

# IONOSPHERIC DATA IN JAPAN

FOR DECEMBER 2018  
VOL. 70 NO. 12

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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> <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> <math>f_oF1</math> <math>f_oE</math> <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> <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> <math>h'F</math> <math>h'E</math> <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. 2018

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

HOURLY VALUES OF fEs AT Wakkanai

DEC. 2018

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	39	45	28	27	G	G			50	161	69	35	39	39	34	27	33	G	G	46		G	G	36
2	G	G	G	G	G	11	G	23	31	33	34	34	G	32	51	167	33	32	G	G	G	G	G	G
3	24	154	38	28	107	G	67	111	39	31		40	44	36	36	30	27	26	31	G	28	32	28	27
4	32	27	40	34	35	36	11	48	159	36	54	38	39	36		G	42	G	G	G	G	28		G
5	G	G	G	G	G	G	41	85	44	34	35	41	43	68	43		G	29	56	38	26	39	29	32
6	G	G	G	G	24	27	G	105	G	110	33	G	G	G	G	G	40	56	31	26	G	26	46	
7	52	G	G	G	G	G			91	84	60	G	71	69	65	40	39	31	60	30	G		G	33
8	29	27	G	G	G	93	113	41	50			49	49		31	61	42	31	33	32	29	32	33	40
9	69	40	36	31	G	28		128	61	87	84	135	109	33	49		39	G	G	G		26	39	72
10	G	G	G	G	G	G	11	34	161	68	45	34	34		G	G	20	G	27	30	46	60	58	
11	58	G	24	G	G	G	24	48	41	33	42	35	87	32		35	11		G	G	G	G	34	34
12	28	24	G	29	32	G	G	94	33	46	54	52	116	38		G	35	G		G	G	G	38	41
13	59	58	38	30	35	G	39	32	61	47	69	52	G	48		G	30	28	G		G	G	G	G
14	G	33	27	23	G	120	G	60	34	103	60	33	G	48		G	34	27	G		G	G	27	112
15	33	34	25	26	G	G	G	134	42	93	38	34	G		32		G	G	G	G	G	G	G	G
16	27	G	G	G	G	G	G	149	27	32	34	34	35	34		G	43	35	30	33		G	G	25
17	G	G	G	25	G	G	G	G	29	50	37	34	34	34		N	G	69	G	G	G	G	G	G
18	G	G	G	G	G	G	G		34	38	35	47	38	40	39	38		G	11		G	G	G	G
19	G	G	G	G	G	11	34	11	27	40	33	G	39	39	31	48		G		G	G	G	G	G
20	G	G	G	G	G	G	G	G		32	32		48	34		G	G		G	24	60	27	G	G
21	G	G	G	G	G	G	G	106		G	48	G	107	40		G	G	40	31	29	41	34	46	49
22	G	G	G	G	G	11	G	56	48		40	50	48	33		G	30	40	26		G	G	84	34
23	28	25	G	G	G	G	32	58	34		41	74	58	43	38	36	84	49	34	70	32	57	29	G
24	G	24	28	35	23	24		91	48	34		50	44	35		G	46	29	71	26	59	59	58	46
25	34	30	26	108	G	G	59	58	79	53		36	50		60	32	33	34	32	39	G	60	34	34
26	36	28	131	G	G	26	53	70	92	87	65	40	33		G	G	26	35	31		G	55	40	45
27	G	G	G	G	G	11	49	58	32		33	34	34	70		G	34	60		30	G	G	33	26
28	24	25	G	G	G	26	30	35	G	150	G	50	49	48		G	G	11	34	30	G	G	G	G
29	G	G	34	39	G	33	49	70	G	G	G	G	G	G		G	36	69	69	56	43	32	25	G
30	G	G	G	G	G	40	34	40	G	G	G	34	G		51		G	32	38	37	G	G	G	26
31	G	G	G	G	G	32		34	31	44	32	91	34	33		G		G	G	G		G		86
	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	27	29	30	30	30	31	31	31	30	30	31	28	28	31	27	30	30	29
MED	G	G	G	G	G	G	11	58	38	38	38	35	39	35	G	30	35	26	26	G	G	G	28	26
U Q	33	28	28	30	G	27	41	92	50	84	54	50	49	43	36	36	40	33	32	32	32	33	38	33
L Q	G	G	G	G	G	G	G	34	31	32	32	34	33	32	G	G	27	G	G	G	G	G	G	G

HOURLY VALUES OF fmin AT Wakkanai

DEC. 2018

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	14	14	14	14			14	14	14	14	14	14	14	18	14	14	14	15		14	14	14
2	14	14	14	14	14	14	16	15	14	14	14	14	14	14	14	14	14	14	14	14	14	15	15	14
3	14	14	14	14	14	14	14	15	14	15		14	14	14	14	14	15	14	14	14	14	14	14	14
4	14	15	14	14	14	14	14	14	14	14	14	14	14	14	15	14	14	14	14	15	15	14		14
5	14	14	14	14	14	14	14	15	14	14	14	15	14	15	15	18	15	14	14	14	14	14	15	14
6	14	14	14	14	14	14	15	14	15	14	14	28	14	15	15	15	14	14	14	15	14	14	14	
7	15	14	15	14	14	14	17		14	14	14	26	17	17	20	15	14	14	14	14	14		14	14
8	14	14	14	14	14	14	14	14	14	14	15	18	15	15	14	15	15	14	14	15	14	14	14	14
9	14	14	14	14	14	14		14	14	15	15	15	17	14	15	15	14	18	15	14		14	14	14
10	14	14	14	14	14	14	18	14	14	14	14	14	14	14	14	15	16	14	17	14	14	14	14	
11	14	14	14	15	14	15	14	14	14	14	14	14	14	14	14	18	15		14	14	14	15	14	14
12	14	14	14	14	14	14	15	14	14	14	14	14	14	14	14	15	14	14		14	14	14	14	14
13	14	14	14	15	14	14	14	15	14	14	14	14	14	15	15	14	14	20		14	14	14	14	14
14	14	14	14	14	15	14	14	14	14	14	14	14	14	15	14	14	14	14		17		14	14	15
15	14	15	14	14	14	15	229	14	14	14	14	14	14	14	14	14	14		14	14	14	15	14	15
16	14	14	14	14	14	14	15	14	17	14	14	14	14	14	14	15	14	14	14	14	15	14	14	14
17	14	14	14	14	14	14	16	15	14	14	14	14	14	14	14	15	14	15	15	14	15	14	15	14
18	14	15	14	17	14	15	14	14	15	15	14	14	14	14	14	14	14	15	14	14	14	14	14	14
19	15	14	14	14	15	14	14	14	14	14	14	14	14	14	14	17	17		14	15	14	14	14	15
20	15	14	14	14	15	14	14	14	15	14	14	14	14	14	14	18	20	15	15	14	14	14	14	14
21	14	14	15	14	14	14	17	14		14	23	15	15	15	14	15	14	14	14	14	14	14	14	14
22	14	14	15	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	15	14	14	14	14
23	14	14	14	14	14	15	14	15	14		14	14	14	14	14	14	14	15	14	15	14	14	14	14
24	15	14	14	14	14	15		14	18	14	15	14	15	14	14	14	14	14	15	14	14	14	15	14
25	15	14	14	14	14	14	14	15	15	15	15	14	14	14	14	14	14	14	14	14	14	14	14	15
26	14	15	14	14	14	14	15	14	14	14	14	14	14	15	14	14	14	14	14	14	14	14	14	14
27	15	15	14	14	14	14	14	14	14	14	14	14	15	14	14	14	14	15	14	14	14	14	14	14
28	14	14	14	15	14	14	14	14	14	14	15	15	20	15	15	15	14	14	21	14	14	14	14	14
29	14	14	14	14	14	14	14	15	22	21	26	27	27	24	15	14	14	14	14	14	14	14	14	14
30	14	14	15	15	14	14	14	14	14	14	15	14	16	15	14	14	14	14	14	14	15	14	14	14
31	14	14	14	14	14	14		14	14	14	14	14	14	14	14		18	14	14	14		14	15	15
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	27	29	30	30	30	31	31	31	31	30	31	28	28	31	27	30	30	29
MED	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
U Q	14	14	14	14	14	14	15	15	14	14	15	15	15	15	15	15	15	14	14	15	14	14	14	14
L Q	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14

HOURLY VALUES OF fof2 AT Kokubunji

DEC. 2018

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	27	27	26	26	25	N		46	53	49	50	65	55	62	54	52	44	35	24	31	26	27	27	25	
2	26	26	27	26	A	N	N	47	65	54	56	64	46	58	52	55	45	34	31	N	30	27	27	26	
3	27	28	58	27	27	N		47	43	55	56	62	74	A	66	55	51	A	A	A	A	A	36	34	
4	32	32	37	36	42	35	34	49	53	49	56	68	65	A	62	109	47	32	A	42	43	34	34	41	
5	44	38	42	42	42	34	26	52	49	51	64	88	79	51	51	56	48	A	28	32	34	26	30	34	
6	32	32	34	34	34	A	26	48	49	55	58	65	63	58	54	54	51	32	30	28	30	27	A	A	
7	A	A	31	28	25	48	25	38	50	51	A	63	A	51	70	60	49	A	33	A	A	28	A	28	
8	32	34	37	36	36	36	31	44	N	51	50	63	74	80	75	70	51	34	A	A	A	27	28	32	
9	34	34	34	52	49	52	34	43	A	54	61	75	68	67	64	59	50	36	28	28	31	32	34	N	
10	27	28	31	34	30	27	27	46	47	55	72	75	63	64	60	49	55	N	A	A	32	A	A	A	
11	32	A	31	30	31	30	31	38	54	50	66	69	56	59	51	49	46	32	30	32	34	32	N	A	
12	26	26	26	25	N	30		20	48	55	57	70	80	57	57	48	42	34	27	A	31	30	26	24	
13	32	32	34	31	31	34	27	47	47	51	53	61	52	54	51	49	42	36	28	28	28	26	27	N	
14	A	32	34	32	31	31	28	44	46	47	52	65	58	59	52	46	39	30	28			N		27	
15	26	25	27	25	26			36	43	46	56	54	61	59	59	53	42	34		A	23	A	27	26	
16	A	27	26	N	N	A	N	37	46	48	52	54	54	52	56	48	44	N	27	48	48	28	25	27	
17	30	30	28	28	26	N	N	39	47	44	47	47	61	62	54	52	50	N	A	30	30	31	26	27	
18	27	27	30	28	27	26	32	43	45	52	52	57	56	52	71	49	45	32	32	38	34		28	31	
19	26	58	34	32	N	28	34	44	44		51	66	57	56	56	49	43	A	34	34	30	26	24	N	
20		27	27	26	N	26	34	45	50	49	60	59	54	52	53	52	A	A	58	32	A	27	26	32	
21	32	32	31	31	27	N	27	38	47	61	75	53	61	56	56	56	49	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	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
25	C	C	C	C	C	C	C	C	C		51	56	58	48	51	50	52	50	30	34	34	N	N	A	A
26	A	A	30	27	A	26	26	34	58	52	54	54	51	54	52	52	44	27	35	A	35	N	A	A	
27	A	27	26	28	31	26		30	44	45	61	57	58	52	50	47	39	36	34	A	A	32	25		
28	27	21	26		A	A	A	38	46	54	80	60	54	59	52	47	40	A	A	A	A	34	34	31	
29			23	N	N	N		34	51	71	80	59	53	54	50	48	40	A	32	58	35	34	32	36	
30	27	30	34	36	32	34	32	39	45	54	78	75	53	54	47	41	39	39	36	32	A	27	A	27	
31	30	34	34	N	N	N	N	31	45	55	62	68	52	48	51	49	40	30	36	36	27	23	27	28	
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	23	27	23	18	16	16	27	25	27	27	28	27	26	28	28	27	17	21	16	18	19	19	19	
MED	28	30	31	30	31	30	30	43	47	51	56	63	57	56	54	52	45	34	32	32	31	27	27	28	
U Q	32	32	34	34	34	34	33	46	50	55	64	68	63	59	59	55	50	35	34	37	34	32	32	32	
L Q	27	27	27	27	27	26	26	37	45	49	52	57	53	52	51	48	42	31	28	30	30	27	26	26	



HOURLY VALUES OF fEs AT Kokubunji

DEC. 2018

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	G	G	G	G	G	G		28	39	42	47	43	40	39	56	70	50	31	33	G	G		27	G	G
2	G	G	G	G	28	G	G	G	33	36	40	40	95	50	G	G	G	G	G	G	G	G	G	G	
3	G	G	G	G	G	G		49	47	42	42	47	59	60	42	35	37	56	42	56	54	40	27	25	
4	G	G	G	G	38	G	G	G	54	50	41	41	49	56	42	34	49	24	33	29	G	34	29	G	
5	G		33	32	G	G	G	25	49	43	41	47	40	37	36	40	36	34	26	25	G	G	G	G	
6	G	G	G	G	36	32	G	G	30	109	39	40	G	40	39	G	G	33	G	G	G	G	39	49	
7	33	31	G	G	G	G	G	42	31	84	128	52	125	40	34	G	39	54	40	55	38	28	27	G	
8	27	G	G	G	G	34	G	42	31	47	41	41	39	38	G	G	G	28	40	50	29	G	G	G	
9	G	G	G	G	30	G	33	43	46	39	G	G	39	G	42	35	35	11	G	G	G	G	G	G	
10	G	G	G	G	G	G	G	29	39	42	56	41	41	35	G	55	G	33	32	38	31	40	34	38	
11	32	65	G	G	24	G	G	47	31	35	46	G	36	G	G	G	G	G	G	G	G	G	G	36	
12	28	39	G	27	G	G		41	40	42	41	42	G	N	34	36	28	26	32	26	29	G	G	G	
13	28	G	G	G	G	G	G	32	35	41	39	G	G	G	G	G	G	G	G	28	25	G	G	28	
14	40	G	G	G	28	G	G	G	31	42	36	G	41	37	35	31	38	G	21			G	G		
15	G	G	G	G	G			40	34	38	41	40	40	G	35	31	45	33		35	G	26	25	G	
16	33	G	G	G	G	34	G	39	31	41	37	36	G	48	34	G	46	G	G	G	G	G	G	G	
17	G	G	G	27	G	G	G	G	33	37	41	42	77	50	39	33	32	26	29	G	G	G	G	G	
18	G	G	G	G	G	G	G	G	31	G	G	G	G	G	35	34	28	31	G	G	G		G	G	
19	G	G	G	G	G	G	G	43	33		G	G	G	36	107	G	42	34	G	G	G	G	G	G	
20		G	G	G	G	G	G	G		33	36	37	40	53	G	G	G	145	51	50	G	29	G	G	
21	G	G	G	G	G	G	G	34	31	166	39	39	42	56	G	G	G	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	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
25	C	C	C	C	C	C	C	C	C		34	36	36	37	40	G	51	29	G	G	11	G	G	46	43
26	40	39	38	G	29	G	G	38	35	41	41	G	44	G	G	35	33	G	28	72	29	G	43	39	
27	32	G	G	24	38	25		32	31	33	40	40	G	G	44	43	29	35	34	55	58	40	G	26	
28	G	29	G		39	34	32	34	31	34	G	40	39	G	48	37	34	55	43	48	41	31	33	G	
29			G	G	G		G	G	32	G	37	G	G	40	40	39	35	65	G	G		28	32	31	G
30	G	G	G	G	23	G	G	G	G	G	G	G	53	G	G	G	32	G	28	32	32	49	G	26	G
31	G	G	G	G	G	G	G	G		53	G	G	G	G	G	G	47	35	G	G	21	25	G	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	25	26	27	26	27	26	21	27	27	27	28	28	28	27	28	28	28	28	27	26	26	26	25	27	27
MED	G	G	G	G	G	G	G	32	33	41	40	40	39	37	34	34	34	28	27	23	13	G	G	G	
U Q	30	G	G	G	29	G	G	41	39	42	41	41	43	40	41	38	38	34	33	38	29	29	29	26	
L Q	G	G	G	G	G	G	G	G	31	34	36	G	G	G	G	G	G	G	G	G	G	G	G	G	

HOURLY VALUES OF fmin AT Kokubunji

DEC. 2018

LAT. 35°43.0'N LON. 139°29.0'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	13	14	15	15	14	17		13	13	13	20	15	23	20	13	14	14	14	14	15	14	14	15	14	
2	13	14	17	17	13	14	14	18	14	13	14	17	17	14	13	14	18	15	13	20	14	14	14	14	
3	13	14	15	14	13	17		14	15	14	13	15	20	15	14	13	14	15	13	14	13	13	13	13	
4	14	13	14	14	14	15	13	14	13	13	14	17	17	14	18	14	13	13	13	13	17	14	14	17	
5	14	13	13	13	13	14	13	20	14	13	15	20	17	17	15	14	13	14	13	13	14	13	14	14	
6	13	14	14	14	13	14	14	15	14	18	20	17	20	15	17	14	21	15	14	14	14	14	13	14	
7	14	13	14	14	14	15	14	21	14	14	15	18	15	15	18	13	20	13	14	13	13	14	14	17	
8	14	13	13	14	13	14	14	14	13	17	17	20	15	18	17	14	15	15	14	13	14	15	13	14	
9	14	14	14	13	13	14	13	18	14	13	20	21	15	14	20	14	14	15	18	20	14	14	14	14	
10	14	14	15	14	15	14	13	14	14	14	20	15	20	17	14	14	20	17	14	14	13	14	14	14	
11	14	14	20	14	15	17	18	14	13	17	15	15	13	14	13	17	21	18	13	18	13	13	15	13	
12	14	13	13	14	14	14		15	14	13	15	18	17	18	14	14	18	14	13	14	14	14	14	15	
13	14	15	14	14	14	15	14	14	13	14	17	18	17	22	17	14	18	14	22	14	13	13	13	14	
14	14	14	15	14	13	13	18	17	13	14	14	14	14	13	14	13	21	14	14				17	14	
15	14	14	14	14	14			18	14	14	13	14	15	14	13	13	17	17		14	13	13	13	17	
16	13	17	14	13	14	25	13	18	13	13	15	14	15	14	14	13	18	14	18	17	14	15	15	14	
17	14	13	14	14	13	18	17	14	13	13	14	17	18	17	14	14	13	14	13	13	14	13	14	13	
18	14	14	14	13	14	14	14	17	13	14	13	20	14	14	14	14	18	14	14	14	14		15	14	
19	14	14	14	14	20	14	25	20	14		15	17	15	20	14	13	20	13	14	14	18	17	18	15	
20		14	14	14	14	17	15	18	14	14	15	18	18	18	18	25	13	13	21	14	17	15	18	14	
21	13	13	14	14	14	14	13	18	13	13	15	14	15	14	14	24	18	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	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
25	C	C	C	C	C	C	C	C	C		14	17	15	13	18	15	14	14	15	20	14	18	20	14	14
26	14	14	14	13	14	14	14	14	14	13	14	14	14	14	18	15	13	20	17	13	14	18	14	14	
27	14	17	15	14	14	14		13	14	14	15	14	21	18	14	15	21	13	14	13	13	14	15	14	
28	15	13	18		17	14	14	14	14	14	18	14	21	22	17	23	18	14	14	14	14	14	14	18	
29			17	14	14	14		17	13	18	21	21	21	21	14	13	14	14	14	14	18	14	17	17	
30	14	20	18	14	14	14	13	18	23	21	13	18	13	18	13	14	20	13	14	14	13	18	14	14	
31	14	15	15	17	17	14	17	17	14	13	13	14	18	14	14	14	15	14	15	13	13	20	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	25	26	27	26	27	26	21	27	27	27	28	28	28	28	28	28	28	27	26	26	26	25	27	27	
MED	14	14	14	14	14	14	14	17	14	14	15	17	17	16	14	14	18	14	14	14	14	14	14	14	
U Q	14	14	15	14	14	15	16	18	14	14	17	18	19	18	17	14	20	15	15	14	14	15	15	15	
L Q	13	13	14	14	13	14	13	14	13	13	14	14	15	14	14	13	14	14	13	13	13	13	14	14	

HOURLY VALUES OF fof2 AT Yamagawa

DEC. 2018

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	28	49	28	28	49	B		37	52	52	53	50	62	70	70	55	51	41	38	29	179	N	B	28
2	N	29	31	34	32	30	26	34	54	54	52	62	56	55	58	59	54	47	34	28	B	A	B	A
3	B	26	A	A	59	N	N	37	46	54	54	60	56	57	57	54	52	51	A	A	A	A	A	A
4	A	A	29	30	34	N		29	42	53	52	47	84	68	50	62	93	42	A	A	49	A	A	A
5	59	A	28	30	28	28	25	43	52	54	50	69	75	77	53	51	66	50	28	28	28	28	B	B
6	28	29	29	34	28	A	A	37	53	50	54	76	67	57	57	54	57	51	A	A	A	189	31	26
7	25	28	30	31	28	B	B	40	49	45	54	65	66	68	54	69	54	43	32	28	59	B	B	49
8	29	30	31	34	30	N	N	38	45	46	A	71	80	86	81	74	61	49	34	30	B	26	26	N
9	28	30	32	34	42	39	28	42	52	48	50	77	86	78	65	58	57	46	37	A	A	N	B	31
10	B	29	31	29	31	N	N	32	44	52	60	58	65	50	59	57	51	51	32	A		34	28	159
11	N	26	28	29	31	29	29	38	47	51	55	64	64	A	A	50	51	45	36	49	28	30	N	N
12	N	28	30	28	N	N	N	31	40	47	A	62	85	77	77	64	51	48	34	A	A	30	N	B
13	25	N	28	28	31	36	31	34	26	46	48	56	61	56	63	50	55	44	35	22	28	B	B	26
14	A	28	28	28	25	26		40	48	47	52	65	65	71	64	48	50	45	34	N	B	B	B	26
15	28	30	32	34	30	N	N	30	42	48	48	57	70	75	A	54	33	40	A	49	28	26	26	26
16	N	26	26	A	A	N	B	31	24	45	A	54	58	57	56	52	49	39	N	32	34	30	N	B
17	49	N	N	N	26	28	N	23	42	45	45	52	53	62	59	57	53	52	34	N	30	29	29	28
18	25	26	26	26	26	28	N	34	26	30	54	55	57	53	57	60	49	49	28	59	32	32	28	25
19	28	29	28	30	N	49	B	34	49	47	52	66	75	55	51	54	47	40	29	34	37	31	N	N
20	59	28	B	N	28	N	N	34	48	53	50	54	58	58	54	46	51	42	30	36	A	N	A	28
21	30	30	28	25	34	N	N	32	29	48	61	82	72	67	72	71	66	50	36	34	34	26	A	N
22	A	25	A	A	31	26	N	30	45	54	54	59	61	58	51	58	54	44	N	A	34	A	A	A
23	32	31	36	31	34	B	B	30	47	50	54	62	52	57	A	52	50	34	A	A	34	A	30	28
24	28	28	28	N	N	N	B	28	31	50	52	51	56	51	51	A	51	40	A	A	31	30	A	B
25	N	26	28	59	59	B		32	42	47	51	68	61	60	56	59	50	A	A	A	64	26	A	A
26	26	30	A	26	A	N	26	30	47	51	57	58	54	54	54	48	57	40	A	A	A	A	A	A
27	A	A	A	B	31	N		A	42	42	51	64	61	67	51	50	48	A	A	A	A	A	A	A
28	A	32	31	N	B	A	B	A	50	45	64	71	71	54	51	54	47	A	A	A	A	36	38	A
29	59	B	N	B	B	A	A	28	44	54	84	53	73	62	56	48	A	A	A	A	35	A	30	A
30	28	59	28	N	N	B	30	34	48	40	65	86	61	55	54	52	48	40	40	A	32	N	A	N
31	29	29	32	25	39	22	N	30	42	54	57	64	68	46	54	57	49	38	59	30	30		26	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	19	25	24	21	23	11	9	29	31	31	28	31	31	30	28	30	30	26	18	15	18	15	11	12
MED	28	29	28	30	31	28	28	34	46	48	54	62	64	58	56	54	51	44	34	32	33	30	28	28
U Q	32	30	31	34	34	36	29	37	49	52	56	69	71	68	62	59	54	49	36	49	35	32	30	30
L Q	28	27	28	28	28	26	26	30	42	46	50	56	58	55	54	51	49	40	32	28	30	26	26	26

HOURLY VALUES OF fEs AT Yamagawa

DEC. 2018

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	G	G	G	G	28	B	G	11	32	40	50	45	44	42	46	39	G	27	11	G	G	G	B	G	
2	G	G	33	G	G	G	25	26	28	53	36	40	40	42	41	40	34	29	28	29	B	24	B	33	
3	B	G	38	34	26	G	G	G	40	39	54	48	60	46	44	56	38	36	49	59	41	41	57	39	
4	34	43	25	G	G	G	G	G	30	34	46	49	46	53	57	46	50	50	48	G	31	41	51	70	
5	25	33	26	24	28	G	G	30	41	42	58	42	46	50	60	60	53	40	25	G	G	G	B	B	
6	G	G	G	G	29	36	36	G	33	34	46	39	39	40	39	49	60	40	88	46	38	24	26	G	
7	G	G	G	30	24	B	B	G	28	42	45	44	46	48	58	45	36	32	30	G	G	B	B	G	
8	G	G	G	G	G	11	G	24	32	43	60	41	47	37	G	G	G	G	26	24	B	G	G	G	
9	G	G	G	G	G	20	G	40	50	39	43	58	49	51	38	42	33	30	25	46	28	G	B	G	
10	B	G	G	G	G	G	G	G	35	39	50	50	46	76	50	56	46	45	28	29	G	G	G	G	
11	G	G	G	24	G	G	G	G	161	35	46	48	62	84	114	48	36	35	35	G	G	G	G	G	
12	G	G	G	G	G	G	11	11	30	45	58	57	68	50	38	38	43	27	32	24	27	G	G	B	
13	24	G	G	G	G	G	G	11	33	39	37	56	37	44	G	G	G	G	G	25	G	38	G	34	
14	29	G	G	G	G	G	G	29	29	35	49	41	41	41	46	36	G	43	35	G	B	B	B	B	
15	G	G	G	34	G	G	G	217	G	49	42	42	44	42	64	34	34	40	41	G	G	G	G	G	
16	G	G	23	32	33	G	B	G	46	33	48	41	47	48	G	43	G	41	G	G	26	G	G	B	
17	G	G	G	G	G	G	G	32	29	36	43	47	48	50	54	36	G	49	G	G	G	G	G	G	
18	G	G	G	G	G	G	G	G	G	49	G	43	41	49	36	40	G	G	G	G	G	G	G	G	
19	G	G	G	G	G	G	B	G	29	33	35	50	38	G	G	34	G	G	G	G	20	G	G	G	
20	G	G	B	G	G	G	G	G	28	33	G	38	38	42	42	39	G	G	G	34	24	G	24	32	
21	G	G	G	G	G	G	G	11	28	33	40	48	65	49	40	G	39	52	31	24	G	G	38	G	
22	39	25	36	31	24	G	G	G	43	53	G	41	59	42	39	35	32	G	G	32	25	26	34	33	
23	G	38	G	G	11	B	B	26	70	42	57	59	57	46	81	57	45	33	28	44	G	29	G	29	
24	G	G	G	G	G	G	B	G	31	50	48	50	48	46	54	76	31	40	32	28	28	G	26	B	
25	G	G	26	G	G	B	G	G	40	37	71	39	42	40	G	G	34	50	57	39	37	G	30	24	
26	G	G	32	34	32	G	G	G	32	40	41	42	46	G	39	69	50	32	60	126	38	35	35	28	
27	33	59	28	B	G	G	G	26	37	54	39	N	46	45	44	G	G	G	45	60	60	70	46	54	72
28	40	30	G	G	B	B	B	25	39	41	36	62	44	53	G	G	G	58	124	128	92	46	25	33	
29	24	B	G	B	B	32	35	G	33	36	41	52	48	44	44	61	58	74	103	60	33	41	28	30	
30	25	G	G	G	G	B	G	G	30	49	G	145	55	41	G	G	41	27	34	29	G	28	35	G	
31	G	G	G	G	G	G	G	G	34	33	36	38	G	40	G	36	31	27	G	G	G	G	G	G	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	29	30	30	29	29	26	24	31	31	31	31	30	31	31	31	31	31	31	31	31	28	28	25	26	
MED	G	G	G	G	G	G	G	G	32	39	43	46	46	45	41	39	34	35	30	25	22	G	24	G	
U Q	24	G	25	24	24	G	G	26	40	45	50	50	49	50	54	49	43	45	48	44	32	32	34	33	
L Q	G	G	G	G	G	G	G	G	29	35	36	41	41	41	G	34	G	27	11	G	G	G	G	G	

HOURLY VALUES OF fmin AT Yamagawa

DEC. 2018

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	14	15	17	15	17	B	17	14	14	14	15	17	20	18	17	15	14	17	15	15	18	15	B	15
2	15	15	15	15	15	16	14	15	15	14	15	18	17	18	17	16	14	14	16	18	B	66	B	14
3	B	16	15	15	15	14	15	15	14	14	14	17	15	17	18	15	14	15	18	15	15	14	14	14
4	14	15	15	15	15	17	15	14	14	14	14	15	15	17	22	15	15	16	15	14	14	15	B	14
5	15	15	16	15	15	15	20	14	14	15	14	17	15	18	16	15	15	17	15	15	15	15	B	B
6	15	16	17	14	15	15	15	14	14	16	15	17	17	18	18	17	16	14	20	14	15	15	15	15
7	15	15	17	14	15	B	B	14	14	14	15	16	18	18	20	15	16	15	15	15	14	B	B	15
8	15	17	16	15	15	17	17	17	14	14	16	17	17	18	18	17	23	18	14	14	B	17	14	18
9	15	14	14	15	14	15	15	14	14	14	15	16	15	16	14	16	15	14	15	14	21	18	B	18
10	B	14	15	14	14	15	17	16	14	14	14	16	21	18	17	15	15	14	14	14	71	15	14	17
11	14	14	15	15	15	15	16	14	15	15	18	20	15	17	15	14	14	14	14	15	15	15	17	16
12	17	15	15	14	15	15	14	15	14	14	15	15	18	18	16	15	18	17	14	17	14	15	18	B
13	14	15	16	14	15	15	17	15	14	14	16	16	16	17	17	16	22	20	15	14	15	15	15	14
14	15	15	14	15	14	14		14	14	15	18	15	17	15	14	15	14	16	15	15	B	B	B	B
15	16	15	14	16	15	15	15	14	15	14	14	14	16	17	15	15	15	14	14	14	15	14	14	16
16	21	14	15	15	15	14	B	15	14	15	14	15	15	15	15	14	16	17	15	15	14	14	17	B
17	15	15	17	15	15	15	15	14	14	15	14	16	17	18	16	16	15	15	14	16	14	15	15	15
18	15	14	14	15	15	17	18	14	21	14	15	15	18	16	17	16	17	18	14	14	18	14	16	14
19	15	14	15	15	15	15	B	15	15	14	14	17	16	16	16	15	22	16	15	14	14	14	18	16
20	15	18	B	17	15	14	18	14	16	15	14	16	17	15	17	16	17	17	15	14	22	16	16	14
21	16	15	14	15	14	15	15	14	14	15	14	15	15	18	17	15	14	14	15	15	16	15	14	17
22	14	15	14	14	15	15	14	14	15	14	15	15	16	17	17	18	15	17	14	15	15	15	14	14
23	15	15	15	14	15	B	B	15	15	14	15	15	18	18	15	15	18	14	14	14	14	15	14	16
24	15	15	17	14	18	14	B	14	14	14	14	15	18	15	18	16	14	15	15	14	16	15	15	B
25	16	17	15	15	15	B		21	17	14	14	15	17	16	17	15	15	15	16	15	14	14	16	15
26	15	14	14	14	14	15	16	14	15	14	14	15	17	17	16	15	16	14	14	15	14	14	15	14
27	15	14	15	B	14	15	15	14	14	14	14	15	15	15	15	17	14	14	14	14	14	14	14	14
28	14	14	14	15	B	15	B	15	14	14	15	14	18	16	15	15	22	14	14	14	14	14	14	14
29	14	B	16	B	B	15	15	15	14	14	15	20	18	16	16	15	15	15	15	15	15	14	15	14
30	14	15	21	18	14	B	15	14	14	14	16	15	15	17	16	18	15	14	15	14	14	15	14	15
31	15	14	14	15	15	15	15	15	14	14	14	15	15	15	15	14	15	15	14	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	30	30	29	29	26	24	31	31	31	31	31	31	31	31	31	31	31	31	31	28	28	25	26
MED	15	15	15	15	15	15	15	14	14	14	15	16	17	17	16	15	15	15	15	14	15	15	15	15
U Q	15	15	16	15	15	15	17	15	15	15	15	17	18	18	17	16	17	17	15	15	15	15	15	16
L Q	14	14	14	14	14	15	15	14	14	14	14	15	15	16	15	15	14	14	14	14	14	14	14	14

HOURLY VALUES OF fof2 AT Okinawa

DEC. 2018

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		A	A	29	A	28	N	34	50	54	62	A	A	102	121	103	68	55	43	31	36	31	30	B
2	B	32	34	34	B	B	29	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
3	B	B	B	B	B	B	B	B	B	B	B	B	C	61	60	65	43	54	A	A	A	A	A	A
4	A	A	A	A	29	29	N	36	64	65	50	69	77	66	63	82	62	50	A	A	A	A	A	A
5	A	A	26	28	A	A	A	34	30	66	42	63	78	84	76	A	54	60	25	30	N		N	B
6	B	59	28	31	N	B	B	34	51	54	A	67	73	77	64	64	A	56	A	A	A	32	31	23
7	B	26	30	32	N	B	N	37	50	48	52	60	72	58	77	72	54	51	47	29	A	28	B	26
8	29	29	32	34	38	N	A	35	66	48	54	68	91	86	88	85	91	32	46	28	29	31	28	25
9	26	28	28	28	38	N	N	34	50	53	48	70	84	82	70	60	62	53	23	A	A	29	26	28
10	N	29	28	26	A	N	B	32	47	54	68	68	61	67	68	71	47	A	50	34	A	30	31	29
11	26	26	30	30	31	N	N	32	54	54	69	75	77	70	A	64	A	72	A	44	N	30	28	B
12	N	N	26	N	29	25	32	27	38	50	57	64	90	120	125	118	76	57	42	A	B	N	A	N
13	24	25	N	N	N	32	N	34	47	45	54	66	58	68	80	87	56	54	41	A	26	28	30	49
14	N	A	A	26	49	A	N	31	44	50	57	62	78	91	104	91	67	56	37	A	A	A	A	B
15	28	29	31	B	26	B	B	29	41	49	54	51	72	88	87	58	53	A	32	A	59	59	26	N
16	N	22	25	N	B	A	A	29	129	47	A	60	A	A	A	55	54	45	35	49	32	29	A	A
17	N	N	N	N	29	28	N	28	40	46	51	50	53	A	60	72	80	62	41	32	26	28	31	36
18	37	34	32	29	28	30	B	30	B	B	B	B	B	B	B	B	52	58	38	59	A	28	31	26
19	26	N	28	28	30	N	B	31	50	54	53	67	86	77	60	48	52	52	48	A	48	34	20	28
20	30	30	B	N	26	N	N	30	52	54	69	57	72	72	59	A	54	52	A	30	A	A	A	28
21	29	30	28	28	34	N	B	32	50	50	60	87	111	104	110	117	84	85	26	37	44	A	A	B
22	26	26	A	A	31	A	B	26	47	55	58	54	58	69	59	54	58	51	28		25	N	A	A
23	28	A	26	42	39	22	B	28	51	48	58	57	71	62	69	58	A	54	52	23	40	41	29	34
24	A	30	30	30	29	25	B	30	44	48	54	A	61	58	A	57	51	59	A	A	42	48	37	B
25	49	32	34	32	30	B	B	29	34	44	54	69	87	101	91	87	75	45	42	A	A	48	A	B
26	A	30	38	A	A	A	B	30	41	49	59	70	A	61	A	A	65	32	A	A	A	A	A	A
27	N	A	A	30	28	A	B	A	41	38	73	64	76	83	84	72	56	44	A	A	A	32	A	A
28	A	A	A	A	A	A	A	A	50	65	75	98	86	84	64	66	52	A	A	A	A	A	A	B
29	A	A	A	B	B	A	A	A	33	54	91	71	64	78	88	60	54	A	A	34	34	A	32	N
30	31	A	26	A	B	B	B	A	50	53	68	82	71	80	87	58	27	49	A	A	38	34	29	28
31	28	30	29	N	B	B	B	30	54	51	62	86	108	90	87	76	53	A	A	A	23	49	N	26
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	14	18	20	17	17	8	2	25	28	28	26	26	25	27	25	26	27	25	18	14	14	20	14	13
MED	28	30	28	30	30	28	30	31	50	50	58	67	76	78	77	68	54	54	41	33	34	30	30	28
U Q	30	30	31	32	36	29	32	34	51	54	68	70	86	88	88	85	67	57	46	38	42	37	31	31
L Q	26	26	27	28	28	25	29	29	41	48	54	60	67	67	63	58	52	49	32	30	26	28	28	26

HOURLY VALUES OF fEs AT Okinawa

DEC. 2018

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	B
2	B	34	32	26	28	B	B		B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
3	B	B	B	B	B	B	B		B	B	B	B	C											
4	39	67	59	28	25	24		G	G															
5	40	40	26	24	35	39	30	24	38	48	50	60	90	68	63	79	64	56	32	23				
6	B	G	G	G	103	B	B		28	44	53	92	79	51	43	51	54	56	115	74	39	33	G	G
7	B	G	G	G	G	B		G																
8	G		G	G	G	G		70	24	48	41	44	132	49	42	40	36	32	39	28	24			
9	G	171						G																
10	G	G	G		24	34	27	B																
11	G	G	G	G	G		G		25	40	39	42	59	179	65	76	93	97	53	50	44	25	G	G
12	G	G	G	G	G	G		G																
13	G		G	G	G	G		G																
14	G	70	43		24	33		G																
15	G	G	G	B	G	B	B	G																
16	G	G			B																			
17	24	27			G			G																
18	25	G	G	G	G	G	B	G																
19	G	G	G	G		G	B	G																
20		G	B	G	G	G	G	G																
21	G	30	25	28	G	G	B	G																
22	G	G					B	G																
23	G	41			20	29	167	G																
24	27	27	24		G		B	G																
25	G	G	G	G		B	B	G																
26	30	29	53	59	60	33		G																
27	G						B																	
28	56	144	59	44	31	32	60	57	38	48	49	48	40	59										
29	28	43	49		B																			
30	G	29	G	33	B	B	B																	
31		G	G	B	B	B	G																	
	24		19																					
	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	30	29	28	25	23	17	29	27	28	28	28	28	29	29	29	30	30	30	29	29	30	29	22
MED	G	26	G	G	20	25	24	G	38	42	44	51	56	55	52	53	48	46	40	34	30	18	26	G
U Q	27	41	35	28	32	30	65	25	44	47	50	59	61	66	62	60	64	60	60	44	35	33	40	40
L Q	G	G	G	G	G	G	G	G	30	38	41	45	47	44	41	39	38	35	32	27	26	G	G	G

HOURLY VALUES OF fmin AT Okinawa

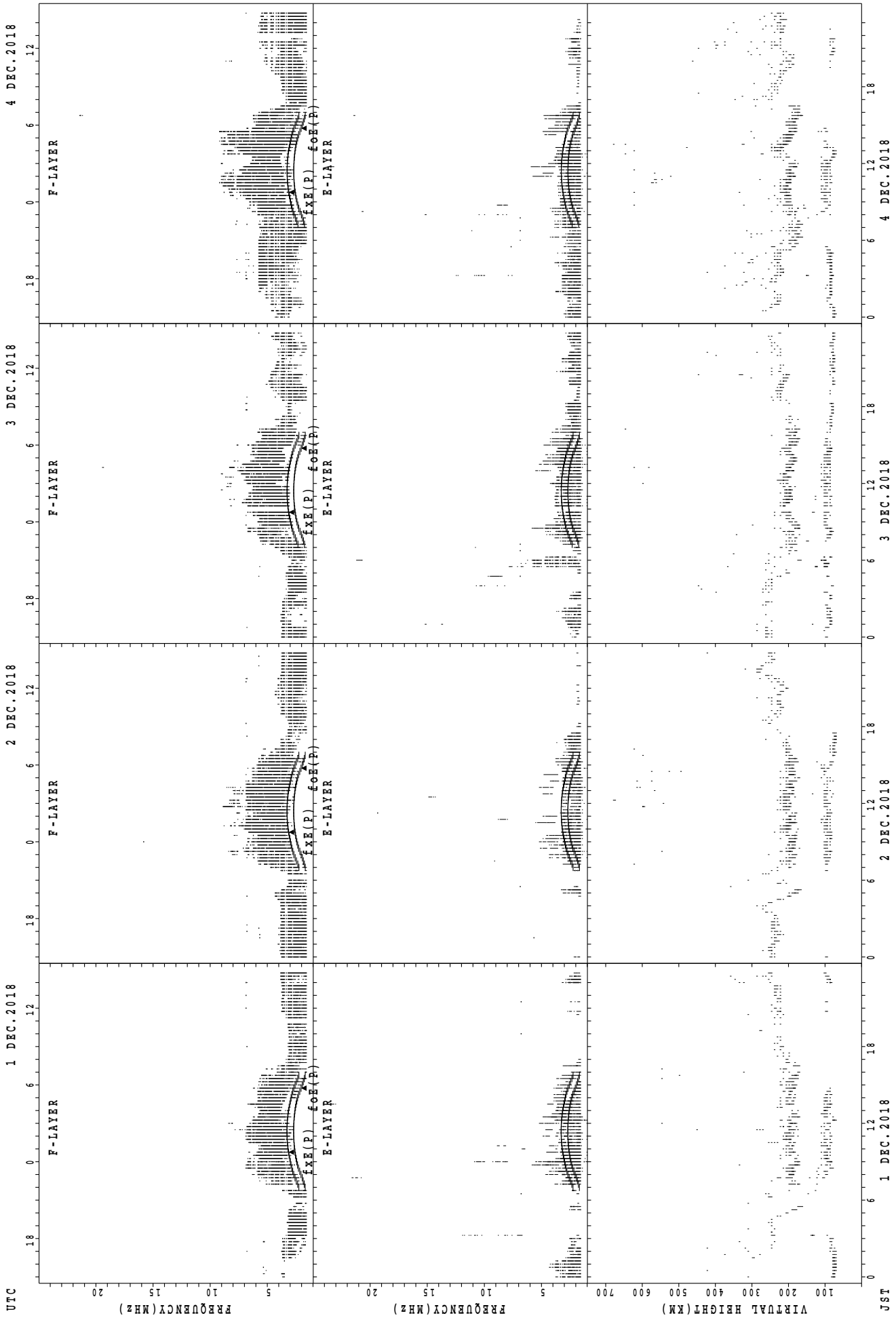
DEC. 2018

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	15	14	14	14	14	14	14	14	14	14	14	14	15	14	14	14	14	17	14	14	14	15	14	B
2	B	14	14	15	B	B	14	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
3	B	B	B	B	B	B	B	B	B	B	B	B	C	14	14	14	14	14	14	14	15	14	14	14
4	14	14	14	14	14	14	17	14	14	14	14	14	14	14	14	14	14	14	14	17	14	14	14	14
5	14	15	14	14	14	14	14	14	14	14	14	14	15	14	14	14	14	14	14	14	14	14	14	B
6	B	14	14	14	15	B	B	14	14	14	14	15	15	15	15	14	14	14	14	14	14	14	14	16
7	B	14	14	14	14	B	16	14	14	15	14	14	14	15	14	14	14	14	14	14	14	14	B	14
8	14	14	14	15	14	16	64	15	14	14	14	14	16	14	14	14	14	15	15	14	14	15	14	17
9	14	14	15	15	14	18	66	15	15	14	14	14	14	16	14	14	14	14	14	14	14	14	14	14
10	15	14	15	14	14	14	B	15	14	14	14	14	15	14	15	14	14	14	14	15	14	15	14	14
11	14	15	14	14	14	14	14	15	14	14	15	15	15	15	14	14	14	14	14	14	14	14	14	B
12	15	14	14	15	15	14	14	16	14	14	14	14	14	14	14	14	14	16	14	14	B	15	15	14
13	14	14	14	14	14	14	14	14	14	14	14	14	15	16	15	15	14	16	15	14	14	14	14	14
14	15	14	14	14	14	14	15	14	14	14	14	14	14	15	14	14	14	14	14	14	15	14	15	B
15	14	14	14	B	B	B	14	14	14	14	15	14	14	14	14	14	14	14	14	14	14	14	14	15
16	14	15	15	14	B	14	14	15	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
17	14	15	14	14	14	14	49	14	14	14	14	14	14	14	14	14	14	18	14	14	14	14	14	14
18	15	14	14	14	14	15	B	14	B	B	B	B	B	B	B	B	14	14	14	14	14	16	14	14
19	14	15	15	16	14	14	B	14	15	14	14	14	14	14	14	14	14	15	14	14	17	14	15	14
20	14	14	B	15	14	14	B	15	14	14	14	15	14	15	14	14	14	14	14	14	14	14	14	15
21	15	14	14	14	14	14	B	15	14	14	14	15	15	14	14	14	15	18	14	14	14	14	14	B
22	14	17	14	14	14	14	B	14	16	14	14	14	14	14	14	14	14	14	14	14	14	14	15	14
23	14	14	14	14	14	14	B	14	14	14	14	14	17	14	14	14	14	14	14	14	14	14	14	14
24	14	14	14	14	14	14	B	14	14	14	14	14	14	15	15	14	14	14	15	14	14	14	14	B
25	14	14	15	15	14	B	B	14	14	14	15	16	14	15	15	14	14	14	14	14	14	14	14	B
26	15	14	14	14	14	15	B	14	15	14	14	14	15	15	14	15	14	15	14	14	14	14	14	14
27	15	14	14	14	14	14	B	14	15	14	14	15	15	16	15	15	14	14	14	14	14	14	14	14
28	14	14	14	15	15	14	14	14	14	14	14	16	16	17	15	14	15	14	14	14	14	14	14	B
29	14	14	14	B	B	14	B	15	14	14	14	15	17	14	14	14	14	14	14	14	14	14	14	14
30	14	14	14	15	B	B	B	14	14	14	14	15	14	14	14	14	14	14	14	14	14	14	14	14
31	14	15	14	15	B	B	B	14	14	14	14	14	14	14	14	14	14	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	27	30	29	28	25	23	17	29	28	28	28	28	28	29	29	29	30	30	30	29	29	30	29	22
MED	14	14	14	14	14	14	15	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
U Q	15	14	14	15	14	14	25	14	14	14	14	15	15	15	14	14	14	15	14	14	14	14	14	14
L Q	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14

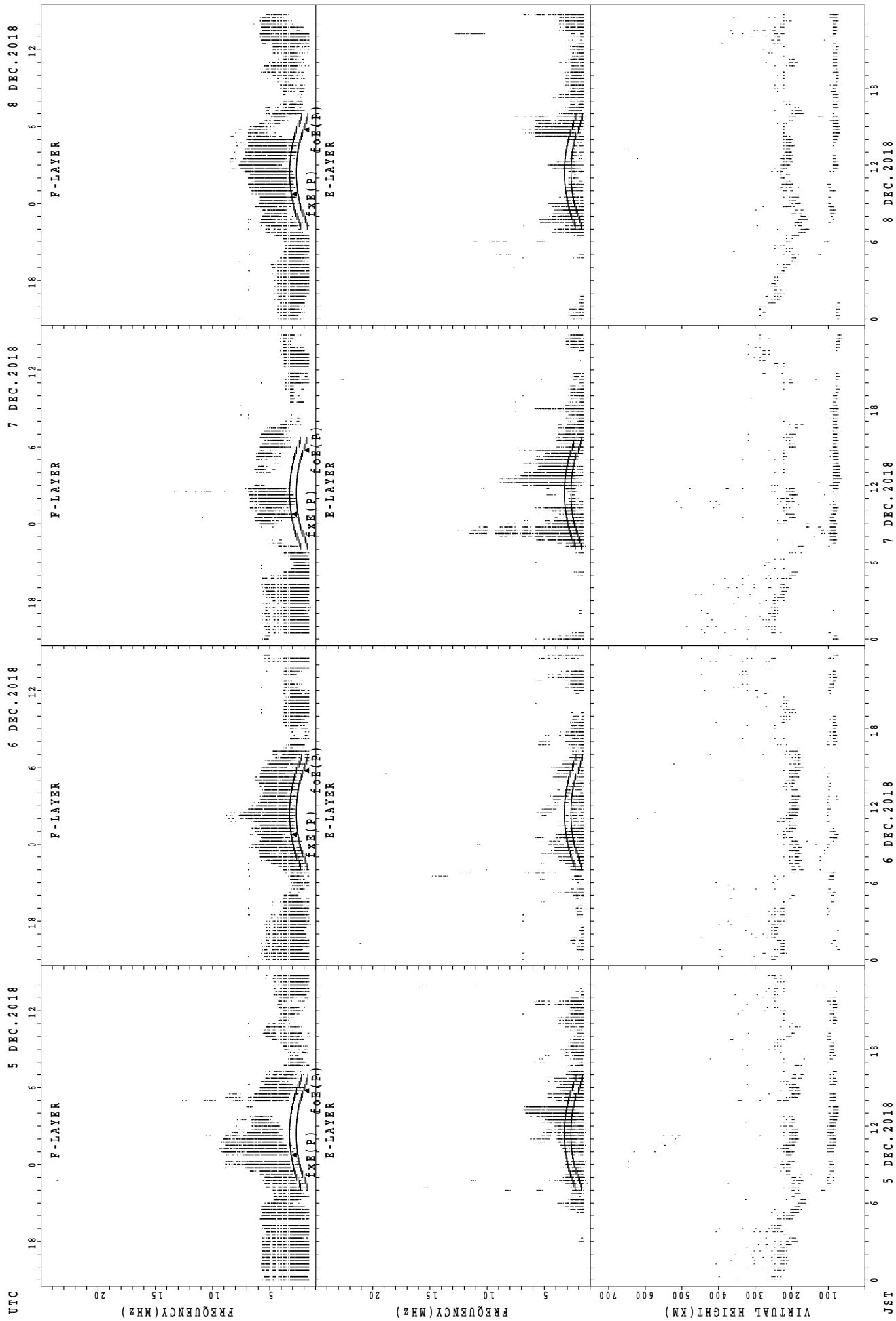


SUMMARY PLOTS AT Wakkanai



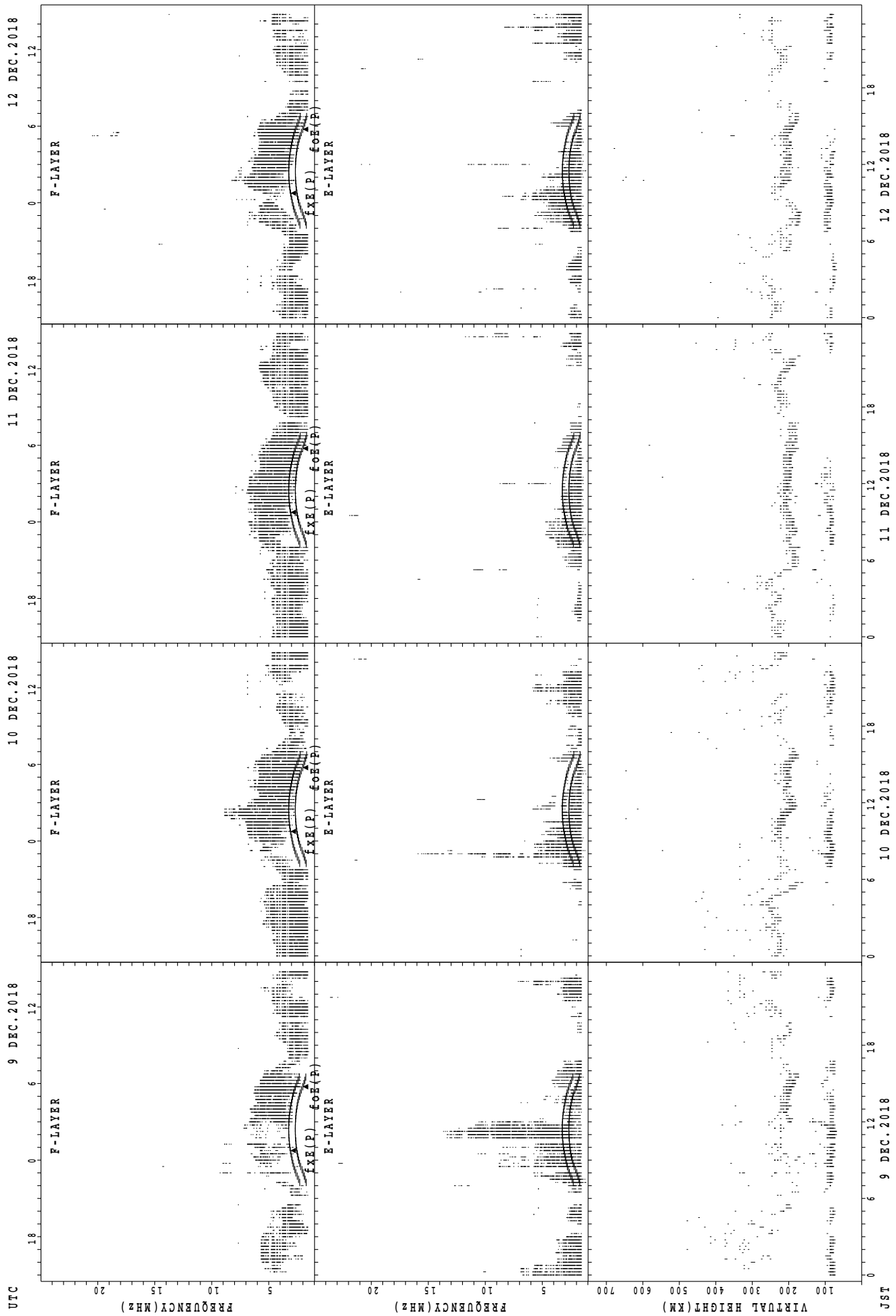
UTC  
1 DEC.2018  
2 DEC.2018  
3 DEC.2018  
4 DEC.2018  
JST  
f<sub>x</sub>E(P); PREDICTED VALUE FOR f<sub>x</sub>E  
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Wakkanai



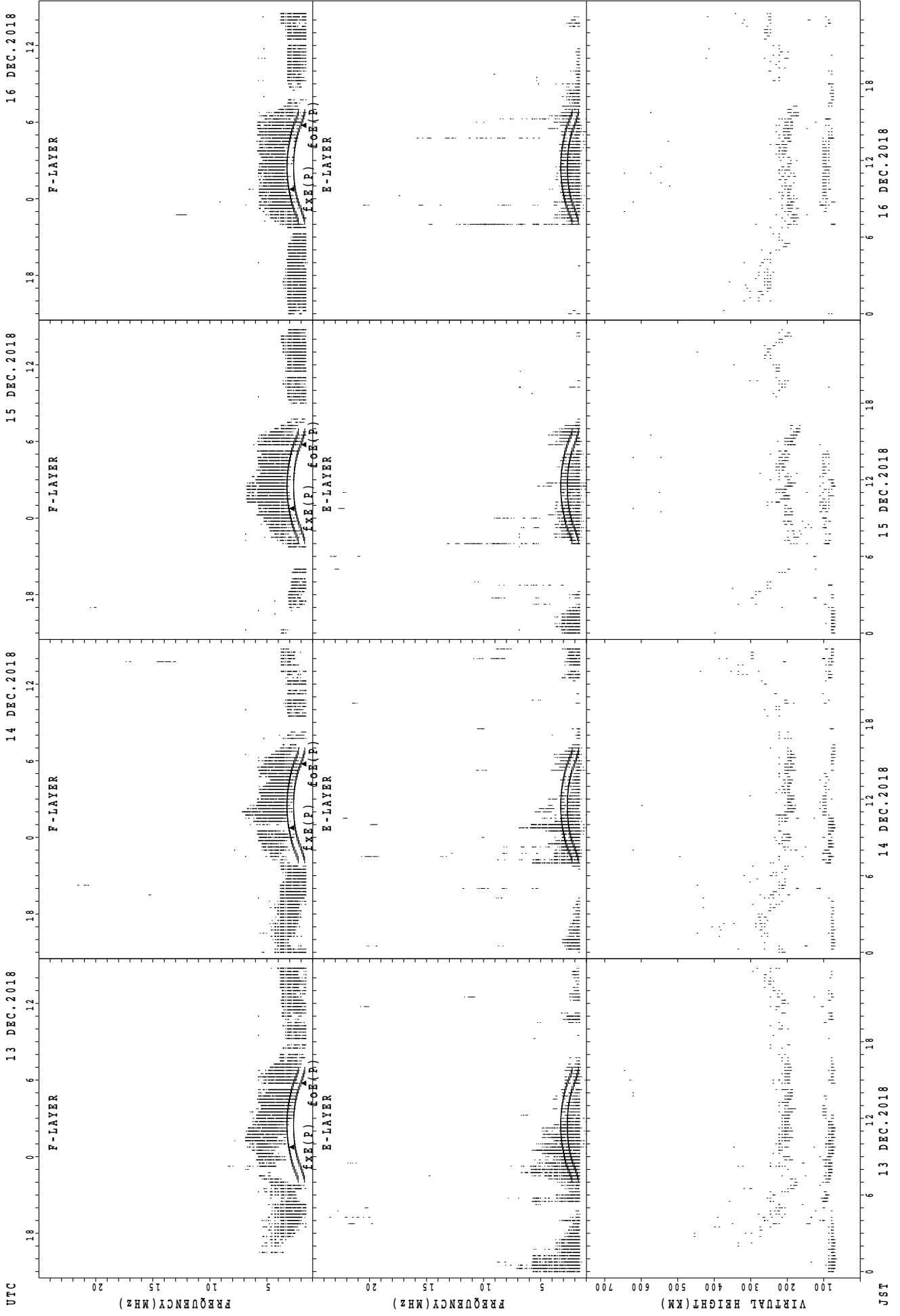
f<sub>oX</sub>(P); PREDICTED VALUE FOR f<sub>oX</sub>  
 f<sub>oE</sub>(P); PREDICTED VALUE FOR f<sub>oE</sub>

SUMMARY PLOTS AT Wakkanai



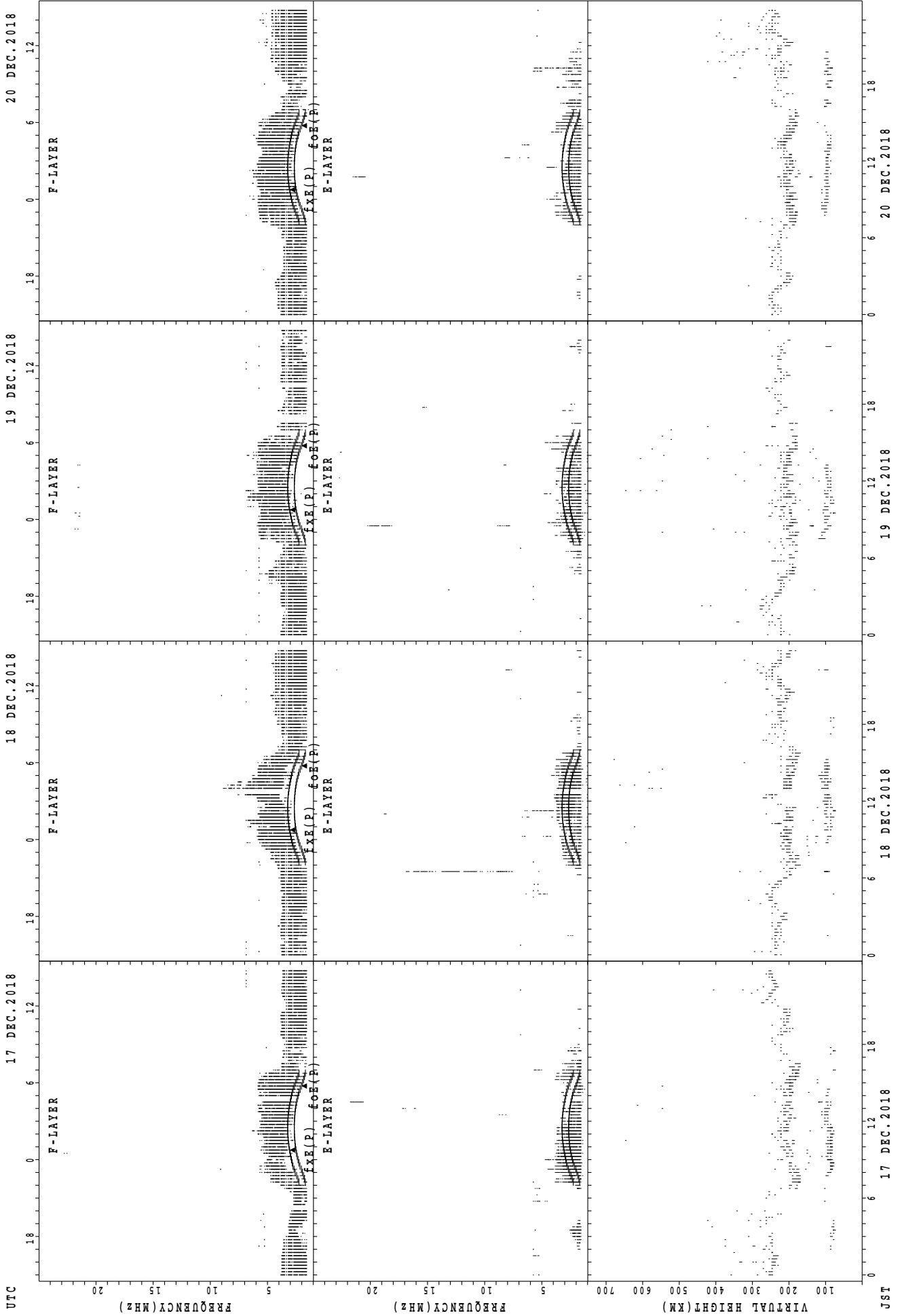
fxE(P); PREDICTED VALUE FOR fxe  
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Wakkanai



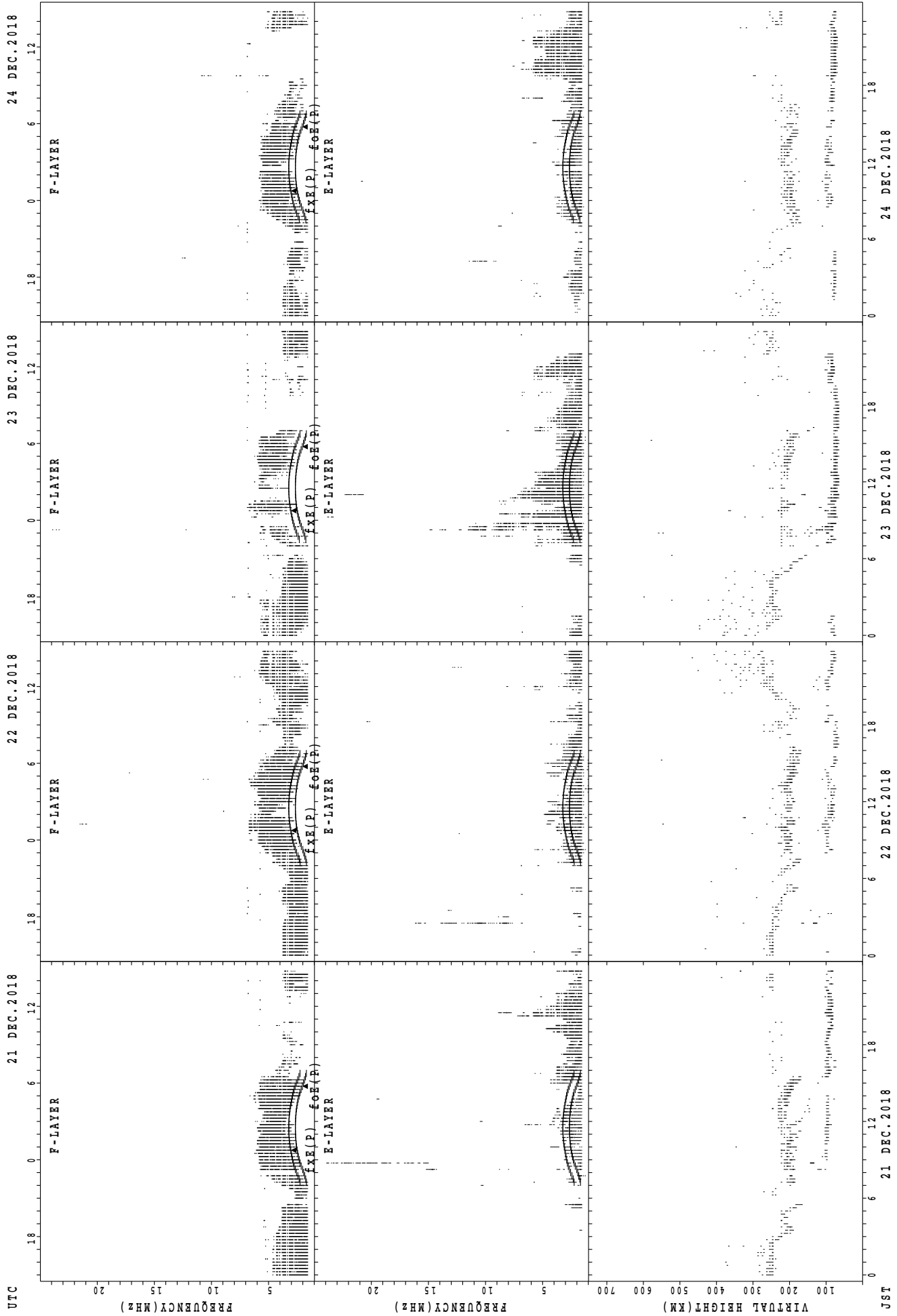
foF2(P); PREDICTED VALUE FOR foF2  
 fxF2(P); PREDICTED VALUE FOR fxF2

SUMMARY PLOTS AT Wakkanai



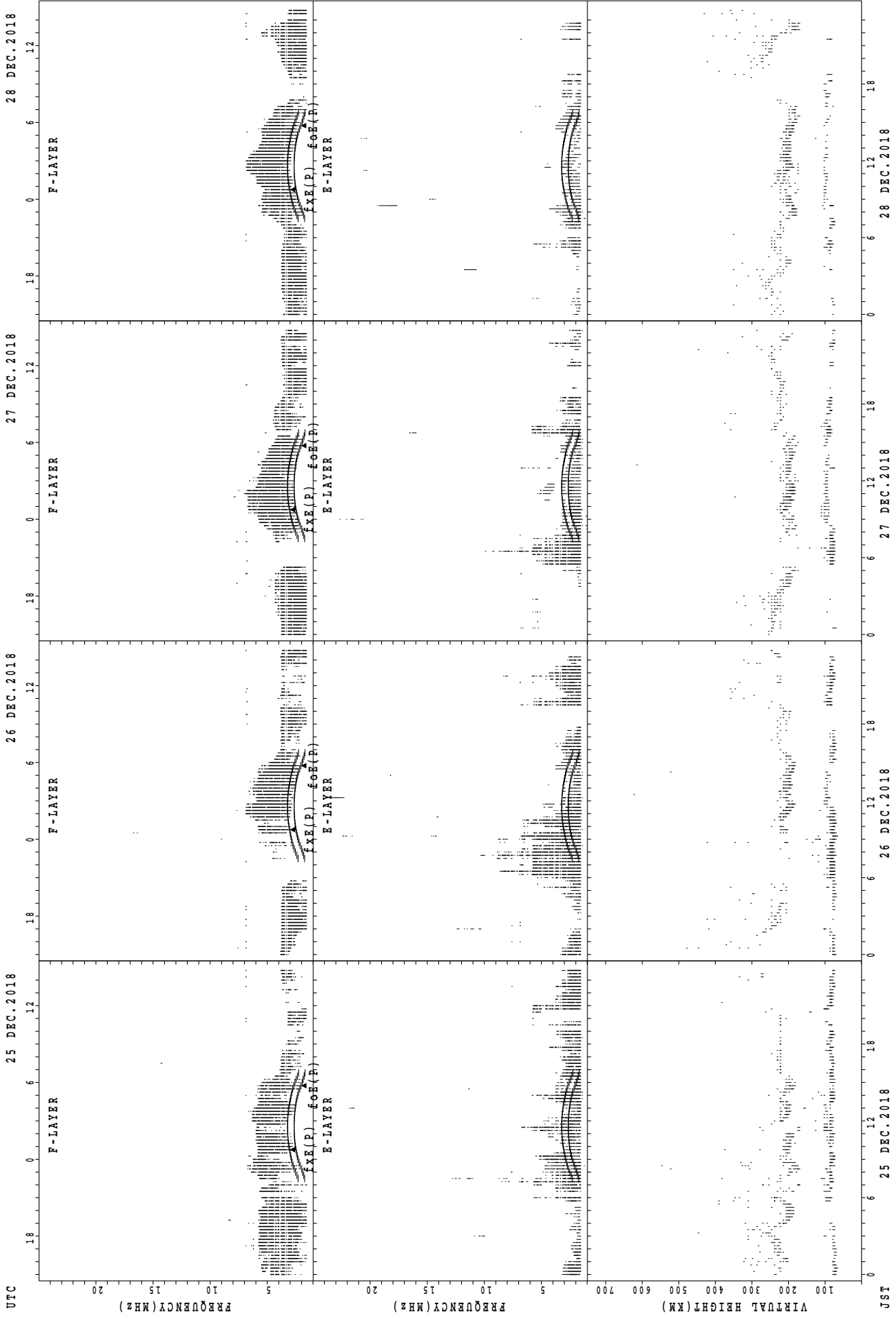
fxe(P); PREDICTED VALUE FOR fxe  
foe(P); PREDICTED VALUE FOR foe

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

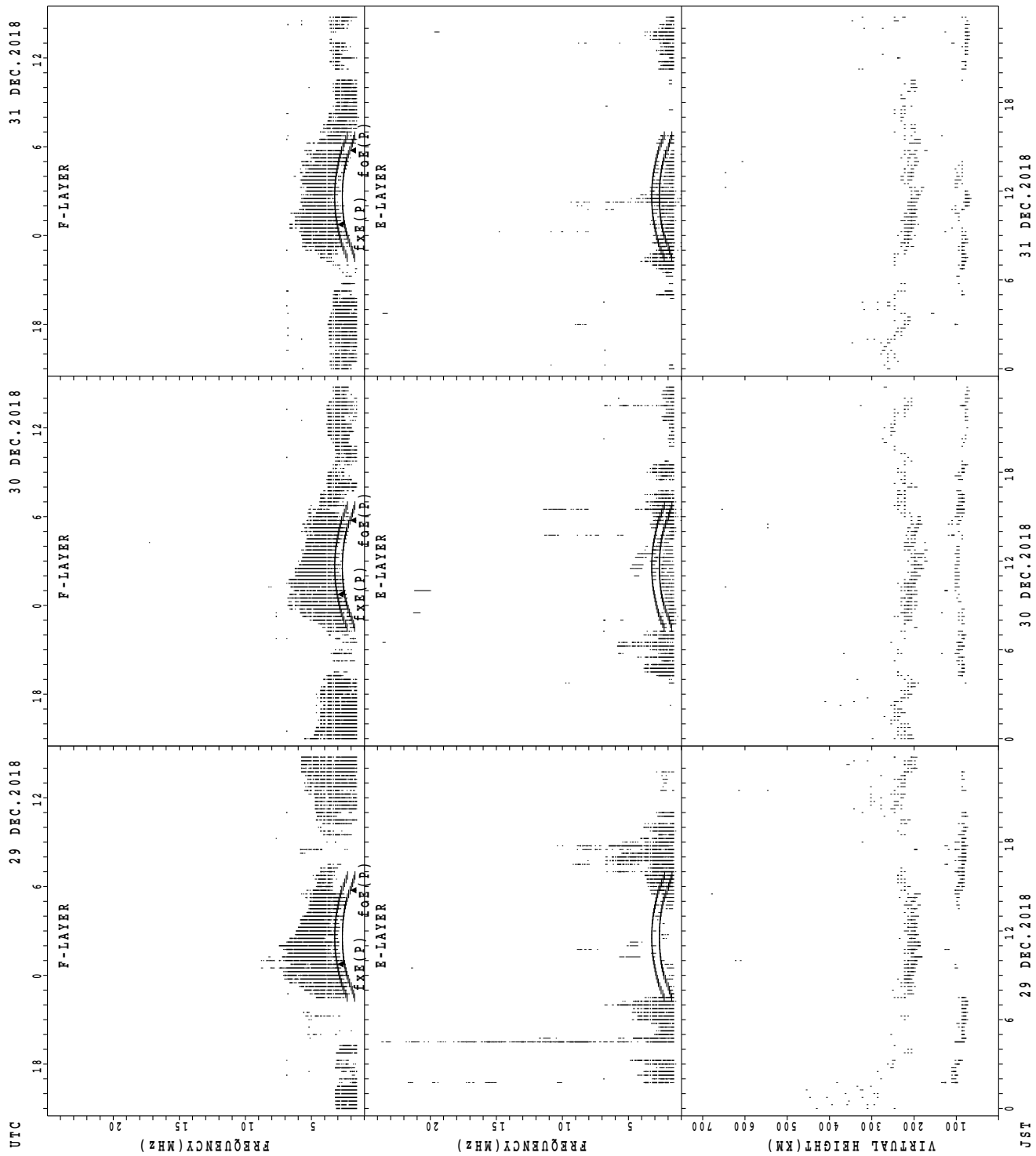


UTC  
25 DEC.2018  
26 DEC.2018  
27 DEC.2018  
28 DEC.2018

JST  
25 DEC.2018  
26 DEC.2018  
27 DEC.2018  
28 DEC.2018

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

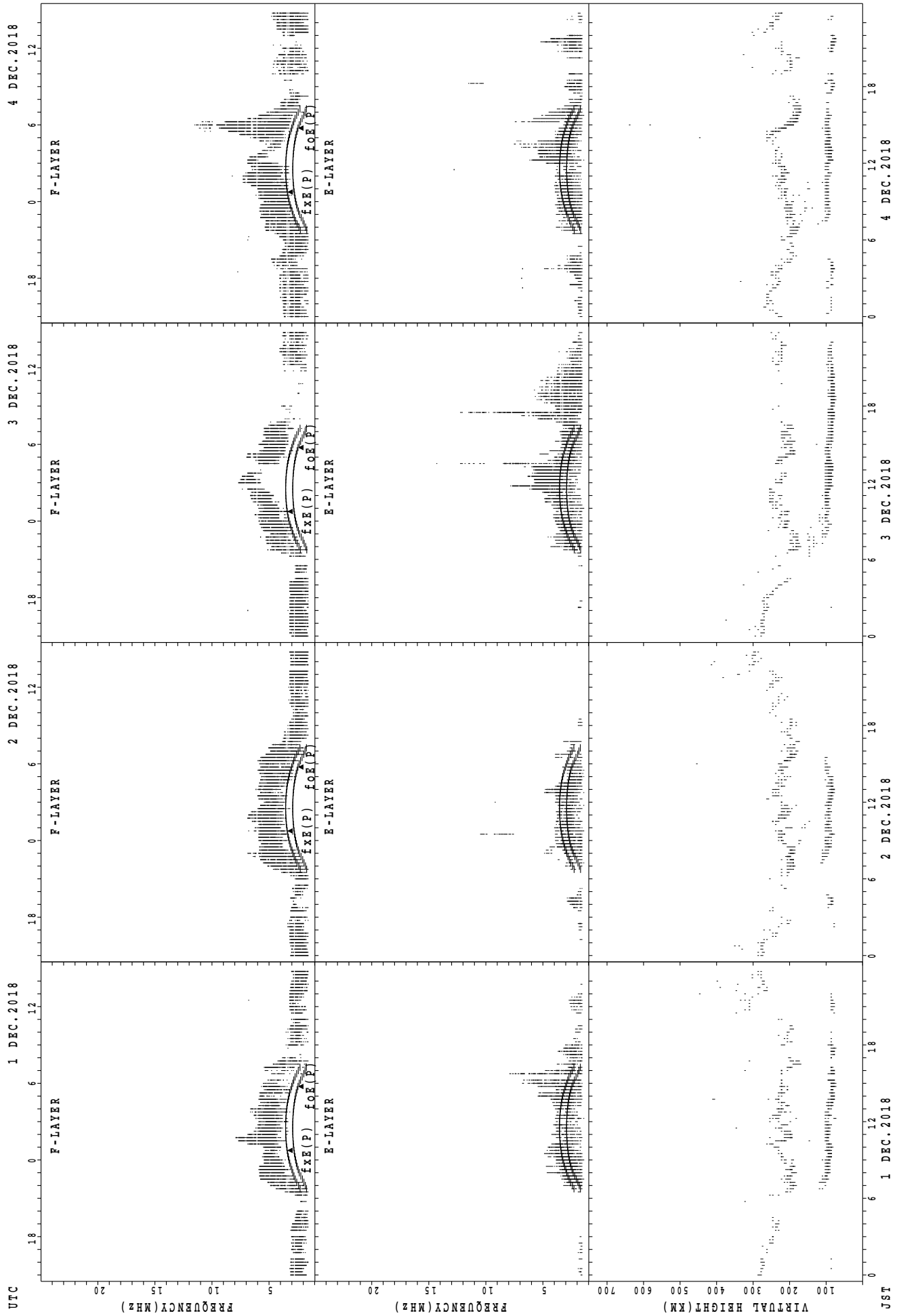
SUMMARY PLOTS AT Wakkanai



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

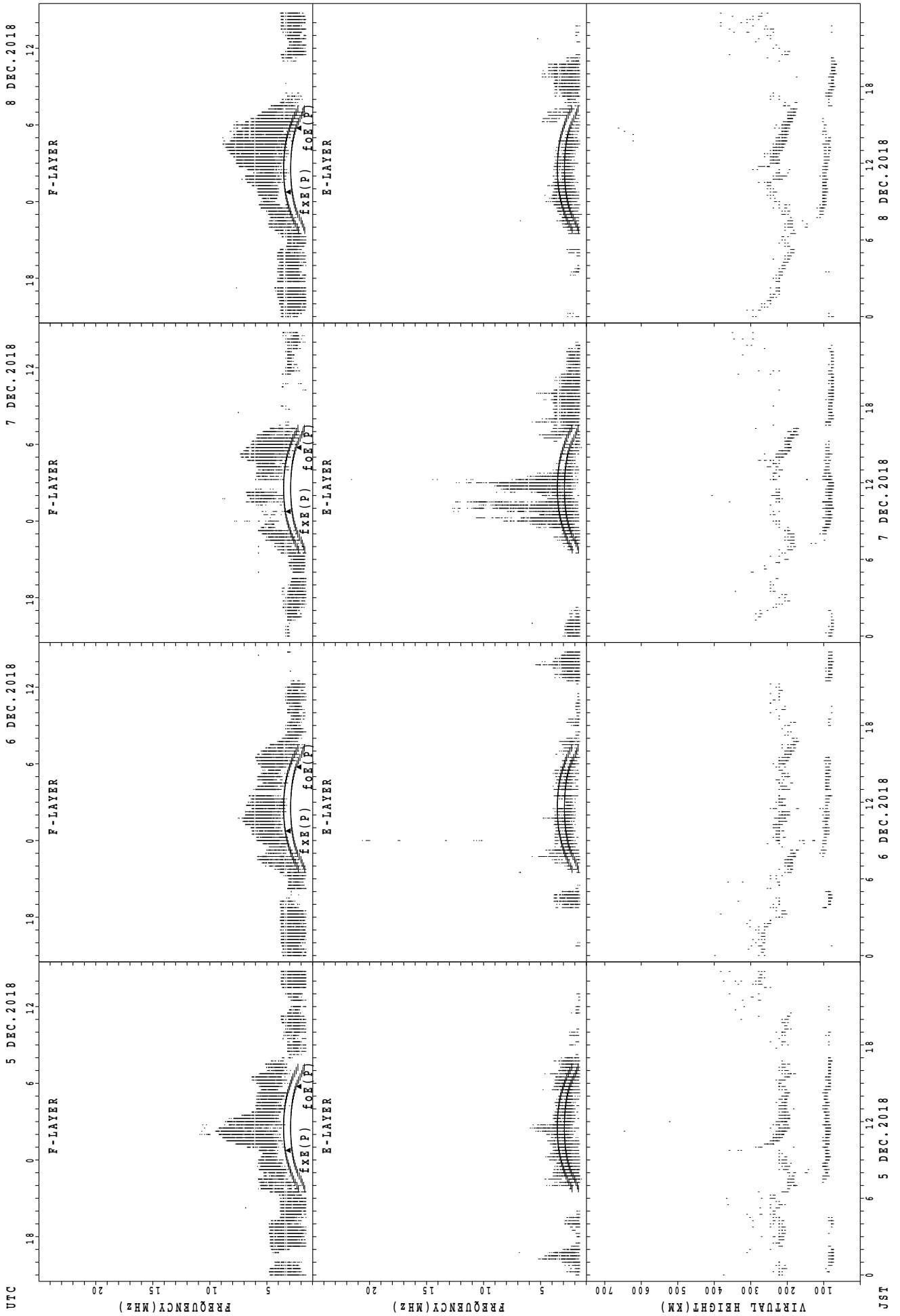


SUMMARY PLOTS AT Kokubunji



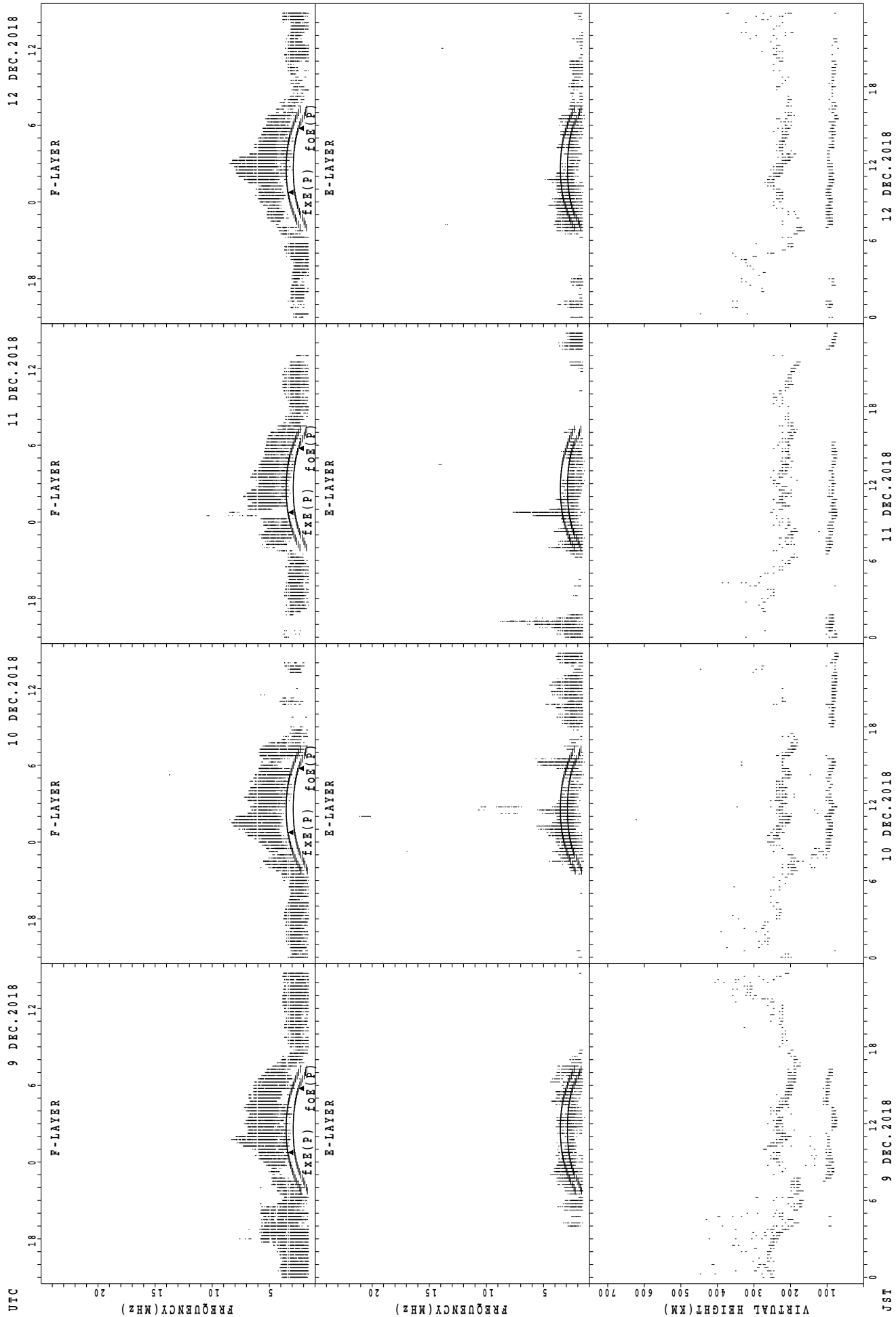
fxe(P); PREDICTED VALUE FOR fxe  
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Kokubunji



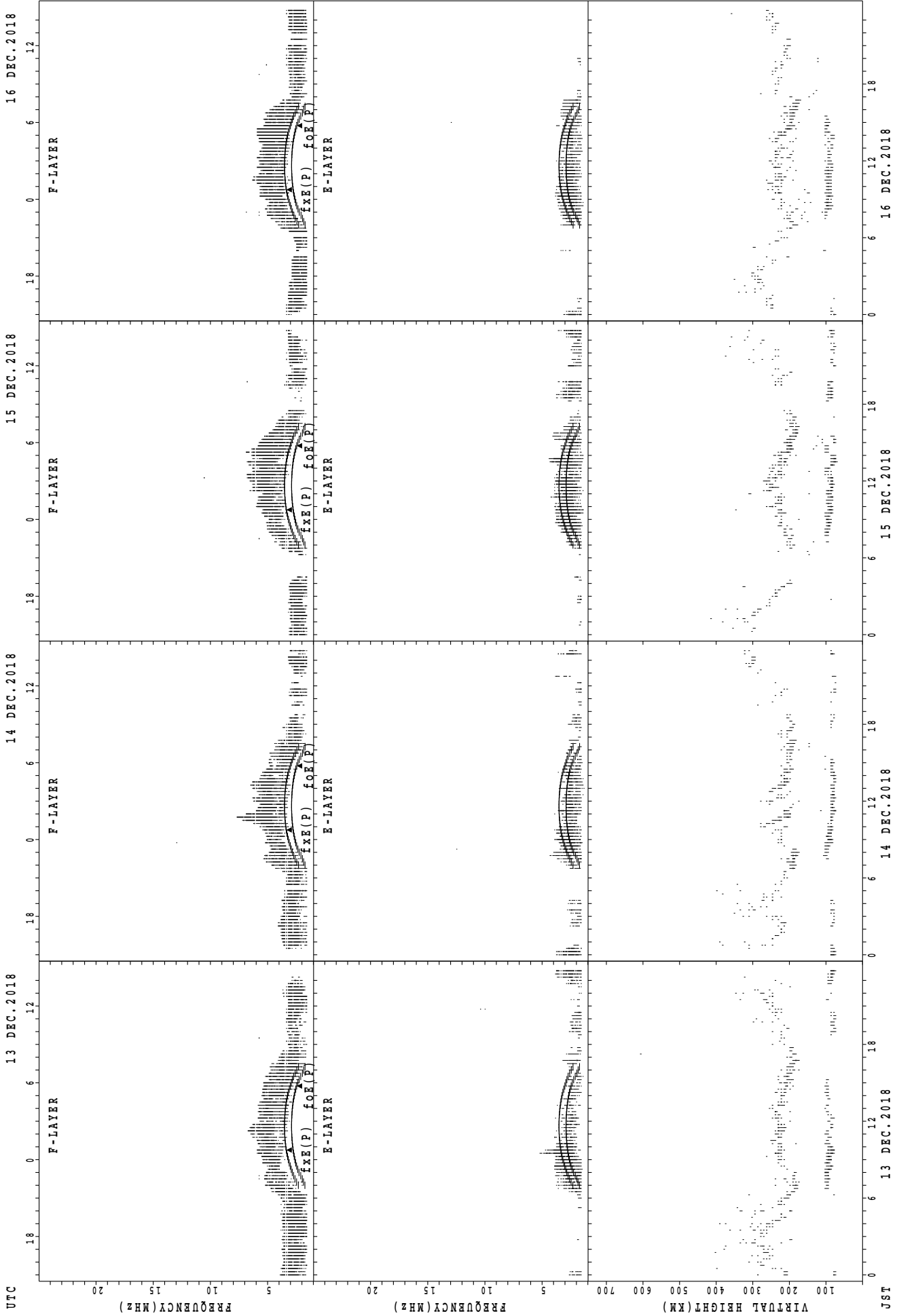
fxe(P); PREDICTED VALUE FOR fxe  
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Kokubunji



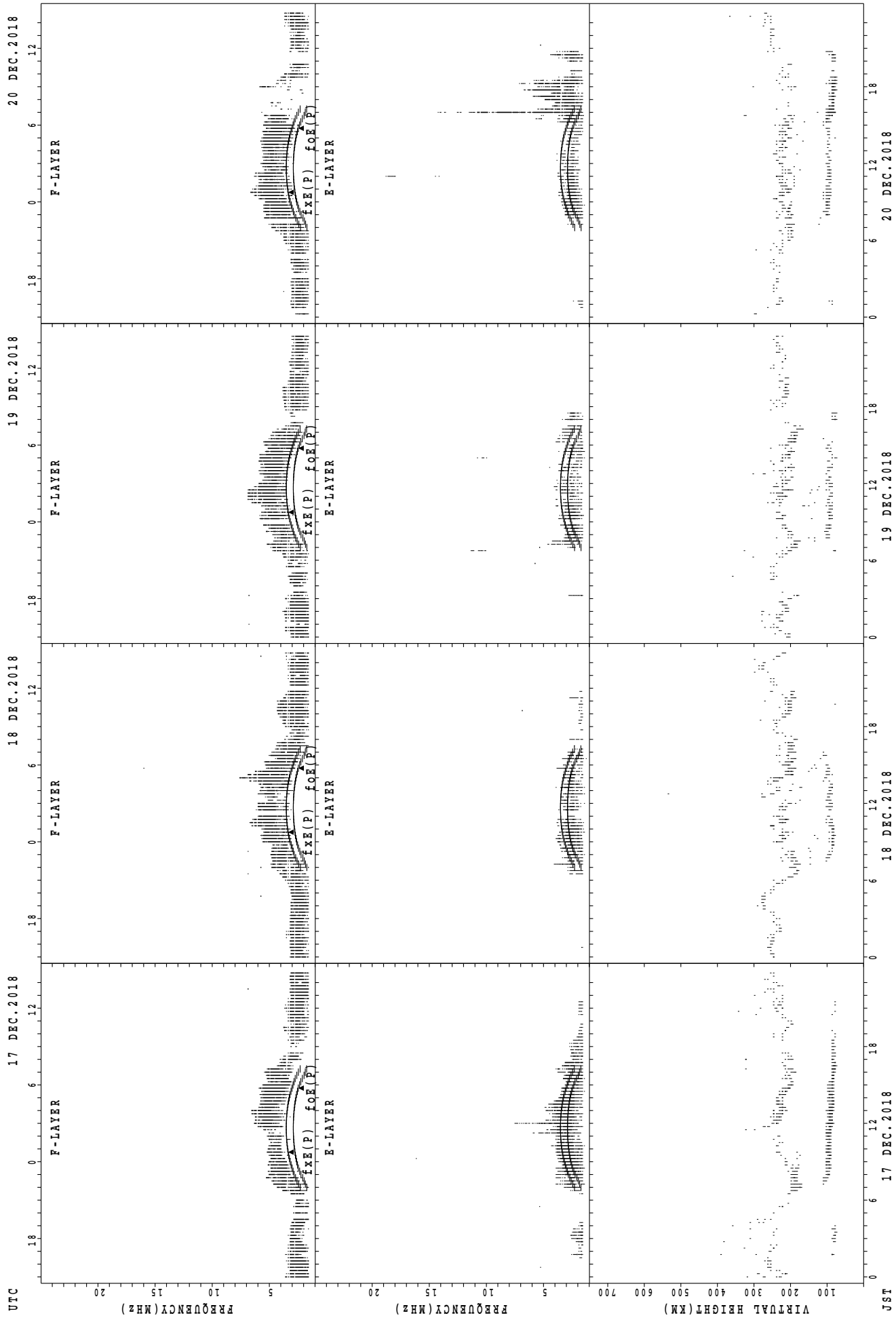
fxe(P); PREDICTED VALUE FOR fxe  
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Kokubunji



