1	C 1	L 1		F 3	F 3	F 1	F 2	F 2	
24	F 3	F 1				F 1		L 1	LC 11	C 1		C 1	C 1	C 1	C 1	C 2	C 2	C 3	F 4	F 5	F 5	F 5	F 5	F 5
25	F 2	F 4	FF 22	F 2	F 1		L 1	L 1			L 1				L 1	HL 11	HL 21	L 2	F 1	F 1	F 2	F 1	F 4	F 5
26	F 5	F 1	F 1	F 2	F 3	F 3	L 2			L 1	C 1	L 1	L 2	L 2	L 2	L 2	L 1	L 3	F 3	F 3	F 2		F 1	F 2
27	F 2	F 3	F 2	F 2	F 1					HL 11						L 1	L 1	L 1		F 3	F 2	F 4	F 4	F 6
28	F 3	F 2	F 6	F 3	F 2	F 3	L 2	H 1		H 1	C 3	C 3	C 3	C 2	C 3	L 2	L 3	L 2	F 2	F 1		F 4	F 2	FF 21
29	F 5	F 3	F 3	FF 21	F 1	F 2	L 1		L 2	L 2	C 2	C 2	C 3	L 2			L 1	L 1	F 3	F 1		F 3	F 2	F 1
30	F 2	F 2	F 1						H 1	H 1					L 2	L 1	L 2	L 3	F 1	F 3	F 2	F 2	F 2	F 2
31		F 1						H 1	H 1	H 1	H 1		C 1	C 1	C 1		L 2	L 4	F 5	F 4	F 1		F 2	F 3
	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																								

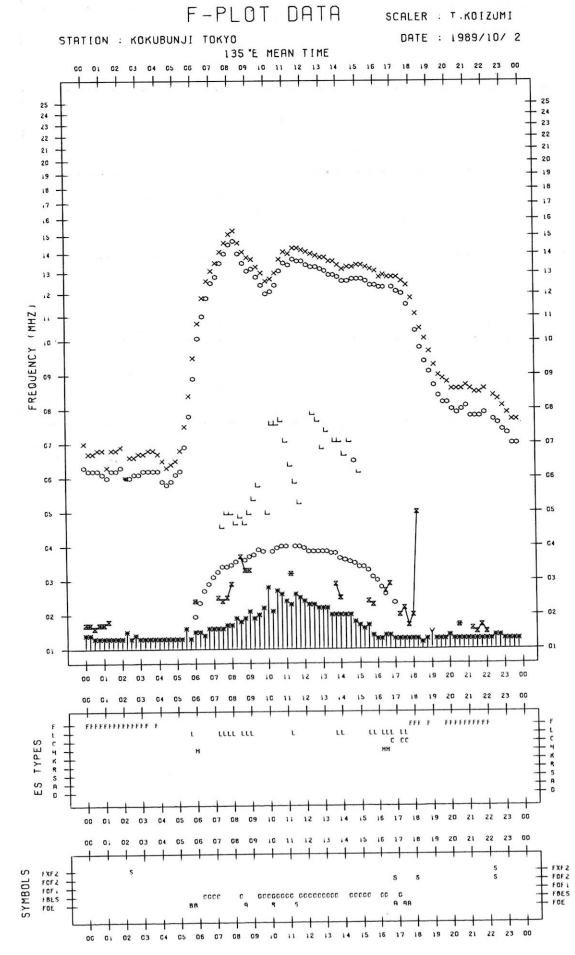
OCT. 1989 | TYPES OF ES

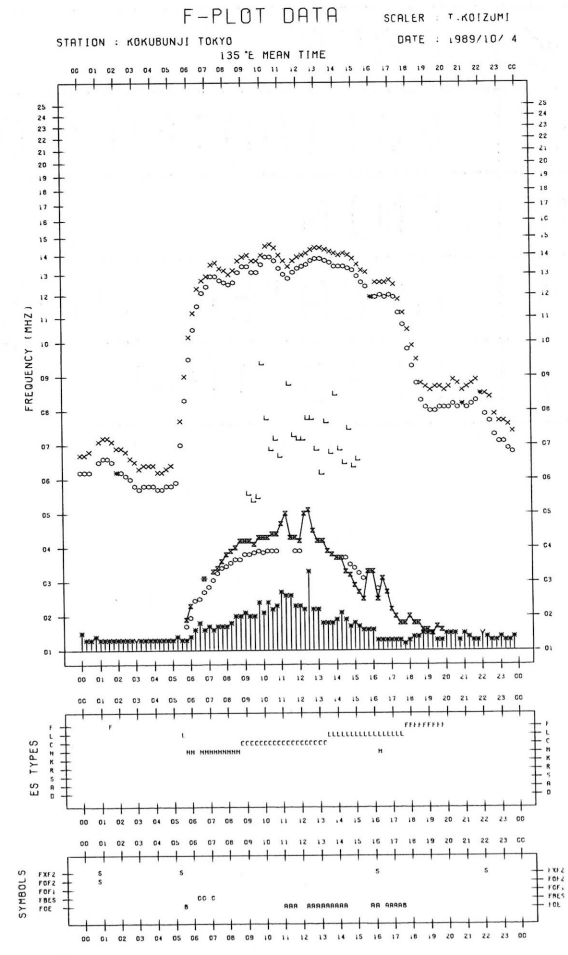
f-PLOTS OF IONOSPHERIC DATA

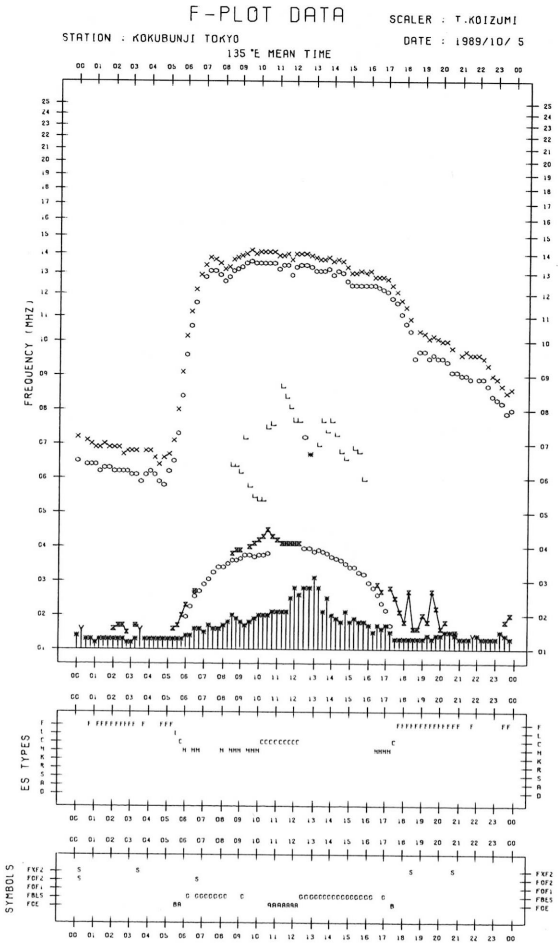
KEY OF F-PLOT	
!	SPREAD
○	FOF2,FOF1,FOE
×	FXF2
✳	DOUBTFUL FOF2,FOF1,FOE
⧖	FBES
∟	ESTIMATED FOF1
↑,↑	FMIN
∧	GREATER THAN
∨	LESS THAN

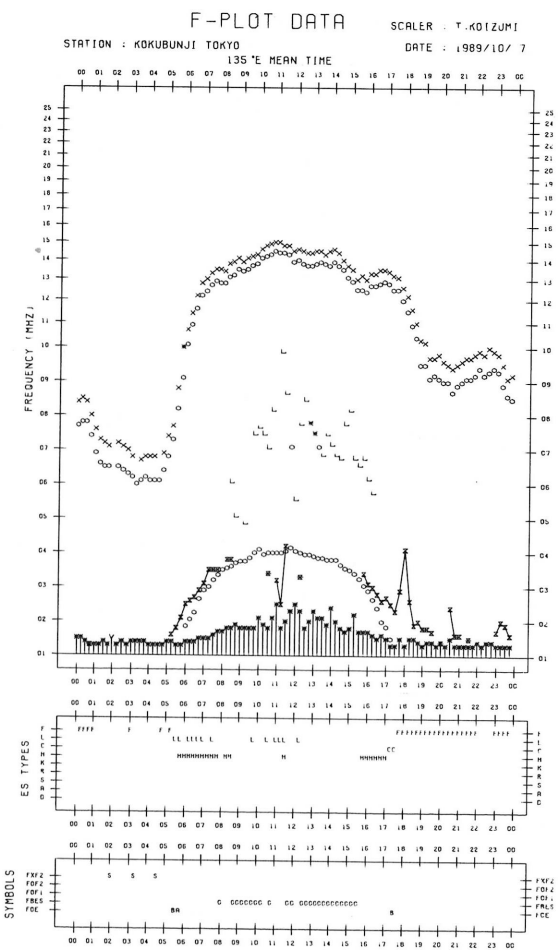

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/ 1
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

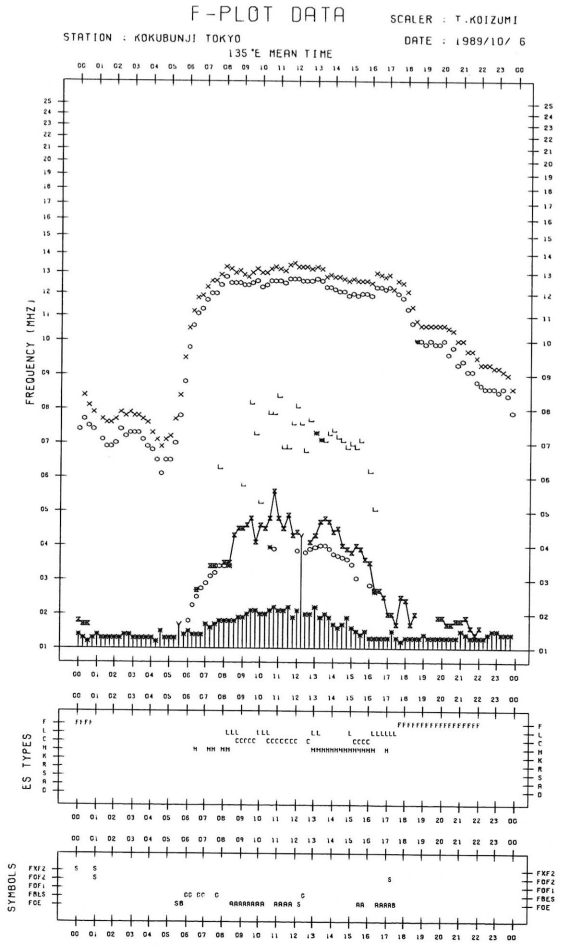

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/ 3
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

