

# IONOSPHERIC DATA IN JAPAN

FOR DECEMBER 2012

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« Real Time Ionograms on the Web .....[http://wdc.nict.go.jp/index\\_eng.html](http://wdc.nict.go.jp/index_eng.html) »



NATIONAL INSTITUTE OF INFORMATION  
AND COMMUNICATIONS TECHNOLOGY  
TOKYO, JAPAN

# INTRODUCTION

This Series contains data on ionosphere (I) and solar radio emission (S) obtained at the following stations under the

National Institute of Information and Communications Technology, Japan.

Stations	Geographic(WGS84)		Geomagnetic (IGRF-10(2005))		Technical Method
	Latitude	Longitude	Latitude	Longitude	
*Wakkanai/Sarobetsu	45°10'N	141°45'E	36.4°N	208.9°	Vertical Sounding (I)
Kokubunji	35°43'N	139°29'E	26.8°N	208.2°	Vertical Sounding (I)
Yamagawa	31°12'N	130°37'E	21.7°N	200.5°	Vertical Sounding (I)
Okinawa	26°41'N	128°09'E	17.0°N	198.6°	Vertical Sounding (I)
Hiraiso	36°22'N	140°37'E	27.6°N	209.1°	Solar Radio Emission (S)

\*We moved the observation facilities at Wakkanai to Sarobetsu on February 2009. The new observatory is located at approximately 26km south from the old observatory. The observation at Sarobetsu commenced on March 6, 2009.

## IONOSPHERE

Ionospheric observations are carried out at the above four stations in Japan by means of vertical sounding using ionosondes. The ionosonde produces ionograms, which are recorded digitally on a computer storage medium. 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 by experienced specialists to supplement automatically-scaled parameters.

### A1. Automatic Scaling

Digital ionograms are automatically scaled by the pattern recognition method. The following five characteristics of the ionospheric are listed below. 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 (  $f_oF2$ ,  $fEs$ ,  $fmin$  ) and monthly medians of two factors (  $h'Es$ ,  $h'F$  ), daily Summary Plots and monthly medians plot of  $f_oF2$ .

#### a. Characteristics of Ionosphere

<b><math>f_oF2</math></b>	Ordinary wave critical frequency for the <b><math>F2</math></b> layer
<b><math>fEs</math></b>	Highest frequency of the <b><math>Es</math></b> layer whether it may be ordinary or extraordinary
<b><math>fmin</math></b>	Lowest frequency which shows vertical iono-spheric reflections
<b><math>h'Es</math></b> <b><math>h'F</math></b>	Minimum virtual height on the ordinary wave for the <b><math>Es</math></b> and <b><math>F</math></b> 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  $f_oF2$  ).
- C Impossible measurement because of any failure in observation.
- G Impossible automatic scaling because of very small ionization density of the layer ( for  $fEs$  ).
- N Impossible automatic scaling because of complex echoes.
- Blank No digital record because of problems occurring in the auto matic data processing system, but existence of film record.

#### c. Definitions of 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  $f_oF2$ ,  $fEs$  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  $f_xE$  and  $f_oE$  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 Hand-book of Ionogram Interpretation and Reduction ( Second Edition ) 1972 " and its revision of chapters I-4, published in July 1978.

#### a. Characteristics of Ionosphere

<b><math>fxl</math></b>	Top frequency of spread <b><math>F</math></b> trace
<b><math>f_oF2</math></b> <b><math>f_oF1</math></b> <b><math>f_oE</math></b> <b><math>f_oEs</math></b>	Ordinary wave critical frequency for the <b><math>F2</math></b> , <b><math>F1</math></b> , <b><math>E</math></b> , and <b><math>Es</math></b> (including particle type <b><math>E</math></b> ) layers, respectively
<b><math>fbEs</math></b>	Blanketing frequency of the <b><math>Es</math></b> layer, e.g. the lowest ordinary wave frequency visible through <b><math>Es</math></b>
<b><math>fmin</math></b>	Lowest frequency that shows vertical ionospheric reflections
<b><math>M(3000)F2</math></b> <b><math>M(3000)F1</math></b>	Maximum usable frequency factor for a path of 3000 km for transmission by the <b><math>F2</math></b> and <b><math>F1</math></b> layers, respectively
<b><math>h'F2</math></b> <b><math>h'F</math></b> <b><math>h'E</math></b> <b><math>h'Es</math></b>	Minimum virtual height on the ordinary wave for the <b><math>F2</math></b> , whole <b><math>F</math></b> , <b><math>E</math></b> and <b><math>Es</math></b> layers, respectively
<b>Types of <math>Es</math></b>	See below b. (iii)

## b. Symbols

## (i) Descriptive Letters

The following letters are entered after, or used to replace 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 by, 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 atmospheric.
- 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 part *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 as-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 ( CNT )** 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.



HOURLY VALUES OF foF2 AT Wakkanai

DEC. 2012

LAT. 45° 10.0' N LON. 141° 45.0' E SWEEP 1.0 MHz TO 30.0 MHz 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	32	32	34	32	32	34	34	54	64	71	67	64	67	65	68	65	54	A	A	28	30	26	30	32	
2	32	32	34	34	34	32	32	44	60	68	68	70	65	61	64	62	54	54	34	30	32	34	32	31	
3	37	34		34	32	34	32	49	66	65	68	64	66	64	65	57	52	43	32	A	28	28	30	26	
4	32	32	32	A	35	34	A	52	66	67	67	69	59	70	65	62	53	52	26	31	34	A	28	32	
5	32	34	32	32	34	34	28	56	64	56	66	65	59	67	65	58	46	34		32	34	31	34	29	
6	32	31	30	32	34	32	30	47	61	65	68	64	67	67	65	55	55	34			32	28	29	30	
7	32	31	32	32	32	29	30	20	52	61	67	70	67	60	62	58	47	34	30	89	29	26	28	30	
8		32	A	31	31	40		50	65	71	68	68	65	64	58	62	23	26	28	26		31	31	31	
9	N	32	28	38	32	31	29	30	70	65	67	69	63	64	62	54	61	34	32	34	32	32	20	28	
10	A	A	34	38	34	34	16	N	63	64	59	71	68	68	60	66	60	34	24	A	28	A	32	34	
11	31	32	34	32	33	32	32	54	63	70	66	72	70	66	70	56	63	32	A	36	30	32	32	34	
12	34	34	34	32	32	34	32	37	68	70	64	70	N	69	66	63	62	32	33	31	34	32	32	A	
13	34	32	34	34	32	35	36	47	68	68	N	68	75	66	68	60	52	32	A	A	A	A	A	34	
14	A	42	34	32	32	37	32	30	64	67			69	68	65	61	36	47	34	49	47	A	32	34	
15	41	34	42	42	A	34	34	52	62	N	67	65	69	67	65	62	55	37	34	A	59	32	32	32	
16	32	34	32	34	34	32	32	47	68	67	68	79	66	70	66	61	52	47	30	34	28	A	A	30	
17	34		28	34	32	37	28	44	67	66	71	69	91	68	72	67	55	50	32	32	35	32	A	A	
18	36		34	34	32	34	34	52	67	69	69	59	62	70	70	61	56	36	29	29	26		A	26	
19	32	32	34	34	34	34	34	54	66	59	86	69	73	67	71	65	55	34	34	28			29	30	
20	31		34	34	35	34	28	32	63	67	59	67	67	64	66	64	47		34	31	32	34	30	34	
21	34	31	40	37	34	34		34	N	70	69	68	68	64	62	61	A	53	37	38	32	32	28	32	
22	31	34	34	42	37	34	38	34	54	68	67	62	67	65	68	58	56	28	26	A		A	32	32	
23	32	35	32	32	32	31	26	41	60	60	62	56	66	70	66	65	53	A	29	N				28	
24		28	31	30	31	32	28	42	52	59	62	64	67	67	64	63	50	26		30	34		32	34	
25	34	34	34	32	32	31		26	57	58	64	68	66	62	40	N	55	34	32	A	29	N	31	32	
26		31	32	32	34	31	34	48	60	66	59	67	65	65	66	65	52	34	A	34	34	31	32	32	
27	32	32	32	44	43	44	42	52	61	67	66	66	66	68	71	71	54	34	A	34	32	36	34	48	
28	50	43	34	46	34	37		34	64	49	66	68	67	66	63	65	51	30	29	28	A	A	32	32	
29	34	34	34	32	32	28	34	38	61	67	66	68	64	67	67	67	41	A	A	A	N	A	A	34	
30	34	30	32	28	34	37	34	37	58	68	59	70	67	63	64	64	49	37	A	A	25		A	32	
31		32	34	34	34	32	A	34	61	59	67	61	67	67	66	64	36	34	37	N		36	34	32	32
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	24	27	29	30	30	31	25	30	30	30	29	30	30	31	31	30	30	27	21	20	24	17	24	29	
MED	32	32	34	34	34	34	32	44	63	67	67	68	67	67	65	62	53	34	32	32	32	32	32	32	
U Q	34	34	34	34	34	34	34	52	66	68	68	69	68	68	68	65	55	43	34	34	34	33	32	34	
L Q	32	32	32	32	32	32	28	34	60	61	64	64	65	64	64	60	49	32	29	29	29	29	29	30	

## HOURLY VALUES OF fEs AT Wakkanai

DEC. 2012

LAT. 45° 10.0' N LON. 141° 45.0' E SWEEP 1.0MHz TO 30.0MHz 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	48	48	50	G	G	G	G	32	G	39	58	G	G	G	G	G
2	G	G	G	G	G	G	G	27	34	G	G	G	G	G	G	44	27	G	G	G	G	G	G	G
3	G	G	G	G	G	G	G	G	G	35	G	G	G	G	G	G	G	G	G	28	G	G	G	G
4	G	G	G	24	G	G	23	G	48	G	N	G	G	G	36	32	26	36	26	G	G	33	G	G
5	G	G	G	G	G	G	G	G	38	G	G	G	G	G	G	G	G	G	G	28	24	G	G	G
6	G	G	G	G	G	G	G	G	45	G	G	G	G	G	G	G	11	G	G	G	G	G	G	G
7	G	G	G	G	G	G	G	11	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
8	G	G	33	23	G	G	G	G	42	G	G	G	G	G	48	G	11	G	G	G	G	G	G	G
9	G	G	G	G	G	G	G	G	30	35	G	G	G	36	G	41	G	G	G	G	G	G	G	G
10	28	33	28	28	G	G	G	G	48	52	39	39	40	40	40	36	28	24	G	34	26	26	G	G
11	24	G	24	25	G	29	G	36	33	37	G	G	50	51	40	41	28	40	27	G	G	G	G	G
12	G	G	24	24	G	G	23	28	G	36	G	G	40	G	G	48	G	G	26	29	24	37	26	28
13	G	G	G	G	G	G	G	33	32	48	36	38	37	48	G	G	G	G	38	36	40	36	36	32
14	39	25	G	G	G	G	26	28	40	52	G	G	G	G	40	40	39	28	35	26	34	40	27	G
15	G	G	29	G	34	G	G	G	48	37	36	38	49	G	G	G	G	G	G	40	G	G	G	G
16	G	G	G	G	G	G	G	G	G	G	G	38	G	G	G	44	G	G	G	44	G	33	28	G
17	G	G	G	G	G	G	35	29	42	G	G	G	G	G	G	G	G	G	G	G	33	26	28	28
18	G	G	G	G	G	G	G	G	37	38	G	G	G	G	G	G	G	G	G	G	G	G	34	G
19	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	40	11	28	27	G	G	G	G	G
20	G	G	G	G	G	G	G	G	42	48	G	G	G	G	G	G	11	G	G	G	G	26	G	G
21	G	G	G	G	G	G	G	G	49	G	40	42	39	G	51	42	38	38	G	G	G	G	G	G
22	G	G	G	24	25	G	G	G	48	33	37	G	G	G	G	G	G	G	26	30	G	33	26	G
23	G	G	G	G	G	G	G	G	G	48	G	G	G	G	G	G	26	34	24	G	G	G	G	G
24	G	G	G	G	G	G	26	G	G	35	G	G	G	42	40	32	27	G	G	G	G	G	G	G
25	G	G	G	G	G	24	G	26	39	34	41	44	38	40	34	G	G	26	G	32	G	G	G	G
26	G	G	G	G	G	G	29	G	G	G	G	44	47	G	34	G	G	27	32	G	G	28	25	27
27	27	G	G	G	G	G	G	G	G	50	G	G	G	G	39	42	34	G	56	27	32	G	G	G
28	G	G	G	25	33	G	G	G	G	G	G	38	G	G	G	G	11	G	G	28	32	38	G	G
29	G	G	G	G	G	G	G	G	29	G	G	G	G	G	G	G	44	44	67	37	34	48	40	24
30	29	G	G	G	G	G	G	37	50	60	49	40	G	G	34	G	G	29	41	50	25	33	G	G
31	G	G	G	G	G	G	28	G	39	G	G	G	38	G	G	52	28	51	28	G	28	26	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	27	29	31	31	31	31	27	31	31	31	29	30	31	31	31	31	31	30	28	30	27	26	30	31
MED	G	G	G	G	G	G	G	G	34	34	G	G	G	G	G	G	11	G	12	G	G	12	G	G
U Q	G	G	G	G	G	G	23	26	45	48	36	38	37	G	36	41	27	28	33	30	28	33	27	G
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

HOURLY VALUES OF fmin AT Wakkanai

DEC. 2012

LAT. 45° 10.0' N LON. 141° 45.0' E SWEEP 1.0MHz TO 30.0MHz AUTOMATIC SCALING

$\begin{matrix} H \\ D \end{matrix}$	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	14	14	15	16	15	16	16	16	14	14	15	17	16	14	14	14	14	14	14	17	14	15	14	17
2	15	15	15	15	15	15	15	20	14	15	15	14	15	15	14	14	14	18	16	14	16	14	14	14
3	15	15	16	14	15	15	15	17	14	14	14	14	15	14	14	18	15	14	15	14	16	15	18	17
4	15	15	18	16	18	15	16	15	15	14	14	14	14	14	14	14	14	15	14	14	14	14	14	14
5	15	14	14	15	14	16	15	17	14	15	16	16	20	20	15	23	15	16		15	14	14	14	15
6	15	15	16	20	15	14	20	16	14	14	16	14	14	14	14	22	15	15			15	15	14	15
7	15	15	15	14	15	17	15	15	14	14	15	15	14	14	14	21	14	15	15	15	15	15	18	15
8		14	14	14	15	14		16	14	15	17	17	17	15	16	23	16	22	15	15		18	15	15
9	21	15	17	14	16	14	15	16	14	14	14	14	14	14	14	14	16	20	18	15	14	14	16	15
10	15	14	15	15	15	15	17	16	14	14	14	14	15	14	15	15	16	15	14	15	15	15	14	14
11	15	15	15	14	14	15	15	14	14	14	15	14	14	14	14	14	14	15	14	14	14	15	14	15
12	14	14	14	14	14	15	14	14	14	14	18	16	14	14	14	14	15	14	14	14	14	14	14	18
13	17	17	15	14	15	15	15	17	14	15	14	14	14	14	14	14	17	14	14	14	14	14	14	14
14	14	14	14	15	15	15	16	14	14	14			16	15	14	15	14	15	15	15	14	14	14	14
15	14	15	14	15	14	14	15	15	14	14	14	15	17	14	14	14	16	15	17	14	14	20	17	20
16	15	15	15	15	14	14	18	15	14	18	14	14	14	15	15	16	20	15	15	15	15	14	17	18
17	21		15	14	15	15	14	15	14	15	15	14	15	14	15	23	16	15	21	15	15	17	14	15
18	15		14	14	15	15	15	15	14	14	15	14	15	14	14	23	16	15	14	14	15		14	17
19	14	15	14	16	15	15	15	15	18	14	14	14	14	14	15	14	15	18	14	14			15	14
20	14	14	14	15	16	14	15	15	15	14	14	14	14	14	14	14	15		15	15	15	14	15	14
21	15	15	16	15	15	15		15	15	14	14	14	14	14	14	14	14	14	16	15	15	15	16	18
22	15	14	16	15	14	14	15	15	14	14	14	14	14	14	14	22	14	14	17	15		14	14	14
23	14	15	14	15	15	15	15	14	21	15	17	18	18	16	15	14	15	14	15	22				21
24		14	15	15	15	14	15	14	14	14	15	14	15	14	14	14	14	15		14	16		14	14
25	14	14	15	15	15	15		15	14	14	14	15	15	14	15	14	16	15	15	15	16	20	15	20
26		16	15	14	14	15	14	16	14	14	14	15	14	14	15	15	16	15	14	14	18	15	15	16
27	14	14	14	17	15	14	15	14	18	14	15	14	15	15	18	15	14	15	14	16	14	15	14	14
28	15	14	15	15	14	15		15	21	15	15	14	14	15	15	14	15	21	15	14	15	14	14	14
29	14	15	15	17	14	15	15	14	14	14	14	14	14	15	14	15	14	15	15	14	16	14	14	15
30	15	16	15	15	15	15	15	14	14	14	14	14	14	14	14	14	16	15	15	14	15		15	15
31		15	15	15	15	15	14	14	14	14	14	14	14	14	15	14	15	14	14	17	14	14	15	14
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	29	31	31	31	31	27	31	31	31	30	30	31	31	31	31	31	30	28	30	27	26	30	31
MED	15	15	15	15	15	15	15	15	14	14	14	14	14	14	14	14	15	15	15	15	15	14	14	15
U Q	15	15	15	15	15	15	15	16	14	15	15	15	15	15	15	18	16	15	15	15	15	15	15	17
L Q	14	14	14	14	14	14	15	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14

HOURLY VALUES OF fof2 AT Kokubunji  
 DEC. 2012  
 LAT. 35° 43.0' N LON. 139° 29.0' E SWEEP 1.0MHz TO 30.0MHz 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				N					52	70	72	73	75	67	71	58	65	62	53		N			N		
2			N				N	N	46	61	73	74	66	80	72	68	69	60	55	45		N	N	N		
3	N		N			30			54	59	66	90	77	75	85	71	67	63	44	46	A					
4	58							N	54	62	66	74	84	84	68	76	72	62		38	N				N	
5			N			34			64	73	65	72	64	76	77	66	67	45	A		34	30			28	
6	N							N	61	48	72	76	79	61	68	66	61	59	45			N		30	34	
7			N					28	53	67	67	61	78	80	85	72	59	54	43	A	N					
8								N	53	69	67	64	72	78	72	64	58	61	39				37			
9		N		N					59	61		68	70	73	77	67	61	N				25		N	N	N
10	N				27			N	68	67	67	78	86	86	81	73	68	59			28					
11	N				N			N	N		71	65	84	73	84	73	74	69	62	46		N	N		N	
12	N		N	N		28		A	52	72	74	72	72	95	90	76	64	58	52		36	A			28	
13	A		N	N					31	59	67	73	78	84	88	81	74	73	62	47	38	N		N		
14		A			N			N	52	72	78	77	80	78	84	78	75	59				32	28			
15				N				28	54	78	75	75	81	78	78	82	71	68				28	36	42	28	
16		31						N	52	60	81	80	77	84	80	74	64	58	44	38					A	
17				48	28				54	68	77	82	88	76	91	80	69	55	51	49						
18	A	A							61	82	86	89	81	82	85	90	85	64	47	37						
19		N			N	N	N		54	74	81	76		C	C	C	C	C	C	C		32			N	
20			N	N		28		N	51	68	67	69		C	C	C	C	C	C	C	C	C	C	C	C	
21	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
22	C	C	C	C	C	C	C	C	C	C	C	C	C	C		69	75		40	A			38		21	28
23	30		N		28	34	28	34	49	59	61	64	67	65	76	80	77	82	A				28		N	
24	30	A	N	N	N	N	A		46	52	62	67	85	85	72	68	71	61	A	N	N	N			27	28
25	27	N		30		34		N	47	56	64	68	72	72	81	72	75	70	42	36	39	28			N	N
26	27	27	28	30	25	28	25	52	66	69	74	81	87	78	78	78	58	39	N		27	A	30		N	
27	26	31	32	26	32	28	32	53	69	64	67	82	71	68	73	66	59	A		34	34	30	58	28	N	
28	25	37	42	42	42	44	45	52	75	72	80	80	82	75	63	64	64	40	A		28	34			25	
29	31	27	34	38	36	32		N	52	71	59	74	75	75	77	77	71	66	46	27	37	26	N	27	27	
30	31	27	32	27	34	26	26	50	72	67	80	78	91	76	73	74	67	52	37	40	27	N				
31	A		A	A	A			31	53	62	71	85	78	73	80	72	62	61	43	25	A	A		A	A	
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT		9	8	8	9	12	8	8	28	29	28	29	27	27	28	28	28	26	19	15	13	9	7	7	5	
MED		30	27	31	28	33	28	31	53	68	68	74	78	78	78	73	69	61	45	37	32	30	30	28	28	
U Q		31	31	33	40	34	32	33	54	72	73	80	81	84	81	76	73	64	51	38	38	36	42	28	28	
L Q		26	27	29	27	28	28	27	52	61	65	68	72	73	72	68	64	59	42	34	28	27	30	27	26	



HOURLY VALUES OF fEs AT Kokubunji

DEC. 2012

LAT. 35° 43.0' N LON. 139° 29.0' E SWEEP 1.0MHz TO 30.0MHz AUTOMATIC SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1			G				G	G	G	G	G	G	G	G	G	G	G	G		G		G	G		
2			G		G	G	G	G	G	G	G	G	G	G	41	G	G	30	G		G	G	G	G	
3	G		G	G	G	G		G	G	G	G	G	G	G	G	G	G	35	30	29					
4	G		G			G	G	G	G	G	G	G	G	G	G	G	G		G	G				G	
5			G	G	G		G	G	G	G	G	G	G	G	G	G	G		G	G				G	
6	G					G	G	G	G	G	G	G	G	G	G	G	G	G			G	G	G	G	
7		G	G	G		G		G	G	G	G	G	G	G	G	G	G	30	28	24	G				
8						G	G	G	G	G		47	G	G	G	G	G	G			G				
9		G		G		G	G	G	G		G	G	G	G	G	G	G			G		G	G	G	
10	G			G	G		G	G	G	G		52	49	G	G	G	G	G	G						
11	G			G	G	G	G	G	G	G	G		60	G	G	G	G	G		G	G			G	
12	G	G	G	G	G		32	36	G	G	G	G	47	G	G	G	G	G		G	25			G	
13	27		22	G		G	G	G	G	G		49	G	49	G	G	G	G	G	G		G			
14		25		G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G				
15				G	G	G		G	G	G	G	G	G	G	G	G	G		G	G	G	G	G		
16		G				G	G	G	G	G	G	G	G	G	G	G	G	G	G		G			31	
17				G	G			G	G	G	G	G	G	G	G	G	G	G	G						
18	32	25						G	G	G	G	G	G	G	G	G	G	G	G						
19		G	G		G	G	G	G	G	G	G	C	C	G	C	C	C	C		G				G	
20			G	G	G		G	G	G	G	G	C	C	C	C	C	C	C	C	C	C	C	C	C	
21	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
22	C	C	C	C	C	C	C	C	C	C	C	C	C	C	G	G		G			G	24	G	G	
23	G		G	G	G	G	G	G	G	G	G	G	G	45	G	G	G	41	G	G		G		G	
24	G	30	26		G	26	27	27	G	G	G	G	G	G	49	36		27	G	G	G		G	G	
25	G	G	27		G	G	G	G	G	G	G	48	49	56	65	60	36	11		32			G	G	
26	24	27	G	G	G	G	G	G	G	G	G	47	48	G	G	G	G	G	24	G	26	22	24		
27	G	G	29	23			29	G	G	G	G	G	G	G	44	G	39	63	23	G	G	G	G	G	
28	G	G	G	G	33		27	G	G	G	G	G	G	G	G	G	32	G	29	G	G		G	G	
29	26	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G		26	24	G	G	G
30	G	24	29	23	G	G	G	G	G	G	G	43	G	G	G	G	38	31	28	49	26				
31	28	24	G	32	40	31		32	48		45	G	44	G	G	52	48	28	29	50	59	26	29	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	17	15	18	21	19	17	24	29	29	28	29	27	27	28	28	28	27	25	22	21	17	13	15	15	
MED	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	
U Q	25	25	22	G	G	G	G	G	G	G	G	G	G	G	G	G	30	29	24	13	24	11	G	G	
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	

HOURLY VALUES OF fmin AT Kokubunji

DEC. 2012

LAT. 35° 43.0' N LON. 139° 29.0' E SWEEP 1.0MHz TO 30.0MHz 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				20				36	37	21	40	43	60	42	21	30	43	17		20		20	18		
2			18			17	18	21	18	15	38	40	39	39	20	17	14	13	42		14	18	18	18	
3	18		14	21	18	18		22	18	21	38	38	42	42	38	15	15	14	14	14					
4	17		18				17	37	14	21	39	46	20	14	36	34	18		15	22				18	
5			21	21	18			21	21	39	39	40	40	46	40	40	14	29	25	17	18			15	
6	15						17	36	13	20	39	38	40	39	20	39	33	20			17	15	18	20	
7		21	18	13			15	14	34	35	37	40	42	40	39	15	14	14	14	14					
8							18	21	14	39	40	42	25	39	17	35	22	14			18				
9		15		18		20	21	20	39		39	40	29	42	15	18	22			14		21	14	15	
10	14			14	18		18	38	14	37	40	35	35	39	39	42	39	17	14						
11	18			20	18	20	14	18	18	18	40	40	40	40	41	14	26	14		18	21			15	
12	15	20	18	15	14		14	14	14	40	39	44	42	39	18	14	25	15		15	15			21	
13	17		17	14			15	18	35	39	39	33	40	39	34	18	18	14	15	15		15			
14		17		17	20	15	18	42	37	37	37	42	43	75	36	36	36	18	17	15	17				
15				15	14	17		21	36	18	38	42	43	39	20	36	28		15	15	14	22	20		
16		15				21	21	22	18	39	40	43	39	40	38	31	34	43	14		21		17		
17				18	18			20	34	35	39	42	38	43	40	34	23	20	23						
18	15	14						21	36	37	39	39	40	43	18	36	37	15	14						
19		21	17		17	14	20	20	39	35	40	C	C	C	C	C	C	C	C	C	13			20	
20			17	18	14		20	21	34	39	39	C	C	C	C	C	C	C	C	C	C	C	C	C	
21	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
22	C	C	C	C	C	C	C	C	C	C	C	C	C	C		14	14		14	13		14	15	14	14
23	14		13	14	14	15	14	15	13	13	17	37	39	15	14	13	21	14	14	14		14		14	
24	14	13	14	13	14	13	14	15	14	13	15	17	15	14	15	15	13	13	14	13	14		13	13	
25	14	14	13		13	13	15	15	13	13	14	18	13	14	13	14	13	13	13	13	14		14	14	
26	14	13	13	13	13	14	14	18	13	13	14	15	14	18	18	14	13	17	13	14	14	13	14		
27	13	14	14	13	14	13	14	14	14	13	14	20	20	20	14	13	13	13	13	13	14	14	14	14	
28	15	14	14	13	13	13	13	13	13	13	14	15	14	40	21	13	15	17	13	18	14		14	13	
29	14	13	13	13	13	13	14	17	13	13	14	15	14	14	13	13	18	13	15	14	13	13	14	14	
30	14	14	13	13	13	14	14	13	13	13	13	14	14	14	13	14	14	13	14	14	14	15			
31	13	13	14	13	13	14	14	13	13	13	13	13	14	13	14	13	14	13	13	13	13	13	13	13	
	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	15	18	21	19	17	24	29	29	28	29	27	27	28	28	28	27	25	22	21	17	13	15	15	
MED	14	14	14	14	14	14	15	20	18	21	39	39	39	39	20	15	21	14	14	14	14	15	14	14	
U Q	16	17	18	18	18	17	18	21	35	37	39	42	42	40	37	34	29	17	15	16	17	19	18	18	
L Q	14	13	13	13	13	13	14	15	13	13	14	18	15	16	14	14	14	13	13	13	14	13	14	14	

HOURLY VALUES OF foF2 AT Yamagawa

DEC. 2012

LAT. 31° 12.0' N LON. 130° 37.0' E SWEEP 1.0MHz TO 30.0MHz AUTOMATIC SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	B	28	29	29	32	28	49	46	64	64	59	72	61	69	64	64	73	67	53	52	41	38	40	N	
2	B	N	29	29	32	28	B	46	68	63	61	68	73	73	74	72	68	52	46	44	N	36	38	30	
3	B	28	B		29	B	N	47	67	58	70	76	62	78	73	77	74	63	A	44	43	43	30	28	
4	28	31	30	30	31	31	36	37	54	66	66	67	86	69	59	74	68	52	A	47	32	N	28	N	
5	B	30	30	34	34	31	28	46	64	62	76	70	69	56	75	76	65	57	46	30	46	37	30	26	
6	26	26	B	26	B	B		26	42	62	74	73	72	68	76	72	73	58	53	44	50	48	34	32	28
7	30	30	29	28	31	29	28	44	64	77	66	67	79	56	73	71	63	58	46	42	43	38	26	N	
8		28	49	N	B	A		26	44	47	67	64	70	N					A	42	53	53	B		
9	N	28	26	B	N		29	28	43	52	60	70	70	75	76	72	67	72	53	40	44	48	34	N	B
10	28	B	30	28	32	B		28	42	67	72	61	72	N	N	N					37	36	31	26	B
11	28	26	34	34	34	29	30	43	54	68	73	77	69	70	72	76				B		43	40	34	28
12	26	31	31	29		29	B	44	46	63	72	69	72	N	N	N					43	40	25	44	89
13	29	34	A	A	32	28	29	43	76	46	72	74	69	75	75	78	66	44	43	B		47	42	34	26
14	28	A	B		32	34	26		38	61	86	76	72	72	82	59	65	70	58	38	34	31	B	34	B
15	28	29	B	30	26	29	N	43	72	N	78	73	72	74	90	71	73	67	51	61	52	52	37	34	
16	30	32	32	26	29	29	B	43	66	71	79	72	86	80	74	68	72	66	58	38	33	37	31	B	
17		B	29	30			28	42	63	75	79	77	67	87	75	75	74	60	58	53	28	N	34	23	
18	B	B	32	26	31	B	N	44	75	74	79	76	86	77	80	59	87	64	52	43			34	25	
19	B	B	26	26	29	29	B	37	74	70	N	70	79	78	71	73	72	73	55	34	47	23	34	26	
20	B	29	28	26	34	29	N	37	52	67	72	72	76	92	73	68	70	66	40	36		B	30	29	
21	28	28	26	37	36	N	B	40	67	67	76	73	69	72	68	67	74	57	52	43	40	40	28	B	
22	29	28	30	29	29	34	N	35	71	77	73	75	76	63	66	74	75	58	43	26	37	34	N	B	
23	B	B		26	30	26	N	37	54	68	64	62	69	73	60	65	N		55	36	39	52	28	28	
24	N	34	32	A	32	30	28	A	52	55	72	72	76	59	72	70	67	55	N	36	36	32	26	B	
25	B	28	32	30	N	36	B	38	52	69	71	64	75	69	79	84	79	N	51	48	53	38		N	
26	A	30	29	N	29	B	26	40	53	67	72	79	76	A	72	71	58	53	42	38	A	37	59	28	
27	28	31	34	26	26	30	26	38	67	71	61	69	69	69	60	66	70	74	42	43	34	59	28	B	
28	26	28	N	26	B	32	59	40	70	N	69	67	78	68	72	61	70	67	N	36	37	B	B	B	
29	B	A		31	31	34	30	28	41	64	70	63	61	66	68	66	77	71	56	43	A	34	37	B	20
30	B	28	34	34	34	30	N	34	67	73	N	80	N	N		79	72	72	72	A	A	48	43	32	B
31	31	B	29	B	32	30	28	41	40	62	72	71	79	69	A	66	72	56	A	A		34	49	26	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	15	22	24	24	24	23	17	30	31	29	29	31	28	27	28	30	30	30	24	26	27	25	25	14	
MED	28	28	30	29	32	29	28	42	64	68	72	72	72	72	72	71	72	58	46	42	41	37	32	28	
U Q	29	31	32	30	34	30	29	44	67	72	74	74	77	77	74	75	74	66	53	44	48	42	34	29	
L Q	28	28	29	26	29	29	27	38	53	63	65	69	69	68	67	67	68	55	42	36	34	34	28	26	

HOURLY VALUES OF fEs AT Yamagawa

DEC. 2012

LAT. 31° 12.0' N LON. 130° 37.0' E SWEEP 1.0MHz TO 30.0MHz 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	B	G	G	G	G	G	G	G	G	G	G	G	G	G	G	38	G	29	G	G	G	G	G	G
2	B	G	G	G	G	G	B	G	G	40	53	48	G	46	42	38	G	G	G	G	G	G	G	G
3	B	G	B	G	G	B	G	G	G	50	44	G	G	42	41	40	35	28	30	G	G	G	G	G
4	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	35	31	G	G	G	G	G
5	B	G	G	G	G	G	G	G	G	32	G	G	G	G	G	46	43	G	G	11	G	G	G	G
6	G	G	B	G	B	B	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
7	G	G	G	G	G	G	G	G	G	48	G	G	G	G	G	G	G	G	32	27	G	G	G	G
8	G	G	G	G	B	28	G	G	N	38	G	41	42	G	G	G	G	G	29	G	G	G	B	G
9	G	G	G	B	G	G	G	G	G	G	42	47	43	47	41	G	G	G	32	G	G	G	G	B
10	G	B	G	G	G	B	G	G	G	G	G	G	G	52	46	G	35	G	G	G	G	G	G	B
11	G	G	G	G	G	G	G	G	32	G	G	41	G	54	G	45	G	G	11	B	G	G	G	G
12	G	G	G	G	G	G	B	G	31	G	G	G	G	G	G	G	48	39	G	G	G	G	G	G
13	G	G	35	34	G	G	G	G	G	G	G	G	46	44	50	43	42	G	50	B	G	G	G	G
14	G	52	B	G	G	G	B	G	G	G	G	G	G	G	40	G	36	G	G	G	G	B	G	B
15	G	G	B	G	G	G	G	G	G	G	G	G	48	G	G	G	42	G	G	G	G	G	G	G
16	G	G	G	G	G	G	B	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	B
17	G	B	G	G	G	G	G	G	G	G	44	G	G	G	G	G	G	G	11	G	G	G	G	G
18	B	B	G	G	G	B	G	G	G	G	G	41	49	G	G	41	36	35	32	G	G	G	G	G
19	B	B	G	G	G	G	B	G	G	G	41	44	G	G	G	G	G	G	11	G	G	G	G	G
20	B	G	G	G	G	G	G	G	G	G	G	G	46	G	G	G	G	G	G	G	G	B	G	G
21	G	G	G	G	G	G	B	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	B
22	G	G	G	G	G	G	G	G	G	G	G	G	G	43	41	G	35	24	G	G	G	G	G	B
23	B	B	G	G	G	G	G	G	G	G	G	G	G	51	G	G	G	G	27	26	G	G	G	G
24	G	G	G	33	28	24	G	34	G	G	G	G	46	58	53	G	43	G	33	G	G	G	G	B
25	B	G	G	G	G	G	B	33	46	G	G	G	53	57	52	50	34	34	44	G	G	G	G	G
26	32	G	G	G	G	B	G	G	G	G	G	G	48	84	55	60	36	40	28	G	G	G	G	G
27	G	G	G	G	G	G	G	G	G	G	G	G	G	G	49	42	36	G	G	G	G	G	G	B
28	G	G	G	G	B	G	G	G	G	G	G	44	G	G	G	G	36	G	11	G	G	B	B	B
29	B	34	G	G	G	G	G	G	G	G	G	G	50	46	G	44	47	32	30	32	32	G	B	30
30	B	G	G	G	G	G	G	G	G	35	G	G	43	47	G	40	51	39	41	41	33	27	G	B
31	G	B	G	B	G	G	G	G	49	G	G	G	52	48	77	44	53	76	50	33	G	G	G	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	20	25	27	29	28	26	24	31	30	31	31	31	31	31	31	31	31	31	31	29	31	28	28	20
MED	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	11	G	G	G	G	G
U Q	G	G	G	G	G	G	G	G	G	G	G	G	46	47	46	42	36	34	30	G	G	G	G	G
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

HOURLY VALUES OF fmin AT Yamagawa

DEC. 2012

LAT. 31° 12.0' N LON. 130° 37.0' E SWEEP 1.0MHz TO 30.0MHz AUTOMATIC SCALING

$\begin{matrix} H \\ D \end{matrix}$	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	16	17	15	15	16	18	17	15	16	16	18	21	22	18	17	14	15	15	16	15	17	15	17
2	B	20	20	18	15	16	B	17	15	15	17	20	28	24	18	14	14	18	15	15	16	16	15	17
3	B	22	B	66	15	B	18	18	14	14	17	21	26	27	18	16	14	14	15	17	15	18	15	66
4	15	17	71	17	16	15	15	15	23	15	15	21	21	23	21	16	15	16	14	15	15	20	20	71
5	B	14	18	15	16	17	15	17	15	15	17	17	21	17	15	14	14	15	17	17	23	18	15	15
6	15	15	B	21	B	B	15	15	14	14	16	18	17	17	15	16	14	20	15	16	15	16	17	66
7	17	14	15	15	16	17	16	17	18	16	15	17	17	17	21	16	14	15	15	27	15	15	15	20
8	66	15	20	15	B	17	17	15	15	15	17	14	18	20	16	14	14	17	15	21	17	17	B	66
9	20	18	15	B	21	15	17	17	24	14	16	20	18	20	17	18	15	14	15	15	15	15	18	B
10	20	B	18	16	15	B	20	27	14	16	17	20	18	18	20	21	15	20	16	15	15	15	18	B
11	17	17	15	16	15	17	16	18	14	15	16	20	20	18	20	17	15	20	15	B	17	17	15	15
12	17	21	16	17	71	16	B	15	14	17	18	17	18	18	17	14	18	15	15	17	66	14	15	18
13	17	15	15	14	15	17	15	16	23	16	16	21	22	18	16	14	15	22	15	B	15	15	15	15
14	16	14	B	15	14	15	B	17	26	17	16	20	22	22	20	20	16	21	18	15	21	B	18	B
15	15	16	B	18	17	15	66	17	27	16	18	24	23	20	35	17	22	21	16	17	16	23	17	15
16	18	17	17	17	15	66	B	18	15	16	16	18	20	20	18	14	24	21	15	15	15	15	18	B
17	66	B	18	18	16	66	18	15	14	16	18	15	20	18	18	17	15	20	17	17	16	21	16	17
18	B	B	14	16	15	B	17	15	22	16	18	17	17	17	17	16	14	15	15	16	20	18	16	18
19	B	B	18	15	18	15	B	15	15	14	18	17	22	22	18	16	16	21	15	15	15	18	15	18
20	B	17	16	17	16	16	16	16	14	15	18	17	18	20	17	16	14	16	15	15	71	B	15	15
21	14	15	15	22	16	17	B	15	24	16	18	17	20	21	17	15	24	21	16	15	14	15	17	B
22	17	16	17	15	18	15	21	15	14	16	15	17	20	40	20	20	15	15	16	15	18	16	17	B
23	B	B	66	16	15	15	18	17	14	15	17	20	21	22	20	17	16	20	15	15	15	14	15	66
24	18	18	15	15	14	15	16	14	15	15	17	21	22	18	21	17	16	23	15	18	15	15	17	B
25	B	16	15	15	14	14	B	14	26	16	16	18	20	21	20	17	15	15	15	18	15	15	71	21
26	15	15	15	17	18	B	17	15	14	15	18	20	20	20	21	18	15	16	15	18	15	21	16	66
27	18	16	16	15	17	18	18	15	24	17	21	21	14	15	14	20	15	20	16	15	17	15	18	B
28	16	15	16	14	B	17	20	15	22	16	15	18	20	20	22	16	15	15	15	16	16	B	B	B
29	B	14	16	14	14	16	18	15	15	14	17	18	18	18	18	14	15	14	15	15	16	15	B	15
30	B	15	18	16	15	21	16	15	14	14	17	17	18	20	16	16	14	14	16	16	15	16	16	B
31	17	B	21	B	17	15	17	15	14	14	14	35	23	22	20	15	15	14	15	14	18	17	20	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	20	25	27	29	28	26	24	31	31	31	31	31	31	31	31	31	31	31	31	29	31	28	28	20
MED	17	16	16	16	16	16	17	15	15	15	17	18	20	20	18	16	15	16	15	16	15	16	16	18
U Q	18	17	18	17	17	17	18	17	23	16	18	20	22	22	20	17	16	20	16	17	17	18	18	66
L Q	15	15	15	15	15	15	16	15	14	15	16	17	18	18	17	15	14	15	15	15	15	15	15	15

HOURLY VALUES OF foF2 AT Okinawa

DEC. 2012

LAT. 26° 41.0' N LON. 128° 09.0' E SWEEP 1.0 MHz TO 30.0 MHz AUTOMATIC SCALING

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

HOURLY VALUES OF fEs AT Okinawa

DEC. 2012

LAT. 26° 41.0' N LON. 128° 09.0' E SWEEP 1.0MHz TO 30.0MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G	G	G	G	G	G	G	G	G	49	42	G	G	G	G	G	G	G	G	G
2	G	G	G	G	G	B	G	G	G	40	46	47	47	G	41	53	G	G	G	G	G	G	G	G
3	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	48	39	G	11	G	G	G	G	G
4	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	35	G	G	G	G	G
5	G	G	G	G	G	G	G	G	G	G	G	G	G	54	G	G	G	G	G	11	G	G	G	G
6	B	G	G	B	G	B	G	G	G	G	G	G	G	G	G	G	G	32	30	26	G	G	G	G
7	B	G	G	G	G	B	G	G	50	G	G	G	G	G	G	G	G	G	G	36	G	G	26	G
8	B	G	G	G	G	G	G	G	G	44	45	49	76	40	G	G	G	G	11	G	G	G	G	G
9	B	G	G	B	G	G	G	G	G	G	55	47	47	50	54	61	G	G	48	G	G	G	G	G
10	G	B	G	G	G	G	G	G	G	37	G	46	56	53	60	G	G	G	32	43	24	G	G	G
11	G	G	G	G	G	B	G	G	G	G	48	47	50	G	G	G	G	G	11	22	G	G	G	G
12	G	G	G	G	G	B	G	G	G	G	G	50	G	G	G	G	G	G	11	G	G	G	G	G
13	G	G	G	31	29	28	G	G	G	G	G	G	G	G	G	G	G	G	29	G	G	36	G	G
14	G	G	G	33	28	B	B	G	G	G	44	G	G	G	G	G	G	G	31	49	33	27	G	G
15	G	G	G	G	G	B	G	G	G	G	43	46	47	46	56	49	54	G	G	48	38	G	G	G
16	G	G	G	G	G	B	G	G	33	G	G	G	G	G	G	G	G	G	G	39	G	G	G	G
17	G	G	G	G	G	G	G	G	G	G	G	G	43	G	G	G	G	G	G	11	27	G	27	G
18	B	G	G	G	G	B	G	G	G	G	G	G	G	46	G	G	G	G	11	G	24	G	G	G
19	G	G	G	G	G	B	G	G	G	G	G	G	G	43	G	G	G	G	11	35	G	G	G	G
20	G	G	B	G	G	B	G	G	G	G	G	G	G	G	46	44	G	G	18	11	G	G	G	G
21	B	G	G	G	G	B	B	G	G	G	G	G	G	G	G	G	G	G	39	24	G	G	G	G
22	G	G	G	B	G	G	B	G	G	G	G	G	55	G	46	G	G	G	48	26	27	G	G	B
23	B	G	G	G	G	G	G	G	G	G	G	G	48	G	G	G	G	39	11	G	G	G	G	G
24	G	G	G	G	G	27	G	35	48	G	G	G	G	64	61	40	G	G	20	24	G	G	28	G
25	B	G	G	G	G	G	34	G	G	G	G	G	G	44	59	51	48	38	30	28	G	G	G	G
26	G	G	G	G	26	B	G	G	G	G	G	G	47	48	74	56	G	46	38	28	G	B	G	B
27	B	B	G	G	B	G	B	G	G	G	G	G	G	62	52	67	59	G	G	G	G	G	G	G
28	G	B	B	G	G	G	B	G	G	G	G	G	46	G	43	G	G	34	27	11	G	G	G	G
29	G	B	G	G	G	G	G	G	G	G	G	48	51	56	48	40	G	G	G	36	G	G	G	G
30	G	24	G	G	26	G	G	G	G	36	G	G	G	48	51	44	54	53	35	26	G	24	30	B
31	G	G	G	B	G	32	G	G	G	G	G	G	G	58	53	70	94	70	51	53	G	G	32	40
	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	27	29	27	30	23	21	31	31	31	31	31	31	31	31	31	31	31	31	31	31	30	31	28
MED	G	G	G	G	G	G	G	G	G	G	G	G	G	43	41	G	G	G	18	22	G	G	G	G
U Q	G	G	G	G	G	G	G	G	G	G	G	G	47	49	52	48	G	G	32	35	G	G	G	G
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

HOURLY VALUES OF fmin AT Okinawa

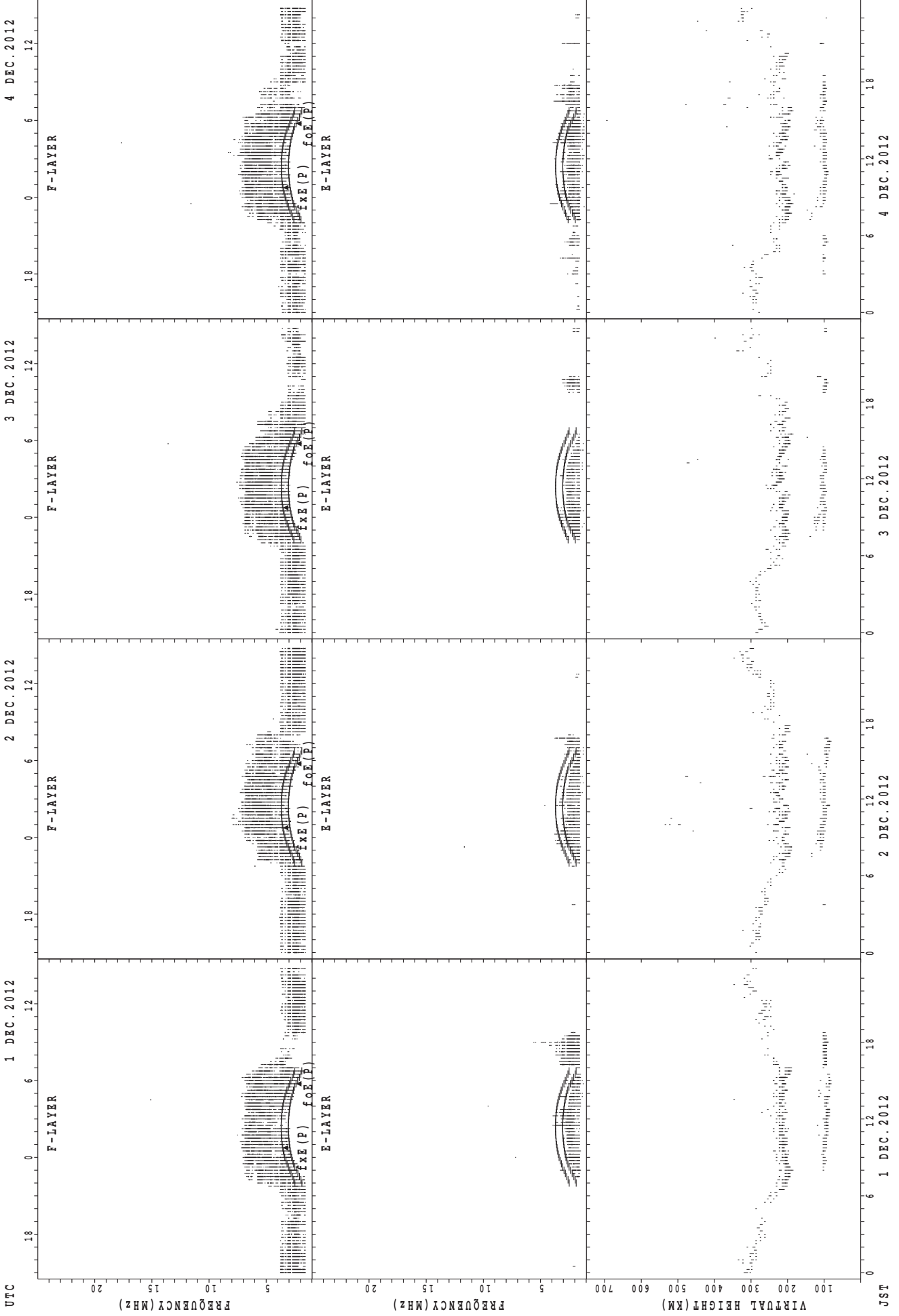
DEC. 2012

LAT. 26° 41.0' N LON. 128° 09.0' E SWEEP 1.0MHz TO 30.0MHz AUTOMATIC SCALING

$\begin{matrix} H \\ D \end{matrix}$	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	16	17	16	16	17	18	16	18	16	17	20	20	21	21	20	18	17	14	17	15	14	15	16	17
2	18	16	15	20	18	B	20	16	15	16	20	23	20	26	24	17	15	14	15	15	18	15	15	15
3	18	15	16	18	15	15	15	17	27	16	20	24	26	27	22	20	15	16	20	15	15	15	15	14
4	21	22	18	17	17	16	23	15	18	33	21	21	40	41	38	20	17	18	15	18	16	15	18	14
5	16	17	15	15	14	14	16	16	21	15	22	18	22	21	20	15	15	22	15	18	41	15	15	15
6	B	18	17	B	17	B	18	18	15	17	16	17	20	22	16	21	18	16	14	15	23	18	15	15
7	B	18	15	15	15	B	15	15	16	17	16	20	18	40	39	18	15	17	17	15	17	18	15	15
8	B	17	16	14	16	17	18	15	15	18	24	20	20	21	20	15	15	21	15	15	14	15	18	26
9	B	66	17	B	18	15	15	18	24	16	16	30	32	22	20	18	14	14	15	21	18	14	16	18
10	18	B	17	15	15	16	17	18	15	17	21	21	34	20	21	21	15	16	14	15	18	16	15	18
11	15	17	17	14	14	15	B	17	16	16	18	21	21	23	21	20	16	15	15	16	20	15	17	15
12	15	18	15	16	21	B	16	17	14	18	20	20	21	21	20	18	16	23	16	18	17	17	17	16
13	66	21	15	15	14	15	18	18	28	16	21	22	21	18	41	14	17	23	16	16	27	15	15	20
14	16	17	17	14	14	B	B	16	26	17	22	38	42	22	22	21	18	22	14	15	15	15	16	24
15	17	15	16	16	15	18	B	18	26	18	21	36	23	44	38	21	27	24	15	16	15	15	15	15
16	15	17	18	15	15	16	B	16	20	18	20	21	42	39	40	18	17	23	15	15	20	20	16	16
17	20	17	15	15	20	20	15	16	24	17	39	20	29	24	20	16	30	15	20	15	15	15	15	17
18	B	18	15	16	15	17	B	15	16	18	20	23	21	21	20	39	17	15	16	18	15	18	17	17
19	16	66	18	15	18	18	B	15	24	17	21	21	39	21	38	21	15	14	15	15	16	15	22	18
20	15	66	B	71	15	B	17	15	14	17	21	22	41	28	20	17	27	23	14	15	22	15	17	16
21	B	17	15	20	15	B	B	15	26	17	20	21	41	20	18	20	14	14	15	16	15	14	22	15
22	21	15	22	B	18	17	B	14	15	17	17	41	35	42	34	21	15	22	18	16	16	18	16	B
23	B	16	15	16	15	18	18	15	26	15	21	22	24	44	41	18	18	15	15	18	18	20	17	15
24	66	66	18	20	15	15	18	14	21	15	15	20	18	33	28	18	33	23	21	17	17	15	15	18
25	B	66	15	14	16	18	14	15	27	20	20	20	22	22	20	20	17	14	15	15	21	17	16	15
26	15	15	16	16	16	B	16	15	15	16	21	22	22	38	27	17	15	15	15	14	17	B	20	B
27	B	B	16	17	B	17	B	15	15	33	21	42	42	34	20	20	20	14	17	18	15	17	15	18
28	16	B	B	15	15	16	B	15	22	14	18	20	21	26	21	18	18	15	14	17	21	21	26	15
29	18	B	14	16	15	14	17	15	15	17	20	21	33	27	20	16	14	18	17	15	16	15	15	16
30	20	15	17	15	15	66	16	20	15	14	17	20	18	21	18	18	15	17	15	15	18	15	14	B
31	66	18	15	B	28	14	18	15	22	20	17	22	21	38	20	17	15	16	14	15	17	17	14	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	22	27	29	27	30	23	21	31	31	31	31	31	31	31	31	31	31	31	31	31	31	30	31	28
MED	18	17	16	16	15	16	17	15	18	17	20	21	22	24	21	18	16	16	15	15	17	15	16	16
U Q	20	21	17	17	17	18	18	17	24	18	21	23	35	38	34	20	18	22	17	17	20	17	17	18
L Q	16	16	15	15	15	15	15	15	15	16	18	20	21	21	20	17	15	15	15	15	15	15	15	15

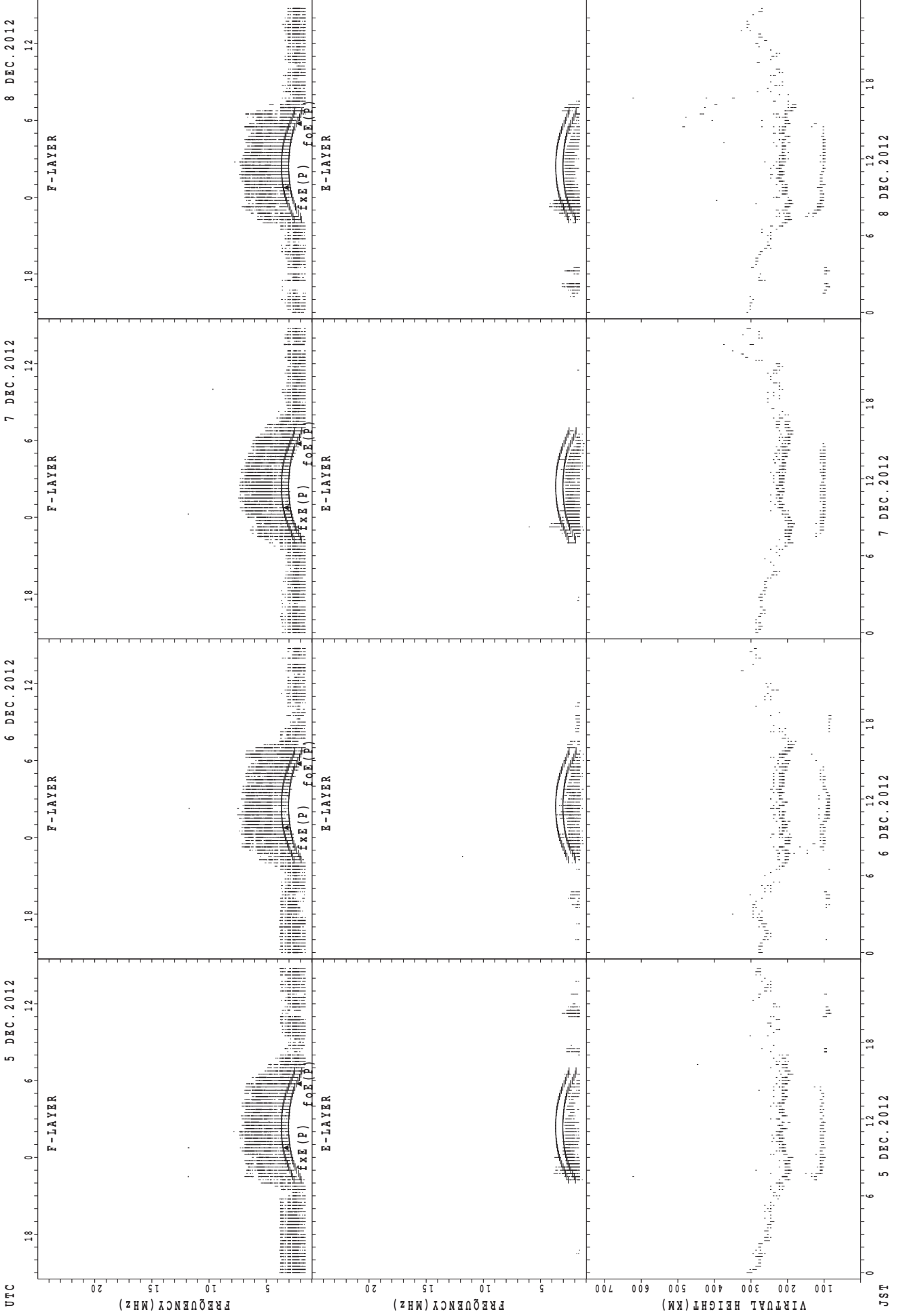


SUMMARY PLOTS AT Wakkanai



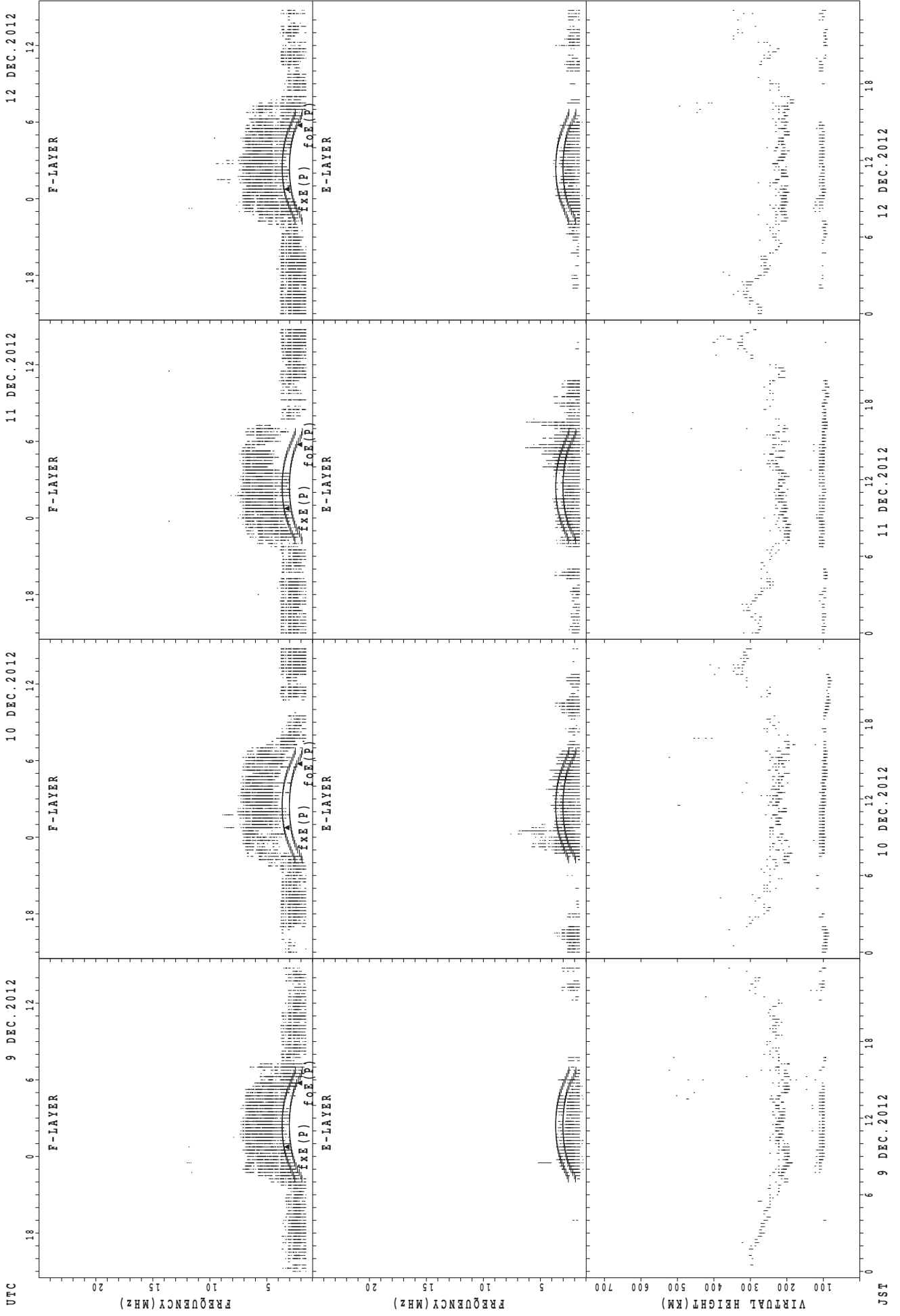
$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $f_oE(P)$ ; PREDICTED VALUE FOR  $f_oE$

SUMMARY PLOTS AT Wakkanai



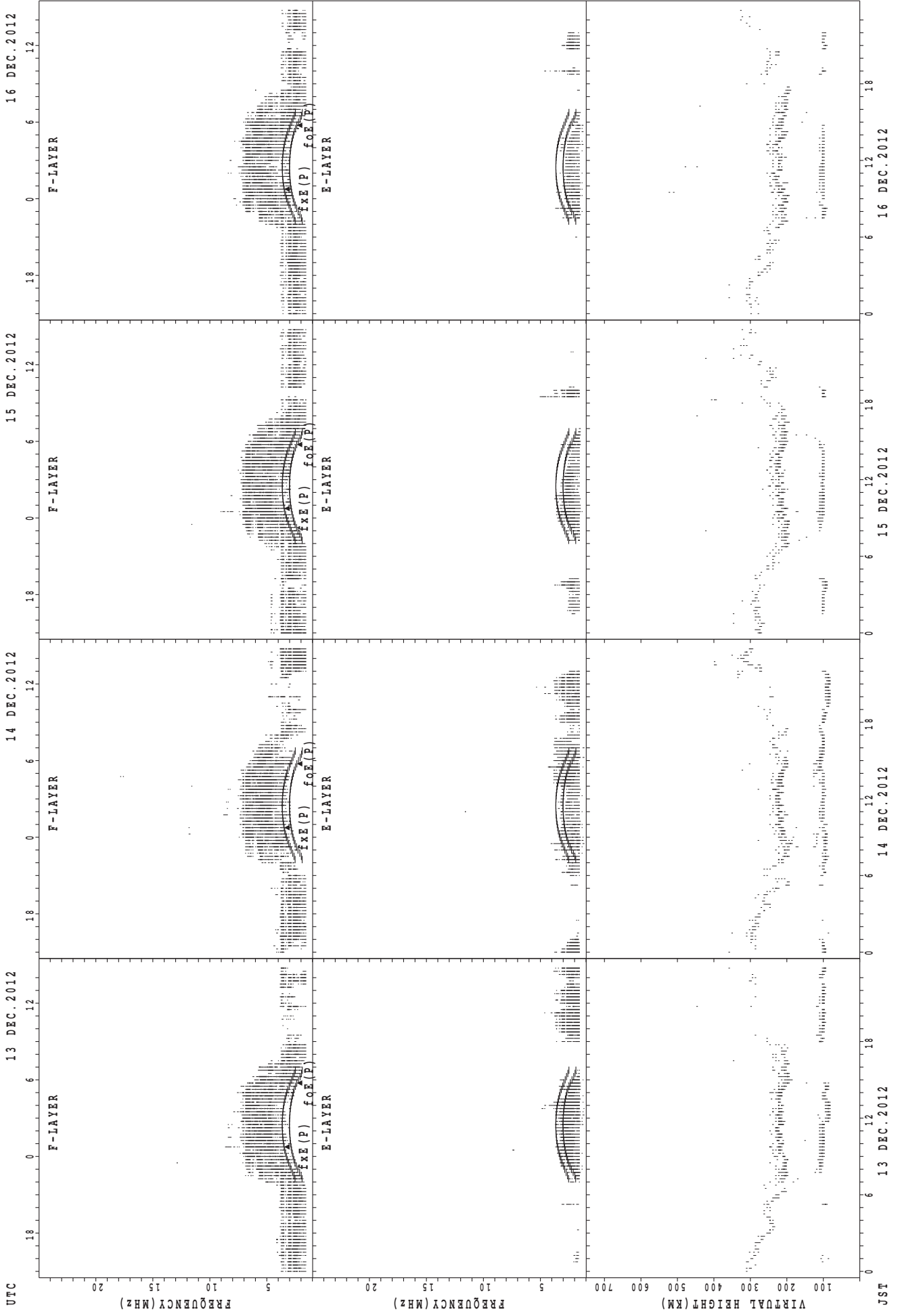
f\_xe(P); PREDICTED VALUE FOR f\_xe  
f\_oE(P); PREDICTED VALUE FOR f\_oE

SUMMARY PLOTS AT Wakkanai



foF2(P); PREDICTED VALUE FOR foF2  
foE1(P); PREDICTED VALUE FOR foE1

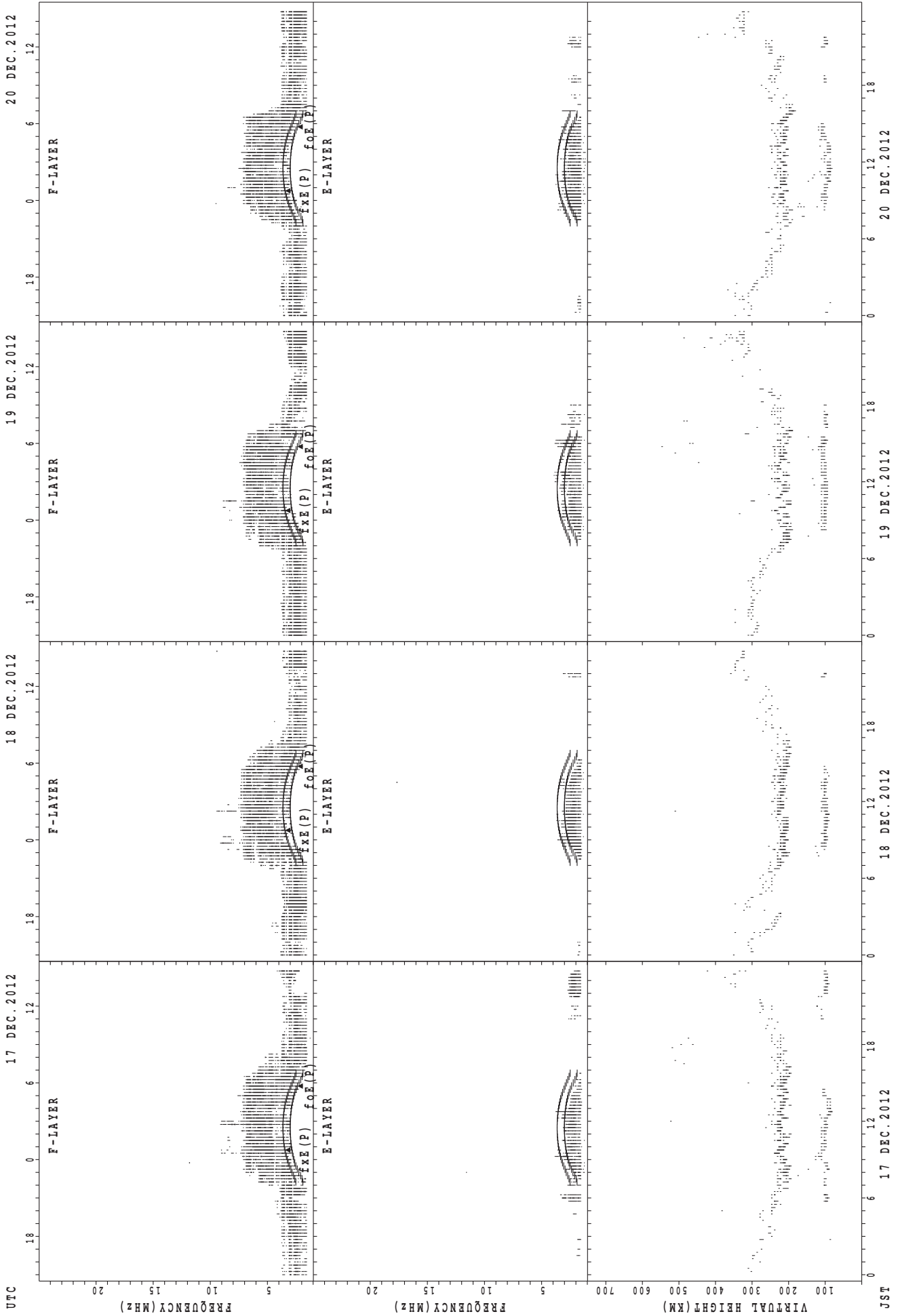
SUMMARY PLOTS AT Wakkanai



f\_xE (P); PREDICTED VALUE FOR f\_xE  
f\_oE (P); PREDICTED VALUE FOR f\_oE

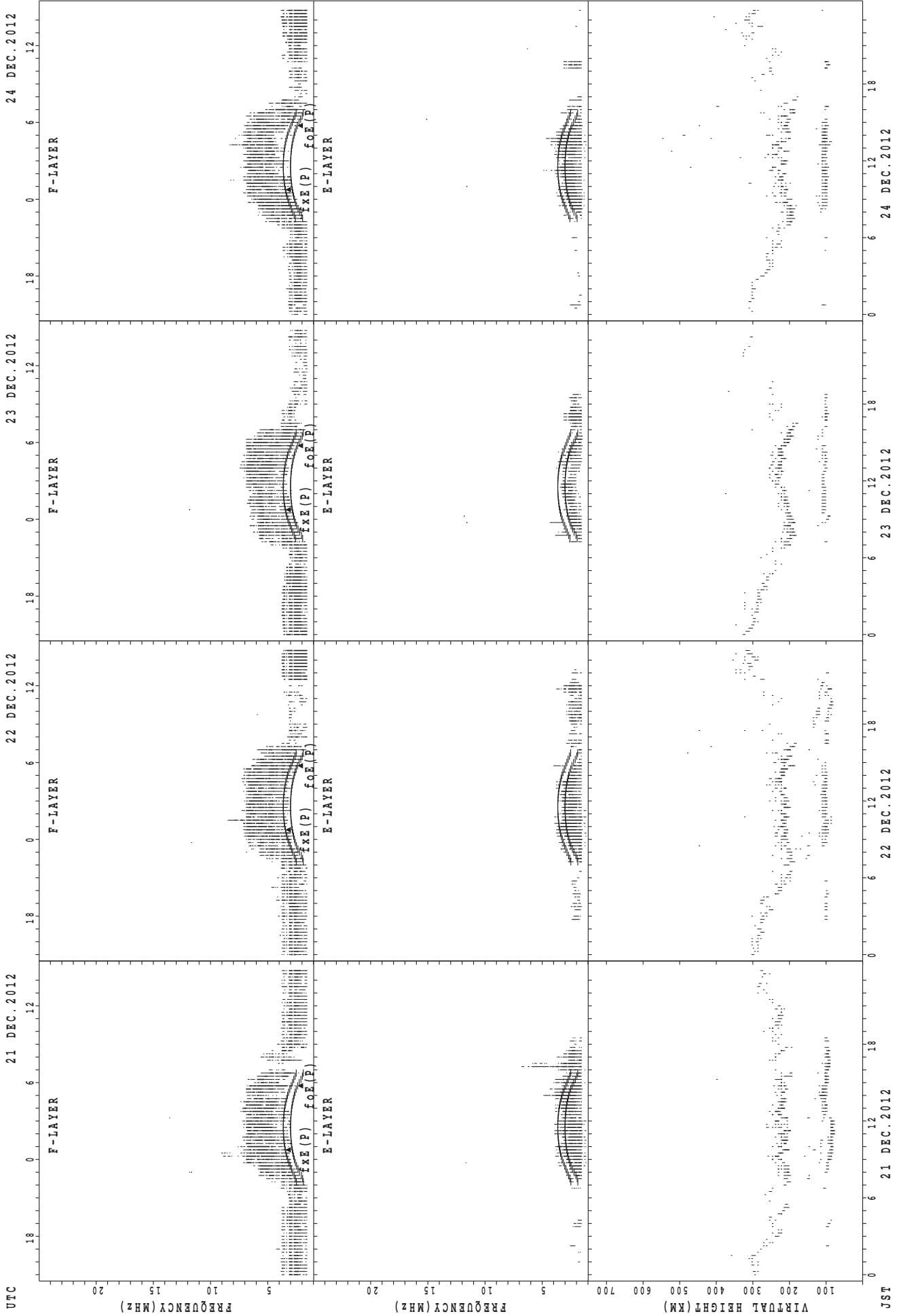
UTC 13 DEC. 2012 14 DEC. 2012 15 DEC. 2012 16 DEC. 2012

SUMMARY PLOTS AT Wakkanai



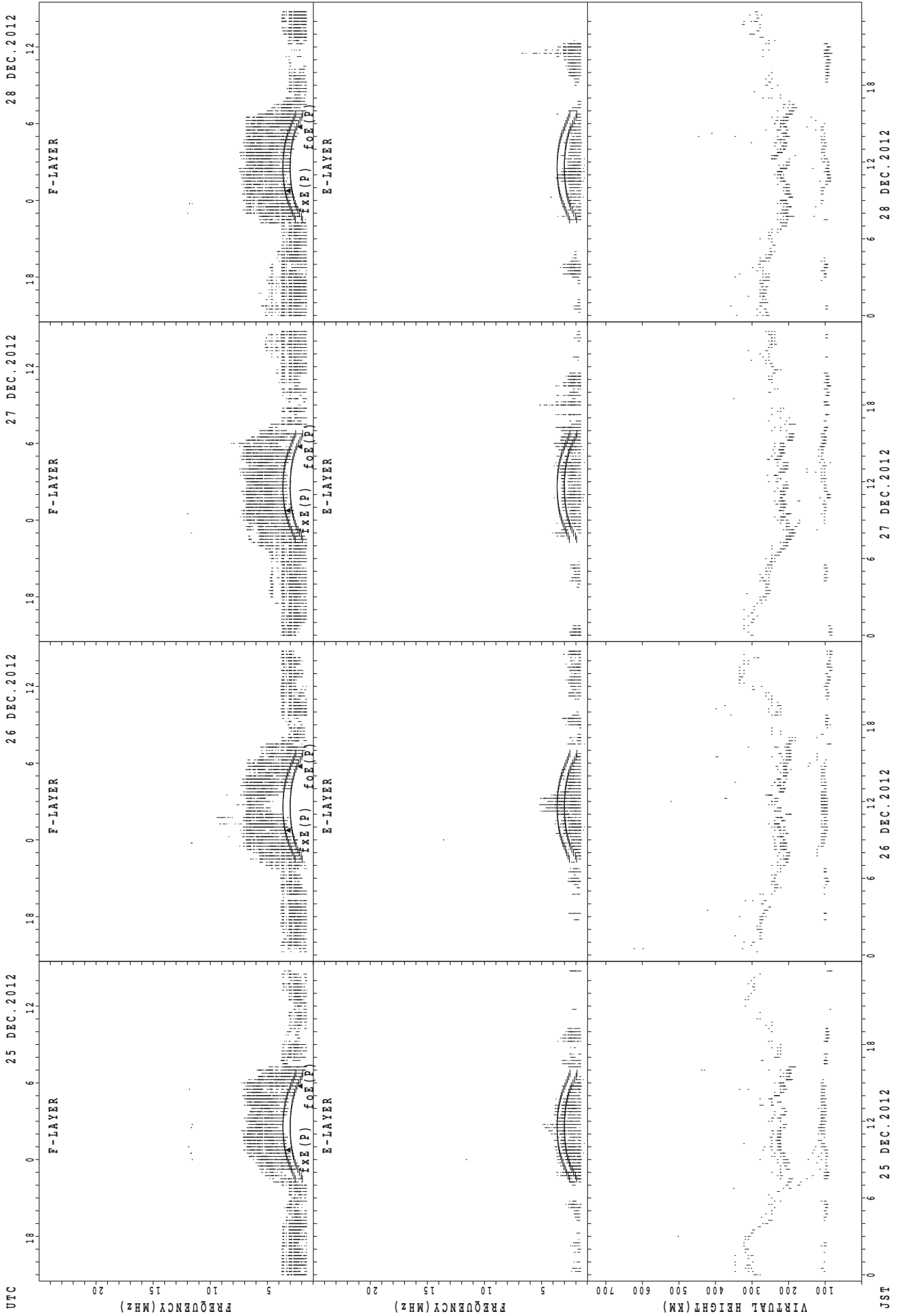
f<sub>xe</sub>(P); PREDICTED VALUE FOR f<sub>xe</sub>  
 f<sub>oE</sub>(P); PREDICTED VALUE FOR f<sub>oE</sub>

SUMMARY PLOTS AT Wakkanai



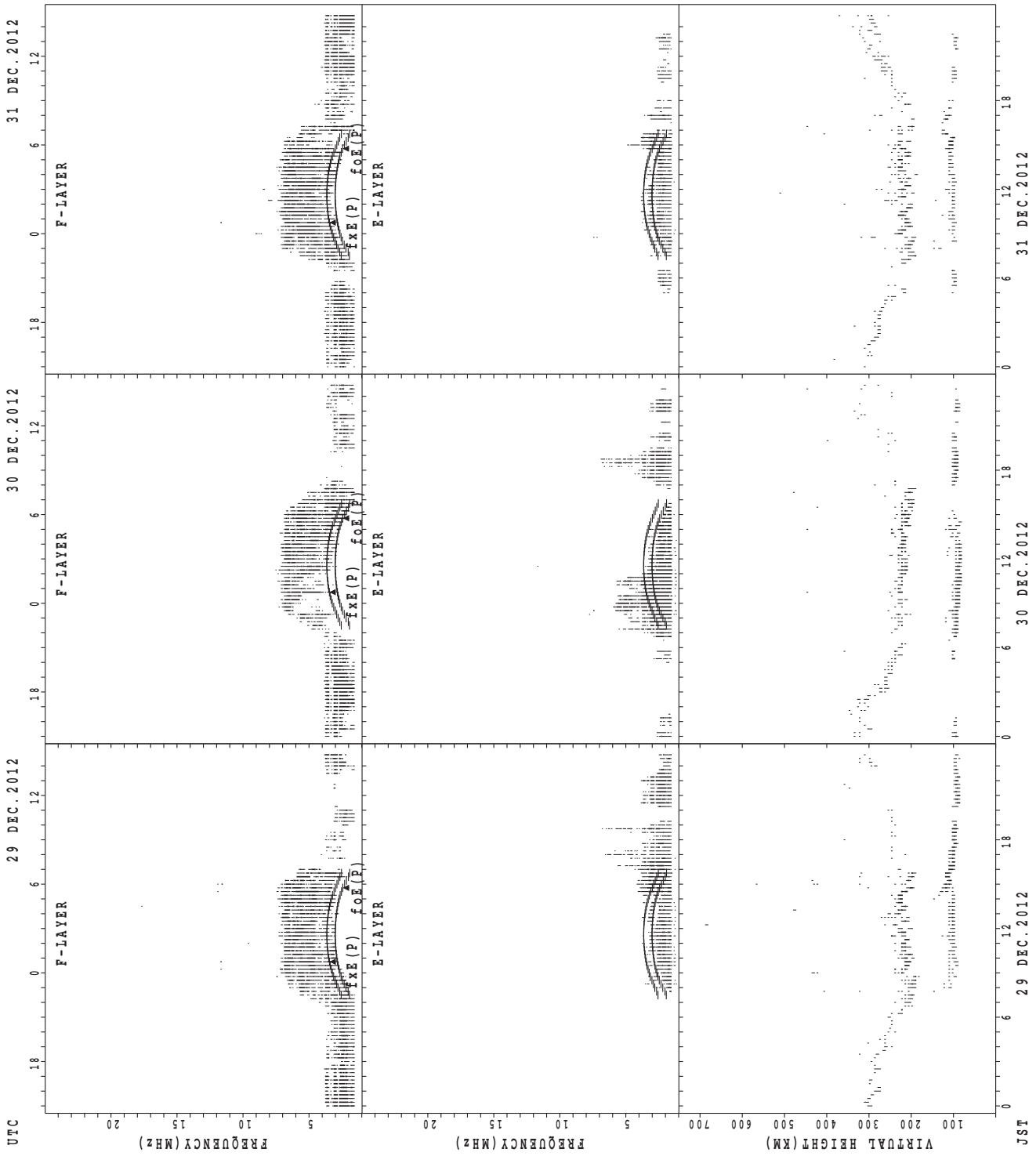
$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $f_oE(P)$ ; PREDICTED VALUE FOR  $f_oE$

SUMMARY PLOTS AT Wakkanai



f<sub>x E</sub>(P); PREDICTED VALUE FOR f<sub>x E</sub>  
 f<sub>o E</sub>(P); PREDICTED VALUE FOR f<sub>o E</sub>

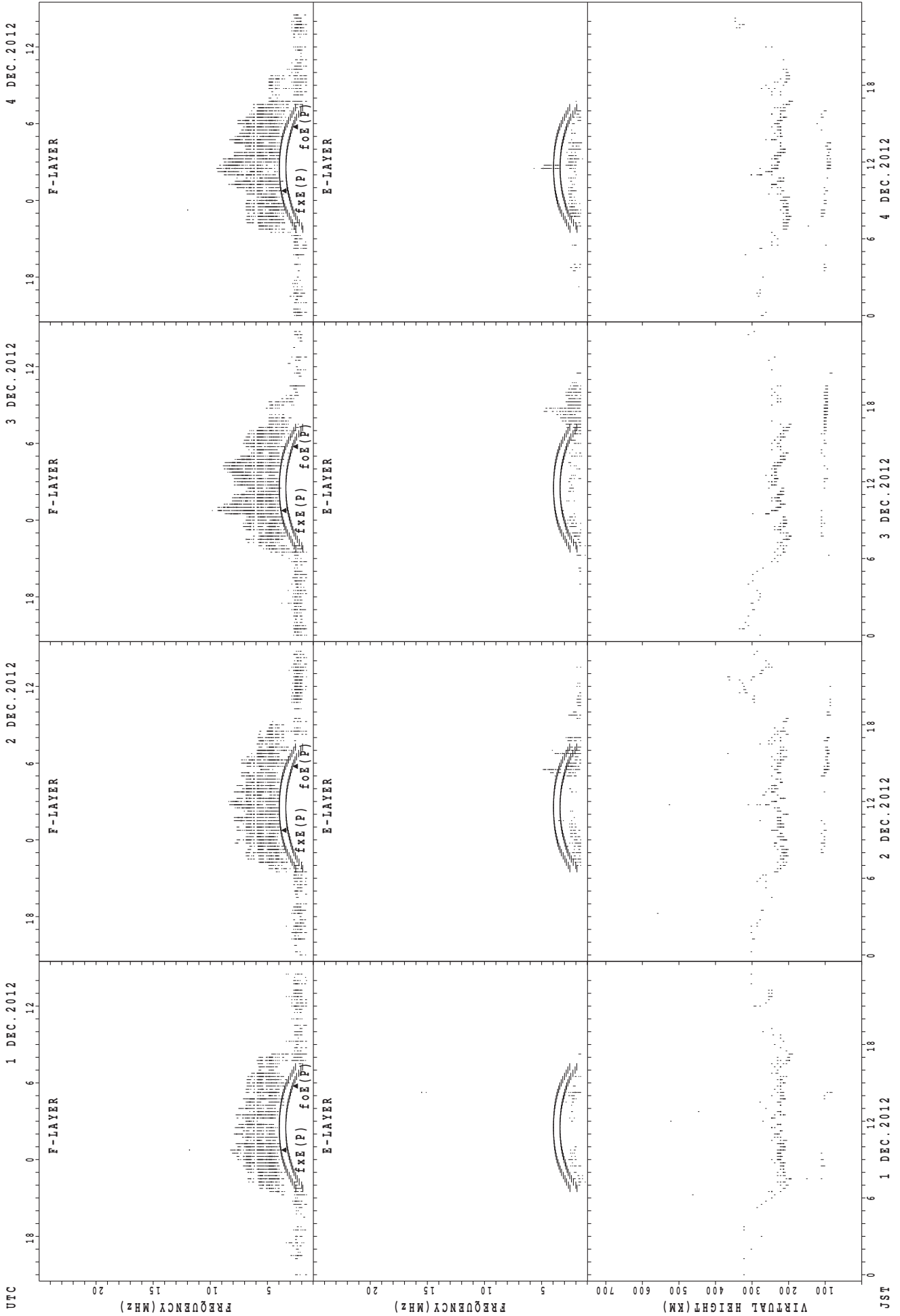
SUMMARY PLOTS AT Wakkanai



f<sub>o</sub>F<sub>2</sub>(P); PREDICTED VALUE FOR f<sub>o</sub>F<sub>2</sub>  
h'F<sub>2</sub>(P); PREDICTED VALUE FOR h'F<sub>2</sub>

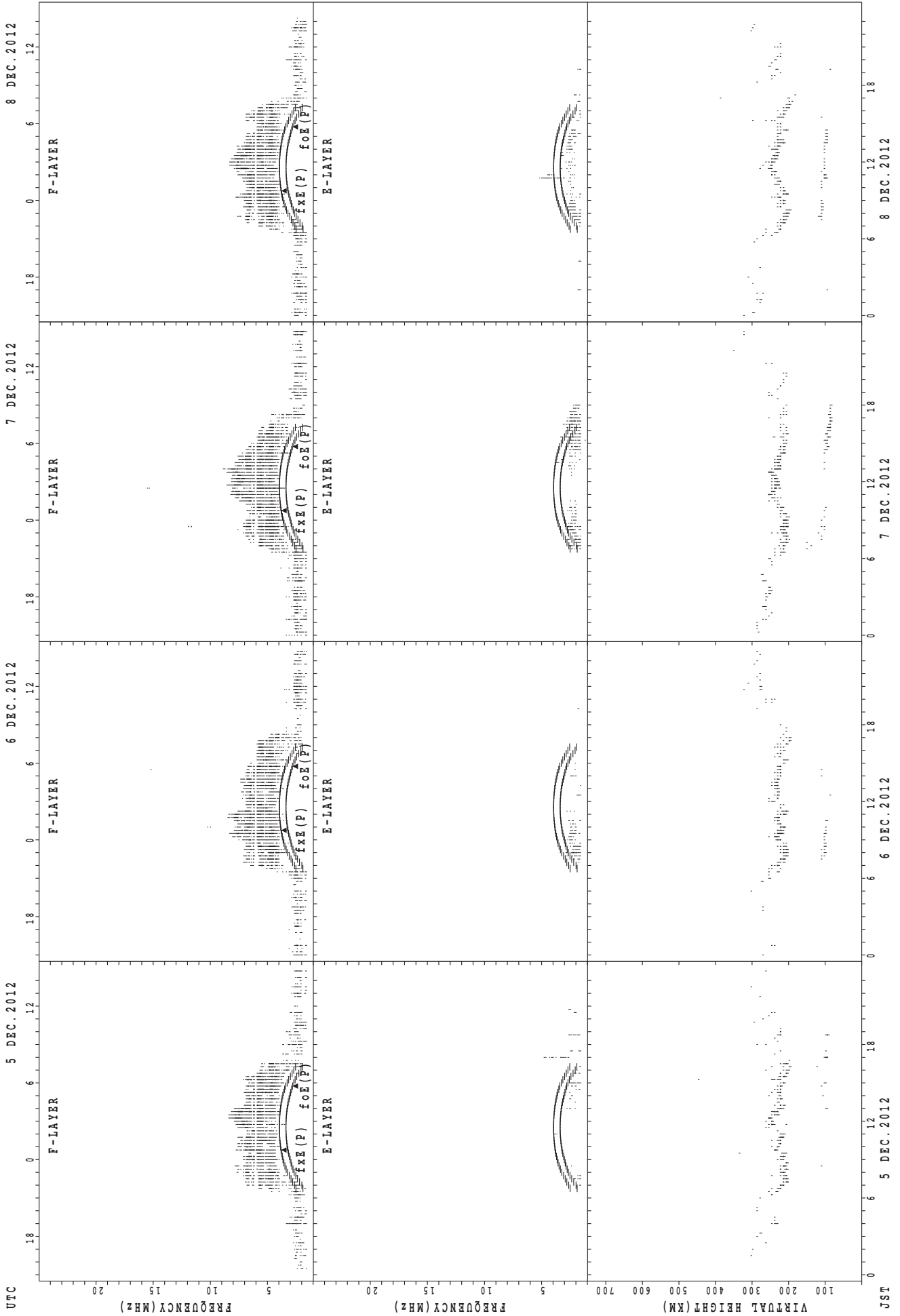


SUMMARY PLOTS AT Kokubunji



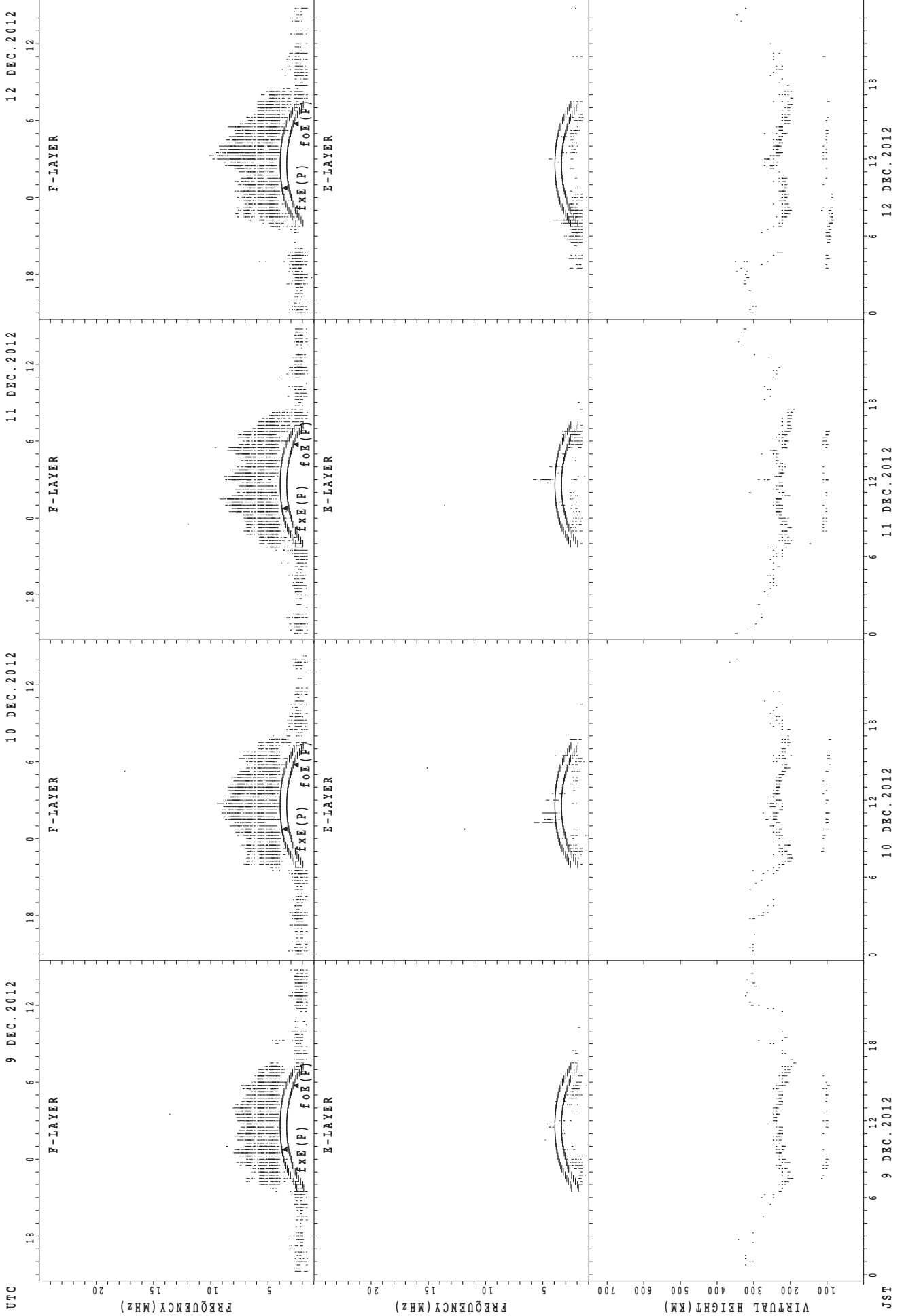
foE(P); PREDICTED VALUE FOR foE  
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Kokubunji



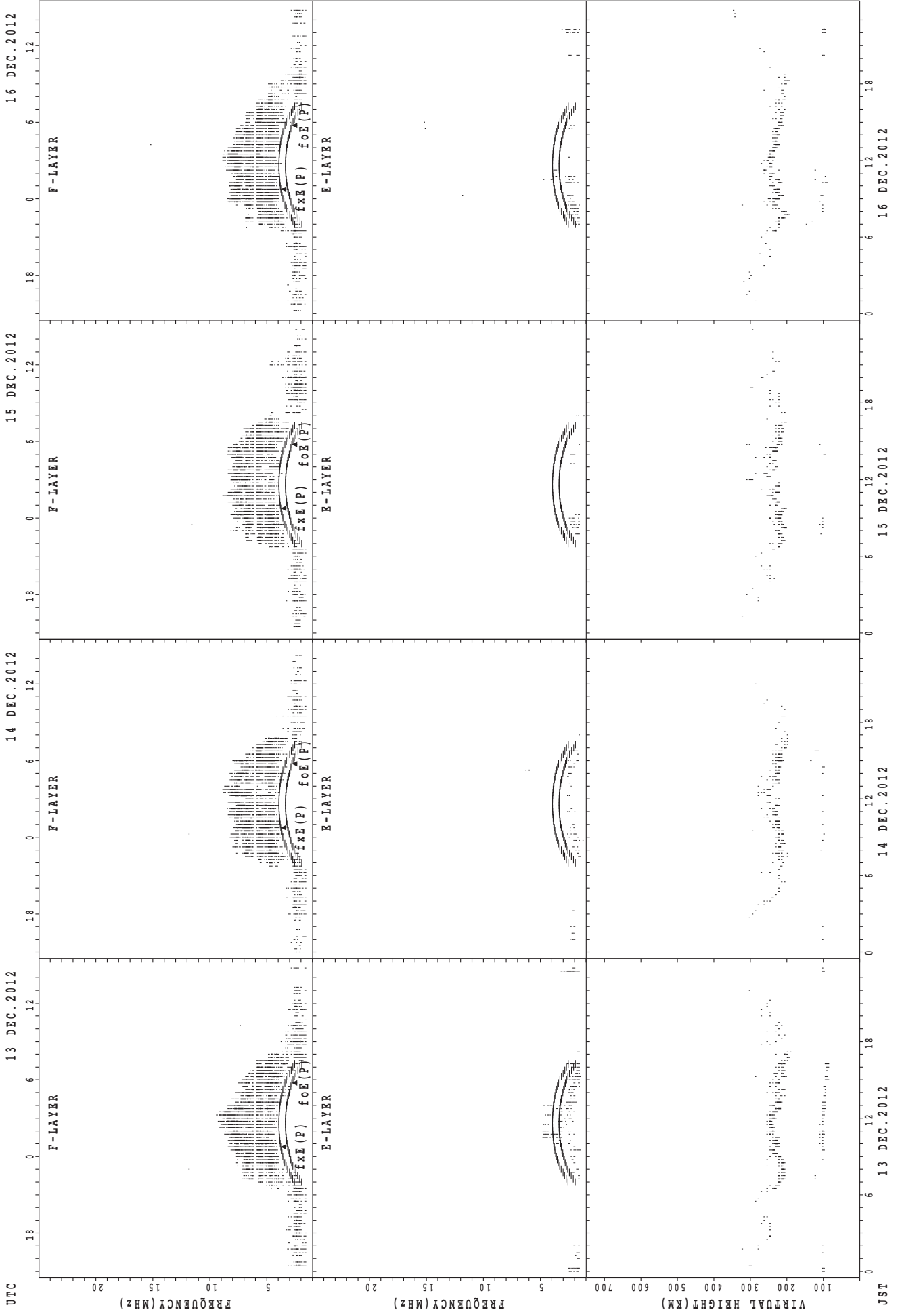
$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $f_oE(P)$ ; PREDICTED VALUE FOR  $f_oE$

SUMMARY PLOTS AT Kokubunji



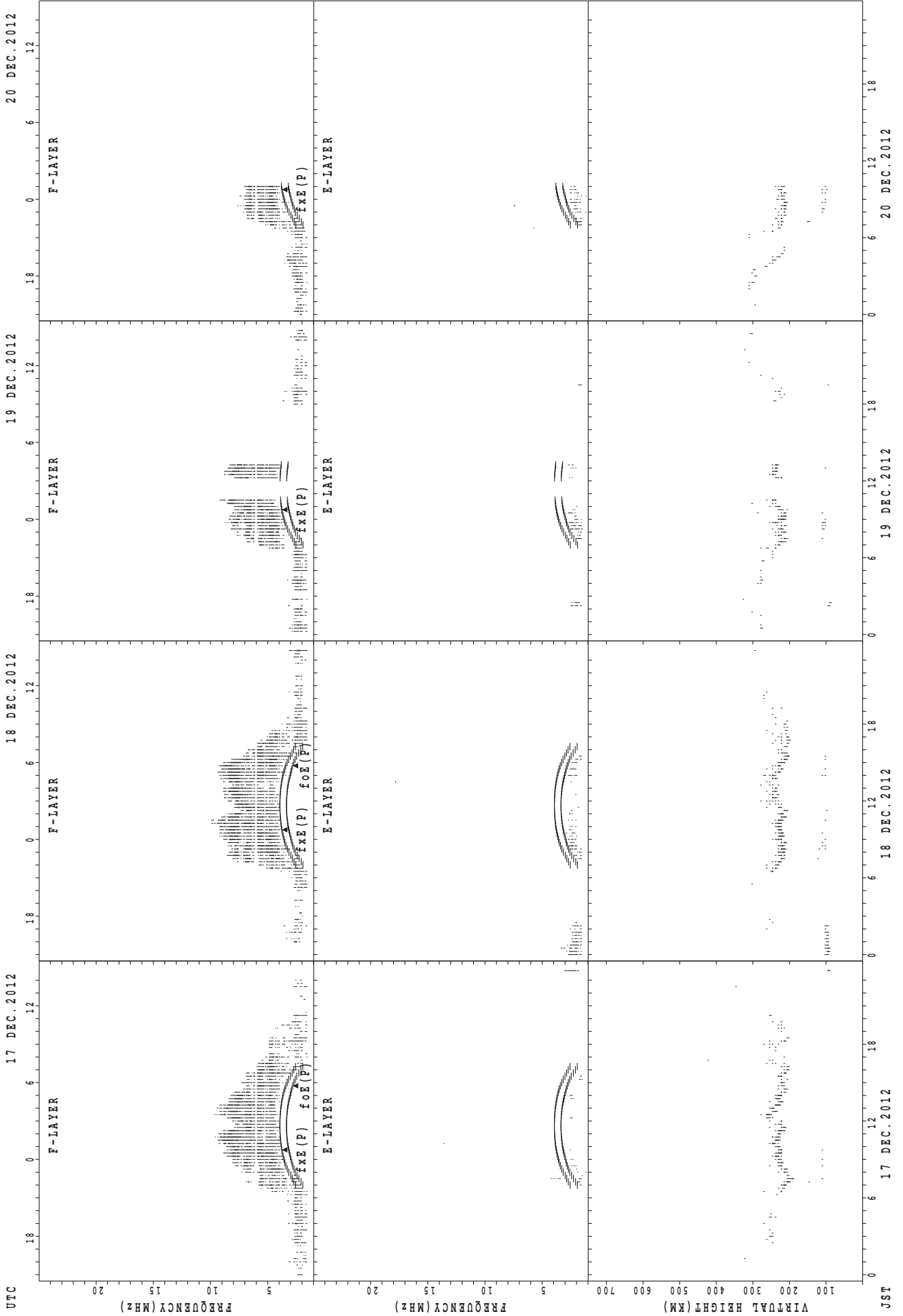
UTC  
 9 DEC.2012  
 10 DEC.2012  
 11 DEC.2012  
 12 DEC.2012  
 JST  
 fxe(P); PREDICTED VALUE FOR fxe  
 foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Kokubunji



foF2(P); PREDICTED VALUE FOR foF2  
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Kokubunji



UTC

17 DEC.2012

18 DEC.2012

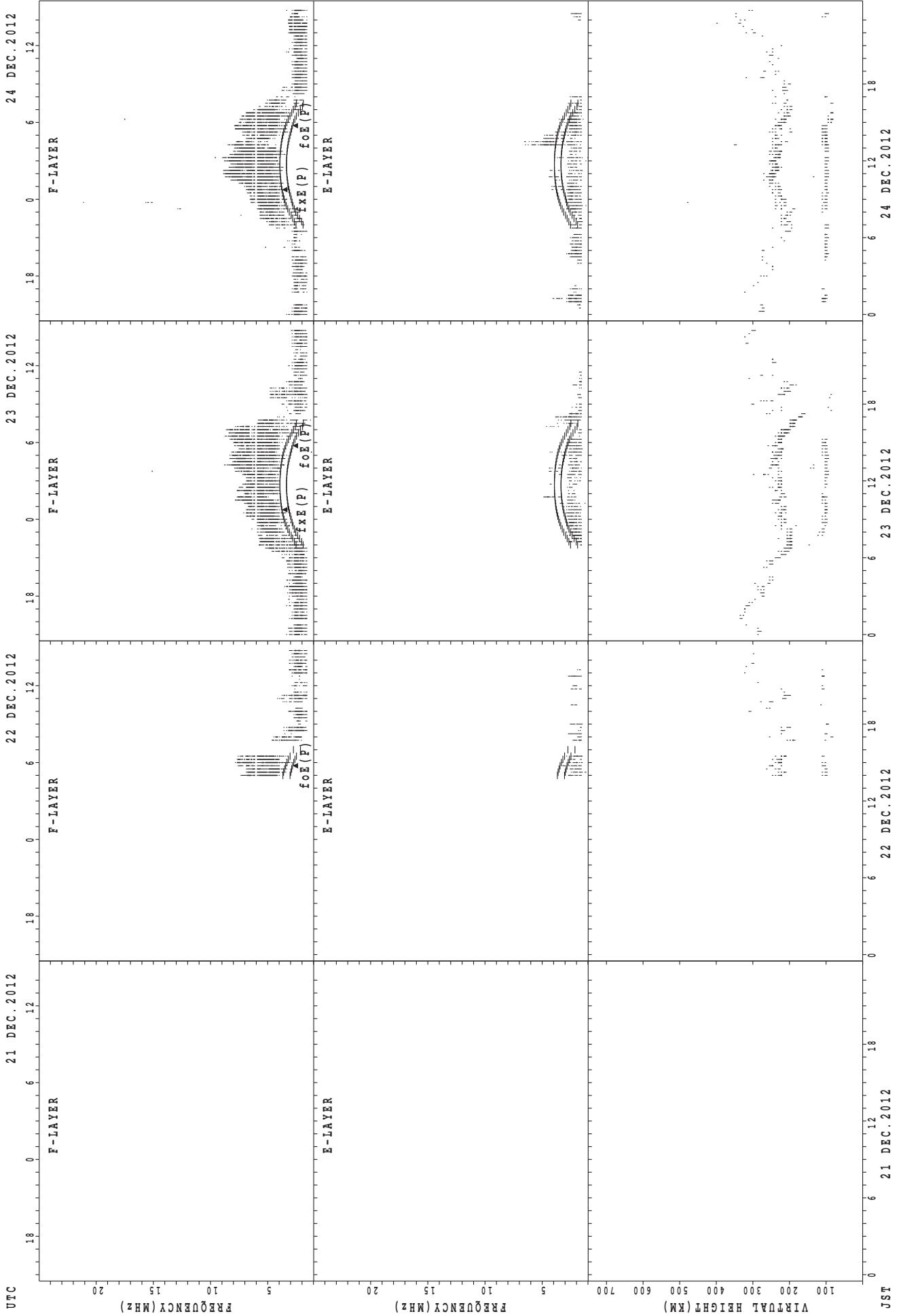
19 DEC.2012

20 DEC.2012

JST

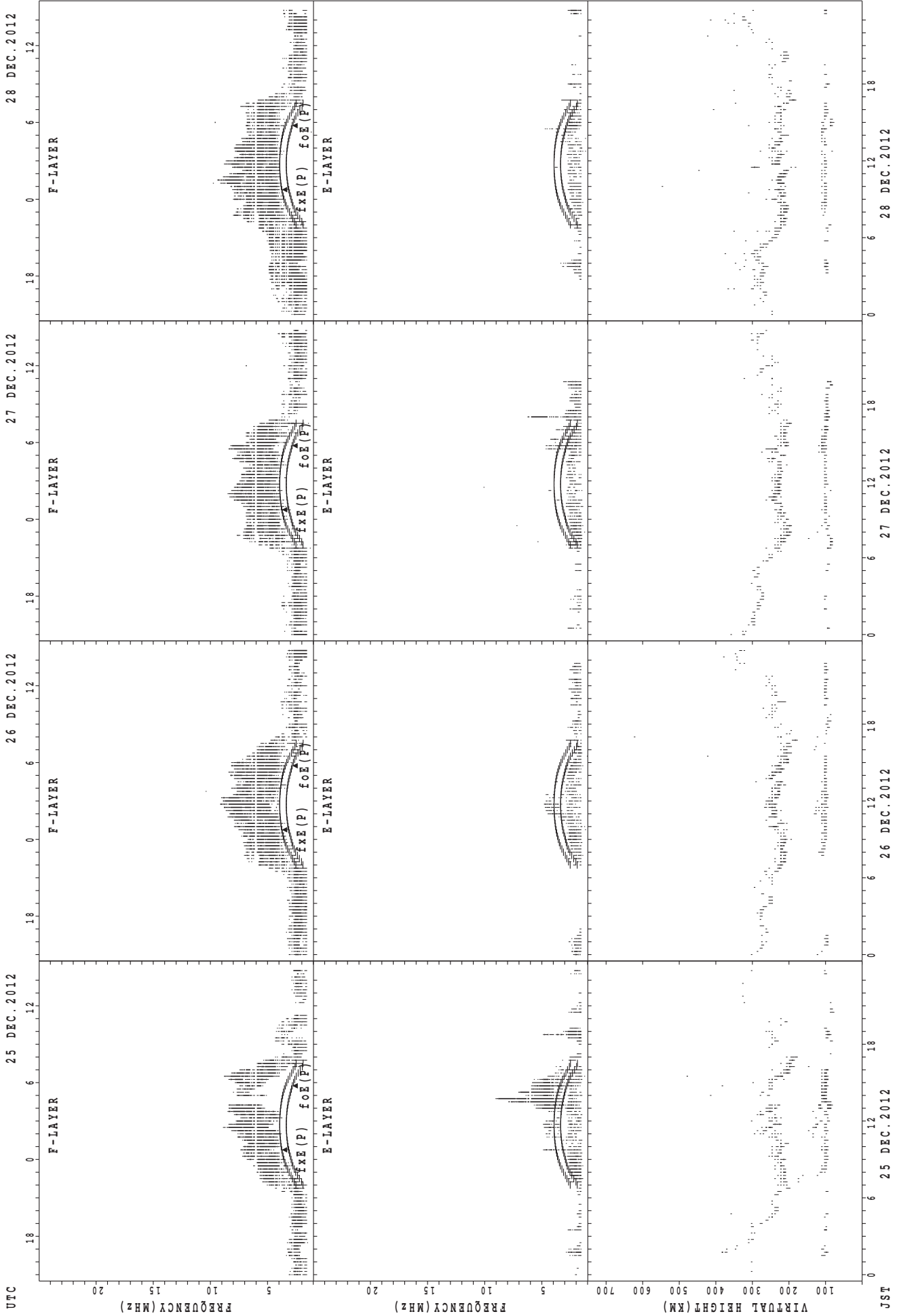
fxe(P); PREDICTED VALUE FOR fxe  
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Kokubunji