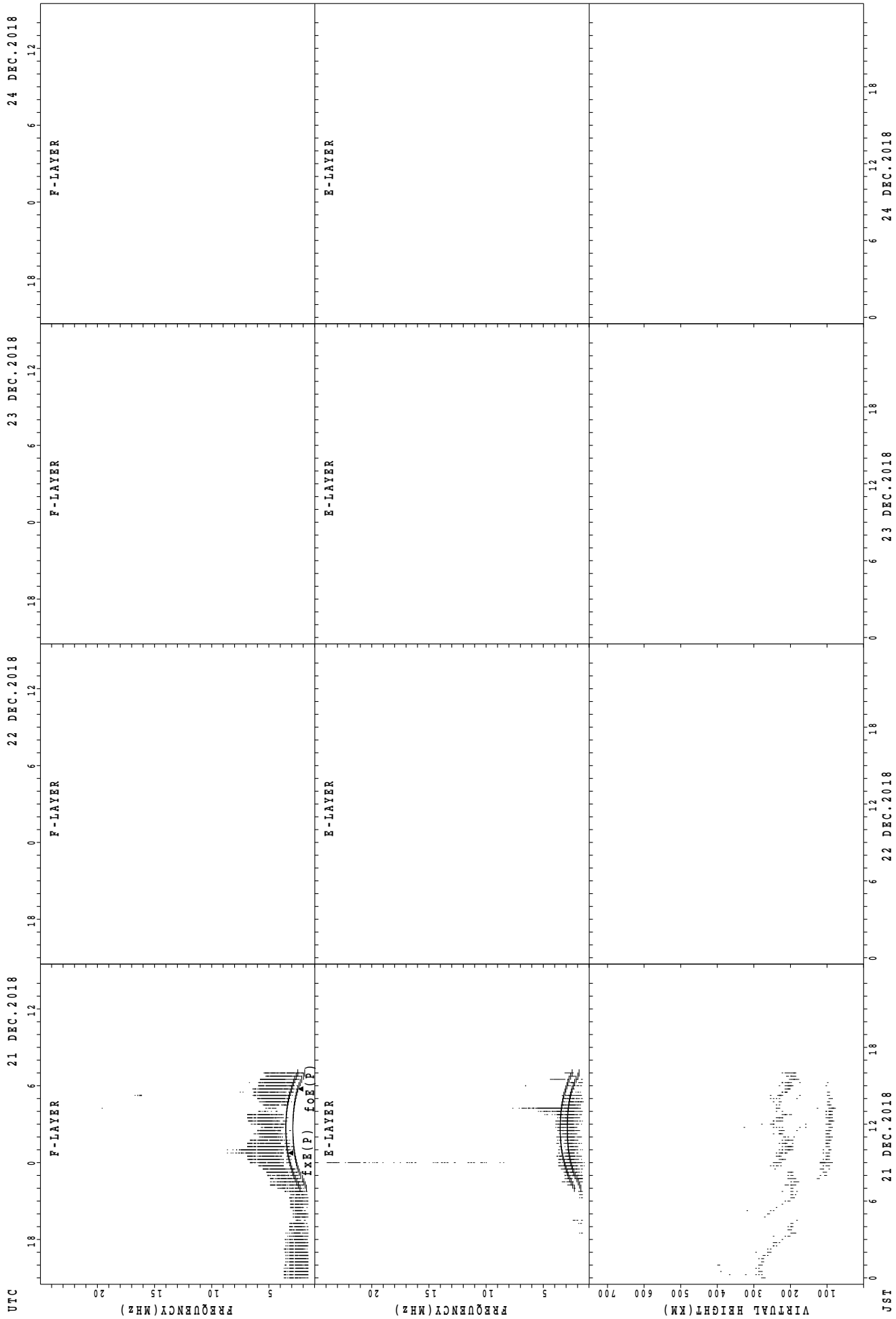
fxe(P); PREDICTED VALUE FOR fxe  
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Kokubunji



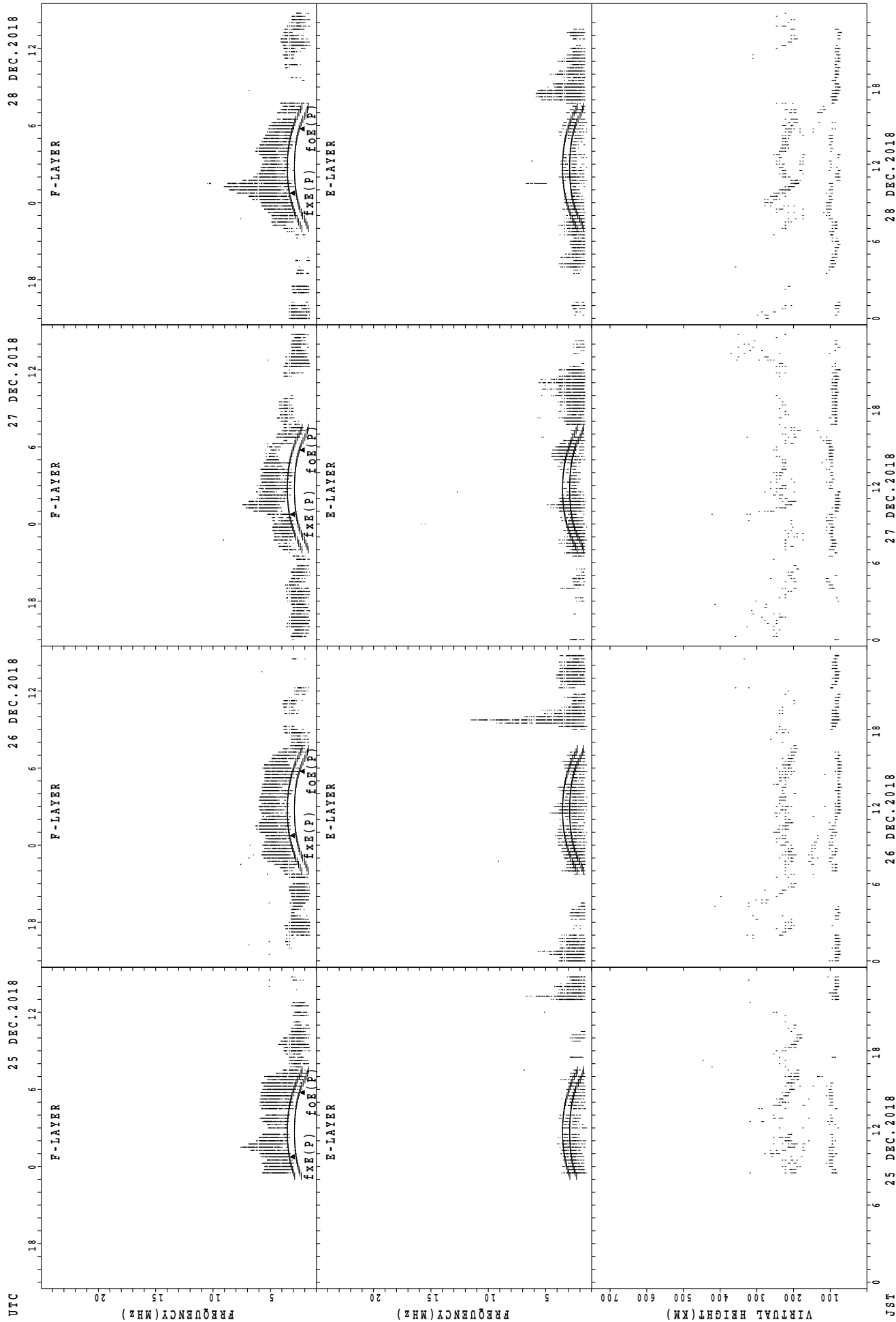
fxe(P); PREDICTED VALUE FOR fxe  
fox(P); PREDICTED VALUE FOR fox

SUMMARY PLOTS AT Kokubunji



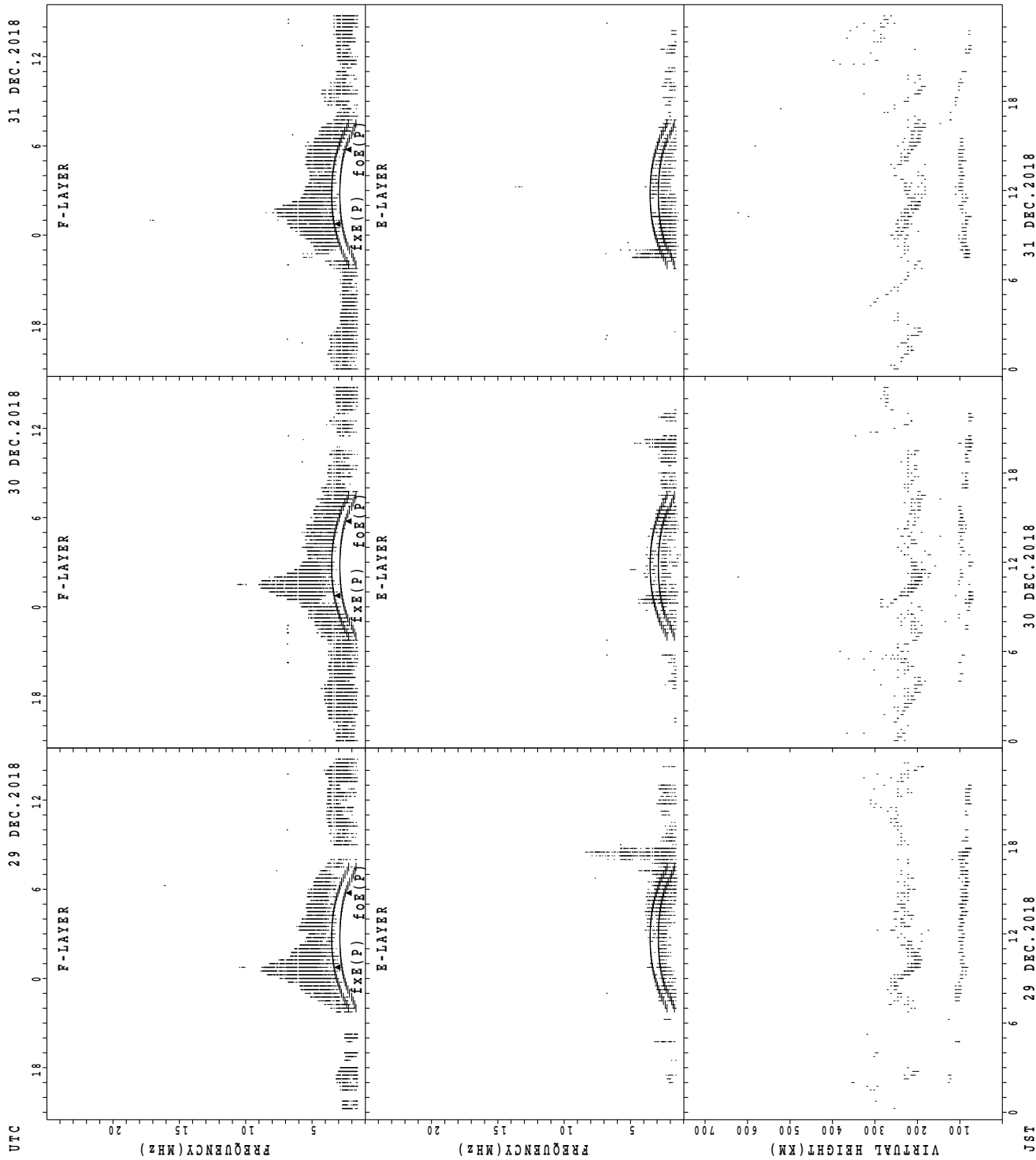
$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $f_oE(P)$ ; PREDICTED VALUE FOR  $f_oE$

SUMMARY PLOTS AT Kokubunji



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

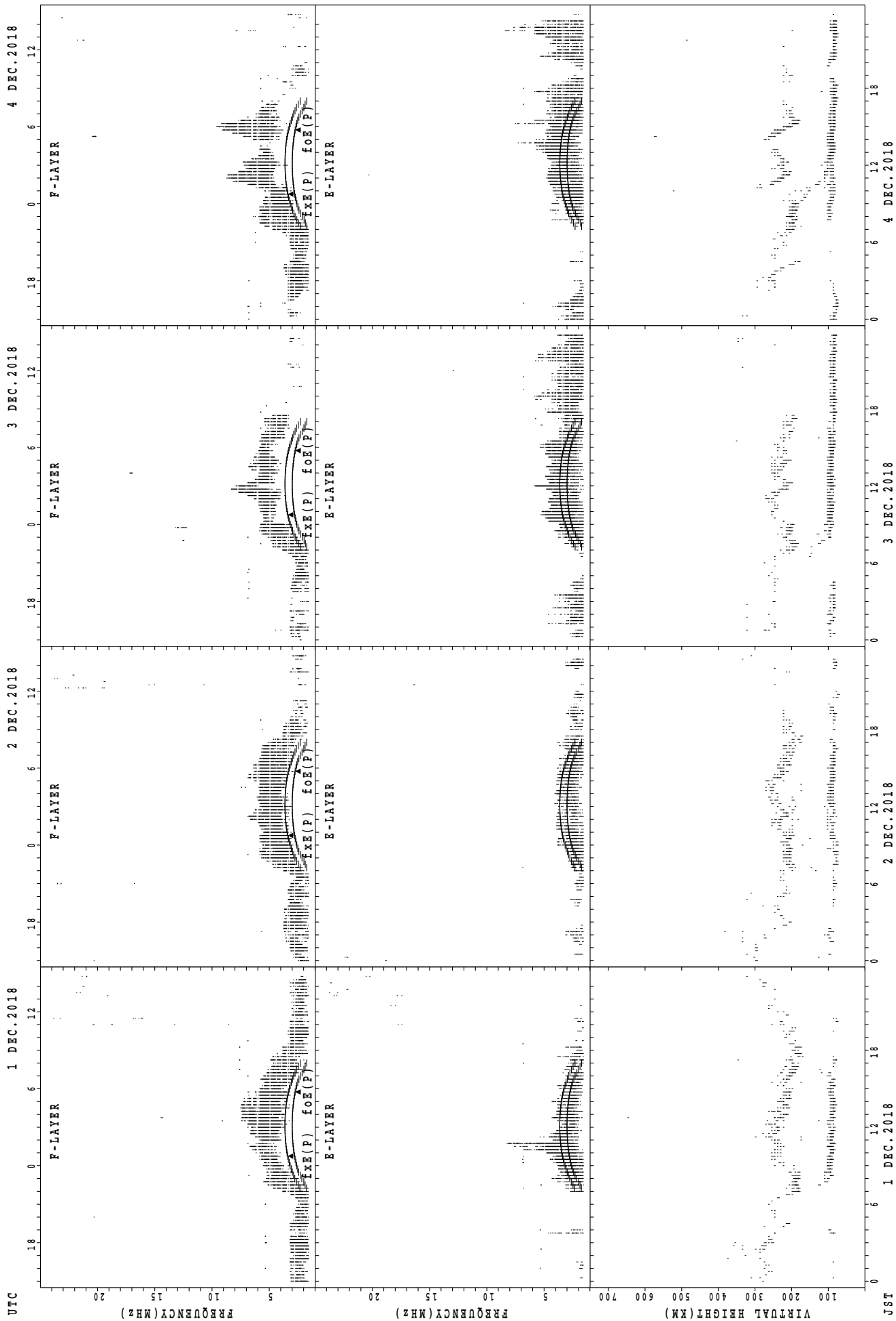
SUMMARY PLOTS AT Kokubunji



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

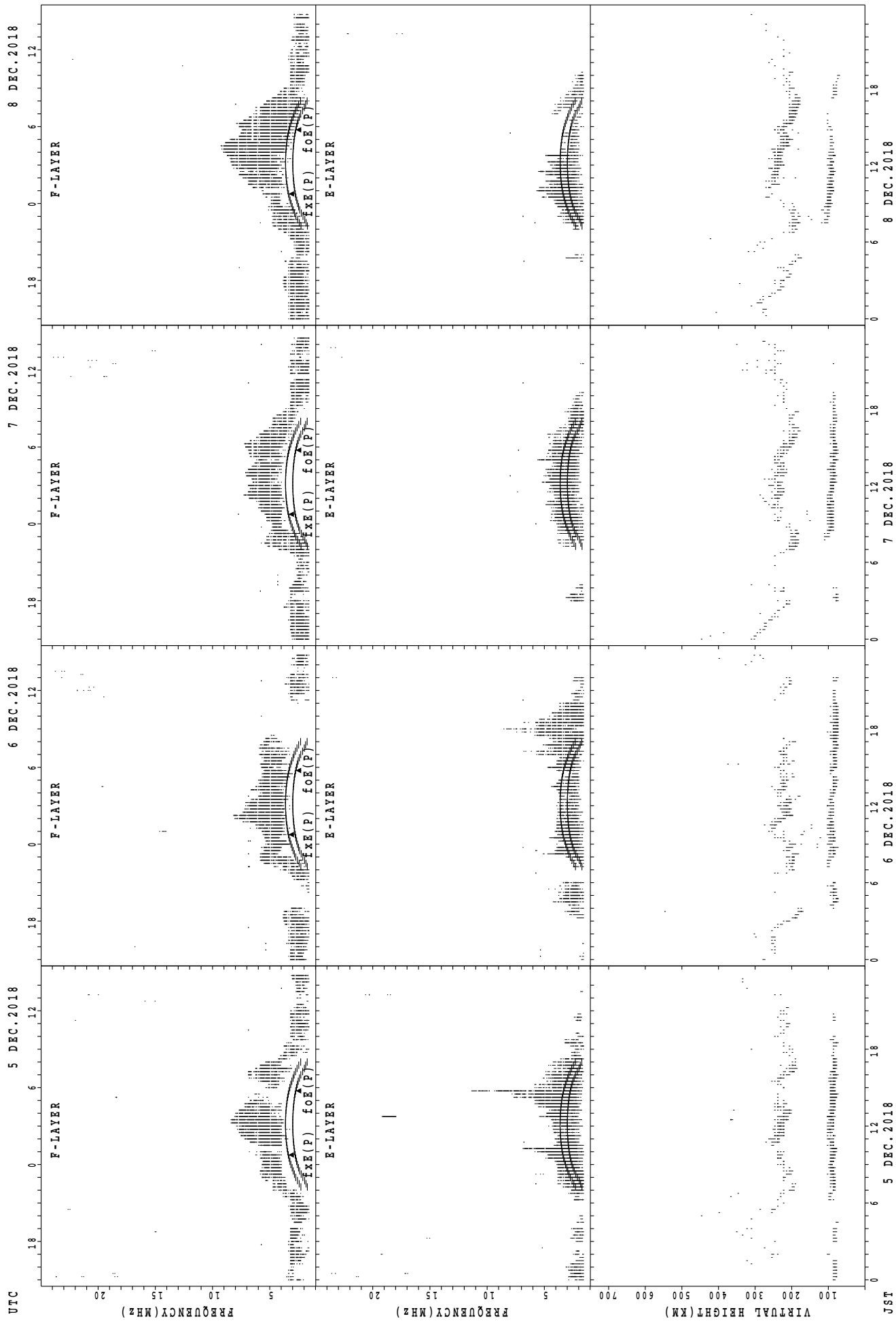


SUMMARY PLOTS AT Yamagawa



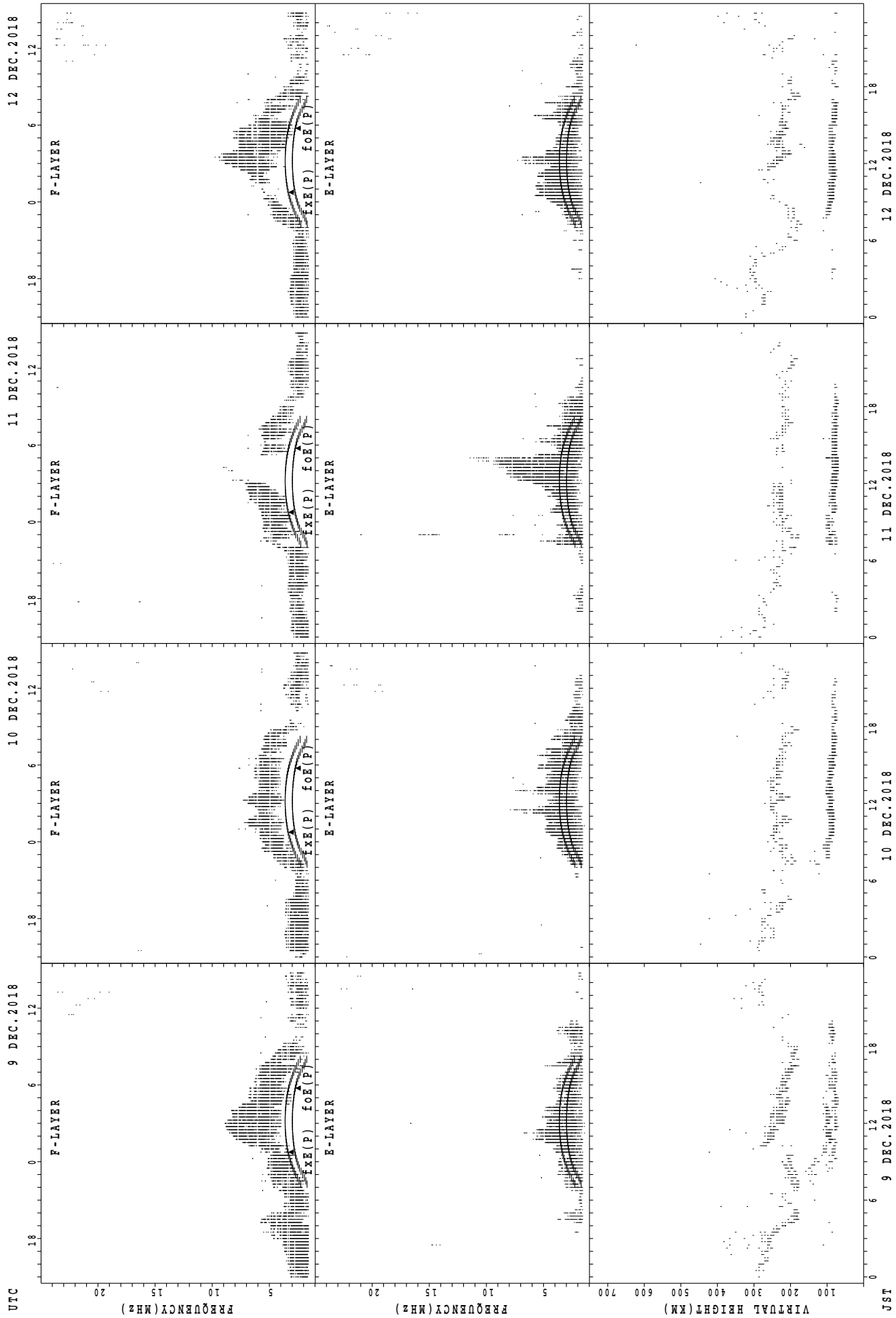
f<sub>xh</sub>(P); PREDICTED VALUE FOR f<sub>xh</sub>  
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa



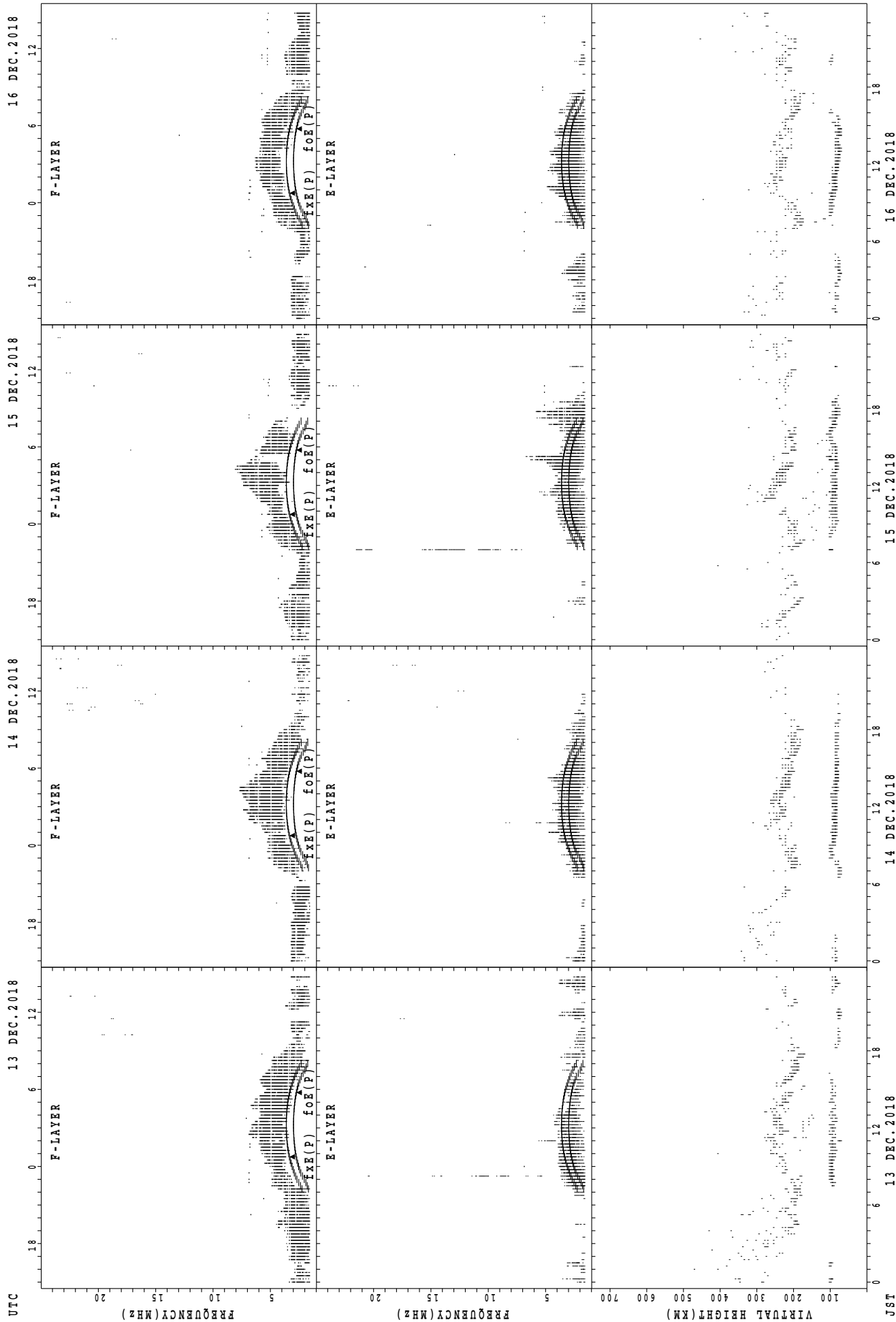
fxe(p); PREDICTED VALUE FOR fxe  
foE(p); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa



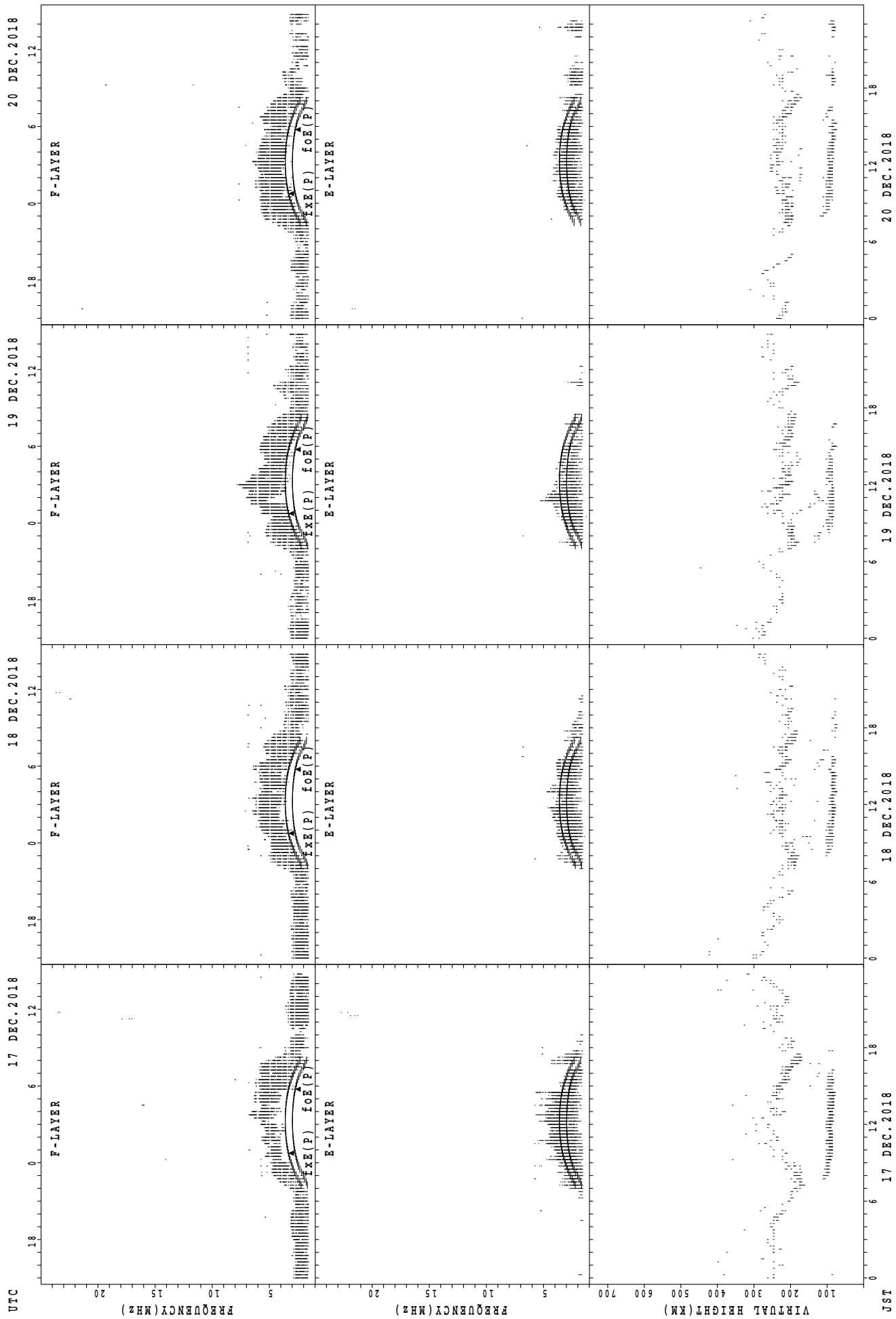
fxe(P); PREDICTED VALUE FOR fxe  
foE(P); PREDICTED VALUE FOR foE

**SUMMARY PLOTS AT Yamagawa**



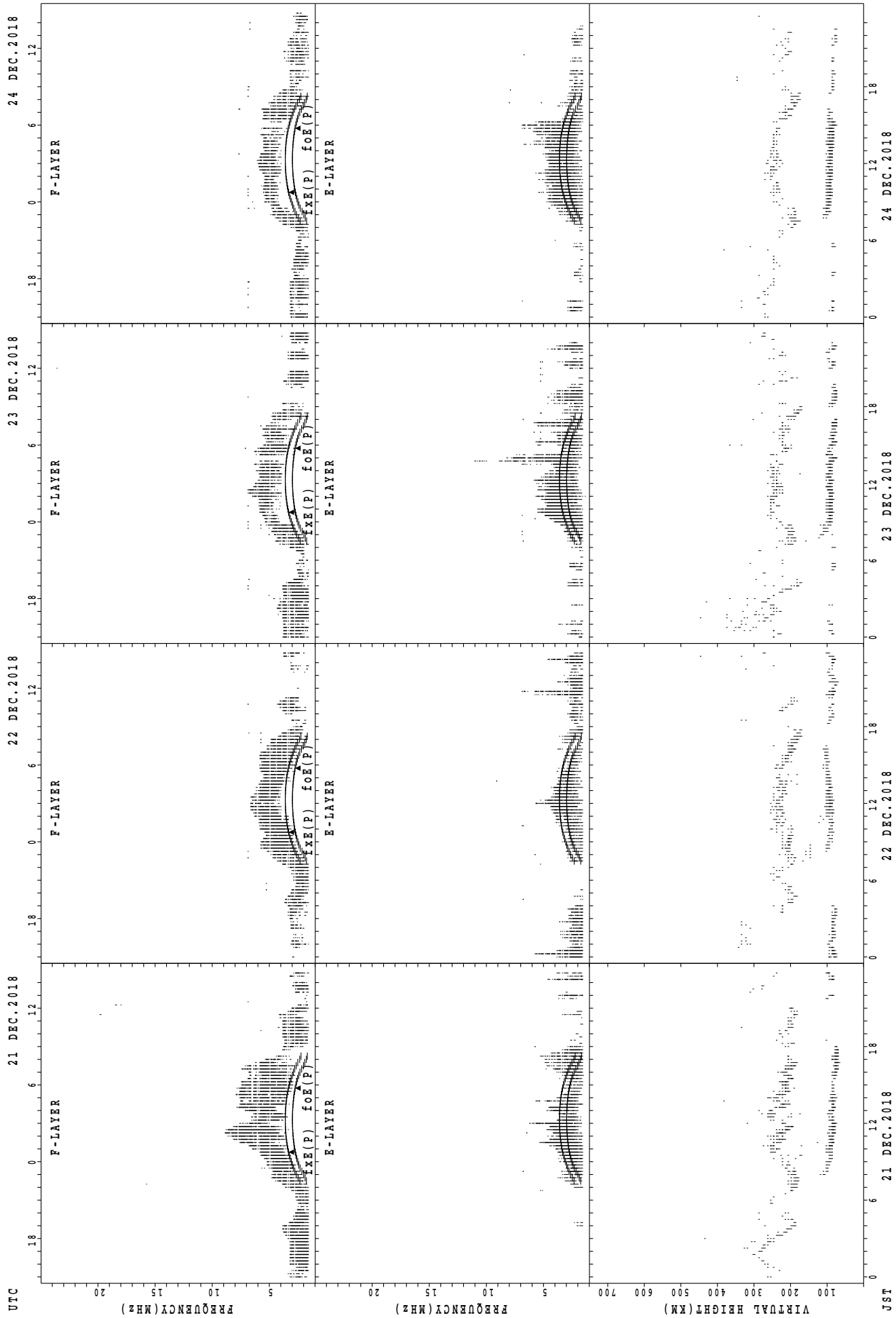
fxE(P); PREDICTED VALUE FOR fxE  
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa



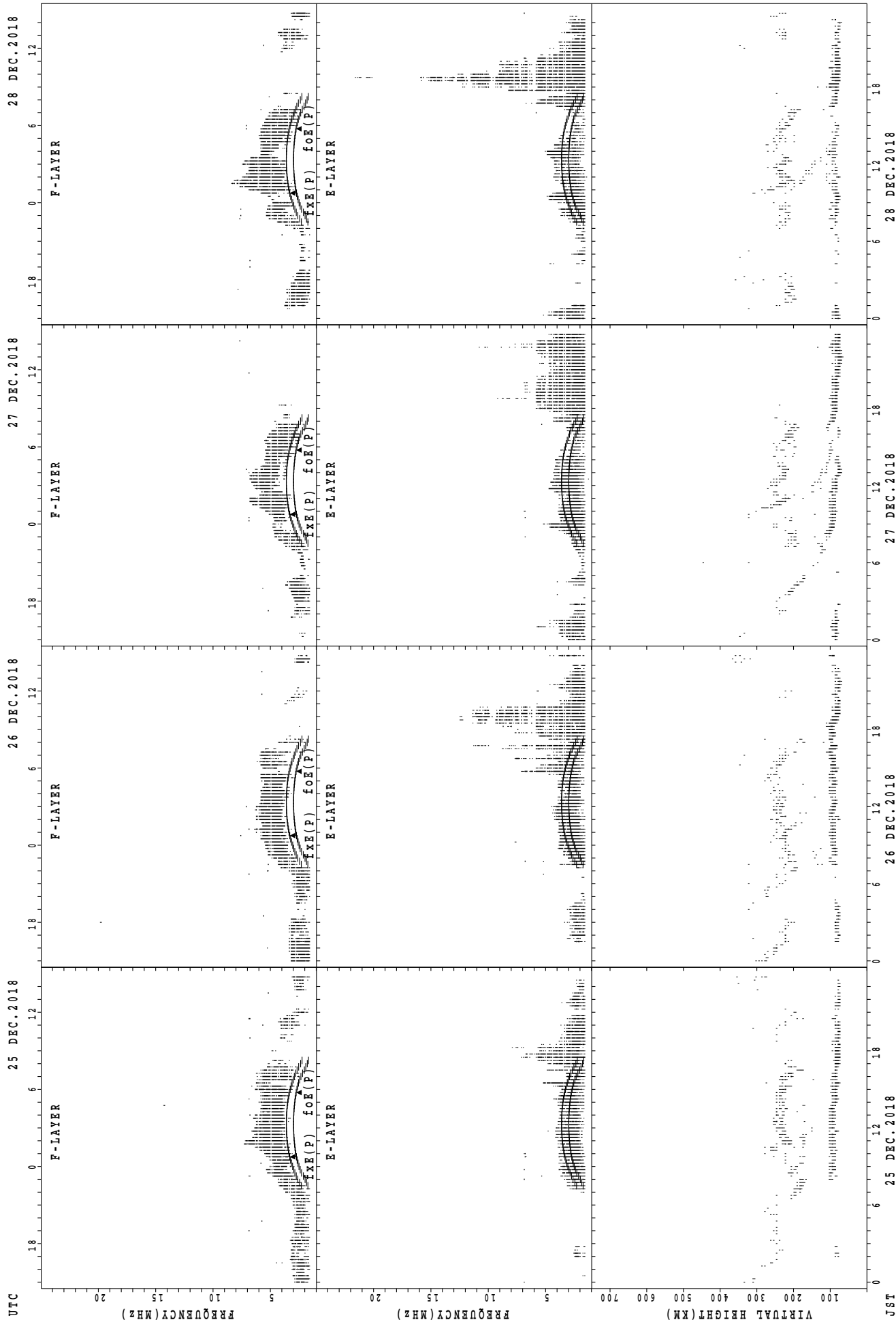
$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $f_oE(P)$ ; PREDICTED VALUE FOR  $f_oE$

SUMMARY PLOTS AT Yamagawa



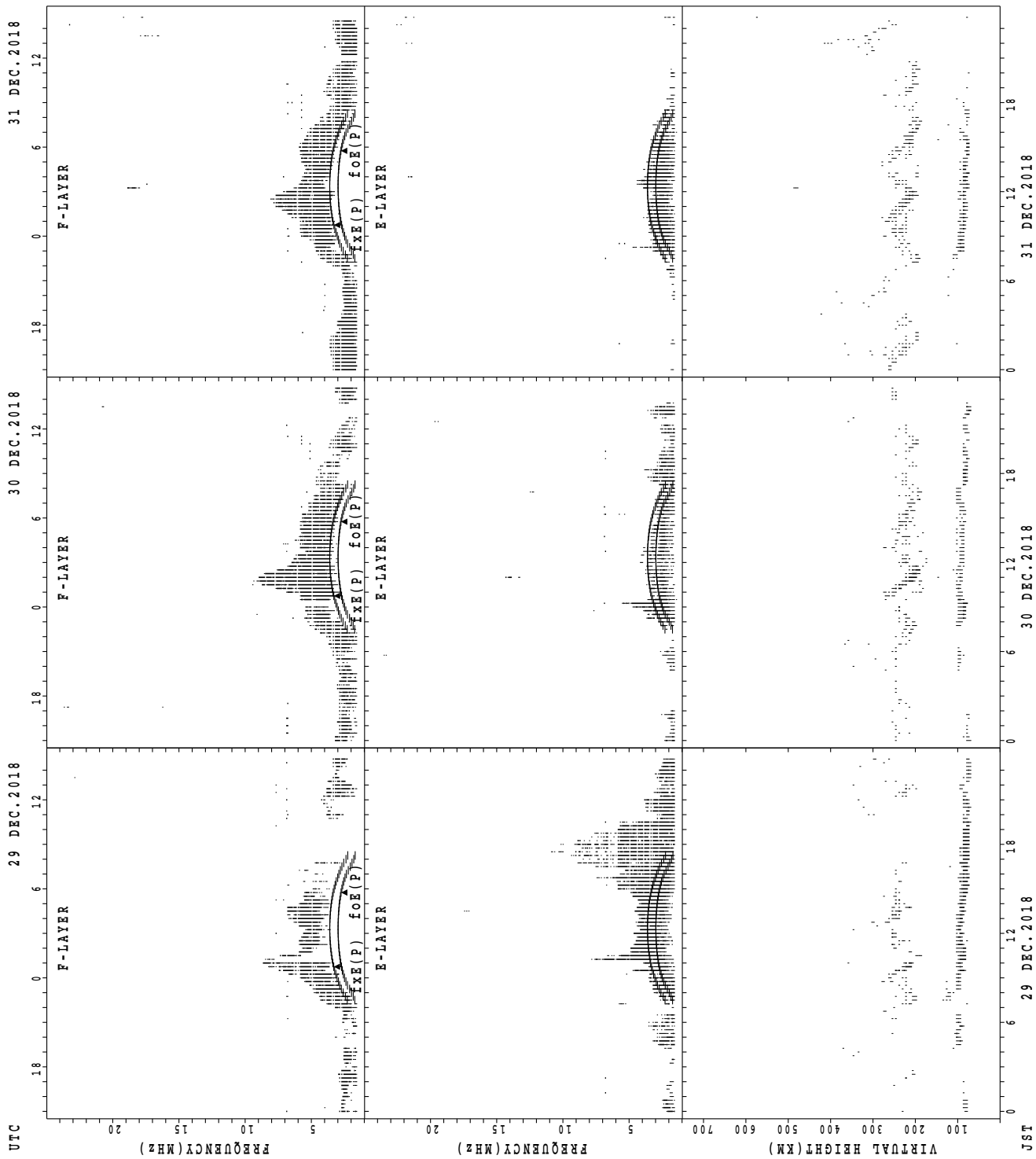
fxe(P); PREDICTED VALUE FOR fxe  
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa



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

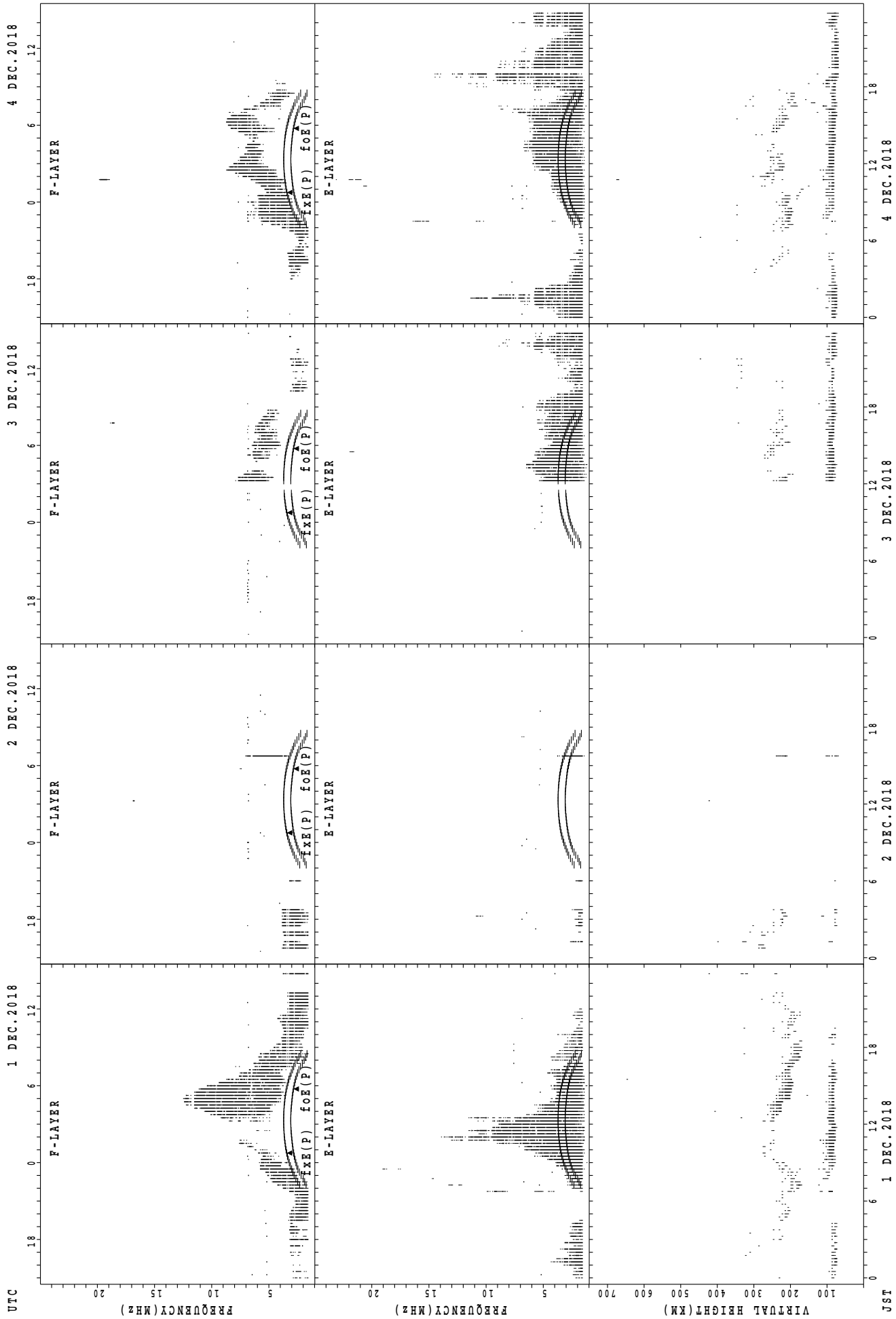
SUMMARY PLOTS AT Yamagawa



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

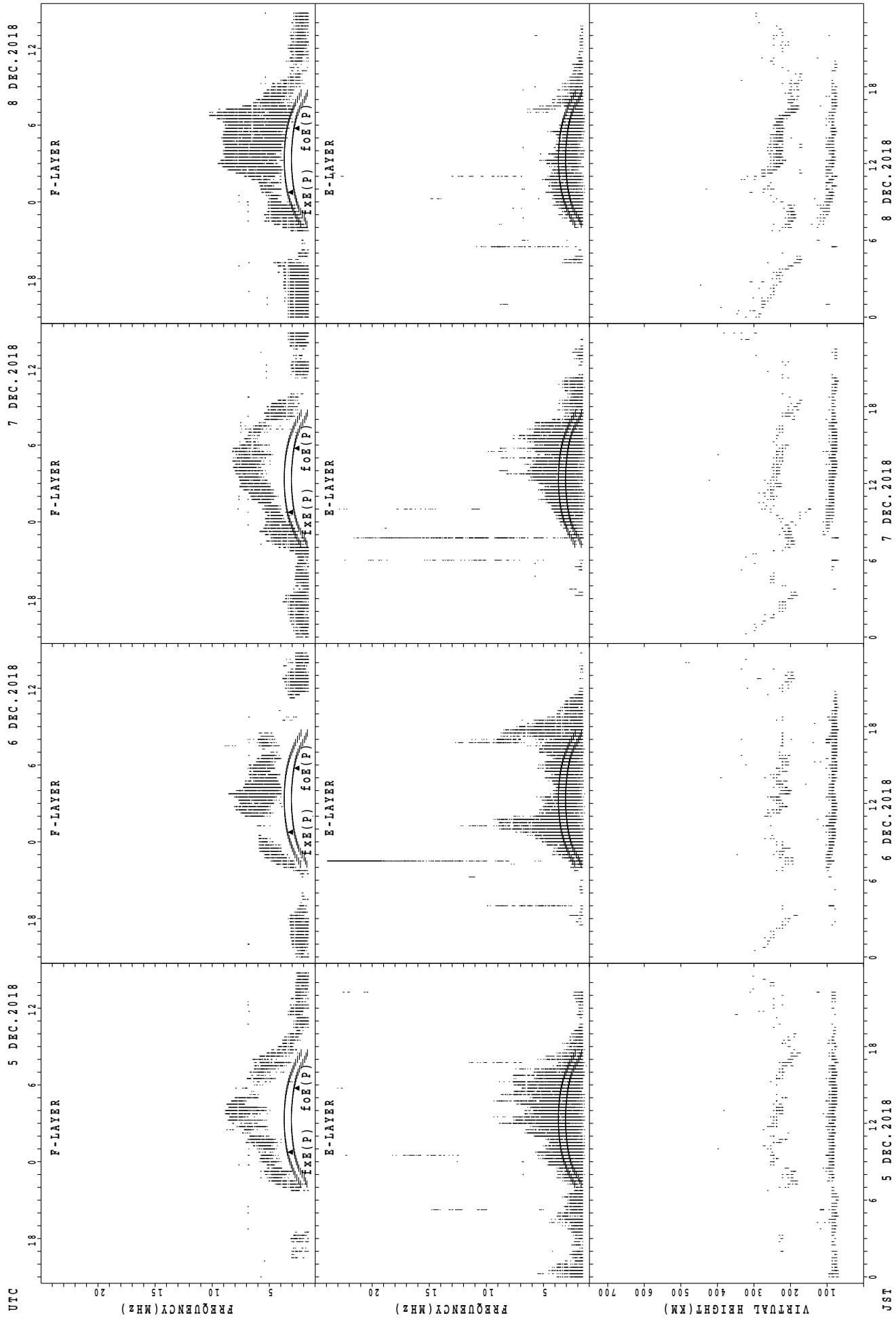


SUMMARY PLOTS AT Okinawa



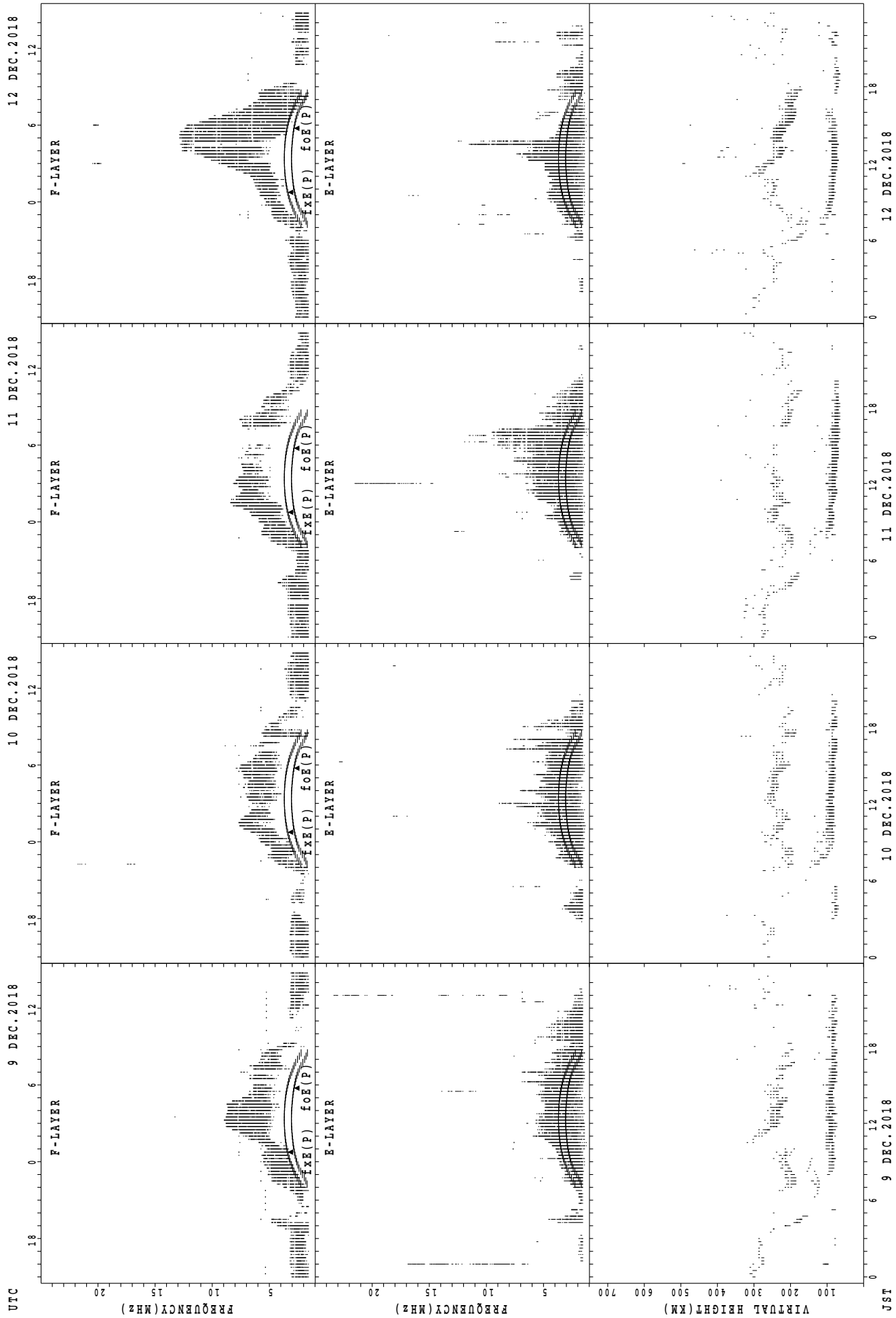
fxe(P); PREDICTED VALUE FOR fxe  
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Okinawa



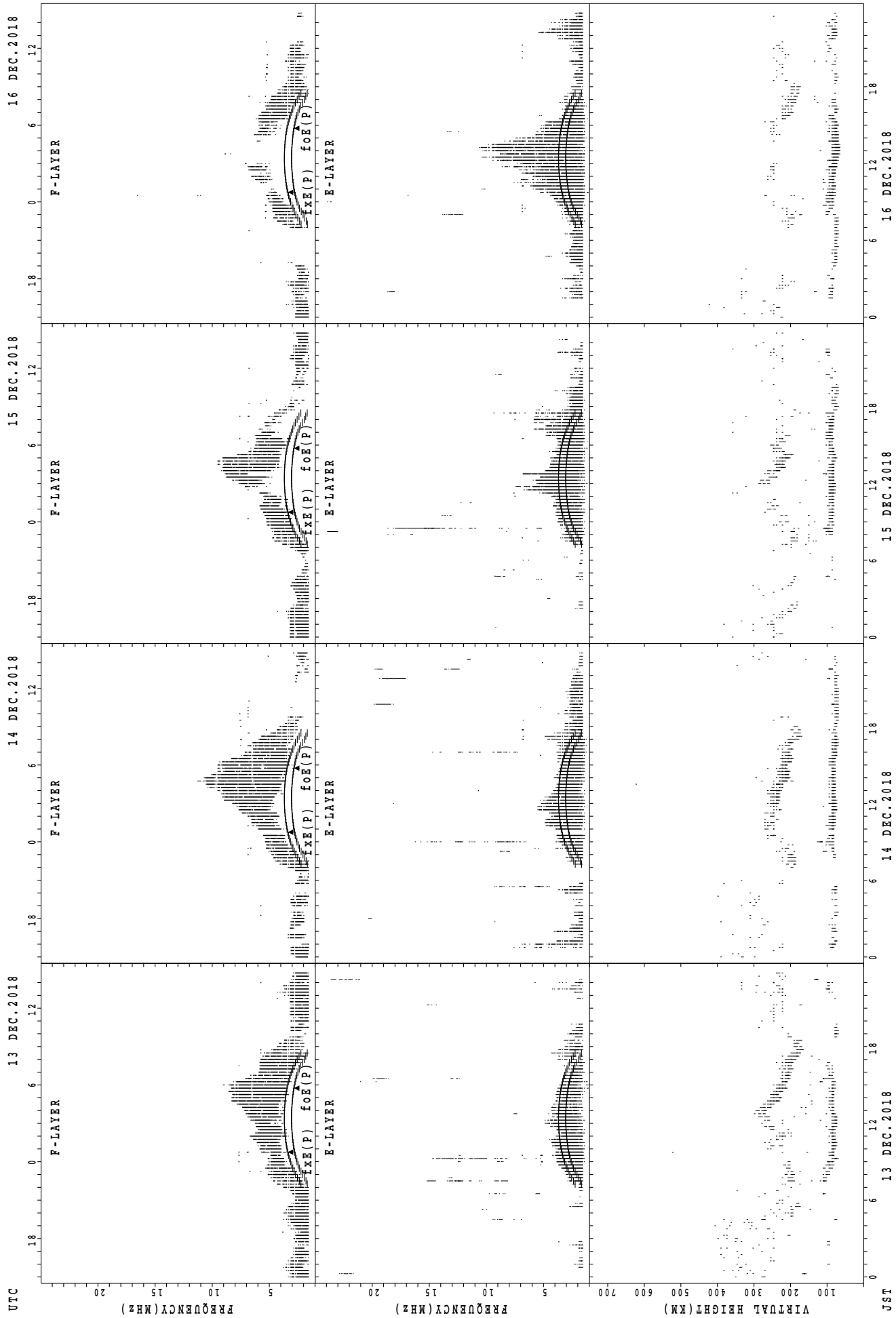
$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $f_oE(P)$ ; PREDICTED VALUE FOR  $f_oE$

SUMMARY PLOTS AT Okinawa



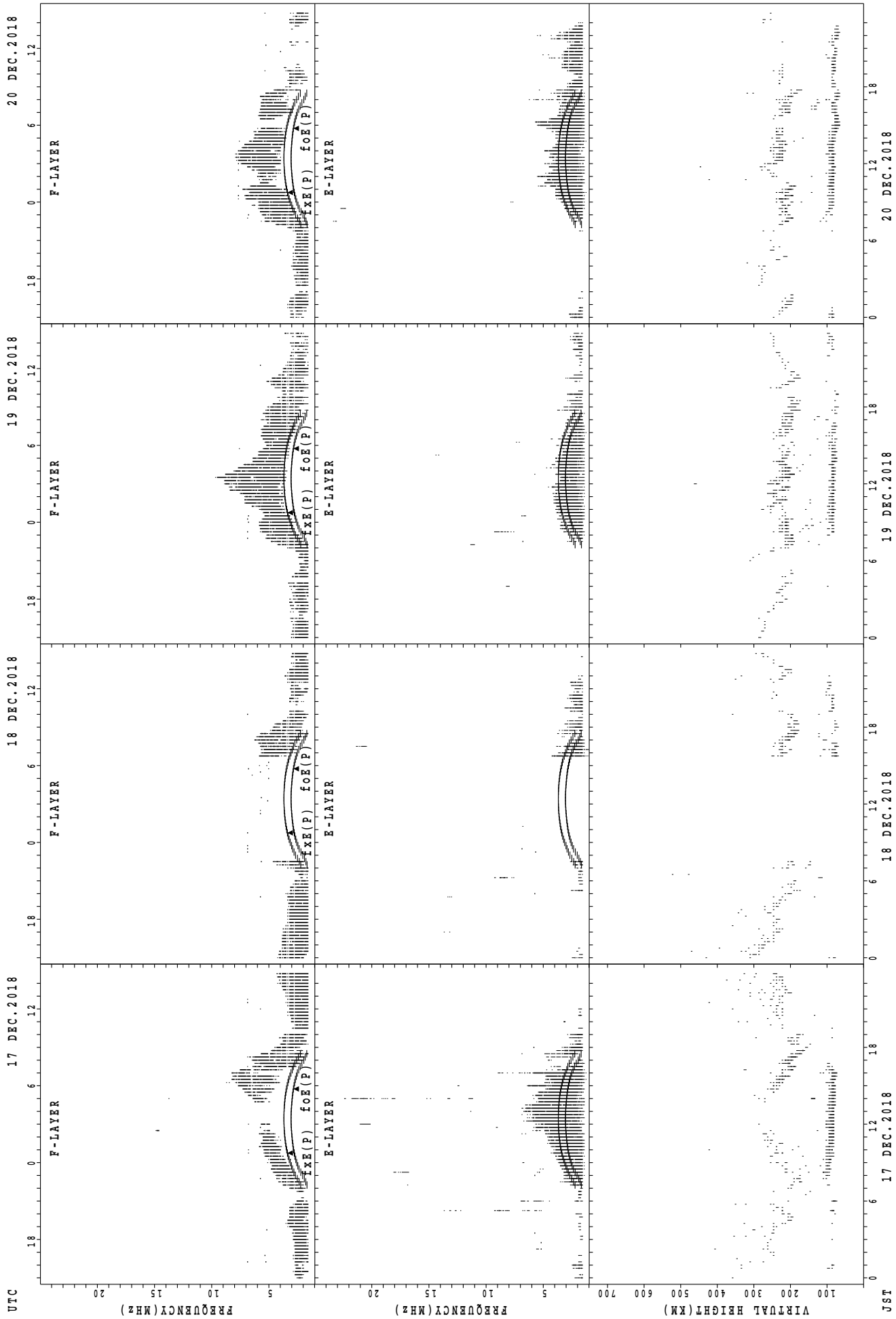
$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $f_oE(P)$ ; PREDICTED VALUE FOR  $f_oE$

SUMMARY PLOTS AT Okinawa



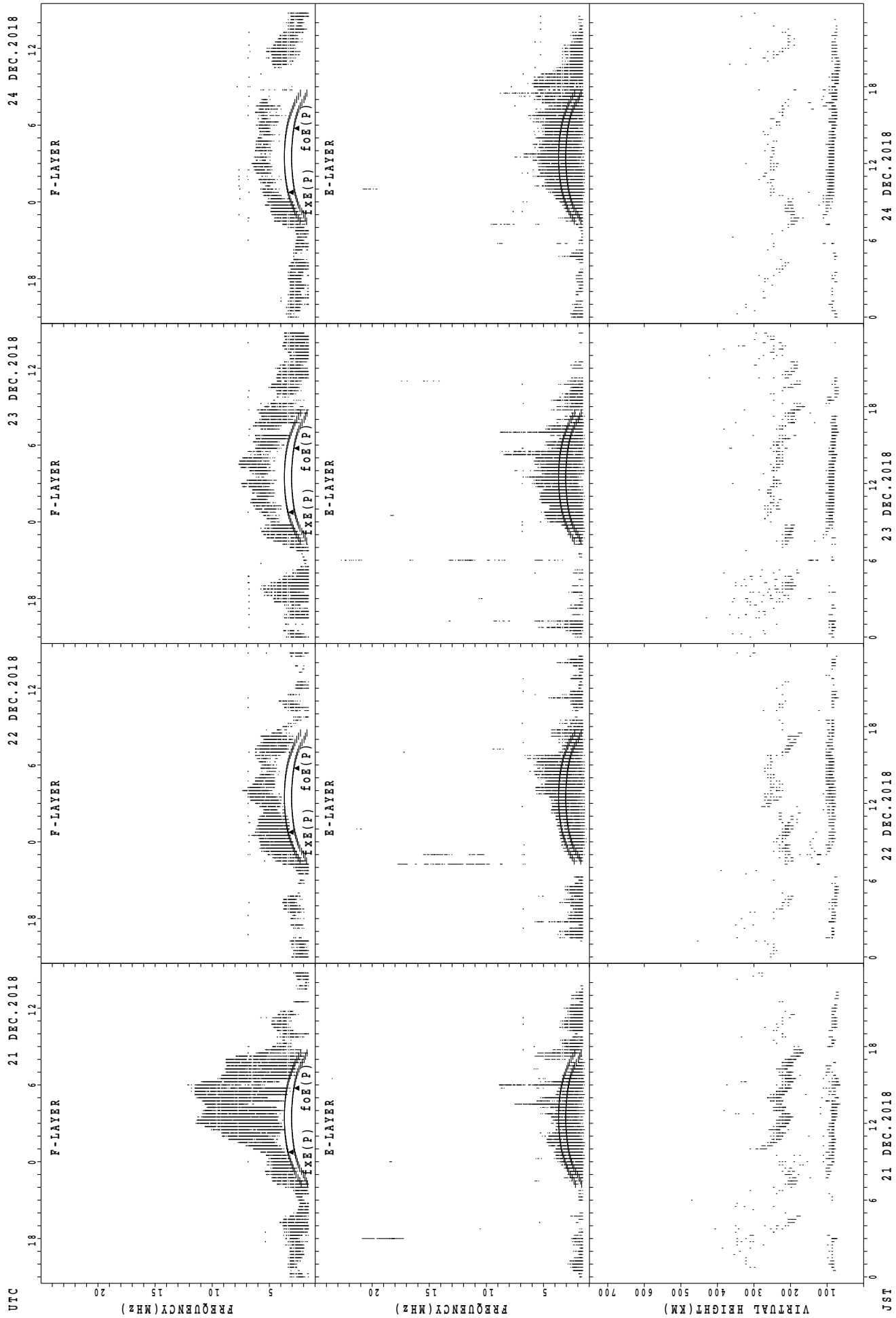
fxe(P); PREDICTED VALUE FOR fxe  
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Okinawa



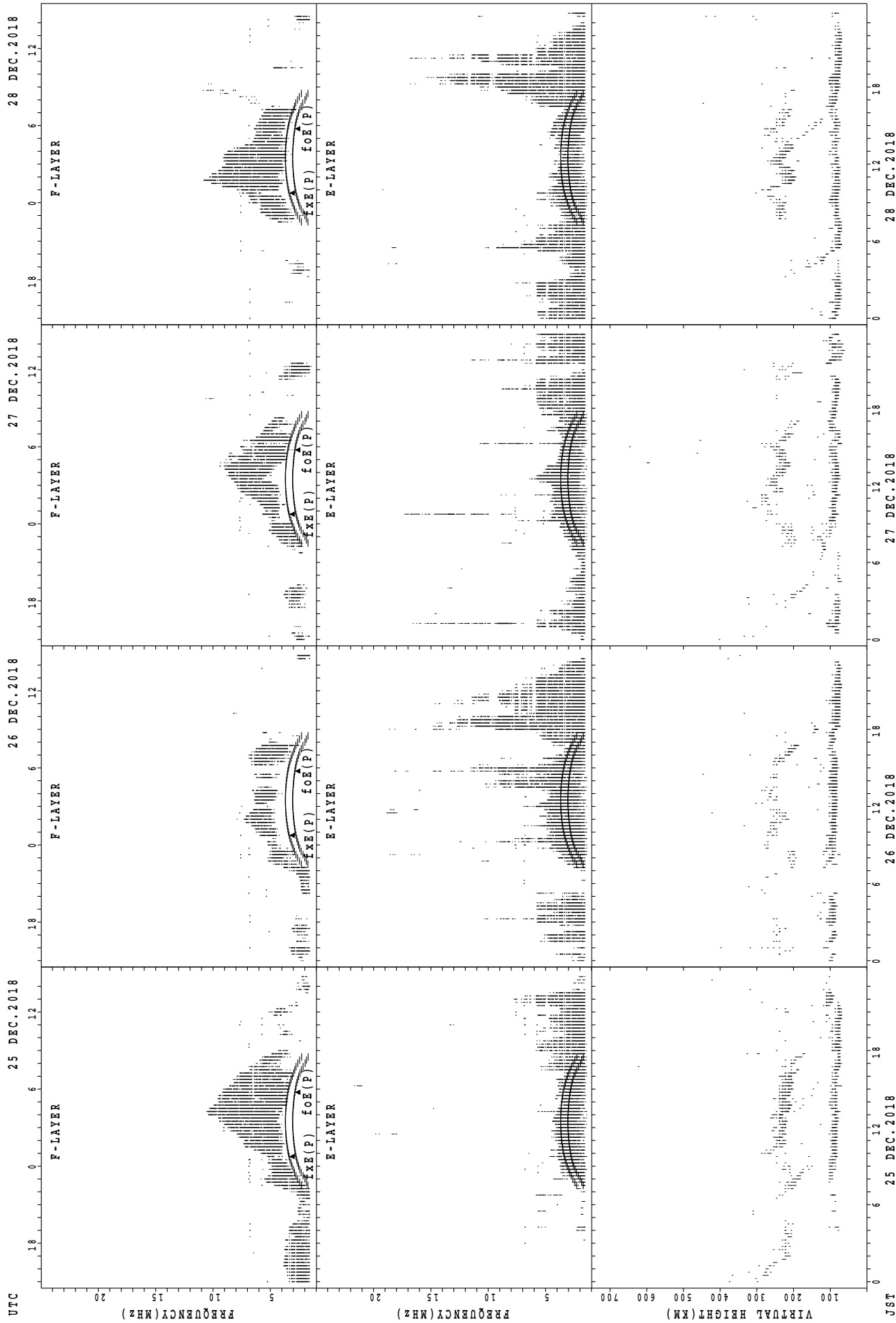
fxe(P); PREDICTED VALUE FOR fxe  
foE(P); PREDICTED VALUE FOR foE

**SUMMARY PLOTS AT Okinawa**



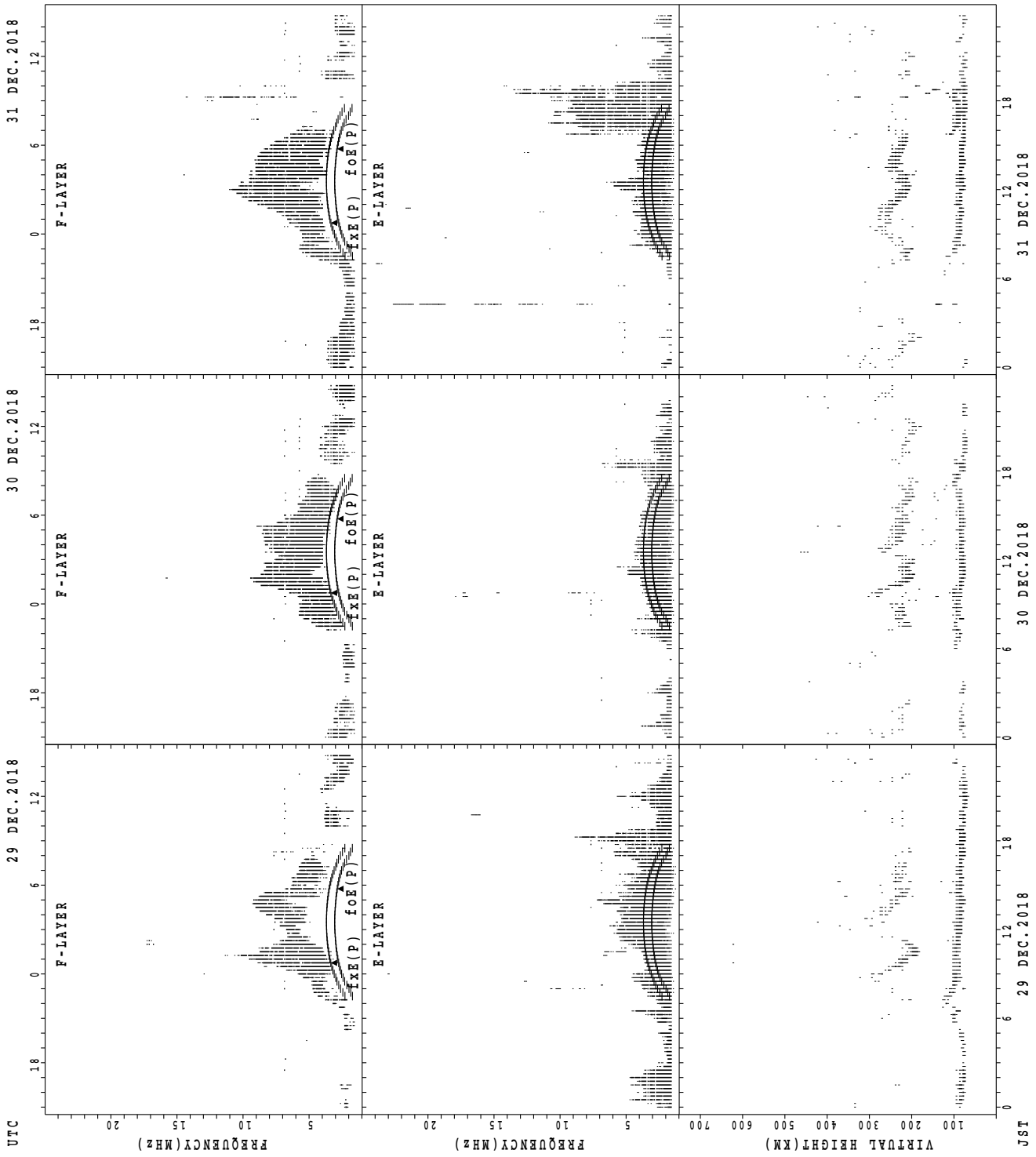
$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $foE(P)$ ; PREDICTED VALUE FOR  $foE$

SUMMARY PLOTS AT Okinawa



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

SUMMARY PLOTS AT Okinawa



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



MONTHLY MEDIANS OF h'F AND h'Es  
 DEC.2018 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									3	9	7	17	8	8	3	2								
MED									200	212	216	210	217	225	226	204								
U Q									238	232	244	220	220	238	342	208								
L Q									192	203	210	200	208	216	206	200								

h'Es

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	15	14	12	14	6	11	13	26	26	24	23	25	24	25	11	18	25	15	16	11	11	14	17	16
MED	81	82	82	85	86	89	97	99	101	99	95	97	95	95	93	90	93	85	89	89	87	86	87	83
U Q	89	89	88	99	95	91	139	123	143	132	113	110	126	101	101	141	173	95	94	97	95	91	95	88
L Q	77	75	75	79	81	81	90	89	89	90	89	88	95	82	83	79	83	81	84	81	81	83	83	81

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	10	11	8	10	8	3							
MED											241	227	224	248	237	227	208							
U Q											258	248	230	273	242	233	218							
L Q											224	212	206	233	226	223	194							

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	9	6	3	3	11	5	2	17	26	23	22	19	18	16	17	18	20	18	15	14	13	9	11	8
MED	83	82	83	83	87	89	126	143	101	99	97	95	96	92	93	89	120	90	87	87	83	83	81	84
U Q	85	89	129	87	95	147	169	176	125	119	105	97	163	100	99	99	161	107	89	89	89	86	83	88
L Q	81	81	79	81	81	87	83	96	95	91	91	89	89	89	87	85	88	87	83	83	81	81	81	82

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									2		3	10			11	6	1							
MED									221		270	236			240	230	216							
U Q									222		282	244			242	232	108							
L Q									220		210	230			232	226	108							

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	9	6	9	8	8	5	4	10	29	31	26	30	30	29	23	24	20	26	23	19	15	12	13	12
MED	87	88	87	83	86	99	92	111	107	99	93	95	91	91	89	87	89	87	87	83	89	85	81	87
U Q	89	95	98	87	93	135	97	137	122	119	107	101	107	97	97	92	93	97	91	89	95	87	87	90
L Q	82	83	84	80	83	83	86	89	97	95	89	89	89	88	85	83	83	83	85	81	81	83	78	81

MONTHLY MEDIANS OF h'F AND h'Es  
 DEC.2018 135E MEAN TIME(UTC+9H) AUTOMATIC SCALING

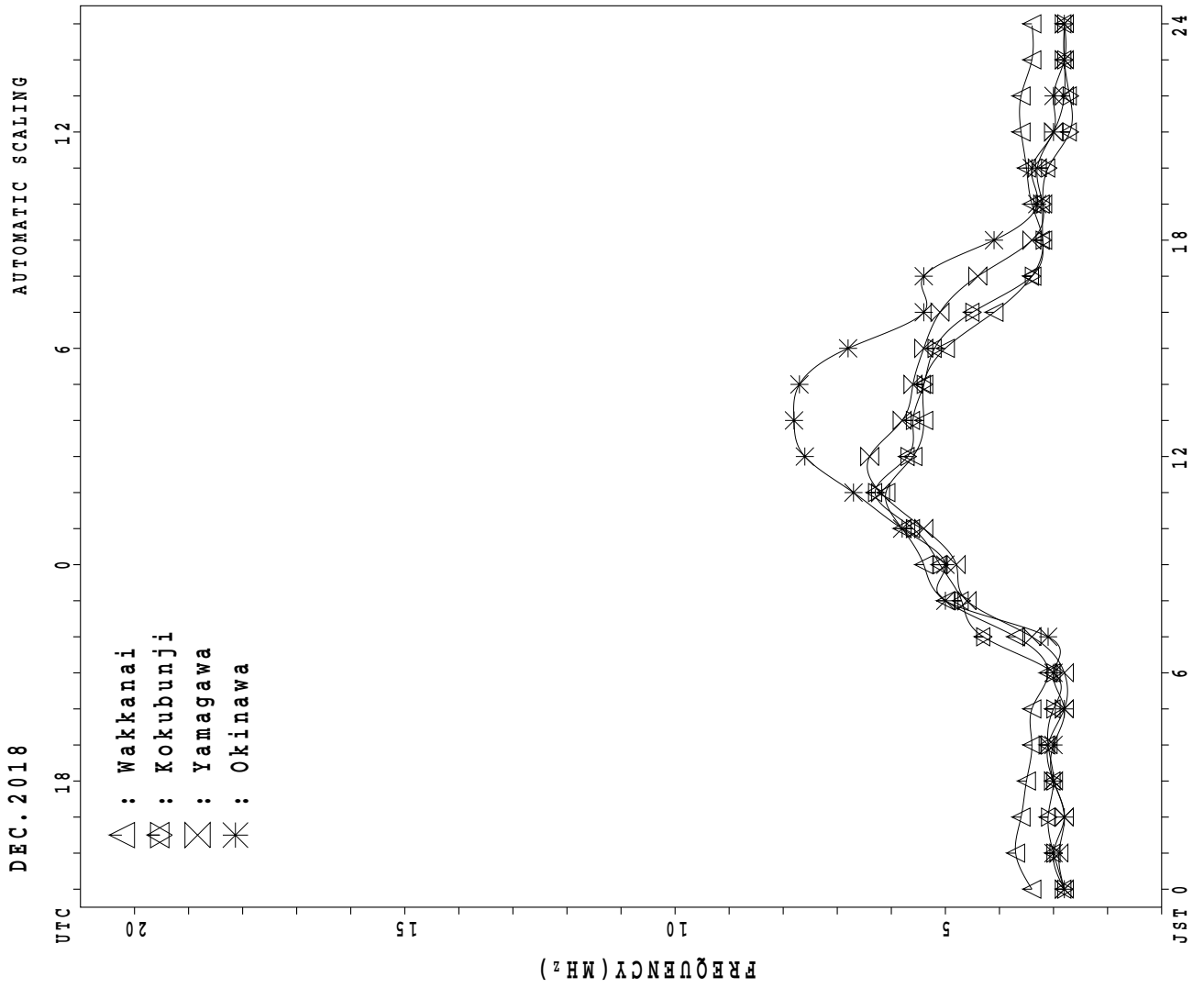
h'F STATION Okinawa LAT. 26°41.0'N LON. 128°09.0'E

	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									1	1	6					15	13	3						
MED									220	234	243					218	216	210						
U Q									110	117	280					232	225	218						
L Q									110	117	214					208	202	208						

h'Es

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	10	16	12	12	13	14	9	12	26	27	28	28	28	29	27	28	29	26	29	28	24	15	20	9
MED	83	89	89	86	87	82	83	113	107	107	101	94	89	95	85	88	89	92	89	87	83	81	83	89
U Q	89	100	91	88	98	119	115	131	131	123	116	103	95	105	101	104	116	101	120	99	99	85	95	94
L Q	83	83	82	81	81	79	80	92	91	91	89	89	86	89	83	83	83	83	81	81	78	79	77	83

MONTHLY MEDIANS PLOT OF fOF2



# IONOSPHERIC DATA STATION Wakkanai

DEC.2018 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 \ 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 37	A	X 37	X 37	X 33	X 32													X 33	X 31	X 35	X 38	X 38	X 37
2	X 40	X 41	X 41	X 41	X 40	X 43													X 31	X 39	X 43	X 42	X 40	X 40
3	X 38	X 39	X 39	X 35	X 33	X 34													X 35	X 44	X 51	X 43	X 41	X 45
4	X 44	X 49	58	58	58	66	58	58								62	57		38	48	55	57	59	59
5	57	58	58	58	X 44	X 59		52											X 38	X 54	X 49	X 41	X 46	X 48
6	54	58	58	58	X 39	X 37													X 33	X 39	X 36	X 39	X 39	52
7	58	58	56	53	57	58													X 32	X 33	X 35	X 35	X 38	X 44
8	43	X 45	X 45	X 45	50	39		55											X 41	X 49	X 51	X 48	59	X 60
9	59	57	58	58	56	56													X 34	X 43	40	47	55	58
10	47	53	55	56	57	55	42												X 35	X 42	X 40	X 34	53	53
11	X 48	47	X 47	X 48	X 47	X 51													X 45	X 50	X 54	X 60	X 48	X 50
12	47	43	44	X 43	X 43	X 38													X 32	X 37	X 44	X 45	X 45	X 50
13	X 43	X 39	X 32	X 48	X 45	X 51	51												X 34	X 35	X 36	X 38	X 38	X 40
14	X 45	56	55	X 41	X 39	X 39													X 27	X 34	X 35	X 35	X 39	X 39
15	39	X 33	X 29	X 32	X 29	X 26													X 29	X 34	X 33	X 34	X 36	X 36
16	X 31	X 33	X 36	X 36	X 34	X 32													X 32	X 33	X 33	X 32	X 35	X 39
17	X 37	X 38	X 38	X 33	X 33	X 26													X 35	X 40	X 39	X 34	X 39	X 36
18	X 37	X 37	X 39	X 39	X 39	X 39													X 44	X 45	X 45	X 45	X 45	X 45
19	41	37	X 33	X 39	X 39	X 48													X 35	X 35	X 40	X 39	X 40	X 38
20	X 40	X 41	X 43	X 39	X 37	X 37		49											X 35	X 45	54	57	48	58
21	53	47	X 47	X 43	X 42	X 38													X 33	X 33	X 30	X 31	X 35	X 36
22	38	X 37	X 38	X 35	X 38	X 41	32								62				X 43	X 43	X 41	X 50	X 59	X 59
23	56	57	57	57	38	36	35												A	X 33	X 35	X 38	X 38	X 36
24	X 37	X 37	X 37	X 32	X 32	X 32													X 34	A	A	A	X 38	X 56
25	48	54	X 57	X 59	X 59	X 60		53											X 35	X 34	X 33	X 34	X 34	X 28
26	40	X 38	40	38	38	38													X 39	X 39	X 39	X 38	X 38	X 39
27	X 37	X 37	X 42	X 39	X 43	X 38													X 41	X 35	X 36	X 37	X 38	X 38
28	X 35	X 36	X 38	X 31	X 37	X 37													X 29	X 34	X 38	X 40	X 57	X 35
29	32	X 33	X 29	X 33	X 30	A													X 40	X 46	X 46	X 49	X 58	X 58
30	X 51	X 47	X 46	X 44	X 40	X 34													X 37	X 33	X 34	X 39	X 39	X 35
31	X 36	X 37	X 39	X 37	X 36	X 33													X 35	X 35	X 29	X 39	X 37	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	30	31	31	31	30	5	5						1		1	1		30	30	30	30	31	31
MED	X 41	X 41	X 42	X 41	X 39	X 38	42	53						62		62	57		X 35	X 38	X 39	X 39	X 39	X 40
U Q	48	53	55	53	45	51	54	56											X 38	X 44	X 45	X 45	X 48	X 53
L Q	X 37	X 37	X 38	X 36	X 36	X 34	34	50											X 33	X 34	X 35	X 35	X 38	X 36

DEC.2018 f<sub>XI</sub> (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Wakkanai

DEC.2018 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		30	A	30	30	26	25	26	41	58	53	51	59	57	50	49	44	36	26	26	24	28	31	31	30		
2		33	34	34	34	33	36	26	40	59	62	64	58	60	66	56	55	42	32	24	32	36	35	33	32		
3		31	32	32	28	26	27	23	38	52	52		59	63	70	55	60	52	37	28	37	44	36	34	38		
4		37	42	Z	F	F	F	F	F	55	58	72	68	58	70	75	F	F	F	F	F	F	F	F	F		
5		F	F	F	F	F	F	F	F	48	72	72	76	58	55	60	54	39	27	32	47	42	34	33	41		
6		F	F	F	F	F	F	F	F	53	60	57	66	56	52	56	46	36	26	26	32	29	32	32	28		
7		F	F	F	F	F	F	F	F	44	55	54	60	57	58	54	52	49	30	25	26	28	28	31	32		
8		F	F	F	F	F	F	F	F	50	54	61	63	72	65	65	59	42	33	34	42	44	41	46	53		
9		F	F	F	F	F	F	F	F	51	58	58	67	61	61	56	52	42	27	27	36	30	30	36	36		
10		F	F	F	F	F	F	F	F	52	55	62	71	56	53	52	56	41	31	28	35	33	27	31	44		
11		41	30	40	41	40	44	42	48	56	59	57	59	62	53	50	45	41	32	38	43	47	53	37	36		
12		F	F	F	F	F	F	F	F	25	41	58	50	58	65	57	52	52	35	27	25	30	37	38	31		
13		36	32	24	33	33	33	31	41	A	50	57	62	54	50	45	45	41	33	27	28	29	31	31	33		
14		F	F	F	F	F	F	F	F	44	52	54	66	50	47	50	47	33	28	20	27	28	28	26	26		
15		F	F	F	F	F	F	F	F	40	48	52	56	55	52	48	48	39	21	22	27	26	27	29	29		
16		24	26	26	27	27	25	20	32	42	50	48	48	48	50	50	48	36	22	25	26	26	25	28	32		
17		30	31	26	26	23	19	19	32	45	45	48	53	50	48	52	52	39	30	28	33	32	27	32	30		
18		30	30	32	32	32	32	33	34	43	52	47	46	52	68	51	41	34	30	37	38	38	38	38	38		
19		F	F	F	F	F	F	F	F	44	48	51	57	48	54	52	49	34	31	28	28	33	32	33	31		
20		33	34	36	32	30	30	27	35	52	53	53	56	52	50	52	44	33	31	28	32	32	38	32	32		
21		F	F	F	F	F	F	F	F	52	54	53	51	48	54	55	52	39	29	26	26	23	24	28	29		
22		F	F	F	F	F	F	F	F	35	47	55	60	54	52	50	56	49	39	32	36	36	34	38	47	37	
23		F	F	F	F	F	F	F	F	26	44	54	61	50	52	44	53	48	36	A	A	26	28	31	31	30	
24		30	30	30	25	25	25	20	27	44	50	50	50	49	50	47	41	39	27	27	A	A	A	38	34		
25		F	F	F	F	F	F	F	F	47	38	58	56	53	53	57	55	50	44	34	30	28	27	26	27	30	
26		F	F	F	F	F	F	F	F	22	28	46	51	53	62	53	56	50	42	34	31	32	32	32	26	31	27
27		30	32	32	32	34	31	A	30	42	51	58	64	52	50	45	38	39	39	34	28	29	30	27	31	31	
28		28	29	25	25	30	30	28	32	47	50	50	59	62	51	49	46	38	22	22	27	31	33	35	21	F	
29		F	F	F	F	F	F	F	F	28	50	67	69	69	56	52	47	40	39	A	33	39	39	42	44	44	
30		44	36	31	37	33	27	25	31	46	58	57	57	51	48	47	41	38	34	30	26	27	32	32	28		
31		29	30	32	30	24	26	21	28	41	52	55	52	49	51	43	40	36	32	28	28	22	32	30	28		
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT		31	30	31	31	31	30	29	31	30	31	30	31	31	31	31	31	31	29	30	30	30	30	31	31		
MED		32	32	32	32	30	30	26	34	48	53	56	59	55	52	52	48	39	30	28	30	32	32	32	32		
U Q		34	34	37	37	33	34	30	38	52	58	60	65	58	56	55	52	41	32	32	36	36	36	36	36		
L Q		F	F	F	F	F	F	F	F	44	50	52	53	51	50	49	44	36	27	25	27	28	28	31	29		

DEC.2018 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Wakkanai

DEC.2018 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											L	L	L	L										
2									240	L	L	L	L	L	L									
3											C	L	L	L										
4											L	L	L	L	L	L								
5											L	L		A										
6											L	L	L											
7											L	260							L					
8											L	L		L										
9								L	L				L											
10							L				L	L	L	L										
11										L	L	L	L											
12											L	L	L		L									
13									A		L	L	L	L										
14												L	L	L	L									
15									L	L	392	L	L	L	L									
16									L			L	L	L	L									
17								L				L	L	L	L	L	L							
18								L				L	L	L										
19										L	L	L	L	L	L									
20										L	L	L	L	L										
21							L			L			L											
22											L		L	L	L									
23									L	L	L			L	L				A					
24								L			L	L	L	L	L	L								
25											L	L	L	L	L									
26											L	L	L	L	L									
27							A	L	L	244	L	L	L	L	L									
28											L	L	L											
29							A			L	L	L	L	L	L				A					
30										L	L		L	L	L	L								
31										L	L		L	L	L									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									1	2	1	3												
MED									240	260	392	280												
U Q												364												
L Q												260												

DEC.2018 foF1 (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Wakkanai

DEC.2018 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							B										B	B						
2							A										A	A						
3							B										A	A	A					
4							B											B	B					
5							A												A					
6							B											B	B					
7							B																	
8							A																	
9							B																	
10							A																	
11							B																	
12							B																	
13							A																	
14							B																	
15							B																	
16							B																	
17							B																	
18							B																	
19							B																	
20							B																	
21							B																	
22							B																	
23							B																	
24							B																	
25							B																	
26							B																	
27							B																	
28							B																	
29							B																	
30							B																	
31							B																	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								1	22	28	26	29	27	28	26	19	4	5						
MED								192	202	232	256	264	264	252	232	196	228	200						
U Q								212	244	260	268	268	254	236	200	308	216							
L Q								188	224	252	256	256	248	224	184	220	186							

DEC.2018 foE (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Wakkanai

DEC.2018 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	38	J A	J A	J A		E B	J A				J A		G	J A	J A	J A	J A	E B	E B	E B	E B		J A	E B	J A	
2	22	E B	E B	E B	E B	E B	E B		J A		G		J A	48	34	29	J A	J A	J A	J A		E B		E B	19	
3	24	J A	J A	J A		E B		J A			C					J A	J A	J A	J A				J A		28	
4	J A	26	26	J A	J A	J A	J A	E B	E B					J A	55	23	J A	E B							20	
5	E B	E B	E B	E B	E B	E B	E B	J A	J A		J A	J A	J A	J A	J A		G		J A	J A			J A		E B	
6	21	22	20	20	26	26	24	E B	J A					G		G	E B	J A	J A	J A			J A	J A	E B	
7	J A	48	22	22	E B		E B	E B	J A	J A	J A		G	J A	J A	J A	J A	J A			J A	J A		J A	30	
8	32	J A	31	22	19	E B	E B	J A	E B					J A	42	28	31	57	32	31	33	32	J A	J A	J A	
9	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	E B	J A	J A	J A	
10	28	J A	E B	J A	J A	E B		J A	J A	J A	J A		G		G			J A	J A	J A	J A	J A		J A	24	
11	J A	52	21	25	J A	J A	23	20	24	24	J A	J A	J A	J A	J A		G		E B				E B	E B	J A	
12	J A	24	25	21	J A	J A	28	22	21	28	J A		J A	J A	J A			J A	E B	E B	E B	E B		J A	J A	
13	J A	52	51	34	J A	J A	E B	J A	J A	J A	J A		G			G	J A	J A	J A					J A	J A	
14	25	J A	31	27	J A	J A		E B	J A					G		G	J A	J A	J A			J A	J A	J A	J A	
15	34	J A	33	33	J A	E B	E B	J A		J A				G	J A		G	E B	J A				E B	E B	E B	
16	26	E B	E B	E B		E B	E B	E B	J A		G			G				J A	J A	J A	J A	J A	E B	J A	25	
17	19	E B	16	20	25	J A	E B		E B	J A	J A						G		J A			E B	E B	E B	E B	
18	E B	E B	E B	E B	E B	E B	E B	J A	J A									J A	E B	E B	E B	J A		E B	E B	
19	E B	16	20	16	16	16	16	16	16	16	16			J A	63	23	E B	E B	E B			E B	E B	E B	21	
20	E B	E B	E B	E B	E B	E B	E B	E B	J A	J A		G		G	J A			E B		G		J A	J A	E B	E B	E B
21	E B	16	28	16	16	16	16	16	16		G			G	J A		G		J A	J A			J A	J A	J A	
22	23	E B	16	20	21	E B	J A	E B	E B			J A					G	J A		J A			E B	J A	J A	
23	29	30	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	E B	
24	E B	16	24	27	27	23	23	22	17	20	J A			J A	J A	J A			G	J A	J A	J A	J A	J A	J A	
25	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	
26	J A	J A	27	28	J A	20	22	J A	J A	J A	J A			J A		G	G	J A	J A	J A	E B	E B	J A	J A	J A	
27	21	E B	E B	E B	E B		J A	J A	J A	J A		G		G	J A			J A		J A	E B	E B	J A	J A	J A	
28	J A	J A	J A	E B			J A	J A	J A		G		G		G			G	E B	J A	J A	J A	E B	E B	E B	
29	E B	E B	E B	J A	J A	E B	J A	J A	J A	J A		G		G				J A	J A	J A	J A	J A	J A	J A	J A	
30	E B	E B	E B	20	E B	J A	J A	J A	J A	J A		G		G				G	J A	J A			J A	J A	J A	
31	E B	E B	E B	E B	E B	E B	J A		J A	J A				J A	J A		G		G		E B	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	31	31	31	31	31	31	31	31	31	31	30	31	31	31	31	31	31	31	31	31	31	31	31	31		
MED	25	24	21	20	20	19	23	24	25	28	30	30	30	28	21	22	J A	J A		24	21	24	25	27	26	
U Q	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	
L Q	E B	E B	E B	E B	E B	E B	E B	E B	E B		G	G	G	G	G	G		E B	E B	E B	E B	E B	E B	E B	E B	