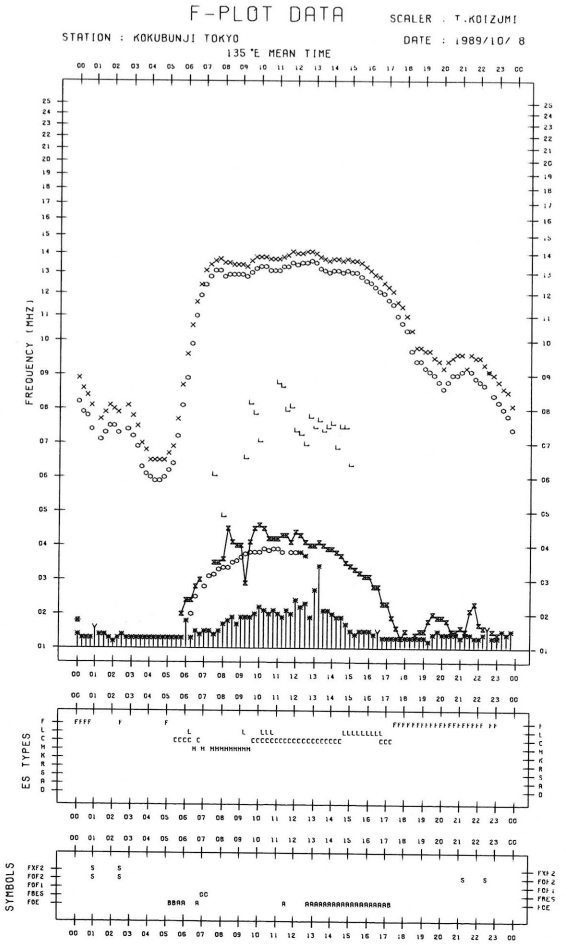

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/ 2
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

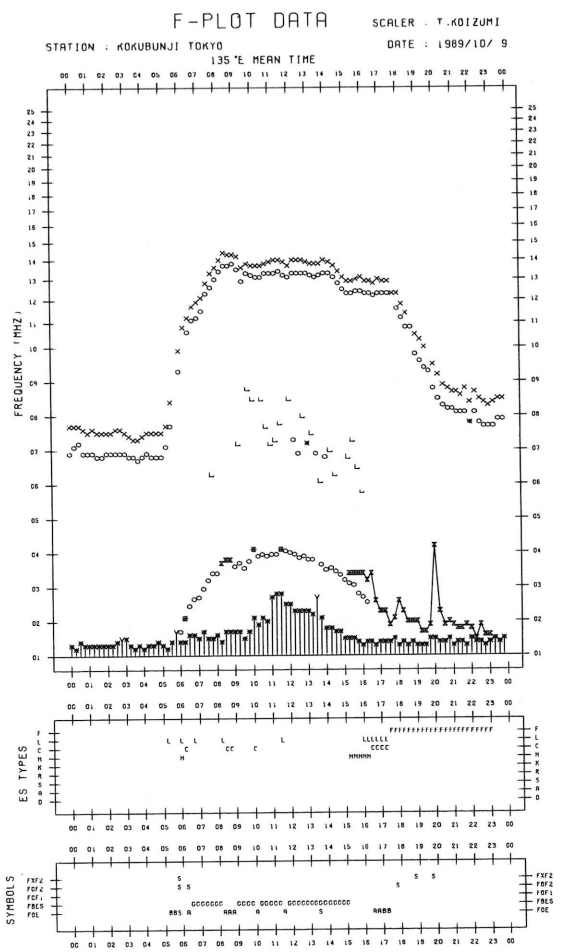

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/ 4
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

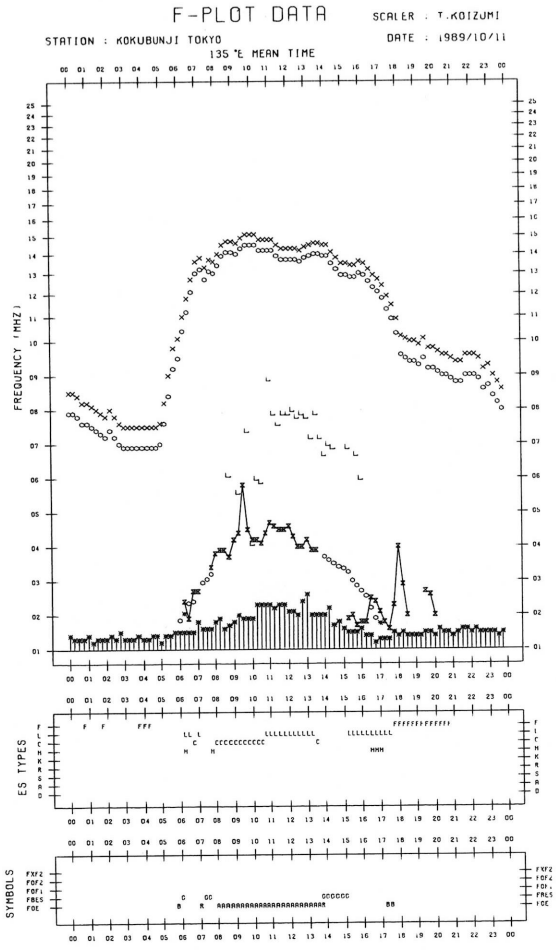

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/ 5
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

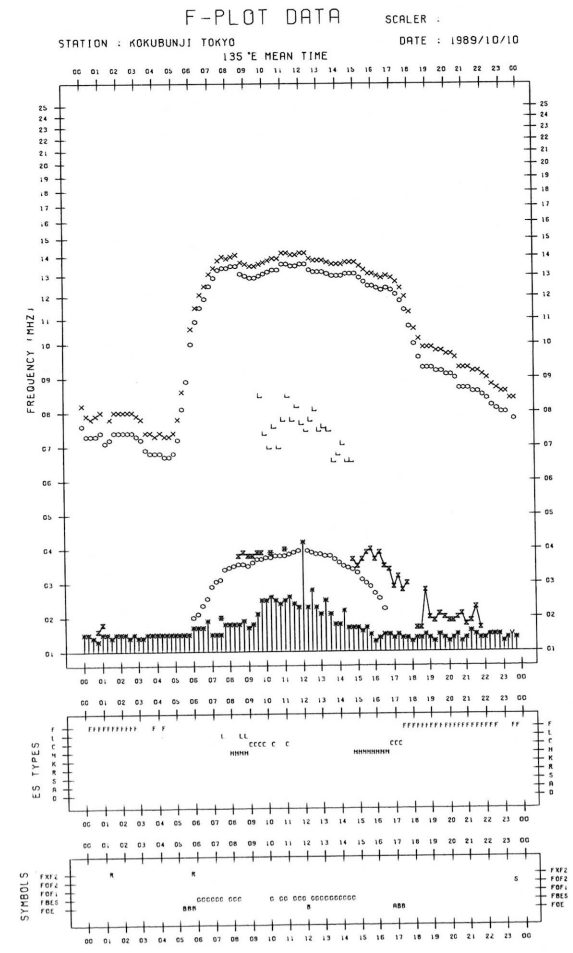

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/ 7
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

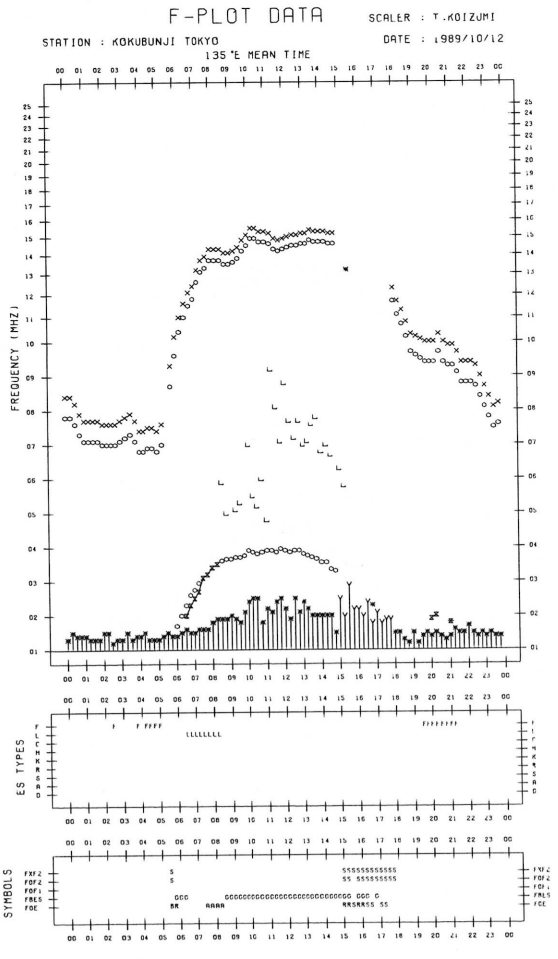

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/ 6
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

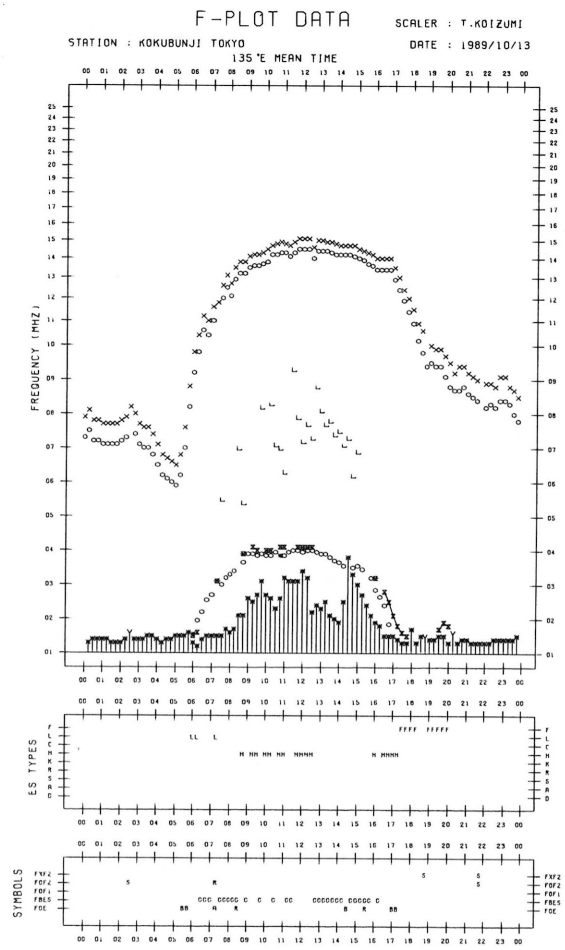

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/ 8
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

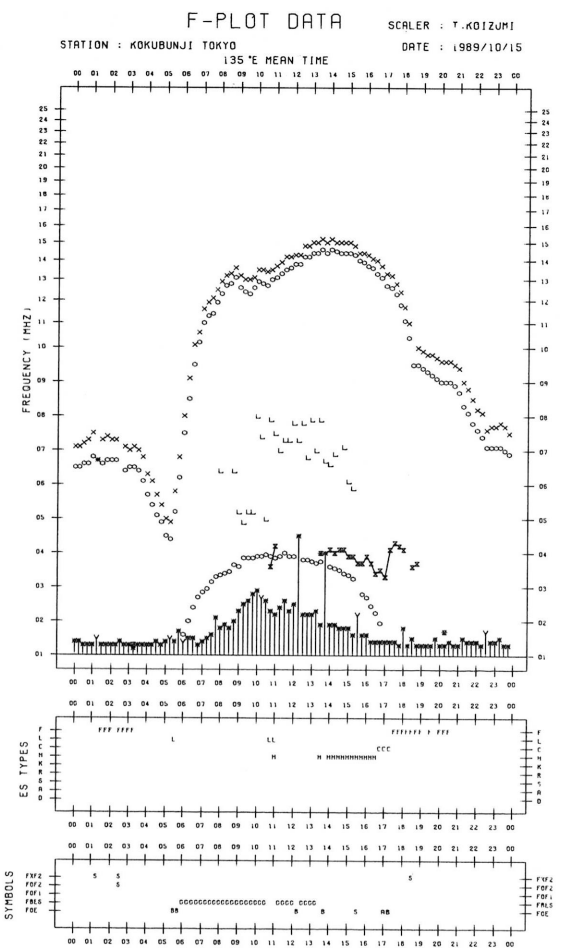

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/ 9
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