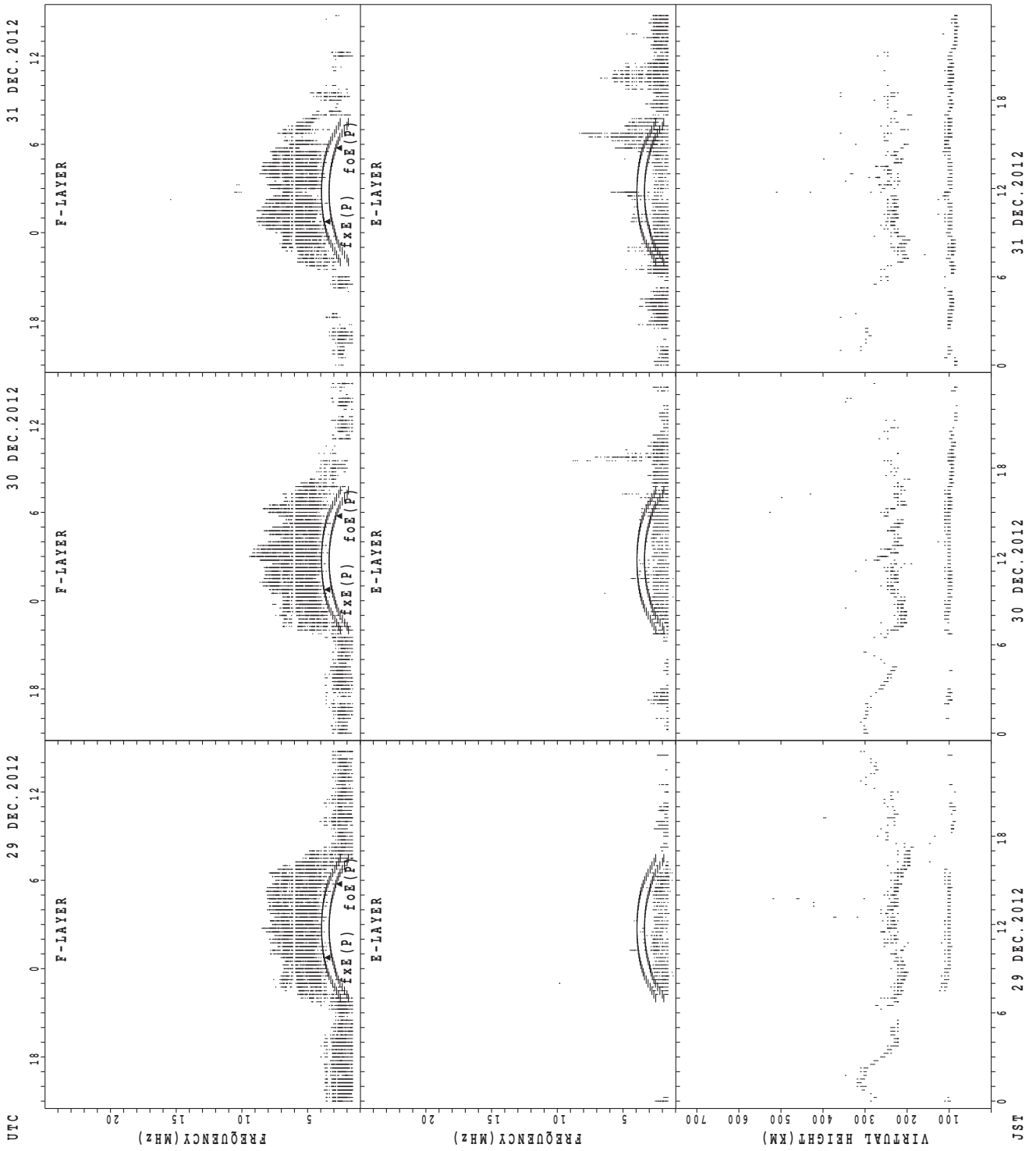
UTC 21 DEC.2012 22 DEC.2012 23 DEC.2012 24 DEC.2012  
JST 21 DEC.2012 22 DEC.2012 23 DEC.2012 24 DEC.2012  
fxe(P); PREDICTED VALUE FOR fxe  
foe(P); PREDICTED VALUE FOR foe

SUMMARY PLOTS AT Kokubunji



fxe(P); PREDICTED VALUE FOR fxe  
foE(P); PREDICTED VALUE FOR foE

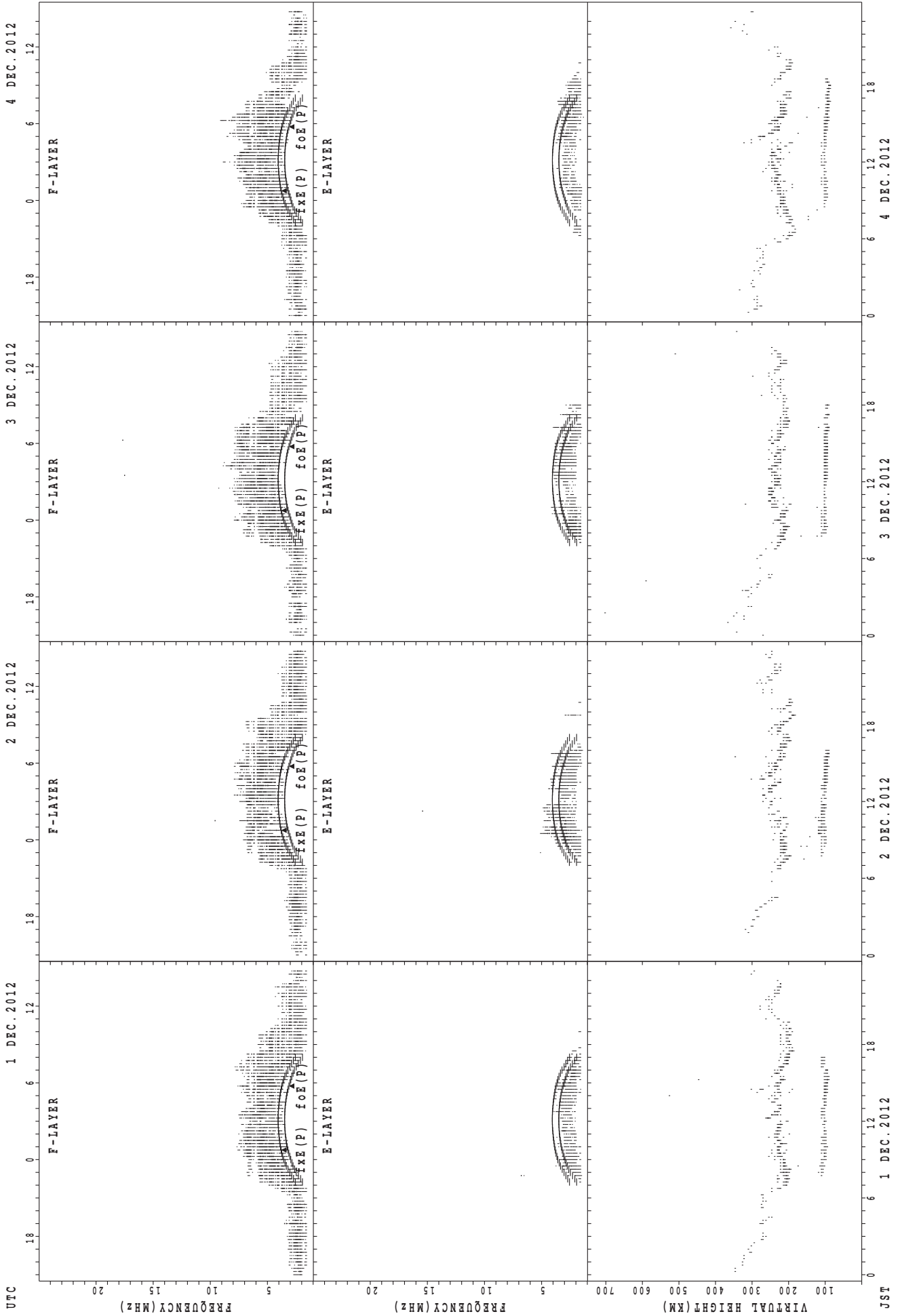
SUMMARY PLOTS AT Kokubunji



f<sub>x</sub>E(P); PREDICTED VALUE FOR f<sub>x</sub>E  
foE(P); PREDICTED VALUE FOR foE

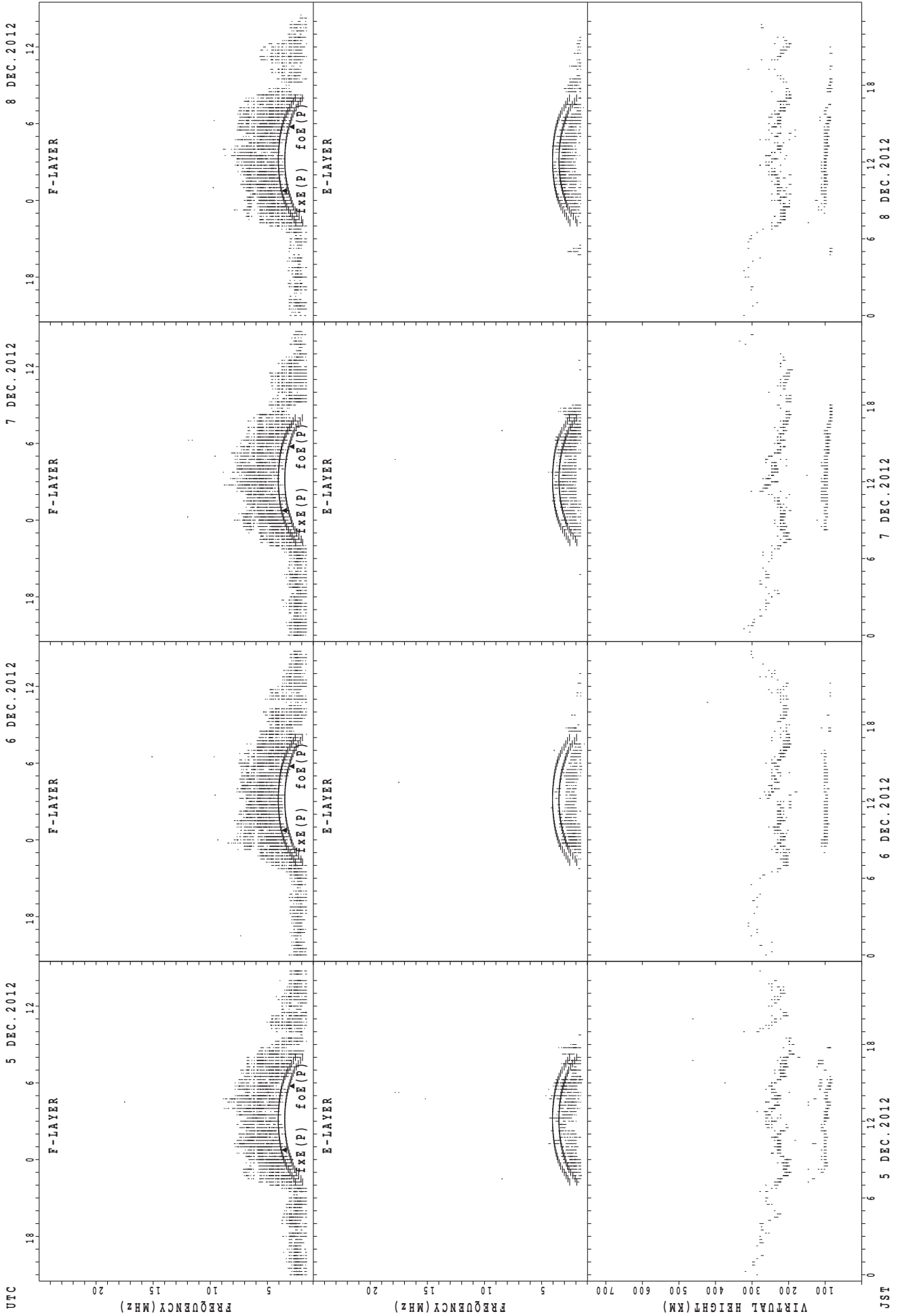


SUMMARY PLOTS AT Yamagawa



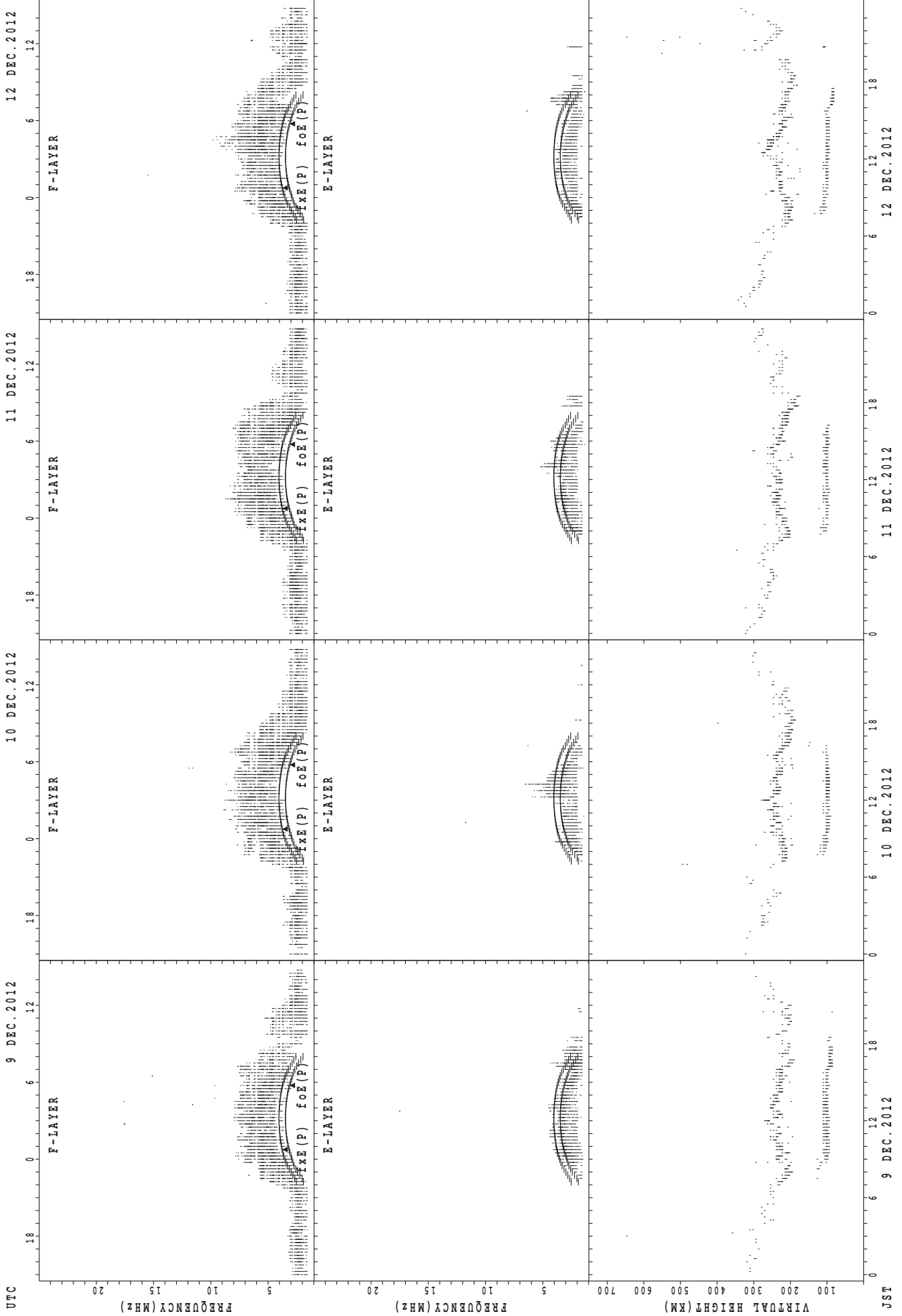
foF2(P); PREDICTED VALUE FOR foF2  
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa



foF(P); PREDICTED VALUE FOR foF  
foE(P); PREDICTED VALUE FOR foE

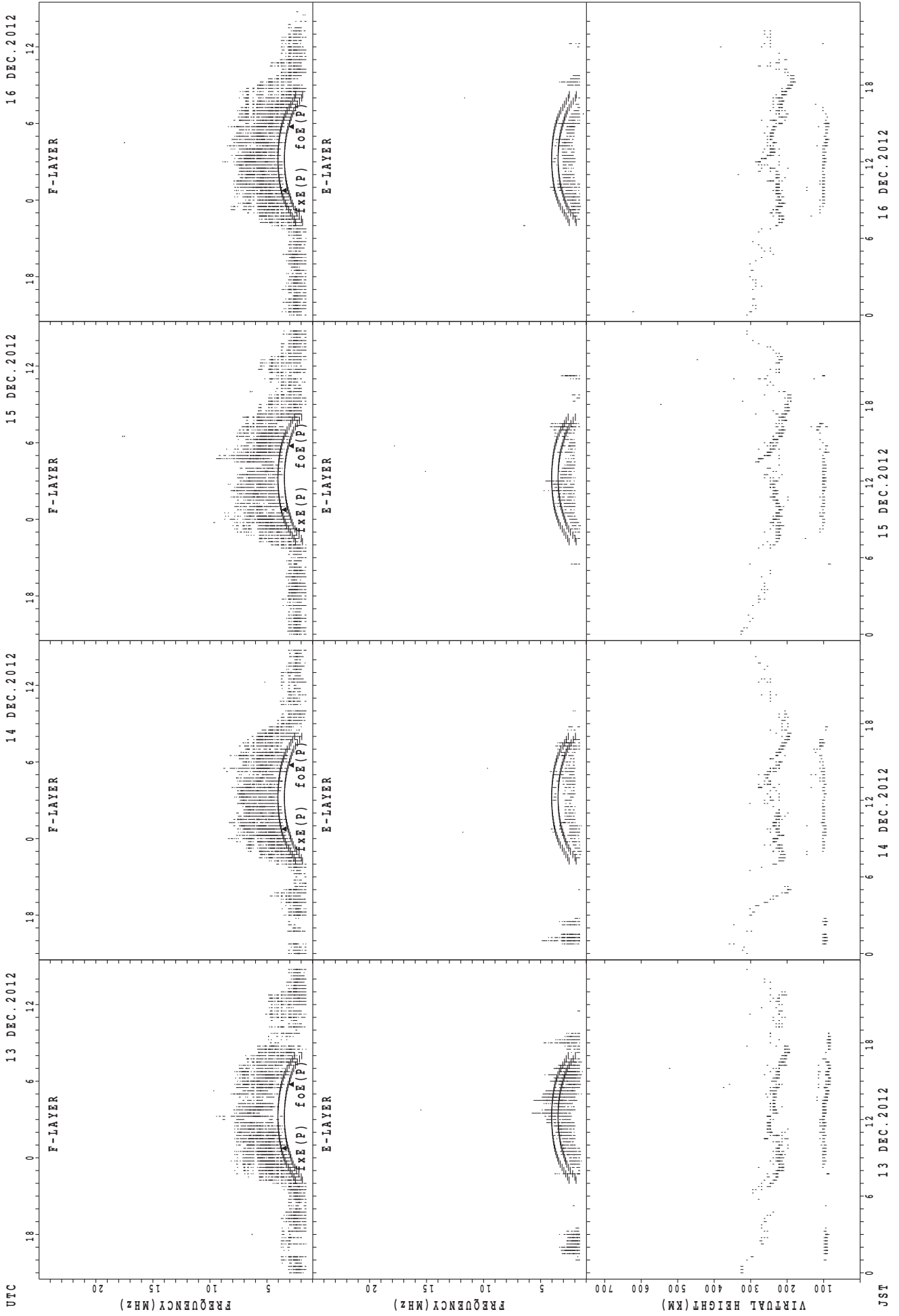
SUMMARY PLOTS AT Yamagawa



f<sub>o</sub>F<sub>2</sub>(P); PREDICTED VALUE FOR f<sub>o</sub>F<sub>2</sub>  
foE(P); PREDICTED VALUE FOR foE

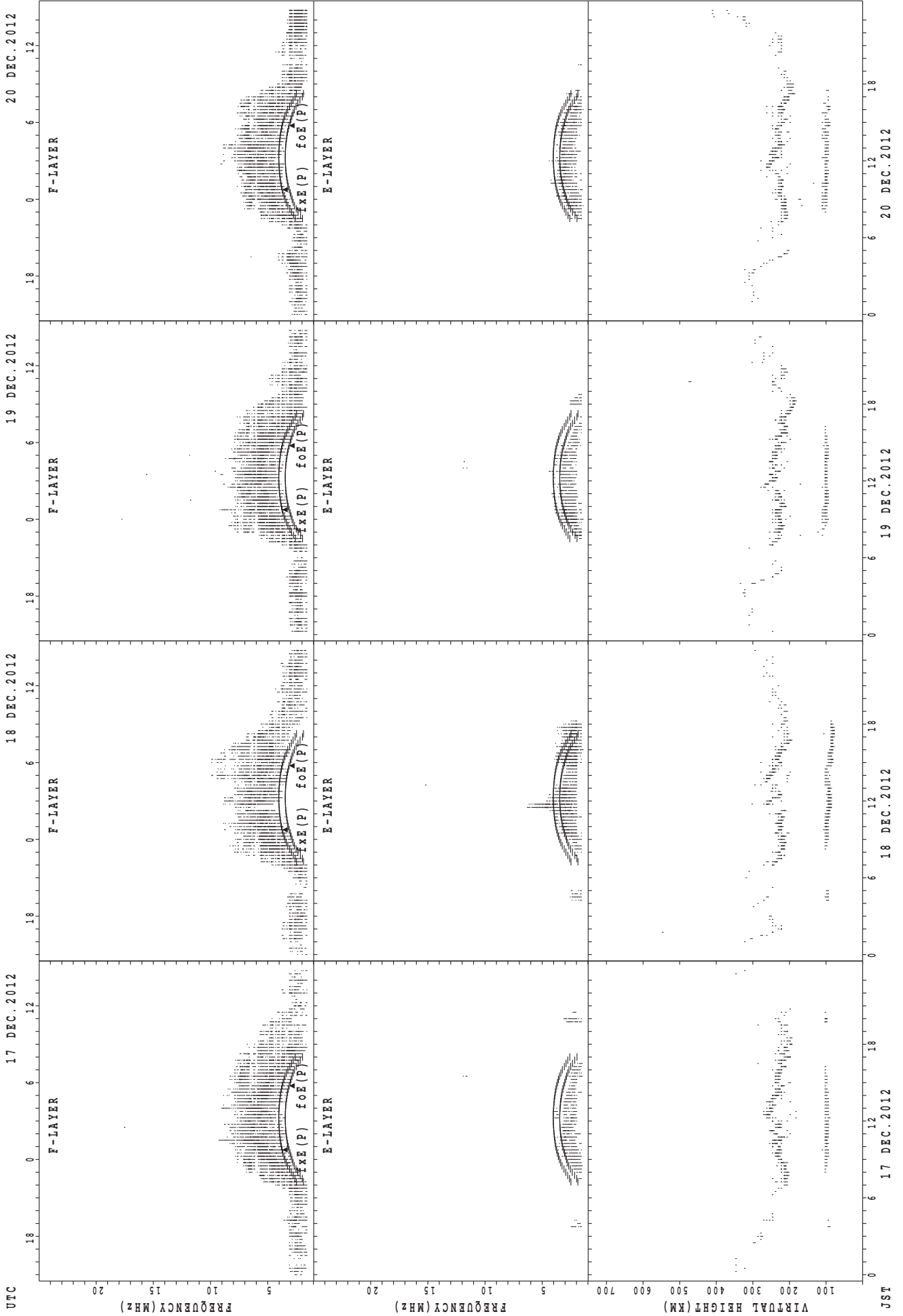
JST

SUMMARY PLOTS AT Yamagawa



fxe(P); PREDICTED VALUE FOR fxe  
foe(P); PREDICTED VALUE FOR foe

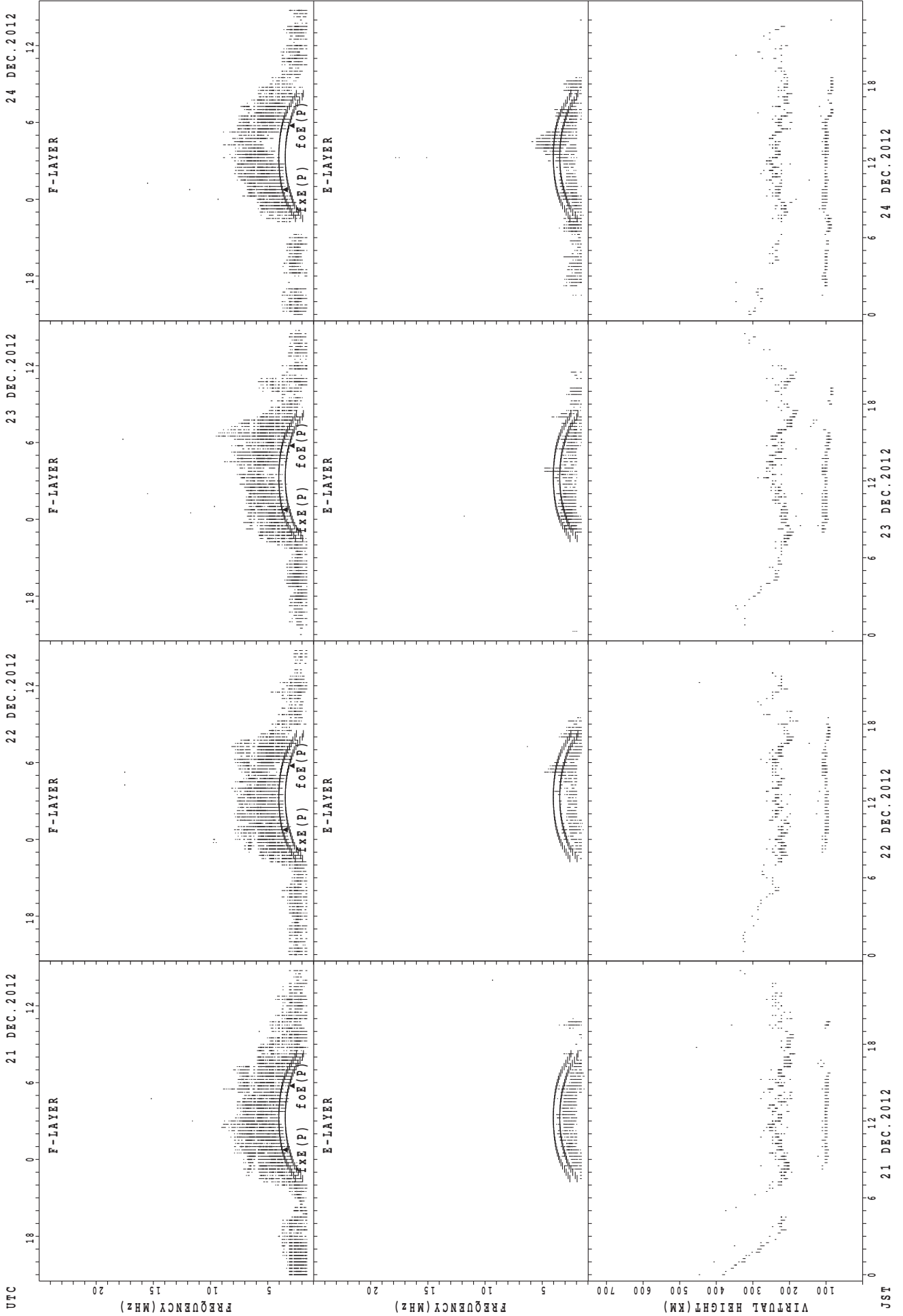
SUMMARY PLOTS AT Yamagawa



f<sub>xe</sub>(P); PREDICTED VALUE FOR f<sub>xe</sub>  
foE(P); PREDICTED VALUE FOR foE

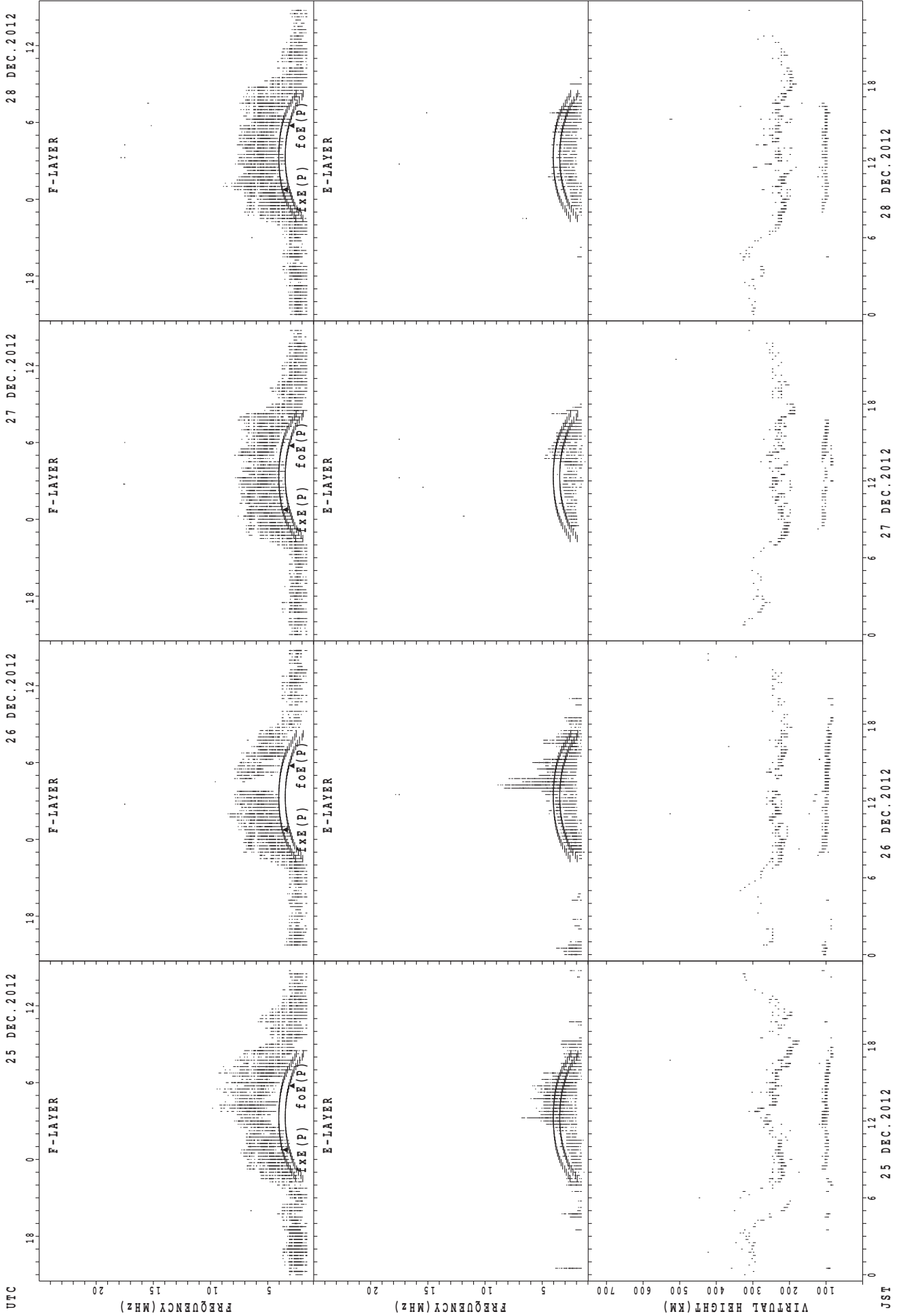
UTC 17 DEC. 2012 18 DEC. 2012 19 DEC. 2012 20 DEC. 2012 JST

SUMMARY PLOTS AT Yamagawa



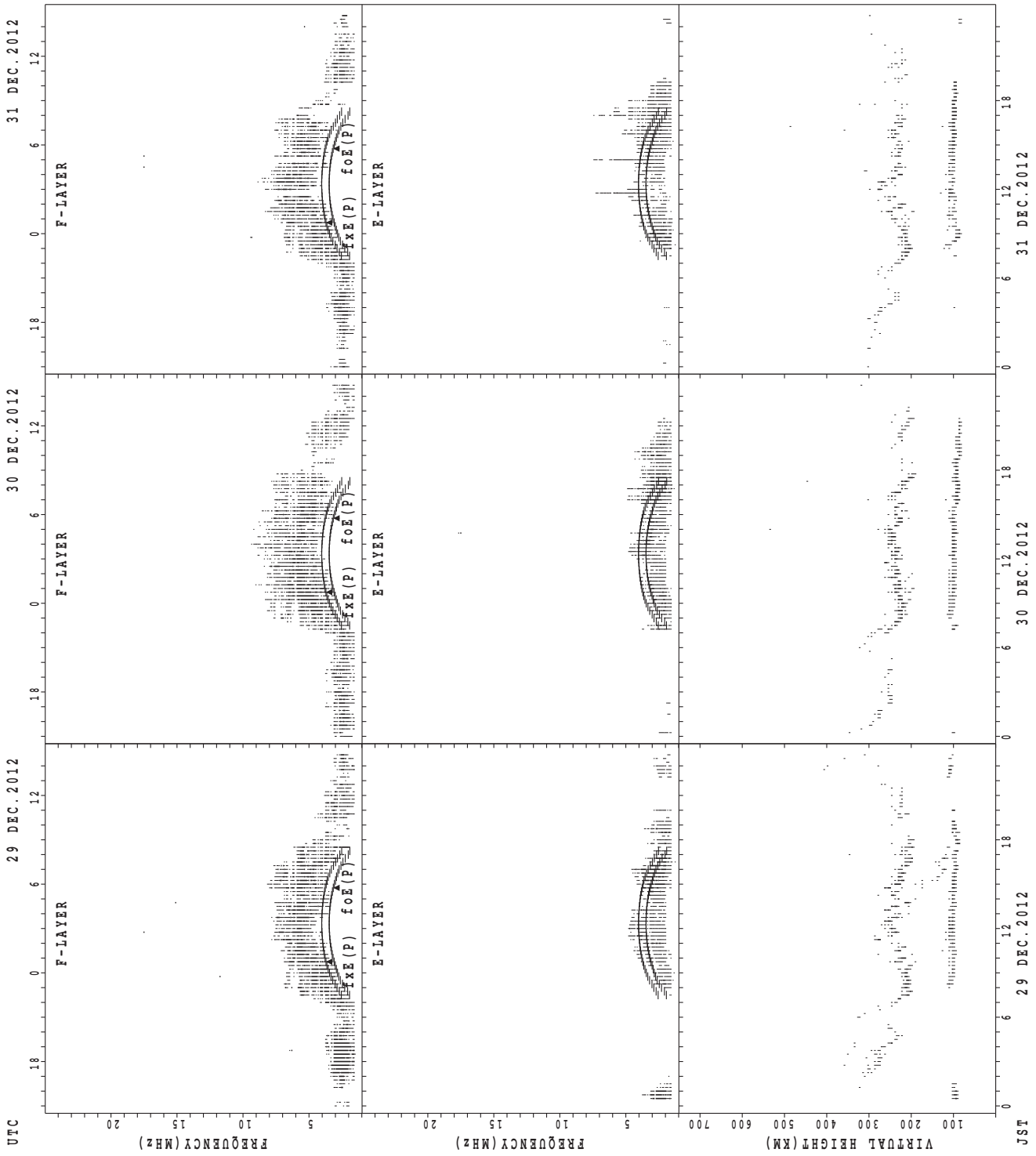
fxE(P); PREDICTED VALUE FOR fxE  
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa



UTC  
JST  
fXE(P); PREDICTED VALUE FOR fXE  
foE(P); PREDICTED VALUE FOR foE

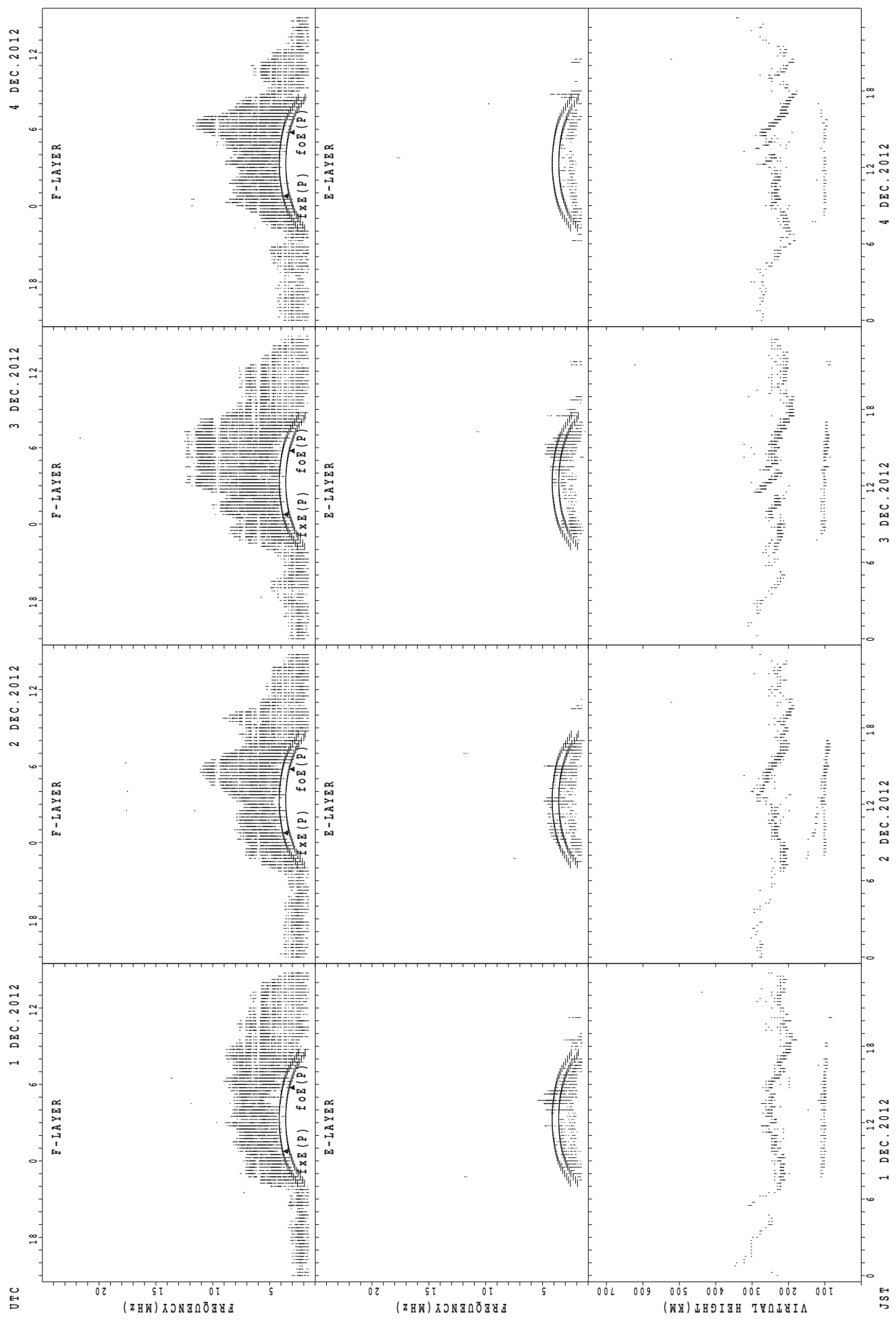
SUMMARY PLOTS AT Yamagawa



$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $foE(P)$ ; PREDICTED VALUE FOR  $foE$

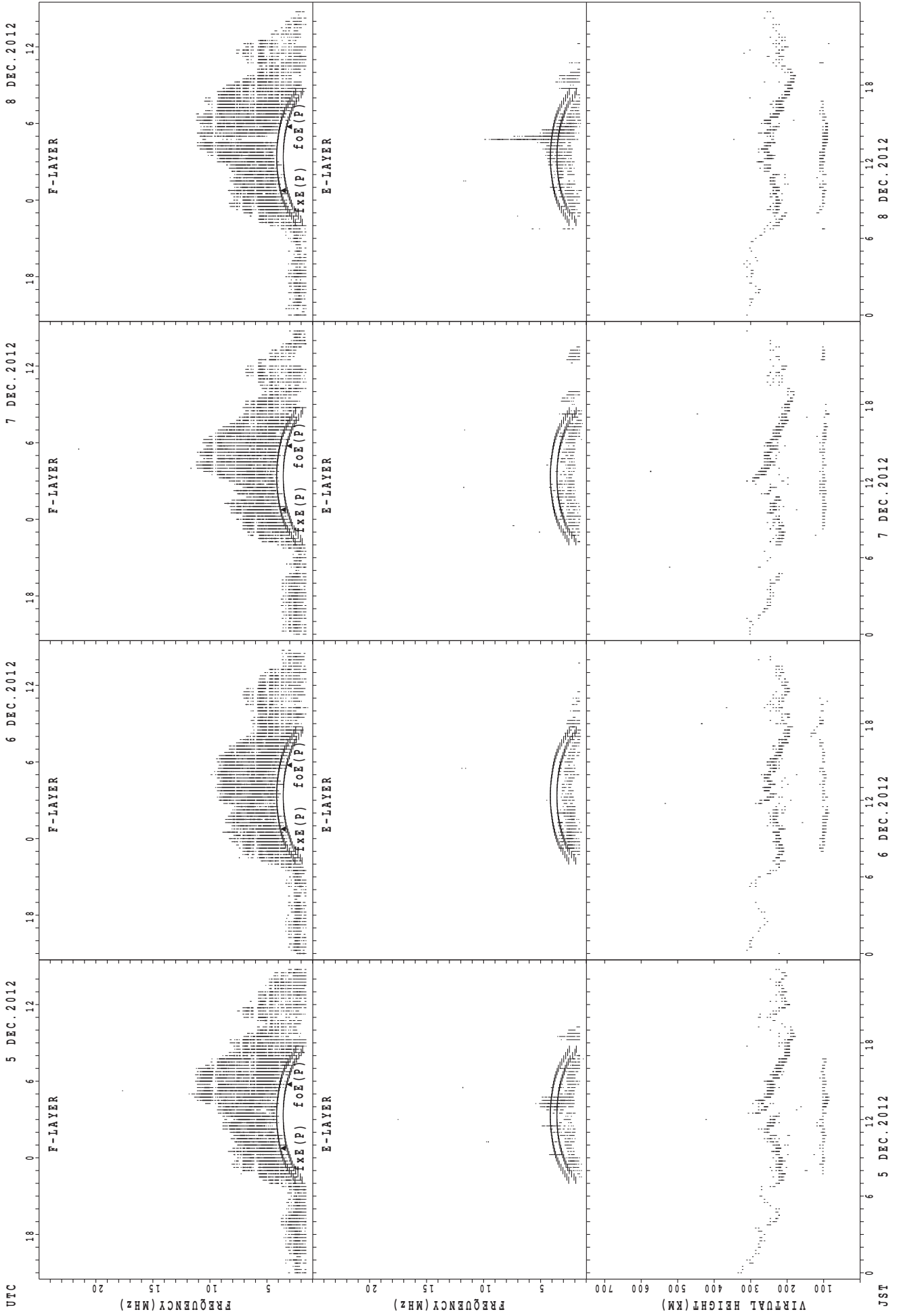


SUMMARY PLOTS AT Okinawa



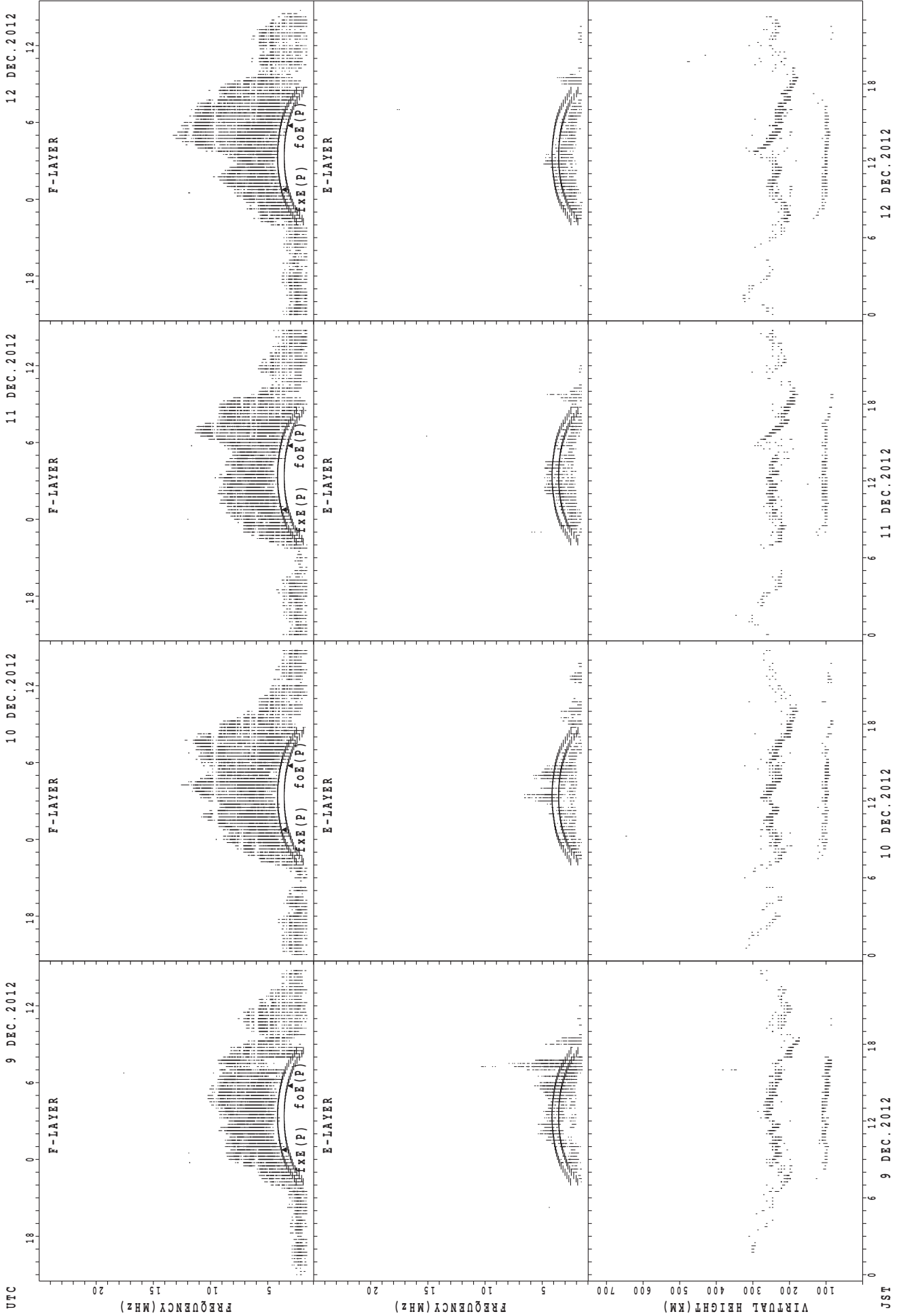
$f_xE(P)$  ; PREDICTED VALUE FOR  $f_xE$   
 $f_oE(P)$  ; PREDICTED VALUE FOR  $f_oE$

SUMMARY PLOTS AT Okinawa



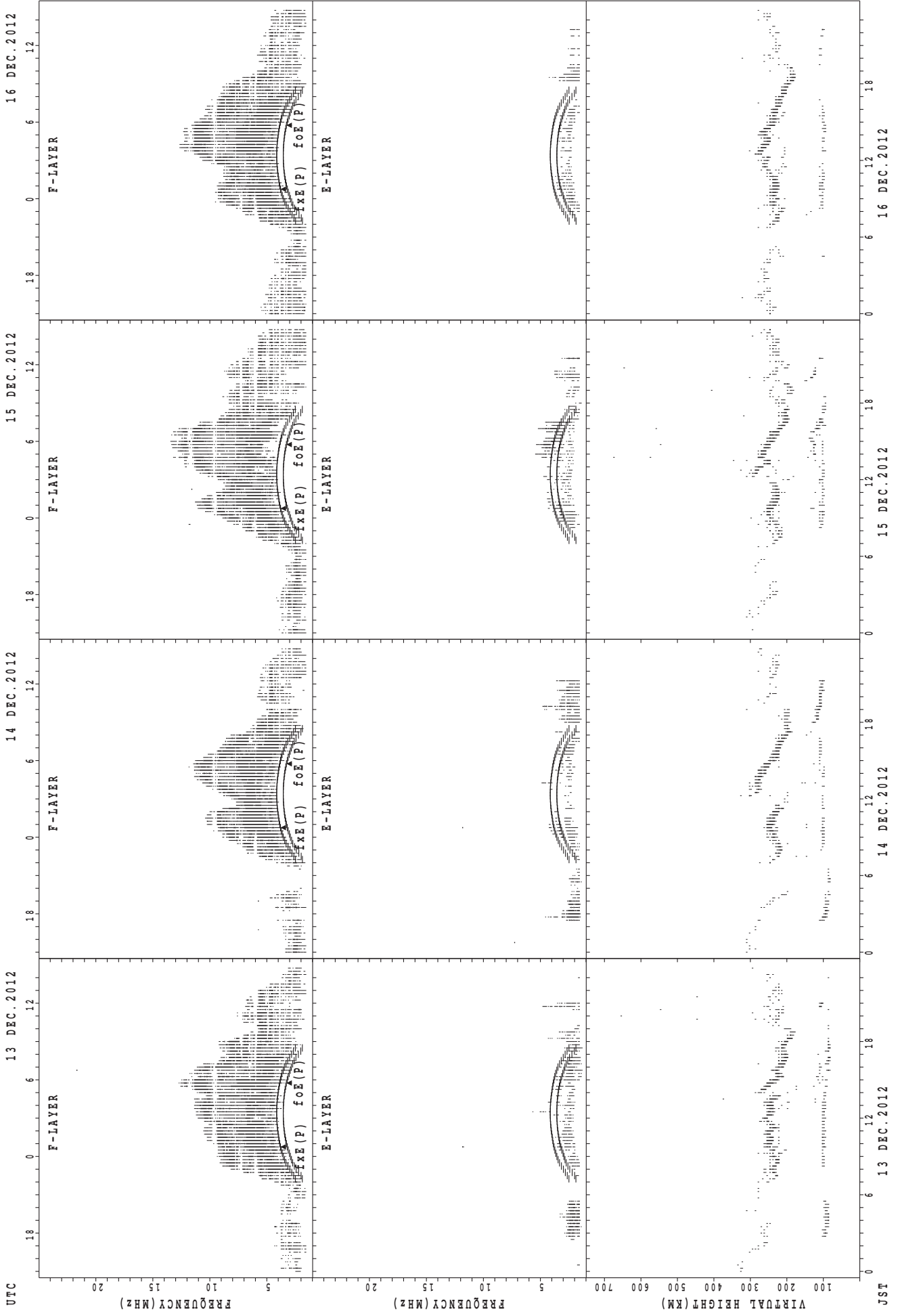
fxe(P); PREDICTED VALUE FOR fxe  
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Okinawa



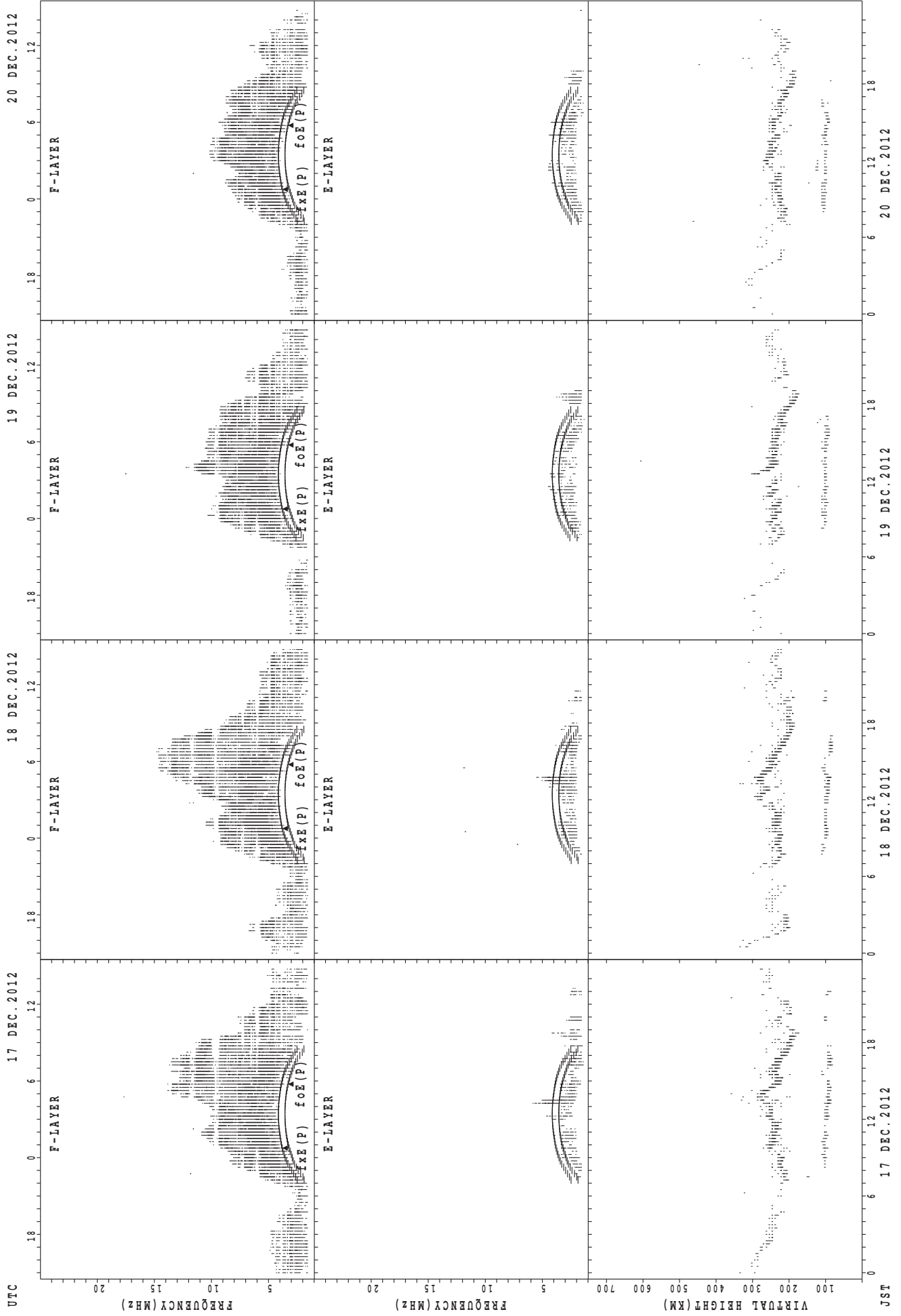
$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $foE(P)$ ; PREDICTED VALUE FOR  $foE$

SUMMARY PLOTS AT Okinawa



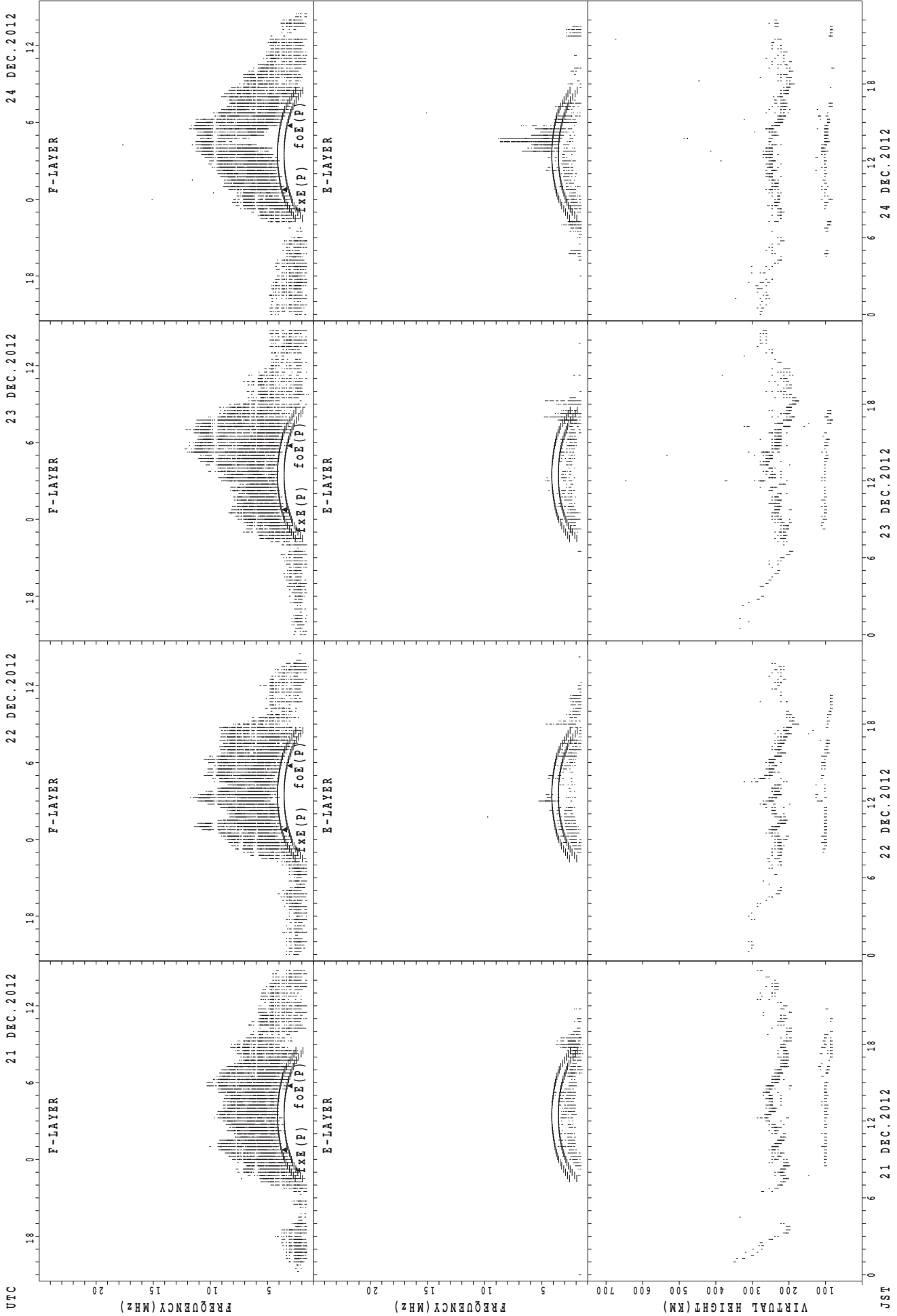
f<sub>x</sub>E(P); PREDICTED VALUE FOR f<sub>x</sub>E  
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Okinawa



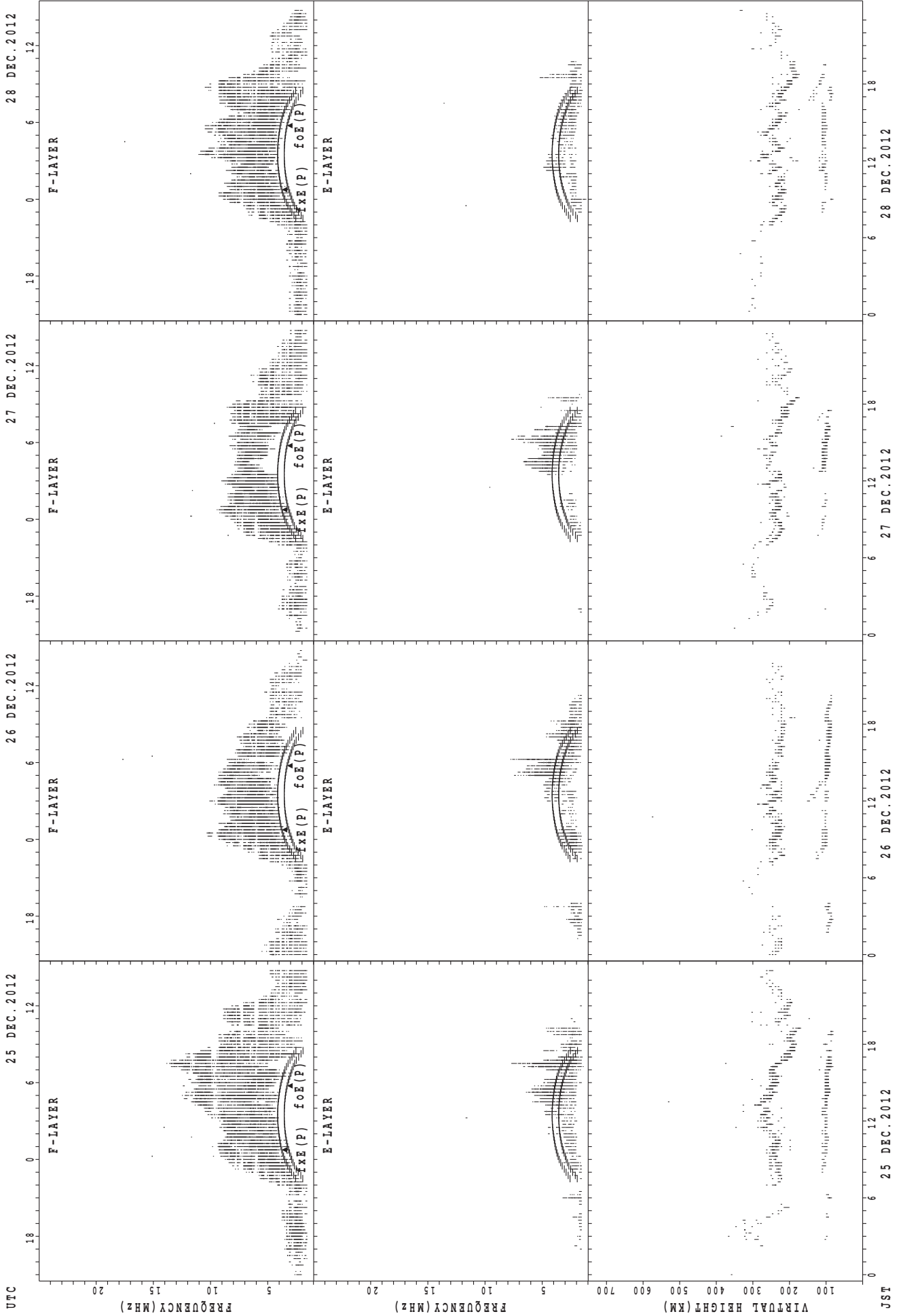
foF2(P); PREDICTED VALUE FOR foF2  
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Okinawa



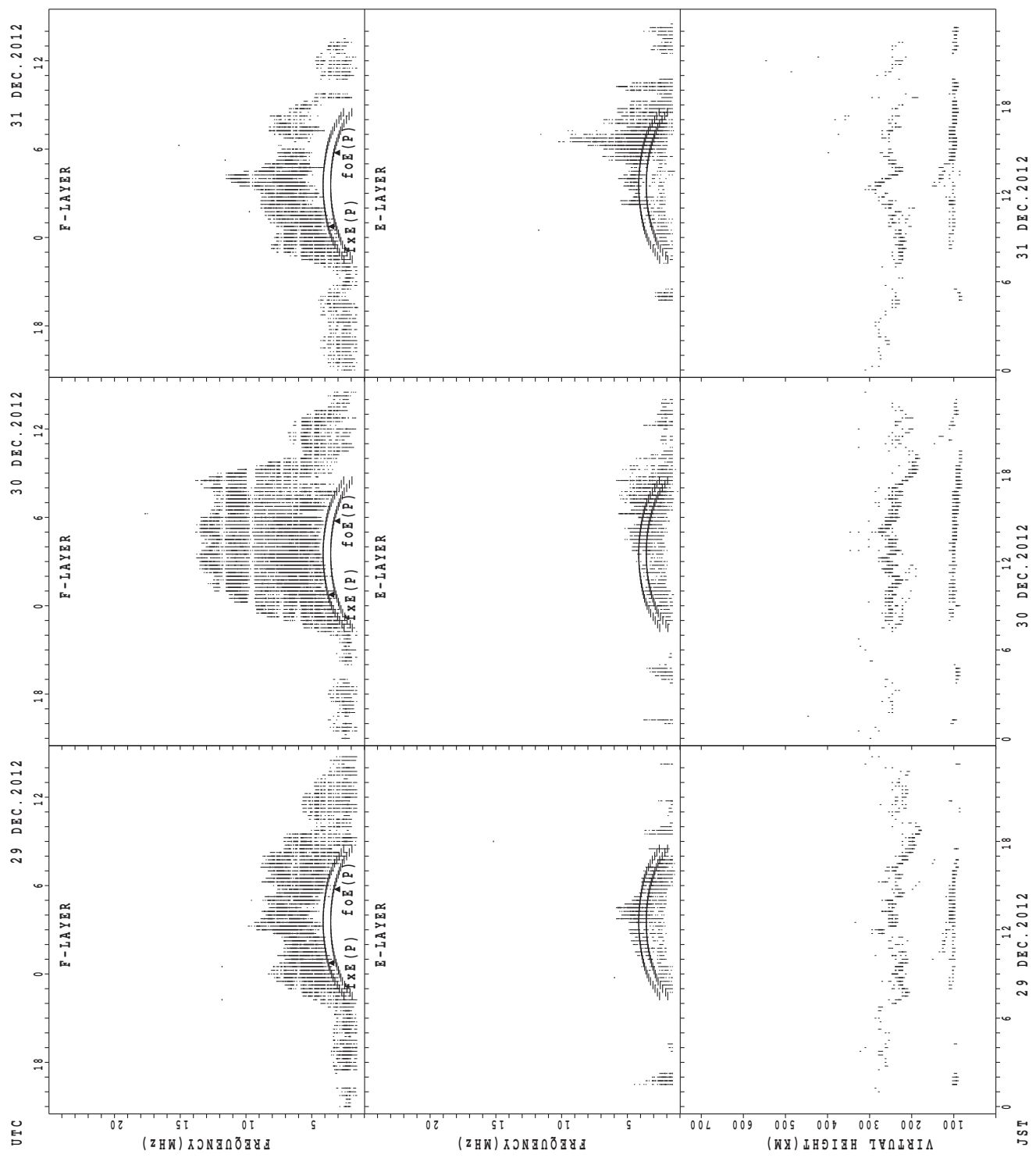
f\_xE(P); PREDICTED VALUE FOR f\_xE  
f\_oE(P); PREDICTED VALUE FOR f\_oE

SUMMARY PLOTS AT Okinawa



fxe(P) ; PREDICTED VALUE FOR fxe  
foe(P) ; PREDICTED VALUE FOR foe

SUMMARY PLOTS AT Okinawa





MONTHLY MEDIANS OF h'F AND h'Es  
 DEC. 2012 135E MEAN TIME (UTC+9H) AUTOMATIC SCALING

h'F STATION Wakkanai LAT. 45°10.0'N LON. 141°45.0'E

	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	19	29	29	30	29	27	16	1							
MED									230	228	230	228	232	234	230	235	210							
U Q									238	238	234	235	240	241	240	240	105							
L Q									224	216	222	223	224	227	222	229	105							

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	5	2	5	7	3	3	7	8	20	17	8	11	8	6	11	15	11	13	14	14	10	13	12	5
MED	99	100	101	103	99	101	101	104	131	113	106	103	104	105	111	107	103	103	102	99	97	97	97	99
U Q	101	105	106	105	103	103	103	163	155	158	122	107	108	107	119	143	111	105	105	105	99	106	101	108
L Q	93	95	95	103	95	97	97	99	109	105	97	93	94	99	103	101	99	102	95	95	93	94	96	94

h'F STATION Kokubunji LAT. 35°43.0'N LON. 139°29.0'E

	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	21	24	26	25	25	26	25	22	9						
MED									248	224	234	236	238	248	239	236	237	232						
U Q									258	229	243	240	247	257	246	247	246	234						
L Q									238	221	225	228	224	239	236	228	230	215						

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	5	6	5	3	2	2	2	6	1		1	6	6	3	4	3	7	9	8	5	5	3	3	1
MED	105	103	107	103	95	101	98	93	99		115	105	114	111	108	101	99	99	97	97	99	103	101	85
U Q	109	109	109	105	95	105	99	101	49		57	119	121	139	115	113	99	106	97	104	109	115	105	42
L Q	94	99	104	99	95	97	97	91	49		57	101	105	99	105	89	97	95	96	93	94	99	89	42

h'F STATION Yamagawa LAT. 31°12.0'N LON. 130°37.0'E

	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	25	30	29	30	29	28	26	25	12	3					
MED									232	230	232	238	245	240	244	238	232	230	234					
U Q									244	237	242	247	254	254	251	244	246	236	248					
L Q									224	224	228	230	236	231	237	232	225	224	222					

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	1	2	1	2	1	2		2	7	3	5	7	12	13	13	14	15	13	14	4	4	1		1
MED	107	99	95	99	101	144		90	157	113	115	103	107	105	103	100	101	95	92	93	97	89		109
U Q	53	101	47	105	50	187		91	179	137	127	109	111	105	107	105	113	100	97	99	103	44		54
L Q	53	97	47	93	50	101		89	113	103	104	101	103	101	99	97	93	88	89	88	89	44		54

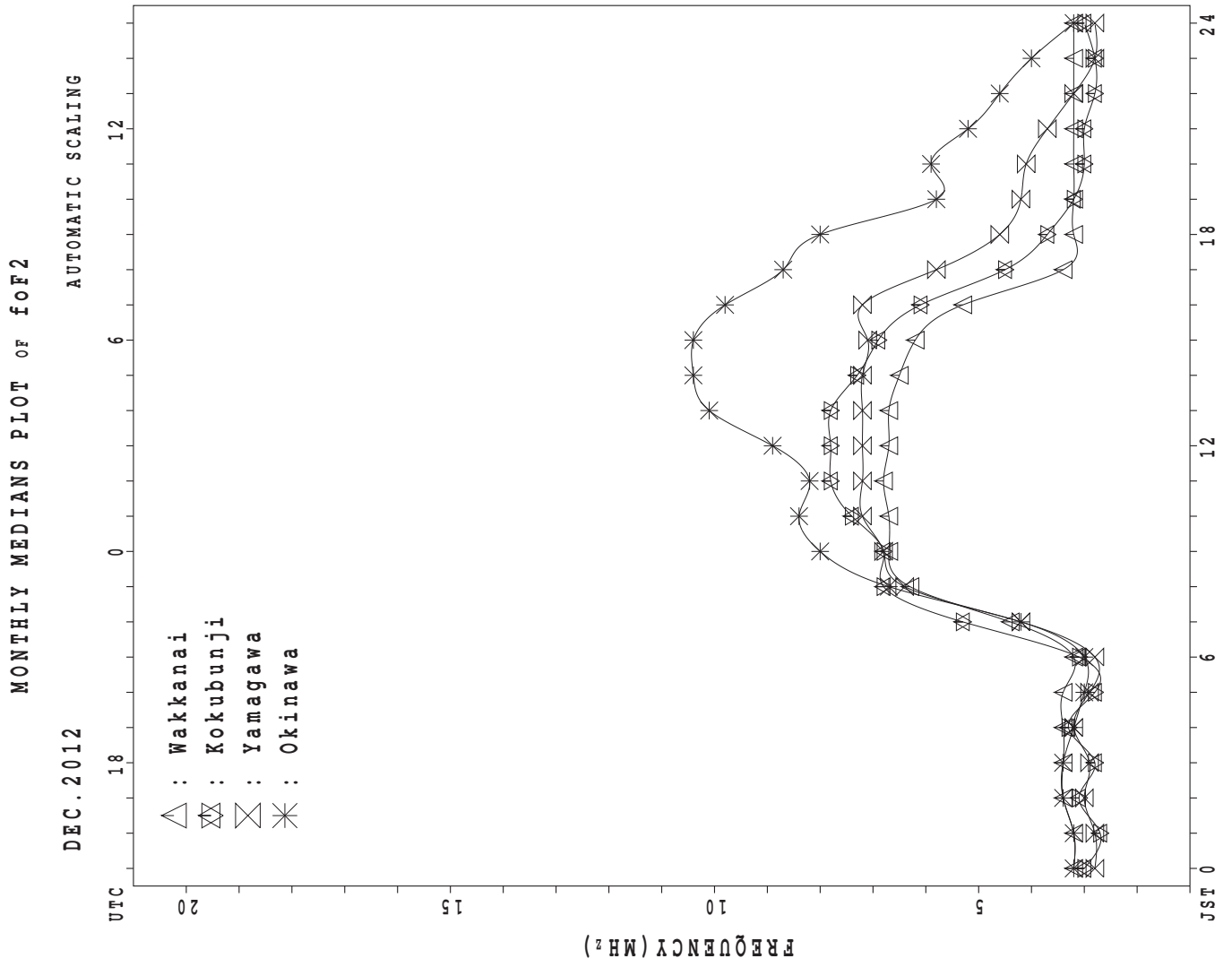
MONTHLY MEDIANS OF h'F AND h'Es  
 DEC. 2012 135E MEAN TIME (UTC+9H) AUTOMATIC SCALING

h'F STATION Okinawa LAT. 26°41.0'N LON. 128°09.0'E

	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	30	31	31	30	31	31	29	31	28	20	5	5	2		
MED									239	238	236	238	259	246	248	238	230	220	214	216	262	248		
U Q									252	242	246	250	270	262	258	245	238	229	226	227	280	266		
L Q									232	228	230	230	246	242	240	231	222	211	207	203	242	230		

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		1	1	2	4	3	1	1	3	3	4	6	13	16	16	13	7	7	15	16	6	3	5	1
MED		107	97	96	93	93	91	93	175	113	129	109	111	105	103	97	95	97	99	101	106	107	95	97
U Q		53	48	97	95	99	45	46	183	155	143	119	114	113	112	103	105	135	127	185	111	113	100	48
L Q		53	48	95	91	87	45	46	139	93	113	107	105	105	99	95	95	91	89	89	103	107	90	48



## IONOSPHERIC DATA STATION Wakkanai

DEC.2012 f<sub>XI</sub> (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	X	X	X	X	X	X	X										X	X	X	X	X	X	X	X	
2	X	X	X	X	X	X	X											X	X	X	X	X	X	X	
3	X	X	X	X	X	X	X										X	X	X	X	X	X	X	X	
4	X	X	X	X	X	X	X											X	X	X	X	X	X	X	
5	X	X	X	X	X	X	X											X	X	X	X	X	X	X	
6	X	X	X	X	X	X	X											X	X	X	X	X	X	X	
7	X	X	X	X	X	X	X										X	X	X	X	X	X	X	X	
8	X	X	X	X	X	X	X											X	X	X	X	X	X	X	
9	X	X	X	X	X	X	X											X	X	X	X	X	X	X	
10	X	X	X	X	X	X	X											X	X	X	X	X	X	X	
11	X	X	X	X	X	X	X											X	X	X	X	X	X	X	
12	X	X	X	X	X	X	X											X	X	X	X	X	X	X	
13	X	X	X	X	X	X	X											X	X	X	X	X	X	X	
14	X	X	X	X	X	X	X											X	X	X	X	X	X	X	
15	X	X	X	X	X	X	X											X	X	X	X	X	X	X	
16	X	X	X	X	X	X	X											X	X	X	X	X	X	X	
17	X	X	X	X	X	X	X											X	X	X	X	X	X	X	
18	X	X	X	X	X	X	X											X	X	X	X	X	X	X	
19	X	X	X	X	X	X	X											X	X	X	X	X	X	X	
20	X	X	X	X	X	X	X											X	X	X	X	X	X	X	
21	X	X	X	X	X	X	X											X	X	X	X	X	X	X	
22	X	X	X	X	X	X	X											X	X	X	X	X	X	X	
23	X	X	X	X	X	X	X											X	X	X	X	X	X	X	
24	X	X	X	X	X	X	X											X	X	X	X	X	X	X	
25	X	X	X	X	X	X	X											X	X	X	X	X	X	X	
26	X	X	X	X	X	X	X											X	X	X	X	X	X	X	
27	X	X	X	X	X	X	X											X	X	X	X	X	X	X	
28	X	X	X	X	X	X	X											X	X	X	X	X	X	X	
29	X	X	X	X	X	X	X											X	X	X	X	X	X	X	
30	X	X	X	X	X	X	X											X	X	X	X	X	X	X	
31	X	X	X	X	X	X	X											X	X	X	X	X	X	X	
	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	1		1						2	4	30	31	31	31	31	30	31	
MED	X	X	X	X	X	X	X	X								68	X	X	X	X	X	X	X	X	X
U Q	X	X	X	X	X	X	X										X	X	X	X	X	X	X	X	X
L Q	X	X	X	X	X	X	X										X	X	X	X	X	X	X	X	X

DEC.2012 f<sub>XI</sub> (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Wakkanai

DEC. 2012 foF2 (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT. 45°10.0'N LON. 141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	33	33	34	33	32	32	32	52	62	72	72	70	66	65	69	67	52	38	29	28	28	30	31	31
2	32	34	34	34	33	32	32	44	57	65	J R 83	J R 76	71	68	66	61	58	55	35	36	36	35	34	34
3	37	36	35	35	35	37	32	49	64	72	72	71	72	71	71	55	49	46	34	27	29	28	29	31
4	32	32	32	R 30	33	35	28	48	65	69	72	76	J R 81	U R 78	72	56	H 55	49	44	37	34	31	32	32
5	34	36	36	37	34	V 35	32	49	63	60	68	77	77	75	65	58	47	36	24	33	32	29	36	36
6	36	36	36	35	34	32	29	45	59	67	68	70	69	65	63	54	54	34	25	26	30	28	V 28	32
7	30	33	32	31	31	28	29	45	60	62	76	76	72	64	61	57	48	35	29	32	28	24	26	31
8	30	31	32	32	29	31	28	48	62	U R 66	70	72	72	63	61	52	45	H 36	28	25	30	28	28	30
9	29	29	30	30	31	29	27	44	74	62	J R 72	76	72	71	66	54	60	35	33	35	31	30	28	R 28
10	32	32	34	38	32	31	30	50	64	68	J R 86	80	75	69	62	67	60	34	28	28	31	28	F 31	F 33
11	F 34	36	35	36	34	31	29	52	62	67	72	73	74	H J 71	R 80	65	65	33	34	35	36	30	F 30	F 33
12	34	34	34	F 35	36	34	31	44	65	75	69	R 74	R 88	73	67	62	63	38	30	29	32	29	30	32
13	34	34	36	40	37	34	35	46	66	71	U R 77	J R 78	78	72	74	59	52	42	30	33	33	32	F 34	35
14	39	39	39	40	38	44	30	49	64	71	U R 78	J R 82	U R 79	78	73	62	52	46	34	35	44	42	F 42	38
15	40	42	42	40	38	40	41	49	67	U R 78	J R 81	R 74	76	74	72	61	54	42	33	33	34	32	33	35
16	35	34	34	35	35	35	32	48	71	71	U R 72	J R 85	73	72	66	68	59	48	31	33	36	27	30	30
17	33	33	36	38	35	39	34	42	67	73	U R 84	R 74	89	78	75	H 74	56	50	41	30	29	30	32	34
18	37	37	39	32	30	31	33	50	73	J R 82	U R 78	Y J 85	U R 81	78	78	59	56	40	30	29	29	26	29	31
19	31	32	32	30	30	32	32	51	67	J R 79	J R 85	U R 77	75	74	J R 78	69	56	40	33	25	23	23	26	28
20	F 30	31	32	33	32	32	26	39	58	69	R 82	73	70	66	65	70	47	40	35	35	36	33	29	34
21	37	36	37	37	35	35	26	37	57	75	R 78	70	72	77	66	59	46	52	38	38	41	36	34	F 35
22	36	38	40	40	40	40	37	40	R 53	R 64	70	68	67	65	70	58	54	28	29	28	30	29	32	F 32
23	30	33	33	31	30	29	24	43	60	58	61	H 60	71	73	67	67	52	34	29	25	23	22	26	27
24	27	28	30	30	30	33	27	39	49	58	68	63	67	71	R 69	59	49	27	25	28	32	27	32	34
25	32	32	32	31	30	30	24	35	49	59	70	71	68	60	74	73	R 59	39	33	28	26	28	31	32
26	31	F 35	35	35	F 35	36	F 34	47	58	74	U R 78	73	72	71	68	67	50	R 38	30	36	35	35	32	36
27	38	F 35	37	42	F 42	42	F 42	51	59	70	74	73	67	70	R 76	82	54	35	28	35	38	40	45	48
28	48	48	F 49	F 45	F 40	36	R 33	42	63	75	75	70	69	66	67	67	H 55	30	29	28	28	28	30	32
29	33	33	32	31	31	31	31	39	59	73	U R 70	R 76	H U 68	Y 75	74	70	52	A	34	27	24	26	A	33
30	36	35	35	F 35	35	37	32	38	58	74	J R 74	R 83	74	70	70	R 69	52	35	35	29	28	28	31	F 32
31	32	32	34	34	35	R 34	25	41	J R 69	R 86	76	H J 70	R 83	68	74	69	55	39	38	32	36	F 36	F 36	F 35
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	30	31	31	31	31	30	31
MED	33	34	34	35	34	34	31	45	62	71	74	74	72	71	69	62	54	38	31	30	31	29	31	32
U Q	36	36	36	38	35	36	33	49	66	74	R 78	R 77	R 77	74	74	69	56	42	34	35	36	32	33	35
L Q	31	32	32	31	31	31	28	41	58	65	70	70	69	66	66	58	50	35	29	28	28	28	29	31

DEC. 2012 foF2 (0.1MHz)

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## IONOSPHERIC DATA STATION Wakkanai

DEC. 2012 foF1 (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT. 45°10.0'N LON. 141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1									252		U L 348	L	L		284										
2										L	L	L	L												
3										L			L												
4										U L 312		L	L	L	L	U L 248									
5											L	L	L	L	L										
6												L	L												
7											L		L												
8										L	L	L	L												
9											L	L	L	L											
10								184			L	L	L	L											
11											L	L	L												
12									256				L	L		248									
13											U L 352				312	256									
14									244	L	356	L	356												
15										316	324	L	L	L											
16												L	L	L											
17									260		L	L	L	L	L										
18										L		L	L	L	L										
19										L	L	L	L												
20											L		L												
21									248		L	L	L	L											
22												L	L	L											
23									248		L			L											
24										264	L		L		L										
25																U L 244									
26										272	L		A			288									
27										312			L												
28												L			L										
29									U L U L 236 328	L	L	L	L	U L 372											
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	9	6	4		2	1	2	5									
MED								184	248	312	350		372	372	298	248									
U Q									258	316	354					272									
L Q									240	292	336					246									

DEC. 2012 foF1 (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Wakkanai

DEC.2012 foE (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1								192	220	244	280	288	296	272	244	A	A								
2								184	216	256	280	296	296	280	260	204	A								
3								J R 184	236	264	276	292	292	280	240	212									
4								160	204	U A 240	280	288	288	280	248	A	A								
5								168	236	276	288	304	300	280	240	204	J R 176								
6								J R 172	212	264	284	292	296	284	232	216	B								
7								B 212	260	284	292	292	288	256	204										
8								J R 168	224	276	292	304	312	288	240	208	B								
9								B 228	268	292	300	296	A	252	216	B									
10								B 276	A	A	A	A	A	A	A	A	A								
11								A	A	A U A 280	288	292	292	244	U A	A	A								
12								A	R 212	268	296	308	U A 312	288	276	208	B								
13								164	220	260	284	304	292	A	252	224	B								
14								B 264	A	296	296	300	288	256	A	A	A								
15								J R 164	232	264	292	292	292	272	252	208	156								
16								J R 160	236	272	292	312	300	288	240	192	148								
17								A 200	252	284	304	296	276	256	200	B									
18								B 204	276	296	304	304	288	260	212	H	B								
19								B 200	236	276	296	300	300	252	A										
20								B 192	256	276	288	292	280	260	212	B									
21								B 188	252	280	288	296	284	252	A	A									
22								184	244	300	308	300	292	256	220	160									
23								J R 164	196	280	280	284	296	288	252	200	A								
24								B 200	256	296	U A 296	300	292	U A	A	A	A								
25								J K J R 140	176	A 244	288	300	300	284	A	A	B								
26								J R 164	220	240	280	296	U A 292	288	264	220	160								
27								B 200	248	272	292	296	284	268	A										
28								B 228	272	280	288	296	284	244	236	B									
29								B 240	A 288	292	292	284	244	232	B										
30								B 220	A 284	U R 300	292	272	252	220	B										
31								B 228	252	280	280	304	272	272	212	A									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT							1	13	26	29	30	30	30	28	28	22	5								
MED							J K J R 140	168	214	260	284	296	296	284	252	212	160								
U Q								180	228	270	292	304	300	288	258	220	168								
L Q								164	200	246	280	288	292	280	244	204	152								

DEC.2012 foE (0.01MHz)

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## IONOSPHERIC DATA STATION Wakkanai

DEC. 2012 foEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT. 45°10.0'N LON. 141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	E B J A	14 13	19	E B	14	19	18	18	G	G	28	30	24	32	G	G	J A	20	J A J A	J A J A	E B E B	E B E B	E B E B	E B E B	
2	E B E B	E B E B	E B E B	E B E B	E B E B	E B E B	E B E B	E B E B	G	25	32	31	34	32	G	G	23	J A J A	E B E B	E B E B	E B E B	E B E B	J A E B	J A E B	
3	E B E B	E B E B	E B E B	E B E B	E B E B	E B E B	E B E B	J A	G	G	20	27	G	G	G	G	G	E B E B	J A J A	J A J A	E B E B	E B E B	E B E B	E B E B	
4	J A	18	18	E B J A	J A E B	J A E B	J A E B	J A E B	J A E B	18	24	26	33	32	32	32	28	32	J A J A	J A J A	E B E B	J A J A	J A J A	J A J A	
5	E B	14	19	E B E B	E B E B	E B E B	E B E B	E B E B	G J A	G	31	28	G	G	G	G	26	20	G J A E	E B E B	J A J A	J A J A	J A E B	J A E B	
6	19	19	18	E B J A	E B J A	E B J A	E B J A	E B J A	G	24	G	G	33	31	G	G	28	G E B J	A J A J	A J A J	15	18	17	E B E B	
7	E B E B	J A E B	J A E B	E B E B	E B E B	E B E B	E B E B	E B E B	G J A	G	23	26	32	G	G	G	G	G E B	J A E B	E B E B	E B E B	E B E B	E B E B	E B E B	
8	E B J A	J A J A	J A J A	J A J A	J A E B	E B E B	E B E B	E B E B	G J A	G	37	26	26	26	26	26	22	22	E B J A	E B E B	E B E B	E B E B	E B E B	E B E B	
9	E B E B	E B E B	E B E B	E B E B	E B E B	E B E B	E B E B	E B E B	G	26	26	32	33	29	29	24	24	21	14	15	15	11	15	26	15
10	J A J A	J A J A	J A J A	J A	J A J A	E B J A	E B J A	E B J A	J A	J A J A	J A J A	J A J A	J A J A	J A J A	J A J A	J A J A	J A J A	J A J A	J A J A	J A J A	J A J A	J A J A	J A J A	J A E B	
11	25	18	24	18	22	20	13	31	26	29	32	24	31	43	43	30	45	20	34	19	12	12	22	12	
12	E B E B	J A J A	J A J A	J A J A	J A J A	J A J A	J A J A	J A J A	G	28	27	32	32	28	27	22	22	E B E B	J A J A	J A J A	J A J A	J A J A	J A J A	J A J A	
13	J A	27	21	J A E B	E B E B	E B E B	E B E B	E B E B	G	26	31	30	33	27	43	26	23	15	15	32	56	56	30	30	26
14	J A J A	J A J A	J A J A	E B J A	J A J A	J A J A	J A J A	J A J A	G	31	32	32	32	32	31	31	31	J A J A	J A J A	J A J A	J A J A	J A J A	J A J A	J A E B	
15	E B J A	J A J A	J A J A	J A J A	J A E B	E B E B	E B E B	E B E B	G	31	G	33	32	G	28	G	G	E B E B	E B E B	J A E B	E B E B	E B E B	J A E B	J A E B	
16	E B E B	E B E B	E B E B	E B E B	E B E B	E B E B	E B E B	E B E B	G J A	24	31	30	33	G E B	14	28	25	G E B E	B J A E	B	15	35	23	15	
17	24	21	J A J A	J A E B	E B E B	J A J A	J A J A	J A J A	G	23	30	G	G	J A	30	G	23	J A E B	E B E B	E B E B	J A J A	J A J A	J A J A	J A J A	
18	J A	17	25	E B E B	E B E B	E B E B	E B E B	E B E B	J A	G	24	29	27	34	25	19	18	G E B E	E B E B	E B E B	E B E B	E B E B	E B E B	E B E B	
19	E B E B	E B E B	E B E B	E B E B	E B E B	E B E B	E B E B	E B E B	G	19	28	30	33	32	31	29	J A E B	J A J A	J A E B	E B E B	E B E B	E B E B	E B E B	E B E B	
20	J A E B	E B E B	E B E B	E B E B	E B E B	E B E B	E B E B	E B E B	G	24	24	33	32	32	31	G	23	E B J A	J A J A	J A E B	J A J A	J A J A	J A J A	J A	
21	J A	15	19	19	18	J A	E B J A	E B J A	J A	20	30	39	35	34	34	43	36	J A J A	J A J A	J A E B	E B E B	E B E B	E B E B	E B E B	
22	E B E B	E B E B	J A J A	J A J A	J A J A	J A J A	J A E B	J A E B	23	27	34	34	34	34	27	19	18	J A J A	J A J A	J A J A	J A J A	J A J A	J A J A	J A E B	
23	E B E B	E B E B	E B E B	E B E B	J A E B	E B E B	E B E B	E B E B	G	22	25	31	33	33	32	30	25	18	J A J A	J A J A	J A E B	E B E B	E B E B	E B E B	
24	20	20	14	20	19	16	18	14	23	30	31	31	31	33	32	24	19	J A E B	E B E B	J A J A	J A E B	E B E B	E B E B	E B E B	
25	18	J A J A	J A J A	J A E B	J A J A	J A J A	J A J A	J A J A	32	34	34	34	36	35	28	21	14	E B J A	E B E B	J A E B	E B E B	E B E B	E B E B	E B E B	
26	J A E B	E B E B	J A E B	J A E B	J A E B	J A E B	J A E B	J A E B	G	28	31	38	48	G	G	25	25	G J A J	J A J A	J A J A	J A J A	J A J A	J A J A	J A J A	
27	J A	20	20	E B	20	22	15	13	G	29	33	32	32	34	31	35	27	J A J A	E B J A	J A J A	J A J A	J A J A	J A E B	J A	
28	19	20	J A J A	J A J A	J A J A	J A E B	J A J A	J A J A	G	G	G	32	G	G	27	20	20	G E B E	B J A J	J A J A	J A J A	J A J A	J A E B	E B E B	
29	E B E B	E B E B	E B E B	E B E B	E B E B	E B E B	E B E B	E B E B	21	30	33	36	32	29	28	34	41	J A J A	J A J A	J A E B	J A J A	J A J A	J A J A	J A J A	
30	J A J A	J A J A	E B	J A	J A	J A	J A J A	J A J A	J A J A	J A J A	J A J A	J A J A	J A J A	J A J A	J A J A	J A J A	J A J A	G E B J	A J A J	A J A J	A J A J	A J A J	A J A J	A J A J	
31	J A J A	E B J A	E B J A	E B J A	E B J A	E B J A	E B J A	E B J A	G	29	36	34	36	32	30	44	31	J A J A	J A J A	J A J A	J A J A	J A J A	J A J A	J A J A	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	
MED	17	17	15	E B	14	15	E B	15	G	24	28	31	32	32	30	28	23	E G J A	J A J A	J A J A	J A J A	J A J A	J A E B	J A E B	
U Q	J A	20	20	19	J A	17	18	17	J A J A	J A J A	15	26	30	33	34	33	33	30	J A J A	J A J A	J A J A	J A J A	J A J A	J A J A	
L Q	E B E B	E B E B	E B E B	E B E B	E B E B	E B E B	E B E B	E B E B	G	G	G	G	G	G	G	G	G	G E B E	E B E B	E B E B	E B E B	E B E B	E B E B	E B E B	

DEC. 2012 foEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



## IONOSPHERIC DATA STATION Wakkanai

DEC.2012 fbEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
1	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
2	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
3	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
4	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
5	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
6	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
7	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
8	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
9	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
10	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
11	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
12	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
13	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
14	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
15	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
16	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
17	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
18	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
19	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
20	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
21	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
22	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
23	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
24	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
25	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
26	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
27	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
28	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
29	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
30	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
31	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	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	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31			
MED	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
UQ	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B
LQ	E	BE	BE	BE	BE	BE	BE	B	G	G											E	BE	BE	BE	BE	BE	BE	B

DEC.2012 fbEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Wakkanai

DEC.2012 fmin (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

$\frac{H}{D}$	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	14	14	14	14	14	14	14	14	13	13	13	12	12	13	12	12	12	12	12	12	12	12	12	12
2	13	13	14	14	14	14	14	14	14	14	15	15	15	15	14	14	14	15	11	11	12	12	12	12
3	14	14	14	14	15	15	15	16	16	16	11	11	12	12	12	12	12	12	12	12	12	12	12	12
4	12	12	12	12	12	12	13	13	13	13	13	12	10	10	11	12	11	12	12	12	12	12	12	12
5	14	14	14	14	14	14	14	14	14	14	14	14	18	17	17	17	16	14	14	16	15	15	15	15
6	13	12	12	12	12	12	12	16	12	11	12	12	12	12	12	12	12	12	12	12	12	12	12	12
7	11	11	12	12	12	11	13	12	12	13	5	14	14	12	12	11	14	13	14	14	13	13	13	13
8	13	13	13	13	13	13	13	13	13	13	13	15	15	15	15	15	14	14	14	15	15	15	15	15
9	15	15	15	13	13	13	13	13	13	14	14	13	13	14	14	15	15	14	15	15	15	15	15	15
10	16	15	16	16	16	16	16	12	11	11	11	11	11	11	11	12	12	12	11	11	11	11	11	11
11	14	14	14	14	14	14	14	14	12	12	15	15	15	16	15	11	13	12	12	12	12	12	12	12
12	12	12	12	12	14	14	14	13	13	13	14	14	12	11	12	12	12	12	12	12	12	12	12	12
13	14	14	14	14	14	14	14	14	11	12	10	14	14	14	14	14	15	12	12	12	12	12	12	12
14	14	14	14	14	14	16	16	14	13	12	12	13	13	13	13	14	12	13	13	13	15	14	14	15
15	15	15	15	15	15	15	14	14	14	13	9	9	12	12	15	17	10	10	10	10	13	12	12	12
16	14	14	14	14	14	14	15	15	15	14	14	13	14	14	15	15	15	15	16	15	15	15	15	15
17	14	14	14	14	14	14	14	13	12	12	12	12	12	12	12	12	12	13	12	12	12	12	12	12
18	13	12	12	12	14	14	14	14	14	14	14	14	14	14	15	15	15	15	14	14	14	14	14	14
19	15	15	15	15	15	15	15	15	15	15	14	14	15	16	16	16	16	16	14	14	14	14	14	14
20	14	14	14	13	13	13	13	14	15	13	13	13	13	13	13	13	13	13	13	15	14	14	14	14
21	13	12	12	12	12	12	12	15	14	12	12	12	13	12	12	12	12	12	12	12	12	12	12	12
22	13	13	13	13	13	14	14	15	16	15	14	14	14	14	14	14	14	12	11	11	11	11	11	11
23	14	14	14	15	15	15	14	14	14	14	14	14	14	14	14	14	14	14	14	14	16	16	16	16
24	16	16	14	14	14	14	14	14	14	14	14	14	13	13	13	13	13	13	13	13	13	13	13	13
25	13	13	13	13	13	13	13	14	13	13	13	13	13	13	13	13	14	14	14	14	14	14	14	14
26	12	12	12	15	15	15	15	14	14	14	13	12	12	12	11	11	12	12	12	12	12	12	12	12
27	14	14	14	14	14	14	14	13	12	12	10	10	10	10	11	15	15	15	12	12	12	12	12	12
28	13	13	13	13	14	14	14	16	15	15	15	15	15	11	11	11	12	16	15	15	15	15	15	15
29	12	12	12	11	10	13	12	12	12	12	12	11	11	11	11	11	11	11	11	15	15	15	15	14
30	12	12	12	12	12	12	13	12	14	14	14	13	12	12	12	12	15	15	14	13	13	13	13	13
31	12	12	12	12	12	12	12	12	12	12	15	15	14	14	14	14	14	13	13	14	14	14	14	14
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	14	14	14	14	14	14	14	14	13	13	13	13	13	13	13	13	13	13	12	13	13	13	13	13
U Q	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	15	15	14	14	14	15	14	14	14
L Q	13	12	12	12	13	13	13	13	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12

DEC.2012 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Wakkanai

DEC.2012 M(3000)F2 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D <sup>H</sup>	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	279	283	287	291	298	305	333	360	368	356	388	361	382	355	361	362	367	325	340	338	343	315	304	300
2	300	305	304	305	321	324	329	330	350	361	R	R	351	368	342	356	344	344	316	311	316	322	298	294
3	305	308	313	306	307	321	329	352	379	369	368	352	371	358	365	369	336	337	355	321	324	324	302	299
4	299	298	295	313 <sup>R</sup>	303	324	335	359	382	358	345	364		351 <sup>R</sup>	383	385	301 <sup>H</sup>	336	335	355	387	279	316	296
5	277	297	301	295	323	316 <sup>V</sup>	332	373	372	354	358	375	376	340	371	351	328	340	334	357	360	329	310	310
6	310	310	314	324	305	303	328	363	369	345	376	365	363	370	372	347	370	307	348	334	330	327	305	309
7	323	300	306	311	311	347	336	359	389	358	293	357	363	378	383	378	338	359	349	353	335	348	322	292
8	303	292	299	299	306	316	333	361	374 <sup>U</sup>	354 <sup>R</sup>	351	369	376	357	370	359	364	318 <sup>H</sup>	370	335	342	311	285	317
9	296	313	313	306	326	337	367	358	376	378	360	362	355	360	372	387	362	326	347	337	331	348	304	308 <sup>R</sup>
10	286	310	292	300	327	341	317	375	365	350	R	368	354	357	353	350	376	363	325	330	344	337	303	288 <sup>F</sup>
11	306 <sup>F</sup>	314	296	308 <sup>F</sup>	330	317	344	368	378	347	348	364	383	330		360	373	283	323	323	367	307	270	278 <sup>F</sup>
12	297	306	301	341 <sup>F</sup>	330	350	350	342	365	379	342	380	363	362	382	365	358	339	339	326	326	333	293	292
13	299	296	302	314	328	312	334	343	359	352	361	358	355	362	358	338	352	348	386	314	340	317	302	299
14	308	308	299	296	306	345	335	351	375	342	360		355	359	367	361	345	351	367	317	328	339	288	288 <sup>F</sup>
15	301	299	299	294	305	324	319	338	365	369	R	354	355	363	360	352	339	330	335	314	333	307	294	276
16	302	296	297	310	300	329	321	320	359	357	380		358	338	355	349	343	350	300	326	321	320	286	283
17	285	305	289	295	309	319	360	332	360	350	371	382	348	341	353	333	353	320	335	335	348	309	286	276
18	292	293	312	339	278	321	314	331	373		377		357	342	342	349	347	336	339	331	331	311	285	267
19	300	291	288	304	304	330	327	367	375		R	383	359	349		350	364	351	351	357	293	303	293	267
20	277 <sup>F</sup>	288	303	312	320	333	366	359	368	352	357	354	368	353	368	342	370	346	330	330	354	322	284	267
21	302	294	321	328	323	344	322	373	354	347	366	362	353	362	366	373	337	340	335	329	325	337	298	311 <sup>F</sup>
22	301	290	298	305	305	331	351	365	366	355	362	370	359	364	363	341	372	367	353	319	336	318	298	298 <sup>F</sup>
23	293	297	302	317	320	329	325	361	379	375	355	347	346	351	367	357	386	340	361	302	318	323	307	292
24	321	306	297	309	322	319	343	353	378	364	363	383	371	354	353	367	364	399	300	333	319	337	282	267
25	308	304	291	293	305	327	348	351	374	356	363	362	351	352	366	379	359	331	325	351	335	303	300	293
26	305	288 <sup>F</sup>	304	309	309	332	343 <sup>F</sup>	341 <sup>F</sup>	348	336	357	379	362	369	386	349	359	362	310	339	338	315	303	277
27	288	312	294 <sup>F</sup>	321	304 <sup>F</sup>	308	312	362	375	335	358	357	347	361	362	364	365	326	352	324	332	317	312	308
28	301	299	291 <sup>F</sup>	307 <sup>F</sup>	309	326	333	346 <sup>R</sup>	363	384	376	357	343	356	352	352	331 <sup>H</sup>	308	316	331	326	326	312	292
29	282	293	300	305 <sup>F</sup>	304	316	320	352	372	365	380	368	338	365	348	371	353		353	364	339	322		319 <sup>A</sup>
30	295	298	292	314 <sup>F</sup>	317	329	348	354	355	375	363		352	353	357	362	346	352	330	362	349	302	299	310
31	287	284	300	300	313	338	391 <sup>R</sup>	336	339		R	356	323		342	340	365	341	316	327	326	290	306	302 <sup>F</sup>
	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	28	27	26	29	31	29	31	31	30	31	31	31	31	30	31
MED	300	298	299	307	309	326	333	354	369	356	361	363	357	357	363	359	353	340	335	331	333	320	300	293
U Q	305	306	304	314	322	333	348	362	375	367	371	370	366	362	370	367	365	351	352	339	343	329	305	308
L Q	288	293	294	300	305	317	325	342	360	350	356	357	352	351	353	349	341	326	325	323	325	309	288	278

DEC.2012 M(3000)F2 (0.01)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Wakkanai

DEC.2012 M(3000)F1 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1									497	U L 420	L L	L L			411									
2										L L	L L	L L												
3										L		L												
4										U L 451		L L	L L	L L	L U L 453									
5											L L	L L	L L	L L										
6												L L	L L											
7											L		L											
8										L	L L	L L	L L											
9											L L	L L	L L	L L										
10								434			L L	L L	L L											
11											L L	L L	L L											
12									446				L L	L L		440								
13										U L 425					417 467									
14									488	L	404	L	401											
15										434 421		L L	L L	L L										
16												L L	L L	L L										
17									435		L L	L L	L L	L L	L L									
18										L		L L	L L	L L	L L									
19										L	L L	L L	L L											
20									480		L		L											
21											L L	L L	405											
22									468 463			L												
23									420		L			L										
24									395		L		L		L									
25																U L 407								
26										426	L		A			402								
27										463			L											
28												L				L								
29									U L U L 444 408	L L	L L	L L	U L 406											
30										L L	L 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	9	6	4			2	1	2	5							
MED								434	446	442	420		403	U L 406	414	440								
U Q									484	463	423					460								
L Q									428	426	412					404								

DEC.2012 M(3000)F1 (0.01)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Wakkanai

DEC.2012 h'F2 (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1									210		210	220	220		220									
2										220	232	222	222											
3										212			212											
4										212		224	232	232	224	214								
5											230	226	226	226	226									
6												224	224											
7											230		230											
8										230	230	230	226											
9											236	236	234	234										
10								210			214	214	216	216										
11											226	224	222											
12									222				222	222		222								
13											226				226	206								
14									204	222	222	222	222											
15										234	234	230	230	230										
16												236	236	236										
17									224		224	224	224	228	228									
18										210		224	224	224	224									
19									206		216	216	218											
20									218		240		230											
21											230	224	228											
22									204	212		216												
23									200		208			232										
24									206		212		212		222									
25																226								
26										226	228		228			228								
27										214			230											
28												234			224									
29									206	218	218	220	220	220										
30										220	228	228	228	228										
31											228		220	226		226								
	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	10	13	20	20	26	13	8	5	1							
MED								210	206	220	227	224	224	228	224	222	226							
U Q									218	227	230	229	230	232	226	227								
L Q									204	212	217	221	220	223	223	210								

DEC.2012 h'F2 (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Wakkanai

DEC. 2012 h'F (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT. 45°10.0'N LON. 141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D	H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1		294	294	294	272	270	270	252	226	164	176 <sup>H</sup>	184	194	196	212	212	212	212	226	248 <sup>A</sup>	248	252	252	272	292
2		290	286	280	280	254	254	252	226	204	204	204 <sup>H</sup>	204	200	208	208	208	208	208	226	234	234	238	252	282
3		282	282	282	278	278	258	224	224	224	222	222	216	216	216	216	216	216	216	242	242	242	294	294	
4		288	288	288	282	282	214	214	222	220	196	212	214	216	216	216	206 <sup>A</sup>	206	210	220	220	220	292	278	282
5		280	280	280	268	258	250	234	232	210	210	210	216 <sup>H</sup>	212	212	172	196	206	206	224	224	224	224	236	256
6		266	266	266	266	266	254	252	218	218	208	206	170 <sup>H</sup>	192	220	220	218	208	208	208	220	234	236	302	282
7		288	288	288	288	248	244	242	210	212	212	212	212	212	212	212	212	208	208	232	232	240	240	316	280
8		292	292	308	288	288	266	252	214	214	198	198	202	202	206	208	208	196	196	206	212	232	250	292	292
9		262	286	286	284	266	256	222	218	218	206	206	216	216	216	214	214	222	224	228	228	228	228	266	270
10		312	310	296	274	274	252	238	180	224	216	216	216	216	216	214	214	214	214	216 <sup>E</sup>	230	230	308 <sup>O</sup>	308	
11		294	290	290	288	264	260	254	232	222	220	218	216	216	216	236 <sup>A</sup>	216	210	210	312 <sup>E</sup>	256	226	226	298 <sup>O</sup>	316
12		288	288	292	286	278	242	230	230	200	202	202	204	220	220	208	180	198	198	214 <sup>A</sup>	240	240	240	276	294
13		316	300	294	260	256	256	222	222	222	222	210	228	224	224	224	224	222	222	222	252	252	252	280	280
14		284	286	286	278	276	242	238	224	176	176	178	196	196	214	214	214	214	214	214	230	234	238	254	310
15		266	266	266	276	276	258	240	210	210	194	192	194	204	204	216	216	216	216	216	252	246	246	282	296
16		290	290	292	288	246	242	238	238	224	224	224	224	214	214	214	214	214	214	266	248	242	242	272	292
17		278	278	278	274	262	254	236	226	188	206	206	206	216	214	214	212	212	216	216	232	232	232	280	310
18		304	296	270	230	286	262	250	236	232	214	214	214	214	214	214	214	214	214	228	238	238	282	318	
19		286	286	286	286	286	270	268	236	186 <sup>H</sup>	226	226	226	226	222	222	220	214	214	214	236 <sup>E</sup>	282 <sup>B</sup>	282	306	318
20		314 <sup>O</sup>	312	300	270	258	242	220	220	180	216	220	220	220	218	216	216	200	210	222	222	222	236	290	302
21		276	286	272	242	242	224	248	218	214	220	220	220	216	216	216	216	216	230	230	232	232	232	258	258
22		284	284	274	274	274	228	216	210	178	178	224	224	220	218	218	218	212	212	230	240	240	254	290	290 <sup>O</sup>
23		318	308	302	288	278	228	258	208	204	204	204	204	224	224	224	218	206	218	222	284	268	268	288	298
24		292	292	292	274	260	250	248	206	206	206	208	214	214	226	200	208	204	196	228	228	230	230	308	316
25		292	292	294	300	266	254	248	232	208	206	216	224	224	224	226	226	214	220	220	232	242	268	270	282
26		278	286	286	278	270	242	232	224	210	200	210	208	216 <sup>A</sup>	214	214	210	204	266	248	246	270	300	300	
27		252	276	278	278	278	260	212	202	194	206	208	214	214	214	212	212	212	208	224	230	230	250	250	
28		260	260	260 <sup>O</sup>	260	260	258	256	224	224	214	214	190	198	214	214	214	208	208	222	228	270 <sup>A</sup>	270	286	286
29		284	284	284	284	274	270	252	218	206 <sup>A</sup>	206	206	206	206	206	222	222	222	244 <sup>A</sup>	244 <sup>A</sup>	242	242	280 <sup>E</sup>	290 <sup>A</sup>	290
30		290	290	290	278	276	240	236	236	224	224	216	216	212	212	226	220	220	220	246	246	246	274	278	272 <sup>O</sup>
31		268	282	282	282	280	226	226	224	220	226	226	226	232	200	212	218	202	252	240	240	248	250	260	274 <sup>O</sup>
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT		31	31	31	31	31	31	31	31	31	31	31	31	30	31	31	31	31	30	31	31	31	31	30	31
MED		288	286	286	278	270	254	240	224	210	206	210	214	215	216	214	214	212	214	223	234	239	241	281	292
U Q		292	292	292	286	278	258	252	230	222	220	218	220	220	218	220	218	214	218	232	246	246	268	294	302
L Q		278	282	278	272	260	242	230	214	202	200	206	204	206	212	212	212	206	208	216	228	230	232	270	280