DEC.2018 foEs (0.1MHz)  
 NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



# IONOSPHERIC DATA STATION Wakkanai

DEC.2018 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

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	A A	17	E B	E B	E B	19	20	24	27	G	G	30	28	27	18	E B	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	16	E B	G	G		27	26	26	22	19	E B	E B	E B	E B	E B	E B	E B	E B	E B	
3	E B	16	E B	E B	E B	E B	E B	E B	25	26		C	30	33	27	25	20	E B	E B	E B	20	16	20	17	18	E B
4	18	18	19	20	E B	E B	E B	E B	24	26	28	28	28	24	22	21	E B	E B	E B	E B	E B	E B	E B	E B	E B	
5	E B	E B	E B	E B	E B	E B	E B	E B	23	23	24	30	24	36	24	19	18	E B	E B	E B	E B	23	16	16	16	
6	E B	E B	E B	E B	E B	E B	E B	E B	22	26	28	29	G	25		G	E B	16	18	E B	E B	E B	E B	E B	E B	
7	E B	E B	E B	E B	E B	E B	E B	E B	29	29	30		G	36	44	36	24	20	23	18	16	16	16	16	20	
8	20	E B	E B	E B	E B	E B	E B	E B	20	24	29	28	39	26	29	35	23	18	E B	16	16	17	E B	E B	E B	
9	16	23	23	E B	E B	E B	E B	19	27	28	26	38	28	28	26	22	19	16	16	16	16	16	16	19	E B	
10	E B	E B	E B	E B	E B	E B	E B	E B	23	26	26	27	27	G	G	G	18	16	18	16	16	16	16	19	E B	
11	E B	E B	E B	E B	E B	E B	E B	E B	29	24	26	26	25	G	G	G	E B	E B	E B	E B	E B	E B	E B	E B	E B	
12	E B	E B	E B	E B	E B	E B	E B	E B	16	22	36	28	28	29	28	21	19	16	16	15	16	16	16	16	18	18
13	24	A	23	E B	E B	E B	20	21	A A	59	26	26	26	26	24	G	23	21	17	16	16	17	16	16	16	
14	E B	20	E B	E B	E B	E B	E B	E B	25	22	23	28	26	G	G	G	23	18	16	16	16	16	16	16	16	
15	18	16	E B	E B	E B	E B	20	16	21	27	30		27	28		G	E B	E B	E B	E B	E B	E B	E B	E B	E B	
16	E B	E B	E B	E B	E B	E B	E B	E B	G	G	G		28	27	26	23	19	16	16	16	16	17	16	16	16	
17	E B	E B	E B	E B	E B	E B	E B	E B	21	27	30	30	29	25		G	E B	16	16	E B	E B	E B	E B	E B	E B	
18	E B	E B	E B	E B	E B	E B	E B	E B	21	25	25	29	29	29	25	22	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	20	25	27	28	31	28	24	G	22	17	16	16	16	16	16	16	16	
20	E B	E B	E B	E B	E B	E B	E B	E B	23	23		G	G	24	23		E B	E B	E B	E B	E B	E B	E B	E B	E B	
21	E B	E B	E B	E B	E B	E B	E B	E B	G	G		24	G	27	G	G	26	20	18	19	18	16	16	16	16	
22	E B	E B	E B	E B	E B	E B	E B	E B	23	24	30	34	27	26		G	18	22	16	16	16	16	16	16	16	
23	E B	E B	E B	E B	E B	E B	E B	E B	24	25	28	27	33	24	24	24	18	A A	A A	A	E B	E B	E B	E B	E B	
24	E B	E B	E B	E B	E B	E B	E B	E B	19	23	26	27	28	26	22	20	20	20	16	52	52	52	20	16	E B	
25	17	E B	E B	E B	E B	E B	E B	E B	20	33	26	27	27	26	27	20	16	E B	E B	E B	E B	16	20	17	17	
26	17	E B	E B	E B	E B	E B	16	17	29	28	28	26	G	G	G		23	23	21	16	16	21	17	18	E B	
27	E B	E B	E B	E B	E B	E B	E B	E B	G	G	G	G	G	G	G		21	24	16	16	16	16	16	16	16	
28	E B	E B	E B	E B	E B	E B	E B	E B	G	G	G	G	G	G	G		21	16	16	16	16	16	16	16	16	
29	E B	E B	E B	E B	E B	E B	E B	E B	G	G	G	G	G	G	G		25	25	62	17	24	16	16	16	16	
30	E B	E B	E B	E B	E B	E B	E B	E B	G	G	G	G	G	G	G		19	19	E B	E B	E B	E B	E B	E B	E B	
31	E B	E B	E B	E B	E B	E B	E B	E B	G		G	G	G	G	G		E B	E B	E B	E B	E B	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	31	30	31	31	31	31	31	31	31	31	30	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	E B	G		G		27	27	26		17	16	16	16	16	16	16	16	16	
U Q	17	16	16	16	16	16	16	19	24		28	28	29	28	24	22	20	18	16	16	16	16	16	17	16	
L Q	E B	E B	E B	E B	E B	E B	E B	E B	G		G	G	G	G	G		E B	E B	E B	E B	E B	E B	E B	E B	E B	

DEC.2018 fbEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Wakkanai

DEC.2018 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

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

DEC.2018 fmin (0.1MHz)

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# IONOSPHERIC DATA STATION Wakkanai

DEC. 2018 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 \ 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	329	A	323	312	307	356	329	380	407	408	390	396	409	363	379	393	370	368	369	329	352	311	324	315
2	314	307	312	312	325	374	372	380	376	391	385	384	366	359	361	382	377	362	331	338	316	331	295	299
3	314	311	311	327	308	347	346	363	383	384	C	349	330	377	383	396	385	363	346	323	363	349	328	312
4	319	336	337	325	359	330	319	415	363	360	390	395	363	346	368	361	F	F	295	342	330	F	F	F
5	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
6	302	314	294	297	311	395	280	378	386	391	369	355	394	354	371	397	369	362	339	348	334	252	301	308
7	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
8	305	317	297	301	330	366	332	398	388	392	359	362	364	353	372	382	386	352	323	329	358	298	314	312
9	341	299	299	298	286	345	337	384	402	357	349	365	372	368	366	390	389	358	359	373	334	288	289	269
10	302	299	287	280	306	338	287	385	378	354	369	374	379	371	377	364	376	355	332	338	359	395	277	269
11	314	313	319	325	286	331	368	383	384	386	371	361	374	381	379	374	357	366	337	326	328	353	314	272
12	300	337	310	327	252	324	323	379	412	404	357	385	378	361	357	389	359	318	336	319	355	347	314	337
13	288	311	438	292	322	327	371	382	A	378	358	378	382	366	361	372	381	366	346	382	349	327	305	294
14	335	288	297	307	331	354	311	373	404	374	385	394	391	391	369	375	363	371	321	361	355	310	281	287
15	294	276	315	304	323	380	361	383	403	352	348	366	357	364	369	396	374	318	301	359	347	322	312	346
16	329	300	301	292	311	348	341	374	398	361	383	357	366	379	379	392	360	379	330	343	338	340	312	311
17	319	306	290	328	272	321	340	363	413	398	368	366	364	366	372	383	382	302	325	352	350	316	306	318
18	310	336	347	347	311	311	356	379	374	391	349	360	318	371	396	397	350	342	325	344	360	298	265	305
19	F	F	297	295	329	355	340	365	358	389	374	393	388	373	389	391	348	341	342	321	341	330	346	358
20	333	320	332	351	319	315	348	348	375	406	379	379	378	367	369	398	367	376	345	339	308	309	301	301
21	305	298	289	331	325	350	329	346	374	394	383	371	369	367	373	403	364	390	326	382	348	325	325	317
22	312	304	299	316	322	367	288	383	383	376	379	363	401	343	377	409	382	345	353	348	299	274	290	307
23	289	289	261	276	297	341	396	386	381	368	388	360	395	387	386	382	364	A	A	348	337	327	297	310
24	277	324	323	294	295	337	351	388	404	371	378	368	375	388	401	388	383	363	330	A	A	A	297	309
25	358	322	329	298	323	318	343	379	393	393	391	399	362	375	368	379	349	361	375	385	362	291	337	285
26	304	292	337	337	311	358	348	390	404	369	352	378	367	385	391	388	358	359	355	355	310	295	301	300
27	298	304	296	289	344	371	A	379	362	377	359	396	370	386	386	371	358	351	362	346	321	324	330	359
28	319	331	295	336	355	286	341	351	401	391	353	370	362	373	376	380	378	361	296	294	303	287	322	338
29	270	278	328	356	329	A	A	362	352	366	374	381	376	367	363	377	382	A	337	341	307	335	313	352
30	355	277	285	313	345	327	353	351	359	370	365	390	379	378	382	374	359	347	372	358	328	307	325	347
31	328	315	303	344	313	353	346	366	386	365	385	380	382	375	355	377	347	328	350	390	323	334	309	316
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	30	31	31	31	30	29	31	30	31	30	31	31	31	31	31	31	29	30	30	30	30	31	31
MED	312	308	304	312	313	346	343	379	385	377	372	374	374	371	372	382	370	358	338	347	344	319	309	311
U Q	329	320	323	328	329	356	354	384	403	391	383	390	382	378	382	393	382	364	350	359	355	332	322	318
L Q	298	299	296	297	304	327	329	365	374	365	359	363	364	363	368	375	359	342	326	330	323	298	297	299

DEC. 2018 M(3000)F2 (0.01)

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# IONOSPHERIC DATA STATION Wakkanai

DEC.2018 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											L	L	L	L										
2									414	L	L	L	L	L	L									
3											C	L	L	L										
4											L	L	L	L	L	L								
5										402	L	L		A										
6										L		L	L											
7											L	554							L					
8											L	L		L										
9								L	L				L											
10							L				L	L	L	L										
11										L	L	L	L											
12											L	L	L		L									
13									A		L	L	L	L										
14												L	L	L	L									
15									L	L	393	L	L	L	L									
16									L			L	L	L	L									
17								L				L	L	L	L	L	L	L						
18								L				L	L	L										
19										L	L	L	L	L	L									
20										L	L	L	L	L										
21							L			L			L											
22											L		L	L	L									
23									L	L	L			L	L				A					
24								L			L	L	L	L	L	L								
25											L	L	L	L	L									
26											L	L	L	L	L									
27							A	L	L	428	L	L	L	L	L									
28											L	L	L											
29							A			L	L	L	L	L	L				A					
30										L	L		L	L	L	L								
31										L	L	534		L	L	L								
											405													
	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	3												
MED									414	415	393	534												
U Q												554												
L Q												405												

DEC.2018 M(3000)F1 (0.01)

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# IONOSPHERIC DATA STATION Wakkanai

DEC.2018 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											222	220	208	226										
2									200	206	224	214	218	228	228									
3											C	224	230	214										
4											218	208	216	246	228	216								
5										224	220	206	E A	434										
6									204		230	210												
7											224	230						320						
8											234	234		234										
9								212	212				218											
10							252				232	232	214	232										
11									200	224	224	224												
12										244	224	224		236										
13									A		222	216	224	224										
14											206	206	218	230										
15									208	242	266	230	230	230	238									
16									208			220	224	224	224									
17									206			244	230	216	222	222	210							
18									224			220	314	226										
19											234	214	226	232	228									
20										210	226	222	220	232										
21							228			216			220											
22											232		206	232	210									
23										212	234	234		208	212				A					
24									212		224	210	222	222	208	208								
25											214	214	238	230	230									
26											230	230	230	222	222									
27							A	264	222	232	242	216	218	222	222									
28											252	224	220											
29							A			236	218	218	224	222	222				A					
30										230	230	212	220	220	220	220								
31										232	232	232	222	232	232									
	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	2	9	12	23	27	27	24	17	4	1	1						
MED							240	238	212	227	230	220	222	226	224	218	210	320						
U Q									217	233	234	230	226	232	230	221								
L Q									207	208	222	214	218	222	221	212								

DEC.2018 h'F2 (KM)

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# IONOSPHERIC DATA STATION Wakkanai

DEC. 2018 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	272	A	264	252	240	206	256	206	206	190	196	206	202	186	204	200	200	206	222	222	234	228	236	246	
2	250	244	234	248	268	186	208	212	204	202	194	188	196	196	190	208	194	208	216	236	236	208	256	264	
3	258	268	260	254	252	208	232	200	202	202	C	202	204	212	204	204	200	196	234	226	214	214	234	252	
4	218	238	220	246	210	222	188	184	200	206	198	200	186	216	200	194	192	240	240	222	208	240	228	232	
5	248	242	238	206	244	202	188	204	202	202	202	198	216	A	216	202	194	210	248	208	192	220	254	236	
6	252	226	244	234	234	208	236	190	208	176	224	198	198	196	212	198	196	212	238	204	214	266	290	280	
7	282	252	242	246	212	196	232	192	206	206	200	194	214	208	226	206	196	198	202	E B	218	200	248	280	258
8	254	260	242	242	218	192	222	178	188	196	196	200	228	198	220	204	192	204	238	220	194	242	242	226	
9	226	270	270	268	286	212	196	196	196	222	226	226	192	220	214	202	190	198	230	198	200	250	260	260	
10	230	228	242	230	256	218	198	208	208	228	194	200	196	194	210	214	202	202	254	224	214	194	266	240	
11	222	234	246	224	256	216	192	190	190	190	190	190	196	214	220	206	204	206	232	232	232	210	182	276	
12	242	232	242	248	274	234	210	202	196	190	198	198	200	212	198	204	196	220	212	248	206	216	256	248	
13	E A	A	194	260	206	222	232	192	A	210	198	194	198	196	202	216	208	216	216	216	206	210	232	260	
14	218	244	266	264	220	212	222	208	196	212	216	196	196	196	206	206	212	204	256	220	200	252	276	270	
15	A	A	234	246	232	198	E A	252	196	190	200	200	196	194	212	200	206	190	240	240	224	204	224	242	216
16	246	242	252	260	246	208	204	194	178	204	208	200	192	198	206	206	190	200	246	242	208	222	254	254	
17	254	244	254	256	252	204	238	198	180	208	222	198	198	198	198	196	188	274	240	216	218	226	252	244	
18	230	226	234	216	242	242	216	190	200	214	210	194	204	210	208	196	204	230	236	236	210	228	254	228	
19	220	244	264	238	216	196	204	202	200	208	200	214	196	208	202	196	204	198	226	232	224	230	212	204	
20	228	242	236	202	236	242	224	208	202	202	192	186	194	208	220	190	196	228	220	200	250	214	244	244	
21	250	254	254	228	212	214	188	216	214	198	198	220	182	244	222	196	220	200	246	226	226	252	252	258	
22	248	248	248	242	226	192	252	202	216	216	216	214	190	192	190	194	194	222	226	200	214	248	254	254	
23	270	258	246	248	260	202	180	188	192	200	200	200	196	180	186	200	200	A	A	212	238	230	262	252	
24	246	236	270	284	242	218	222	208	184	214	192	186	186	196	196	182	202	212	242	A	A	A	286	246	
25	234	218	232	246	212	206	216	182	196	214	212	194	182	198	198	206	216	210	220	204	218	302	258	248	
26	248	258	250	236	220	220	228	202	202	202	194	194	194	196	196	198	208	226	228	214	276	276	A	246	
27	250	252	230	230	194	182	A	208	196	202	202	192	180	196	196	204	216	218	210	226	226	258	244	214	
28	234	260	242	236	206	230	224	196	200	210	196	192	196	220	216	202	202	202	E B	276	254	274	254	210	
29	E B	252	252	234	202	A	A	208	220	208	198	194	200	196	192	214	214	A	216	234	252	232	226	204	
30	214	214	236	214	214	242	212	212	230	196	196	196	182	186	194	192	222	212	212	212	260	250	234	204	
31	262	238	260	216	248	218	236	208	224	198	198	198	188	200	198	220	206	222	212	208	E B	248	244	252	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	30	28	31	31	31	30	29	31	30	31	30	31	31	30	31	31	31	29	30	30	30	30	30	31	
MED	246	244	244	242	234	210	219	202	200	202	198	198	196	198	202	202	200	210	230	221	215	231	252	246	
U Q	254	253	254	252	252	220	232	208	206	210	208	200	200	212	214	206	208	222	240	232	236	250	258	258	
L Q	230	235	236	230	212	202	201	192	196	198	196	194	190	196	196	196	194	202	216	212	206	220	234	228	

DEC. 2018 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Wakkanai

DEC.2018 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							B										B	B						
2							A										A	A						
3							B										A	A	A					
4							B											B	B					
5							A										A		A					
6							B										B	B						
7							B																	
8							A																	
9							B																	
10							A																	
11							B																	
12							B																	
13							A																	
14							B																	
15							B																	
16							B																	
17							B																	
18							B																	
19							B																	
20							B																	
21							B																	
22							B																	
23							B																	
24							B																	
25							B																	
26							B																	
27							B																	
28							B																	
29							B																	
30							B																	
31							B																	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								1	22	28	26	29	27	28	26	20	4	5						
MED								136	116	111	112	108	108	108	110	114	105	96						
U Q								120	114	116	112	112	112	112	120	326	104							
L Q								108	108	108	105	104	106	108	108	96	87							

DEC.2018 h'E (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Wakkanai

DEC.2018 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 \ 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	90	90	94	94	98	B	102	134	122	108	120	G	110	110	102	102	B	B	B	B	94	102	B	98
2	102	B	B	B	B	B	114	102	102	G	G	104	104	128	94	110	86	86	86	B	104	102	B	108
3	106	106	106	100	B	100	116	104	102	148	C	116	110	110	102	106	100	100	94	94	94	94	94	94
4	94	92	98	98	96	98	B	B	152	100	158	128	100	90	108	114	B	110	104	100	100	94	96	96
5	B	B	B	B	B	B	92	120	152	100	100	100	100	100	100	100	100	100	100	100	100	100	100	B
6	94	86	86	110	110	104	104	B	130	170	150	126	G	G	G	G	B	100	100	92	92	106	102	B
7	96	94	94	92	B	92	B	B	104	102	98	G	96	92	96	98	98	90	96	98	90	90	96	92
8	86	82	94	88	B	B	110	B	104	130	96	192	96	196	94	94	92	92	94	96	96	88	98	98
9	98	98	98	98	98	92	100	106	102	102	102	98	94	94	96	110	98	88	B	B	100	100	98	98
10	112	98	B	98	86	B	102	102	102	102	98	98	G	G	G	132	96	96	92	100	100	98	98	98
11	98	90	90	90	90	116	110	118	92	92	98	98	124	G	G	G	B	94	90	92	B	B	102	98
12	98	98	96	90	90	88	92	108	106	100	108	98	92	92	90	140	B	B	B	B	94	112	104	100
13	100	94	94	90	108	B	102	102	102	106	96	88	88	88	G	90	86	90	90	90	96	96	96	96
14	96	88	90	90	88	92	B	100	100	126	96	108	G	G	G	84	84	82	84	84	98	98	98	98
15	92	92	90	90	B	B	86	136	142	94	144	G	88	158	G	G	B	92	84	102	B	B	92	B
16	88	B	B	88	84	B	B	B	100	G	G	168	104	170	164	150	90	90	90	90	90	90	90	96
17	96	B	92	92	92	B	138	B	98	98	98	98	146	154	G	130	86	90	90	B	B	90	B	B
18	B	B	B	B	B	B	100	100	148	148	156	128	116	116	114	108	B	B	104	90	B	B	B	B
19	B	90	B	B	B	B	B	B	152	134	138	130	132	116	100	154	B	B	90	B	B	102	102	102
20	B	B	88	B	B	B	B	B	114	114	G	106	G	102	152	G	B	86	100	104	114	B	B	B
21	B	96	B	B	B	B	B	B	G	G	106	G	108	G	G	G	104	104	106	104	104	104	104	104
22	Q	B	112	102	B	88	B	B	154	128	120	100	148	148	G	86	90	86	86	86	B	102	102	92
23	Q	96	B	B	B	B	B	B	106	106	106	94	94	90	88	88	88	88	80	90	102	102	102	B
24	B	94	94	94	94	86	86	86	182	100	114	122	108	102	120	106	100	100	100	92	92	94	94	94
25	90	90	88	88	88	B	98	110	100	94	200	92	98	156	100	96	96	96	98	98	106	106	100	100
26	86	86	96	96	92	88	94	94	96	94	92	92	G	G	G	88	90	88	B	B	108	100	94	94
27	94	B	B	B	84	98	98	96	92	G	G	G	G	88	G	146	104	104	98	B	B	96	90	90
28	90	90	90	B	96	96	104	96	G	G	100	G	G	162	G	104	B	104	106	122	B	B	B	88
29	B	B	114	106	B	100	100	96	G	G	G	G	G	G	G	102	102	102	102	98	92	92	92	96
30	B	B	122	B	106	100	100	96	96	G	G	G	G	G	G	106	100	106	100	100	96	96	86	84
31	84	B	B	B	B	104	98	100	100	152	152	90	108	G	G	G	B	B	B	B	94	98	92	92
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	23	20	21	20	18	16	22	21	28	24	24	23	22	23	16	25	20	26	26	22	23	25	24	24
MED	94	92	94	93	93	97	100	102	103	104	104	100	104	110	100	106	96	93	95	97	96	98	98	96
U Q	98	96	98	98	98	100	104	109	136	129	141	126	110	156	111	122	100	100	100	100	102	102	102	98
L Q	90	90	90	90	88	90	98	96	100	100	98	98	96	92	95	95	89	88	90	90	94	94	94	93

DEC.2018 h'Es (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



# IONOSPHERIC DATA STATION Wakkanai

DEC. 2018 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	F3	F6	F2	F2	F1		L1	C2	C2	L1	C2		C1	C2	C2	LC11					F1	F1		F2	
2	F1						L1	C1	C2			C2	C1	C2	LC12	LQ11	L1	L3	F1		F1	F1		F1	
3	F1	F2	F2	F2		F1	L2	L1	L2	H2		C2	C3	CL21	C3	C3	L1	L1	F3	F1	F3	F3	F4	F2	
4	F3	F2	F4	F4	F1	F2			H2	C2	H1	CC21	C2	LC11	C2	L1		L1	F1	F1	F1	F2	F2	F1	
5							L1	L1	C2	C2	C2	C4	C3	C4	C5	C2	C1	L1	F2	F1	F2	FF21	FF21		
6	F1	F2	F2	F1	F1	F1	L1		C2	H1	H1	C2		C1				L3	F2	F1	F1	F1	F2		
7	F2	F1	F1	F1		F1			L3	L2	L2		L2	L2	L1	L1	L3	C2	F3	F2	F2	F2	F1	F3	
8	F2	F2	F1	F1			L1		L1	CL21	CL21	C2	L2	CL11	L2	L3	L4	L2	F1	F2	F1	F1	F2	F2	
9	F3	F2	F3	F2	FQ11	F2	L1	L3	L2	L1	L2	L3	LC11	LC11	LC11	C1	C1	C1			F1	F1	F3	F2	
10	F1	F1		F1	F1		C1	L3	L2	L2	L2	L2				C1	L1	L1	F1	F2	F2	F3	F3	F1	
11	F1	F1	F2	F2	F2	F1	L1	L1	L4	L2	LC11	LC11	C1					L1	F1	F1			F1	F2	
12	F2	F1	F1	F3	F2	F1	L1	L2	C4	L4	L3	L2	C1	LC21	LC11	CL11					F1	F1	F3	F3	
13	F4	F4	F2	F2	F1		L3	L2	L6	LQ11	L2	L2	C1	C1		L2	L2	L1	F1	F1	F3	F1	F2	F1	
14	F1	F3	F2	F2	F2	F1		L2	LC21	CL21	L2	C1				L1	L2	C1	F1	F1	F1	F1	F2	F2	
15	FQ31	FQ31	FQ11	F1			L1	C1	C1	LC11	H1		LC11	H1				L1	F1	F1		F1			
16	F2			F1	F1				LC21			H1	LC11	H2	H2	H2	L1	L1	F1	F1	F1		F1	F2	
17	F1		F1	F1	F1		H1		L3	32	LC21	LC22	H2	H2		C1	L1	L2	F1			F1			
18							L1	L1	H1	H1	H2	C2	C2	C2	C2	C3				F1	F1				
19		F1							H1	C2	C2	C2	CL21	CL21	LC11	H1			F1				F1	F1	
20			F1						C2	C1		C2		L1	H1			L1	F1	F1	F2				
21		F1									C1		C2				L2	L2	F2	F4	F6	F3	F2	F2	
22	F2		F1	F2		F1			HL11	C1	C1	C3	H1	HL11		L2	L1	L2	F2	F1		F2	F2	FQ21	
23	FQ21	FQ21			F1		L1	L1	LC11	LC11	L2	L3	L4	L2	L3	L3	L2	L4	F2	F2	F2	F3	F1		
24		F2	F2	F3	F2	F2	L2	L1	C1	LC21	L1	C2	LC11	L1	L1	LC11	L2	L3	F3	F6	F6	F6	F6	F2	
25	F3	F2	F2	F2	F1		L2	LQ11	L1	L3	L2	L1	L1	H1	L2	L3	L3	LQ11	F2	F4	F1	F3	FQ21	FQ21	
26	FQ31	FQ11	FQ11	FQ11	F2	F2	L2	LQ61	LQ61	LQ41	L2	L1				L2	L2	L2			F2	F2	F4	F2	
27	F1				F1	F1	LQ61	LQ31	LC11					C1		H2	L3	LC11	F1			F2	F1	F1	
28	F1	F1	F1		F1	F2	L1	L3			L1			H1		L1		L1	F1	F1				F1	
29			F2	F4		F4	L7	L4								L2	L3	L5	F5	F4	F3	F1	F1	F1	
30			F1		F1	F5	L3	L3	L1					H1		LQ21	L3	L1	F2	F1	F1	F2	F2	F2	
31	F1				F5	L2	L3	L1	HL11	HL11	LC21	CL21									F2	F2	F3	F2	
	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																									

# IONOSPHERIC DATA STATION Kokubunji

DEC.2018 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

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 32	X 32	X 30	X 31	X 31	X 27	X 25								X 58	X 58		X 39	X 37	X 38	X 30	X 32	X 32	X 34
2	X 34	X 36	X 33	X 31	X 30	X 30	X 29											X 40	X 37	X 32	X 35	X 35	X 33	X 32
3	X 36	X 33	X 34	X 33	X 32	X 26	X 27											X 46	X 41	A	X 37	X 40	X 41	X 37
4	X 39	X 39	X 42	X 43	X 46	X 40	X 38											X 38	X 34	X 42	X 51	X 38	X 38	X 46
5	X 48	X 45	X 46	X 53	X 50	X 41	X 41											X 40	X 33	X 36	X 37	X 32	X 36	X 39
6	X 37	X 36	X 40	X 40	X 39	X 31	X 30											X 38	X 35	X 34	X 36	X 34	X 32	X 34
7	X 35	X 34	X 36	X 33	X 31	X 27	X 33											X 37	X 40	X 38	X 38	X 38	X 33	X 32
8	X 39	X 39	X 46	X 47	X 42	X 42	X 33												X 38	A	X 36	X 34	X 40	X 40
9	X 44	X 44	X 48	X 70	X 61	X 60	X 39											X 41	X 32	X 37	X 36	X 43	X 42	X 39
10	X 39	X 36	X 40	X 38	X 36	X 33	X 32												X 34	X 34	X 43	X 39	X 32	X 41
11	X 40	X 36	X 35	X 35	X 40	X 33	X 36											X 38	X 35	X 37	X 40	X 39	X 28	X 31
12	X 32	X 37	X 31	X 30	X 37	X 38	X 35											X 39	X 33	X 33	X 36	X 36	X 39	X 42
13	X 42	X 36	X 40	X 40	X 39	X 42	X 44											X 42	X 33	X 37	X 37	X 32	X 32	X 31
14	X 38	X 36	X 44	X 40	X 39	X 37	X 33											X 36	X 36	X 28	X 31	X 31	X 28	X 36
15	X 30	X 30	X 36	X 33	X 30	X 24	X 21											X 39	X 31	X 34	X 34	X 32	X 36	X 35
16	X 39	X 33	X 36	X 32	X 32	X 25	X 25											X 31	X 32	X 33	X 34	X 34	X 32	X 32
17	X 38	X 38	X 33	X 34	X 30	X 28	X 25											X 41	X 32	X 37	X 34	X 40	X 33	X 33
18	X 33	X 33	X 35	X 32	X 32	X 31	X 37												X 38	X 44	X 44	X 32	X 35	X 36
19	X 38	X 34	X 39	X 38	X 30	X 33	X 39											X 33	X 39	X 40	X 36	X 34	X 32	X 32
20	X 29	X 33	X 32	X 32	X 31	X 31	X 38											X 34	A	X 38	X 33	X 32	X 32	X 37
21	X 37	X 39	X 37	X 36	X 33	X 30	X 33											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	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
25	C	C	C	C	C	C	C	C	C									X 38	X 40	X 44	X 32	X 32	X 32	X 34
26	X 38	X 39	X 38	X 33	X 38	X 35	X 31	X 40										X 34	X 40	X 40	X 41	X 31	A	X 32
27	X 32	X 38	X 34	X 38	X 36	X 31	X 25											X 44	X 44	X 38	X 36	X 40	X 40	X 31
28	X 37	X 37	X 31	X 27	X 26	X 28	X 26	X 44										X 40	A	X 37	X 39	X 40	X 38	X 36
29	X 30	X 27	X 33	X 31	X 26	X 25	X 26											X 38	X 37	X 38	X 41	X 41	X 37	X 44
30	X 32	X 34	X 42	X 46	X 40	X 40	X 40											X 44	X 41	X 37	X 30	X 34	X 33	X 33
31	X 35	X 40	X 37	X 30	X 29	X 30	X 29											X 36	X 45	X 42	X 33	X 33	X 36	X 38
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	27	27	27	27	27	27	2							1	1		24	25	25	27	27	26	27
MED	X 37	X 36	X 36	X 34	X 33	X 31	X 33	X 42							X 58	X 58		X 38	X 37	X 37	X 36	X 34	X 33	X 35
U Q	X 39	X 39	X 40	X 40	X 39	X 38	X 38											X 40	X 40	X 39	X 39	X 39	X 38	X 39
L Q	X 32	X 33	X 33	X 32	X 30	X 28	X 26											X 36	X 33	X 34	X 34	X 32	X 32	X 32

DEC.2018 f<sub>XI</sub> (0.1MHz)

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# IONOSPHERIC DATA STATION Kokubunji

DEC.2018 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

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	26	26	24	25	25	21	19	45	55	51	52	64	55	61	52	52	44	33	31	32	24	26	26	F
2	F	F	27	25	24	24	23	46	64	55	58	64	52	57	53	55	45	34	30	26	29	29	27	26
3	F	27	28	27	26	20	21	46	45	54	56	62	72	A	65	55	50	40	36	A	31	34	35	31
4	33	33	36	37	40	34	32	48	52	50	56	67	64	52	62	90	47	32	28	36	F	32	32	40
5	42	39	40	F	F	F	F	52	48	52	64	88	79	56	55	57	45	34	27	30	31	26	F	F
6	31	30	F	F	33	25	24	46	49	54	59	66	60	57	53	54	52	32	29	28	F	F	F	28
7	29	28	30	27	25	20	F	40	48	51	57	62	54	56	68	60	49	31	34	F	F	F	27	26
8	33	33	F	F	36	36	27	43	44	49	54	64	71	81	74	68	50	32	32	A	30	28	F	F
9	F	F	F	F	F	F	F	41	44	53	61	75	67	66	63	60	50	35	26	31	30	F	F	F
10	F	F	25	32	30	27	26	44	44	56	69	73	60	63	61	54	54	38	28	28	37	33	26	F
11	F	30	29	29	F	27	30	44	55	52	64	69	55	59	51	49	44	32	29	31	34	32	22	F
12	F	F	25	24	F	F	F	39	47	55	56	71	80	57	56	48	40	32	27	27	30	30	J	F
13	F	30	F	F	F	F	F	44	46	49	54	59	53	54	51	49	44	35	27	31	F	26	26	F
14	32	30	F	F	F	F	27	41	44	45	54	66	58	59	51	45	40	30	30	22	25	25	22	F
15	24	24	F	F	24	18	15	36	44	45	56	54	60	59	61	54	41	33	25	27	28	25	F	F
16	F	27	F	F	F	19	19	38	46	46	52	52	52	52	56	48	44	25	26	27	28	28	26	26
17	F	F	27	28	24	22	19	38	46	46	46	46	59	61	53	52	50	35	26	31	28	F	27	27
18	27	27	29	26	26	25	31	43	44	51	53	58	55	53	70	49	44	32	32	38	38	26	F	30
19	F	28	33	F	24	27	F	44	44	56	51	65	57	56	57	51	43	26	33	34	30	28	26	26
20	23	27	26	26	25	25	32	44	49	48	60	59	52	53	52	52	A	28	A	C	C	C	27	26
21	31	F	30	30	27	24	26	38	47	60	73	55	61	57	56	56	49	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	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
25	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	F
26	F	F	F	F	F	F	25	34	52	52	56	54	55	52	52	52	44	28	34	34	35	25	A	25
27	26	F	F	F	31	25	19	34	42	43	60	56	56	52	48	42	39	38	38	32	30	F	F	25
28	F	F	25	21	20	22	20	38	46	56	80	60	52	58	52	46	40	34	A	31	F	34	32	30
29	24	21	F	F	20	19	20	33	51	72	77	58	V	54	53	49	47	40	32	31	32	35	F	F
30	26	28	F	F	F	F	F	39	44	54	77	74	53	53	48	44	41	38	34	31	24	28	27	27
31	29	34	31	24	23	24	23	33	44	56	66	67	52	47	50	48	41	30	38	36	27	27	F	F
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	15	18	16	15	18	20	20	27	27	28	28	28	28	27	28	28	27	27	25	24	23	22	19	14
MED	29	28	28	27	25	24	24	41	46	52	56	63	56	56	54	52	44	32	30	31	30	28	26	27
U Q	32	30	30	29	30	26	27	44	49	55	64	67	60	59	61	55	49	35	34	33	31	30	31	30
L Q	26	27	26	25	24	20	20	38	44	49	54	58	53	53	52	48	41	31	27	28	27	26	26	26

DEC.2018 foF2 (0.1MHz)

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# IONOSPHERIC DATA STATION Kokubunji

DEC.2018 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											A			LU L 368										
2										L	A	L		L	L									
3												A		A										
4												L	A											
5											L			L										
6												L	L	L										
7											A	A				L	L							
8																L								
9											L			376										
10										U L 388	L	L	L	L	L									
11											A	L	L	L	L									
12												LU L 416	L	L	L									
13										L	L	L	L	L	L									
14												LU L 392	L	L	L	L								
15										U L U L 348 396	L	L	L	L		368	L							
16											L	L	L	L	L	L	L							
17												U L U L 380 392	L	L	L	L								
18											L	L	L	L	L									
19														A U L 380										
20												L	L	U L L 372				A						
21											L	L	L	A	L	L				C				
22									C	C	C	C	C	C	C	C	C	C						
23									C	C	C	C	C	C	C	C	C	C						
24									C	C	C	C	C	C	C	C	C	C						
25									C	C	LU L 404	L	L	L		A								
26											L	L	L	L	L	L								
27									L	L		U L L 368 404	LU L 384	L	L	L								
28										L			L	L	L	L								
29										L	L	L		L	L	L								
30										U L 380	L	L	L	L	L	L								
31										L	LU L 392	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										3	4	6	2	4	1									
MED										U L 380	U L 394	U L 392	U L 384	U L 376	U L 368									
U Q										U L 388	U L 400	U L 404		U L 382										
L Q										U L 348	U L 380	U L 380		U L 370										

DEC.2018 foF1 (0.01MHz)

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# IONOSPHERIC DATA STATION Kokubunji

DEC.2018 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								U R 188	A	A	A	A	A	A			B								
2								U R 184	R U R 264	300		A	A	A U R U R 268 252			B								
3								B 236	A	A	A	A	A	A	A	A	B								
4								B 228	272		A	A	A	A	A	A	B								
5								B U A 252	A	A	A	A	A U R U R 292 272			A	A								
6								B U R 252	272		A	R	R	A	A U A 244	A	A								
7								B	A	A	A	A	A	A	A U R 236		B								
8								U A U A 176 248	A	A	A	A	A	A U R U R 272 248			B	B							
9								B	A	A	A U A 300	A U A 292	288		A	A	A								
10								B U A 228	A	A	A	A	A U R 296	R	A U R 172										
11								A U A 244	288		A U R 292		A R U R 264			180									
12								B	A	A	A	A U R U R 296 284		A	A	A									
13								A	A	A U R U R 304 300	296	R U R U R 276 228				B									
14								B U A 248	A U R 304			R	A	A	A	R	B								
15								U R U R 176 244	A	A	A	A	A	A	A	R									
16								B U R 228	276 296		R U R U R U R U R 308 292 264 236 184														
17								B	A	A	A	A	A	A	A	A									
18								B U R 244	A	A	A	A U R 288	272			A	B	B							
19								B U A U A 232 256	284 292		A U A 292	A	A	A U R U R 236 168											
20								B	A	A	A U R 288	A	R U A U R 260 224			A									
21								B U A 228	A	A	A	A	304 A U R 252		R U R 168										
22								C	C	C	C	C	C	C	C	C									
23								C	C	C	C	C	C	C	C	C									
24								C	C	C	C	C	C	C	C	C									
25								C	C U R U R 260 296		R	R	276 260	U A 232	A										
26								U R 212	A	A	A	A	284 260	U A 260	A	A									
27								B	A U R U A 276 308		A	R U R 296		A	A U R 204										
28								U R U A U R U R 232 280 296 300 304	292 268 228																
29								B	A U R 272	A	A	A	A	A	A	A									
30								B U R 228	A U R U R 300 308	296 280 264 228					U R 228	A									
31								B	A	R U R 272 296		R	R	R	264 228		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								4	16	11	10	8	8	11	14	12	6								
MED								U R U 180	U 234	U 272	U R U 298	U R U 298	U R U 300	U R U 288	U R U 264	U R U 234	U R U 176								
U Q								U R U A U 186 246	U R U 276	U R U 304	U R U 300	U R U 304	U R U 292	U R U 272	U R U 240	U R U 184									
L Q								U 176	U 228	U R 264	U R 296	U R 292	U R 296	U 284	U 260	U R 228	U R 168								

DEC.2018 foE (0.01MHz)

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# IONOSPHERIC DATA STATION Kokubunji

DEC.2018 foEs (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	20	21	21	20	E 16	B 15	B 15	G	J 35	A 36	J 43	J 40	J 36	J 34	J 53	J 65	J 43	J 28	J 29	22	E 15	B 24	J 22	22
2	E 16	B 16	B 20	20	J 42	A 22	E 15	G	G	G	36	J 37	J 37	J 47	G	G	E 12	B 15	B 15	B 16	E 15	B 16	B 15	B 16
3	E 16	B 16	B 16	20	20	19	E 15	23	28	34	J 39	J 44	J 59	J 55	J 38	J 30	J 34	J 54	J 36	J 62	J 52	J 37	J 24	J 23
4	20	21	19	24	J 42	A 15	E 16	B 16	30	32	36	J 38	J 47	J 52	J 44	J 30	22	J 22	J 29	J 24	A 16	B 33	J 28	21
5	21	J 33	J 38	J 24	J 26	A 22	E 16	19	32	34	J 39	J 44	J 40	31	G	J 36	J 32	J 31	J 23	J 23	21	23	20	E 16
6	J 22	A 22	E 16	B 16	J 42	A 30	E 21	B 16	G	33	J 39	G	G	J 36	J 33	J 29	J 25	J 15	J 23	J 22	22	20	J 33	J 49
7	J 35	J 32	J 24	A 16	E 21	B 16	B 16	19	28	J 83	J 123	J 50	J 128	33	J 32	G	21	J 50	J 36	J 56	J 34	J 28	J 28	J 25
8	J 30	24	20	E 16	20	E 16	B 16	23	28	J 43	J 39	J 36	J 37	J 36	G	G	E 14	B 28	J 35	J 50	J 34	21	23	22
9	E 16	B 17	B 16	B 15	J 26	A 16	B 16	B 16	41	31	35	34	33	32	J 37	J 32	J 32	16	16	16	16	16	16	16
10	J 25	A 16	B 16	B 15	21	22	22	23	33	35	J 50	J 37	J 40	G	G	J 50	G	J 20	J 27	J 38	J 34	J 36	J 36	J 36
11	J 35	J 62	J 34	J 23	A 25	J 21	E 15	J 41	G	G	J 43	G	J 33	G	G	J 29	G	21	21	21	E 16	B 16	B 16	J 34
12	J 27	J 34	20	J 26	A 20	E 16	B 15	22	J 34	J 41	J 37	J 40	G	G	J 31	J 34	J 24	J 23	J 29	J 20	J 30	J 20	J 24	J 20
13	J 25	J 23	E 16	B 16	E 16	B 18	20	J 27	J 31	J 37	G	G	G	G	G	E 18	B 21	21	24	J 22	J 23	J 24	J 28	
14	J 36	24	J 20	J 24	J 28	E 21	B 16	17	28	J 37	G	J 27	33	J 34	J 34	J 25	22	J 25	J 22	J 24	20	22	E 16	22
15	20	20	21	21	E 16	B 16	19	22	J 32	J 36	J 37	34	34	31	32	28	G	J 24	J 28	J 36	J 26	J 25	J 22	25
16	J 32	23	E 16	B 15	E 16	B 15	14	16	29	31	32	G	G	G	G	G	E 15	B 20	15	20	20	20	E 15	B 16
17	E 16	B 16	B 24	J 23	J 24	20	E 16	20	J 29	J 33	J 36	J 40	J 71	J 43	J 35	J 29	J 27	J 23	J 28	J 23	19	22	20	E 16
18	E 16	19	E 16	B 16	B 15	B 16	B 16	16	G	33	32	32	32	G	30	27	J 22	J 15	20	22	21	E 16	B 16	15
19	E 16	B 16	B 16	B 16	B 16	B 16	B 16	19	28	31	32	35	33	34	32	27	20	J 31	J 16	B 16	B 16	B 16	B 16	B 16
20	E 16	22	E 16	B 16	B 16	B 16	B 16	19	30	J 32	J 35	G	G	G	30	G	J 104	J 46	J 51	J 22	J 24	J 16	J 15	J 16
21	E 16	B 16	B 16	B 16	B 16	19	E 16	B 16	J 26	J 34	J 32	J 36	J 37	J 51	G	G	G	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	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
25	C	C	C	C	C	C	C	C	C	G	G	G	G	34	32	28	24	E 16	B 26	B 16	E 16	B 16	J 53	J 45
26	J 38	J 35	J 33	J 28	J 25	J 21	E 16	J 33	28	34	34	34	J 41	J 33	J 32	J 34	J 29	J 15	J 26	J 96	J 26	J 25	J 49	J 35
27	J 40	J 24	J 34	J 24	J 33	J 24	J 22	J 34	25	34	J 42	G	G	J 40	J 40	G	J 31	J 33	J 54	J 54	J 39	J 22	J 24	
28	J 21	J 24	J 24	20	J 34	J 30	E 26	J 34	G	31	J 36	G	G	G	G	32	J 30	J 52	J 50	J 46	J 44	J 28	J 29	15
29	E 15	B 16	23	22	20	22	E 16	J 19	28	G	J 33	J 33	J 32	J 35	J 34	J 35	J 30	J 64	J 24	J 23	J 23	J 34	J 32	15
30	E 16	B 19	19	E 16	B 23	20	E 16	B 16	G	30	J 33	G	34	33	31	28	20	J 26	J 33	J 30	J 50	J 16	J 26	B 16
31	E 16	B 16	B 16	B 16	B 16	B 16	E 19	B 17	J 48	G	G	G	G	G	G	30	E 16	B 22	J 21	J 21	24	22	21	E 16
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	27	27	27	27	27	27	27	27	28	28	28	28	28	28	28	28	28	27	27	27	27	27	27
MED	20	21	20	20	21	19	E 16	B 19	28	33	35	34	33	33	32	28	22	J 23	J 26	J 23	22	22	22	21
UQ	J 30	J 24	J 24	J 23	J 26	J 22	J 19	J 23	J 32	J 36	J 39	J 39	J 38	J 36	J 34	J 33	J 30	J 31	J 33	J 38	J 34	J 28	J 28	J 25
LQ	E 16	B 16	B 16	B 16	B 16	B 16	B 16	B 16	G 25	G 30	G 32	G	G	G	G	G	G	E 16	B 21	B 21	E 16	B 16	B 16	B 16

DEC.2018 foEs (0.1MHz)

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# IONOSPHERIC DATA STATION Kokubunji

DEC.2018 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	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
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
4	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
5	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
6	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
7	E	B	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	E	B	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
10	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
11	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
12	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
13	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
14	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
15	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	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
17	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
18	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
20	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	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
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	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
25	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
26	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
27	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
28	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	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
30	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
31	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	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	27	27	27	27	27	27	27	27	27	28	28	28	28	28	28	28	28	27	27	27	27	27	27	27
MED	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
UQ	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
LQ	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.2018 fbEs (0.1MHz)

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# IONOSPHERIC DATA STATION Kokubunji

DEC.2018 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	16	16	15	16	15	15	15	16	14	15	14	16	12	14	16	16	15	16	16	15	16	16	16
2	16	16	16	16	15	16	15	14	15	15	15	15	15	14	15	16	12	15	15	16	15	16	15	16
3	16	16	16	16	15	15	15	14	16	16	15	15	17	14	14	14	15	15	15	15	16	16	16	16
4	16	16	15	16	15	15	16	16	15	14	14	14	15	14	14	15	15	16	16	16	16	16	14	16
5	16	16	16	16	16	16	16	14	16	14	15	15	16	16	15	15	16	16	16	16	16	17	16	16
6	16	16	16	16	16	16	16	16	15	16	16	16	15	16	17	15	16	15	16	16	16	16	16	16
7	16	15	16	16	16	16	16	15	14	17	16	15	17	15	16	15	14	16	16	16	15	16	16	16
8	16	16	16	16	16	16	16	12	15	16	16	18	15	16	15	16	14	16	16	16	16	16	16	16
9	16	17	16	15	16	16	16	16	15	14	17	14	15	15	18	15	16	16	16	16	16	16	15	16
10	16	16	16	15	15	16	16	16	15	16	15	17	15	17	13	14	14	17	17	16	15	16	16	16
11	16	16	15	16	16	16	15	16	14	15	16	15	14	15	16	13	14	16	16	16	16	16	16	16
12	16	16	16	16	16	16	15	15	15	15	14	16	15	14	15	14	15	16	16	15	16	15	16	16
13	16	16	16	16	16	18	17	16	15	15	15	18	17	17	17	16	18	16	17	16	16	16	16	16
14	16	16	16	16	16	16	16	17	15	15	16	17	15	14	16	14	14	16	17	16	16	17	16	16
15	16	16	15	16	16	16	14	16	15	14	14	15	16	15	14	14	15	16	17	16	16	16	16	16
16	16	16	16	15	16	15	14	16	16	14	12	14	16	16	15	14	15	15	15	15	16	16	15	16
17	16	16	16	16	16	16	16	16	14	16	16	16	17	17	16	15	15	16	15	16	16	16	16	16
18	16	15	16	16	15	16	16	16	15	15	14	14	14	14	15	15	16	15	16	16	16	16	16	15
19	16	16	16	16	16	16	16	19	14	16	16	15	15	19	15	14	14	15	16	16	16	16	16	16
20	16	15	16	16	16	16	16	16	15	15	15	17	17	19	16	15	15	16	15	16	16	16	15	16
21	16	16	16	16	16	15	16	16	16	14	15	16	16	13	15	16	15	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	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
25	C	C	C	C	C	C	C	C	C		16	16	17	14	15	15	14	14	16	16	16	16	16	16
26	16	16	16	16	15	16	16	15	16	14	14	16	14	16	16	15	16	15	16	16	16	17	16	16
27	16	16	17	16	16	16	16	16	14	15	15	13	16	17	16	16	15	14	16	16	16	16	16	16
28	16	16	17	16	16	16	16	16	15	15	17	16	18	15	17	17	15	16	16	15	16	16	16	15
29	15	16	16	16	16	16	16	15	15	15	14	19	19	15	16	15	16	16	16	17	16	16	16	15
30	16	15	16	16	16	15	16	16	15	15	14	17	14	16	16	14	16	16	16	16	15	16	16	16
31	16	16	16	16	16	16	16	17	15	16	14	15	15	16	15	16	16	15	16	16	16	16	16	16
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	27	27	27	27	27	27	27	27	28	28	28	28	28	28	28	28	27	27	27	27	27	27	27
MED	16	16	16	16	16	16	16	16	15	15	15	16	15	15	15	15	15	16	16	16	16	16	16	16
U Q	16	16	16	16	16	16	16	16	15	16	16	17	16	16	16	16	16	16	16	16	16	16	16	16
L Q	16	16	16	16	16	16	15	15	15	14	14	15	15	14	15	14	14	15	16	16	16	16	16	16

DEC.2018 fmin (0.1MHz)

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# IONOSPHERIC DATA STATION Kokubunji

DEC.2018 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	317	330	351	348	336	340	350	392	403	381	343	398	367	391	375	408	352	397	385	356	343	294	300	F
2	F	F	339	362	317	349	346	396	396	379	398	387	344	375	356	379	366	352	380	339	356	332	327	276
3	F	319	326	322	348	352	332	408	401	386	361	374	383	A	392	389	375	370	392	A	327	333	352	356
4	340	337	336	322	350	348	341	406	395	385	354	375	367	388	332	400	411	387	361	326	F	343	322	317
5	338	325	342	F	F	F	F	402	399	394	338	367	380	403	401	356	390	387	370	360	369	321	F	F
6	302	313	F	F	347	310	346	381	402	376	376	396	374	389	406	375	384	356	394	347	333	350	313	323
7	329	342	327	366	338	345	F	407	387	369	378	372	379	348	373	399	408	332	373	F	F	F	318	320
8	309	320	F	F	342	368	347	398	392	385	350	376	359	372	373	399	391	339	354	A	327	334	F	F
9	F	F	F	F	F	F	F	400	378	340	337	379	353	370	387	383	382	376	347	336	342	F	F	F
10	F	F	F	320	313	310	375	373	386	363	370	386	374	380	393	380	381	367	350	328	377	377	304	F
11	F	324	309	325	F	352	383	394	402	374	369	383	365	383	389	383	381	355	349	357	364	382	369	F
12	F	F	308	301	F	F	F	429	406	364	359	358	371	350	394	386	380	390	362	323	338	336	F	F
13	F	296	F	F	F	F	F	404	401	380	375	371	372	361	388	381	354	372	337	349	F	338	309	F
14	307	298	F	F	F	F	389	412	413	379	348	388	364	377	395	381	384	372	386	396	320	323	306	F
15	296	285	F	F	393	361	314	388	387	372	380	333	341	353	358	400	384	385	326	337	341	333	F	F
16	F	324	F	F	F	349	403	401	399	372	367	379	372	376	398	396	387	385	361	355	399	377	341	351
17	F	F	304	302	313	359	322	416	407	389	390	373	372	391	384	406	391	392	356	351	375	F	312	299
18	324	337	337	368	330	322	344	386	394	387	345	360	403	377	372	387	376	363	324	341	360	333	F	292
19	F	336	333	F	317	332	F	396	375	385	363	374	378	389	377	361	402	316	328	349	349	328	353	352
20	322	350	339	347	357	370	376	369	390	373	399	376	374	358	385	386	A	373	A	356	314	351	329	292
21	299	F	292	351	379	334	376	384	384	368	395	373	367	384	361	390	400	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	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
25	C	C	C	C	C	C	C	C	C	C	370	373	382	383	358	367	375	388	366	355	388	386	312	297
26	F	F	F	F	F	F	391	393	368	371	363	389	385	376	369	377	371	337	367	370	374	390	A	321
27	320	F	F	F	371	372	360	387	399	379	346	377	381	366	393	367	370	347	365	358	324	F	F	285
28	F	F	351	369	359	363	353	383	368	347	378	374	376	385	376	394	392	369	A	312	F	317	388	367
29	327	325	F	F	327	310	338	367	348	352	393	380	321	368	373	381	396	352	344	345	328	F	350	F
30	333	330	F	F	F	F	F	383	364	342	370	397	400	375	375	379	364	354	383	359	369	331	351	321
31	323	354	354	347	310	342	381	374	371	357	368	403	376	371	363	376	389	344	360	371	399	302	F	F
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	15	18	15	15	18	20	20	27	27	28	28	28	28	27	28	28	27	27	25	24	23	22	18	14
MED	322	325	336	347	340	348	352	394	394	374	368	376	373	376	376	383	384	367	361	350	349	333	324	320
U Q	329	337	342	362	357	360	378	404	401	383	378	386	380	385	392	395	391	385	376	358	374	350	351	351
L Q	307	319	309	322	317	333	342	383	378	366	352	373	366	366	370	378	375	352	348	338	328	323	309	292

DEC.2018 M(3000)F2 (0.01)

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# IONOSPHERIC DATA STATION Kokubunji

DEC.2018 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											A		LU	L										
2										L	A	L		L	L									
3												A		A										
4												L	A											
5											L			L										
6												L	L	L										
7											A	A			L	L								
8													449		L									
9											L		L	L										
10										U L	L	L	L	L										
										386														
11											A	L	L	L										
12											LU	L	L	L										
											372													
13										L	L	L	L	L										
14											LU	L	L	L	L									
											407													
15										U L	U L	L	L	L		L								
										421	403				416									
16											L	L	L	L	L	L								
17											U L	U L	L	L	L									
											433	379												
18											L	L	L	L										
19														A	L									
														443										
20												L	L	U L			A							
														430										
21											L	L	L	A	L	L				C				
22									C	C	C	C	C	C	C	C	C							
23									C	C	C	C	C	C	C	C	C							
24									C	C	C	C	C	C	C	C	C							
25									C	C	LU	L	L	L		A								
											396	448												
26											L	L	L	L	L									
27									L	L	LU	L	LU	L	L									
											422	428		405										
28										L	L	L	L	L	L									
											401													
29										L	L	L		L	L									
30										U L	L	L	L	L	L									
										399														
31										L	LU	L	L	L										
											412													
	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	4	6	2	4	1									
MED										U L	U L	U L	U L	U L										
										399	402	420	414	430	416									
U Q										U L	U L	U L	U L	U L										
										421	412	433	436											
L Q										U L	U L	U L	U L											
										386	398	407	417											

DEC.2018 M(3000)F1 (0.01)

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# IONOSPHERIC DATA STATION Kokubunji

DEC.2018 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

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											242		254	224										
2										234	208	226		244	250									
3											236			A										
4											224	228												
5											276			224										
6											224	232	222											
7											242	238			238	218								
8													236		230									
9											268		234	244										
10										254	242	220	216	222										
11											238	220	242	226										
12											248	246	230	238										
13										232	238	246	240	252										
14											274	220	260	240	234									
15										226	248	306	264	246	230	216								
16											250	246	242	236	226	220								
17												250	236	230	240									
18											252	252	214	244										
19													224	230										
20												226	238	242			A							
21											252	220	220	248	228	244				C				
22									C	C	C	C	C	C	C	C	C	C						
23									C	C	C	C	C	C	C	C	C	C						
24									C	C	C	C	C	C	C	C	C	C						
25									C	C	244	244	224	240	232									
26											250	224	238	238	246									
27									226	238	270	236	234	250										
28										270	234	234	236	234	242									
29										254	218	226		252	242									
30										272	232	208	224	240	234									
31										248	244	220	232	260										
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
CNT										1	11	21	23	23	23	13	3							
MED										226	248	244	226	236	238	238	218							
U Q										254	251	246	242	244	243	220								
L Q										234	236	220	230	228	231	216								

DEC.2018 h'F2 (KM)

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# IONOSPHERIC DATA STATION Kokubunji

DEC.2018 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 B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	A	202	198	184	216	210	210	182	200	200	210	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	A	198	178	198	196	220	192	194	190	220	218	226	222	E B	286	
3	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	A	216	A	212	198	206	232	206	A	216	224	218	204	E B	204	
4	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	A	212	210	200	178	180	218	216	188	210	E A	E B	E B	E B	242	
5	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	A	216	208	184	198	206	188	196	200	200	200	224	250	E B	260	
6	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	A	198	188	194	204	208	190	186	186	220	214	214	288	E B	298	
7	E A	E A	E B	E B	E B	E B	E B	E B	E B	E B	E B	A	A	224	216	202	188	184	E A	234	196	216	E A	190	E B	268	
8	E A	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	A	214	186	216	186	200	190	196	206	A	210	206	E B	E B	256	
9	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	A	204	186	208	210	204	194	186	194	210	206	212	272	E B	256	
10	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	A	186	190	192	208	210	206	192	216	E A	296	204	222	E B	244	
11	E B	E A	E A	E B	E B	E B	E B	E B	E B	E B	E B	A	186	192	194	200	204	200	198	200	210	200	194	212	E B	290	
12	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	A	196	202	182	212	208	196	198	210	E A	242	210	226	E B	202	
13	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	A	184	188	190	218	202	194	194	206	212	224	220	E B	E B	202	
14	E A	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	A	186	184	206	190	202	202	190	190	190	E B	248	210	E B	280	
15	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	A	202	218	202	188	194	188	184	220	E A	234	210	E A	E B	242	
16	E A	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	A	190	190	188	190	186	192	182	216	212	204	202	E B	E B	230	
17	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	A	178	192	202	202	202	190	196	210	218	198	222	204	E B	230	
18	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	A	204	192	200	220	208	196	188	E B	232	208	204	194	E B	E B	258
19	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	A	214	A	184	204	202	196	E A	264	226	210	210	214	218	E B	218
20	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	A	190	184	178	206	204	A	204	A	198	206	228	226	E B	E B	250
21	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	A	180	A	192	188	194	196	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	C	C
23	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	C
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
25	C	C	C	C	C	C	C	C	C	C	C	A	178	188	172	176	232	210	198	200	216	190	190	214	E B	E B	288
26	E A	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	A	210	192	192	202	216	202	194	214	208	204	198	A	E A	300	
27	E A	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	A	186	194	184	214	224	206	E A	234	208	210	E A	E A	E B	E B	298
28	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	A	184	186	180	200	212	202	212	A	E A	E A	280	E A	E A	E B	200
29	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	A	190	188	206	200	206	206	202	214	222	236	260	226	E B	E B	202
30	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	A	186	178	196	182	198	200	208	202	202	210	E B	E B	E B	E B	246
31	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	A	188	186	188	222	206	202	202	212	192	192	286	274	E B	E B	260
	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		
CNT		27	27	27	27	27	27	27	27	27	28	24	26	25	27	27	28	27	27	25	25	27	27	26	27		
MED		E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	A	190	190	194	202	204	196	195	207	209	207	216	E B	E B	E B	256
U Q		E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	A	196	206	212	209	202	204	216	220	218	228	262	E B	E B	E B	280
L Q		222	228	224	208	204	206	204	188	192	193	195	186	186	184	196	200	190	188	200	201	204	210	222	230		

DEC.2018 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Kokubunji

DEC.2018 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								112	122		A	A	A	A			B							
2								124	118	118	116		A	A	A	112	112	B						
3								B					A	A	A	A	A	B						
4								B	118	120	114		A	A	A	A	A	B						
5								B	116	116	116		A	A	A		A	A						
6								B	116	118					118	116								
7								B	114	116		A	118	108		A	108	A						
8								B	112		A	A	A	A		A	110	B	B					
9								120	120		A	A	A	A		112	110	A						
10								B	A		110	112	112	100	108		A	A	A					
11								B	122	118					116	114		114						
12								A			A			A		A		A						
13								B	110	114		114		106	112		108							
14								B	A	A	A			A	A	A	A	B						
15								B	A	A		114	114	112	110	108	110	B						
16								B	108		A	108	108	114	110		108	B						
17								B										B	B					
18								B	118	118	114	110	110	110	108	110								
19								B	116	120	112	112	112	112	108	108	112							
20								B	112	112	112	112	112	114	114	116	A							
21								B	118	118	116		A		A			C						
22								C	C	C	C	C	C	C	C	C	C							
23								C	C	C	C	C	C	C	C	C	C							
24								C	C	C	C	C	C	C	C	C	C							
25								C	C		116	118	118	108	110	110	116	116						
26									116	116	116	116		A	110	110	A	A						
27								B	118	120	116		A		A	A		116						
28									116	116	118	112	108	110	112	110	122							
29								B	A		A	A	A	A	A	A	A							
30								B		120														
31								B	122	112	112	112	108	108	108	108	112	B						
									A		114	114	116	114	112	112	110							
CNT								4	21	20	18	15	16	19	17	16	10							
MED								122	118	117	115	114	109	110	112	110	116							
U Q								125	121	119	116	116	113	114	113	112	118							
L Q								116	115	115	112	112	108	110	108	109	112							

DEC.2018 h'E (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Kokubunji

DEC.2018 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	88	98	88	88	B	B	B	G	114	106	102	102	100	98	96	90	92	100	88	88	B	86	86	98	
2	B	B	90	88	88	100	B	G	G	G	152	100	100	98	G	G	B	B	B	B	B	B	B	B	
3	B	B	B	90	102	98	B	B	138	136	114	112	102	100	98	100	98	98	92	94	88	90	90	94	
4	92	92	92	92	92	B	B	B	150	146	134	100	102	102	102	100	100	100	92	92	B	92	86	86	
5	90	86	86	88	88	92	B	B	108	138	130	98	94	92	140	G	94	92	92	92	92	92	92	92	
6	92	94	B	B	96	94	94	B	G	152	100	G	G	94	94	158	98	B	92	92	88	94	94	90	
7	90	92	86	B	92	B	B	126	122	96	90	90	90	132	100	G	120	90	90	90	84	82	82	80	
8	84	84	82	B	92	B	B	138	136	106	104	102	100	98	G	G	B	92	86	84	78	88	88	86	
9	B	B	B	B	88	B	B	B	98	128	128	130	132	130	100	100	98	B	B	B	B	B	B	B	
10	88	B	B	B	90	90	90	132	126	120	104	98	98	G	G	94	G	104	98	98	96	92	86	86	
11	102	94	108	102	88	86	B	B	96	G	G	88	G	G	G	94	G	94	94	94	B	B	B	94	
12	88	98	98	92	90	B	B	94	96	100	98	98	G	G	100	92	84	90	86	86	84	84	82	82	
13	86	84	B	B	B	B	88	96	100	98	G	G	G	G	G	G	B	86	86	86	86	86	96	94	
14	94	90	90	88	86	88	B	B	144	94	G	98	120	114	86	86	154	96	96	88	88	88	108		
15	90	94	96	98	B	B	B	B	156	100	108	104	112	142	140	120	130	124	G	100	102	98	98	94	
16	88	90	B	B	B	B	B	B	152	150	148	G	G	G	G	G	G	B	128	B	114	114	B	B	
17	B	B	94	92	84	86	B	B	94	102	102	102	100	100	100	98	96	96	92	92	92	90	86	84	
18	B	84	B	B	B	B	B	B	G	126	128	122	122	G	138	120	120	B	88	90	90	B	B	B	
19	B	B	B	B	B	B	B	B	150	140	154	140	128	118	116	160	136	86	B	B	B	B	B	B	
20	B	92	B	B	B	B	B	B	128	122	116	122	G	110	136	G	96	94	92	92	88	B	B	B	
21	B	B	B	B	B	B	B	B	138	118	118	104	158	96	G	G	G	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	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
25	C	C	C	C	C	C	C	C	C	C	G	G	G	G	154	154	144	126	B	98	B	B	B	98	94
26	94	88	88	90	90	90	B	92	138	140	120	124	86	132	118	86	84	B	96	94	94	86	88	90	
27	90	94	104	90	100	96	112	98	112	G	136	90	G	G	100	102	G	98	94	94	92	90	90	92	
28	88	84	86	90	100	98	88	98	G	160	G	86	G	G	G	142	126	94	94	94	94	92	88	B	
29	B	B	120	124	140	140	B	120	106	G	98	98	100	100	100	96	94	96	86	86	86	90	86	B	
30	B	86	114	B	106	102	B	B	G	116	80	G	138	164	146	138	130	98	94	94	92	B	86	B	
31	B	B	B	B	B	B	B	B	G	G	G	G	G	G	154	166	B	114	114	110	104	98	82	B	
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	
CNT	16	18	16	14	18	14	7	15	21	22	23	20	20	18	19	21	18	20	24	22	20	19	19	15	
MED	90	91	91	90	91	94	94	100	122	117	112	100	100	108	100	100	98	94	93	92	90	90	86	90	
U Q	92	94	101	92	100	98	120	128	138	140	128	113	125	132	136	140	126	99	96	94	94	92	90	94	
L Q	88	86	87	88	88	90	88	96	104	104	98	98	99	98	100	94	94	92	89	88	87	86	86	86	

DEC.2018 h'Es (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Kokubunji

DEC.2018 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

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	F2	F1	F2	F2					C3	L2	L3	L2	L2	L2	L3	L4	L4	F1	F3	F1		F2	F2	F2
2			F2	F1	F2	F3				H1	L2	L2	L2											
3				F1	F1	F1		H2	H2	C3	C2	L3	L4	L3	L2	L3	L3	F5	F4	F6	F6	F4	F3	F3
4	F1	F3	F4	F4	F3			H2	H2	C1	L2	L2	L3	L3	L2	L1	L1	F2	F4	F3		F4	F5	F2
5	F2	F6	F5	F3	F4	F2		C2	H2	C2	L2	L2	L2	H2		L4	L2	F3	F2	F2	F2	F2	F2	
6	F2	F2			F2	F2	F1			H2	L2			L3	L2	H2	L1		F1	F2	F2	F1	F3	F3
7	F2	F2	F2		F2			C1	C2	L3	L3	L3	L2	CL12	L2		C1	F4	F3	F3	F3	F2	F2	F1
8	F1	F1	F1		F1			H2	H2	L3	L2	L1	L1	L2				L1	F4	F6	F5	F1	F2	F1
9					F1				L3	CL22	C2	H1	CL12	HL12	L2	L3	L3							
10	F2				F1	F2	F1	H3	C3	C2	L3	L3	L2			L5		L1	F3	F4	F4	F6	F4	F2
11	F2	F3	F2	F1	F2	F1		L2			L4		L2			L1		F1	F2	F1				F3
12	F2	F2	F2	F2	F2			L1	L4	L3	L2	L2			L3	L2	L2	L1	F3	F2	F2	F1	F2	F1
13	F2	F1					F2	L3	L2	L2								F1	F1	F3	F3	F1	F2	F2
14	F4	F2	F2	F2	F2	F1		H2	L2	L2		L2	CL22	CL22	L2	L2	H2	F2	F1	F1	F3	F2		F1
15	F1	F2	F1	F2			F1	L1	L3	L3	C2	HL12	HL12	CL12	CL22	C2		F1	F1	F3	F2	F3	F2	F2
16	F3	F1						H2	H2	H1									F1		F1	F1		
17			F2	F2	F2	F2		L1	L2	L2	L2	L2	L2	L3	L4	L4	L4	F2	F4	F3	F1	F2	F1	
18		F1								C2	CL22	C2	C1		H2	C1	C2		F1	F1	F2			
19									H3	H2	H1	H1	C2	C2	C2	H1	C1	F2						
20		F3						C1	C2	C2	C1		C1		H2		L4	F5	F5	F1	F2			
21						F1			H2	C2	C1	L2	HL22	L2										
22																								
23																								
24																								
25														H1	H2	H2	C2		F1				F2	F4
26	F3	F2	F2	F2	F5	F1		L2	H2	H2	C1	C1	L3	HL12	CL12	L2	L2		F2	F4	F2	F2	F5	F5
27	F3	F1	F2	F2	F2	F2	F1	L2	C2		H1	L2			L2	L3		F5	F3	F3	F3	F4	F2	F2
28	F1	F2	F1	F1	F2	F3	F3	L4		H1		L1				H2	C3	F3	F5	F4	F4	F3	F2	
29			F1	F1	F2	F1		C2	L2		L2	L2	L1	L2	L2	L2	L3	L3	F2	F2	F1	F2	F2	
30		F1	F1		F2	F1				CL12	L2		H1	H1	H1	H2	C1	F3	F2	F3	F3		F4	
31							F1		L4						H1	H1		F2	F3	F2	F2	F2	F2	
CNT																								
MED																								
U Q																								
L Q																								

# IONOSPHERIC DATA STATION Yamagawa

DEC.2018 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 32	X 34	X 34	X 32	X 34	X 30														X 34	X 34	X 31	X 30	X 31
2	X 31	X 32	X 34	X 38	X 37	X 35														X 34	X 30	X 32	X 33	X 28
3	X 32	X 34	X 34	X 32	X 33	X 30														X 33	A	X 32	X 34	X 34
4	X 34	A	X 36	X 36	X 38	X 31														X 34	X 31	A	A	A
5	X 34	X 36	X 33	X 35	X 32	X 32		X 48												X 35	X 34	X 33	X 27	X 30
6	X 33	X 36	X 36	X 39	X 35	X 28														A	X 32	X 34	X 34	X 32
7	X 34	X 33	X 34	X 36	X 34	X 29														X 32	X 33	X 33	X 32	X 32
8	X 33	X 35	X 36	X 40	X 35	X 28														X 34	X 34	X 32	X 32	X 32
9	X 33	X 35	X 40	X 54	X 56	X 50	X 38													X 32	X 35	X 32	X 34	X 37
10	X 31	X 39	X 39	X 34	X 36	X 29	X 29	X 37												X 30	X 35	X 38	X 34	X 30
11	X 33	X 32	X 32	X 34	X 36	X 33														X 34	X 33	X 38	X 28	X 25
12	X 30	X 33	X 38	X 33	X 30	X 28														X 31	X 32	X 36	X 32	X 34
13	X 38	X 32	X 40	X 40	X 40	X 49	X 41												X 40	X 33	X 33	X 34	X 32	X 31
14	X 32	X 36	X 36	X 32	X 30	X 30														X 30	X 29	X 33	X 28	X 31
15	X 33	X 35	X 39	X 40	X 34	X 27														X 31	X 36	X 31	X 31	X 32
16	X 35	X 36	X 33	X 33	X 33	X 33	X 28	X 38												X 37	X 38	X 34	X 26	X 28
17	X 29	X 29	X 32	X 29	X 32	X 32														X 30	X 38	X 39	X 35	X 32
18	X 33	X 30	X 30	X 30	X 30	X 33														X 38	X 38	X 38	X 33	X 30
19	X 33	X 33	X 35	X 35	X 31	X 29														X 40	X 42	X 38	X 30	X 32
20	X 35	X 34	X 31	X 31	X 34	X 30	X 29													X 42	X 32	X 30	X 33	X 34
21	X 36	X 34	X 34	X 37	X 38	X 28														X 41	X 44	X 31	X 27	X 30
22	X 32	X 31	X 32	X 33	X 35	X 31														X 38	X 44	X 28	X 30	X 36
23	X 39	X 42	X 43	X 40	X 40	X 24														X 38	X 40	X 29	X 40	X 32
24	X 33	X 33	X 34	X 32	X 30	X 28														X 36	X 36	X 36	X 33	X 30
25	X 30	X 32	X 34	X 33	X 31	X 30														X 42	X 42	X 31	X 28	X 29
26	X 32	X 33	X 37	X 34	X 28	X 32	X 33													A	X 40	X 30	A	X 26
27	X 34	X 36	X 30	X 29	X 35	X 31														X 39	X 38	A	A	A
28	X 40	X 36	X 36	X 31	X 24	X 24														A	X 42	X 42	X 45	X 30
29	X 30	X 28	X 30	X 25	X 25	X 28	X 28													A	X 38	X 41	X 40	X 38
30	X 32	X 30	X 32	X 30	X 30	X 30														X 37	X 40	X 31	A	X 34
31	X 33	X 38	X 37	X 30	X 31	X 26														X 37	X 42	X 36	X 28	X 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	31	30	31	31	31	31	7	4											2	27	30	29	27	29
MED	X 33	X 34	X 34	X 33	X 34	X 30	29	38											X 38	X 34	X 36	X 33	X 32	X 32
U Q	34	36	37	37	36	32	38	43												38	40	37	34	34
L Q	X 32	X 32	X 32	X 31	X 30	X 28	28	38												X 32	X 33	X 31	X 30	X 30

DEC.2018 f<sub>XI</sub> (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



# IONOSPHERIC DATA STATION Yamagawa

DEC.2018 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

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

DEC.2018 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Yamagawa

DEC.2018 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										L	U L	U L	U L	408	424	408	400							
2										L	U L	U L	L	L	L	L								
3											A	A		A					A					
4											436		L		A									
5												404	L		A									
6										L	U L	U L	L	L	L					A				
7									L	U L	U L	U L	L	L	A	A								
8											U L	L	U L	L	L	L								
9											428	L	U L	U L	L	L								
10											416	L	U L	L	L	A								
11											A	L	A	A	A	L								
12											A	A		A	A	L								
13							A				U L	U L	L											
14											416	416	412			L	L	L						
15									L		L		L	A		L	L							
16											392	408												
17										L	U L	U L	U L	L	L									
18											412	404	404	A	L	A	L	L						
19											L	L	L	L	L	L								
20											U L	A	A	L	L	L								
21									L		L	L	U L	U L	L	L								
22											392	400												
23											U L	L	U L	L	L	L								
24											L	L	A	A	L	L	L							
25										L	U L	U L	L	L	L	L				A				
26											U L	L	A	A		L	A			A				
27											404	404	400											
28											U L	L	A	A	L	L			A	A				
29											396		A	A	L	L	A	A	A					
30											392	400												
31											L	L	U L	U L	L	L								
											U L	L	U L	L	L	L								
											408	408	412	408	400									
											U L	U L	U L	U L										
											432	412	420	412										
											U L	U L	U L											
											L	L	L	L										
											388	400	404	408										
CNT											9	14	11	11	2									
MED											U L	U L	U L	U L										
U Q											416	408	412	408	400									
L Q											U L	U L	U L											
											432	412	420	412										
											U L	U L	U L											
											L	L	L	L										
											388	400	404	408										

DEC.2018 foF1 (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Yamagawa

DEC.2018 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							B	B	U R U R	A	A	U R	A	U R	A	U A	B	B						
2							B	B	U R	U R	A	A	A	A	A	A	B	B						
3							B	B	U A	A	A	A	A	A	A	A	B	B						
4							B	B	U R U R U A	A	A	A	A	A	A	A	A	B						
5							B		A	A	A	A	A	A	A	A	B	B						
6							B	B	A U R U A U R U R	A	A	U R	A	A	A	A	B	B						
7							B	B	U R	A	A	A	A	A	A	A	B	B						
8							B	B	A	A	A	A	U R U R U R U R	U R U R	U R U R	U R U R	B	B						
9							B	B		A	A	A	A	U R	U R	U R	B	B						
10									A	A	A	A	A	A	A	A	B	B						
11							B	B	A U R	A	A	A	A	A	A	A	B	B						
12							B	B	U A	A	A	A	A	A	A	A	B	B						
13							B	B	A U A	U R	U R	U R	U R	U R	U R	U R	B							
14							B	B	U R	A	A	U R	A	U R	U R	U R	U R	B						
15							B	B	A U A U A U A U A	A	A	U R	A	A	A	U R	B	A						
16							B	B	U R U R U R U R	U R	A	A	U R	U R	U R	U R	B	B						
17							B	B	U R	R	A	A	A	A	A	A	B	B						
18							B	B	U R U A U R	A	A	A	A	U A U A	U A U A	B	B							
19							B	B	U A U A U R	A	A	U R U R	U R	U R	U R	B	B							
20								B	U R U R U A	A	A	U R	A	A	U R	B	B							
21							B	B	U R U R U A	A	A	A	A	U R	A	A	B							
22							B	B	U R U R U R	A	A	A	A	U R U R	U R U R	B	B							
23							B	B	U A	A	A	A	A	A	A	A	B	B						
24							B	B	U A	A	A	A	A	A	A	U R	B	B						
25							B	B	U R	A U A	A	A	U A	U A	U A	B	B							
26							B	B	U A	A	A	A	U R	R	A	A	B	B						
27							B	B	U R	A U A U R	U R	U R	U R	U R	U R	A	B	B						
28							B	B	U R U R U R U R	U R	U R	U R	U R	U R	U R	A	B	B						
29								B	U A U A	A	A	A	A	A	A	A	A	B						
30							B		A	A U R U R U R U R	U R	U R	U R	U R	U R	U R	B	B						
31							B	B	A U R U R U R U R	U R	U R	U R	U R	U R	U R	A	B							
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									23	17	16	10	9	9	14	12	15	1						
MED									U R U R U R U R	U R U R U R U R	U R U R U R U R	U R U R U R U R	U R U R U R U R	U R U R U R U R	U R U R U R U R	U R U R U R U R	U R U R U R U R	U R U R U R U R						
U Q									224	272	300	320	326	320	300	276	236							
L Q									U U A U A U R	U R U R U R U R	U R U R U R U R	U R U R U R U R	U R U R U R U R	U R U R U R U R	U R U R U R U R	U R U R U R U R	U R U R U R U R							

# IONOSPHERIC DATA STATION Yamagawa

DEC.2018 foEs (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	J A	22	21	J A	J A	E B	E B	E B	G	J A	J A	J A	G	J A	J A	J A	26	21	21	21	25	23	E B	E B	
2	E B	16	20	J A	E B	15	24	23	J A	G	G	G	34	34	J A	J A	J A	J A	J A	J A	J A	24	24	E B	J A
3	22	22	J A	J A	J A	E B	E B	E B	27	33	50	43	56	44	42	53	33	33	50	55	39	39	55	36	
4	J A	J A	J A	J A	E B	E B	E B	E B	G	G	36	43	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	
5	J A	J A	J A	J A	J A	22	20	30	37	40	60	36	48	48	60	56	51	35	28	23	23	23	24	E B	
6	23	E B	J A	23	J A	J A	J A	J A	G	G	36	G	G	J A	J A	J A	J A	J A	J A	J A	J A	34	26	J A	
7	E B	E B	E B	J A	J A	E B	E B	E B	G	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	E B	16	20	E B	
8	21	E B	E B	E B	E B	E B	E B	23	28	38	52	42	42	G	G	G	G	E B	J A	J A	E B	E B	E B	E B	
9	E B	E B	E B	J A	20	19	22	16	29	33	36	52	47	57	31	38	G	27	23	41	26	16	20	E B	
10	E B	E B	E B	E B	J A	E B	J A	20	29	31	45	46	46	70	46	52	50	40	24	23	20	22	22	J A	
11	E B	E B	22	24	20	E B	20	22	25	G	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	E B	E B	E B	E B	
12	E B	E B	E B	E B	J A	E B	E B	E B	26	39	52	54	72	45	35	35	41	32	28	23	22	22	22	19	
13	J A	22	21	21	20	20	E B	20	J A	G	34	G	G	35	32	G	E B	16	21	J A	J A	23	34	16	
14	J A	J A	22	21	20	E B	J A	J A	G	J A	J A	J A	J A	G	33	G	G	J A	28	23	23	23	19	E B	
15	E B	E B	E B	E B	E B	E B	E B	E B	23	30	36	37	37	36	61	34	G	J A	36	40	22	25	22	E B	
16	J A	J A	J A	J A	J A	J A	E B	E B	G	G	33	G	J A	J A	G	30	G	E B	15	20	22	24	19	22	
17	E B	E B	E B	E B	E B	E B	E B	E B	G	G	J A	J A	J A	J A	J A	30	29	E B	E B	E B	E B	17	16	E B	
18	E B	E B	E B	E B	E B	E B	E B	E B	G	29	G	J A	41	35	44	33	34	26	19	J A	22	22	20	E B	
19	E B	E B	E B	E B	E B	E B	E B	E B	23	30	G	J A	48	37	G	G	33	25	J A	22	19	E B	19	E B	
20	E B	E B	E B	E B	E B	E B	E B	E B	G	G	33	35	39	G	J A	J A	26	15	16	29	20	16	24	J A	
21	E B	E B	E B	E B	E B	E B	E B	E B	G	31	34	J A	J A	J A	J A	G	J A	J A	J A	J A	E B	16	20	J A	
22	J A	J A	J A	J A	J A	E B	E B	E B	G	G	G	35	54	41	36	G	E B	16	24	26	24	24	33	32	
23	J A	J A	E B	E B	E B	E B	E B	J A	25	J A	J A	J A	J A	J A	J A	J A	J A	35	32	45	22	33	22	25	
24	E B	J A	E B	J A	E B	E B	E B	19	25	J A	J A	J A	J A	J A	J A	J A	G	19	J A	J A	J A	J A	J A	E B	
25	E B	E B	20	23	J A	E B	E B	E B	G	J A	33	G	G	J A	38	36	32	28	J A	J A	J A	J A	J A	J A	
26	23	E B	J A	J A	J A	28	23	19	22	27	32	34	35	J A	G	G	J A	J A	J A	J A	J A	J A	J A	J A	
27	J A	J A	J A	22	20	20	20	22	25	50	35	40	40	36	G	G	26	J A	J A	J A	J A	J A	J A	J A	
28	J A	J A	23	22	E B	J A	27	22	24	J A	G	G	37	J A	51	34	G	J A	J A	J A	J A	J A	J A	J A	
29	22	22	20	22	21	J A	J A	20	26	31	36	47	44	40	40	58	52	76	102	64	35	35	28	28	
30	21	21	J A	E B	E B	E B	J A	20	J A	J A	J A	G	G	G	G	G	G	J A	J A	J A	J A	J A	J A	J A	
31	20	E B	E B	E B	E B	E B	E B	E B	J A	G	G	G	G	G	G	J A	32	24	24	22	21	21	16	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	
MED	21	E B	17	20	22	20	19	E B	19	25	31	36	J A	J A	J A	J A	J A	J A	J A	J A	J A	23	22	22	19
U Q	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
L Q	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	E B	19	22	22	20	16	16	16

# IONOSPHERIC DATA STATION Yamagawa

DEC.2018 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 16	E 16	E 16	E 16	E 16	E 14	E 16	E 16	G	29	32	32	G 32	G 25	26	25	17	16	E 16	18	E 15	E 14	E 15	
2	E 16	E 16	E 16	E 15	E 16	E 15	E 16	E 17	G	G 19	G	32	30	31	31	26	22	18	E 16	19	E 15	E 15	E 15	16
3	E 15	E 15	E 16	E 16	E 16	E 16	E 16	E 16	24	29	44	38	48	36	34	43	28	26	A 50	A 22	A 39	21	18	18
4	A 20	A 41	E 16	E 16	E 16	E 16	E 16	E 16	G	G	34	37	33	38	40	37	34	38	22	E 16	E 16	E 16	E 16	E 16
5	E 16	E 17	E 16	E 16	E 16	E 16	E 16	E 23	27	30	38	34	33	38	40	28	30	29	E 16	E 16	E 16	E 16	E 16	E 16
6	E 16	E 17	E 16	E 16	E 16	E 16	E 16	E 16	19	G	33	G	G	32	30	37	25	28	A 89	A 53	A 16	E 16	E 16	E 16
7	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	G	28	32	32	34	31	36	32	30	21	E 16	E 16	E 16	E 16	E 16	E 16
8	E 15	E 15	E 15	E 15	E 16	E 15	E 16	E 16	24	32	33	33	33	G	G	G	G	E 15	E 16	E 16	E 16	E 16	E 16	E 16
9	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	24	30	34	34	37	32	24	30	G	20	18	21	16	E 16	E 16	E 16
10	E 16	E 16	E 16	E 16	E 16	E 16	E 15	E 15	28	28	36	32	33	33	30	34	34	29	22	20	E 16	E 16	E 16	E 16
11	E 16	E 16	E 16	E 16	E 16	E 16	E 17	E 16	22	G	36	33	50	A 78	42	29	23	20	19	16	E 16	E 16	E 16	E 15
12	E 15	E 15	E 16	E 16	E 16	E 16	E 16	E 16	25	23	36	47	36	37	33	29	32	19	20	17	E 16	E 16	E 16	E 16
13	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	20	G	33	G	G	33	31	G	G	E 16	E 16	E 16	E 16	22	E 16	E 16
14	E 18	E 16	E 16	E 16	E 16	E 16	E 16	E 20	G	26	30	31	31	G	G	G	G	E 18	E 16	E 16	E 16	E 16	E 17	E 17
15	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 15	22	30	34	35	36	33	53	27	G	21	21	E 16	E 16	E 16	E 16	E 16
16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 15	G	G	32	G	32	33	G	29	G	E 15	E 16	E 15	E 16	E 16	E 16	E 16
17	E 17	E 16	E 16	E 16	E 15	E 16	E 16	E 15	G	G	32	34	37	33	35	29	25	16	16	16	E 17	E 16	E 16	E 16
18	E 16	E 16	E 16	E 16	E 16	E 16	E 15	E 15	G	28	G	34	33	32	31	32	26	18	18	E 16	E 18	E 16	E 16	E 16
19	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	21	26	G	40	34	G	G	28	23	17	E 16	E 16	E 16	E 16	E 16	E 16
20	E 16	E 16	E 17	E 16	E 16	E 16	E 16	E 16	G	G	31	31	31	G	30	28	24	E 15	E 16	E 20	E 16	E 16	E 16	E 16
21	E 16	E 16	E 16	E 16	E 16	E 15	E 16	E 16	G	29	34	34	35	33	30	G	24	24	18	E 16	E 16	E 16	E 16	E 16
22	E 16	E 16	E 16	E 16	E 17	E 16	E 16	E 16	G	G	G	33	34	32	30	G	G	E 16	E 16	23	21	21	E 16	E 20
23	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	23	27	39	38	33	32	38	28	32	32	E 15	21	E 16	E 16	E 16	E 16
24	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	24	28	32	36	37	33	31	41	G	18	E 16	18	E 16	E 16	E 17	E 16
25	E 16	E 16	E 16	E 16	E 17	E 16	E 16	E 16	G	25	32	G	G	32	33	30	24	32	A 52	18	E 16	E 16	E 16	E 16
26	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	24	29	32	33	32	G	G	43	30	20	A 53	A 130	30	19	A 34	E 16
27	E 16	E 16	E 16	E 16	E 16	E 17	E 16	E 18	23	29	31	G	38	36	34	G	24	27	28	20	20	44	50	77
28	23	19	E 16	E 16	E 16	E 16	E 16	E 16	18	G	G	G	37	42	32	G	23	A 52	150	150	25	19	E 16	E 17
29	E 16	E 16	E 16	E 16	E 16	E 17	E 16	E 16	23	27	32	42	38	33	31	36	38	76	A 19	A 64	E 16	20	17	19
30	E 16	E 16	E 17	E 16	E 16	E 16	E 16	E 16	20	36	G	G	G	G	G	G	G	18	20	21	E 16	E 16	E 16	E 16
31	E 16	E 16	E 16	E 16	E 15	E 16	E 16	E 16	22	G	G	G	G	G	G	G	28	22	E 18	E 16	E 16	E 16	E 16	E 16
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	20	27	32	33	33	32	31	28	24	20	18	17	E 16	E 16	E 16	E 16
U Q	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	24	29	34	35	37	33	34	32	30	28	A 22	21	17	19	17	16
L Q	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	G	G	G	G	G	G	G	G	G	E 17	E 16	E 16	E 16	E 16	E 16	E 16

DEC.2018 fbEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Yamagawa

DEC.2018 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

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

DEC.2018 fmin (0.1MHz)

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# IONOSPHERIC DATA STATION Yamagawa

DEC. 2018 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	317	323	310	295	355	320	330	383	398	384	375	357	354	365	374	370	374	367	390	353	326	334	340	335	
2	314	304	299	360	334	339	336	363	376	369	370	370	368	362	355	369	371	377	382	357	297	343	350	297	
3	312	342	314	348	352	312	336	366	387	402	374	350	397	356	394	401	395	379	A	387	A	312	335	345	
4	323	A	321	322	354	329	354	378	394	393	292	385	376	365	340	386	378	398	366	364	332	A	A	A	
5	347	F	339	F	303	319	353	378	373	378	397	360	365	381	375	389	380	397	374	330	349	356	351	315	
6	327	333	325	373	378	331	340	376	405	392	359	380	376	350	374	366	377	397	A	A	303	382	351	328	
7	F	309	326	373	385	326	338	380	397	387	349	353	355	378	353	385	393	378	371	334	357	319	313	341	
8	321	289	323	300	346	413	320	385	413	388	318	337	360	347	369	370	375	402	374	369	331	340	346	331	
9	310	304	F	F	F	F	F	386	397	379	329	345	360	376	372	361	386	372	377	337	312	295	324	F	
10	305	F	F	311	329	316	347	360	357	357	369	390	360	375	365	362	372	372	391	324	323	347	355	310	
11	F	325	336	328	341	339	343	381	385	371	377	369	377	A	371	354	360	377	365	345	361	366	400	376	
12	312	321	F	305	306	297	419	386	394	394	359	349	341	348	355	346	381	393	365	356	347	359	398	F	
13	F	F	F	F	F	F	F	387	415	390	368	363	340	346	380	352	371	383	390	357	367	357	371	372	
14	346	F	F	323	312	325	355	372	402	370	354	358	360	360	391	374	387	376	413	363	316	362	334	327	
15	342	315	350	401	369	355	319	381	380	408	386	358	362	370	383	394	395	380	393	358	F	359	335	326	
16	F	F	F	F	F	F	F	F	393	387	343	379	368	375	362	382	403	395	318	333	F	340	363	267	
17	335	361	F	357	323	339	381	395	386	395	375	374	365	380	367	373	387	403	346	399	F	F	F	304	
18	F	313	326	376	331	390	356	378	417	419	363	367	364	357	392	379	355	389	354	365	351	355	355	336	
19	315	306	359	359	345	367	339	379	393	385	368	385	401	394	353	362	362	381	332	346	402	383	345	342	
20	353	359	338	338	342	366	336	356	392	382	374	389	375	364	373	352	384	383	344	364	337	354	313	336	
21	329	324	316	F	366	385	360	380	412	369	348	353	390	353	345	345	359	382	357	343	366	404	314	342	
22	300	291	F	341	371	377	346	359	377	388	368	371	370	371	377	367	393	397		351	380	388	313	318	
23	F	F	F	F	F	370	435	366	383	379	374	372	393	359	358	375	374	391	373	373	F	319	F	326	
24	316	334	330	331	359	344	347	366	408	381	377	367	385	375	357	382	370	378	389	343	344	358	379	293	
25	312	338	347	359	345	343	350	367	404	389	352	389	356	368	367	377	372	379	A	A	353	354	360	313	292
26	294	339	F	F	352	F	F	366	372	365	359	356	376	347	317	349	384	381	A	A	404	377	A	276	
27	F	F	351	340	382	437	363	373	401	396	332	376	362	367	356	365	378	377	351	382	321	A	A	A	
28	F	348	358	F	330	330	330	344	394	356	357	374	381	362	353	366	413	A	A	A	310	311	F	316	
29	333	316	342	383	330	350	358	362	371	338	380	345	345	359	363	349	354	A	A	A	317	334	F	F	
30	360	337	352	335	335	340	338	359	379	373	346	389	370	350	355	370	405	354	367	341	361	352	A	317	
31	306	F	336	336	F	310	334	381	389	349	347	367	388	353	350	362	391	394	337	372	373	315	F	F	
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	
CNT	23	22	21	23	26	27	27	30	31	31	31	31	31	30	31	31	31	29	25	27	26	28	22	25	
MED	317	324	336	340	345	339	346	377	393	384	363	367	368	363	365	369	378	381	367	356	346	354	346	326	
U Q	335	338	348	360	359	367	356	381	402	392	374	379	377	375	374	379	391	394	386	365	361	361	355	338	
L Q	312	309	322	323	330	325	336	366	380	370	348	356	360	353	355	361	371	377	348	343	321	334	324	307	

DEC. 2018 M(3000)F2 (0.01)

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# IONOSPHERIC DATA STATION Yamagawa

DEC.2018 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										L	U L	U L	U L	401	387	L									
2										L	U L	U L	L	L	L	L									
3											A	A		A					A						
4											383		L		A										
5												413	L		A										
6										L	U L	U L	L	L	L				A						
7								L		U L	U L	U L	L	L	A	A									
8										U L	U L	L	U L	L	L	L									
9										373	422	381	A	U L	L										
10										385	L	A	U L	L	L	A									
11										A	L	A	A	A	A	L									
12										A	A		A	A	L										
13							A			U L	U L	U L	L												
14										L	377	398	419	L	L	L	L								
15								L			383		A	393		L	L								
16											414	A	390			L	L								
17									L		U L	U L	U L	L	L										
18										L	394	411	410	A	L	A	L	L							
19											L	L	L	L	L	L									
20										L	U L	A	A	L	L	L									
21								L			L	U L	U L	U L	L	L									
22										L	L	L	L	L	L	L									
23											A	A	L	L	A	L									
24									L	L	A	A	L	L	L	L		L							
25									L	U L	U L	U L	L	L	L	L				A					
26											L	U L	U L	U L	L	A			A						
27										U L	L	A	A		L				A		A				
28										391	440	A	A	L	L			A		A					
29										L	U L	A	A	U L	L	A	A	A							
30										399	L	U L	U L	L											
31									A		L	U L	U L	L	L										
											L	402	414		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											9	14	11	11	2										
MED											U L	U L	U L	U L	396										
U Q											385	402	407	401											
L Q											U L	U L	U L	U L											
											377	394	389	389											