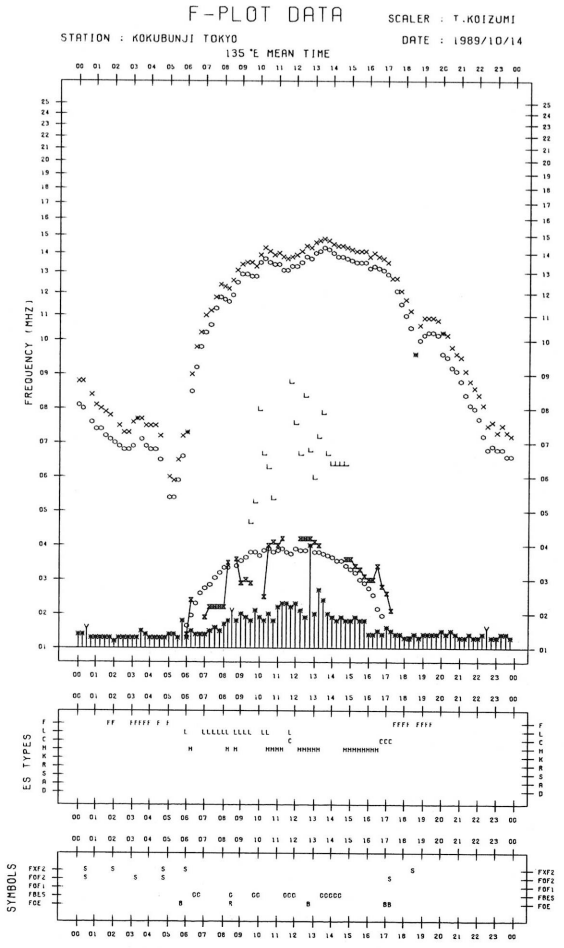

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/11
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

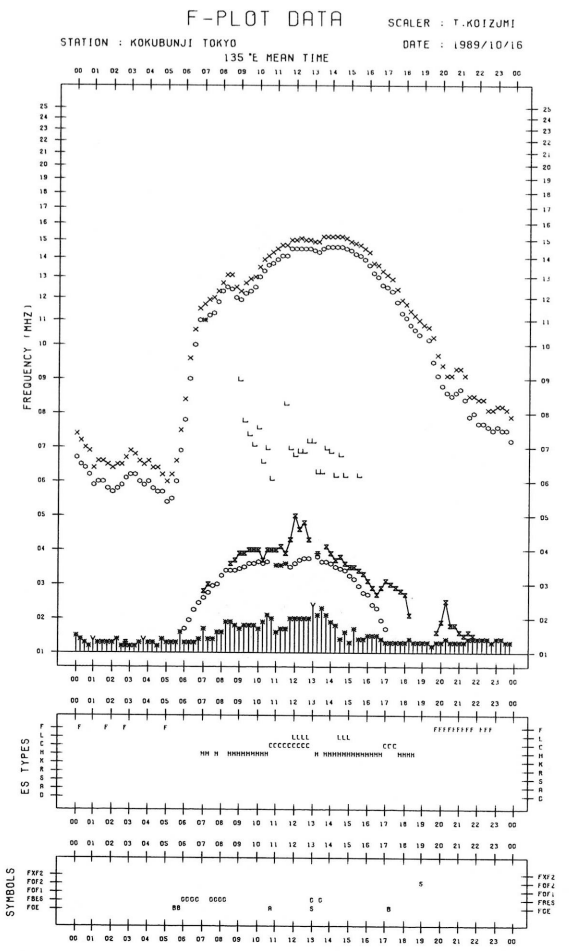

F-PLOT DATA
SCALER :
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/10
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

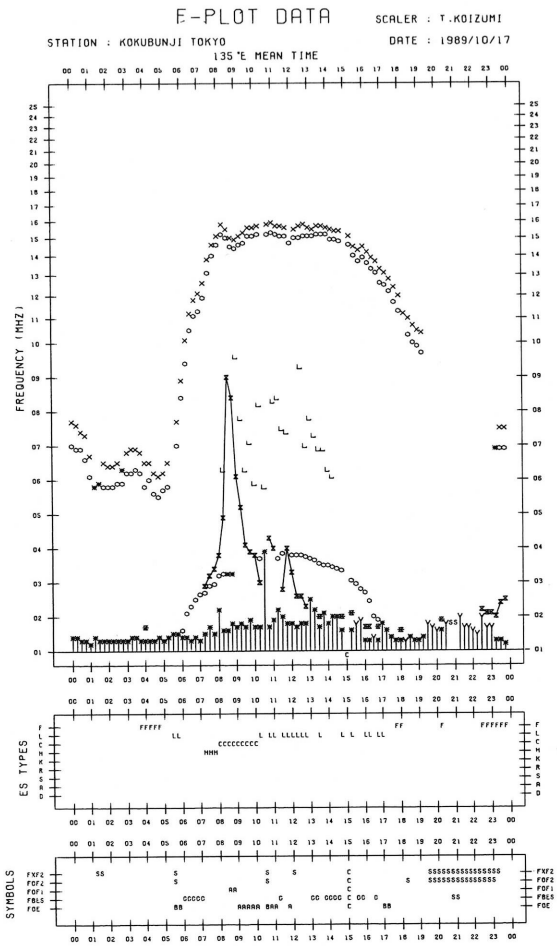

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/12
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

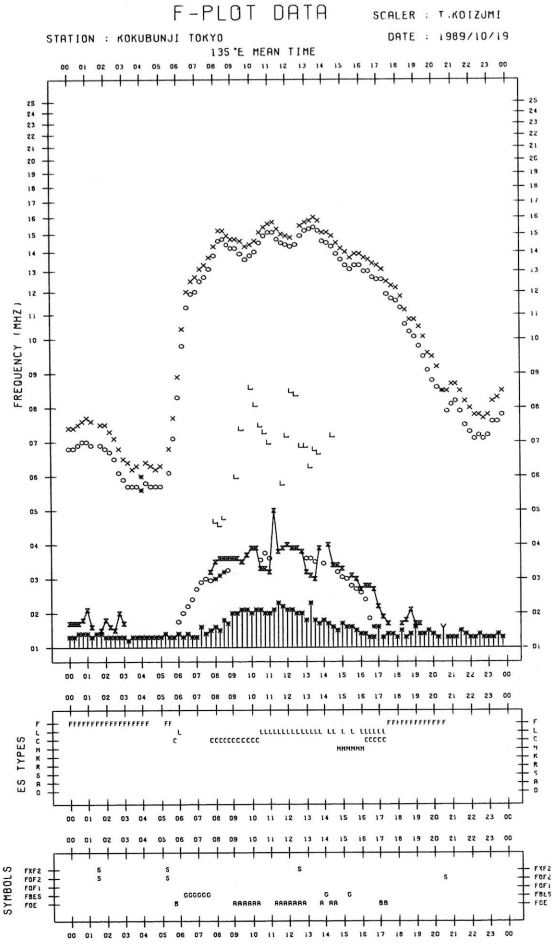

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/13
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FOE

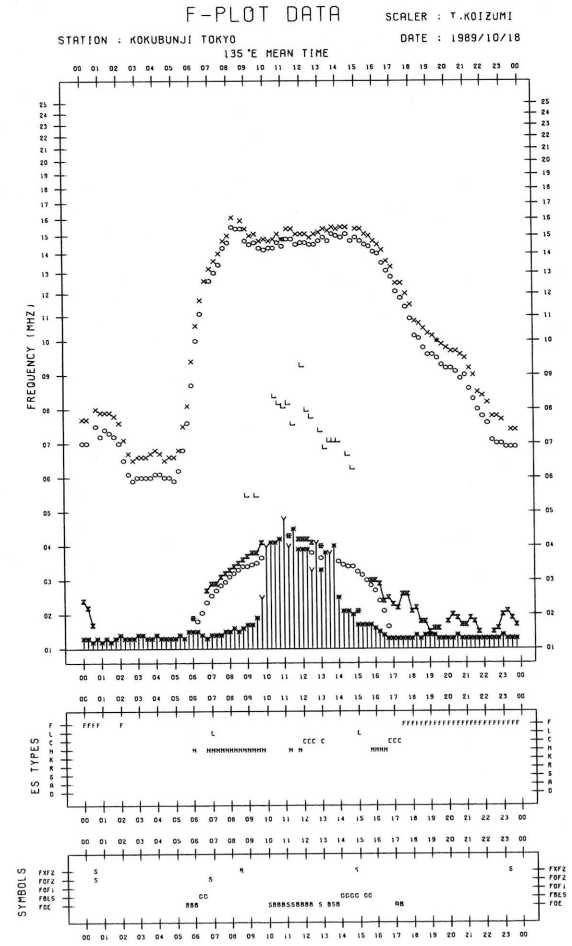

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/15
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FOE

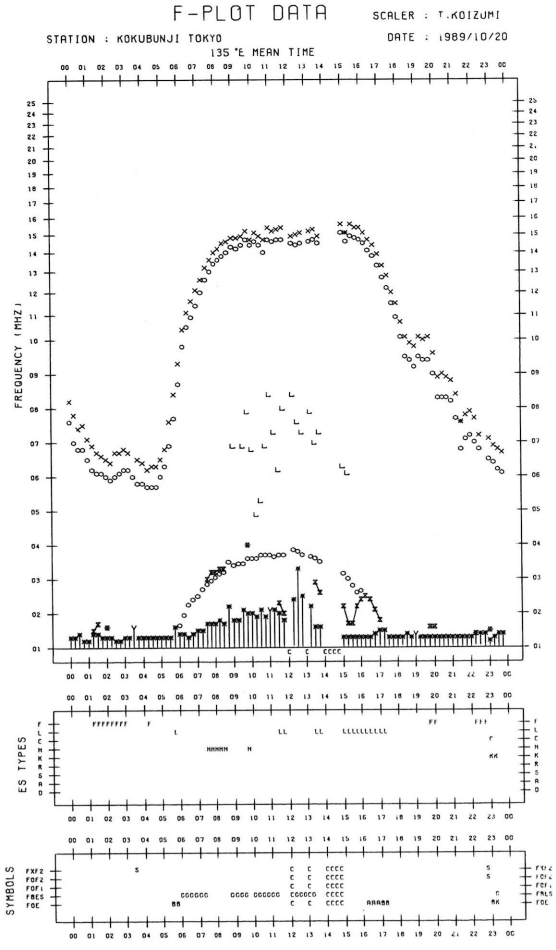

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/14
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FOE