DEC. 2012 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Wakkanai

DEC.2012 h'E (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								E B 202	104	124	126	122	122	122	122									
2								150	128	118	110	114	114	114	110	110	A							
3								B 134	126	122	122	120	108	108	108									
4								E B 176	120	118	118	118	116	118	118			A						
5								E B 202	144	130	130	122	122	122	122	146			B					
6								B 114	114	112	112	112	112	112	112			B						
7								B 126	126	126	126	126	126	118	118	118								
8								B 118	138	130	124	120	118	118	118			B						
9								B 136	136	128	128	126		A	128	128			A					
10								B A	A	132				A	A	A								
11								A A	A		120	120	116	116	116			A						
12									116	122	122	122	118	118	118	118		B						
13								E B 174		136	134	134	128		A	128	132		B					
14								A A	A		130	124	124	122	122	122			A					
15								B 116	116	116	116	116	116	116	116	116		E B 176						
16								B A		118	118	118	118	118	118	118	138							
17									128	122	122	120	122	122	122	122			B					
18								B 130	130	128	128	118	118	118	118	118		H A	B					
19									144	134	124	122	122	120	120									
20								B 120	120	116	116	106	106	106	106	134		B						
21								B 130	130	132	130	120	120	120	120		A	A						
22									120	120	120	120	120	120	120	128	150							
23								B 128	124	124	126	126	120	120	120		A							
24								B 142	128	128	128	130	114		A	A		A						
25							B	B A		116	116	116	116	116				B						
26								B 122	112	116	116	114	114	114	114	134	146							
27								B 120	118	118	104	104	104	104				A						
28								B 130	124	114	114	114	114	114	114	132			B					
29								B 114	114	114	114	114	114	114	114				B					
30								B 116		A	116	116	116	116	116	128			B					
31								B 128	128	128	122	122	122	122				A						
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								5	24	29	30	30	30	28	28	20	4							
MED								E B 176	127	124	122	121	119	118	118	119	145							
U Q								E B 202	130	130	128	124	122	120	121	130	163							
L Q								162	119	118	116	116	116	114	114	117	142							

DEC.2012 h'E (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Wakkanai

DEC.2012 h'Es (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	B	100	100	B	98	106	104	G	G	160	160	100	168	G	106	102	102	102	102	102	B	B	B	B	
2	B	B	B	B	B	B	102	G	142	136	136	190	136	G	G	166	104	104	B	B	B	B	104	B	
3	B	B	B	B	B	B	102	G	102	118	G	110	G	G	G	G	B	B	104	104	122	B	B	B	
4	122	106	B	106	106	B	B	G	106	106	158	124	164	164	212	138	126	116	116	116	108	B	108	108	106
5	B	120	B	B	B	B	B	G	120	120	G	G	G	G	144	138	G	114	B	B	108	108	108	B	
6	100	100	100	B	100	B	100	G	158	G	G	G	G	G	206	G	B	96	96	96	96	96	B	B	
7	B	B	100	B	B	B	B	B	104	104	180	G	G	G	G	G	B	98	124	B	B	B	B	B	
8	B	118	94	98	98	B	B	G	114	114	114	114	114	G	174	106	B	114	B	B	B	B	B	B	
9	B	B	B	B	100	B	B	B	152	118	196	176	102	102	102	148	108	B	B	B	106	B	132	B	
10	110	100	100	100	100	126	126	B	112	112	112	112	112	112	112	112	110	110	110	102	102	98	98	B	
11	108	108	108	108	108	108	116	112	112	112	114	110	122	118	118	112	104	104	104	104	B	B	104	B	
12	B	B	104	104	108	108	108	104	170	118	118	162	114	114	114	174	B	B	98	110	118	108	108	108	
13	94	118	106	B	B	106	B	G	176	164	110	148	100	96	96	96	B	96	120	120	120	118	114	114	
14	110	110	110	B	98	98	110	110	106	106	172	170	170	144	144	124	114	114	114	110	100	102	102	B	
15	B	102	102	102	102	B	B	G	G	122	G	122	172	G	158	G	G	B	B	108	B	B	98	B	
16	B	B	B	B	B	B	110	G	110	152	124	222	G	B	194	194	G	B	B	100	B	100	100	B	
17	104	104	104	104	B	B	B	B	104	104	154	146	G	104	104	G	164	104	B	B	B	110	124	106	106
18	106	102	B	B	B	B	B	B	218	106	106	190	102	102	102	G	B	B	B	B	B	B	102	B	
19	B	B	B	B	B	B	B	B	102	170	160	202	130	130	156	118	B	116	112	B	B	B	110	110	
20	102	102	B	B	B	B	B	B	158	112	158	146	140	140	G	126	B	106	106	106	B	B	106	138	
21	98	98	98	98	104	104	B	108	108	152	94	88	182	146	120	106	106	106	106	B	B	102	B	B	
22	B	B	B	102	102	102	106	B	152	152	136	130	130	130	142	112	156	104	136	128	128	126	102	B	
23	B	B	B	B	108	B	B	G	178	104	196	156	146	138	136	136	116	110	110	110	106	B	B	B	
24	126	118	B	118	118	114	102	102	192	172	108	108	108	116	116	174	108	B	B	124	128	B	B	B	
25	112	112	106	106	120	B	110	106	144	144	136	128	128	120	120	G	G	108	B	104	B	B	B	B	
26	100	B	B	118	104	104	116	116	182	160	116	116	G	G	202	G	122	106	106	106	106	106	106	102	
27	96	96	96	B	104	104	114	B	174	174	174	162	138	122	112	112	B	B	106	106	106	106	B	106	
28	106	106	106	106	106	106	106	106	G	G	G	120	G	G	216	116	B	B	108	104	104	104	B	B	
29	B	B	B	B	B	B	B	B	116	188	188	132	132	144	148	132	120	118	106	102	B	102	102	102	
30	102	102	102	B	118	118	118	102	100	100	100	98	186	196	158	106	B	106	116	104	104	104	104	104	
31	96	96	B	126	114	108	B	G	158	148	140	134	134	174	124	124	124	124	124	120	102	102	102	102	
	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	20	16	14	17	15	17	11	26	29	25	28	26	20	25	26	15	21	21	22	17	18	19	11	
MED	104	103	102	105	104	106	106	106	118	124	144	134	131	130	138	124	110	108	108	106	106	105	104	106	
U Q	110	111	106	108	108	114	112	110	158	159	168	167	164	142	158	148	116	115	116	110	119	108	108	110	
L Q	99	100	100	102	100	104	103	104	108	112	113	111	114	113	115	112	104	104	105	104	103	102	102	102	

DEC.2012 h'Es (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



## IONOSPHERIC DATA STATION Wakkanai

DEC. 2012 TYPES OF Es 135°E MEAN TIME (G.M.T. + 9 H)

LAT. 45°10.0'N LON. 141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D	H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1		F1	F1		F1	F1	F1			HL11	HL11	L1	HL11		L1	L2	L1	F2	F3	F1					
2							F1		H1	C1	C1	HL11	HL11				HL11	L2	F1					F1	
3							F1		L1	C1		L1								L1	F3	F1			
4		FF11	F1		F2	F2	F2	L1	HL11	CL11	HL11	HL12	HL12	HL12	HL12	C2	C2	F2	F1	F1			F2	F1	F1
5			F1						L2	L1					H1	L1		F1				F2	F1	F1	
6		F1	F1	F1		F1	F1		H1			L1	HL12		H1			F1	F1	F1	F1	F1	F1		
7			F1						L1	L1	HL11							F1	F1						
8		R1	F3	FF21	F1				C3	L1	L1	L1	L1		H1	L1		F1							
9					F1				HL11	L2	HL12	HL12	L1	L2	L2	H2	LH11					F1		FF11	
10		F1	F2	FQ11	F2	F1	F1	F1	L3	L3	L2	L2	L3	L2	L2	L3	L3	F1	F1	F3	F2	F2	F1		
11		F2	F1	F1	F2	F2	F1	L3	L2	L2	L1	L1	L1	C3	C3	C4	L2	F2	F3	F3	FQ11			F1	
12			F1	F1	F1	F2	F2	LC11	H1	L2	L1	L1	L2	L2	L1	L1			F1	F2	FF11	FF12	F2	F2	F2
13		FF21	FF21	F1		F1			HL13	HL13	L2	HL22	HL22	L3	L1	L1		F1	F3	FF21	FF12	FF31	F2	F2	FQ21
14		FQ21	FQ11	F1		F1	F2	C2	L2	L2	HL11	HL22	HL22	HL22	CL22	C3	C3	F1	F3	F1	F4	F3	F1		
15			F1	F2	F2					C1		L1	HL11		H1						F3			F3	
16						F1		L2	HL11	CL11	HL11				HL11	H1					F1		FC21	F1	
17		FF11	F1	F1	F1		F3	L1	HL11	H2				L1	L1		H1	L1				F1	F1	F1	FQ11
18		F1	F1						HL11	L2	L2	HL12	L1	L1	L1									F1	
19									L1	HL11	HL11	HL11	CL11	L1	HL23	L3		F1	F1						F1
20		F1	F1						H1	L1	HL11	HL11	HL11	HL11		L1		FF11	F1	FF11			F1	F1	F1
21		F1	F1	F1	F1	F1		L1	L1	HL11	LH21	LH21	HL12	HL12	CL21	C5	L3	F2	F1				F1		
22				F2	F2	F2	F1		H1	H1	CL11	CL11	CL11	CL11	HL11	L1	C1	F1	FF11	FF11	FF11	FF11	FF21	F1	
23				F1					H1	L1	H1	HL11	HL11	HL11	HL11	C1	C1	FQ11	FF11	F1	F1				
24		F1	F2	F1	F1	F2	L1		HL11	HL11	L1	L1	L1	L2	C2	HL12	L1				F1	FF11			
25		F1	F2	F1	F1	FF11	K1	L1	LQ21	HL11	H2	H2	C2	CL11	C1	C1		F1		F3					
26		F1		F1	F1	F2	L1	L1	H1	H1	C2	C2				HL11		F1	F2	F2	F1	F2	F2	F2	F2
27		FQ11	F1	F1	F1	F2	F1		H1	HC11	HL11	H1	C2	C2	C2	C3		F2	F2	F2	F2	F2	F1		F1
28		F1	F1	F1	F3	F2	F2	L1				LC11			H1	L1			F1	F2	F3	F2			
29									C1	H1	H1	C1	C1	C1	C1	C4	C6	F4	F2	F3			F3	FQ31	F2
30		F2	F1	F1	F1	F1	L3	L2	LQ21	L2	LQ21	HL12	HL12	HL12	HL12	L2		L2	FF15	FF31	F2	F1	F2	F1	F1
31		F1	F1	F1	F1	F2			HL11	HL11	H2	C1	CL11	HL11	HL11	LH21	C1	FF31	F2	F1	F2	F1	F2	F1	F1
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT																									
MED																									
U Q																									
L Q																									

DEC. 2012 TYPES OF Es

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Kokubunji

DEC.2012 f<sub>XI</sub> (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	X 35	X 35	X 38	X 37	X 36	X 37	X 41											X 60	X 40	X 37	X 35	X 40	X 39	X 36
2	X 39	X 37	X 38	X 39	X 38	X 38	X 36											X 66	X 52	X 36	X 42	X 45	X 44	X 38
3	X 40	X 40	X 40	X 40	X 40	X 41	X 44											X 52	X 56	X 44	X 37	X 38	X 33	X 32
4	X 38	X 36	X 36	X 39	X 38	X 37	X 38											X 52	X 57	X 52	X 30	X 31	X 32	X 35
5	X 36	X 37	X 38	X 39	X 40	X 36												X 54	X 42	X 40	X 40	X 41	X 34	X 39
6	X 35	X 31	X 36	X 36	X 36	X 34	X 35											X 52	X 36	X 35	X 40	X 42	X 41	X 40
7	X 41	X 41	X 40	X 40	X 39	X 37	X 37										X 62	X 50	X 41	X 39	X 43	X 32	X 30	X 34
8	X 35	X 36	X 37	X 36	X 37	X 35	X 36											X 48	X 36	X 43	X 44	X 38	X 35	X 36
9	X 36	X 36	X 37	X 37	X 39	X 36												X 47	X 47	X 41	X 40	X 35	X 38	X 38
10	X 40	X 39	X 39	X 39	X 38	X 36	X 37											X 46	X 40	X 36	X 36	X 32	X 33	X 34
11	X 36	X 38	X 39	X 40	X 40	X 37	X 37											X 56	X 32	X 41	X 44	X 36	X 29	X 35
12	X 37	X 39	X 37	X 40	X 41	X 35	X 32											X 58	X 37	X 41	X 39	X 36	X 36	X 35
13	X 41	X 36	X 39	X 39	X 37	X 35	X 38											X 56	X 46	X 42	X 36	X 37	X 34	X 36
14	X 37	X 39	X 39	X 40	X 42	X 38	X 31											X 48	X 46	X 42	X 36	X 38	X 37	X 36
15	X 38	X 37	X 40	X 40	X 41	X 38	X 37											X 54	X 42	X 37	X 43	X 51	X 39	X 38
16	X 40	X 41	X 40	X 40	X 42	X 39	X 38											X 58	X 54	X 36	X 37	X 38	X 33	X 36
17	X 36	X 37	X 37	X 40	X 37	X 35	X 37											X 58	X 55	X 48	X 36	X 33	X 34	X 35
18	A	X 37	X 42	X 36	X 33	X 35	X 36											X 55	X 44	X 37	X 36	X 36	X 31	X 34
19	X 36	X 36	X 35	X 37	X 37	X 36	X 36				C	C			C	C	C	X 43	X 39	X 32	X 32	X 32	X 35	X 35
20	X 36	X 38	X 37	X 39	X 43	X 39	X 31					C	C	C	C	C	C	C	C	C	C	C	C	C
21	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
22	C	C	C	C	C	C	C	C	C	C	C	C	C	C			C	X 47	X 36	X 36	X 46	X 31	X 32	X 35
23	X 37	X 36	X 36	X 37	X 39	X 35	X 42											X 44	X 41	X 51	X 30	X 36	X 31	X 34
24	X 36	X 36	X 36	X 36	X 34	X 36	X 36											X 47	X 38	X 35	X 35	X 33	X 32	X 36
25	X 38	X 36	X 37	X 37	X 37	X 36	X 35											X 48	X 44	X 46	X 37	X 32	X 33	X 36
26	X 37	X 38	X 36	X 36	X 37	X 34	X 38											X 46	X 37	X 40	X 38	X 36	X 33	X 35
27	X 37	X 38	X 39	X 38	X 38	X 37	X 39											X 45	X 42	X 40	X 36	X 40	X 37	X 39
28	X 42	X 42	X 44	X 44	X 48	X 50	X 54											X 52	X 42	X 39	X 43	X 34	X 34	X 36
29	X 39	X 40	X 39	X 43	X 42	X 39	X 34											X 52	X 37	X 42	X 43	X 35	X 36	X 36
30	X 36	X 38	X 38	X 40	X 40	X 35	X 36											X 58	X 44	X 47	X 35	X 35	X 32	X 36
31	X 36	X 35	X 37	X 38	X 37	X 36	X 39											X 50	X 42	X 46	X 34	X 35	X 37	X 41
	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	27										1	28	29	29	29	29	29	29
MED	X 37	X 37	X 38	X 38	X 38	X 36	X 37										X 62	X 52	X 42	X 40	X 37	X 36	X 34	X 36
U Q	X 39	X 39	X 39	X 40	X 40	X 38	X 38											X 56	X 46	X 44	X 42	X 38	X 37	X 37
L Q	X 36	X 36	X 37	X 37	X 37	X 35	X 36											X 48	X 38	X 37	X 36	X 33	X 32	X 35

DEC.2012 f<sub>XI</sub> (0.1MHz)

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## IONOSPHERIC DATA STATION Kokubunji

DEC.2012 foF2 (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	29	29	31	31	30	31	35	58	62	72	72	75	66	71	62	65	65	54	34	31	29	33	33	30	
2	33	31	32	33	32	32	30	55	67	74	73	67	85	71	70	70	59	60	46	30	F	F	36	31	
3	34	34	34	34	34	36	38	57	58	65	91	78	78	86	72	66	64	46	50	37	30	32	27	26	
4	32	30	30	33	32	31	32	60	62	64	73	90	86	67	75	72	62	46	51	46	24	25	26	28	
5	30	30	32	33	34	30	33	64	74	66	72	64	76	76	66	63	54	48	36	34	34	35	28	33	
6	29	25	29	30	30	28	29	60	70	71	74	81	67	68	66	62	60	45	29	29	33	36	34	33	
7	35	35	34	34	33	31	31	58	71	66	63	80	80	85	72	59	55	44	35	32	38	26	24	28	
8	29	30	31	30	31	29	30	57	69	65	64	71	82	72	64	57	62	42	30	37	38	32	29	30	
9	30	30	31	31	33	30	28	59	59	66	67	72	72	77	68	61	56	41	41	35	34	29	32	31	
10	34	32	33	33	32	29	31	68	68	69	79	88	86	81	73	69	59	40	34	30	30	26	26	28	
11	30	32	33	34	34	31	31	58	70	70	84	74	84	73	76	70	62	50	26	35	38	30	23	29	
12	30	33	31	F	35	28	26	57	74	74	72	72	97	89	76	64	60	52	31	35	33	30	30	29	
13	S	30	33	33	31	29	32	60	70	73	81	86	90	81	73	69	61	50	40	36	30	31	28	30	
14	31	33	33	34	36	32	25	54	72	79	78	80	77	84	80	76	61	42	40	36	30	32	31	30	
15	32	31	34	34	34	32	31	61	77	75	77	82	77	79	86	72	67	48	36	31	37	45	33	32	
16	34	35	34	34	36	33	32	60	58	82	79	79	85	82	73	65	60	52	48	30	31	32	27	29	
17	30	30	31	33	31	29	31	62	65	77	84	93	79	91	79	70	60	52	48	42	30	27	28	29	
18	A	31	36	30	27	28	32	62	82	86	90	83	82	86	90	85	64	49	38	31	30	30	25	28	
19	30	30	29	30	31	30	29	58	73	81	76	C	C	82	C	C	C	C	C	36	32	26	26	27	28
20	30	32	31	33	37	33	25	50	67	68	70	C	C	C	C	C	C	C	C	C	C	C	C	C	
21	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
22	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
23	31	30	30	31	33	29	36	55	57	60	62	67	63	76	78	76	81	38	35	45	24	29	25	28	
24	30	30	30	30	28	30	30	45	54	62	67	84	85	78	68	70	60	40	31	28	29	27	26	30	
25	32	30	31	31	31	30	29	47	55	64	68	71	72	81	72	76	70	42	38	40	31	26	27	29	
26	31	32	30	30	31	28	32	54	65	63	74	80	86	78	79	77	58	41	31	34	32	29	27	29	
27	31	32	33	32	32	31	33	54	69	64	68	81	71	68	71	65	61	39	35	34	30	34	31	32	
28	36	36	38	38	42	F	F	59	74	76	80	78	77	76	63	64	61	46	36	33	37	27	28	30	
29	33	F	33	36	36	33	28	51	70	65	74	75	73	76	78	71	64	46	30	36	37	29	29	30	
30	30	32	32	34	34	29	30	56	70	66	81	78	90	75	72	76	64	52	38	41	29	29	26	30	
31	30	29	32	32	31	29	33	56	68	71	85	77	74	81	74	58	66	43	36	40	28	29	30	35	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	28	28	29	28	29	28	28	29	29	29	29	27	27	28	28	28	27	28	29	29	28	28	29	29	
MED	31	31	32	33	32	30	31	58	69	69	74	78	79	78	72	70	61	46	36	34	30	29	28	30	
U Q	33	32	33	34	34	32	32	60	72	74	80	82	85	82	77	73	64	50	40	37	36	32	30	30	
L Q	30	30	31	31	31	29	29	54	62	65	69	72	73	74	69	64	60	42	31	31	30	27	26	28	

DEC.2012 foF2 (0.1MHz)

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## IONOSPHERIC DATA STATION Kokubunji

DEC.2012 foF1 (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

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

DEC.2012 foF1 (0.01MHz)

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## IONOSPHERIC DATA STATION Kokubunji

DEC.2012 foE (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								B	A	A	A	R	R	A	A	A	200							
2								B	R	A	A	A	R	R	A	A	A							
3								B	A	A	A	R	R	R	R	R	A							
4								B	A	R	A	R	A	A	A	R	A							
5							B	B	R	R	R	A	A	A	R	A	B							
6								B	R	R	R	A	A	R	R	U R	R							
7								B	A	A	R	R	R	A	A	A								
8								B	A	A	A	A	A	A	R	R	U R							
9							B	B	R	R	A	A	A	A	A	R	R							
10								B	U R	A	A	A	A	A	A	R	A							
11								U R	A	A	A	A	A	A	A	A	U R							
12								A	R	A	A	A	A	R	A	R	R							
13								U R	R	R	A	A	A	A	A	A	B							
14								B	R	A	A	A	A	R	A	A	A							
15								B	R	R	A	A	R	R	A	A	R							
16								B	A	R	A	R	R	R	R	R	R							
17								B	R	R	R	R	A	A	R	R	R							
18								U R	R	A	A	A	R	A	A	A	R							
19								R	R	R	A	C	C	R	C	C	C							
20								B	R	A	A	C	C	C	C	C	C	C	C	C	C	C	C	C
21								C	C	C	C	C	C	C	C	C	C							
22								C	C	C	C	C	C	C	A	U A	C							
23								B	U R	A	A	U A	A	A	A	A	B							
24								B	U R	R	A	A	A	A	A	A	A							
25								B	U A	R	A	A	A	A	A	A	A							
26								B	R	A	A	A	A	A	A	U R	R							
27								B	U R	R	R	A	A	A	A	A	A							
28								B	R	R	A	A	A	A	A	A	A							
29								B	U R	R	A	A	A	A	A	U A	A							
30								B	U R	A	A	A	A	A	A	A	A							
31								B	A	R	A	A	A	A	A	A	A							
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								3	10	1	1		1	2		4	4							
MED								U R	U R	U R	312		U A	312		U	254	192						
U Q								U R	R							U	256	198						
L Q								U R	U							U	250	186						

DEC.2012 foE (0.01MHz)

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## IONOSPHERIC DATA STATION Kokubunji

DEC.2012 fbEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B
2	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B
3	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B
4	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B
5	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B
6	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B
7	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B
8	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B
9	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B
10	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B
11	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B
12	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B
13	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B
14	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B
15	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B
16	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B
17	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B
18	A	A	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B
19	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B
20	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B
21	C	C	C	C	C	C	C	C	C	C	C		C					C	C	C	C	C	C	C	C
22	C	C	C	C	C	C	C	C	C	C	C		C					C	C	C	C	C	C	C	C
23	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B
24	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B
25	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B
26	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B
27	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B
28	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B
29	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B
30	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B
31	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	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	29	29	29	29	29	29	29	29	29	29	29	27	27	28	28	28	27	28	29	29	29	29	29	29	
MED	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B
UQ	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B
LQ	E	B	E	B	E	B	E	B	E	B	B		G					E	B	E	B	E	B	E	B

DEC.2012 fbEs (0.1MHz)

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## IONOSPHERIC DATA STATION Kokubunji

DEC.2012 fmin (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	16	15	15	14	14	15	15	14	10	15	14	12	16	16	16	13	13	15	15	14	15	15	15	15
2	15	15	14	14	14	14	15	14	14	12	13	14	19	13	14	12	12	14	15	15	15	14	14	16
3	15	15	15	15	14	15	15	15	14	13	18	14	18	15	14	15	14	15	14	13	14	15	15	14
4	14	14	15	14	16	15	16	14	13	12	12	13	14	14	14	15	13	15	15	16	15	15	14	13
5	15	15	14	15	15	15	15	15	14	16	17	14	13	12	14	14	15	15	15	14	15	15	15	14
6	16	16	15	14	15	15	14	16	15	14	14	14	14	15	13	14	15	16	16	15	14	15	15	14
7	15	15	15	16	15	15	15	14	16	16	17	14	16	16	14	11	14	13	15	15	13	15	16	14
8	14	15	15	15	15	16	15	15	14	16	15	17	12	15	12	13	15	14	16	15	14	16	14	15
9	14	15	14	14	15	15	14	14	12	14	16	15	14	12	11	14	14	15	14	16	14	14	14	15
10	15	14	15	15	15	15	14	15	14	16	17	18	18	14	13	14	14	15	15	15	15	15	15	14
11	14	14	15	15	15	14	14	14	14	14	18	18	17	16	13	14	14	14	16	15	14	15	15	15
12	15	15	14	15	15	15	14	14	16	14	15	15	18	16	14	14	14	14	14	15	15	15	15	15
13	14	15	15	14	14	13	16	14	14	15	14	16	16	15	13	12	14	14	14	14	15	14	15	14
14	15	15	15	15	15	15	15	15	15	13	16	17	18	16	12	14	12	14	14	14	14	15	15	15
15	15	15	15	15	14	16	15	14	16	15	14	18	18	16	16	16	13	15	15	15	16	15	15	16
16	16	15	15	14	14	15	14	15	13	14	17	16	18	16	17	16	15	14	14	15	16	15	15	15
17	15	15	15	15	14	14	15	14	14	18	17	16	17	15	14	15	16	16	16	15	15	16	15	15
18	14	15	15	15	15	14	15	14	14	12	14	17	16	12	13	14	13	15	14	14	15	16	16	16
19	15	14	16	15	14	16	15	14	13	14	15	C	C	16	C	C	C	C	16	15	15	15	16	15
20	15	14	14	15	15	15	14	14	14	15	12	C	C	C	C	C	C	C	C	C	C	C	C	C
21	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
22	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
23	14	14	15	15	15	14	16	16	13	13	14	16	14	16	14	14	14	15	16	15	15	15	15	15
24	15	15	15	15	15	15	15	15	14	13	15	13	14	15	13	14	12	14	14	15	14	14	15	15
25	14	15	15	16	15	15	15	16	14	13	13	16	14	14	13	13	14	14	15	14	15	14	15	14
26	15	15	15	15	15	14	16	15	13	13	14	14	14	14	15	14	14	15	15	15	15	15	15	15
27	16	16	14	15	15	15	15	15	15	15	12	15	12	13	15	14	14	15	16	15	15	15	14	16
28	15	15	14	16	15	15	15	15	14	14	13	14	15	14	17	14	13	15	16	16	15	15	15	15
29	15	15	15	15	15	14	14	14	15	14	14	13	14	13	14	12	13	15	16	15	15	15	15	15
30	14	15	14	14	16	15	16	15	14	15	12	14	15	15	14	14	14	15	14	15	15	15	15	16
31	15	15	15	15	15	14	15	15	15	14	14	14	12	11	14	13	13	14	14	15	14	14	15	14
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	29	29	29	29	29	29	29	29	29	29	27	27	28	28	28	27	28	29	29	29	29	29	29
MED	15	15	15	15	15	15	15	15	14	14	14	15	15	15	14	14	14	15	15	15	15	15	15	15
U Q	15	15	15	15	15	15	15	15	15	15	16	16	18	16	14	14	14	15	16	15	15	15	15	15
L Q	14	15	14	14	14	14	14	14	14	13	14	14	14	14	13	13	13	14	14	14	14	15	15	14

DEC.2012 fmin (0.1MHz)

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## IONOSPHERIC DATA STATION Kokubunji

DEC.2012 M(3000)F2 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D	H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1		296	302	312	321	310	314	327	375	371	372	379	368	356	358	359	347	354	365	353	323	303	325	337	315	
2		302	300	304	303	313	315	316	362	381	381	383	388	365	350	349	353	361	351	345	330	F	F	319	320	
3		298	302	311	318	297	309	356	373	368	353	385	372	351	345	362	364	381	334	343	336	313	319	348	302	
4		320	326	313	344	298	318	343	369	383	377	348	332	345	386	353	362	364	313	350	327	362	334	281	297	
5		306	319	305	306	344	314	318	378	368	377	365	381	350	368	364	367	362	335	327	351	324	328	309	310	
6		333	341	309	317	319	311	334	371	379	366	376	390	355	362	365	366	368	374	374	324	323	301	311	321	
7		297	309	321	325	321	327	351	377	376	389	372	344	353	371	380	369	373	349	341	339	357	321	291	297	
8		299	316	355	303	297	291	318	370	389	373	353	353	358	354	357	350	369	373	324	338	355	356	296	310	
9		295	301	295	301	327	315	322	374	391	362	376	368	352	361	368	372	380	329	337	352	325	309	285	296	
10		279	290	302	309	313	299	318	373	367	357	350	355	352	365	361	345	355	347	347	362	344	321	294	283	
11		294	318	298	308	331	315	351	380	381	362	358	338	351	346	341	361	370	366	358	327	332	324	285	284	
12		308	303	290	F	315	314	332	371	376	381	361	327	340	356	352	374	362	354	344	355	329	334	318	291	
13		S	307	305	319	320	322	311	334	371	374	372	357	352	361	356	361	360	363	364	345	354	341	348	314	301
14		314	303	295	292	322	366	352	359	364	363	349	357	339	349	352	381	377	341	341	358	320	304	317	313	
15		312	312	295	291	325	322	314	355	377	360	343	364	322	327	328	349	378	337	342	326	302	313	315	300	
16		297	293	292	292	318	322	332	354	383	359	355	342	343	360	353	350	348	341	363	346	326	328	298	296	
17		288	298	312	340	322	321	348	379	365	349	344	354	319	348	356	359	353	327	353	347	341	296	298	290	
18		A	286	327	328	328	301	305	350	372	352	357	363	343	334	339	375	355	354	349	343	329	300	313	305	
19		308	305	297	286	313	312	340	366	362	363	351	C	C	353	C	C	C	C	299	356	318	310	302	303	
20		291	294	299	307	328	377	319	355	361	365	353	C	C	C	C	C	C	C	C	C	C	C	C	C	
21		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
22		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
23		312	298	290	308	318	310	343	399	362	374	372	331	354	334	352	362	386	433	302	356	337	319	298	301	
24		306	284	288	314	324	322	375	366	374	352	345	358	357	343	347	349	366	347	367	352	321	311	314	284	
25		301	301	278	307	310	320	326	362	380	364	366	332	324	351	349	326	385	375	316	331	364	301	291	295	
26		306	306	317	313	322	307	335	360	379	370	363	345	348	357	347	390	346	352	336	334	345	340	313	298	
27		295	309	304	326	301	314	324	359	390	372	361	367	355	354	356	359	361	335	350	343	318	328	318	315	
28		314	320	310	302	302	F	F	361	367	362	342	380	364	344	375	346	359	353	364	318	362	329	298	293	
29		298	F	285	321	344	341	319	363	375	351	366	365	350	367	356	353	377	369	327	336	315	333	311	307	
30		299	304	303	315	338	305	297	357	374	380	351	342	354	353	367	335	344	362	322	360	323	323	274	300	
31		311	305	299	296	308	322	338	373	375	356	353	350	330	332	324	352	353	345	352	356	361	333	301	293	
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT		28	28	29	28	29	28	28	29	29	29	29	27	27	28	28	28	27	28	29	29	28	28	29	29	
MED		302	304	303	308	319	314	332	369	375	364	357	355	351	354	356	359	363	352	344	343	329	324	302	300	
U Q		310	310	312	320	326	322	343	374	380	374	369	368	355	360	362	366	377	364	352	354	350	333	314	308	
L Q		296	299	295	302	310	310	318	360	368	358	350	342	343	346	349	350	355	339	332	328	320	310	292	294	

DEC.2012 M(3000)F2 (0.01)

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DEC. 2012 M(3000)F1 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

LAT. 35°43.0'N LON. 139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1												L	A	L											
2												A													
3											A	L	L	L											
4												L	A	A	A										
5												A	L	A											
6													L	L											
7												L	L	A	A	A									
8													A	A											
9												L	L	A	A										
10												A	L	A											
11													A												
12										A			L												
13											L	A	A												
14												A													
15								L				L	L	L											
16											L	A	L	L											
17											L			A											
18											L	L	L	L	A										
19											A	C	C	L	C	C	C								
20												C	C	C	C	C	C	C	C	C	C	C	C	C	
21								C	C	C	C	C	C	C	C	C	C								
22								C	C	C	C	C	C	C	A	A	C								
23														A	A										
24											A	A	L	L	A										
25														A	A										
26											L		U L 373	A											
27												L													
28								L	L	L		L	U L 370	L											
29												L		A											
30											L	L	U L 362		A										
31										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											
MED													U L U L 368 370												
U Q																									
L Q																									

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## IONOSPHERIC DATA STATION Kokubunji

DEC. 2012 h'F2 (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT. 35°43.0'N LON. 139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1												244	226	258										
2												210												
3											226	232	246	246										
4												276	234	216	228									
5												218	252	228										
6													252	240										
7												256	242	232	228	212								
8													244	236										
9												236	248	246	226									
10												246	240	242										
11													266											
12										220			262											
13											234	242	240											
14												232												
15									232			234	290	244										
16											252	248	256	240										
17											240		244											
18											236	228	260	250	246									
19											236	C	C	250	C	C	C							
20												C	C	C	C	C	C	C	C	C	C	C	C	C
21									C	C	C	C	C	C	C	C	C							
22									C	C	C	C	C	C				C						
23													262	238										
24											230	242	244	246	230									
25													242	254										
26											244		246	240										
27												236												
28										250	258	228	240	252										
29												236	238											
30												238	246	258	228									
31											236		262											
	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	3	10	18	20	20	9	2								
MED									232	236	237	236	247	243	228	225								
U Q										250	244	246	259	248	242									
L Q										220	234	232	241	239	228									

DEC. 2012 h'F2 (KM)

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## IONOSPHERIC DATA STATION Kokubunji

DEC. 2012 h'F (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT. 35°43.0'N LON. 139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D	H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
1	E	298	310	290	262	286	278	228	200	208	222	208	198	A	210	212	216	214	200	206	226	E	276	272	242	278		
2	E	276	276	280	258	252	236	252	212	210	214	218	A	232	228	218	222	210	208	204	210	E	258	296	262	240		
3	E	268	298	294	270	278	280	226	204	200	214	A	200	220	194	212	218	210	E	A	220	E	242	236	218	290		
4	E	258	252	262	254	254	276	216	204	202	206	222	212	A	A	A	220	214	200	216	200	202	E	238	318	314		
5	E	300	286	266	258	230	240	254	216	210	204	224	A	200	A	216	214	198	E	A	E	E	246	248	274	264		
6	E	244	232	286	262	264	276	230	222	208	220	214	212	190	206	216	210	212	192	212	E	E	242	262	256	260		
7	E	274	268	248	246	238	232	228	212	206	206	214	210	206	A	A	A	200	218	202	222	208	E	256	250	306		
8	E	290	270	264	282	272	268	262	218	202	206	210	228	A	A	224	212	206	194	242	E	228	214	290	276			
9	E	276	300	290	284	246	240	240	220	206	204	218	196	198	A	A	218	206	196	228	206	220	E	248	294	288		
10	E	296	278	280	274	234	274	252	218	210	208	246	A	192	A	224	210	212	192	212	E	226	222	262	328			
11	E	320	282	268	254	236	236	224	204	214	210	226	218	A	212	232	212	204	200	282	250	228	E	222	284	294		
12	E	298	276	282	294	258	206	278	220	212	A	204	220	220	224	216	206	208	200	210	218	228	E	232	246	304		
13	E	318	288	258	232	232	256	254	218	210	210	208	A	A	236	210	222	212	196	220	222	228	E	230	262	282		
14	E	294	288	284	284	246	212	208	208	210	214	190	H	A	218	232	226	216	204	186	222	E	220	248	270	282		
15	E	286	276	284	270	246	234	254	216	202	218	228	200	210	202	216	220	216	200	210	E	E	260	224	236	294		
16	E	286	276	284	290	248	240	244	220	204	224	208	A	212	216	222	216	206	202	202	204	E	238	232	302	308		
17	E	314	302	276	238	234	226	234	216	210	220	194	228	222	A	230	214	206	212	222	216	E	214	260	280	318		
18	A	314	244	234	252	288	262	232	216	214	206	198	198	208	A	218	210	202	206	226	E	238	246	270	286			
19	E	268	272	280	294	274	256	248	228	214	218	A	C	C	206	C	C	C	C	C	202	224	E	228	258	278	286	
20	E	286	290	298	286	244	208	272	224	210	220	216	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
21	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
22	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	A	A	C	198	212	E	262	214	208	296	290		
23	E	272	300	318	276	252	262	228	200	198	190	212	216	218	A	A	222	210	174	248	E	202	204	E	266	286	298	
24	E	280	300	296	254	252	260	208	182	H	H	208	A	A	214	214	A	220	204	210	200	E	230	224	E	280	310	
25	E	282	284	314	286	278	224	228	188	H	210	216	220	214	230	A	A	230	206	186	242	E	208	E	272	292	298	
26	E	274	258	258	268	242	266	232	220	210	216	194	E	A	230	A	222	204	204	218	226	E	230	208	E	250	304	
27	E	304	288	282	264	276	276	238	226	202	210	218	200	228	218	218	208	208	220	220	E	214	222	E	240	252	266	
28	E	240	252	254	274	266	278	236	212	216	208	194	200	208	190	208	220	214	198	214	E	240	208	E	236	262	302	
29	E	272	296	296	258	220	224	258	232	216	208	226	202	232	A	E	A	236	220	198	190	E	232	E	234	222	268	262
30	E	282	280	280	260	236	256	270	226	208	212	206	198	192	222	A	230	218	206	212	216	222	E	216	E	306	290	
31	E	278	288	280	288	272	260	226	210	210	204	228	216	216	216	216	208	206	192	240	224	E	216	E	236	296	302	
		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	28	26	20	22	17	19	26	27	28	29	29	29	29	29	29	29		
MED	E	282	284	280	268	252	256	238	216	210	211	214	208	213	214	217	217	208	200	211	219	217	E	236	270	290		
UQ	E	297	297	290	284	269	275	254	221	210	217	222	217	220	223	224	220	212	209	230	226	E	238	257	291	304		
LQ	E	273	274	265	256	237	233	228	206	203	207	206	200	200	206	216	212	204	193	208	213	214	E	223	254	280		

DEC. 2012 h'F (KM)

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## IONOSPHERIC DATA STATION Kokubunji

DEC.2012 h'E (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1								B	114	114	A	116	116	114	A	A	120								
2								B	116	112	A	112	118	118	A	A	A								
3								B	116	114	A	114	124	116	120	114	A								
4								B	A	116	A	116	A	A	A	118	A								
5							B	B	122	122	122	A	A	A	122	A	B								
6								B	116	112	110	A	A	118	116	112	116								
7								B	116	114	114	112	114	110	A	A									
8								B	A	118	A	A	A	A	120	118	120								
9							B	B	118	116	A	A	A	A	A	116	116								
10								B	116	A	A	A	A	A	A	116	A								
11								120	120	A	A	120	A	A	A	A	124								
12								A	124	A	A	A	A	114	A	114	116								
13								126	120	124	118	A	A	A	A	A	B								
14								B	114	A	A	A	A	122	A	120	118								
15								B	122	116	A	A	122	120	A	A	116								
16								B	116	A	120	116	120	122	122	118	120								
17								B	118	118	122	122	A	A	122	112	124								
18								118	118	A	A	A	116	A	A	A	116								
19								124	116	116	A	C	C	122	C	C	C								
20								B	118	112	A	C	C	C	C	C	C	C	C	C	C	C	C	C	
21								C	C	C	C	C	C	C	C	C	C								
22								C	C	C	C	C	C	C	112	120	C								
23								B	118	112	112	A	114	118	118	A	B								
24								B	110	114	116	116	116	A	A	A	A								
25								B	114	112	110	112	118	116	A	A	A								
26								B	118	112	A	114	118	A	A	122	122								
27								B	120	116	120	A	A	A	112	A	A								
28								B	120	114	112	A	112	A	A	A	A								
29								B	116	116	116	A	A	A	A	116	116								
30								B	116	A	A	A	A	A	A	A	A								
31								B	A	114	118	118	A	A	A	A	A								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT								4	26	22	13	12	12	12	9	13	13								
MED								122	117	114	116	116	117	118	120	116	118								
U Q								125	120	116	120	117	119	121	122	119	121								
L Q								119	116	112	112	113	115	115	114	114	116								

DEC.2012 h'E (KM)

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## IONOSPHERIC DATA STATION Kokubunji

DEC.2012 h'Es (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D	H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	B	B	B	B	B	B	B	B	170	118	120	106	G	120	120	106	108	152	88	B	B	B	B	108	B
2	B	B	B	B	B	B	B	B	154	G	112	108	122	G	104	100	98	94	92	96	96	90	90	88	90
3	B	B	B	102	94	94	94	B	122	116	108	G	G	G	104	100	104	104	104	104	102	100	94	B	B
4	B	B	B	B	100	B	100	144	106	108	106	100	98	94	104	G	106	B	86	B	B	B	B	B	B
5	B	B	B	B	B	B	B	B	132	G	G	G	96	98	100	G	104	126	102	B	B	100	96	B	B
6	B	B	B	B	B	B	B	108	138	G	G	G	102	104	G	G	G	G	92	94	B	B	B	B	B
7	B	B	B	B	B	B	B	B	142	150	120	G	G	G	146	106	98	94	92	90	92	B	B	B	B
8	B	B	100	B	100	B	B	B	162	108	G	106	100	106	106	104	G	G	90	92	94	B	B	B	B
9	B	B	B	B	B	B	B	B	148	G	106	106	106	104	102	104	G	G	B	130	96	B	B	B	B
10	B	B	B	B	B	B	B	B	136	G	104	106	102	102	104	106	G	98	94	B	B	B	B	B	B
11	B	B	B	B	B	B	B	B	G	122	106	104	118	104	104	108	104	G	B	100	104	B	B	B	B
12	B	B	B	B	102	102	98	96	96	96	96	106	106	108	G	104	G	G	B	B	B	108	B	B	B
13	108	114	108	108	106	B	B	B	B	G	112	106	108	100	104	100	96	B	B	B	B	B	B	104	B
14	104	104	108	98	B	B	B	B	B	G	106	106	108	108	G	108	124	118	B	B	B	B	B	B	B
15	B	B	B	B	B	B	B	B	146	G	G	108	106	G	G	102	110	G	98	B	B	B	B	B	B
16	B	B	B	B	B	B	B	B	142	142	108	G	116	G	G	G	G	G	B	B	B	108	102	B	B
17	B	B	B	B	B	B	B	B	146	G	G	G	G	108	108	G	G	G	B	B	B	B	B	B	B
18	100	96	102	102	98	B	B	G	G	G	104	106	106	G	106	106	108	G	B	B	B	B	B	B	B
19	B	B	94	B	B	B	B	B	G	G	G	106	C	C	G	C	C	C	C	94	96	96	B	B	B
20	B	B	B	B	B	B	B	B	158	G	116	104	C	C	C	C	C	C	C	C	C	C	C	C	C
21	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
22	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
23	B	B	B	B	B	B	B	B	138	138	G	122	106	144	136	124	106	136	B	92	94	94	B	B	B
24	B	110	110	B	106	104	104	104	B	G	106	150	126	138	104	104	96	96	102	B	B	B	B	B	106
25	100	B	108	B	104	104	104	B	110	G	116	128	118	122	106	104	102	G	B	92	98	B	90	84	B
26	104	96	102	B	B	B	B	B	152	G	120	106	120	120	104	110	102	G	116	98	96	104	104	104	B
27	B	102	108	108	B	92	104	92	G	G	106	106	106	108	122	106	102	98	98	98	B	B	B	B	B
28	B	B	B	106	100	B	100	94	G	G	120	110	110	108	108	90	102	94	98	102	B	B	B	B	B
29	102	B	B	B	B	B	B	B	B	G	G	130	104	102	106	108	126	162	B	96	96	96	96	98	B
30	96	106	110	102	100	110	B	108	G	106	104	104	108	110	106	106	104	104	100	96	96	98	92	98	98
31	90	102	104	104	100	100	106	98	96	104	120	122	106	106	106	110	104	106	104	104	104	102	98	92	90
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT		8	8	11	8	11	7	9	21	11	17	24	23	21	21	24	20	17	16	18	16	11	9	10	4
MED		101	103	108	103	100	102	104	142	118	106	106	106	108	106	106	105	104	96	97	96	100	96	95	94
U Q		104	108	108	107	104	104	105	150	138	116	114	118	114	109	108	109	122	103	100	102	104	101	104	102
L Q		98	99	102	102	100	94	99	106	106	105	106	104	104	104	104	100	97	92	92	96	96	92	92	90

DEC.2012 h'Es (KM)

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## IONOSPHERIC DATA STATION Kokubunji

DEC. 2012 TYPES OF Es 135°E MEAN TIME (G.M.T. + 9 H)

LAT. 35°43.0'N LON. 139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1								H 2	C 2	C 2	L 2		C 2	C 2	L 2	L 2	H 2	F 1						F 1	
2								H 1		C 1	L 2	C 2		L 2	L 2	L 2	L 3	F 3	F 1	F 3	F 2	F 2	F 1	F 1	
3			F 1	F 1	F 2	F 2			C 2	C 2	L 2				L 2	L 2	L 2	F 3	F 4	F 2	F 2	F 1			
4				F 2		F 1		H 1	L 2	L 2	L 2	L 2	L 2	L 2	L 2		L 2		F 1						
5								H 2				L 2	L 2	L 2		L 2	C 2	F 3				F 1	F 2		
6							F 1	H 1				L 2	L 2					F 2	F 2						
7								H 2	H 2	C 2				H 2	L 2	L 2	L 3	F 2	F 3	F 1					
8			F 2		F 1			H 1	L 2		L 2	L 2	L 2	L 2	L 2			F 2	F 2	F 2					
9								H 1		L 2	L 2	L 2	L 2	L 2	L 2				F 1	F 1					
10								H 2		L 2	L 2	L 2	L 2	L 2	L 2		L 2	F 3							
11									C 2	L 2	L 2	C 1	L 2	L 2	L 2	L 2			F 2	F 1					
12					F 2	F 1	F 3	L 3	L 2	L 2	L 2	L 2	L 1		L 2						F 2				
13	F 3	F 2	F 2	F 1	F 1						C 1	L 2	L 1	L 2	L 2	L 2	L 2							F 2	
14	F 1	F 1	F 2	F 2						L 2	L 2	L 2	L 2		L 2	C 1	C 1								
15								H 2			L 2	L 2			L 2	L 1		F 2							
16								H 2	H 2	L 2		C 2										F 1		F 3	
17								H 2					L 2	L 2											
18	F 3	F 2	F 2	F 1	F 1					L 2	L 1	L 2		L 2	L 2	L 2									
19			F 2								L 2								F 2	F 1	F 1				
20								H 1		C 2	L 2														
21																									
22															CL 21	CL 21		F 2	F 2	F 1			F 1		
23								H 1	H 1		C 2	L 2	HL 22	HL 22	CL 22	L 2	H 1		F 1	F 1	F 1				
24		F 4	F 2		F 1	F 2	F 1	L 2		L 2	HL 12	CL 12	CL 12	L 2	L 2	L 3	L 2	F 2						F 1	
25	F 2		F 5		F 2	F 2	F 1		L 2		C 2	C 2	CL 22	CL 22	L 3	L 4	L 3		F 2	F 2		F 1	F 1		
26	F 2	F 2	F 1					H 1		C 2	L 2	C 2	CL 22	L 2	L 2	L 2		F 2	F 2	F 2	F 2	F 2	F 2	F 2	
27		F 2	F 2	F 2		F 3	F 1	L 3			L 2	L 2	L 2	L 2	C 1	L 2	L 2	F 5	F 2	F 2	F 2			F 2	
28				F 2	F 2		F 1	L 2			C 1	L 2	L 1	L 1	L 2	L 3	L 2	F 1	F 2	F 2					
29	F 1										CL 22	L 2	L 2	L 2	L 2	C 2	H 2		F 1	F 3	F 3	F 3	F 2	F 2	
30	F 1	F 2	F 2	F 2	F 2	F 1		L 1		L 2	L 2	L 2	L 2	L 2	L 2	L 2	L 3	F 5	F 4	F 4	F 3	F 3	F 3	F 2	
31	F 2	F 2	F 1	F 2	F 3	F 3	F 3	L 3	L 3	L 2	CL 11	CL 11	L 2	L 2	L 2	L 2	L 3	F 2	F 3	F 3	F 3	F 2	F 4	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																									
U Q																									
L Q																									

DEC. 2012 TYPES OF Es

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Yamagawa

DEC.2012 f<sub>XI</sub> (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	X 31	X 34	X 34	X 35	X 37	X 35	X 36												X 61	X 57	X 47	X 46	X 47	X 35
2	X 36	X 36	X 36	X 36	X 38	X 35	X 33												X 77	X 52	X 39	X 42	X 44	X 40
3	X 33	X 35	X 38	X 38	X 38	X 36	X 36												X 52	X 53	X 50	X 51	X 42	X 34
4	X 37	X 38	X 37	X 37	X 37	X 38	X 43												X 48	X 59	X 39	X 33	X 33	X 36
5	X 36	X 37	X 36	X 39	X 39	X 38	X 36												X 53	X 45	X 53	X 44	X 44	X 34
6	X 34	X 33	X 32	X 32	X 32	X 32	X 32												X 54	X 55	X 55	X 48	X 40	X 36
7	X 36	X 38	X 39	X 40	X 38	X 36	X 33												X 53	X 50	X 52	X 46	X 33	X 34
8	X 34	X 35	X 35	X 35	X 36	X 34	X 34												X 48	X 51	X 58	X 59	X 34	X 34
9	X 33	X 33	X 34	X 34	X 36	X 34	X 34												X 46	X 57	X 56	X 42	X 36	X 34
10	X 36	X 36	X 38	X 38	X 37	X 34	X 35												X 61	X 46	X 44	X 39	X 36	X 35
11	X 35	X 39	X 39	X 40	X 40	X 38	X 37												X 62	X 42	X 50	X 46	X 40	X 36
12	X 35	X 36	X 38	X 37	X 37	X 36	X 35												X 61	X 48	X 52	X 53	X 55	X 41
13	X 39	X 40	X 40	X 39	X 38	X 35	X 35												X 57	X 53	X 56	X 55	X 42	X 33
14	X 34	X 35	X 38	X 38	X 42	X 38	X 28												X 45	X 38	X 42	X 41	X 40	X 36
15	X 35	X 36	X 39	X 40	X 38	X 36	X 36												X 61	X 46	X 58	X 60	X 46	X 40
16	X 38	X 40	X 39	X 38	X 38	X 36	X 34												X 71	X 48	X 44	X 43	X 38	X 33
17	X 33	X 35	X 35	X 38	X 38	X 36	X 35												X 72	X 61	X 51	X 35	X 40	X 37
18	X 36	X 40	X 46	X 36	X 37	X 32	X 32												X 58	X 52	X 48	X 46	X 42	X 40
19	X 34	X 33	X 34	X 32	X 35	X 35	X 30												X 67	X 46	X 54	X 44	X 38	X 35
20	X 33	X 34	X 35	X 36	X 42	X 37	X 32												X 46	X 42	X 40	X 44	X 34	X 34
21	X 36	X 39	X 43	X 45	X 42	X 29	X 31												X 60	X 50	X 48	X 45	X 44	X 37
22	X 37	X 36	X 36	X 36	X 36	X 39	X 34												X 50	X 41	X 44	X 45	X 30	X 30
23	X 33	X 35	X 34	X 34	X 38	X 35	X 34												X 48	X 60	X 60	X 40	X 38	X 36
24	X 38	X 38	X 39	X 38	X 40	X 36	X 34												X 58	X 48	X 43	X 41	X 38	X 30
25	X 34	X 37	X 37	X 37	X 39	X 46	X 36												X 60	X 57	X 67	X 46	X 38	X 37
26	X 40	X 40	X 36	X 36	X 35	X 34	X 34												X 48	X 45	X 42	X 42	X 38	X 34
27	X 35	X 37	X 40	X 38	X 39	X 36	X 35												X 50	X 50	X 44	X 40	X 37	X 33
28	X 35	X 35	X 35	X 39	X 40	X 39	X 39												X 63	X 46	X 46	X 38	X 33	X 32
29	X 35	X 35	X 37	X 38	X 39	X 35	X 32												X 51	X 44	X 46	X 46	X 38	X 33
30	X 35	X 37	X 40	X 40	X 40	X 38	X 36												X 73	X 50	X 56	X 56	X 42	X 34
31	X 38	X 38	X 38	X 38	X 38	X 35	X 34												X 48	X 41	X 39	X 39	X 33	X 35
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31												31	31	31	31	31	31
MED	X 35	X 36	X 37	X 38	X 38	X 36	X 34												X 57	X 50	X 48	X 44	X 38	X 35
U Q	X 36	X 38	X 39	X 39	X 39	X 38	X 36												X 61	X 53	X 55	X 46	X 42	X 36
L Q	X 34	X 35	X 35	X 36	X 37	X 35	X 33												X 48	X 45	X 44	X 41	X 36	X 34

DEC.2012 f<sub>XI</sub> (0.1MHz)

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## IONOSPHERIC DATA STATION Yamagawa

DEC.2012 foF2 (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	25	28	28	29	31	29	30	47	65 <sup>R</sup>	62 <sup>U</sup>	80 <sup>Y</sup>	74	70	67	73	72	76	71	56	51	40	40	41	29
2	30	30	30	30	32	29	27	46	64	70	66	70	73	82 <sup>R</sup>	80	80	70	57	71	46 <sup>H</sup>	32	36	38	34
3	27	29	32	32	32	30	30	48	72 <sup>R</sup>	79	71	84 <sup>U</sup>	86 <sup>R</sup>	85	84 <sup>J</sup>	82	82	64	46	47	44	45	36	28 <sup>V</sup>
4	30	31	30	30	31	32	37	39	60	65	67	72	86 <sup>R</sup>	72	86	88	69	60	42	53	33	27	27	28
5	30	31	30	33	33	32	30	46	69	63	78	76 <sup>R</sup>	76	87	78	82	72	67	47	39	47	38	38	28
6	29	27	26	26	26	26	26	42	63	80	80	72	68	76	71	74	66	56	48	49	49	42	34	30
7	30	32	33	34	32	30	27	45	65 <sup>J</sup>	76	66	70	82	80	88 <sup>U</sup>	75	64	62	47	44	46	41	26	26
8	28	29	29	29	30	28	28	46	72 <sup>R</sup>	71	71	71	85 <sup>U</sup>	89	80	78	74	70	42	45	52	53	28	28
9	27	27	28	28	30	28	28	42	60 <sup>U</sup>	79	72	70	82 <sup>R</sup>	79	79	68	78	56	40	51	50	36	30	28
10	30	30	32	32	32	28	29	44	70	72	82	80	96 <sup>J</sup>	87	80	78	80	66	55	42	38	33	30	29
11	30	33	33	34	34	32	31	44	62	72	76	80	75	72	74	78	79	72	56	36	44	40	34	30
12	29	30	32	31	31	30	28	43	64	61	74	72	79	94 <sup>J</sup>	98 <sup>U</sup>	80	74	67 <sup>R</sup>	55	42	46	46 <sup>F</sup>	49	34
13	33	34	34	33	32	28	28	42	78	79	73	80	88	86	84 <sup>R</sup>	80	77	71	50	47	49	49	36	27
14	28	29	32	32	36	32	22	40	62	87 <sup>R</sup>	80	74	76	87	81 <sup>U</sup>	73	73	61	39	32	36	35	33	30
15	29	30	33	33	32	30	30	42	72 <sup>J</sup>	89 <sup>R</sup>	84	85	80	82	98 <sup>U</sup>	98 <sup>R</sup>	76	72	55	40	51	53	40	34
16	32	33	33	32	32	30	28	42	72	77	79	69	92 <sup>J</sup>	97 <sup>R</sup>	84	74	72	74	67	41	39	37	32	27
17	27	29	29	32	32	30	29	41	65	76 <sup>R</sup>	85	94	80	93	98 <sup>R</sup>	84	83	68	66	55	45	29	34	31
18	30	34	39	30	30	26	26	43	80	83	89	82	92 <sup>U</sup>	88	106 <sup>R</sup>	104	92	66	52	46	42	40	36	34
19	28	27	28	26	29	29	24	37	75	83 <sup>J</sup>	88 <sup>R</sup>	78	88 <sup>J</sup>	80	80	79	72	79	61	40	48	38	32	29
20	27	28	29	30	35	31	26	37	62	66	72	72	87 <sup>J</sup>	92 <sup>U</sup>	74	68	69	67	40	36	35	37	28	28
21	28 <sup>F</sup>	30 <sup>F</sup>	34 <sup>F</sup>	36	36	23	25	40	69	72	78	77	95 <sup>J</sup>	75	70	76	82	65	54	44	42	39	37	31
22	31	30	30	30	30	33	28	37	63 <sup>U</sup>	84 <sup>R</sup>	76	81	81	88	73 <sup>R</sup>	75	81	58	44	35	38	39	24	24
23	27	29	28	28	32	29	28	39	61	67	63	68	68	84 <sup>U</sup>	86 <sup>Y</sup>	79	100	61	42	54	54	34	32	30
24	32	32	33	32	34	30	28	34	56	60	67	78	94 <sup>U</sup>	90	87	77	69	62	52	42	37	35	33	24
25	28	31	31	31	33	40	27	38	62	64	72	68	80	104 <sup>U</sup>	86 <sup>R</sup>	86	92	81 <sup>U</sup>	54	51	61	41	32	31
26	34	34	30	29	29	28	28	40	68	69	77	84	78	A	80	78	60	61	42	39	36	36	32	28
27	29	31	34	32	33	30	29	39	68	71	67	70	76	70	76	65	70	76	44	44	38	34	31	27
28	29	29	29	33	34	33	33	42	70	65 <sup>U</sup>	94 <sup>R</sup>	68	86 <sup>U</sup>	75	75	68	72	71	57	40	38	32	26	26
29	28	29	31	32	33	29	26	40	65	65	68	66	74	72	72	84	77	61	45	38	40	40	32	27
30	29	31	34	34	34	32	30	38	74	80 <sup>U</sup>	85 <sup>U</sup>	86 <sup>U</sup>	93 <sup>U</sup>	96 <sup>U</sup>	106 <sup>R</sup>	83	82	92	67	44	50	50	36	28
31	32	32	32	32	33	29	28	40	62	68	73	77	88 <sup>U</sup>	90 <sup>Y</sup>	73 <sup>U</sup>	67	74	64	41	35	33	32	27	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	31	31	31	31	31	31	31	31	31	31	31	31	31	30	31	31	31	31	31	31	31	31	31	31
MED	29	30	31	32	32	30	28	42	65	72	76	74	82	86	80	78	74	66	50	44	42	38	32	28
U Q	30	32	33	33	33	32	30	44	72 <sup>R</sup>	79	80	80	88 <sup>R</sup>	90 <sup>R</sup>	86	82	81	71	56	47	49	41	36	30
L Q	28	29	29	30	31	28	27	39	62	65	71	70	76	76	74	74	70	61	42	39	38	35	30	27

DEC.2012 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Yamagawa

DEC.2012 foF1 (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1									U L	U L	L	L	L	L	L		320							
2									272		L	L	L	L	L	L	L							
3										L	L	U L	L	L	L	U L								
4										L	L	L	L	L	L	L								
5											L	L	L	L	L	U L	L							
6									L	L	U L	L	L	L	L	L								
7										L	L		U L	L	L	L	U L							
8										L	L	U L	L	U L	U L	U L	L							
9										L	L	L	U L	L	U L	L	L							
10										L	L	L	U L	L	L	L								
11										L	L	U L	L	L	L	L	L							
12										L	L	L	L	L	U L	U L	L							
13										L	L	L	L	L	L	L								
14									288	L	L	L	L	U L	L	L	L							
15										L	L	L	L	L	U L	U L	L							
16											L	L	U L	L	L	L	L							
17										L	L	L	L	L	L	L	L							
18									L	U L	L	L	L	U L	U L	U L	L							
19										L	L	L	L	L	U L	U L	L	L						
20									248	320		L	U L	U L	L	L	L							
21									268	U L	L	L	L	L	L	L	L							
22									256	L	U L	U L	L	L	L	L	L							
23									U L	L	L	L	L	L	U L	U L	L	L						
24												L	U L	A	A	L	L							
25									252		L	L	U L	L	L	L	L							
26											L	L	L	A	A	A	L							
27										L	L	L	L	L	L	L	L							
28										L	U L	L	U L	L	L	L	L							
29										L	L	L	L	L	L	L	L							
30										L	U L	U L	L	L	U L	U L	L							
31									240		L	L	U L	L	L	A								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									9	5	4	6	10	6	9	2	4							
MED									256	336	422	444	474	462	464	420	318							
U Q									280	354	424	452	480	480	472		332							
L Q									250	326	420	428	472	456	454		310							

DEC.2012 foF1 (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Yamagawa

DEC.2012 foE (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								U R 176	240	288	296	328	R 348	A 332	R 296	220		A						
2								J R 176	232	280	316	328	U A 324	A 324	A A	A	228	184						
3								J R 164	248	272	316	328	A A	A A	A A	292		A	A					
4								B 220	268	308	328	U R 328	R 324	R 316	272	224		A						
5								U R 236	224	276	304	312	348	328	320	288	236	168		K 196				
6								B 224	284	304	316	316	324	316	292	236		B						
7								B 248	276	308	320	A 336	A 340	A 344		244		B						
8								J R 160	232	272	A A	A A	A A	328	320	300	228	172						
9								B 232	A 316	U A A	A A	A 340	A A	A A	296	244		B						
10								B 232	A 324	U R 324	U R 328	R 328	A A	A A	280	208	176							
11								B 288	316	328	340	336	328	A A	A A	244		B						
12								B 228	296	316	336	352	324	316	284	220		A						
13								B 224	280	324	332	A A	A A	A A	A A	A A		188						
14								J R 156	204	264	312	320	R 340	R 344	R 344	304	260	180						
15								B 228	276	308	A A	A A	336	308	288	256		B						
16								B 200	288	316	332	344	332	304		236	196							
17								B 220	U A 256	A 308	A 328	340	R 340	R 316	276	260	188							
18								B 220	260	324	348	352	R 344	R 336			A	A	A					
19								J R 148	224	268	U A 308	U A 320	R 348	R A	A A	304	256	176						
20								B 212	264	304	328	344	U A 348	U A 324		252		A						
21								B 216	276	304	324	328	344	328	276	256	188							
22								B 204	272	300	316	332	328	324		244		A						
23								B 208	272	292	344	352	U A 336	U A 316		260	192							
24								B 232	A 268	A 300	A 324	A 340	U A 328	U A 312			A	A						
25								J K 152	A 208	A 272	A 308	A 340	U A 340	U A A	A A	A A	260		A					
26								B 224	A A	A A	328	336	328	U A 308	U A A	A A	244		A					
27								B 224	276	312	344	348	U A 336	U A 320			A	A						
28								B 204	264	296	316	332	U A 332	U A A		A	A							
29								B 236	276	296	316	336	U A 332	U A 328	A 296	A 256	A 188							
30								J R 124	216	268	312	U R 328	U A 328	U A 364	U A 332		A	A						
31								J R 128	216	264	308	308	U A 336	U A 336	U A 324	A 292		A	A					
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT							1	9	30	28	29	28	25	25	23	16	23	15			1			
MED							J K 152	J R 160	224	272	308	328	340	336	320	292	244	188		K 196				
U Q							U R 176	232	278	316	330	348	340	328	296	256	192							
L Q							J R 138	216	268	304	320	332	328	316	282	228	176							

DEC.2012 foE (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



## IONOSPHERIC DATA STATION Yamagawa

DEC.2012 fbEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23																
1	E	BE	BE	BE	BE	BE	BE	B	G	G	G	32	34	29	36	32	32	26	20	E	BE	BE	BE	BE	BE	BE	BE	B												
2	E	BE	BE	BE	BE	BE	BE	B	G	G	G	32	32	33	33	33	31	18	G	E	BE	BE	BE	BE	BE	BE	BE	B												
3	E	BE	BE	BE	BE	BE	BE	B	G	G	G	G	G	32	32	32	24	23	17	16	E	BE	BE	BE	BE	BE	BE	B												
4	E	BE	BE	BE	BE	BE	BE	B	G	G	G	G	G	27	28	28	26	21	21	E	BE	BE	BE	BE	BE	BE	BE	B												
5	E	BE	BE	BE	BE	BE	BE	B	G	G	G	32	32	G	G	33	32	32	25	20	E	B	K	E	BE	BE	BE	B												
6	E	BE	BE	BE	BE	BE	BE	B	G	G	G	G	G	24	34	34	32	G	E	BE	BE	BE	BE	BE	BE	BE	BE	B												
7	E	BE	BE	BE	BE	BE	BE	B	G	G	G	31	34	34	35	35	35	29	29	19	22	19	11	11	11	11	11													
8	E	BE	BE	BE	BE	BE	B	E	B	G	G	G	29	32	32	27	26	23	G	G	22	17	17	E	BE	BE	BE	B												
9	E	BE	BE	BE	BE	BE	BE	B	G	G	G	29	33	33	29	32	32	25	21	20	E	BE	BE	BE	BE	BE	BE	B												
10	E	BE	BE	BE	BE	BE	BE	B	G	G	G	27	27	34	G	33	31	G	27	G	E	BE	BE	BE	BE	BE	BE	B												
11	E	BE	BE	BE	BE	BE	BE	B	G	G	G	G	G	G	G	G	29	20	19	14	14	16	16	16	16	16	16	16												
12	E	BE	BE	BE	BE	BE	BE	B	G	G	G	34	38	37	36	34	30	27	27	E	BE	BE	BE	BE	BE	BE	BE	B												
13	E	BE	B	17	17	E	BE	BE	B	G	G	G	G	33	32	37	39	32	20	29	18	17	15	15	15	15	15													
14	E	BE	BE	BE	BE	BE	BE	B	G	G	G	G	G	37	37	37	G	28	G	E	BE	BE	BE	BE	BE	BE	BE	B												
15	E	BE	BE	BE	BE	BE	BE	B	G	G	G	12	32	33	26	G	G	31	E	BE	BE	BE	BE	BE	BE	BE	BE	B												
16	E	BE	BE	BE	BE	BE	BE	B	G	G	G	34	37	28	G	G	27	G	G	E	BE	BE	BE	BE	BE	BE	BE	B												
17	E	BE	BE	BE	BE	BE	BE	B	G	G	G	26	33	21	20	36	34	23	26	G	E	BE	BE	B	E	BE	BE	B												
18	E	BE	BE	BE	BE	BE	BE	B	G	G	G	26	25	36	28	19	34	30	30	24	19	14	14	14	14	14	14	14												
19	E	BE	BE	BE	BE	BE	BE	B	G	G	G	23	20	31	32	35	G	32	G	G	E	BE	BE	BE	BE	BE	BE	B												
20	E	BE	BE	BE	BE	BE	BE	B	G	G	G	20	26	31	32	35	36	36	30	27	18	11	11	11	11	11	11	11												
21	E	BE	BE	BE	BE	BE	BE	B	G	G	G	16	15	15	15	14	14	14	18	G	E	BE	BE	BE	BE	BE	BE	B												
22	E	BE	BE	BE	BE	BE	BE	B	G	G	G	12	11	11	11	12	14	14	14	22	29	25	34	34	34	34	34	34												
23	E	BE	BE	BE	BE	BE	BE	B	G	G	G	14	14	14	14	14	14	15	29	30	33	36	38	G	29	21	17	16	16											
24	E	BE	BE	BE	BE	BE	BE	B	G	G	G	13	13	13	13	13	12	12	18	28	32	33	34	43	45	31	30	18	19	13	13	12	12	12	12					
25	E	BE	BE	BE	BE	BE	BE	B	K	G	G	12	14	15	15	15	15	18	29	32	33	36	40	38	33	22	24	13	12	12	12	12	12	12						
26	22	E	BE	BE	BE	BE	BE	B	G	G	G	22	15	15	15	15	15	15	26	28	36	36	A	A	79	44	50	19	18	18	14	18	E	BE	BE	BE	B			
27	E	BE	BE	BE	BE	BE	BE	B	G	G	G	14	14	14	14	14	14	34	G	G	G	G	G	G	G	21	34	37	34	26	20	12	12	12	12	13	14			
28	E	BE	BE	BE	BE	BE	BE	B	G	G	G	15	15	15	15	15	15	16	G	G	31	32	32	32	32	32	29	26	20	E	BE	BE	BE	BE	BE	BE	B			
29	E	B	E	BE	BE	BE	BE	B	G	G	G	15	19	15	15	15	14	14	14	27	30	33	39	35	30	33	34	21	18	21	19	12	12	12	12	12				
30	E	BE	BE	BE	BE	BE	BE	B	G	G	G	14	14	13	15	15	15	14	G	G	G	G	G	G	G	36	31	26	29	29	22	22	31	18	18	E	BE	BE	BE	B
31	E	BE	BE	BE	BE	BE	BE	B	G	G	G	15	12	12	12	12	12	14	21	28	29	33	35	38	56	33	26	28	24	24	E	BE	BE	BE	BE	BE	BE	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	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	
MED	E	BE	BE	BE	BE	BE	BE	B	G	G	G	14	14	14	14	14	14	14	28	31	G	33	33	33	29	26	19	14	14	14	14	14	14	14	14	14	14	14	14	
UQ	E	BE	BE	BE	BE	BE	BE	B	G	G	G	15	15	15	15	15	15	15	G	G	32	34	36	36	36	36	32	28	20	19	17	16	15	15	15	14	14	14	14	
LQ	E	BE	BE	BE	BE	BE	BE	B	G	G	G	13	13	13	13	13	13	14	20	26	29	32	G	G	G	G	G	G	G	G	E	BE	BE	BE	BE	BE	BE	BE	BE	B

DEC.2012 fbEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Yamagawa

DEC.2012 fmin (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

$\frac{H}{D}$	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	14	14	14	14	14	14	14	14	14	14	16	15	15	15	15	15	15	12	14	14	14	14	14	14
2	12	12	12	12	12	12	14	14	15	15	15	15	15	21	18	14	14	15	14	14	14	14	14	14
3	12	13	13	13	13	13	13	14	14	14	14	14	14	15	15	17	17	14	14	14	14	14	14	14
4	14	14	14	14	14	14	14	14	14	14	14	14	14	16	16	16	16	16	13	14	14	14	14	14
5	15	15	15	16	16	15	15	16	15	15	15	15	18	18	18	17	17	13	14	15	15	15	15	15
6	14	14	14	14	14	14	14	14	14	14	14	18	16	16	16	16	16	17	16	16	14	14	12	12
7	15	15	15	15	15	14	14	14	14	14	13	12	12	12	12	12	12	12	12	11	11	11	11	11
8	15	15	15	14	12	12	12	12	12	12	12	12	21	19	15	15	15	15	14	14	14	14	14	14
9	14	14	14	14	14	14	14	14	14	14	14	14	14	14	16	17	16	14	14	16	15	15	15	15
10	11	11	11	12	12	12	12	13	12	12	12	14	14	18	18	18	12	12	13	13	13	13	18	14
11	14	14	14	14	14	14	14	14	14	14	13	16	16	18	19	16	14	19	14	14	16	16	16	16
12	12	12	12	12	13	13	15	13	8	7	17	16	16	15	15	14	14	14	12	17	19	14	14	14
13	16	15	15	15	14	14	14	14	13	13	14	16	17	16	15	16	15	15	13	13	12	15	15	15
14	15	13	13	13	13	13	13	14	14	14	12	15	18	18	18	18	16	16	14	14	13	13	13	13
15	15	15	16	15	15	15	15	15	15	15	14	20	20	20	20	16	16	18	14	14	12	11	12	12
16	15	15	15	15	15	15	15	15	15	15	15	14	14	18	18	15	15	15	12	13	13	13	13	13
17	15	15	15	15	14	14	14	14	14	14	15	15	17	18	17	17	14	14	14	14	14	14	14	14
18	14	14	14	14	14	14	14	14	13	13	14	17	17	17	16	16	16	15	14	14	14	14	14	14
19	13	13	13	13	13	13	15	15	13	13	13	12	16	16	16	16	15	15	15	15	15	15	15	15
20	14	14	14	14	14	14	13	13	13	13	13	13	14	14	14	14	12	11	11	11	11	11	11	11
21	16	15	15	15	15	16	15	14	14	14	14	18	18	19	17	17	17	14	14	14	14	14	14	14
22	12	11	11	11	12	14	14	14	14	13	15	15	15	18	18	15	15	15	11	12	12	12	12	12
23	14	14	14	14	14	14	14	14	12	11	11	11	19	19	18	14	14	12	12	15	14	14	14	14
24	13	13	13	13	13	13	12	12	12	12	12	14	14	12	12	14	14	14	12	13	13	12	12	12
25	12	14	15	15	15	15	15	12	12	12	15	16	16	19	19	16	16	15	13	12	12	12	12	12
26	15	15	15	15	15	15	15	15	15	12	12	12	17	17	17	17	16	14	14	14	14	16	16	14
27	14	14	14	14	14	14	14	14	15	16	18	16	12	12	12	18	13	12	12	12	12	12	13	14
28	15	15	15	15	15	15	15	15	12	12	12	14	16	18	18	16	16	14	15	15	15	15	15	15
29	15	15	15	15	15	14	14	14	13	13	13	13	13	14	14	12	12	12	12	12	12	12	12	12
30	14	14	13	15	15	15	14	14	14	14	14	14	14	18	16	14	15	15	14	14	14	14	14	14
31	15	12	12	12	12	12	14	14	14	14	14	14	14	20	14	16	16	14	14	14	14	14	14	14
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	14	14	14	14	14	14	14	14	14	14	14	14	16	18	16	16	15	14	14	14	14	14	14	14
U Q	15	15	15	15	15	15	15	14	14	14	15	16	17	18	18	17	16	15	14	14	14	14	15	14
L Q	13	13	13	13	13	13	14	14	13	12	13	14	14	15	15	14	14	13	12	13	12	12	12	12

DEC.2012 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Yamagawa

DEC.2012 M(3000)F2 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D	H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1		305	292	306	321	301	325	317	349	376 <sup>R</sup>	368 <sup>U</sup>	384 <sup>Y</sup>	365	325	382	352	359	346	364	331	342	317	317	335	308
2		303	307	307	316	311	318	323	349	357	367	386	362	348	349 <sup>R</sup>	337	359	345	346	351	336	319 <sup>H</sup>	296	339	309
3		294	292	288	299	296	312	315	346	379	375 <sup>R</sup>	342	345 <sup>R</sup>	357 <sup>U</sup>	349 <sup>R</sup>	349 <sup>J</sup>	340	348	354	358	335	314	354	356	303 <sup>V</sup>
4		299	292	299	299	315	307	360	341	368	377	358	363	350 <sup>R</sup>	364	344	337	369	391	326	353	340	373	293	287
5		298	291	326	326	322	338	319	334	374	369	371	369	356	355	356	355	353	374	349	306	334	315	335	343
6		308	336	321	316	316	310	314	379	356	374	374 <sup>R</sup>	379	332	351	356	363	373	368	314	360	342	365	327	319
7		299	295	314	339	320	333	318	366	364	368	357	330	363	363 <sup>U</sup>	371 <sup>R</sup>	335	367	377	346	321	346	325	503	271
8		283	326	318	305	297	297	311	336		363 <sup>U</sup>	370 <sup>R</sup>	369	355 <sup>U</sup>	374 <sup>R</sup>	348	341	348	381	361	314	322	349	292	323
9		306	306	302	294	342	329	335	346	366	366	368	364	349 <sup>U</sup>	342 <sup>R</sup>	359	368	352	335	332	339	344	373	332	306
10		293	294	304	304	304	317	303	335	359	347	354	342		358	371	336	362	371	375	339	348	312	340	293
11		286	298	302	317	336	329	306	336	367	360	339	361	367	339	345	361 <sup>R</sup>	357	356	372	336	314	341	348	302
12		299	288	306	315	319	313	333	361	380	398	368	367	332		384 <sup>U</sup>	363 <sup>A</sup>	357	364 <sup>R</sup>	351	324	291	308 <sup>F</sup>	317	312
13		284	296	307	313	319	330	330	336	373	368	351	351	358	359	357 <sup>R</sup>	336	342	360	336	348	319	314	345	341
14		304	294	294	290	331	394	327	328	355	364	349	366	350 <sup>R</sup>	332	345 <sup>U</sup>	340 <sup>R</sup>	374	353	360	345	314	317	332	322
15		307	304	293	310	309	310	311	340	358		361 <sup>U</sup>	356 <sup>R</sup>	339	330	340	324 <sup>R</sup>	355	354	368	328	304	341	335	287
16		289	290	288	301	301	332	319	336	352	356	377 <sup>R</sup>	354		344	338 <sup>R</sup>	364	349	363	366	331	353	315	338	281
17		284	290	297	318	318	340	330	343	362	358	359	326	344	353	356 <sup>R</sup>	343	342	362	351	349	345	311	319	289
18		281	268	339	313	310	329	308	331	356	358	361 <sup>R</sup>	353	340	319 <sup>U</sup>	344 <sup>R</sup>	339	361	351	346	339	331	326	307	311
19		316	311	299	320	321	355	299	329	350	356		338		344 <sup>R</sup>	336	353	347	369	331	320	287	319	320	
20		297	308	294	299	309	365	349	328	372	366	364	350		365 <sup>U</sup>	357 <sup>R</sup>	365	357	371	379	367	342	323	348	297
21		272 <sup>F</sup>	301 <sup>F</sup>	301 <sup>F</sup>	316	350	288	313	329	369	358	351	352		356 <sup>R</sup>	352	352	368	366	357	328	319	342	334	291
22		291	286	287	301	317	351	312	328	351	383	379	356	353	369	339	336	353	379	365	356	322	339	360	312
23		302	281	290	306	317	348	360	367	350	372	374	355	356	346 <sup>U</sup>	346 <sup>Y</sup>	336	371	396	326	330	348	345	321	301
24		279	314	311	292	338	340	335	352	368	348	352	349	345	349	336	360	311	358	370	351	326	344	330	304
25		290	275	296	296	323	363	276 <sup>V</sup>	325	351	351	354	344	345	342 <sup>U</sup>	356 <sup>R</sup>	347	373	374 <sup>U</sup>	372	311	354	318	315	299
26		286	305	326	331	331	305	325	334	350	370	359	364	358		366 <sup>A</sup>	361	367	370	319	323	347	339	346	281
27		276	290	315	300	298	291	303	340	358	355	374	367	364	372	357	346	361	376	363	334	337	334	337	319
28		312	312	304	297	305	300	308	334	357	386	359	398	367	313	348	322	357	344	361	348	348	330	322	322
29		301	296	289	303	317	337	309	325	361	377	360	327 <sup>H</sup>	351	347	329	357	348	349	381	339	322	324	304	309
30		308	301	311	312	320	326	295	318	363	359	366	367	358	348	325	334	325	354	342	326	322	328	345	283
31		282	282	318	308	326	371	317	339	373	368	344	356	341 <sup>U</sup>	376 <sup>Y</sup>		339	335	364	366	342	322	338	329	332
		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	30	30	30	31	26	28	30	31	31	31	31	31	31	31	31	31
MED		297	295	304	308	317	329	317	336	362	366	360	356	350	350	348	343	355	364	358	336	326	328	334	306
U Q		304	306	314	316	323	340	330	346	369	372	371	366	358	364	357	360	367	374	368	348	345	342	345	319
L Q		284	290	294	299	309	310	308	329	356	358	354	349	344	343	344	336	348	354	342	328	319	315	319	291

DEC.2012 M(3000)F2 (0.01)

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## IONOSPHERIC DATA STATION Yamagawa

DEC.2012 M(3000)F1 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1									U L U L	L L	L L	L L	L L	L L	L L		427							
2									430		L L	L L	L L	L L	L L	L L								
3										L L	U L	L L	L L	L L	L L	U L	L L							
4										L L	L L	L L	L L	L L	374	L L								
5											L L	L L	L L	L L	L L	U L	L L	L L						
6									L L	L L	U L	L L	L L	L L	L L	L L								
7										L L	L L		U L	L L	L L	L L	U L	L L						
8										L L	U L	L L	U L	U L	U L	U L	L L							
9										L L	L L	L L	U L	U L	U L	L L	L L							
10										L L	L L	L L	U L	L L	L L	L L								
11										L L	U L	L L	L L	L L	L L	L L	L L							
12										L L	L L	L L	L L	U L	U L	L L	L L							
13										L L	L L	L L	L L	L L	L L	L L								
14									H 430	L L	L L	L L	U L	U L	L L	L L								
15										L L	L L	L L	L L	L L	U L	U L	L L							
16											L L	U L	L L	L L	L L	L L	L L							
17										L L	L L	L L	L L	L L	L L	L L								
18										U L	L L	L L	L L	U L	U L	U L	L L							
19										L L	L L	L L	L L	L L	U L	U L	L L	L L						
20												L L	U L	U L	L L	L L	L L							
21										479	453		L L	U L	U L	L L	L L							
22										398	418	L L	L L	L L	L L	L L	L L							
23										455	L L	U L	U L	L L	L L	L L	L L	460						
24										U L	L L	L L	L L	L L	U L	U L	L L	L L						
25												L L	U L	L L	L L	L L	L L	L L						
26										423		L L	L L	L L	A A	A A	A A	L L						
27											L L	L L	L L	L L	L L	L L	L L	L L						
28											L L	U L	L L	U L	L L	L L	L L							
29											L L	L L	L L	L L	L L	L L	L L							
30											L L	U L	U L	L L	U L	U L	L L	L L						
31											L L	L L	U L	L L	L L	A A								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									9	5	4	6	10	6	9	2	4							
MED									445	425	387	402	380	386	368	371	426							
U Q									467	442	392	415	393	395	382		444							
L Q									426	402	382	400	370	368	362		416							

DEC.2012 M(3000)F1 (0.01)

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DEC.2012 h'F2 (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1									220	220	220	226	226	226	238		238								
2									218		222	238	248	250	250	246	242								
3										238	238	240	240	250	250	250									
4										214	222	224	240	240	264	264									
5											232	232	238	238	238	238	238								
6									224	224	228	228	228	240	240	240									
7										232	232		234	234	238	238	230								
8										226	226	236	236	230	232	232									
9										234	234	234	256	258	250	246	246								
10										224	242	242	266	242	242	242									
11										236	236	238	238	242	254	230	230								
12										222	226	226	246	248	248	238	238								
13										230	230	246	246	248	246		236								
14									222	230	230	230	238	270	264	238									
15										232	232	232	232	248	250	250									
16											234	234	280	254	254	244	240								
17										236	236	238	238	252	248	248									
18									226	226	226	232	244	248	252	242									
19										232	222	226	240	240	240	236	234								
20									216	216		228	236	236	236	236									
21									220	220	222	222	226	228	228	230									
22									216	228	228	232	240	240	240	240	230								
23									212	212	218	230	234	262	260	246	224								
24											232	250	250	250	250	300									
25									230		230	232	258	276	248	248	236								
26											228	234	250	A	236	236	220								
27										228	228	228	236	236	252		234								
28										224	230	216	216	226	238	232									
29										234	234	234	246	246	242										
30										228	230	230	234	240	248	252									
31									212		228	228	268	228	A										
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT									11	24	29	30	31	30	30	26	16								
MED									220	228	230	232	240	242	248	241	236								
U Q									224	232	233	234	248	250	250	248	239								
L Q									216	223	226	228	234	236	238	236	230								

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## IONOSPHERIC DATA STATION Yamagawa

DEC. 2012 h'F (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT. 31°12.0'N LON. 130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	292	294	294	268	268	268	268	224	192 <sup>H</sup>	192	202	196	196	210	222	222	200	200	200	200	230	238	238	240
2	282	282	290	288	270	242	242	228	210	210	210	210	210	220	226	228	218	218	218	212	208	248	248	248
3	246	342	312	292	290	280	270	238	224	192 <sup>H</sup>	192	192	192	212	212	190	214	214	214	214	214	218	220	282
4	298	292	292	292	282	280	218	212	212	212	212	212	228	226	202	196 <sup>H</sup>	210	210	228	228	214	214	274	310
5	278	278	260	260	260	226	240	240	212	208	220	220	174	232	224	200	216	216	208	296	238	238	230	230
6	270	264	266	284	284	284	280	218	212	212	198	212	212	188	198	214	218	214	210	210	210	210	230	254
7	292	292	268	258	258	258	258	236	216	216	216	216	216	212	212	212	210	200	220	220	220	220	220	288
8	298	296	296	306	306	306	298	246	228	222	220	212	212	212	200	210	218 <sup>H</sup>	210	210	238	238	232	242	242
9	266	306	278	294	264	264	250	246	214	214	214	208	196	196	202	206	206	206	212	212	212	240	240	
10	308	310	304	290	272	258	268	260	234	194	216	216	216	216	202	204	222	224	214	214	214	216	244	282
11	304	290	288	266	266	252	252	252	224	210	204	202	220	220	216	220	220	218	210	212	232	232	232	256
12	292	304	298	288	288	284	244	228	216	206	206	210	210	210	210	210	210	210	210	210	252	258	254	272
13	316	312	296	274	268	246	250	250	222	222	220	214	214	214	228	228	214	222	230	222	222	216	228	
14	298	318	314	308	266	194	264	254	170	186 <sup>H</sup>	220	220	182	190	228	228	228	206	204	206	218	238	238	246
15	312	310	300	276	268	262	262	252	228	200	204	204	214	212	212	226	226	224	216	216	238	238	234	258
16	286	286	286	286	286	240	254	246	242	240	232	210	210	188	208 <sup>H</sup>	208	212	220	204	204	204	242	242	258
17	312	312	312	274	274	256	240	228	222	208 <sup>H</sup>	210	210	210	202	202	202	220	218	206	206	206	214	254	272
18	324	324	220	232	256	256	268	254	252	210	214	208	216	212	224	224	224	224	224	224	228	228	256	252
19	264	264	268	302	300	234	248	248	242	220	220	220	230	214	214	216	216	216	208	210	216	216	242	258
20	282	282	282	286	266	212	220	224	190	186	216	216	216	216	216	216	216	212	212	210	210	210	218	284
21	380	332 <sup>O</sup>	282 <sup>O</sup>	228	228	310	296	240	214	212	194	206	206	206	206	206	214	210	206	206	206	214	216	242
22	310	310	310	300	276	232	240	240	178	216	214	214	214	206	206	206	186	186	200	200	234	232	232	280
23	288	296	306	306	262	240	232	224	212	206	204	204	204	230	222	194	220	206	206	226	194	218	254	292
24	306	280	280	282	258	248	238	224	220	220	226	226	228	228	228	220	200	202	202	202	228	220	234	272
25	292	304	304	304	284	198	336	256	192	228	226	226	224	236	236	236	236	224	190	238	214	214	244	278
26	318 <sup>A</sup>	262	262	262	262	262	262	246	236	230	220	228	228	228	228	222	222	216	224	224	226	226	239	292
27	346	314	272	272	272	272	274	254	212	212	212	212	210	210	222	220	220	220	184	212	212	220	232	232
28	286	286	286	286	276	288	282	246	222	222	222	218	218	212	214	212	226	222	198	198	212	216	230	252
29	278	316 <sup>A</sup>	310	296	272	236	286	248	224	224	224	206	242	222	210	232	232	212	200	226	226	226	240	250
30	284	284	266	266	266	246	298	270	224	224	202	202	214	212	204	204	220	220	204	268 <sup>A</sup>	234	230	228	282
31	276	284	284	284	282	232	250	250	176	226	216	216	216	232	232	240	228	222	222	222	222	222	242	248
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	28	27	30	30	31	31	31	31	31	31	31
MED	292	296	288	286	270	256	258	246	216	212	214	212	214	212	212	213	218	214	208	212	218	222	238	258
U Q	310	312	304	294	282	272	274	252	224	222	220	216	218	218	222	224	222	220	216	226	230	232	244	282
L Q	282	284	272	268	264	236	242	228	212	206	204	206	210	208	204	206	212	210	204	206	212	216	230	246

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DEC.2012 h'E (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1								B	118	106	106	110	120		A	120	116	A							
2								B	114	114	110	110	110	110	A	A	110	144							
3								B	136	124	116	108		A	A	A	108	A	A						
4								B	118	116	116	116	116	116	116	116	116	A							
5								B	114	114	110	110	110	110	110	110	110	128	E	B					
6								B	124	124	118	118	116	114	112	112	112	B							
7								B	110	110	110	A	110	108	108	A	110	B							
8								B	118	118	A	A	A	118	118	118	118	150							
9								B	116	A	108	A	122			122	122	B							
10								B	128	A	124	108	108		A	A	108	108	E	B					
11								B		118	110	112	112	112	120	A	120	B							
12								B	118	118	118	118	118	118	118	108	108	A							
13								B	118	118	118	118	A	A	A	A	E	B							
14								B	114	114	114	114	114	114	114	114	114	134							
15								B	156	A	128	116	A	A	116	116	116	B							
16								B	122	120	120	116	116	116	110		110	152							
17								B	108	108	A	108	108		108	112	118	134							
18								B	118	116	118	118	118	116	116	A	A								
19								B	124	122	116	108	A	108	A	108	108	144							
20								B	124	124	A	124	114	114	114		114	A							
21								B	110	110	110	110	110	110	110	110	112	E	B						
22								B	122	120	102	102	102	102	102	A	102	A							
23								B	132	120	116	116	112	112	112	A	120	128							
24								B	160	A	A	114	114	112	112	A	112	A							
25							B	A	114	114	114	114		112	A		116	A							
26								B	126			104	102	102	102	A	124	A							
27								B	128	120	118	116	110	102	102		A	118							
28								B	132	114	114	114	114	114				128							
29								B	116	114	114	114	112	112	114	A	114	A							
30								B	128	118	116	114	114	114	114	112	A	A							
31								B	114	114	114	114	114	114	114	114	A	A							
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT									30	27	26	27	25	25	22	16	23	14			1				
MED									118	118	115	114	114	112	113	112	114	134	E	B	188				
U Q									128	120	118	116	116	115	116	116	118	152	E	B					
L Q									114	114	110	110	110	110	110	109	110	128							

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DEC.2012 h'Es (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	B	B	B	B	B	B	B	G	G	G	152	154	106	106	148	176	128	120	B	B	B	B	B	B
2	104	104	B	B	B	B	B	G	170	158	118	118	118	112	110	110	106	G	B	B	B	B	B	B
3	B	B	B	B	B	B	B	G	102	174	136	G	110	108	108	110	106	106	106	B	B	B	B	B
4	B	106	B	B	128	B	B	B	G	150	194	188	G	G	92	170	142	104	104	104	B	B	B	B
5	B	B	B	B	B	B	B	G	140	G	148	122	G	148	130	128	132	170	B	B	B	B	B	B
6	B	B	B	B	B	B	B	106	106	106	106	160	100	182	190	190	G	B	90	100	100	98	98	B
7	B	B	B	B	B	B	B	B	G	168	182	178	148	148	188	96	200	92	92	92	B	114	B	B
8	B	B	B	B	96	96	B	G	G	112	112	114	114	104	104	104	G	G	100	100	100	98	B	B
9	B	B	B	B	B	B	B	B	G	106	106	106	106	106	106	106	106	106	100	100	100	100	B	B
10	B	B	B	B	B	B	B	B	G	102	102	112	G	112	112	G	158	G	B	B	B	106	106	B
11	B	B	B	B	106	B	B	B	122	186	120	120	G	120	114	108	108	B	B	B	B	B	B	B
12	B	B	B	B	B	B	B	B	G	G	194	190	172	156	156	156	176	108	88	B	B	B	96	B
13	B	96	96	96	B	B	B	B	104	104	104	114	114	110	104	98	98	168	100	94	106	B	B	B
14	B	102	116	B	B	B	B	G	144	166	158	G	172	150	150	G	132	116	96	96	B	B	B	B
15	B	B	B	B	B	B	104	104	108	G	120	120	110	110	G	G	126	B	B	126	126	102	B	B
16	B	B	B	B	B	B	B	B	136	G	136	G	188	108	G	96	G	G	96	B	134	116	B	B
17	B	102	B	B	102	102	B	B	G	120	190	100	100	184	184	106	192	G	B	B	114	B	B	B
18	B	B	B	B	122	110	B	B	G	118	106	194	96	96	200	96	96	96	96	96	B	B	B	B
19	B	B	B	B	B	B	B	G	174	110	110	110	162	G	108	G	G	G	B	100	B	B	B	B
20	B	B	B	B	B	B	B	182	168	168	166	148	122	216	126	120	180	96	96	96	92	B	B	B
21	B	B	B	B	B	B	B	B	194	196	110	140	140	G	192	108	108	G	96	B	96	98	B	B
22	B	B	B	B	B	B	B	B	G	196	182	134	134	132	116	116	166	100	100	96	122	B	B	B
23	B	B	B	B	B	B	B	B	110	178	178	176	160	114	G	106	106	100	100	100	B	B	B	B
24	B	B	116	116	114	110	110	104	112	188	166	150	128	120	112	112	96	96	94	94	108	B	B	94
25	B	B	108	108	B	108	106	102	G	186	182	174	120	116	114	106	106	100	94	94	B	B	B	94
26	102	102	98	98	B	98	B	B	G	110	108	140	140	106	104	104	102	102	102	B	102	B	B	B
27	B	B	B	B	B	B	B	B	G	G	200	G	88	138	116	116	104	156	B	B	B	B	B	B
28	B	B	B	B	B	B	B	B	104	G	168	128	128	124	114	112	112	146	B	B	B	B	B	B
29	B	106	106	B	B	B	B	B	G	150	136	132	116	116	112	154	134	144	106	106	106	106	106	106
30	104	B	B	B	104	B	B	G	G	G	G	G	104	104	104	104	104	102	102	102	102	98	98	98
31	B	104	104	104	104	B	B	102	158	154	146	128	122	122	118	118	118	110	110	110	144	B	B	B
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	3	8	7	5	8	6	3	7	16	23	30	26	27	28	28	27	27	21	21	18	15	9	5	4
MED	104	103	106	104	105	105	106	104	129	154	141	133	120	116	114	110	112	106	100	100	106	100	98	96
U Q	104	105	116	112	118	110	110	106	163	178	178	160	140	143	149	120	142	132	102	102	122	110	106	102
L Q	102	102	98	97	103	98	104	102	107	110	110	118	106	108	108	104	106	100	95	96	100	98	97	94

DEC.2012 h'Es (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Yamagawa

DEC. 2012 TYPES OF Es 135°E MEAN TIME (G.M.T. + 9 H)

LAT. 31°12.0'N LON. 130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D	H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1												HL 11	HL 11	L 1	L 1	HL 11	HL 12	CL 11	L 1							
2	F 1	F 1								HL 11	HL 11	C 1	C 1	C 1	C 2	C 2	L 1									
3									L 1	H 1	C 1			L 1	L 1	L 2	L 2	L 2	L 2	F 2						
4		F 1			F 1					HL 11	HL 11	HL 11			L 1	HL 11	HL 12	HL 12	L 3	F 3	F 1					
5									H 1		H 1	H 1			HL 11	CL 11	CL 12	CL 12	HL 11		K 1					
6								L 1	L 1	L 1	L 1	HL 11	L 11	L 11	HL 11	HL 11	HL 11			F 1	F 1	F 1	F 1	F 1		
7										HL 11	HL 11	HL 11	HL 11	HL 11	HL 11	HL 11	L 2	HL 11	L 2	L 2	F 1		F 1	F 1		
8					F 2	F 3				C 1	C 1	CL 11	CL 11	L 1	L 2	L 2	L 2			L 2	F 1	F 1	F 1			
9										C 1	C 1	C 1	L 1	L 2	L 1	L 1	L 1	L 1	L 2	F 1	F 1	F 2	F 1			
10										L 1	L 1	C 1			C 1	L 2		H 1					F 1	F 1		
11					F 1					CL 11	HL 11	CL 11	CL 11		C 1	L 1	C 2	L 1								
12												H 1	HL 11	HL 11	HL 11	HL 11	H 1	HL 11	L 3	F 1				F 1		
13		F 1	F 3	F 2					L 1	L 1	L 1	C 1	C 1	C 1	L 3	L 2	L 2	L 2	HL 11	L 3	F 1	F 1				
14		F 2	F 1						H 1	H 1	HL 11		H 1	H 1	H 1		C 1	L 1	F 1	F 1	F 1					
15						F 1	L 1		L 1			C 1	C 1	L 1	L 1			CL 21			C 2	F 1	F 1			
16									H 1			CL 21		HL 11	L 1		L 1			L 1		F 1	F 2			
17		F 1			F 1	F 1				C 1	HL 11	L 1	L 1	HL 11	HL 11	HL 11	L 1	HL 11				F 3				
18					F 1	F 1				C 1	C 1	HL 11	LH 11	L 2	HL 11	L 1	L 2	L 2	F 2	F 1						
19									H 1	L 1	C 1	C 1	HL 11		L 2						F 1					
20								H 1	H 1	HL 11	HL 11	HL 11	HL 11	HL 11	H 1	C 11	HL 11	HL 11	L 1	F 1	F 1	F 1				
21									H 1	H 1	L 1	H 1	H 1		H 1	L 1	L 1	L 1	F 1	F 1	F 1	F 1	F 1			
22											H 1	H 1	H 1	C 1	C 1	C 2	C 1	H 1	L 3	F 1	F 1	F 1				
23									L 1	HL 11	HL 11	HL 11	H 1	C 1			L 2	L 2	L 1	F 2	F 2					
24			F 1	F 2	F 2	F 1	F 2	L 2	L 1	HL 11	HL 11	H 1	C 1	C 2	C 2	C 1	C 2	C 2	L 1	F 2	F 1	F 1		F 2		
25			F 1	F 1		F 2	KL 11	L 3		H 1	H 1	H 1	C 1	C 1	C 2	C 2	L 2	LH 21	L 2	F 1	F 1			F 1		
26	F 4	F 1	F 2	F 1		F 1				C 1	C 1	H 1	H 1	C 4	C 2	C 3	L 2	L 2	F 2			F 1				
27								L 1			H 1			L 2	HL 11	CL 11	C 2	L 2	H 1							
28									L 2		H 1	C 1	C 1	C 1	C 1	C 1	C 1	LQ 21	C 1							
29		FO 31	F 1							H 1	C 1	C 1	C 2	C 1	C 1	C 1	HL 11	CL 11	HLC 11	F 2	F 1	F 2		F 1	F 2	
30	F 1				F 1									C 1	L 2	L 1	L 1	L 3	L 4	F 3	F 6	F 2	F 2	F 1	F 1	
31		F 1	F 1	F 1	F 1			L 1	H 1	HL 11	H 1	CL 11	C 1	C 1	C 1	C 1	C 1	C 3	L 3	F 3	F 3	F 1				
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT																										
MED																										
U Q																										
L Q																										

DEC. 2012 TYPES OF Es

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Okinawa

DEC.2012 f<sub>XI</sub> (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D	H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	X	X	X	X	X	X	X	X											X	X	X	X	X	X	X	
	35	33	33	36	37	34	36												89	74	82	71	71	59	59	
2	X	X	X	X	X	X	X	X												X	X	X	X	X	X	X
	43	40	40	41	40	36	37												78	88	63	56	52	46	46	
3	X	X	X	X	X	X	X	X												X	X	X	X	X	X	X
	40	38	41	44	52	42	43												89	76	81	79	62	50	50	
4	X	X	X	X	X	X	X	X												X	X	X	X	X	X	X
	45	47	48	45	47	51	48												58	63	69	52	37	36	36	
5	X	X	X	X	X	X	X	X												X	X	X	X	X	X	X
	36	37	37	38	42	36	35												86	68	72	70	62	52	52	
6	X	X	X	X	X	X	X	X												X	X	X	X	X	X	X
	36	36	37	36	36	35	36												66	68	73	67	56	45	45	
7	X	X	X	X	X	X	X	X												X	X	X	X	X	X	X
	40	40	41	39	41	33	34												72	55	66	73	51	37	37	
8	X	X	X	X	X	X	X	X												X	X	X	X	X	X	X
	34	35	35	37	36	36	37												90	70	74	78	52	41	41	
9	X	X	X	X	X	X	X	X												X	X	X	X	X	X	X
	32	32	34	34	36	36	34												84	69	78	67	52	42	42	
10	X	X	X	X	X	X	X	X												X	X	X	X	X	X	X
	42	42	41	40	39	34	32												104	75	60	50	46	43	43	
11	X	X	X	X	X	X	X	X												X	X	X	X	X	X	X
	40	38	40	42	42	31	34												95	64	55	63	51	44	44	
12	X	X	X	X	X	X	X	X												X	X	X	X	X	X	X
	42	38	40	42	40	38	40												91	65	67	64	64	50	50	
13	X	X	X	X	X	X	X	X												X	X	X	X	X	X	X
	42	44	48	46	41	41	38												94	69	79	73	60	42	42	
14	X	X	X	X	X	X	X	X												X	X	X	X	X	X	X
	38	39	42	46	45	32	28												64	53	61	58	56	48	48	
15	X	X	X	X	X	X	X	X												X	X	X	X	X	X	X
	40	40	42	43	36	36	35												89	85	87	86	73	68	68	
16	X	X	X	X	X	X	X	X												X	X	X	X	X	X	X
	61	54	54	49	46	41	33												87	67	61	60	54	50	50	
17	X	X	X	X	X	X	X	X												X	X	X	X	X	X	X
	48	50	52	54	44	36	33												118	80	80	62	52	53	53	
18	X	X	X	X	X	X	X	X												X	X	X	X	X	X	X
	51	58	68	46	47	46	34												98	75	66	63	61	51	51	
19	X	X	X	X	X	X	X	X												X	X	X	X	X	X	X
	34	34	34	35	40	34	27												90	61	74	63	47	44	44	
20	X	X	X	X	X	X	X	X												X	X	X	X	X	X	X
	37	35	34	36	38	30	31												75	57	60	69	52	41	41	
21	X	X	X	X	X	X	X	X												X	X	X	X	X	X	X
	34	37	39	46	32	32	32												85	65	66	61	57	51	51	
22	X	X	X	X	X	X	X	X												X	X	X	X	X	X	X
	46	40	38	38	40	39	34												88	55	56	60	48	33	33	
23	X	X	X	X	X	X	X	X												X	X	X	X	X	X	X
	32	34	35	36	39	36	39												93	76	77	58	50	53	53	
24	X	X	X	X	X	X	X	X												X	X	X	X	X	X	X
	53	51	49	45	46	38	33												80	70	59	54	46	40	40	
25	X	X	X	X	X	X	X	X												X	X	X	X	X	X	X
	32	34	38	37	42	40	32												102	96	98	90	58	49	49	
26	X	X	X	X	X	X	X	X												X	X	X	X	X	X	X
	59	52	47	40	33	33	34												68	53	55	54	48	34	34	
27	X	X	X	X	X	X	X	X												X	X	X	X	X	X	X
	34	35	43	41	37	38	36												83	58	66	57	45	40	40	
28	X	X	X	X	X	X	X	X												X	X	X	X	X	X	X
	35	34	34	35	37	37	36												102	64	49	52	49	37	37	
29	X	X	X	X	X	X	X	X												X	X	X	X	X	X	X
	34	34	36	37	38	36	37												75	50	61	62	52	40	40	
30	X	X	X	X	X	X	X	X												X	X	X	X	X	X	X
	40	40	39	41	37	34	34												126	80	68	66	56	40	40	
31	X	X	X	X	X	X	X	X												X	X	X	X	X	X	X
	41	46	47	45	47	46	36												67	46	49	54	46		A	
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT		31	31	31	31	31	31	31												31	31	31	31	31	30	
MED		X	X	X	X	X	X	X												X	X	X	X	X	X	
U Q		43	44	47	45	44	39	37												94	75	77	70	58	50	
L Q		X	X	X	X	X	X	X												X	X	X	X	X	X	
		34	35	36	37	37	34	33												75	58	60	57	48	40	

DEC.2012 f<sub>XI</sub> (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Okinawa

DEC.2012 foF2 (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

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

DEC.2012 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Okinawa

DEC.2012 foF1 (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1										L	L	LU	LU	LU	LU	L									
2												LU	LU	LU	LU	A	L								
3										L	L	LU	LU	LU	L	A	L								
4									L	L	LU	LU	LU	LU	LU	LU	L								
5									L	L	LU	LU	LU	LU	LU	LU	L								
6											L	L	LU	LU	LU	LU	L								
7								156	256	360	U	L	L	LU	LU	LU	L	L							
8									L	L	L	L	LU	LU	LU	LU	L								
9								U	L	L	L	L	LU	LU	LU	LU	L	L							
10										L	L	LU	LU	LU	LU	LU	L								
11									L	L	L	L	LU	LU	LU	LU	L	L							
12									L	L	L	L	L	LU	LU	LU	L								
13									L	LU	LU	L	LU	LU	LU	LU	L	L							
14									L	L	L	L	LU	LU	LU	LU	L	L							
15									L	L	L	L	LU	LU	LU	LU	L	A							
16									L	L	L	L	LU	LU	LU	LU	L	L							
17									L	L	L	L	LU	LU	LU	LU	L	L							
18									L	L	L	L	LU	LU	LU	LU	L	L							
19									L	L	L	L	LU	LU	LU	LU	L	L							
20									L	L	L	L	LU	LU	LU	LU	L	L							
21									L	L	L	L	LU	LU	LU	LU	L	L							
22									L	L	L	L	LU	LU	LU	LU	L	L							
23									U	L	L	L	LU	LU	LU	LU	L	L							
24									L	L	L	L	LU	LU	LU	LU	L	L							
25									L	L	L	L	LU	LU	LU	LU	L	L							
26									L	L	L	L	LU	LU	LU	LU	L	L							
27									L	L	L	L	LU	LU	LU	LU	L	L							
28									L	L	L	L	LU	LU	LU	LU	L	L							
29									L	L	L	L	LU	LU	LU	LU	L	L							
30									L	L	L	L	LU	LU	LU	LU	L	L							
31									L	L	L	L	LU	LU	LU	LU	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	7	2	3	18	21	21	17	9	1	4							
MED								156	268	368	460	466	484	480	468	440	356	252							
U Q								288		480	472	490	496	492	456			274							
L Q								252		448	464	466	468	460	434			238							

DEC.2012 foF1 (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



# IONOSPHERIC DATA STATION Okinawa

DEC.2012 foE (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								B			U A U R				A	A U A								
2								160	228	280	324	332	348	A	A	A	260	A						
3								B	232	280	320	332		A	A	A		176						
4								B	244	272	320	336	344	340		A	296	260	196					
5								B	208	284	308	324	360	328	328	304		A	A					
6								B	236	280	316	328	336	336	324	304	264	212						
7								B	224	280	324	336	352	360	328	300	260	176						
8								B	A	288		U A A	A	A	A		300	272	204					
9								B	220	280	288		A	A	A	A		272	208					
10								B	240	288	328	328		A	A	A	A		256					
11								B	U A	196	288	320		A	A	U A	A		268	180				
12								B	236	288	324	356		A	340	328	308	292	184					
13								B	220	276	312	352	336	336	320	312	276	216						
14								164	244	292	328	344	352	356	348	312	284	180						
15								B	228	300	320	356	332		A	U A	356	320	280	212				
16								B	204	280	320	336	348	352		R	304	272	192					
17								B	212	280	312		U A R	U A R	U A R	324	296	268						
18								B	216	276		A	R	R	A	A	316	264	220					
19								B	220	284	320	352	320	352	348	300	264							
20								B	208	276	320	340	344		A	A	U A	304	268	192				
21								B	220	268	320	336	352	344		A		272	208					
22								B	212	276	324	328	332	340	308	308	268	196						
23								B	208	280	320	340	348	352	340	300	252	220						
24								A	224	280	316	356	348	336		A	A	268	224					
25								B	212	280	316	332	356		A	A	A	A	A					
26								B	220	284	332	348	352	344		A	A	272						
27								B	224	280	320	356	352	344	324		A	A	228					
28								B	208	268	316	332	340		U A	U A	356	320	284	224				
29								B	220	284	308	332	340	336	320		A	256	200					
30								B	220	288	320	328	348		A	A	A	A	A					
31								B	220	280	316	340	364	360	332		U A	A	A					
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								2	30	31	29	27	24	20	16	18	25	22						
MED								162	220	280	320	336	348	344	328	304	268	206						
U Q									228	288	322	352	352	354	348	312	272	216						
L Q									212	280	316	332	340	336	324	300	260	192						