DEC.2018 M(3000)F1 (0.01)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



# IONOSPHERIC DATA STATION Yamagawa

DEC.2018 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										246	246	246	246	222	222	222								
2										228		234	236	252	260	246								
3											246	246		246					A					
4											386		238		270									
5												246	236		218									
6											218	262	232	232	244	224				A				
7									212		280	252	242	228	236	224								
8											294	262	238	238	238	238								
9											300	260	234	234	242									
10											248	232	254	250	242	232								
11											234	234	242	A	234	248								
12											248	248	248	224	234	232								
13							E A				246	246	248	260										
14											270	254	250	244	222	232	216							
15									228			256	250	240		230	230							
16											282	244	240	240	240									
17										222			262	230	230	242	224							
18											254	254	252	260	228									
19											242	232	218	218	250	232								
20											232	232	222	240	240	240								
21									210		252	236		256	256	234								
22											224	258	232	226	232	244	240							
23											248	242	238	238	252	226								
24											234	240	248	230	244	260	242							
25											206	266	234	236	236	244	244				A			
26											244	254	234	268	270	E A 248				A				
27											288	236	250	236		250				E A 250				
28											258	240	232	242	256	234			A	A				
29											280	224	226	240	240	242	238	E A 232		A				
30											232	254		240	264	252								
31											252	238	222	250	276	244								
	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	27	28	29	28	27	20	5			1				
MED									212	230	252	243	240	240	242	235	227		E A 250					
U Q									228	234	270	250	248	250	256	244	237							
L Q									210	222	246	234	234	235	234	232	220							

DEC.2018 h'F2 (KM)

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# IONOSPHERIC DATA STATION Yamagawa

DEC. 2018 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

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	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	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	E B	E B	E B	E B	E B	E B	E B	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	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B
4	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	E B	E B	E B	E B	E B	E B	E B	E B
5	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	E B	E B	E B	E B	E B	E B	E B	E B
6	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	E B	E B	E B	E B	E B	E B	E B	E B
7	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	E B	E B	E B	E B	E B	E B	E B	E B
8	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	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	E B	E B	E B	E B	E B	E B	E B	E B
10	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	E B	E B	E B	E B	E B	E B	E B	E B
11	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	E B	E B	E B	E B	E B	E B	E B	E B
12	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	E B	E B	E B	E B	E B	E B	E B	E B
13	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	E B	E B	E B	E B	E B	E B	E B	E B
14	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	E B	E B	E B	E B	E B	E B	E B	E B
15	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	E B	E B	E B	E B	E B	E B	E B	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	E B	E B	E B	E B	E B	E B	E B	E B
17	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	E B	E B	E B	E B	E B	E B	E B	E B
18	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	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	E B	E B	E B	E B	E B	E B	E B	E B
20	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	E B	E B	E B	E B	E B	E B	E B	E B
21	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	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	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	E B	E B	E B	E B
23	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	E B	E B	E B	E B	E B	E B	E B	E B
24	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	E B	E B	E B	E B	E B	E B	E B	E B
25	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	E B	E B	E B	E B	E B	E B	E B	E B
26	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	E B	E B	E B	E B	E B	E B	E B	E B
27	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	E B	E B	E B	E B	E B	E B	E B	E B
28	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	E B	E B	E B	E B	E B	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	E B	E B	E B	E B	E B	E B	E B	E B
30	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	E B	E B	E B	E B	E B	E B	E B	E B
31	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	E B	E B	E B	E B	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	31	30	31	31	31	31	30	31	31	30	26	25	22	26	24	27	30	29	25	27	30	29	27	29
MED	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	E B	E B	E B	E B	E B	E B	E B	E B
U Q	274	262	254	242	240	250	250	208	208	206	204	204	198	200	202	206	206	200	202	210	230	227	248	267
L Q	238	238	228	218	214	206	214	194	192	192	194	187	184	186	182	190	198	193	188	200	202	200	206	236

DEC. 2018 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Yamagawa

DEC.2018 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	B	110	110		A	A	112	112	A	118	B	B					
2							B	B	118	116	114	A	110	A	A	A	A	B	B					
3							B	B	110	110		A	A	A	A	A	A	B	B					
4							B	B	108	108	108	108	A	A	A	A	A	A	B					
5							B		A	A	A		108	A	A	A	A	B	B					
6							B	B	A	108	108	108	108	A	A	A	A	B	B					
7							B	B		A	A	A	A	A	A	A	A	B	B					
8							B	B	108			A	A	A	A	A	A	B	B					
9							B	B	124	120		A	A	120	112	112	112	B	B					
10									112	112	108	A	A	A	A	A	A	B	B					
11							B	B	A		A	A	A	A	A	A	A	B	B					
12							B	B		A	A	A	A	A		A	A	B	B					
13							B	B	120			A		108										
14							B	B	A	118	118	118	112	112	112	112	112							
15							B	B		A	A		A	112	112	112	112	130	B	A				
16							B	B	116	116	118	122	124	120	A	A	120	B	B					
17							B	B	114	114	114	114	A	A	A	A	108	112	B	B				
18							B	B	108	108				A		108	112	B	B					
19							B	B	108	108	108	108	108	108	108	110	110	B	B					
20									110	110	110	112	112	112	112	A	112	B	B					
21							B	B	112	112	112	112	A	112	112		112	B	B					
22							B	B	120	120	120	118	A	A	A	118	A	A	B	B				
23							B	B	130	124	110	110	A	A	A	112	118	B	B					
24							B	B	116					A	A	A	A	B	B					
25							B	B	118					A			114	B	B					
26							B	B	110		112	110	110	A	110	110	112	B	B					
27							B	B	120	122	118	116	A	114	114			B	B					
28							B	B	116		116	116	116	110	110	110	110	B	B					
29									128	122	114	110	110	110	110	110	110	B	B					
30							B	B		A	A		A	A	A	A	A	B	B					
31							B	B	110	110		112	112	114	114	114	114	B	B					
									A		112	112	114	114	114	A	114	B						
									114	114	114	114	114	114	114		114							
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									25	22	18	18	12	11	16	12	18	1						
MED									112	113	113	112	112	112	112	111	112	130						
U Q									119	118	116	116	114	114	112	112	114							
L Q									110	110	110	110	110	112	110	110	110							

DEC.2018 h'E (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Yamagawa

DEC.2018 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

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		88	88	102	100	100	B	B	B	G	110	108	106	G	106	98	98	154	86	96	94	92	92	B	B
2		B	96	102	B	102	102	96	134	B	90	G	96	108	106	102	102	102	102	94	94	94	88	B	86
3		94	108	100	96	96	96	B	B	110	110	102	102	102	102	102	102	100	98	98	98	98	98	98	98
4		96	86	86	92	B	B	B	B	G	G	148	124	106	100	100	96	96	96	96	94	94	94	94	94
5		94	86	102	94	94	94	98	98	98	98	98	112	104	98	98	98	98	90	90	90	100	100	100	B
6		92	B	90	88	88	92	92	108	102	G	152	G	G	98	94	94	94	94	94	94	94	94	90	B
7		B	B	B	90	90	90	B	B	G	96	96	94	94	94	94	94	94	92	92	92	B	92	92	B
8		92	B	B	B	B	92	B	120	130	122	98	96	96	G	G	G	G	B	90	90	B	B	B	B
9		B	B	B	100	100	98	134	B	146	130	108	102	100	100	86	88	G	88	88	88	88	B	88	B
10		B	B	B	B	88	B	88	88	114	120	100	100	100	100	100	100	96	92	92	92	92	92	92	92
11		B	B	B	84	84	82	B	B	82	82	106	G	92	92	92	88	88	88	88	88	86	86	86	B
12		B	B	B	86	90	90	B	B	146	104	104	96	96	96	152	96	88	88	88	88	88	88	88	88
13		102	100	100	98	98	92	B	104	104	G	140	G	G	148	138	G	G	B	86	86	86	86	B	B
14		92	92	92	92	90	B	98	82	G	104	102	102	102	G	152	G	G	102	94	94	90	90	B	B
15		B	B	B	B	B	B	B	B	116	122	134	158	158	146	106	102	G	100	100	92	92	92	B	B
16		100	100	100	90	90	90	146	B	G	G	146	G	90	90	G	158	G	B	B	134	92	98	98	98
17		B	B	B	B	96	B	92	B	G	G	96	96	96	96	96	136	114	B	B	98	B	B	B	B
18		B	B	B	B	B	B	B	B	G	154	G	122	122	82	148	136	144	138	84	84	84	B	B	B
19		B	B	B	B	B	B	B	B	140	140	G	128	128	G	G	88	130	94	92	B	92	B	B	B
20		B	B	B	B	B	B	B	B	G	G	124	122	104	G	112	100	144	B	B	104	104	B	96	96
21		B	B	B	B	96	B	B	B	G	146	160	118	96	96	96	G	92	88	88	100	B	90	90	B
22		100	100	98	96	96	96	B	B	G	G	G	110	106	106	104	G	G	B	104	100	100	100	100	98
23		90	90	B	B	B	B	90	90	146	102	100	100	100	100	92	92	92	90	92	92	92	92	96	96
24		B	94	B	94	94	B	B	94	162	106	104	104	104	104	102	92	G	106	98	94	94	94	90	B
25		B	B	90	90	90	90	B	B	G	92	156	G	G	102	138	146	146	90	90	90	90	90	90	86
26		86	B	86	86	86	86	86	130	136	128	126	126	106	G	G	106	106	106	106	96	92	92	92	92
27		92	92	92	92	92	92	126	126	144	100	120	G	124	122	118	G	120	106	100	100	100	100	94	94
28		94	94	94	94	B	94	90	90	90	G	G	G	138	118	118	G	124	102	102	98	98	98	96	92
29		92	92	92	92	104	104	104	130	128	128	100	100	100	100	100	100	90	90	84	84	84	82	82	82
30		84	84	84	B	B	96	96	106	106	100	G	G	G	G	G	G	G	100	96	90	90	90	90	112
31		B	B	B	B	B	B	B	B	G	G	G	G	G	G	G	88	126	94	92	92	86	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		17	15	17	19	21	18	15	17	19	21	24	23	25	24	25	23	22	25	29	30	27	23	21	16
MED		92	92	92	92	94	93	96	104	116	110	106	102	102	100	102	98	101	94	92	92	92	92	92	93
U Q		98	100	100	96	97	96	104	123	144	128	137	122	107	106	118	102	126	102	98	96	98	98	96	97
L Q		91	88	88	90	90	90	90	90	106	100	100	96	96	96	96	92	94	90	89	90	88	90	90	87

DEC.2018 h'Es (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Yamagawa

DEC.2018 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	F2	F2	F1	F2	F3					C3	L3	L2		L2	L2	L3	H2	L2	L2	F1	F2	F2		
2		F1	F2		F2	F2	L2	CL22		L2		L1	L1	L2	L2	L3	L3	L3	L3	F2	F3	F2		F5
3	F2	F1	F3	F3	F4	F2			C3	C3	L6	L3	L5	L2	L2	L5	L5	L7	L7	F4	F5	F3	F5	F5
4	F5	F9	F3	F2							H2	C3	L1	L3	L3	L7	L3	L5	L3	F2	F3	F8	F9	F6
5	F3	F3	F2	F2	F2	F2	L1	L7	L3	L2	L4	C1	L2	L3	L5	L2	L3	L3	L1	F2	F1	F1	F1	
6	F1		F1	F1	F1	F2	L2	L1	L1		H1			L2	L2	L2	L2	L3	L3	F4	F2	F3	F3	
7				F2	F3	F2				L2	L2	L2	L1	L2	L3	L3	L2	L2	L3	F2		F1	F1	
8	F1				F1		C2	C2	C3	C3	L3	L2	L2						L1	F2				
9				F2	F1	F1	H2		H2	H3	C2	L2	L2	L2	L3	L3		L2	L1	F3	F2		F1	
10				F1		F1	F1	C2	C2	L3	L3	L2	L2	L3	L1	L4	L3	L5	L3	F3	F2	F2	F1	F1
11			F4	F2	F4		L2	L1	L2		L4	L2	L5	L8	L4	L3	L4	L4	L4	F2	F2			
12				F2	F1	F1			H2	L2	L3	L3	L3	L3	H2	L5	L6	L2	L4	F2	F3	F2	F1	F1
13	F2	F2	F1	F2	F1	F1		L1	L5		H2			H1	H2				L1	F4	F3	F4		F2
14	F2	F2	F2	F1	F1		L1	L4		L2	L2	L2	L2		HL12			L2	L2	F2	F2	F1		
15									C2	H2	H2	HL12	HL12	HL12	L6	L2		L3	L3	F2	F2	F1		
16	F1	F2	F2	F6	F3	F2	H1				H1	L2	L3			H1			H1	F1	F2	F1	F1	F1
17				F2		L1				L2	L2	L3	L2	L3	L3	H2	C2			F1				
18									H2			CL23	CL23	L3	HL22	HL22	HL22	H2	L3	F2	F1			
19								H2	H2			C5	C1			L2	C3	L2	L1		F1			
20							L2				C2	C2	L2		CL22	L3	H2			F3	F2		F2	F2
21				F1					H2	H2	C2	L3	L2	L2	L2		L3	L3	L3	F1		F1	F2	
22	F2	F2	F2	F4	F2	F2						C2	L2	L2	L2				L1	F3	F3	F4	F3	F4
23	F2	F2					L1	L2	H2	L3	L3	L3	L2	L2	L3	L4	L4	L3	L3	F3	F1	F2	F1	F2
24		F2		F2	F1			F1	H2	L2	L2	L2	L3	L2	L3	L6		L2	L1	F2	F1	F2	F3	
25			F2	F2	F2	F1				L2	H2			L2	HL22	HL13	HL23	L6	L6	F3	F2	F1	F2	F2
26	F2		F2	F2	F2	F1	L1	C1	H2	C2	C2	C2	L2			L3	L2	L2	L3	F6	F6	F3	F2	F2
27	F2	F2	F2	F2	F1	F1	C1	C2	H2	L2	C2		C1	CL23	C2		C1	L6	L7	F4	F5	F6	F4	F3
28	F3	F2	F2	F1		F2	L2	L2	F2			H1	L3	C1			C1	L7	L7	F5	F4	F4	F3	F2
29	F2	F2	F2	F2	F2	F6	L2	C2	C2	C2	L3	L3	L3	L2	L2	L4	L7	L4	L4	F5	F2	F6	F2	F2
30	F2	F2	F2		F2	L2	L1	L3	L4									L2	L4	F5	F1	F2	F4	F1
31	F1				F2			C2	L4							L3	C2	L3	L2	F1	F2		F2	
	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																								

# IONOSPHERIC DATA STATION Okinawa

DEC.2018 fxI (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 32	X 32	X 32	X 34	X 33	X 33	X 30													X 38	X 40	X 34	X 33	C	
2	C	X 34	X 38	X 39	C	C		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
3	C	C	C	C	C	C	C	C	C	C	C	C	C							X 31	X 30	X 30	X 32	X 33	
4	X 34	A	X 31	X 32	X 33	X 33	X 26												A	A	A	A	A	O 30	X 30
5	X 31	X 32	X 32	X 32	X 30	X 28	A													X 44	X 34	X 30	X 31	X 28	X 28
6	X 28	X 32	X 33	X 35	X 26	X 23	X 23														X 32	X 34	X 36	X 36	X 26
7	X 29	X 32	X 36	X 38	X 29	X 28	X 25														X 32	X 35	X 32	X 31	X 37
8	X 36	X 37	X 37	X 43	X 44	X 25	X 23														X 34	X 34	X 37	X 33	X 32
9	X 32	X 35	X 34	X 35	X 44	X 25	X 26														A	X 33	X 33	X 32	X 32
10	X 32	X 33	X 33	X 32	X 30	X 30	X 22														X 40	X 31	X 35	X 36	X 33
11	X 33	X 33	X 35	X 34	X 40	X 29	X 28														X 48	X 33	X 36	X 33	X 27
12	X 28	X 30	X 32	X 33	X 34	X 33	X 36														A	X 28	X 29	X 29	X 32
13	X 34	X 38	X 35	X 34	X 36	X 42	X 32														X 30	X 30	X 32	X 39	X 35
14	X 26	X 30	X 39	X 32	X 33	X 33	X 26														X 34	X 28	X 28	X 28	X 29
15	X 32	X 33	X 35	X 27	X 32	X 24	X 20													X 37	X 30	X 29	X 28	X 33	X 31
16	X 28	X 27	X 33	X 28	X 31	A	A														X 35	X 37	X 33	X 27	X 28
17	X 31	X 29	X 29	X 31	X 33	X 30	X 28														X 36	X 32	X 33	X 39	X 46
18	X 46	X 42	X 42	X 33	X 33	X 34	X 28		C	C	C	C	C	C	C	C					X 34	X 33	X 32	X 36	X 32
19	X 32	X 32	X 33	X 34	X 34	X 28	X 26														X 41	X 53	X 39	X 33	X 33
20	X 36	X 35	X 27	X 29	X 30	X 30	X 29														X 37	X 34	X 32	A	X 34
21	X 34	X 34	X 36	X 39	X 41	X 30	X 27														X 44	X 50	X 34	X 26	X 27
22	X 32	X 31	X 30	X 33	X 36	X 28	X 23														X 34	X 43	X 29	X 25	X 30
23	X 38	X 35	X 39	X 58	X 58	X 31	X 22														X 44	X 39	X 41	X 33	X 36
24	X 33	X 33	X 34	X 33	X 33	X 30	X 27														X 41	X 46	X 53	X 42	X 33
25	X 34	X 36	X 38	X 36	X 34	X 28	X 26														X 42	X 45	X 44	X 28	X 28
26	X 30	X 34	X 34	X 36	X 24	X 24	X 26														A	X 38	A	A	A
27	X 28	X 34	A	X 34	X 32	A	X 19														X 42	X 42	X 32	O 34	X 29
28	X 29	X 43	A	X 28	X 25	A	A	A													X 43	A	O 34	X 25	
29	X 28	X 32	X 28	X 22		X 23	X 26														X 39	X 37	X 42	X 39	X 32
30	X 33	X 32	X 30	X 23	X 24	X 24	X 24														X 43	X 43	X 34	X 29	X 28
31	X 34	X 38	X 34	X 27	X 23	X 23	X 26														A	X 42	X 34	X 28	X 30
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	29	29	28	30	28	26	26													2	25	28	27	26	28
MED	X 32	X 33	X 34	X 33	X 33	X 28	X 26													X 40	X 37	X 34	X 33	X 33	X 32
U Q	X 34	X 35	X 36	X 35	X 35	X 31	X 28														X 42	X 42	X 36	X 36	X 33
L Q	X 29	X 32	X 32	X 31	X 30	X 25	X 23														X 34	X 32	X 32	X 28	X 28

DEC.2018 fxI (0.1MHz)

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# IONOSPHERIC DATA STATION Okinawa

DEC.2018 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		26	26	26	28	27	27	24	33	46	53	61	62	71	102	119	100	68	56	42	32	34	28	27	C		
2		C	28	32	33	C	C	27	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
3		C	C	C	C	C	C	C	C	C	C	C	C	C	58	59	61	58	52	40	25	24	24	26	27		
4		28	A	25	26	27	27	20	36	61	61	48	69	76	65	62	81	74	48	A	A	A	A	A	24		
5		25	R	26	26	24	22	A	34	49	54	57	61	77	84	76	64	62	60	38	28	24	25	22	22		
6		22	26	27	29	J	R	17	34	49	53	57	66	71	74	61	62	50	58	48	26	28	30	30	20		
7		23	26	30	32	23	22	19	35	48	48	50	61	69	74	75	69	63	48	46	26	29	26	25	F		
8		F	F	F	F	38	19	17	34	50	46	52	68	90	86	87	84	91	57	44	28	28	31	27	26		
9		26	29	28	29	38	19	20	34	47	50	48	68	84	83	68	59	59	48	39	A	27	27	26	26		
10		26	27	27	26	24	24	16	31	46	53	68	66	60	65	68	70	56	51	47	34	25	29	30	27		
11		27	27	29	28	34	23	22	32	52	56	68	74	77	69	66	61	61	66	50	41	27	30	27	21		
12		22	24	26	27	28	F	24	30	28	43	48	56	64	J	R	124	117	74	57	41	A	22	23	F		
13		F	F	F	F	F	F	F	F	31	46	44	53	62	58	68	78	J	R	85	56	52	40	24	F		
14		20	24	24	24	F	F	F	F	20	30	44	49	55	62	77	91	104	91	65	55	37	28	22	F		
15		26	27	29	21	26	J	14	28	41	47	52	51	72	88	85	58	52	48	31	24	23	22	F			
16		22	21	F	F	F	A	A	27	40	46	49	58	66	A	58	52	51	45	34	29	31	27	21	F		
17		F	F	F	F	27	24	19	27	39	45	49	50	52	50	59	71	78	61	40	30	F	25	27	F		
18		F	F	F	F	27	27	28	22	28	C	C	C	C	C	C	C	C	C	C	52	58	42	28	27	F	
19		26	26	27	28	28	22	20	30	47	54	54	66	77	76	60	48	52	50	48	35	47	33	27	27		
20		30	29	20	24	24	24	23	30	52	58	67	56	69	72	58	52	53	52	31	31	28	26	A	28		
21		28	28	F	F	F	F	F	29	47	48	59	88	110	103	109	116	H	83	83	44	38	44	28	20	21	
22		26	25	24	26	30	22	17	25	46	54	58	54	57	68	56	54	58	51	33	28	37	23	19	24		
23		26	29	F	F	F	F	J	B	26	50	44	58	56	69	64	68	57	54	54	51	38	33	35	27	30	
24		27	27	28	27	27	24	21	27	42	47	50	52	58	58	53	55	57	52	J	R	28	34	40	43	36	26
25		28	30	32	30	28	22	20	28	50	44	54	68	82	100	92	86	75	57	39	36	39	38	22	22		
26		24	28	28	30	18	18	20	28	46	48	57	67	56	59	59	59	63	46	A	A	32	A	A	A		
27		22	F	A	28	26	A	J	B	13	24	40	45	50	62	74	82	75	71	H	A	36	36	26	A	23	
28		23	F	A	20	19	A	A	A	50	60	75	97	85	83	59	58	53	A	A	37	A	A	28	19		
29		22	26	J	B	B	17	20	28	43	56	91	68	60	77	88	58	53	44	A	A	33	31	32	F	F	F
30		27	26	24	17	18	18	18	26	49	52	68	82	68	79	J	R	85	56	50	48	A	37	37	28	F	22
31		F	F	F	21	17	17	18	28	52	50	62	84	106	91	86	76	55	A	A	A	36	28	22	24		
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT		29	29	28	29	27	26	27	28	28	28	28	28	28	28	28	29	29	30	28	23	25	28	27	26	28	
MED		26	27	27	27	26	22	20	28	47	50	56	65	72	76	68	62	58	52	40	31	28	27	26	24		
U Q		27	28	28	29	28	24	21	32	50	54	62	68	80	87	86	82	65	57	46	36	36	30	28	26		
L Q		22	26	24	24	21	19	17	28	44	46	51	60	63	66	59	58	53	48	37	28	26	26	22	22		

DEC.2018 foF2 (0.1MHz)

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# IONOSPHERIC DATA STATION Okinawa

DEC.2018 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	A	A	A											
2									C	C	C	C	C	C	C	C	C	C	C	C				
3									C	C	C	C	C	C	A	A	L	A						
4												L	A	A	A	A								
5										L		L	L	A	A	A	L							
6											U L	U L	424	428	U L	A	A							
7											U L	L	L	L	L	L	L							
8											U L	L	L	L	L	L	L	L						
9										L	A			L	A	L								
10										L	400	A	L	A	A	A	A							
11								A		U L	384	404	A	428	416	A	L	A						
12											U L	L	L	A		L	L							
13											396	408	424	420	408	396	L	L						
14										L							L							
15											U L	U L	L	L	U L	U L								
16									L		U L	380	412	416	A	408	380	L						
17									L		L	L	U L	U L	412	380								
18									C	C	C	C	C	C	C	C	C							
19										240	L	U L	404	416	412	416	L	L	L					
20										U L	332	404	412	416	408	400	388	L	L					
21										L	L	L	L	428	424	420	A	L	L					
22										248	L	L	408	420	420	404	384	L	L					
23											L	408	A	416	420	404	404	L	A					
24										U L	296	408	420	412	408	A	388	L						
25											L	396	420	416	420	404	392							
26										L	L	404	412	420	412	404	392	L	L		A			
27											U L	400	408	416	412	412	388	L	L		A			
28									L		384	388	416	420	404	420	A	L	A	A				
29											L	384	392	416	A	A	A	A				A		
30											L	400	408	412	416	404						A		
31										L	408	412	420	420	404	380				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	5	21	22	25	24	20	19								
MED									244	384	404	412	416	420	408	388								
U Q										L	U L	L	L	L	L	L	L							
L Q										U L	314	396	408	416	414	404	384							

DEC.2018 foF1 (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



# IONOSPHERIC DATA STATION Okinawa

DEC.2018 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	A	A	A	A	A	A	A	A	A	A	B					
2							B	C	C	C	C	C	C	C	C	C	C	C	C					
3								C	C	C	C	C	C	A	A	A	A	A	A					
4								B	A				A	A	A	A	A	A						
5								B	A	A	A	A	A	A	A	A	A	A						
6								B	A	A	A	A	A	A	A	A	A	A	A					
7								B	U	A	A	A	A	A	A	A	A	A	A	B				
8								B	216	256		A	A	A	A	A	A	A	A	B				
9								A	192	268	280	U	A	U	A	U	A	A	A	B				
10								A	180	240	276	280	316	316	296									
11								A	200	272	292		A	A	A	A	A	A	A					
12								B	A	A	A	A	A	A	A		280	228		B	A			
13								B	A	A	A	308	320	308	304		A	228	192		B			
14								B	216		A	A	A	A	A	A	A	A	A	B				
15								B	A	252	288		A	A	A	A	280	248		A				
16								A	216	276		A	A	A	A	A	A	232		A	B			
17								B	204	A	A	A	A	A	A	A	A	A	184		B			
18								B	C	C	C	C	C	C	C	C	C	256	184		B			
19								B	168	236		A	300	308	296		A	264	228		A	A		
20								B	192	268	280		A	A	296		A	A		A	B			
21								B	A	252	284		A	A	A	A	A	244	164		A			
22								B	172	236	264	280		A	U	A	U	A	A	A	B			
23								B	212	248	284	300	308		A	A	A	A	A	A	B			
24								B	212	268	276		A	A	A	A	A	A	A	B				
25								B	200	A	A	A	A	A		308	280	236		A	A			
26								B	A	U	A	A	A	A	A	A	A	A	172		A			
27								A	192	260		A	A	A	A		304	292		A	A	A		
28									A	A	U	A	A	308	304	296		A	248		A	A		
29								A	A	A		A	A	A	A	A	A	A	A	A	A			
30								B	A			A									A			
31								B	A	U	A	A	A	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									15	18	13	6	6	7	9	7	12	6						
MED									200	256	280	300	310	304	304	280	236	178						
U Q									212	268	290	308	316	308	308	280	246	184						
L Q									192	248	278	280	308	296	296	280	228	164						

DEC.2018 foE (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Okinawa

DEC.2018 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	J	A	J	A	J	A	J	A	E	B	E	B	E	B	E	B	J	A	J	A	J	A	E	B	E	B	C	
2	C	E	B	J	A	J	A	C	C	J	A	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
3	C	C	C	C	C	C	C	C	C	C	C	C	C	C	J	A	J	A	J	A	J	A	J	A	J	A	J	A
4	J	A	J	A	J	A	J	A	J	A	E	B	E	B	E	B	J	A	J	A	J	A	J	A	J	A	J	A
5	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
6	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
7	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
8	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	J	A	J	A	J	A	J	A	J	A	J	A
9	E	B	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
10	E	B	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
11	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	J	A
12	E	B	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
13	J	A	J	A	J	A	E	B	E	B	J	A	J	A	J	A	J	A	J	A	J	A	J	A	J	A	J	A
14	E	B	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
15	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
16	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
17	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
18	J	A	E	B	E	B	E	B	E	B	E	B	E	B	E	B	J	A	J	A	J	A	J	A	J	A	J	A
19	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	J	A	J	A	J	A	J	A	J	A	J	A
20	J	A	E	B	E	B	E	B	E	B	E	B	E	B	E	B	J	A	J	A	J	A	J	A	J	A	J	A
21	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
22	E	B	E	B	J	A	J	A	J	A	E	B	E	B	J	A	J	A	J	A	J	A	J	A	J	A	J	A
23	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
24	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
25	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	J	A
26	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
27	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
28	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
29	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
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	J	A	J	A
31	J	A	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
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
CNT	29	30	30	30	29	29	30	29	28	28	28	28	28	29	29	29	30	30	30	30	30	30	30	29				
MED	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
UQ	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
LQ	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	J	A	J	A	J	A	J	A	J	A	J	A

DEC.2018 foEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Okinawa

DEC.2018 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	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 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	25	30	40	42	42	34	34	30	26	18	E 16	E 16	E 16	E 16	E 16	E 16	C
2	C	E 16	E 16	E 16	C	C	E 16	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
3	C	C	C	C	C	C	C	C	C	C	C	C	C	46	42	29	34	25	35	E 16	E 16	E 16	E 16	E 16	E 16
4	20	A 64	A 16	E 16	E 16	E 16	E 16	E 16	23	32	36	34	46	46	44	43	58	32	A 53	A 108	A 84	A 51	A 32	A 18	
5	E 16	E 23	E 16	E 16	E 16	E 16	E 16	E 16	28	34	37	37	36	37	49	38	32	20	E 16	E 16	E 16	E 16	E 16	E 16	E 16
6	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	31	35	36	38	35	32	34	38	41	23	42	21	20	E 16	E 16	E 16	E 16
7	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	24	30	35	34	36	37	33	34	29	22	E 16	E 16	E 16	E 16	E 16	E 16	E 16
8	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	24	30	32	34	34	33	G	G	30	20	E 16	E 16	E 16	E 16	E 16	E 16	E 16
9	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	17	25	30	33	41	37	37	40	37	34	28	E 16	E 16	E 16	E 16	E 16	E 16
10	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	17	30	32	33	41	36	39	42	36	30	46	22	20	E 16	E 16	E 16	E 16
11	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	17	27	29	33	42	40	34	42	32	46	34	19	18	E 16	E 16	E 16	E 16
12	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	28	32	37	39	41	42	32	G	24	17	21	A 39	E 16	E 16	E 16	E 16	E 16
13	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	25	30	33	34	32	33	33	30	26	G	E 16	E 16	E 16	E 16	E 16	E 16	E 16
14	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	16	29	34	34	33	34	31	29	25	20	E 16	E 16	E 16	E 16	E 16	E 16	E 16
15	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	24	32	33	34	40	37	34	30	33	28	18	E 16	E 16	E 16	E 16	E 16	E 16
16	E 16	E 16	E 16	E 16	E 16	E 32	E 22	17	G	G	32	37	37	A 99	36	32	26	21	E 16	E 16	E 16	E 16	E 16	E 16	E 16
17	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	G	30	32	34	38	35	38	35	47	20	E 16	E 16	E 16	E 16	E 16	E 16	E 16
18	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	C	C	C	C	C	C	C	C	G	19	21	E 16	E 16	E 16	E 16	E 16	E 16
19	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	20	28	32	34	35	32	33	28	26	23	17	23	E 16	E 16	E 16	E 16	E 16
20	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	22	G	31	33	32	34	29	34	28	25	E 16	E 16	E 16	E 16	E 16	E 16	E 16
21	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	22	G	19	33	31	32	31	36	40	25	20	E 16	E 16	E 16	E 16	E 16	E 16
22	E 16	E 16	18	E 16	E 16	E 16	E 16	E 16	21	28	31	34	36	34	35	30	26	20	E 16	E 16	E 16	E 16	E 16	E 16	E 16
23	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	22	37	37	44	38	34	33	34	47	18	E 16	E 16	E 16	E 16	E 16	E 16	E 16
24	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	G	G	33	32	33	35	42	34	28	26	E 16	E 16	28	17	25	E 16	E 16
25	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	22	31	33	35	33	32	35	33	30	29	27	24	22	19	E 16	E 16	E 16
26	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	26	33	33	34	35	34	35	34	27	36	A 88	A 110	18	A 84	A 63	A 40	
27	E 16	E 16	E 50	E 16	E 16	E 18	E 16	E 20	28	30	35	37	37	34	33	G	29	26	A 52	20	22	E 16	E 16	E 16	E 16
28	E 16	E 16	E 52	E 16	E 16	E 26	E 53	E 35	27	29	24	G 31	33	33	32	36	28	A 70	A 102	32	A 100	A 53	20	E 16	E 16
29	E 16	E 19	E 20	E 16	E 16	E 16	E 16	E 20	28	26	G 34	42	42	63	43	29	37	A 72	A 16	E 16	E 16	24	20	E 16	E 16
30	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	22	17	G 22	38	26	G 22	G 22	32	29	28	A 38	E 16	20	E 16	E 16	E 16	E 16
31	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	27	G 21	29	31	34	32	34	31	29	A 100	A 101	A 53	E 16	E 16	E 16	E 16	E 16
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	29	30	30	30	29	29	30	29	28	28	28	28	28	29	29	29	30	30	30	30	30	30	30	29	
MED	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	24	30	33	34	36	34	34	33	29	24	18	E 16	E 16	E 16	E 16	E 16	E 16
UQ	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	27	32	35	38	38	37	41	36	33	29	A 38	A 24	18	19	E 16	E 16	E 16
LQ	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	G 22	27	32	34	33	33	33	30	26	20	E 16	E 16	E 16	E 16	E 16	E 16	E 16

DEC.2018 fbEs (0.1MHz)

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# IONOSPHERIC DATA STATION Okinawa

DEC.2018 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

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

DEC.2018 fmin (0.1MHz)

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# IONOSPHERIC DATA STATION Okinawa

DEC.2018 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

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	345	320	318	356	339	371	360	389	381	380	362	363	339	332	359	360	351	377	379	406	339	344	321	C					
2	C	300	322	358	C	C	373	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C					
3	C	C	C	C	C	C	C	C	C	C	C	C	C	362	350	370	369	380	403	355	350	325	333	351					
4	329	A	352	316	347	383	296	361	380	395	344	340	380	354	334	372	401	397	A	A	A	A	A	336					
5	311	R	356	362	366	358	316	A	380	401	378	328	351	362	361	382	351	376	396	384	397	352	324	330	346				
6	316	327	342	383	404	R	332	366	380	384	377	357	366	372	349	392	388	374	397	393	315	356	391	334					
7	305	314	350	376	352	326	327	360	388	390	355	357	361	360	370	385	388	390	378	362	364	334	333	F					
8	F	F	298	333	369	403	287	362	397	380	356	331	360	354	347	349	393	389	392	364	317	338	342	297					
9	302	308	323	309	377	412	311	367	393	391	357	330	346	351	377	367	380	379	389	A	308	313	316	324					
10	323	322	335	314	323	388	294	358	388	362	372	395	355	363	349	379	373	379	377	389	283	326	332	332					
11	297	314	300	318	366	404	344	358	387	364	361	363	364	J	R	356	346	360	336	384	361	406	355	347	366	331			
12	313	303	311	318	337	339	401	404	398	372	367	314	330	322	346	371	363	377	357	A	344	321	369	F					
13	F	F	355	F	F	F	307	399	362	377	388	405	375	388	338	324	347	J	R	308	378	395	380	359	308	337	344	F	F
14	359	347	320	F	F	F	F	F	383	361	384	371	366	346	345	349	331	340	357	405	373	376	328	327	338	323	F	F	
15	341	333	369	304	378	386	B	365	399	387	362	308	338	364	384	357	380	389	385	358	333	333	362	355	F	F	F		
16	376	344	329	F	F	F	A	A	387	405	361	340	371	369	A	356	364	394	390	380	356	352	382	375	328	F	F	F	
17	F	F	338	352	334	326	397	419	386	397	384	355	337	350	321	348	364	372	378	345	386	F	334	372	341	F	F	F	
18	F	F	301	F	326	324	349	392	394	384	C	C	C	C	C	C	C	C	C	362	379	373	348	339	317	362	349		
19	306	320	329	361	369	394	307	360	380	385	336	317	350	379	372	371	364	351	357	310	375	350	360	323	A				
20	338	372	309	315	328	358	334	341	370	367	406	366	357	355	360	355	368	373	394	326	346	358	319						
21	320	328	322	F	F	F	F	F	332	372	399	384	337	348	355	322	350	340	H	335	376	364	336	388	380	373	318		
22	327	343	300	345	373	377	391	354	372	372	389	380	347	367	372	357	381	370	393	309	378	370	286	327					
23	309	349	338	F	F	F	F	B	404	350	401	385	366	364	376	364	376	363	366	375	372	315	371	395	340	311			
24	354	328	337	332	362	332	331	381	397	394	381	360	384	372	359	376	388	414	J	R	385	336	327	373	375	324			
25	303	312	355	350	364	345	334	364	410	381	347	368	334	335	340	353	359	397	376	321	A	A	338	369	362	312	A	A	
26	359	383	346	353	423	320	315	354	390	365	362	387	349	344	354	344	379	388	A	A	380	A	A	380	A	A	A		
27	316	331	A	377	426	A	B	360	384	370	356	336	333	347	324	304	H	375	414	A	A	355	371	319	317	A			
28	297	296	F	A	417	442	A	A	A	363	381	312	372	334	361	355	360	355	A	A	333	A	A	386	327	F	F	F	
29	334	356	368	B	B	326	359	366	371	340	381	376	318	326	358	334	348	383	A	A	331	337	334	317	299	F	F	F	
30	322	345	366	321	332	318	321	349	371	363	346	389	370	322	J	R	352	382	380	A	A	351	369	384	313	336	F	F	
31	F	F	F	372	335	323	321	354	400	361	347	349	364	330	327	355	372	A	A	A	379	396	317	300					
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23					
CNT	29	29	28	28	27	25	24	28	28	28	28	28	28	28	29	29	30	28	23	25	28	27	26	28					
MED	316	328	336	340	358	372	333	363	388	380	359	358	352	354	350	360	372	382	379	355	345	338	343	326					
U Q	336	346	354	364	373	396	368	378	398	385	370	372	364	362	365	370	381	392	389	381	370	370	369	336					
L Q	304	314	321	317	337	329	318	358	380	366	346	338	338	331	346	350	362	377	372	332	328	326	330	318					

DEC.2018 M(3000)F2 (0.01)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Okinawa

DEC.2018 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	A	A	A												
2									C	C	C	C	C	C	C	C	C	C	C	C					
3									C	C	C	C	C	A	A	L	A								
4												L	A	A	A	A									
5										L		L	L	A	A	A	L								
6											U L	U L	U L	U L	U L	A	A								
7											399	395	379	391	393										
8											U L	L	L	L	L	L	L	L							
9										L		A		L	A	L									
10										L	390	A	L	A	A	A	A								
11								A	U L		379	394	A	A	A	L	A								
12											U L	L	A	A		L	L								
13											400	399	402	419	371	385									
14										L							L								
15											U L	U L	L	A		U L									
16									L	U L	403	392	406		A	U L	L								
17									L			L	U L	U L	A	A									
18									C	C	C	C	C	C	C	C									
19									442	L	U L	390	406	415	405	L	L	L							
20									U L	U L	424	397	418	404	407	U L	U L								
21									L	L	377	374	381	389	410	L	A	L							
22									463	L		L	U L	U L	L	U L	L								
23											L	387	A			L	A								
24									U L	U L	457	396	408	410	408	A	L	L							
25											L	396	382	403	397	412	A								
26										L	390	377	404	395	387	385	L	L		A					
27										U L	393	395	375	393	382	393	L			A					
28									L	385	418	395	411	397	449	A	L	A	A						
29										L	362	390	403	A	A	A	A								
30										L	377	A	L	417	414	403									
31										L	385	395	387	396	395	385			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	5	21	21	23	24	19	17									
MED									452	U L	385	393	396	404	397	395	393								
U Q									U L	440	398	407	411	407	404	400									
L Q									L	370	386	388	386	390	385	385									

DEC.2018 M(3000)F1 (0.01)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Okinawa

DEC.2018 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										236	258	246	272	240	220	212								
2								C	C	C	C	C	C	C	C	C	C	C	C					
3								C	C	C	C	C	C		242	254	236	234						
4												274	230	252	264	230								
5										248		238	246	230	220	232	224							
6											242	266	232	212	256	220	222							
7											264	252	238	242	222	218								
8											268	286	240	240	240	240	206							
9										230		288	244	244	226	234								
10										258	238	216	242	248	254	218	222							
11								200		258	252	232	242	244	256	236	268							
12											254	302	264	234	240	220	204							
13											252	232	280	282	240	230	214							
14										246	260	258	246	242	222	226	218							
15											262	338	272	246	222	252								
16									204		272	246	244	A	246	240	214							
17									196			268	274	L	304	268	244							
18									C	C	C	C	C	C	C	C								
19									206	220	272	252	250	222	228	226	230							
20										238	212	252	254	230	246	250								
21									214	228	282	236	224	232	246	210	214							
22									218	236	220	230	270	232	234	252	222							
23										246	246	232	252	228	244	248								
24										210	242	266	236	244	258	236	220							
25											276	242	236	244	230	218								
26										252	254	230	262	274	262	270	224			A				
27											264	282	262	238	234	254	220			A				
28									246	230	278	212	244	232	242	242	232			A		A		
29										284	224	212	306	276	244	252					A			
30										246	268	212	208	254	232						A			
31											256	260	252	222	230	248	232			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	6	16	24	28	28	28	29	28	18							
MED								200	210	242	259	249	244	242	240	235	222							
U Q									218	254	268	267	263	250	254	244	230							
L Q									204	230	244	232	236	232	228	223	214							

DEC.2018 h'F2 (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Okinawa

DEC. 2018 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

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	230	256	262	232	238	218	230	192	202	202	A	A	A	192	214	208	206	198	182	200	204	198	230	C	
2	C	270	254	222	C	C	182	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
3	C	C	C	C	C	C	C	C	C	C	C	C	C	A	A	216	A	208	214	210	214	290	272	248	
4	260	A	214	258	238	202	296	216	214	220	222	218	A	A	A	A	214	196	A	A	A	A	A	A	298
5	286	264	220	224	232	284	A	208	204	226	220	226	196	204	A	A	212	202	192	180	208	242	254	248	
6	304	260	242	208	200	226	E B 346	206	212	220	218	220	188	188	190	A	A	202	218	216	E A 286	208	200	276	
7	302	286	226	206	218	244	274	214	208	206	214	210	216	222	210	214	210	196	186	204	236	228	230	320	
8	288	270	248	236	200	212	376	212	204	212	210	190	214	194	196	200	204	200	186	184	230	220	224	264	
9	292	274	274	270	214	190	308	210	208	212	202	A	222	232	A	A	220	200	180	A	268	254	258	252	
10	246	260	246	264	264	198	E B 432	216	208	228	222	A	192	240	A	A	238	206	190	238	206	190	320	240	230
11	278	270	270	272	206	182	240	A	212	202	198	A	A	190	A	208	A	210	200	184	188	222	210	248	
12	296	288	272	244	238	258	190	196	208	228	A	E A 236	A	A	180	162	196	204	178	A	236	254	224	264	
13	252	258	274	250	292	200	230	196	206	206	208	198	170	164	228	212	202	202	182	186	250	232	218	228	
14	238	230	296	258	268	272	220	200	212	180	228	192	174	204	176	206	180	192	176	192	252	264	236	280	
15	244	252	202	294	200	246	A	208	194	222	200	202	A	A	220	202	220	200	178	218	244	248	230	260	
16	216	244	264	202	284	A	A	200	194	190	202	216	212	A	E A 228	A	184	208	200	186	210	210	198	222	268
17	290	268	250	252	240	202	200	190	172	214	208	218	222	202	A	A	218	214	160	178	282	224	218	226	
18	258	264	236	242	234	206	192	216	C	C	C	C	C	C	C	C	226	216	188	194	230	250	218	238	
19	282	264	260	212	218	196	318	212	170	208	198	204	186	188	216	182	212	208	188	E A 218	198	208	220	242	
20	234	206	278	274	274	220	248	228	212	194	204	186	168	194	176	216	216	206	176	206	216	246	A	252	
21	254	268	282	262	204	210	300	204	190	214	204	180	186	178	196	A	A	206	202	190	210	184	196	228	292
22	254	236	338	236	186	208	258	234	156	214	206	190	186	184	206	210	208	200	182	268	198	210	362	268	
23	276	228	268	202	202	178	322	224	214	214	224	A	E A 224	A	184	192	192	A	194	176	202	170	188	220	236
24	248	258	258	250	214	252	264	206	202	182	206	190	196	194	A	210	210	190	188	274	220	208	194	234	
25	290	260	212	218	216	240	270	218	194	224	204	206	180	176	214	A	220	200	196	266	228	210	214	276	
26	246	208	234	252	206	328	288	218	208	218	200	208	204	198	220	220	206	204	A	A	204	A	A	A	
27	302	248	A	192	178	A	B E A 236	A	210	220	224	E A E A 234	242	210	220	194	210	198	A	226	214	224	A	324	
28	328	312	A	190	186	A	A	A	226	206	182	168	184	208	194	A	222	A	A	E A 310	A	A	E A 220	282	
29	280	240	248	B	B	356	254	226	224	212	212	192	A	A	A	A	210	218	A	A	222	E A E A 228	276	230	262
30	240	232	216	360	302	324	296	238	218	210	194	192	172	204	214	218	214	A	A	218	198	188	316	254	
31	256	222	190	224	308	344	292	226	210	216	214	192	198	192	198	216	220	A	A	A	200	194	300	288	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	29	29	28	29	28	26	25	27	28	28	26	22	22	23	20	19	25	28	23	25	28	27	26	28	
MED	260	260	250	242	218	219	264	212	208	213	207	199	192	193	203	208	210	202	186	206	216	222	225	261	
U Q	290	269	271	260	252	258	304	224	212	220	218	218	214	204	218	214	219	208	192	220	240	248	236	278	
L Q	246	238	230	215	203	202	230	204	198	206	202	190	186	184	193	194	206	199	178	191	202	208	218	245	

DEC. 2018 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



# IONOSPHERIC DATA STATION Okinawa

DEC.2018 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		A	A	A	A	A	A	A	A	A	B					
2							B	C	C	C	C	C	C	C	C	C	C	C	C					
3								C	C	C	C	C	C	A		A	A	A	A					
4								B	A				A	A	A	A	A	A						
5								B	A		A	A	A	A	A	A	A	A						
6								B	A	A	A	A	A	A	A	A	A	A	A					
7								B			A	A	A	A	A	A	A	A	A	B				
8								B				A	A	A					A	B				
9								A											A	B				
10								A											A	A				
11								A	A	A	A	A	A	A	A	A	A	A	A	A				
12								B	A	A	A	A	A	A	A				B	A				
13								B	A	A	A									B				
14								B		A	A	A	A	A	A	A	A	A	A	B				
15								B	A			A	A	A	A					A				
16								A			A	A	A	A	A	A	A	A	B					
17								B		A	A	A	A	A	A	A	A	A	B					
18								B	C	C	C	C	C	C	C	C	C			B				
19								B			A								A	A				
20								B				A	A						A	B				
21								B	A			A	A	A	A	A	A	A	A					
22								B				A							A	B				
23								B											A	B				
24								B											A	B				
25								B											A	A				
26								B	A		A	A	A	A	A	A	A	A	A					
27								A			A	A	A	A					A	A				
28									A	A		A							A	A				
29								A	A	A		A	A	A	A	A	A	A	A	A				
30								B	A			A								A				
31								B	A			A	A	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									15	18	13	6	6	7	9	7	12	6						
MED									108	106	106	104	104	104	104	104	104	105						
U Q									110	108	106	108	110	108	105	108	105	110						
L Q									108	104	103	102	102	102	103	102	102	104						

DEC.2018 h'E (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Okinawa

DEC.2018 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	88	88	90	94	92	B	B	B	172	124	104	100	96	100	170	100	92	96	98	90	B	90	B	C	
2	C	B	96	88	C	C	94	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
3	C	C	C	C	C	C	C	C	C	C	C	C	C	106	108	106	102	100	96	96	98	96	92	96	
4	92	92	100	98	98	96	106	B	108	196	166	132	104	104	96	98	94	94	108	88	88	88	88	102	
5	94	90	88	92	92	92	86	94	102	102	102	102	100	102	94	98	94	94	90	92	94	90	90	94	
6	94	88	B	88	98	86	88	108	104	104	96	108	92	106	98	96	94	108	92	90	90	90	88	88	
7	84	B	B	B	B	92	92	B	172	116	110	102	104	100	96	96	96	116	92	92	88	92	86	90	
8	B	B	94	94	B	B	B	136	132	114	110	110	102	104	G	146	G	92	88	94	90	88	88	B	
9	B	88	84	84	B	104	96	130	144	142	122	110	104	104	104	102	94	98	96	94	94	86	90	84	
10	B	90	B	94	88	88	160	146	128	128	116	102	102	102	100	100	98	94	94	90	90	B	B	B	
11	B	B	B	B	B	92	90	140	86	106	106	96	96	94	94	92	90	86	86	86	86	B	B	B	
12	B	B	96	96	B	96	B	B	166	154	154	100	96	94	92	96	G	166	130	86	86	86	112	88	
13	124	100	100	104	B	B	B	96	106	102	96	144	92	112	146	150	136	G	B	86	94	86	86	112	
14	B	92	94	92	88	88	B	88	88	104	102	102	100	96	100	94	92	90	90	86	84	88	86	82	
15	86	B	84	B	B	B	92	B	156	134	114	104	100	126	94	140	108	100	90	90	90	96	106	110	
16	130	132	96	94	92	90	88	84	G	G	98	98	96	90	90	90	152	176	92	92	104	102	96	96	
17	96	96	96	88	92	90	90	90	G	158	118	104	100	102	100	100	118	164	102	96	150	122	B	B	
18	92	86	B	B	B	B	B	B	C	C	C	C	C	C	C	C	88	122	88	88	98	102	100	B	
19	B	B	B	B	B	B	B	B	156	B	140	148	150	128	128	154	92	152	166	134	86	82	106	100	100
20	96	B	B	B	B	B	B	B	B	G	166	122	98	104	104	112	88	140	134	94	96	94	90	82	
21	90	96	98	92	96	104	98	B	102	90	174	104	98	96	88	88	158	184	106	98	92	90	82	B	
22	B	B	96	94	94	88	90	B	148	170	138	114	102	106	106	102	106	100	100	B	96	92	106	94	
23	92	96	104	98	98	B	B	B	156	108	108	104	100	100	98	96	94	94	94	110	84	B	B	124	
24	86	94	92	90	88	88	90	90	G	G	106	104	104	104	100	96	92	90	92	90	90	90	90	90	
25	B	B	B	86	86	B	90	90	152	162	96	102	102	102	188	146	124	90	102	94	88	88	110	B	
26	106	116	100	104	106	106	146	88	116	112	104	104	104	104	100	98	G	108	106	104	96	96	92	92	90
27	92	98	98	92	90	90	146	128	132	148	134	154	160	98	146	124	114	100	96	94	96	104	104	106	
28	104	96	94	94	94	128	90	88	98	106	96	96	160	160	130	146	136	104	96	92	88	88	88	88	
29	98	94	90	90	90	90	110	134	118	114	G	104	104	100	98	98	100	94	94	92	92	88	88	88	
30	88	90	90	90	90	114	104	96	96	96	96	90	92	94	92	128	142	126	92	88	86	B	86	B	
31	86	88	102	B	B	142	134	B	132	98	100	106	96	98	94	94	114	106	106	88	88	88	100	86	
	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	20	22	23	19	20	21	19	25	25	27	28	28	29	28	27	29	29	29	29	29	25	25	20	
MED	92	93	96	92	92	92	92	96	132	114	106	104	101	102	99	98	106	100	94	92	90	90	90	92	
U Q	97	96	98	94	98	104	108	136	153	148	122	109	104	105	107	128	136	124	100	95	95	96	100	101	
L Q	88	89	90	90	90	89	90	90	103	104	100	101	96	98	94	96	94	94	90	88	88	88	88	88	

DEC.2018 h'Es (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Okinawa

DEC. 2018 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	F	F	F	F	F					H	C	CQ	CQ	LQ	CQ	HQ	CQ	LQ	L	L	F		F		
2			F	F				F																	
3															C	C	C	C	C	L	F	F	F	F	F
4	F	F	F	F	F	F	F			CH	HC	H	H	C	C	C	L	L	CL	FQ	FQ	FQ	F	FF	
5	FF	F	F	F	F	F	F	L		C	C	C	C	CQ	CQ	L	L	L	LQ	L	F	F	F	F	F
6	F	F		F	F	F	F	C		CQ	CQ	LQ	CQ	LQ	C	L	L	L	CL	L	F	F	F	F	F
7	F						F			H	CH	CH	CQ	CQ	CQ	LQ	LQ	LQ	CLH	LQ	FQ	F	F	F	FF
8			F	F				H	H	C	C	CL	CH	C		H		LQ	LQ	F	F	F	F		
9		F	F	F		F	F	H	H	H	C	C	C	C	C	CQ	L	L	L	FQ	FQ	FQ	F	F	F
10		F		F	F	F	F	H	C	C	C	C	CQ	C	C	C	L	L	L	L	F				
11					F	F	H	LHC	C	C	L	L	LQ	LQ	LQ	LQ	LQ	L	L	F	F	F	F		
12			F	F		F		HC	HC	HC	C	L	L	L	L		H	H	L	F	F	F	F		
13	F	F	F	F			L	CH	CH	LH	HL	L	C	HL	HL	H				F	F	F	F	FF	FF
14		FF	F	F	F	F		L	L	C	CH	C	C	LH	LH	LQ	LQ	LQ	L	FQ	F	F	F	F	F
15	F		F				FF	HC	H	C	C	C	CL	L	HC	C	C	C	L	F	F	F	F	F	F
16	F	F	F	F	F	F	L			LC	LQ	LQ	LQ	LQ	LQ	LQ	HL	HCL	L	L	FF	FF	F	FQ	FQ
17	FF	F	F	F	F	F	L			HC	C	CQ	CQ	CQ	CQ	CQ	CL	H	C	FF	F	FF			
18	F	F						H									L	C	L	L	F	F	F		
19									H	H	HL	CL	CL	CL	HL	L	H	HC	HL	L	F	F		F	F
20	F				F			H		CL	L	C	C	C	C	L	HL	HL	L	F	F	F	FQ	F	F
21	F	F	F	F	F	F	F			C	LH	H	CQ	L	L	L	L	H	H	C	FF	FQ	F	F	
22			F	F	F	F	F			H	HH	H	C	C	C	C	C	L	L		F	F	F	F	F
23	F	F	F	F	F					H	C	C	C	C	C	L	L	L	L	FF	FF				FF
24	F	F	F	F	F	F	L					CQ	CQ	CQ	CQ	CQ	LQ	LC	LC	LH	F	FQ	F	F	F
25				F	F		F	L	H	HC	LH	C	C	C	H	H	C	L	CL	FF	FF	FQ	FQ		
26	F	F	F	F	F	F	L	C	C	CQ	CQ	CQ	CQ	CQ	CQ	CQ	LQ	CQ	C	C	FQ	FQ	FQ	FQ	FQ
27	F	FF	FQ	FQ	FQ	F	F	C	H	H	HC	HC	HC	LQ	H		CL	C	L	F	F	F	F	FF	FF
28	F	F	F	F	F	FQ	FQ	LQ	LQ	CQ	L	L	HL	H	H	HL	H	C	L	F	F	F	LQ	FQ	F
29	F	F	F	F	F	F	F	H	C	C		C	C	C	L	L	C	L	L	F	F	FQ	FQ	F	F
30	F	F	F	F	F	F	L	L	L	L	L	L	L	L	L	C	H	C	L	F	F		F	F	F
31	F	F	F		F	F	H	HC	L	L	C	L	L	L	L	L	CL	CL	CL	F	F	F	F	F	F
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT																									
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
v	LESS THAN

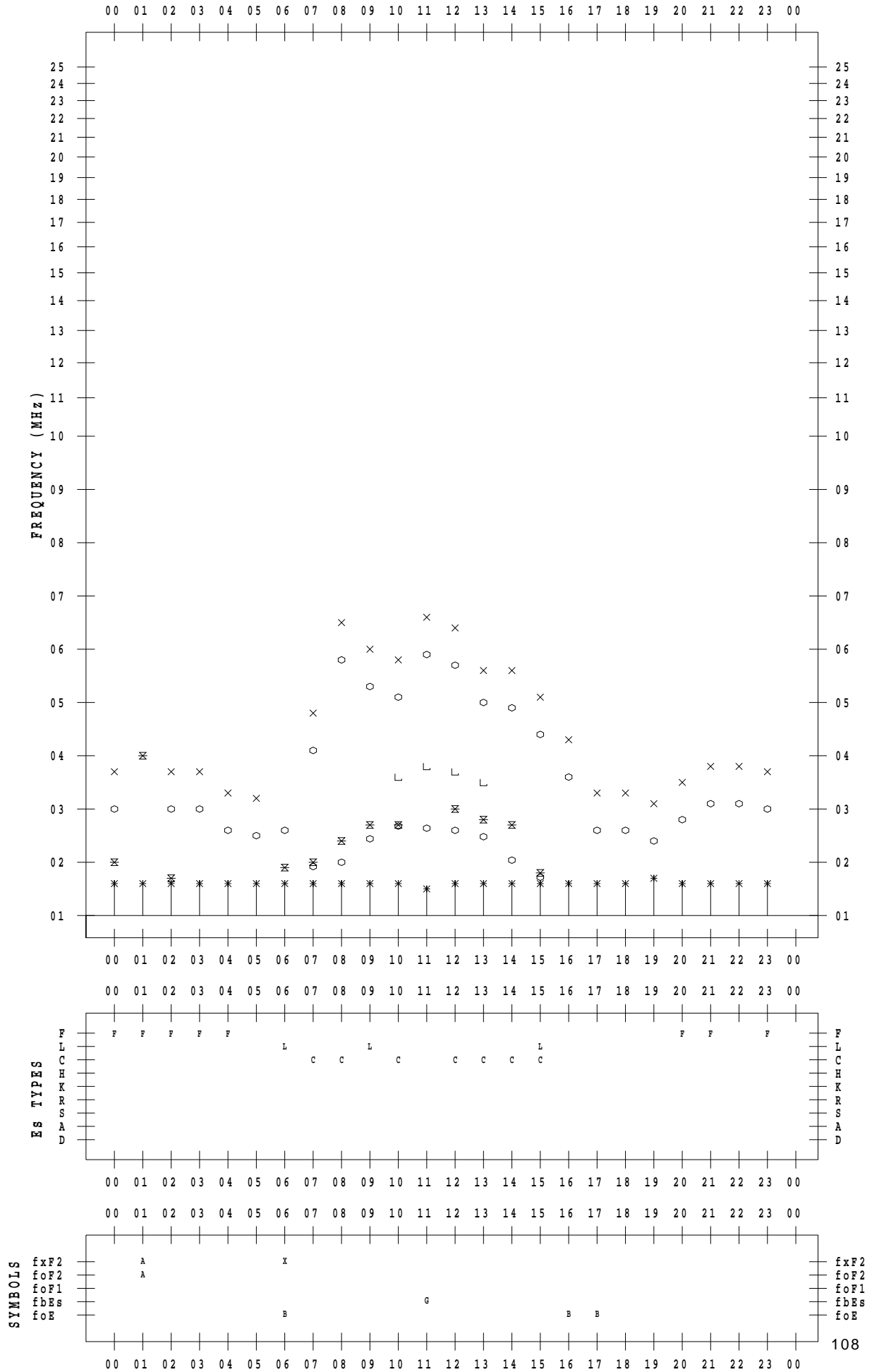
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/ 1

135 ° E MEAN TIME



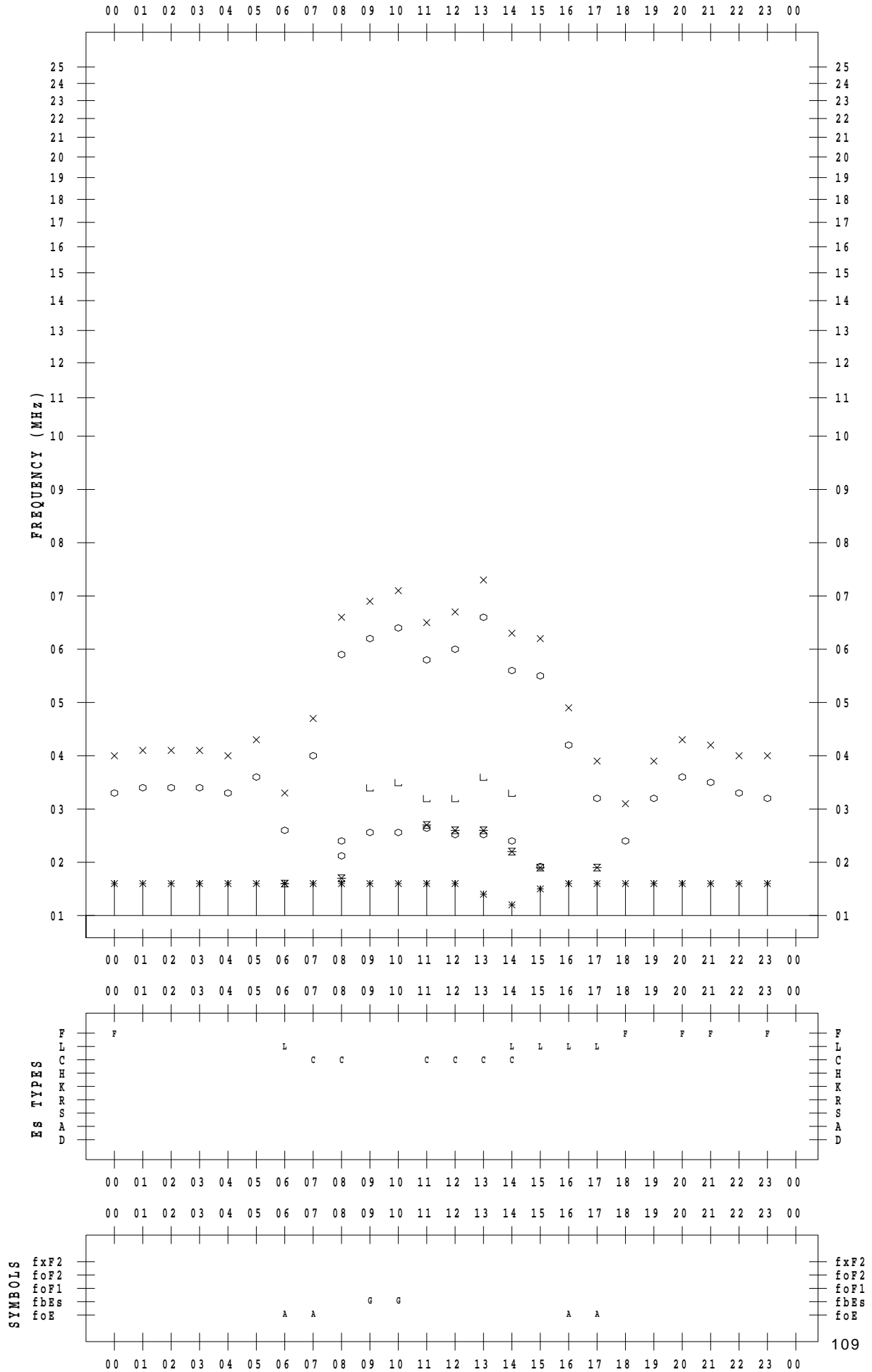
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/ 2

135 ° E MEAN TIME



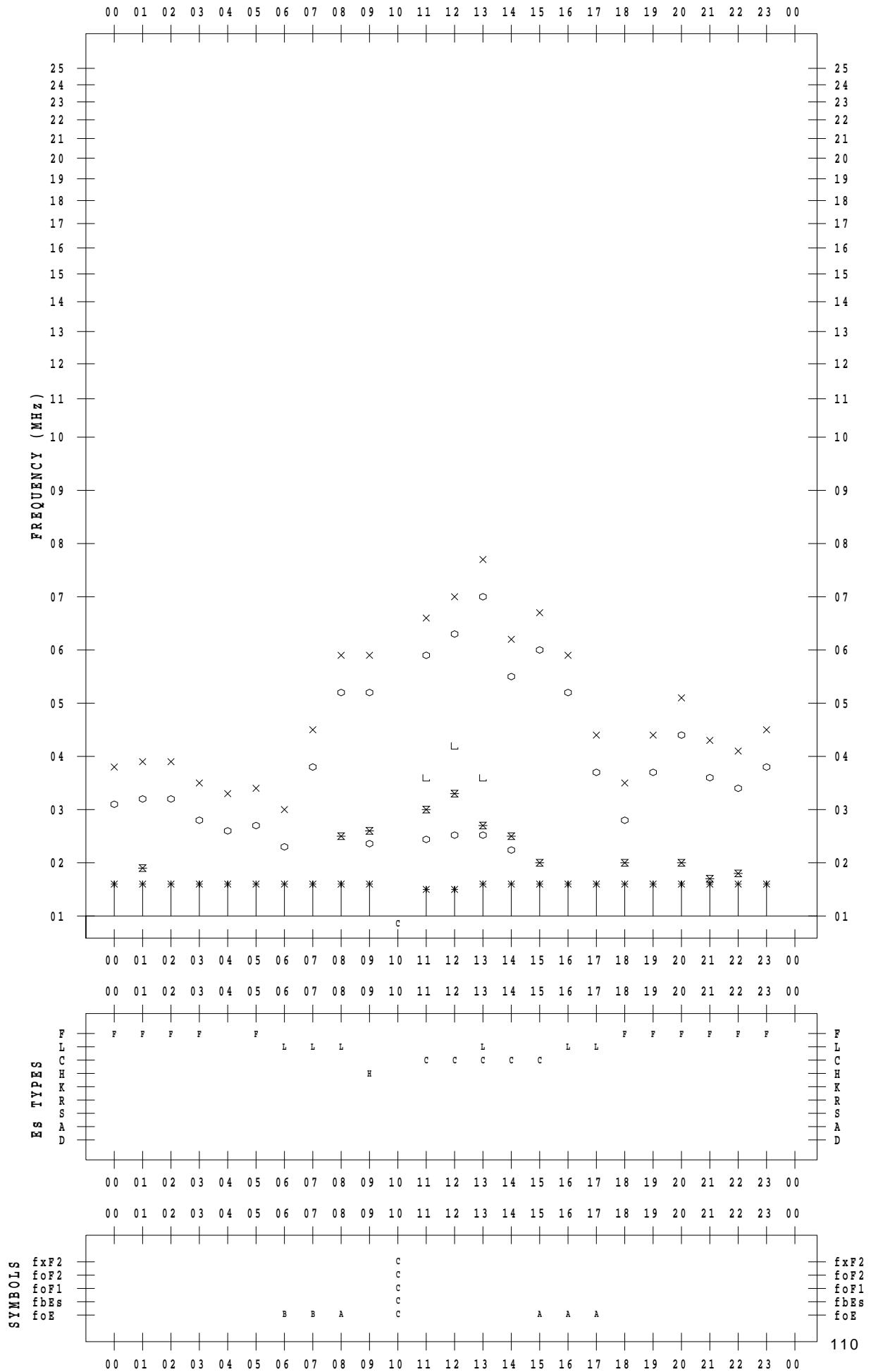
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/ 3

135 ° E MEAN TIME



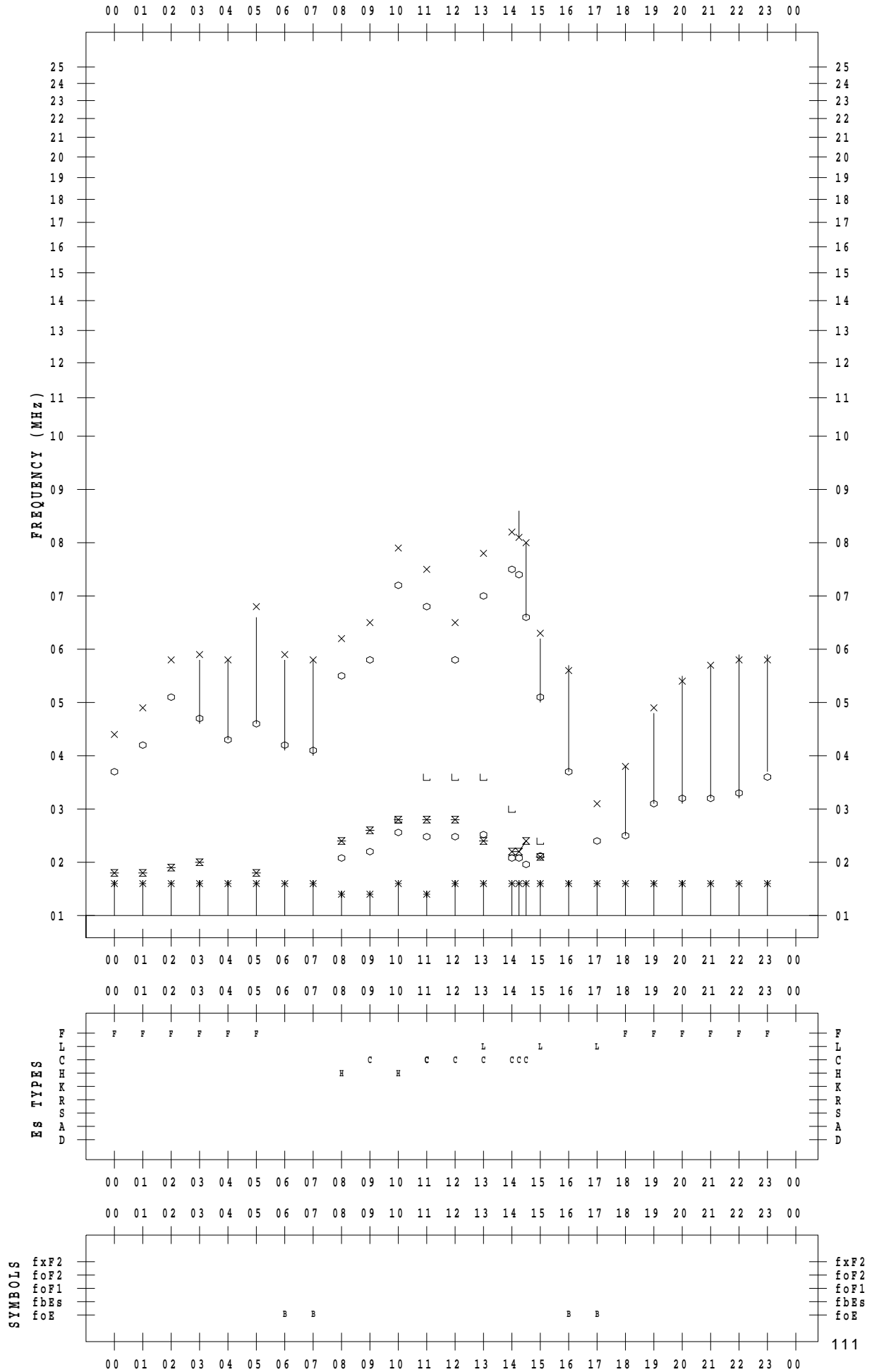
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/ 4

135 ° E MEAN TIME





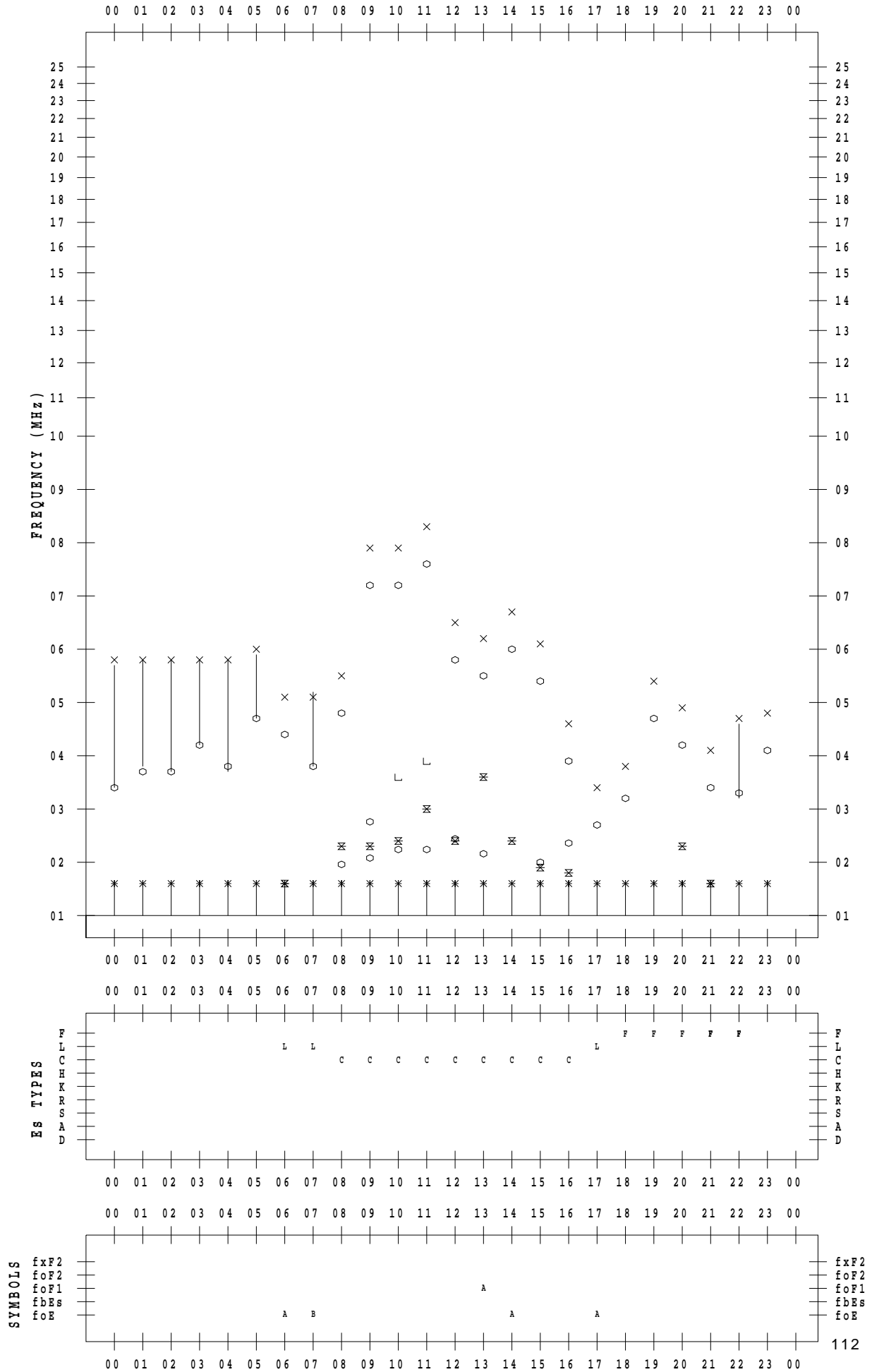
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/ 5

135 ° E MEAN TIME



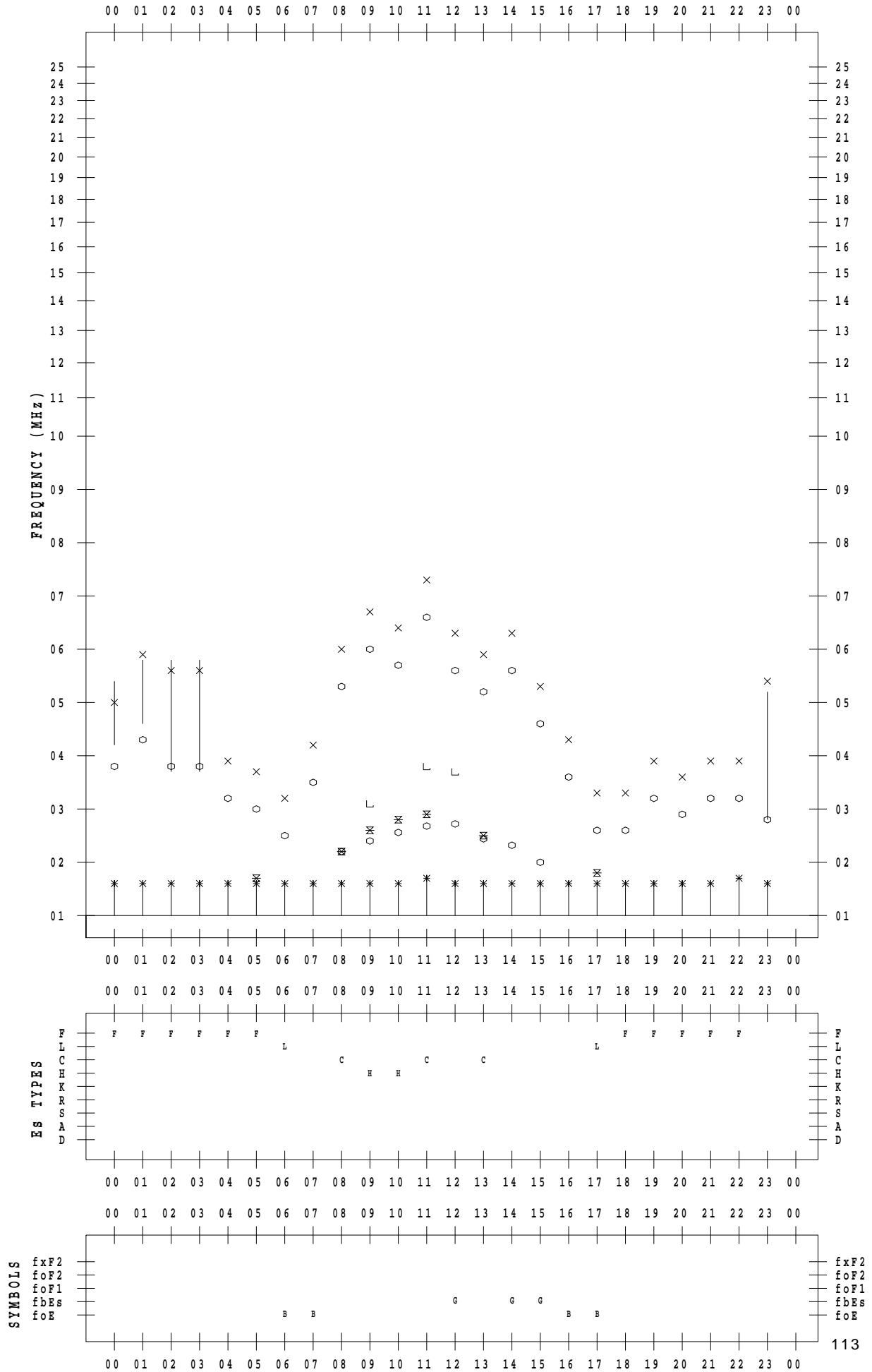
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/ 6

135 ° E MEAN TIME



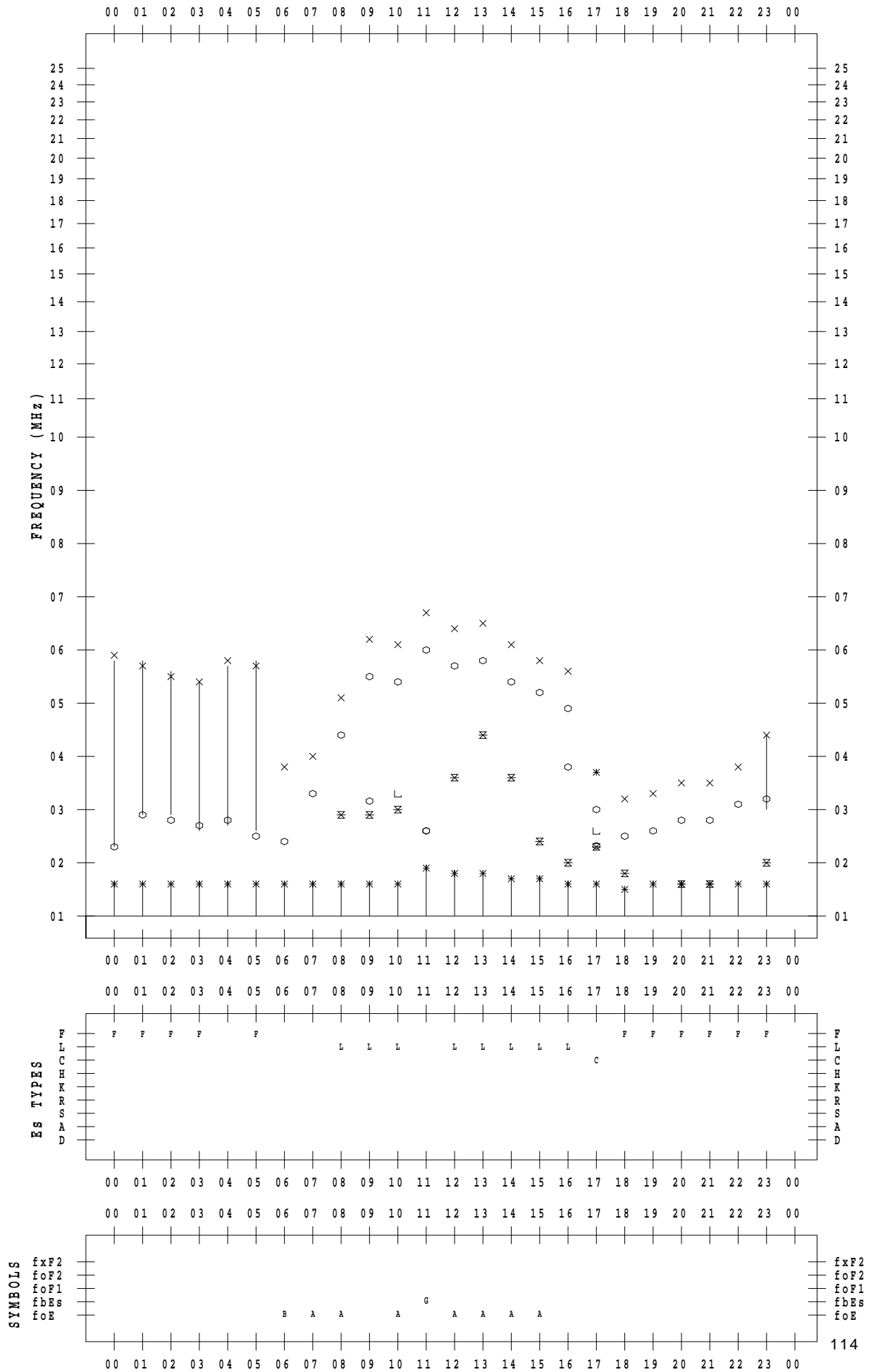
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/7

135 ° E MEAN TIME



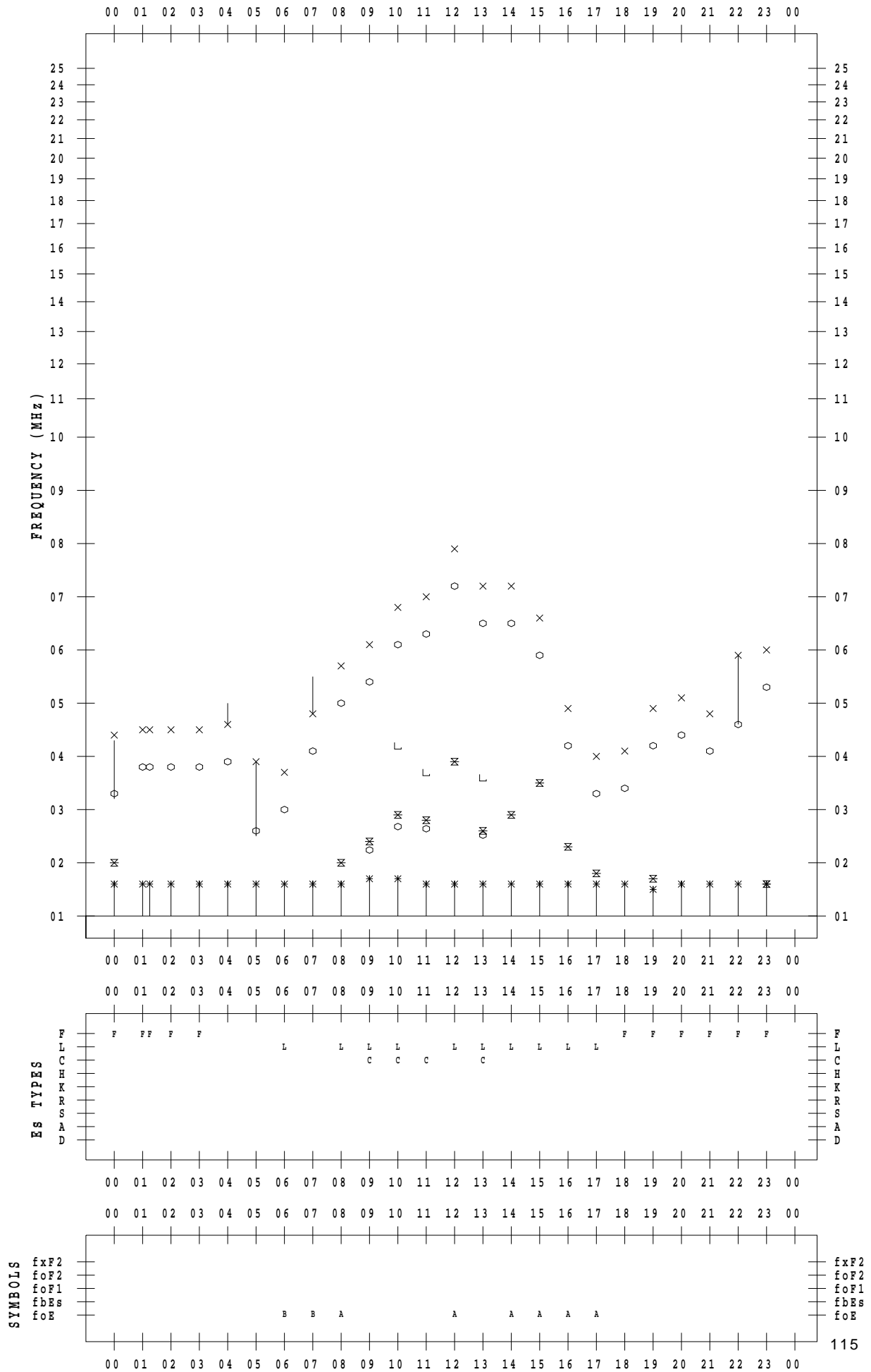
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/ 8

135 ° E MEAN TIME



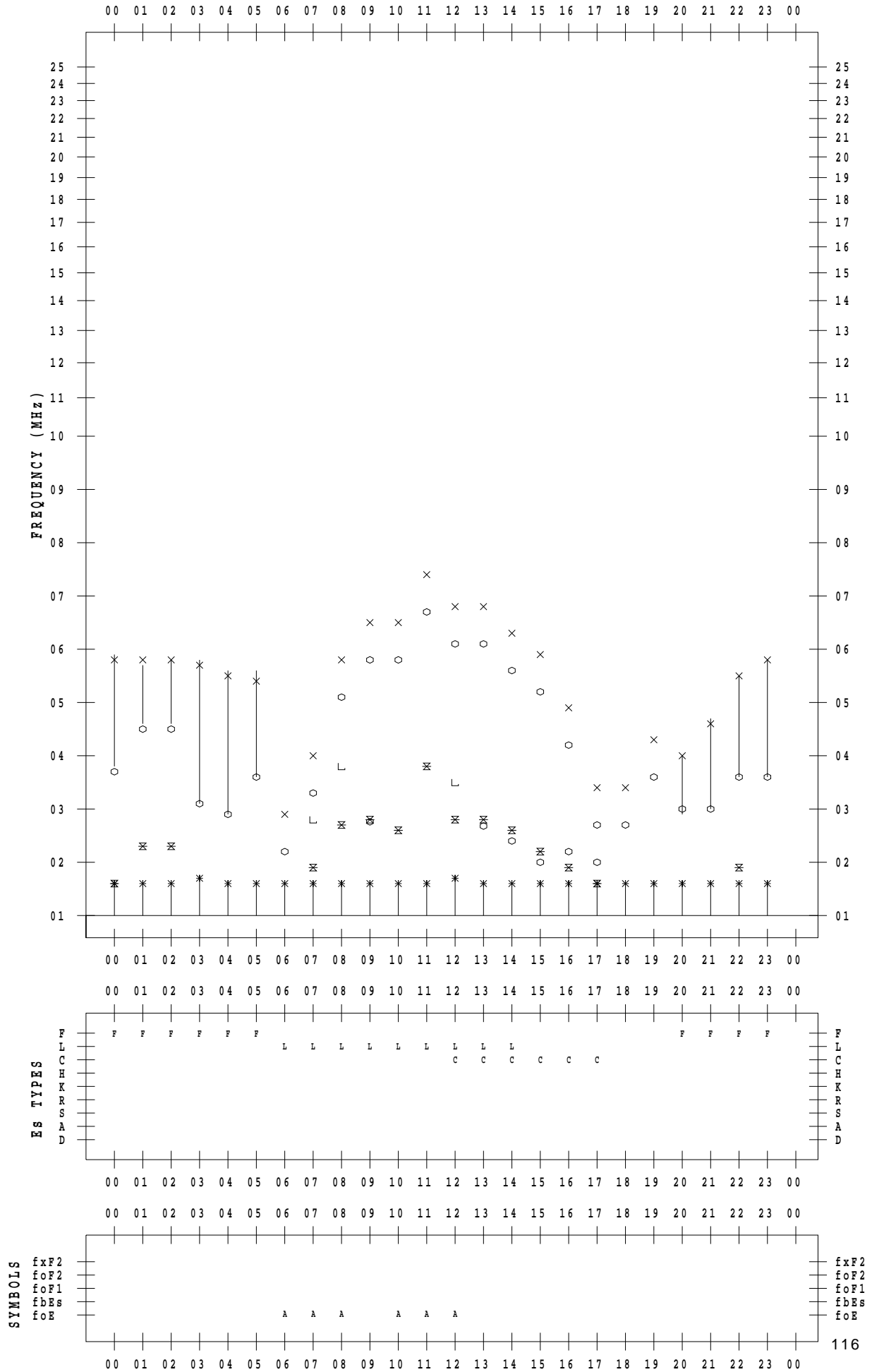
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/9

135 ° E MEAN TIME



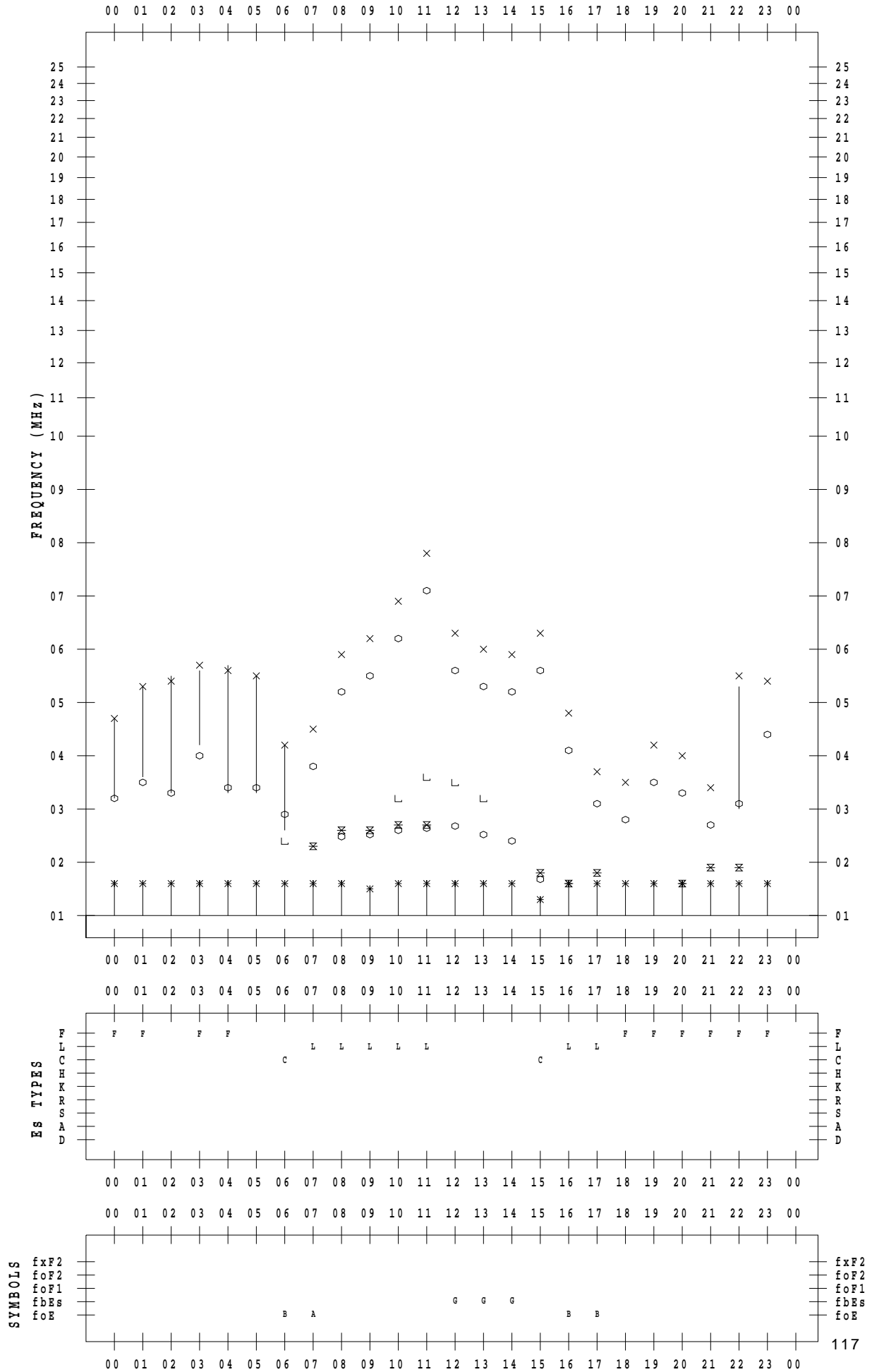
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/10