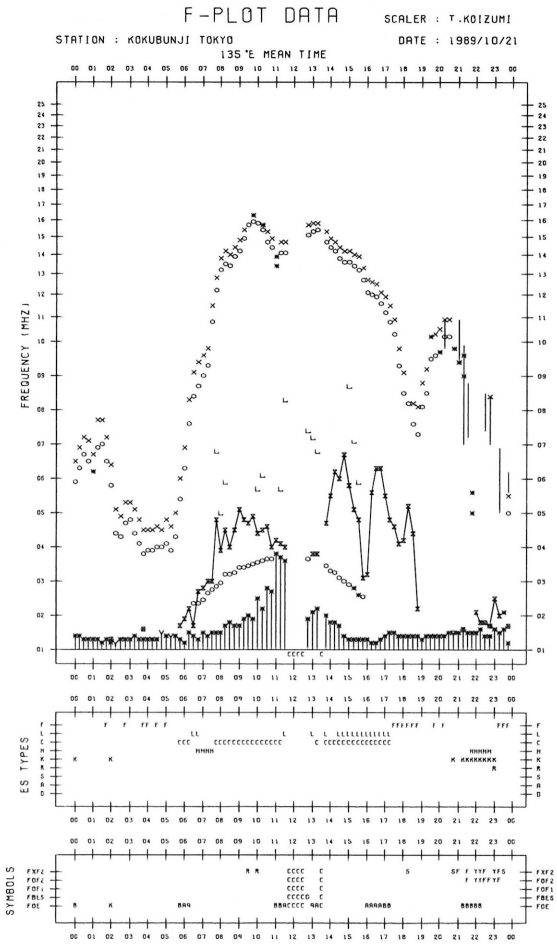

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/16
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FOE

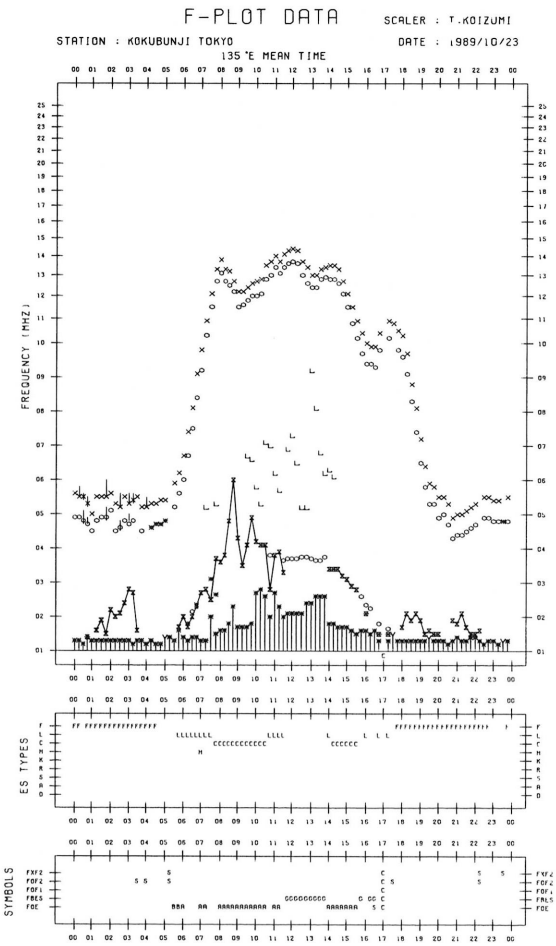

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/17
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBLS
FOE

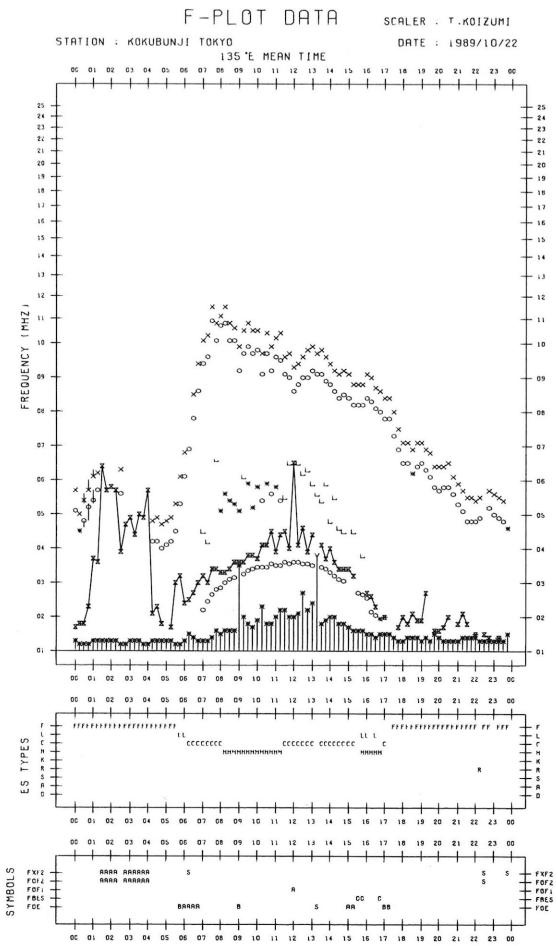

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/19
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBLS
FOE

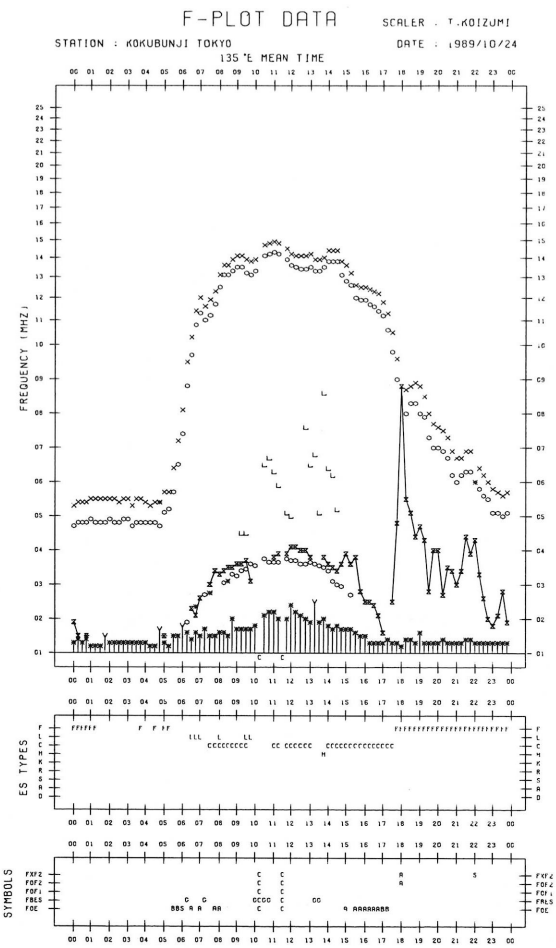

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/18
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBLS
FOE

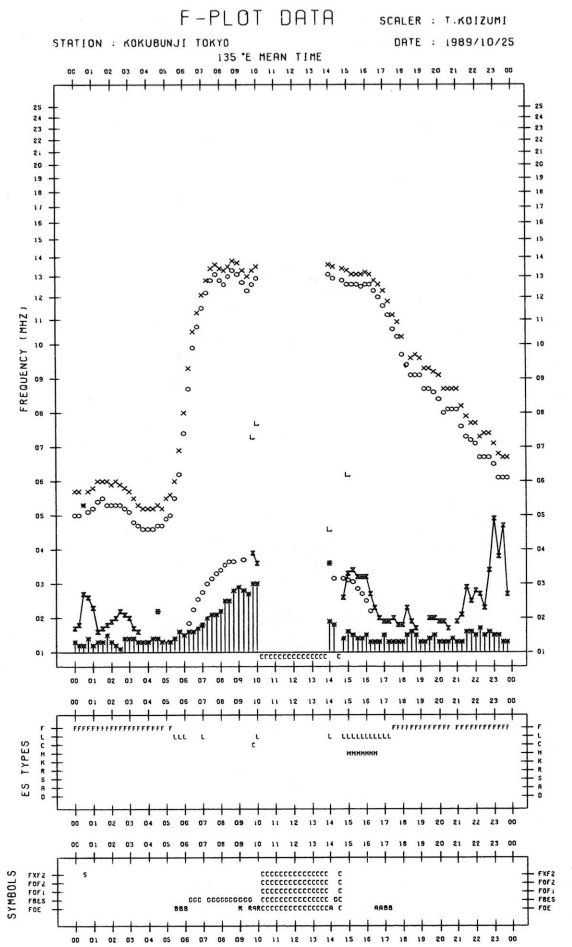

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/20
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBLS
FOE

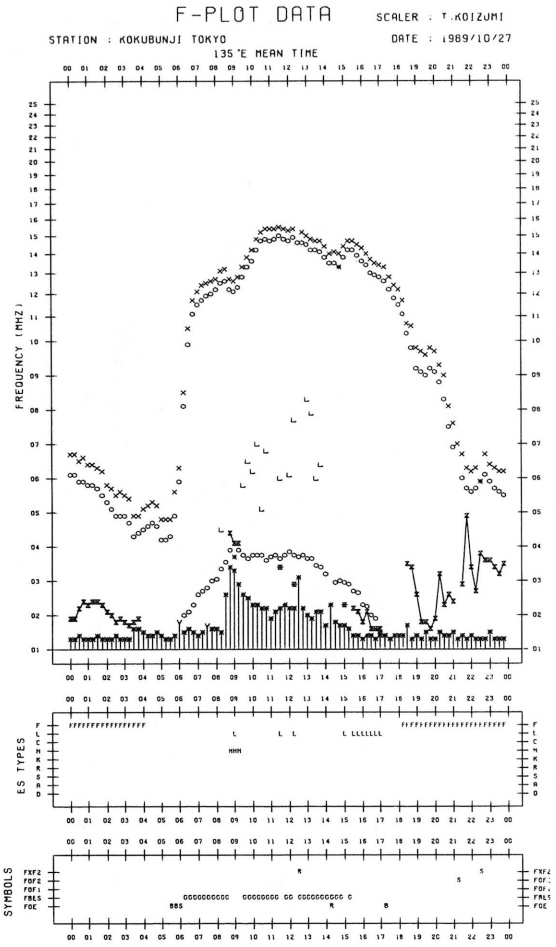

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/21
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

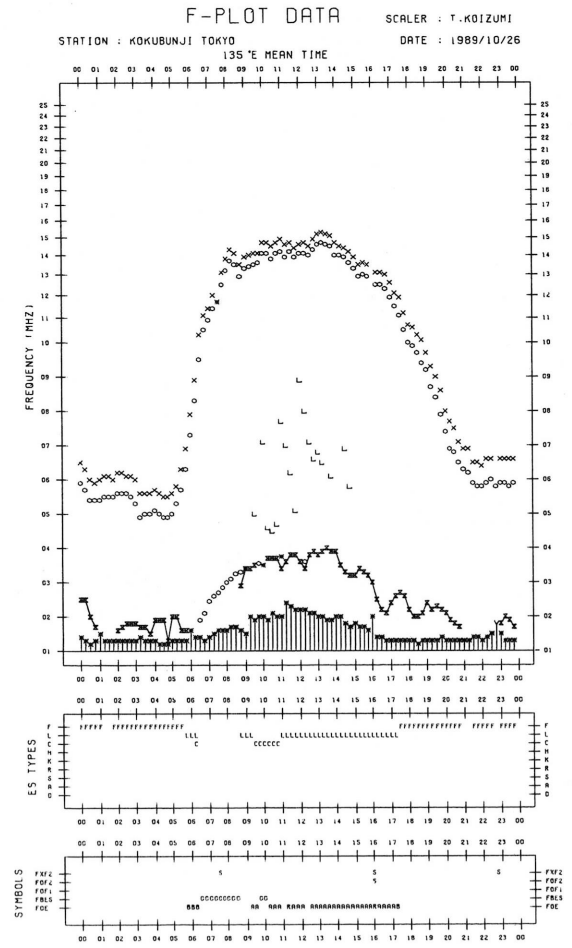

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/23
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