IONOSPHERIC DATA STATION Okinawa

DEC.2012 foEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
1	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	B
2	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	B
3	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	B
4	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	B
5	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	B
6	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	B
7	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	B
8	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	B
9	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	B
10	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	B
11	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	B
12	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	B
13	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	B
14	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	B
15	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	B
16	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	B
17	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	B
18	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	B
19	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	B
20	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	B
21	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	B
22	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	B
23	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	B
24	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	B
25	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	B
26	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	B
27	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	B
28	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	B
29	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	B
30	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	B
31	E	B	E	B	E	B	E	B	E	B	E	B	G		J	A	J	A	J	A	E	B	J	A	E	B	E	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	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	
MED	E	B	E	B	E	B	E	B	E	B	E	B	E	B	J	A	J	A	J	A	E	B	J	A	E	B	E	B
UQ	E	B	E	B	E	B	E	B	E	B	E	B	E	B	J	A	J	A	J	A	E	B	J	A	E	B	E	B
LQ	E	B	E	B	E	B	E	B	E	B	E	B	E	B	J	A	J	A	J	A	E	B	J	A	E	B	E	B

IONOSPHERIC DATA STATION Okinawa

DEC.2012 fbEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
1	E	BE	BE	BE	BE	BE	BE	BE	B			G						G		E	BE	BE	BE	BE	BE	B
2	E	BE	BE	BE	BE	BE	BE	BE	B	G								G		E	BE	BE	BE	BE	BE	B
3	E	BE	BE	BE	BE	BE	BE	BE	B		G	G								E	BE	BE	BE	BE	BE	B
4	E	BE	BE	BE	BE	BE	BE	BE	B	G	G								G	E	BE	BE	BE	BE	BE	B
5	E	BE	BE	BE	BE	BE	BE	BE	B			G								E	BE	BE	BE	BE	BE	B
6	E	BE	BE	BE	BE	BE	BE	BE	B											E	BE	BE	BE	BE	BE	B
7	E	BE	BE	BE	BE	BE	BE	BE	B										G		E	BE	BE	BE	BE	B
8	E	BE	BE	BE	BE	BE	BE	BE	B										G		E	BE	BE	BE	BE	B
9	E	BE	BE	BE	BE	BE	BE	BE	B										G		E	BE	BE	BE	BE	B
10	E	BE	BE	BE	BE	BE	BE	BE	B											E	BE	BE	BE	BE	BE	B
11	E	BE	BE	BE	BE	BE	BE	BE	B										G		E	BE	BE	BE	BE	B
12	E	BE	BE	BE	BE	BE	BE	BE	B											G		E	BE	BE	BE	B
13	E	BE	BE	BE	BE	BE	BE	BE	B											G		E	BE	BE	BE	B
14	E	BE	BE	BE	BE	BE	BE	BE	B											G		E	BE	BE	BE	B
15	E	BE	BE	BE	BE	BE	BE	BE	B											G		E	BE	BE	BE	B
16	E	BE	BE	BE	BE	BE	BE	BE	B											G		E	BE	BE	BE	B
17	E	BE	BE	BE	BE	BE	BE	BE	B											G		E	BE	BE	BE	B
18	E	BE	BE	BE	BE	BE	BE	BE	B											G		E	BE	BE	BE	B
19	E	BE	BE	BE	BE	BE	BE	BE	B											G		E	BE	BE	BE	B
20	E	BE	BE	BE	BE	BE	BE	BE	B											G		E	BE	BE	BE	B
21	E	BE	BE	BE	BE	BE	BE	BE	B											G		E	BE	BE	BE	B
22	E	BE	BE	BE	BE	BE	BE	BE	B											G		E	BE	BE	BE	B
23	E	BE	BE	BE	BE	BE	BE	BE	B											G		E	BE	BE	BE	B
24	E	BE	BE	BE	BE	BE	BE	BE	B											G		E	BE	BE	BE	B
25	E	BE	BE	BE	BE	BE	BE	BE	B											G		E	BE	BE	BE	B
26	E	BE	BE	BE	BE	BE	BE	BE	B											G		E	BE	BE	BE	B
27	E	BE	BE	BE	BE	BE	BE	BE	B											G		E	BE	BE	BE	B
28	E	BE	BE	BE	BE	BE	BE	BE	B											G		E	BE	BE	BE	B
29	E	BE	BE	BE	BE	BE	BE	BE	B											G		E	BE	BE	BE	B
30	E	BE	BE	BE	BE	BE	BE	BE	B											G		E	BE	BE	BE	B
31	E	BE	BE	BE	BE	BE	BE	BE	B											G		E	BE	BE	BE	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	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	
MED	E	BE	BE	BE	BE	BE	BE	BE	B											G		E	BE	BE	BE	B
UQ	E	BE	BE	BE	BE	BE	BE	BE	B											G		E	BE	BE	BE	B
LQ	E	BE	BE	BE	BE	BE	BE	BE	B											G		E	BE	BE	BE	B

DEC.2012 fbEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Okinawa

DEC.2012 fmin (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

$\begin{matrix} H \\ D \end{matrix}$	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	14	14	14	14	14	14	14	14	15	16	17	20	19	21	18	17	14	14	14	14	14	14	14	14
2	14	14	14	14	14	14	14	14	14	14	20	20	20	20	20	14	14	13	14	14	14	14	14	14
3	14	14	14	14	14	14	14	14	14	14	16	18	22	17	16	16	15	13	14	14	14	14	14	14
4	14	14	14	14	14	14	14	15	14	15	20	15	21	21	22	20	14	15	14	14	14	14	14	14
5	14	14	14	14	14	14	14	14	14	15	20	16	21	18	18	16	14	14	14	14	14	14	14	14
6	14	14	14	14	14	14	14	14	14	14	14	17	20	20	16	17	13	14	14	14	14	14	14	14
7	14	14	14	14	14	14	14	14	14	13	16	17	16	19	14	14	14	14	14	14	14	14	14	14
8	14	14	14	14	14	14	14	14	14	15	21	14	19	15	17	14	14	14	14	14	14	14	16	14
9	14	14	14	14	14	14	14	14	14	16	16	16	21	18	14	16	13	14	14	14	14	14	14	14
10	14	14	14	14	14	14	14	14	14	16	16	17	22	18	16	21	14	14	14	14	14	14	14	14
11	14	14	14	13	14	14	14	14	14	14	15	18	20	21	20	16	15	13	14	14	14	14	14	14
12	14	14	14	14	14	14	14	14	14	14	16	17	20	21	18	16	16	14	14	14	14	14	14	14
13	14	14	14	14	14	14	14	14	14	15	18	20	19	20	15	14	14	14	14	14	14	14	14	14
14	14	14	14	14	14	14	14	14	14	16	17	20	20	20	21	20	18	14	14	14	14	14	14	14
15	14	14	14	14	14	14	14	14	15	15	21	21	21	22	20	21	20	17	14	14	14	14	14	14
16	14	14	14	14	14	14	14	14	15	18	20	20	21	21	21	19	16	16	14	14	14	14	14	14
17	14	14	14	14	14	14	14	14	15	16	18	18	20	23	18	14	14	14	14	14	14	14	14	14
18	14	14	14	14	14	14	14	14	16	18	19	20	17	20	15	21	15	14	14	14	14	14	14	14
19	14	14	14	14	14	14	14	14	16	14	14	21	22	21	24	17	15	14	14	14	14	14	14	14
20	14	14	14	14	14	14	14	14	14	15	21	18	20	22	20	17	14	14	14	14	14	14	14	14
21	14	14	14	14	14	14	14	14	14	15	19	20	21	16	17	15	13	12	13	14	14	14	14	14
22	14	14	14	14	14	14	14	14	14	15	17	21	20	23	24	20	14	14	14	14	14	14	14	14
23	14	14	14	14	14	14	14	14	15	15	17	21	22	20	20	16	14	14	14	14	14	14	14	14
24	14	14	14	14	14	14	14	14	14	14	16	20	16	21	21	17	16	17	14	14	14	14	14	14
25	14	14	14	14	14	14	14	14	14	20	18	20	20	21	18	16	15	14	14	14	14	14	14	14
26	14	14	14	14	14	14	14	14	14	14	17	20	21	21	21	16	14	14	14	14	14	14	15	14
27	14	14	14	14	14	14	14	14	14	18	18	22	24	21	21	20	20	14	14	14	14	14	14	14
28	14	14	14	14	14	14	14	14	14	12	15	18	21	18	22	15	16	14	13	14	14	14	14	13
29	14	14	14	14	14	14	14	14	14	14	18	21	17	20	16	14	14	14	14	14	14	14	14	14
30	14	14	14	14	14	14	14	14	14	14	17	16	21	16	16	15	14	14	14	14	14	14	14	14
31	14	14	14	14	14	14	14	14	14	20	15	16	21	15	15	14	15	14	14	14	14	13	14	14
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	14	14	14	14	14	14	14	14	14	15	17	20	20	20	18	16	14	14	14	14	14	14	14	14
U Q	14	14	14	14	14	14	14	14	14	16	19	20	21	21	21	19	15	14	14	14	14	14	14	14
L Q	14	14	14	14	14	14	14	14	14	14	16	17	19	18	16	15	14	14	14	14	14	14	14	14

DEC.2012 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Okinawa

DEC.2012 M(3000)F2 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D <sup>H</sup>	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	342	290	302	309	325	306	301	337	372	377	354	361	365	354	346	342	344	347	350	328	333	305	325	363
2	306	311	307	302	319	304	336	352	367	334	369	361	313 <sup>H</sup>	316	320	334	371	337	317	365	344	316	311	351
3	301	298	303	315	329	359	325	331	363	378	352	347	335	320	314 <sup>R</sup>	319	330	337	318	319	325	343	340	326
4	292	304	311	307	311	349 <sup>R</sup>	393	343	373	353	354	371	312	341	314	339	372	364	311	313	357	346	314	327
5	295	307	311	325	346	345	321	345	357	351	354	345	335	321	327	341	356	344	353	328	307	345	346	349
6	289	305	321	323	309	311	319	354	376	367	348	370	351	338	334	341	356	352	344	324	344	332	345	305
7	294	298	322	340	348	317	326	349	370	371	360	341	325	346	343	351	368 <sup>H</sup>	366 <sup>R</sup>	373 <sup>J</sup>	318 <sup>R</sup>	319	337	323 <sup>R</sup>	316
8	300	298	306	297	305	301	312	343	360	367	367	360	330	334	317	318 <sup>H</sup>	329 <sup>J</sup>	331 <sup>R</sup>	362 <sup>R</sup>	337	314	336	320	322
9	312	300	304	307	318	323	336	351	361	365	364	341	316	336	333	342 <sup>V</sup>	325	356	381	309	326	338	338	316
10	297	292	319	343	330	325	311	326	350	362	343	360	325	344	331	314 <sup>R</sup>	329	338	350	310	336	324	308	302
11	313	297	300	317	344	371	286	332	365	357	344	358	348	349	331	317	353	350	358	360	300 <sup>V</sup>	333	348	321
12	325	289	296	324	316	296	339	351	374	355	351	362	329	323	340	341	333	339	350	346	295	301	330	318
13	289	287	300	307	306	314	312	326	341	347	339	346	335	329	310	348	347	328	362	304	329	320	334	323
14	293	294	309	272	341	305	312	325	362	358	360	364	294	308	325 <sup>R</sup>	347 <sup>R</sup>	355 <sup>R</sup>	373	361	321	330	310	332	336
15	300	300	319	346	332	315	312	329	343	338	353	360	293	316	321 <sup>R</sup>	330 <sup>R</sup>	358 <sup>R</sup>	344	339	343	312	317	318	288
16	293	292	304	297	312	346	306	341	353	358	369	339	316	329	321	329	331	350	368	327	311	309	316	314
17	279	285	291	297	324	342	368	332	349	355	354	360	330	312	321	337	329	344	346	323	347	352	311	304
18	276	293	346	338	328	342	304	335	360	364	362	366	310	309	320	332	342 <sup>R</sup>	352	323	356	320	304	341	317
19	356	312	314	301	326	371	320	320	347	351	363	357	317	354	347	344	347	337	351	304	332	339	335	322
20	329	315	305	301	339	351	325	329	370	365	365	364	344	351	341	346	340	367	354	333	304	339	326	308
21	276	281	314	348	360	294	319	348	370	352	369	329	334	349	335	359	358	352	357	348	346	325	333	313
22	285	291	307	295	310	365	345	342	352	344	367	342	347	332	328	337	334	354	366 <sup>R</sup>	299	320	328	351	367
23	301	293	293	310	320	357	368	354	383	348	362	355	350	336	332	348	362	337	337	329	355	303	316	298
24	292	302	304	306	346	346	355	332	351	357	361	341	337	343	322	341	328	330	337	353	324	308	323	341
25	291	298 <sup>R</sup>	311	305	293 <sup>F</sup>	360	286	317	343	347	351	319	320	304	339	339	337	343	339	341	314	324	276 <sup>R</sup>	297 <sup>H</sup>
26	294	342	333	358	313	288	310	321	344	356	339	337	359	327	343	356	363	354	369	351	327	318	331	320
27	277	303	321 <sup>V</sup>	312	303	293	308	311	363	354	371	365	368	330	341	344	365	354	378	331	344	321	329	325
28	301	306	306	308	308	313	300	336	366	369	357	350	322	359	327	350	316	334	365	362	327	326	331	330
29	302	317	321	321	322	308	306	332	361	372	360	358	344	345	356 <sup>V</sup>	307	345	369	359	339	311	344	334	292
30	300	305	328	340	337	302	301	308	339	333	341	324	317	319	315	326	320	337	367	345	319	338	356	302
31	304	303	313	291	319	346	338	329	357	361	355	341	308	349	364	349	330	369	375	353	308 <sup>J</sup>	337 <sup>R</sup>	332 <sup>R</sup>	302 <sup>A</sup>
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	30
MED	297	298	309	309	322	323	319	332	361	357	357	357	330	334	331	341	344	347	354	331	325	326	331	319
U Q	304	305	319	325	337	349	336	345	370	365	364	361	344	346	341	347	358	354	366	348	336	338	338	327
L Q	291	292	304	301	311	305	306	326	350	351	351	341	316	320	321	330	330	337	339	319	312	316	318	305

DEC.2012 M(3000)F2 (0.01)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Okinawa

DEC.2012 M(3000)F1 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1										L	L	LU	LU	LU	LU	L									
2												LU	LU	LU	LU	A	L								
3										L	L	LU	LU	LU	L	A	L								
4									L	L	LU	LU	LU	LU	LU	LU	L								
5									L	L	LU	LU	LU	LU	LU	LU	L								
6											L	L	LU	LU	LU	LU	L	L							
7								B	U	L	L	LU	LU	LU	LU	L	L								
8									L	L	L	LU	LU	LU	L	A	L	L							
9									U	L	L	LU	LU	LU	LU	L	L								
10										L	LU	LU	LU	LU	LU	L									
11									L	L	L	LU	LU	LU	L	L	L								
12									L	L	L	L	L	LU	LU	L	L								
13									L	LU	LU	LU	LU	LU	LU	L	L								
14										L	L	L	LU	LU	L	L	L								
15										L	LU	LU	LU	LU	A	L	A								
16									L	L	L	LU	LU	L	L	L	L								
17										L	LU	LU	L	L	H	L	L								
18										L	LU	LU	L	LU	LU	L	L								
19									L	L	L	L	LU	LU	L	L	L								
20									L	L	L	LU	LU	LU	L	L	L								
21									4	3	L	L	LU	LU	LU	LU	L								
22										L	LU	LU	L	L	LU	LU	L								
23									4	3	U	L	L	LU	LU	L	L								
24											LU	LU	LU	LU	A	LU	L								
25									4	2	L	LU	LU	LU	LU	LU	A	L							
26									L	L	LU	LU	LU	LU	L	L	L								
27										L	LU	LU	L	A	L	A	A								
28										L	L	LU	LU	LU	L	L	L								
29									L	L	L	L	L	A	LU	L	L								
30									L	L	L	H	L	L	L	A									
31											L	L	L	A	A	A	A								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT									7	2	3	18	21	21	17	9	1	4							
MED									4	2	6	4	1	9	3	9	6	4	2	2					
U Q									4	3	7	3	9	8	3	9	6	4	2	6					
L Q									4	1	8	3	8	5	3	7	6	4	1	8					

DEC.2012 M(3000)F1 (0.01)

IONOSPHERIC DATA STATION Okinawa

DEC.2012 h'F2 (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1										226	250	236	240	248	248	248								
2											238	238	252	278	260	240	218	212						
3										222	252	228	268	222	238	234	230							
4									208	254	242	228	252	244	250	256								
5									224	220	226	258	238	260	246	248	222							
6											240	232	252	250	250	244	224							
7								224	214	228	238	256	294	254	254	246	224							
8									238	228	230	232	272	262	246	256	222							
9									222	246	238	254	250	250	244	240	218							
10										236	254	240	248	246	228	258								
11									226	232	254	250	246	246	236	276	236							
12									210	228	254	234	244	272	238	226								
13									248	240	246	244	260	244	278	232	218							
14										244	244	230		284	262	238	222							
15										252	236	224	294	274	266	244	222	206						
16									218	232	230	250	260	264	262	238	234							
17										222	244	238	250	258	270	226	238							
18										228	236	224	284	270	270	248	226							
19									246	244	234	248	238	248	240	242	234	218						
20									218	224	232	232	262	240	230	248								
21									220	246	240	240	258	242	256	238	228							
22										232	232	238	248	234	252	250	236							
23									220	230	234	220	272	248	252	230	226							
24											238	250	244	246	238	224	216							
25									232	242	240	246	270	268	254	236	246	204						
26									240	246	230	254	246	258	244	236	228							
27										242	226	238	234	254	250	234	222							
28									220	236	236	260	290	224	268	232	264							
29									222	244	248	238	274	242	252	226								
30									254	242	252	236	258	248	270	238	232							
31										244	254	264	260	246	248	238								
	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	18	27	31	31	30	31	31	31	25	4						
MED								224	222	236	238	238	255	250	250	240	226	209						
U Q									238	244	246	250	270	262	262	248	235	215						
L Q									218	228	234	232	246	244	244	234	222	205						

DEC.2012 h'F2 (KM)

## IONOSPHERIC DATA STATION Okinawa

DEC. 2012 h'F (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT. 26°41.0'N LON. 128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
1	222	310	294	278	240	258	274	224	214	214	220	214	200	E A	256	204	198	216	214	200	186	198	216	222	214		
2	248	264	276	270	258	240	232	214	212	212	216	200	212	H	192	226	A	210	208	206	198	H	184	226	200	208	
3	266	284	270	256	236	210	232	234	224	210	214	200	190	200	196	A	218	204	190	186	216	206	202	222			
4	244	260	252	256	254	228	192	200	206	H	196	210	208	188	204	192	184	218	204	178	236	204	208	228	258		
5	302	278	272	250	230	222	252	222	208	206	198	178	190	172	218	202	H	222	200	202	184	236	198	208	212		
6	220	276	250	254	268	272	256	222	214	222	216	204	188	192	170	H	198	218	198	210	216	208	206	214	236		
7	272	278	254	238	232	232	228	B	172	198	212	190	196	206	210	216	214	208	198	184	208	202	220	234			
8	284	288	270	292	286	272	268	228	208	216	224	206	206	206	A	H	H	190	200	210	196	188	218	202	220	238	
9	250	286	284	278	242	250	232	216	198	196	212	200	198	E A	196	228	206	212	200	184	236	208	202	214	240		
10	264	282	250	226	240	250	288	252	218	216	228	220	A	A	192	206	198	238	206	198	184	212	226	234	246		
11	252	282	276	252	218	210	292	246	208	196	218	246	214	216	A	H	H	190	180	220	196	180	230	222	206	228	
12	232	286	296	252	248	254	234	220	204	200	222	202	E A	234	196	196	216	218	206	188	186	204	250	232	230		
13	302	294	258	238	258	254	248	250	234	224	202	220	186	208	188	224	218	204	200	188	216	210	218	230			
14	280	294	264	276	230	E A	282	290	246	218	228	234	218	194	224	230	224	H	200	206	198	190	252	232	228	226	
15	258	276	258	228	220	258	254	238	216	222	218	206	190	H	226	A	A	A	206	206	186	244	194	224	220		
16	240	238	242	248	246	220	270	238	214	210	222	212	212	H	196	H	H	H	210	214	196	182	222	210	222	248	
17	274	274	260	238	232	232	210	214	212	212	H	198	216	204	218	H	H	H	192	212	198	190	218	206	262	250	
18	282	276	204	204	240	220	236	238	226	222	200	202	H	220	H	226	232	220	222	206	190	196	192	242	218	232	
19	212	264	272	286	244	204	276	242	214	236	H	188	H	186	224	208	224	198	216	192	192	184	228	210	226	240	
20	228	274	276	292	240	210	254	200	214	220	216	216	202	218	218	204	210	212	194	186	216	210	228	248			
21	324	324	270	226	208	278	274	220	210	202	212	210	206	226	198	214	224	208	216	196	214	210	222	236			
22	276	290	280	290	268	212	236	222	226	212	218	200	E A	240	210	218	192	H	204	212	180	192	226	224	226	216	
23	280	306	298	258	252	216	208	208	182	194	184	188	176	216	226	204	220	190	186	204	212	190	240	256			
24	264	258	262	244	230	222	198	250	220	230	214	216	212	230	A	202	196	222	194	192	206	214	228	226			
25	310	282	268	O	O	E A	370	240	192	208	220	210	214	210	E A	246	222	A	E A	204	188	186	212	202	216	246	
26	240	220	234	222	268	292	276	248	220	222	216	218	222	H	212	A	E A	H	230	192	218	208	204	232	230	232	226
27	332	310	252	252	264	288	266	258	226	214	218	216	210	A	A	A	A	212	194	198	222	228	228	230			
28	270	276	294	272	272	266	274	248	214	220	218	206	184	188	224	214	206	224	196	184	190	246	226	232			
29	286	262	E A	280	248	254	256	264	240	212	208	212	214	E A	228	A	206	192	240	220	200	182	232	214	230	228	
30	270	270	240	238	246	276	280	268	224	216	204	192	180	H	216	198	A	A	238	196	186	226	204	202	244		
31	282	258	250	266	246	230	220	238	226	222	198	196	246	A	A	A	A	A	220	208	240	250	220	236	A	A	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
CNT	31	31	31	31	31	31	31	30	31	31	31	31	30	28	24	25	26	31	31	31	31	31	31	31	30		
MED	270	278	266	252	246	236	254	238	214	214	216	206	202	208	207	204	215	208	196	188	216	210	224	232			
U Q	282	288	276	276	258	266	274	246	220	222	218	216	214	218	225	216	218	214	200	198	228	226	228	244			
L Q	244	264	252	238	232	220	232	220	208	206	204	200	190	196	197	198	204	204	190	184	208	204	216	226			

DEC. 2012 h'F (KM)

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DEC.2012 h'E (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								B	114	110	110	110	110	110	A	A	118	140	A					
2								B	132	118	110	110	110	108	A	A	112	A	A					
3								B	116	116	112	112	A	110	A	A	A	A						
4								B	128	108	112	110	110	110	A		110	110	120					
5								B	116	112	110	110	110	A	110	110		A	A					
6								B	118	114	112	110	108	108	108	112	112	112						
7								B	112	110	110	110	110	110	110	110	112		A					
8								B	A	108	A	110	A	A	A	110	110	110						
9								B	116	108	108		A	A	A	A		114	138					
10								B	114	110	110	110	A	A	A	A	110		A					
11								B	110	110	110	A	A	A	110	A	112	112						
12								B	116	110	110	110	A	110	110	108	110	122						
13								B	108	108	108	108	108	114	108	110	112	114						
14								162	150	146	110	110	124	110	110	110	114	114						
15								B	114	112	112	110	110	A	110	110	110	110						
16								B	110	110	110	110	110	108	A	108	110	114						
17								B	110	110	110	110	A	110	106	106	110	A						
18								B	110	110	A	A	112	A	A	112	102	A						
19								B	114	108	108	108	108	110	112	112	112	A						
20								B	112	116	A	110	110	A	A	110	110	110						
21								B	110	122	112	112	112	110	A	A	114	A						
22								B	112	110	110	110	110	110	110	120	114	112						
23								B	110	110	110	110	110	110	110	110	110	116						
24								A	A	108	108	108	108	108	A	A	118	118						
25								B	114	110	110	110	110	A	A	A	A	A						
26								B	112	112	110	110	108	108	A	A	114	A						
27								B	114	114	108	110	110	110	A		A	122						
28								B	118	110	108	108	112	112	112	112	112	A						
29								B	114	110	110	110	108	108	108	A	108	124						
30								B	112	114	110	110	108	A	A	A	A	A						
31								B	116	112	110	110	110	110	110	110	A	A						
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								2	29	31	28	28	24	20	16	18	25	17						
MED								166	114	110	110	110	110	110	110	110	112	114						
U Q									116	114	110	110	110	110	110	112	114	122						
L Q									111	110	110	110	108	108	109	110	110	112						

DEC.2012 h'E (KM)

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DEC.2012 h'Es (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
1	B	B	B	B	B	B	B	B				G								B			B	B		
2	B	B	106	B	B	B	B	G	196	196	168		150	144	126	106	120	100	98	B	B	106	94	B	B	
3	B	B	B	B	B	B	B	B			G	G								B	B		B	B	B	
4	B	B	B		B	B	B	B	186			136	104	106	104	100	98	158	98	98	96		B	B	B	
5	B	B	96	B	B		B	B	104		172		G	G	G		108	100	148		98	92	B	B	B	
6	B	B	B	B	B	B	B	B			G		G	G	G		178	184	134	112	110	110	94	94	B	
7	B	B	B	B	B	B	B		112	162	168	98									B		120	106	B	
8	B	B	B	B	B		B	B	110	166	188	158	168	162	164	164	182	98	148	96	126		B	B	B	
9	B	B	B	B	B	92	B	B	120		112	110	108	104	98	98			168		B	B	100		90	
10	B	B	B	B	B	B	B	B	100	138		110	110	110	110	104	102	102	100		B	B	94	90	B	
11	B	B	B	B	B	B	B	B			G		G								B		108	106	94	94
12	B	B	100	98	B	B	B	B	118		176	112	114	106	112	108	106	96	98	90		112		B	B	
13	B	90	B	100	100	94	94	B			G		178	164	158	180	188		128		B	B	98	92	100	
14	B	B	B	102	96	92	90	G			184	132	126	116	98	98	100	94	94	120	106			92	B	
15	B	B	B	B	B	B	B		200	172	142	132	104	188	168	118		142	132	118	114	110	90		B	
16	B	B	B	B	B	B	B	B	94	186	178	132	116	114	112	126	128	118		100		140	122		B	
17	B	B	B	B	B		B	B	138		176	106	104		102		G		186		B	B	120		110	
18	B	B	B	B	B	102	B	B	164		112		102	102	98	98	98	96	96		B	B	104		98	98
19	B	B	92	B	B	B	B	B	92	186	102	102	102	102	104	104		94	92	92	100	104		B	B	
20	B	B	B	B	B	B	B	B	180	194	112		112	140	108	104	100	100		B	B	94		B	B	
21	90	B	B	B	B	B	B	B	152	176	142	138	120	112	106	100		G	G	94	94			B	B	
22	B	B	B		B	B	B	B			G		G				106	100	100	112	110	110	90		B	
23	92	B	B	B	B	B	B	B	194		166	140	114	124	110	110	102	182	98	96	90	90		B	92	
24	B	B	88	100	B	100	100	98			166	174		G		102	102	158	98	98	92	94		96	96	
25	B	B	104	104	104		98	B	176	94	156	158		112	106	98	124		G		90	86		90	B	
26	B	100	100	90	96	96		B	174		194	170	150	108	104	104	100	98	108	92	114	138		B	B	
27	B	B	102	B	104	B	B	B			G	G		G							B	B	B		B	
28	B	B	B	B	B	B	B	B	194		194			112	114	108	102	100	100	96				96	B	
29	B	B	104	94	100		B	B	186	166	130	114	114	192	184	164	130	122	114		B	B	106	104	90	
30	98	110	106	B	98	100		B	178	148	124	118	108	110	108	182	142				90	90		B	B	
31	B	B	B	B	B		B	B			G		G													B
						94	166	186			G		116	176	128	114	108	108	102	102	102	108		102	102	
CNT	3	3	10	9	7	9	6	6	21	18	26	23	23	26	30	29	27	26	24	19	22	16	12	10		
MED	92	100	101	100	100	94	97	99	166	169	162	124	114	112	106	104	102	100	98	96	104	105	95	96		
U Q	98	110	104	103	104	100	98	110	186	186	176	140	144	126	114	112	148	142	105	110	110	112	102	98		
L Q	90	90	96	96	96	92	94	94	138	114	132	110	106	106	104	100	98	98	96	92	94	94	91	92		

DEC.2012 h'Es (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Okinawa

DEC.2012 TYPES OF Es 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D	H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1										H1	H1	HC11		HC11	HC11	CL11	C1	CL11	LC11	F1		F1	F1			
2			F1							HL11	HL11	C1	C1	C1	C1	L3	L1	L2								
3										H1			H1	C1	L1	L1	L2	L1	HL11	F1	F1	F1				
4				F1						L1		HCL11				C1	L1	HL11		F1		F1				
5			F1			F1				HHL11	H1		C1		LH11	LH11	L1	L1	CL11							
6										CH11	HC11	HC11	L1				HL11	H1	H1	F3	F5	FF11	F2	F1		
7								C1		H1	H1	H1	HC11	H1	H1	H1	H1	L1	HL11	F1	F1		F1	F2		
8					F1					C1		C1	C1	C1	L1	L1	L1		H1				F1		F1	
9								L1		H1		C1	C1	C1	C1	L2	L2	L1	L1			F2	F1		F1	
10											C1	H1	C1	C1	C1	L1	L1	H1	L1	F1	F1	F1	F1	F1	F1	
11									C1		H1	C1	C1	C1	C1	L1	L1	L1	LH11	F1	F1		F1			
12			F1	F1								HC11		HL11	HL11	HL11	HL11	HL11		F1			F1	F1	F1	
13		F1		FO21	FO31	FO21	F1						H1	H1	CL11	CL11	L1	L1	L1	F2	F1	F1	F1	F1	F1	
14				FO21	FO31	F1	FO21			HL11	HL11	H1	H1	L1	H1	H1	C1		H1	F4	F3	F3	F2	F1		
15								L1		H1	H1	H1	C1	C1	C1	C1	C1	C1		F1		FF51	F1			
16										H1		H1	L1	L1					H1			F1		F1		
17					F1					H1		C1		L1	L1	L1	L1	L1	L2	F1		F1		F2	F1	
18			F1					L1		H1	L1	L1	L1	L1	L1	L1	L1	L1	L1	F1	F1	F1				
19										H1	H1	C1		C1	HL11	L1	L1	L1	L2			F1				
20										HL11	HL11	HL11	H1	C1	CL11	C1	L1			F1	F1					
21	F1						F1			H1	L1	HC11	C1			C1	L1	L1	CL13	FF32	FF22	F1				
22				F1						H1		H1	H1	C1	C1	C1	L1	L1	H1	F2	F3	F4	F2		F1	
23	F1										H1	H1				L1	L1	H1	L1	F1	F1	F1		F1	F1	
24			F1	F1		F2	F1	L2		HL11	L1	HL11	H1		C1	C1	L1	CL11		F1	F1			F3		
25			F1	F1	F1		F3			H1		H1	H1	H1	C1	C1	L2	L2	L3	L3	F1	F1	FF11	FF11		
26		F1	F1	F1	FO11	F1					H1	H1	H1	H1	C1	L2	L2	L1	L3	FO21	FO11	F2				
27			F1		F1							H1			C1	C1	C1	L3	L2	L1	F2	F1			F1	
28							F1			HL11	H1	H1	C1	C1	HC11	HL11	HL11	HL11	HL11	FF21	F1	F1	F1	F1		
29			FO21	F1	F1					H1	H1	C1	C1	C1	C1	C1	C1	HL11	H1			F1	F1			
30	F1	F2	F1		F2	F2				L1					C1	L2	CL13	LQ21	L4	F4	F1	FF11	F1	F4	F1	
31					F4			H1		H1		C1	H1	CL21	CL31	CL31	C2	L3	F3	F9	F1		F4	F3		
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT																										
MED																										
U Q																										
L Q																										

## f-PLOTS OF IONOSPHERIC DATA

KEY OF f-PLOT	
	SPREAD
◊	f <sub>o</sub> F <sub>2</sub> , f <sub>o</sub> F <sub>1</sub> , f <sub>o</sub> E
×	f <sub>x</sub> F <sub>2</sub>
*	DOUBTFUL f <sub>o</sub> F <sub>2</sub> , f <sub>o</sub> F <sub>1</sub> , f <sub>o</sub> E
⊗	f <sub>b</sub> E <sub>s</sub>
└	ESTIMATED f <sub>o</sub> F <sub>1</sub>
†, ‡	f <sub>min</sub>
^	GREATER THAN
∨	LESS THAN

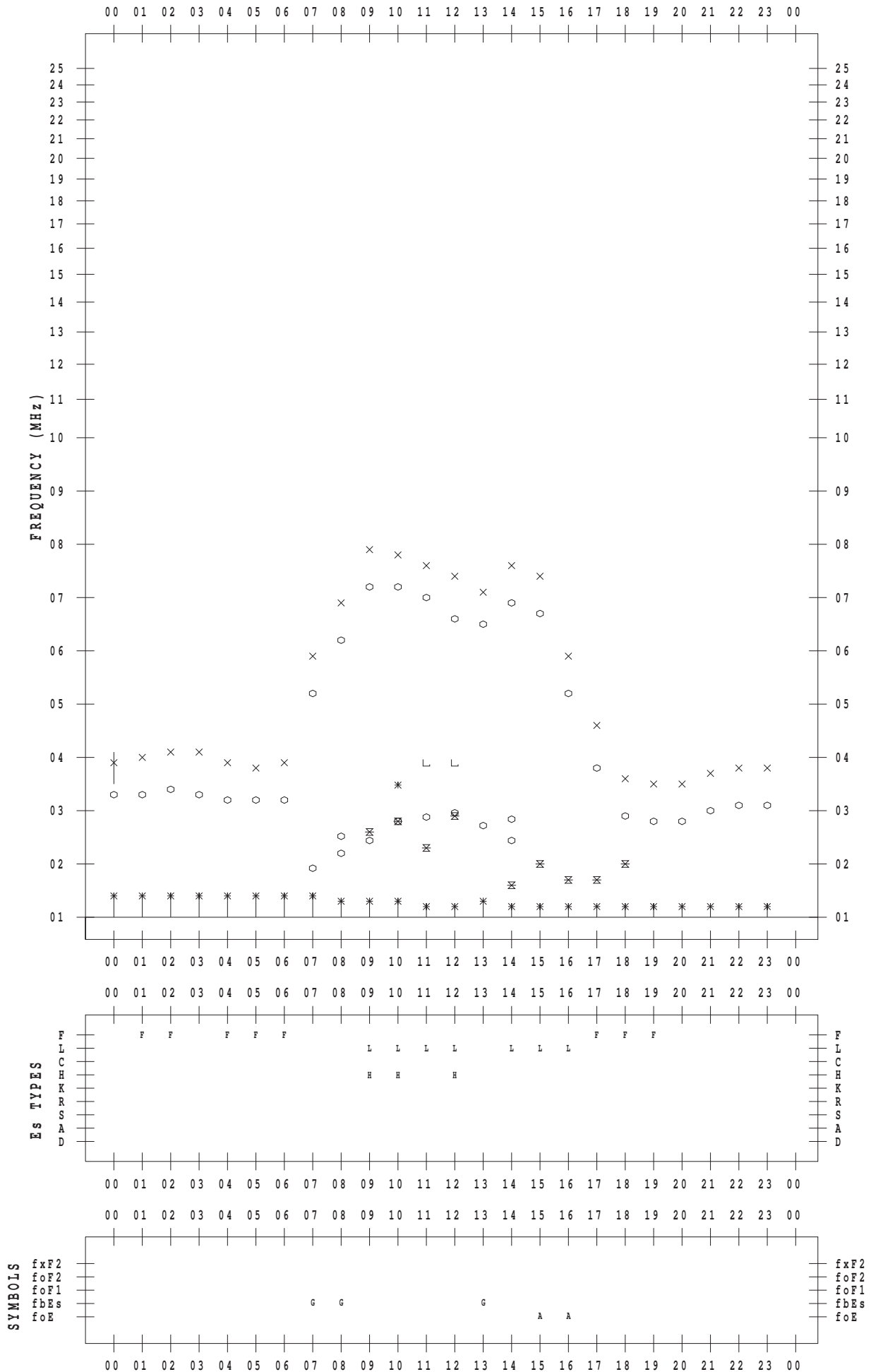
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/ 1

135 ° E MEAN TIME



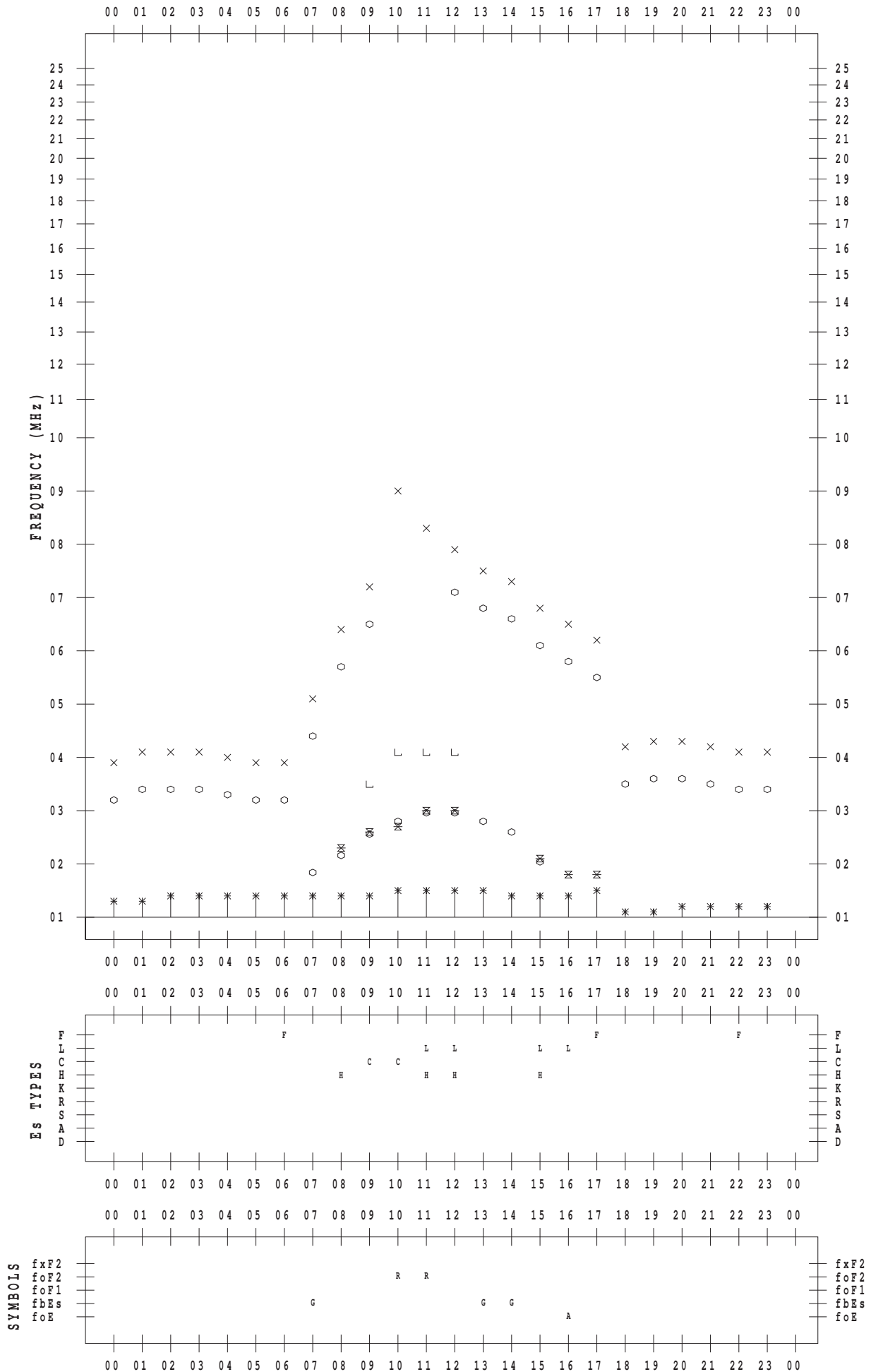
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/ 2

135 ° E MEAN TIME



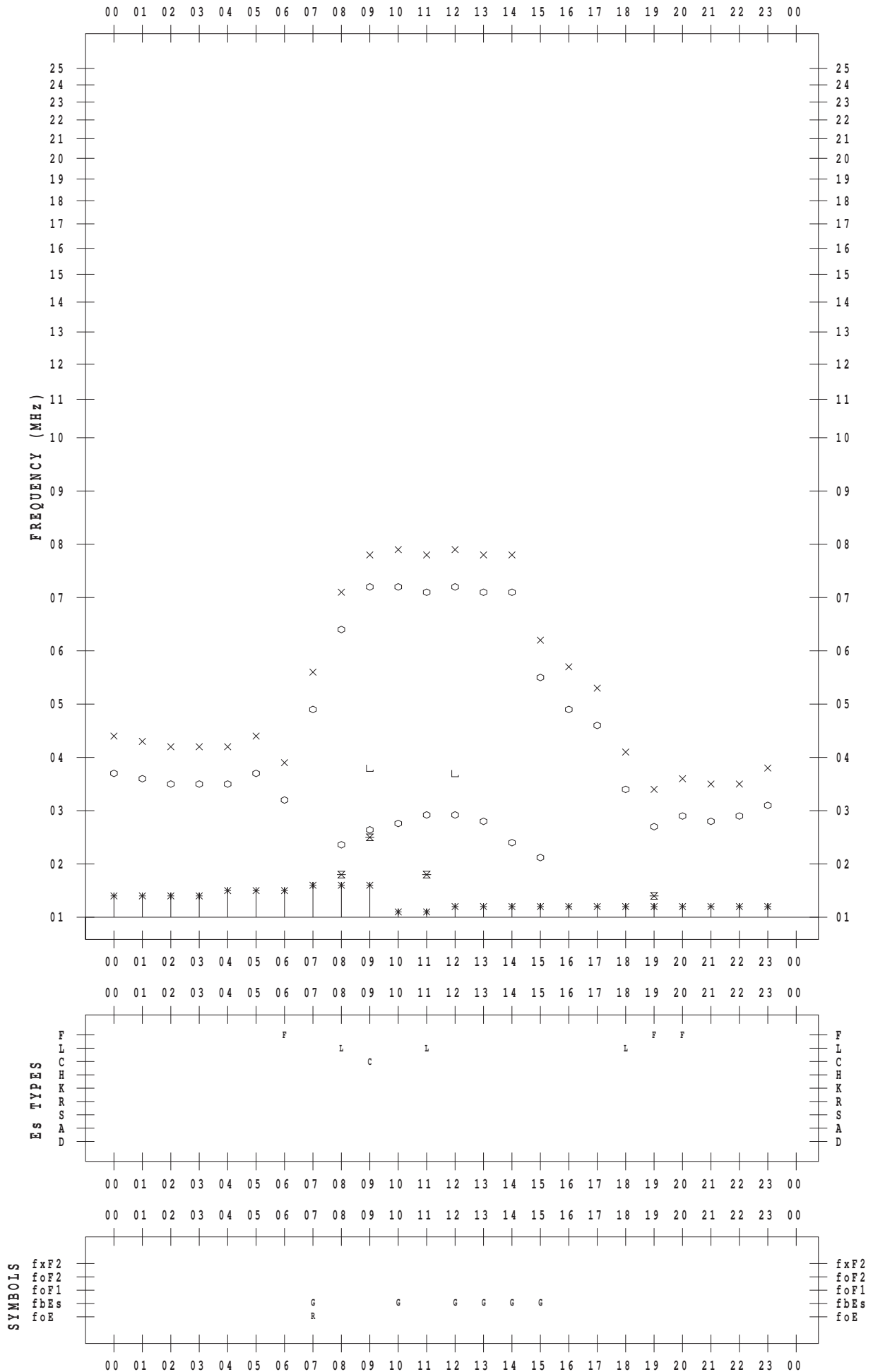
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/ 3

135 ° E MEAN TIME



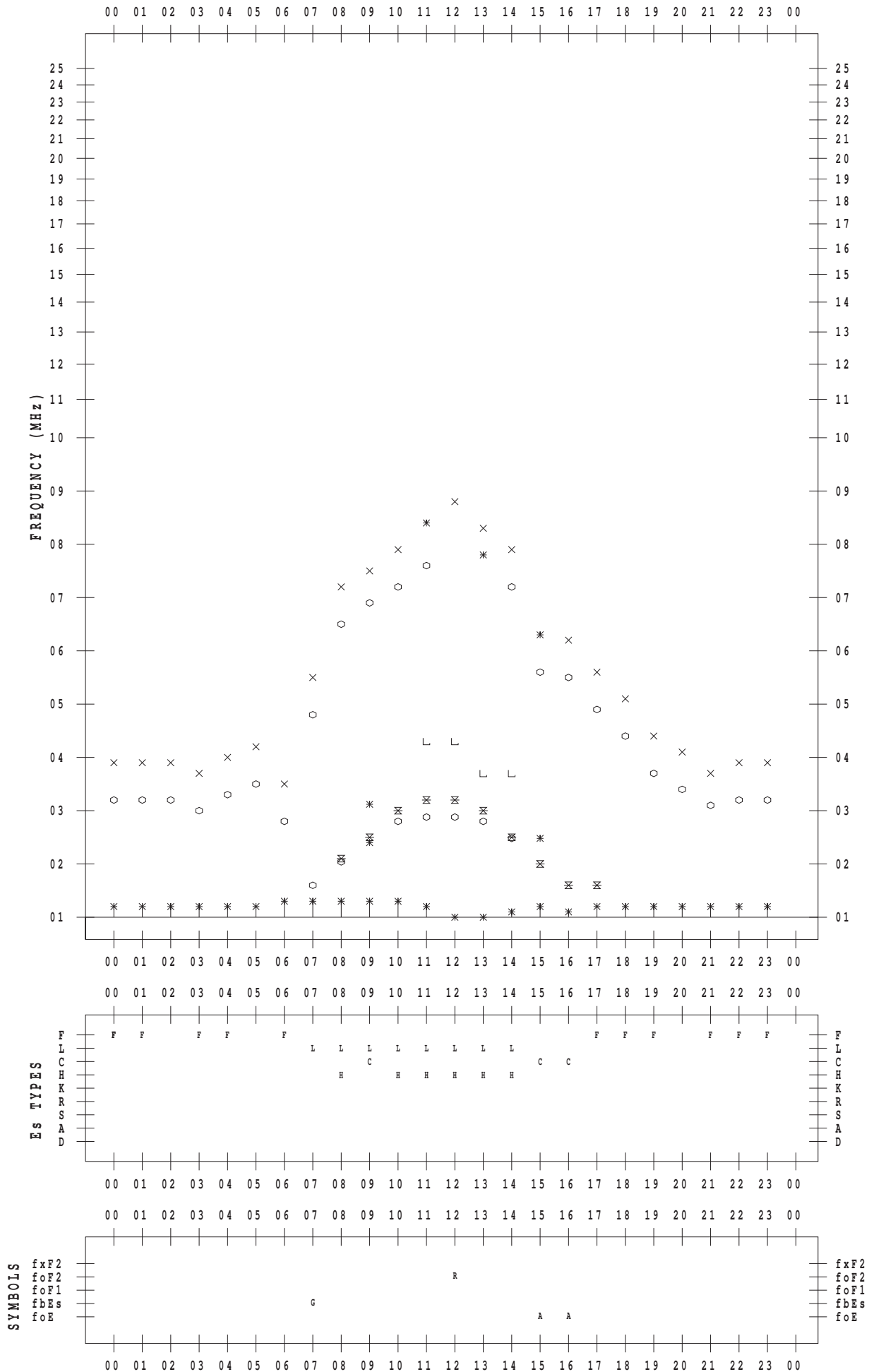
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/ 4

135 ° E MEAN TIME





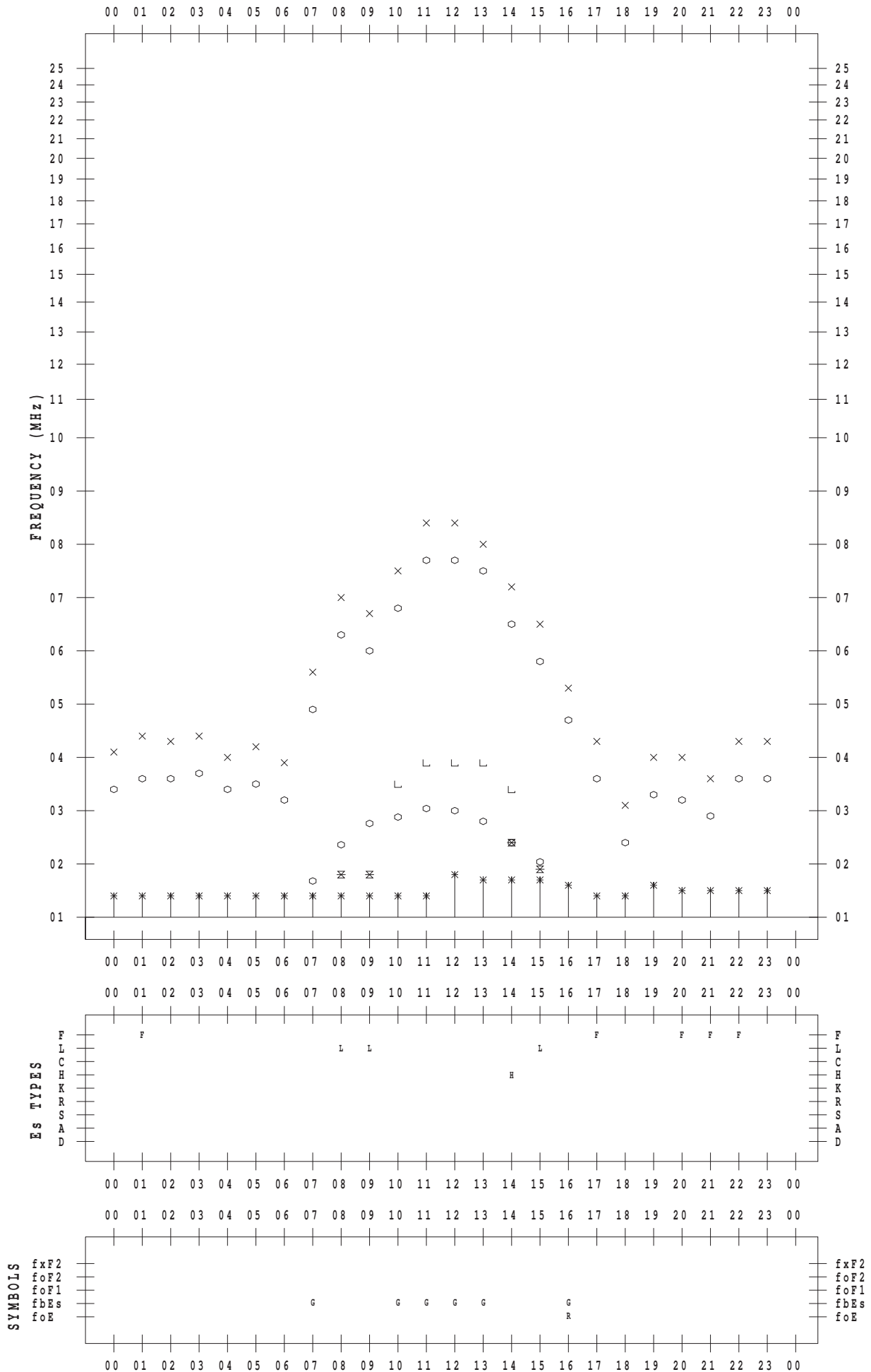
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/ 5

135 ° E MEAN TIME



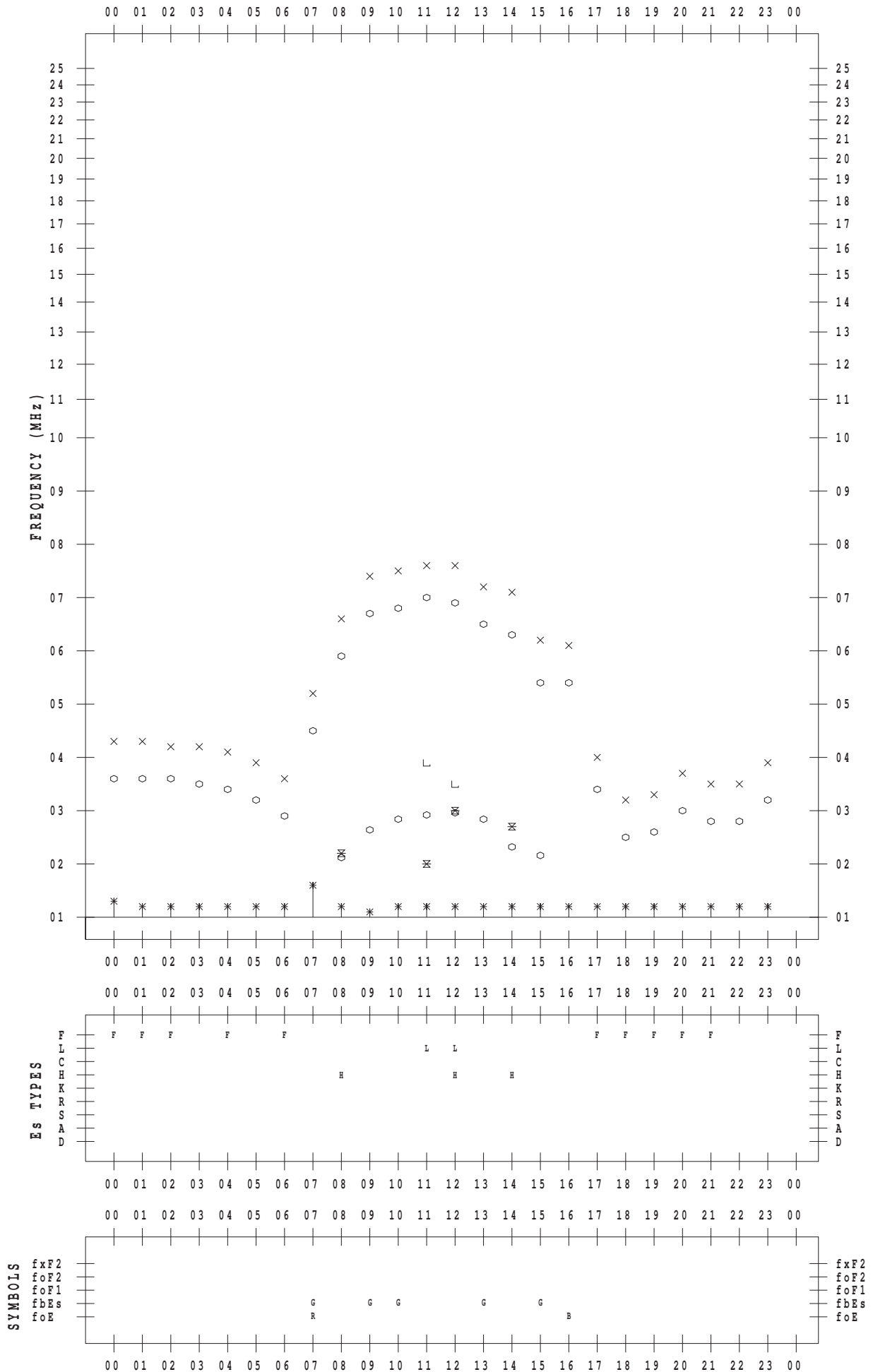
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/ 6

135 ° E MEAN TIME



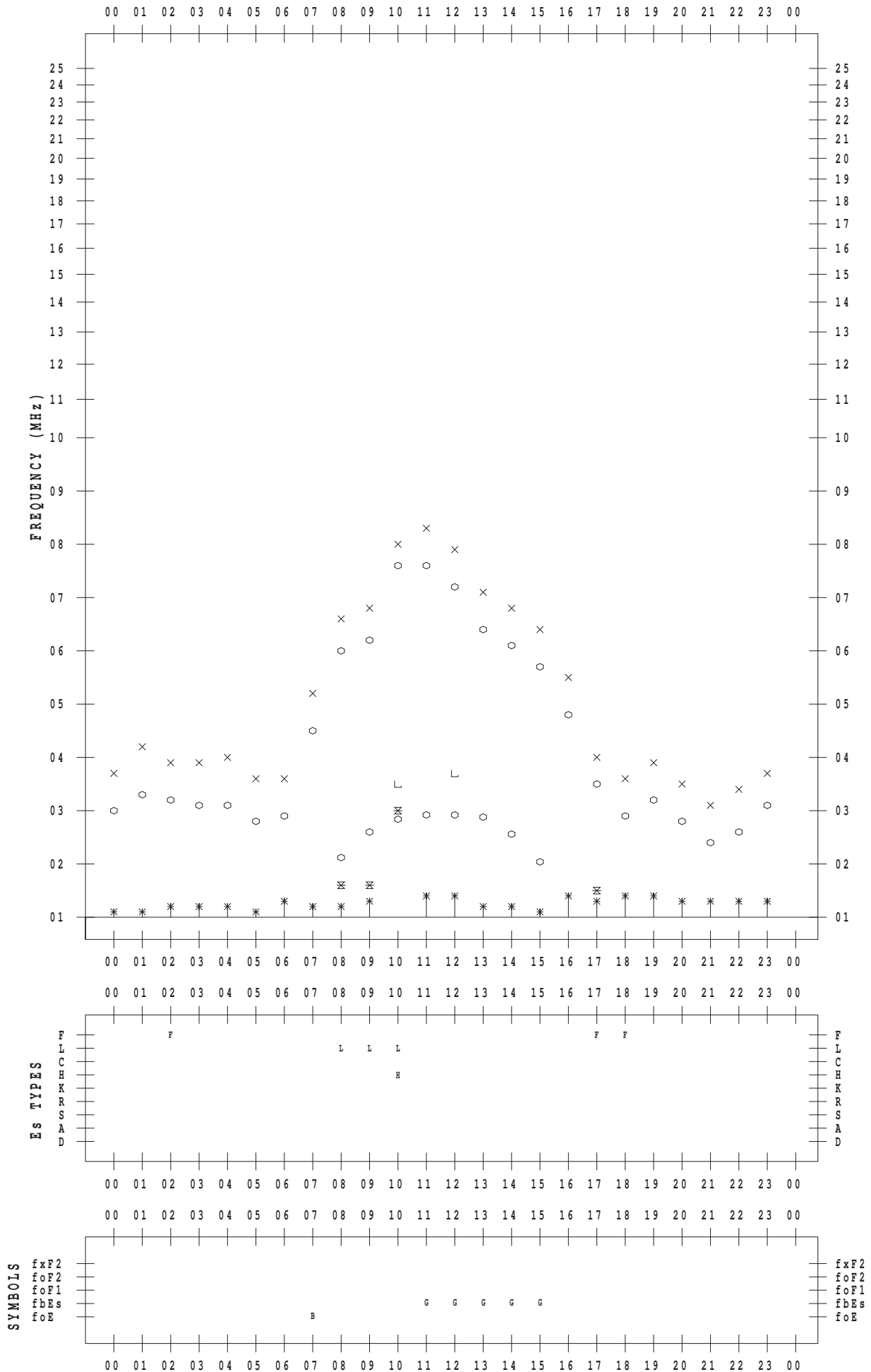
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/ 7

135 ° E MEAN TIME



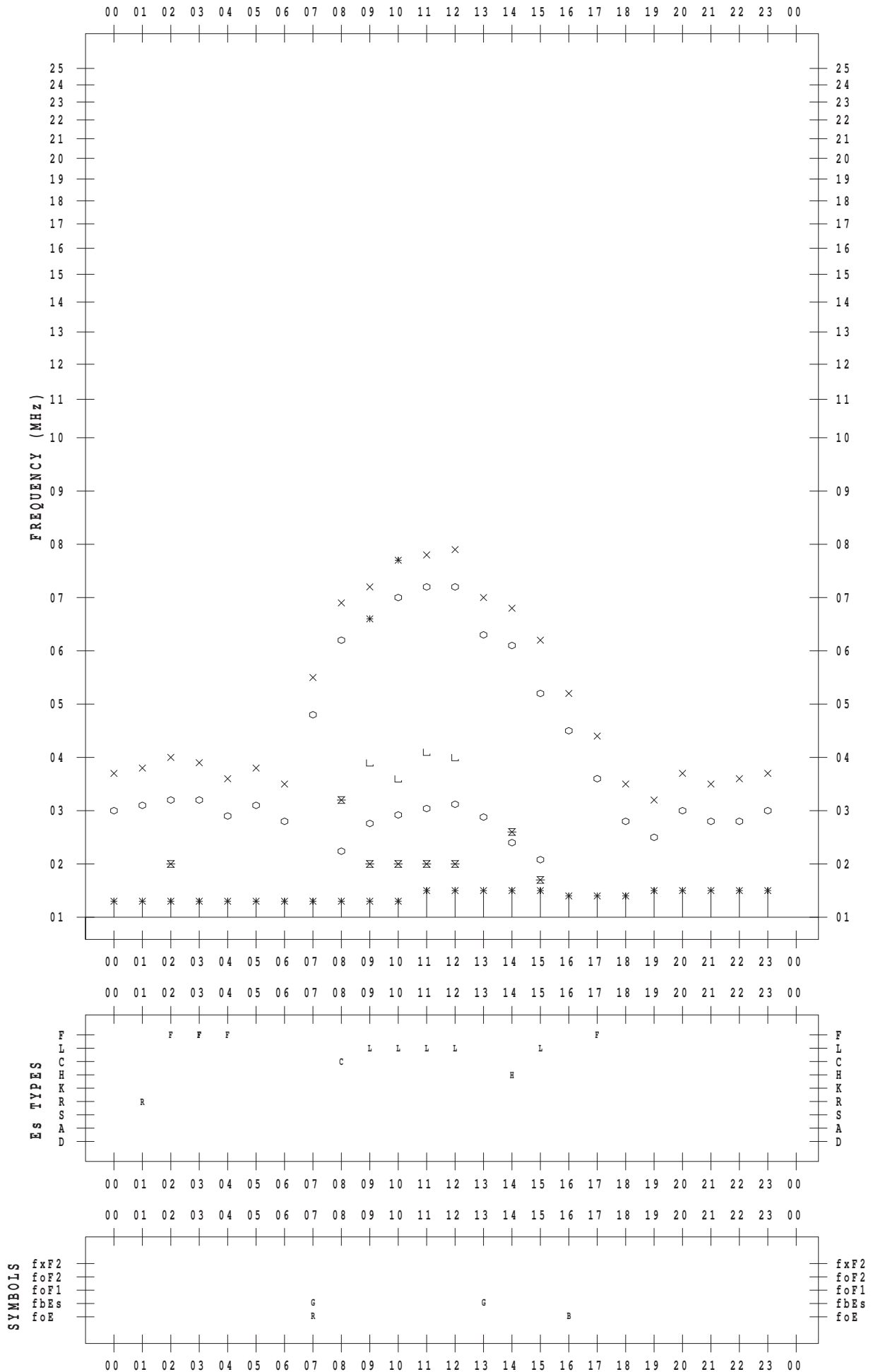
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/ 8

135 ° E MEAN TIME



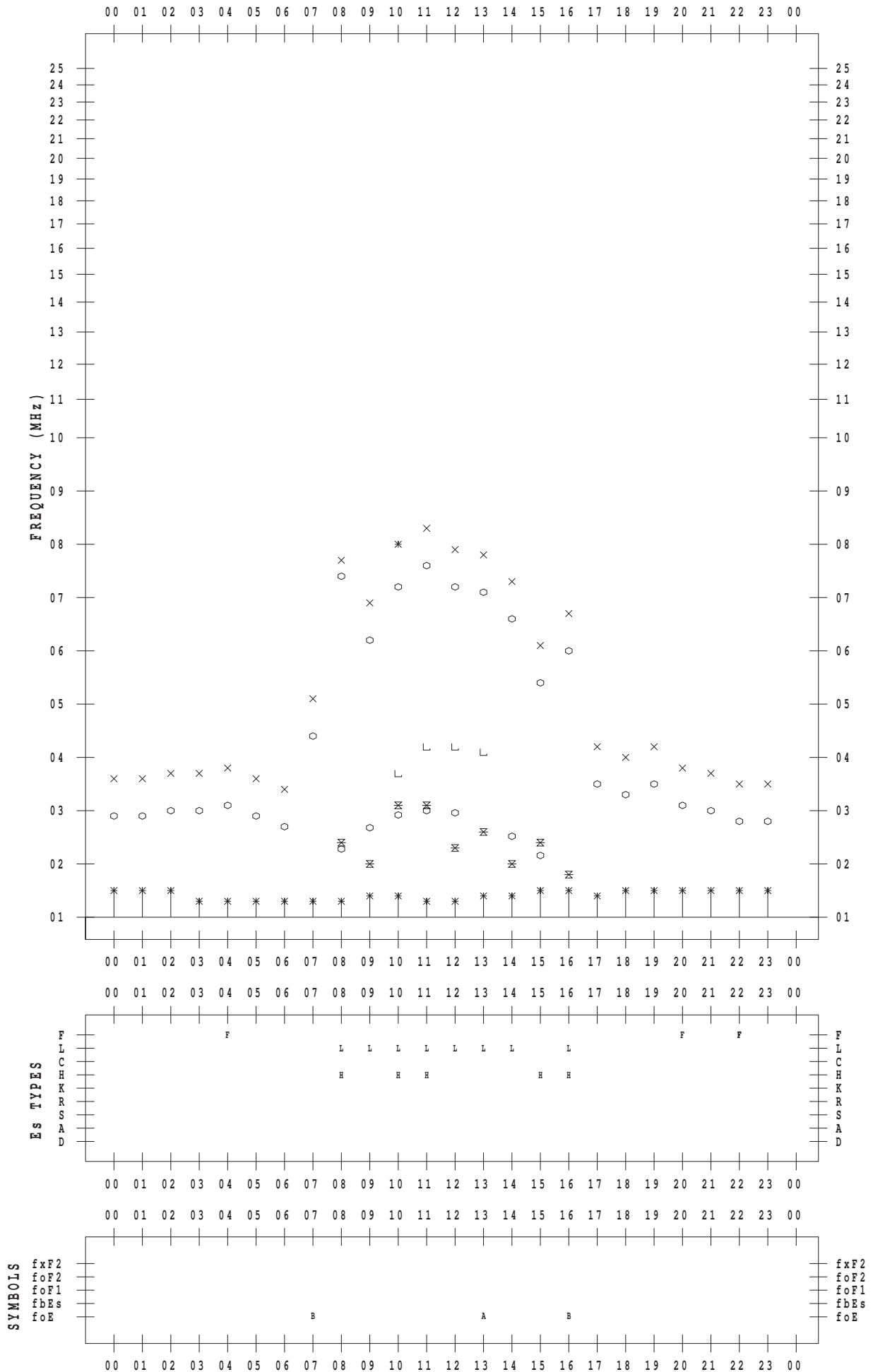
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/ 9

135 ° E MEAN TIME



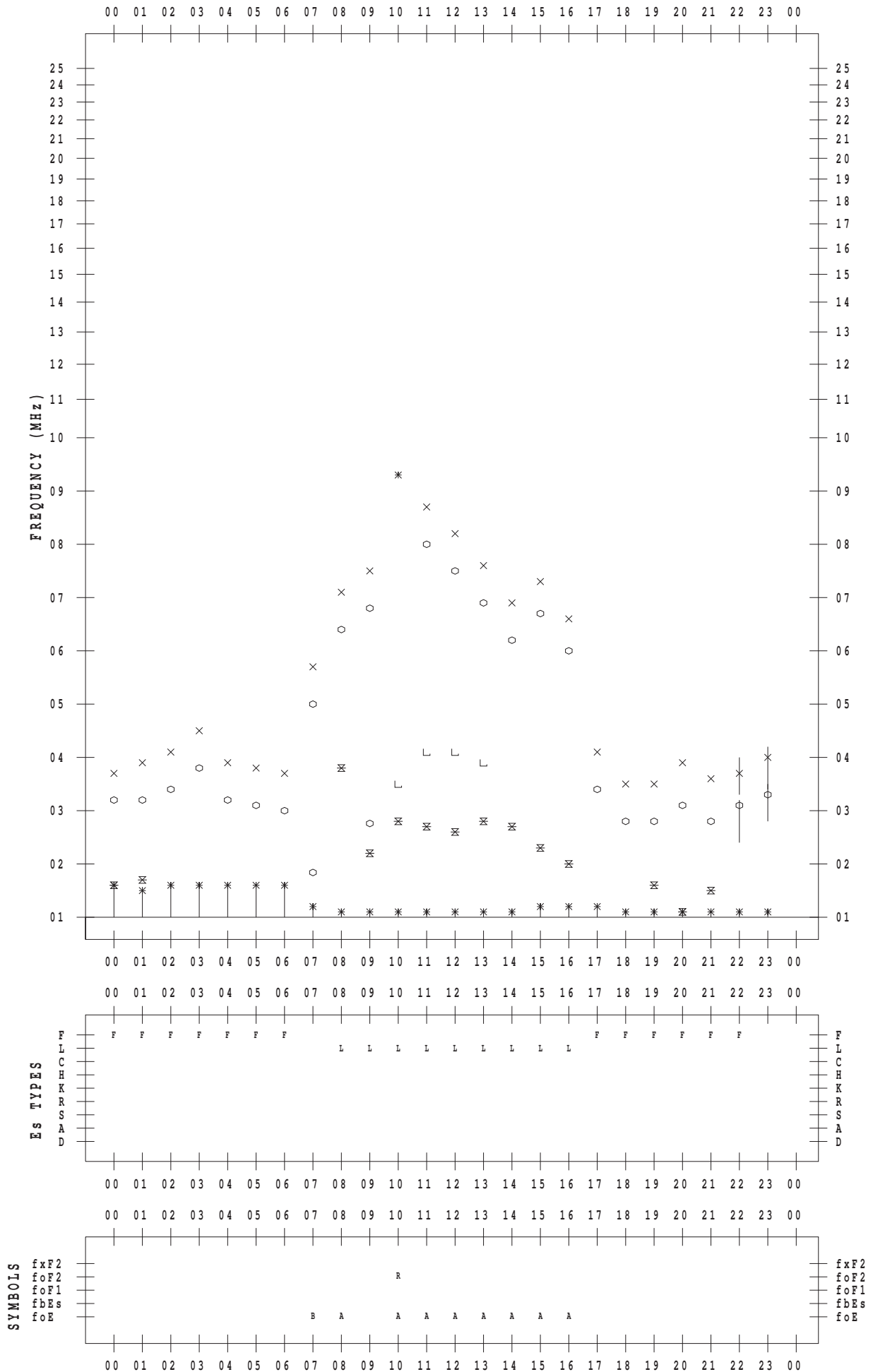
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/10

135 ° E MEAN TIME



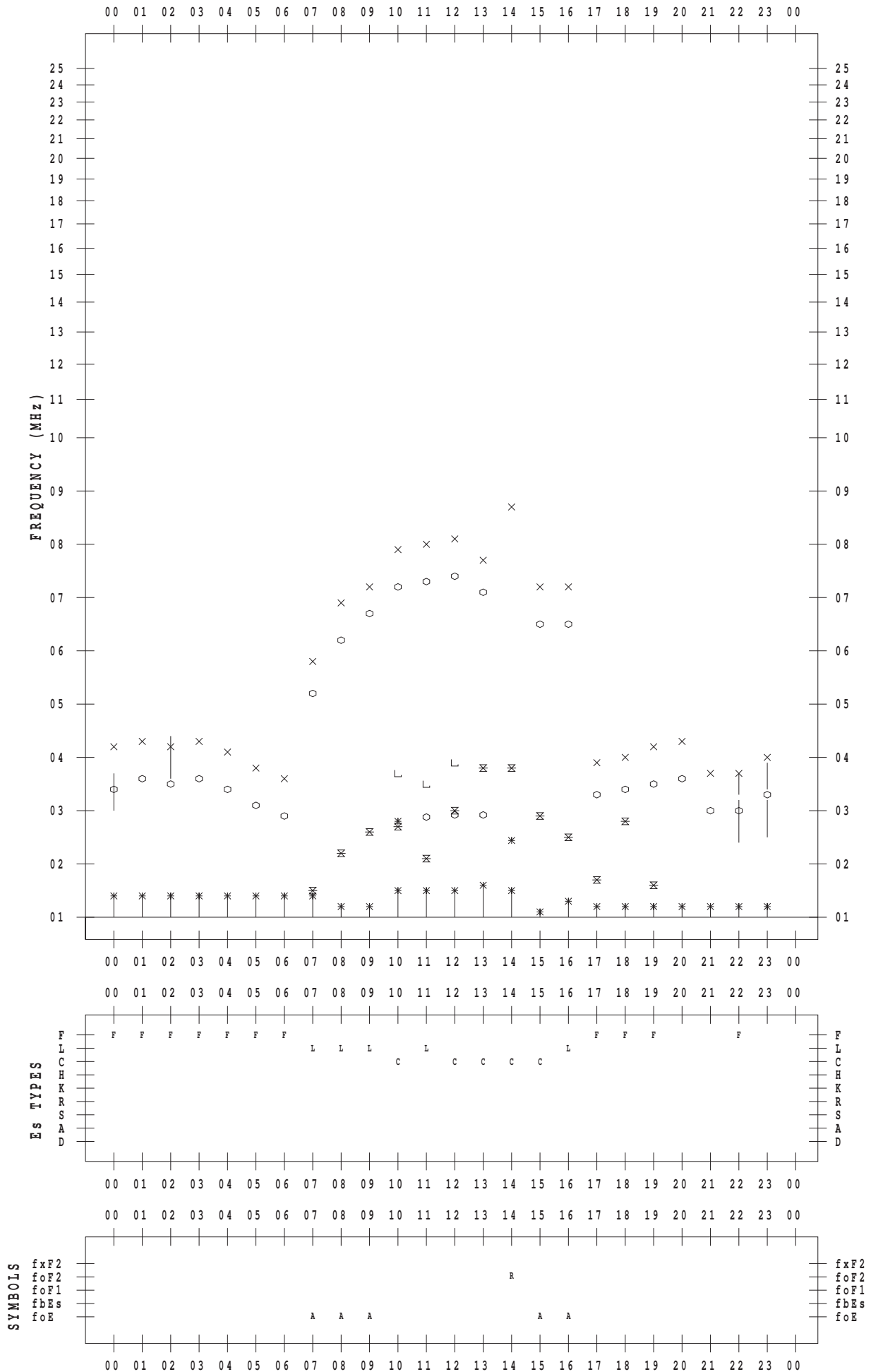
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/11

135 ° E MEAN TIME



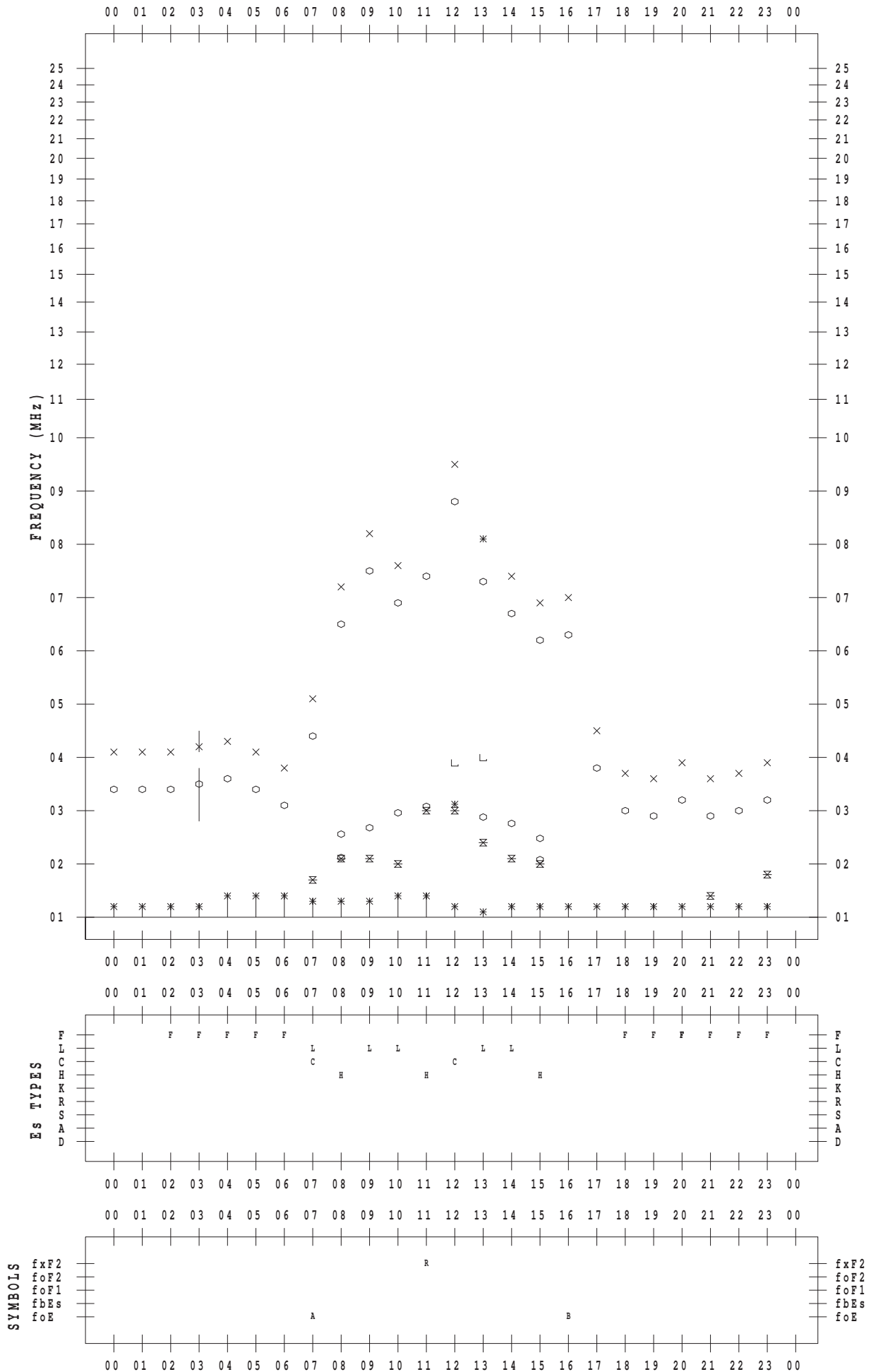
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/12

135 ° E MEAN TIME





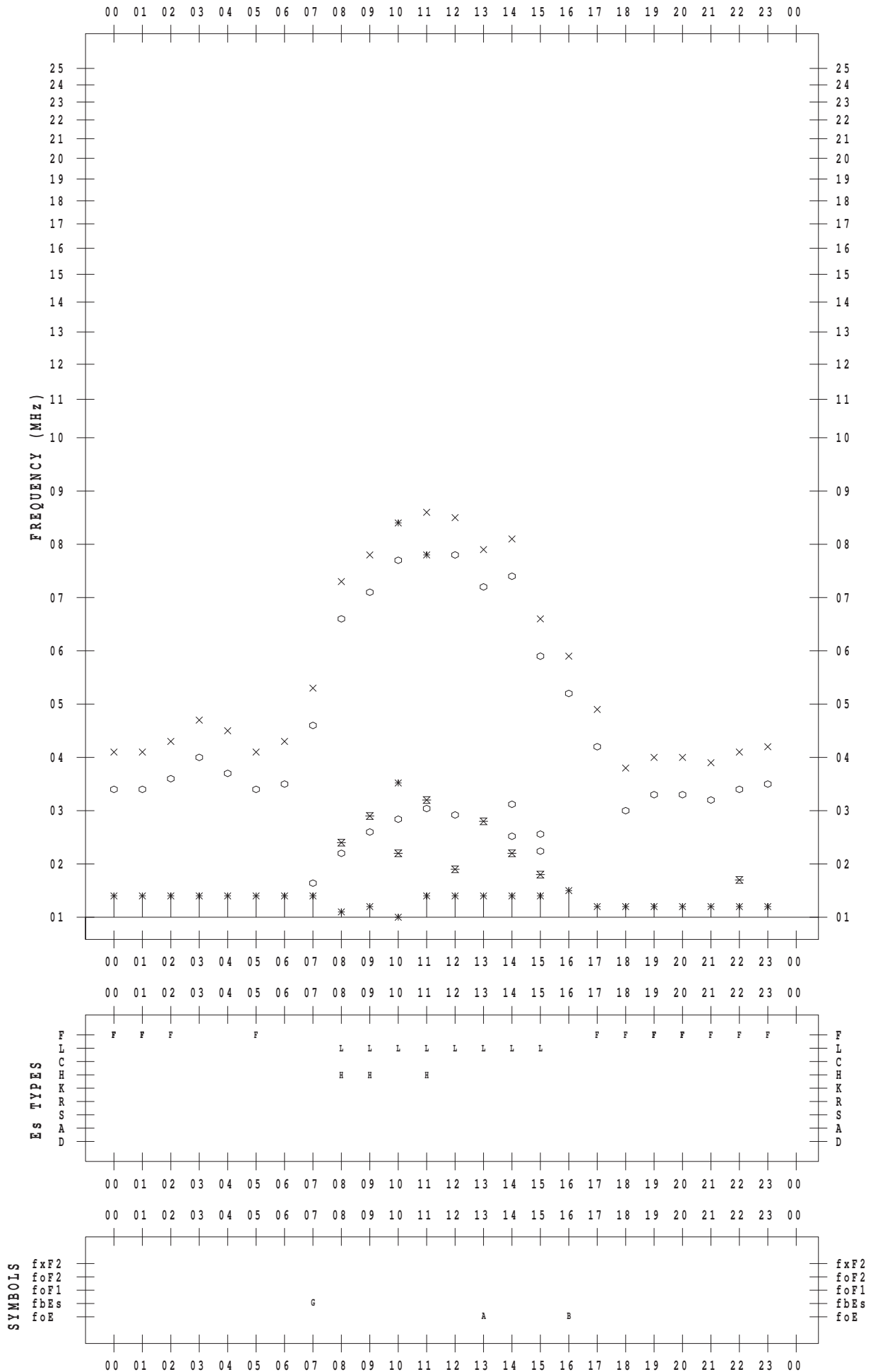
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/13

135 ° E MEAN TIME



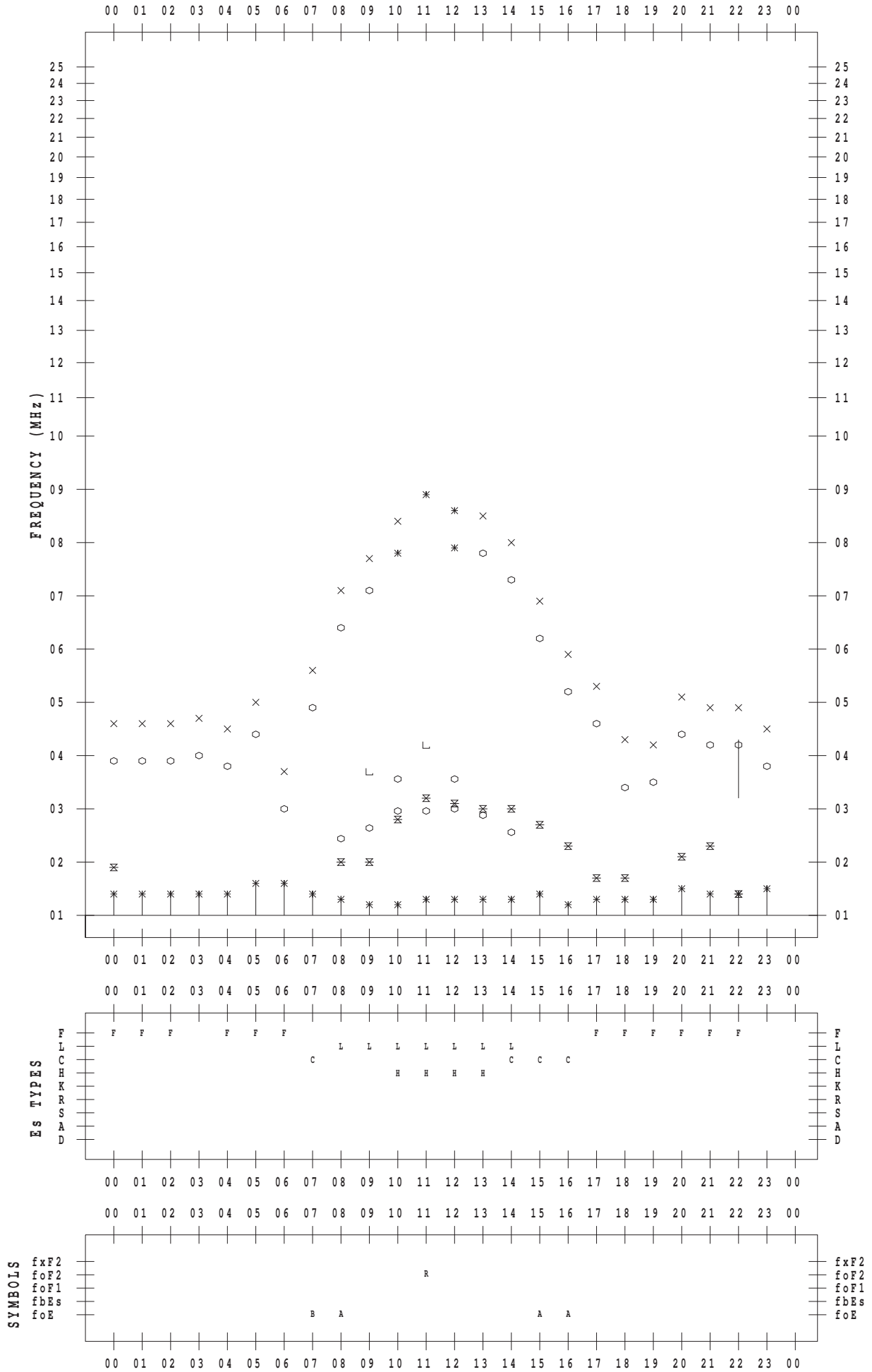
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/14

135 ° E MEAN TIME



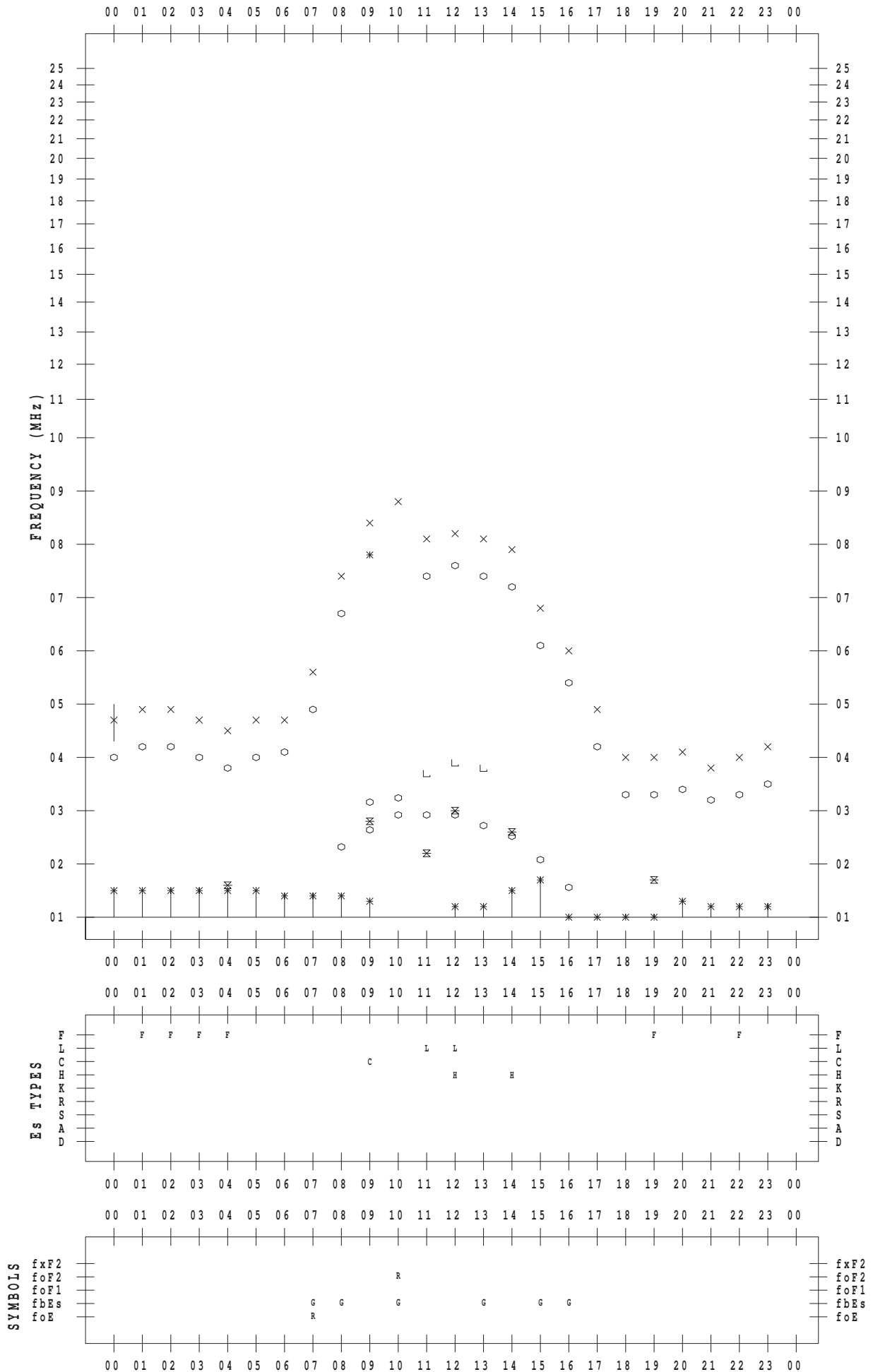
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/15

135 ° E MEAN TIME



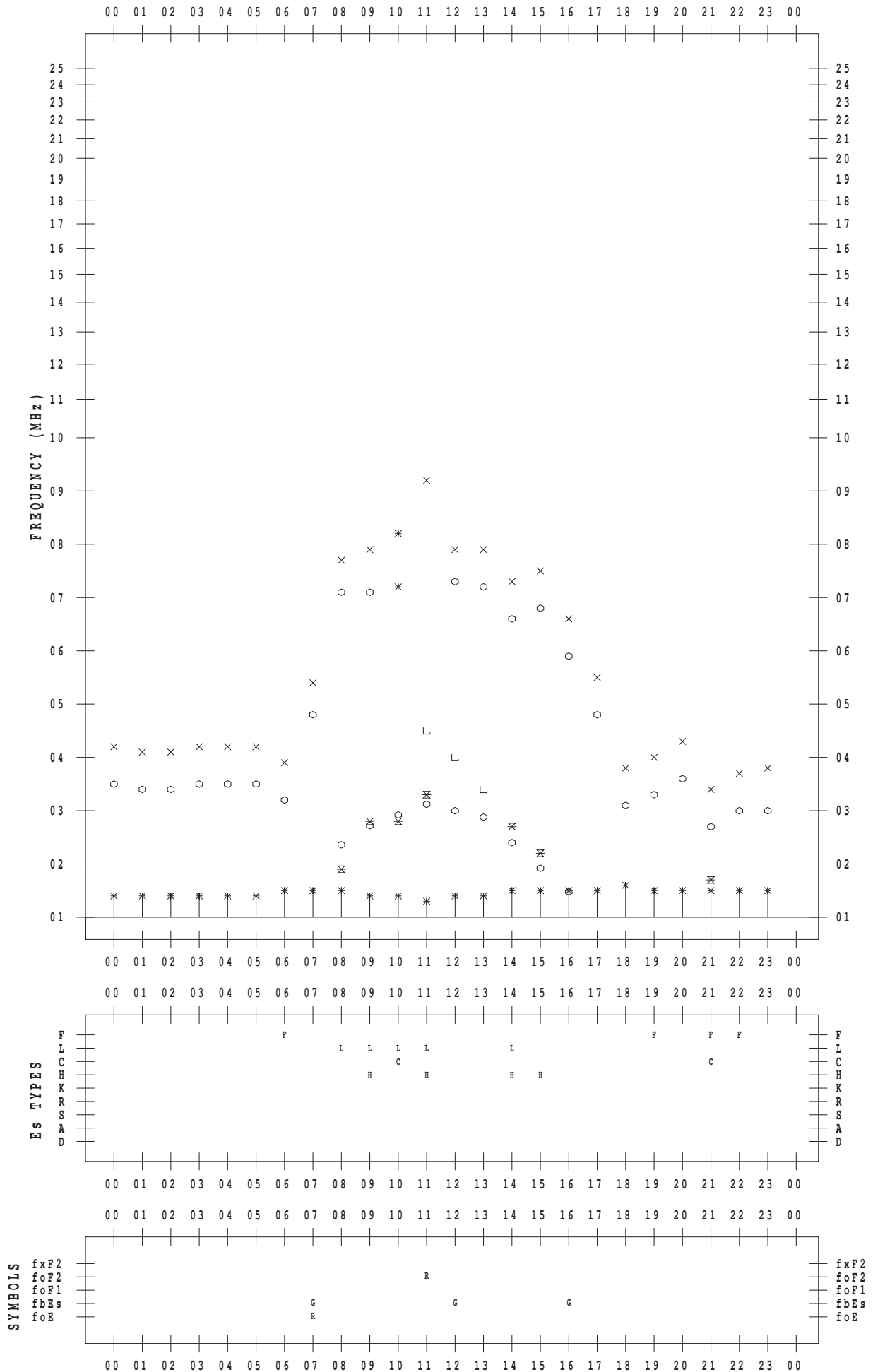
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/16

135 ° E MEAN TIME



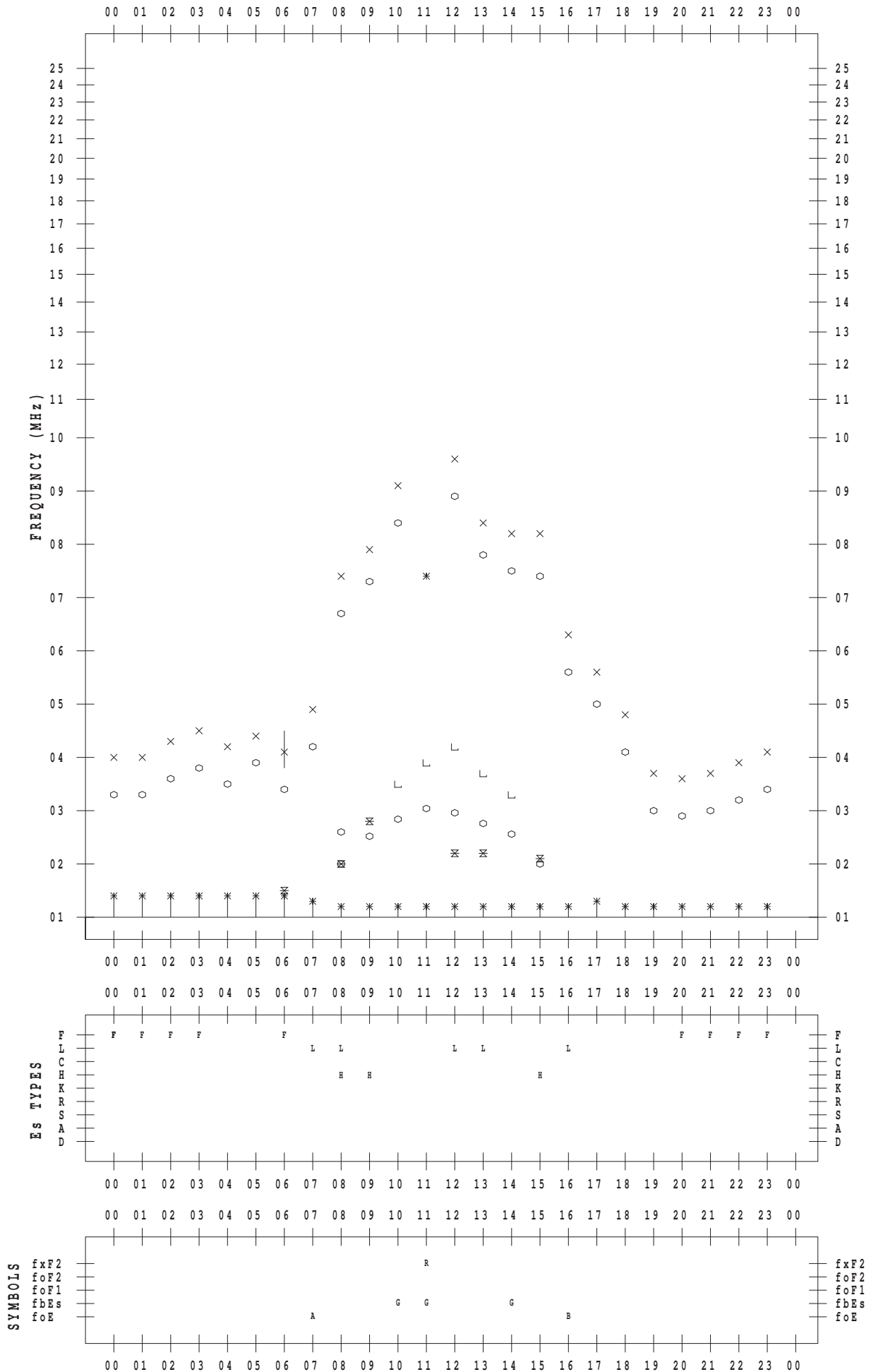
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/17

135 ° E MEAN TIME



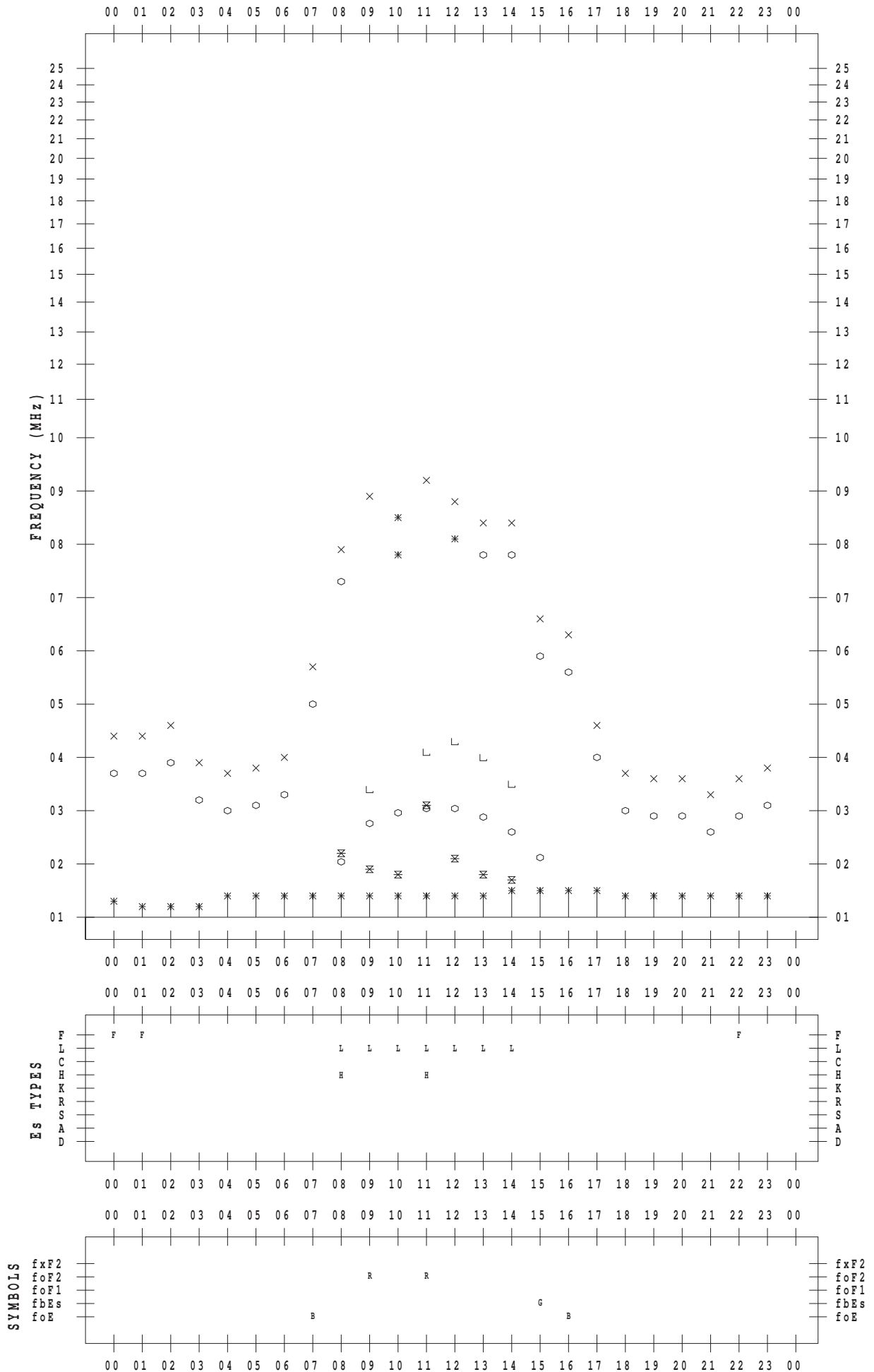
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/18

135 ° E MEAN TIME



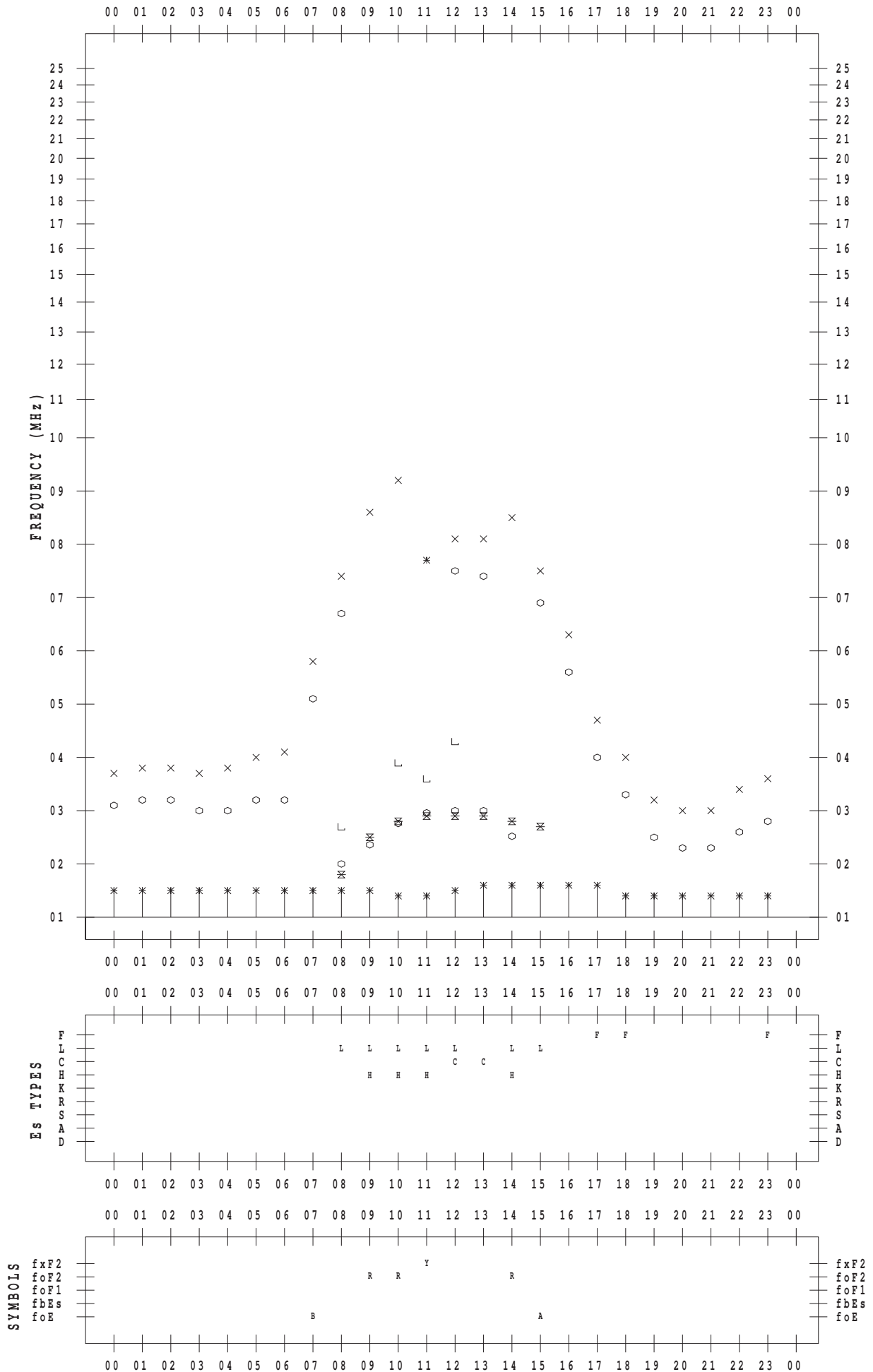
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/19

135 ° E MEAN TIME



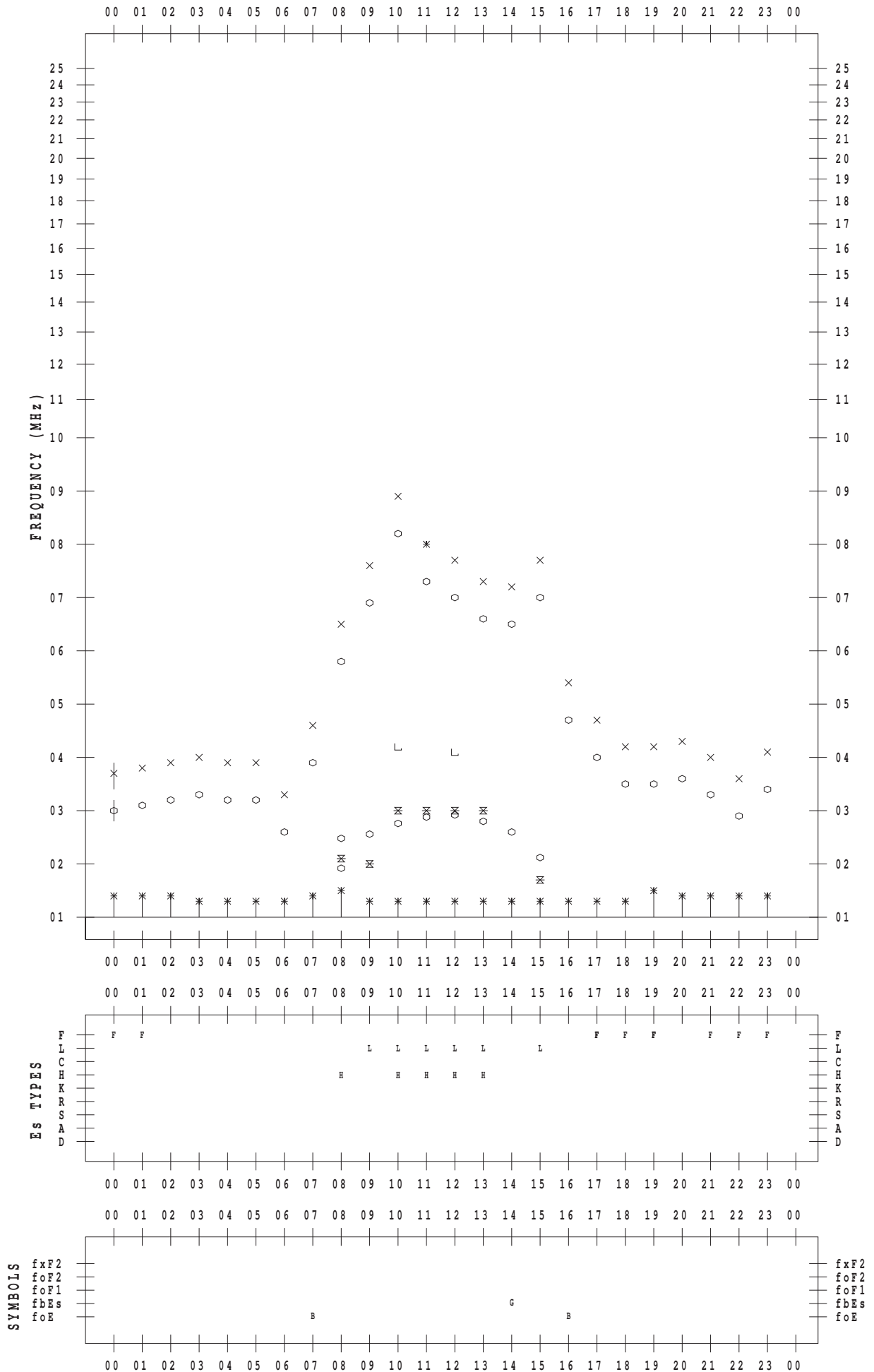
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/20