135 ° E MEAN TIME



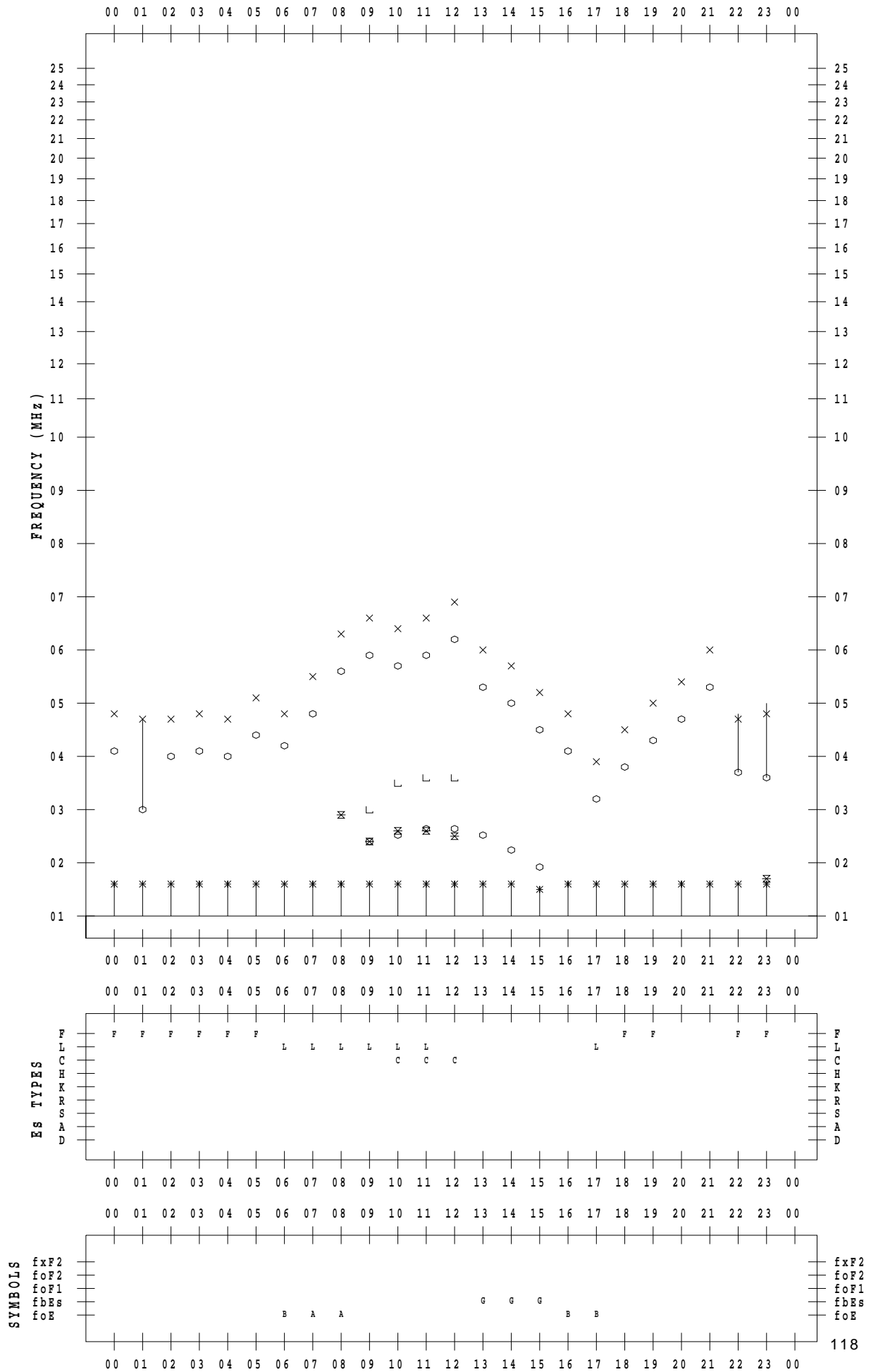
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/11

135 ° E MEAN TIME



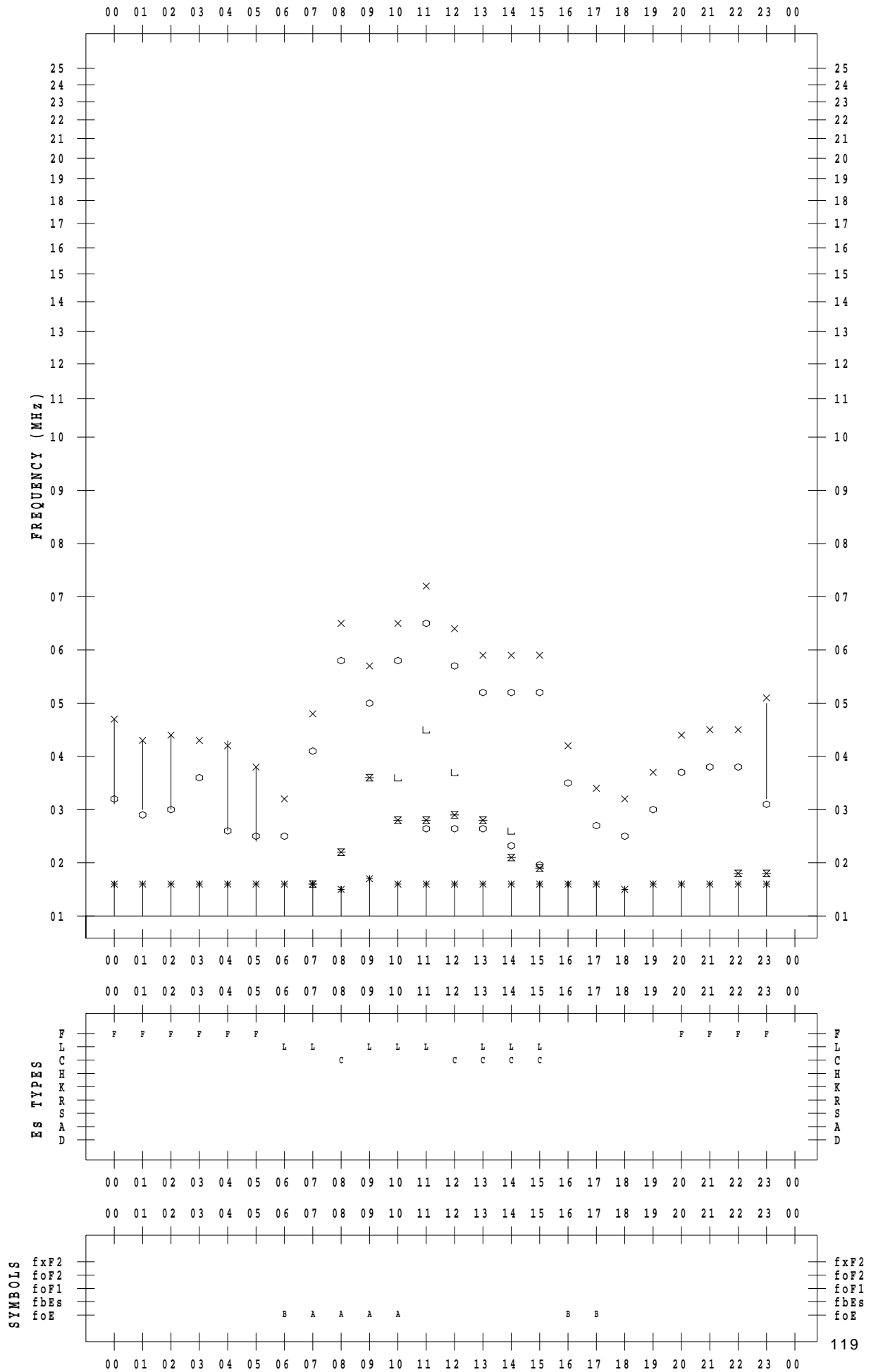
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/12

135 ° E MEAN TIME





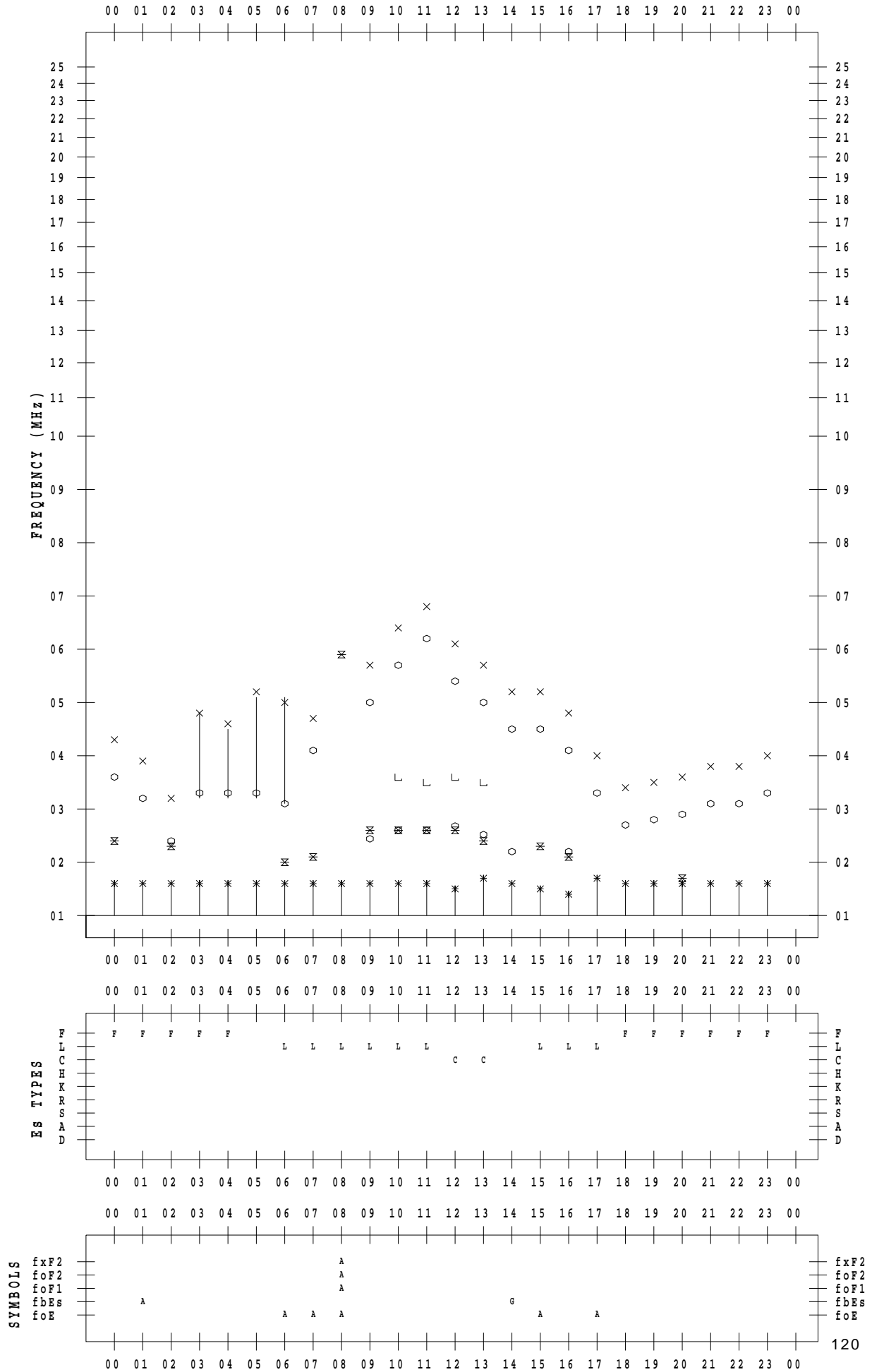
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/13

135 ° E MEAN TIME



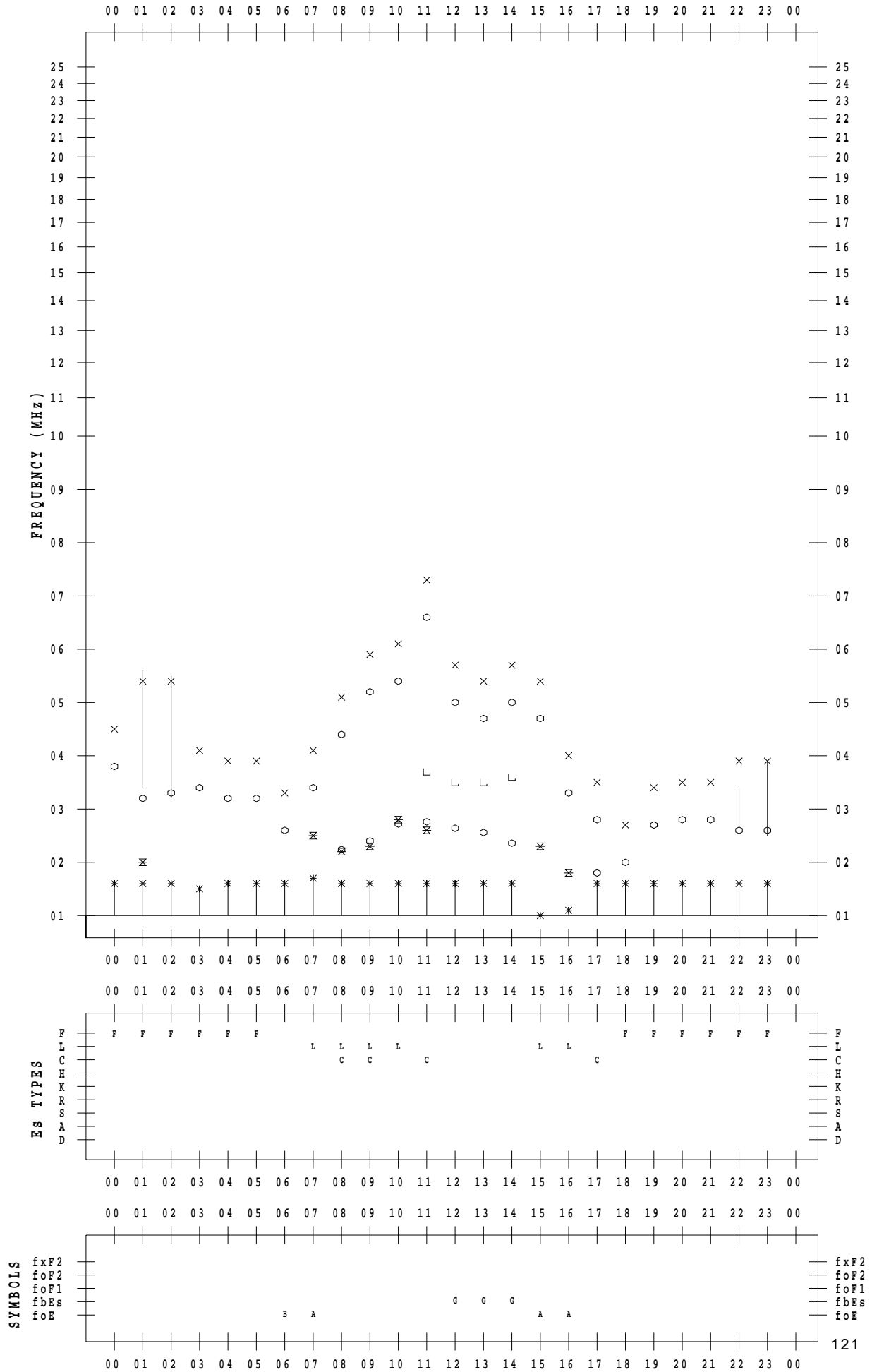
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/14

135 ° E MEAN TIME



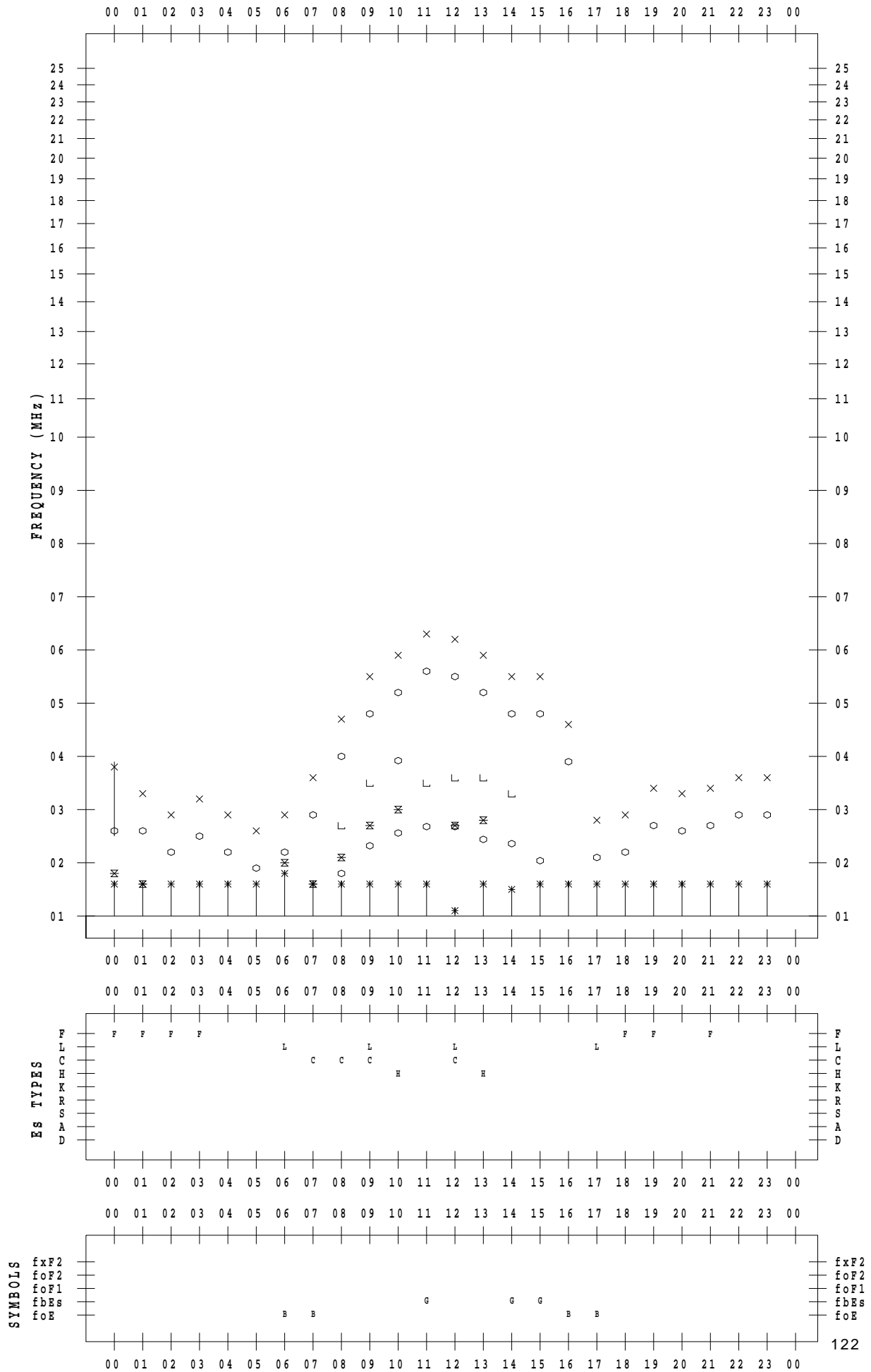
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/15

135 ° E MEAN TIME



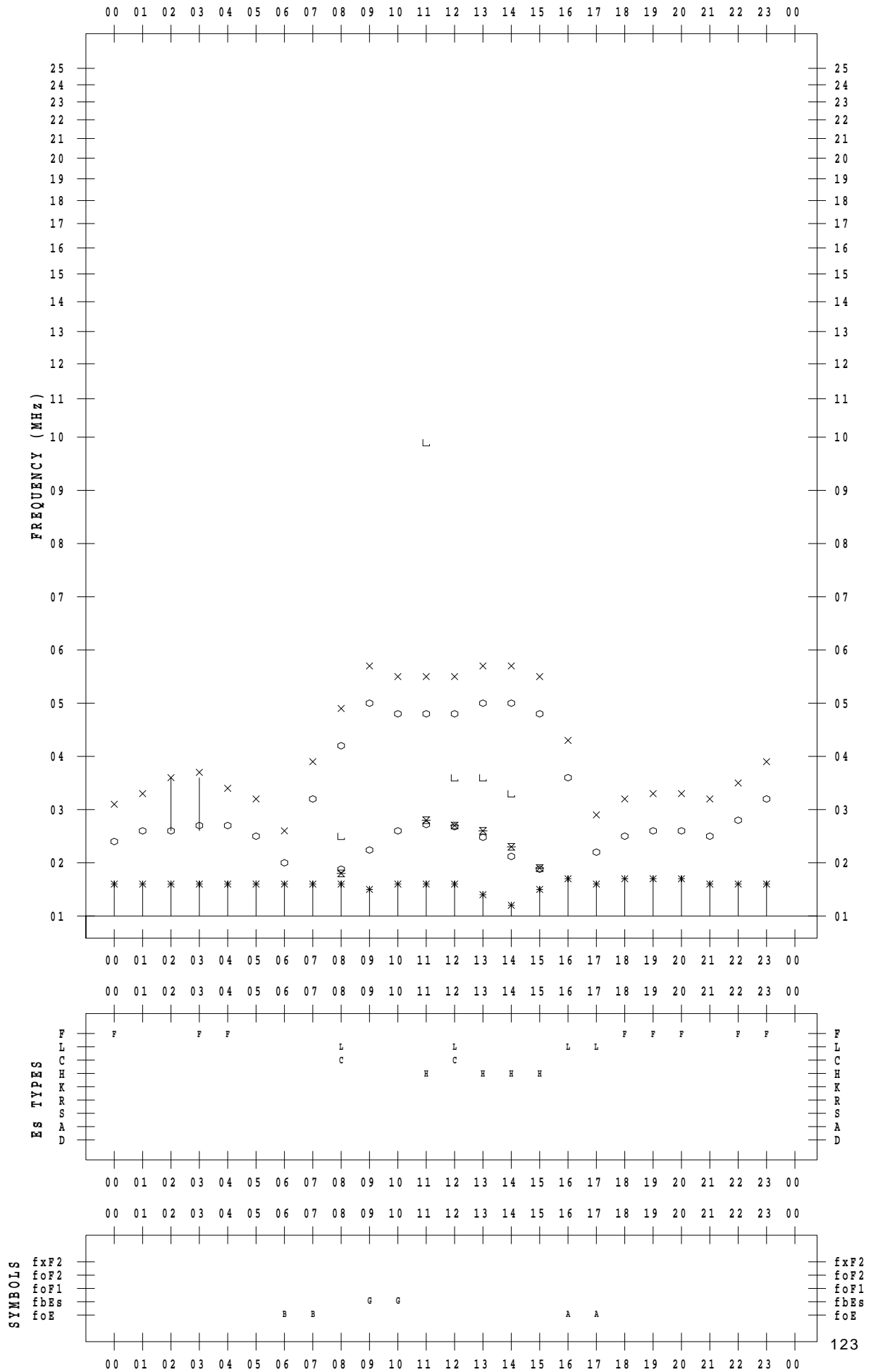
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/16

135 ° E MEAN TIME



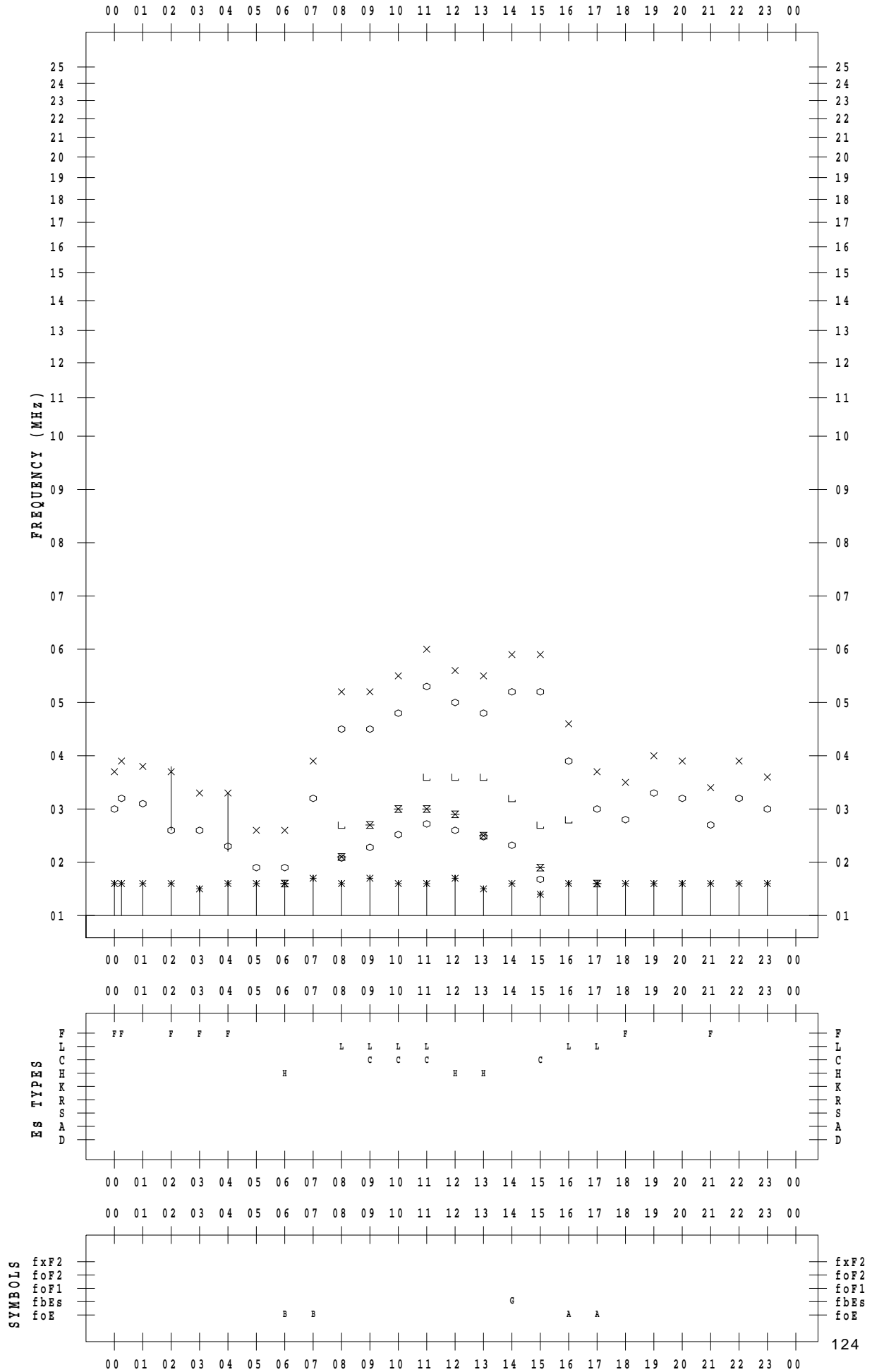
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/17

135 ° E MEAN TIME



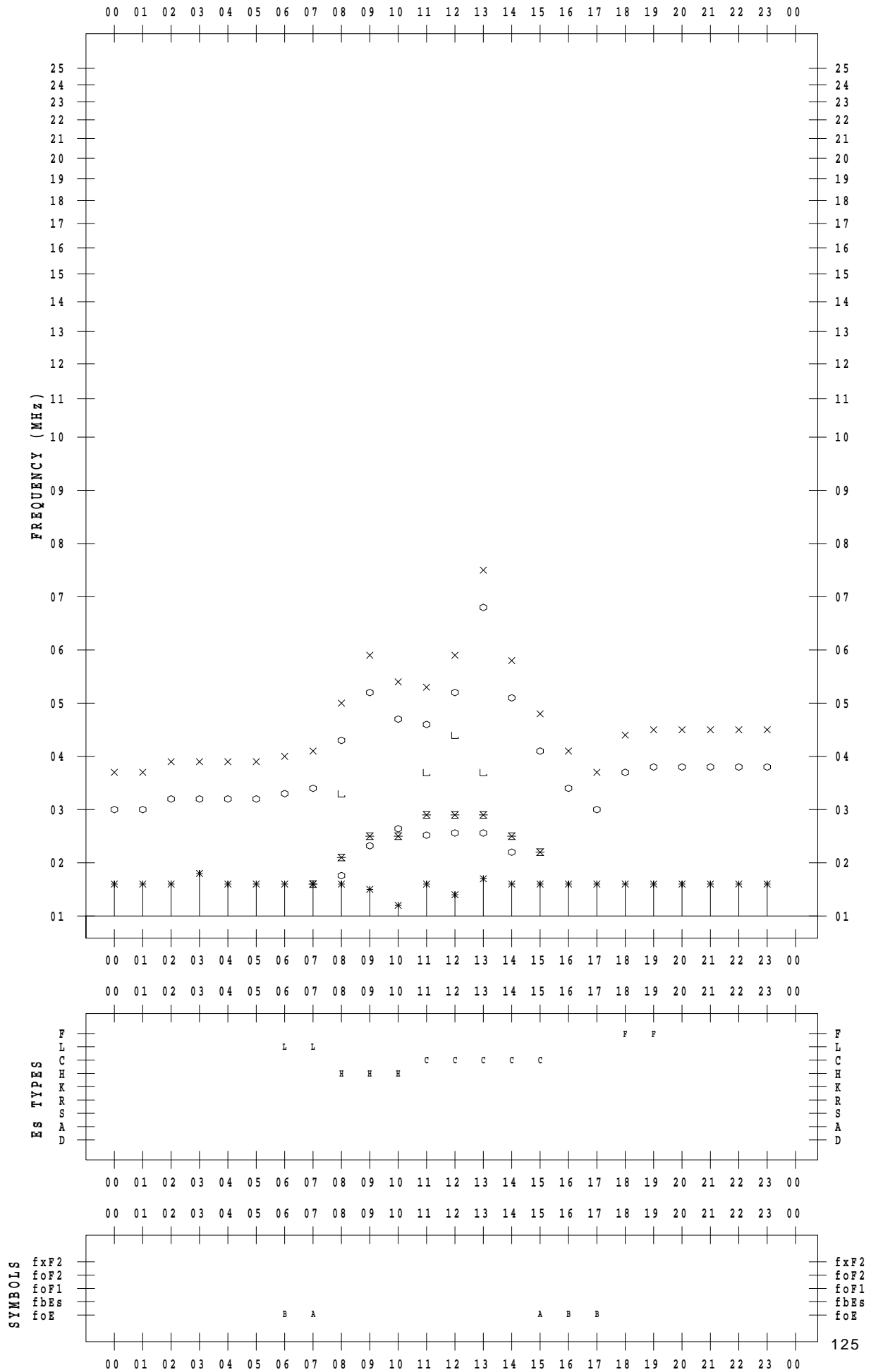
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/18

135 ° E MEAN TIME



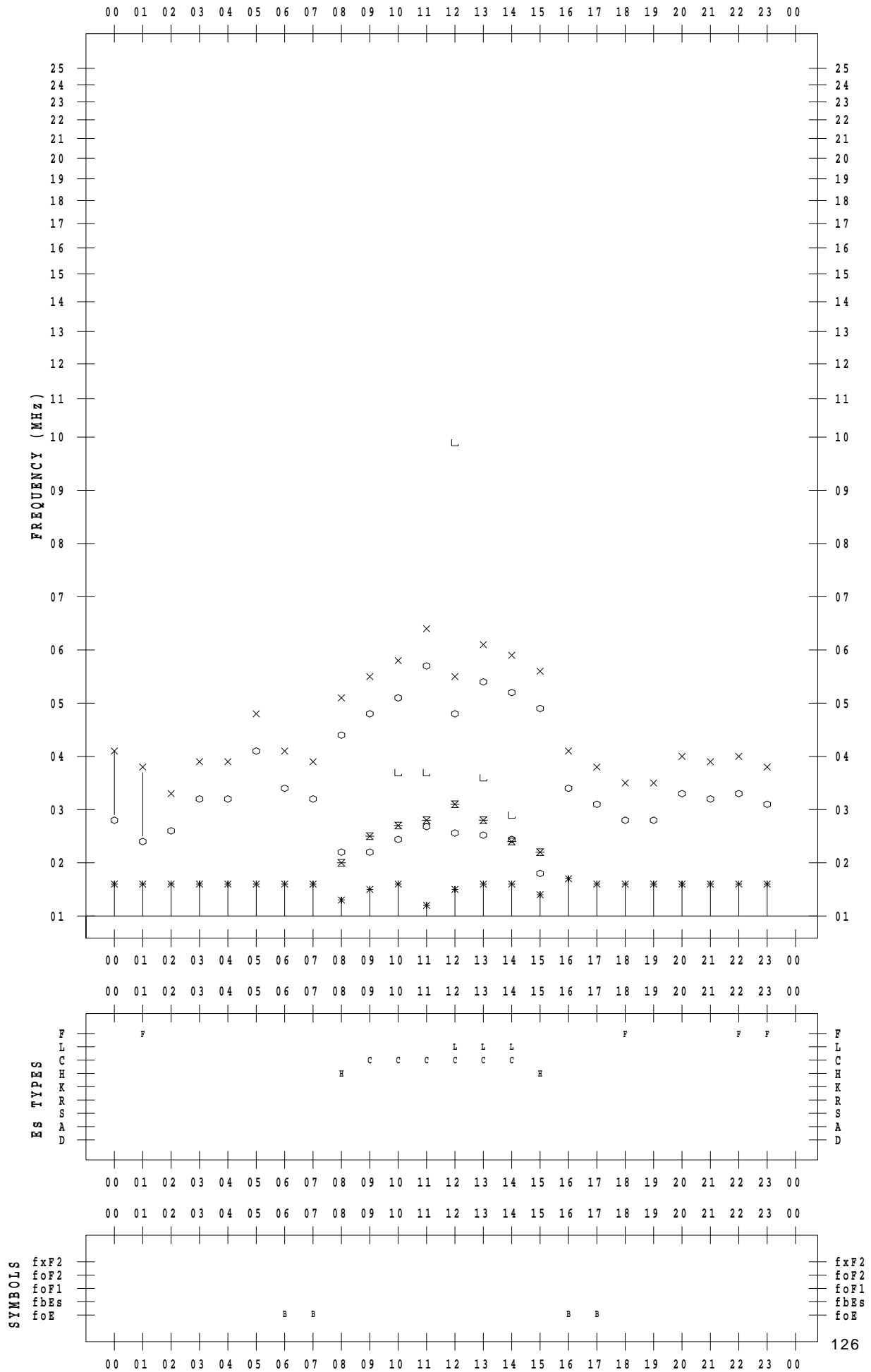
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/19

135 ° E MEAN TIME



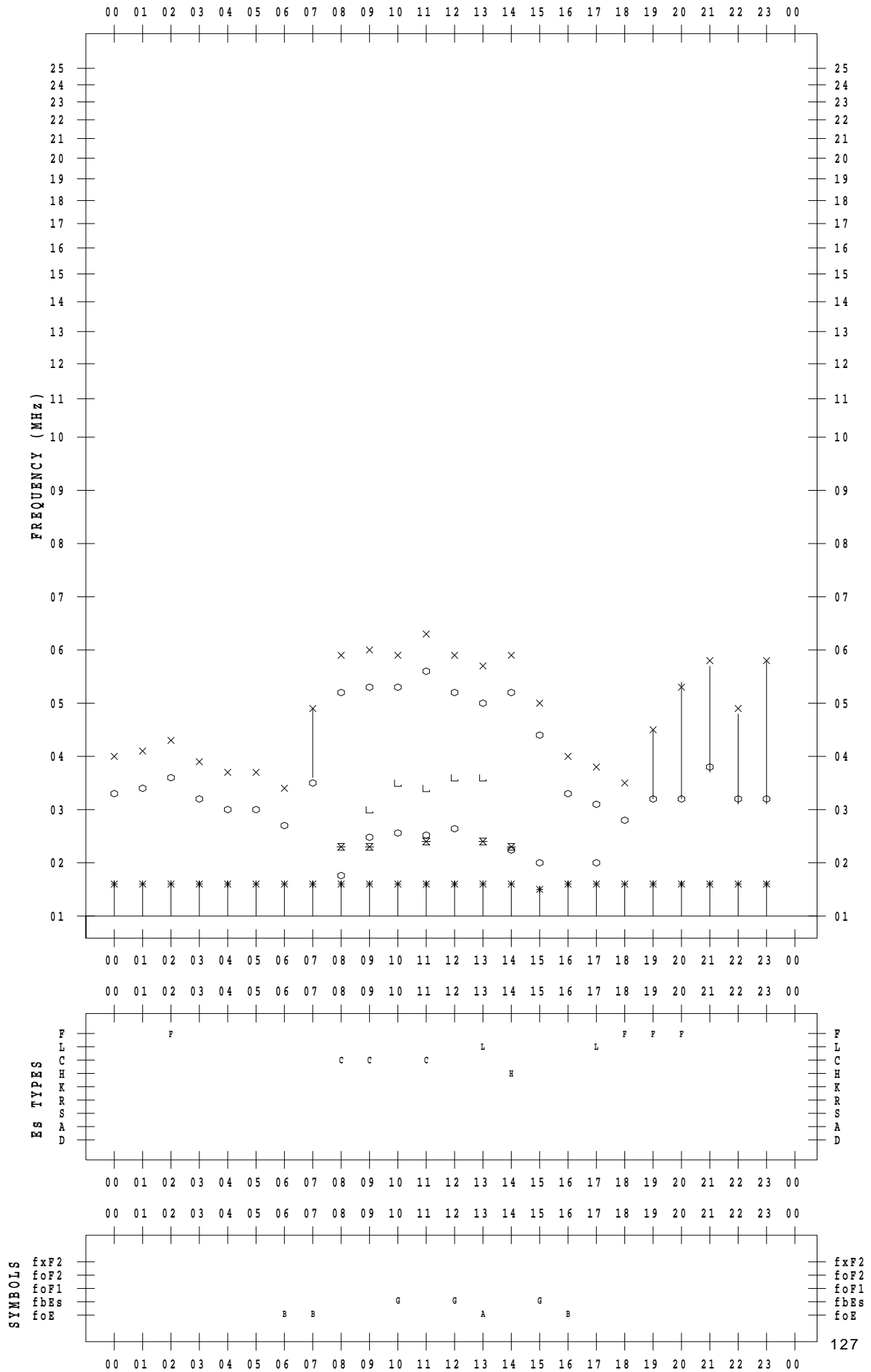
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/20

135 ° E MEAN TIME





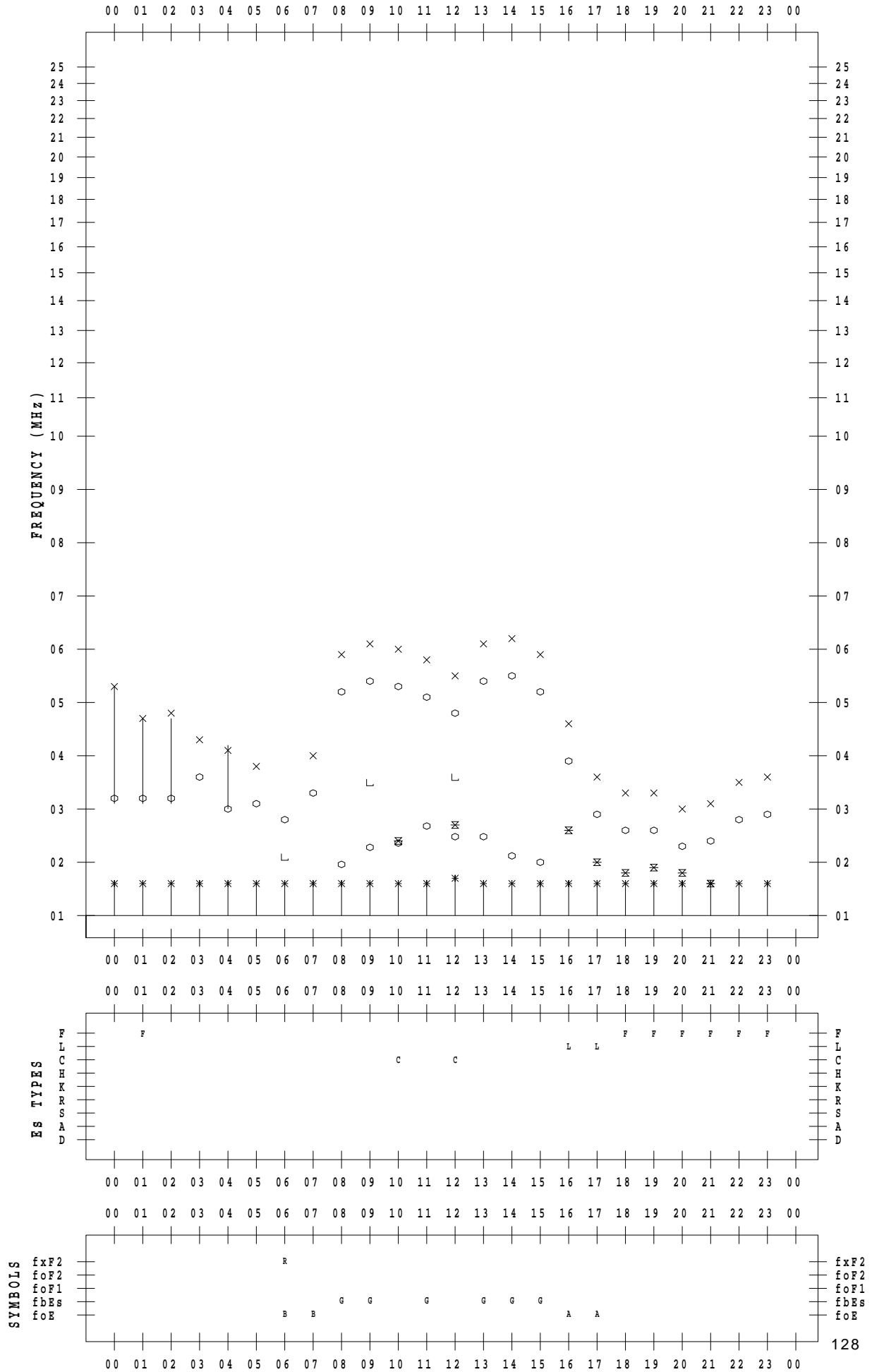
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/21

135 ° E MEAN TIME



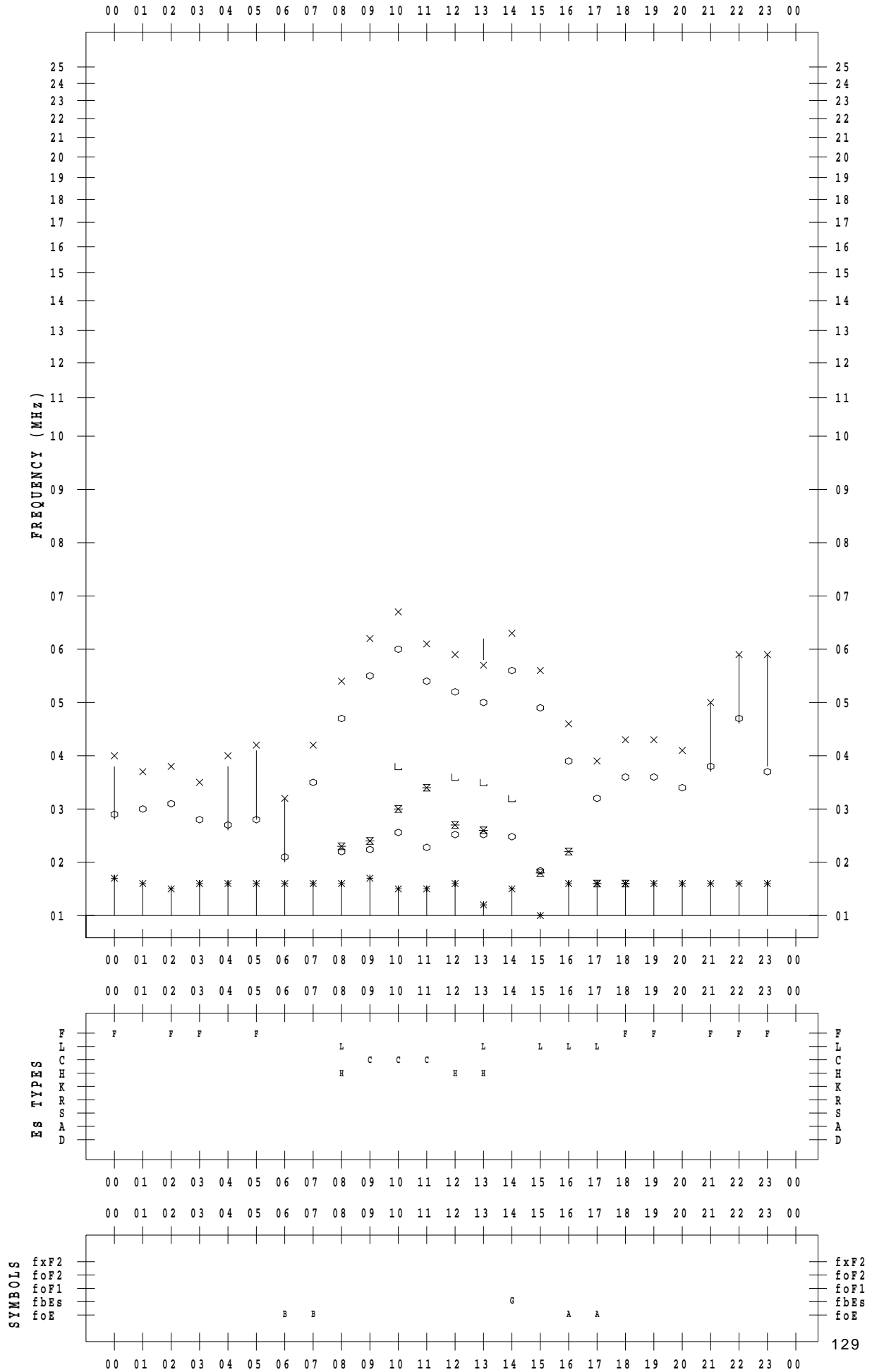
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/22

135 ° E MEAN TIME



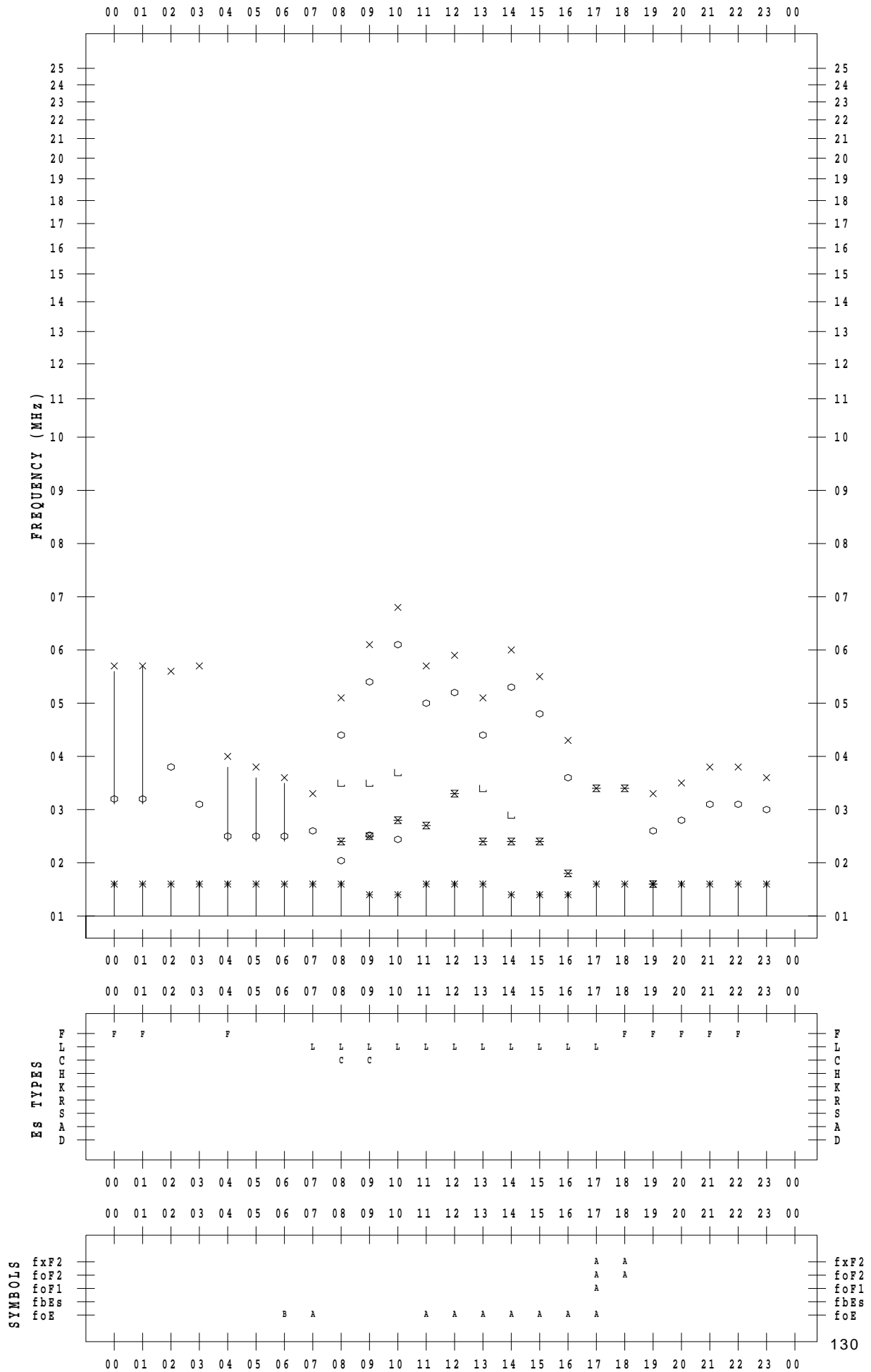
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/23

135 ° E MEAN TIME



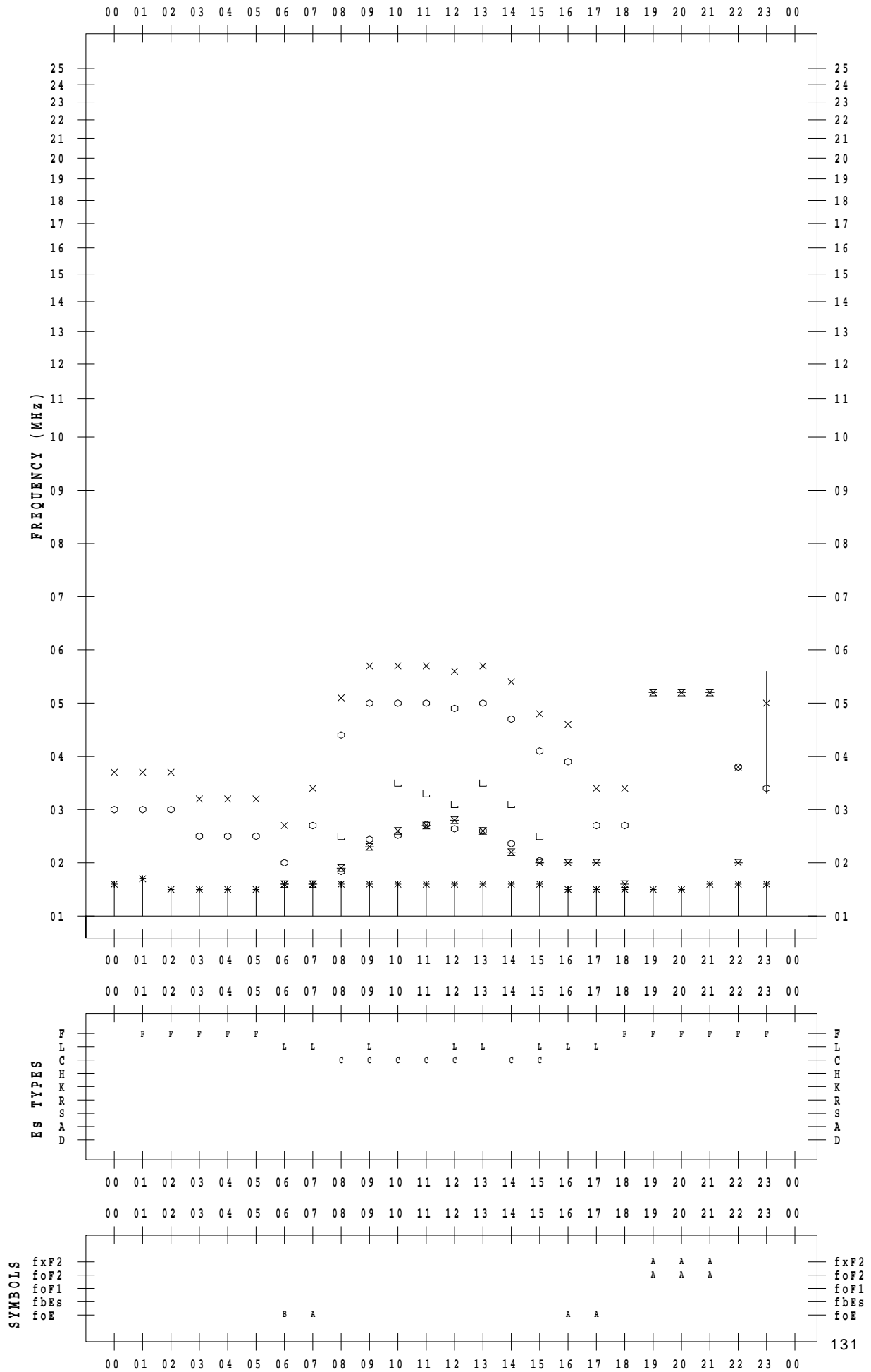
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/24

135 ° E MEAN TIME



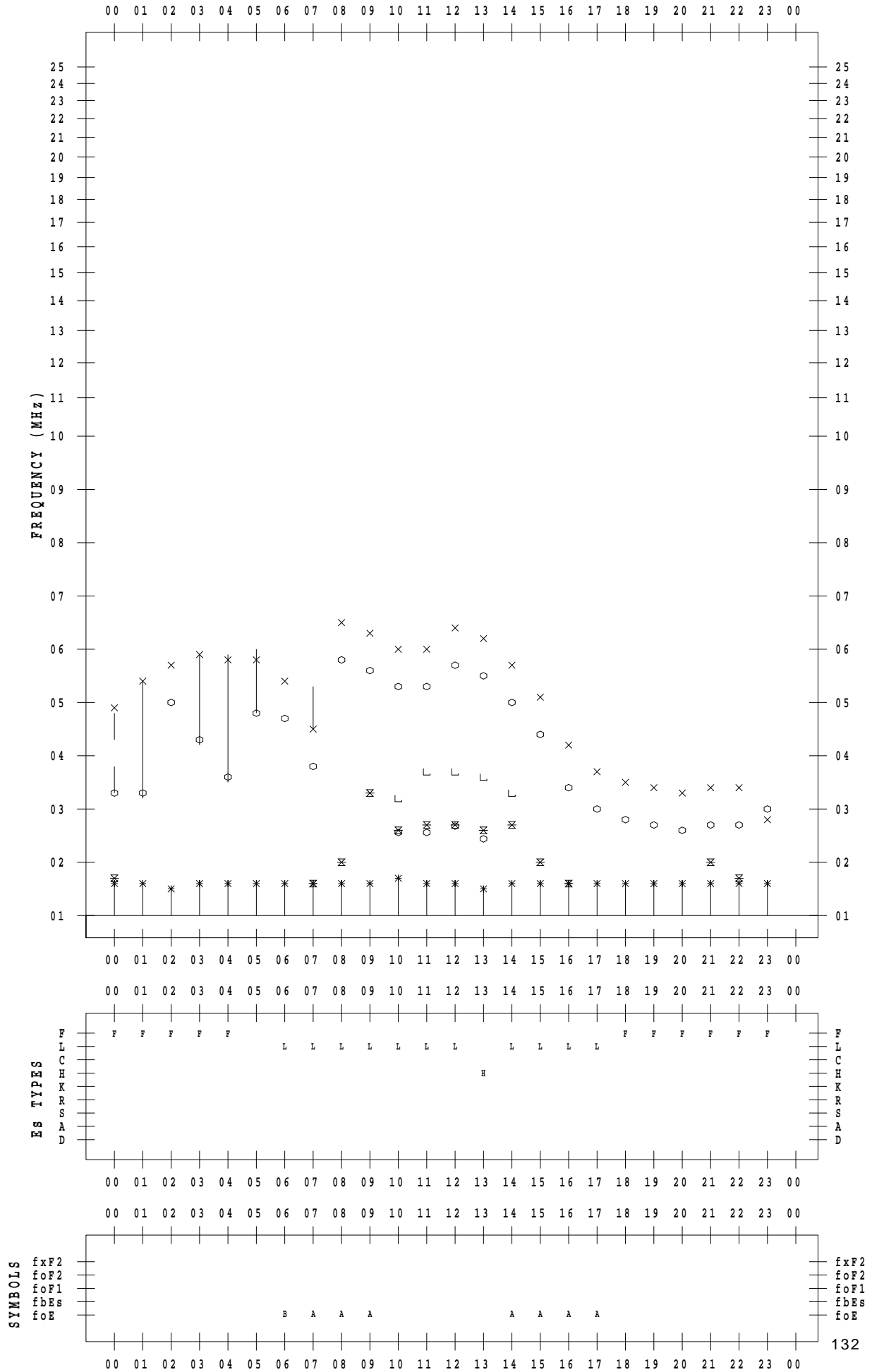
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/25

135 ° E MEAN TIME



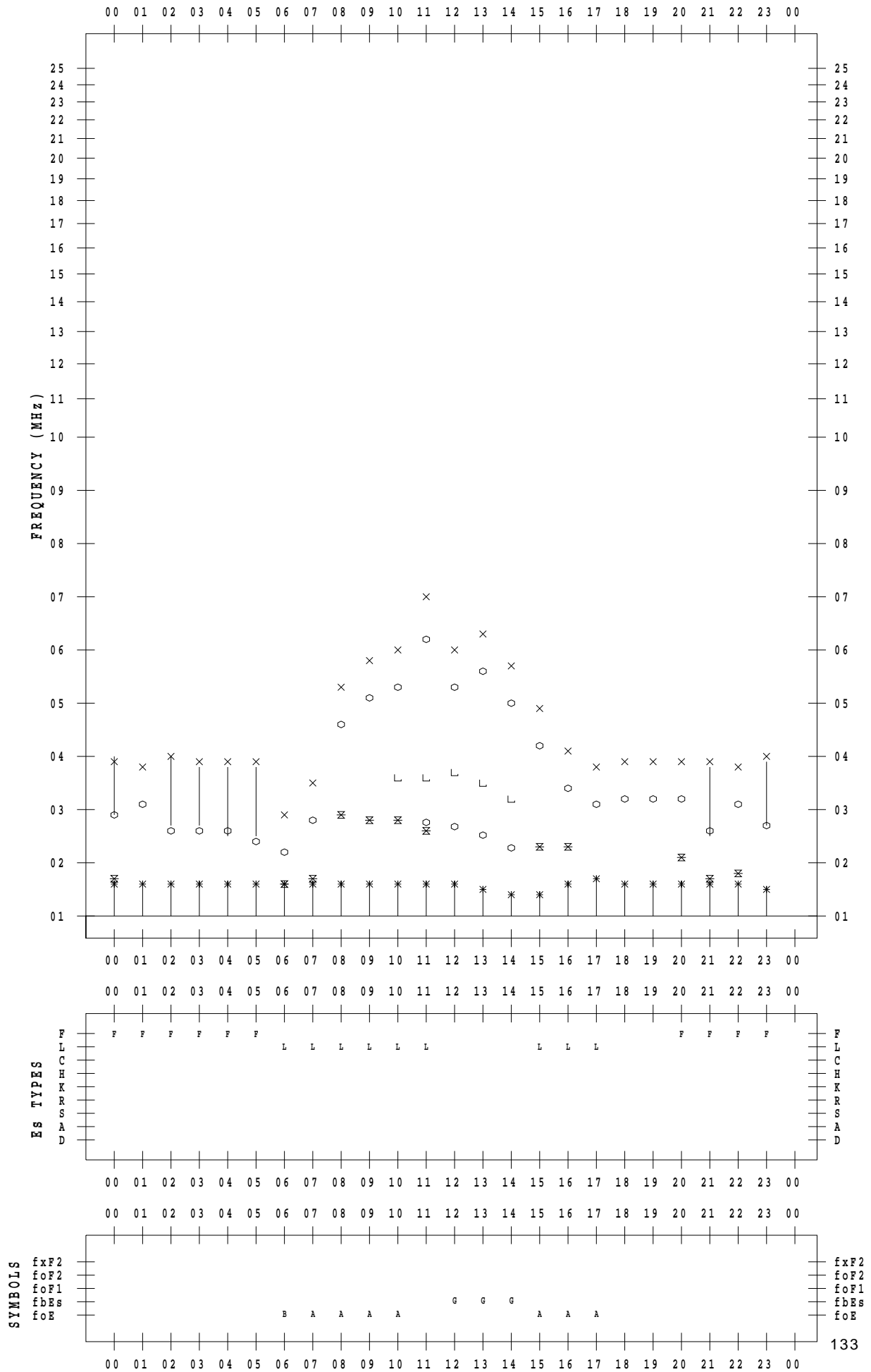
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/26

135 ° E MEAN TIME



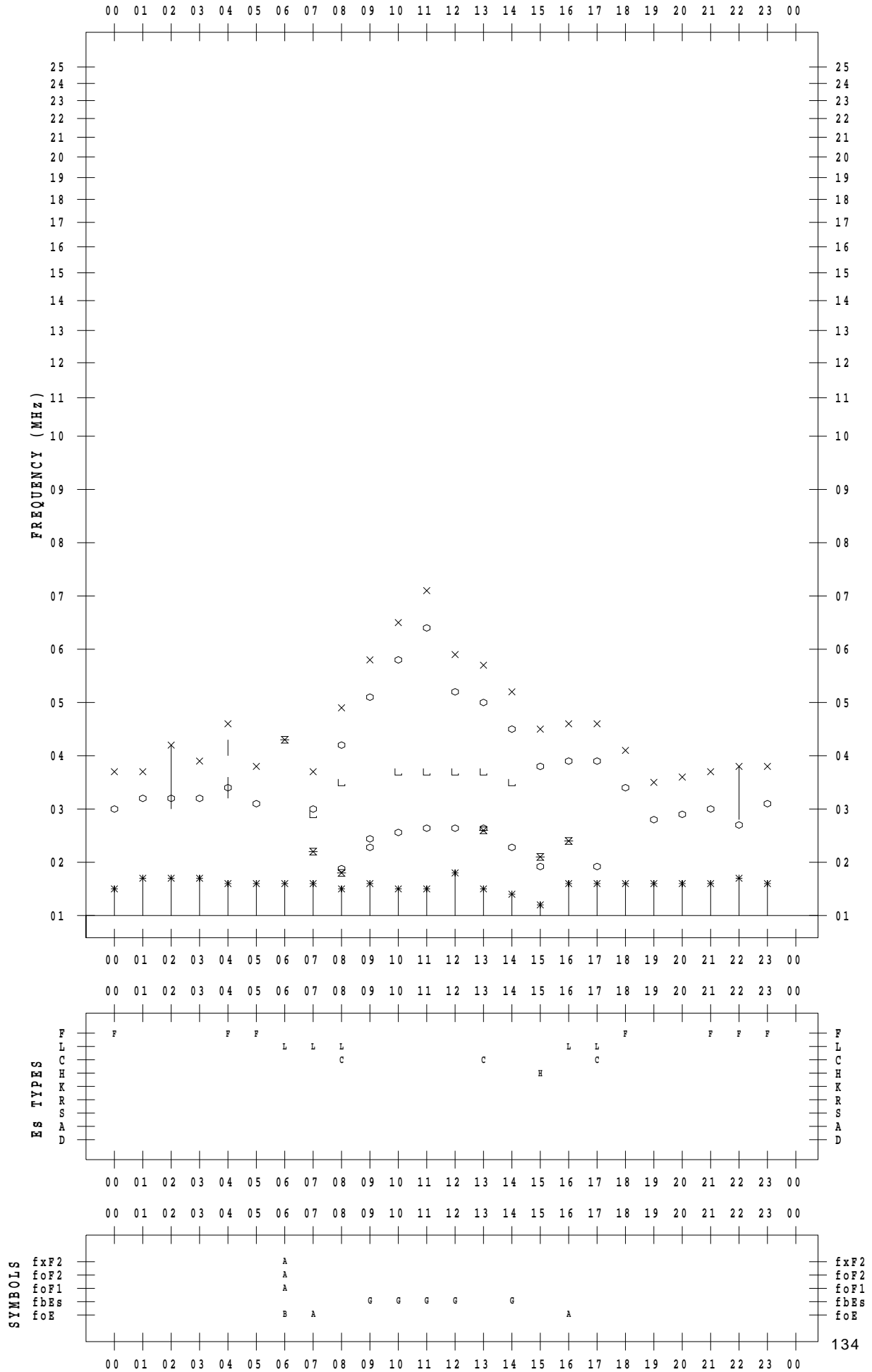
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/27

135 ° E MEAN TIME



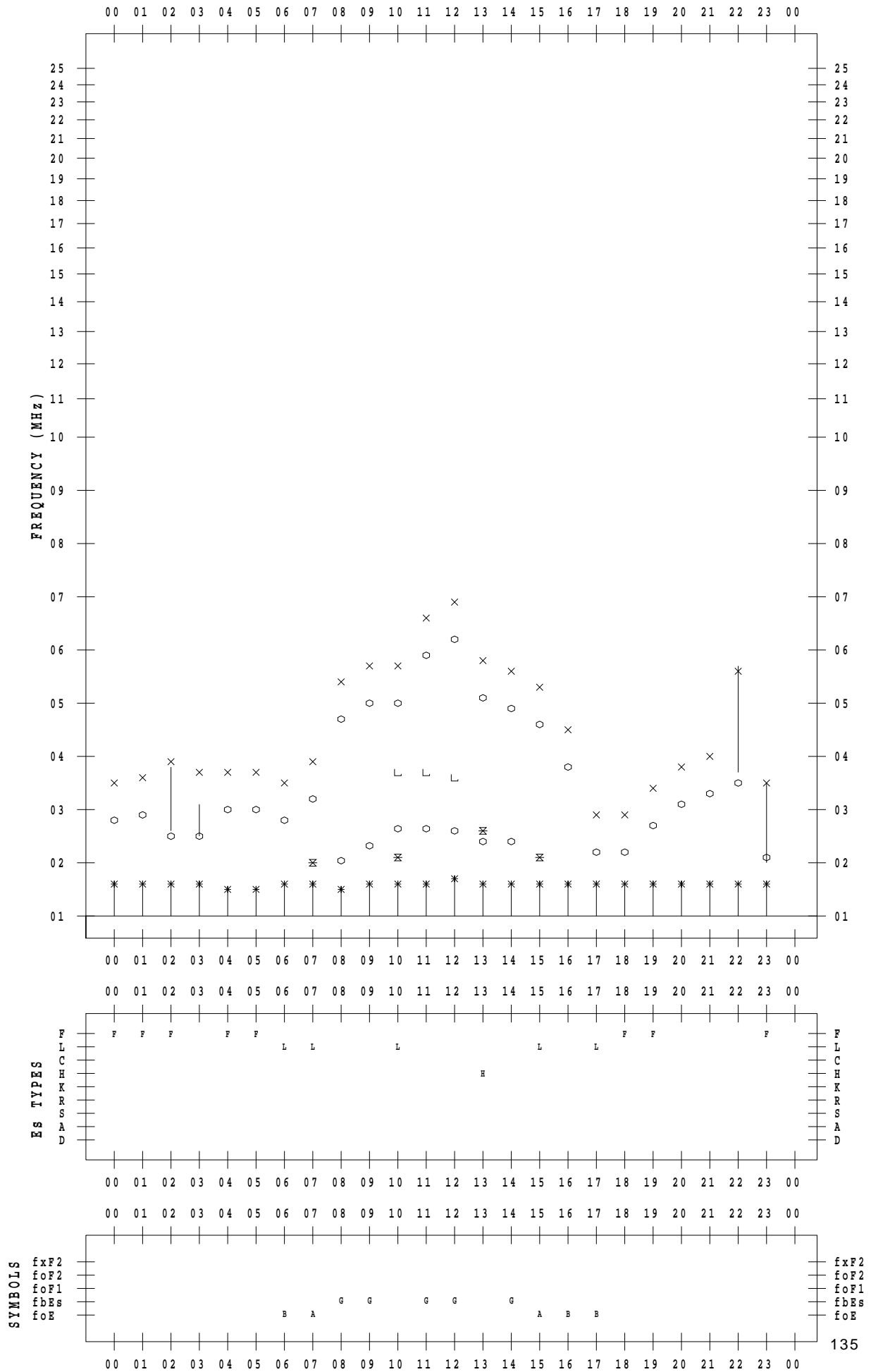
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/28

135 ° E MEAN TIME





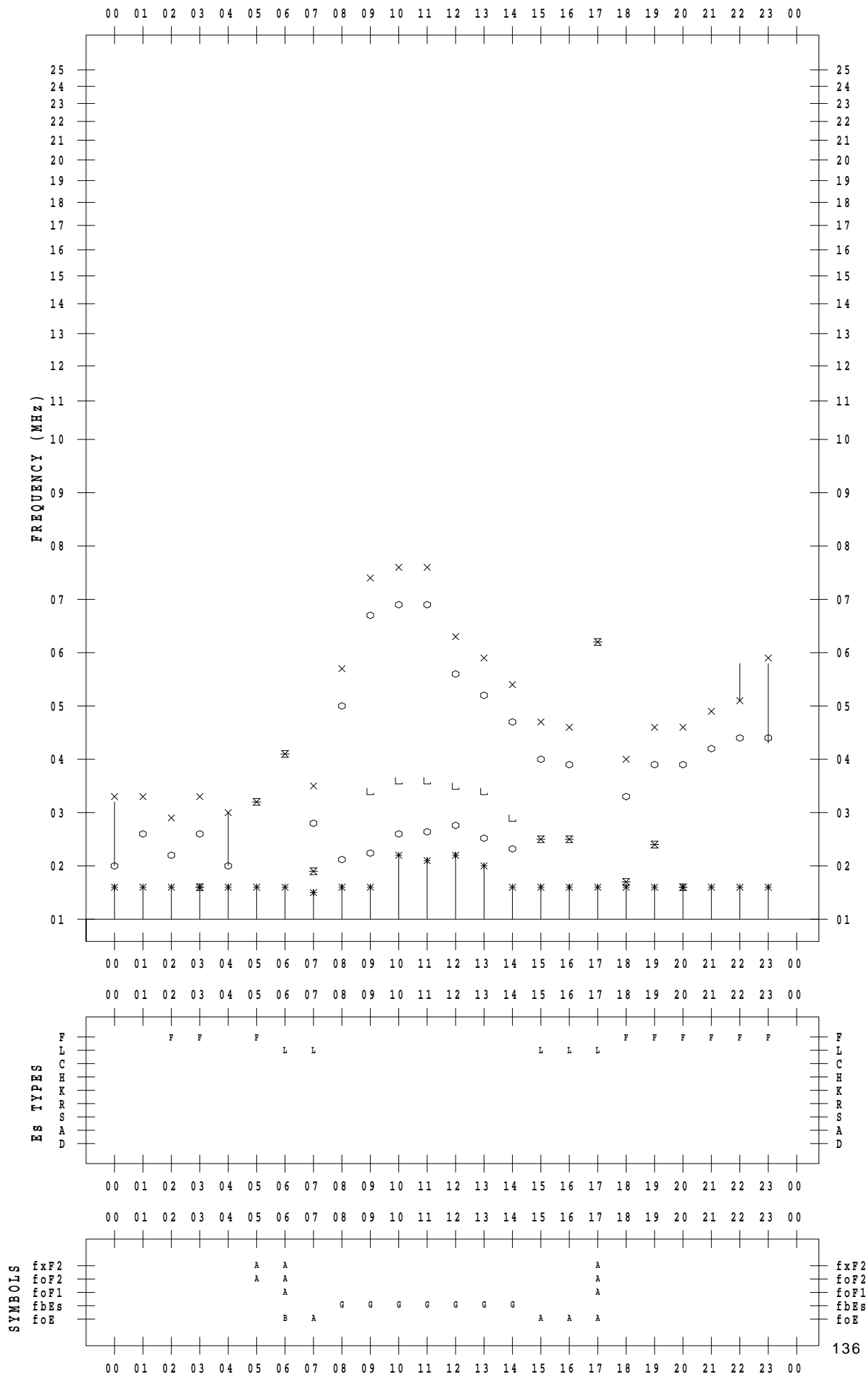
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/29

135 ° E MEAN TIME



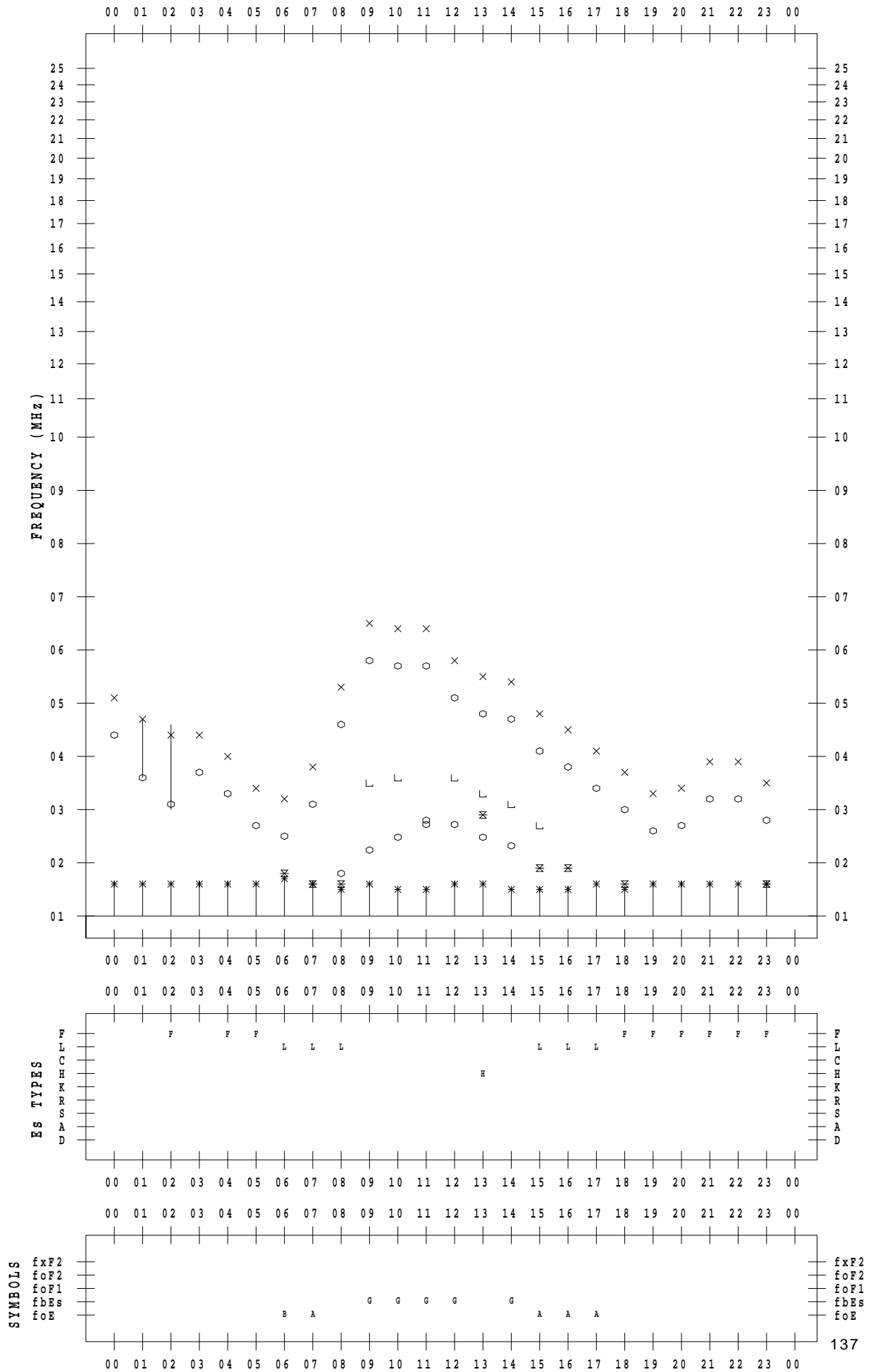
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/30

135 ° E MEAN TIME



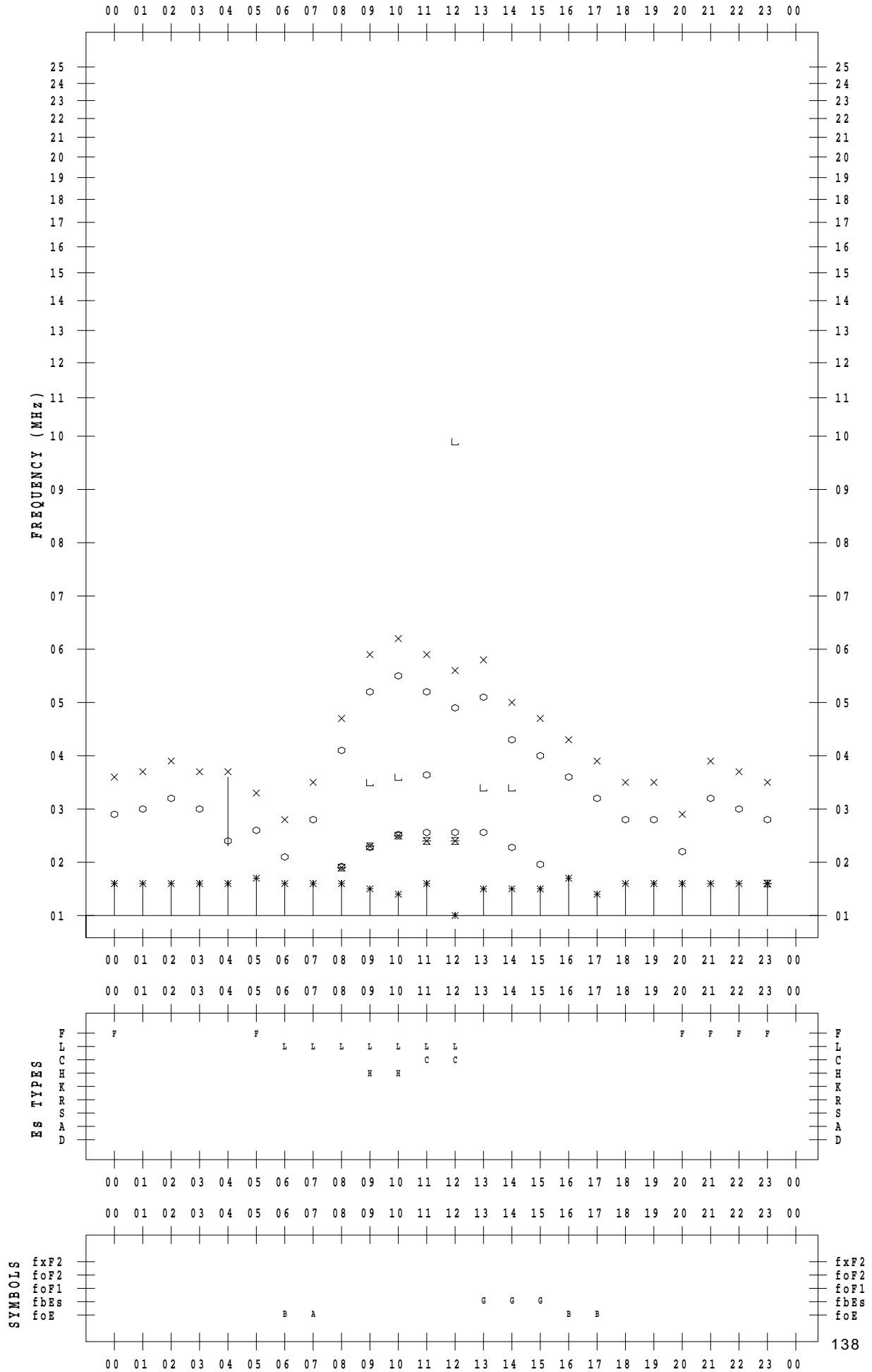
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2018/12/31

135 ° E MEAN TIME



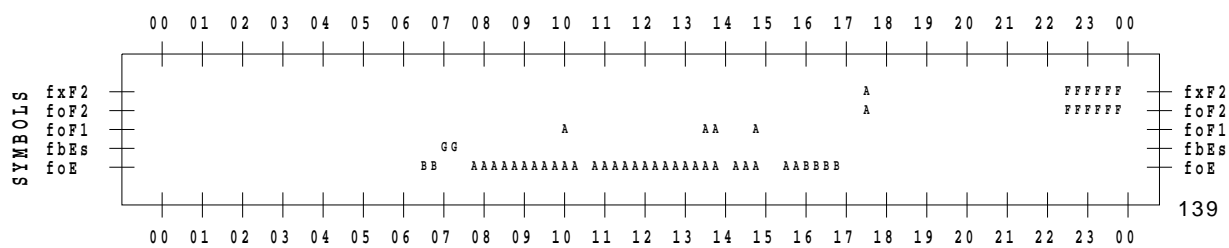
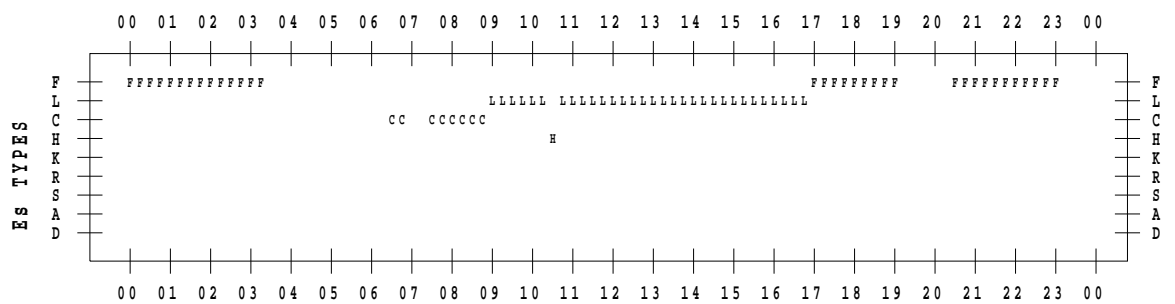
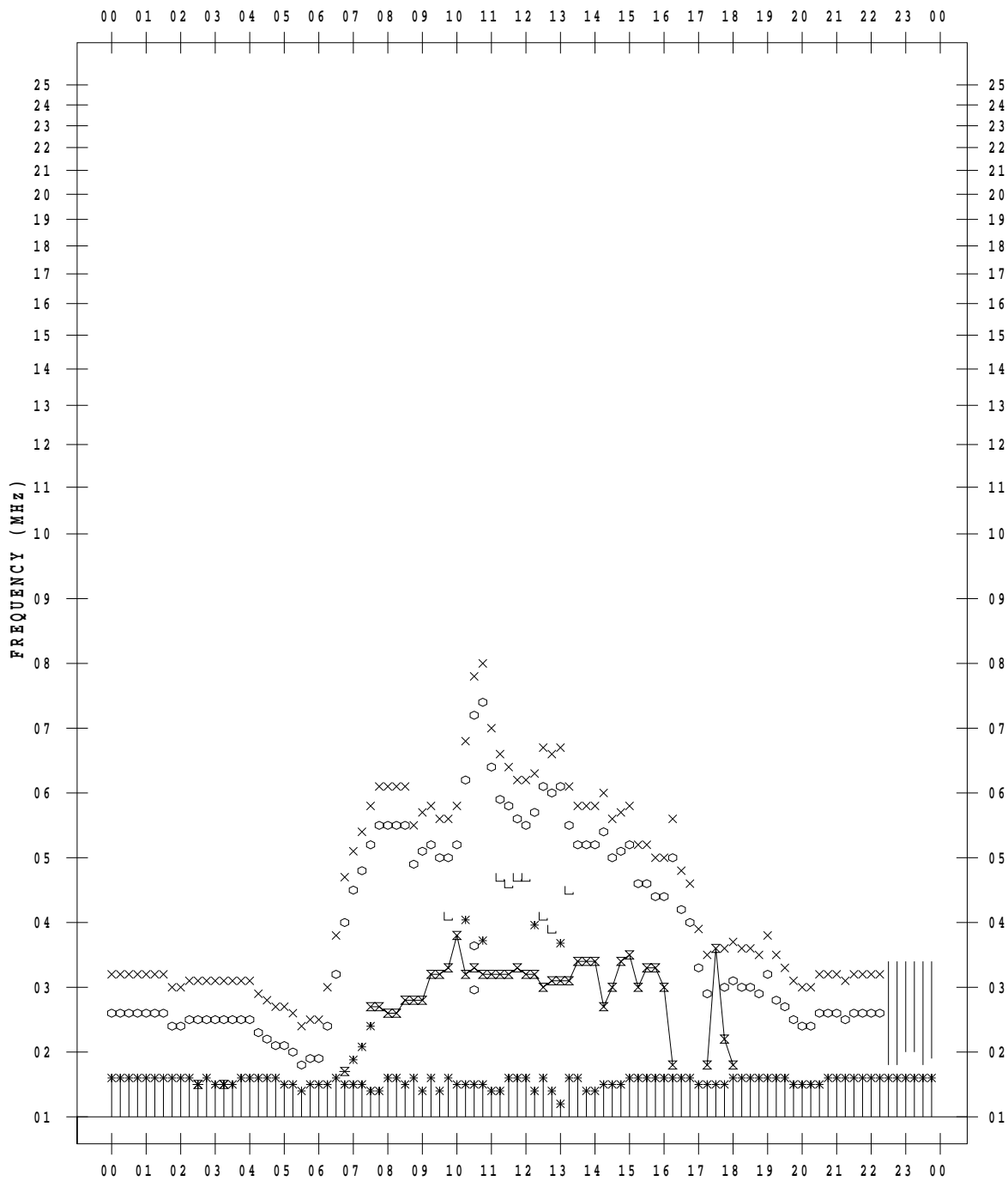
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2018/12/ 1

135 ° E MEAN TIME



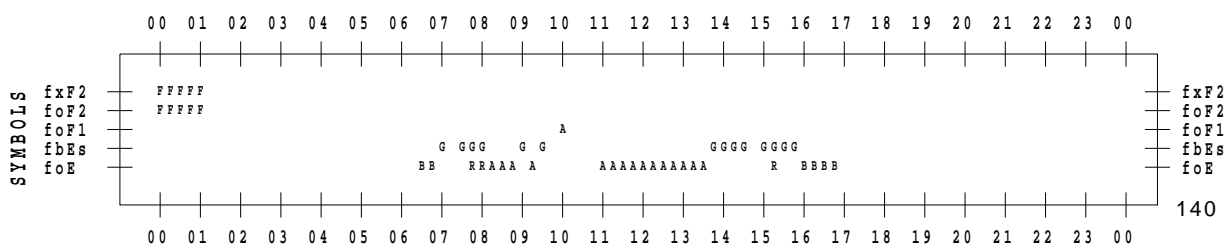
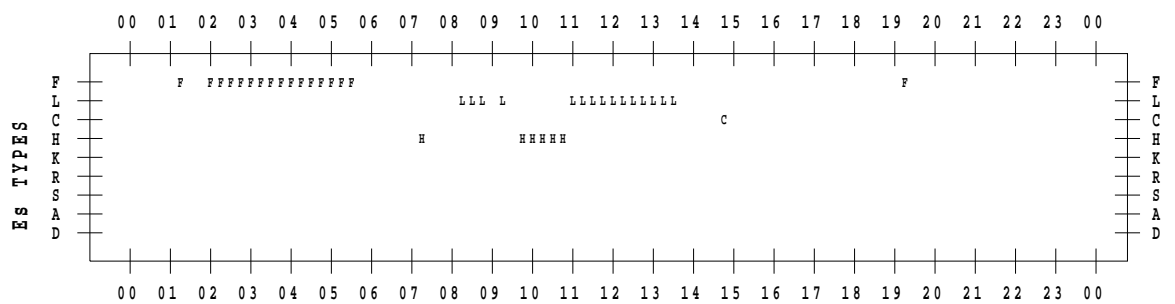
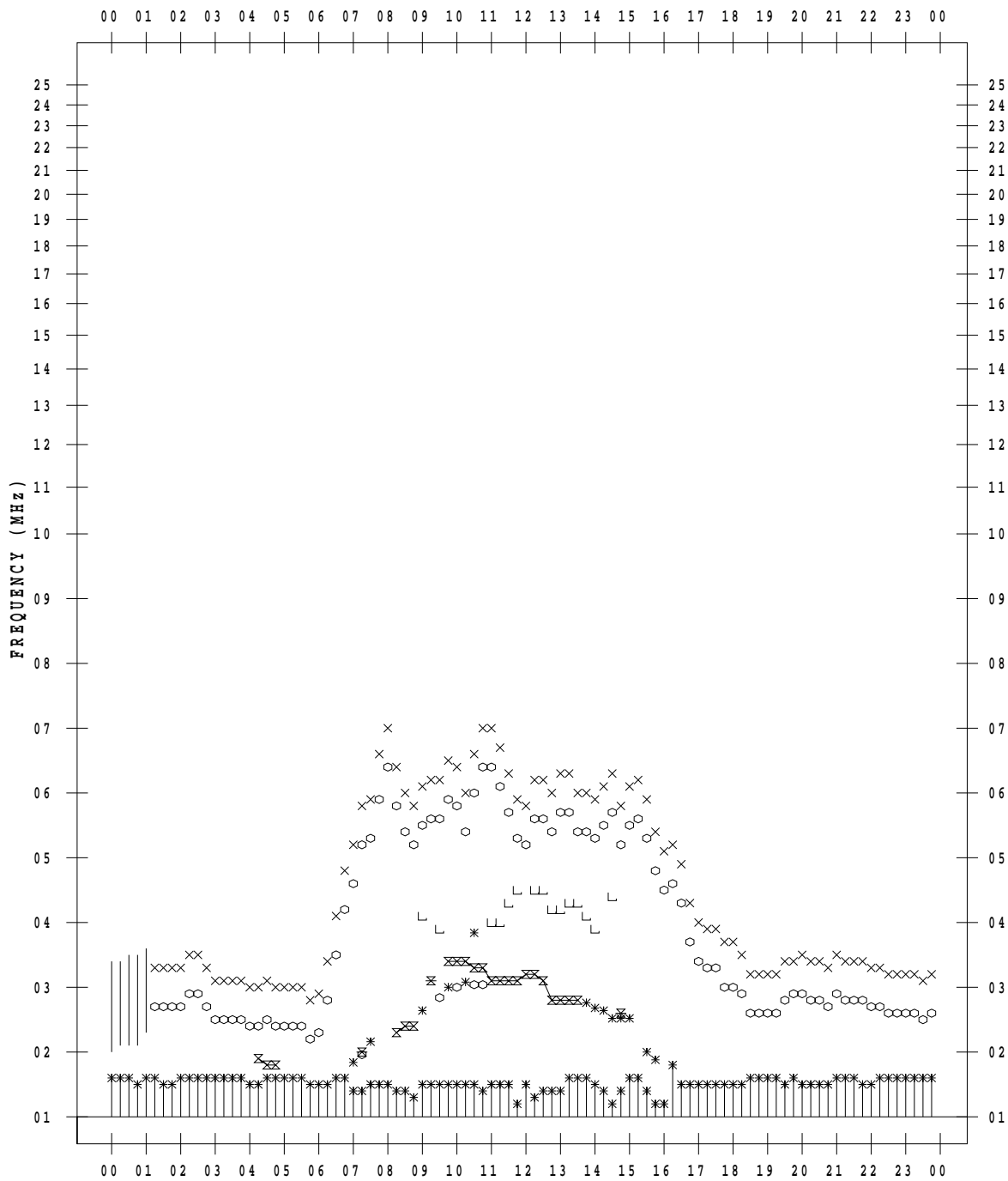
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2018/12/ 2