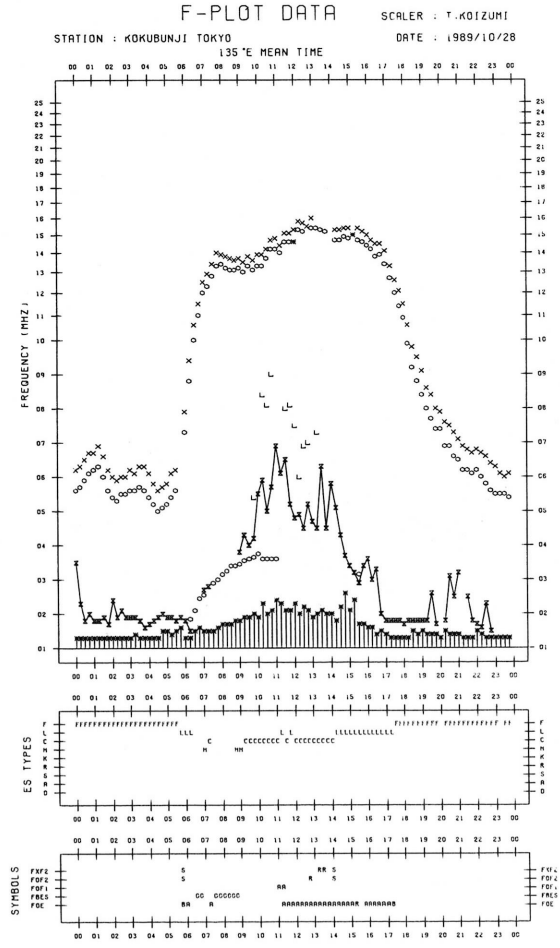

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/22
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

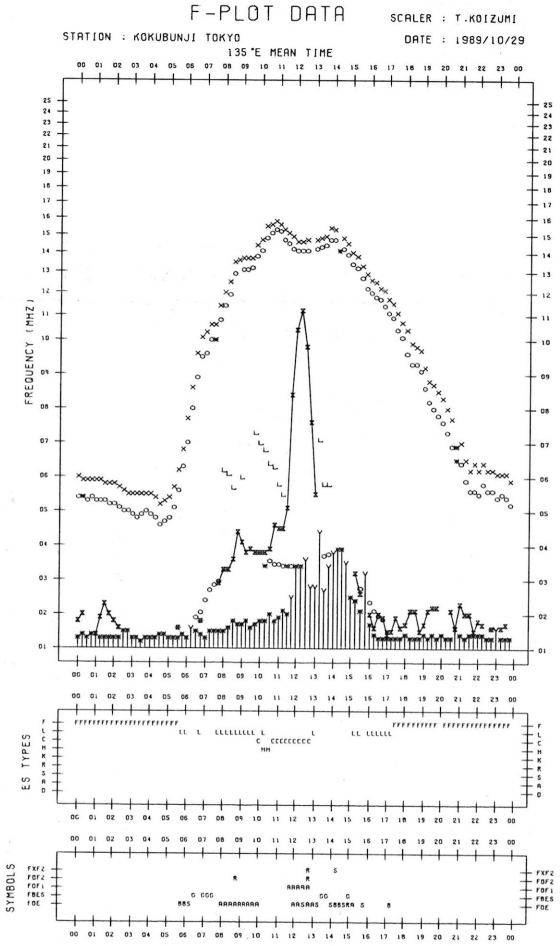

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/24
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

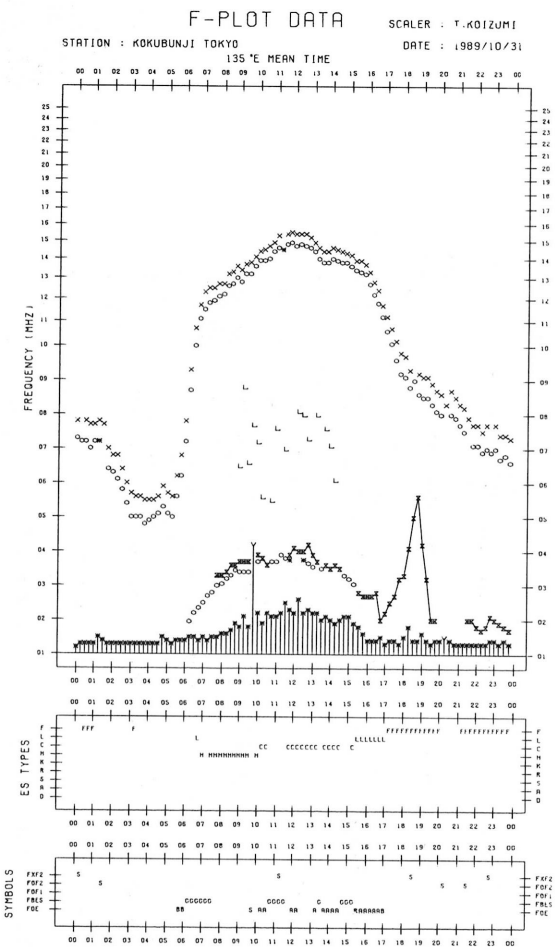

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/25
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

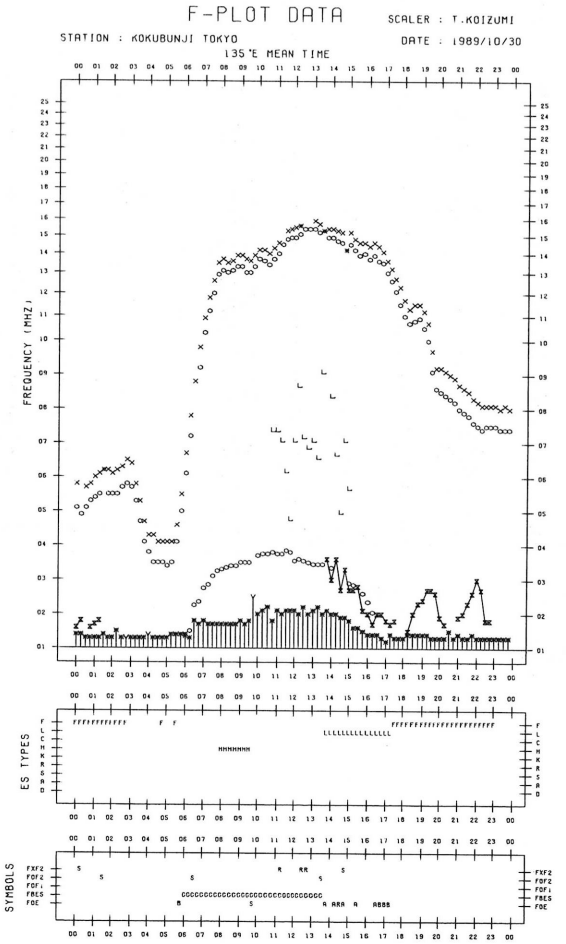

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/27
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/26
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/28
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/29
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/31
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/10/30
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

B.Solar Radio Emission

B1.Daily Data at Hiraiso

200 MHz

Hiraiso October 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	10	*	*	9	10	0	*	0	0	0
2	*	10	(10)	*	10	*	0	*	0	*
3	*	*	*	10	*	(0)	*	*	1	*
4	*	*	*	*	*	*	*	*	*	*
5	(11)	(11)	11	*	11	(0)	(0)	0	0	0
6	(11)	*	*	*	*	0	0	0	1	0
7	*	*	*	B	*	0	0	*	1	0
8	B	B	B	13	B	1	1	1	1	1
9	B	B	B	13	B	1	1	1	0	1
10	13	13	13	10	13	1	1	(0)	0	1
11	(11)	12	12	*	11	0	1	(1)	1	1
12	*	*	*	B	*	1	1	*	2	1
13	B	B	B	13	B	2	3	2	1	2
14	B	B	(B)	B	B	2	3	(3)	3	2
15	B	B	(B)	B	B	(2)	3	(2)	2	2
16	12	12	(12)	B	13	1	1	(1)	2	1
17	B	B	(B)	B	B	1	1	(2)	2	2
18	B	B	(B)	B	B	2	2	(2)	3	2
19	B	-	-	B	B	3	-	-	3	3
20	B	B	(B)	B	B	2	3	(3)	3	3
21	(B)	16	(B)	11	B	(3)	3	(3)	(0)	3
22	10	(10)	(*)	B	10	0	0	(0)	2	0
23	B	10	(10)	10	B	1	0	(0)	0	1
24	10	10	(10)	*	10	0	0	(0)	0	0
25	*	*	(*)	10	*	0	0	(0)	*	0
26	10	10	(*)	-	10	0	0	(*)	-	0
27	(*)	*	(*)	*	*	*	*	(*)	0	*
28	*	*	(*)	-	*	0	0	(0)	-	0
29	(10)	11	(11)	12	11	(0)	0	(0)	1	0
30	10	10	(11)	12	11	0	0	(0)	3	0
31	12	13	(13)	*	13	2	1	(1)	*	2

Note: No observations during the following periods.

9th 0042 - 0200. 19th 0325 - 0622
26th 2050 - 27th 0035. 28th 2050 - 29th 0117

B.Solar Radio Emission

B1.Daily Data at Hiraiso

500 MHz

Hiraiso October 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	52	53	51	51	52
2	53	53	52	54	52
3	55	B	57	61	56
4	60	60	59	59	60
5	59	59	58	59	59
6	59	59	58	58	59
7	58	57	56	58	57
8	58	58	57	56	58
9	58	61	61	60	59
10	58	58	56	56	58
11	58	57	56	59	57
12	59	58	60	B	59
13	B	B	B	B	B
14	B	B	(59)	B	B
15	B	62	(59)	59	B
16	57	57	(56)	55	57
17	57	58	(58)	57	57
18	B	B	(B)	57	B
19	B	(56)	-	54	59
20	53	52	(51)	-	52
21	53	53	(51)	52	52
22	53	53	(52)	54	52
23	53	52	(51)	52	53
24	53	53	(53)	52	53
25	55	52	(51)	51	52
26	52	51	(50)	54	51
27	51	52	(52)	51	52
28	51	51	(51)	-	51
29	(50)	B	(53)	52	B
30	52	51	(51)	54	51
31	54	53	(54)	52	54

Note: No observations during the following periods:

19th 0330 - 0635
20th 2047 - 2350
28th 2120 - 29th 0128

B, Solar Radio Emission

B2, Outstanding Occurrences at Hiraiso

Hiraiso — October 1989

Single-frequency observations

Normal observing period: 2050 - 0800 U.T. (sunrise to sunset)