135 ° E MEAN TIME





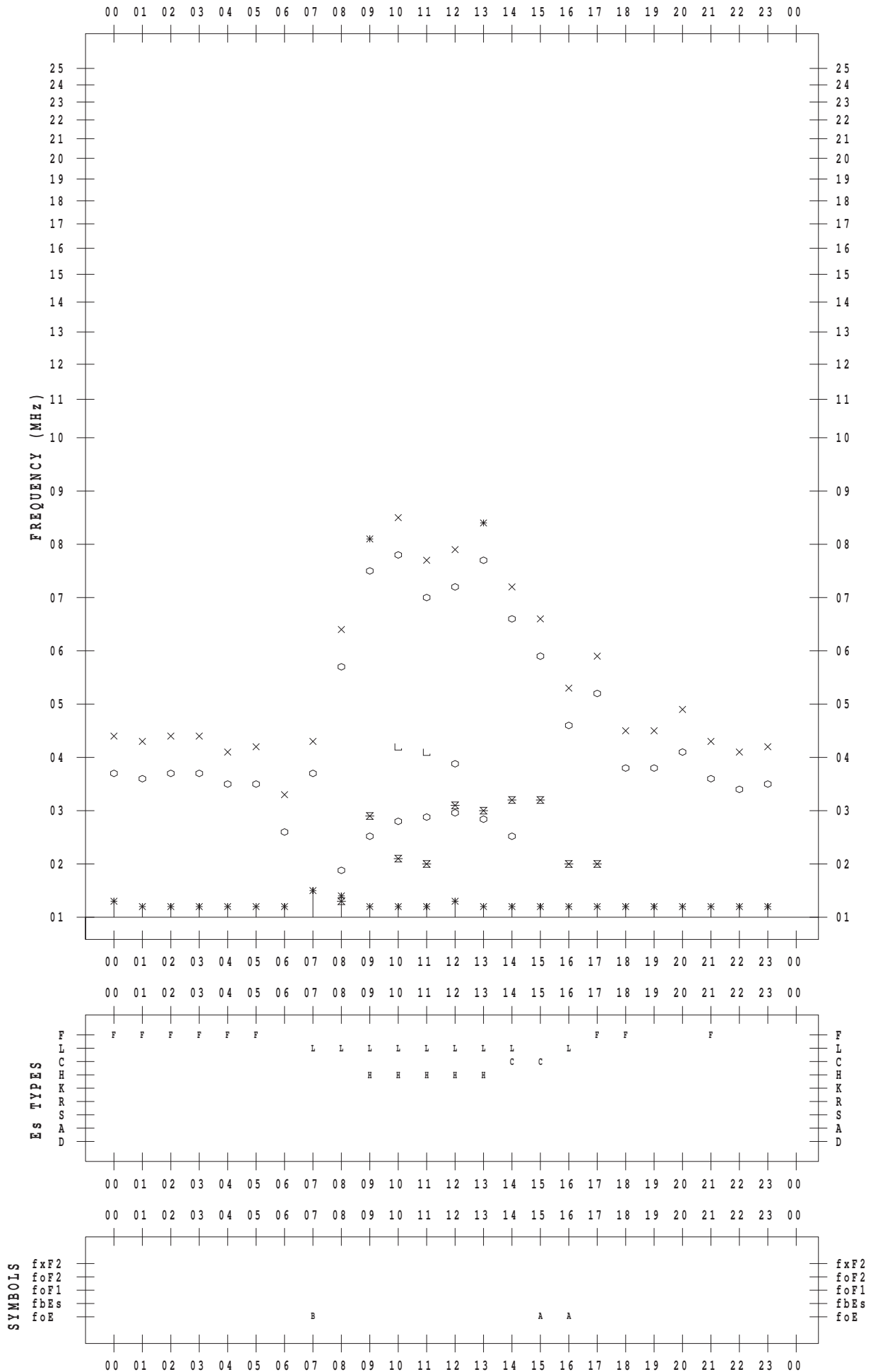
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/21

135 ° E MEAN TIME



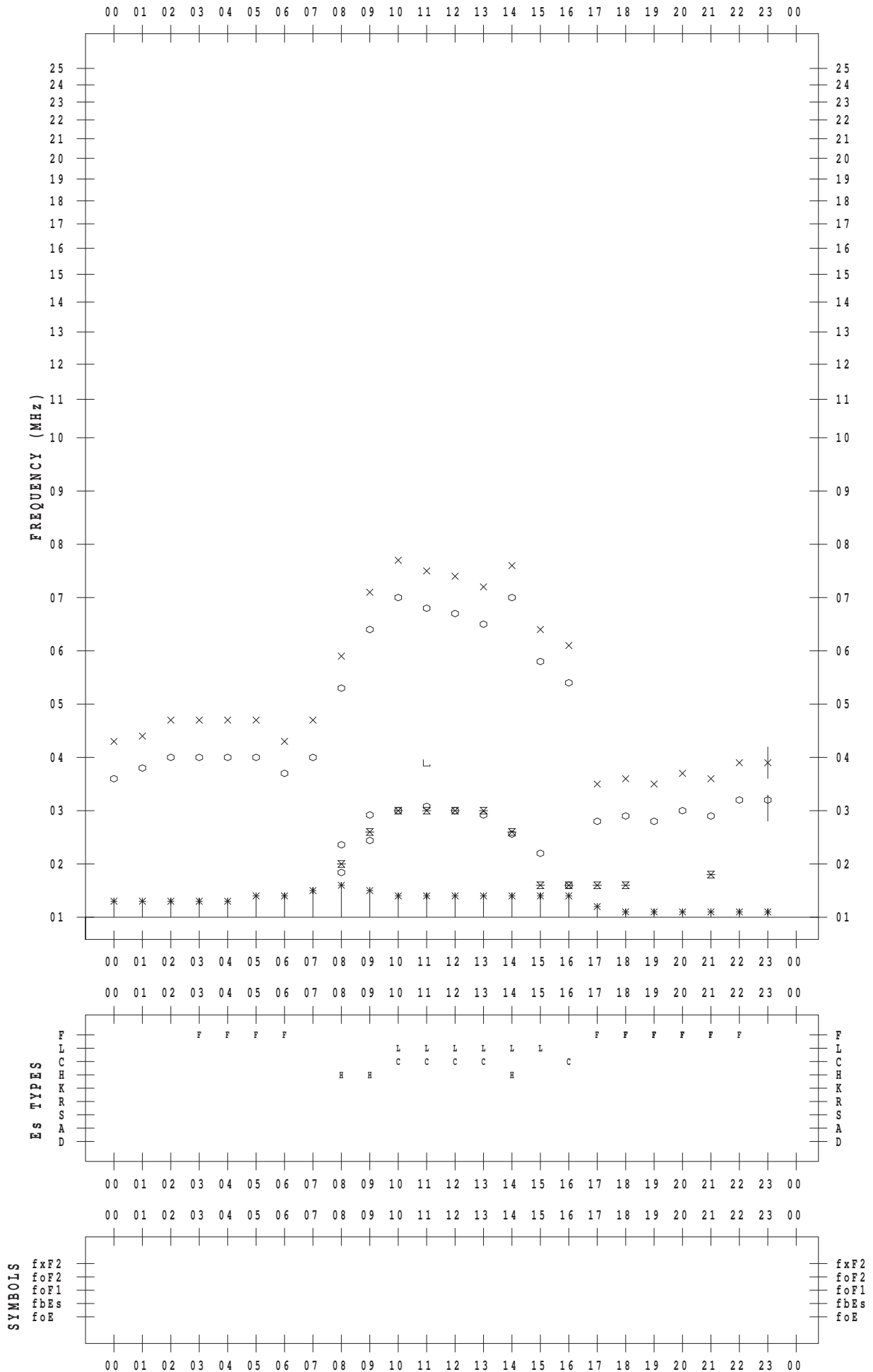
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/22

135 ° E MEAN TIME



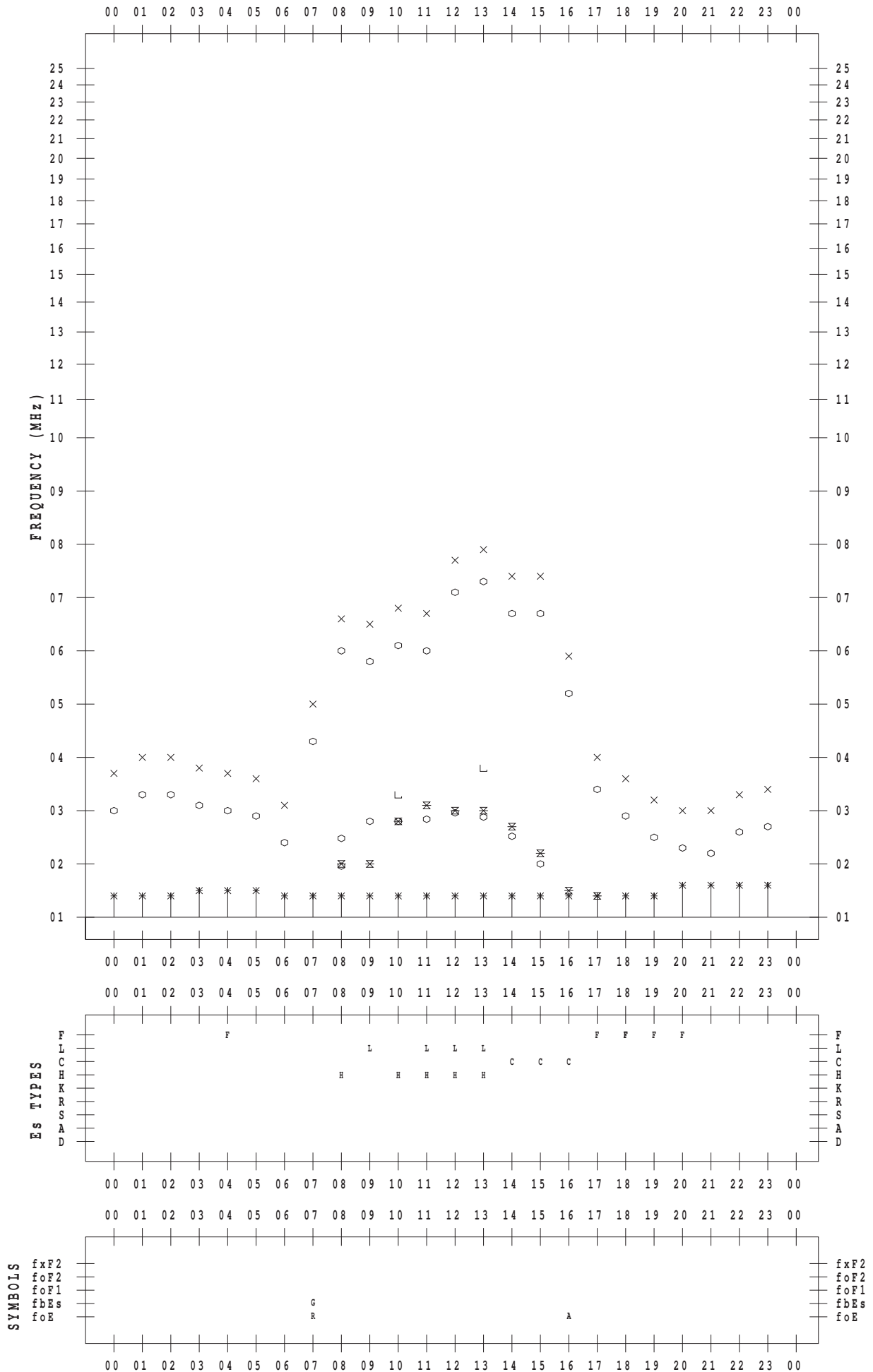
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/23

135 ° E MEAN TIME



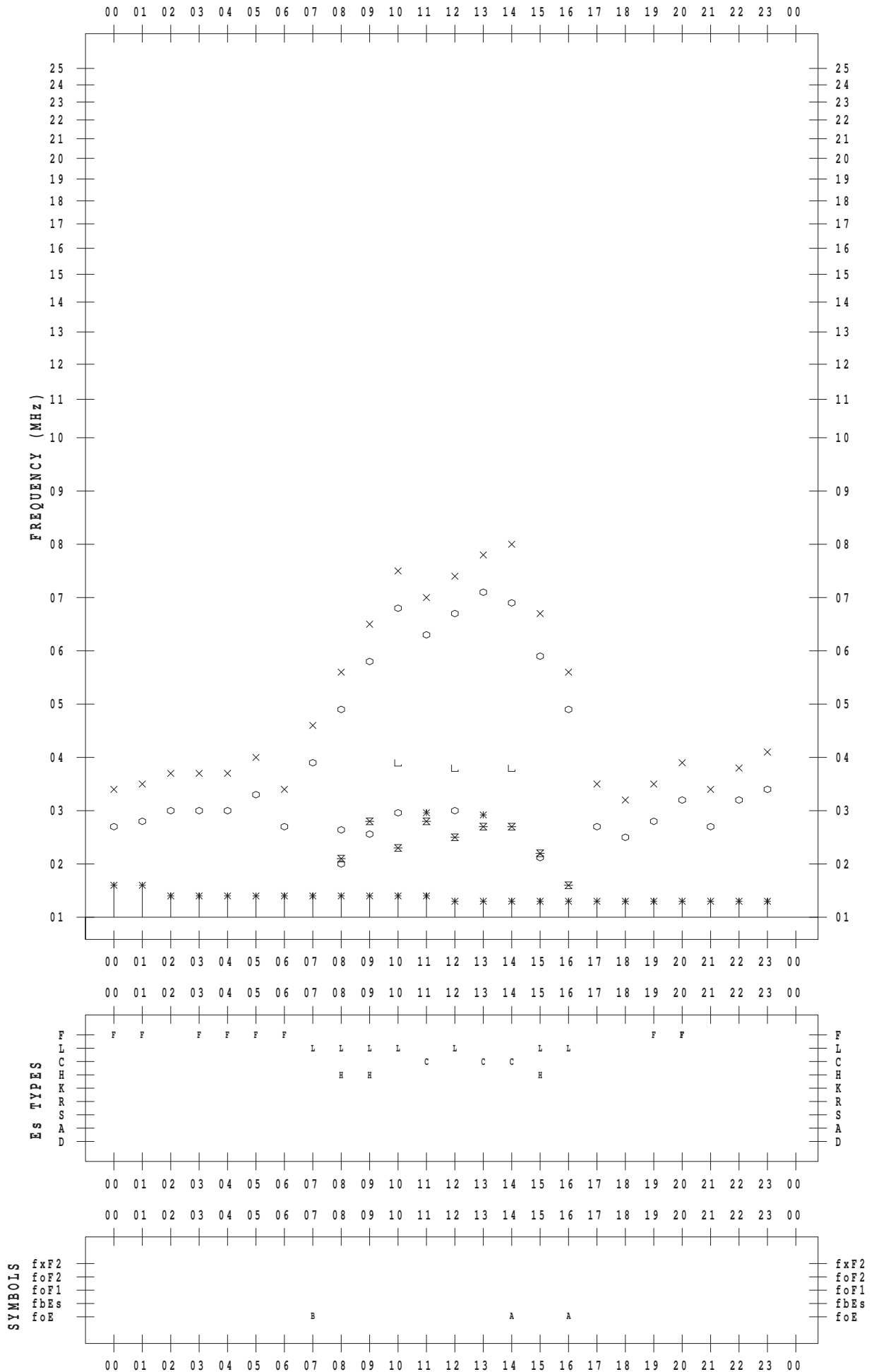
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/24

135 ° E MEAN TIME



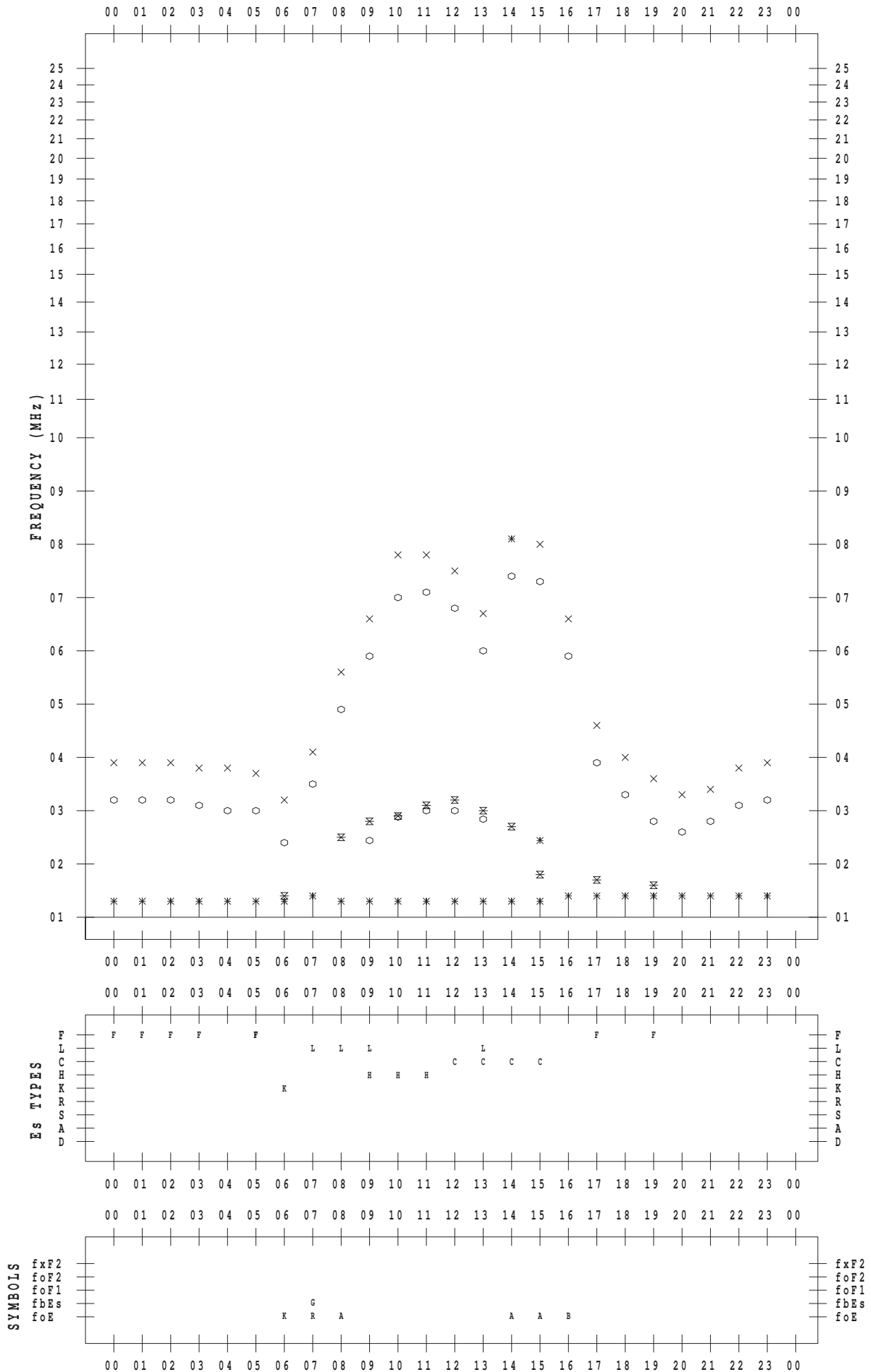
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/25

135 ° E MEAN TIME



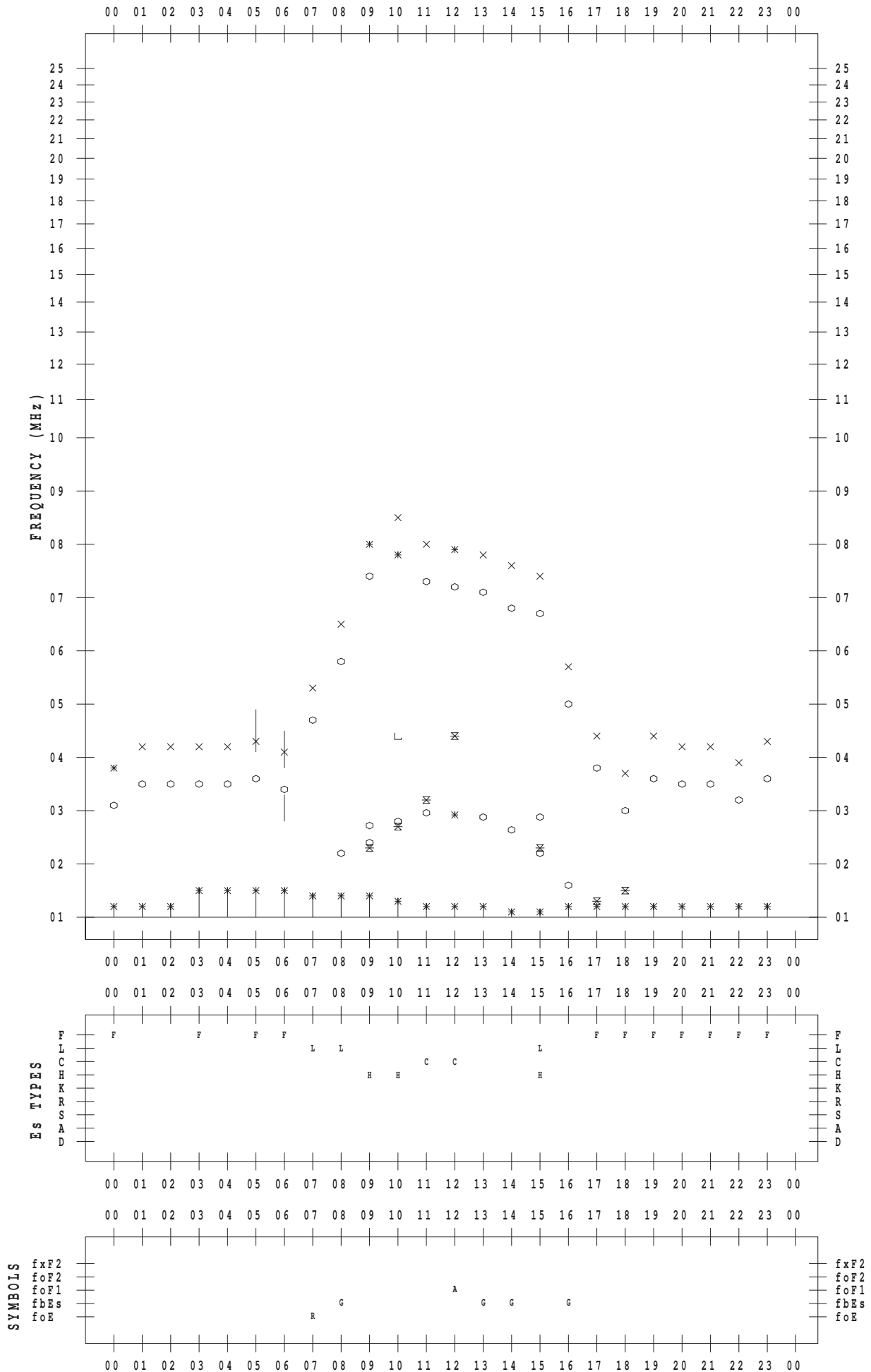
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/26

135 ° E MEAN TIME



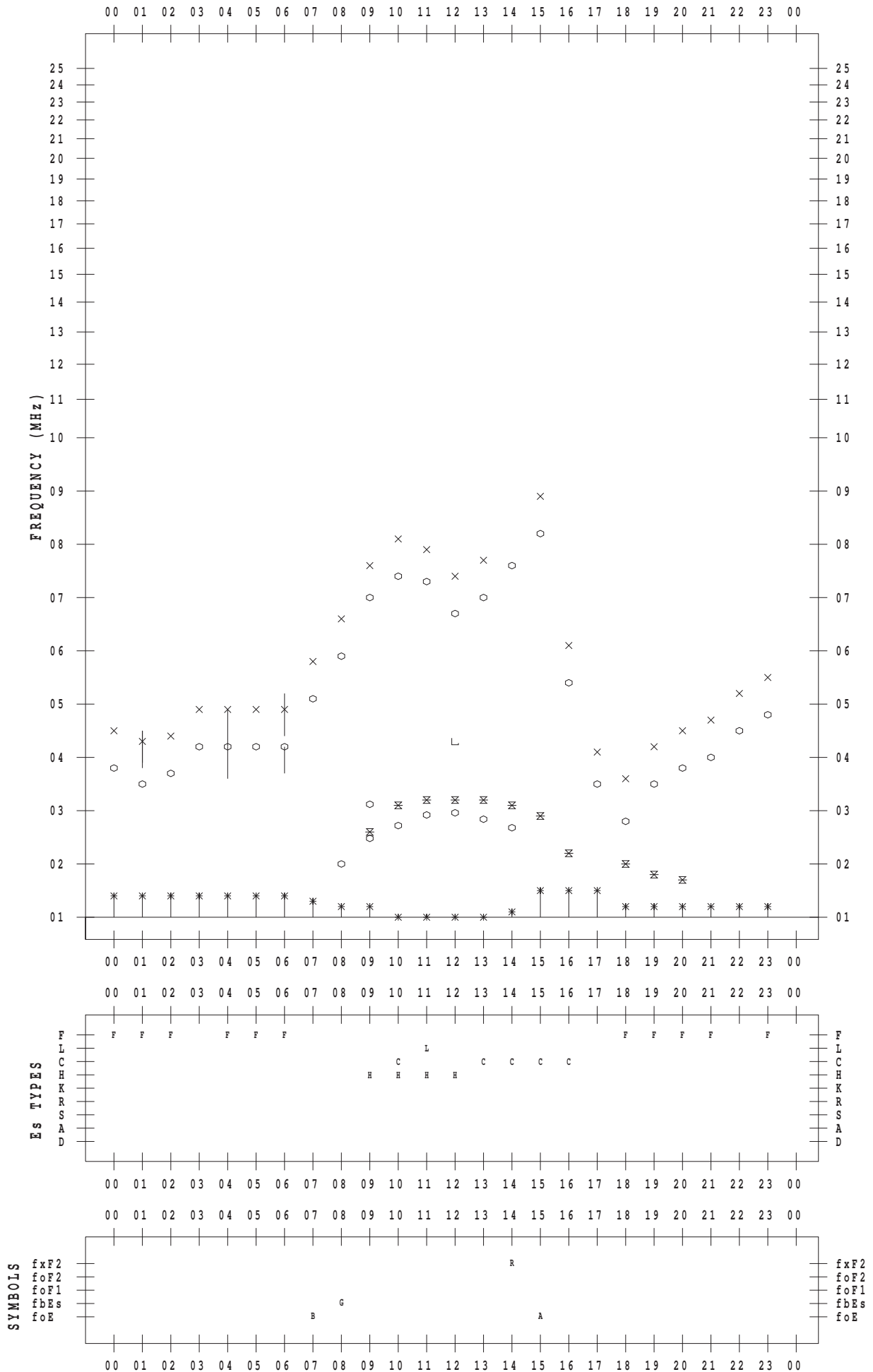
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/27

135 ° E MEAN TIME



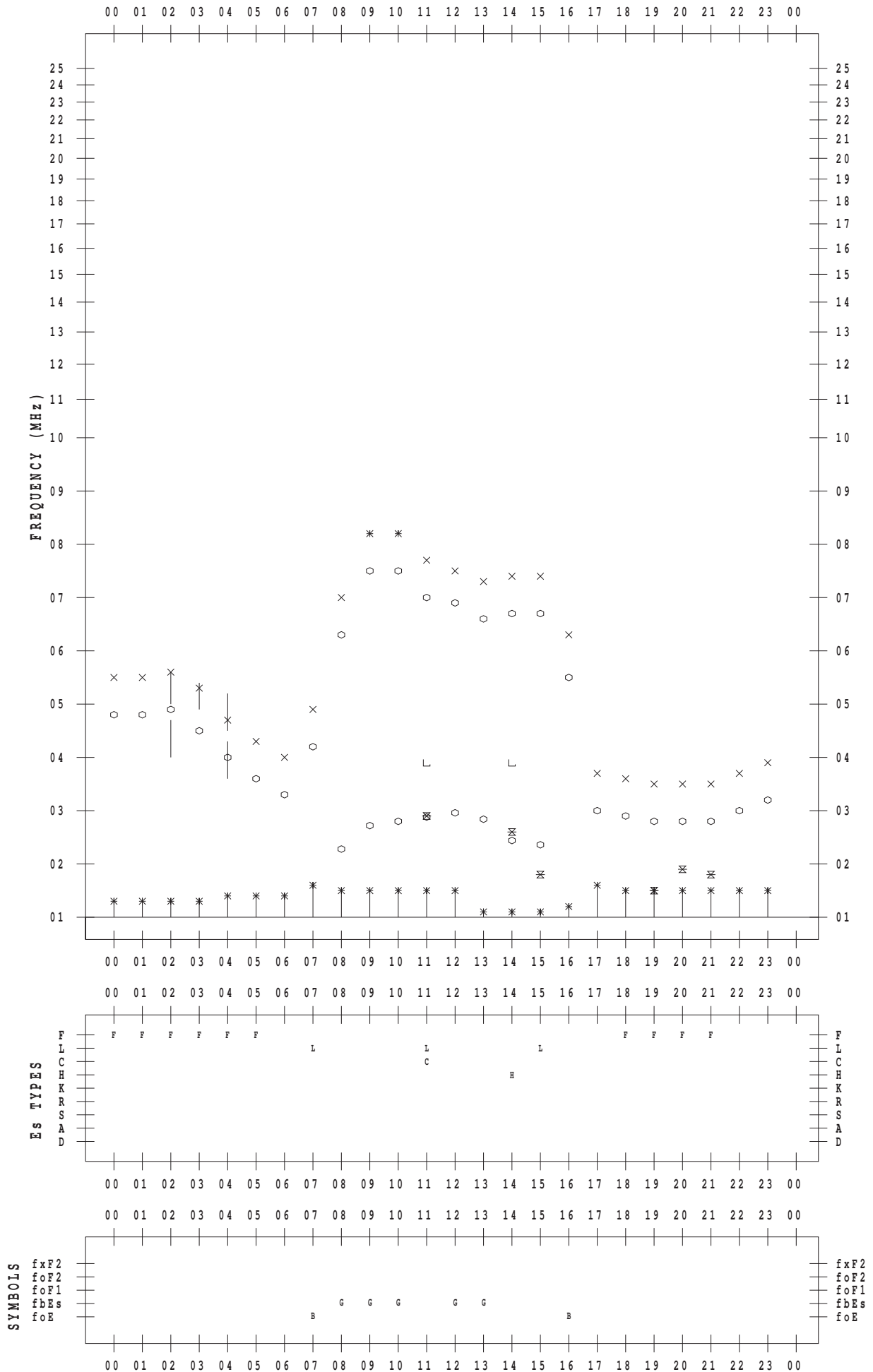
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/28

135 ° E MEAN TIME





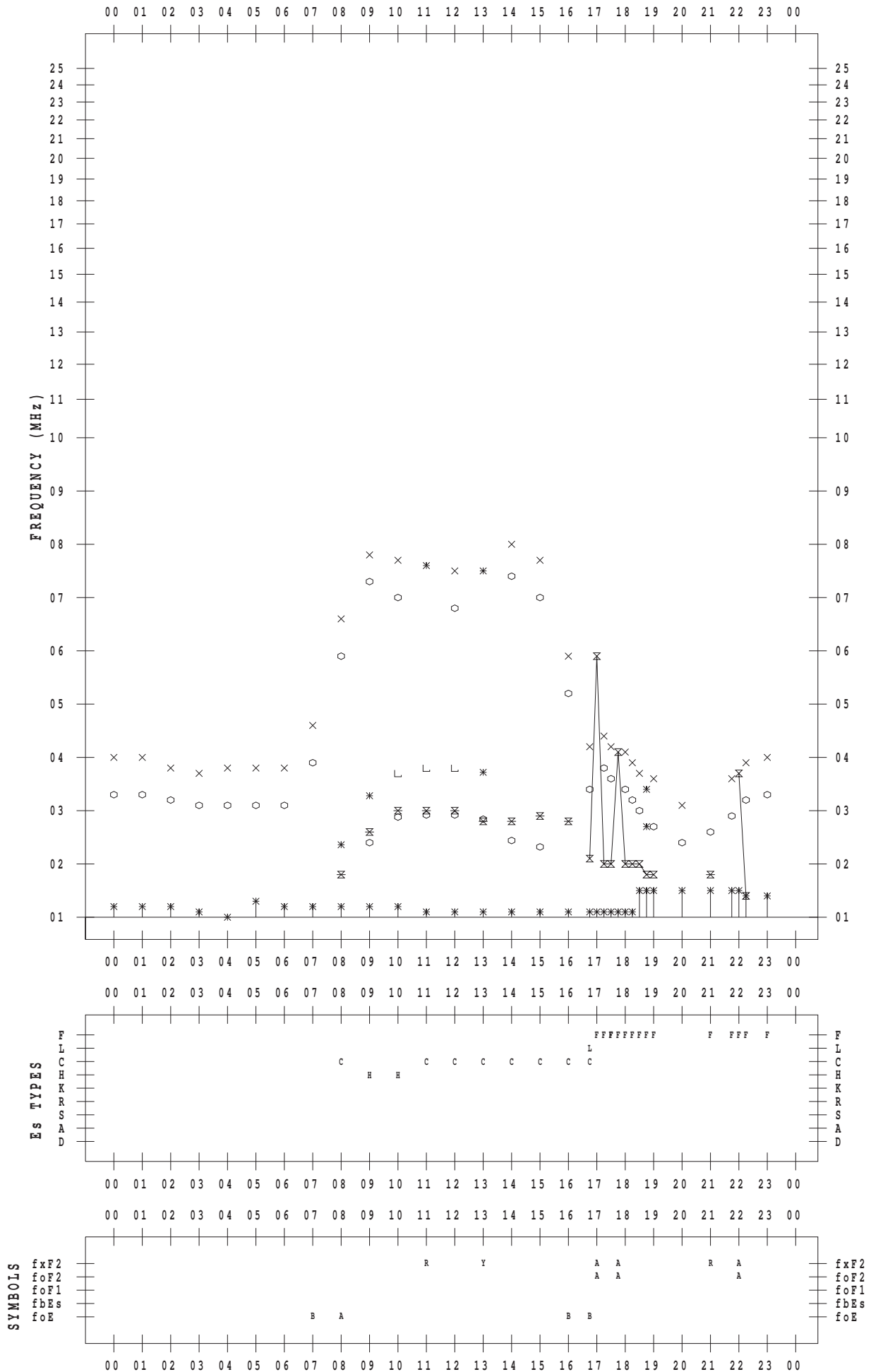
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SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/29

135 ° E MEAN TIME



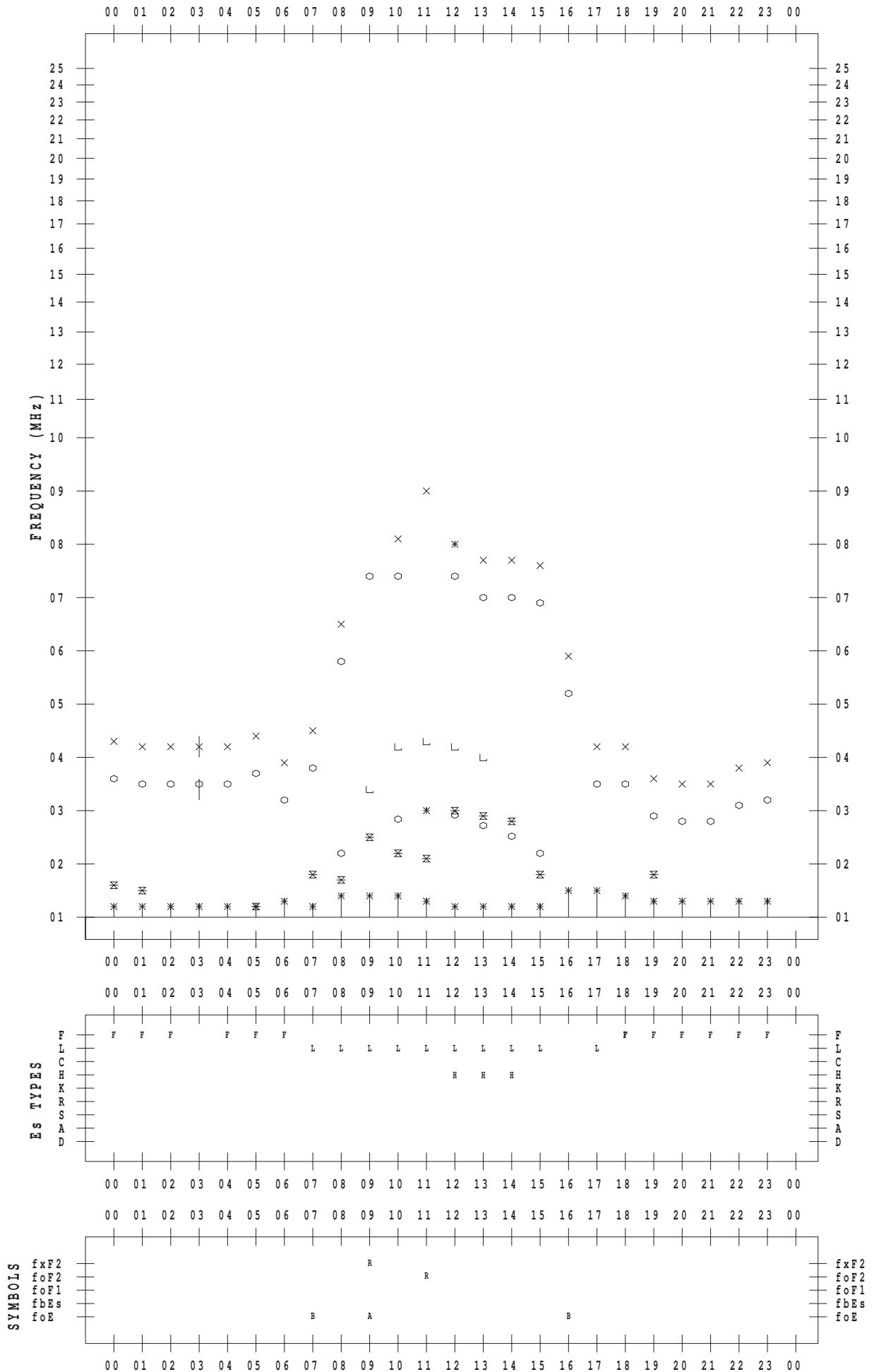
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/30

135 ° E MEAN TIME



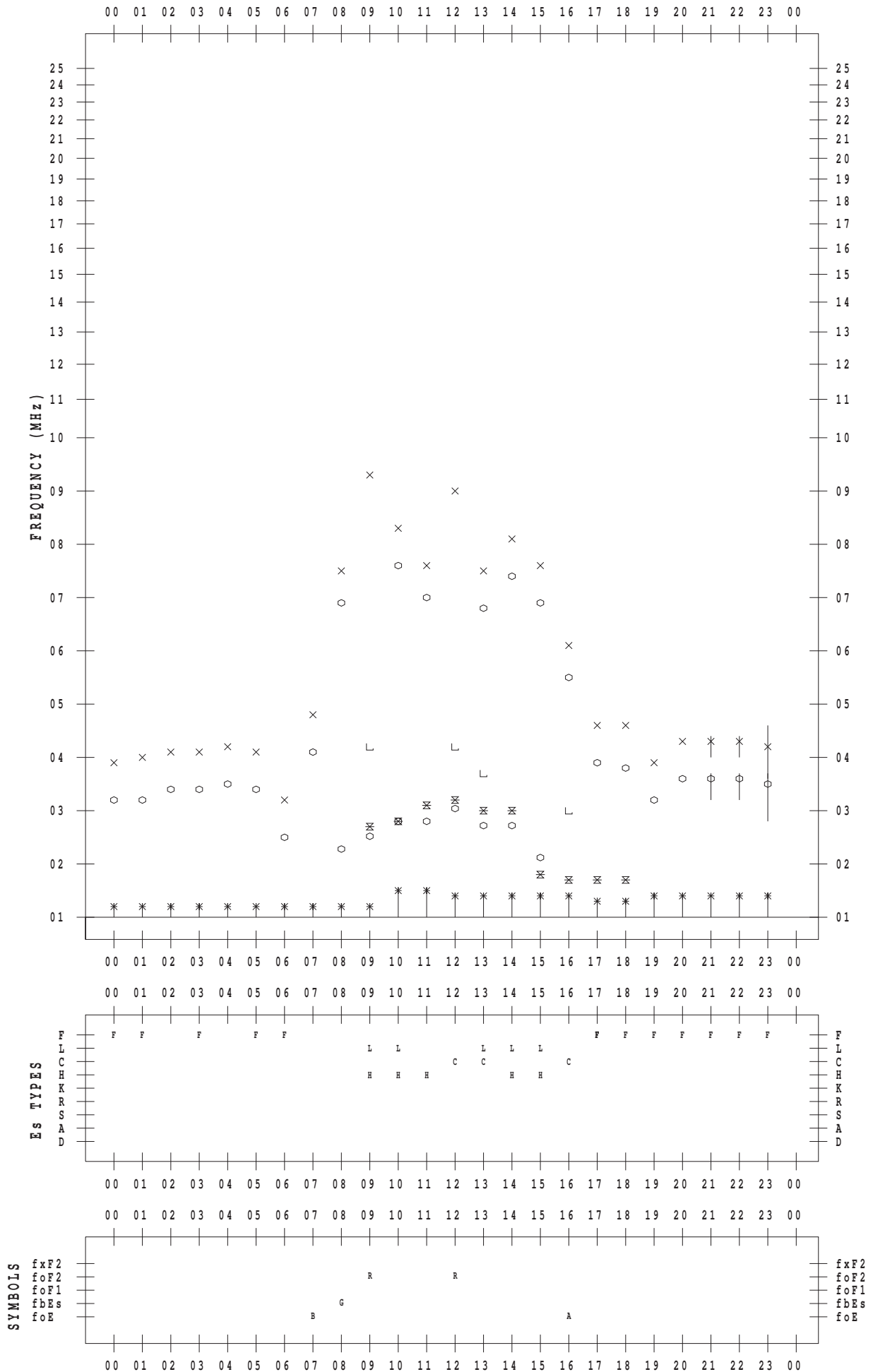
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2012/12/31

135 ° E MEAN TIME



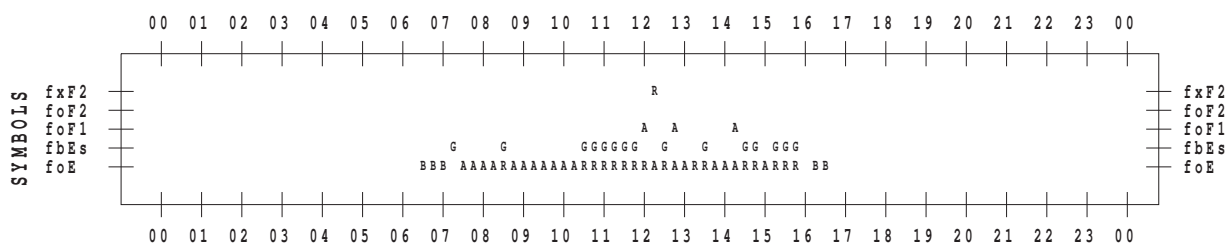
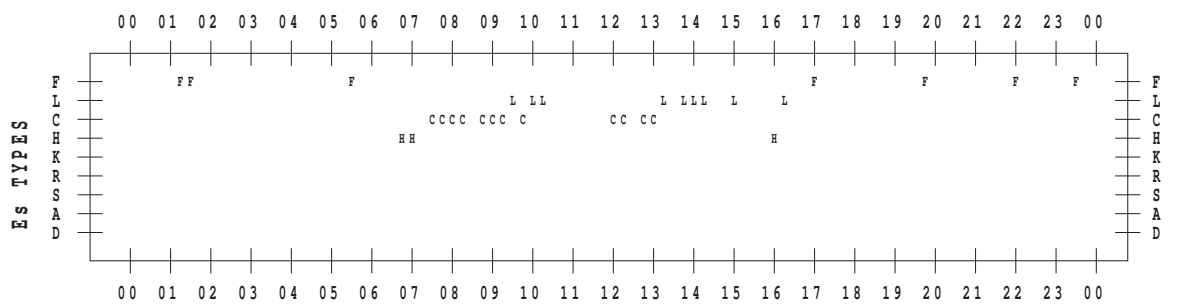
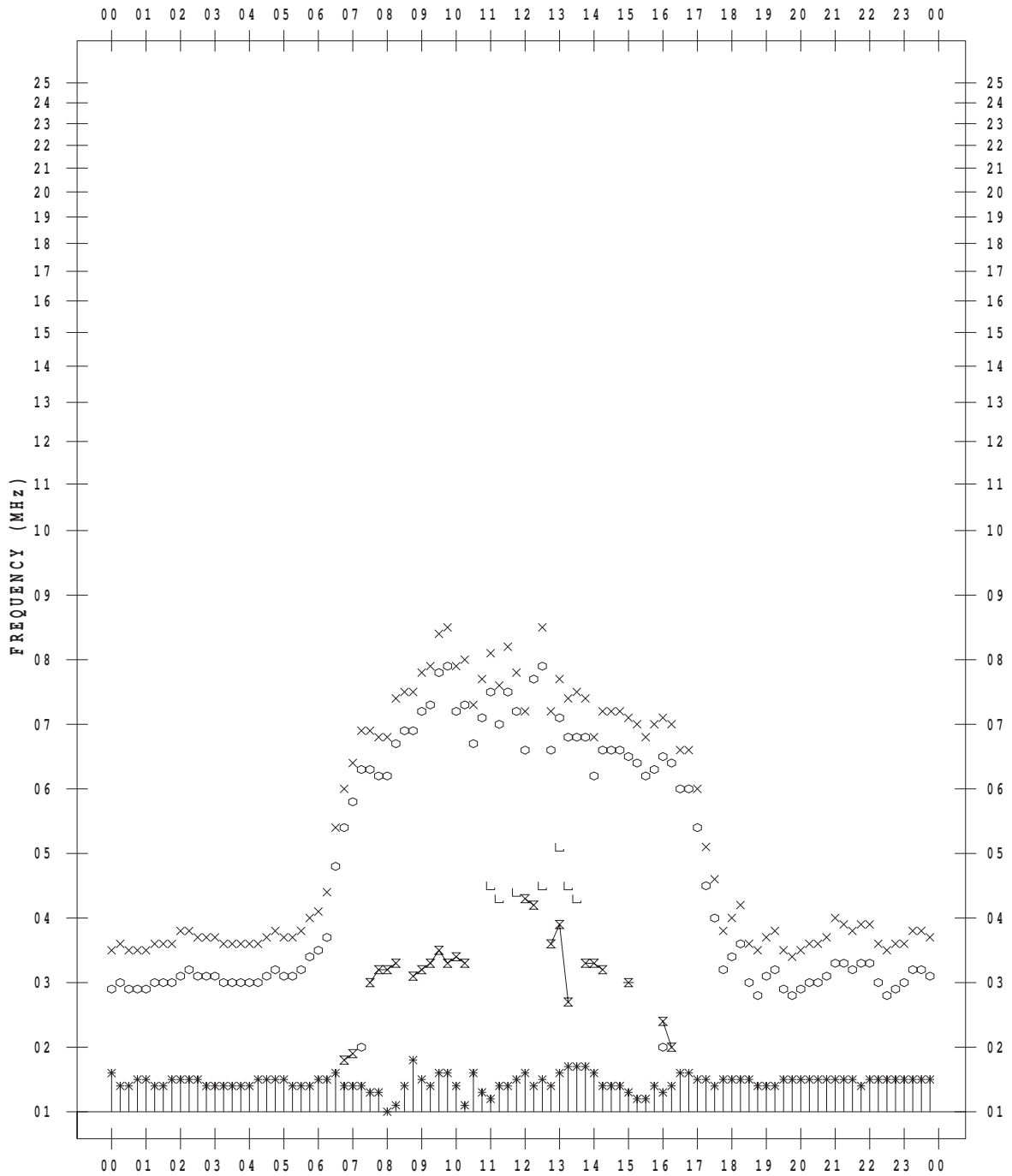
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2012/12/ 1

135 ° E MEAN TIME



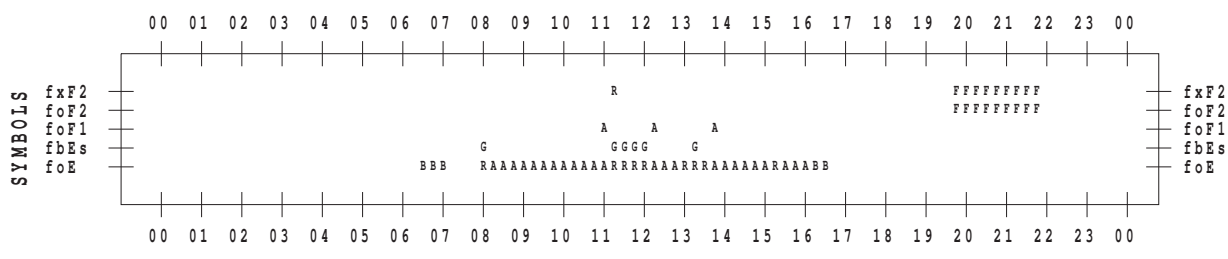
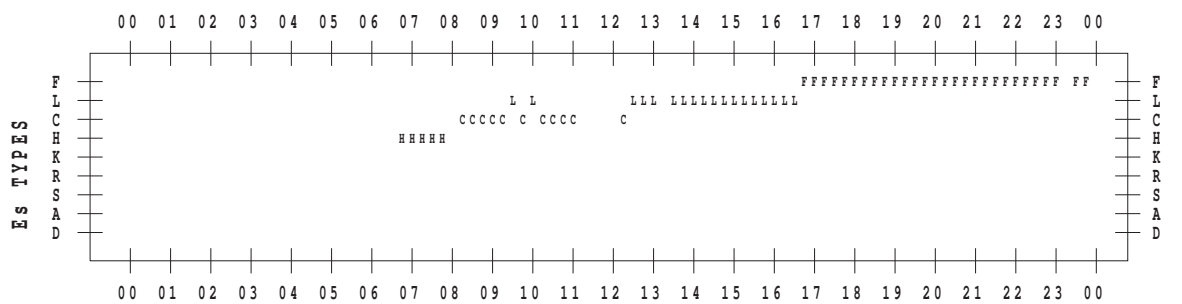
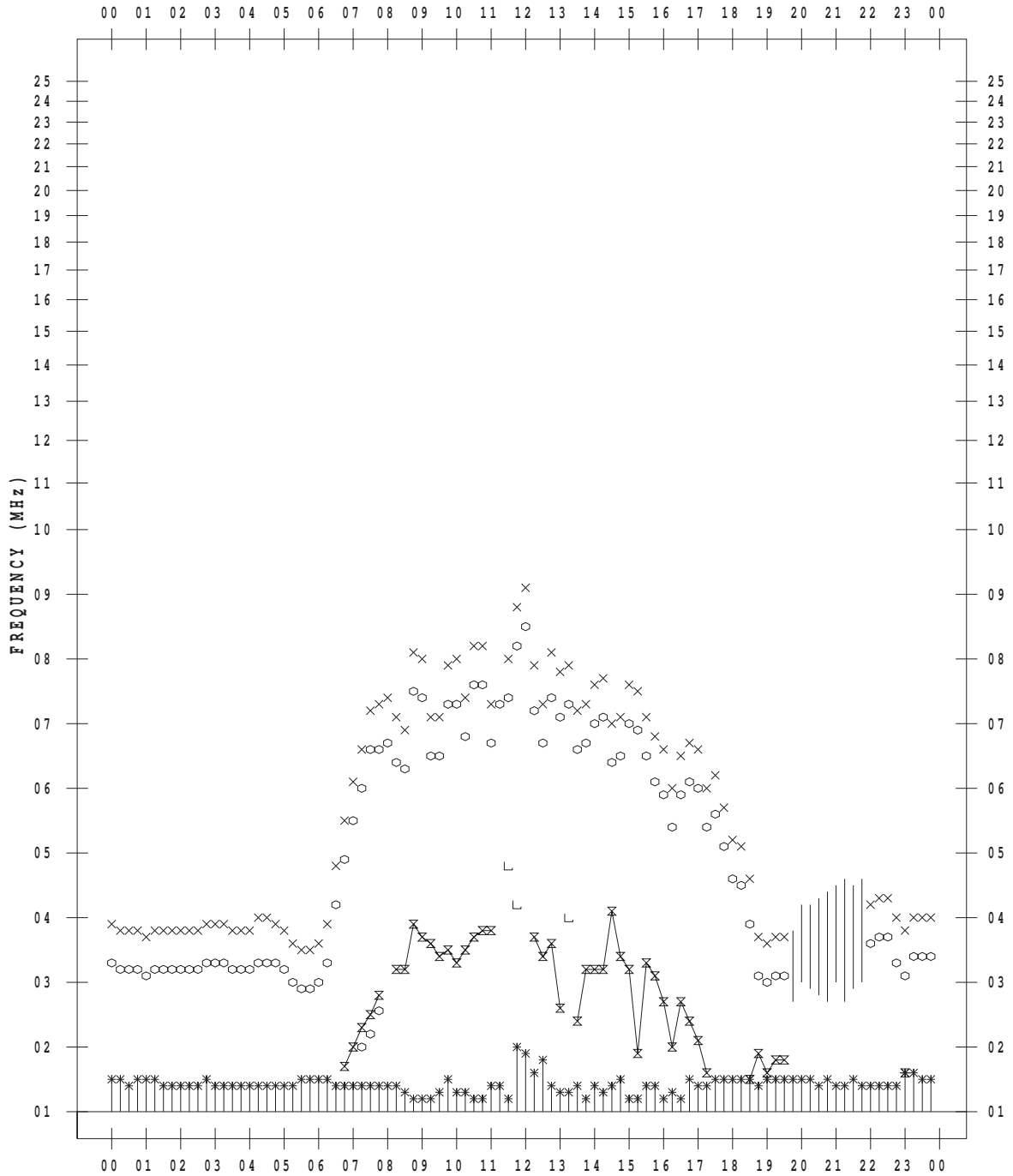
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2012/12/ 2

135 ° E MEAN TIME



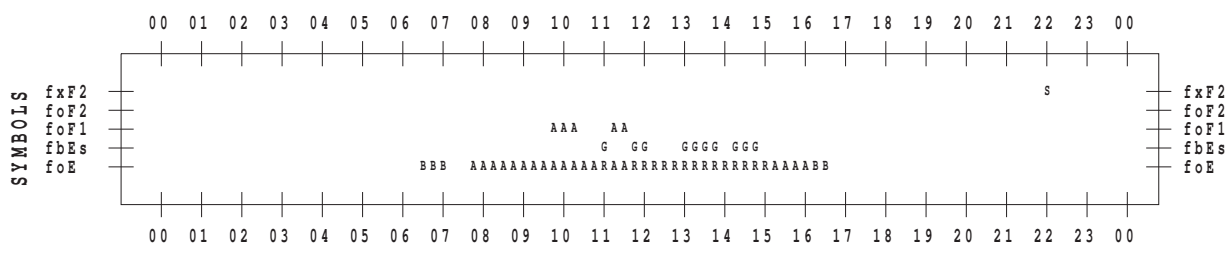
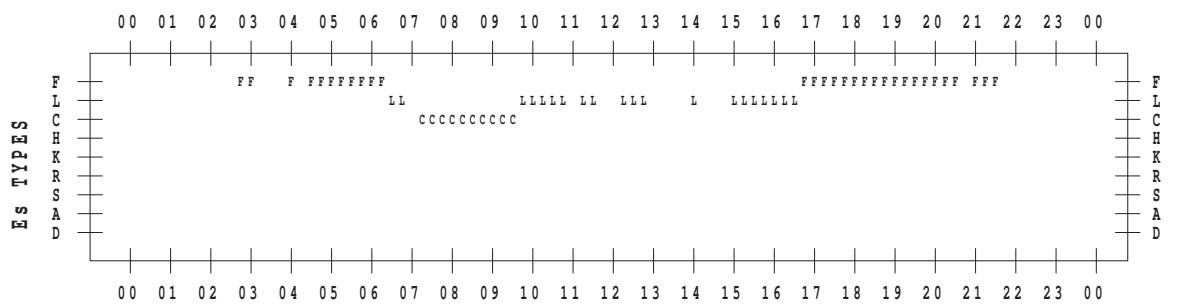
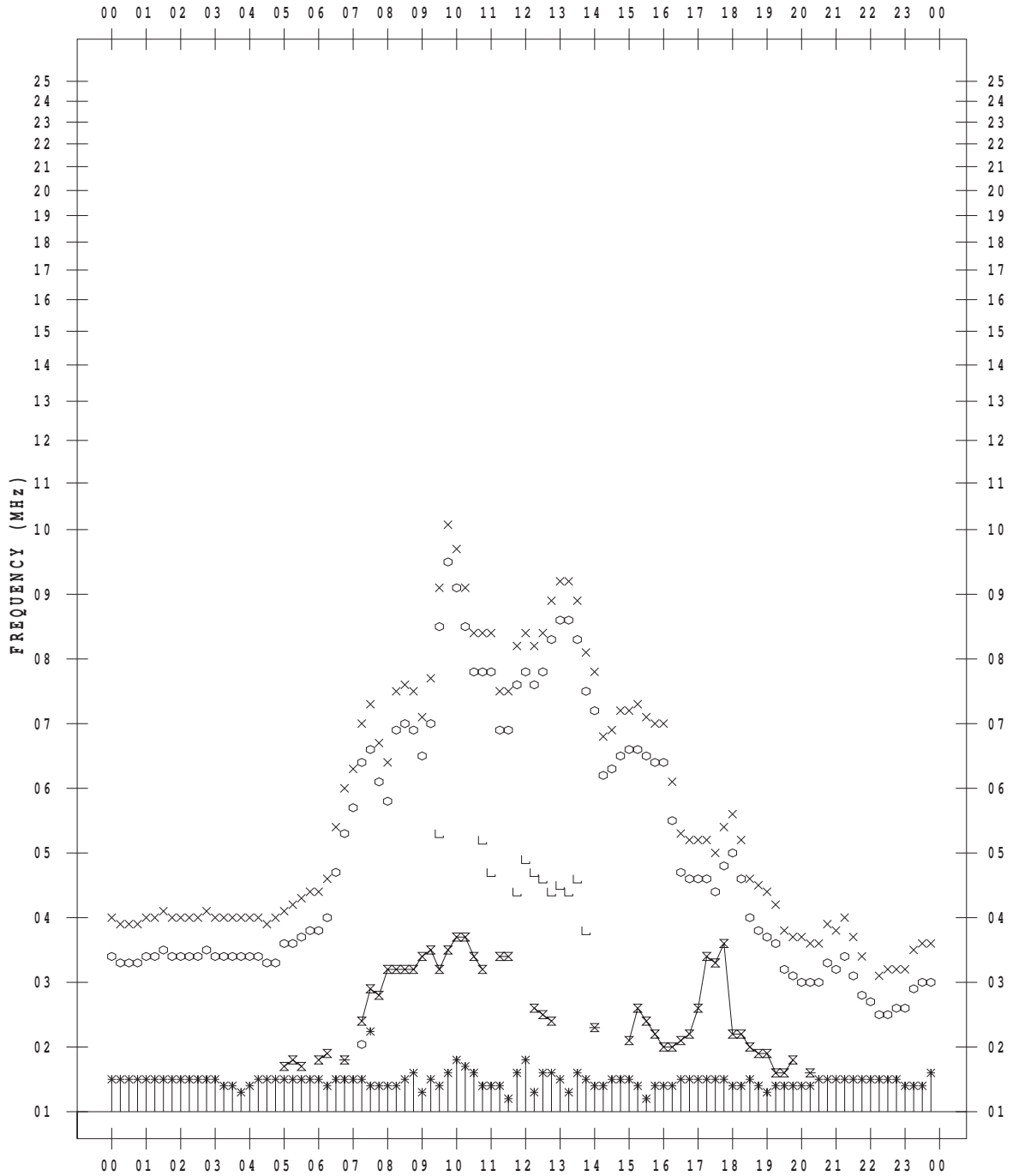
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2012/12/ 3

135 ° E MEAN TIME



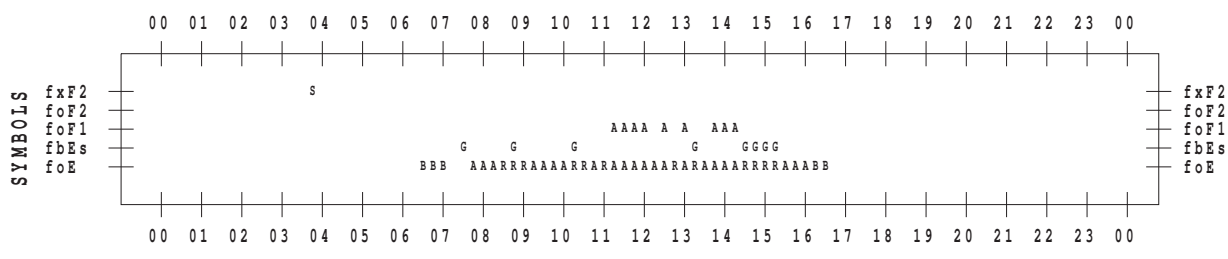
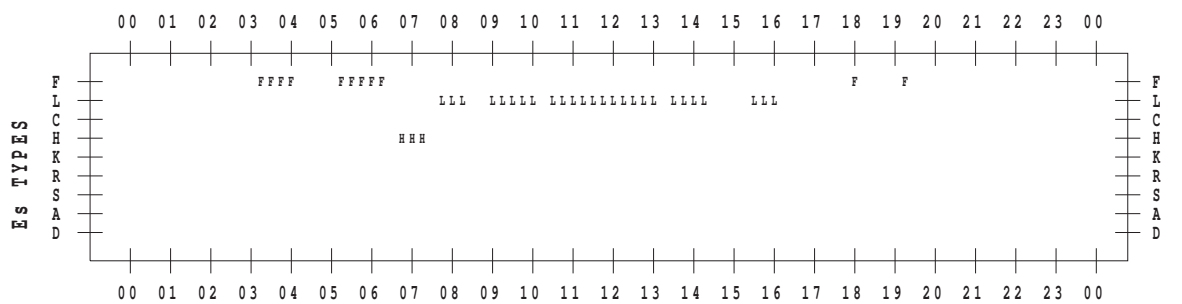
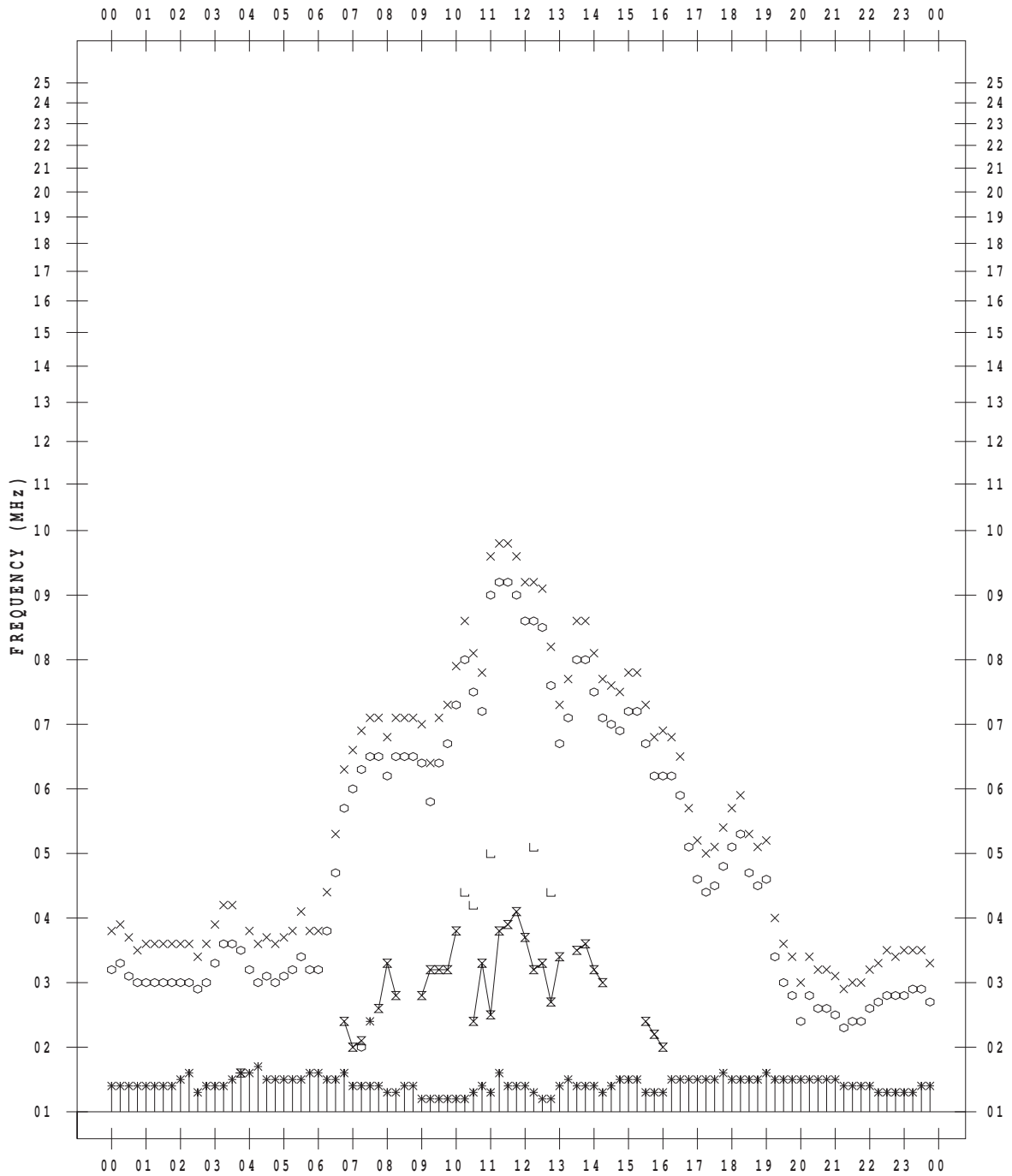
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2012/12/ 4

135 ° E MEAN TIME



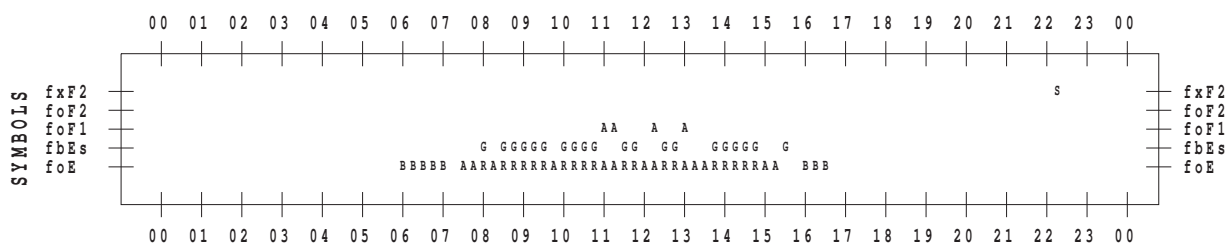
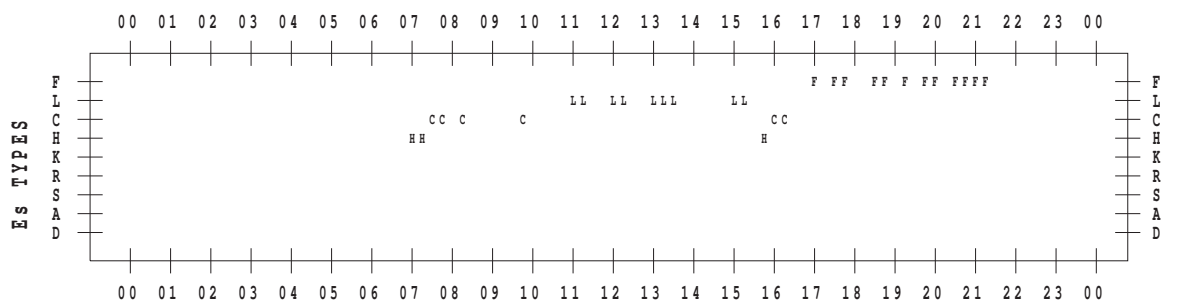
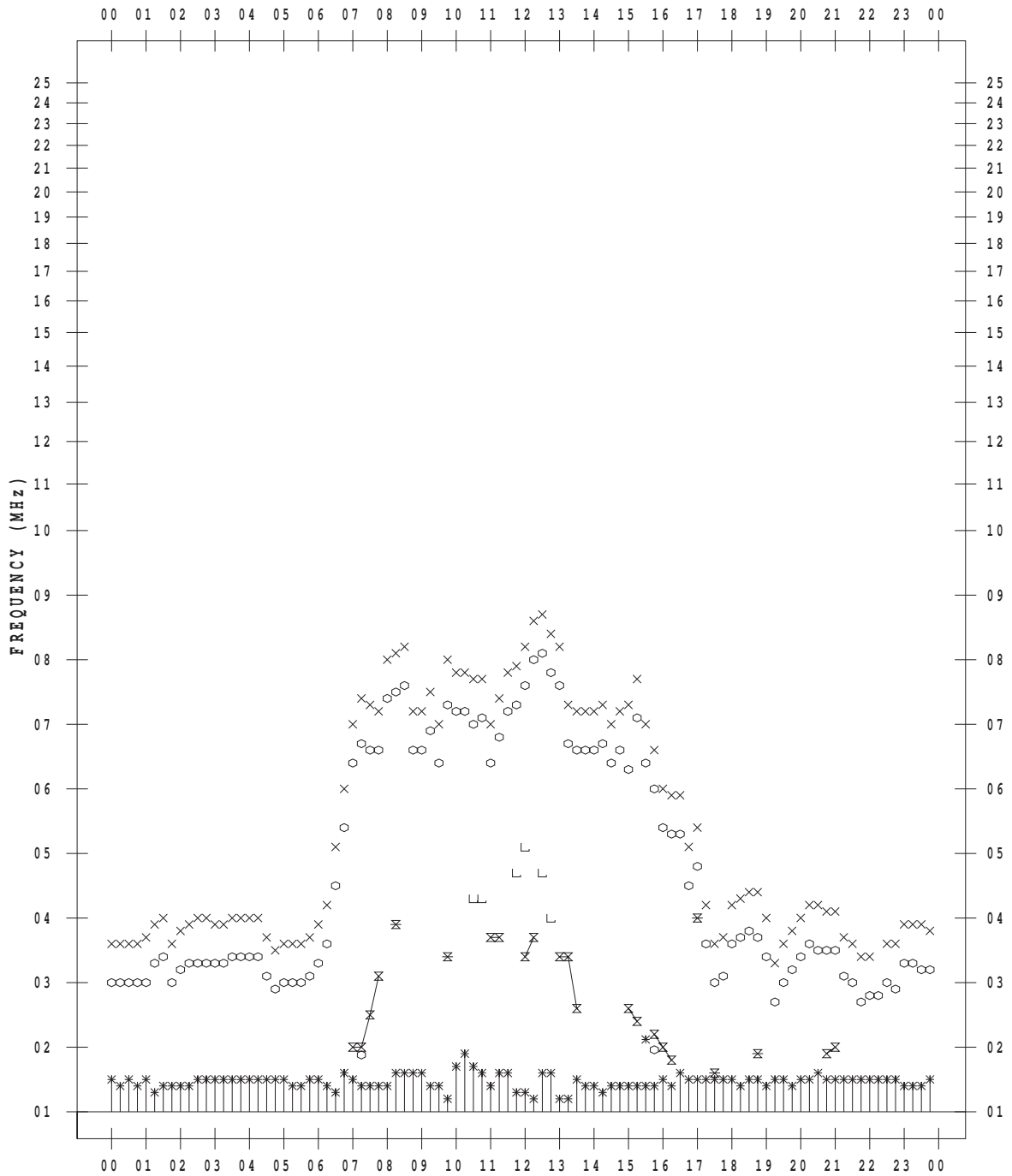
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2012/12/ 5

135 ° E MEAN TIME





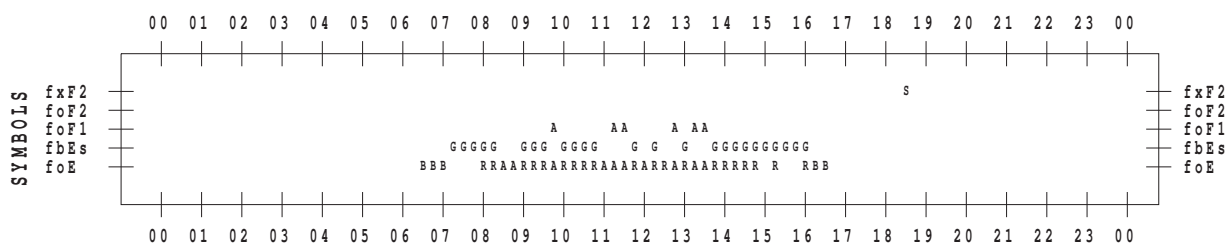
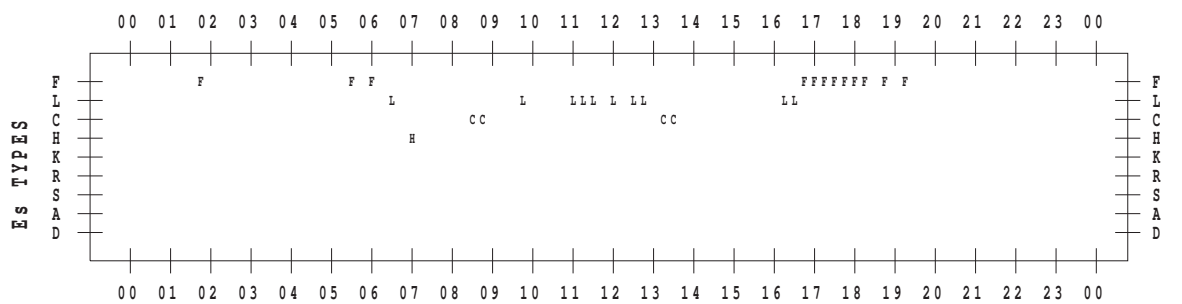
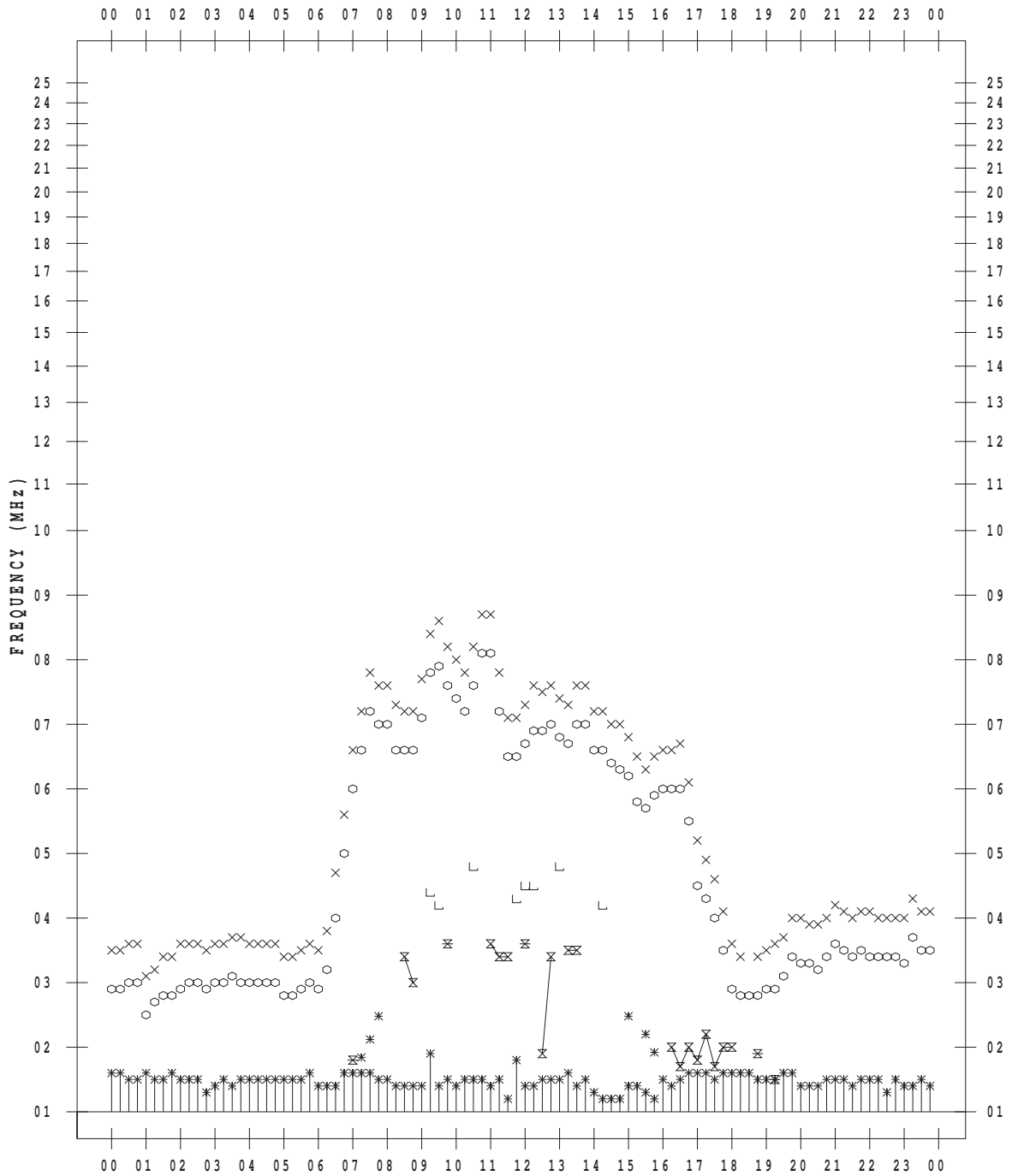
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2012/12/ 6

135 ° E MEAN TIME



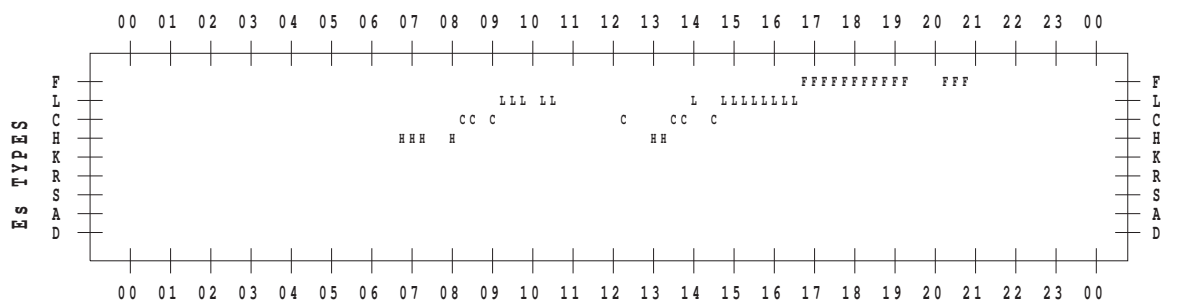
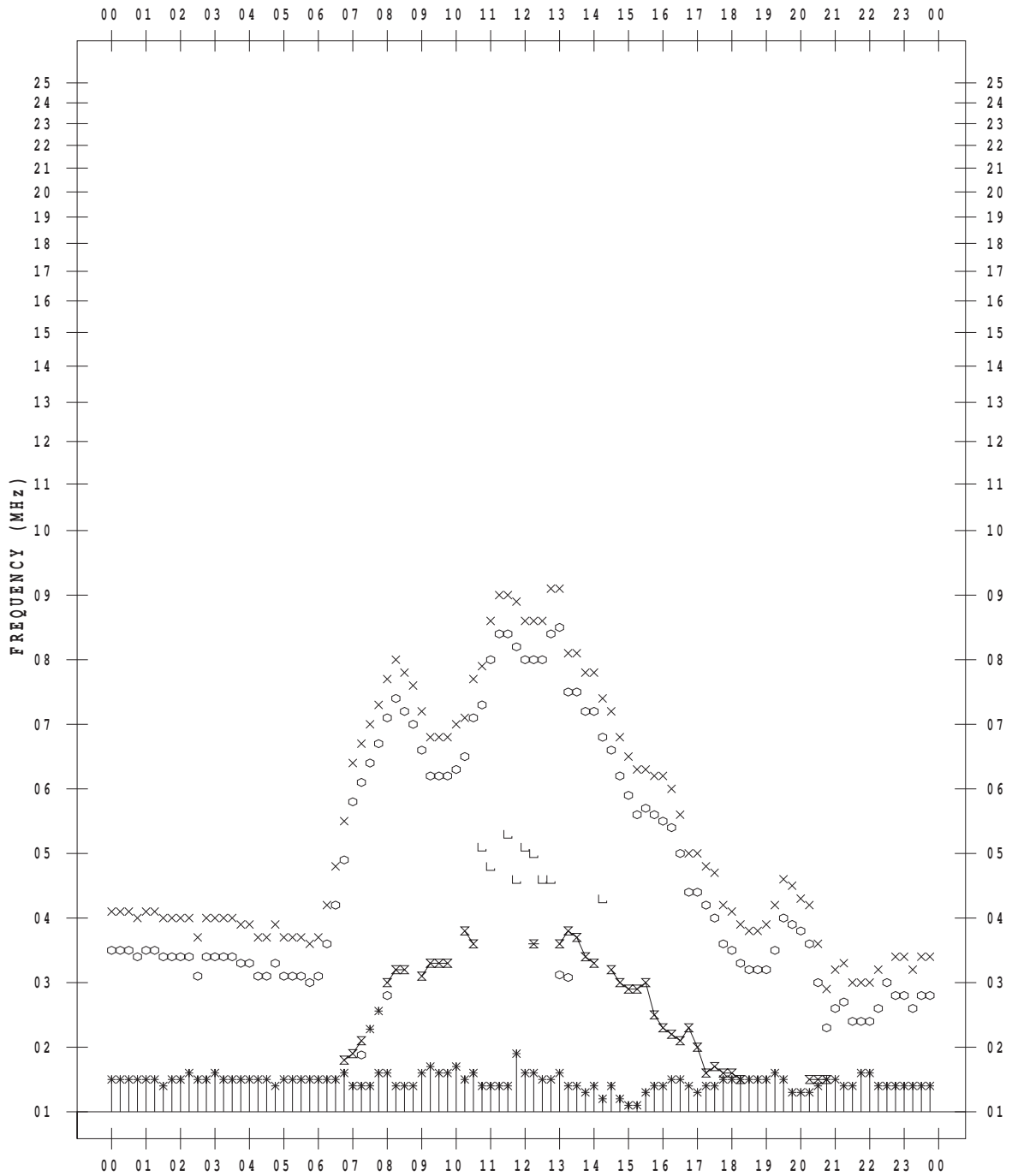
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2012/12/ 7

135 ° E MEAN TIME





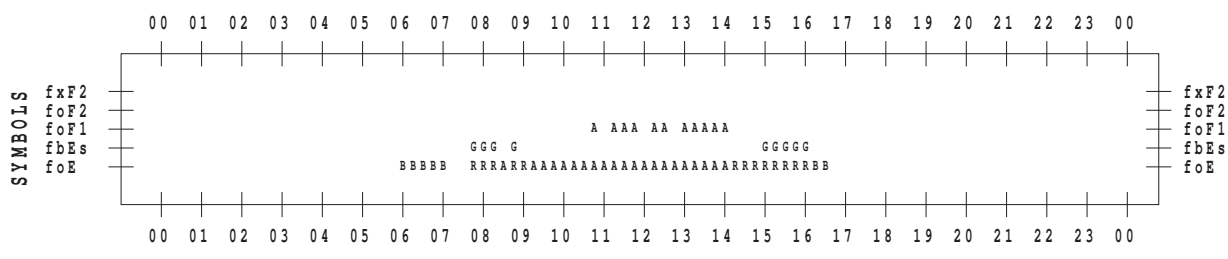
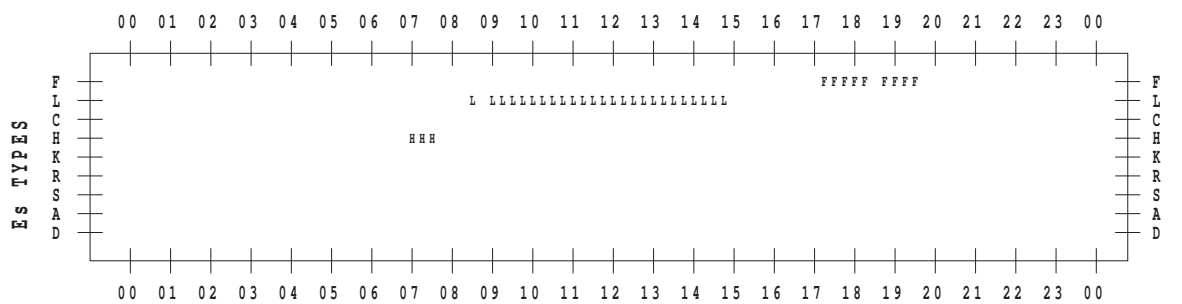
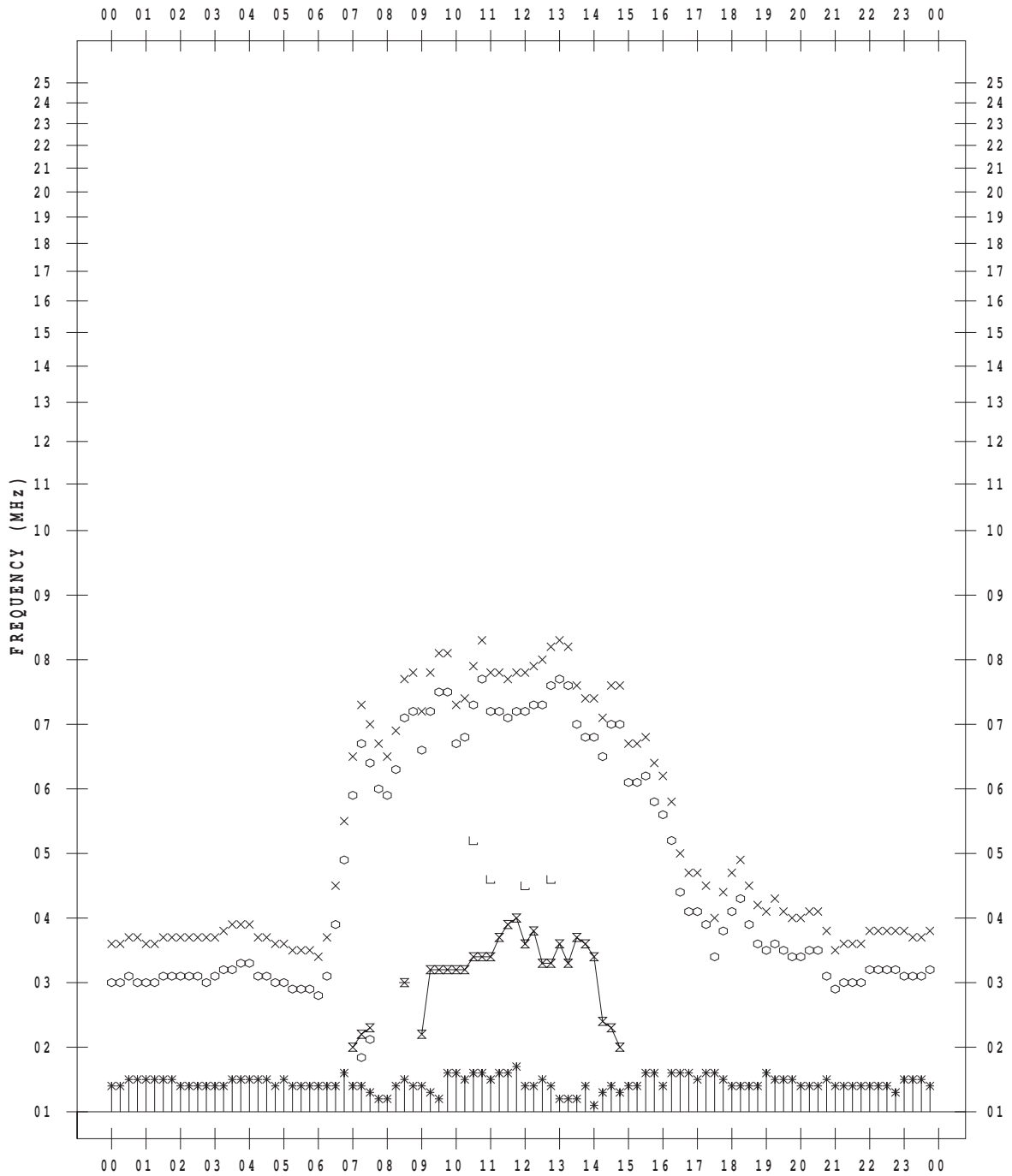
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2012/12/ 9

135 ° E MEAN TIME



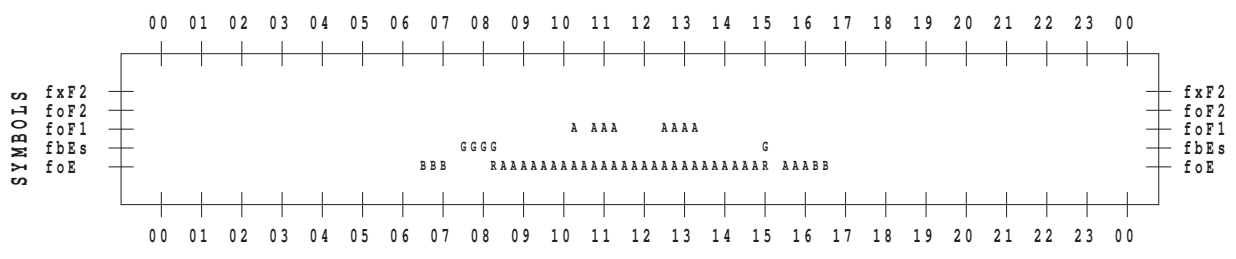
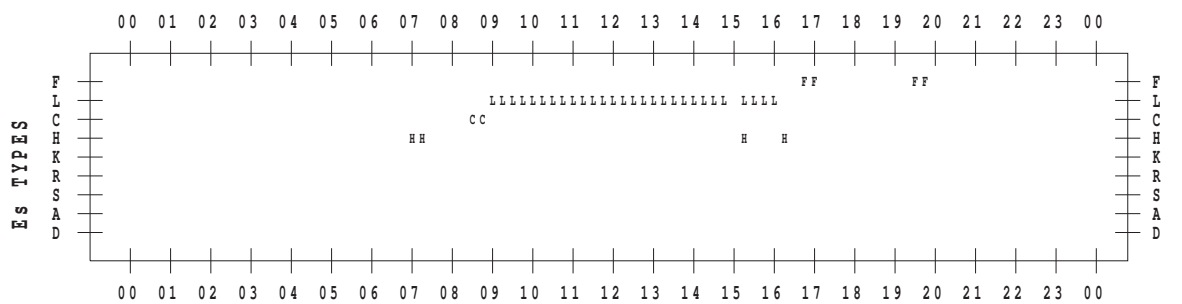
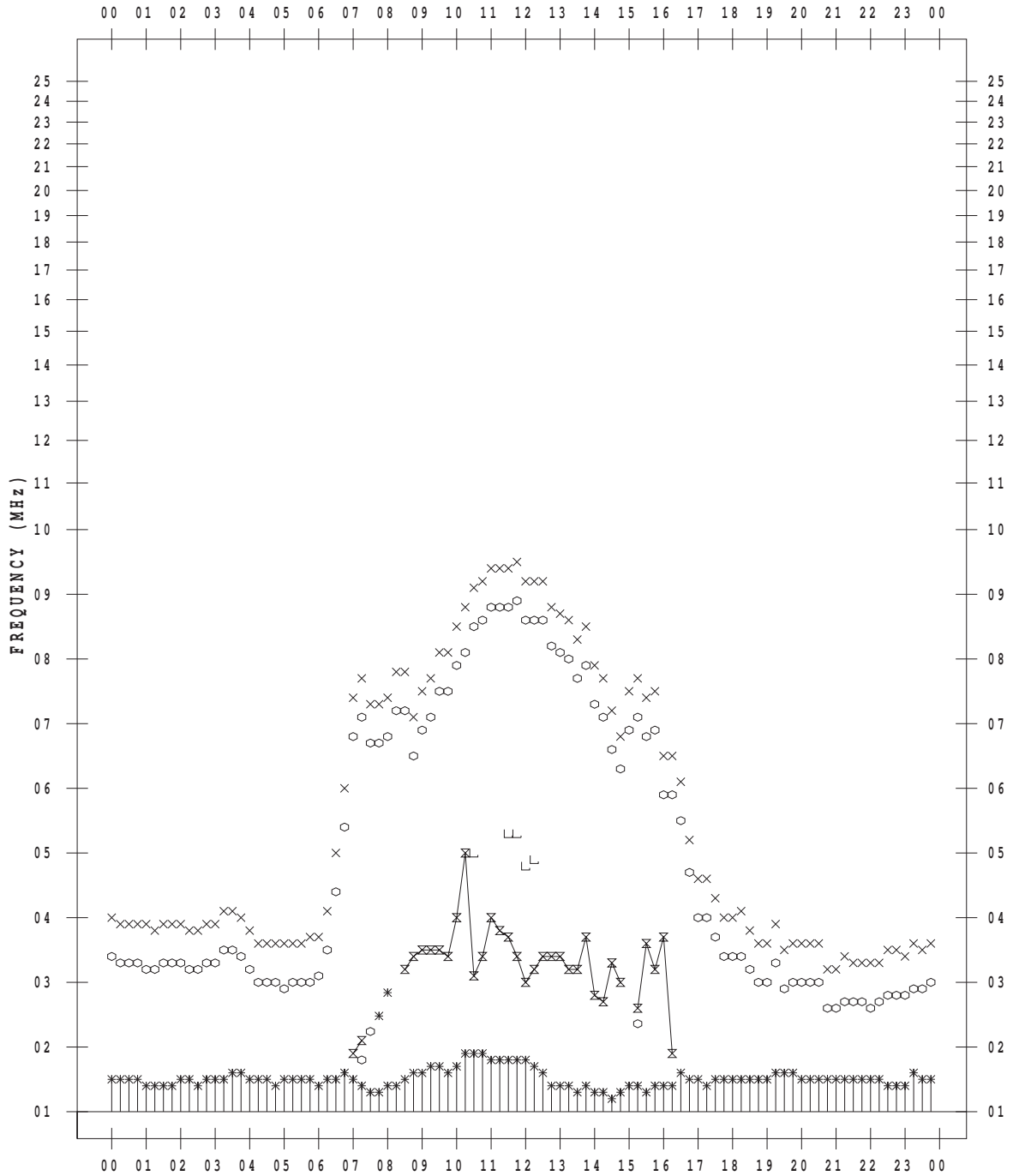
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2012/12/10

135 ° E MEAN TIME



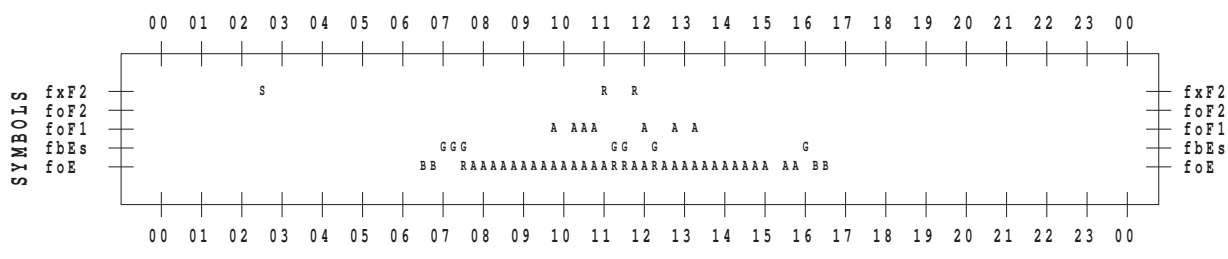
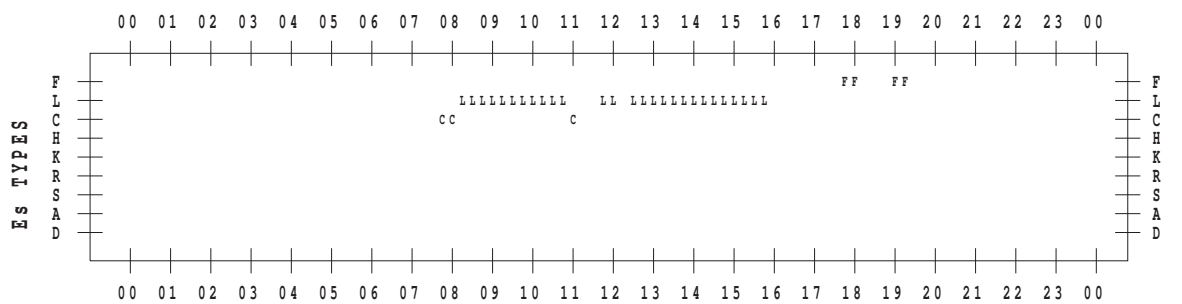
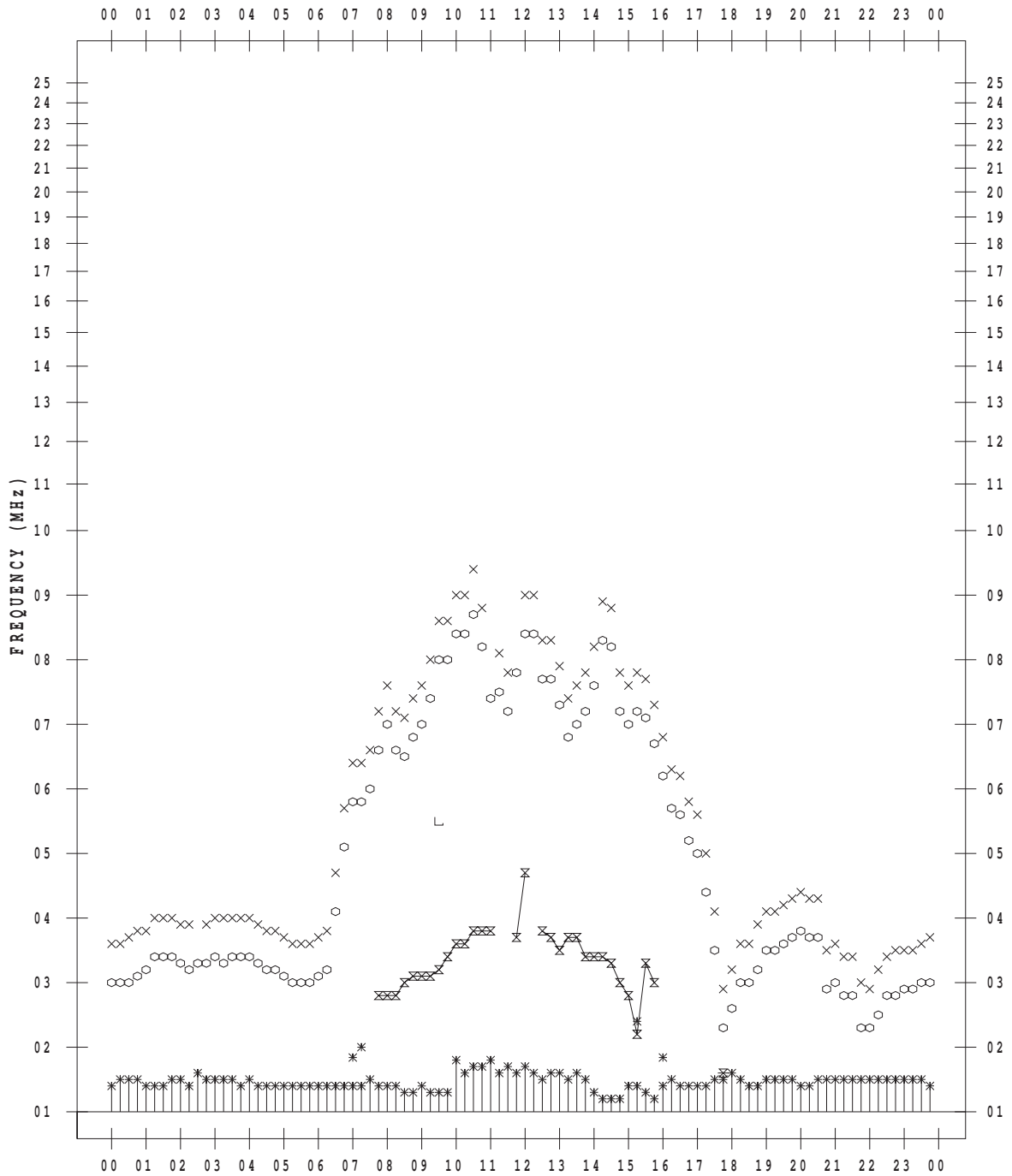
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2012/12/11

135 ° E MEAN TIME



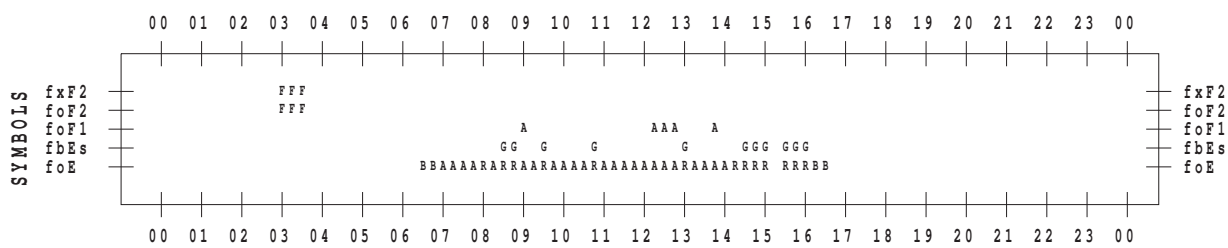
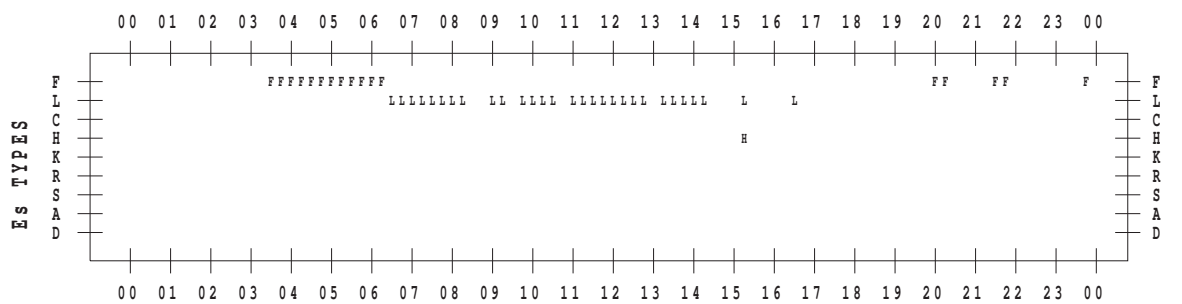
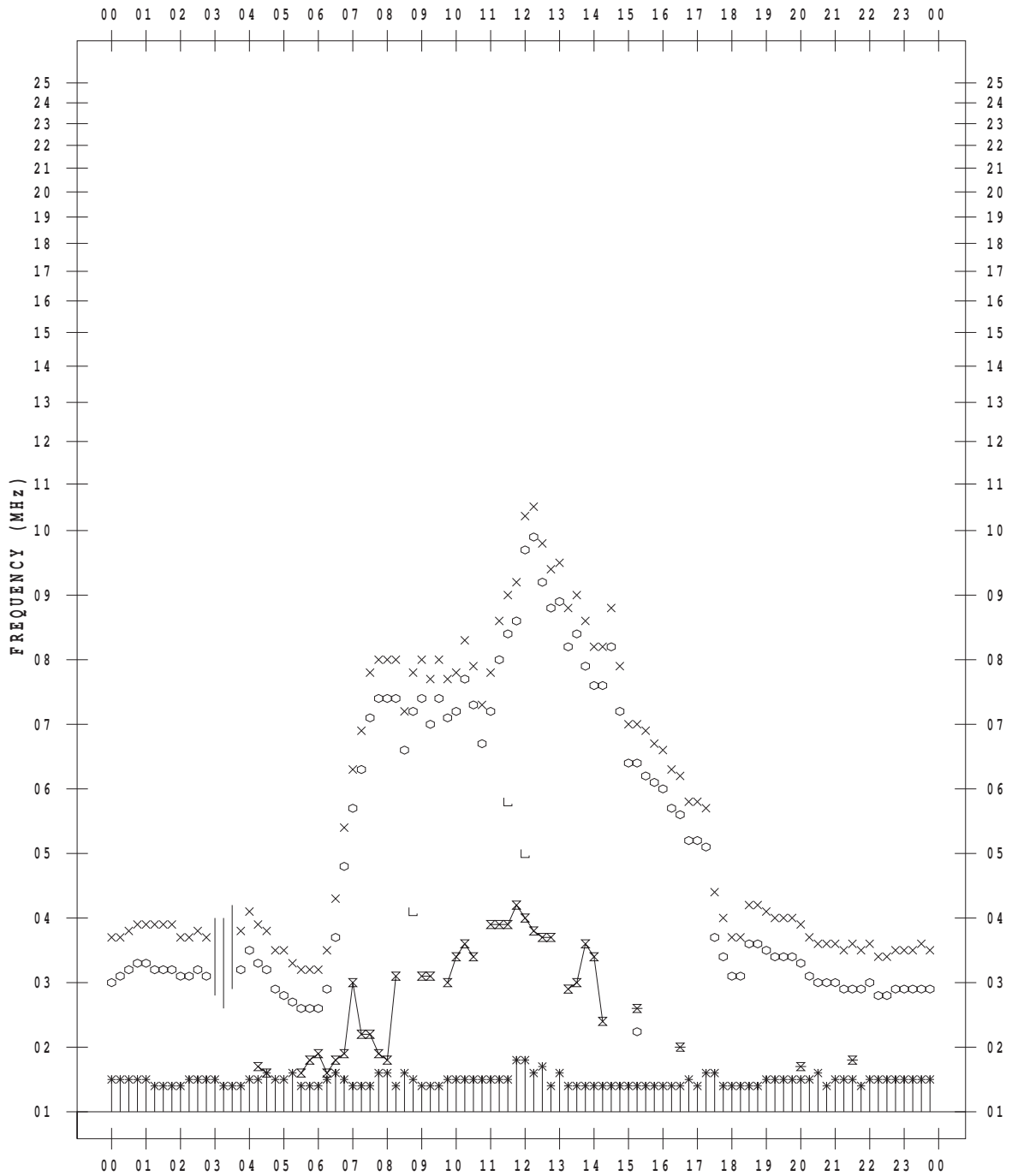
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2012/12/12