135 ° E MEAN TIME



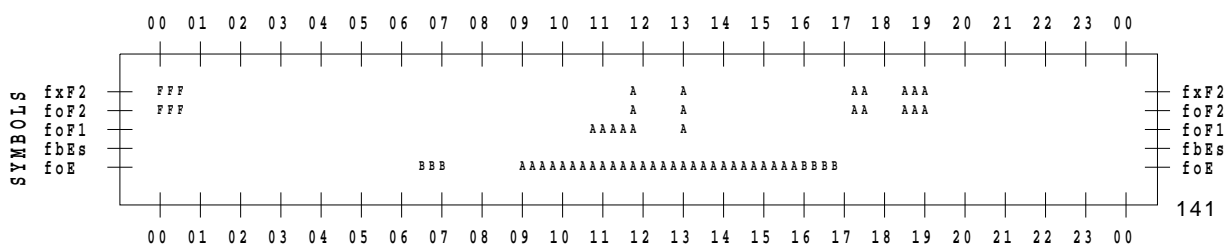
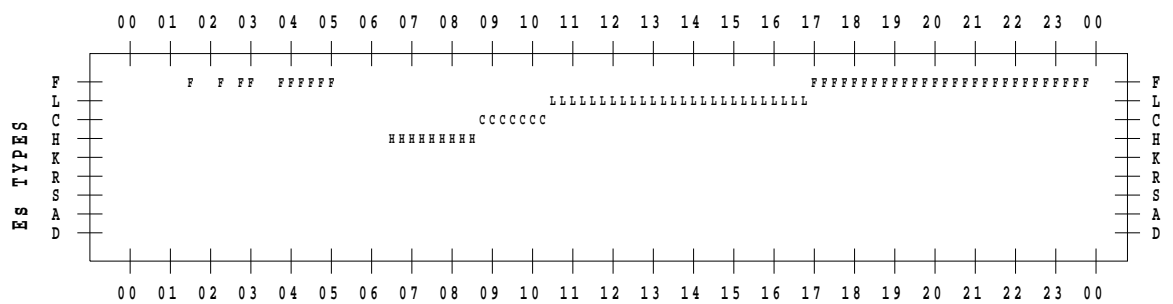
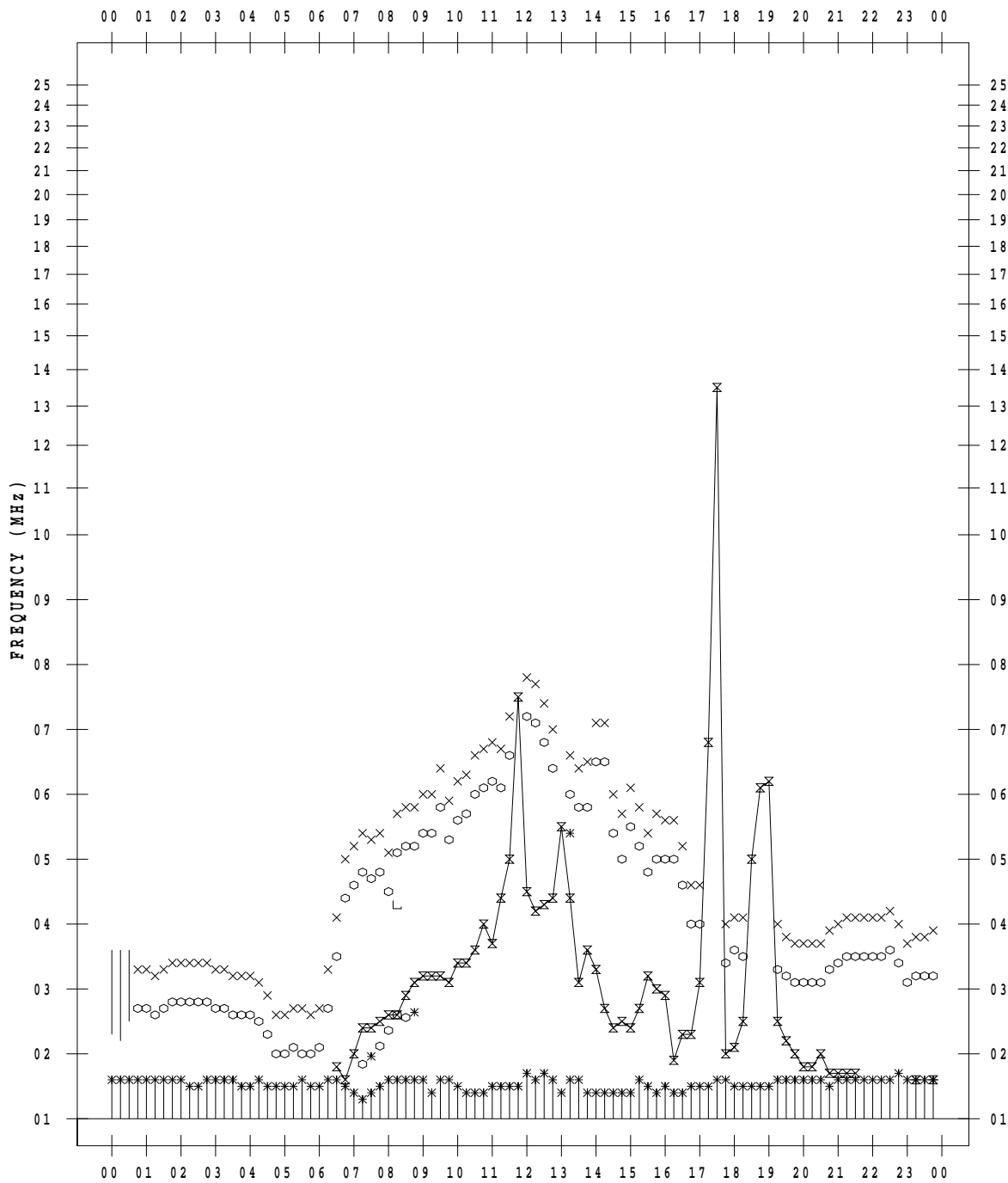
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2018/12/ 3

135 ° E MEAN TIME



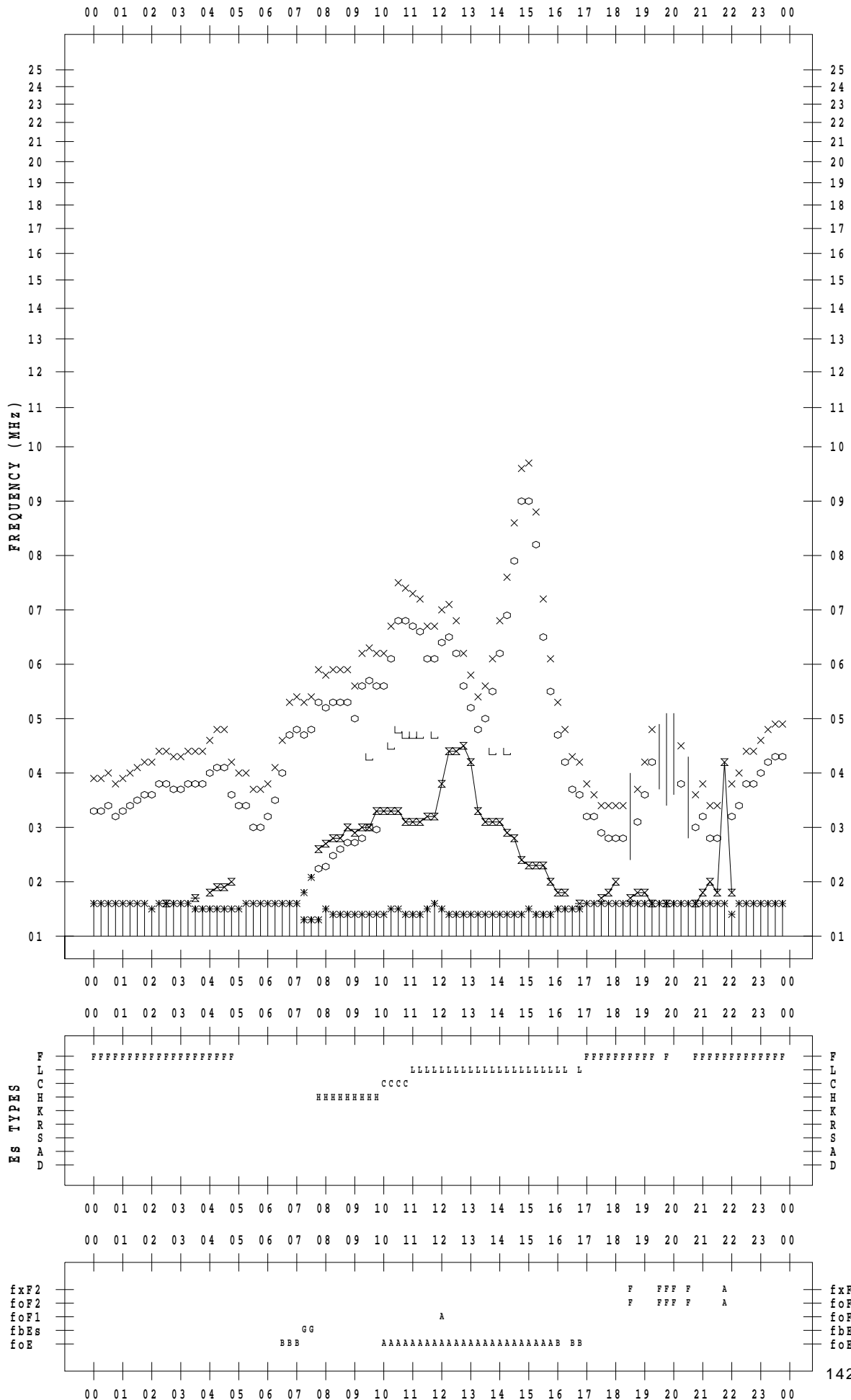
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2018/12/ 4

135 ° E MEAN TIME



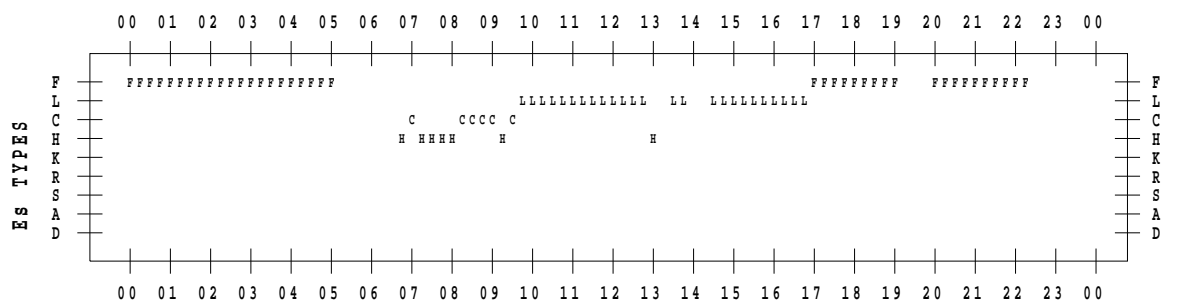
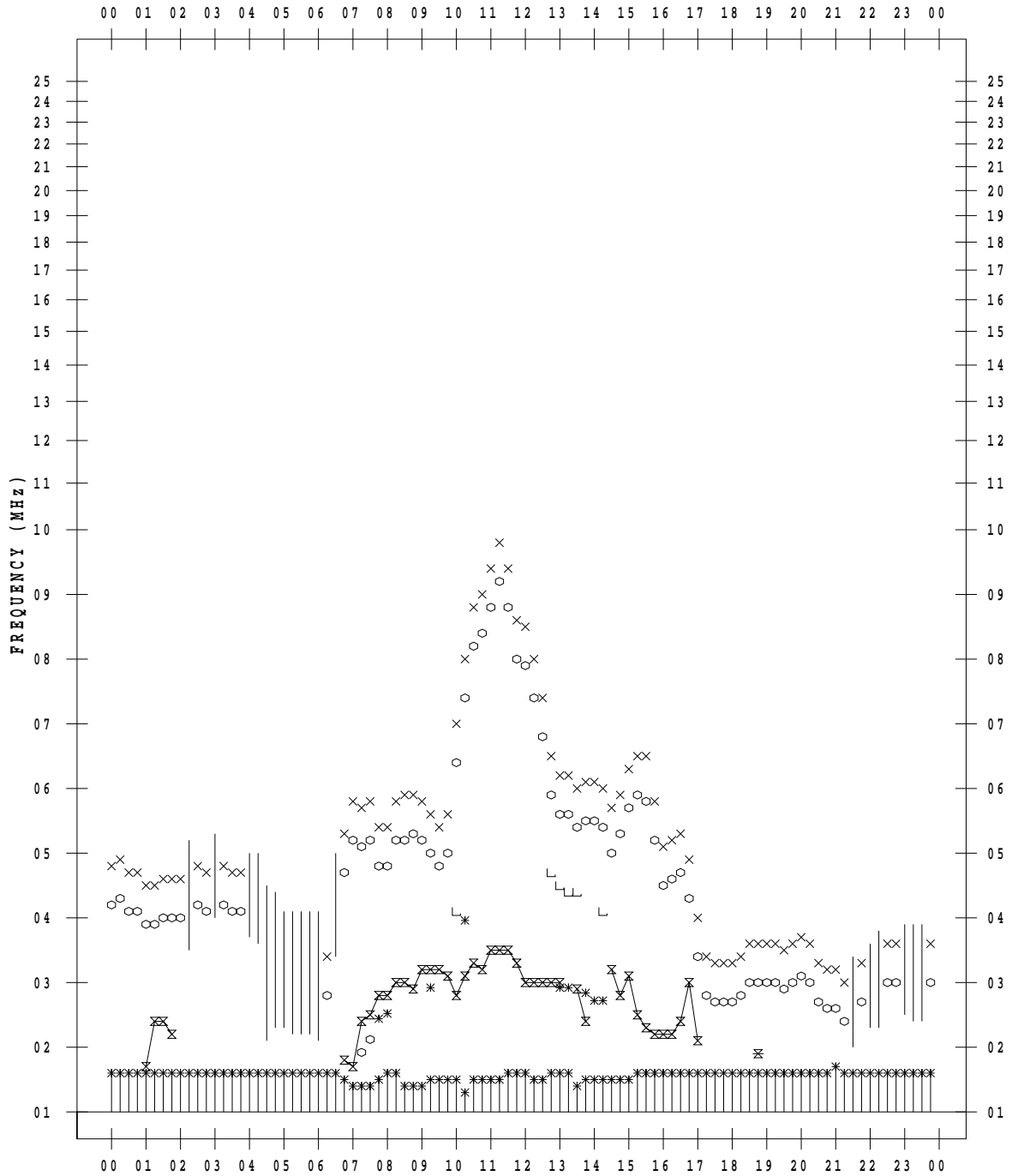
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2018/12/ 5

135 ° E MEAN TIME





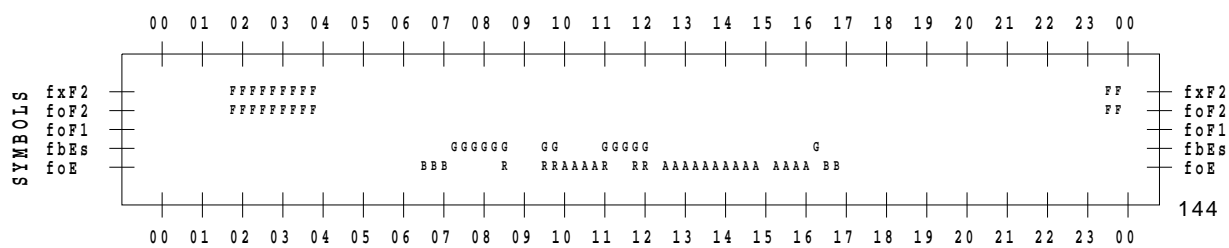
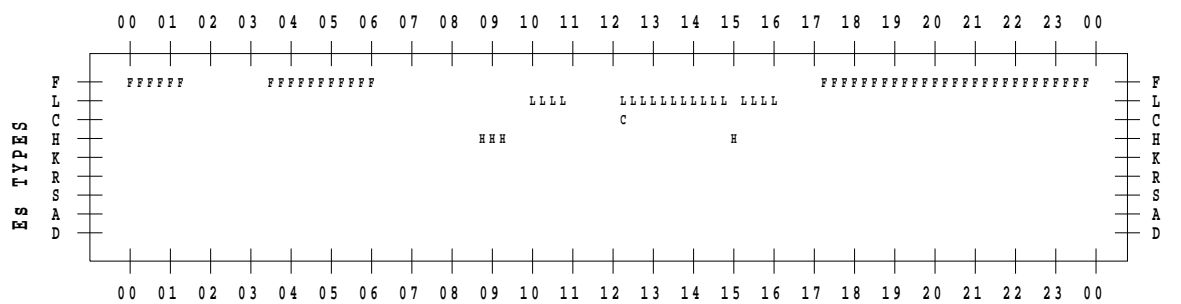
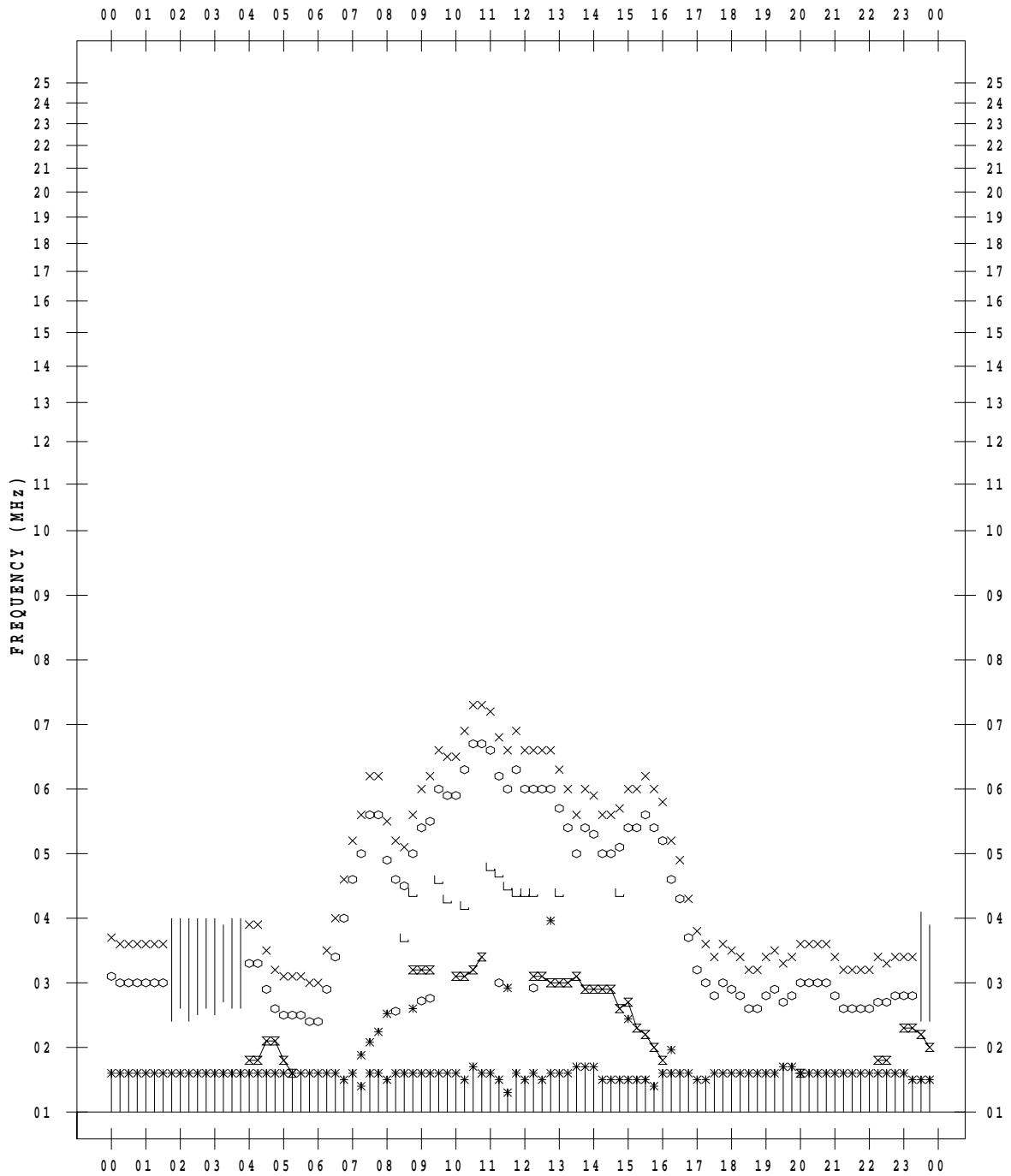
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2018/12/ 6

135 ° E MEAN TIME



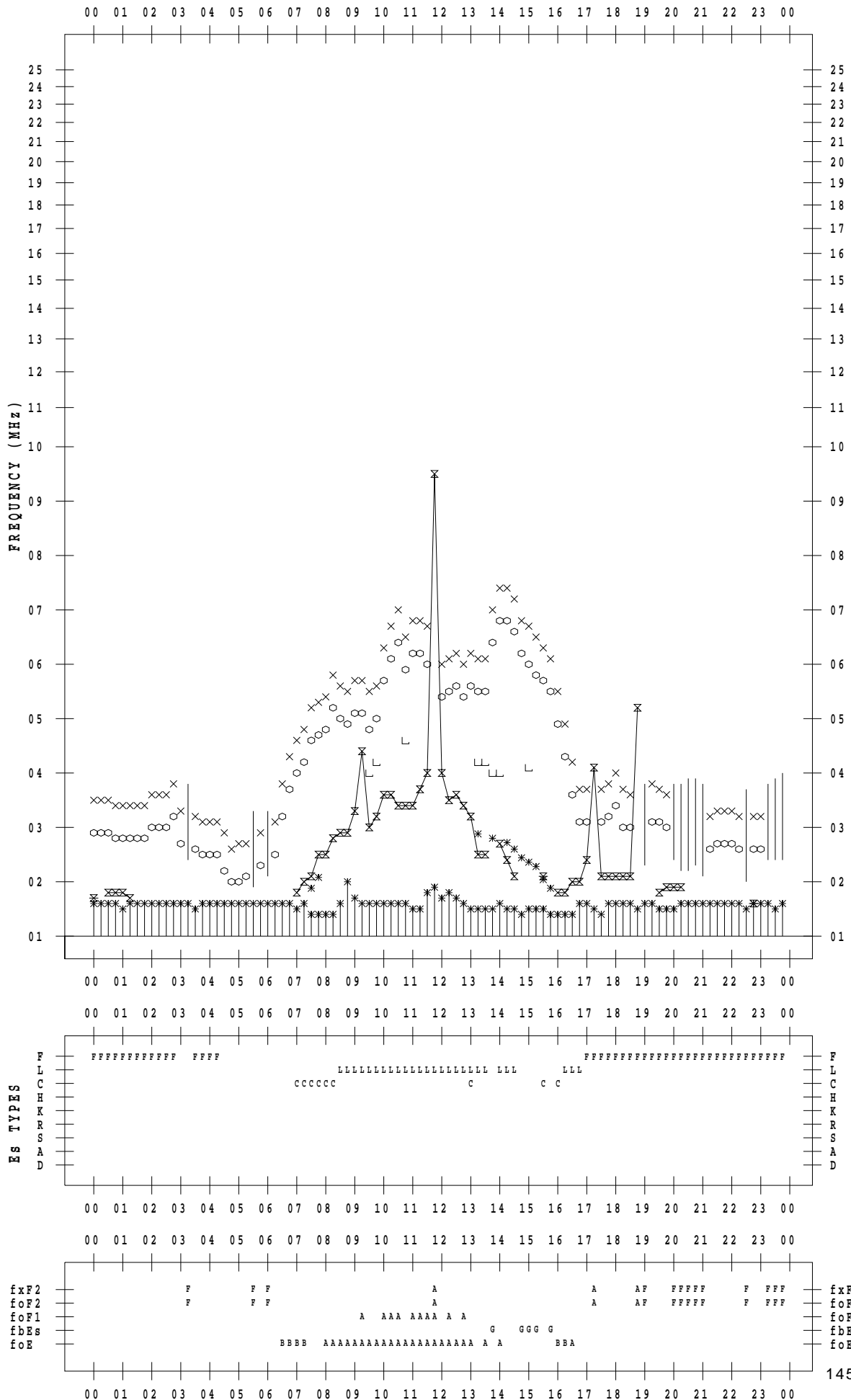
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2018/12/ 7

135 ° E MEAN TIME



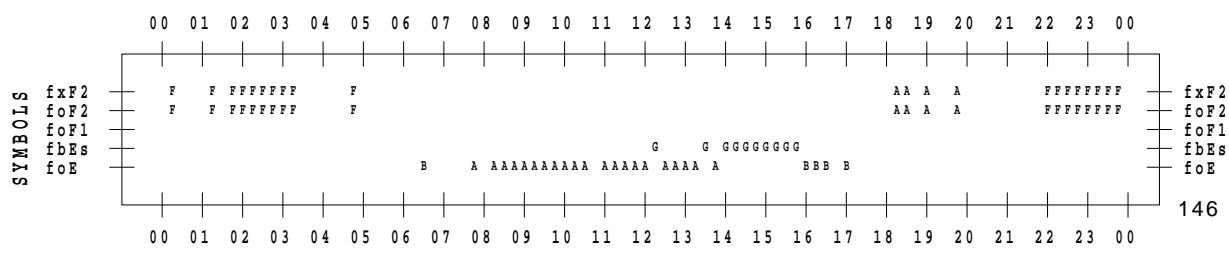
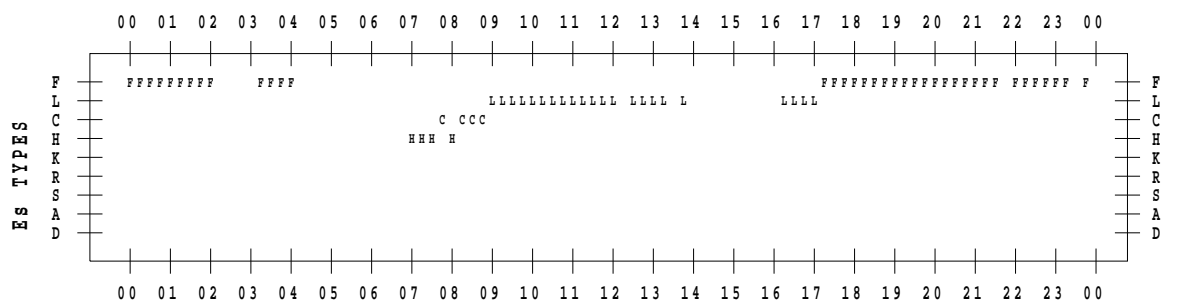
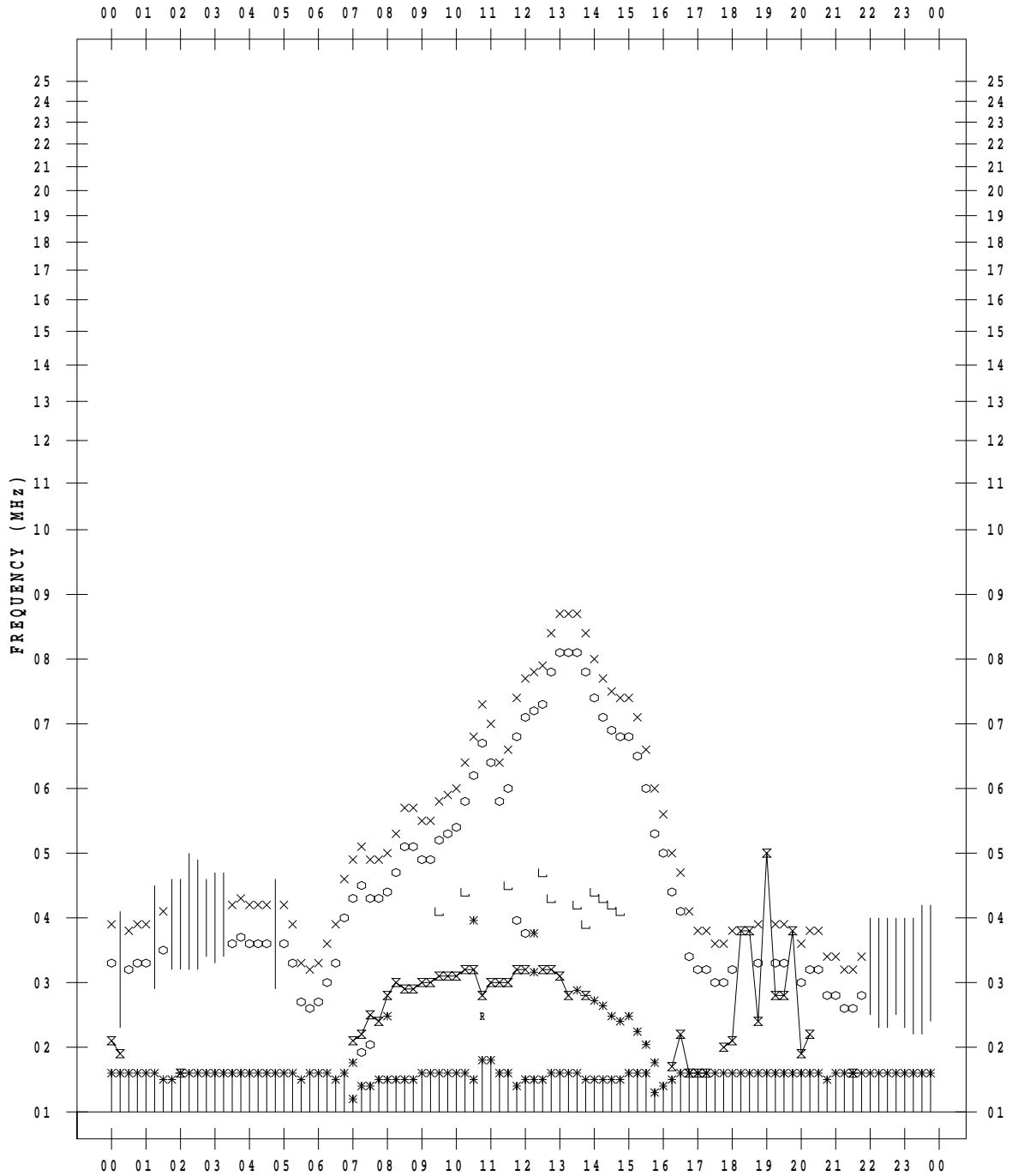
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2018/12/ 8

135 ° E MEAN TIME



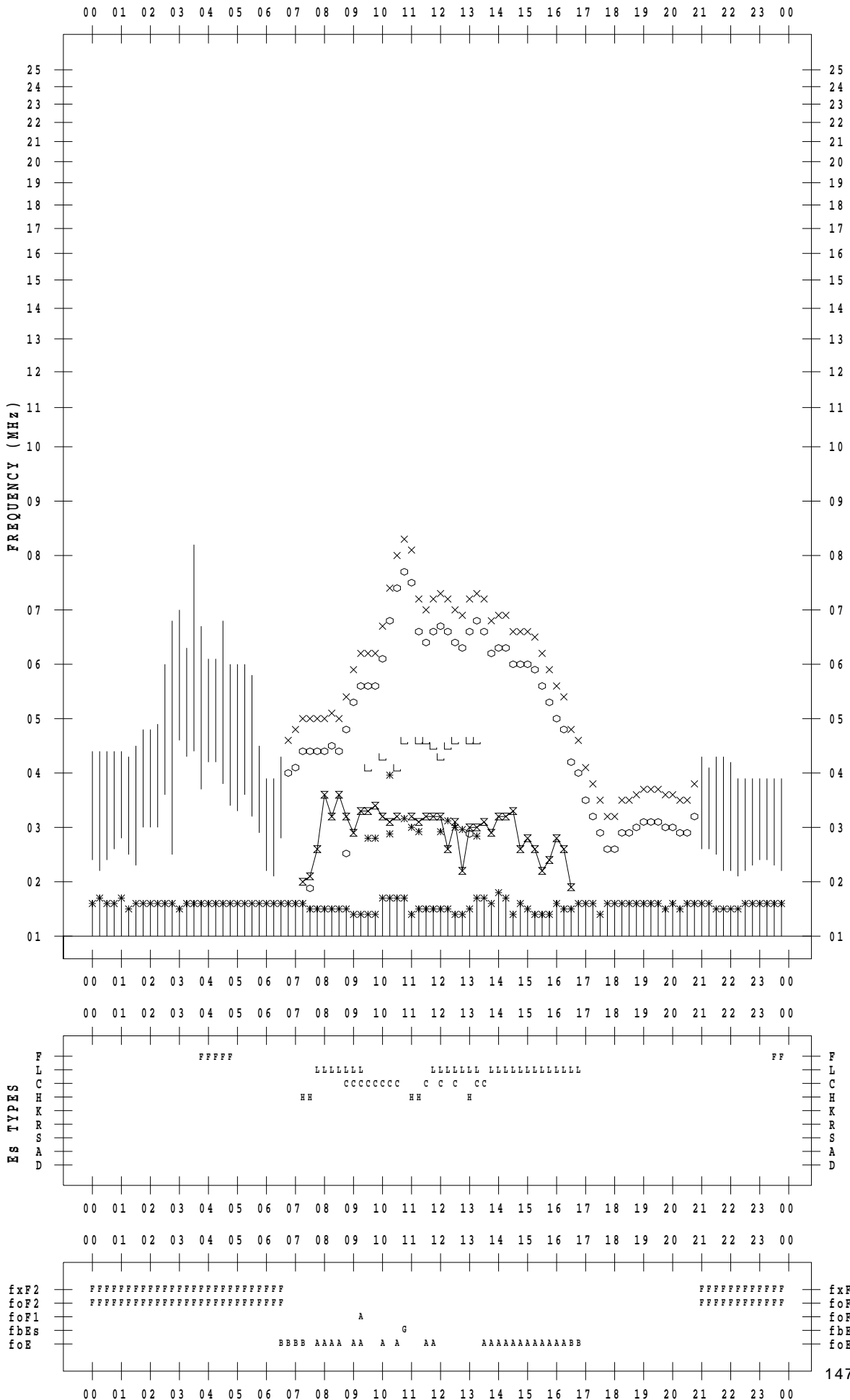
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2018/12/9

135 ° E MEAN TIME



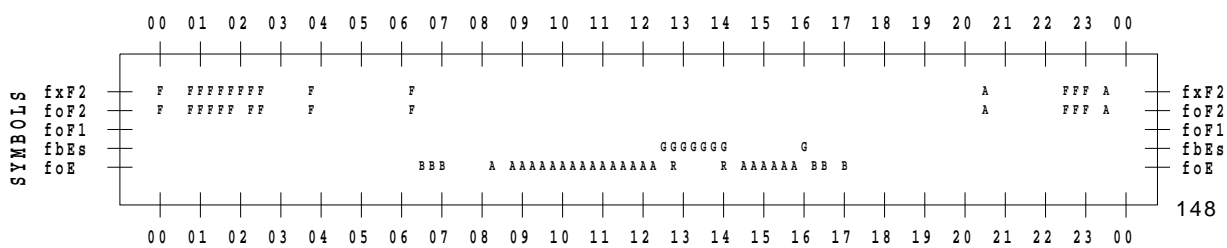
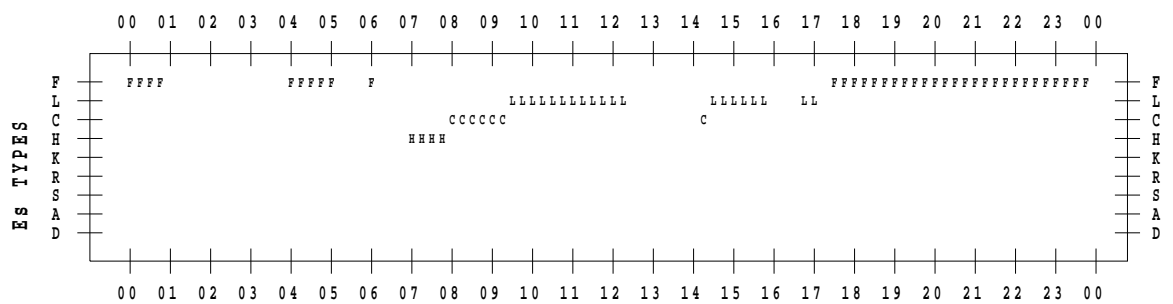
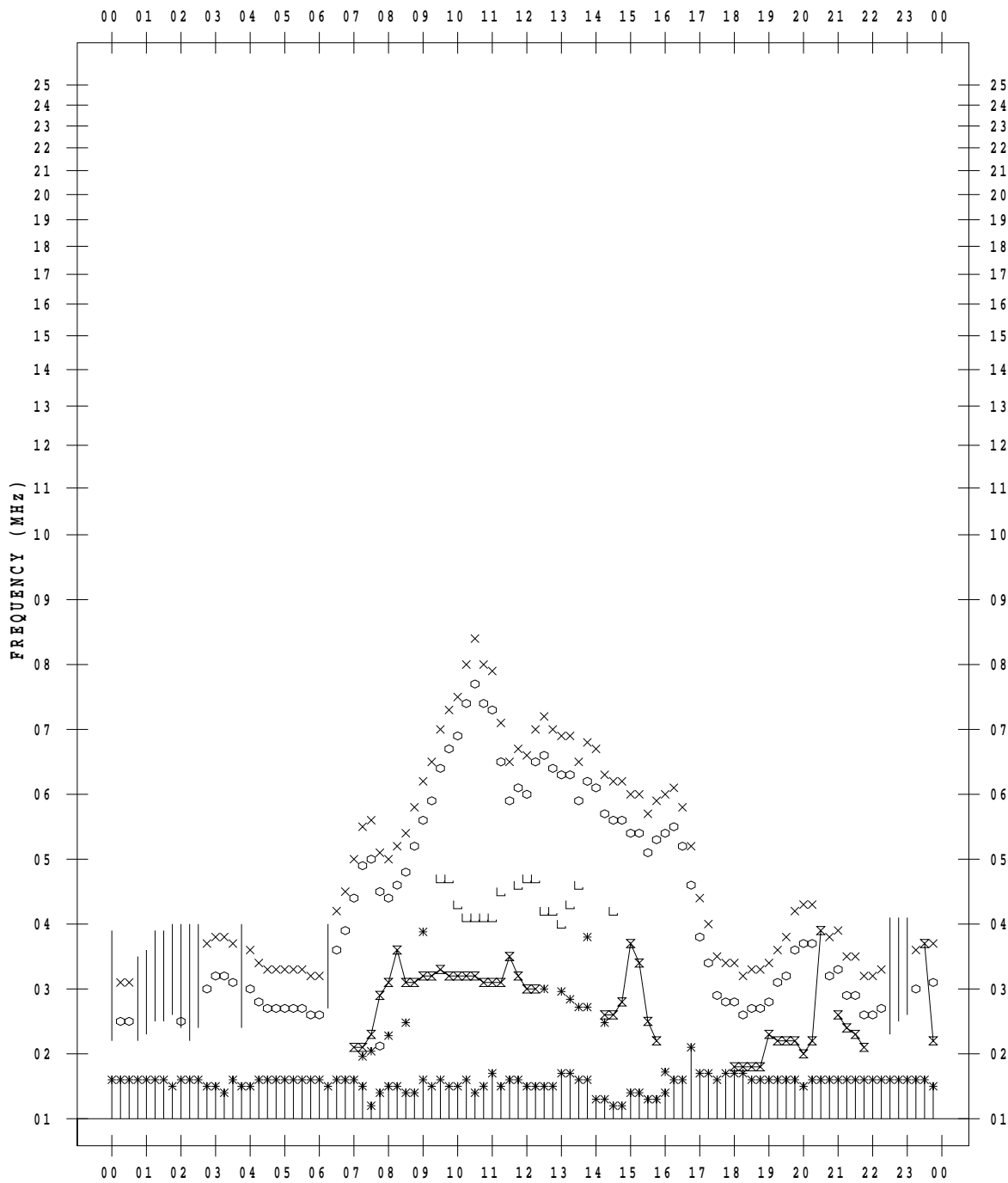
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2018/12/10

135 ° E MEAN TIME



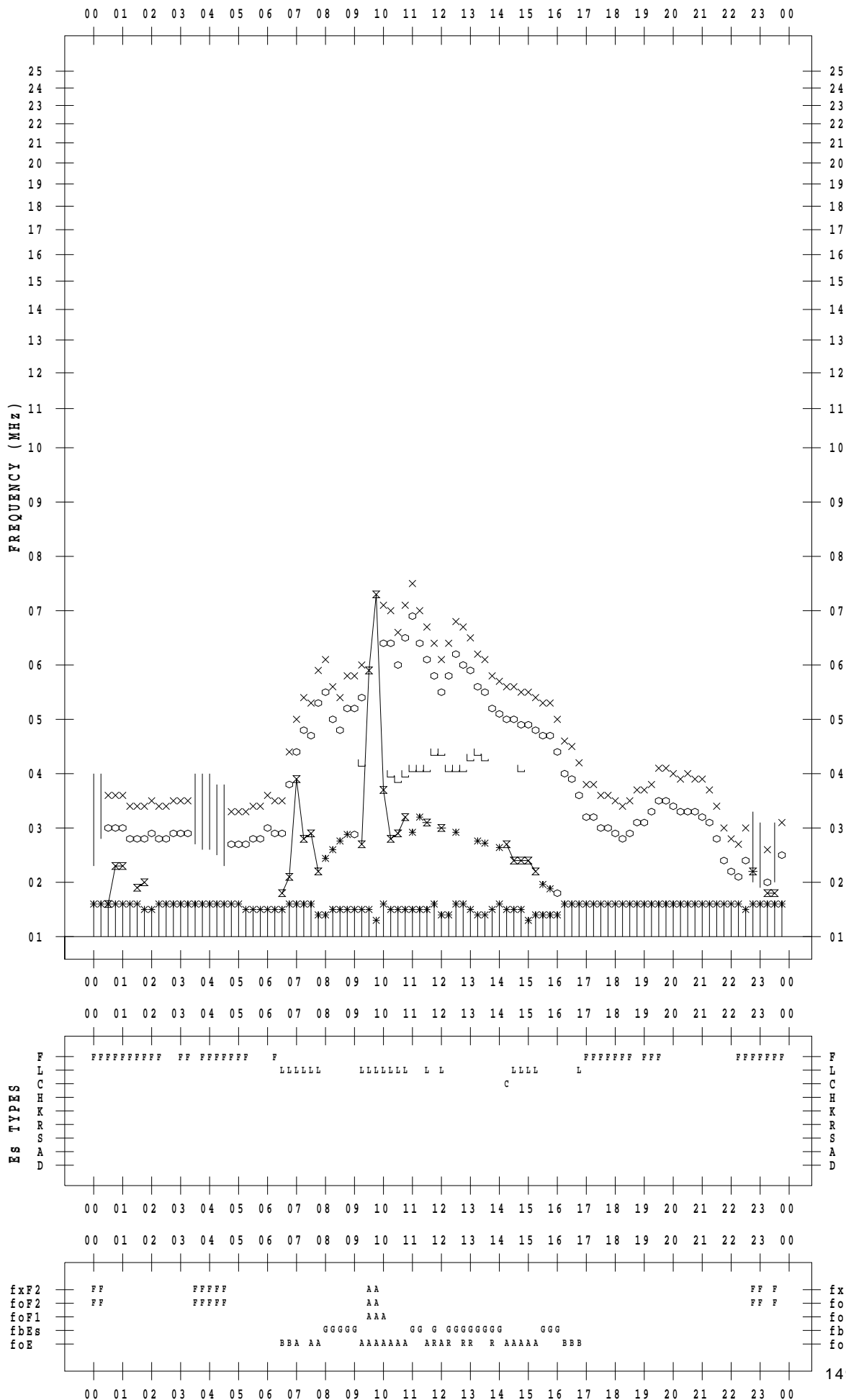
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2018/12/11

135 ° E MEAN TIME



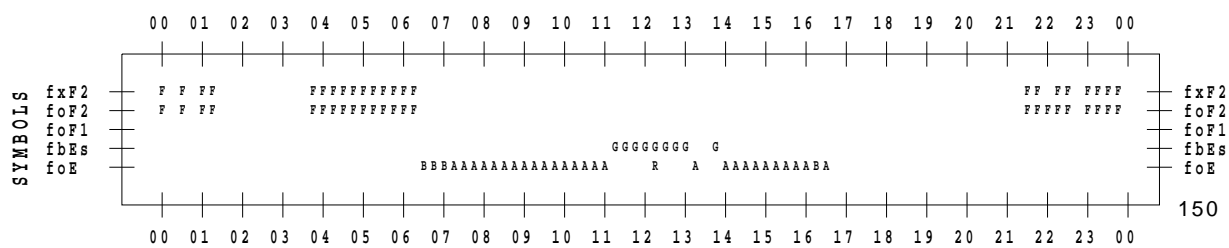
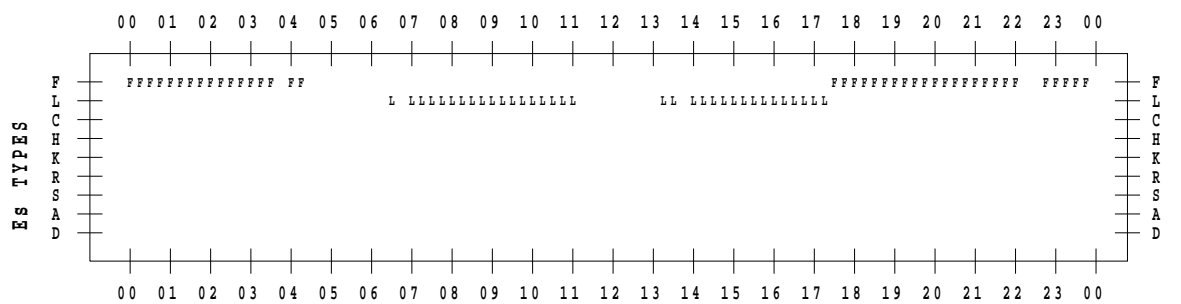
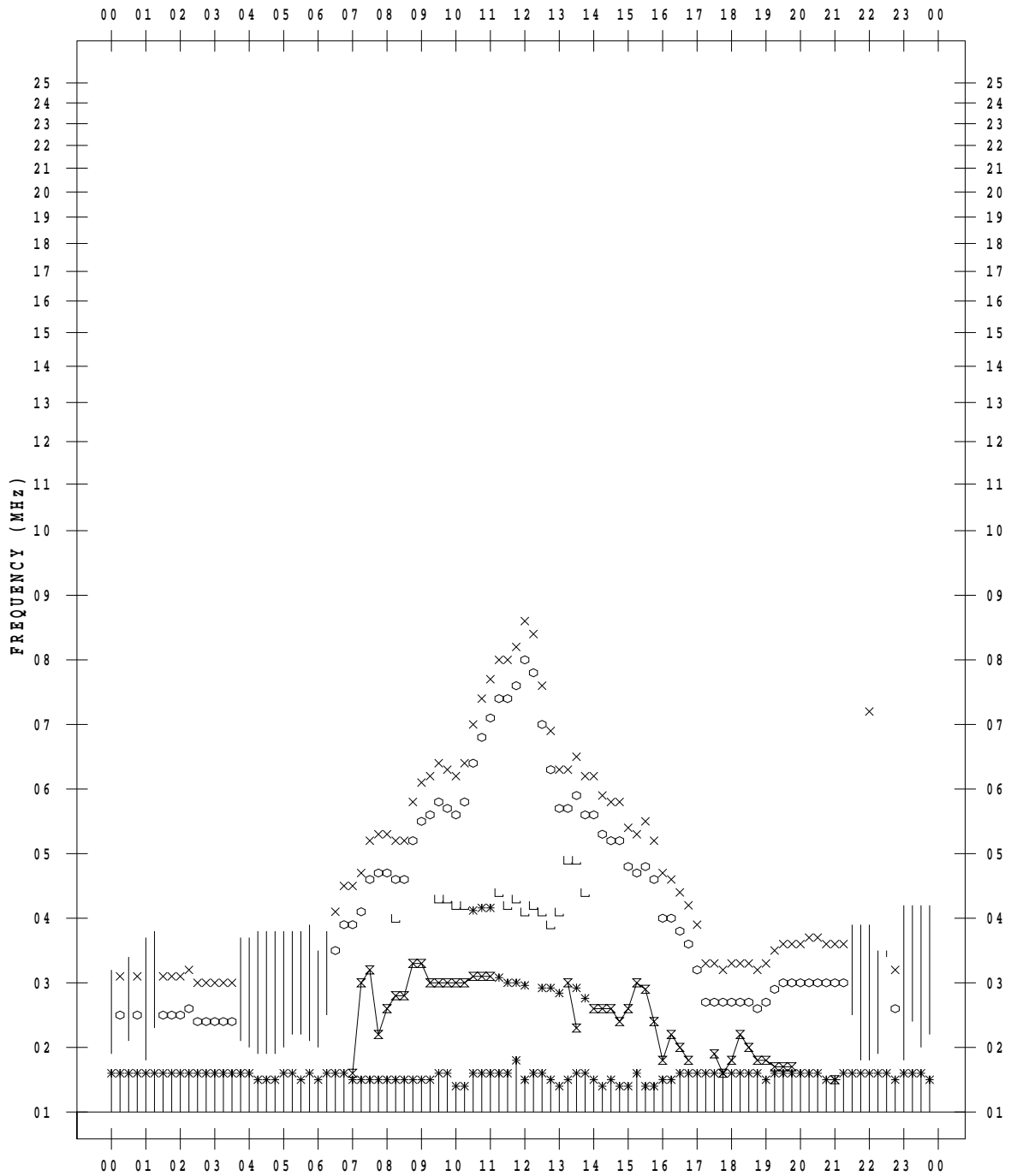
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2018/12/12

135 ° E MEAN TIME



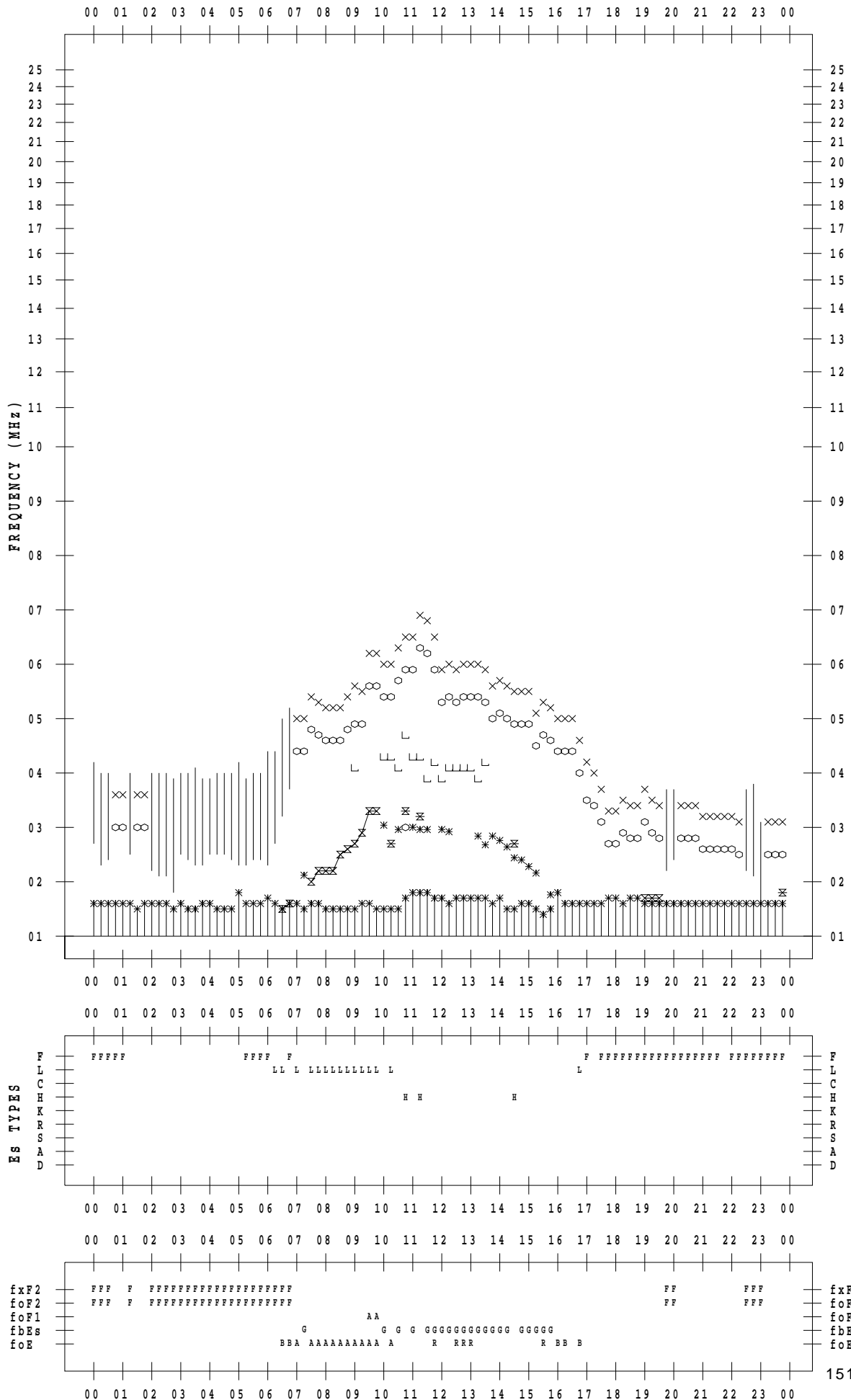
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2018/12/13

135 ° E MEAN TIME





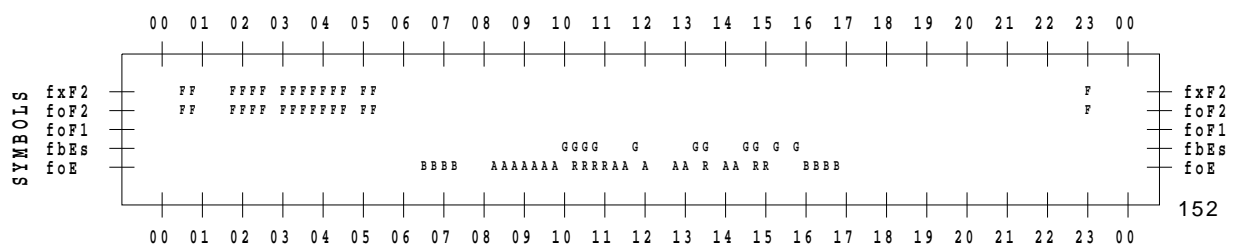
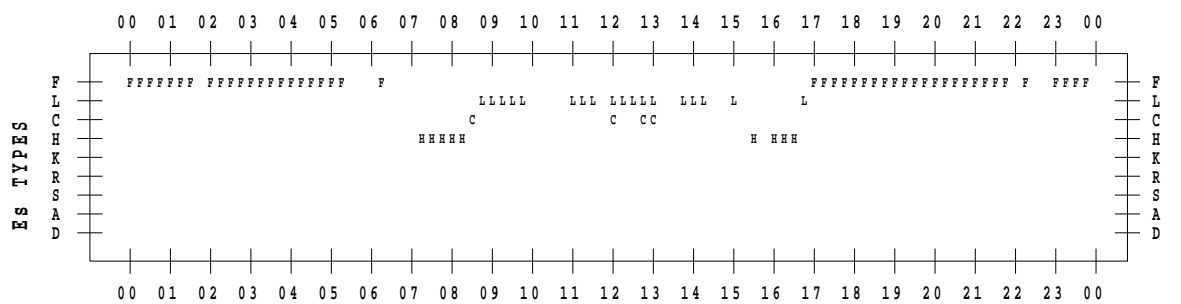
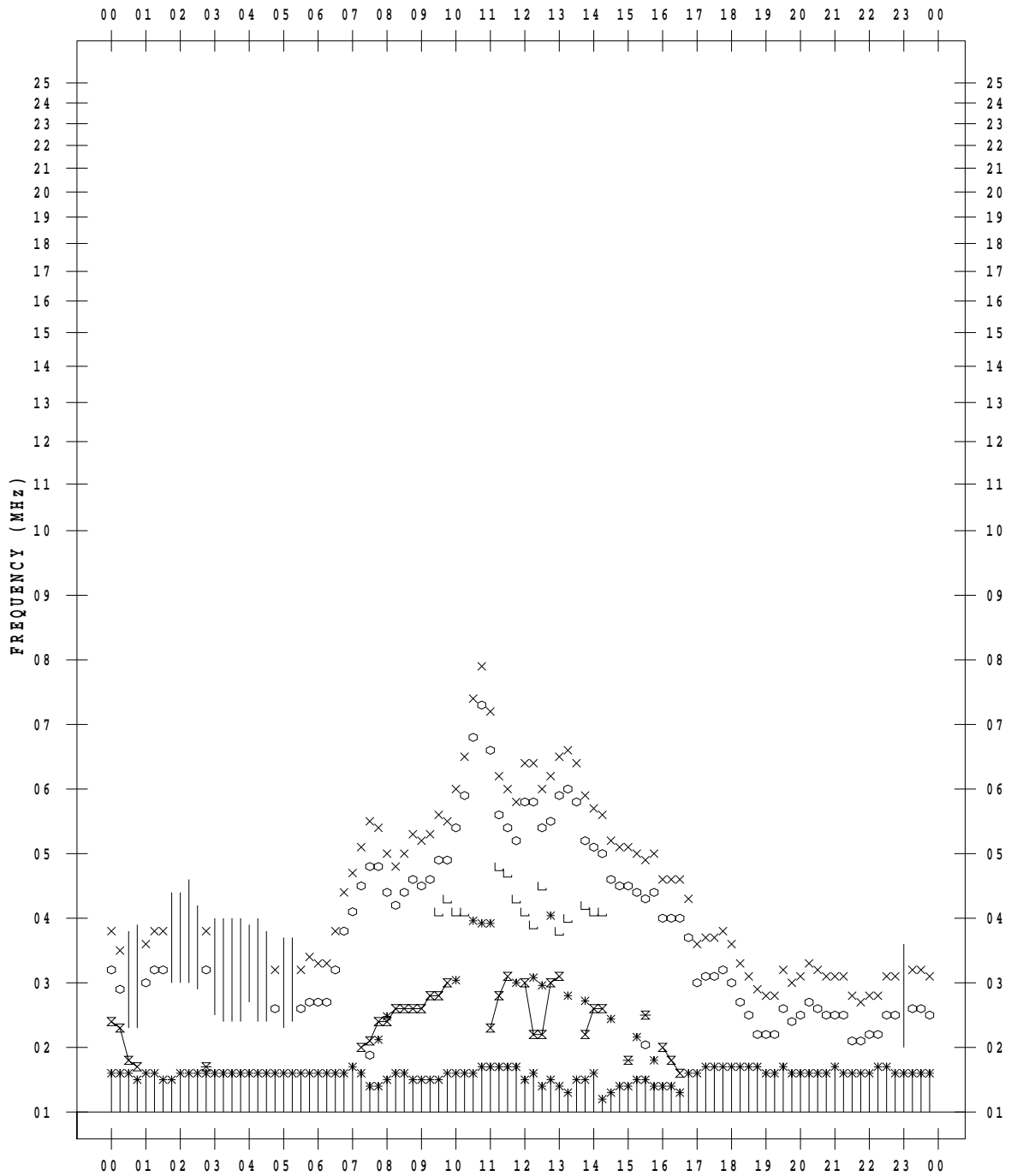
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2018/12/14

135 ° E MEAN TIME



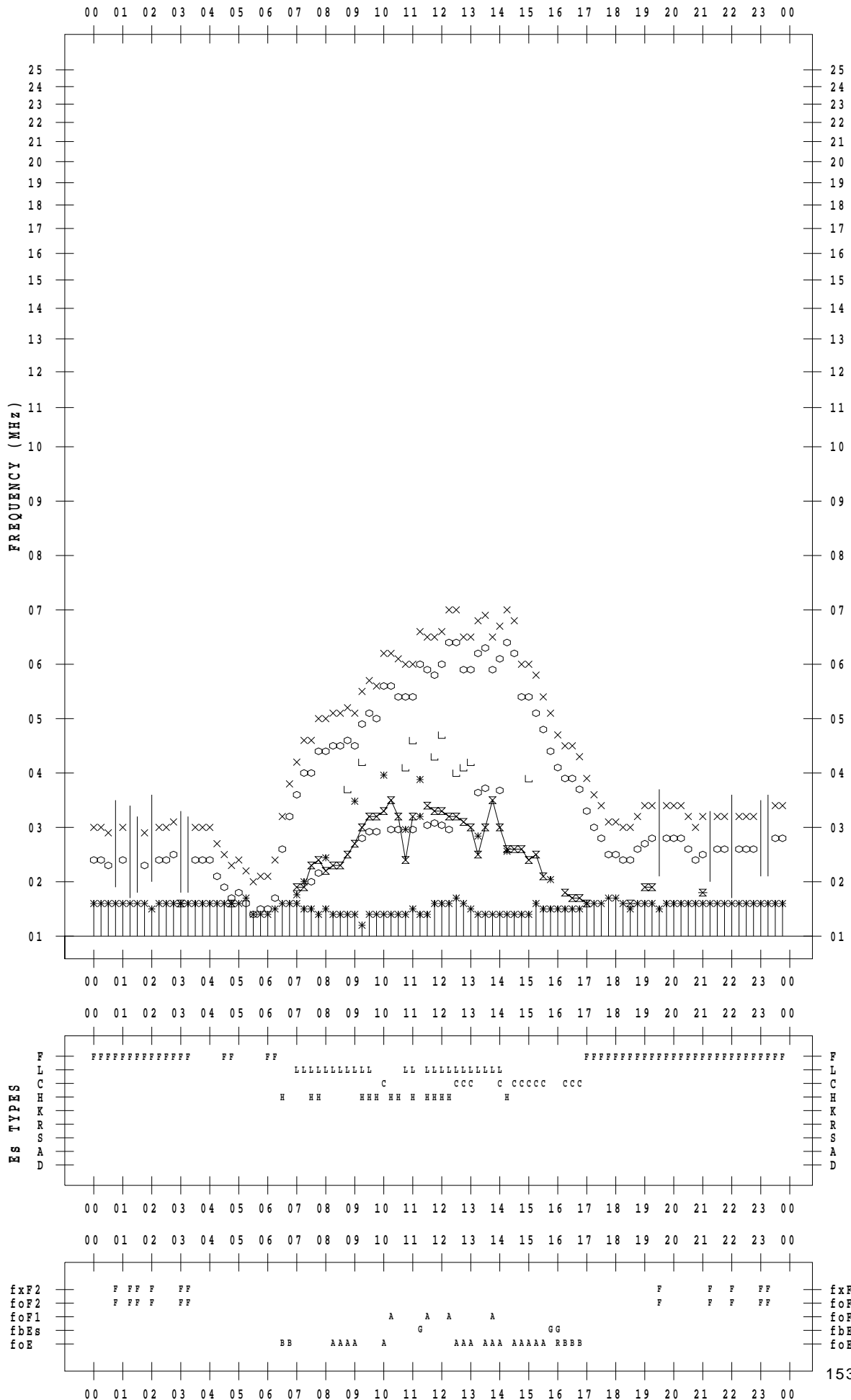
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2018/12/15

135 ° E MEAN TIME



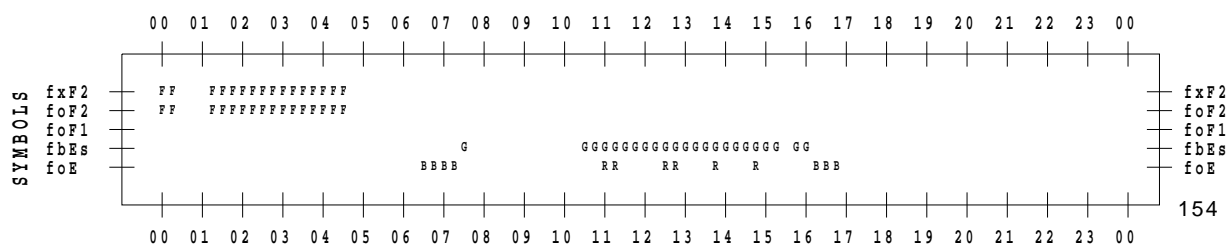
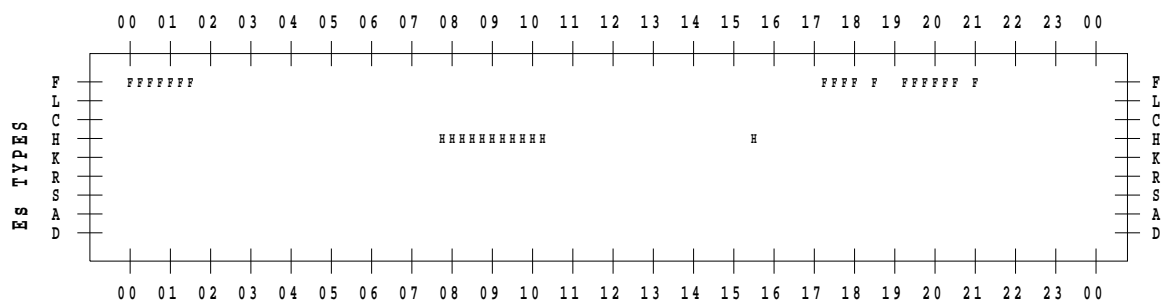
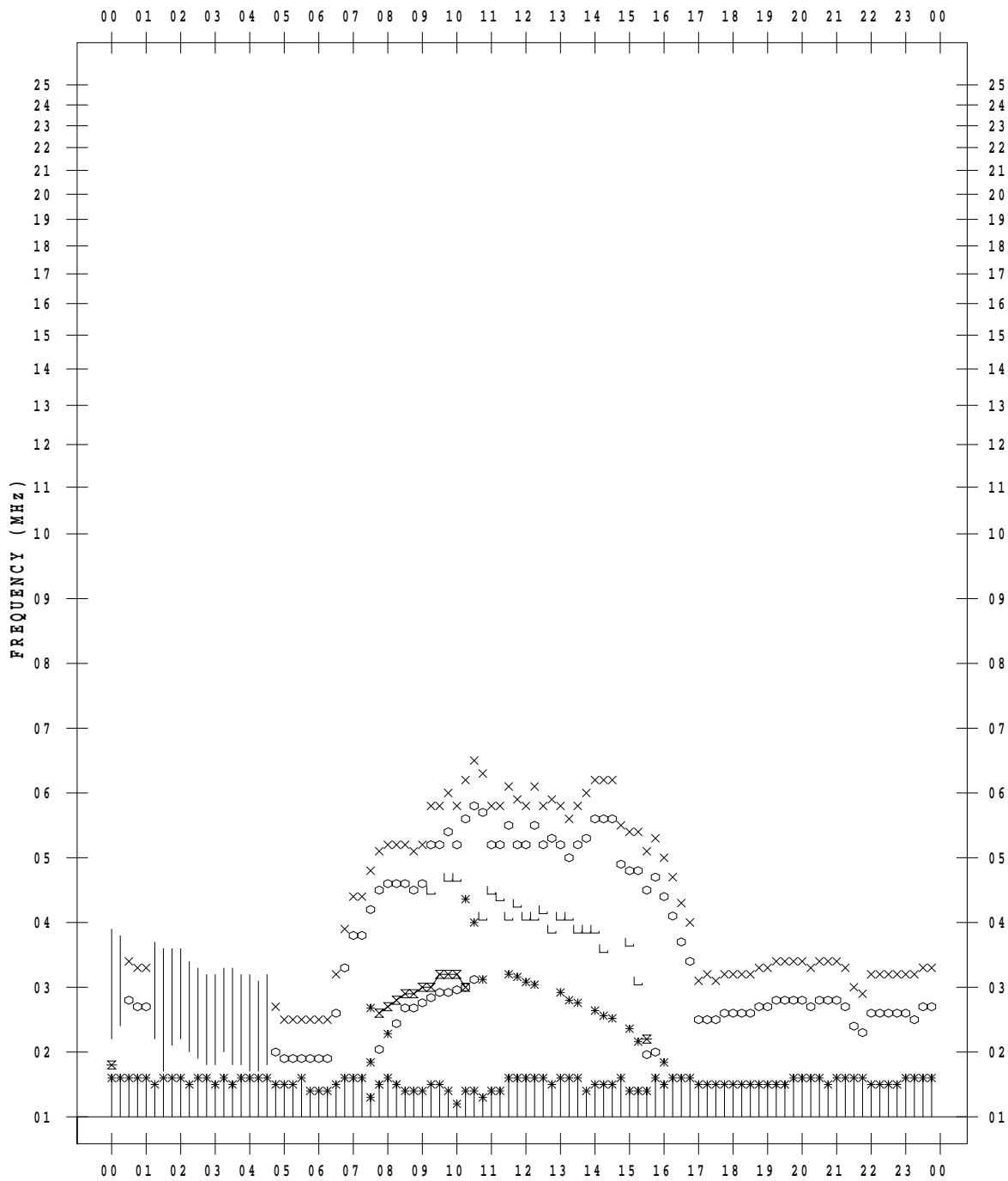
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2018/12/16

135 ° E MEAN TIME



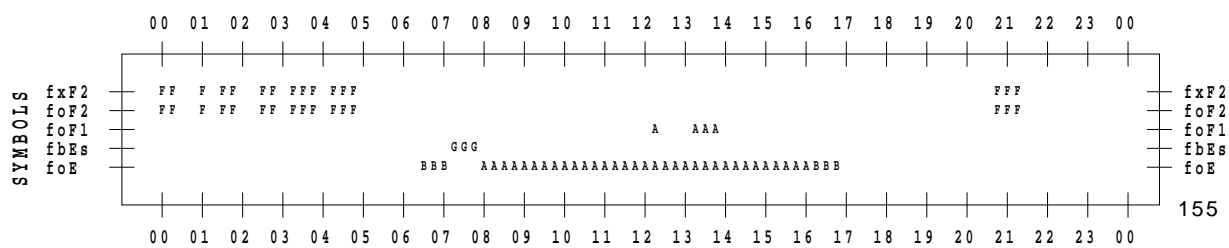
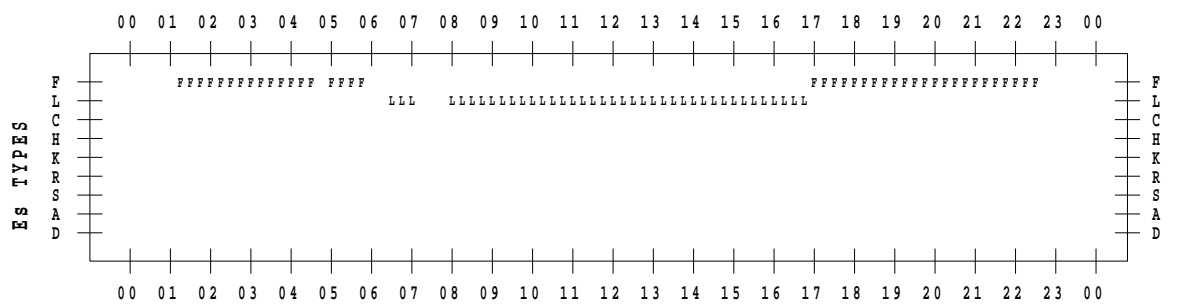
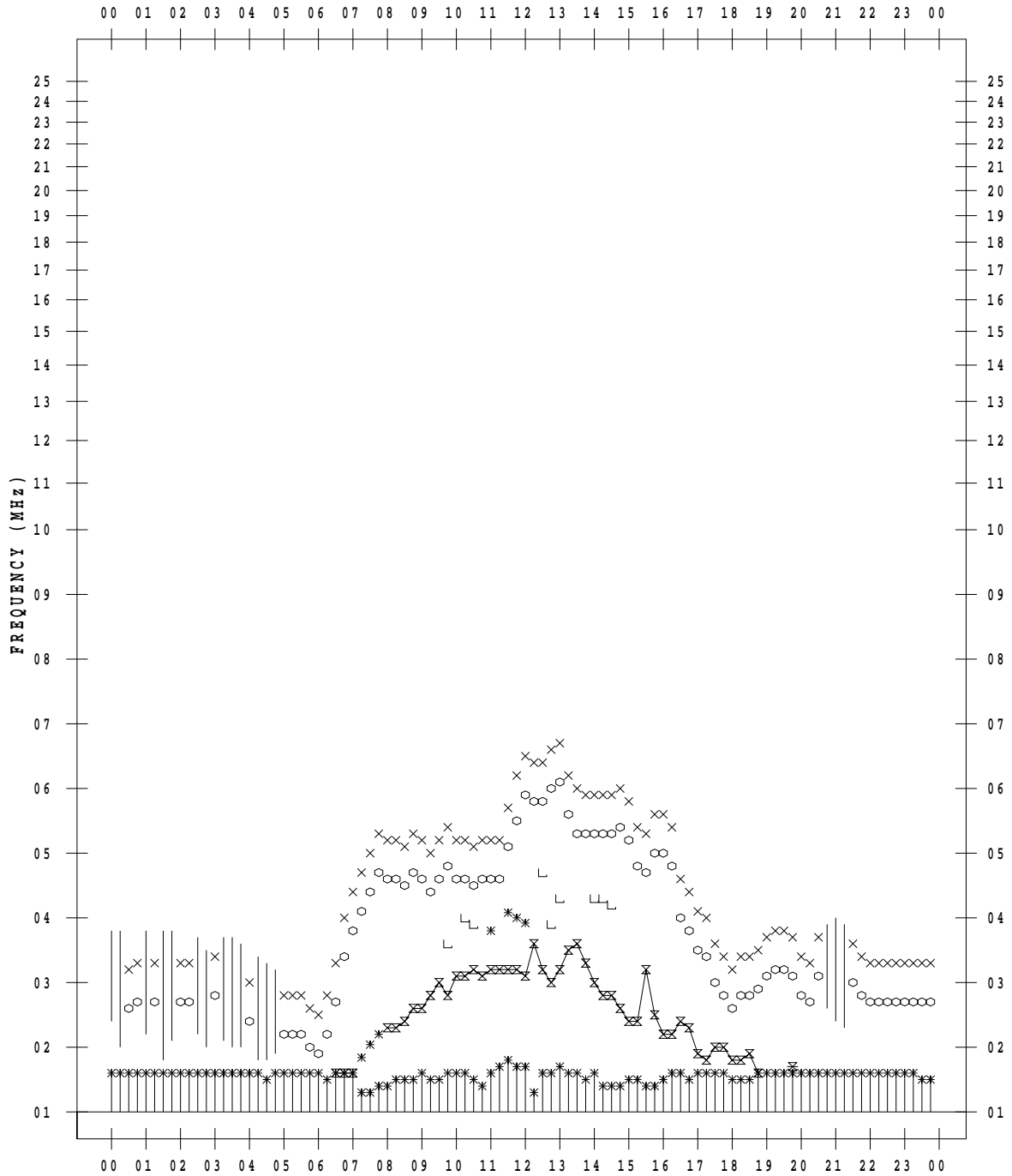
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2018/12/17

135 ° E MEAN TIME



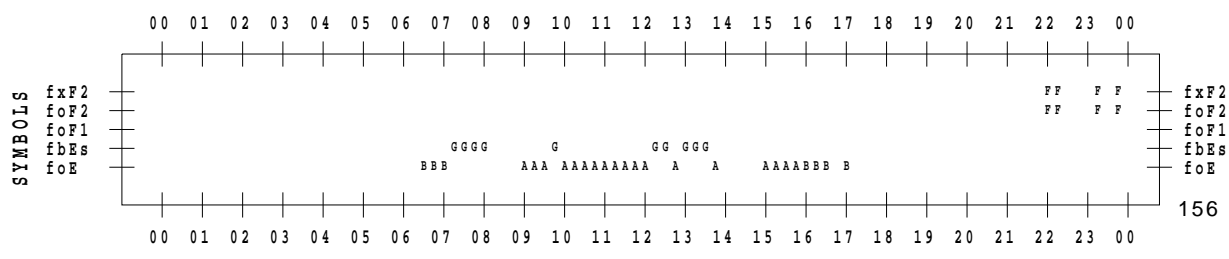
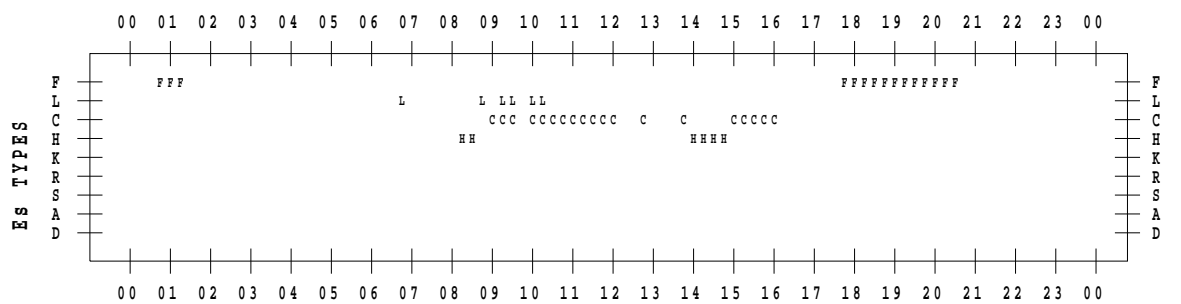
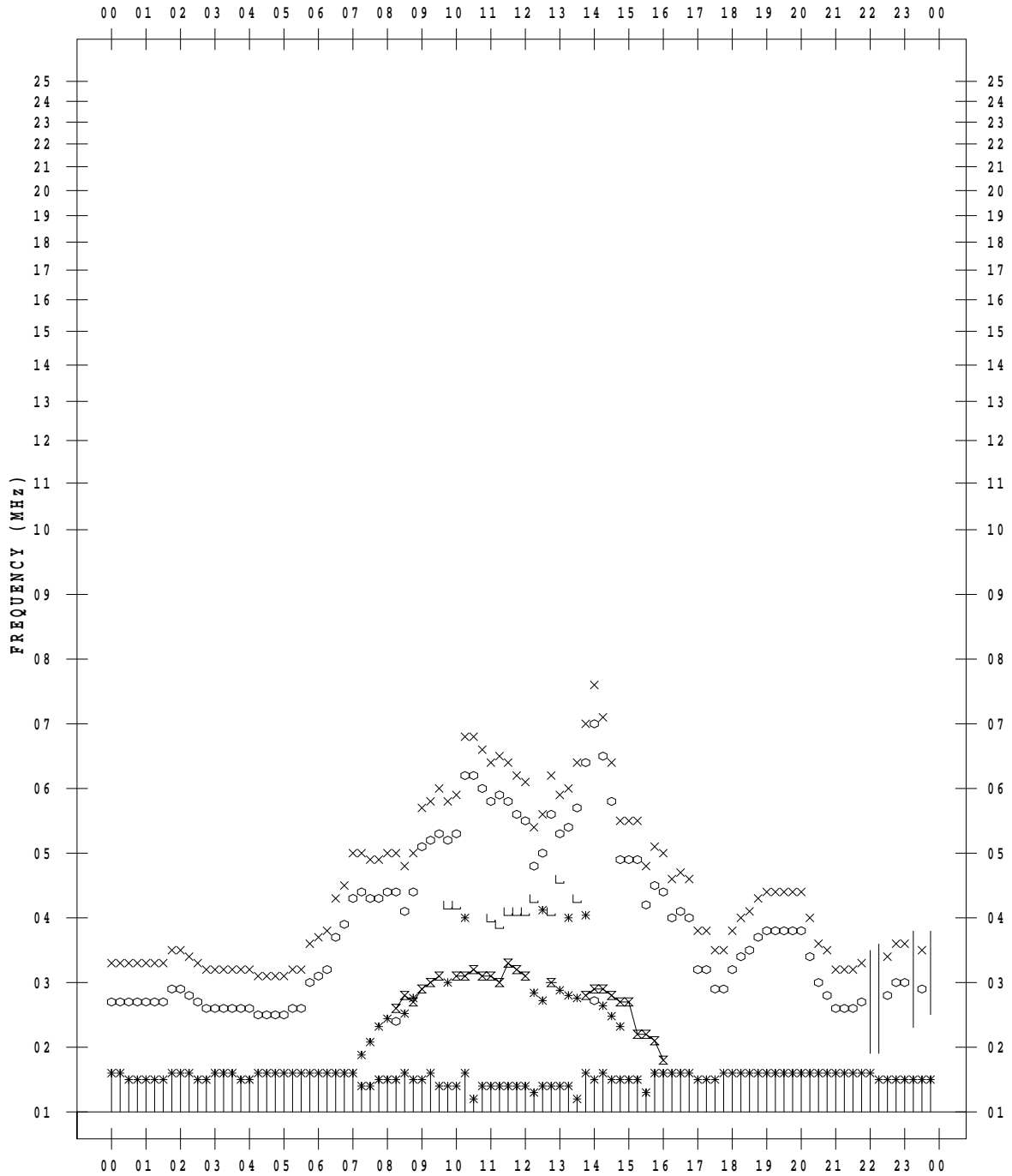
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2018/12/18

135 ° E MEAN TIME



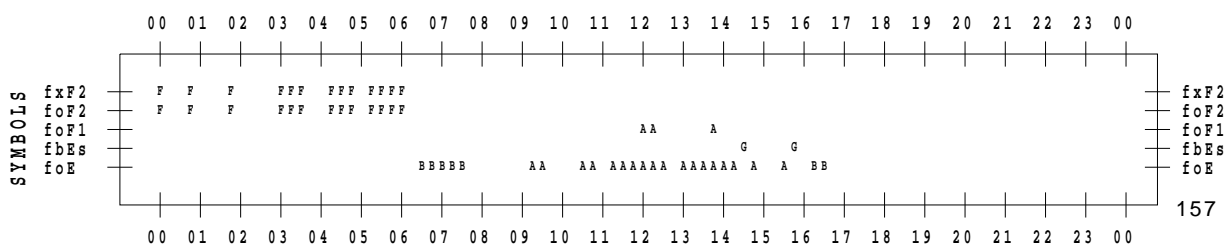
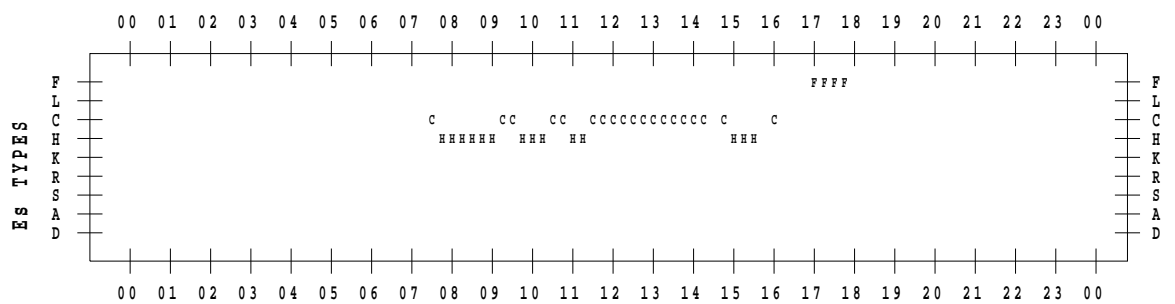
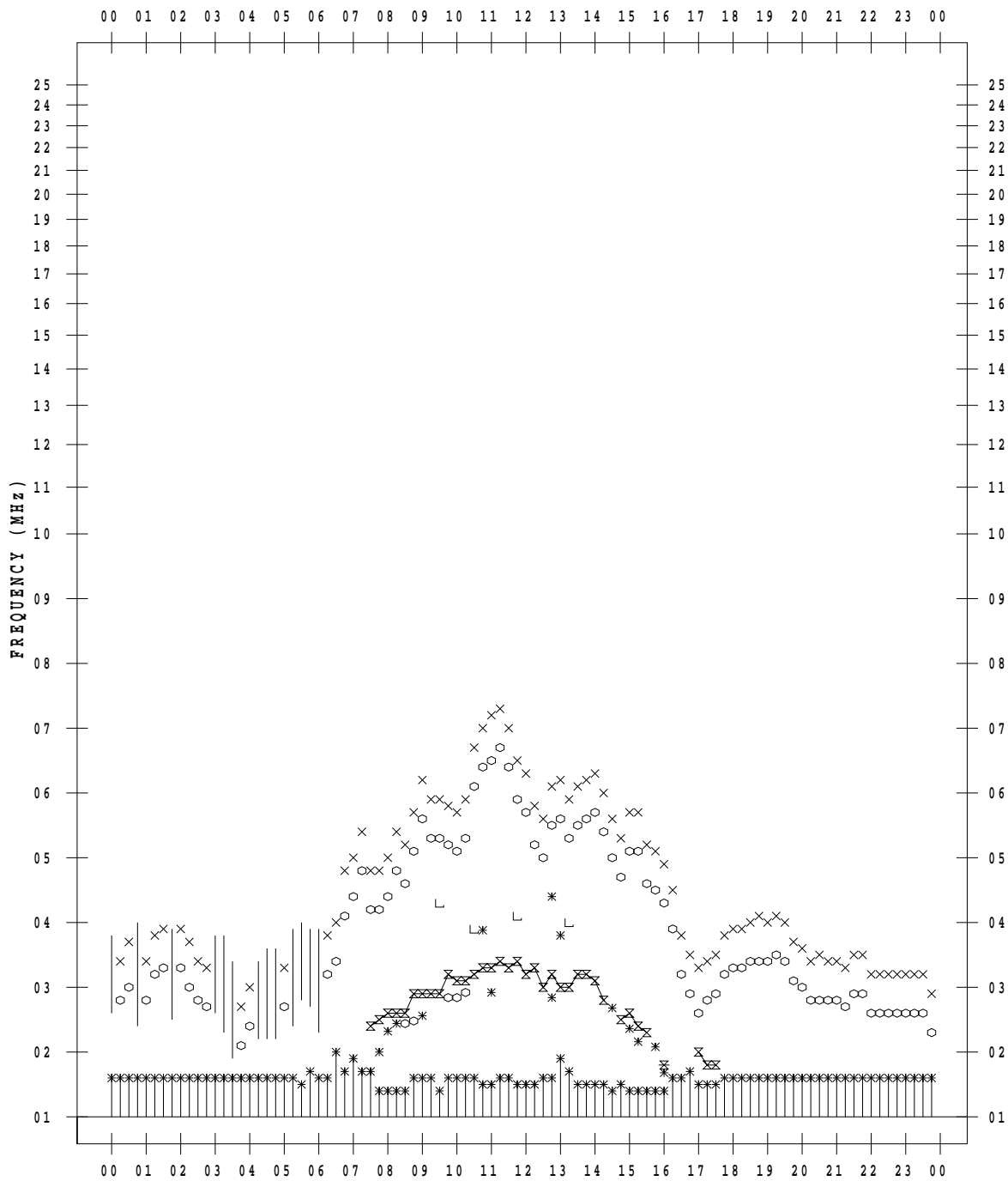
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2018/12/19

135 ° E MEAN TIME



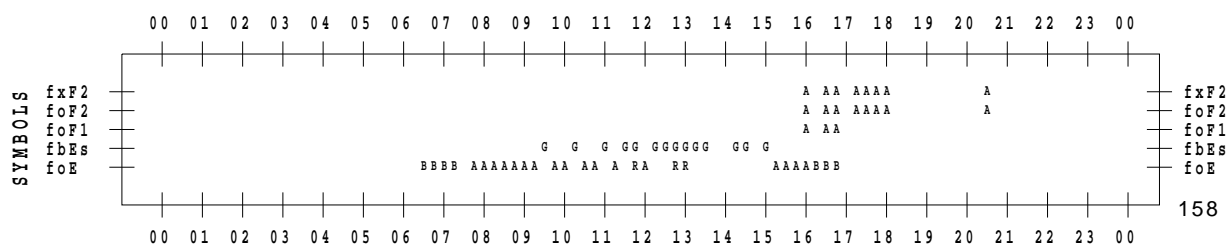
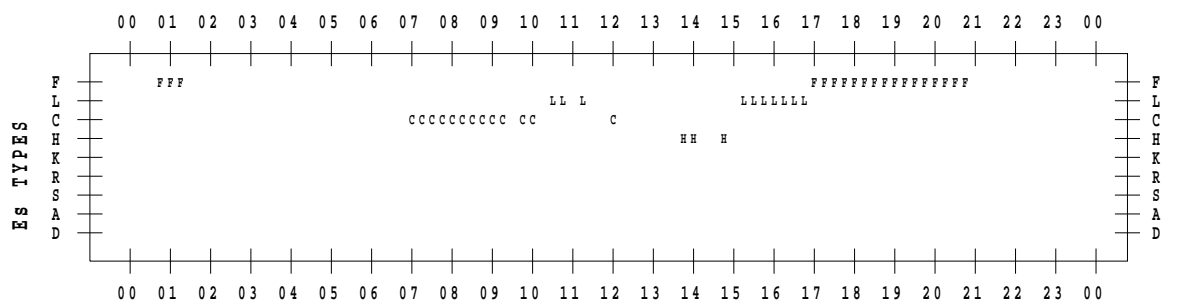
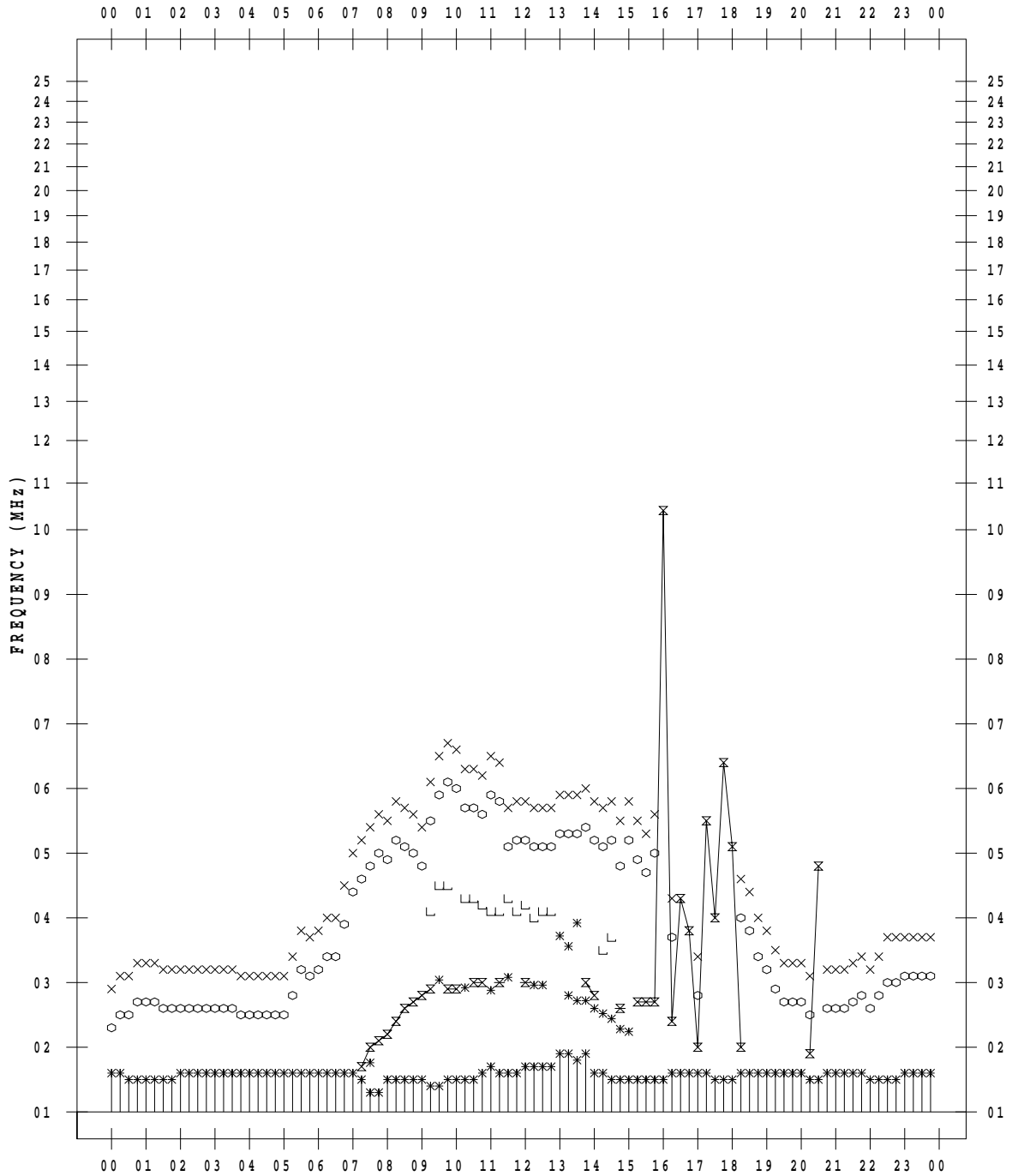
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2018/12/20