OCT 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
1	500	46 C	2049.5	2053.2	22.5	47	20	0
3	500	21 GRF	0305	0345	165	15	7	0
4	500	41 F	0529.7	0538.8	32.5	40	-	WR
5	200	42 SER	0606.7	0608.3	5.9	150	-	0
	200	42 SER	0717.8	0726.0	8.6	1600	-	WR
	500	42 SER	0718.0	0718.9	8.5	21	-	WR
	100	42 SER	0718.9	0726.2	7.7	1000D	-	-
6	200	46 C	2204.0	2215.2	18.5	3600	45	WR
	500	46 C	2206.5	2217.0	19.0	18	-	WR
	100	7 C	2215.3	2216.3	36	1000D	-	-
				2227.0		70		-
7	500	46 C	0451.0	0451.4	10.5	95	-	0
	200	44 NS	2037E	0600	700D	20	10	MR
	100	42 SER	2319.8	2325.1	29.7	470	-	-
	200	46 C	2342.2	2345.5	5.9	40	-	MR
8	200	7 C	0136.3	0138.0	25	125	-	0
				0151.5		23		MR
	100	46 C	0137.0	0146.2	36	190	-	-
				0154.8		25		-
	200	46 C	0431.7	0432.1	5.1	410	-	SR
	200	41 F	0518.8	0523.8	45	90	-	MR
	100	46 C	0519.8	0537.6	54	460	74	-
	500	46 C	0644.1	0644.5	2.3	44	-	0
	100	46 C	2217.2	2218.4	50	640	95	-
	200	46 C	2217.3	2221.0	28.4	315	80	MR
				2239.4		135		MR
	500	46 C	2218.0	2226.0	22.5	35	-	WR
				2231.0		13		WR
9	500	42 SER	0114.5	0119.3	5.0	95	-	0
	500	46 C	0146.0	0156.8	32	48	-	0
	200	43 NS	0200E	0446	480D	24	10	MR
	100	43 NS	0200E	-	480D	-	65	-
	100	42 SER	0336.3	0405.9	47	630	-	-
	500	27 RF	2209	2303	95	6	3	0
10	200	42 SER	0015.2	0016.8	4.0	185	-	0
	100	46 C	0327.9	0329.0	1.1	380	-	-
	200	8 S	0328.1	0328.4	1.0	145	-	0
	200	46 C	0357.8	0357.9	4.1	315	-	0
	100	42 SER	2351.5	2352.3	7.4	335	-	-
	200	42 SER	2352.1	2359.3	7.9	290	-	0
11	100	42 SER	0107.1	0233.0	87.8	1000D	-	-
	200	41 F	0151.1	0156.9	21	320	-	WR
	200	42 SER	0229.5	0233.0	7.9	2200	-	WL
	100	42 SER	0301.7	0324.1	24.6	1000D	-	-
	200	42 SER	0510.6	0511.2	10.0	300	-	0
	200	46 C	0546.9	0547.0	1.8	120	-	0
	100	41 F	0617.2	0622.6	10.6	315	-	-
	200	41 F	0620.1	0621.8	11.2	80	-	WR
	200	8 S	2133.3	2133.7	0.9	450	-	0
12	100	46 C	0110.4	0110.6	2.0	460	-	-
	500	46 C	0110.5	0111.8	2.0	70	-	0
	200	46 C	0110.6	0110.8	2.0	1500	-	0
	500	41 F	0208.0	0210.3	5.0	60	-	0
	200	46 C	0210.6	0211.3	2.6	2400	-	0
	100	46 C	0210.9	0211.6	1.5	810	-	-
	500	44 NS	2042E	0210	680D	36	13	WL
	200	44 NS	2042E	0440	680D	240	57	ML
	100	44 NS	2042E	0455	680D	260	70	-

OCT 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
13	500	8 S	0252.8	0253.2	0.5	1500	-	O
	100	46 C	0601.3	0603.5	4.6	450	-	-
	100	42 SER	0623.8	0623.8	13.2	870	-	-
	500	42 SER	2238.7	2239.5	1.5	47	-	O
	500	43 NS	2300	0319	340	17	5	WR
	100	42 SER	2332.3	2354.1	54.8	1000D	-	-
	200	42 SER	2333.0	2354.1	60.0	1900	-	O
	500	42 SER	2334.0	2335.5	42.5	45	-	ML
14	200	43 NS	0050	0326	430D	27	8	MR
	200	42 SER	0508.9	0509.2	12.5	1850	-	O
	100	46 C	0509.0	-	2.6	1000D	-	-
	200	42 SER	0646.9	0714.5	62.7	1500	-	O
	100	42 SER	0658.0	0714.5	17.2	1000D	-	-
	100	46 C	0748.5	0749.7	2.6	1000D	-	-
	200	44 NS	2044E	-	680D	-	22	-
	500	22 GRF	2130	2247	270	21	6	WR
	200	27 RF	2135	2242	180	37	18	MR
15	100	46 C	0245.5	0246.2	1.3	1000D	-	-
	200	27 RF	2200	2323	200	5	1	WL
16	100	46 C	0418.2	0818.7	4.0	690	-	-
	200	44 NS	2045E	0623	670D	14	9	WR
17	100	44 NS	2045E	-	200D	-	25	-
	200	44 NS	2045E	-	200D	-	6	-
	100	46 C	2107.9	2110.9	3.2	2800	-	SL
18	200	24 R	0015.8	0051.4	460D	434	82	MR
	500	24 R	0016.0	0031.4	460D	24	15	ML
	100	24 R	0021.1	0241.6	460D	850	270	-
	200	44 NS	2047E	2143	670D	37	19	WR
	100	44 NS	2047E	2243	400D	80	27	-
	500	27 RF	2300	0119	180	30	11	WL
19	200	44 NS	2047E	2218	670D	12	6	WR
20	100	45 C	0236.8	0237.3	1.3	1000D	-	-
	200	44 NS	2048E	2208	665D	25	5	MR
21	200	42 SER	0640.6	0648.2	10.0	1100	-	O
	100	46 C	0640.9	0648.2	10.0	830	-	-
	500	42 SER	0641.3	0643.5	9.5	18	-	O
22	500	46 C	0348.0	0349.3	7.0	9	-	O
	200	44 NS	2051E	2300	300D	6	3	O
23	500	46 C	0047.5	0055.8	50	8	-	O
	500	41 F	0538.0	0538.5	3.5	11	-	O
24	500	46 C	0152.8	0152.9	1.6	227	-	O
25	500	41 F	0000	0045	60	17	5	WL
	500	41 F	2323	0011	90	13	-	O
26	500	8 S	0101.7	0102.3	0.7	49	-	O
	500	41 F	2228.5	2300.5	90	12	-	O
	500	46 C	2324.7	2329.8	17.5	19	-	O
29	500	46 C	0249.5	0253.3	20	24	-	O
				0255.7		7		O
	500	48 C	0346.0	0431.0	101	860	128	O
				0454.5		370		O
				0505.3		760		O
	200	46 C	0348.2	0354.1	53	130	14	O
	100	46 C	0349.5	0354.5	46	1800	55	O
	500	46 C	0533.0	0540.3	23.5	80	23	O
	500	46 C	2129.5	2138.2	25.5	8	-	O
30	100	41 F	2338.6	2340.6	3.6	12200	-	WL
	200	41 F	2339.0	2339.6	2.4	1200	-	O
31	200	8 S	0015.2	0015.2	0.7	1300	-	O
	500	46 C	0015.3	0015.5	19.7	40	-	O
				0026.3		10		O
	100	46 C	0217.6	0219.1	3.1	2400	-	O
	200	46 C	0339.0	0340.3	1.5	7500	-	O
	100	48 C	0340.0	-	2.1	16000D	-	-
	500	46 C	0340.5	0341.0	3.5	98	-	O
	200	8 S	0713.2	0713.2	0.8	710	-	O
	200	46 C	2330.4	2332.0	4.0	120	-	WR
	100	46 C	2331.0	2332.5	5.3	830	-	-

C. RADIO PROPAGATION

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

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

MEASURED AT HIRAISO

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

C. RADIO PROPAGATION

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

OCT 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	ES -21	-2	7	17	25	27	30	29	27	34	32	29	-1	-9	ES -21	ES -21	ES -21	-1	25	7	9	4	-8	ES -21
2	ES -22	ES -22	4	5	11	26	27	30	26	25	27	24	-10	-13	ES -22	ES -22	ES -22	-10	18	-1	3	-2	-14	ES -22
3	ES -22	ES -22	3	4	15	23	27	26	25	28	27	15	4	ES -22	ES -22	ES -22	-9	12	ES -22	1	1	-2	ES -22	ES -22
4	-7	-9	-2	16	12	21	28	26	26	32	27	28	24	8	-2	-2	ES -22	12	13	4	8	4	-8	ES -22
5	-9	-7	7	9	14	25	25	28	25	26	25	24	20	25	12	-13	ES -22	12	20	-2	7	-7	-7	-9
6	-9	ES -23	-4	3	15	22	25	26	29	25	30	20	21	22	18	22	-9	22	21	6	9	2	-7	ES -21
7	ES -21	0	6	9	17	25	31	32	34	25	32	30	30	24	19	21	28	20	21	5	4	4	-6	-6
8	ES -22	ES -22	2	7	19	22	25	25	31	25	26	23	25	13	12	12	25	14	23	8	2	0	6	ES -8
9	-4	-9	ES -21	12	20	23	26	27	25	26	28	30	28	8	0	-7	2	11	19	4	-2	0	-11	-13
10	-8	-10	-5	7	15	20	22	26	25	29	22	24	22	12	5	18	23	12	17	2	6	-8	-5	ES -22
11	-11	-10	-4	8	7	12	18	17	20	18	15	10	13	16	1	11	3	7	15	0	2	-8	-10	ES -23
12	ES -23	-8	0	7	12	17	16	22	18	22	22	16	11	12	15	10	-4	22	20	9	1	-3	-11	ES -23
13	ES -22	ES -22	-2	6	11	13	21	30	23	22	22	15	19	15	11	2	1	22	19	6	3	ES -9	-3	-6
14	ES -22	ES -22	-5	6	15	17	17	27	24	25	24	22	1	ES -23	ES -23	ES -23	ES -23	-4	8	-4	4	-3	ES -9	ES -11
15	ES -22	ES -22	2	9	19	26	24	23	24	26	27	13	21	12	2	ES -22	ES -22	11	14	7	4	1	-4	-9
16	-1	0	3	12	19	20	26	27	20	22	25	23	21	5	-2	ES -22	ES -22	1	17	9	9	1	-8	-9
17	-3	-1	4	17	22	21	21	24	24	26	27	28	29	18	21	23	22	16	18	5	4	4	4	-7
18	ES -22	ES -22	ES -22	0	13	20	21	27	23	21	27	21	14	8	2	-5	-3	18	4	-7	4	4	-5	-4
19	-3	2	4	12	C	C	6	30	29	24	15	12	4	2	12	14	-6	19	13	2	3	-5	-11	-11
20	ES -23	-2	2	2	19	19	ES -11	25	26	24	24	21	8	3	-9	-5	5	-9	10	0	9	-5	0	-5
21	-8	0	0	10	17	26	24	23	13	3	8	-12	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	7	5	18	-2	2
22	7	-11	5	11	14	22	26	24	19	12	12	7	-9	-12	-12	-15	-15	-9	ES -24	1	-4	-5	-9	-10
23	-6	-4	3	5	11	20	24	22	19	19	9	-9	-12	-15	ES -24	ES -24	ES -24	ES -24	ES -24	-2	9	0	-2	-9
24	-6	2	2	4	14	16	22	19	24	22	14	12	2	ES -15	ES -24	ES -24	ES -24	-12	ES -24	ES -24	ES -24	ES -24	-15	ES -24
25	ES -24	-15	-9	4	14	18	19	19	18	22	14	7	-15	-15	-15	ES -24	ES -24	ES -24	ES -24	-1	ES -24	0	-4	-4
26	-3	-3	1	4	9	13	19	17	15	14	-9	-15	-15	-15	-15	ES -24	ES -24	ES -24	ES -24	-1	ES -24	0	-4	-4
27	-14	-3	2	8	11	19	16	23	17	25	19	8	-2	-14	ES -23	ES -23	-14	4	16	6	7	1	-1	-6
28	-5	0	2	7	12	17	22	27	29	19	-8	-9	-8	8	7	-1	ES -23	-1	7	0	UC 3	UC 5	5	-1
29	-3	-3	-3	-11	-4	16	22	23	24	21	5	-11	-15	-15	-15	ES -24	19	ES -24	8	3	ES -15	ES -24	-1	-1
30	-3	0	2	12	16	19	24	23	27	20	20	11	2	9	10	7	ES -24	-11	ES -24	7	9	2	-4	-6
31	-5	-1	6	10	16	22	24	23	24	20	17	24	-2	-13	ES -15	ES -24	-15	11	14	14	-6	0	-2	-2
CNT	31	31	31	31	30	30	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	-9	-7	2	7	14	20	24	25	24	24	22	16	4	5	-2	-13	-15	7	14	3	4	0	-5	US -9
UD	-3	0	6	16	20	26	28	30	29	29	30	29	28	22	18	21	23	22	21	9	9	4	4	-1
LD	ES -23	ES -22	-9	2	9	13	16	19	17	14	5	-11	-15	ES -22	ES -23	ES -24	ES -24	ES -24	ES -24	-4	ES -24	ES -9	ES -14	ES -23