135 ° E MEAN TIME







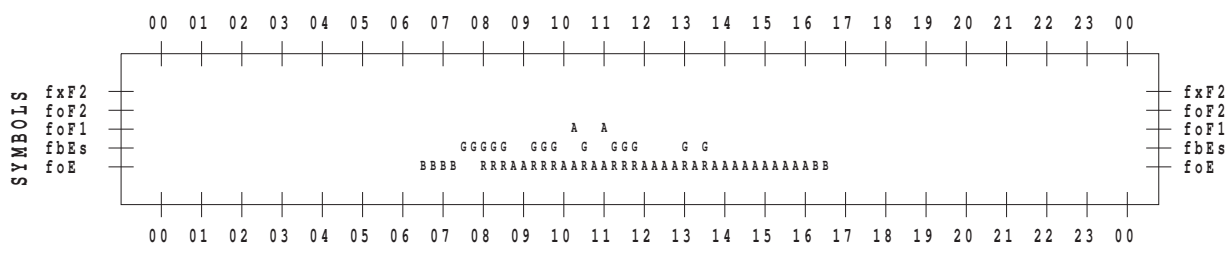
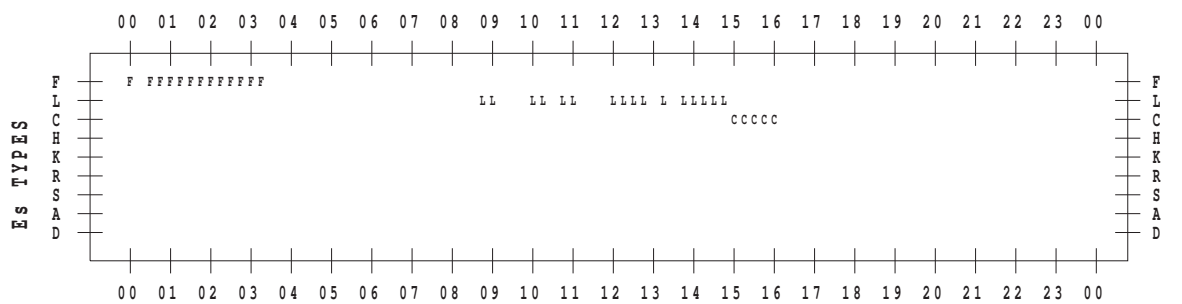
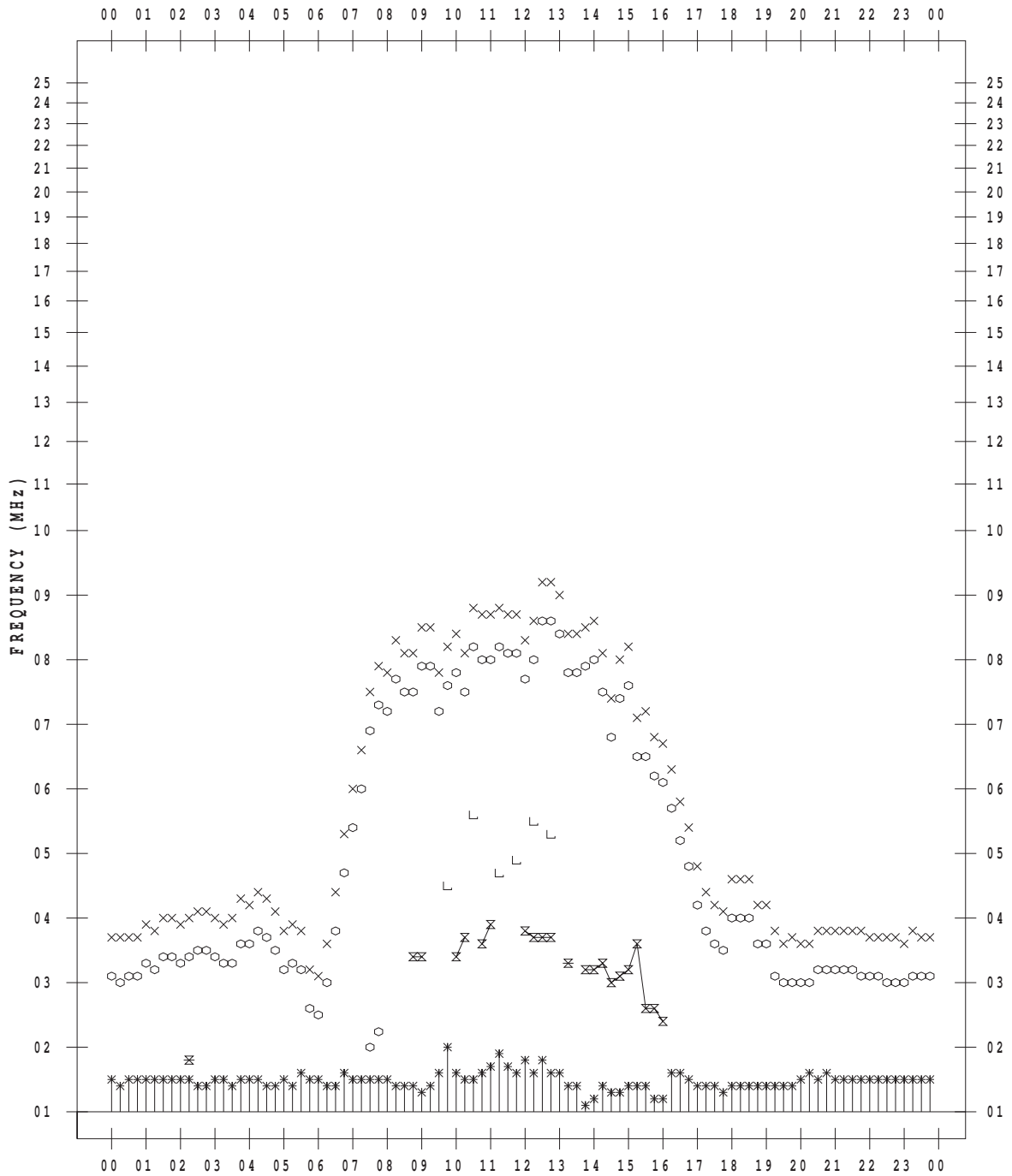
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2012/12/14

135 ° E MEAN TIME



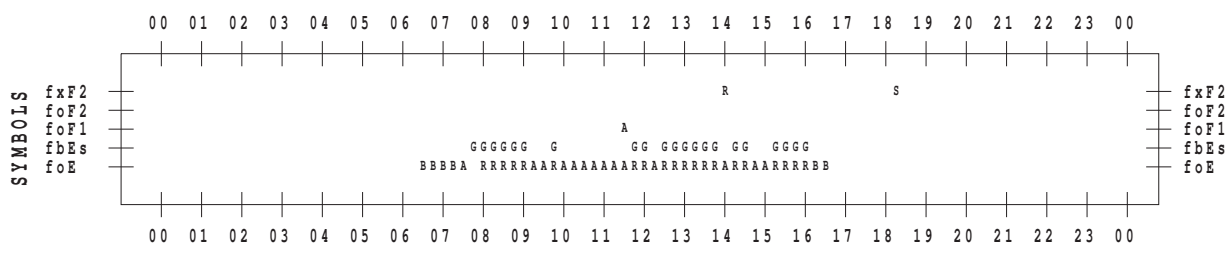
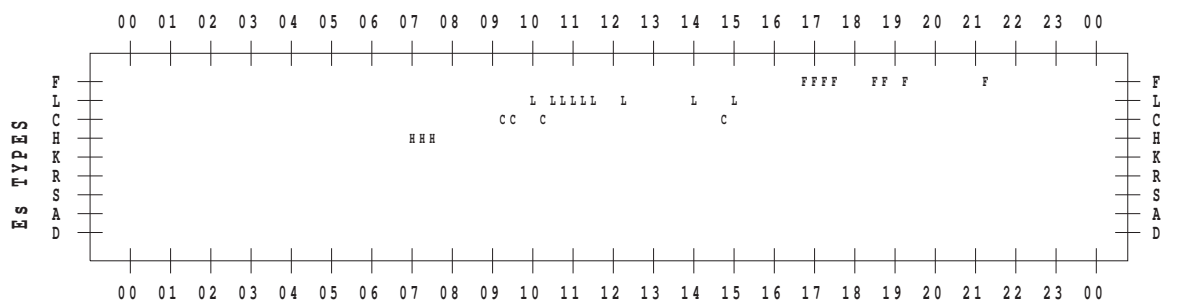
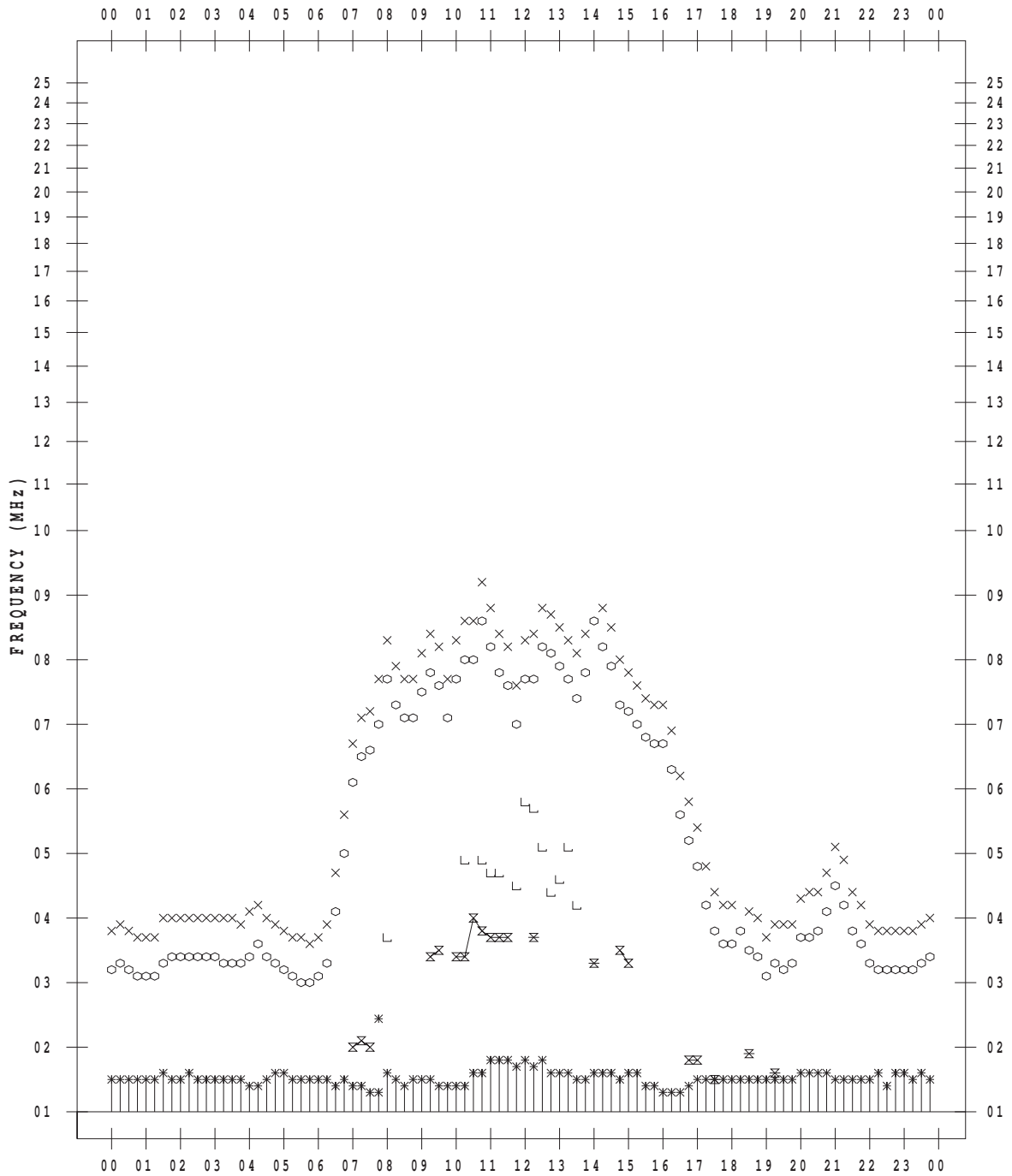
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2012/12/15

135 ° E MEAN TIME



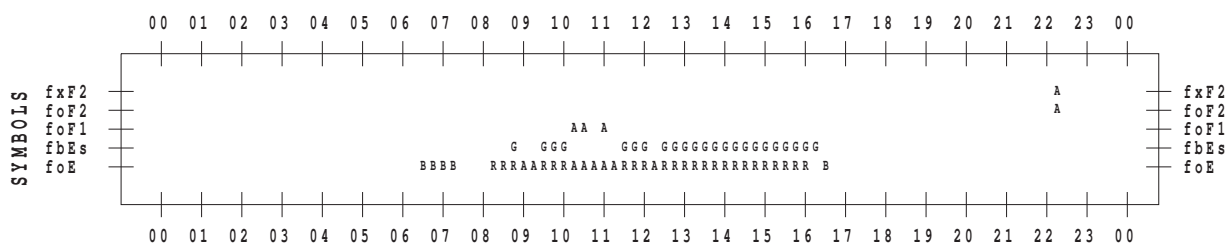
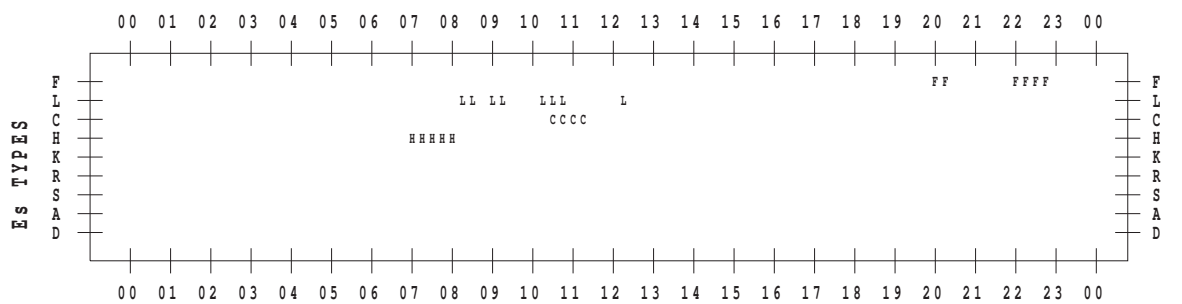
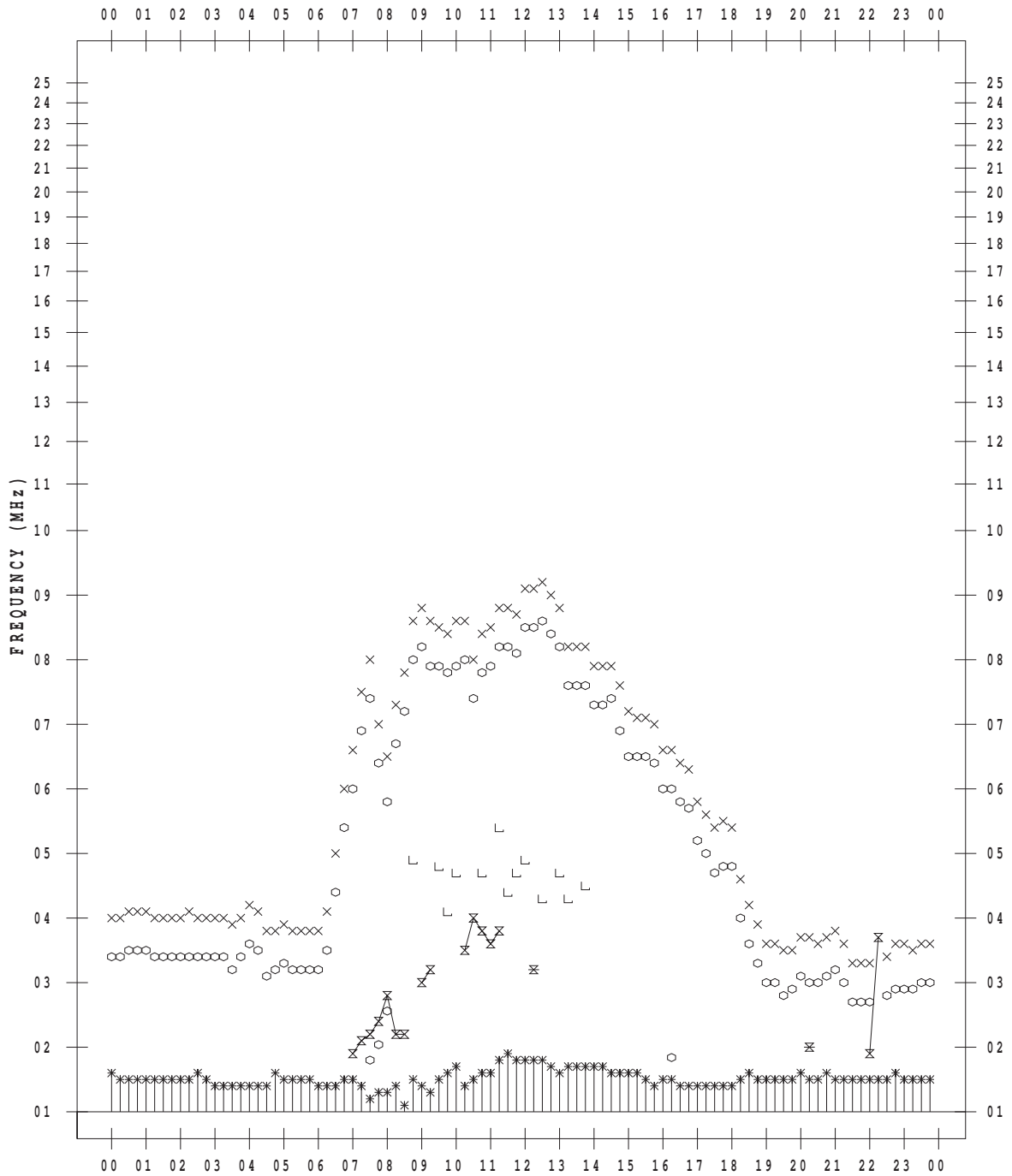
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2012/12/16

135 ° E MEAN TIME





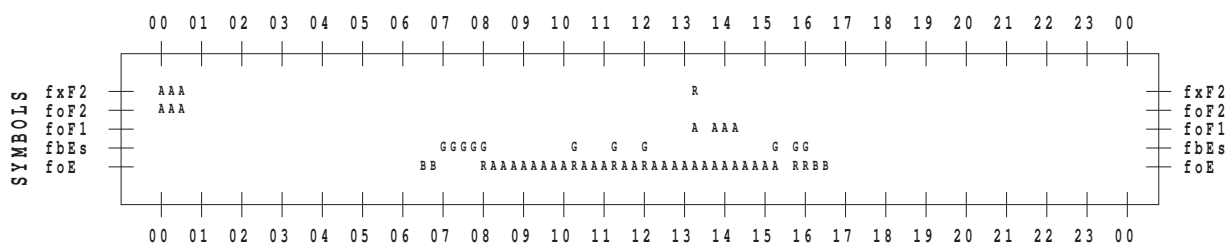
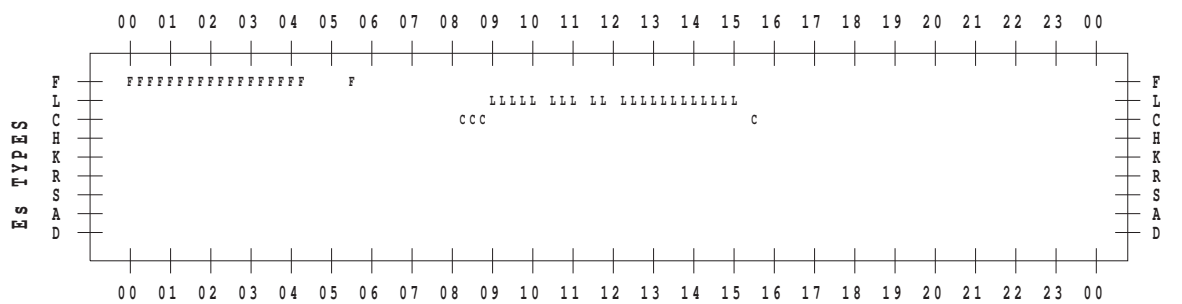
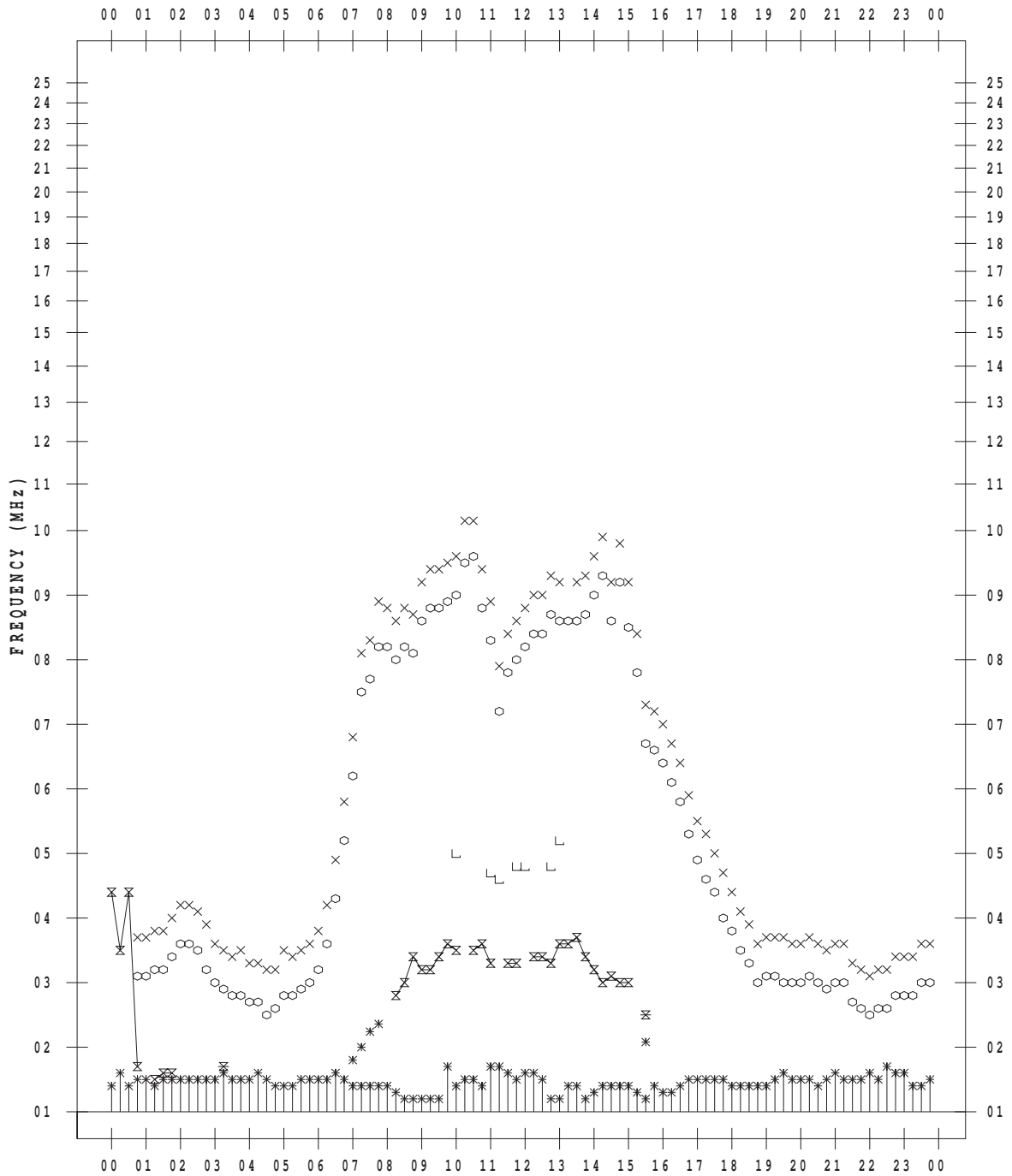
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2012/12/18

135 ° E MEAN TIME



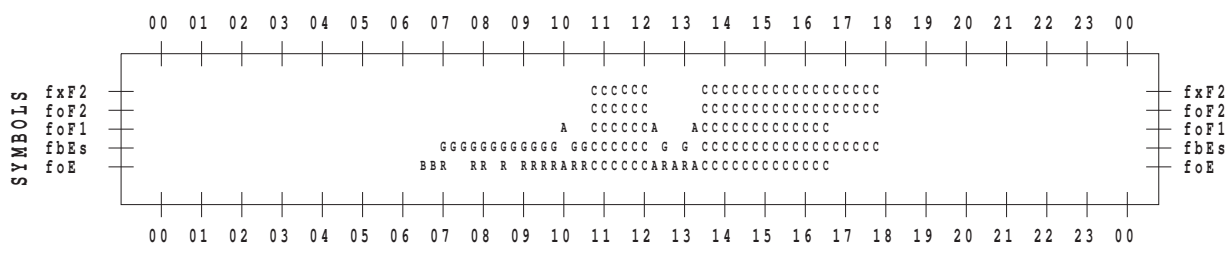
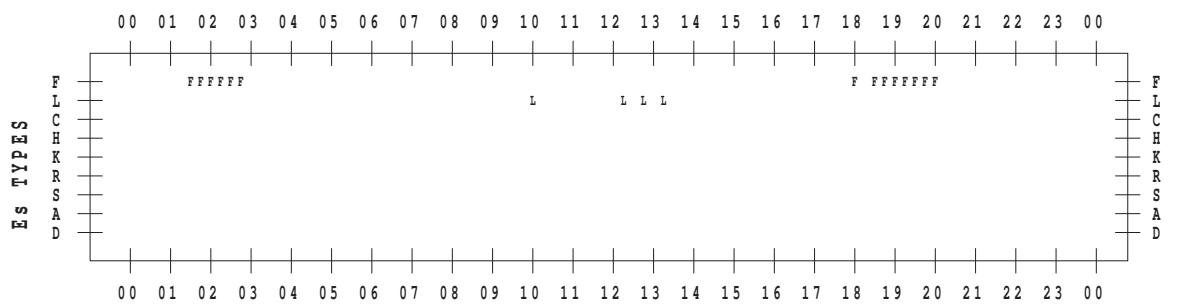
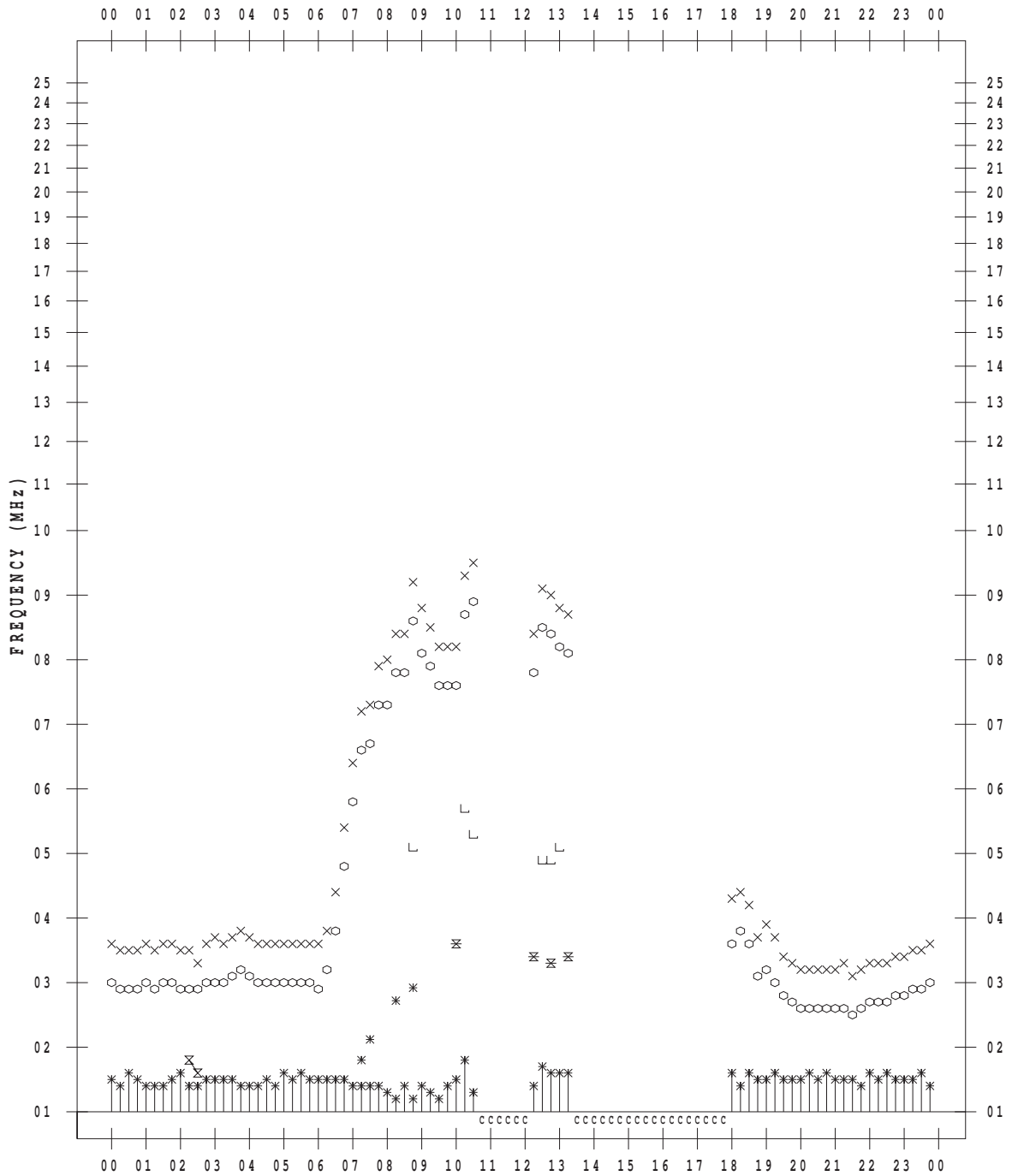
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2012/12/19

135 ° E MEAN TIME



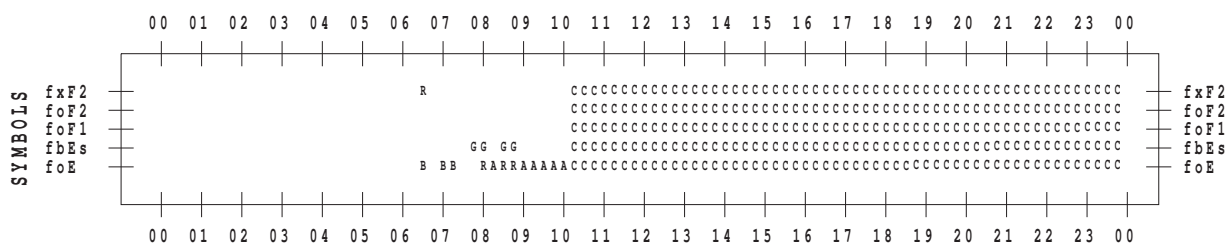
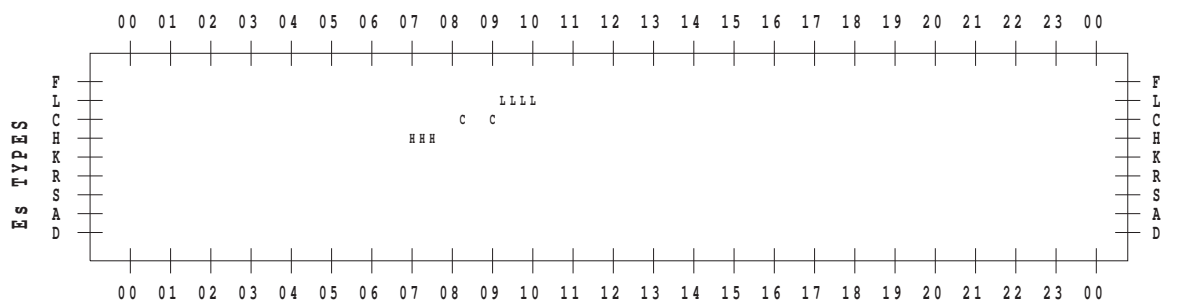
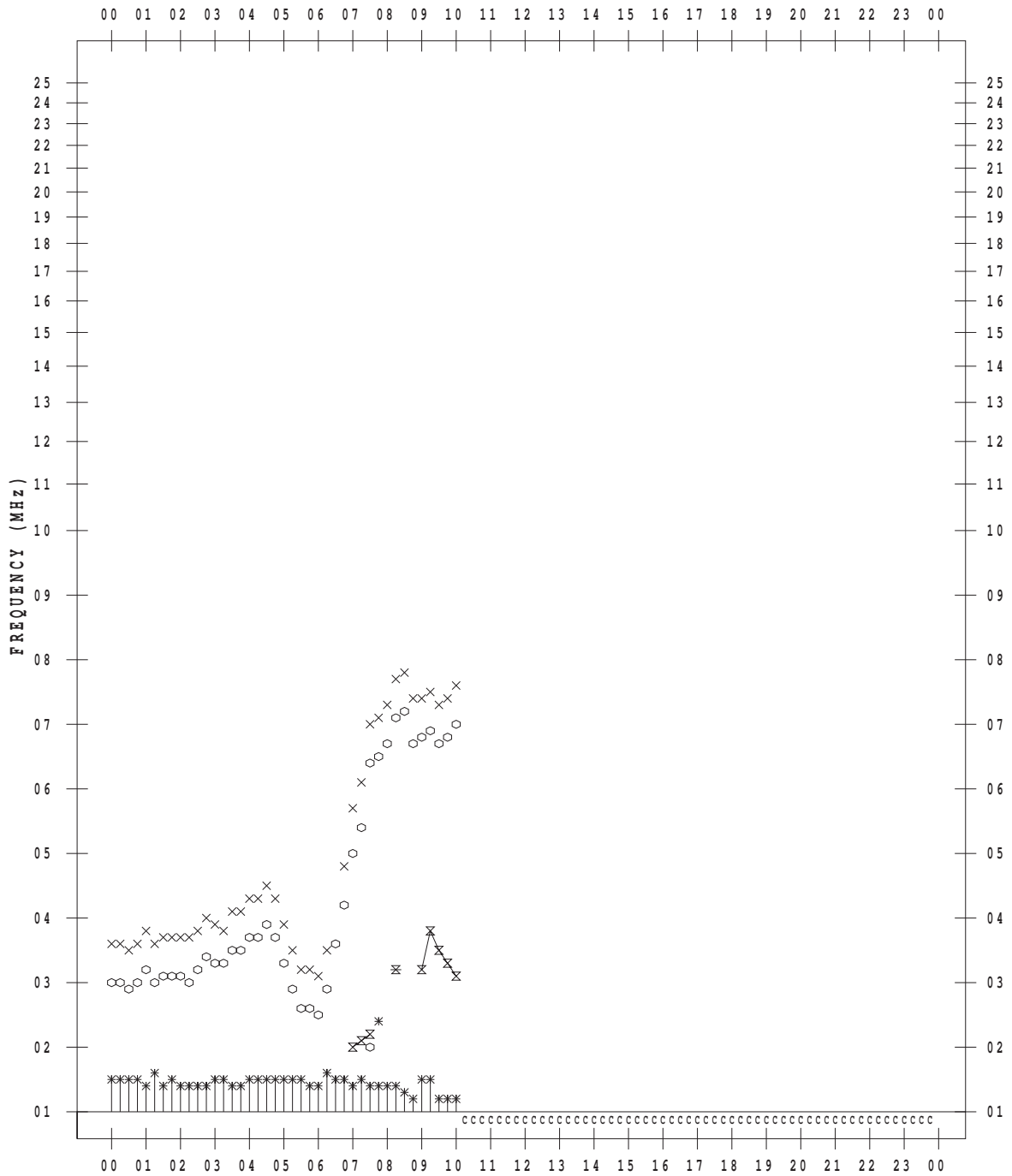
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2012/12/20

135 ° E MEAN TIME



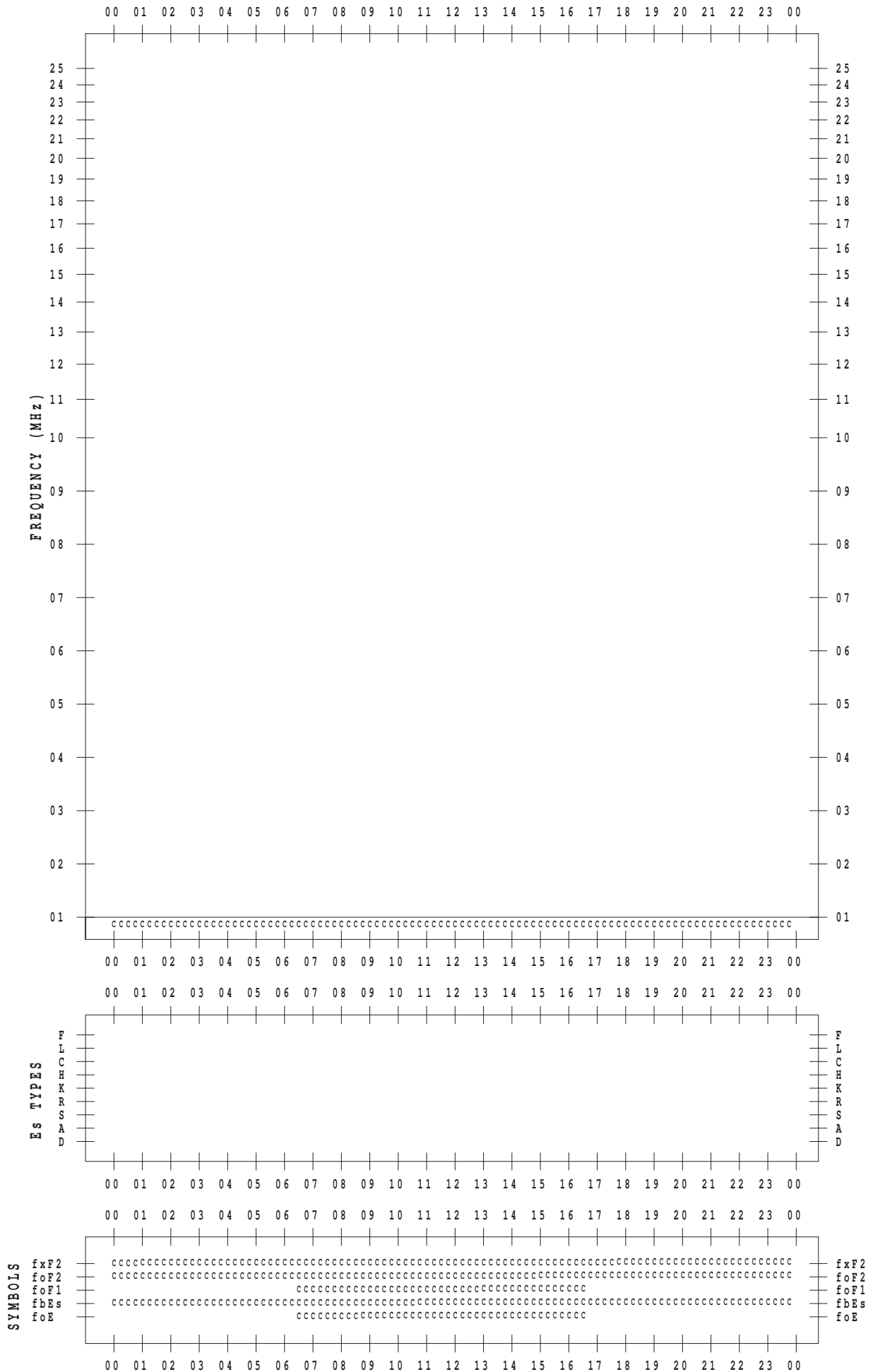
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2012/12/21

135 ° E MEAN TIME





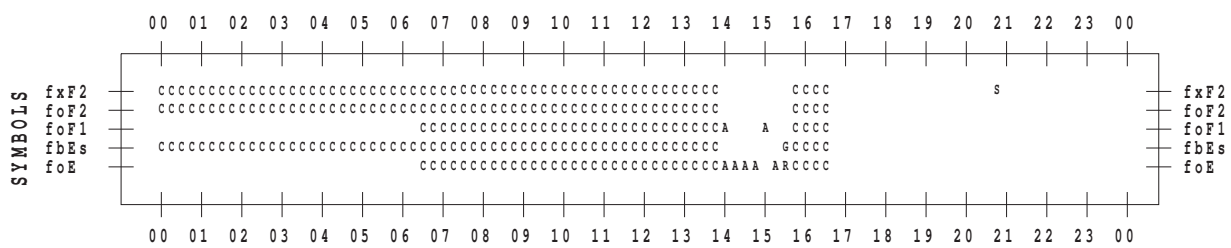
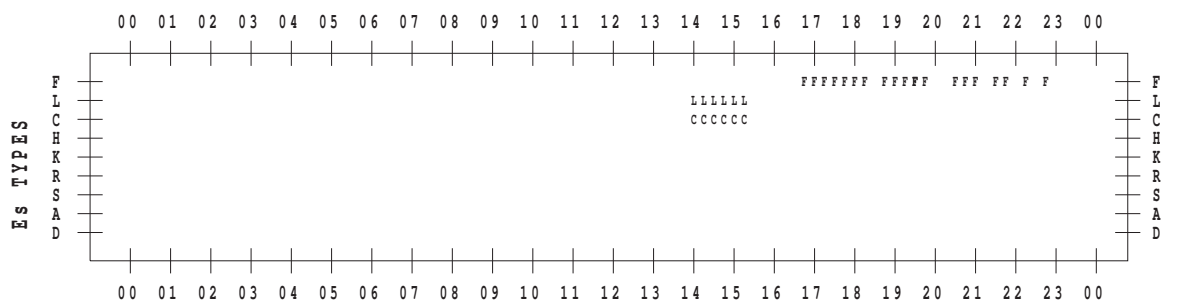
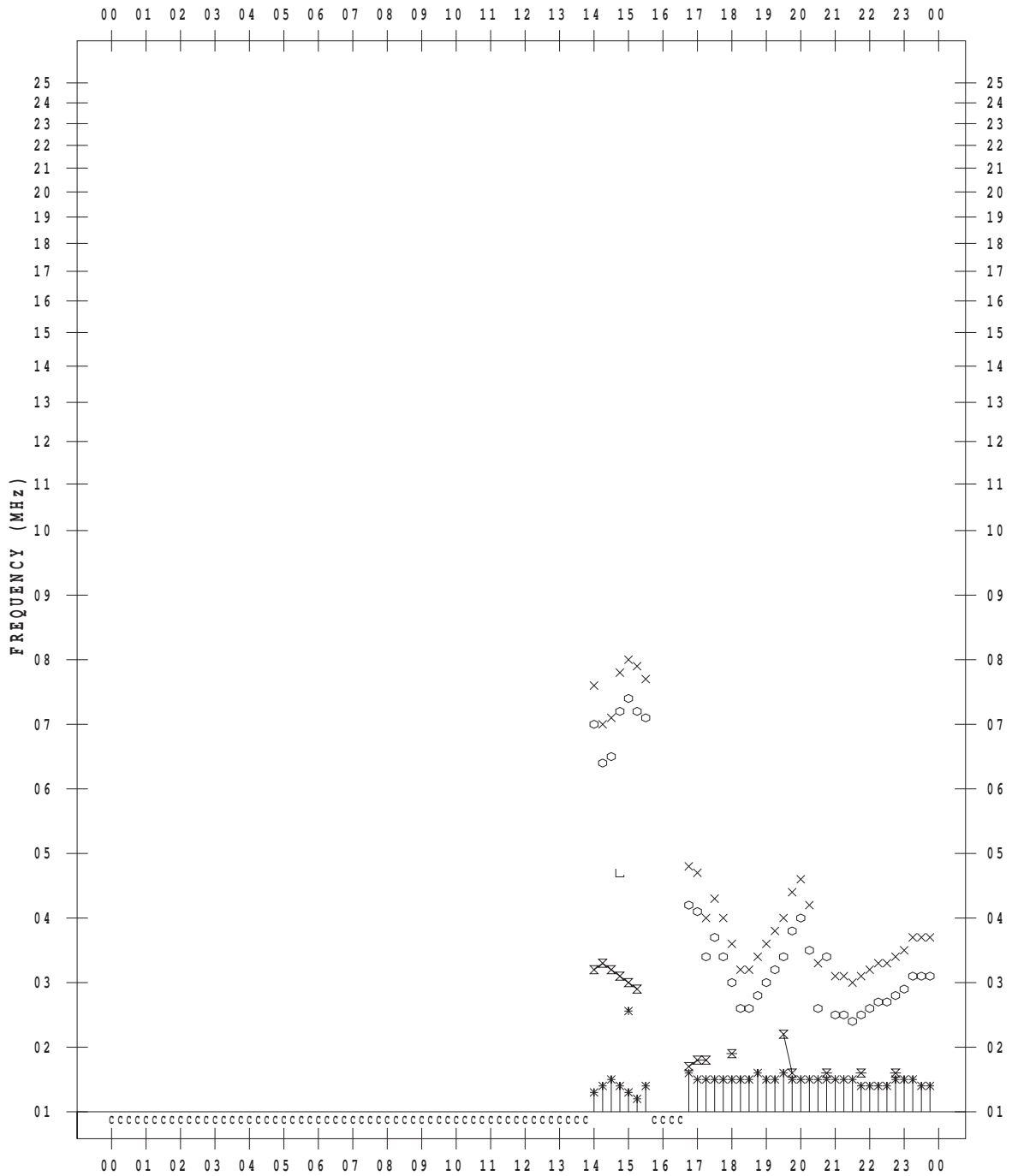
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2012/12/22

135 ° E MEAN TIME



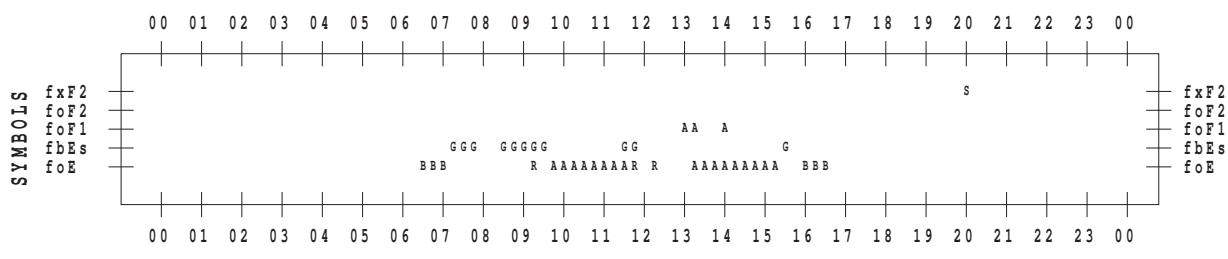
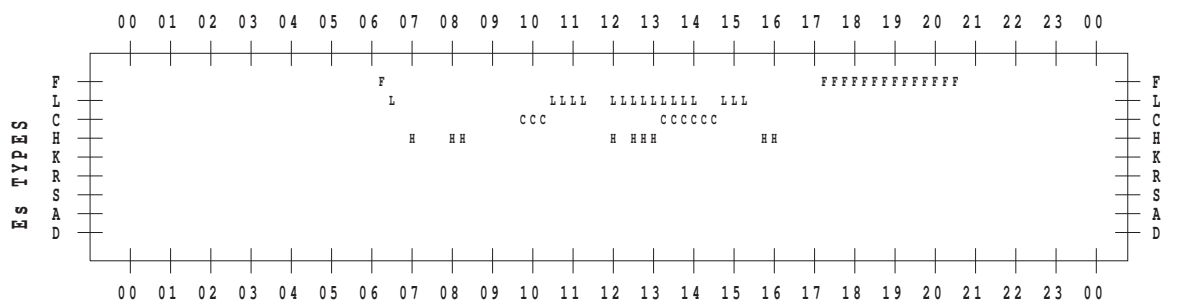
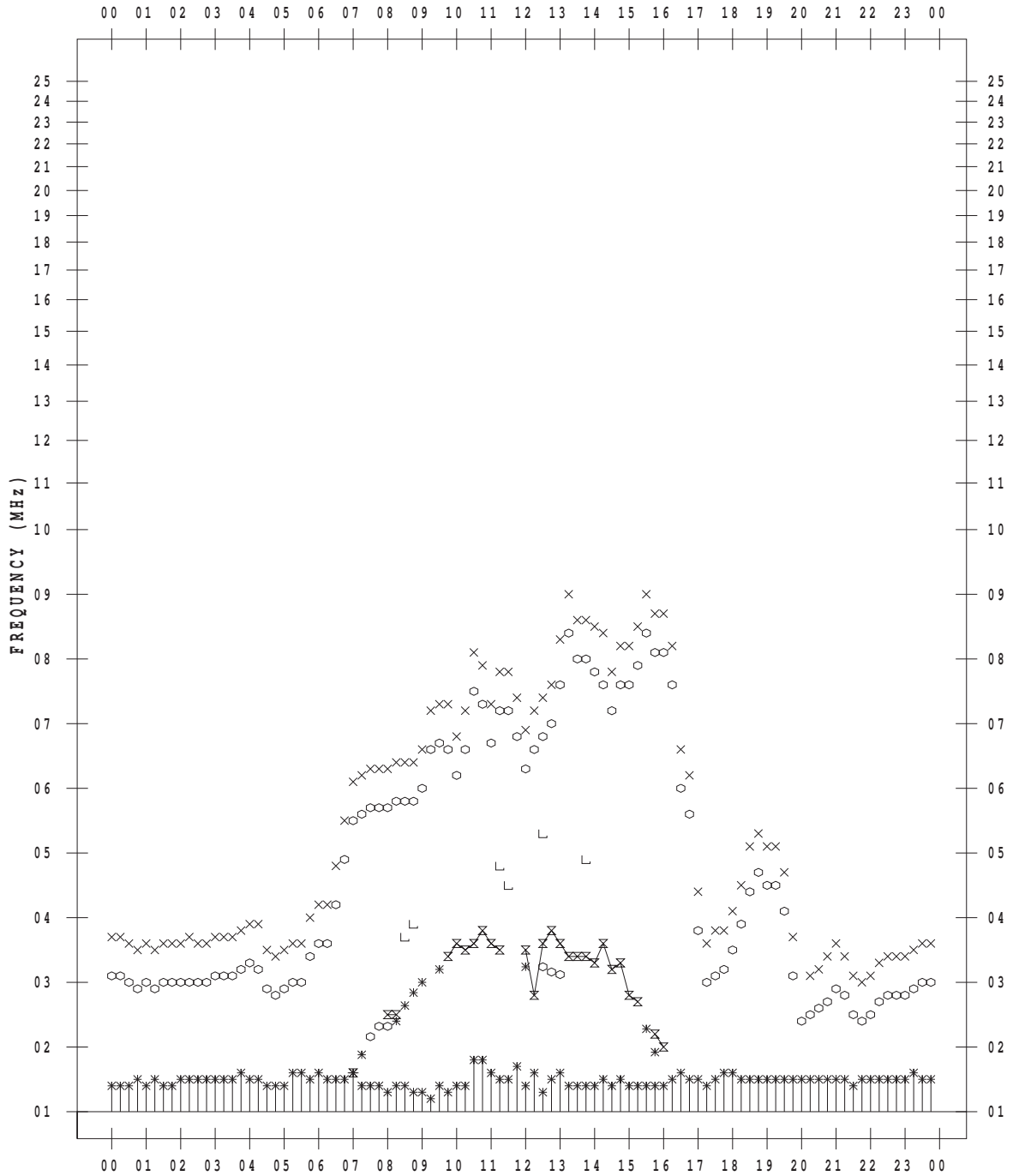
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2012/12/23

135 ° E MEAN TIME



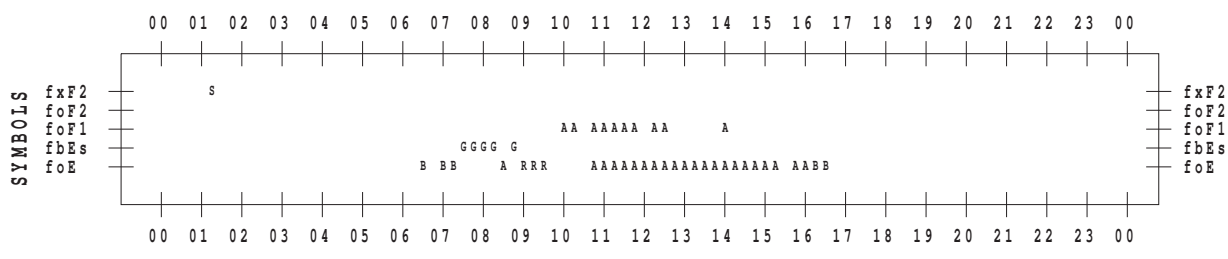
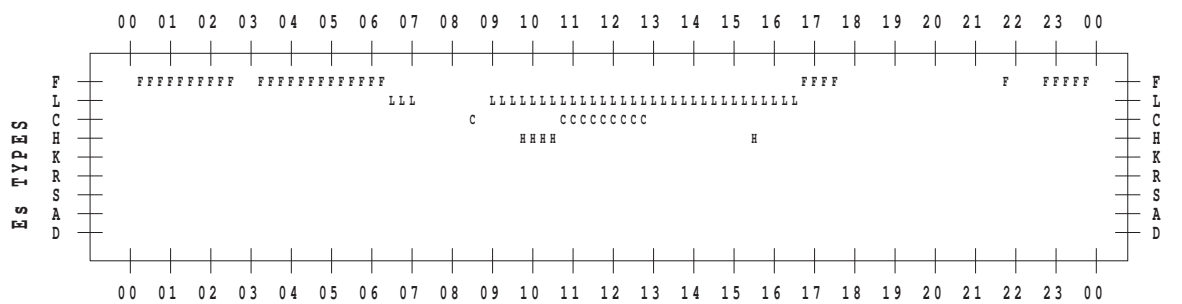
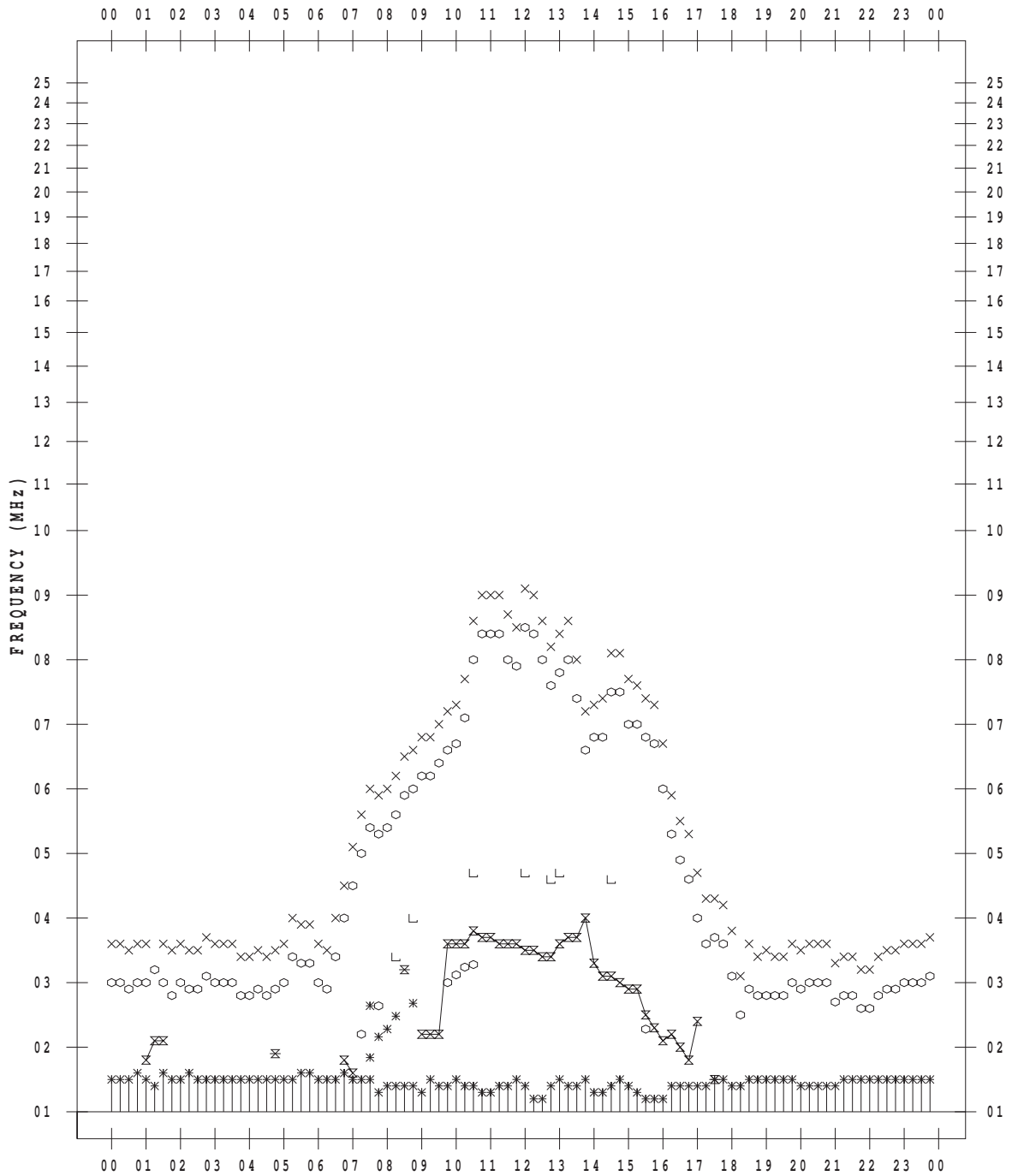
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2012/12/24

135 ° E MEAN TIME



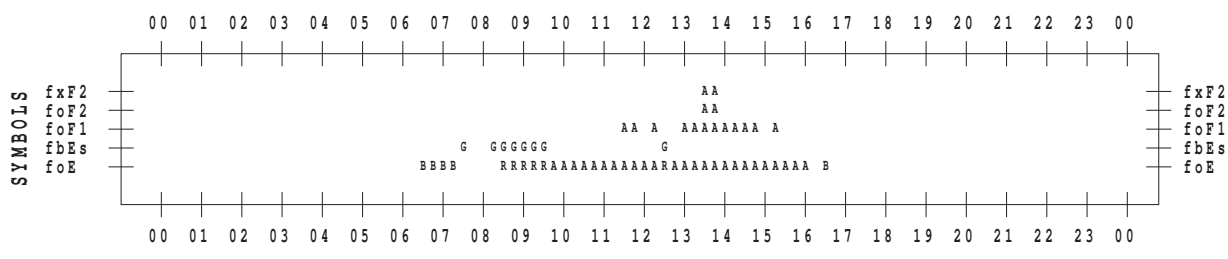
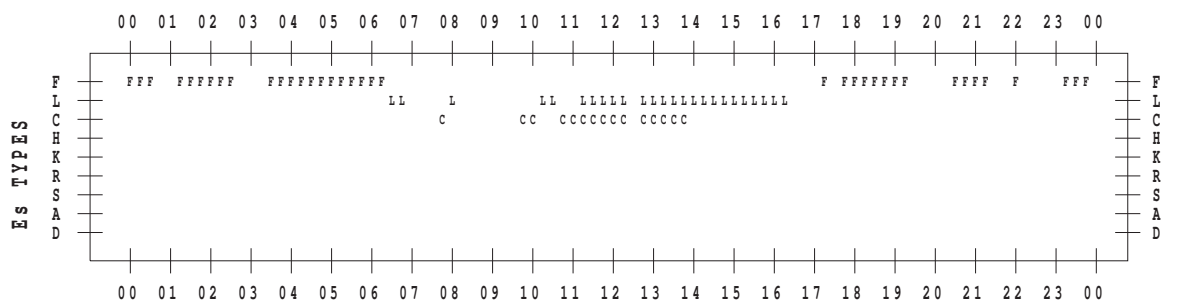
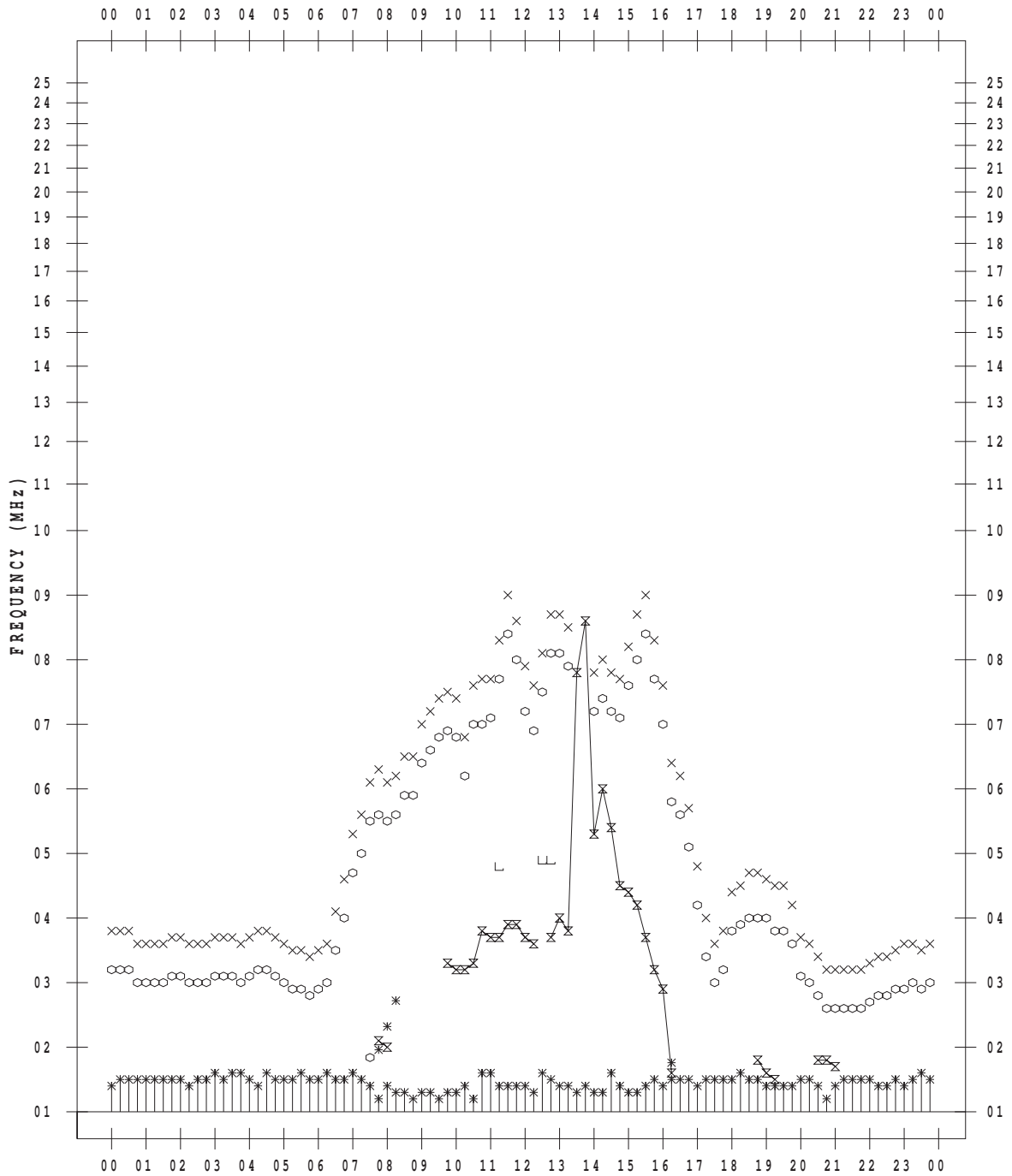
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2012/12/25

135 ° E MEAN TIME



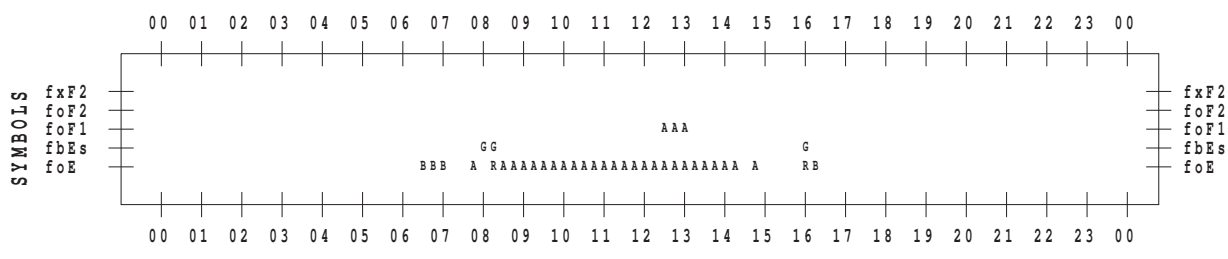
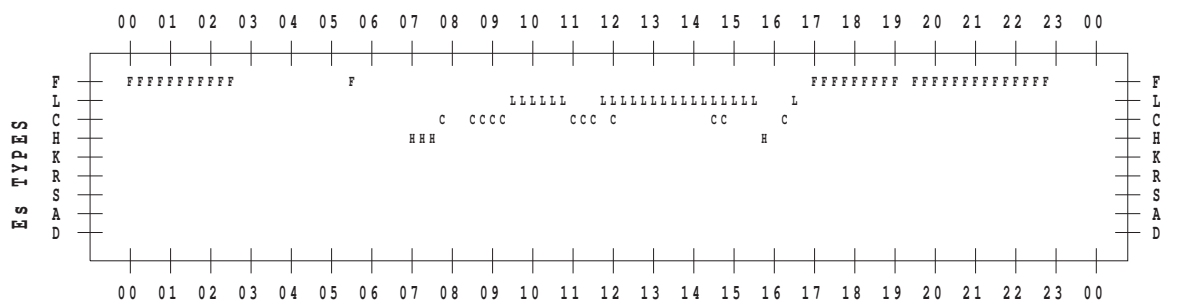
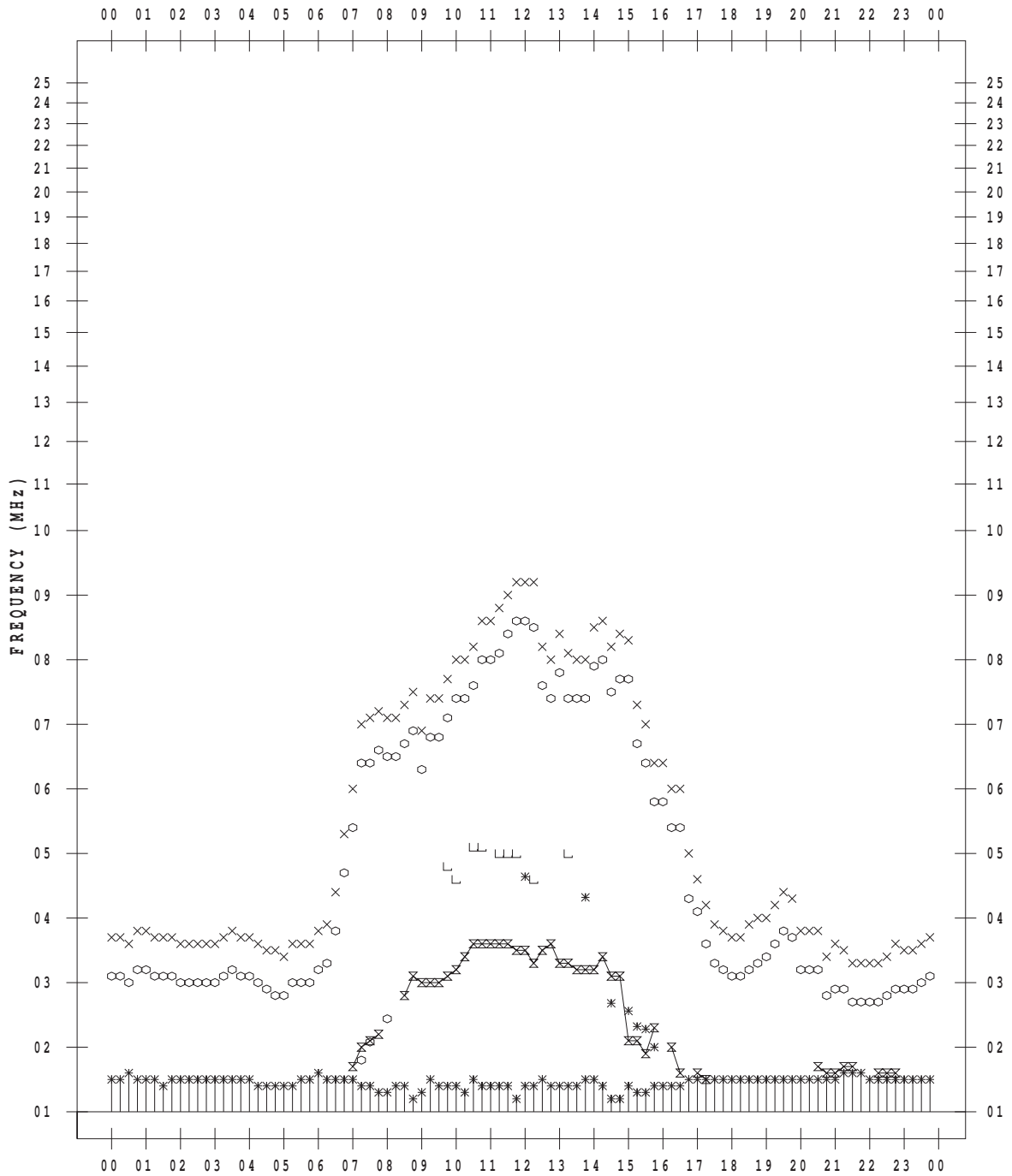
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2012/12/26

135 ° E MEAN TIME



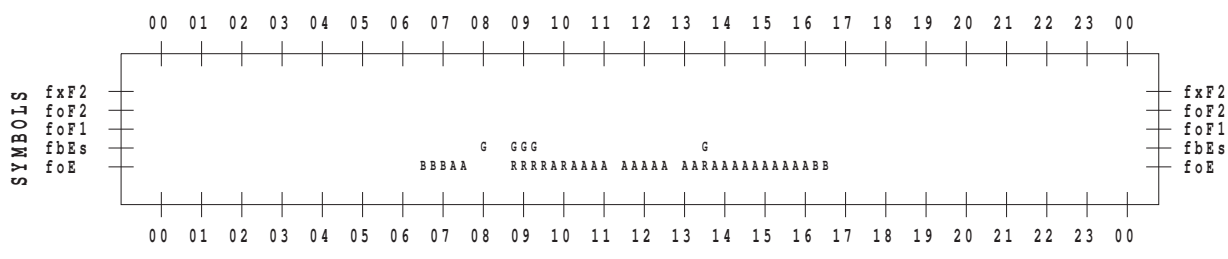
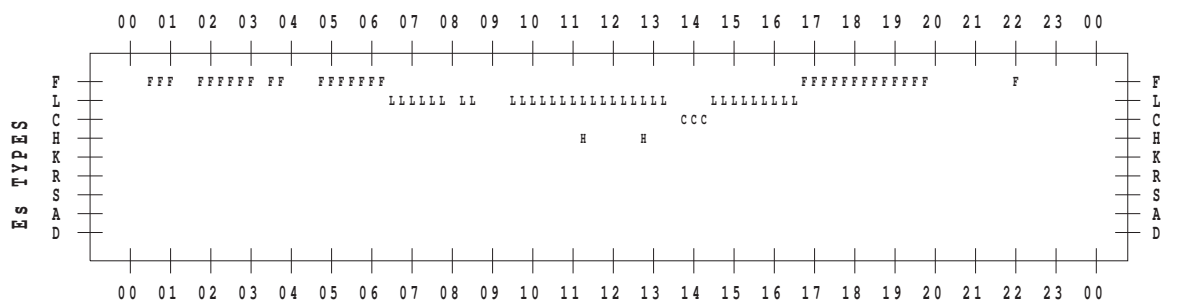
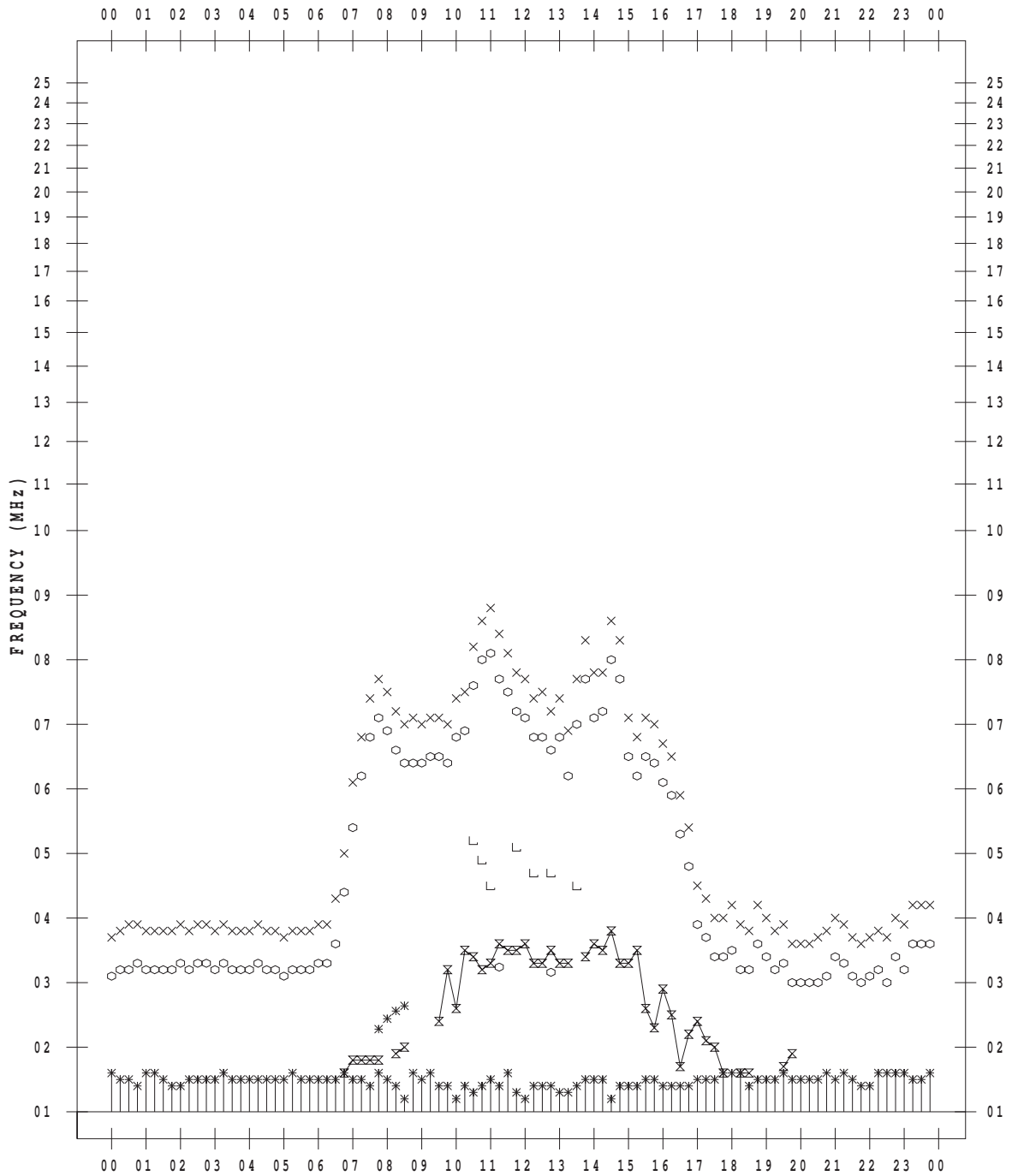
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2012/12/27

135 ° E MEAN TIME



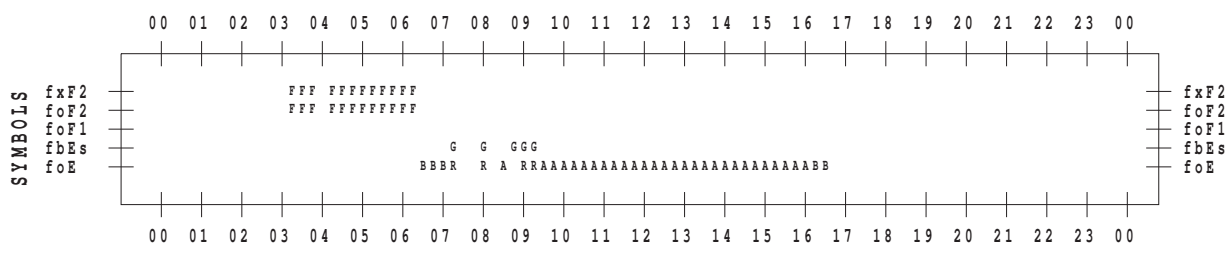
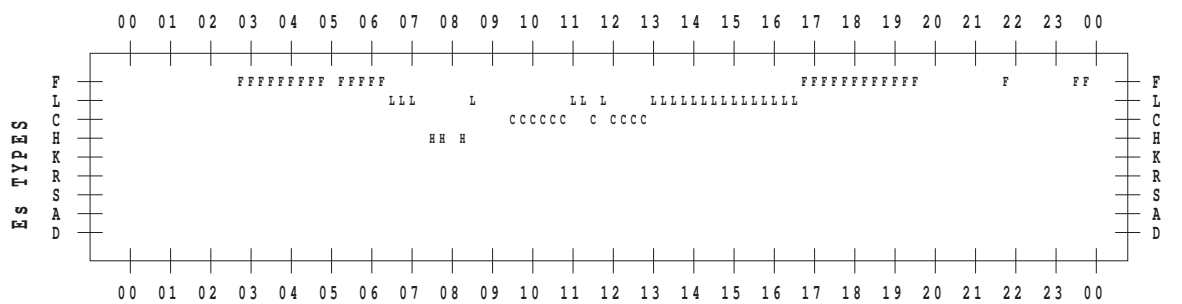
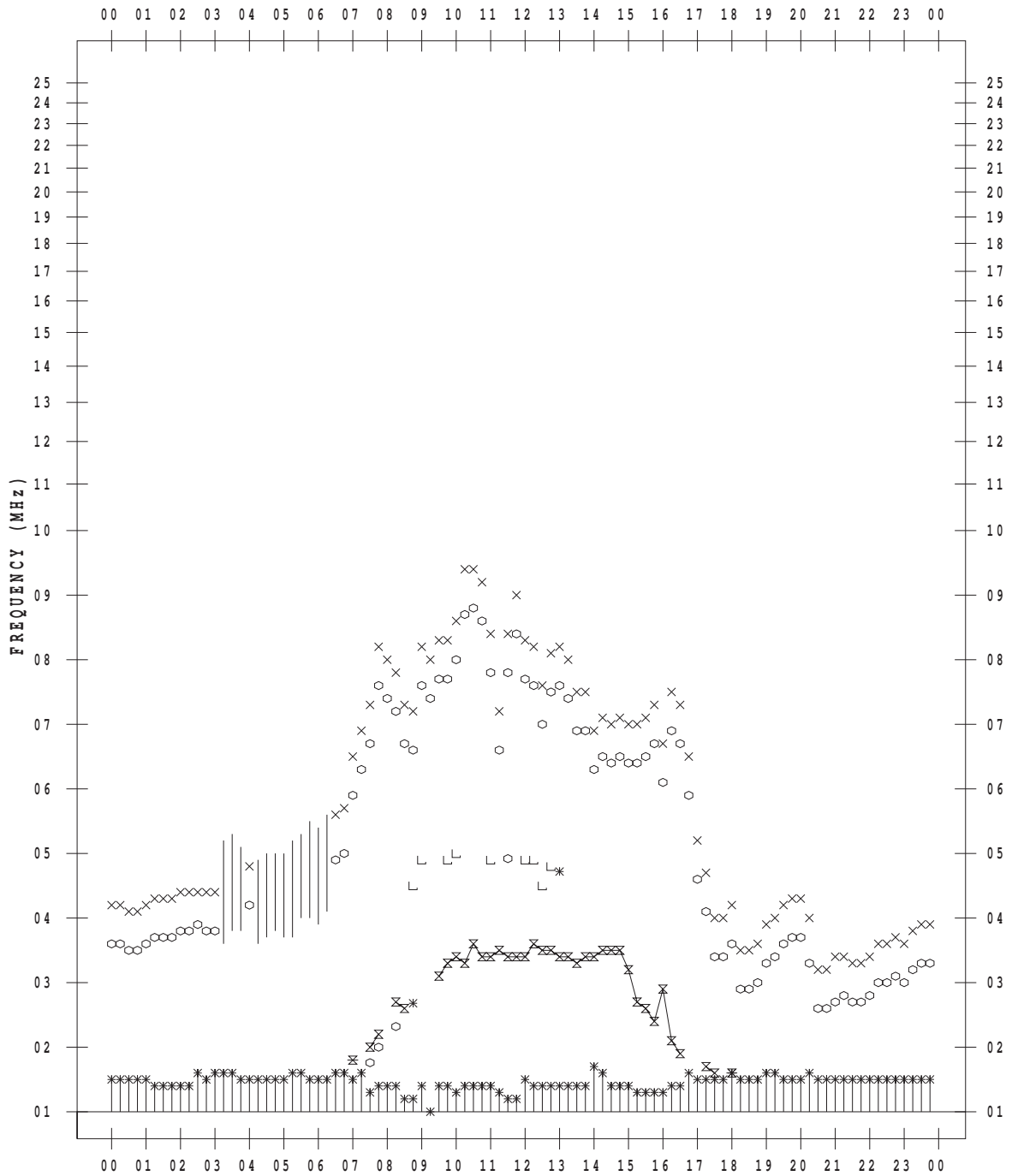
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2012/12/28

135 ° E MEAN TIME







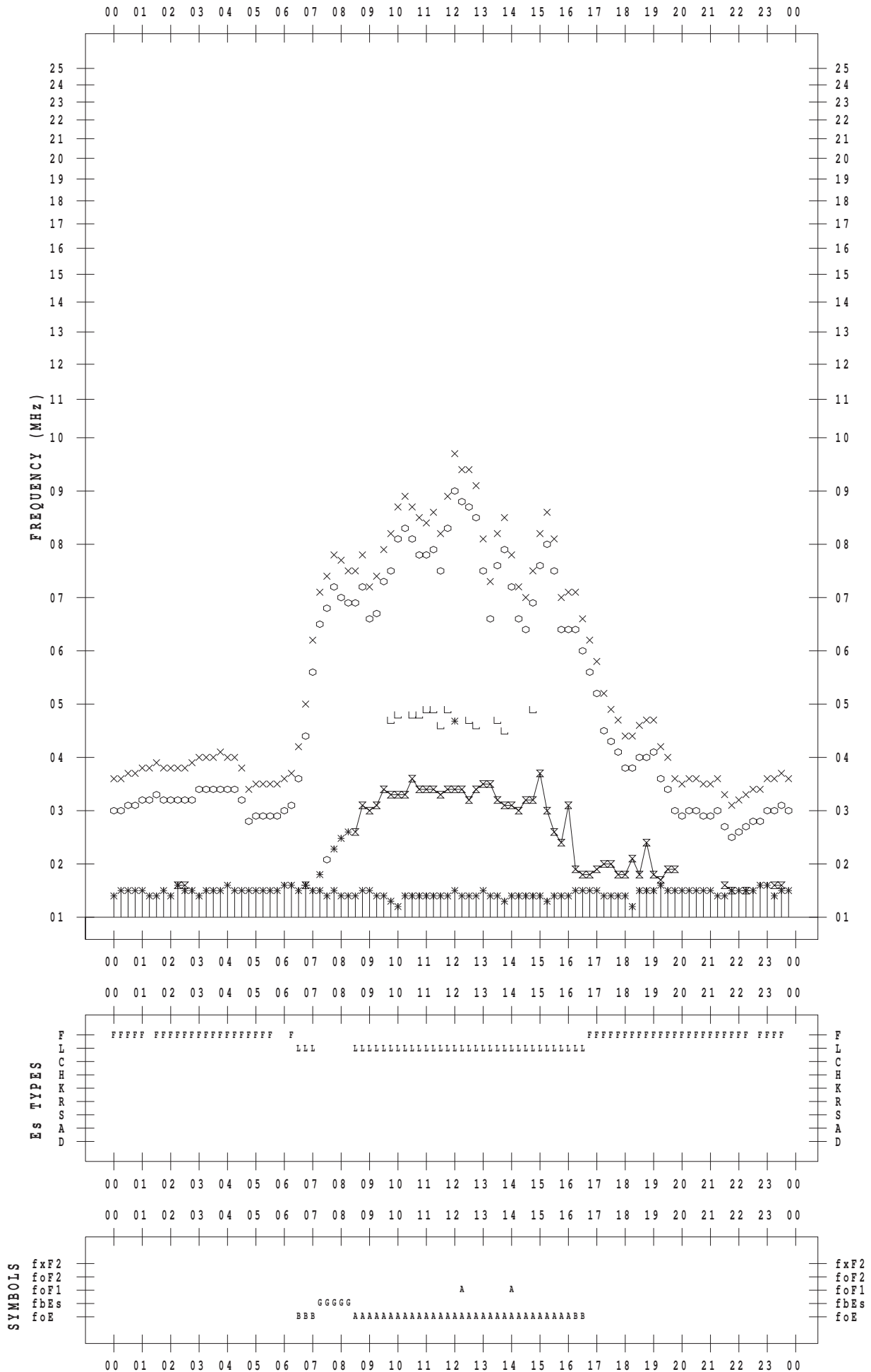
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2012/12/30

135 ° E MEAN TIME



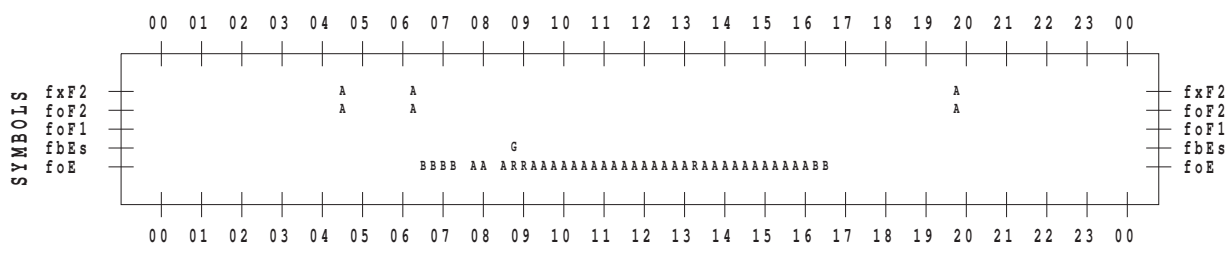
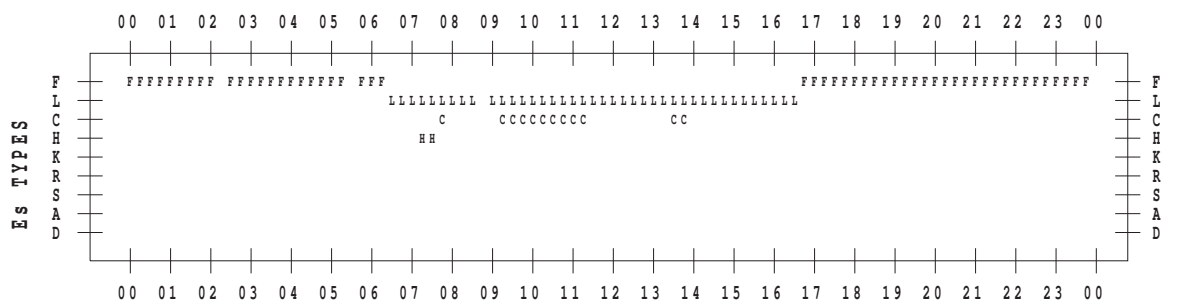
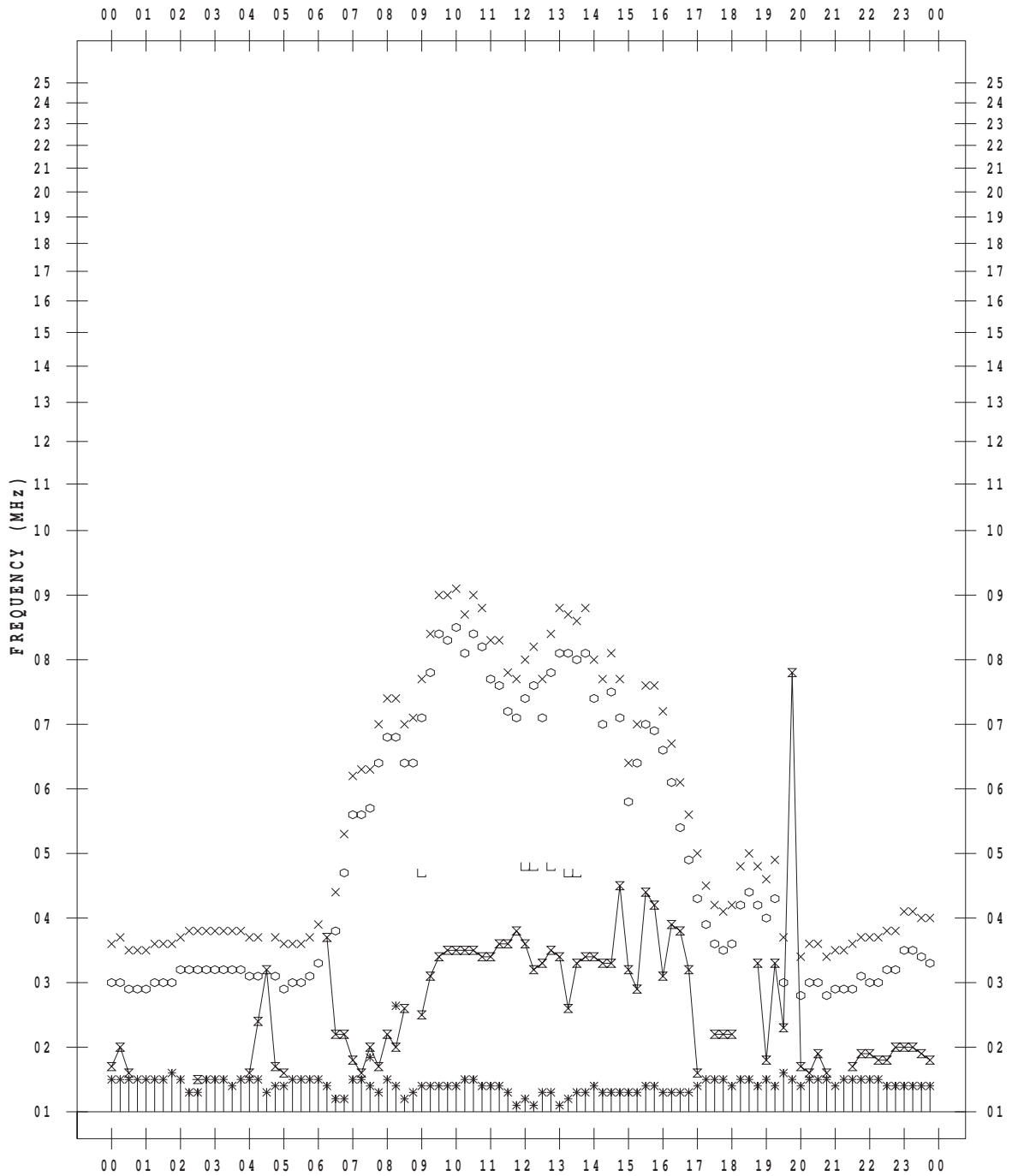
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2012/12/31

135 ° E MEAN TIME



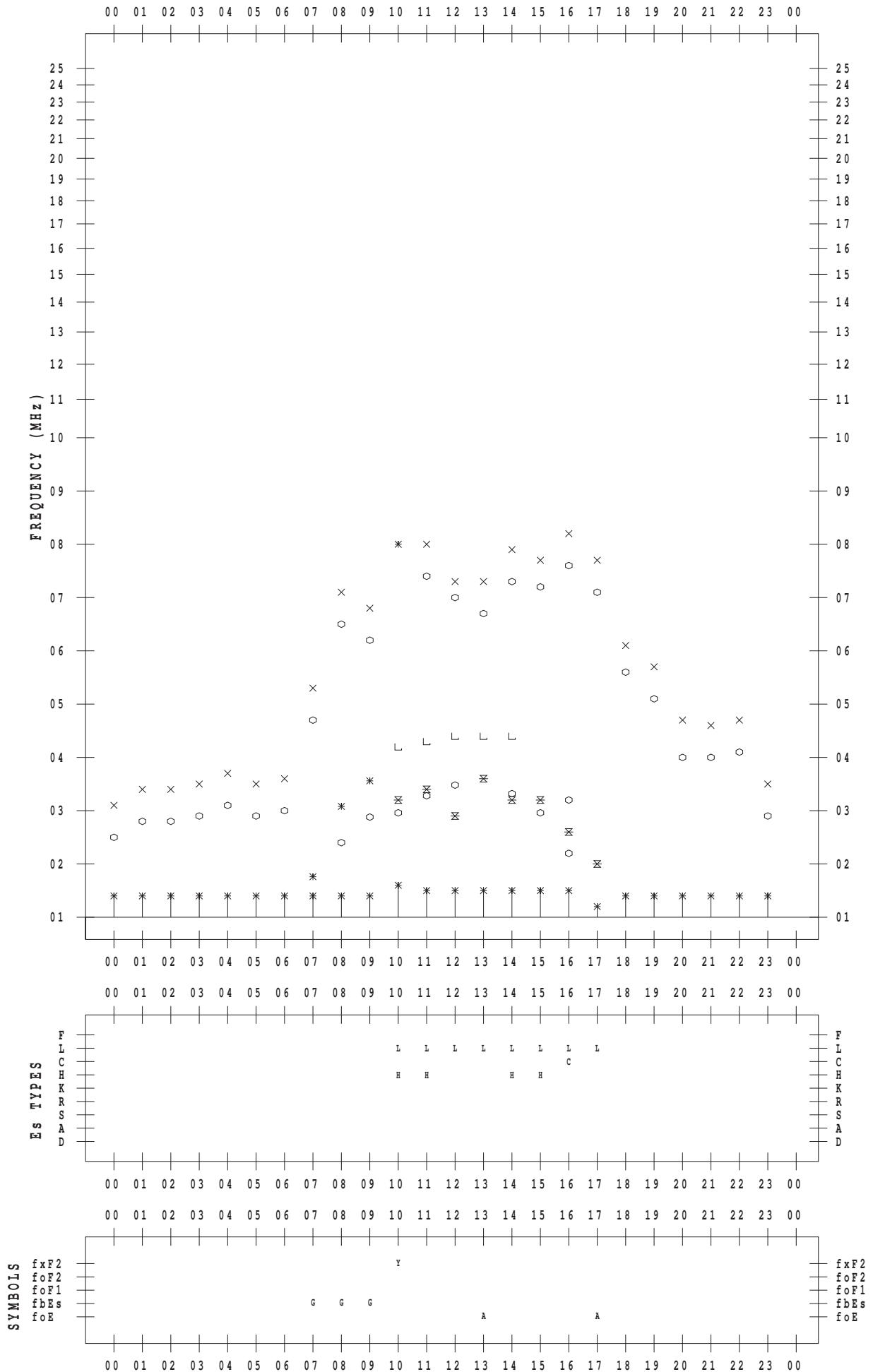
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/ 1

135 ° E MEAN TIME



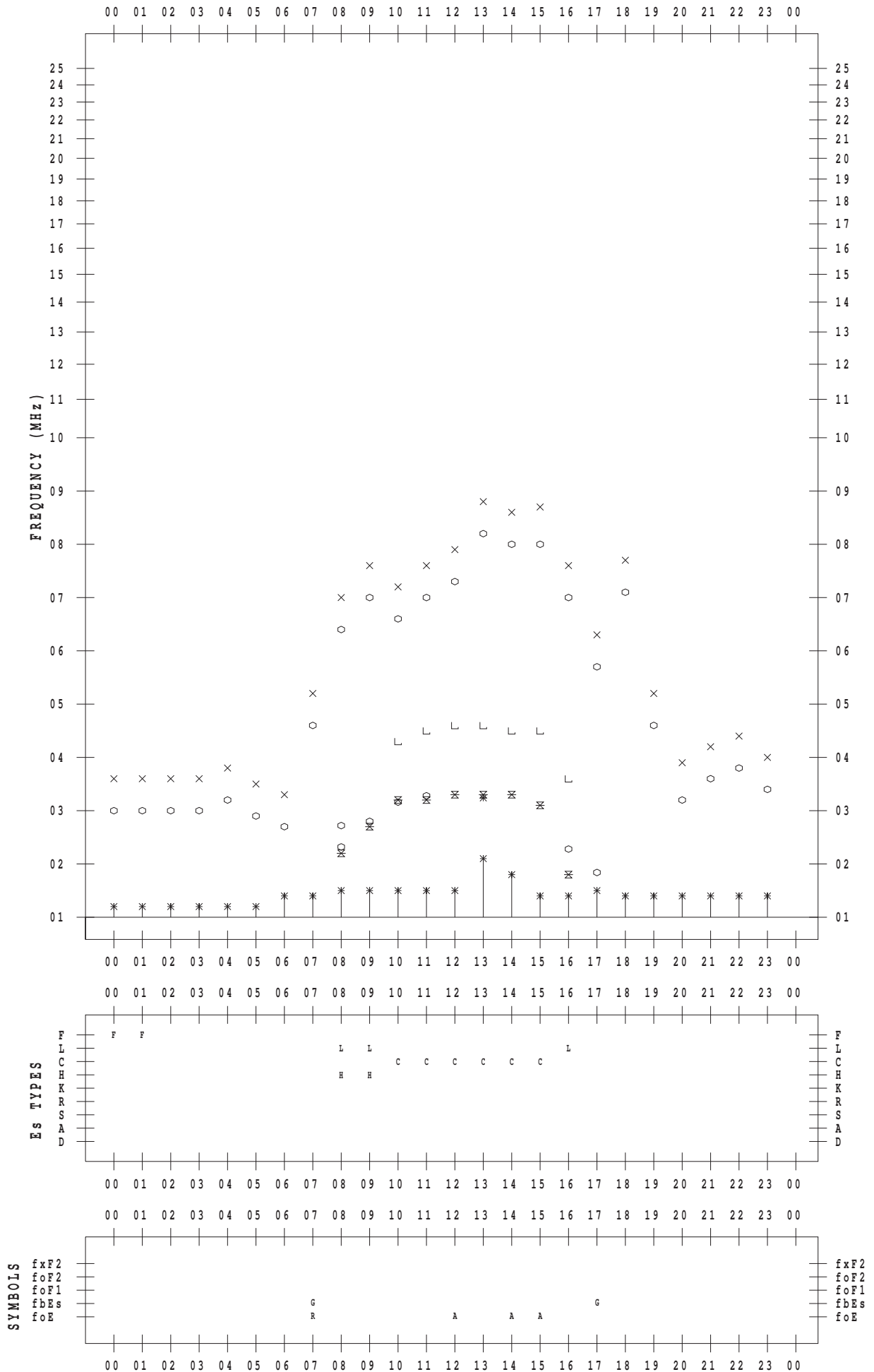
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/ 2

135 ° E MEAN TIME



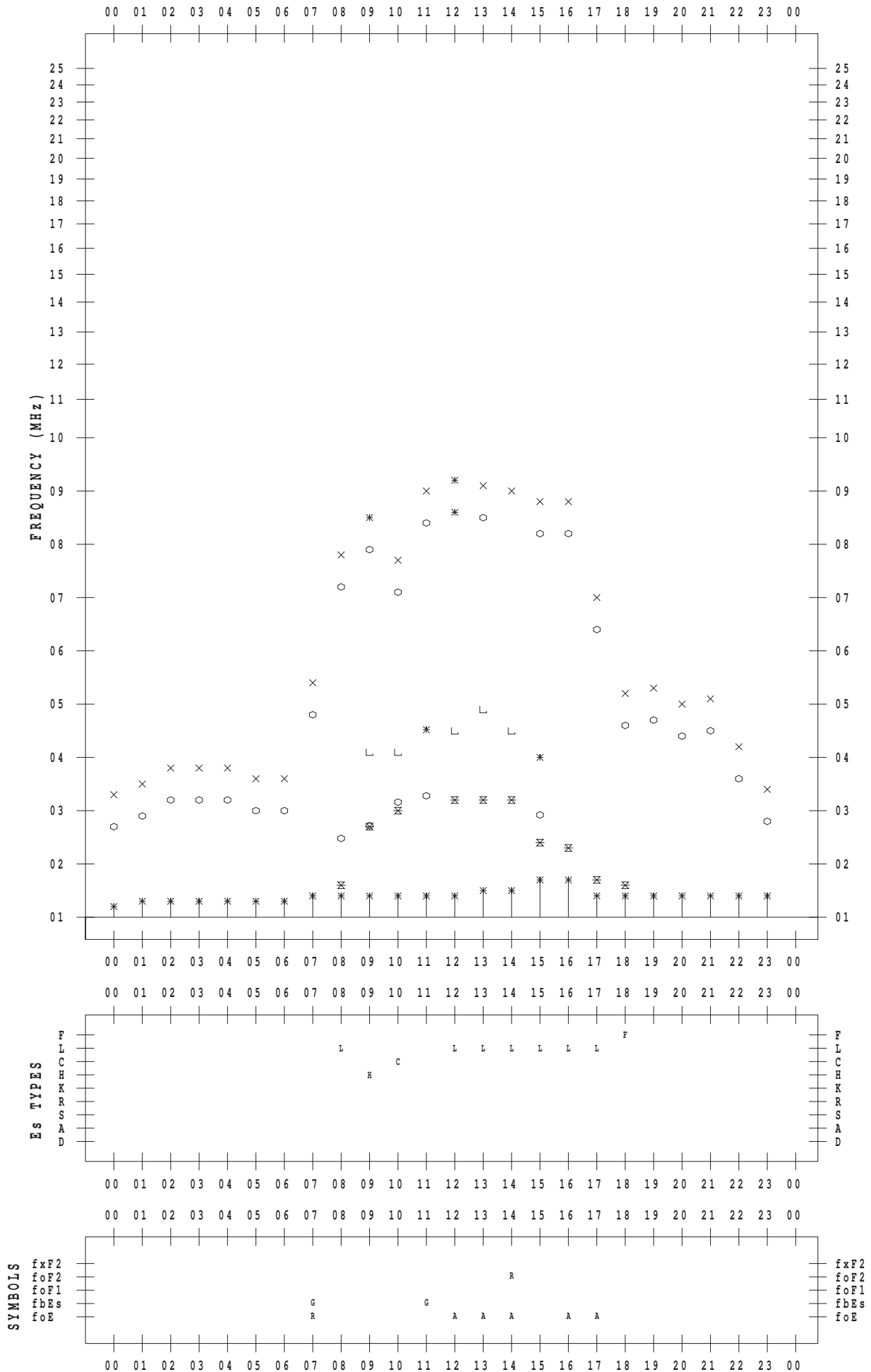
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/ 3

135 ° E MEAN TIME



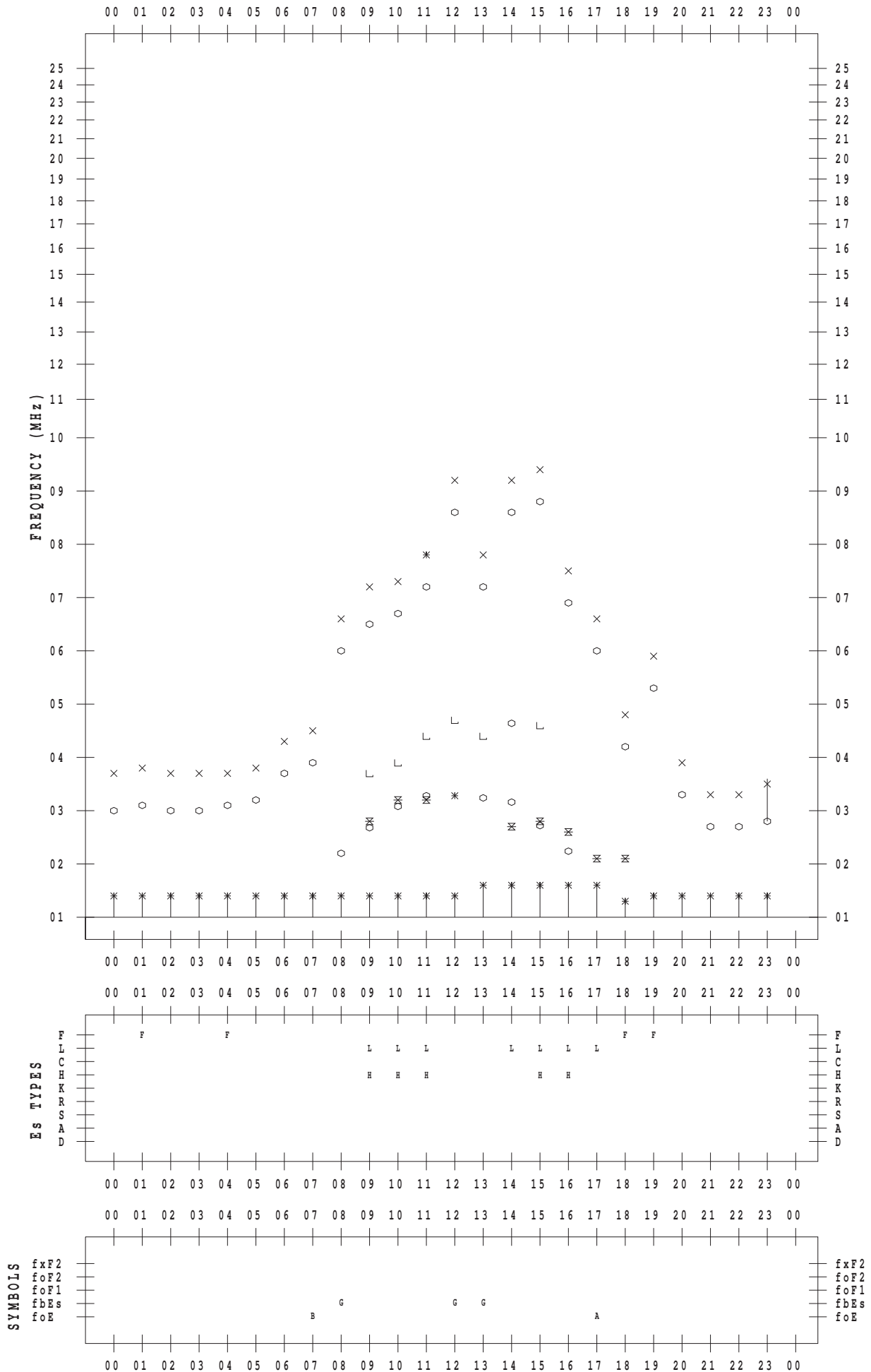
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/ 4