135 ° E MEAN TIME







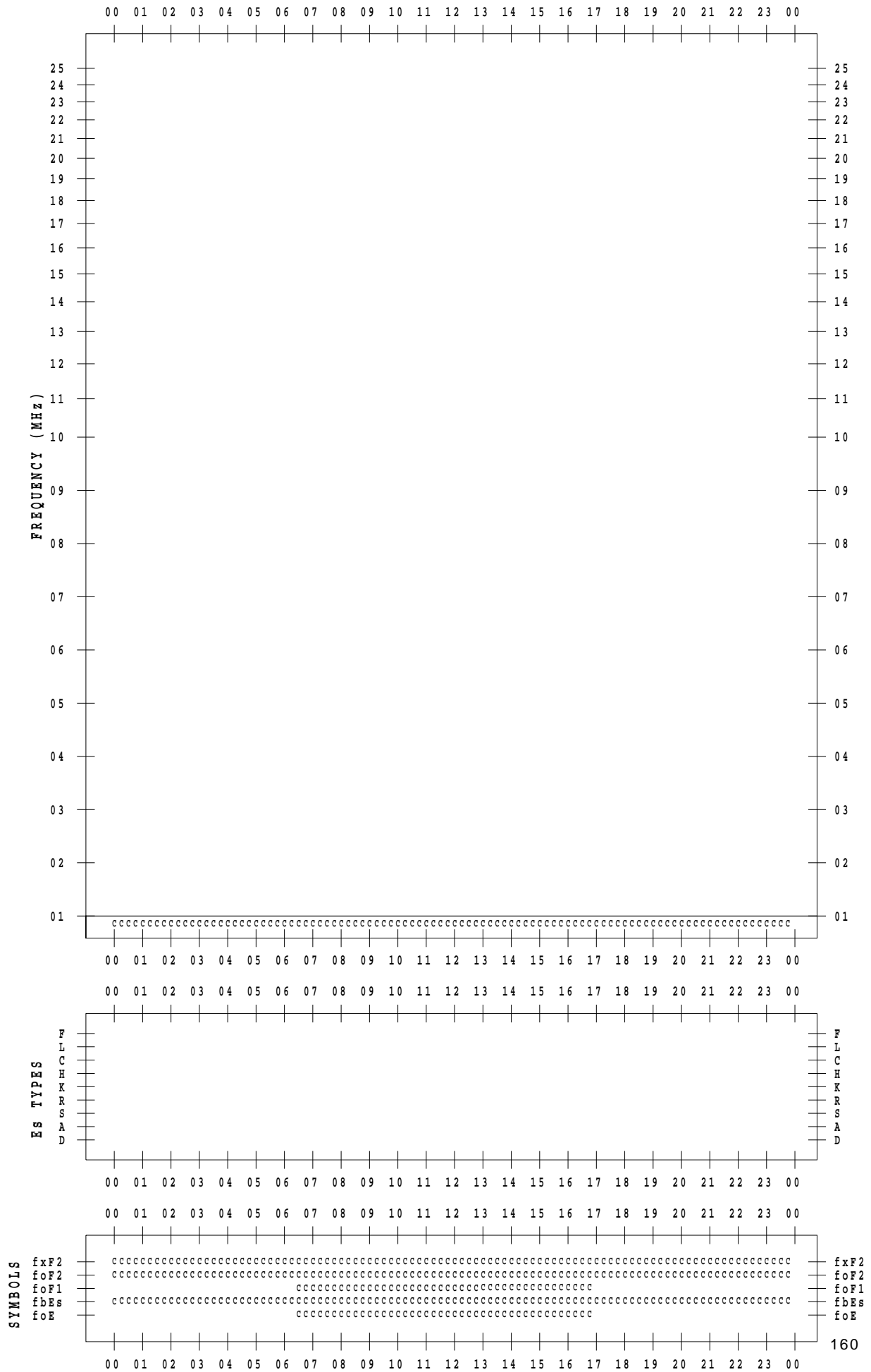
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2018/12/22

135 ° E MEAN TIME



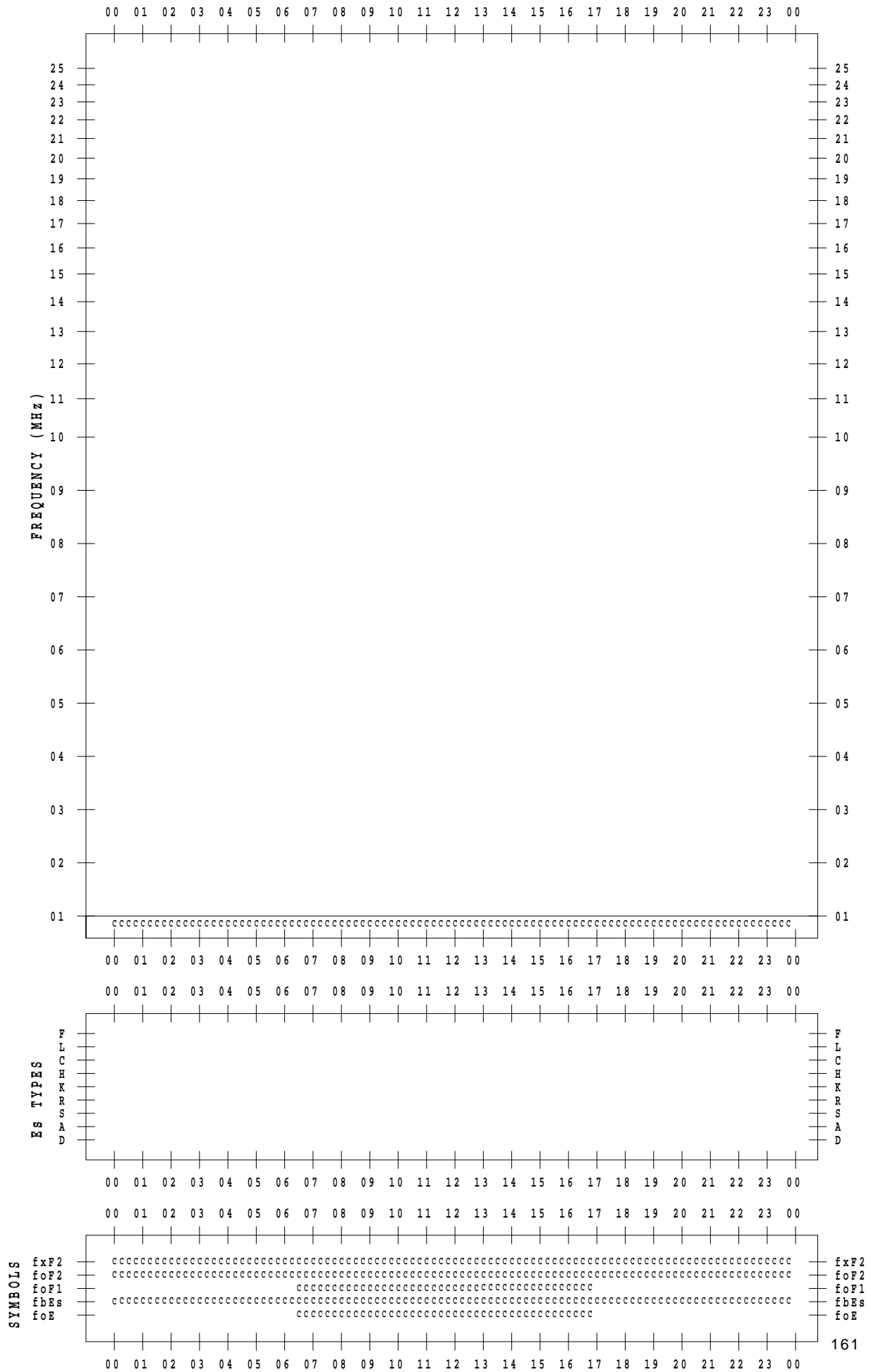
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2018/12/23

135 ° E MEAN TIME



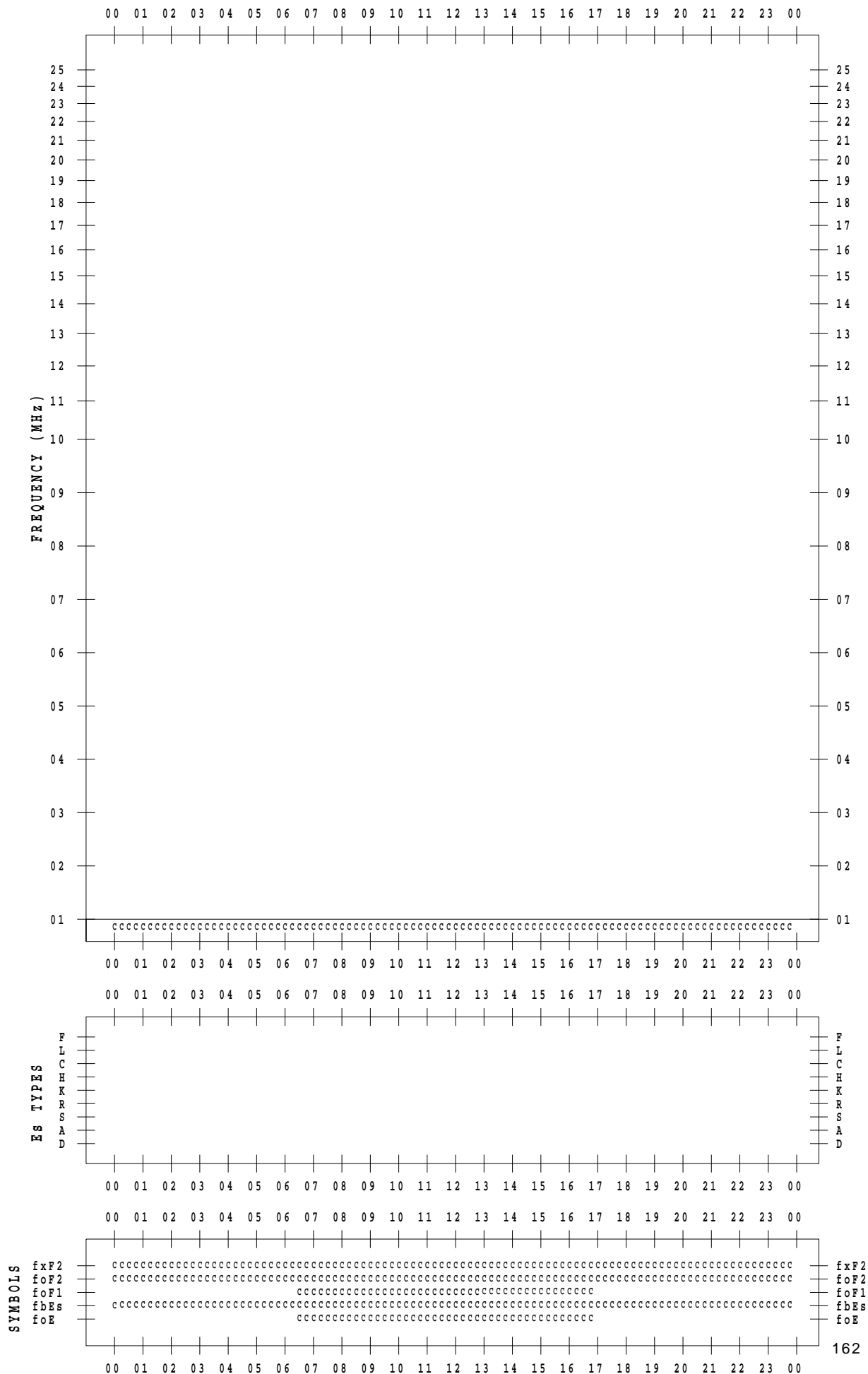
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2018/12/24

135 ° E MEAN TIME



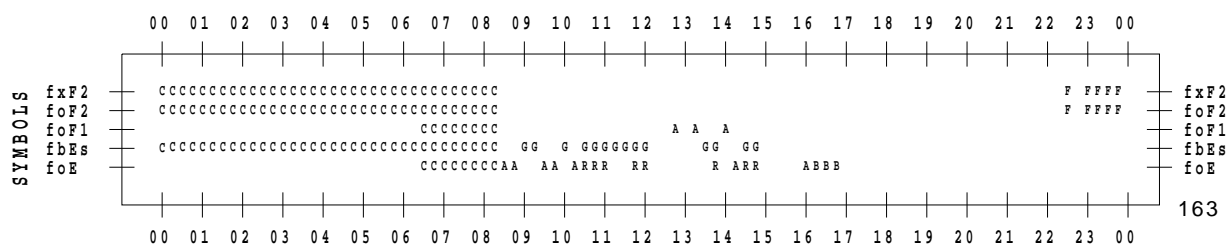
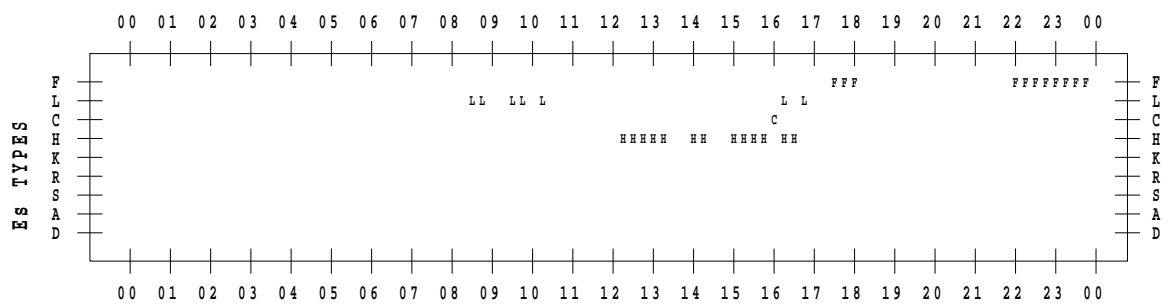
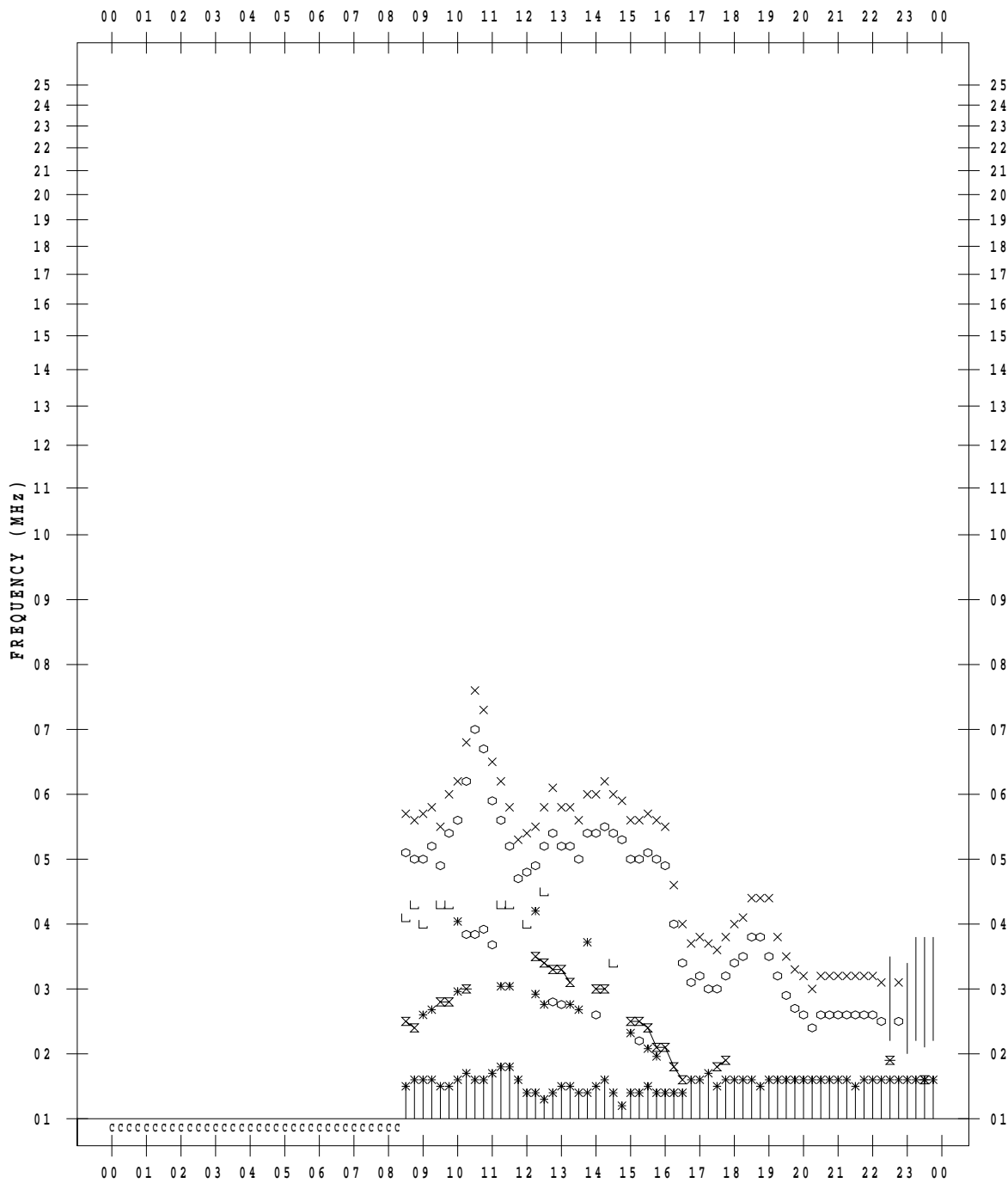
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2018/12/25

135 ° E MEAN TIME



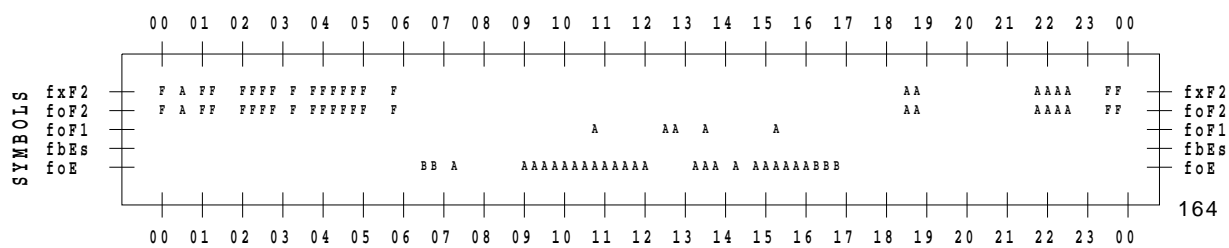
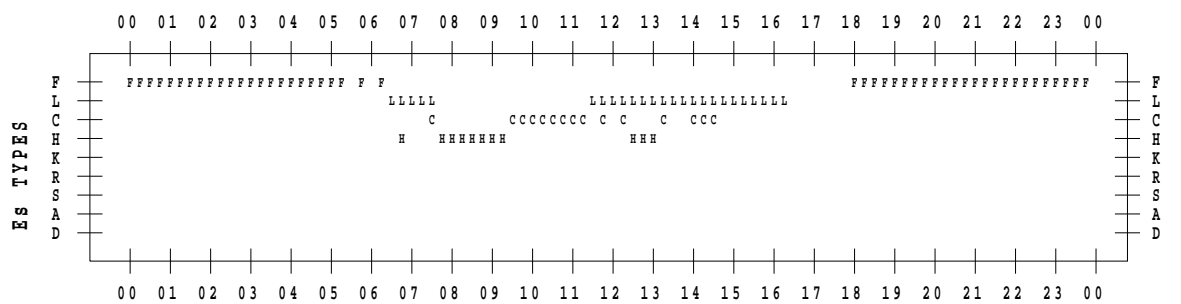
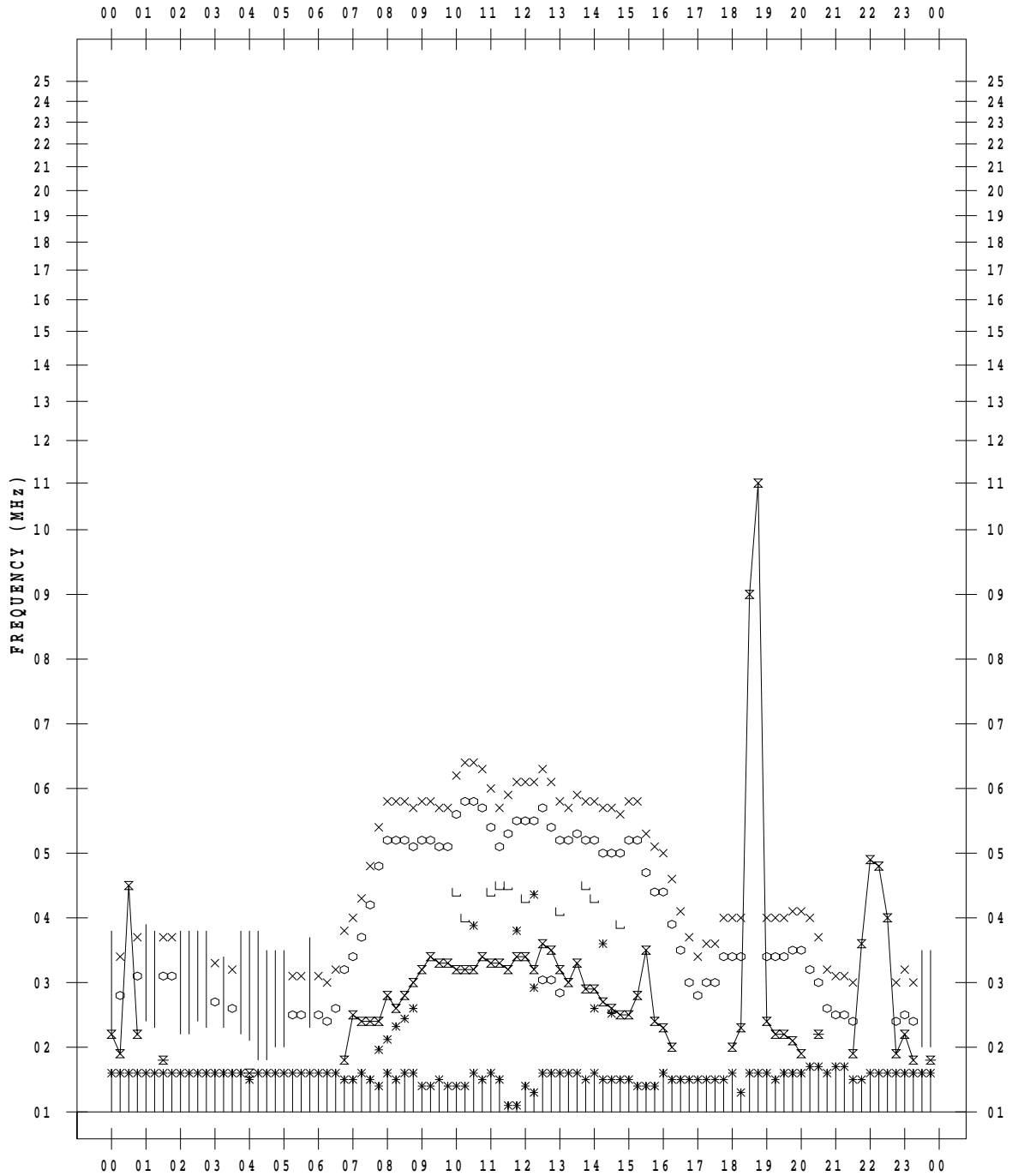
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2018/12/26

135 ° E MEAN TIME



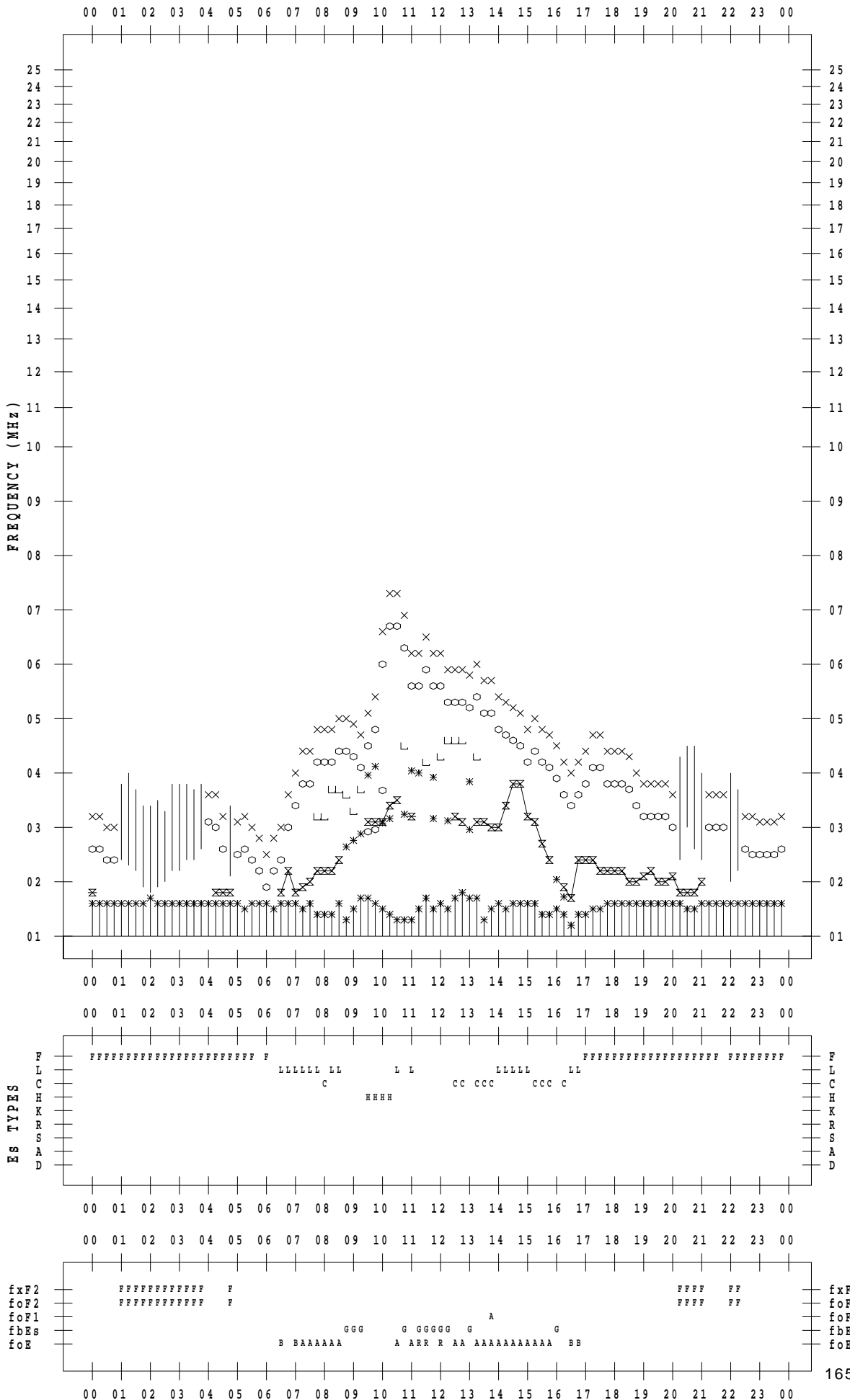
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2018/12/27

135 ° E MEAN TIME



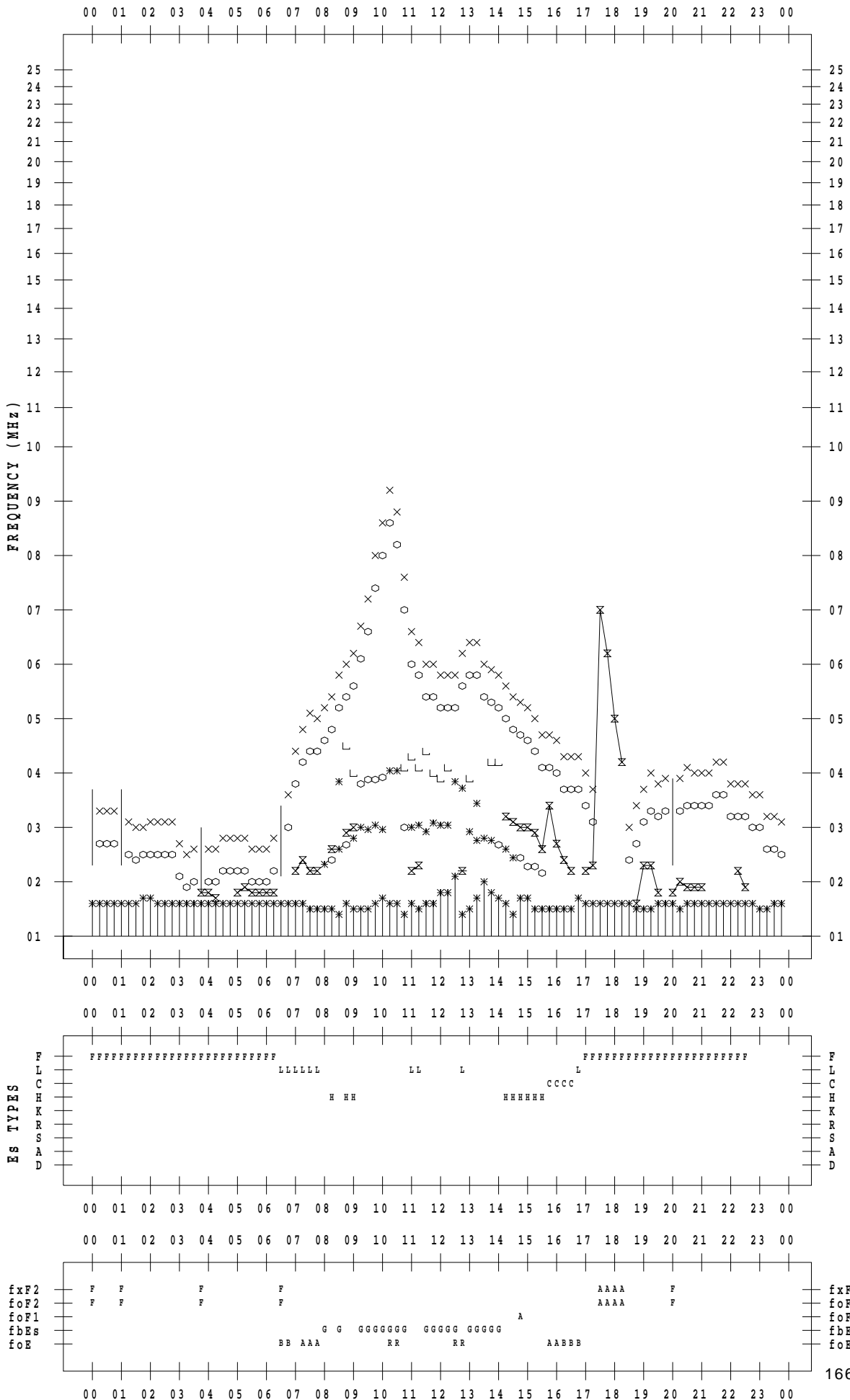
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2018/12/28

135 ° E MEAN TIME



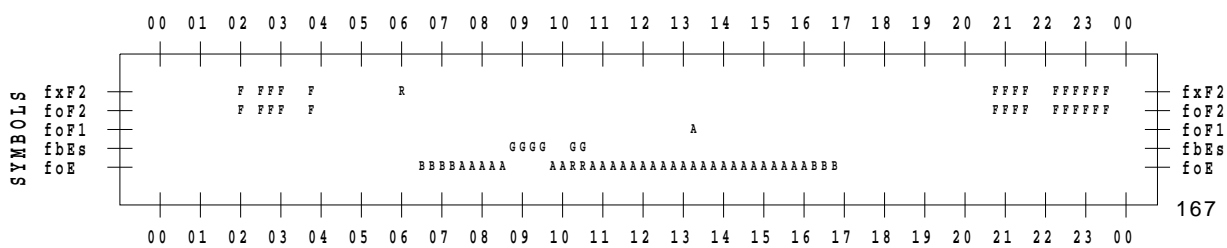
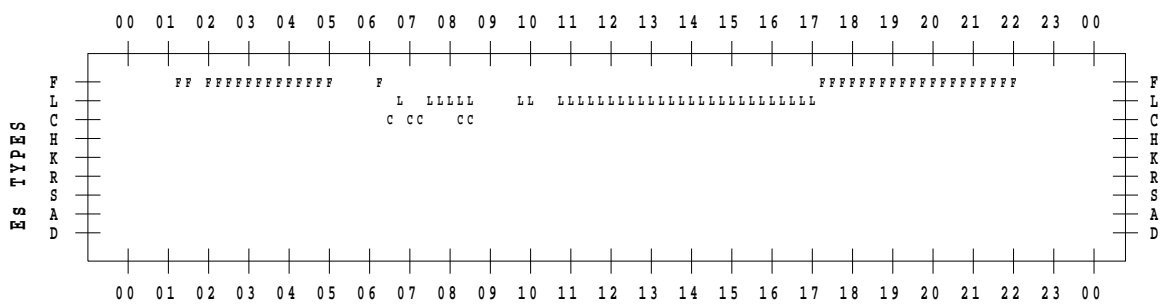
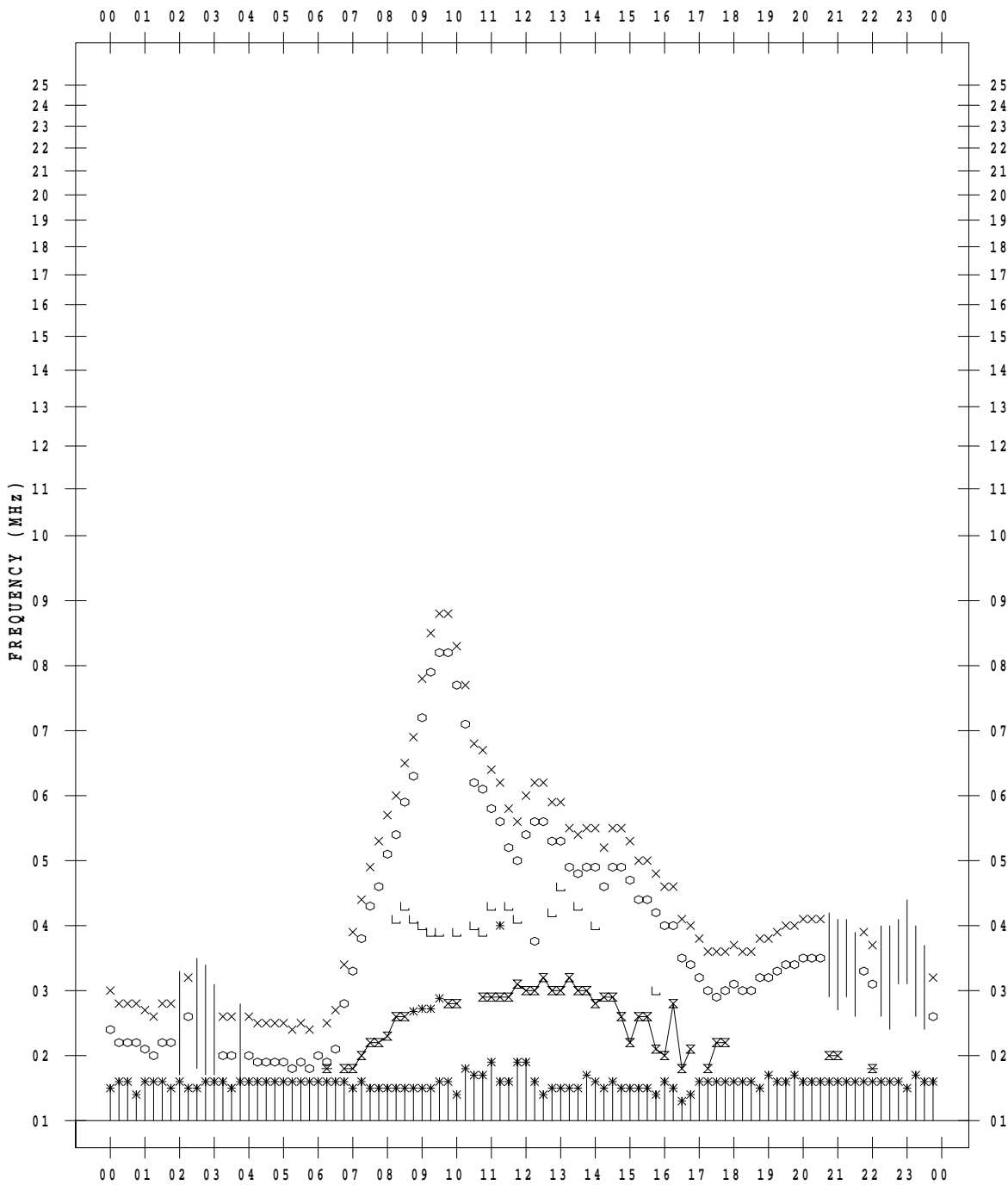
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2018/12/29

135 ° E MEAN TIME





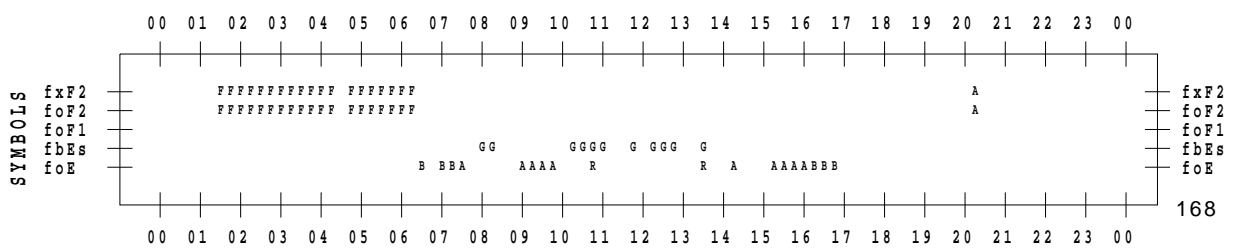
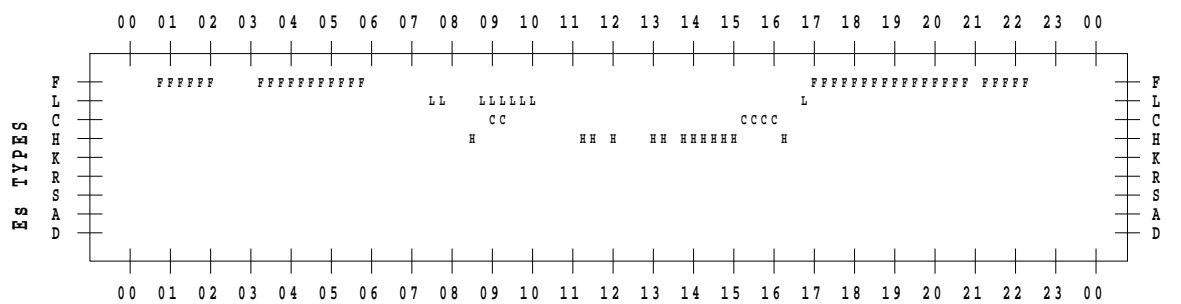
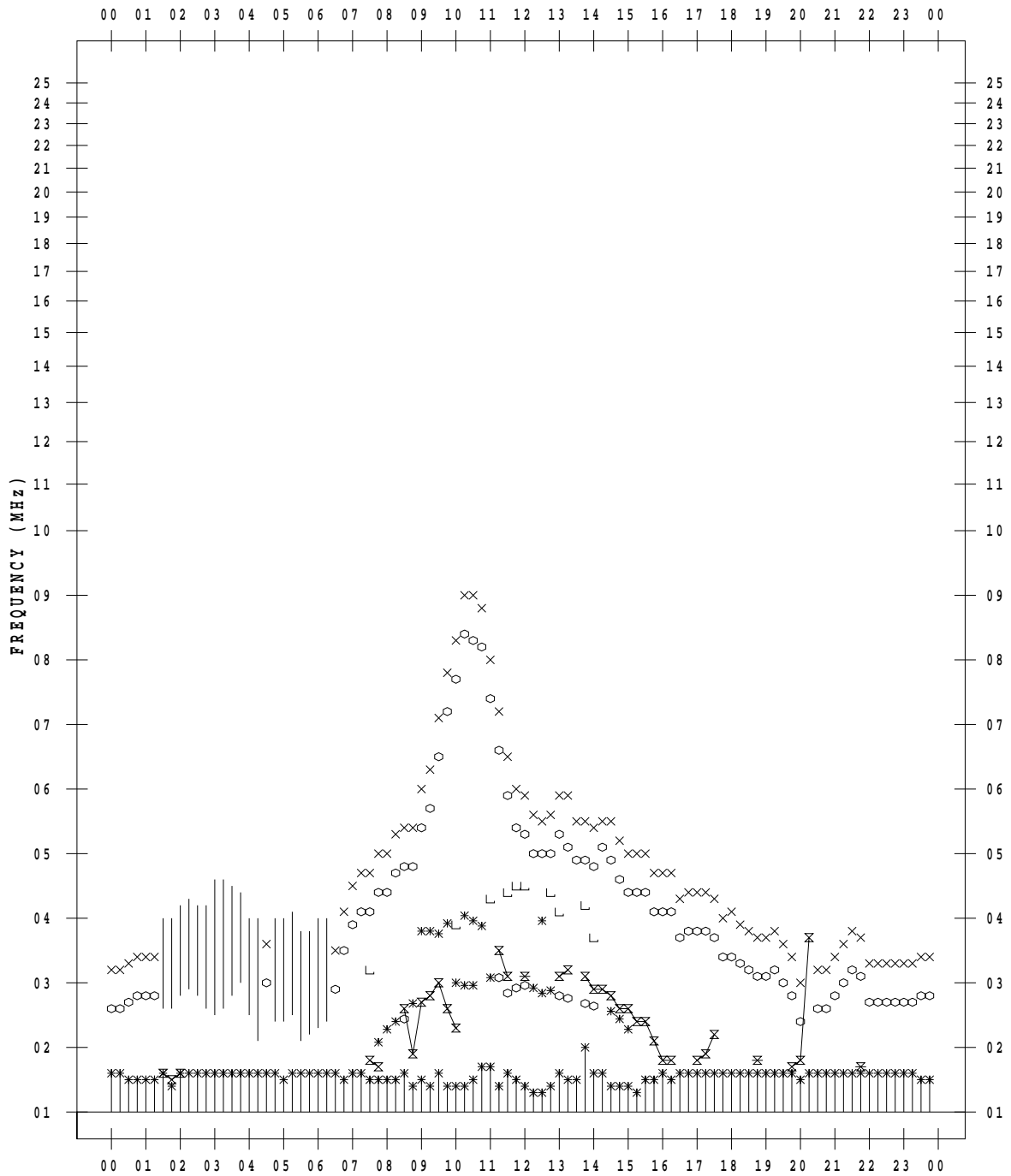
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2018/12/30

135 ° E MEAN TIME



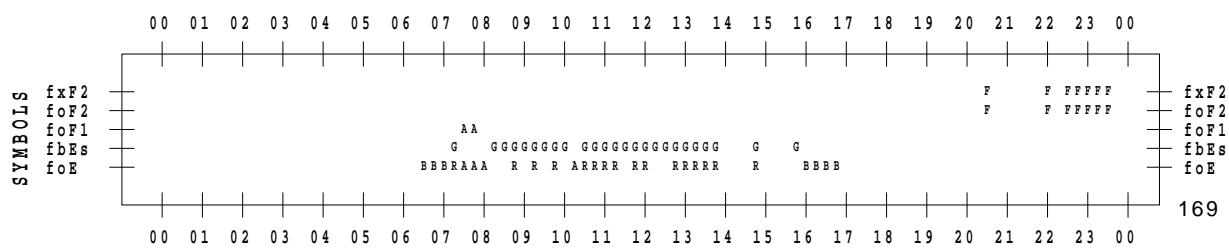
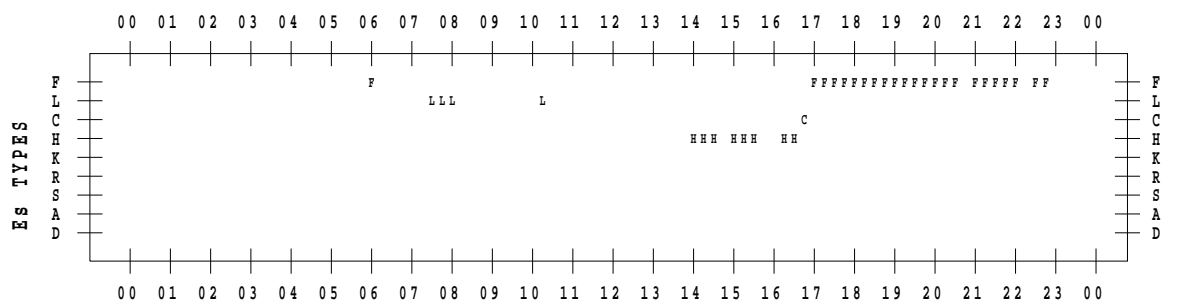
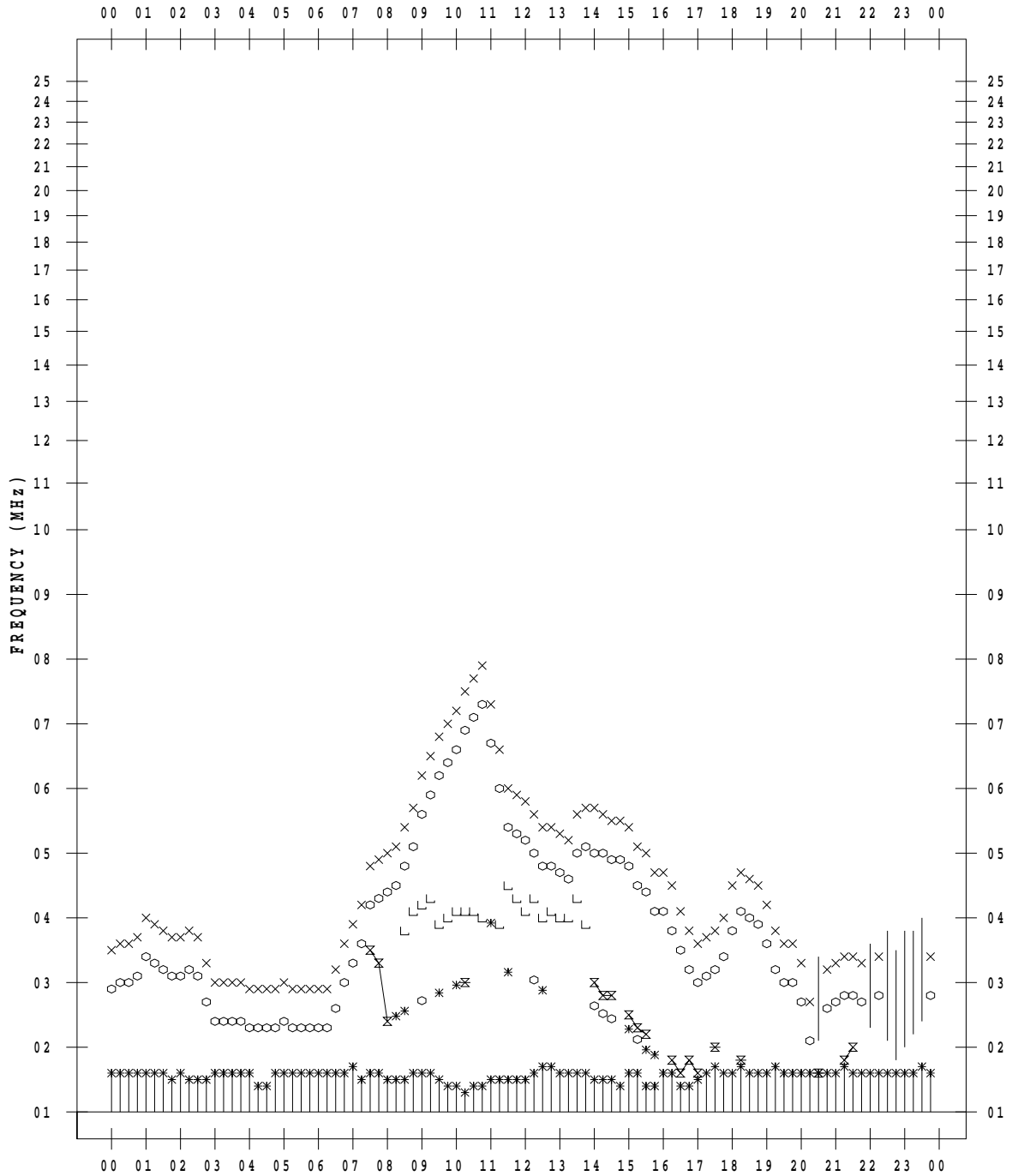
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SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2018/12/31

135 ° E MEAN TIME



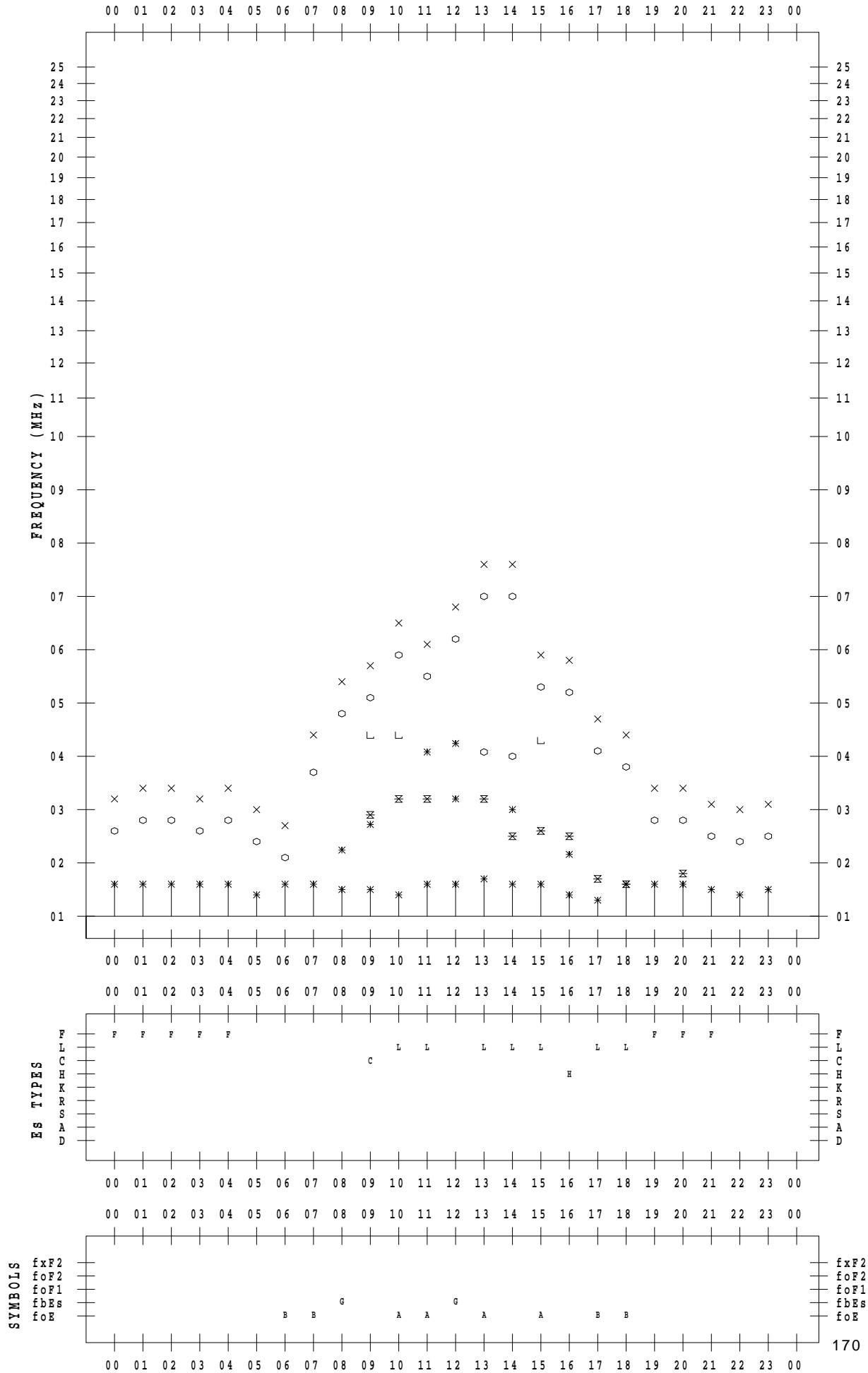
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/ 1

135 ° E MEAN TIME



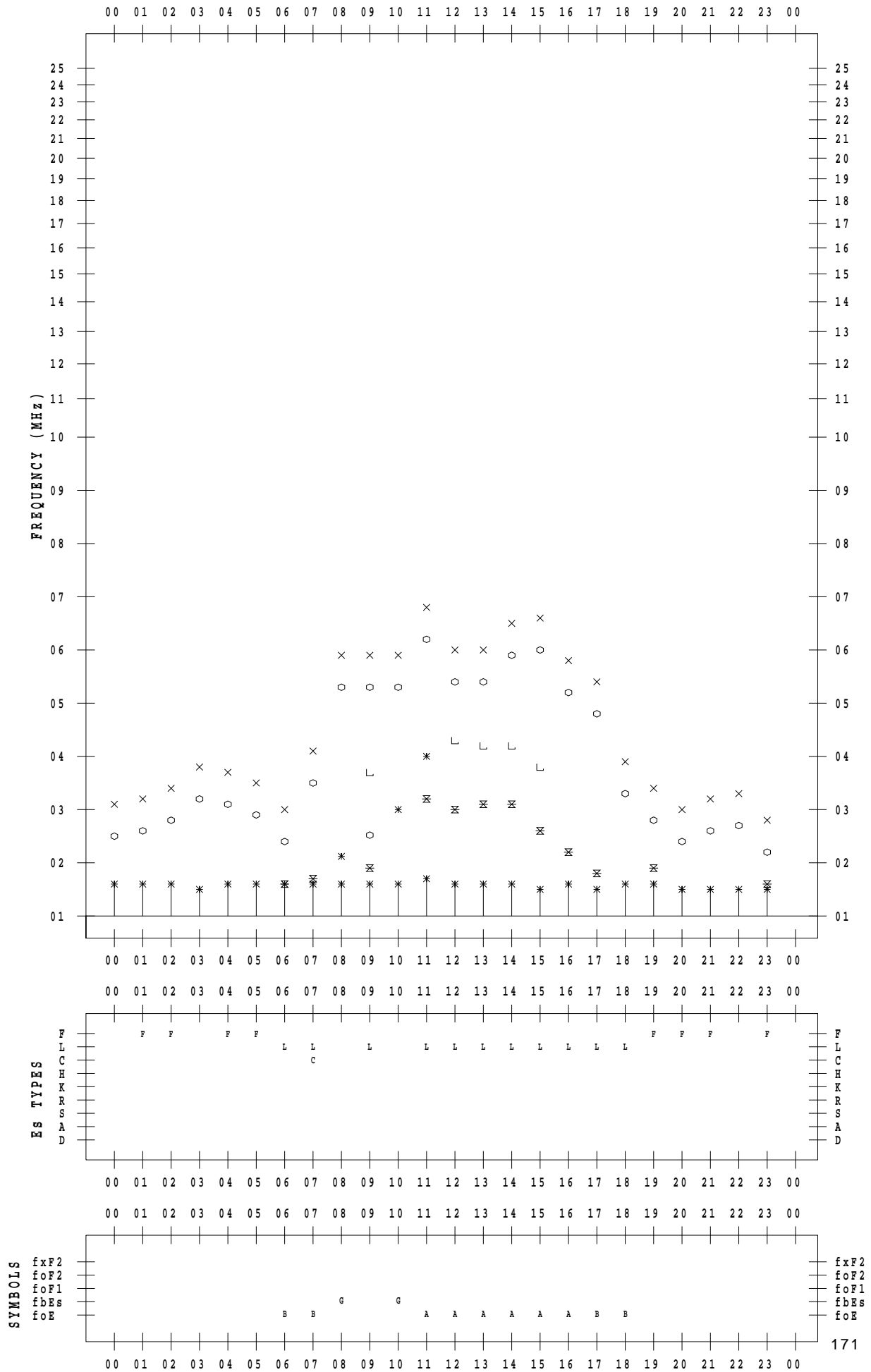
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/ 2

135 ° E MEAN TIME



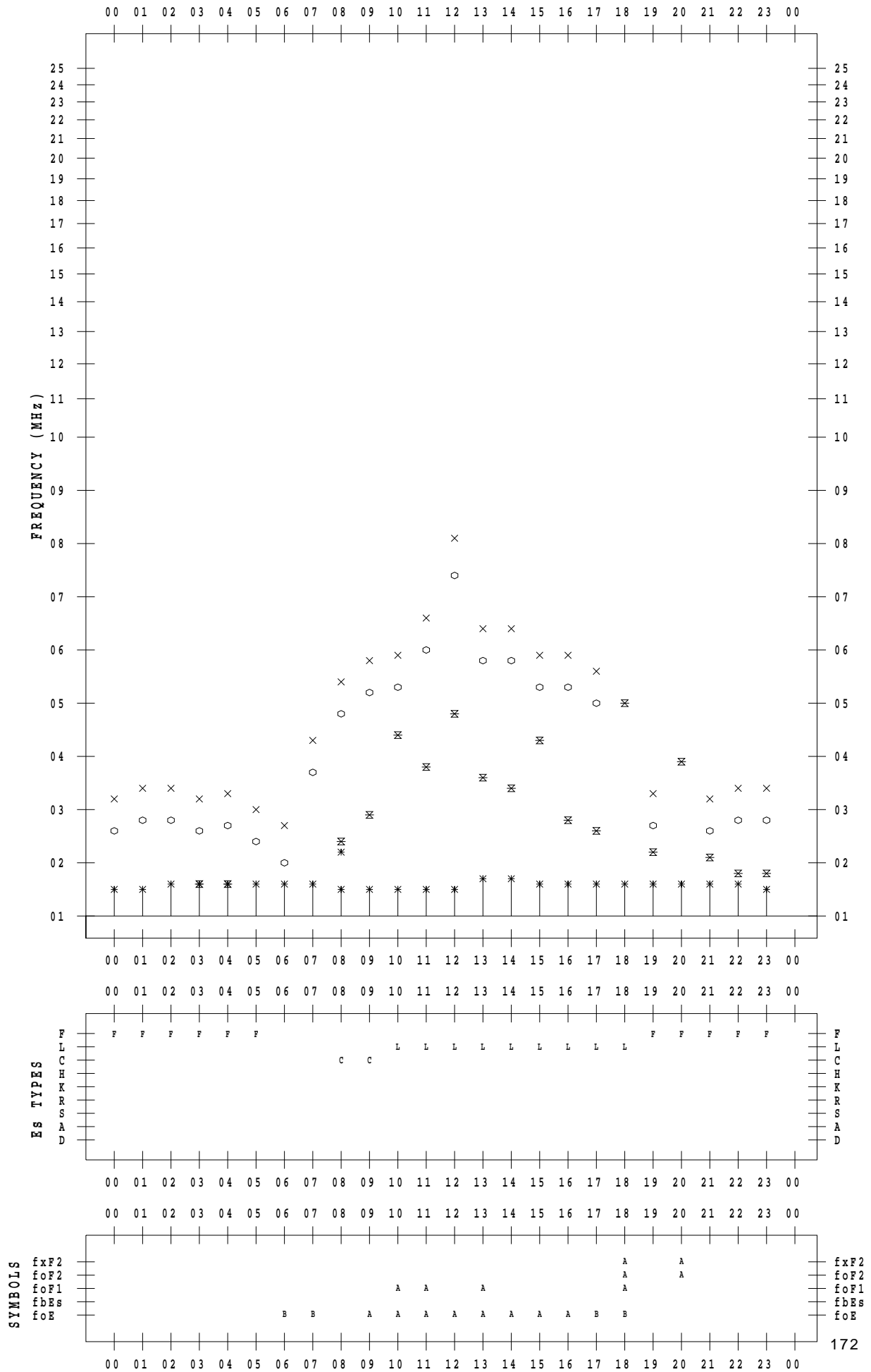
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/ 3

135 ° E MEAN TIME



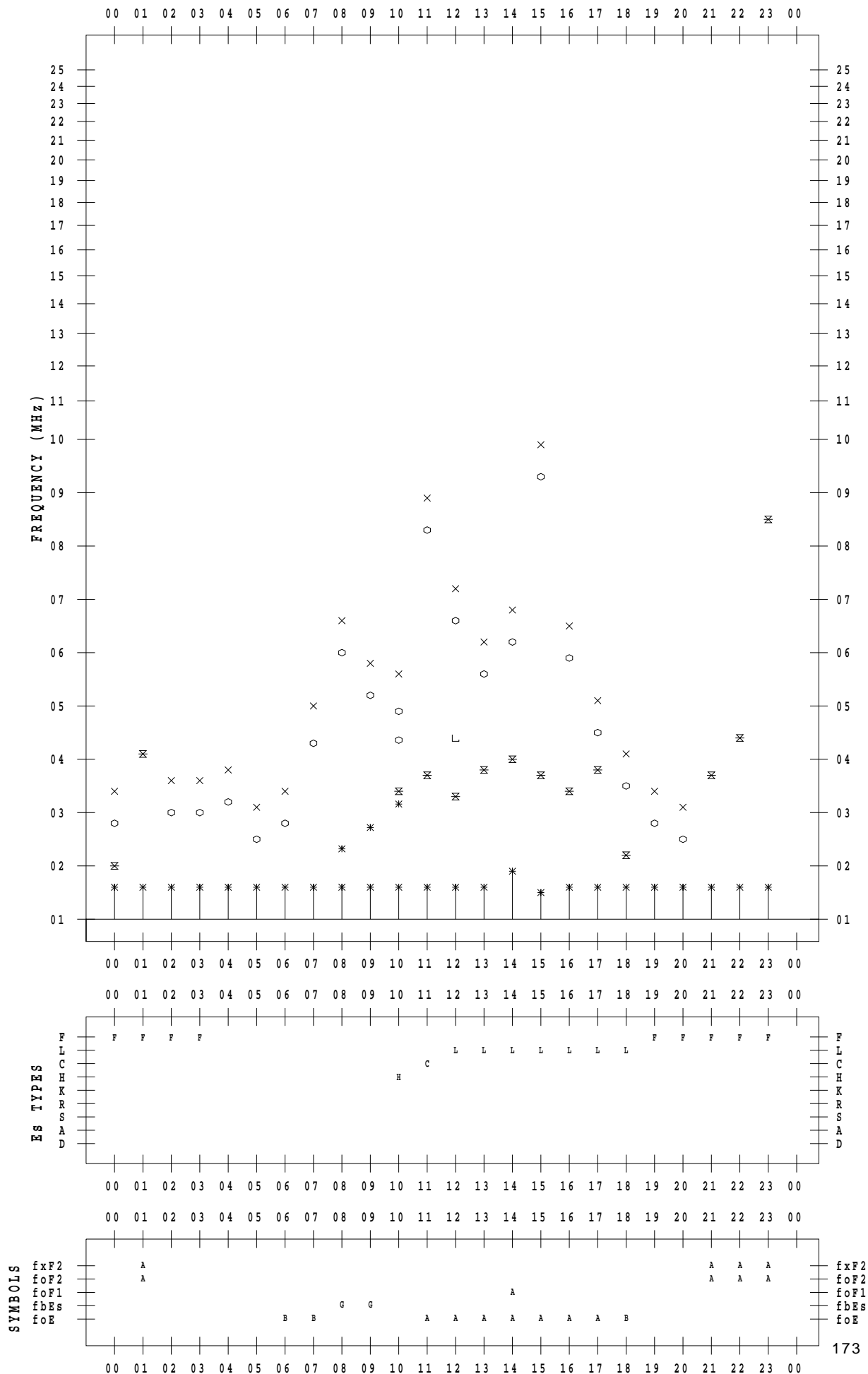
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/ 4

135 ° E MEAN TIME



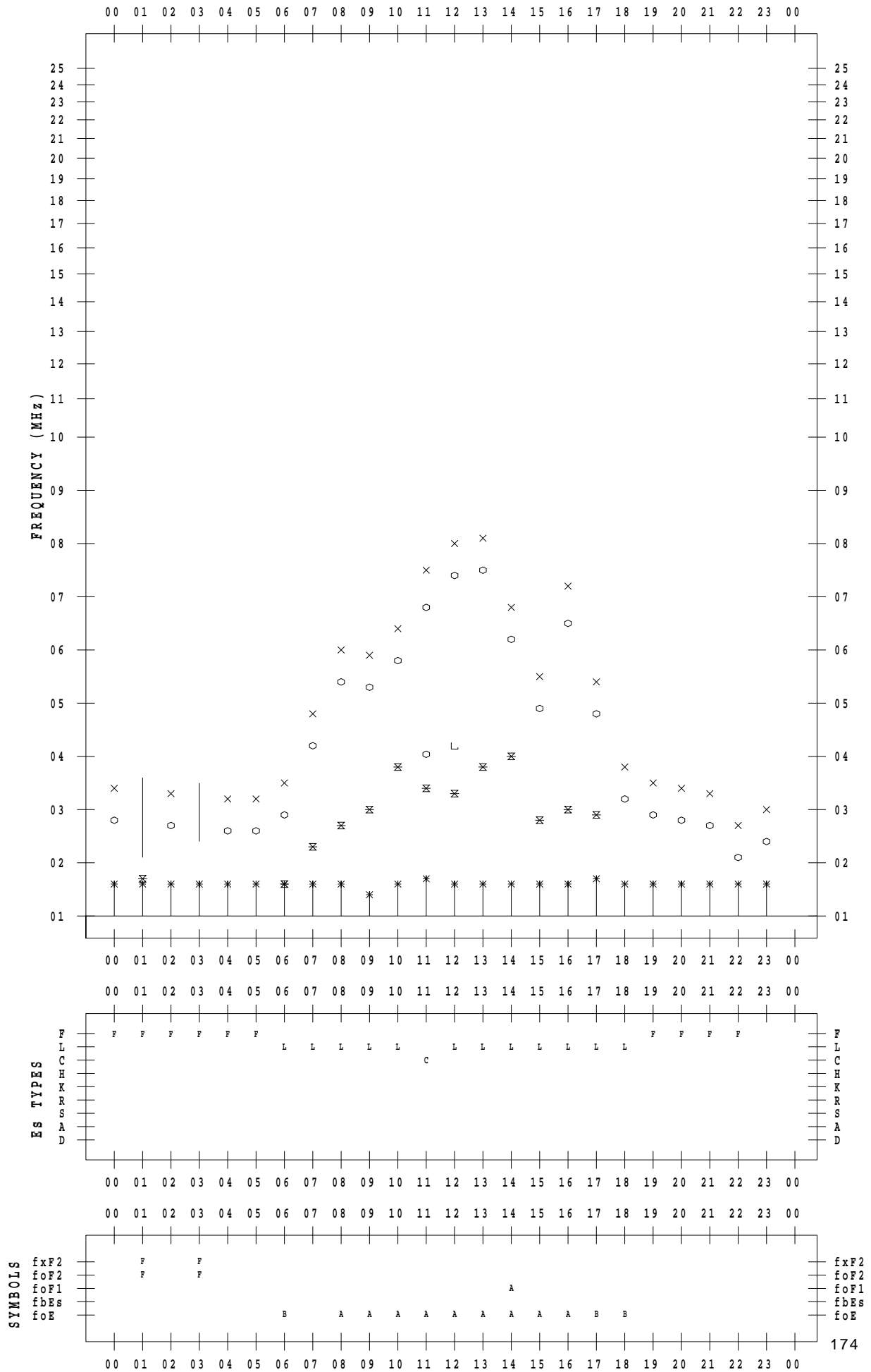
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/ 5

135 ° E MEAN TIME



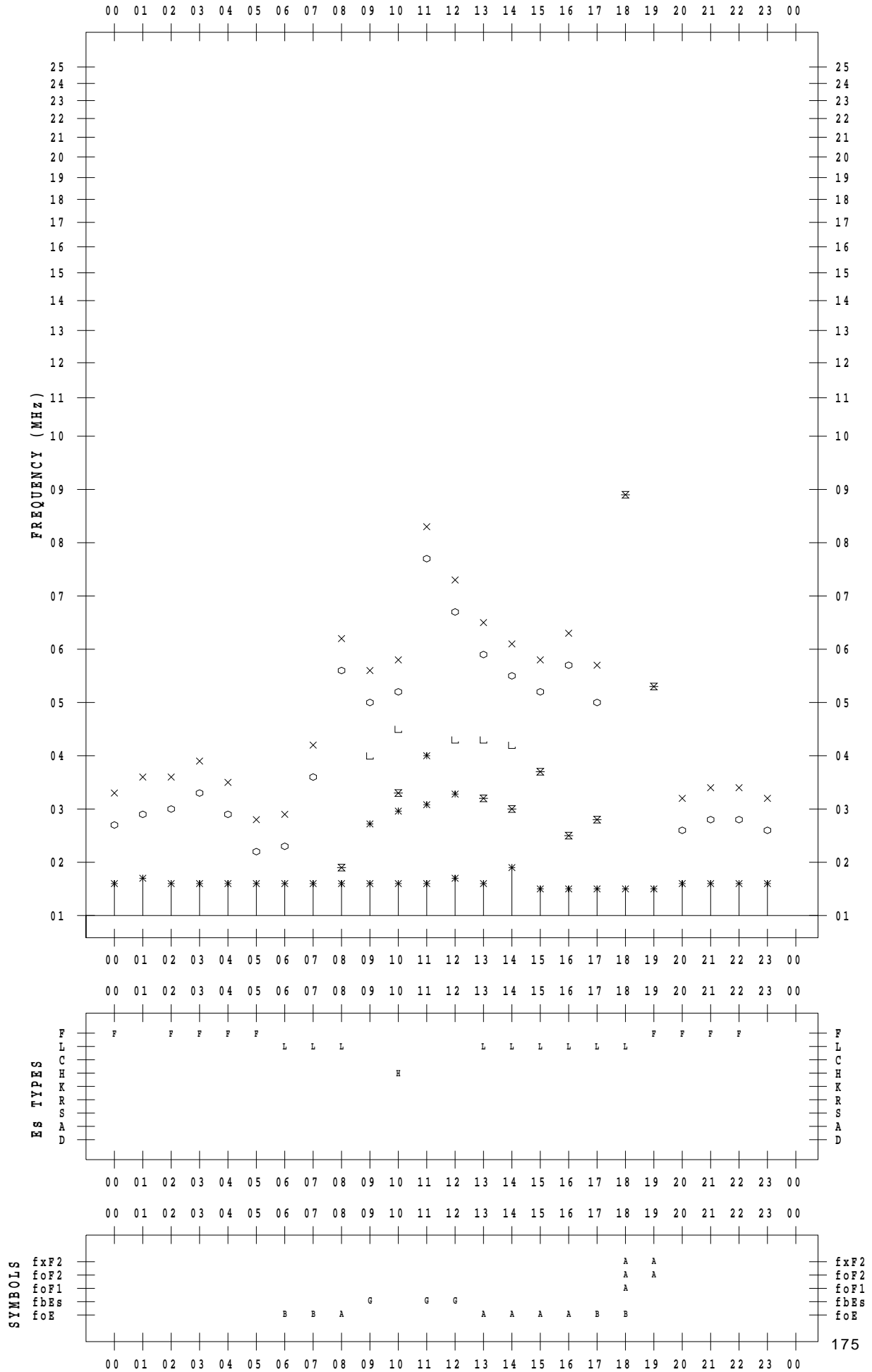
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/ 6

135 ° E MEAN TIME





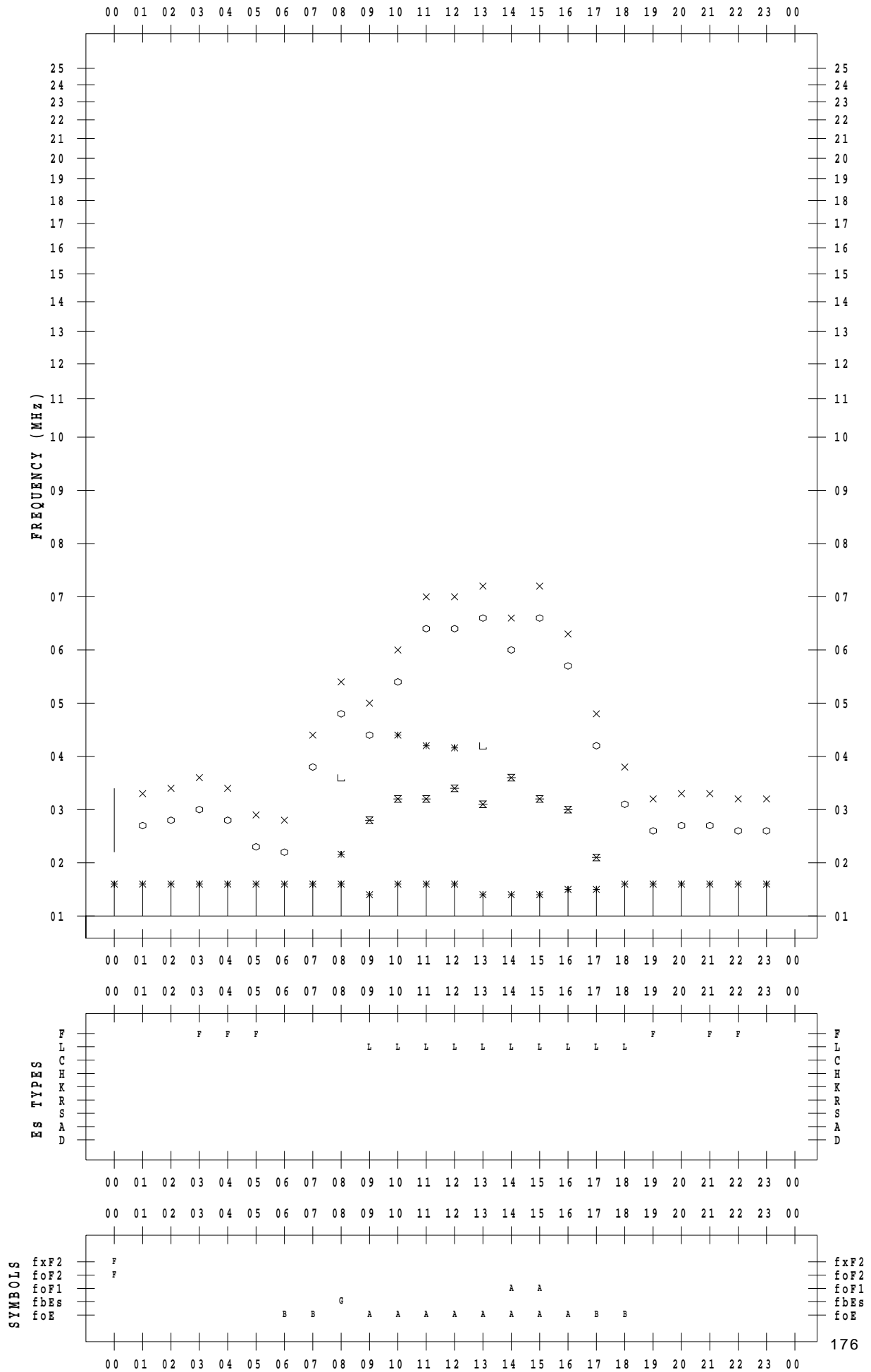
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SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/7

135 ° E MEAN TIME



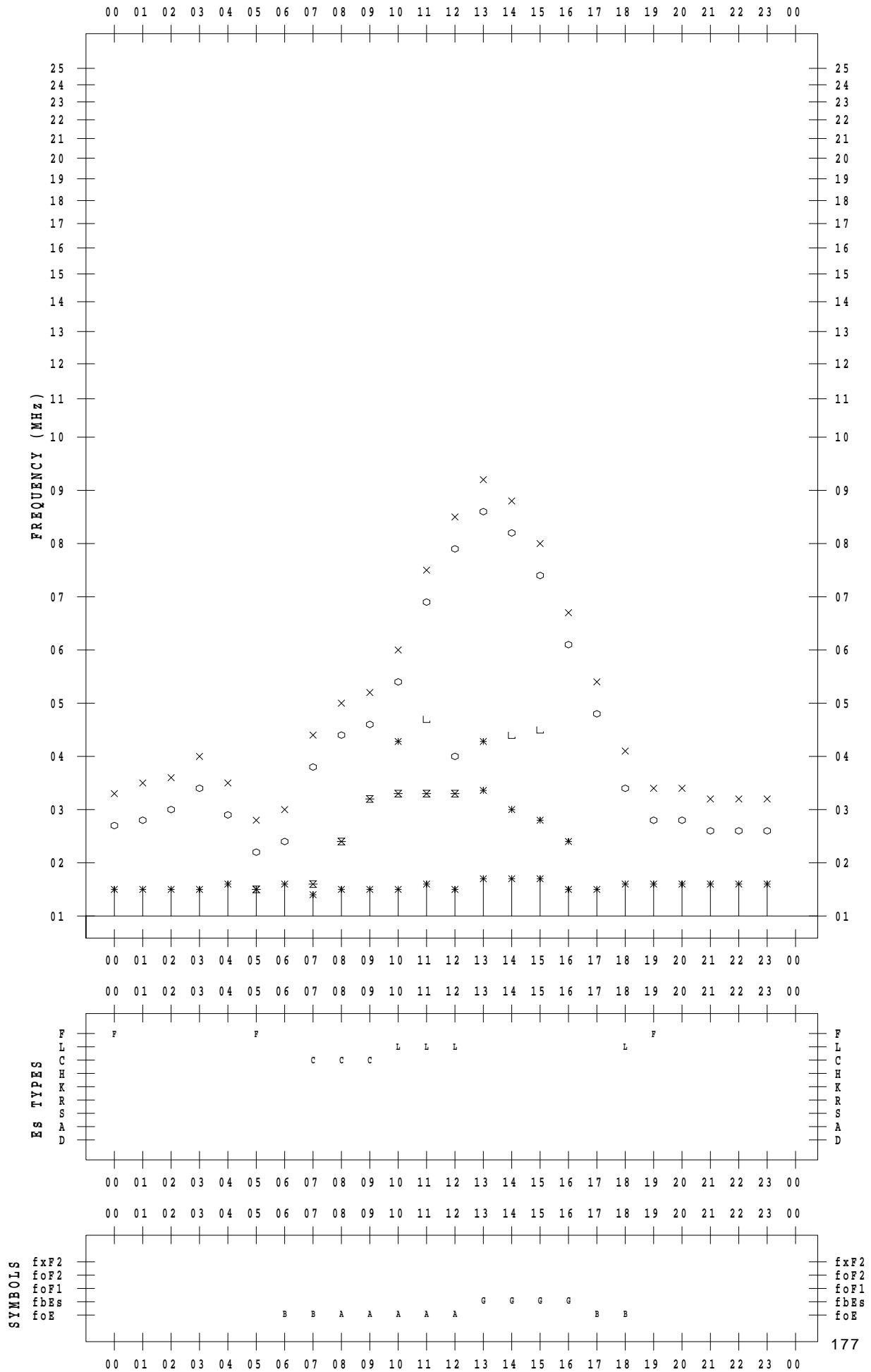
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/ 8

135 ° E MEAN TIME



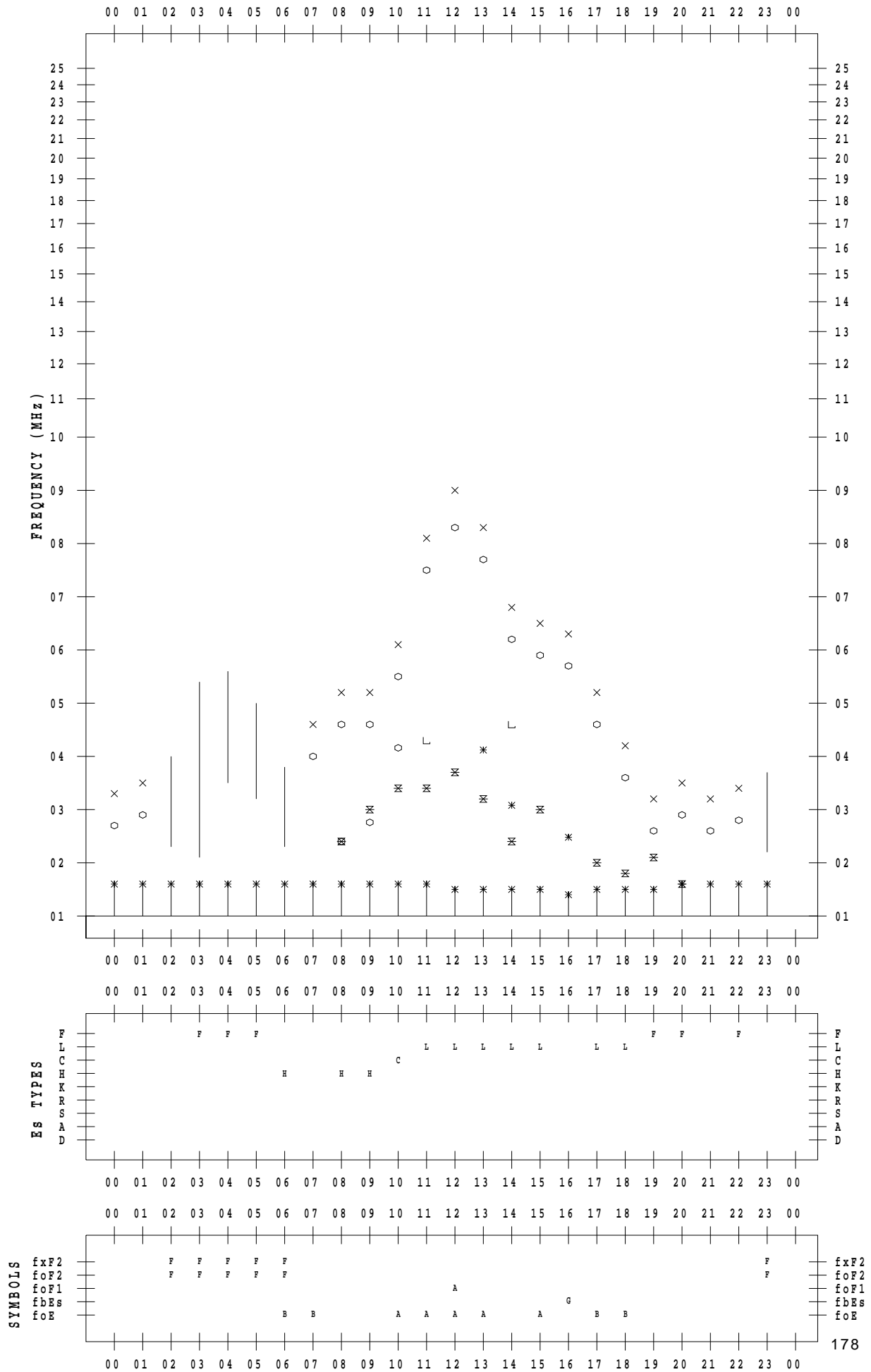
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/ 9

135 ° E MEAN TIME



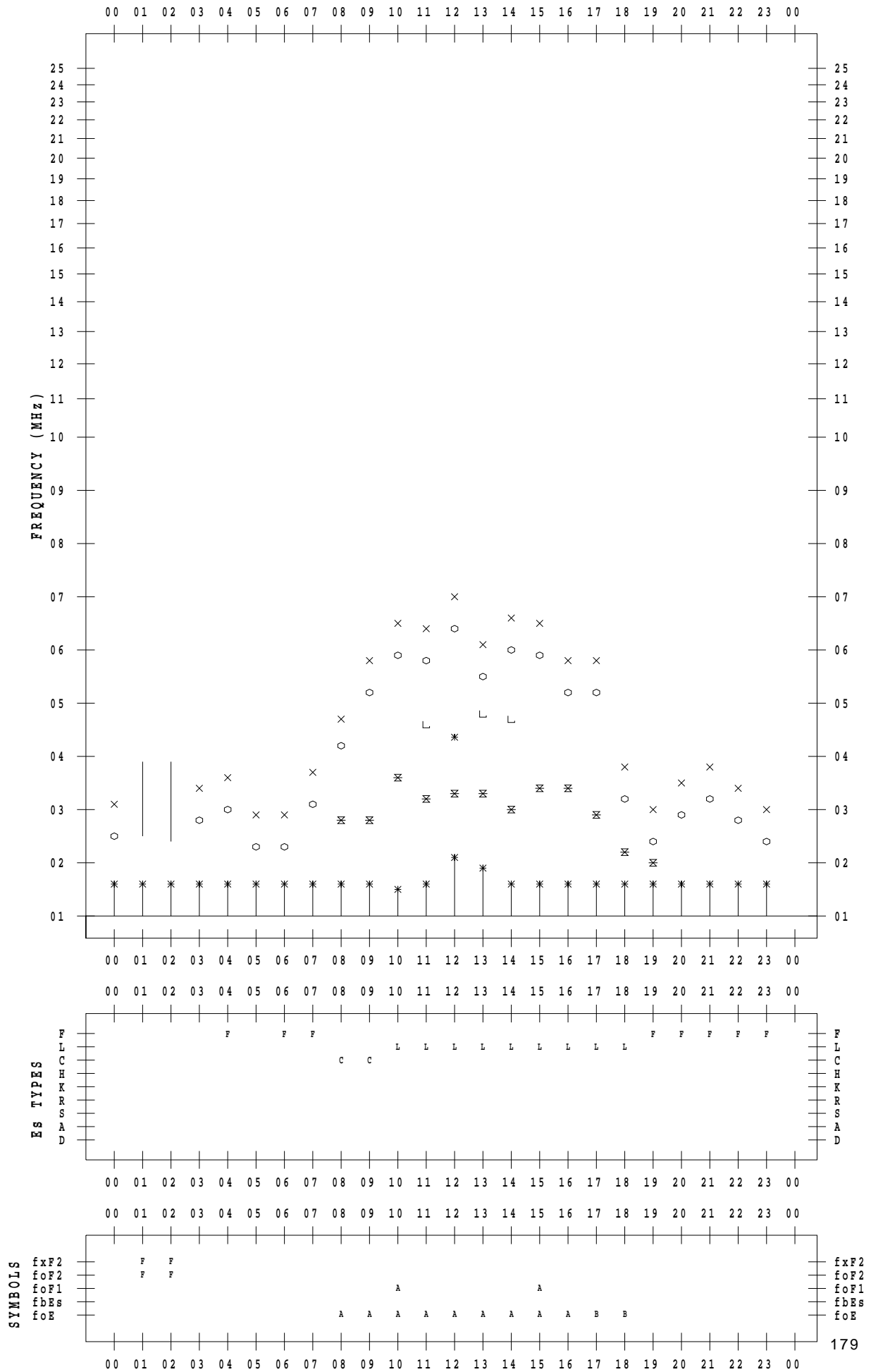
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/10

135 ° E MEAN TIME



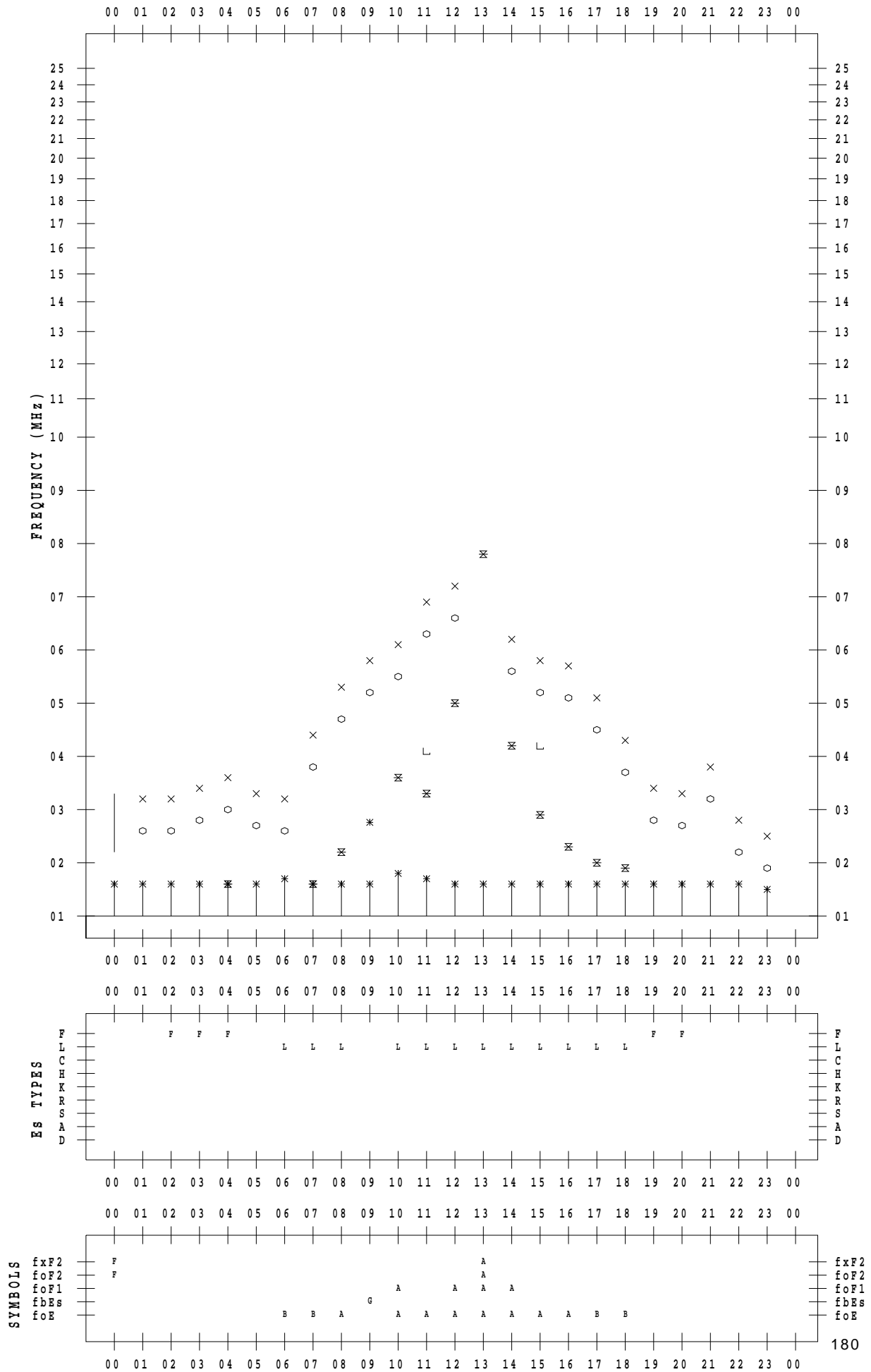
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/11

135 ° E MEAN TIME



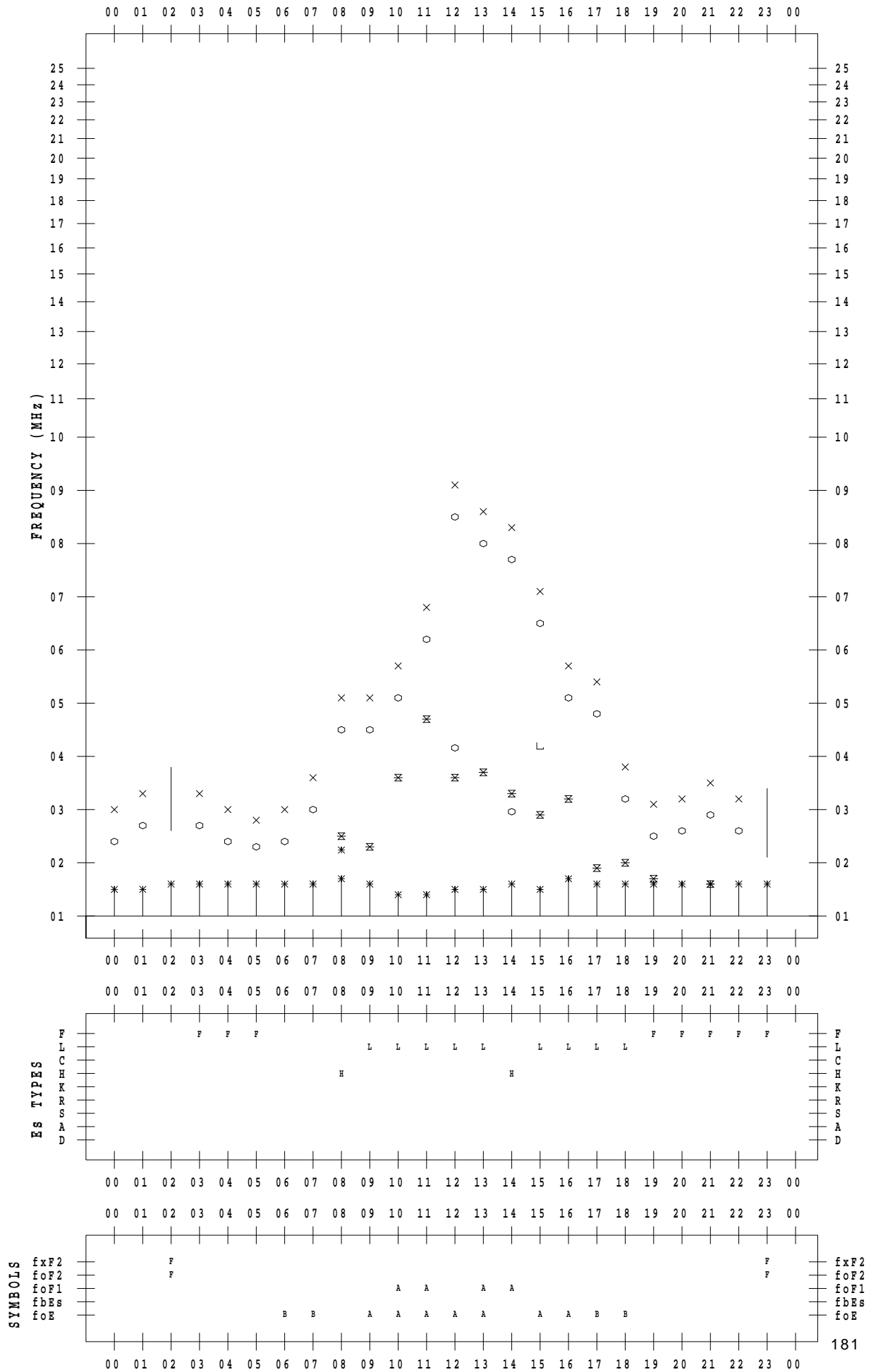
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SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/12