C. Radio Propagation

c2. Radio Propagation Quality Figures at Hiraiso

Hiraiso

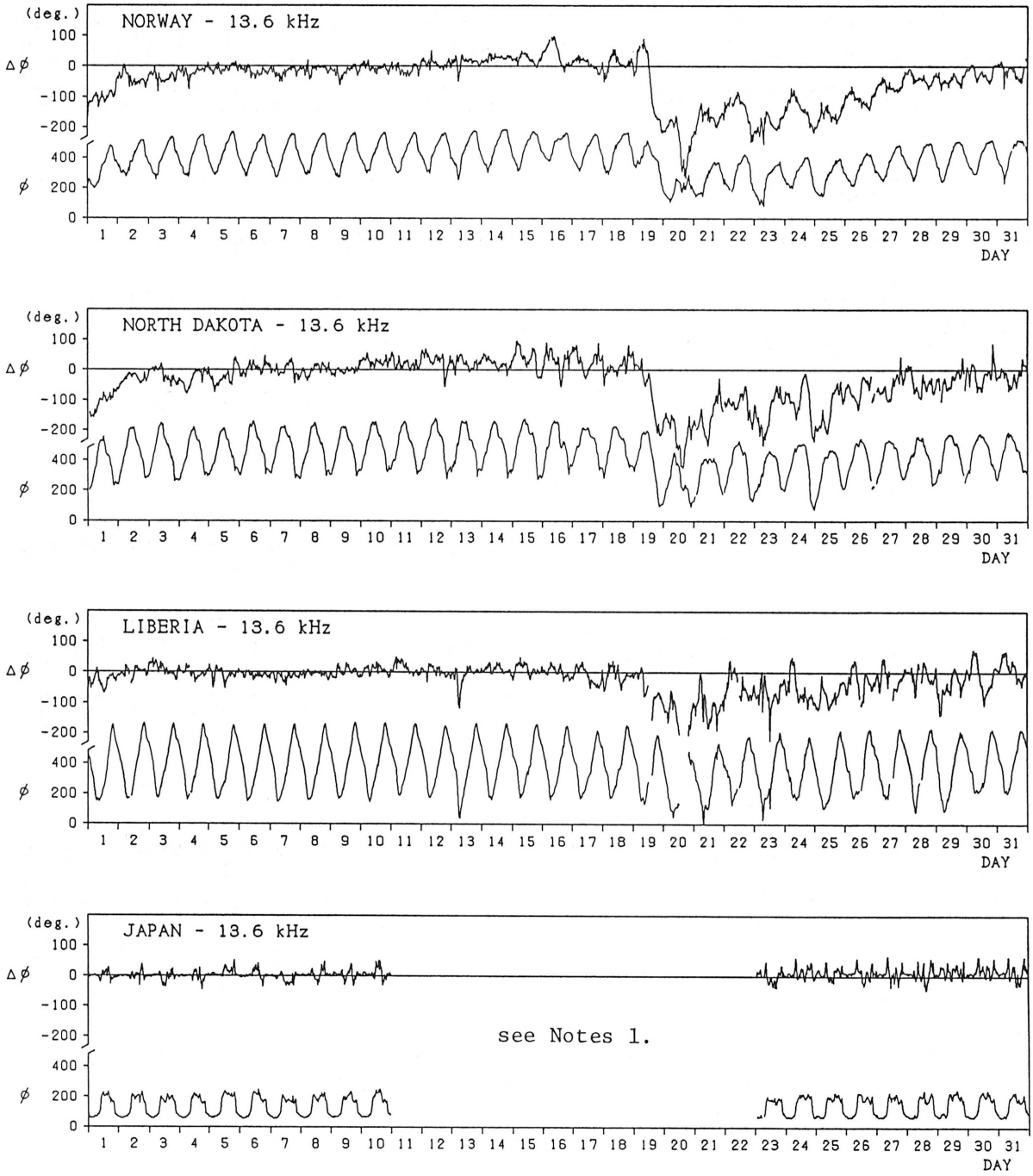
Time in U.T

Oct. 1989	Whole Day Figure	W W V 00 06 12 18 | | | | 06 12 18 24	W W V H 00 06 12 18 | | | | 06 12 18 24	Conditions 00 06 12 18 | | | | 06 12 18 24	Principal Geomagnetic Storms Start h m	End h	Range nT
1	4-	4 4U 4U 3U	4 4 3 4	N N N N			
2	3+	3U 2U 4U 3U	4 4 3 4	N N N N			
3	4-	5 3U 4U 3U	4 4 3U 3	N N N N			
4	4-	3U 2U 5U 4U	4 4 4 4	N N N N			
5	4o	4 4U 4U 4U	4 4 4 4	N N N N			
6	4+	4 5U 5U 4U	4 4 5 4	N N N N			
7	4+	4 5U 5U 4U	4 5 5 4	N N N N			
8	5-	5 5U 5U 5U	4 4 5 4	N N N N			
9	4o	3U 3U 5U 5U	4 4 4 4	N N N N			
10	5-	5 5U 5U 5U	4 4 5 4	N N N N			
11	4+	5 4U 5U 4U	4 4 5 3	N N N N			
12	4+	4 5U 4U 4U	4 4 5 4	N N N N			
13	4+	4 5U 5U 5U	4 4 5 4	N N N N			
14	4o	5 5U 4U 5U	3 4 3U 4	N N N N			
15	4+	4 5U 4U 5U	4 4 4 4	N N N N			
16	4+	4 5U 5U 5U	4 4 4 4	N N N N			
17	5-	5 5U 5U 5U	5 4 5 4	N N N N			
18	4+	4 5U 5U 5U	3 4 4 4	N N N N			
19	4+	5U 5U 4U 3U	4 4 5 4	N N N N			
20	3+	3 4U 3U 3U	3 4 4 4	N N N N	1917	---	307
21	3o	2U 3U 3U 3U	4 3 2U 4	U U U U	---	---	
22	3o	2U 2U 3U 3U	4 3 3 3	U U U U	---	---	
23	3o	2U 3U 3U 3U	4 3 2U 3	U U U U	---	10	
24	3o	2U 3U 4U 3U	4 4 2U 2U	U U U U			
25	3o	3 4U 3U 4U	3 3 2U 3	U U U U			
26	3-	2U 2U 3U 4U	4 2 2U 3	N N N N			
27	4-	4 4U 4U 3U	4 3 3 4	N N N N			
28	3+	2U 2U 3U 5U	4 3 4 4	N N N N			
29	3o	2U 2U 3U 4U	4 3 3 4	N N N N			
30	4o	4 4U 5U 4U	4 4 3 4	N N N N			
31	4-	3 3U 4U 4U	4 4 3 4	N N N N			

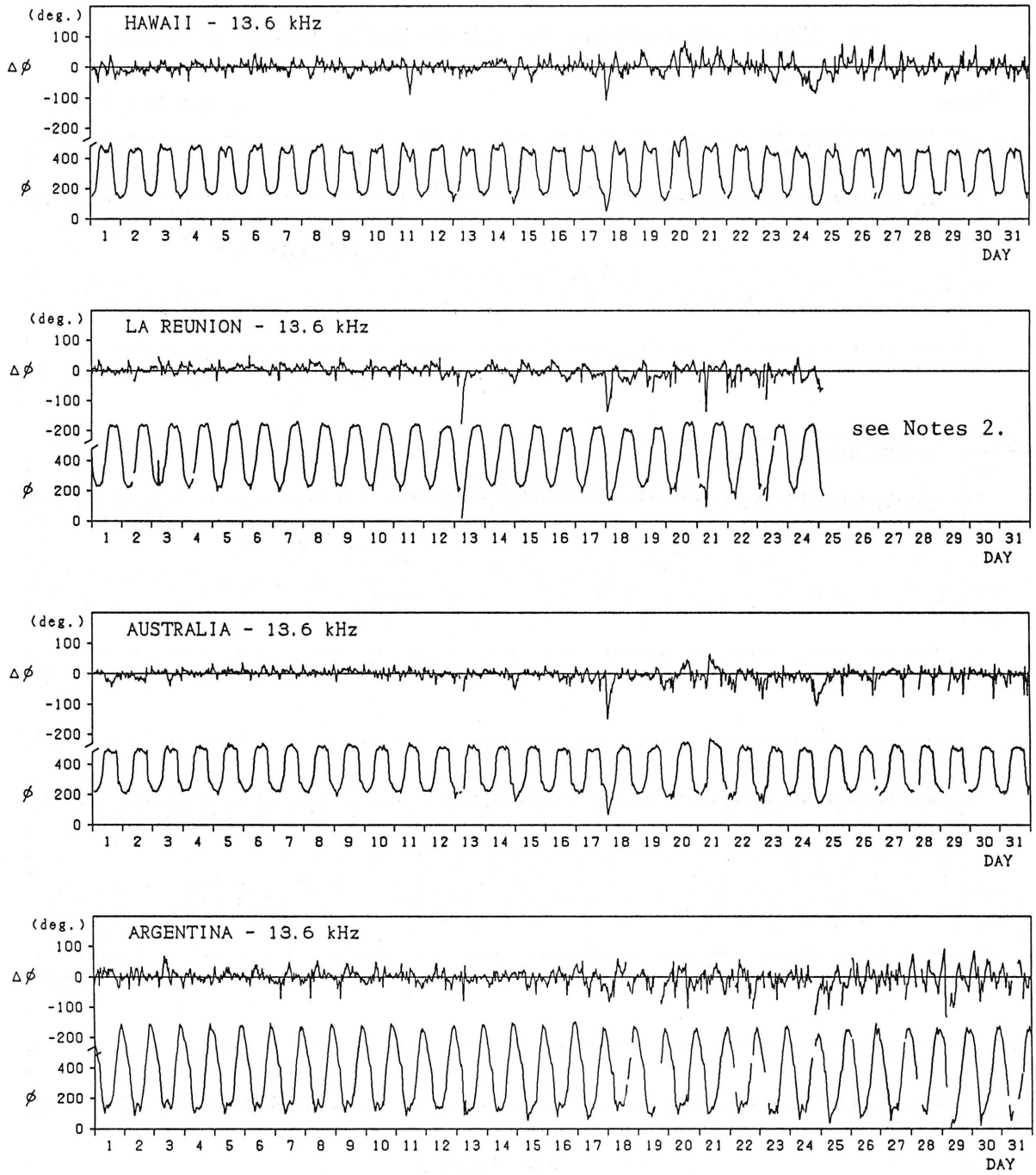
C. Radio Propagation

C3. Phase Variations in OMEGA Radio Waves at Inubo

Inubo October 1989



Inubo October 1989



Notes: 1. As for JAPAN - 13.6 kHz, no record during October 11 - October 23, due to the maintenance of transmitter.
2. As for LA REUNION - 13.6 kHz, no record during October 25 - November 02, due to the maintenance of transmitter.