135 ° E MEAN TIME



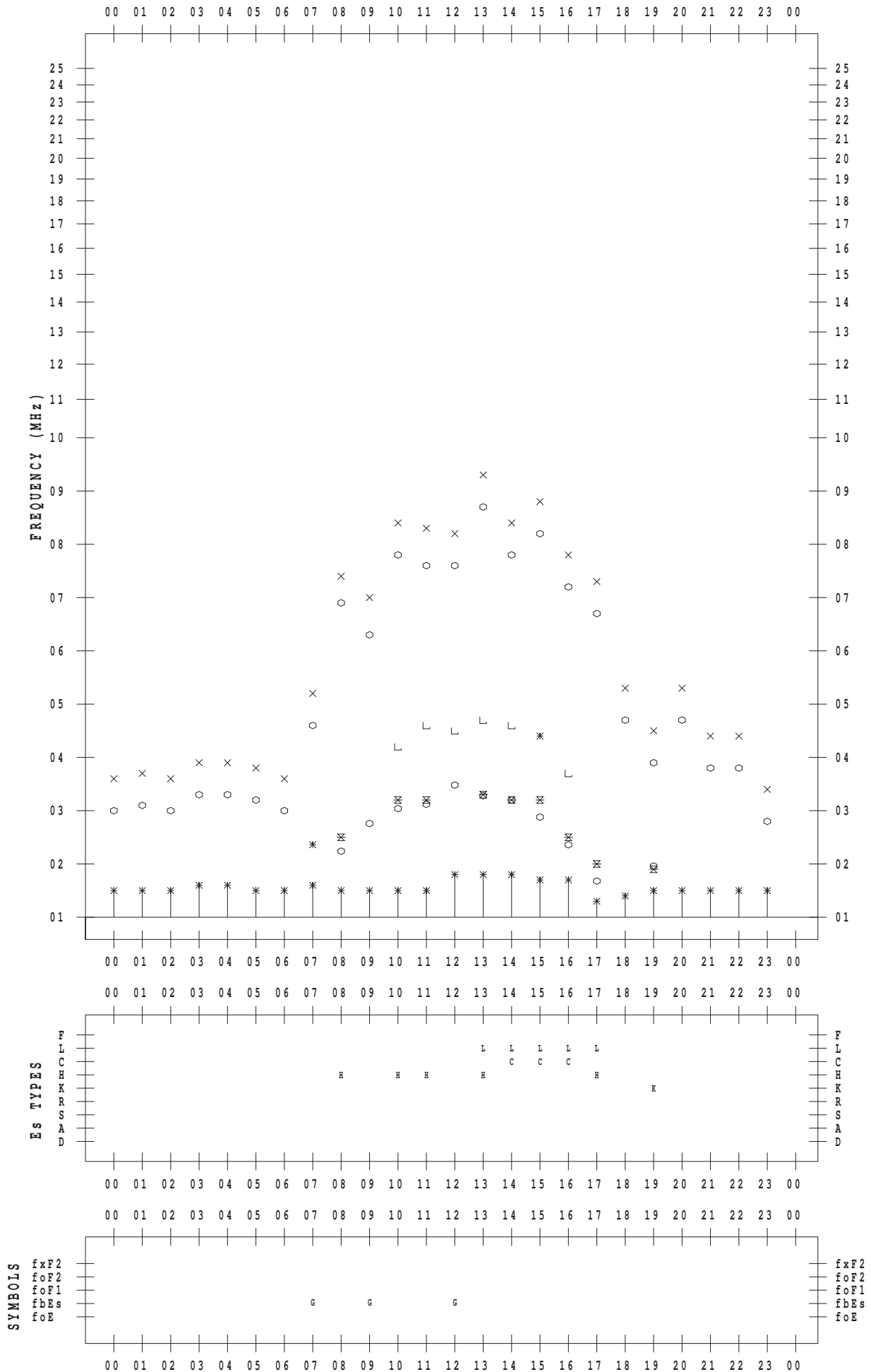
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/ 5

135 ° E MEAN TIME



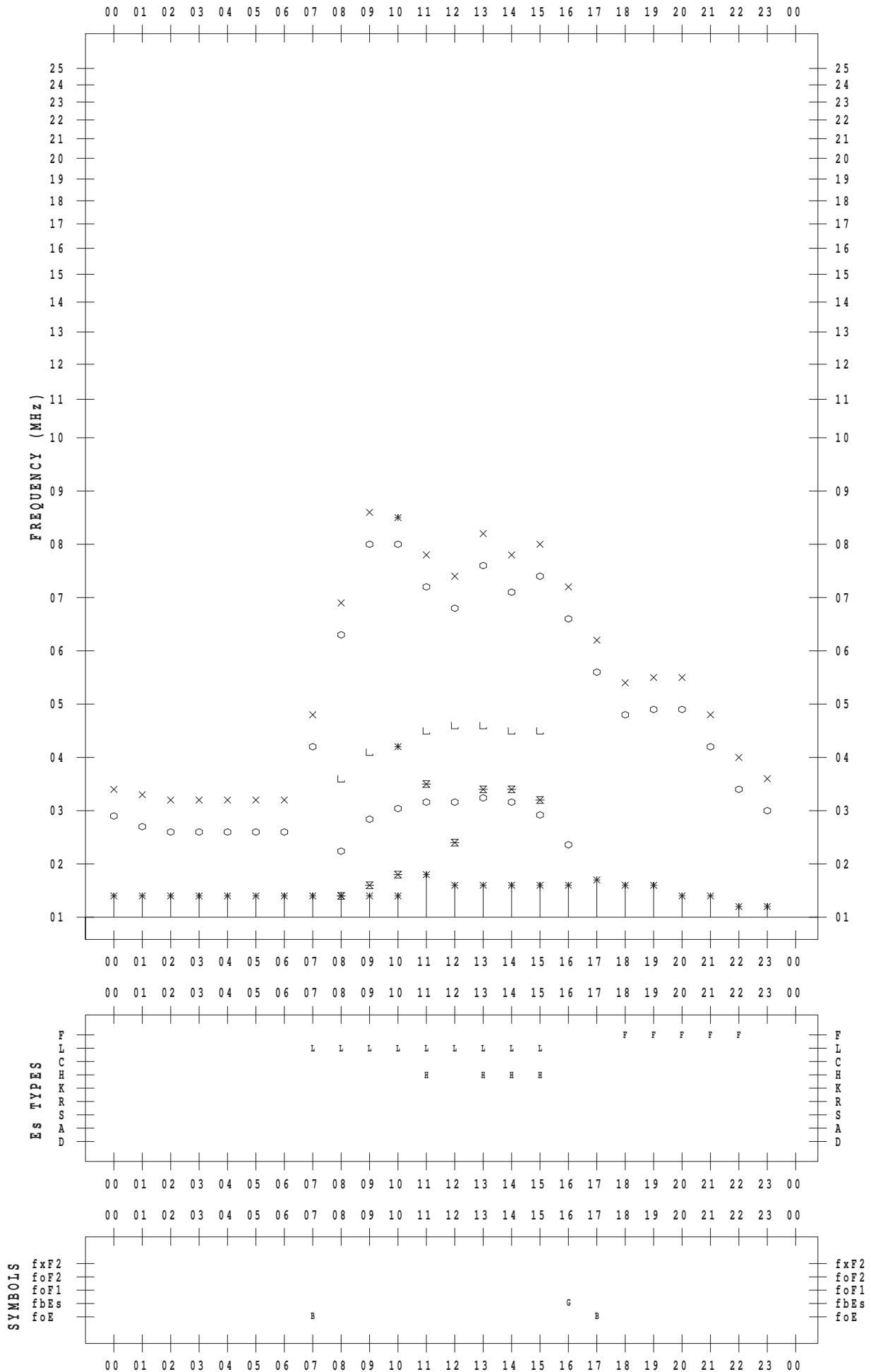
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/ 6

135 ° E MEAN TIME





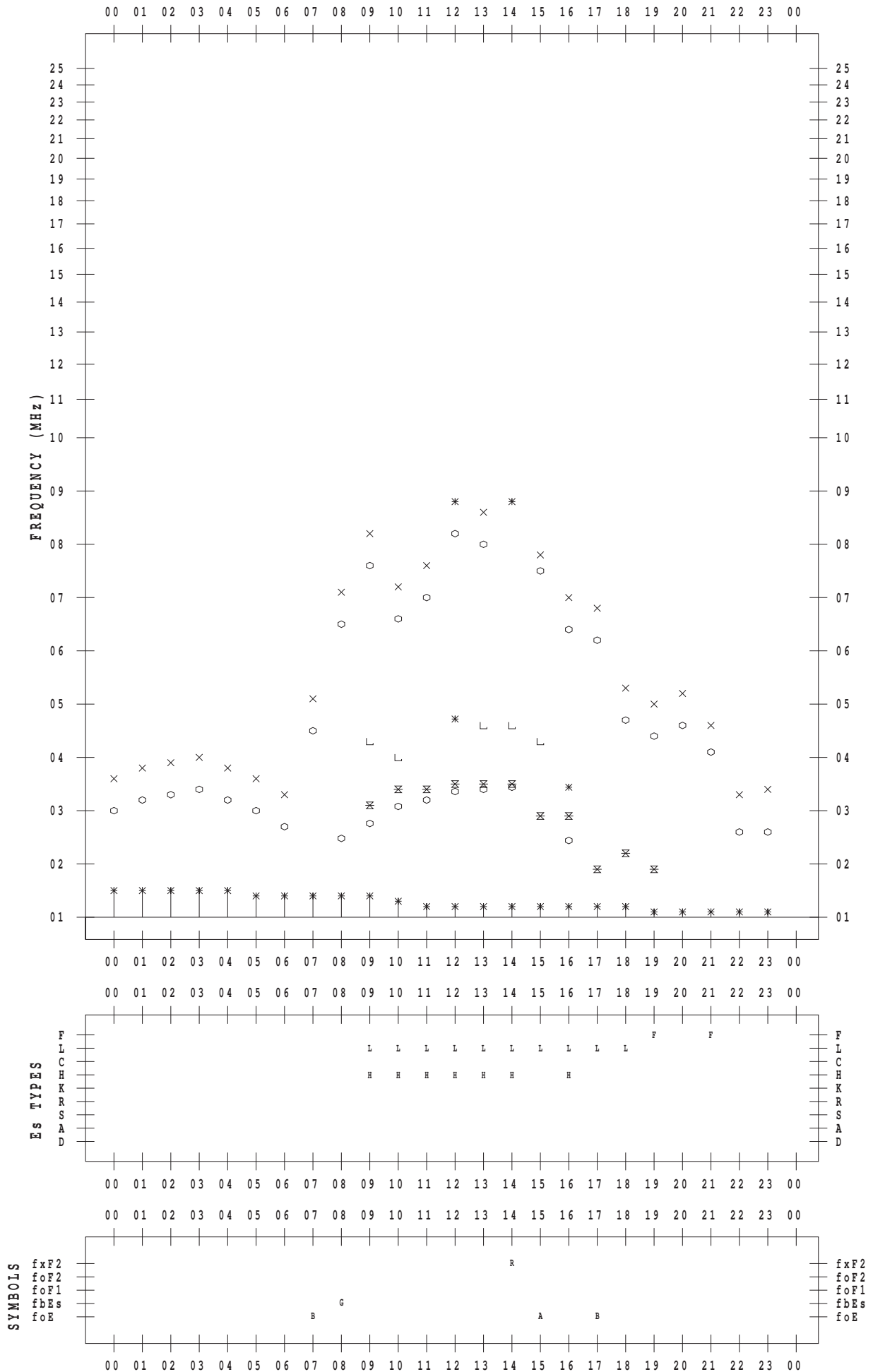
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/ 7

135 ° E MEAN TIME



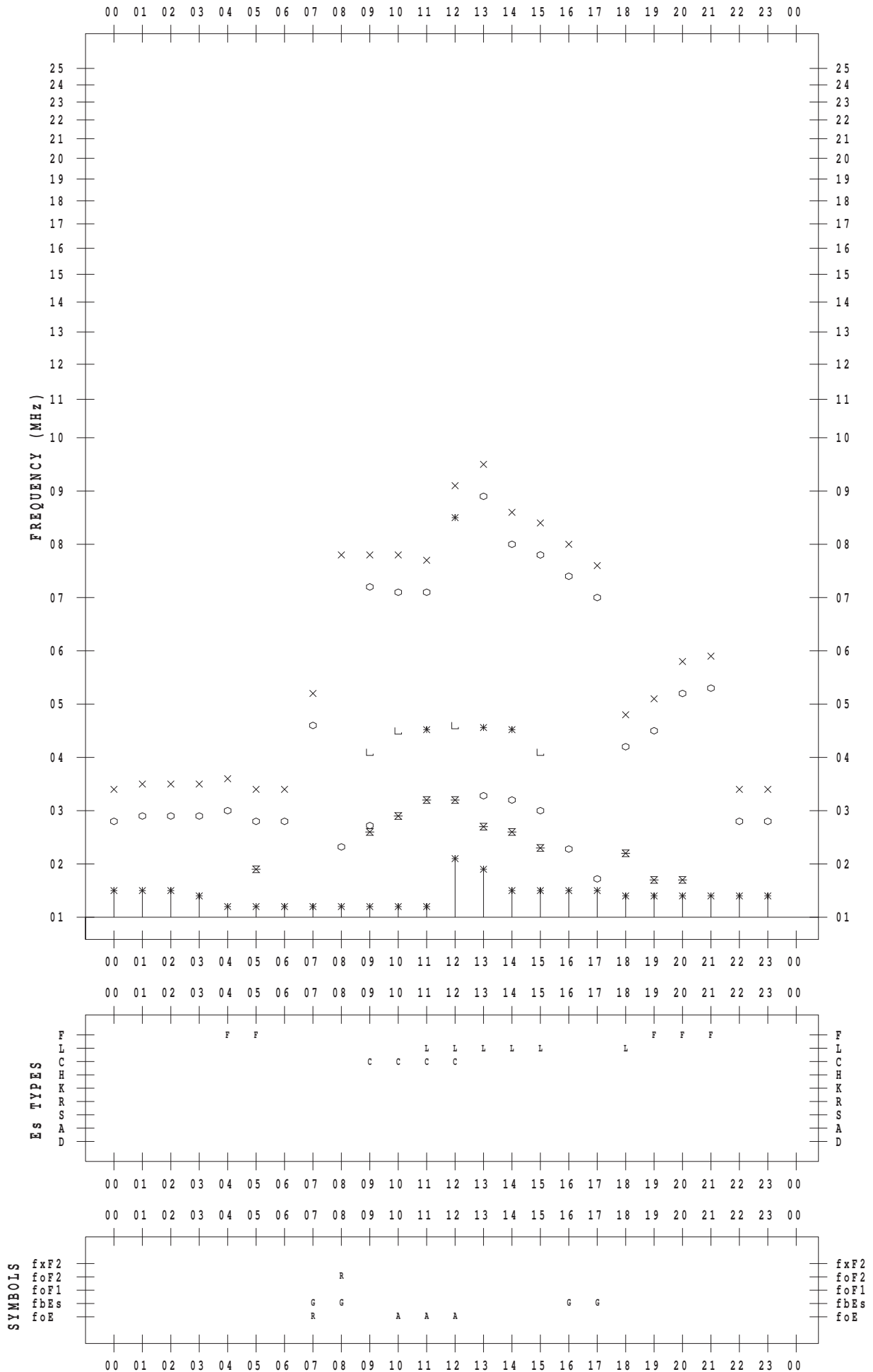
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/ 8

135 ° E MEAN TIME



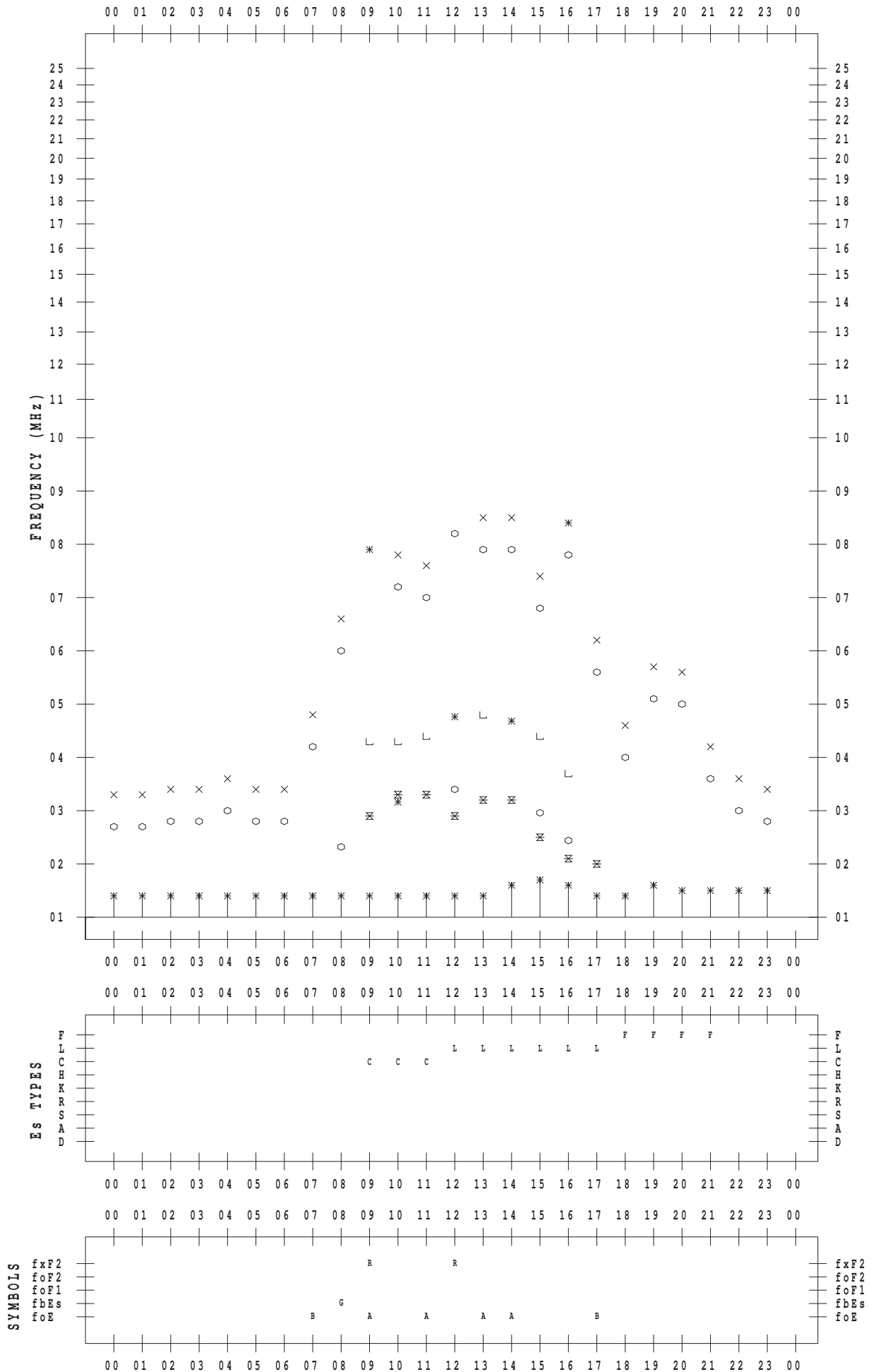
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/ 9

135 ° E MEAN TIME



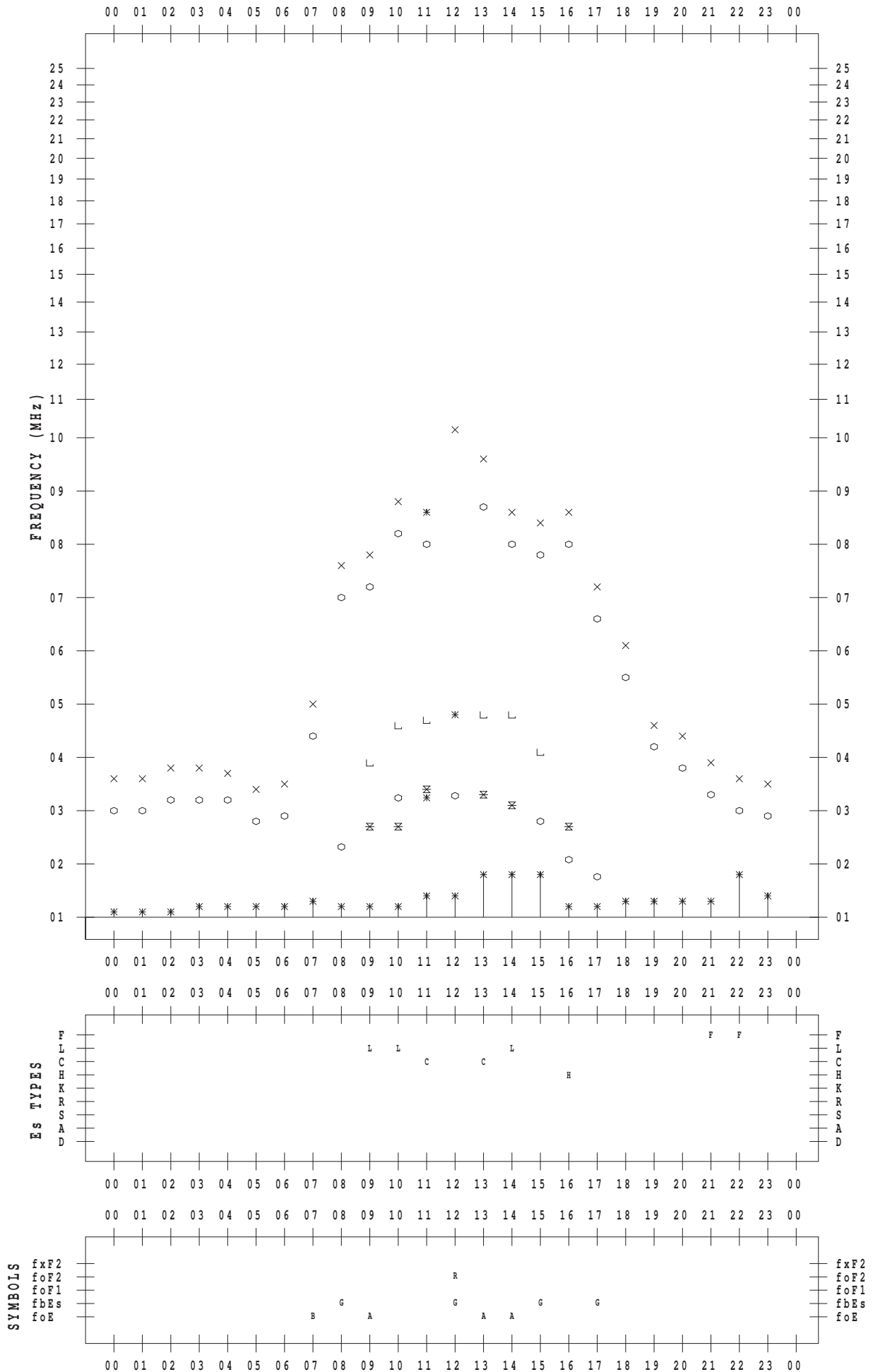
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/10

135 ° E MEAN TIME



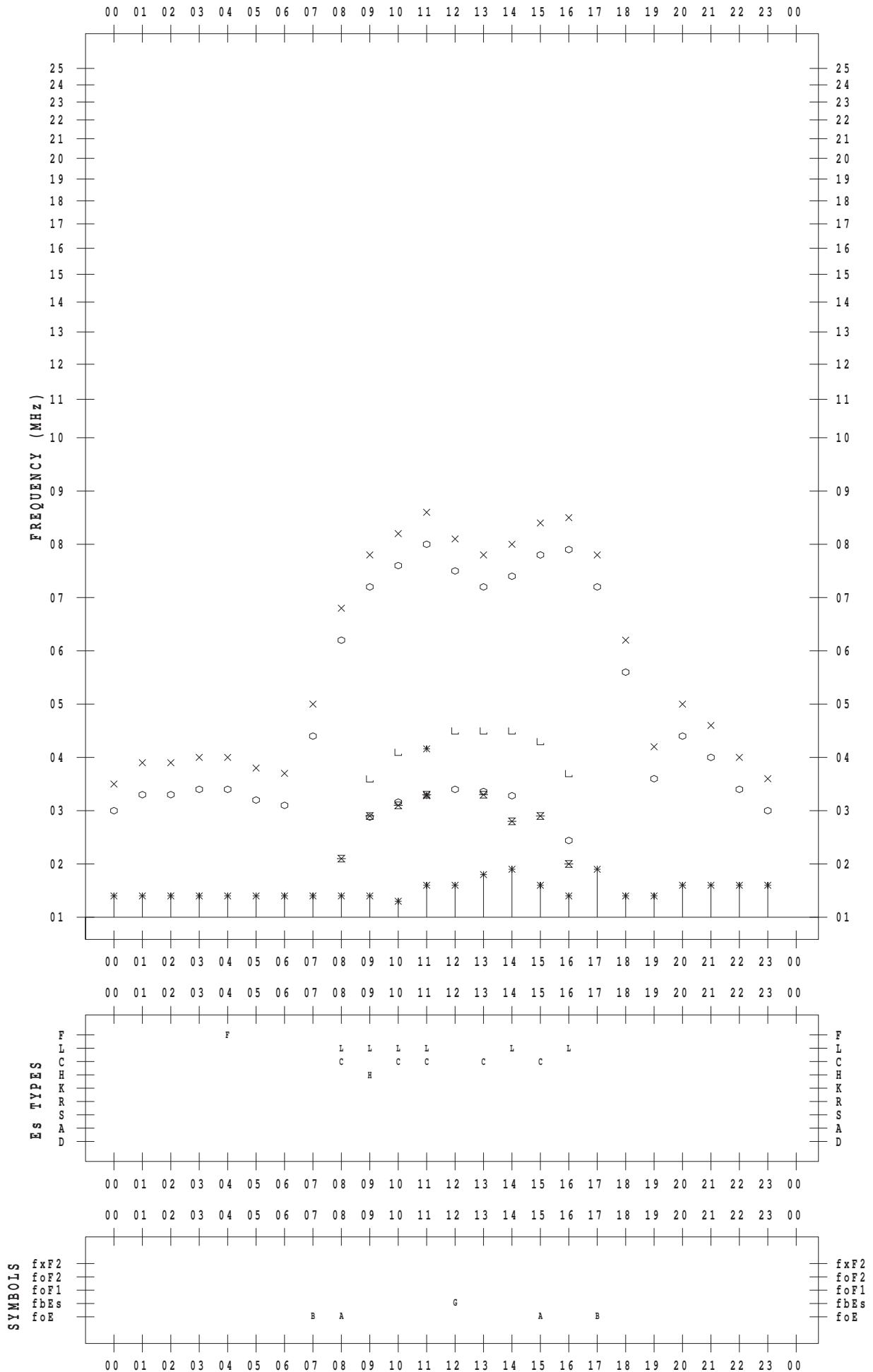
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/11

135 ° E MEAN TIME



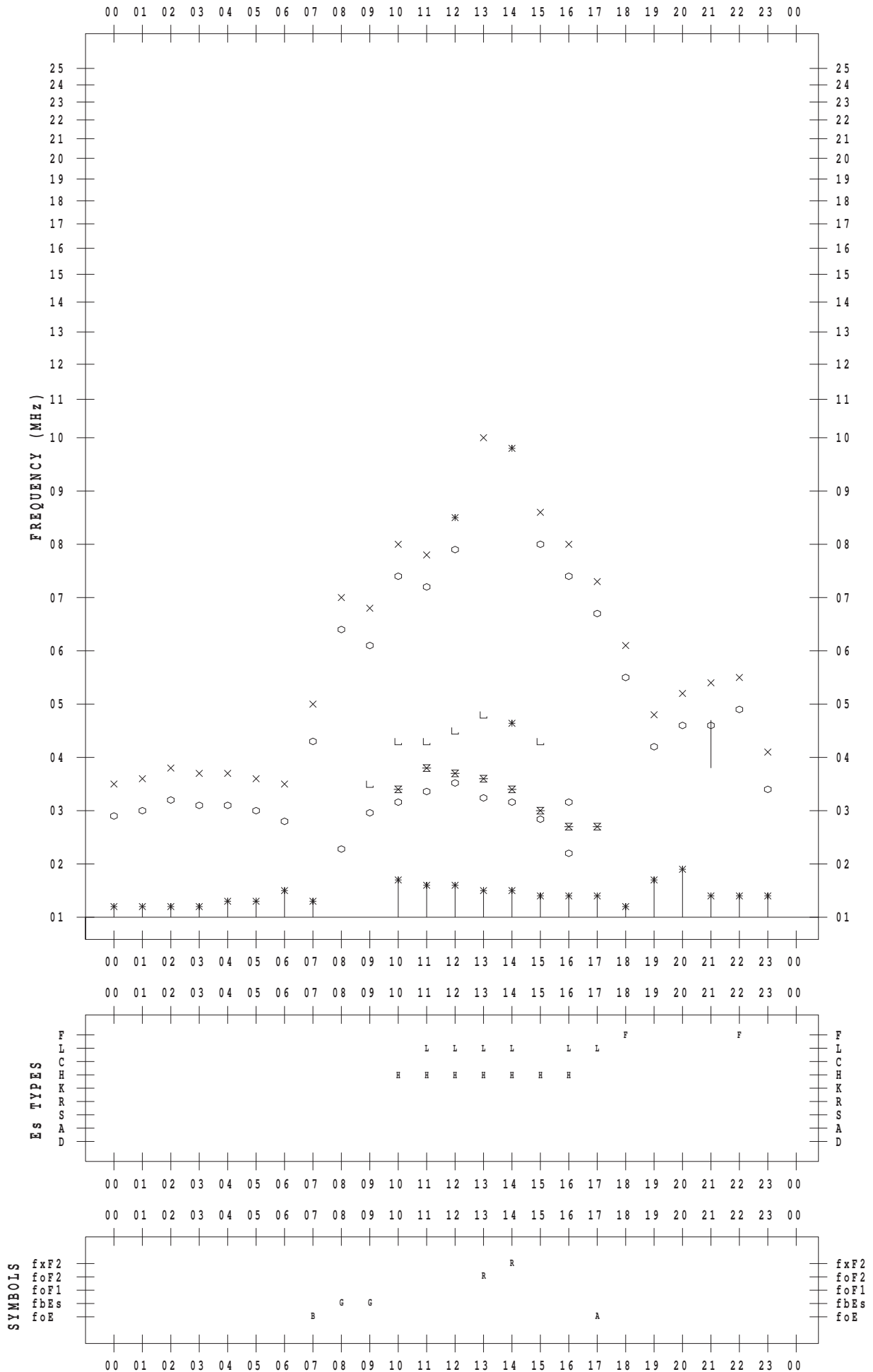
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/12

135 ° E MEAN TIME



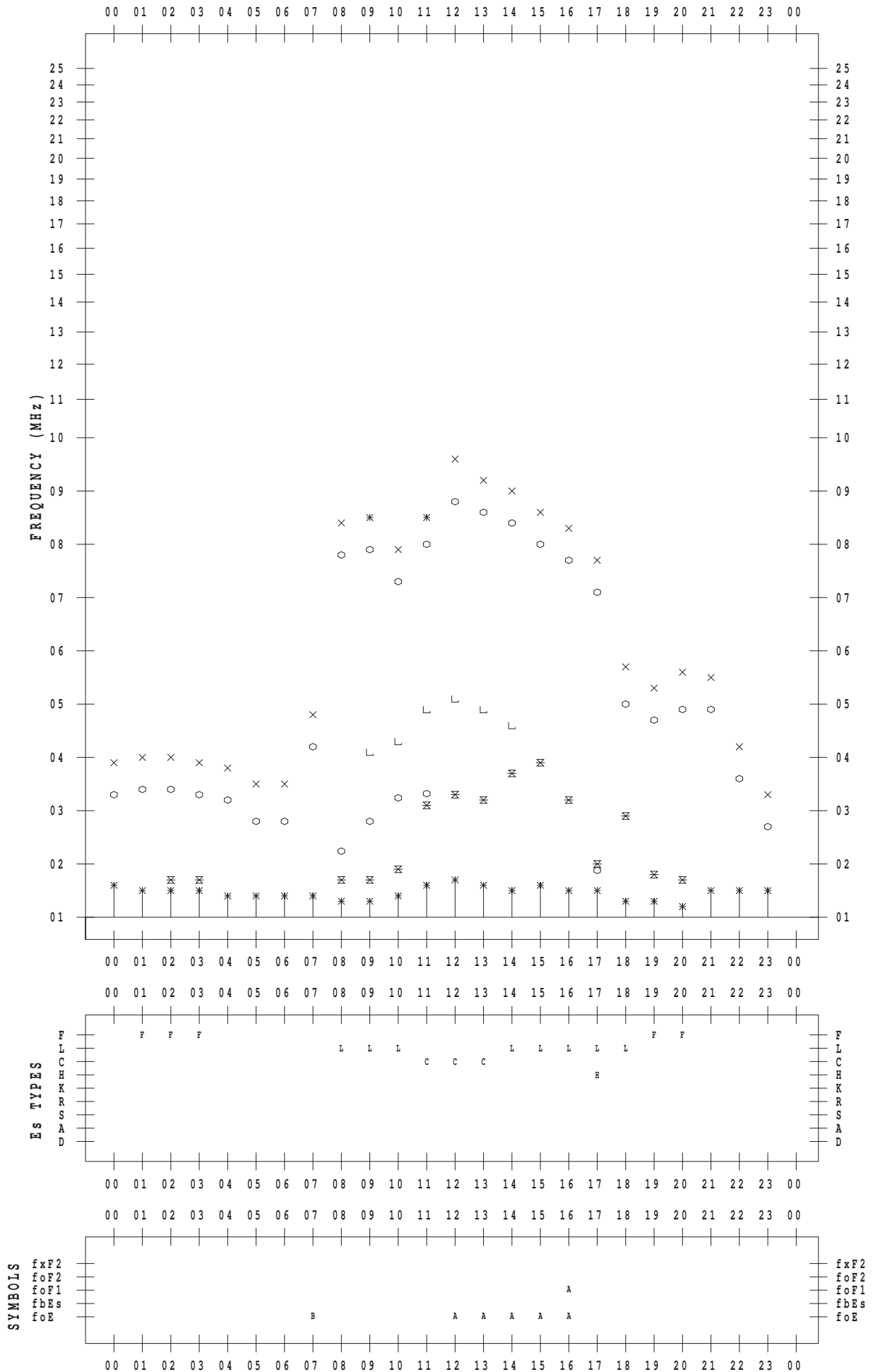
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/13

135 ° E MEAN TIME



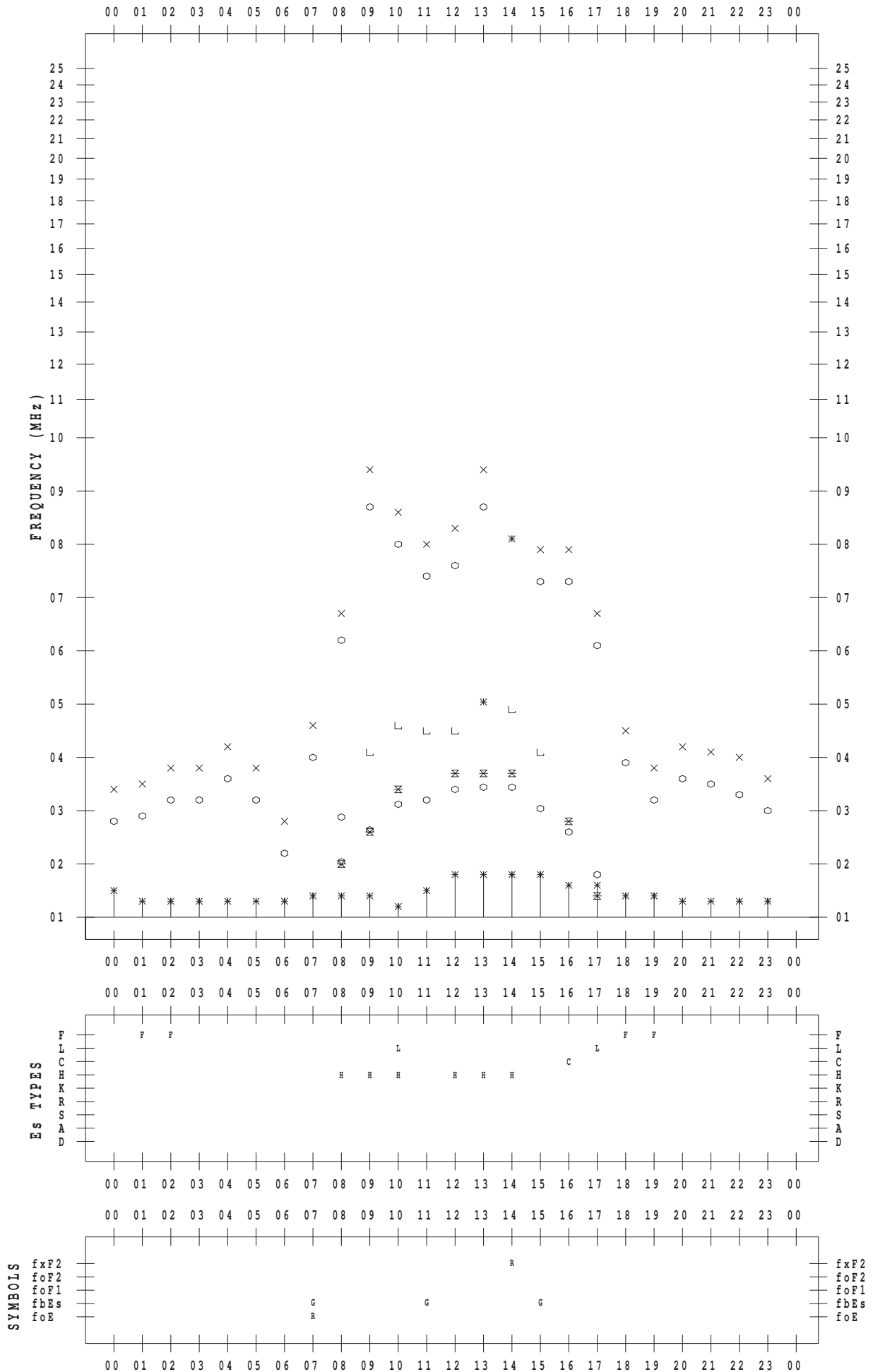
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/14

135 ° E MEAN TIME





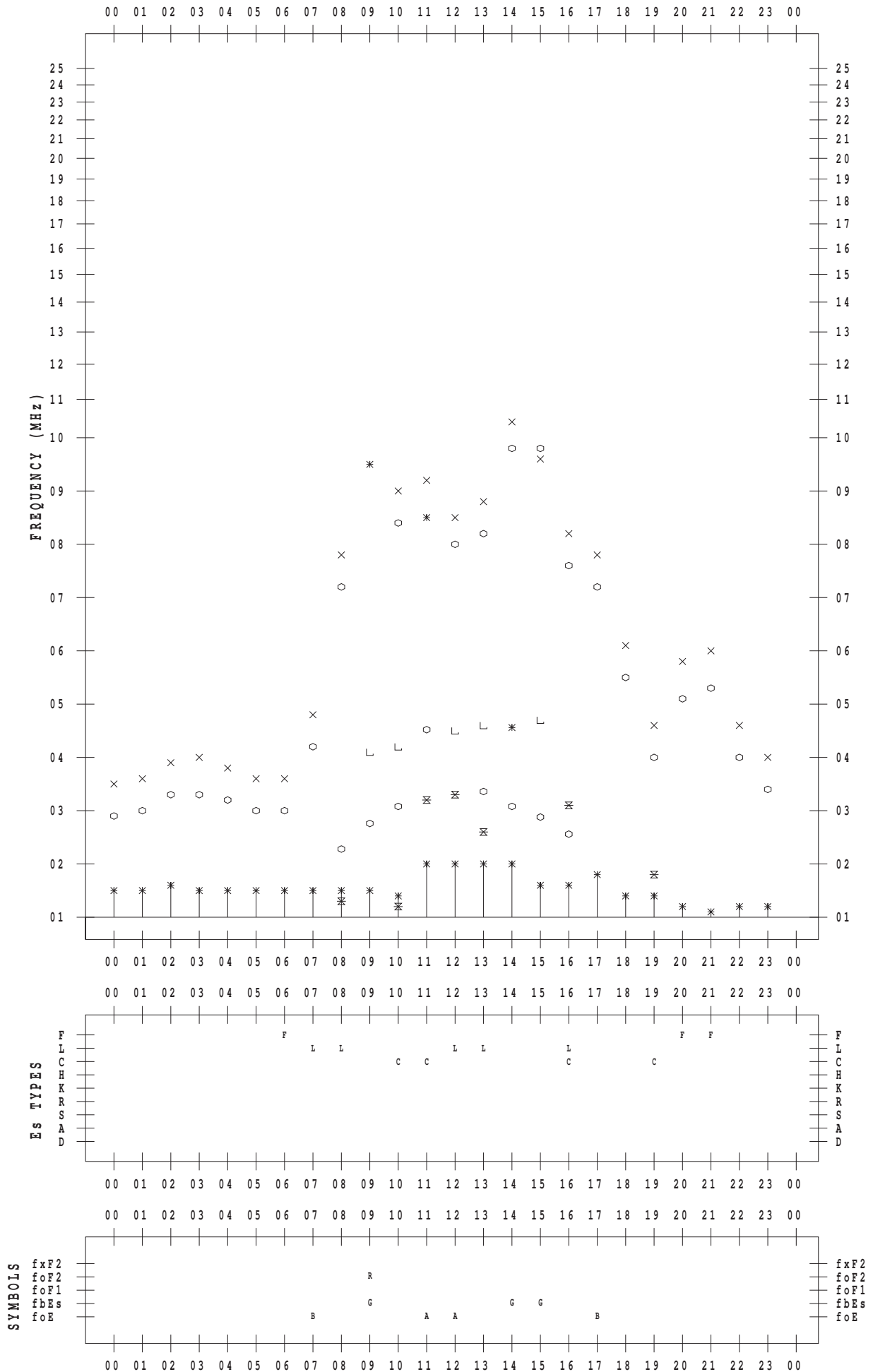
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/15

135 ° E MEAN TIME



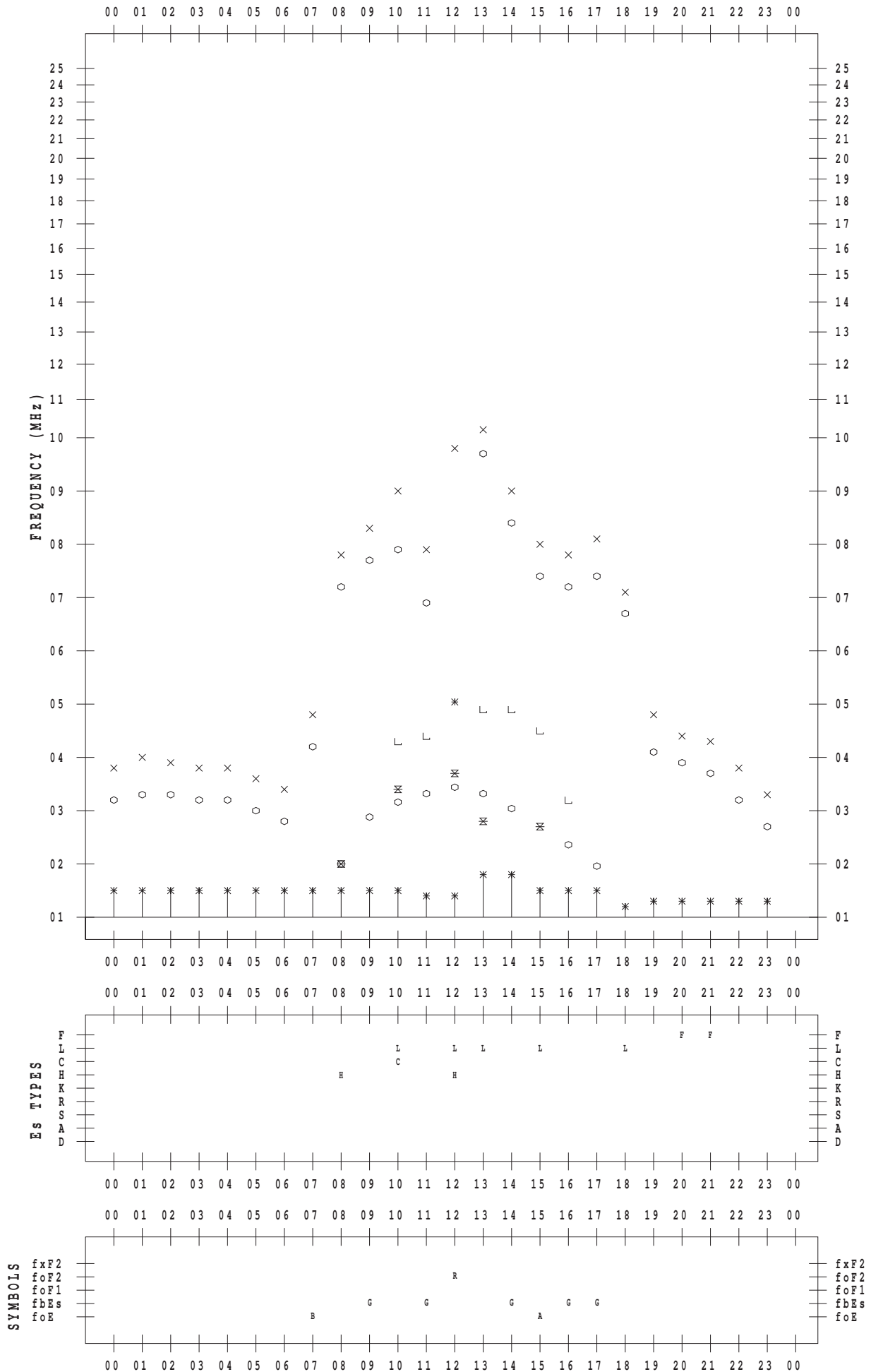
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/16

135 ° E MEAN TIME



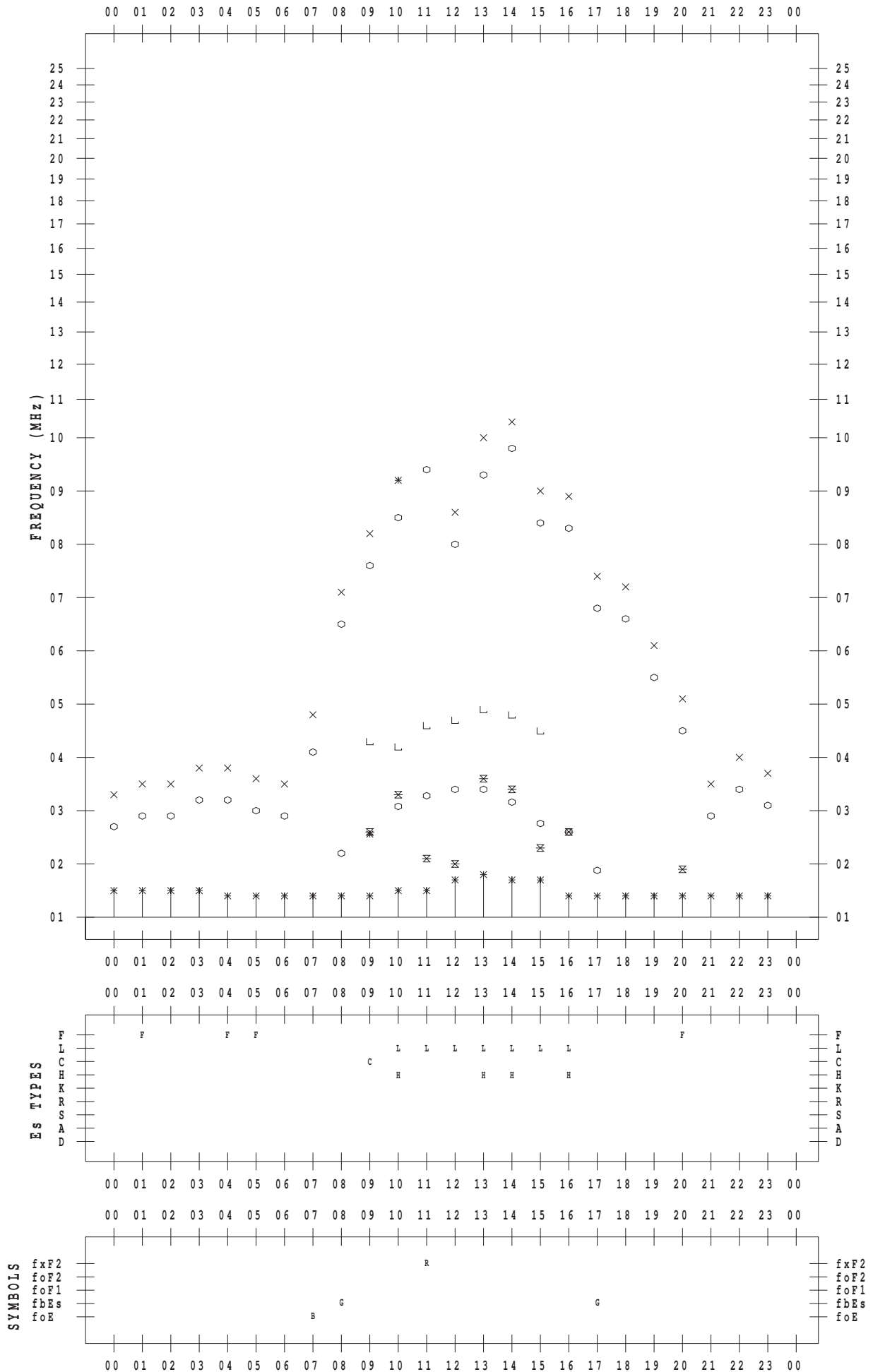
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/17

135 ° E MEAN TIME



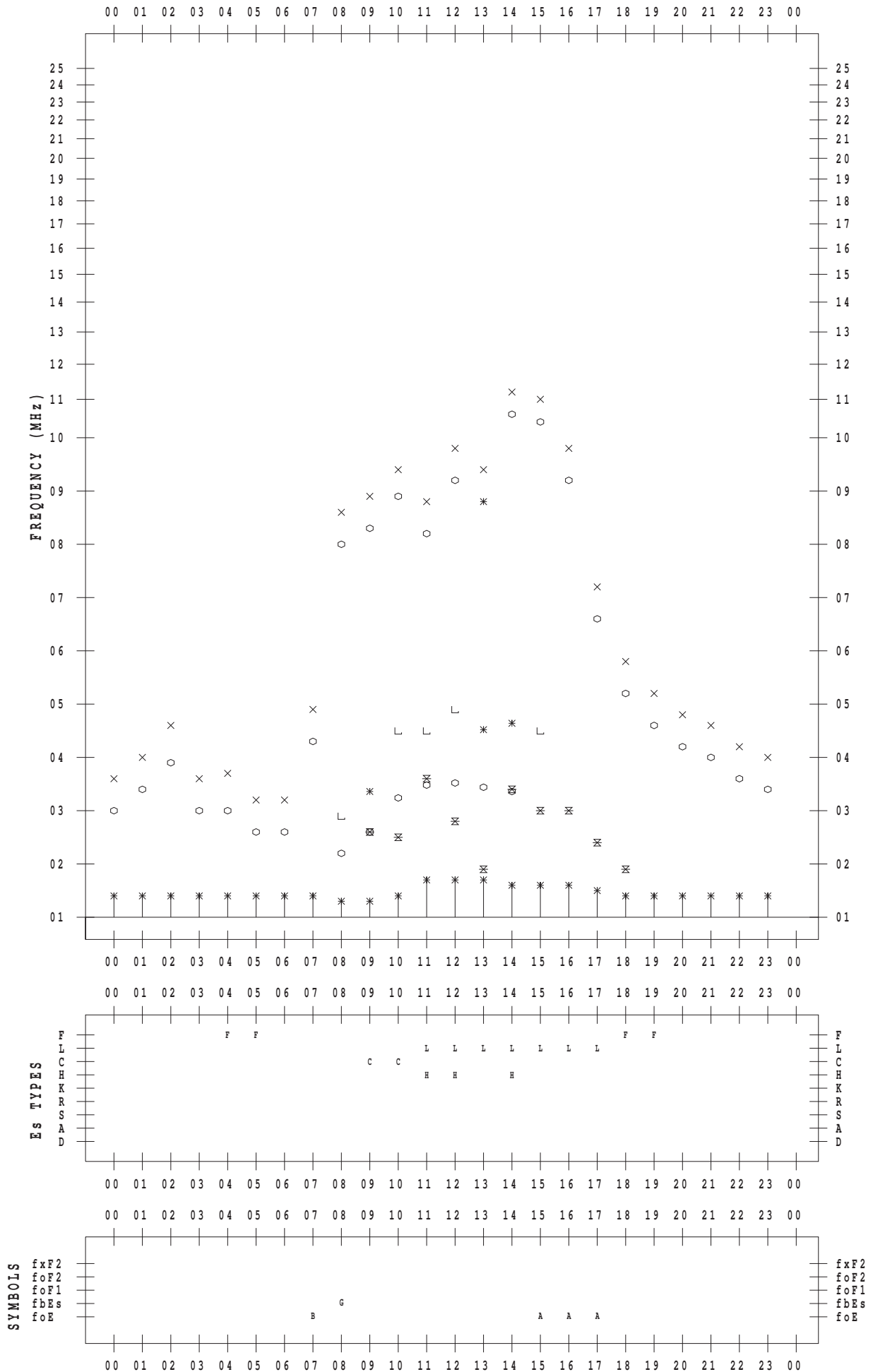
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/18

135 ° E MEAN TIME



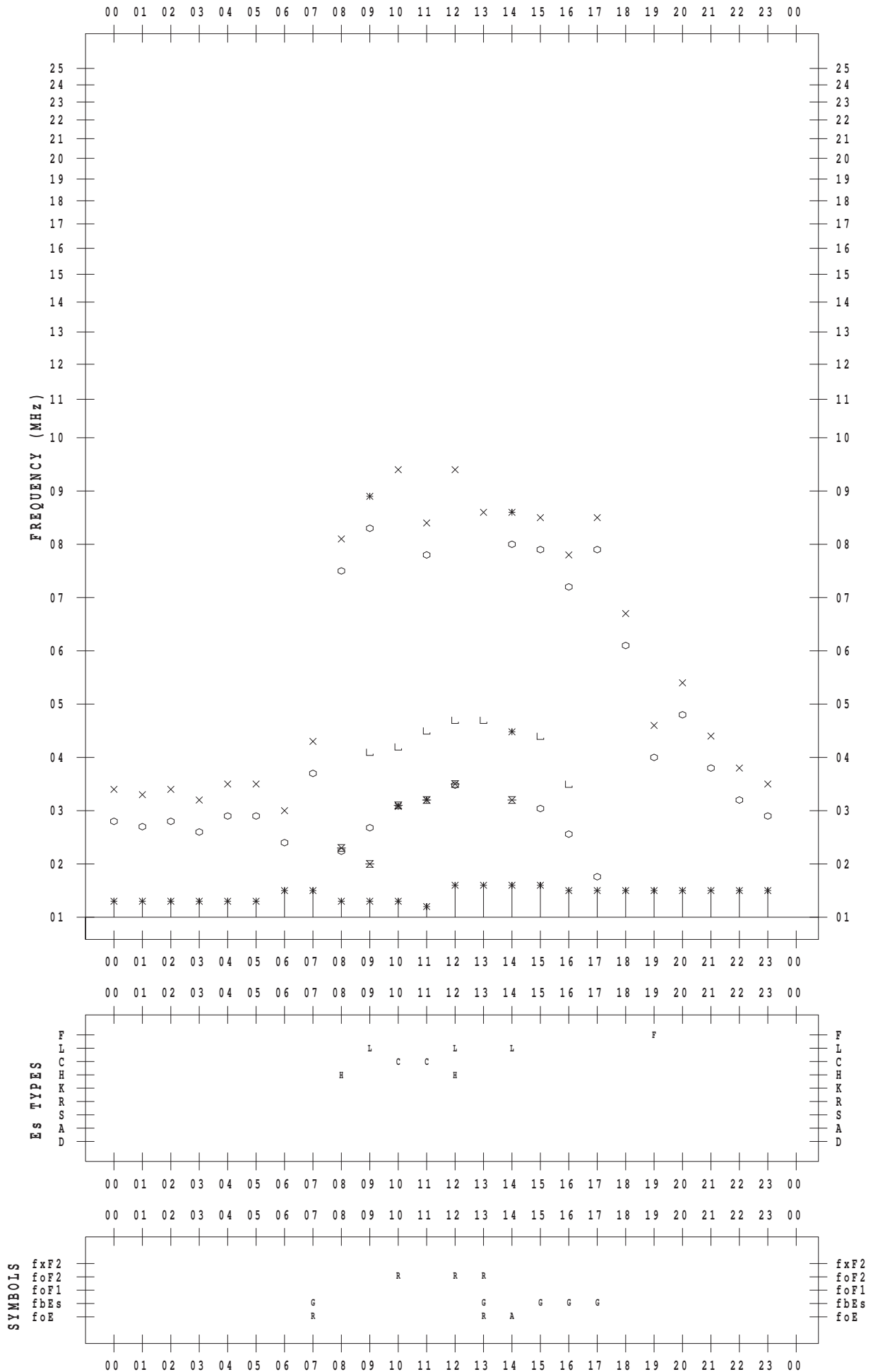
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/19

135 ° E MEAN TIME



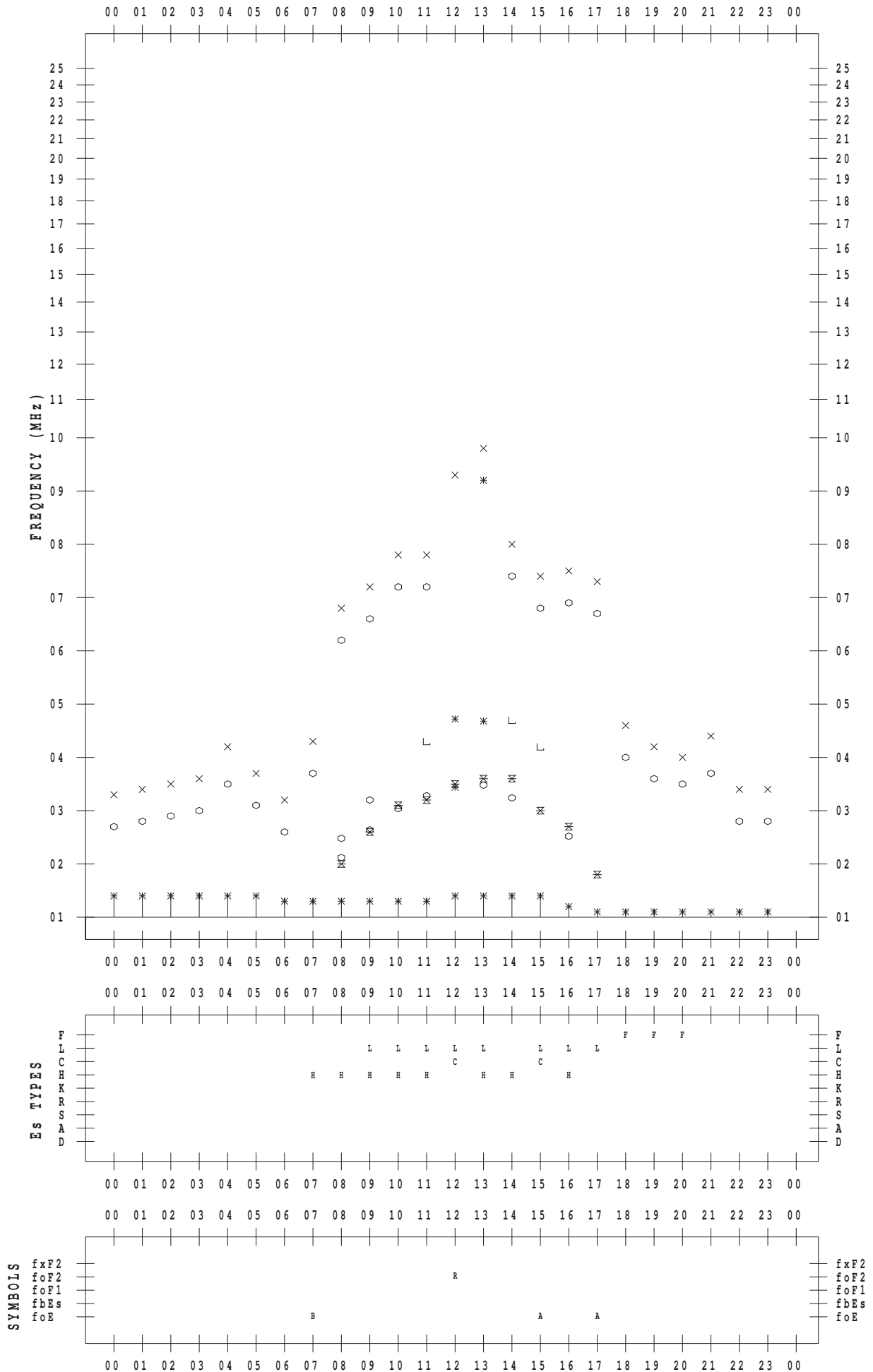
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/20

135 ° E MEAN TIME



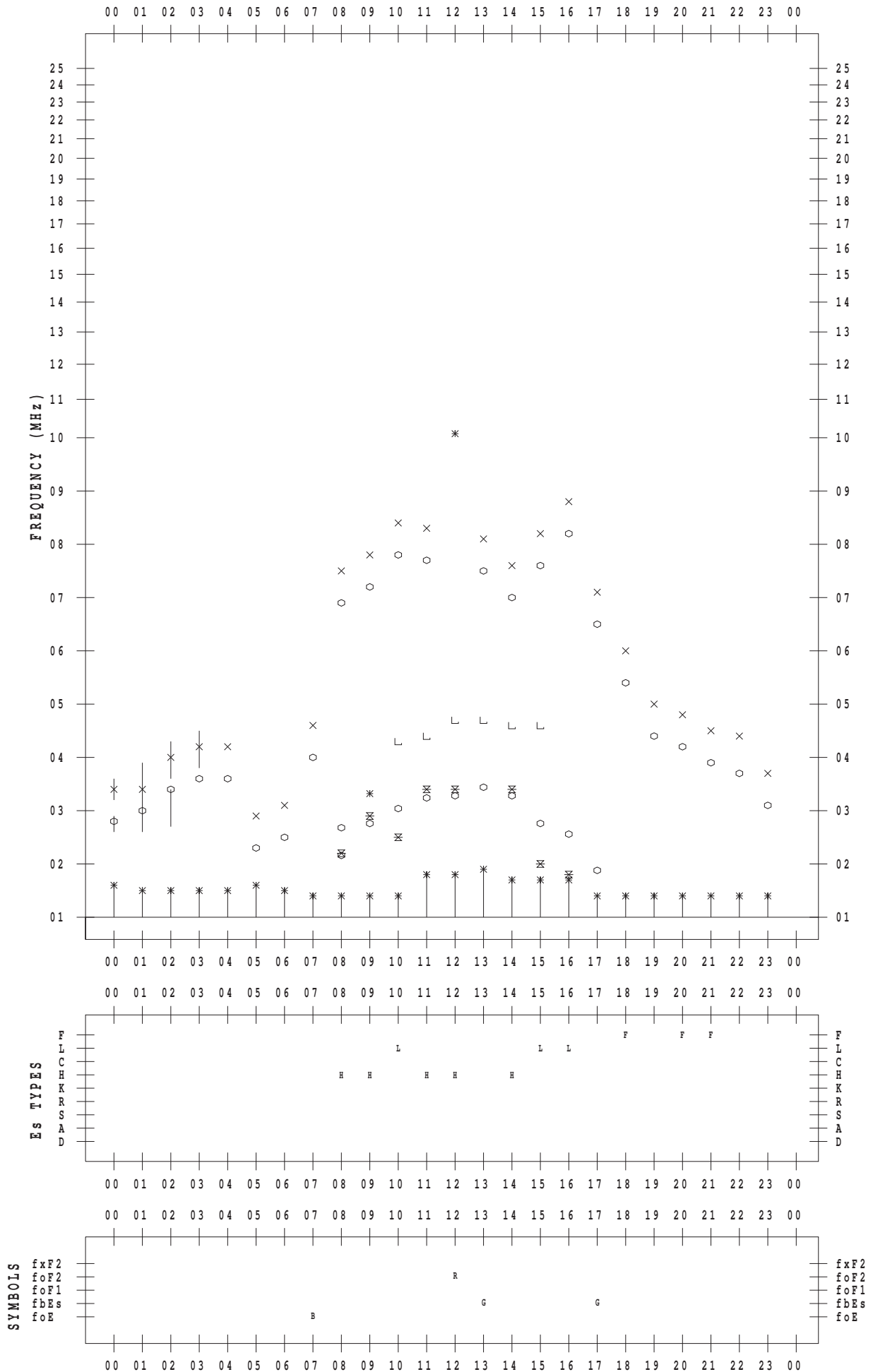
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/21

135 ° E MEAN TIME



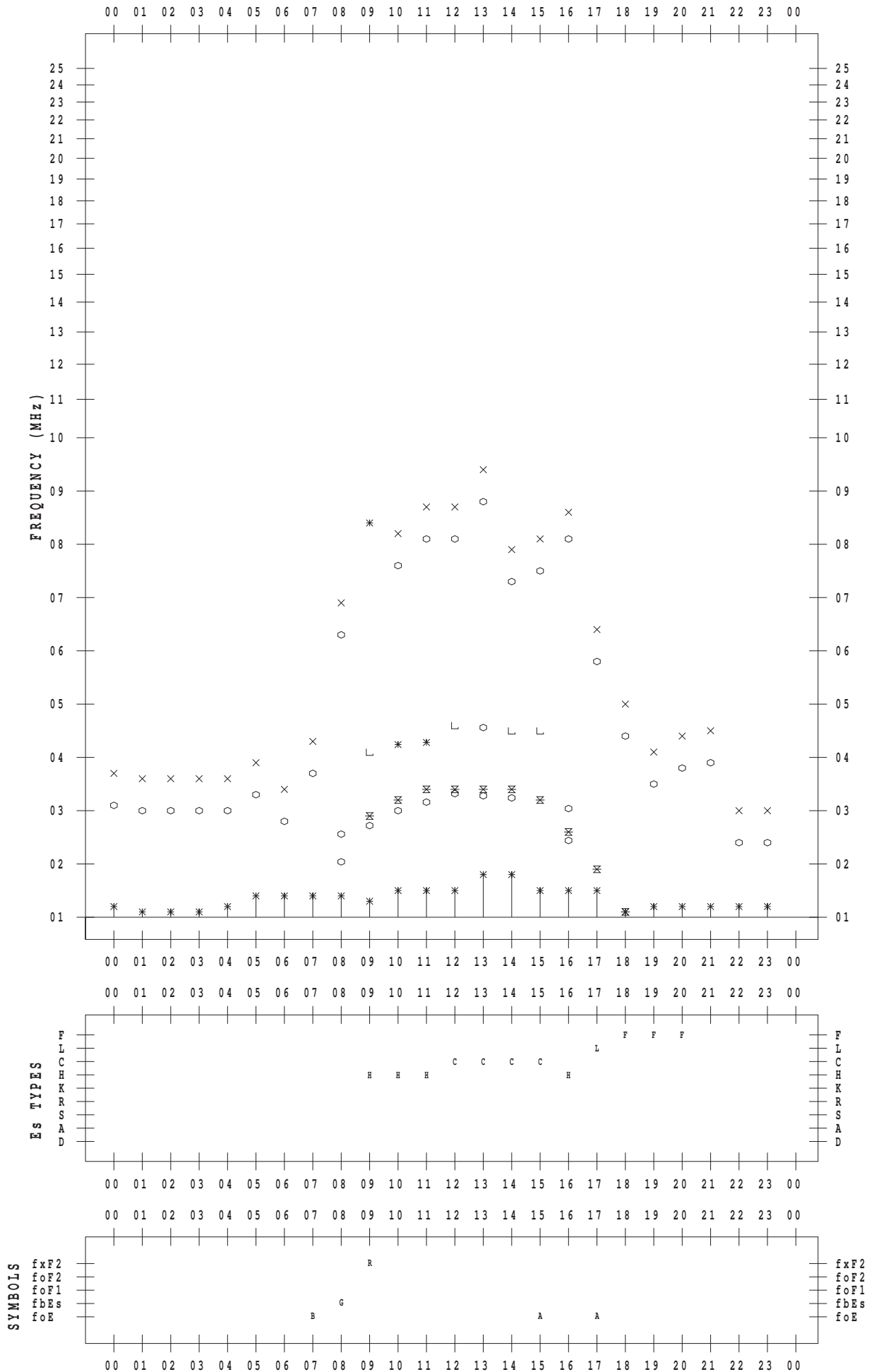
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/22

135 ° E MEAN TIME





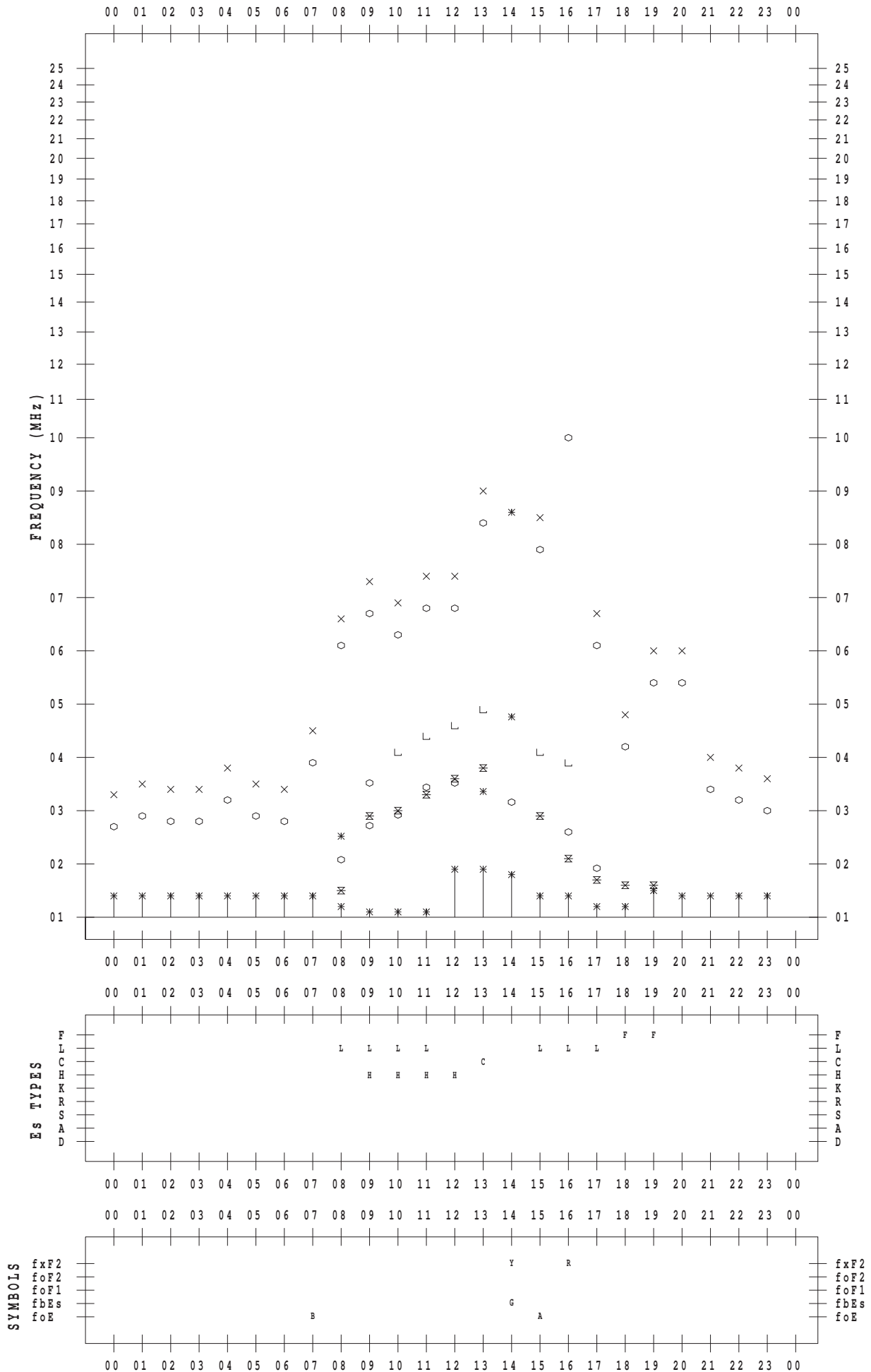
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/23

135 ° E MEAN TIME



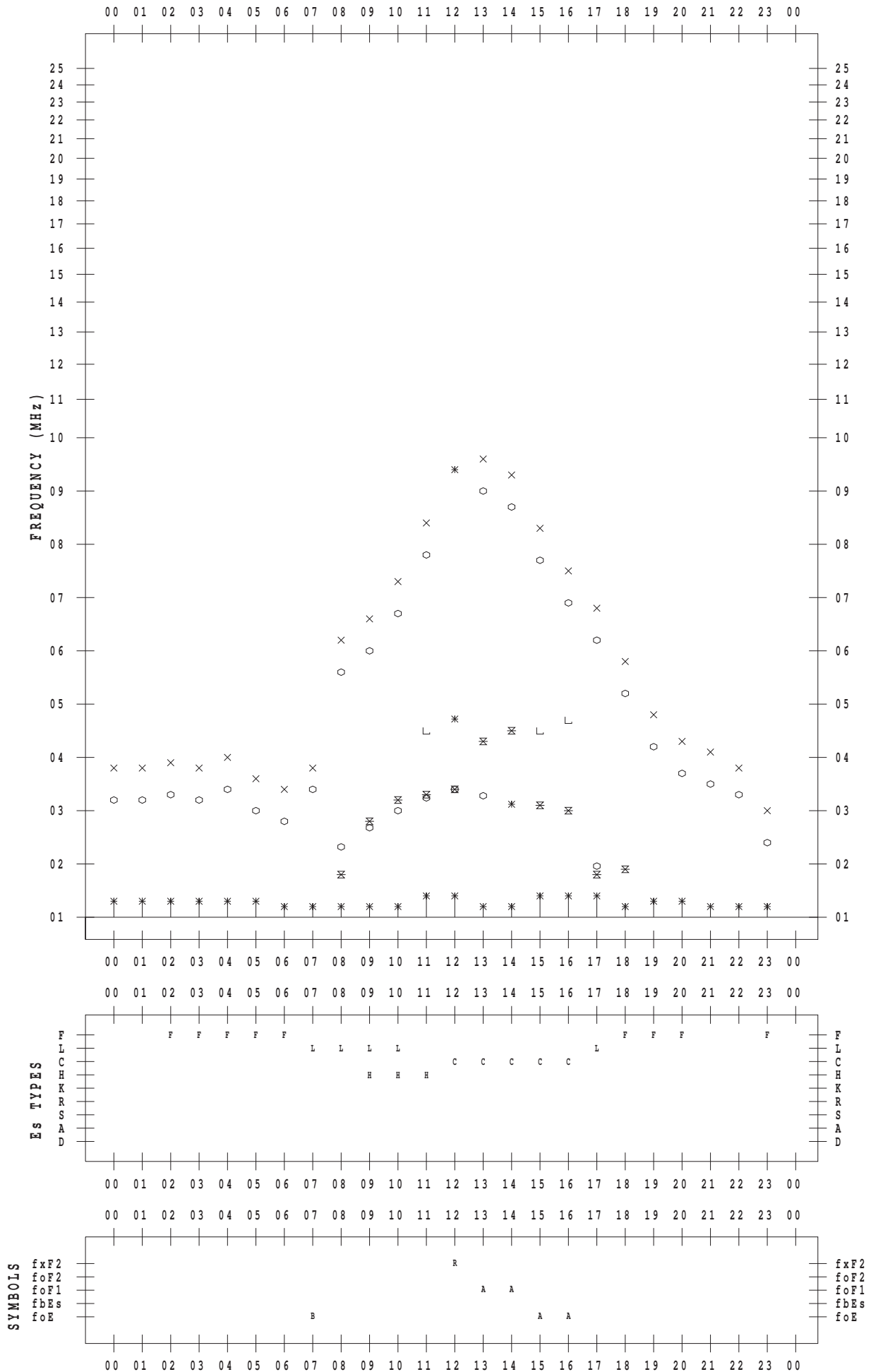
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/24

135 ° E MEAN TIME



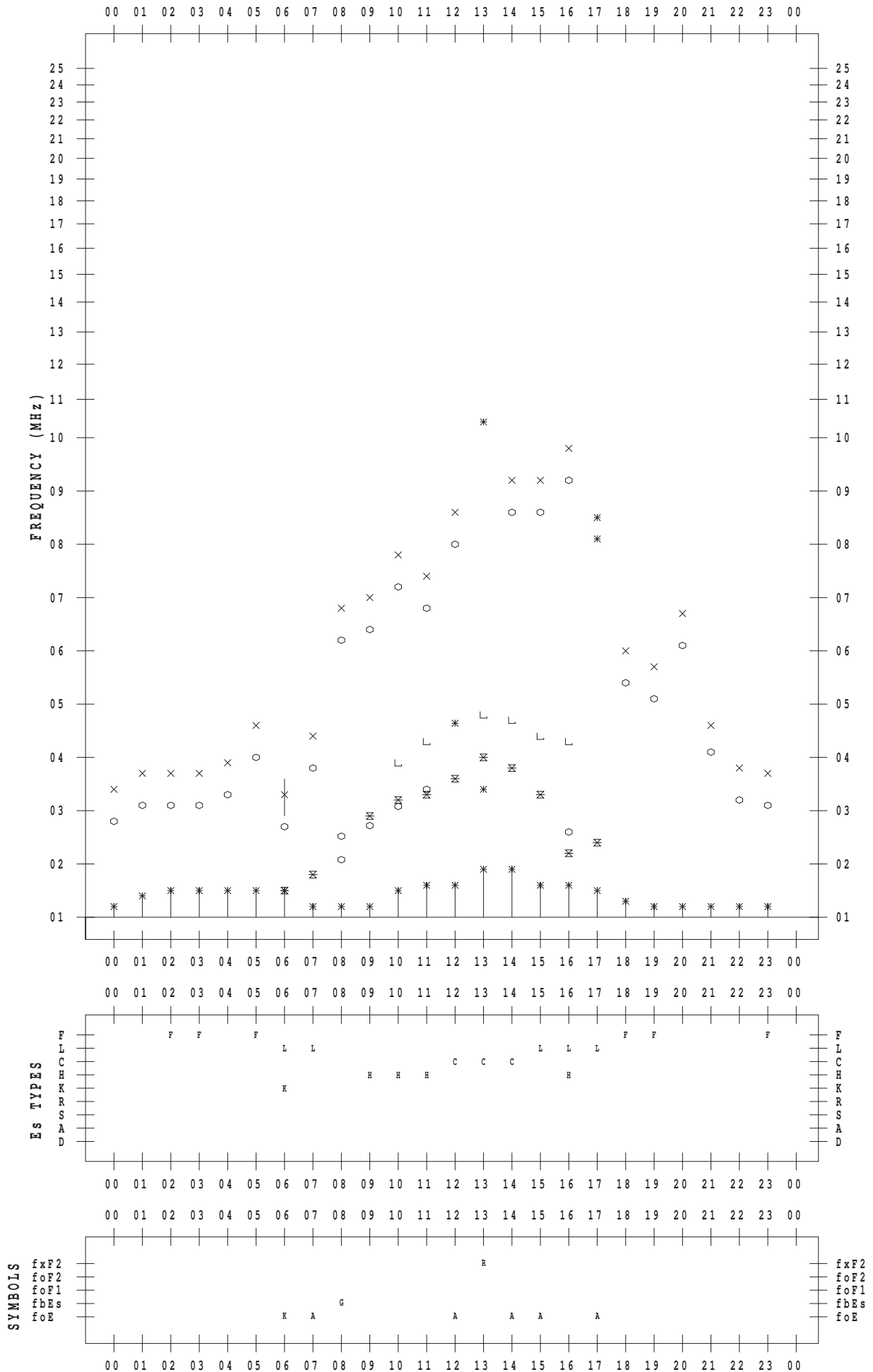
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/25

135 ° E MEAN TIME



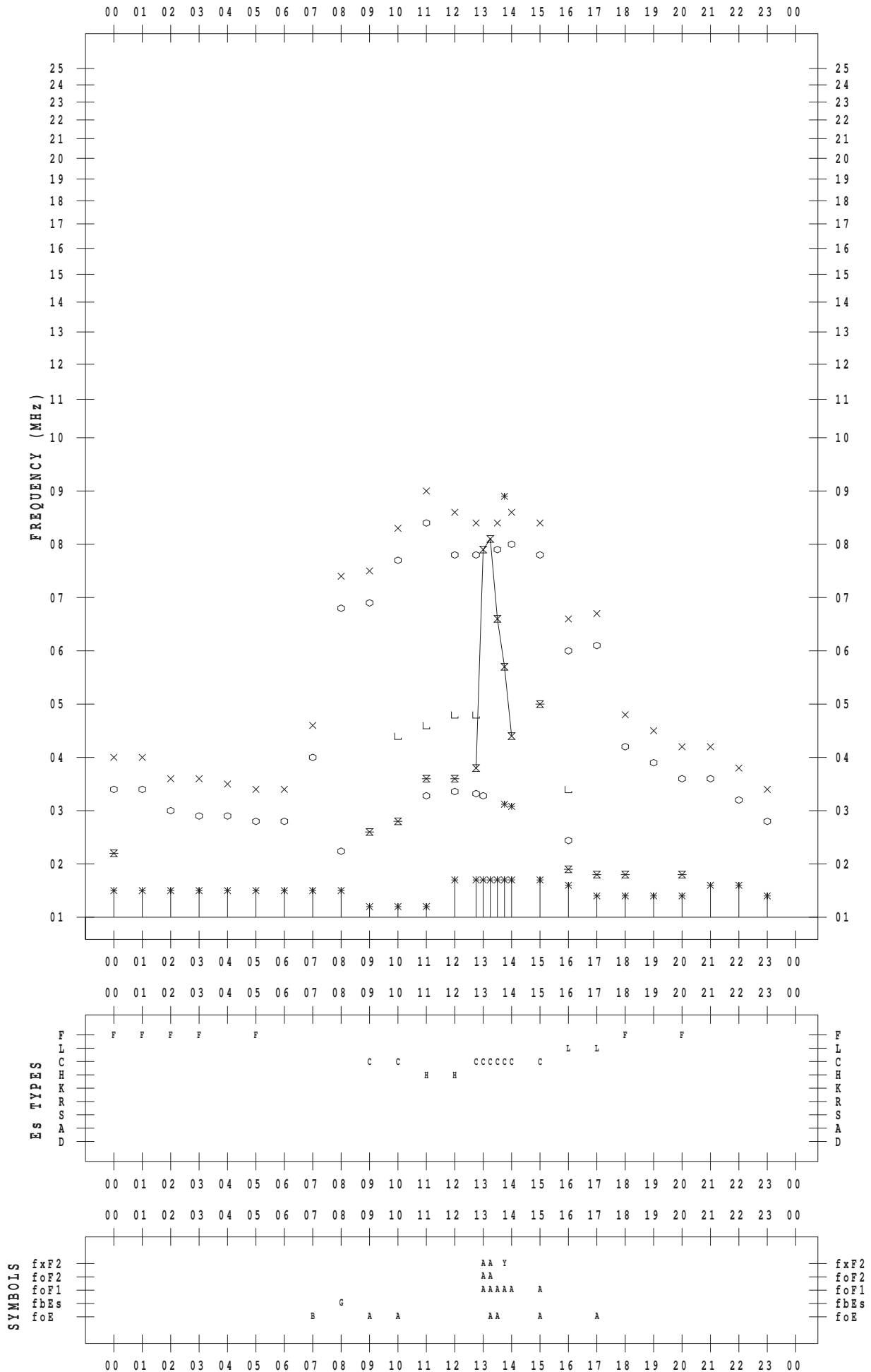
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/26

135 ° E MEAN TIME



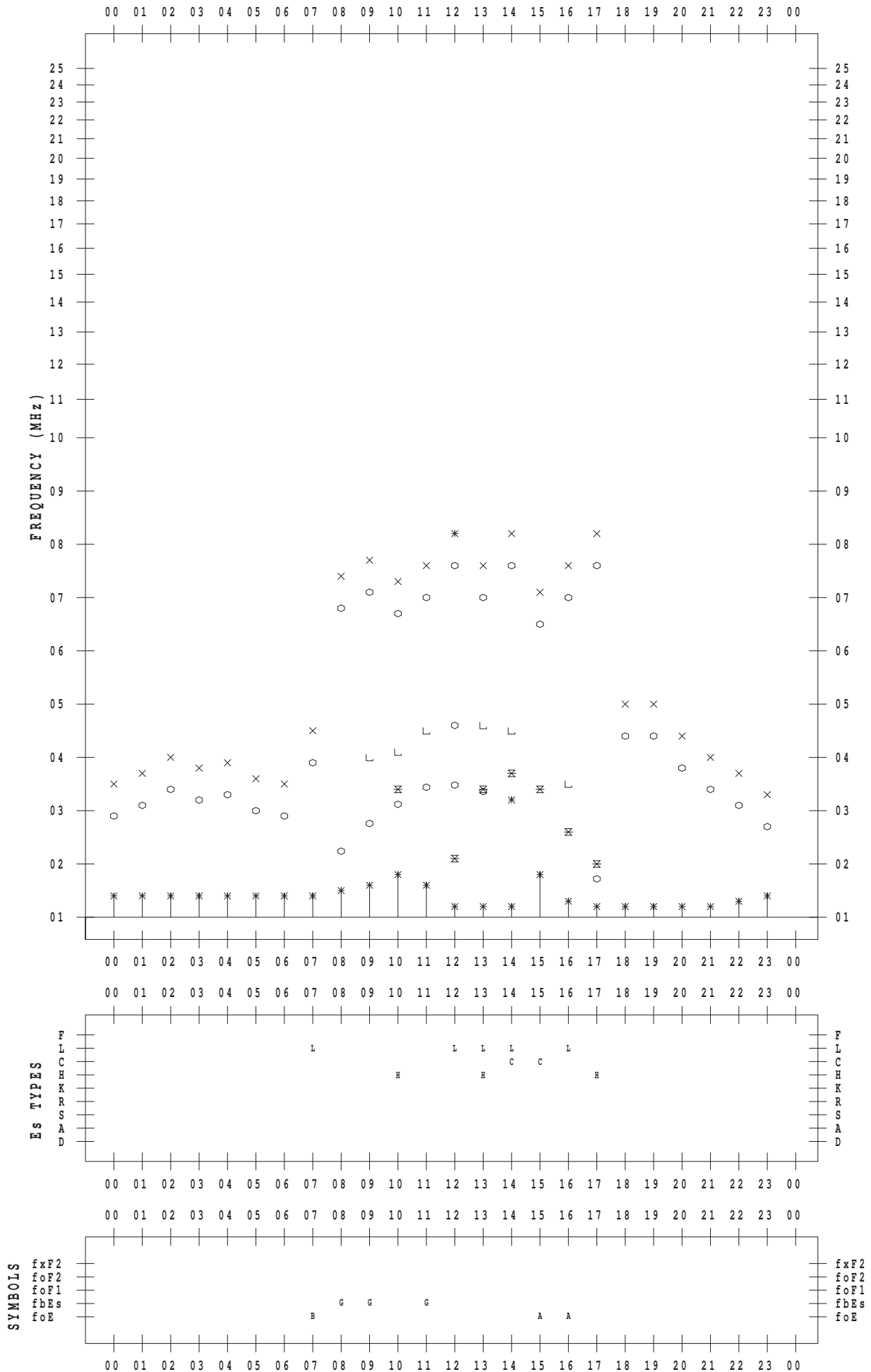
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/27

135 ° E MEAN TIME



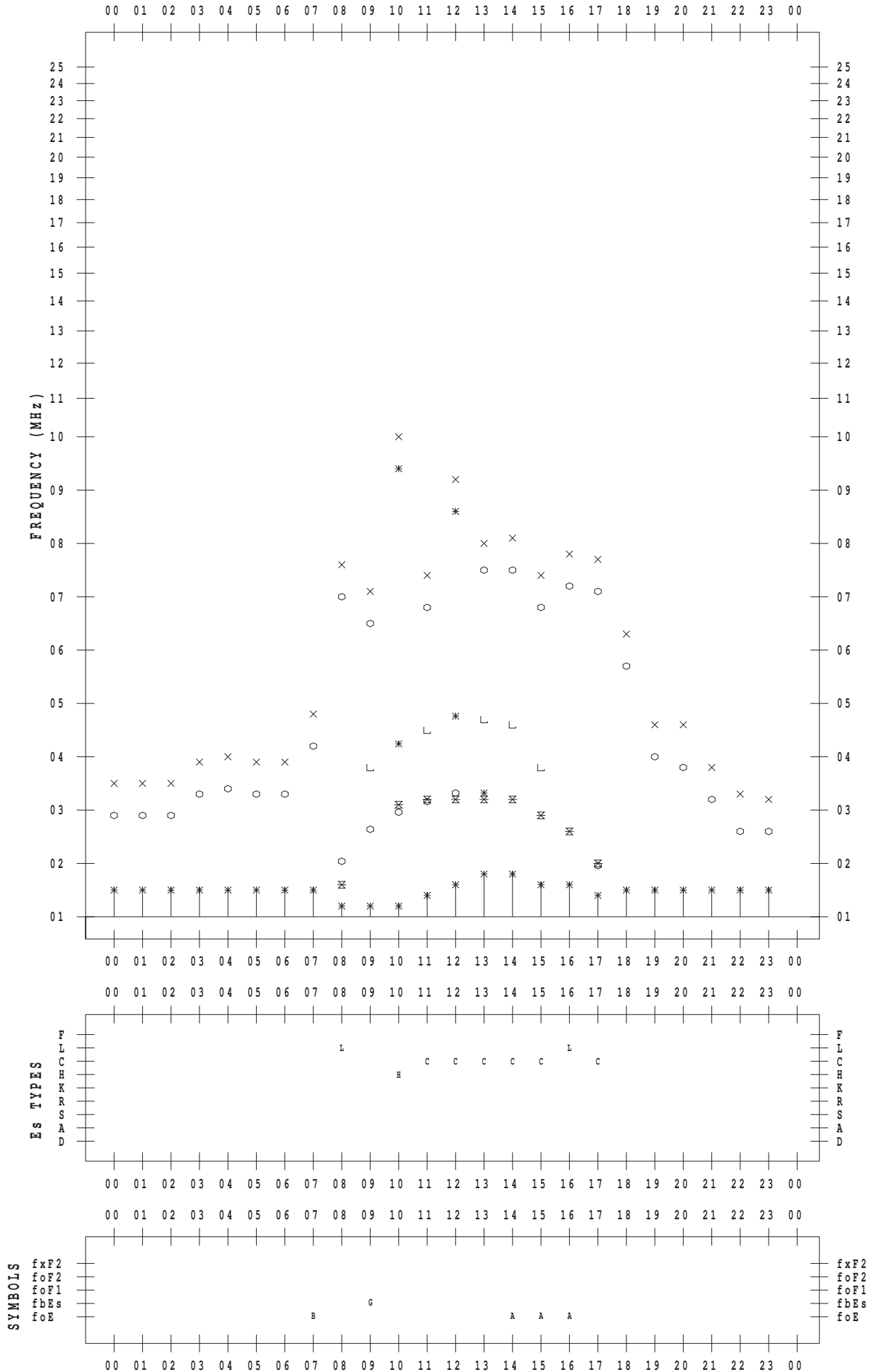
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/28

135 ° E MEAN TIME



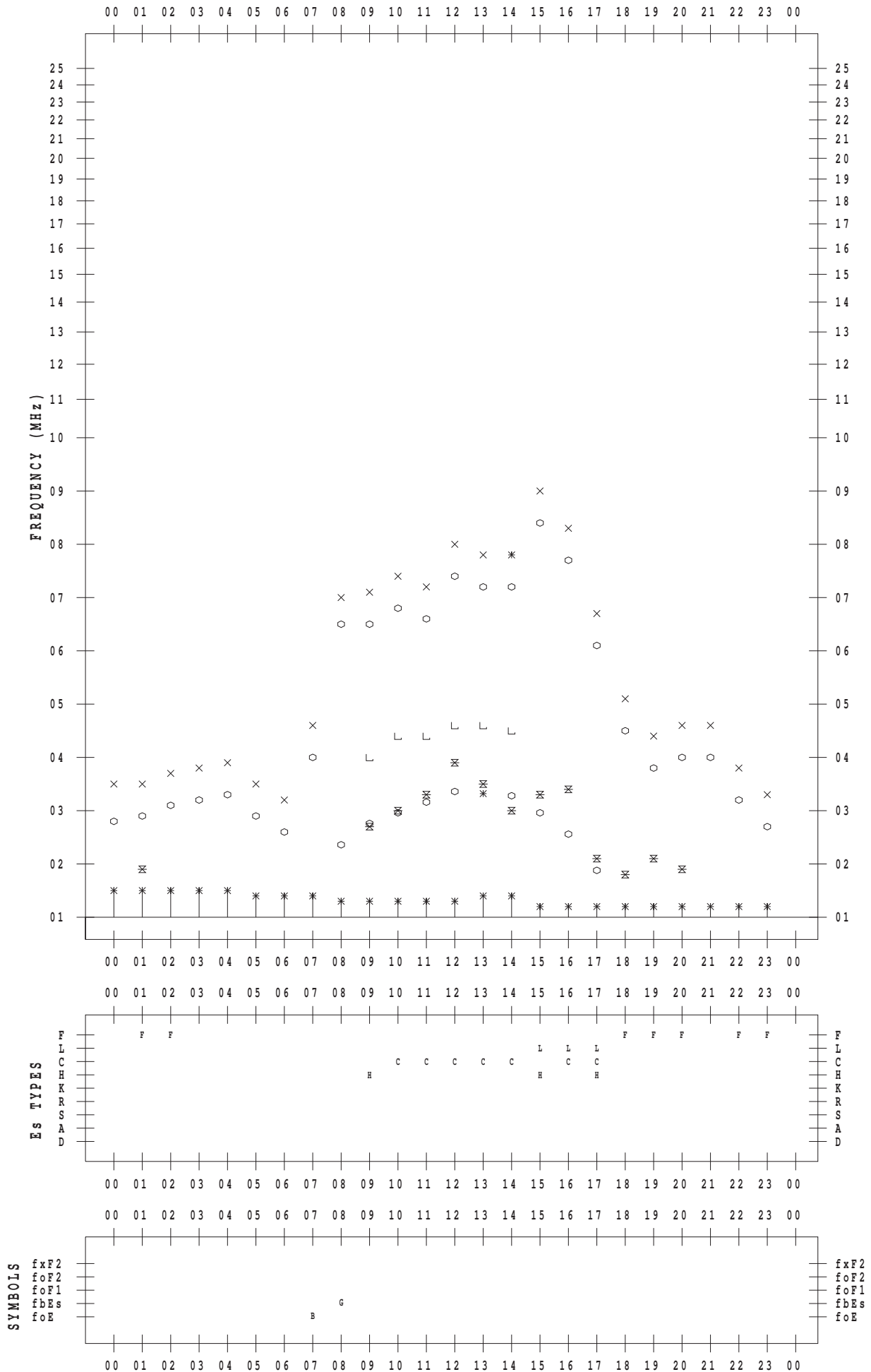
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/29

135 ° E MEAN TIME



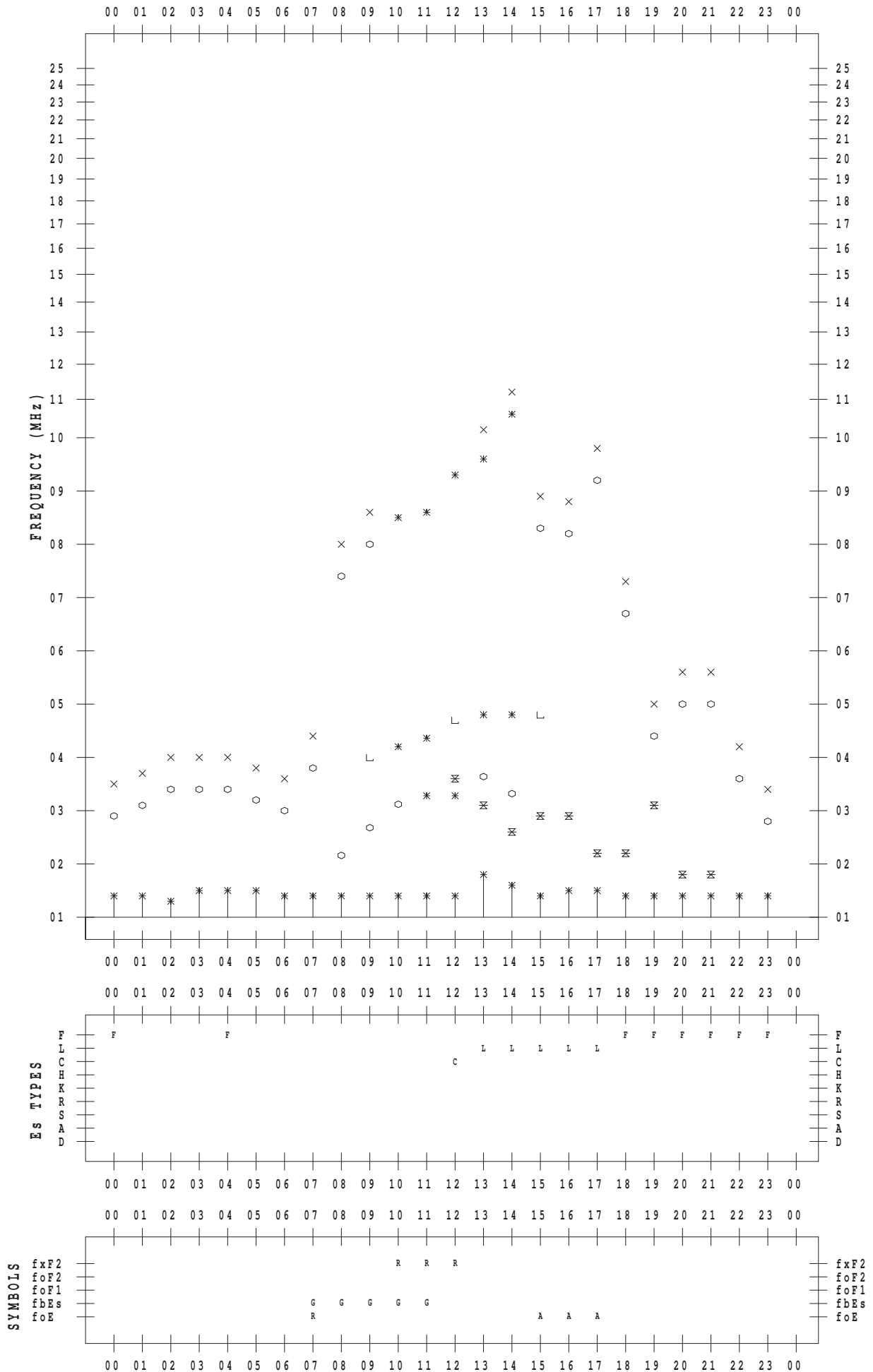
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/30

135 ° E MEAN TIME





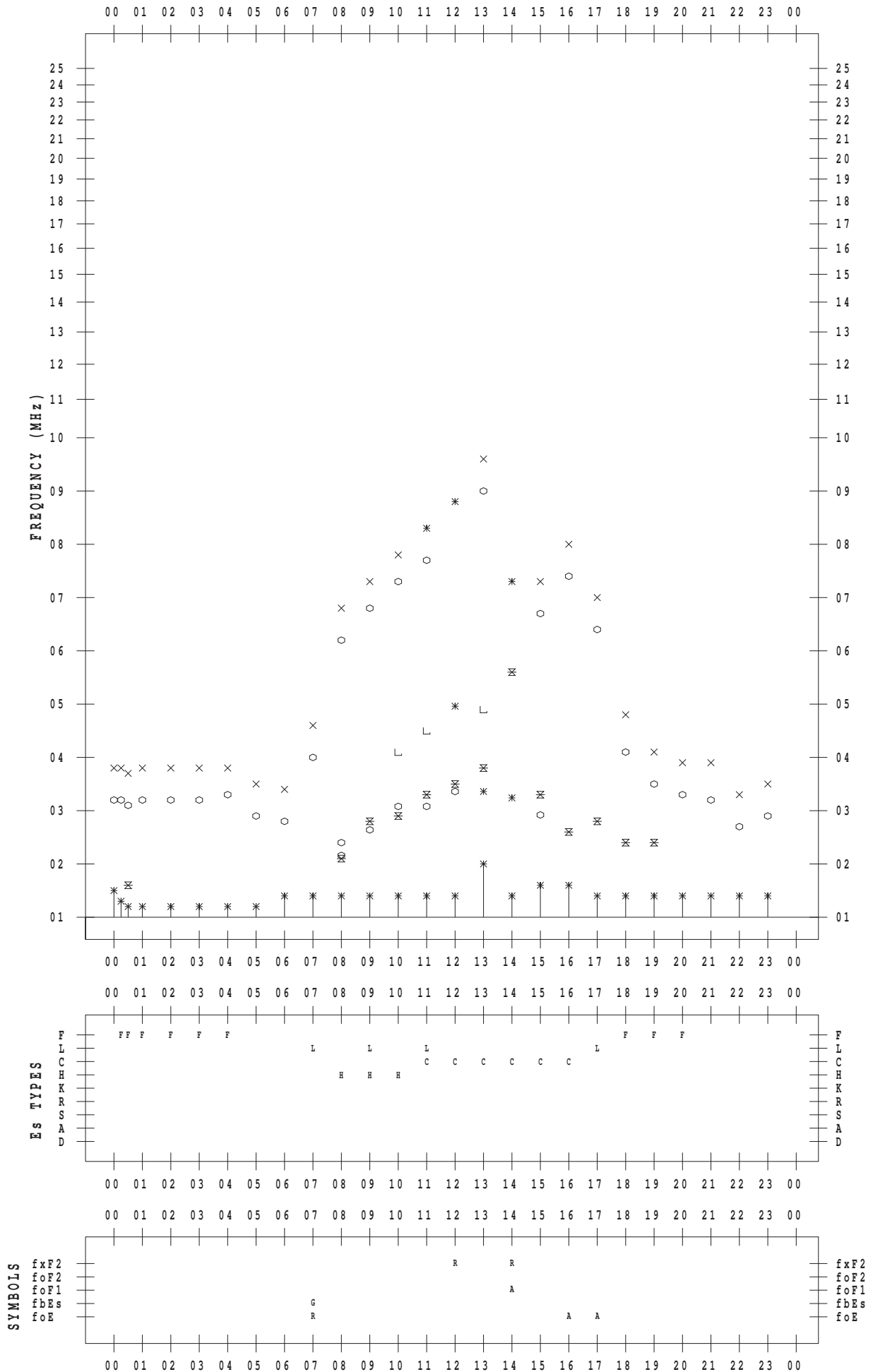
# f-PLOT DATA

SCALER : M.NISHIDA

STATION : Yamagawa

DATE : 2012/12/31

135 ° E MEAN TIME



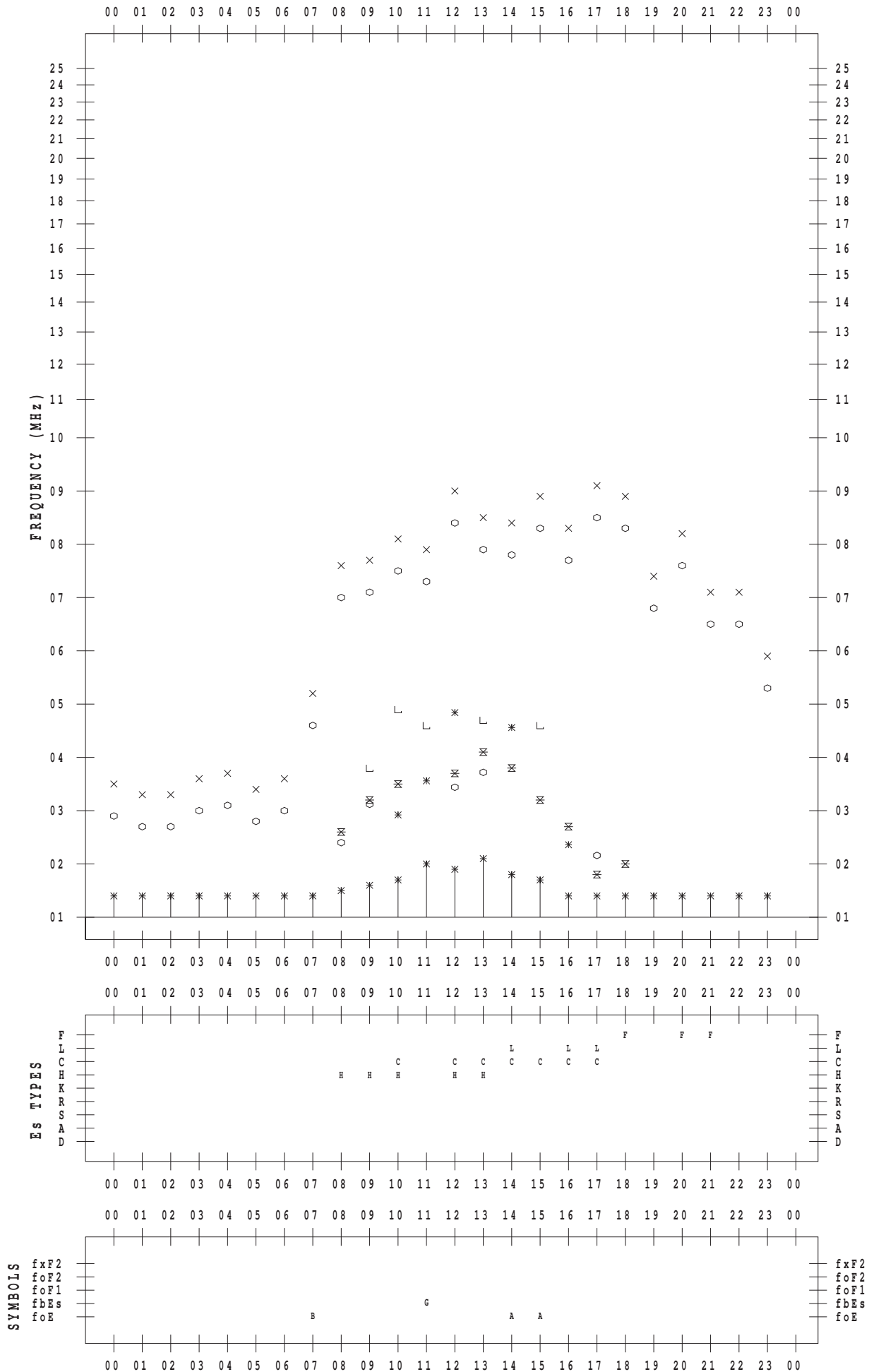
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/ 1

135 ° E MEAN TIME



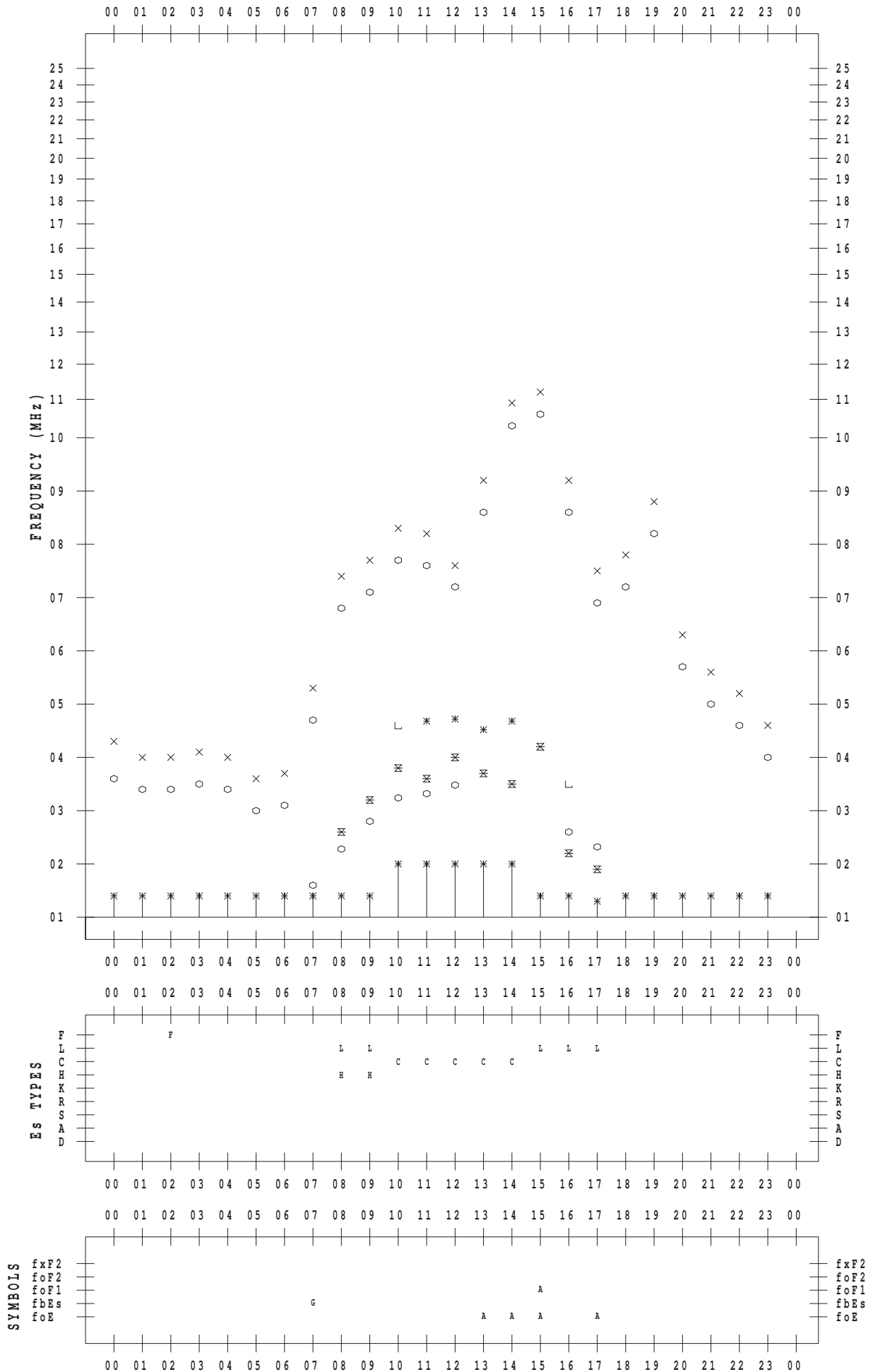
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/ 2