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

Start (U.T.)	End (U.T.)	Max. (U.T.)	Max. Phase Deviation (negative value, deg.)
Oct.19/1324	Oct.20/1030D	Oct.19/2230	255.6
Oct.20/1030E	Oct.22/1635D	Oct.20/1609	403.2
Oct.22/1635E	Oct.24/1836D	Oct.22/2222	302.4
Oct.24/1836E	Oct.29/0230D	Oct.24/2330	259.2
Oct.29/0230E	Oct.31/0430	Oct.29/0857	106.2

C. Radio Propagation

C4. Sudden Ionospheric Disturbance

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

Hiraiso — Time in U.T.

Oct. 1989	S W F Drop-out Intensities(dB) CO	HA	1)	2)	3)	Start	Duration	Type	Imp.	Correspondence Solar Flare	Solar Noise
13	21	27	12	x		0252	34	SL	3-		x
13			16	x		0530	38	G	1+		x
18	x	x	50	x		0015	223	G	3+	x	x
18			22			0437	26	SL	2-	x	x
19	x	x		x	37	1240	102	SL	2+	x	
20			18			0338	12	S	1+	x	x
20			14			0519	11	S	1	x	
21	x	28	27	x		0152	28	S	3	x	x
23			11			0334	34	SL	1-	x	x
23			12			0410	37	SL	1	x	x
23			11			0630	16	S	1-	x	x
23			8			0648	25	S	1-	x	x
23					18	1236	43	S	1+	x	
26			18			2322	33	G	1+		x
27					15	1131	27	SL	1	x	
28	23		12			0513	70	S	2-		x
29	24	30	42	x		0224	234	G	3+		x
31			8			0338	9	S	1-		x

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

(b) Sudden Phase Anomaly (SPA) at Inubo

Inubo

Oct. 1989	S Phase Advance (degrees) Ω/N	Ω/L	Ω/LR	NWC	P Ω/H	Ω/ND	A Time (U.T.) Start	End	Maximum
Date									
1	41	30	58	84	70	55	0008	0214D	0026
1				14	6	15	0214E	0253	0224
1			10	14			0324	0409	0346
1			27				0803	0900	0829
1			13				0910	0927	0913
1	21		17	31	36	24	2307	2350	2310
2			—	21			0427	0541	0444
2		24	32	14			0747	0847D	0805
2		99	98				0847E	1047	0906
2		23					1205	1237	1221
3			6	—			0616	0629	0619
3		47	56	14			0812	0905	0822
3				17	29	22	2253	0029	2310
4			17	6			0505	0640	0519
4		78	77	26			0836	0925	0850
4		20					0937	1010	0943
4		21					1253	1330	1304
5			42	37	14	18	0319	0539	0345
5		24	12	10			0606	0647	0617
5			12	9			0633E	0726	0653
5		36	9				1155	1309	1212
6				11	6		0142	0240	0157
6			21	16			0606	0702	0629
6					11		2128	2204	2135
6					8		2239	2338	2252
7			13	16			0354	0453D	0415
7			49	44		13	0453E	0649	0509
8			19	18	6		0345	0511	0405
9	21	21	45	64	34	16	0151	0357	0214
9				6	7		2315	2353	2319
10				—		11	0355	0429	0403
10			6	—			0543	0607	0551
10		44	67	—			0709	0821D	0724
10		17	39				0821E	0855	0830
10		31					1330	1419	1339
11			12	—	5		0232	0315	0241
11			41	33			0440	0624	0458
11			9	5			0650	0659	0653
11					13	27	2149	2226D	2201
11					26	24	2226E	2335D	2251
11				6	16		2335E	0029	2343
12			35*	27*			0430	0624	0510
12		19					1222	1307	1229
12	27			51	48	50	2340	0132	0000
13	**14**			**19**	**8**	**35**	**0141**	**0236**	**0204**
13	48	66	102	76	—	55	0257	0403	0306
13	29	26	17	14	—		0418	0441	0426
13	122	126	202	107			0453E	0844	0555
13				8	7		2355	0014	2357
14			25	10			0745	0831	0754
14			27				0832	0915	0841
14					15		2113	2158	2119
14	17	18	26	37	73	46	2231	2322D	2247
14				51	72	41	2322E	0213D	0009
15				19	24		0213E	0339	0228
15		36					1239	1321	1252
15		57					1425	1531	1435
15					9		2251	2320D	2256
15					7		2320E	0038	2333
16		27	8	—			0420	0453	0432
16			13	—			0504	0546	0515
16		26					1258	1342	1312
16				9	17	20	2254	2346D	2301
16				—	10	13	2346E	0037D	0001
17					5		0037E	0105	0045
17			15	22	11	11	0203	0325	0209
17			45	—	—		0523E	0659	0527
17						31	1850	1915	1856
18			112	130	113	82	0014	0258D	0121
18			123	91			0258E	0440D	0301
18	25	36	143	87	19	15	0438E	0748	0443
18		26	14				0907	0935	0916
18		42	18				1052	1210	1109
18		15					1512	1540	1517
18					9	20	2136	2236D	2143
18					5		2236E	2308	2247
18					8		2323	0002D	2340
19				11	16		0002E	0145	0012
19				10	5		0217	0302	0228
19			10	10			0414	0516	0423

Inubo

Oct.	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
19			17	6			0703	0805	0714
19		74	67				0832	0956D	0917
19		66	48				0956E	1114	1012
19		312	78				1238	1711	1303
20				10	6	15	0009	0057	0018
20	25	29	110	72	42	26	0335	0518D	0343
20	23	25	117	67	25	27	0518E	0646	0524
20		23					0702	0734D	0709
20		23					0734E	0751D	0740
20		46	73	29			0750	0829	0754
20		89				39	1305	1445D	1351
20		47					1445E	1609	1518
20				18	60	39	2128	2222D	2142
20					10		2222E	2307	2232
20				13	12		2308	0000	2316
21				10	4		0047	0109D	0100
21				18	10		0109E	0142	0117
21	41	43	123	108	86	39	0152	0309	0158
21			8	12			0334	0400	0339
21		17	11	14			0513	0547	0521
21		56	67	40			0640	0711D	0703
21		125	136	91			0711E	0738D	0729
21		156	169	108			0738E	0823D	0749
21		66	98				0823E	1017	0829
21		41					1411	1442	1420
21		65					1821	1916	1829
21					46	24	2001	2045	2010
21				6	35	22	2201	2239D	2207
21				12	22	20	2239E	2336	2244
21	52	54	83	136	128	67	2348	0101D	2358
22	37	28	61	84	67	31	0101E	0213	0106
22	15	15	30	32	19	18	0220	0300	0224
22	25	21	63	52	32	12	0309	0454D	0321
22			36	19			0454E	0519D	0506
22			45	25			0519E	0543D	0523
22			69	32		18	0543E	0616D	0556
22		47	89	37		13	0616E	0707D	0627
22			26				0707E	0743	0716
22			14	14			0806	0835	0811
22		96	49				1117	1237	1129
22		31					1337	1408	1348
22		32					1551	1652	1608
22					13		2041	2133	2049
22					5		2227	2251	2229
22				5	11		2256	2318	2303
22				20	16		2321	0019	2328
23				—	4		0027	0045	0030
23			46	—	30		0052	0151D	0113
23			80	—	42	14	0151E	0301D	0202
23			—	—	6		0301E	0322	0308
23	30	37	90	—	41	40	0342	0412D	0359
23	43	23	122	—	47	40	0412E	0551D	0427
23		30	14	—			0548	0612D	0559
23		37	12	—			0612E	0631D	0616
23	44	169	171	—		38	0631E	0718D	0655
23		119	107	—			0718E	0823	0725
23		25	21	—			0902	0930D	0913
23		31	13	—		16	0930E	1013	0939
23		21	12				1103	1153	1119
23		180	58				1237	1448	1247
23					11		2110	2157	2122
23					8		2215	2247	2219
23		17	24	42	40	25	2332	0057D	2344
23					9		0057E	0119D	0102
24				—	9		0119E	0153D	0123
24			14	—	12		0154	0222	0159
24			15	—	10		0300	0333	0304
24			13	12			0338	0418	0351
24			30	21			0426	0509D	0439
24			46	39			0509E	0539D	0525
24			35	28			0539E	0638	0544
24		21*	22*	7			0642	0719	0653
24		20	13				0719	0801	0733
24		20	15				0943	1021	0956
24		39	13				1054	1155	1117
24		33					1356	1435	1407
24				—	6		2305	0009	2333
25				5	6		0052	0135	0054
25			—	27	12		0459	0545	0504
25		58	—				1636	1812	1642
25			—	6	13	22	2235	2335	2245
26			—	26	14		0056	0222	0105
26		33	—				1201	1310	1207
26			—		126	54	2044	2221	2050
26	45	46	—	118	116	92	2318	0236	2339
27			—	10			0217	0253	0225
27			—	12		13	0306	0355	0320
27			—	14			0418	0513	0428
27			—	12			0544	0616	0548
27		186	—				1124	1239D	1144
27		106	—				1239E	1456	1248
27			—		68	33	1856	1957	1909
27			—		4		2237	2349	2247
28			—	18	8		0335	0411D	0348
28			—	67			0411E	0509D	0449
28	25	48	—	131		29	0509E	0843	0536
28		27	—				1103	1120D	1108
28		154	—				1120E	1343	1133
29			—	138	95	71	0226	0347D	0328
29			—	145	104	70	0347E	0407D	0354
29			—	165	120	72	0407E	0844	0423
29	12	42	—				1915	1955	1923
29			—		75	47	2126	2359	2200
30	15		—	—		27	0209	0249	0219
30			—		26		2114	2150	2120
30			—		5		2231	2313	2242
30			—		9		2341	0013	2343
31			—	18	8		0051	0134	0103
31			—	10	5		0219	0251	0224
31	16	25	—	55	23	19	0341	0448	0343
31	21		—	91			0507	0716	0540
31		34	—				1557	1744	1628
31			—		66	45	2039	2156	2047

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