135 ° E MEAN TIME



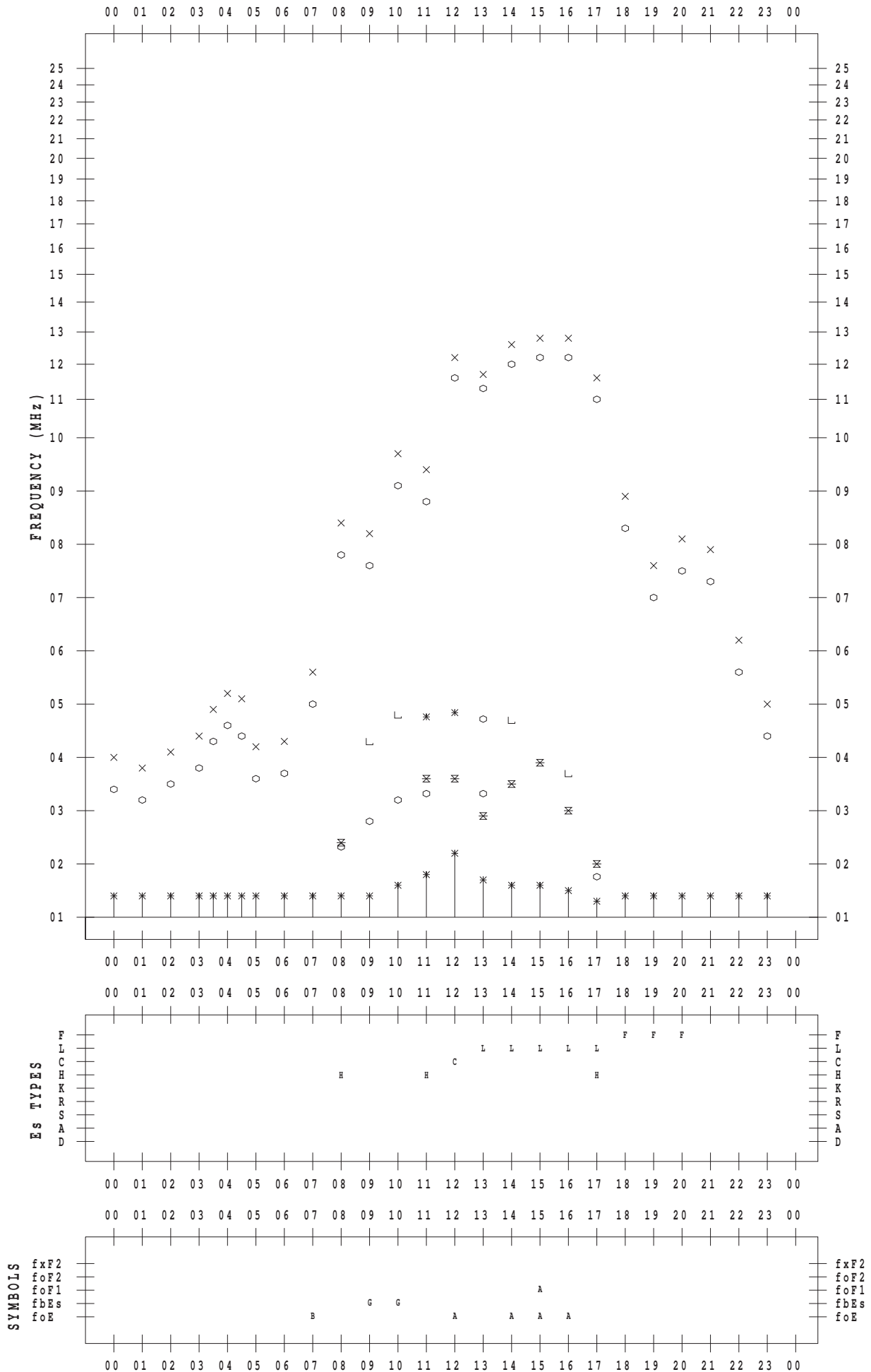
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/ 3

135 ° E MEAN TIME



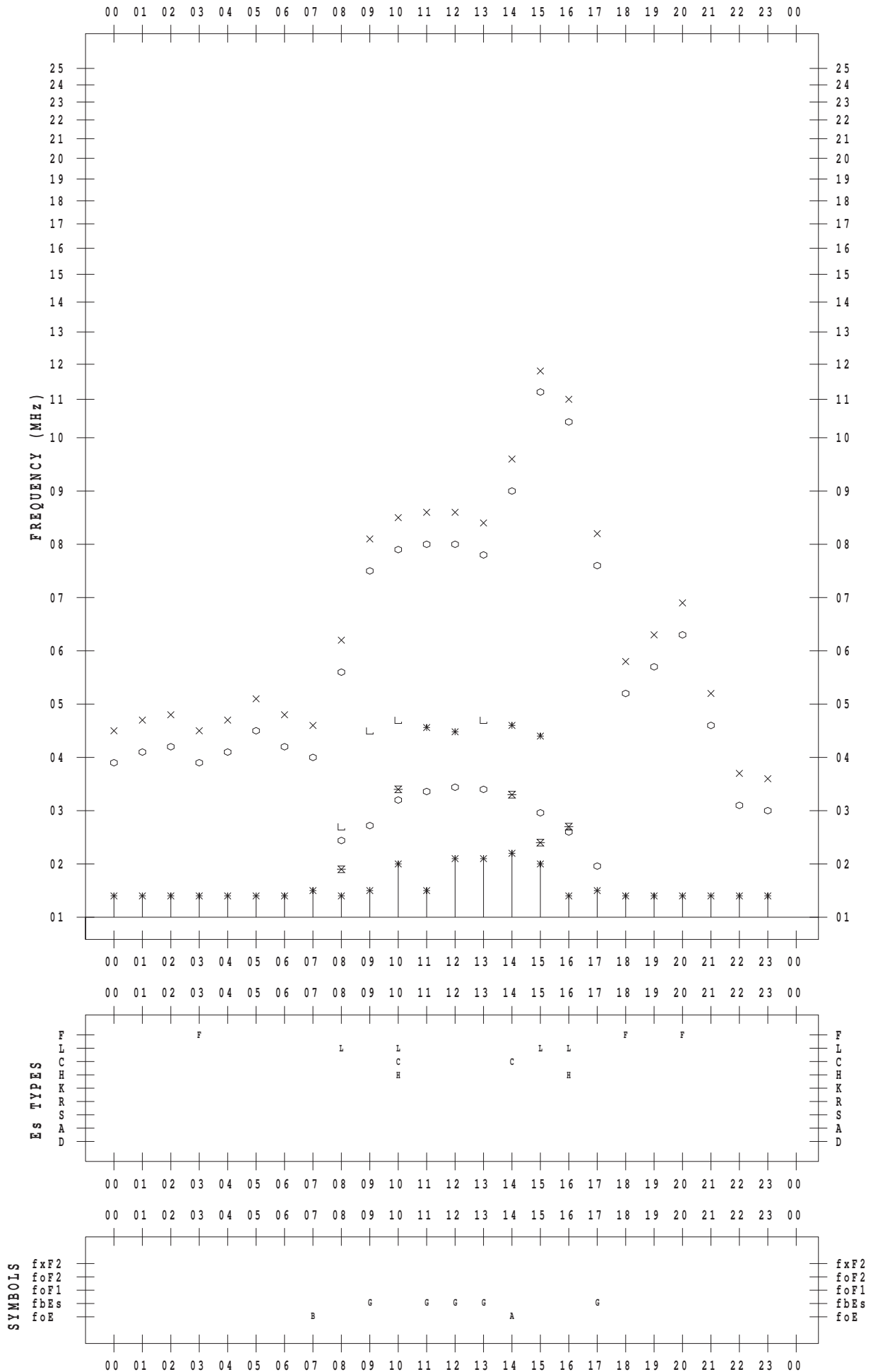
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SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/ 4

135 ° E MEAN TIME



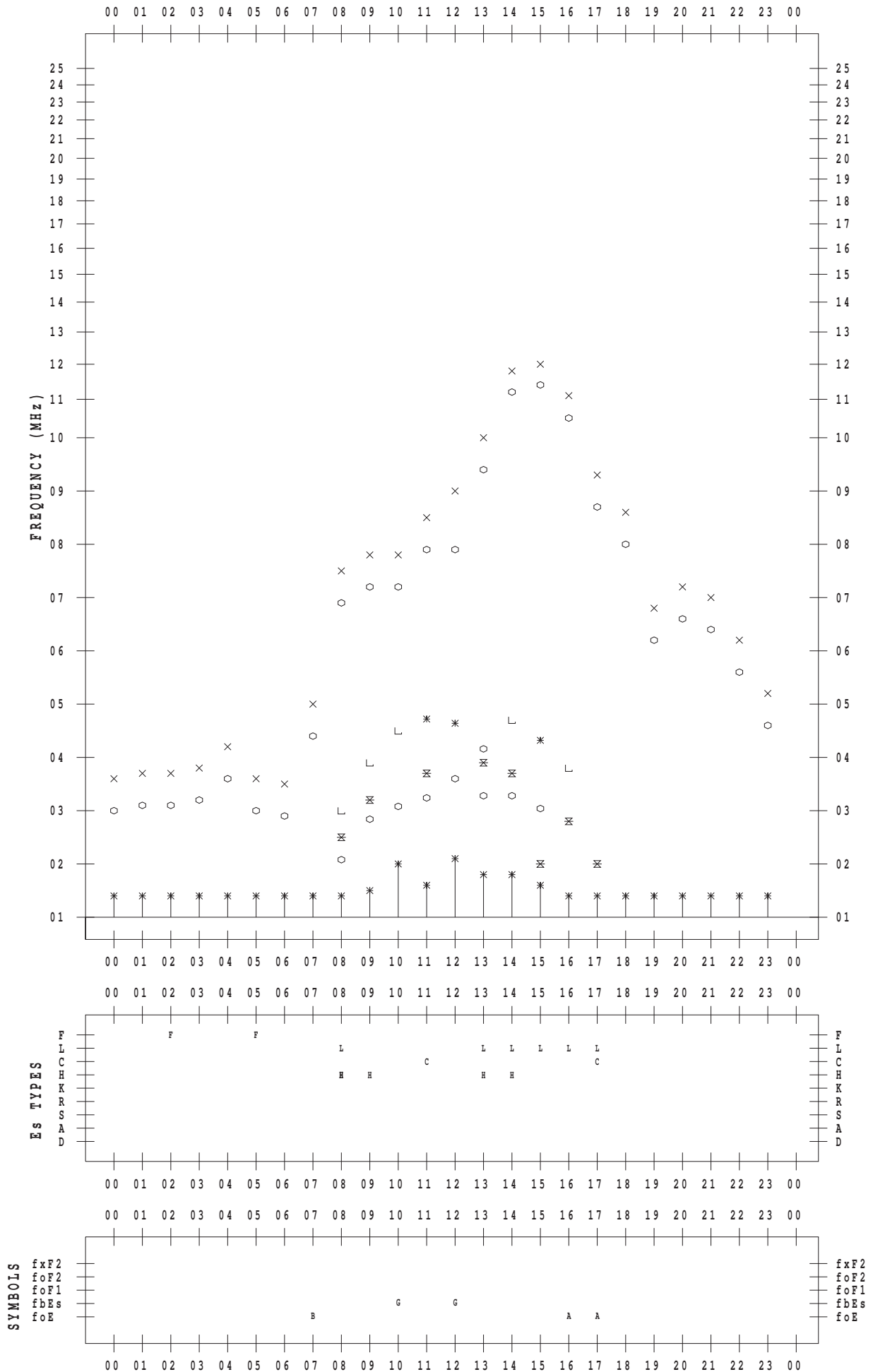
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/ 5

135 ° E MEAN TIME



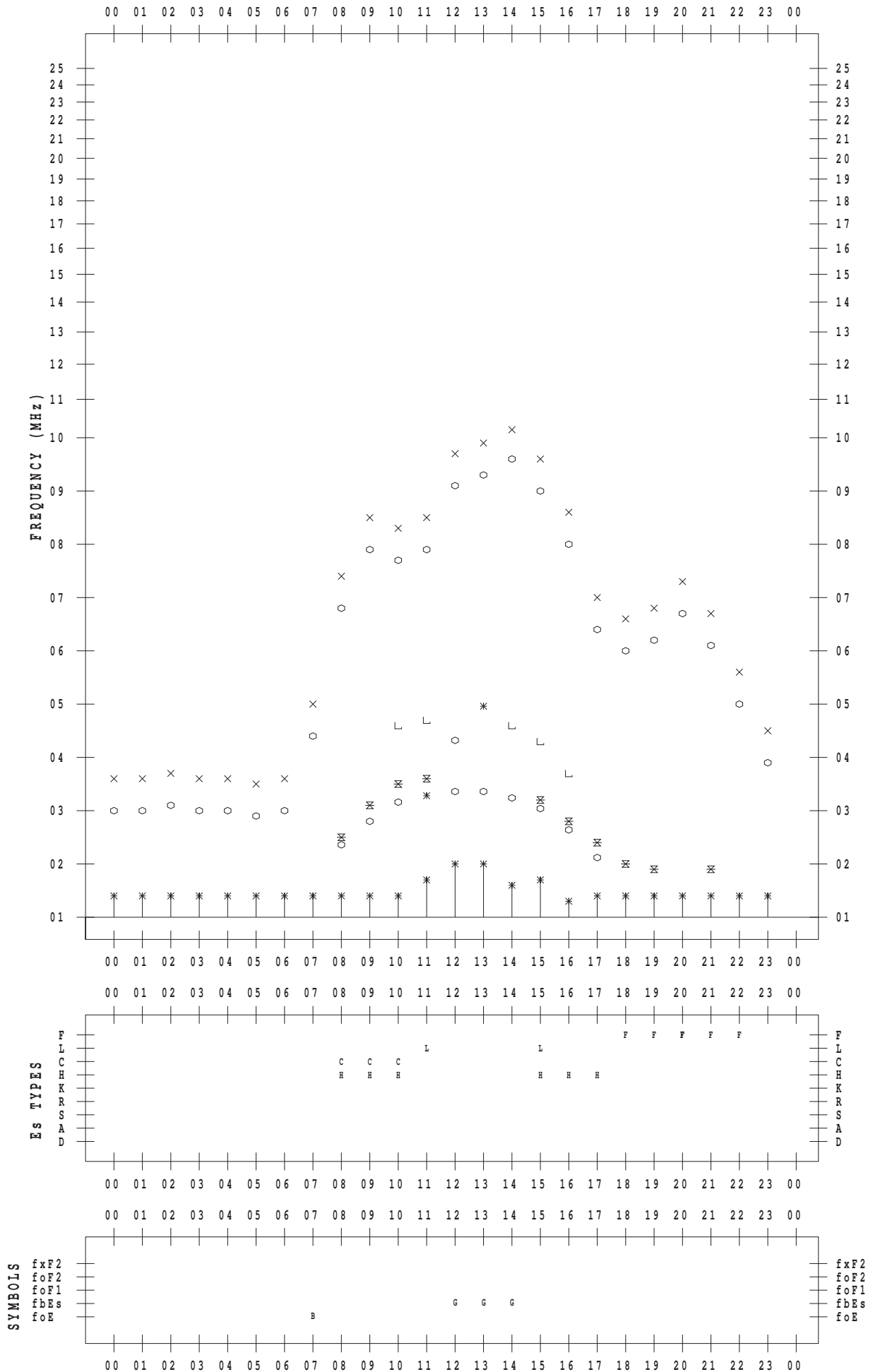
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/ 6

135 ° E MEAN TIME



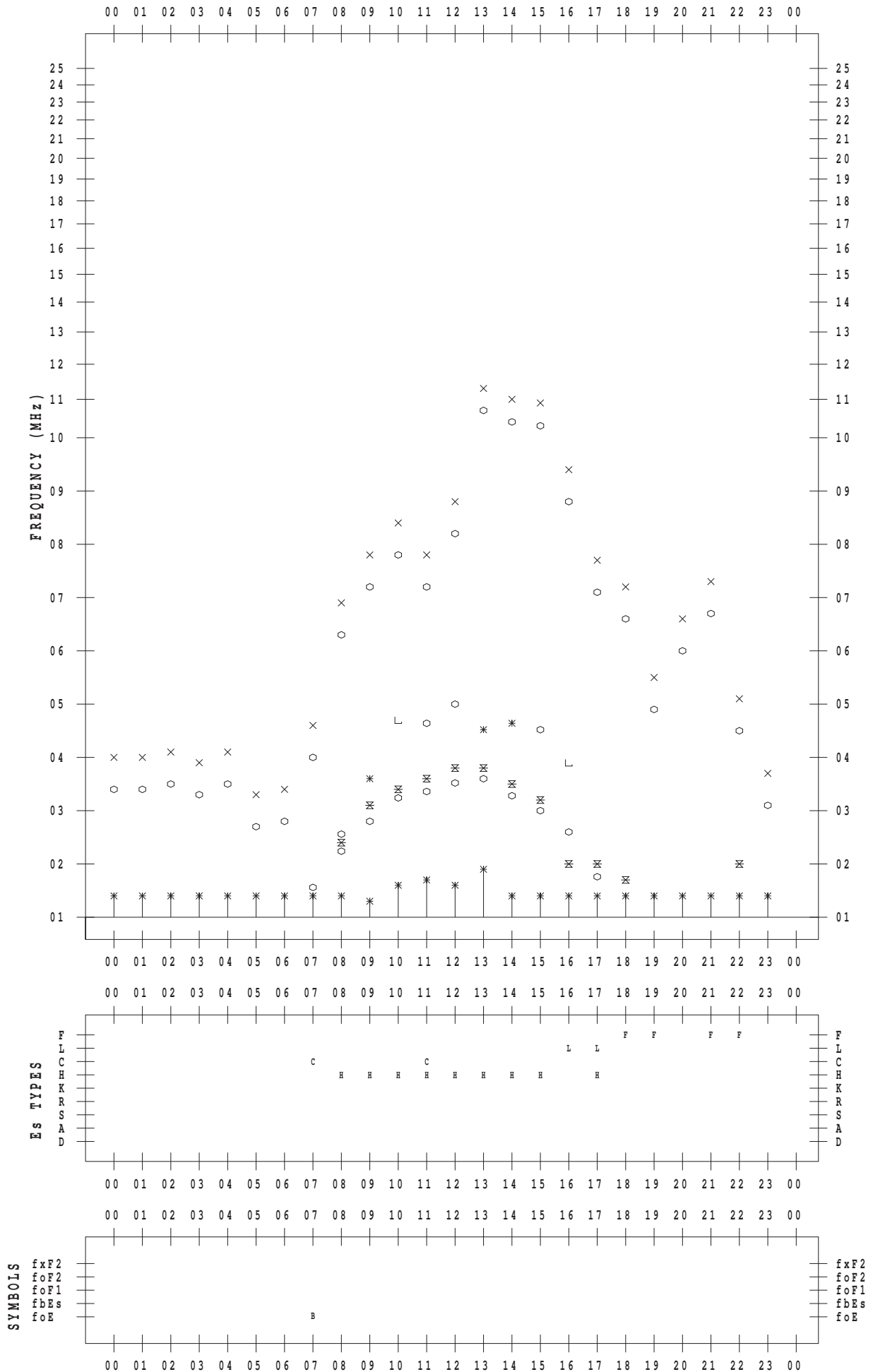
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SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/7

135 ° E MEAN TIME





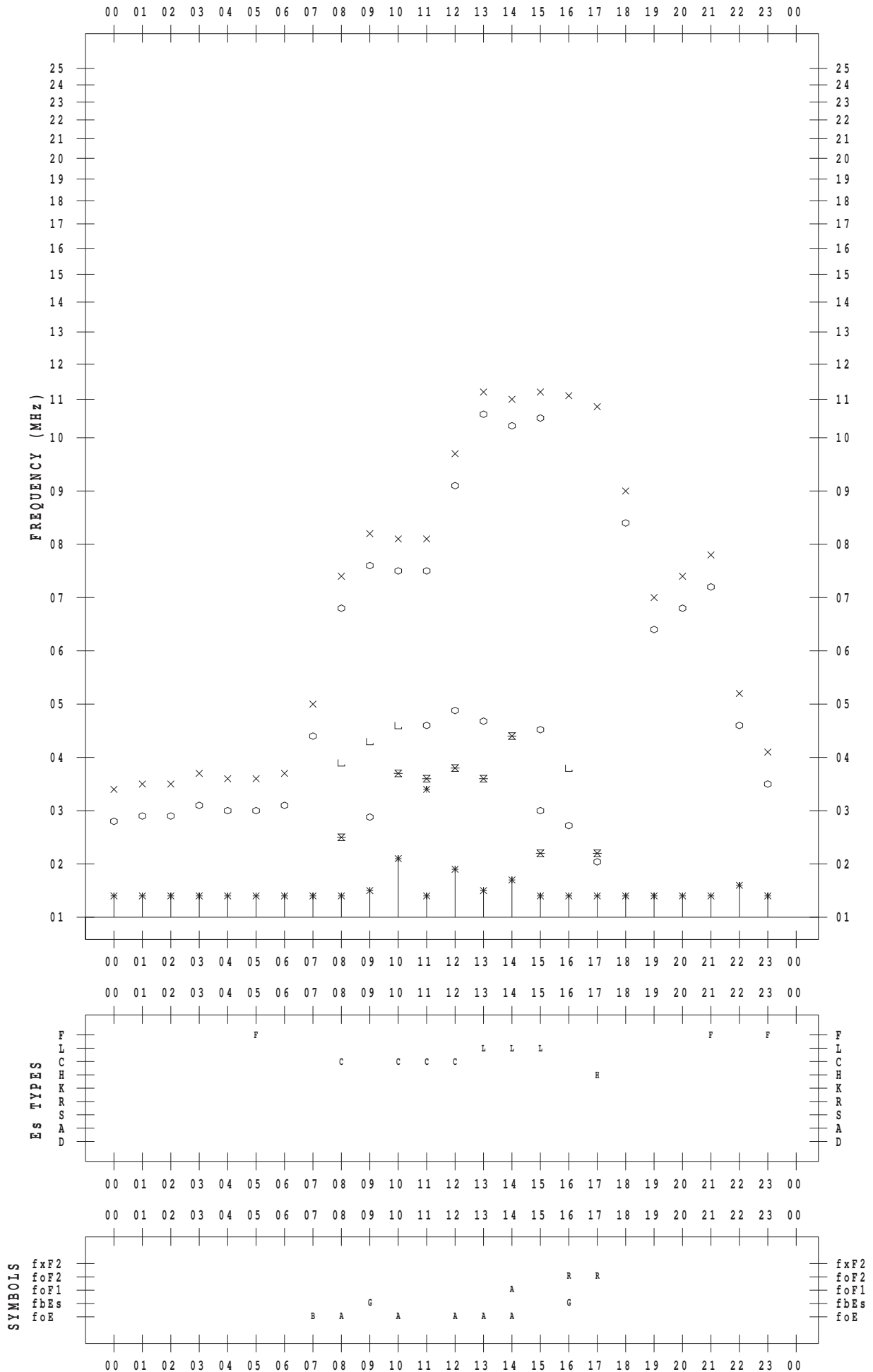
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/ 8

135 ° E MEAN TIME



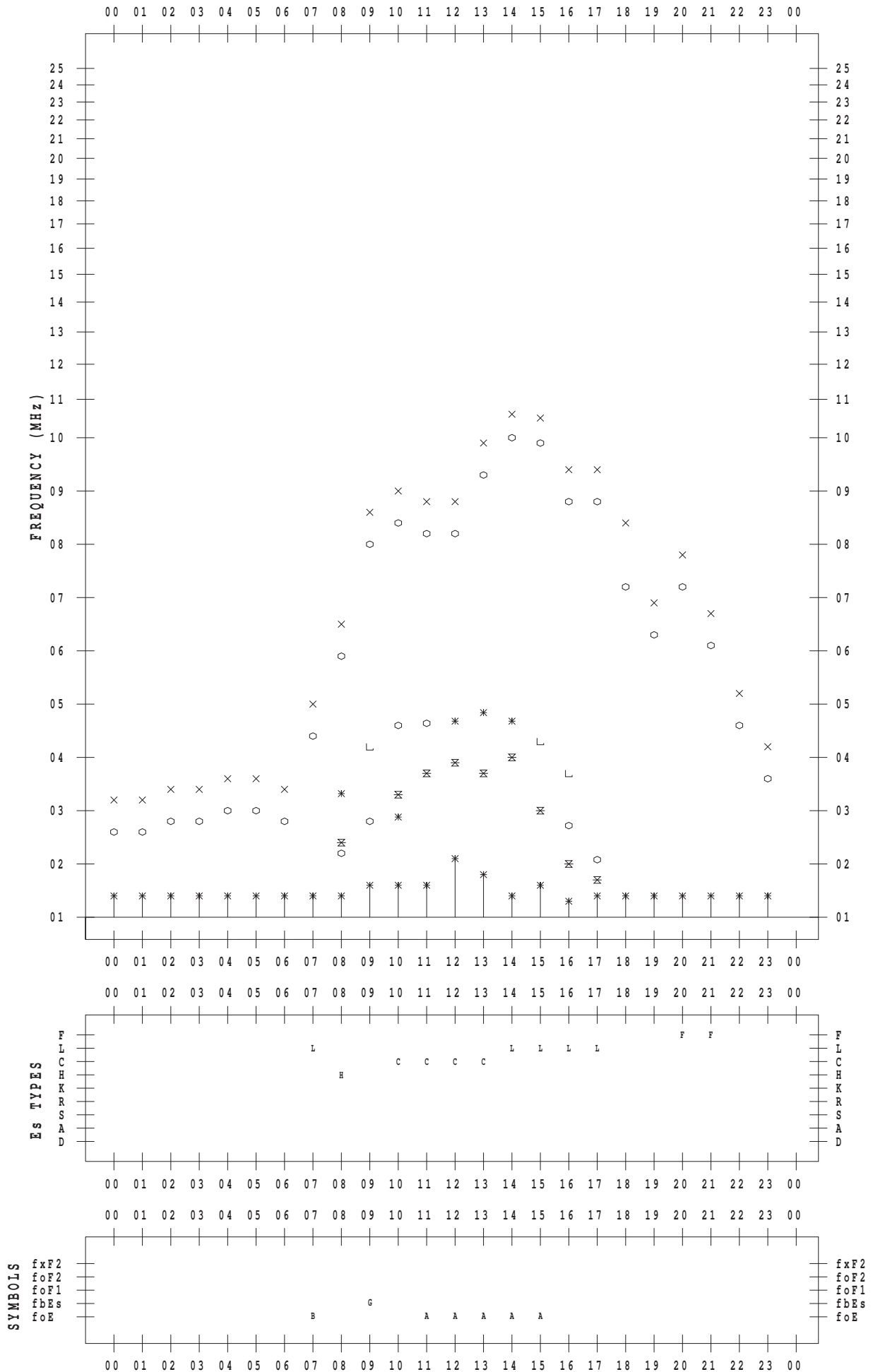
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/9

135 ° E MEAN TIME



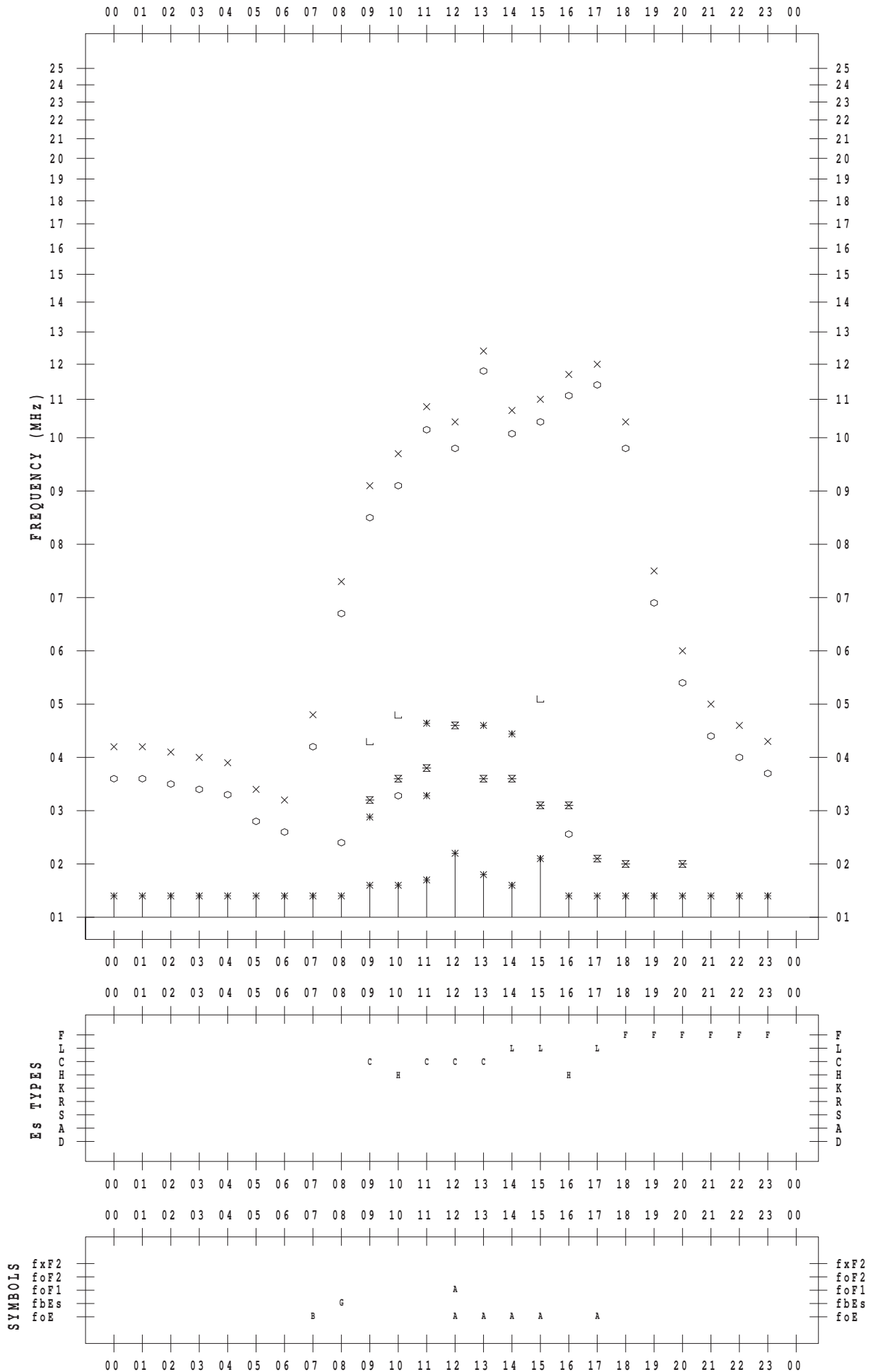
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/10

135 ° E MEAN TIME



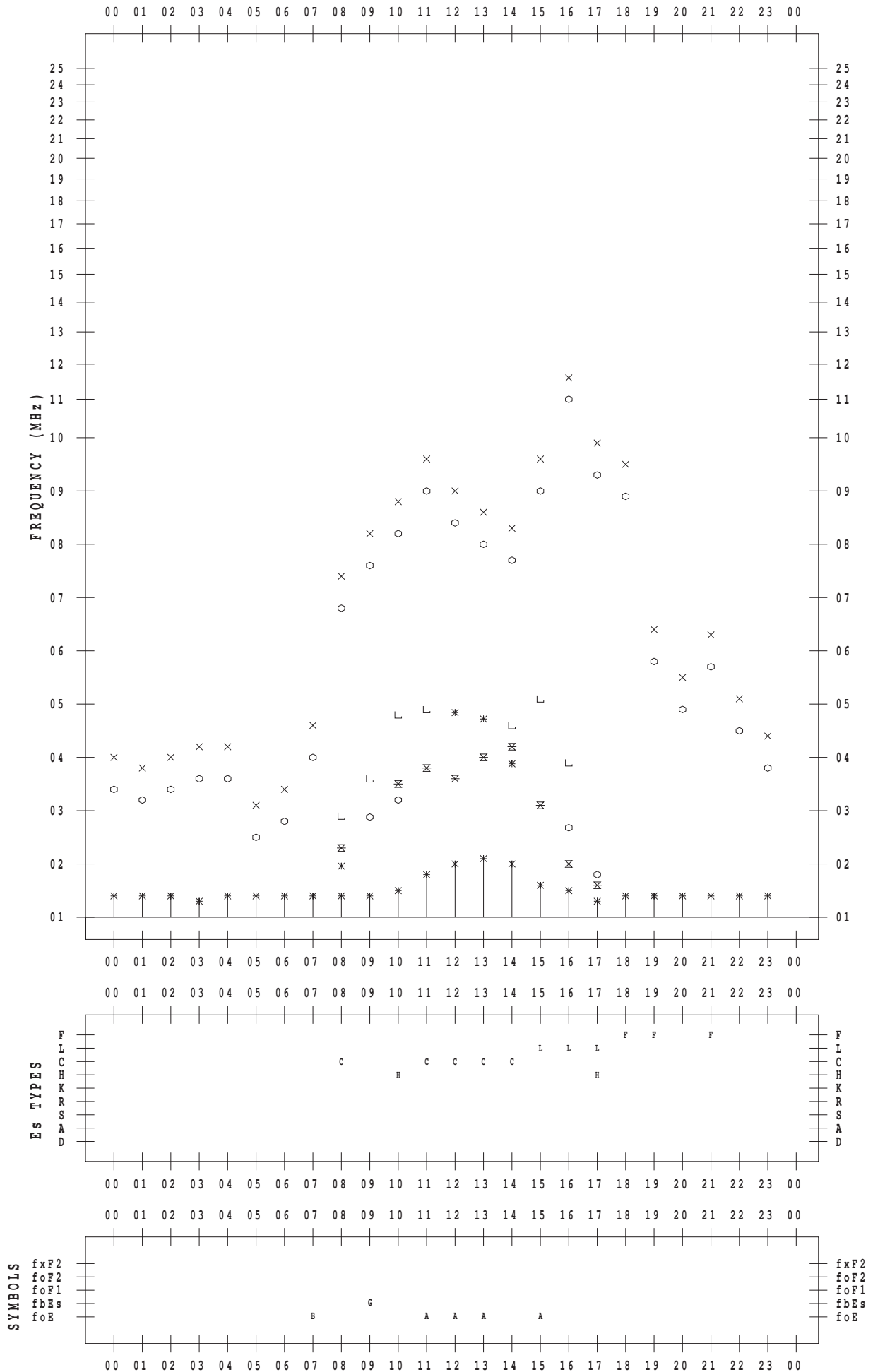
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/11

135 ° E MEAN TIME



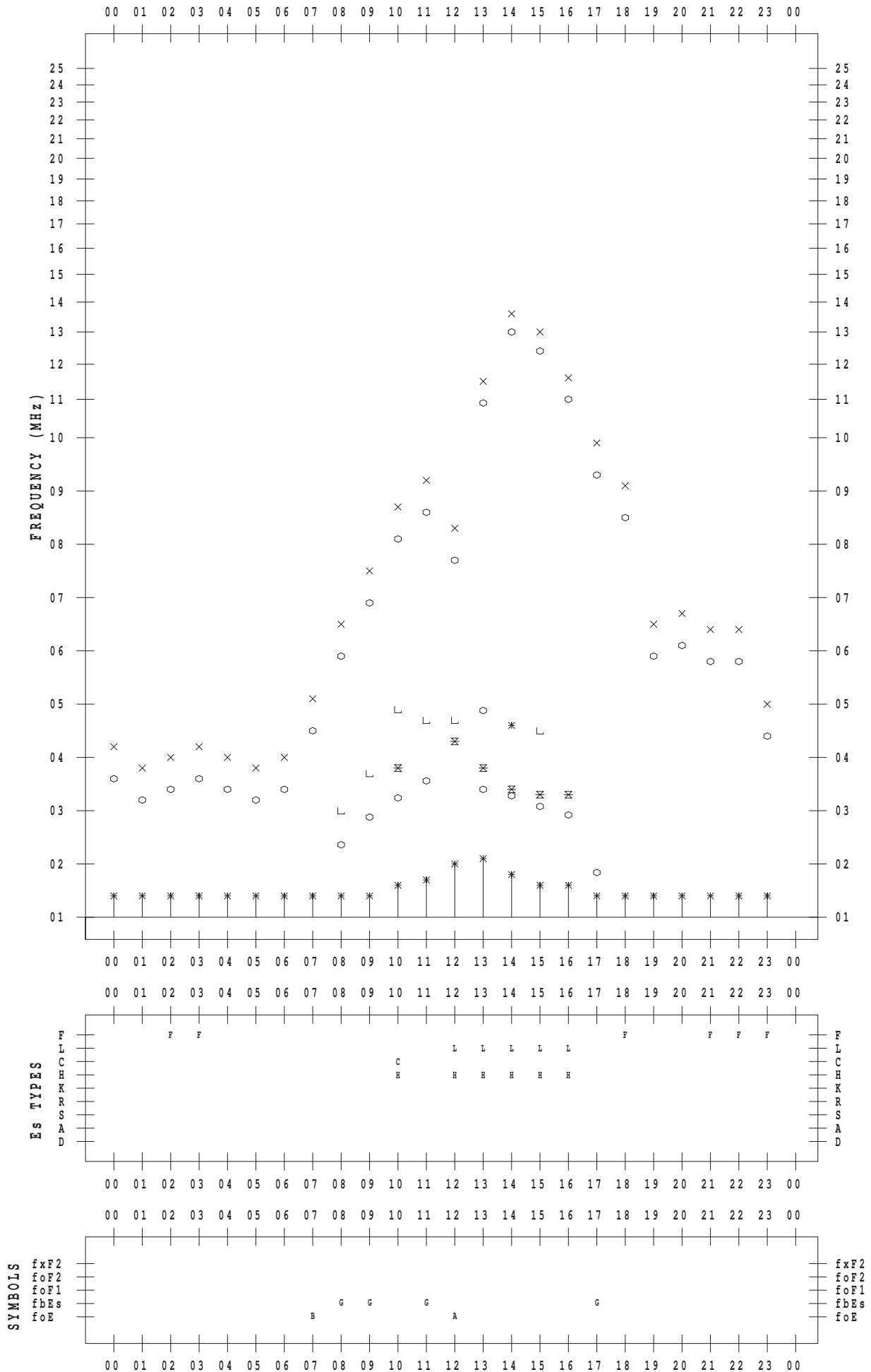
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/12

135 ° E MEAN TIME



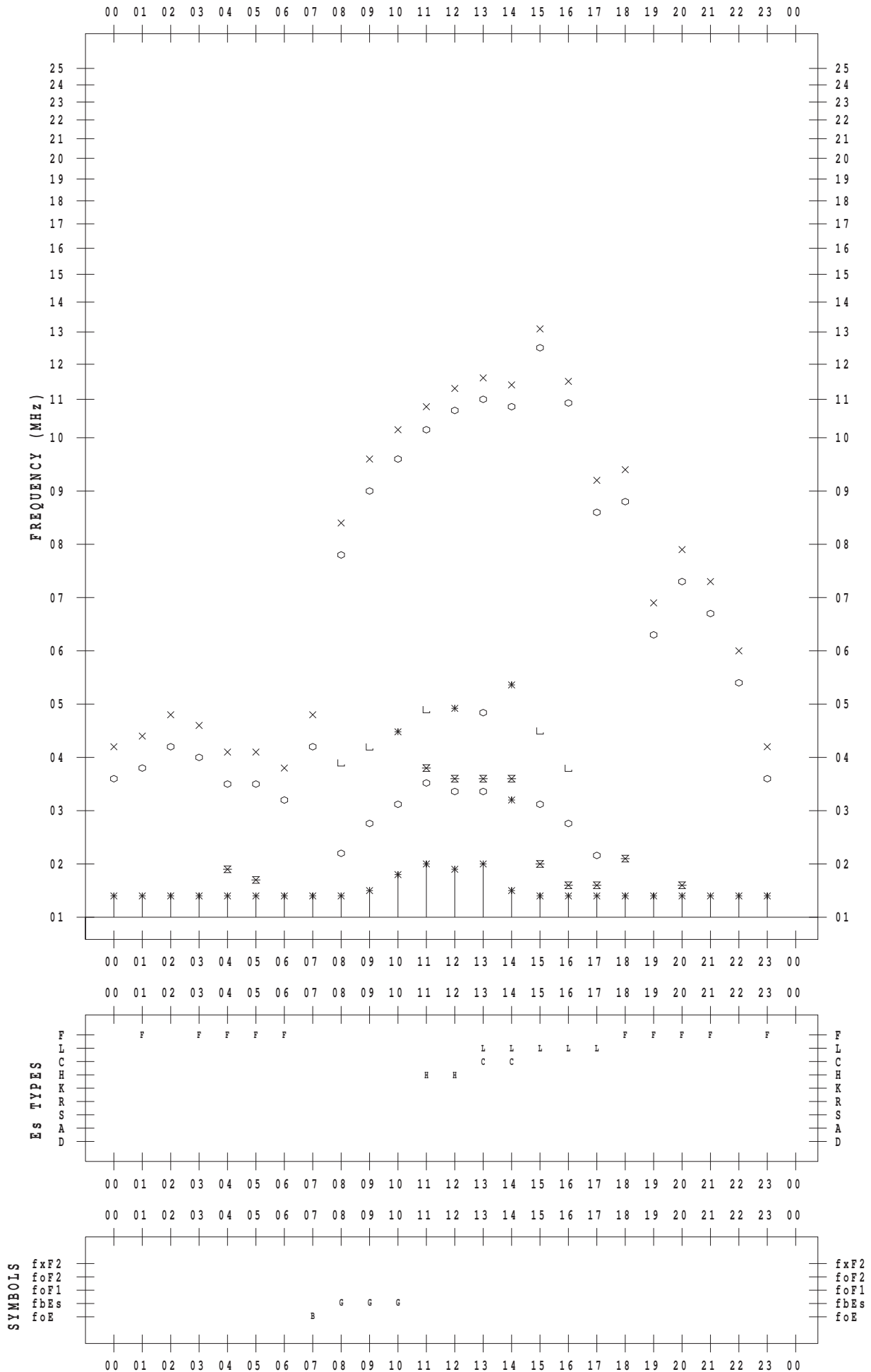
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/13

135 ° E MEAN TIME



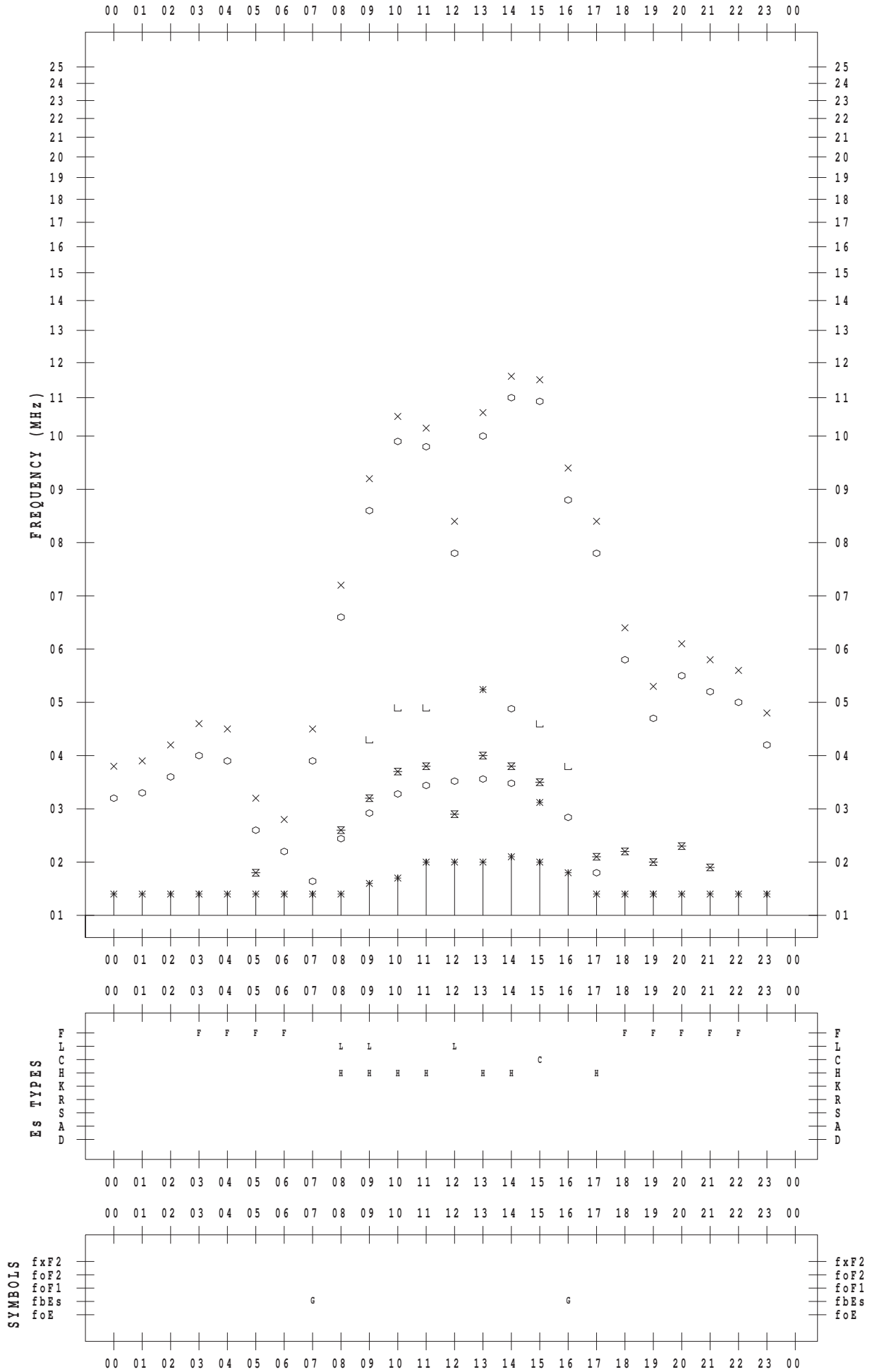
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/14

135 ° E MEAN TIME



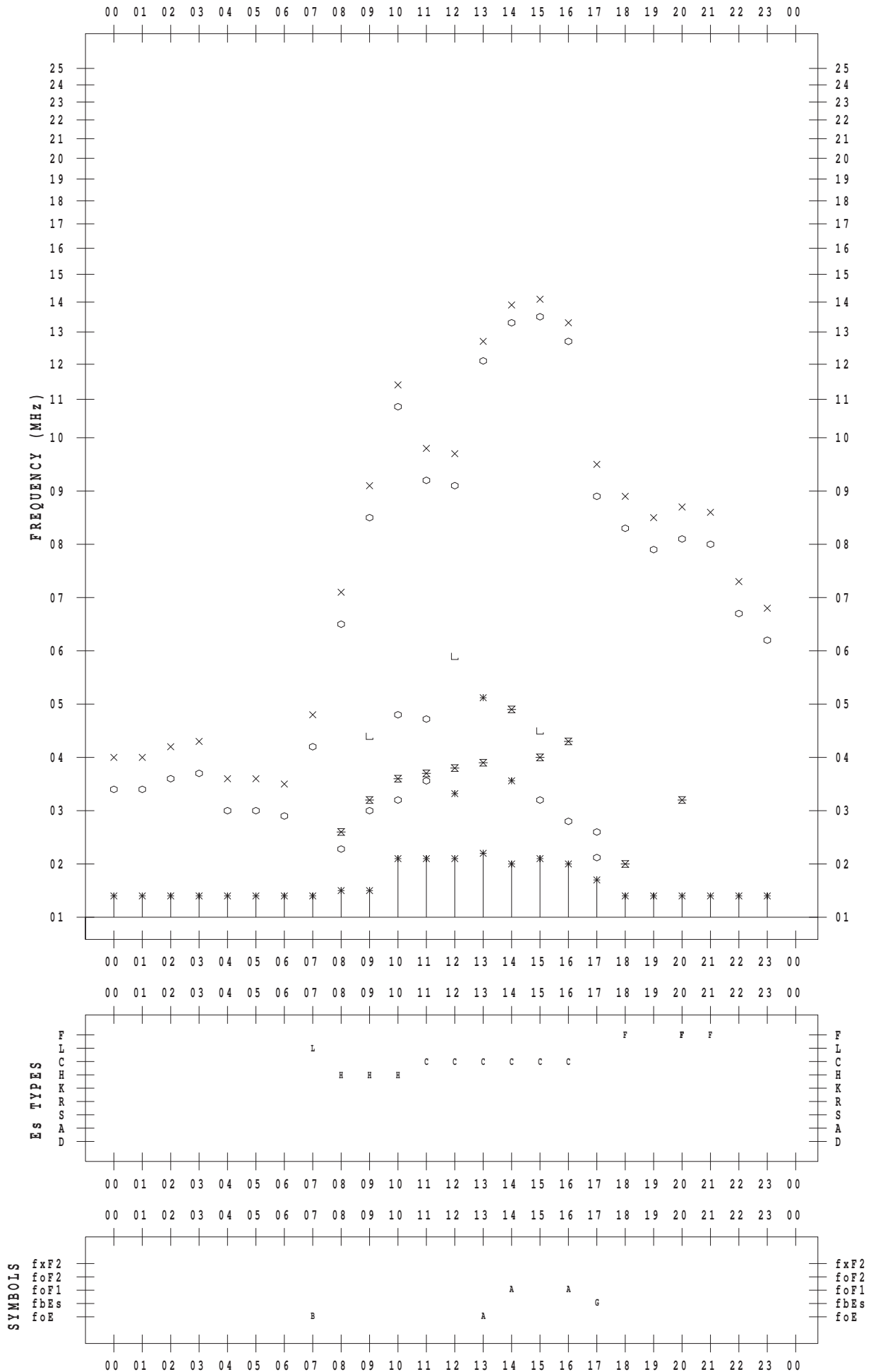
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/15

135 ° E MEAN TIME





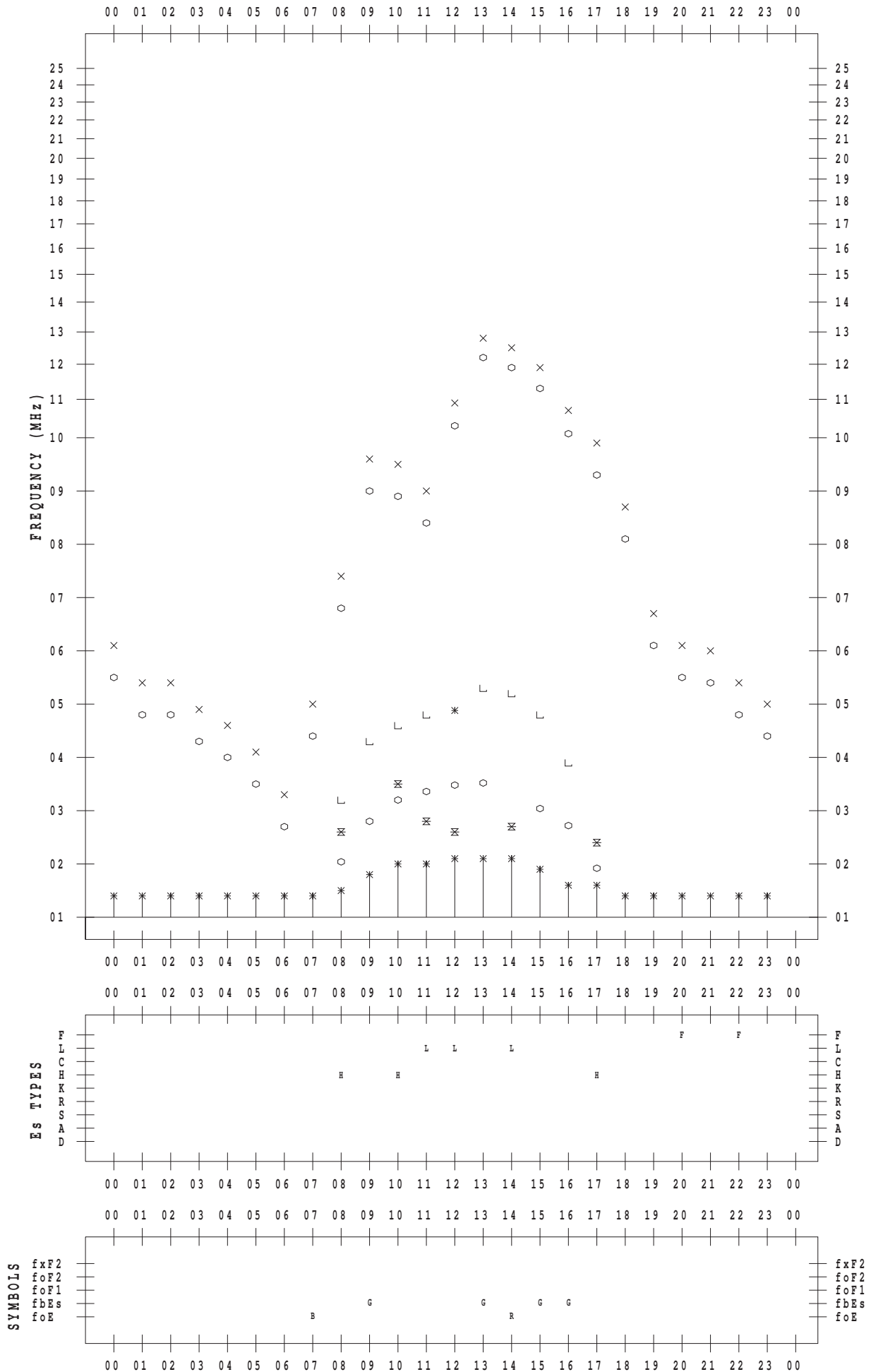
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/16

135 ° E MEAN TIME



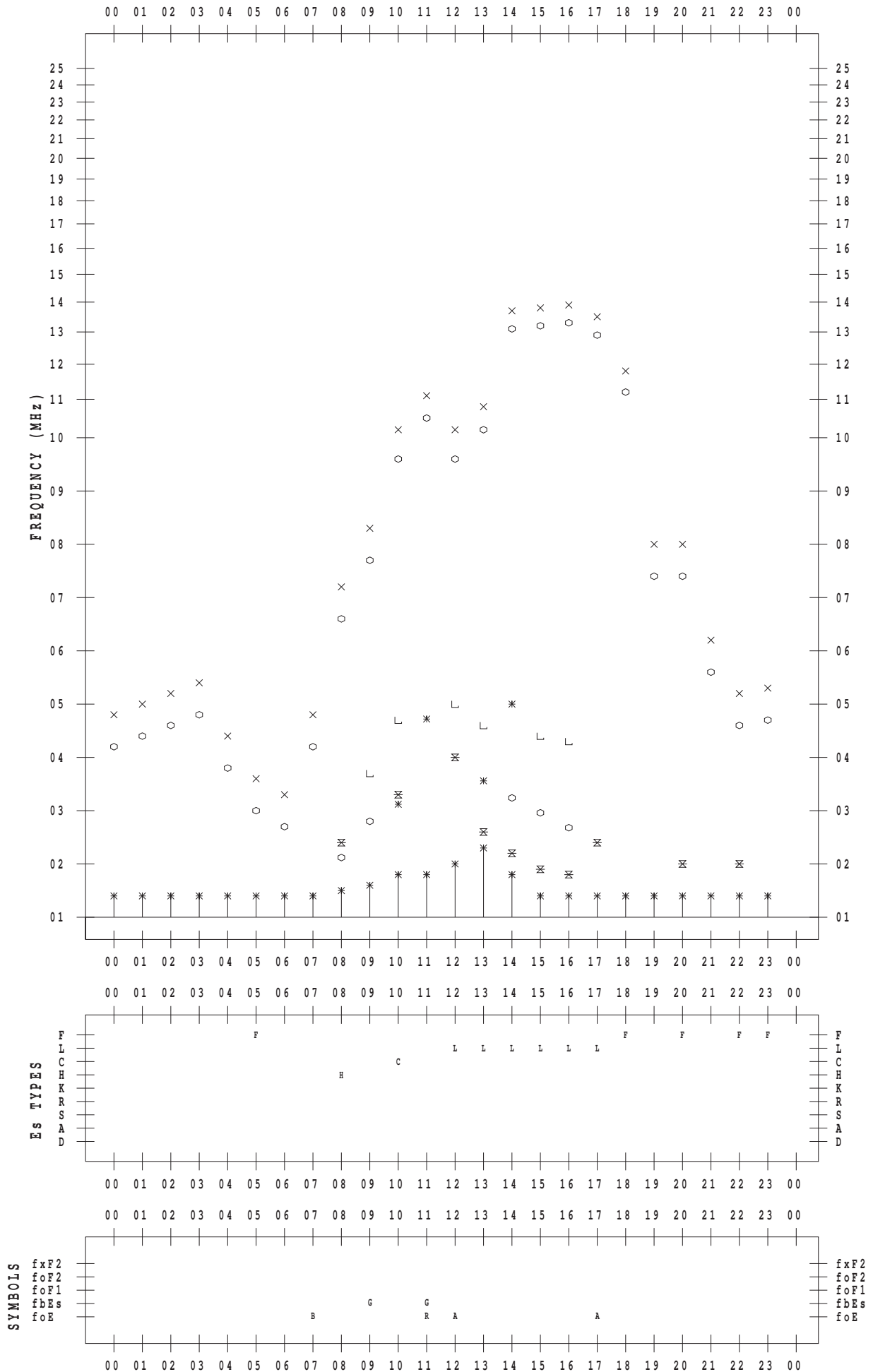
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/17

135 ° E MEAN TIME



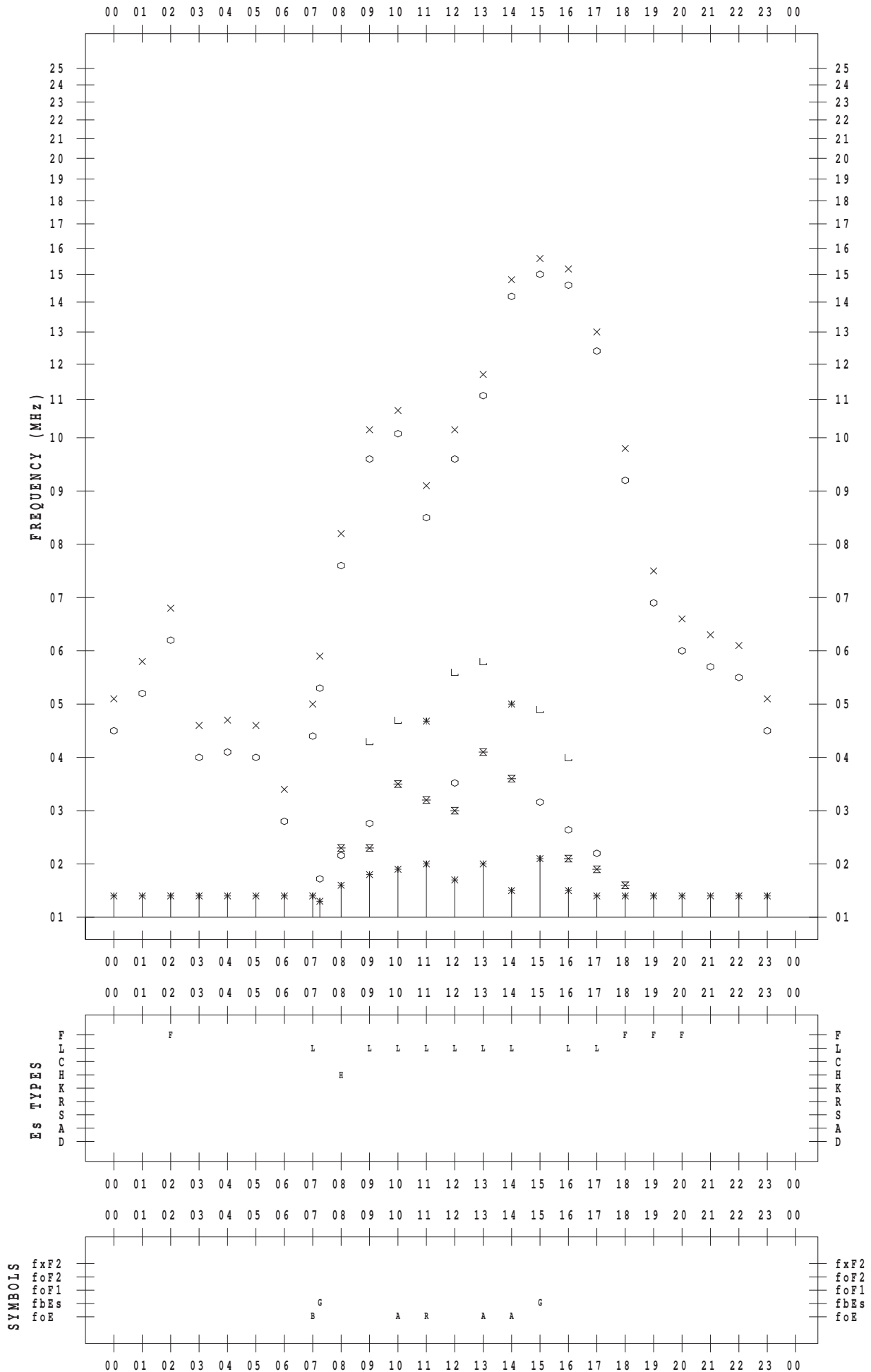
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/18

135 ° E MEAN TIME



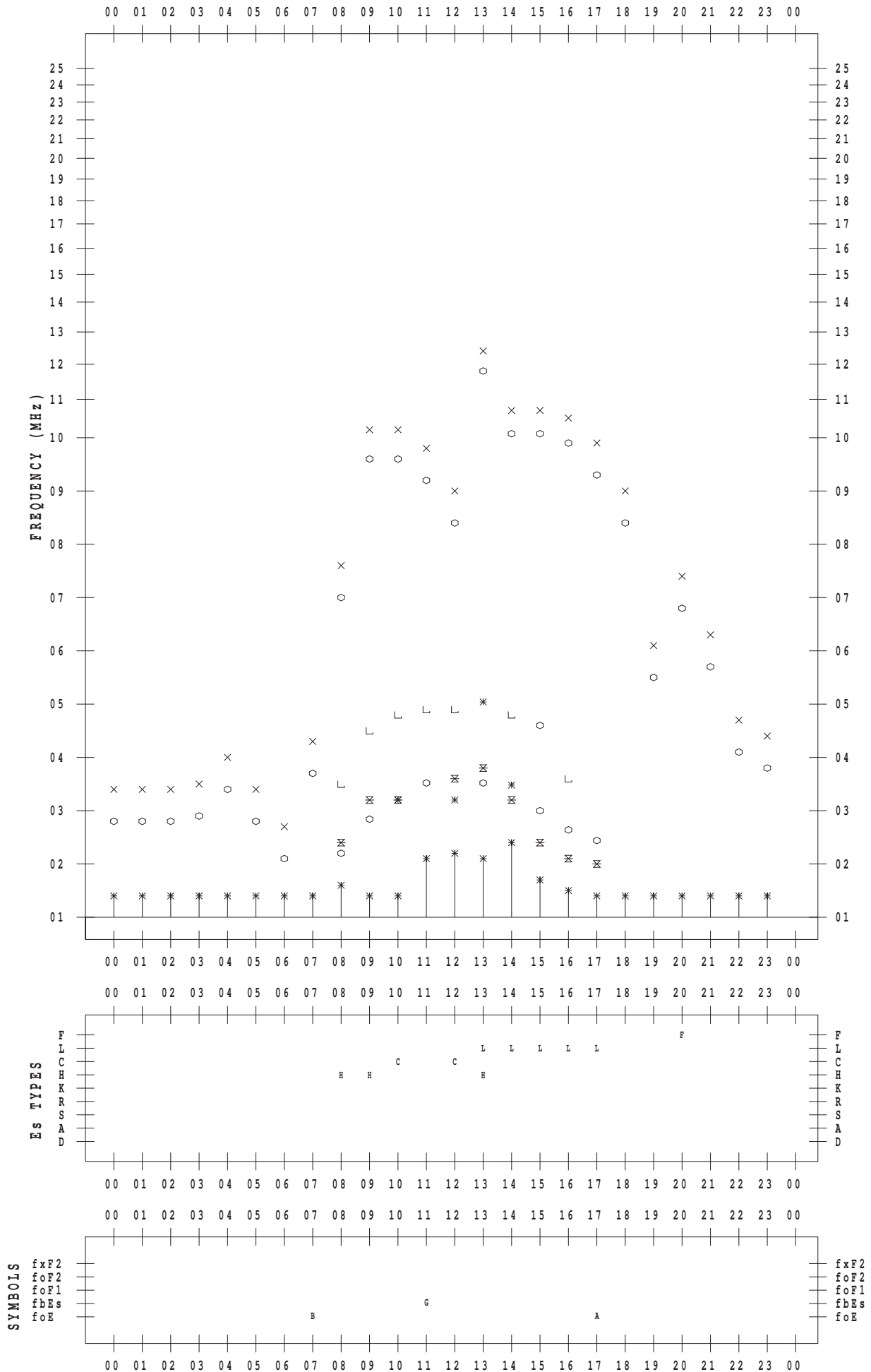
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SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/19

135 ° E MEAN TIME



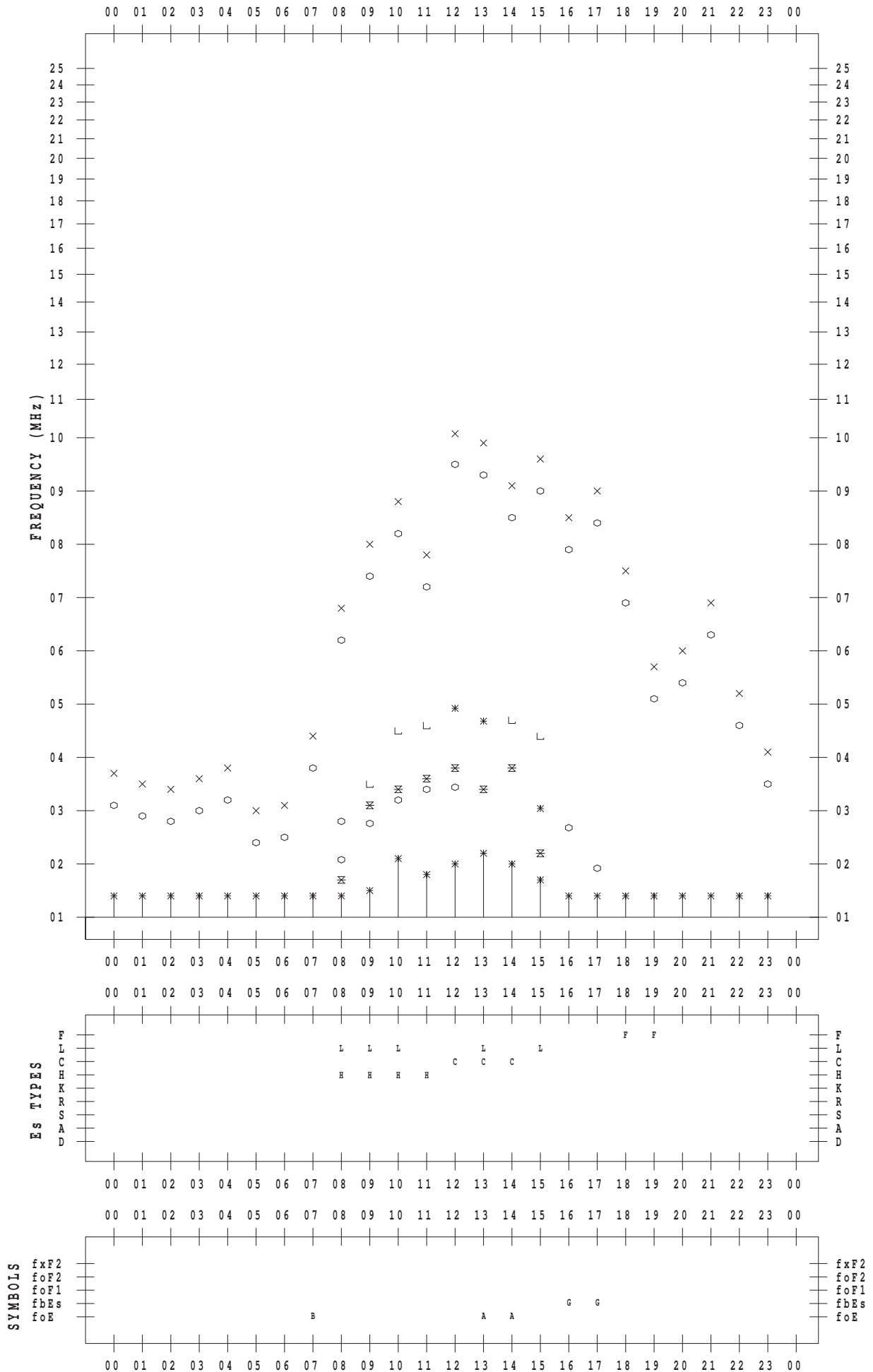
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/20

135 ° E MEAN TIME



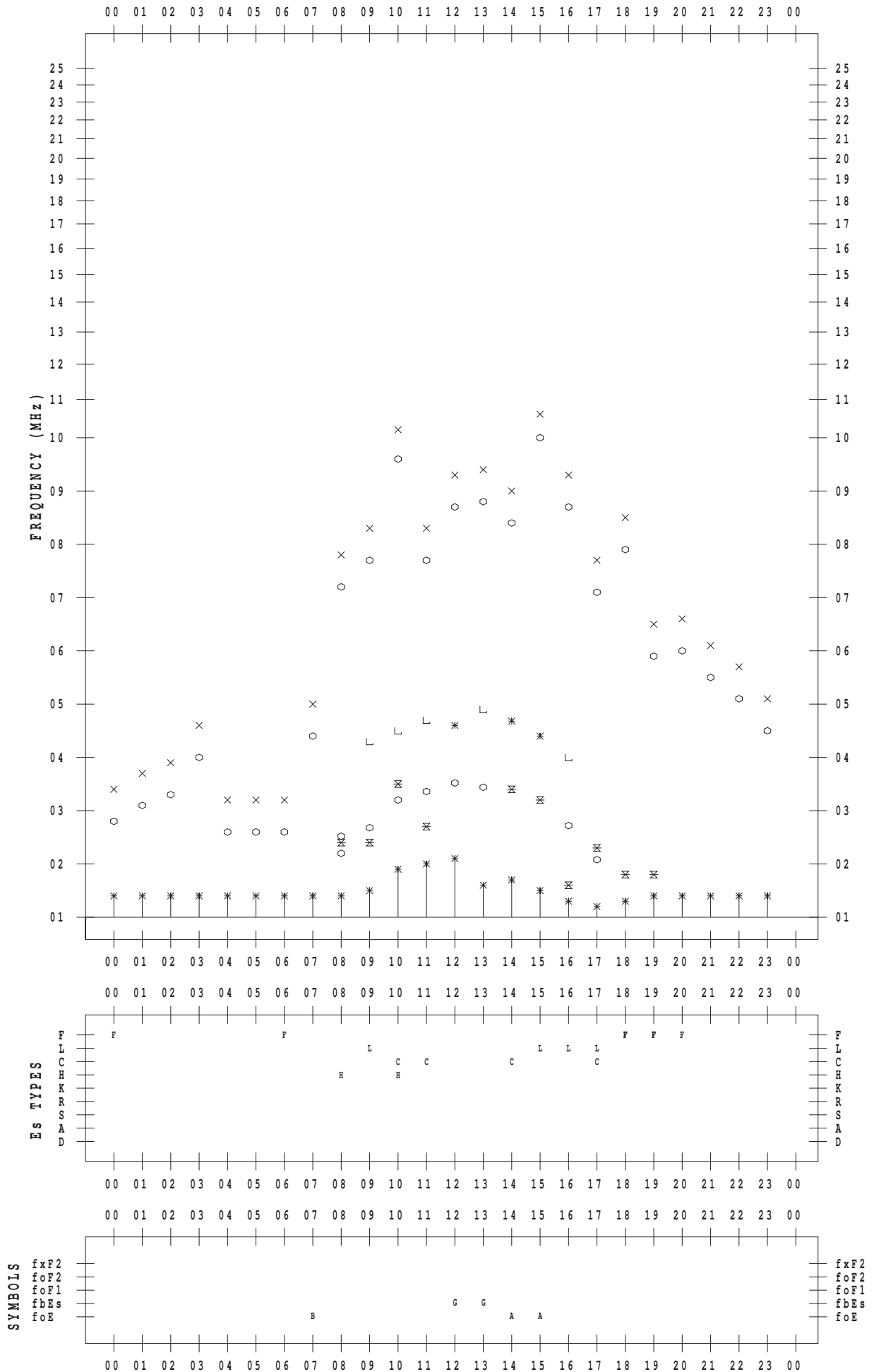
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/21

135 ° E MEAN TIME



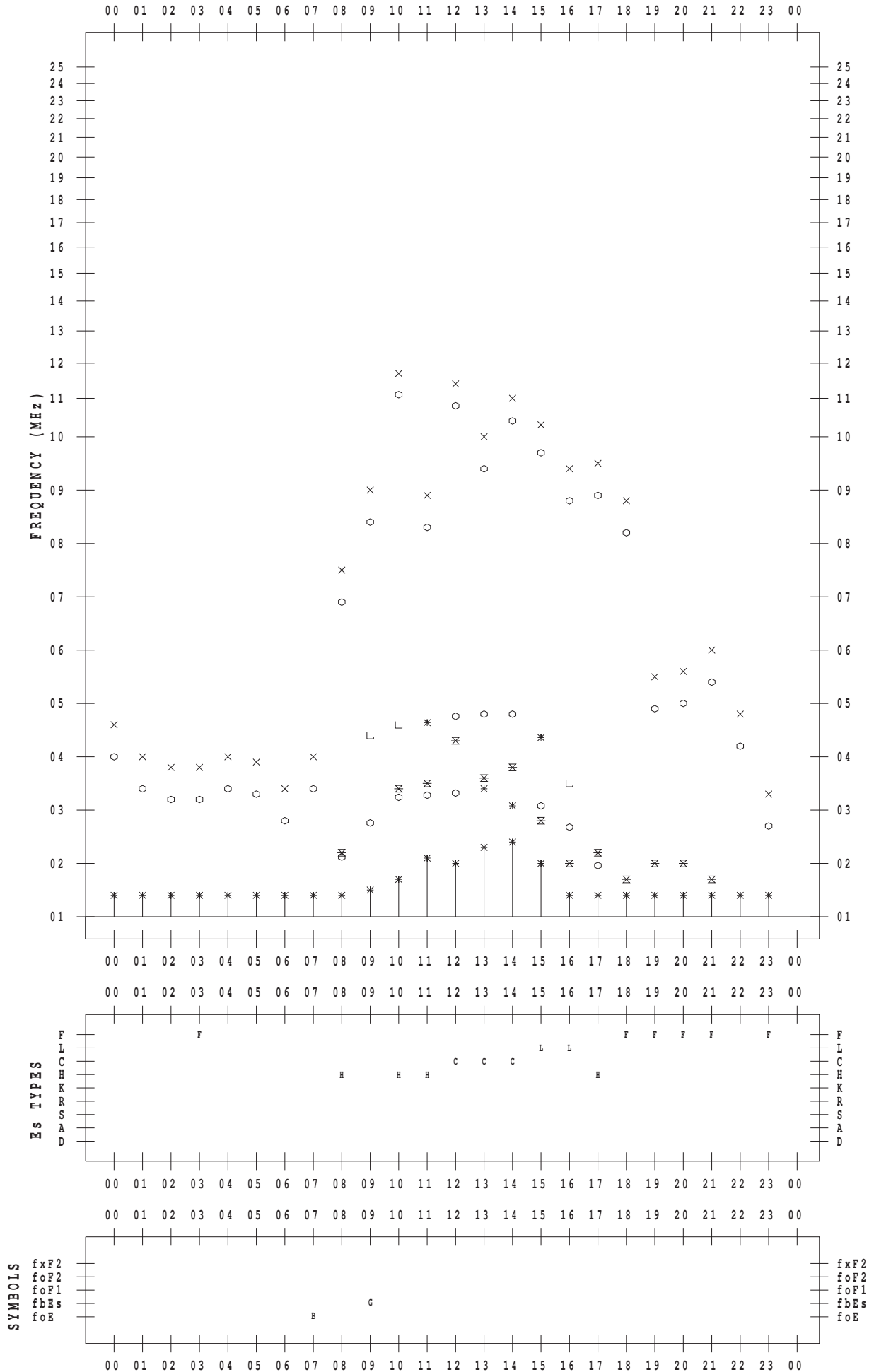
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/22

135 ° E MEAN TIME



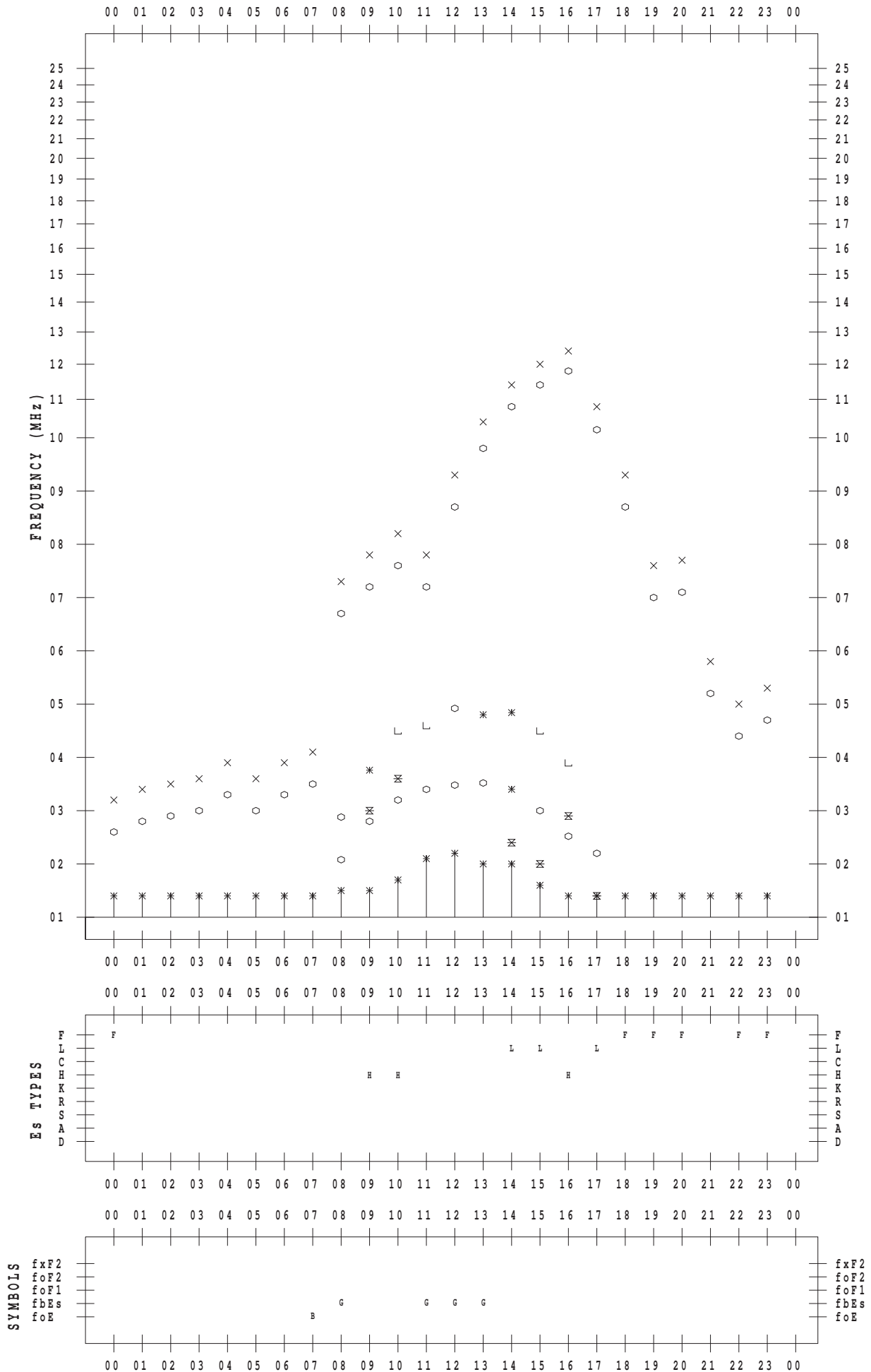
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/23

135 ° E MEAN TIME





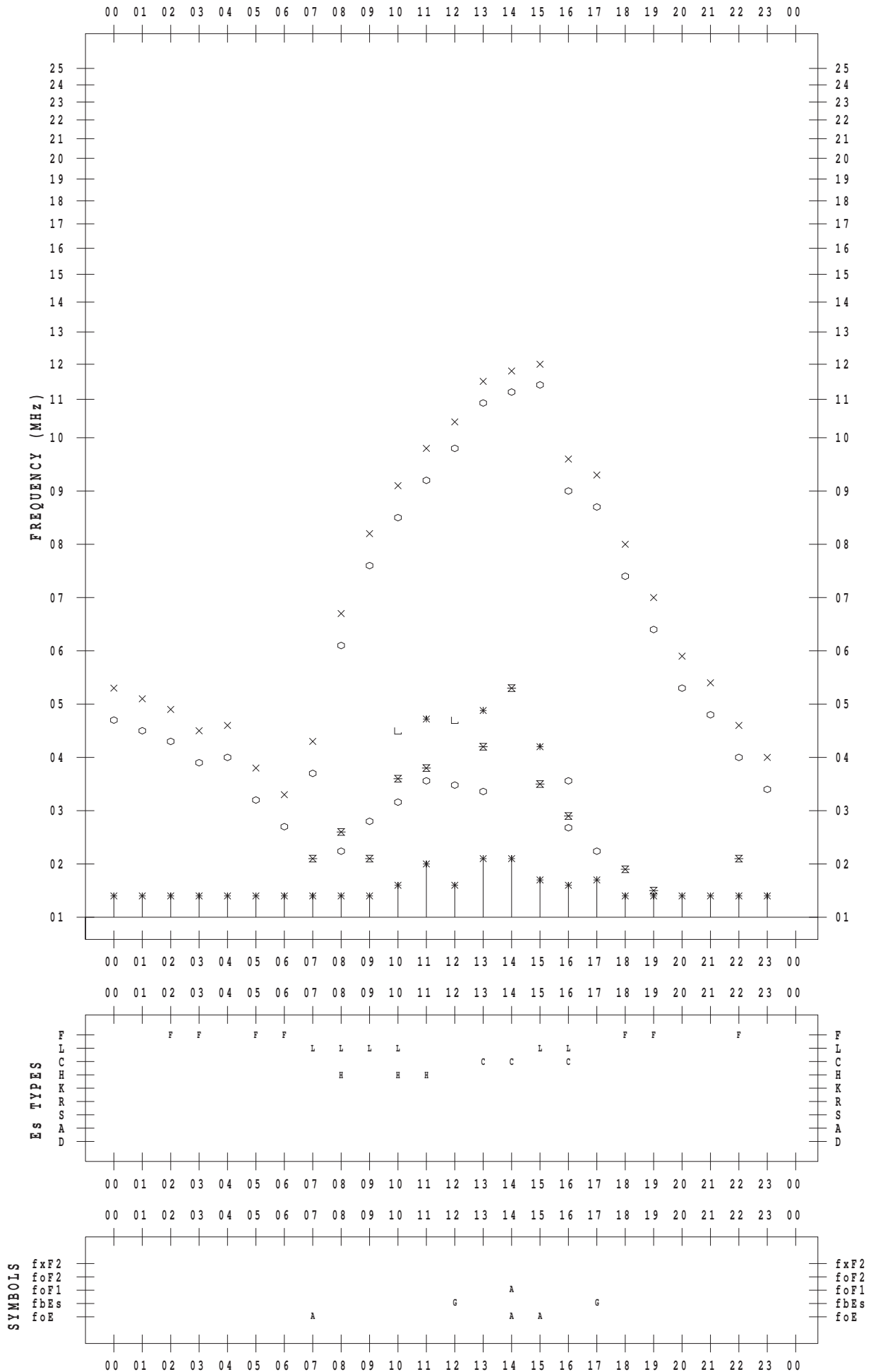
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/24

135 ° E MEAN TIME



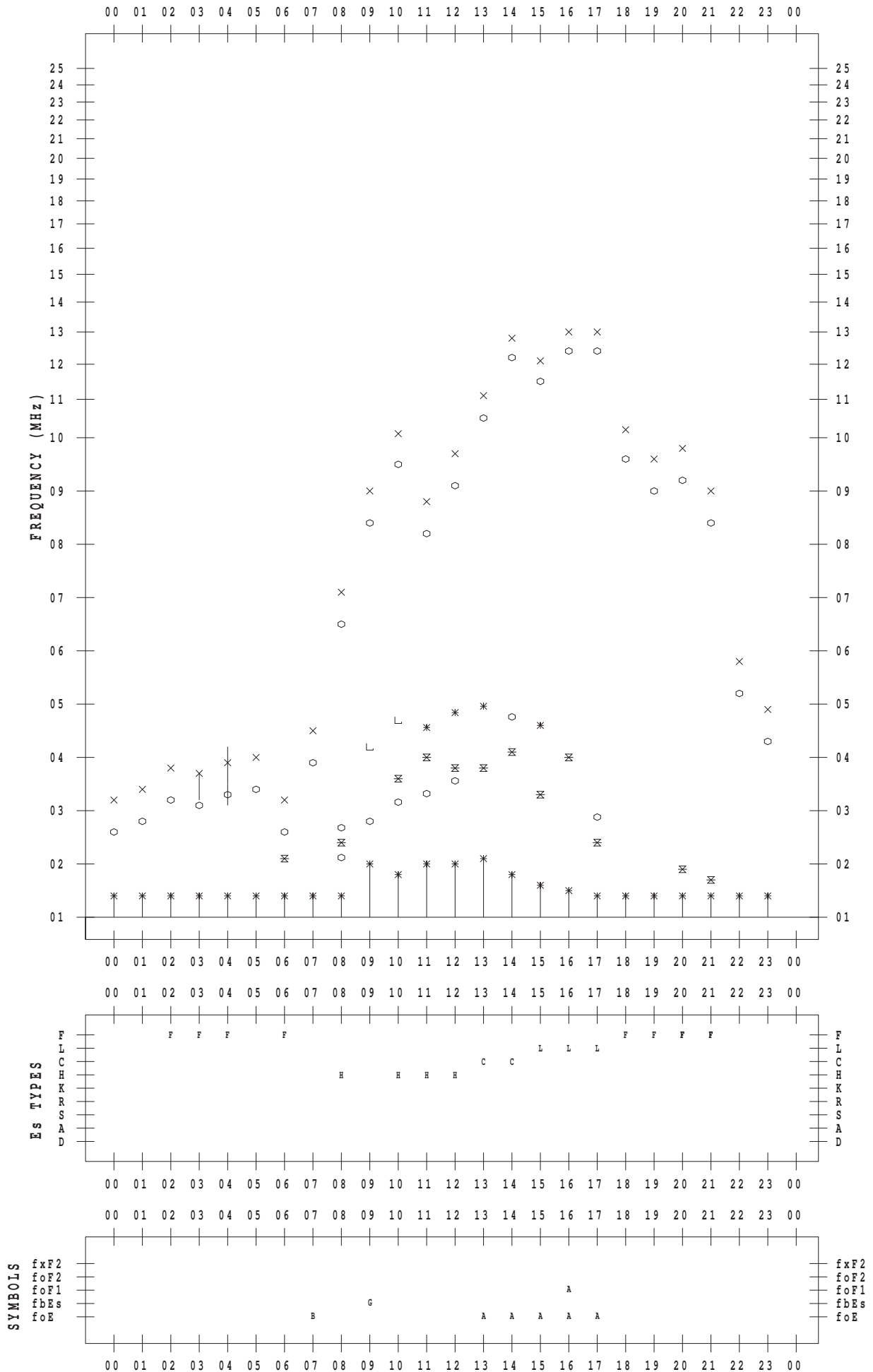
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/25

135 ° E MEAN TIME



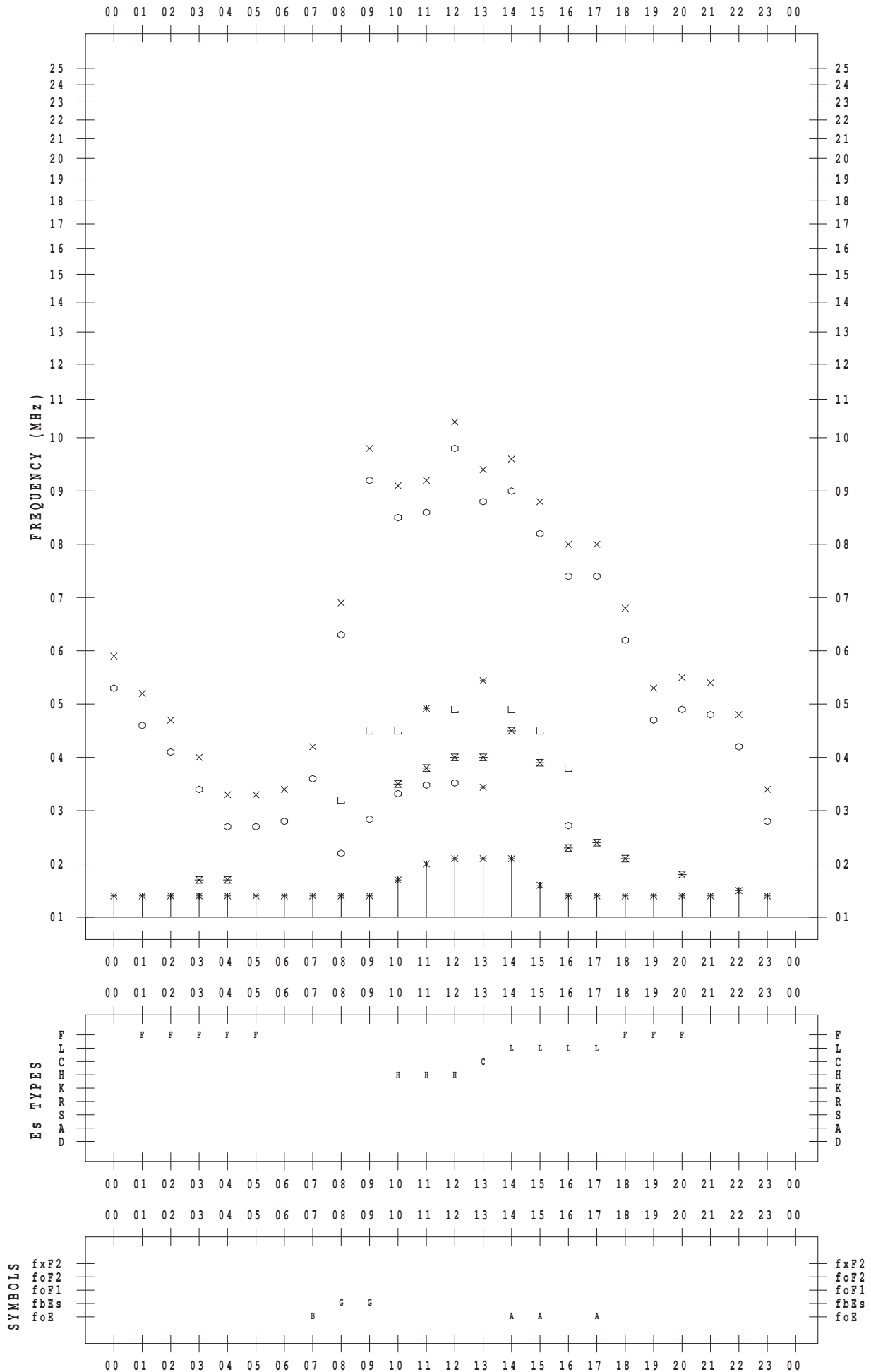
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/26

135 ° E MEAN TIME



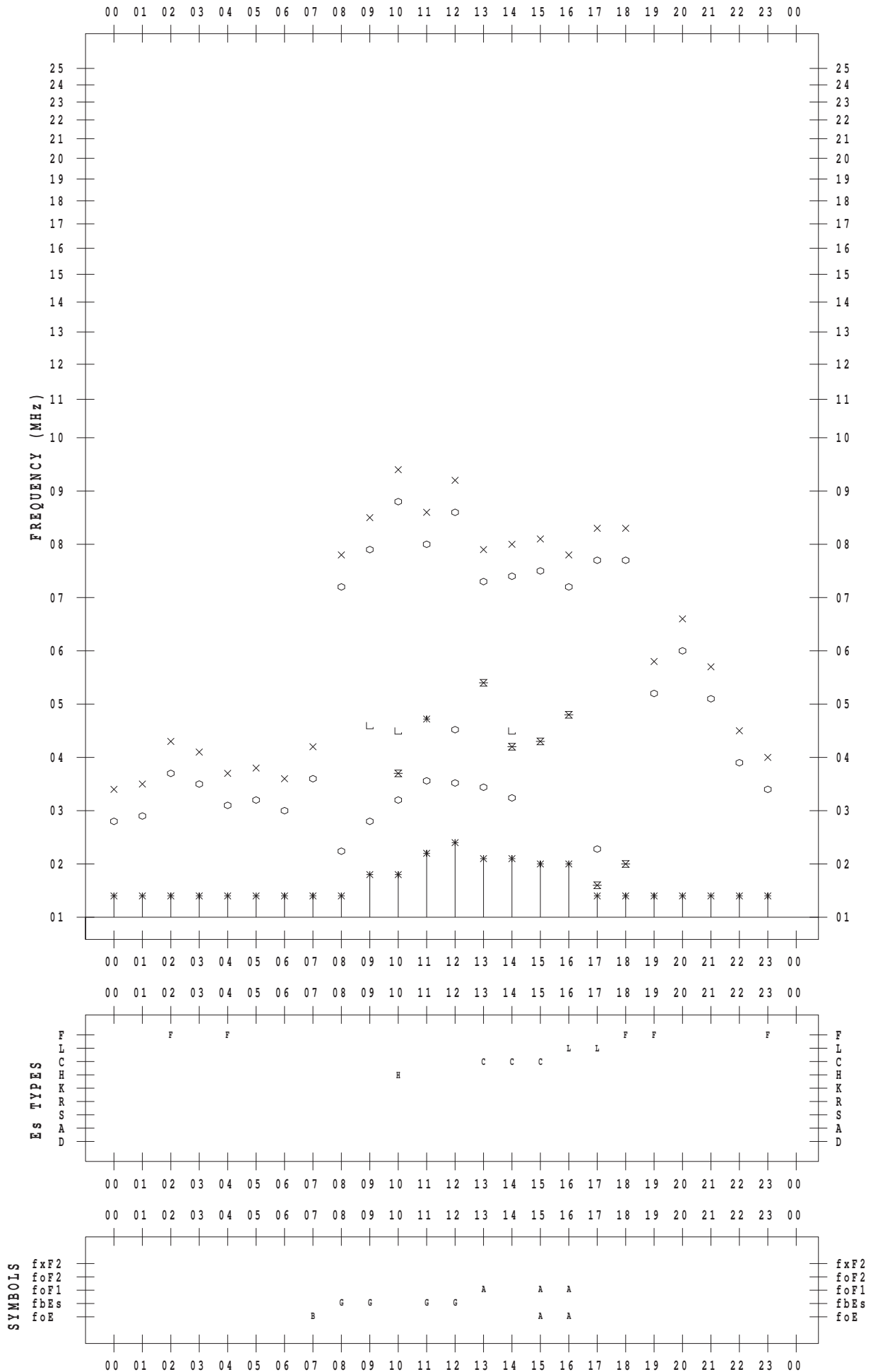
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/27

135 ° E MEAN TIME



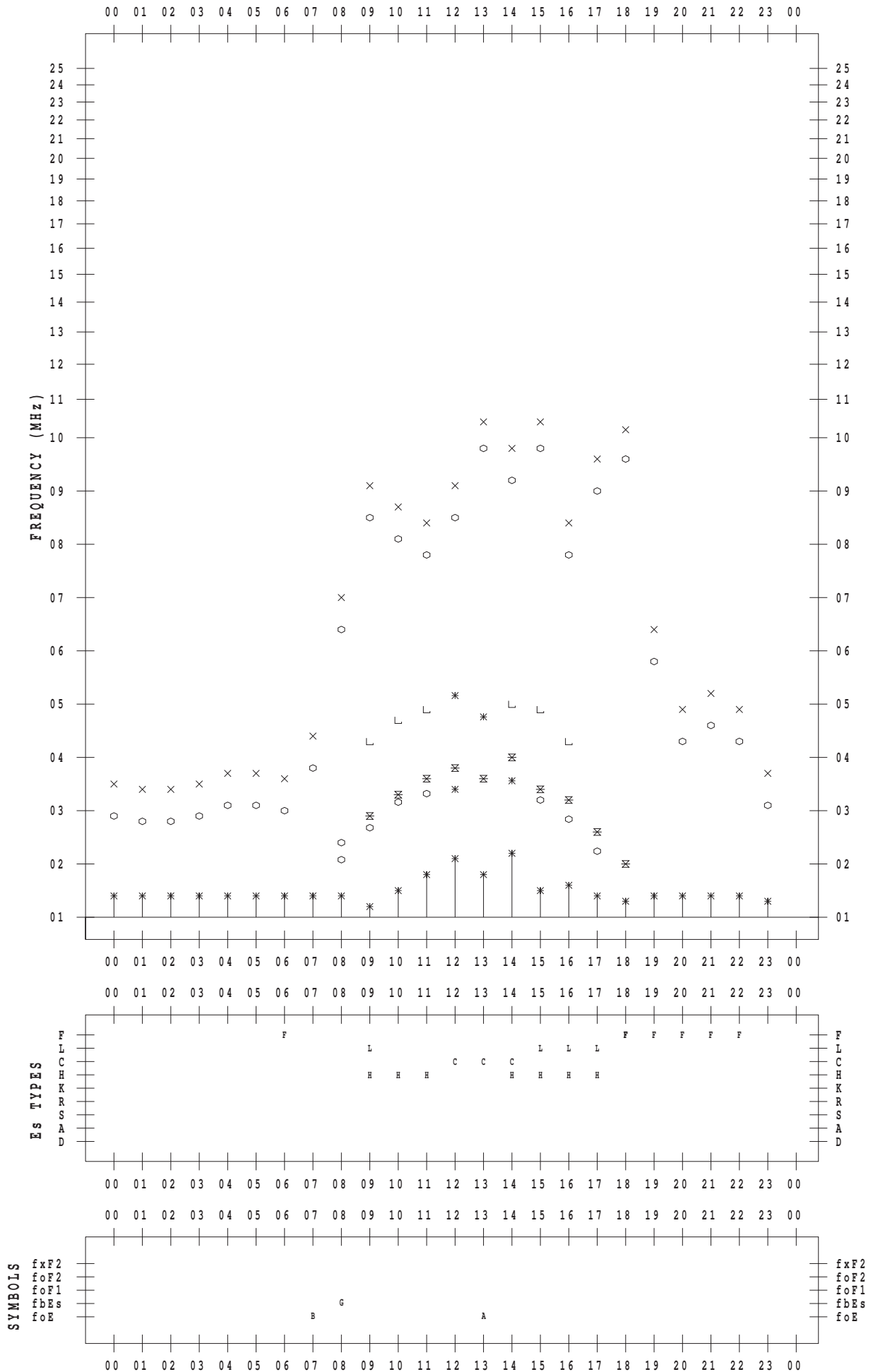
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/28

135 ° E MEAN TIME



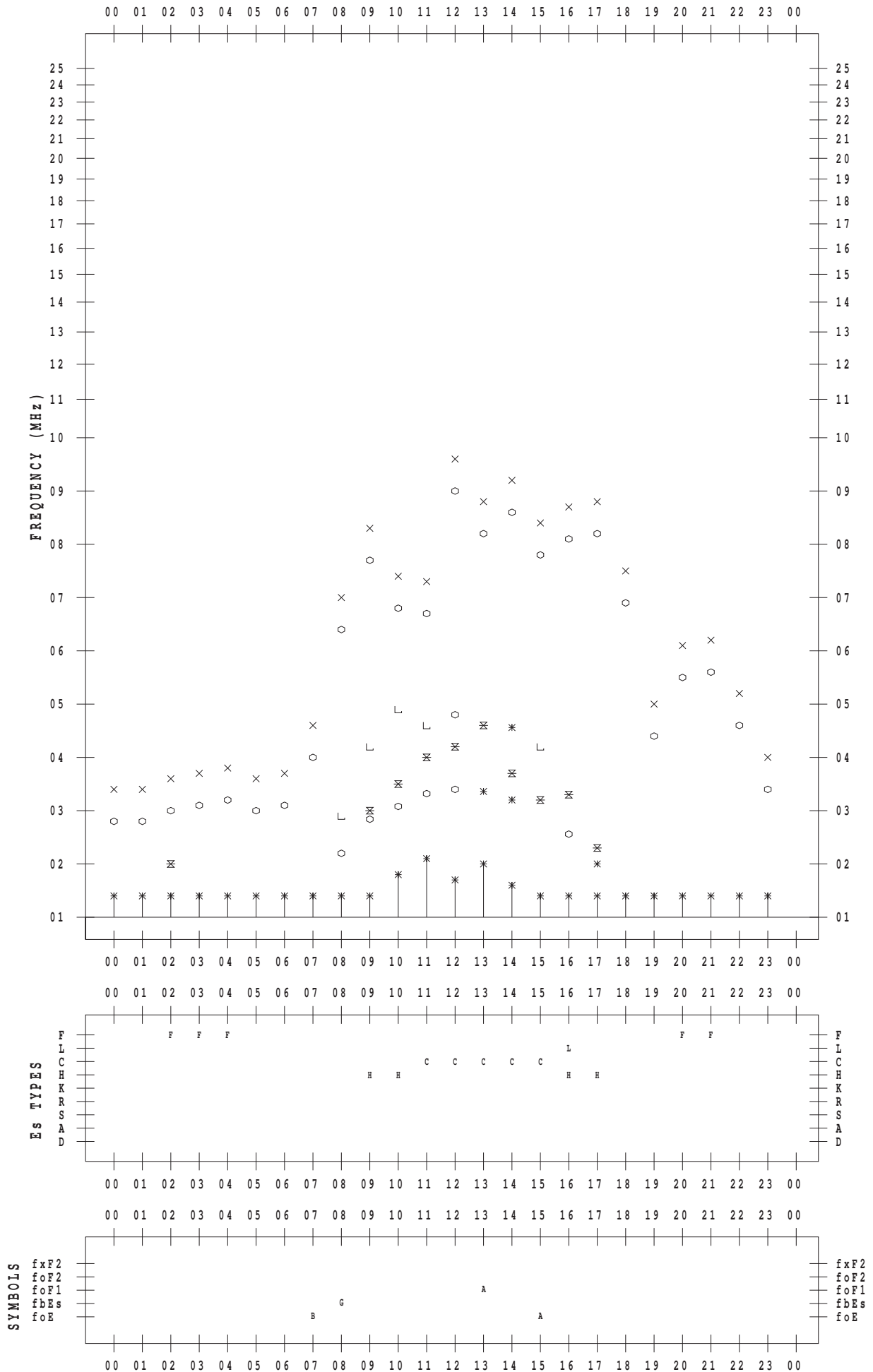
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/29

135 ° E MEAN TIME



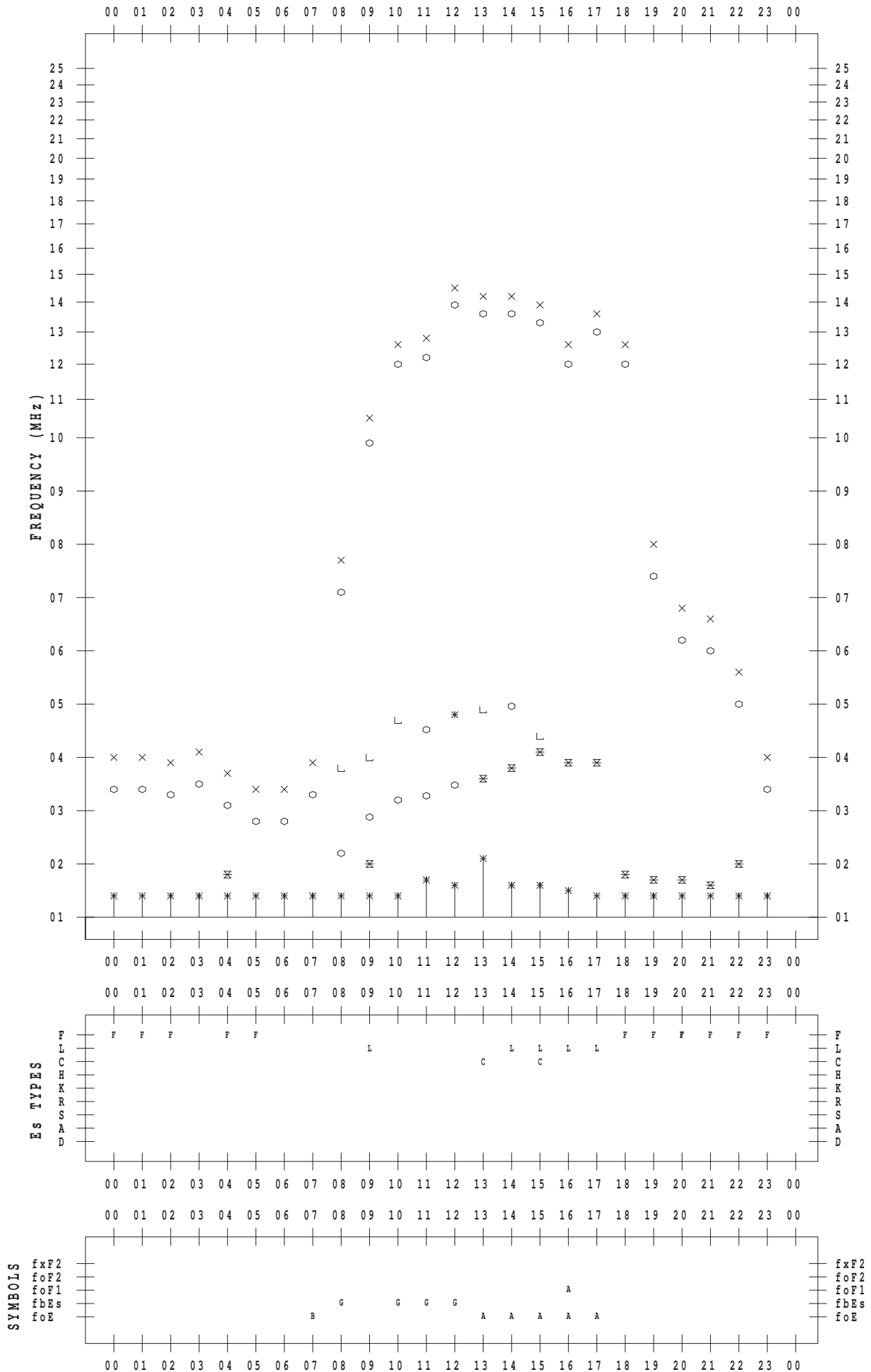
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/30

135 ° E MEAN TIME



# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2012/12/31

135 ° E MEAN TIME