135 ° E MEAN TIME



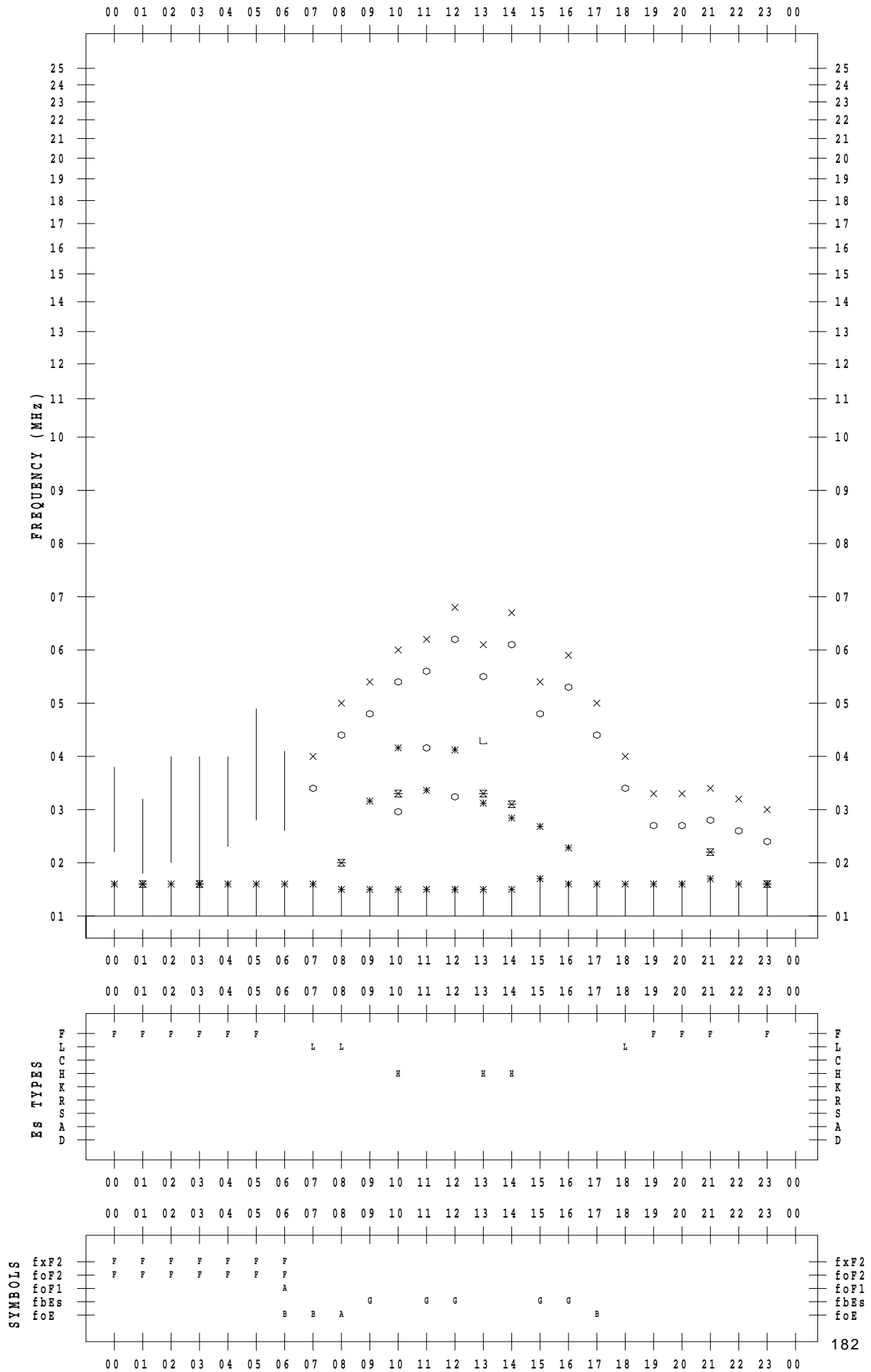
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/13

135 ° E MEAN TIME



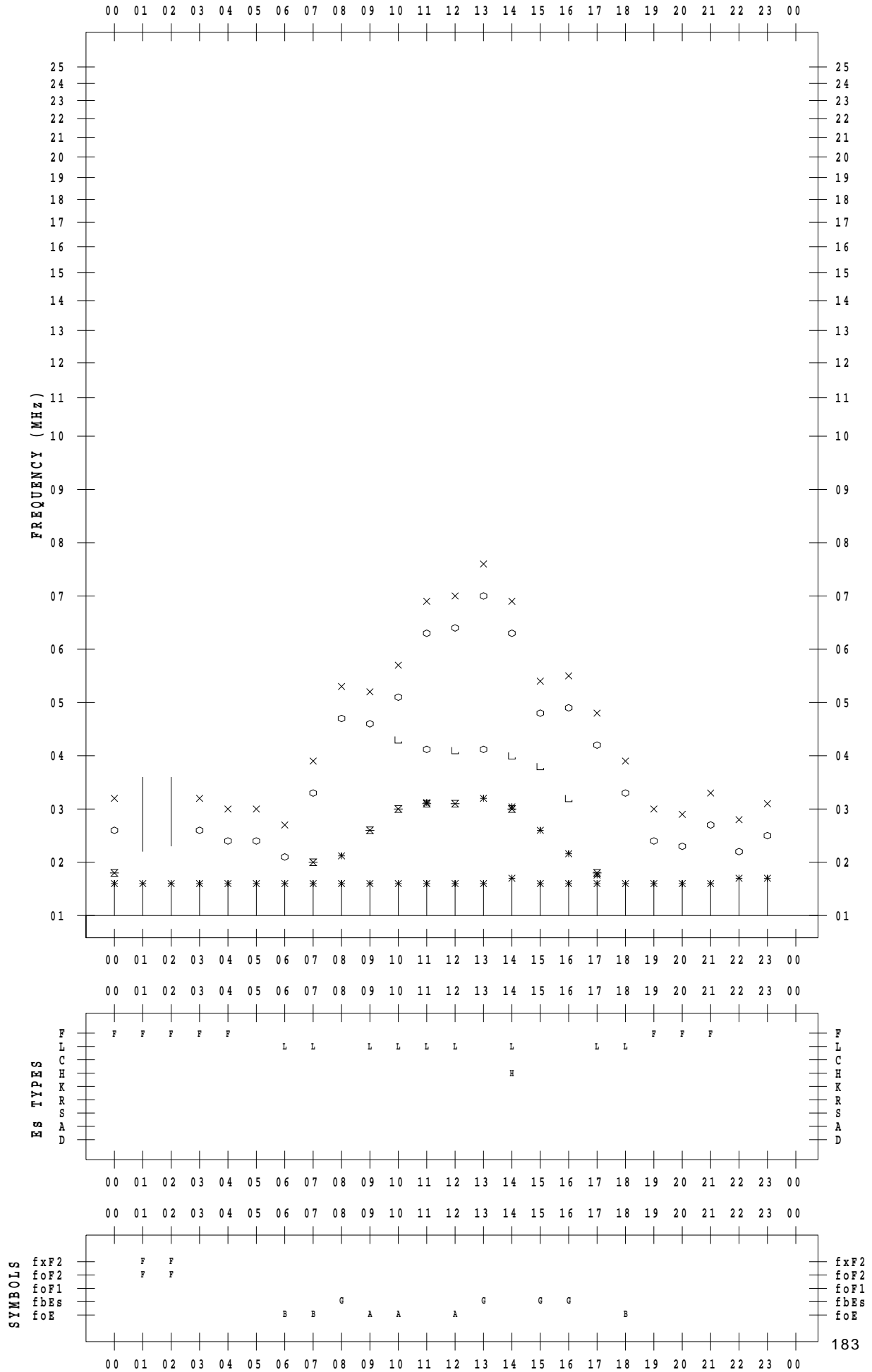
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/14

135 ° E MEAN TIME





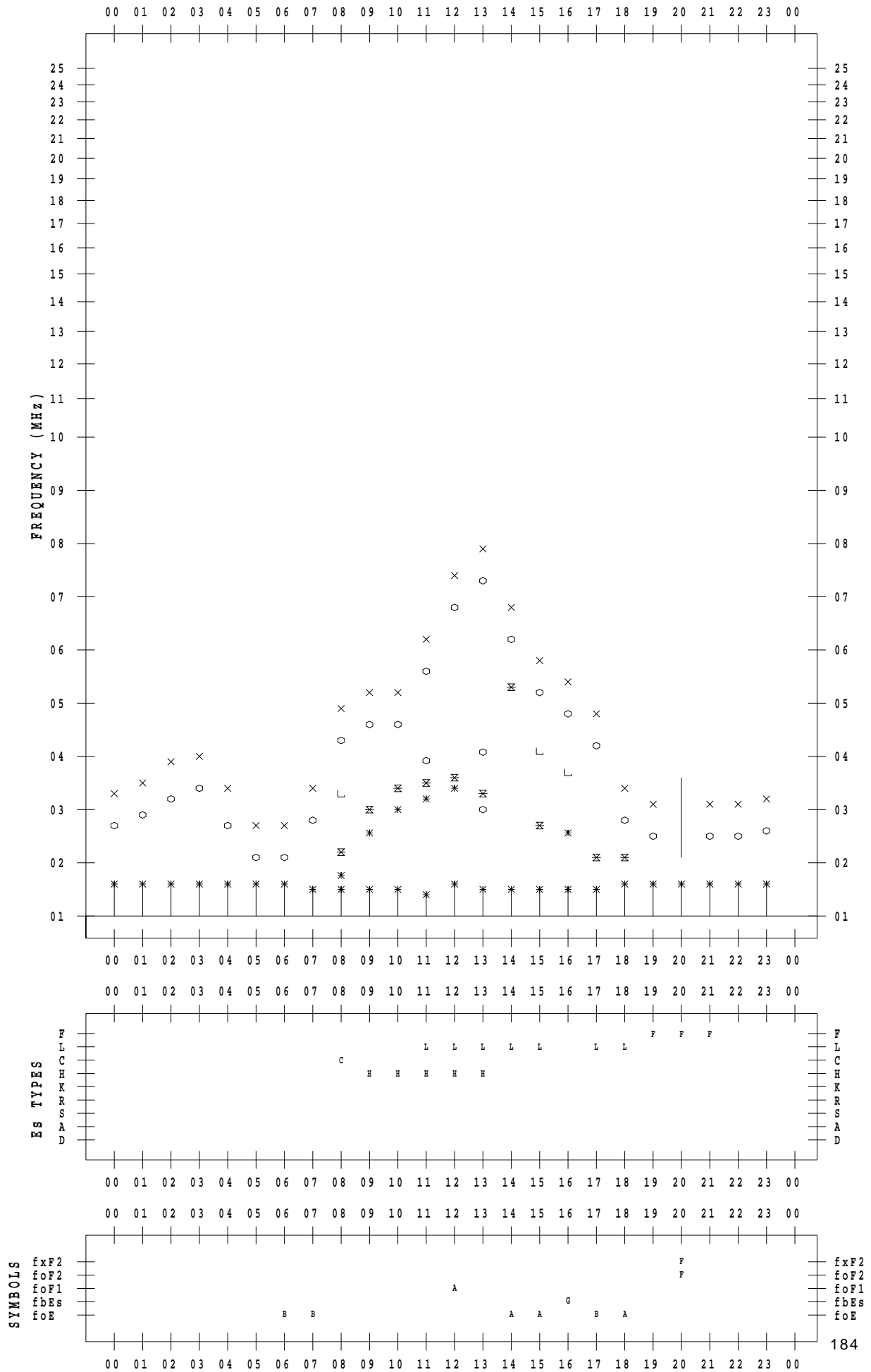
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/15

135 ° E MEAN TIME



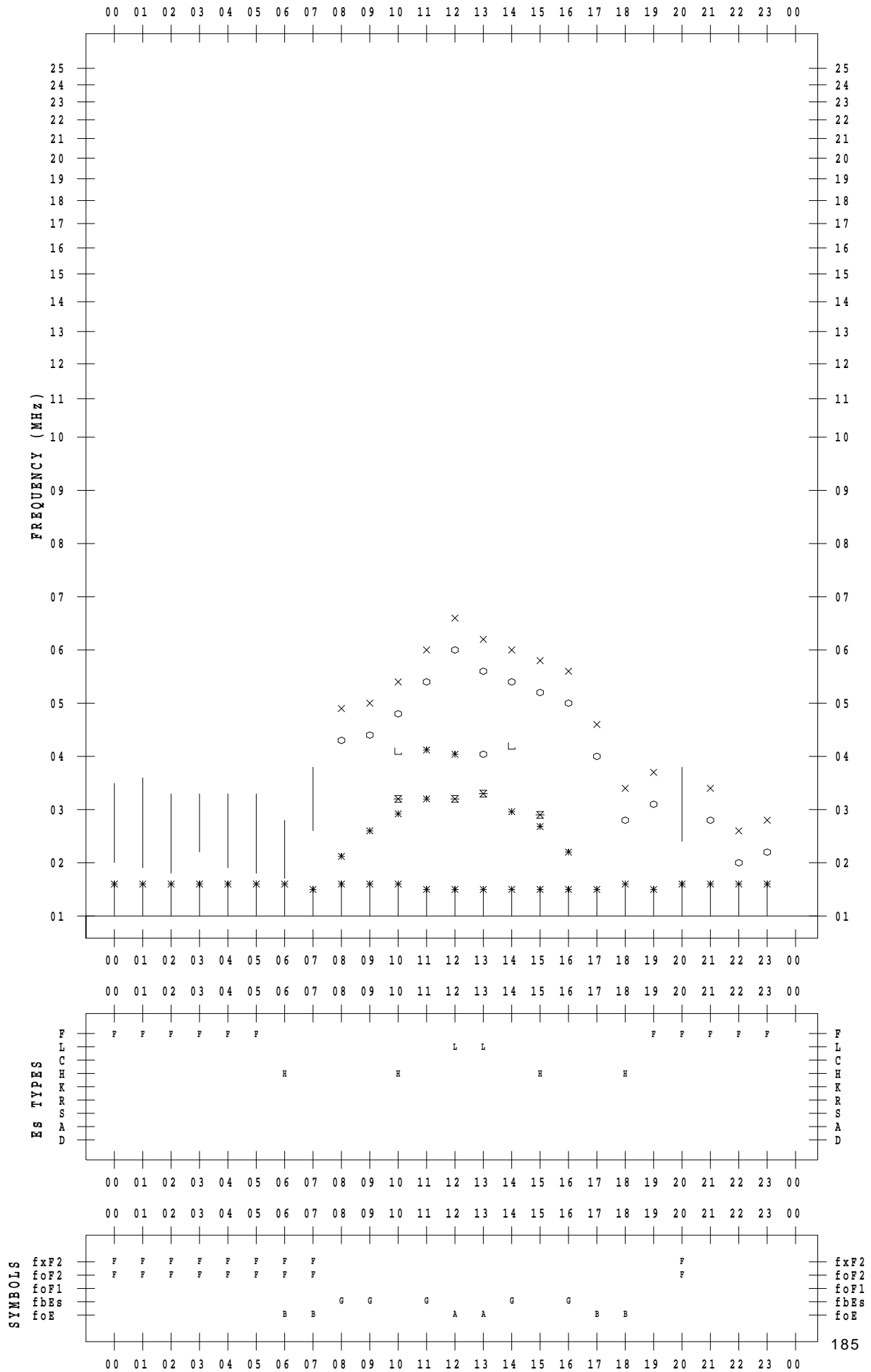
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/16

135 ° E MEAN TIME



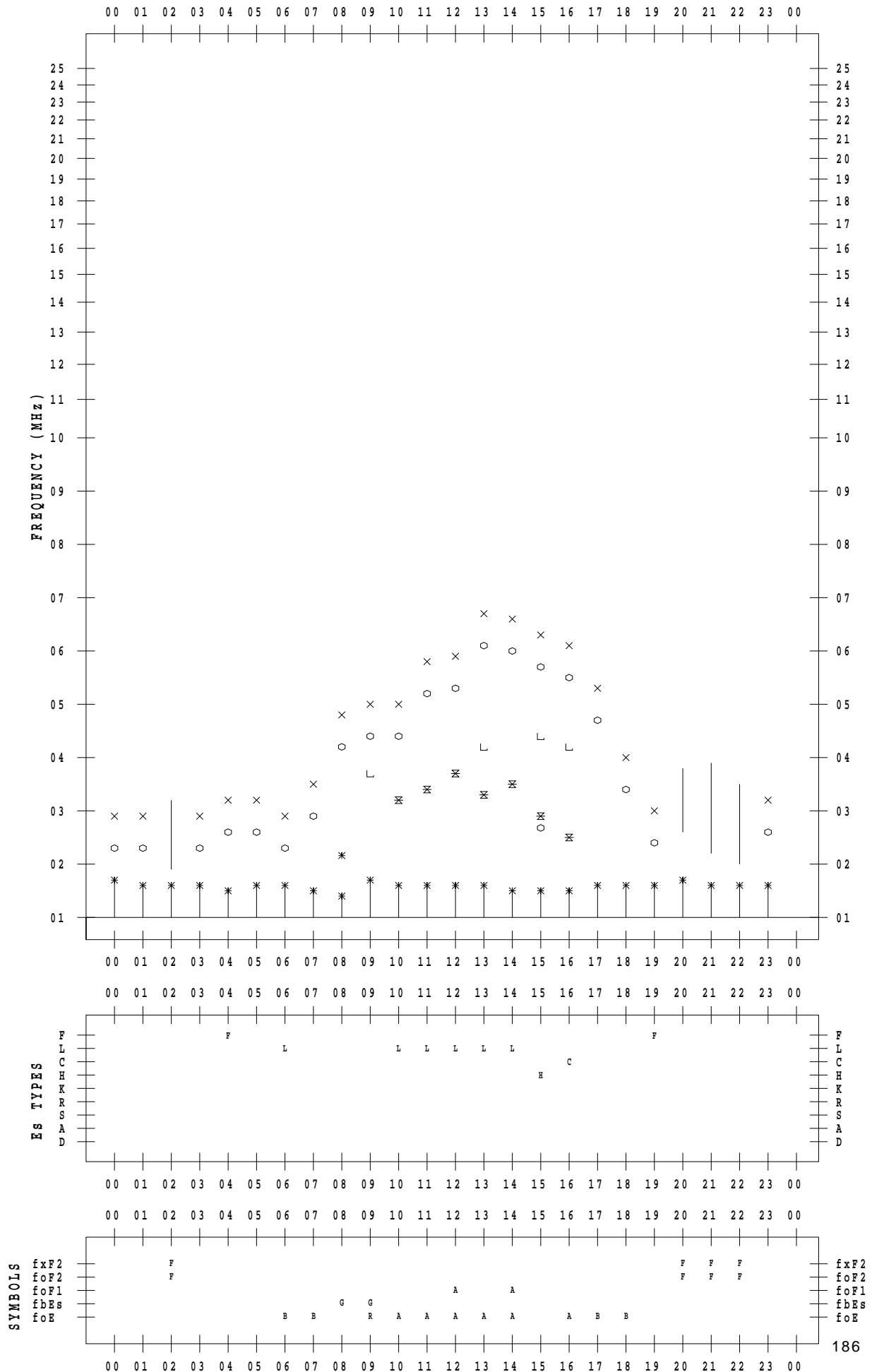
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/17

135 ° E MEAN TIME



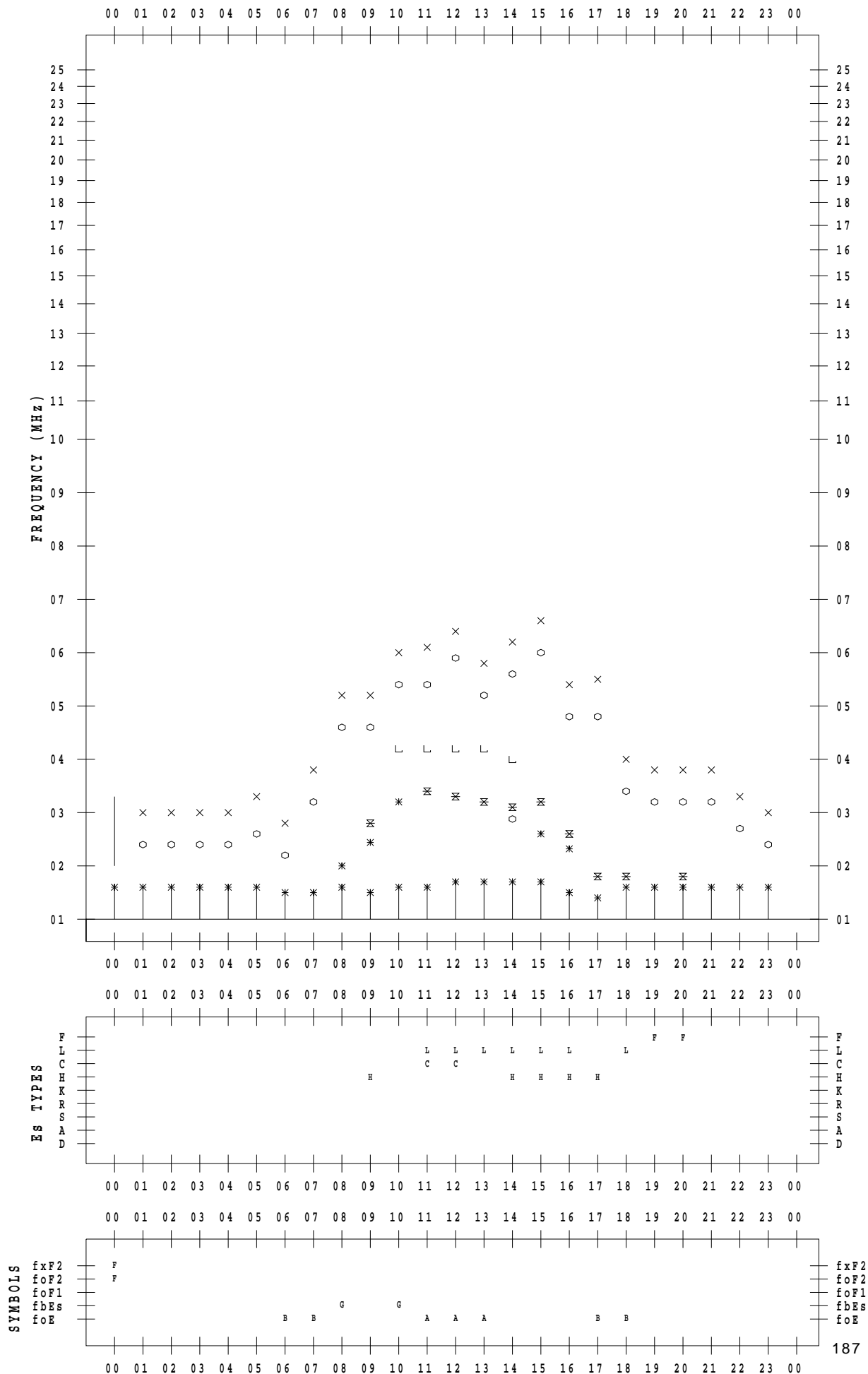
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/18

135 ° E MEAN TIME



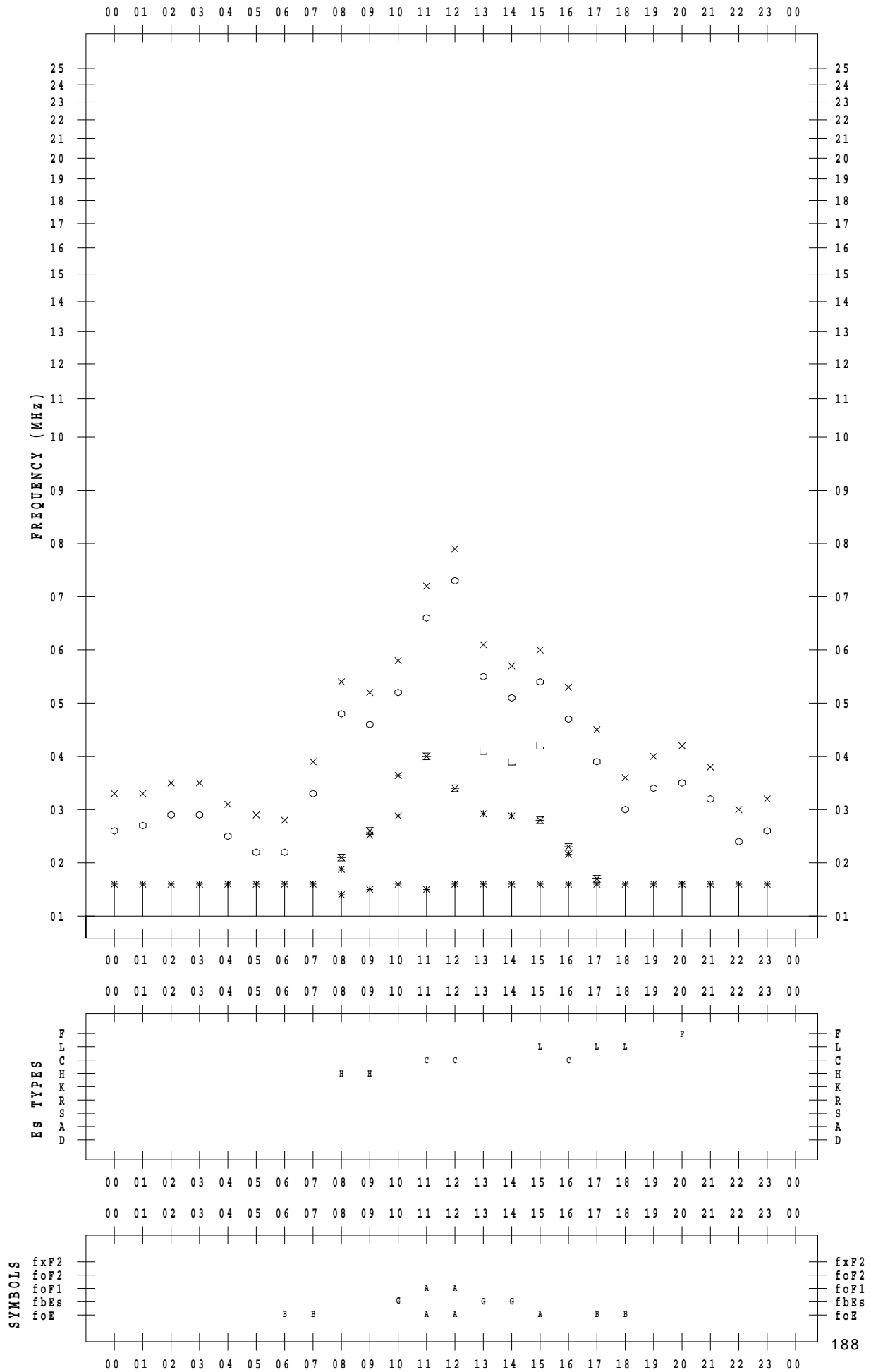
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/19

135 ° E MEAN TIME



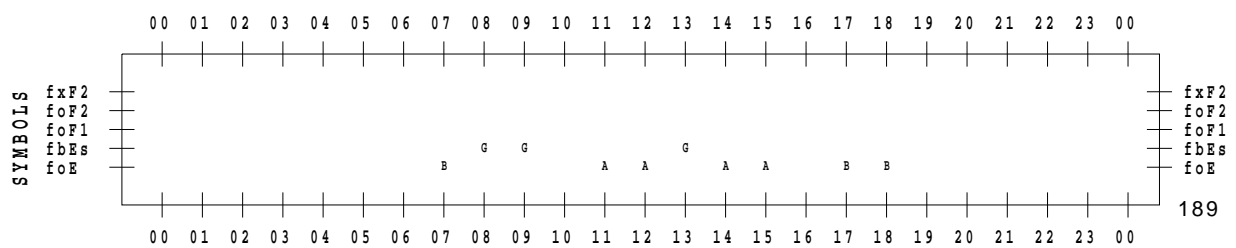
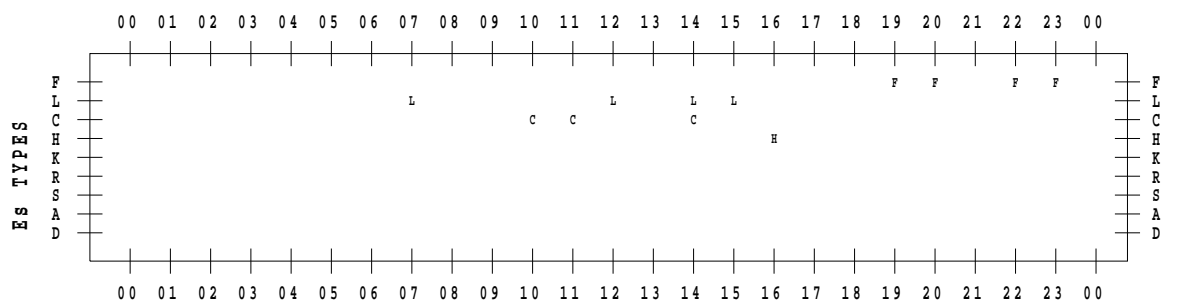
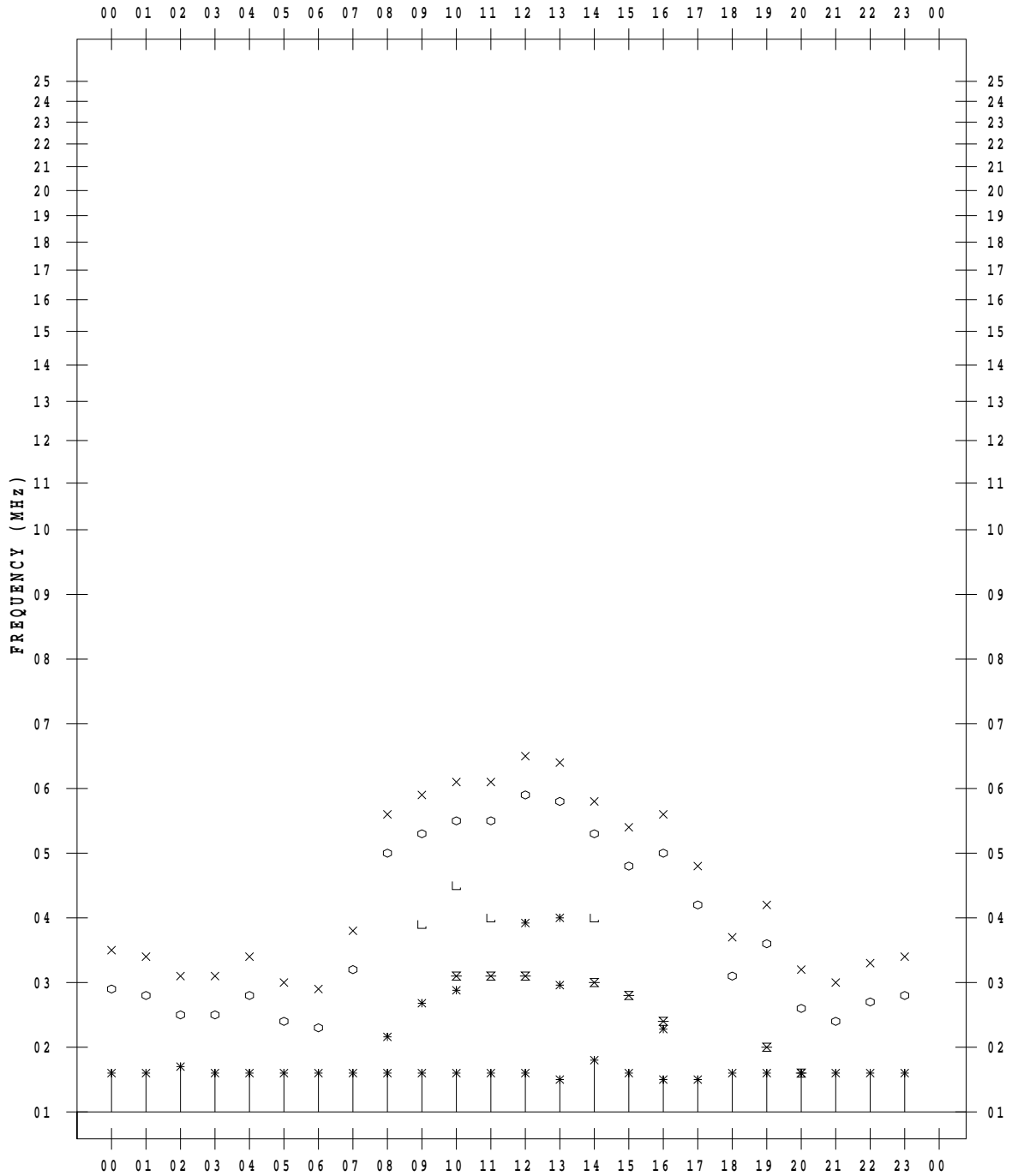
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SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/20

135 ° E MEAN TIME



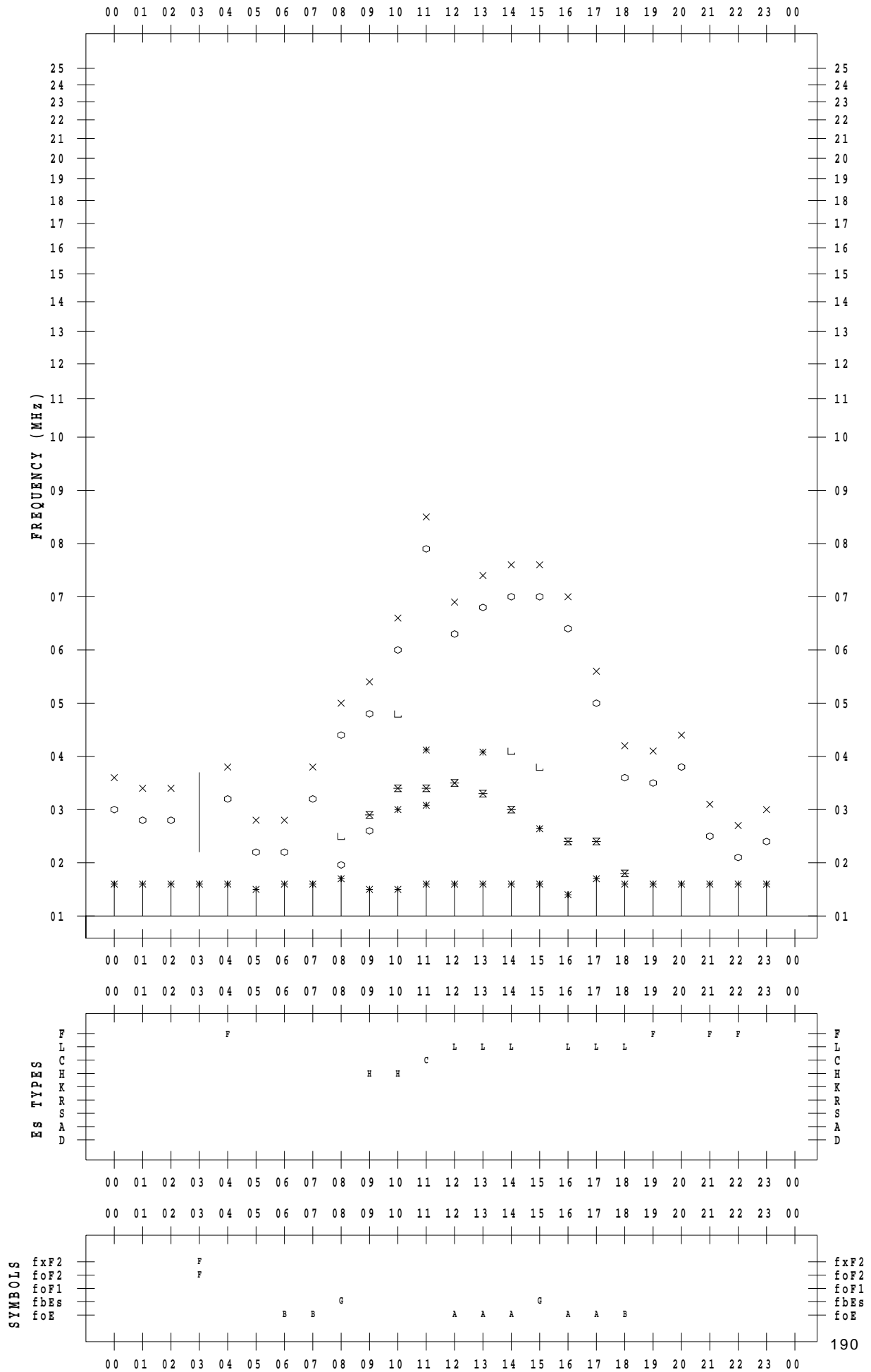
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/21

135 ° E MEAN TIME



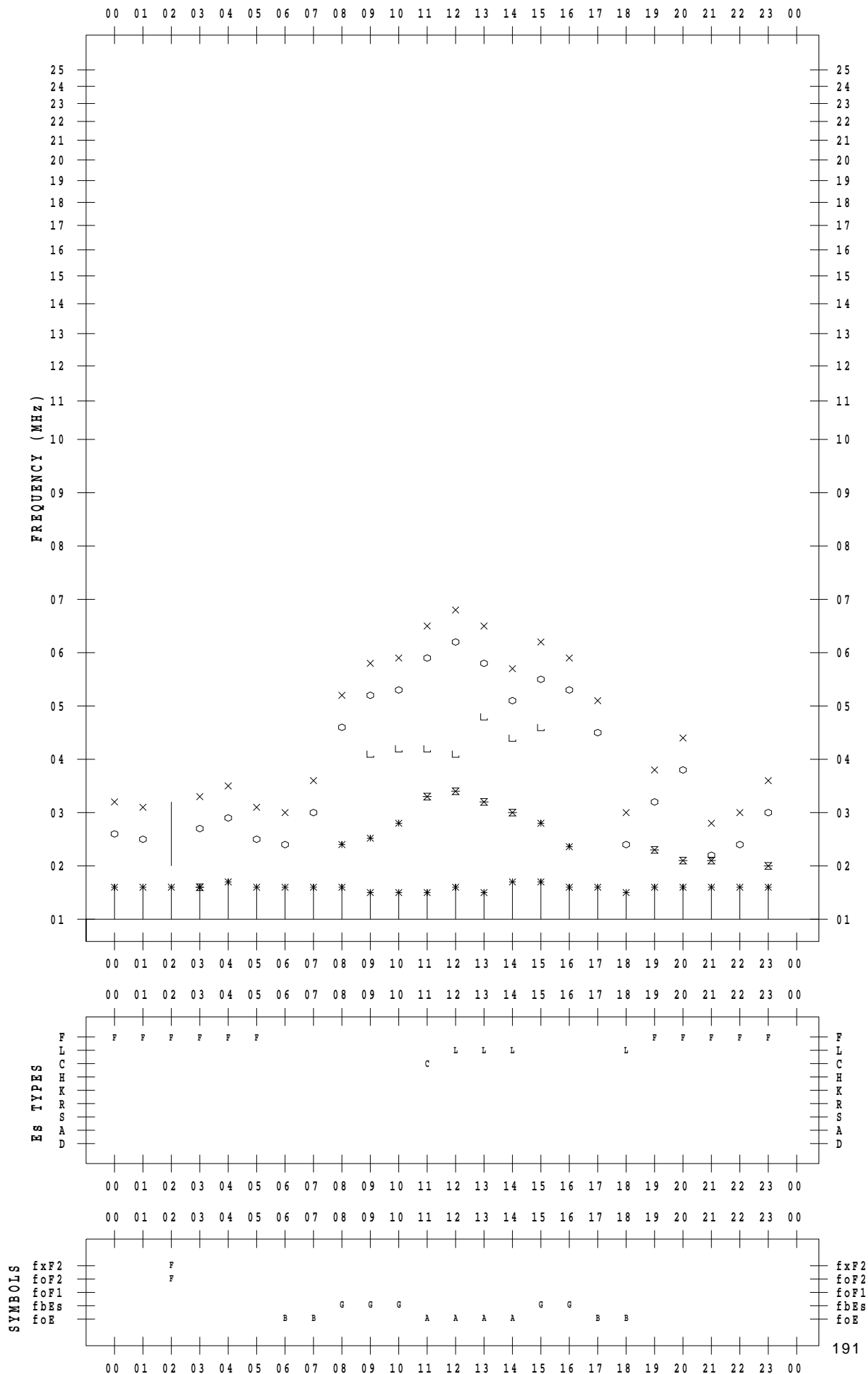
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/22

135 ° E MEAN TIME





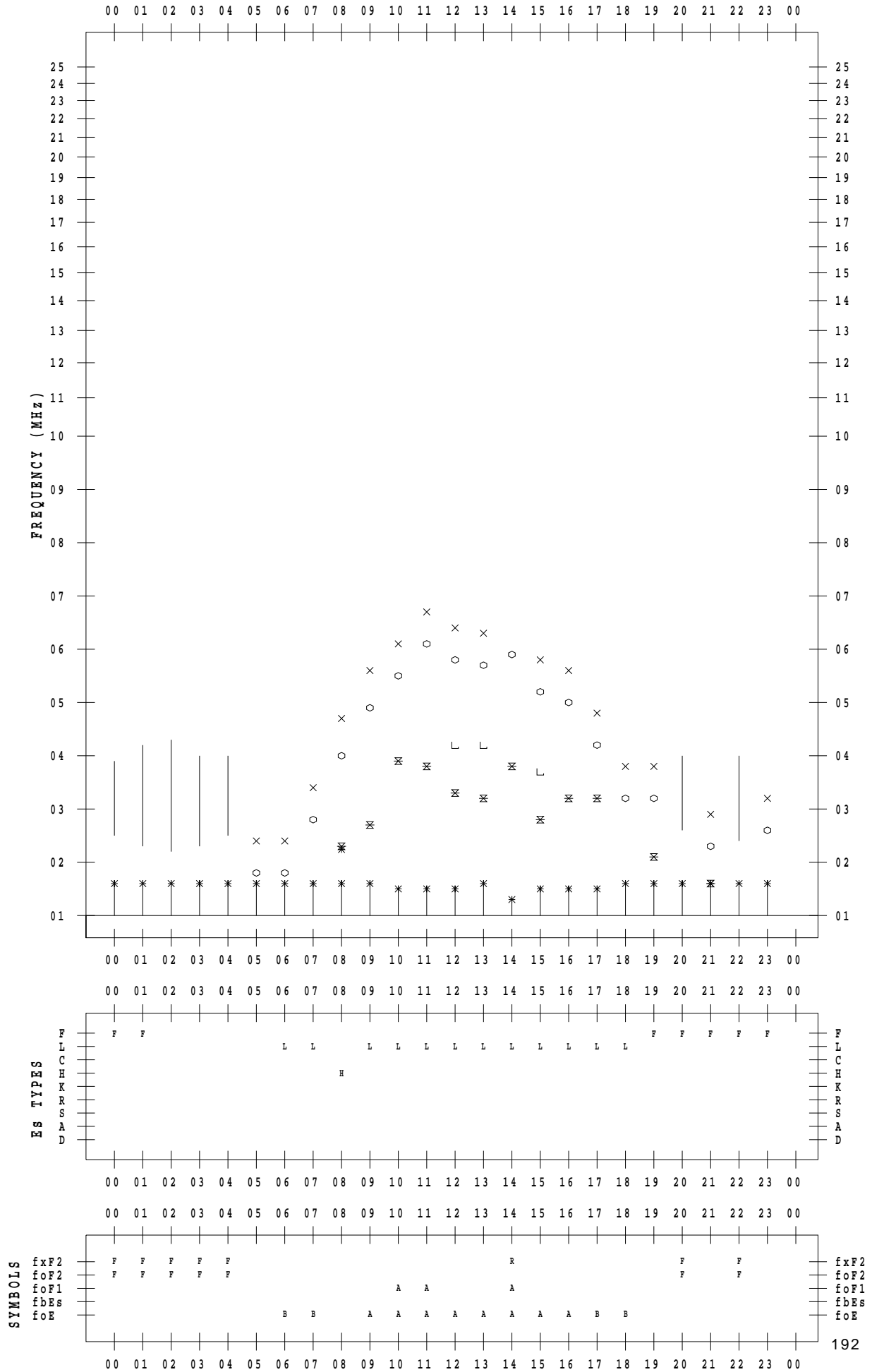
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/23

135 ° E MEAN TIME



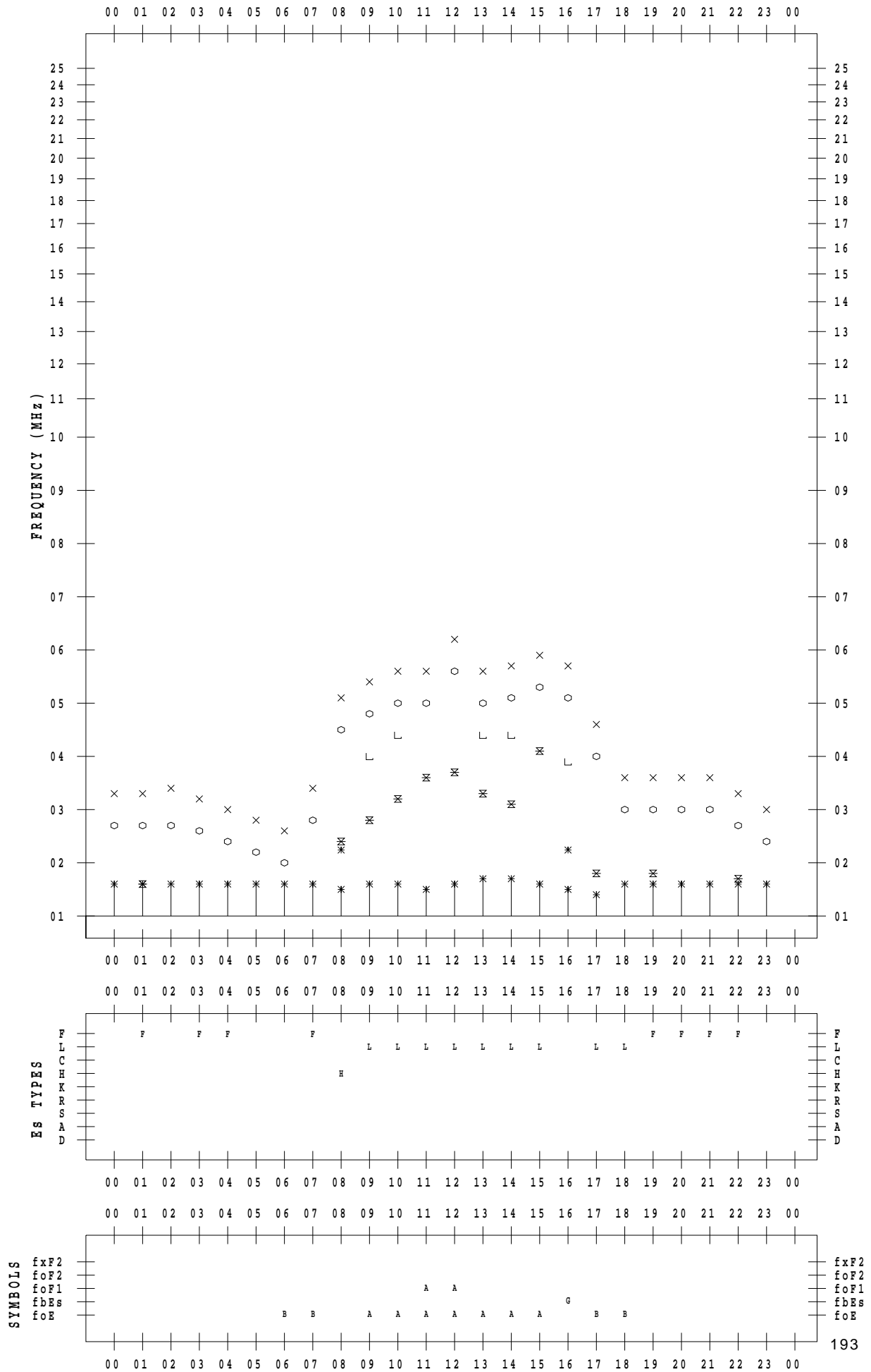
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/24

135 ° E MEAN TIME



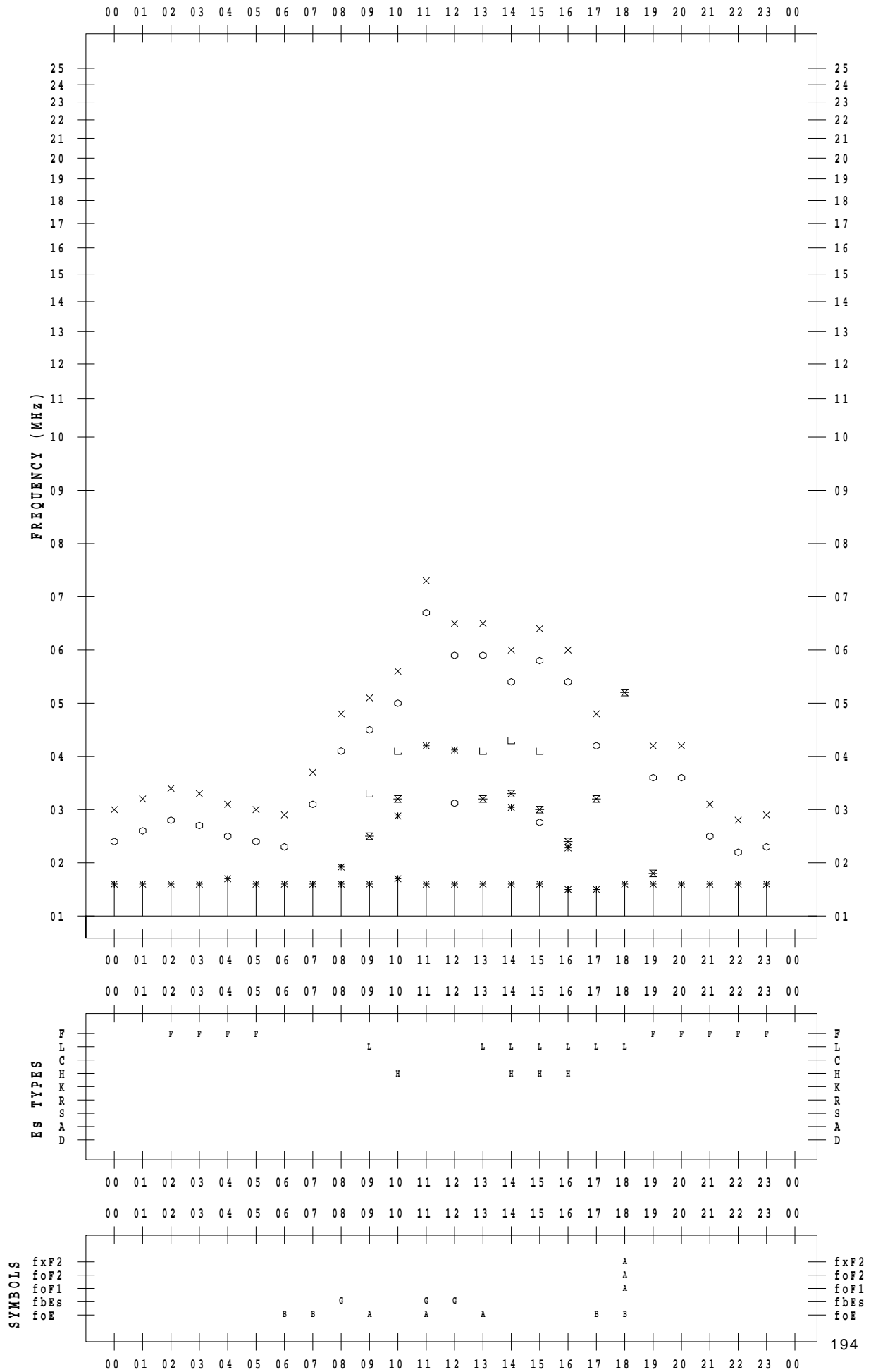
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/25

135 ° E MEAN TIME



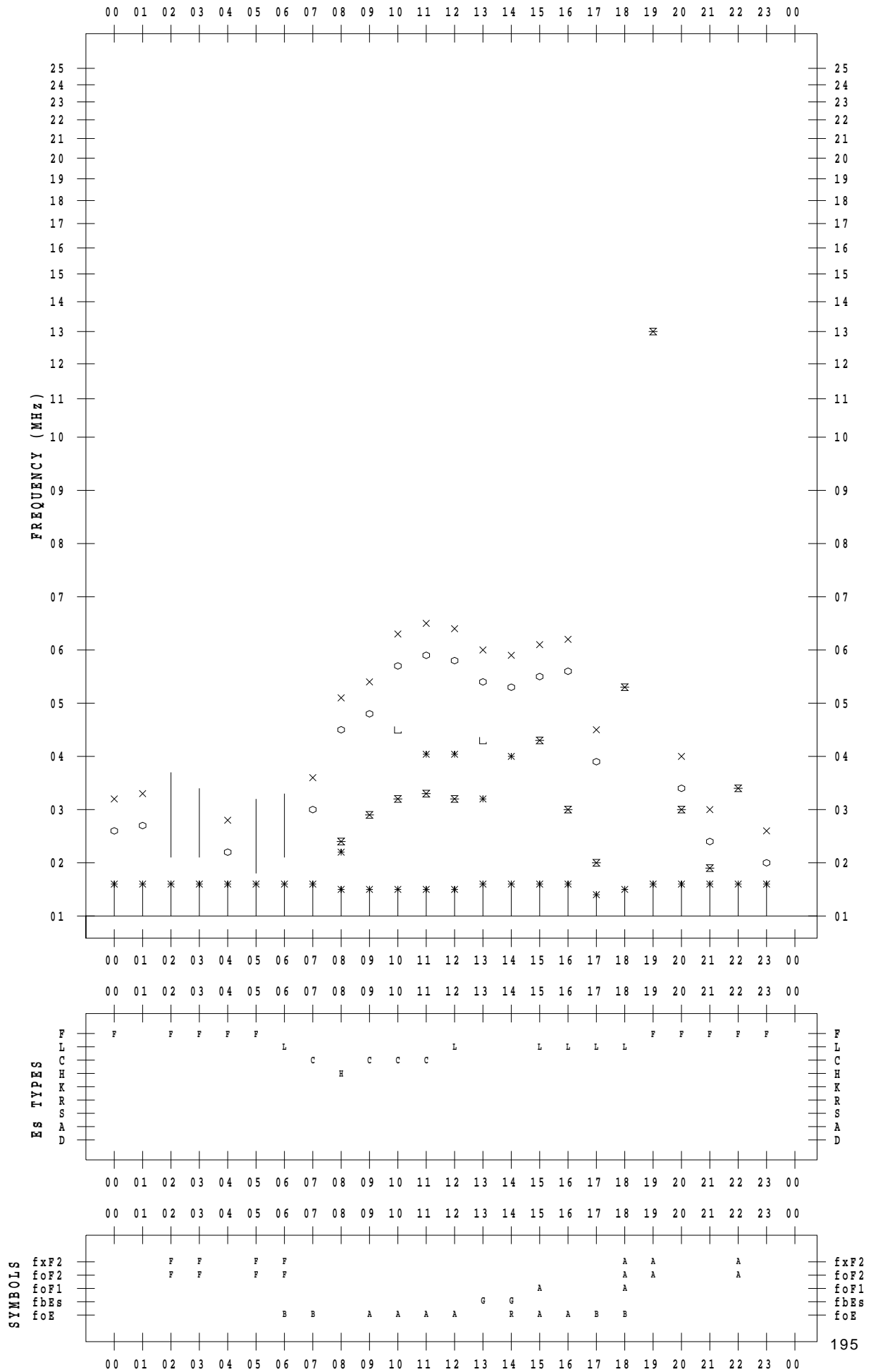
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/26

135 ° E MEAN TIME



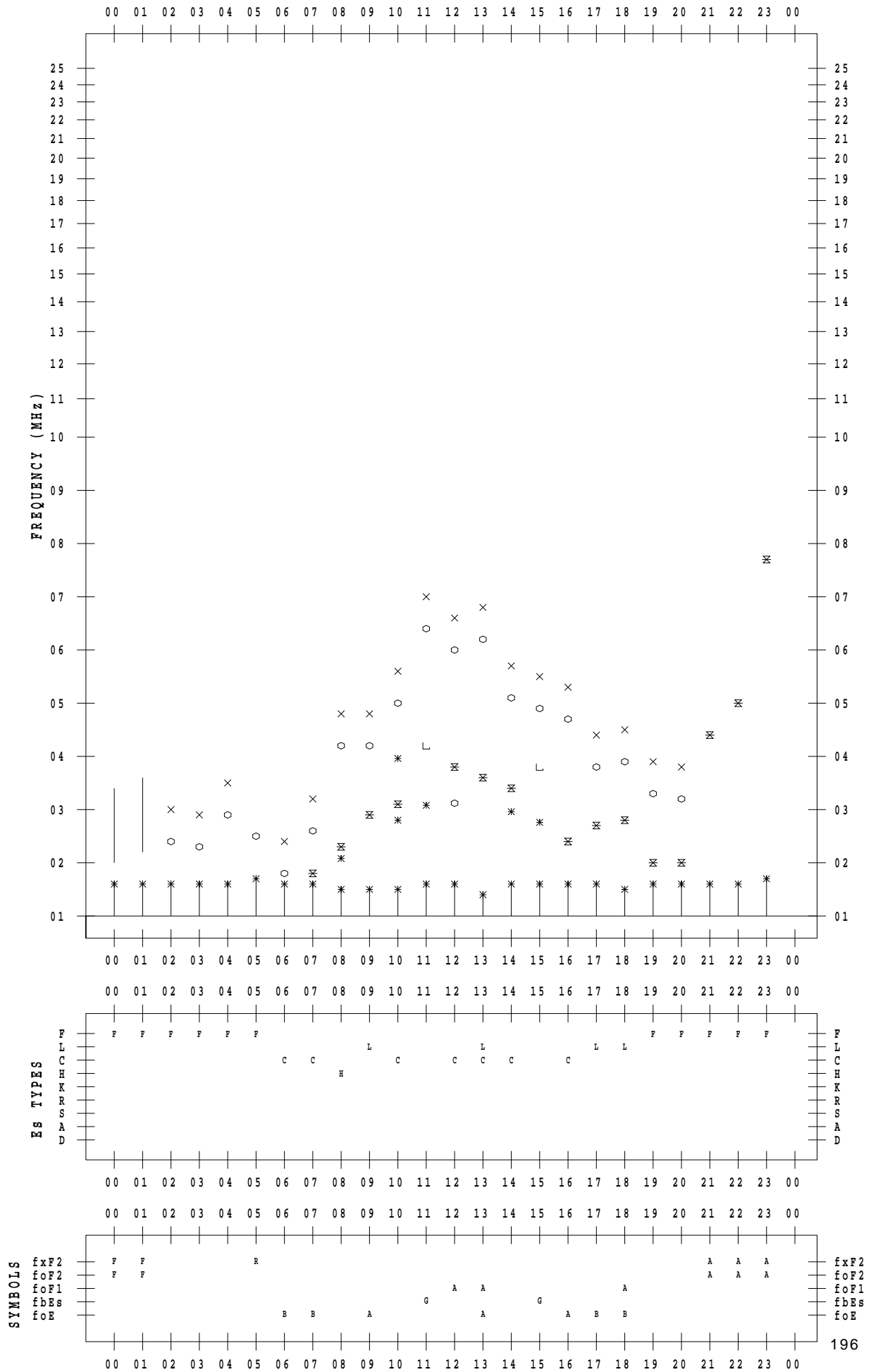
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/27

135 ° E MEAN TIME



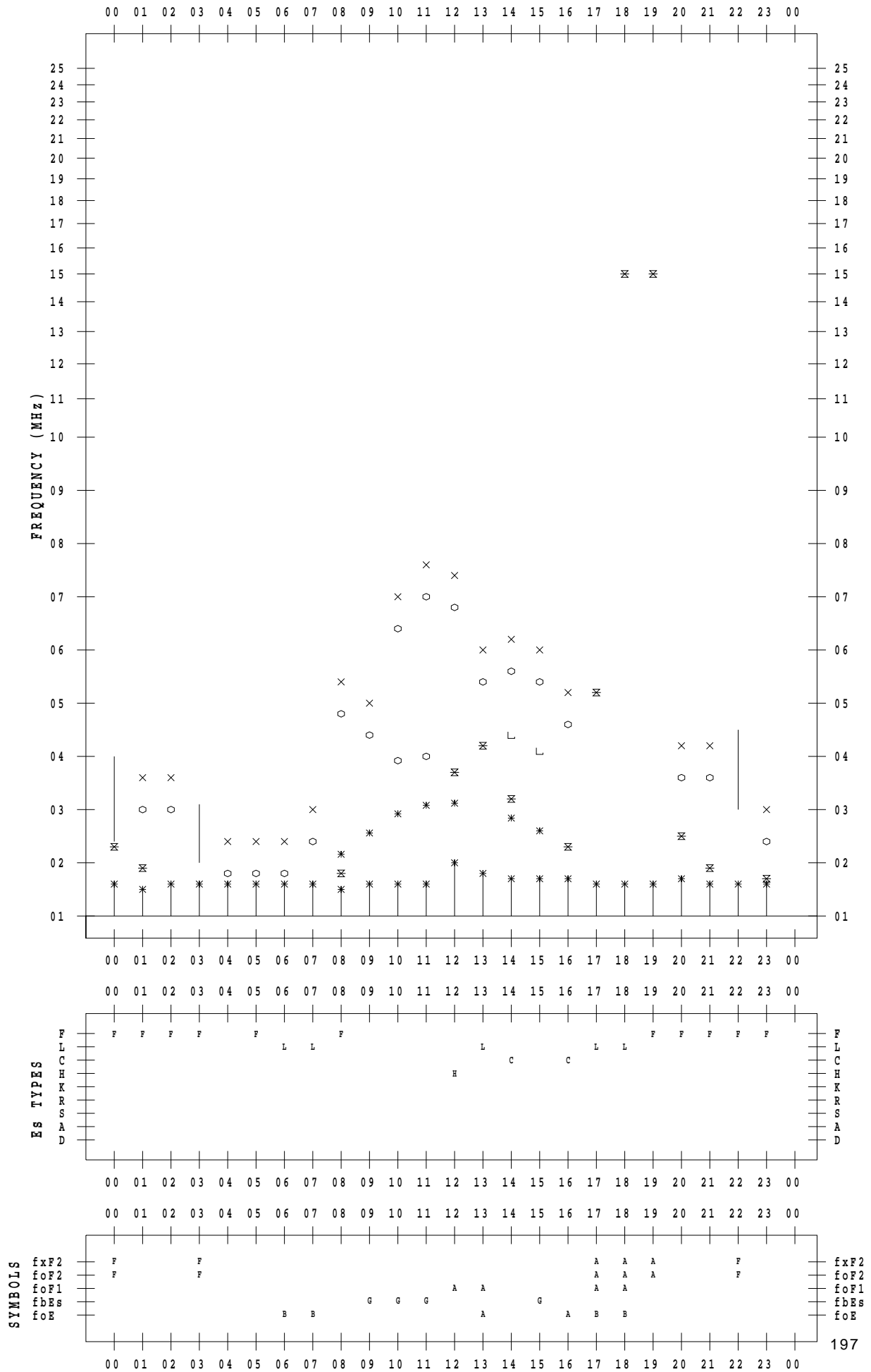
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/28

135 ° E MEAN TIME



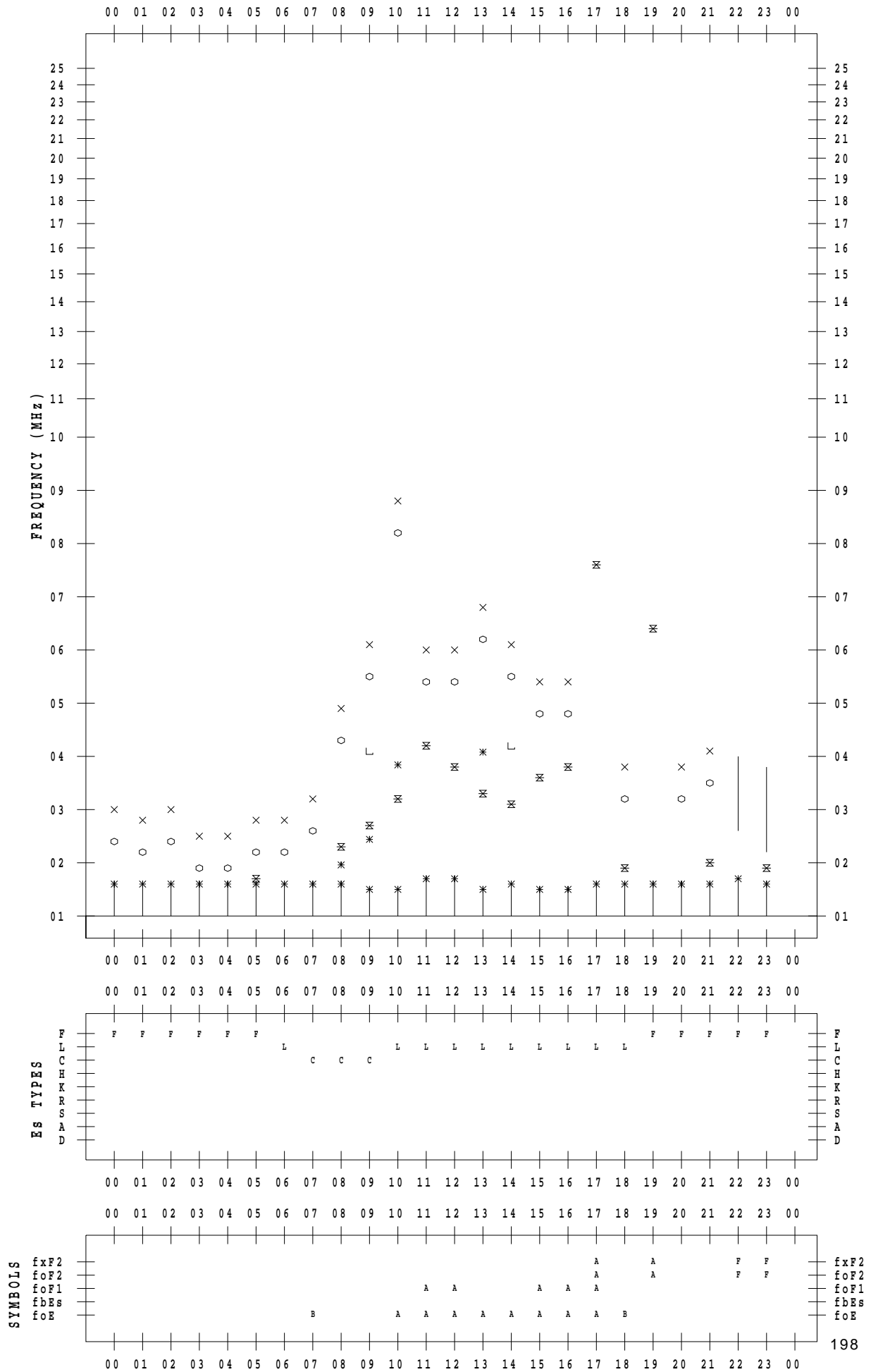
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/29

135 ° E MEAN TIME



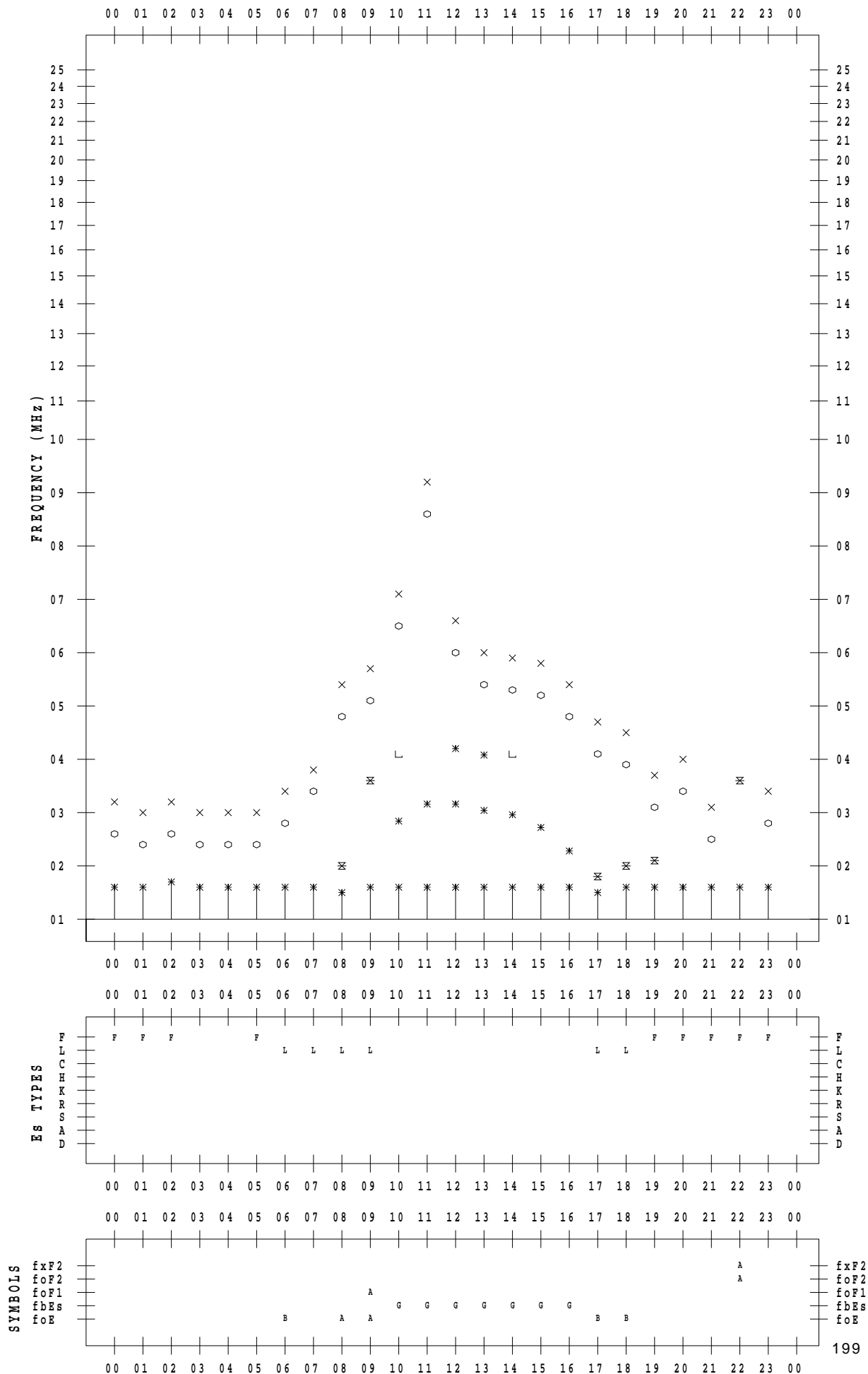
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/30

135 ° E MEAN TIME





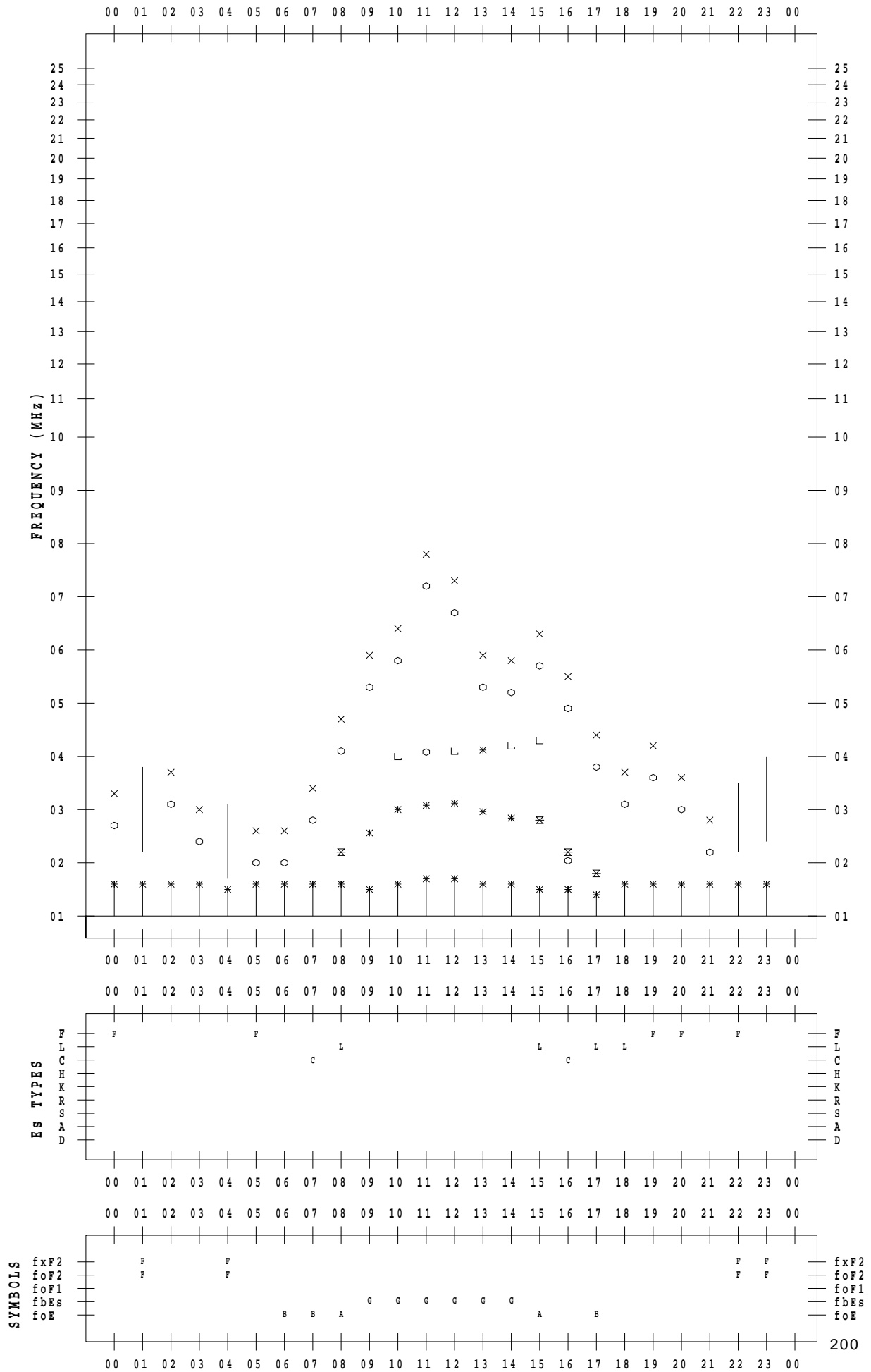
# f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2018/12/31

135 ° E MEAN TIME



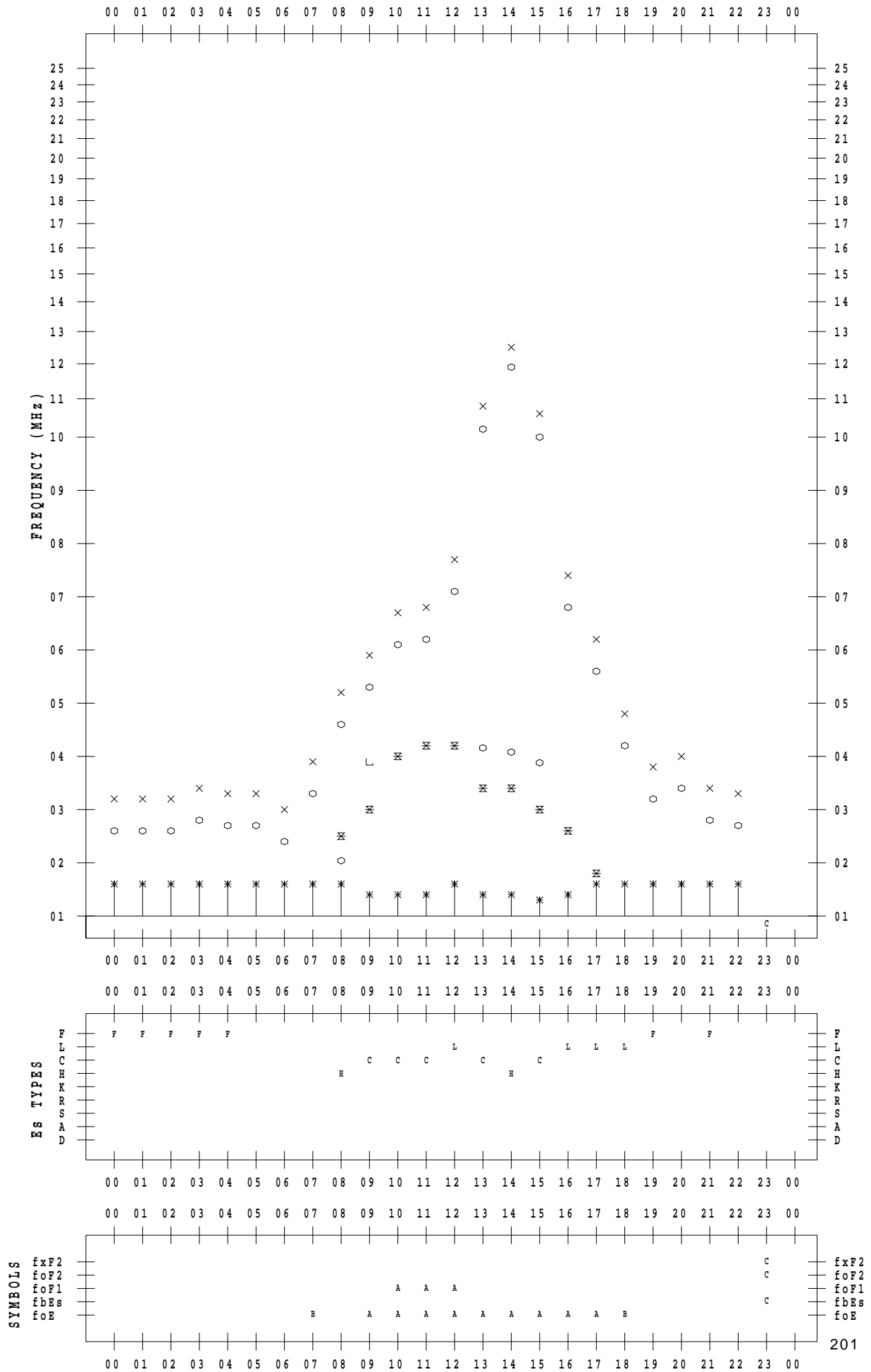
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/ 1

135 ° E MEAN TIME



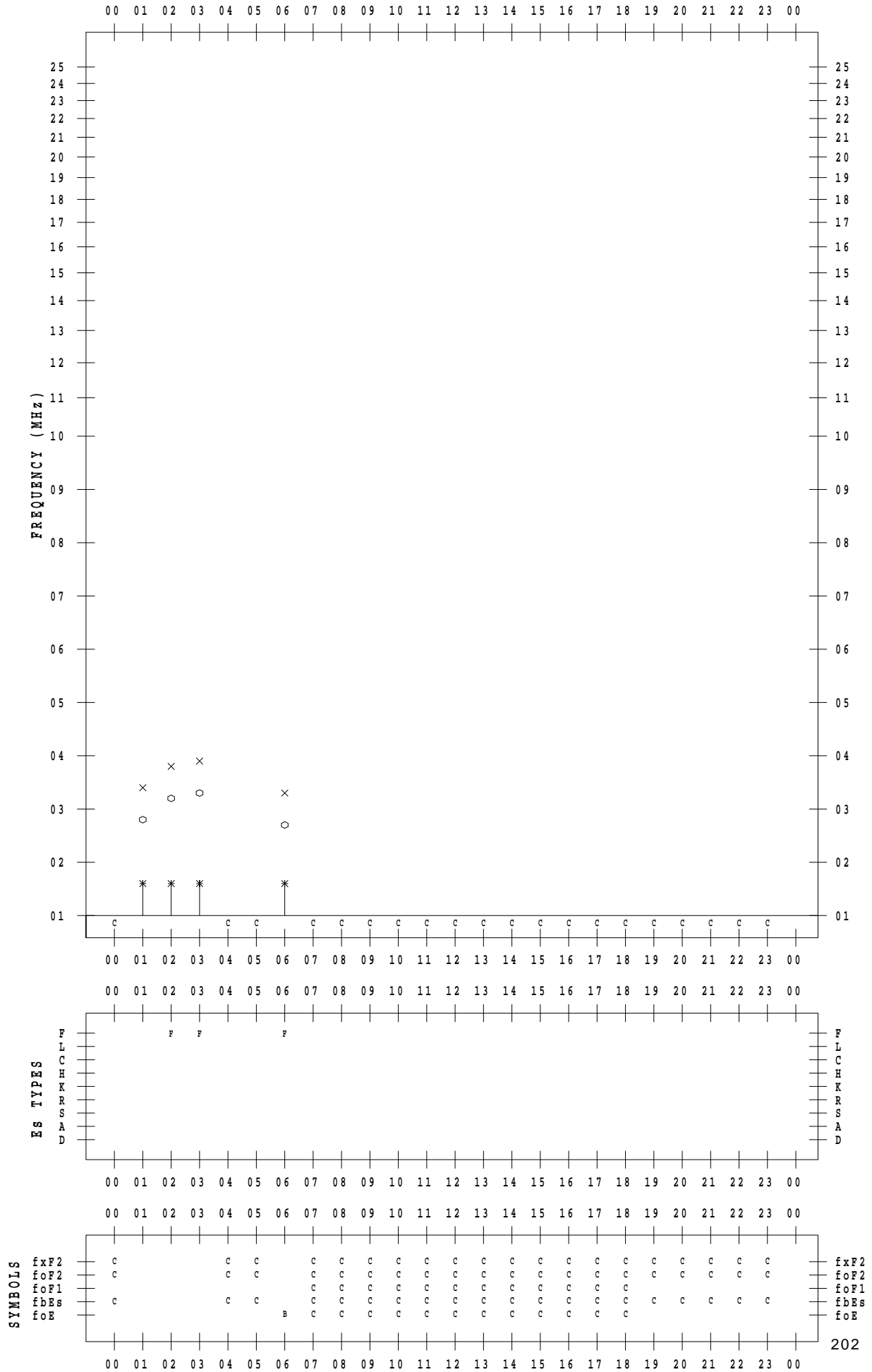
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/ 2

135 ° E MEAN TIME



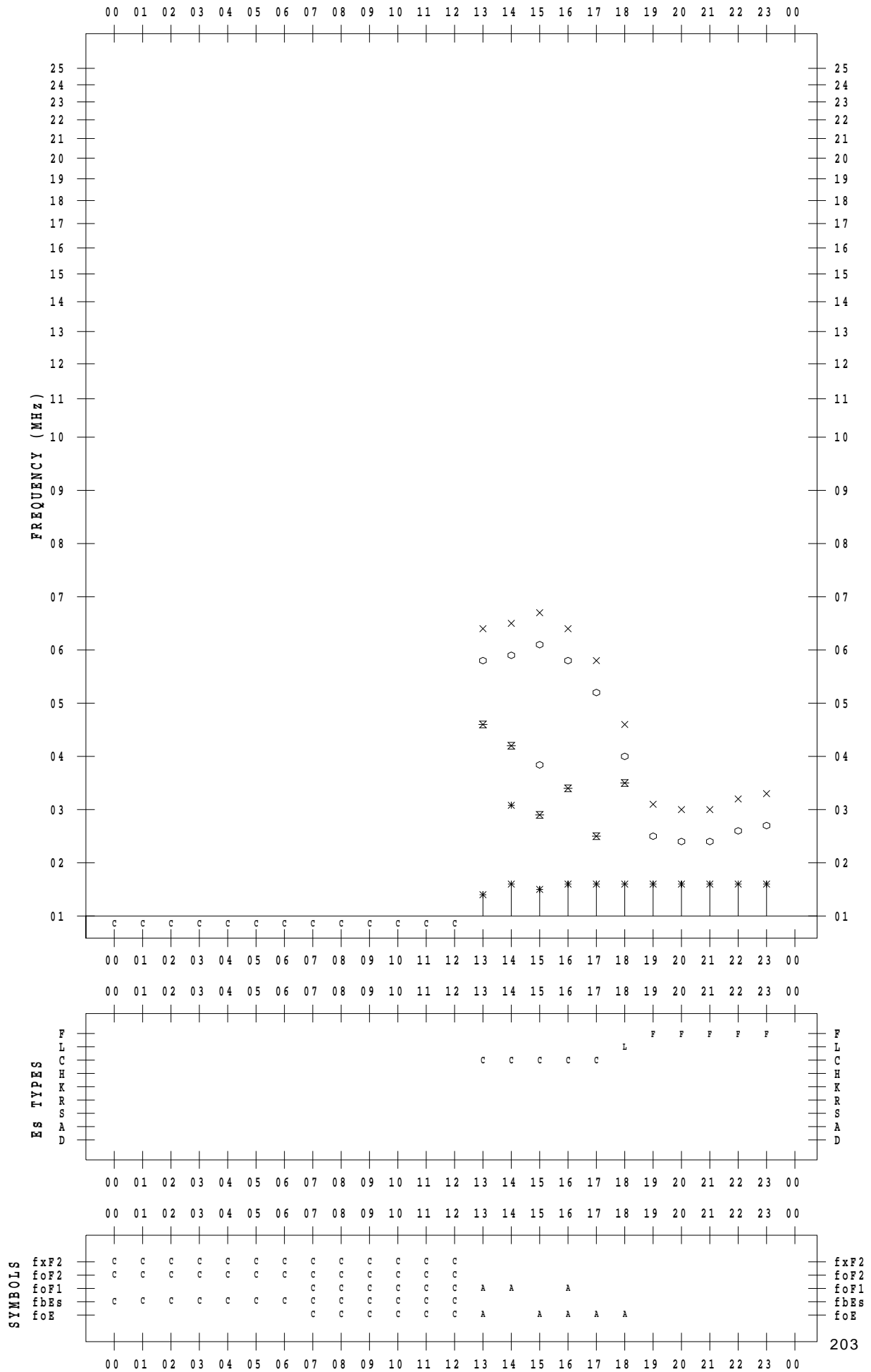
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SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/ 3

135 ° E MEAN TIME



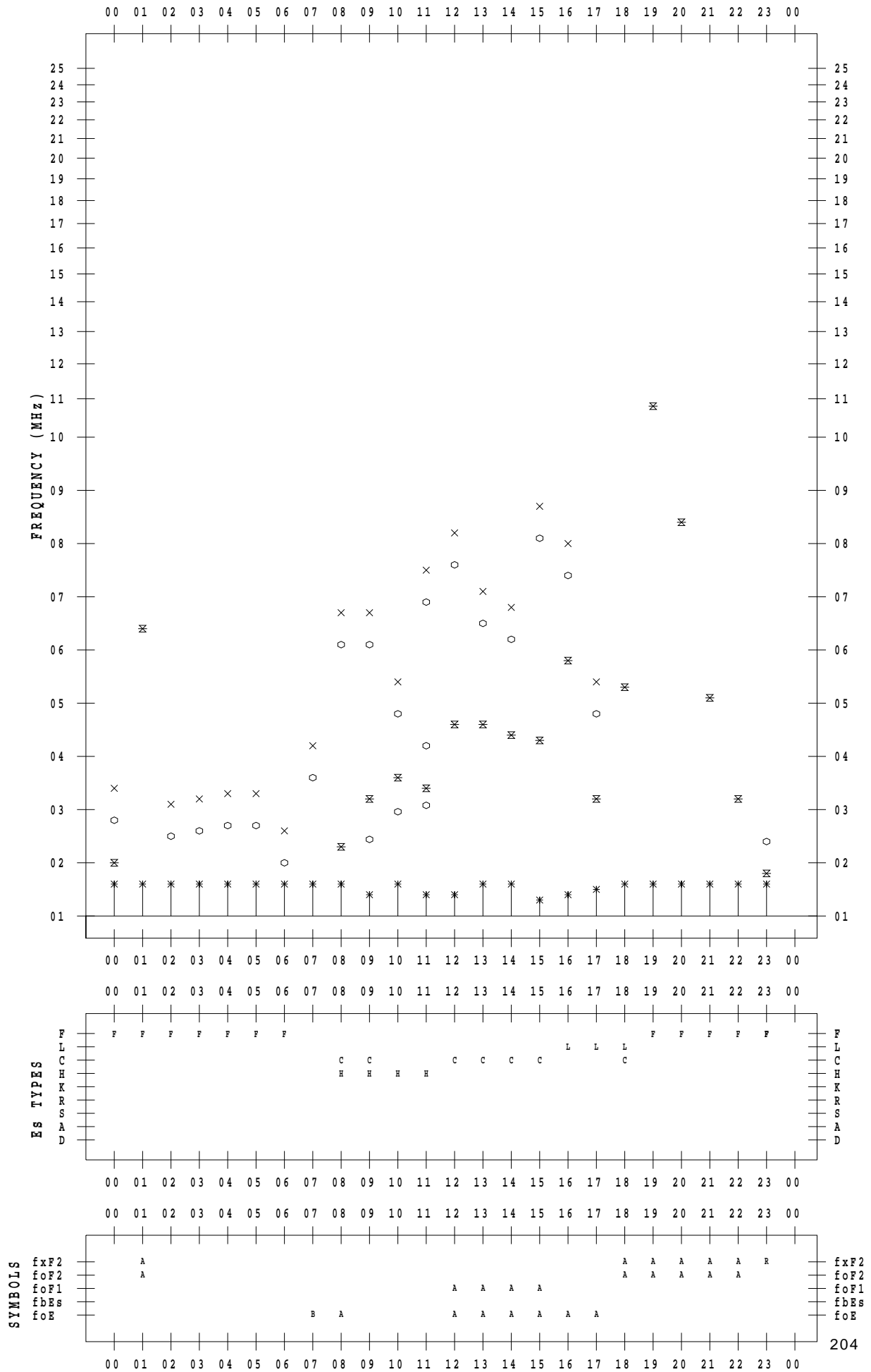
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/ 4

135 ° E MEAN TIME



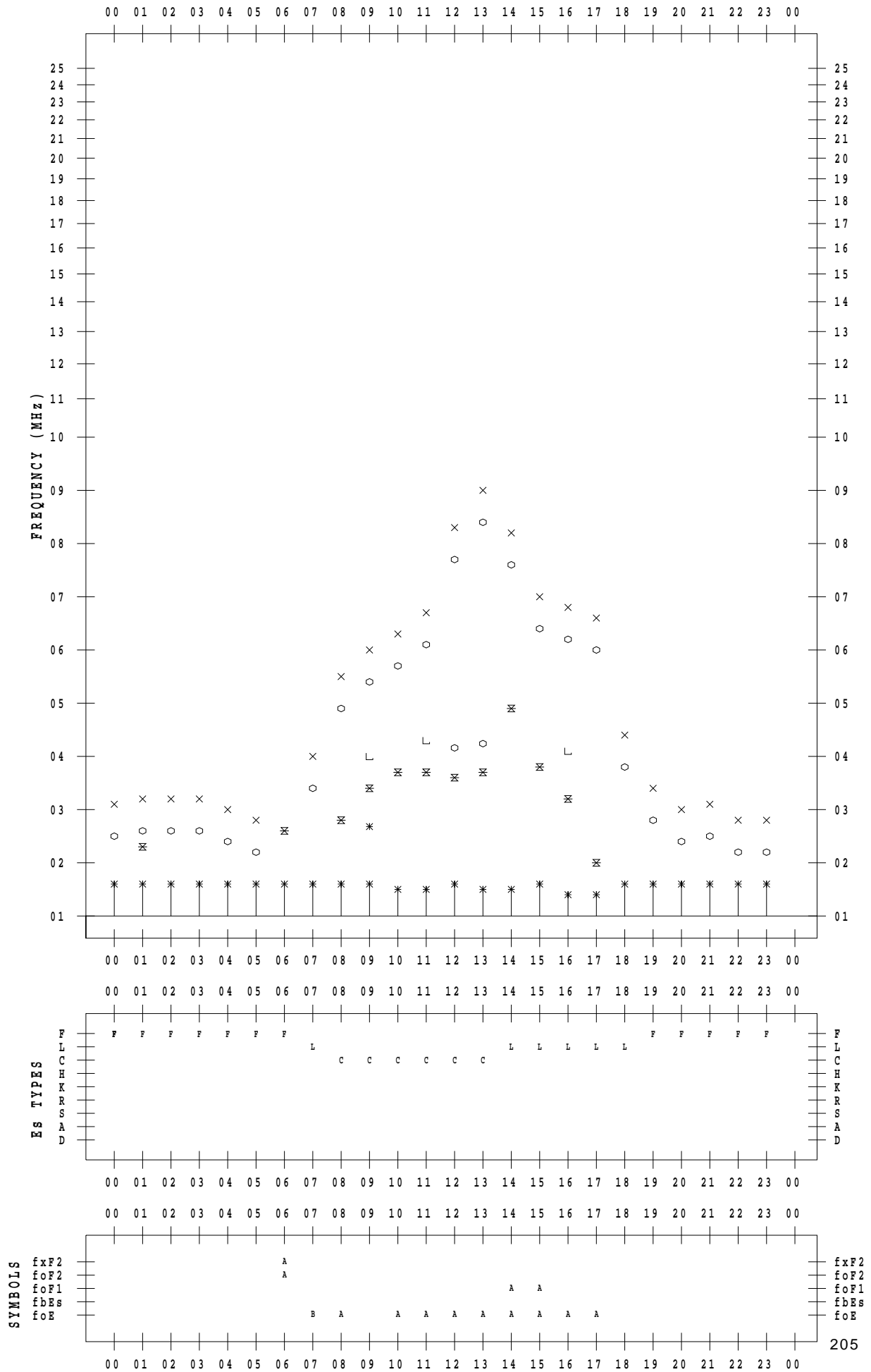
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/ 5

135 ° E MEAN TIME



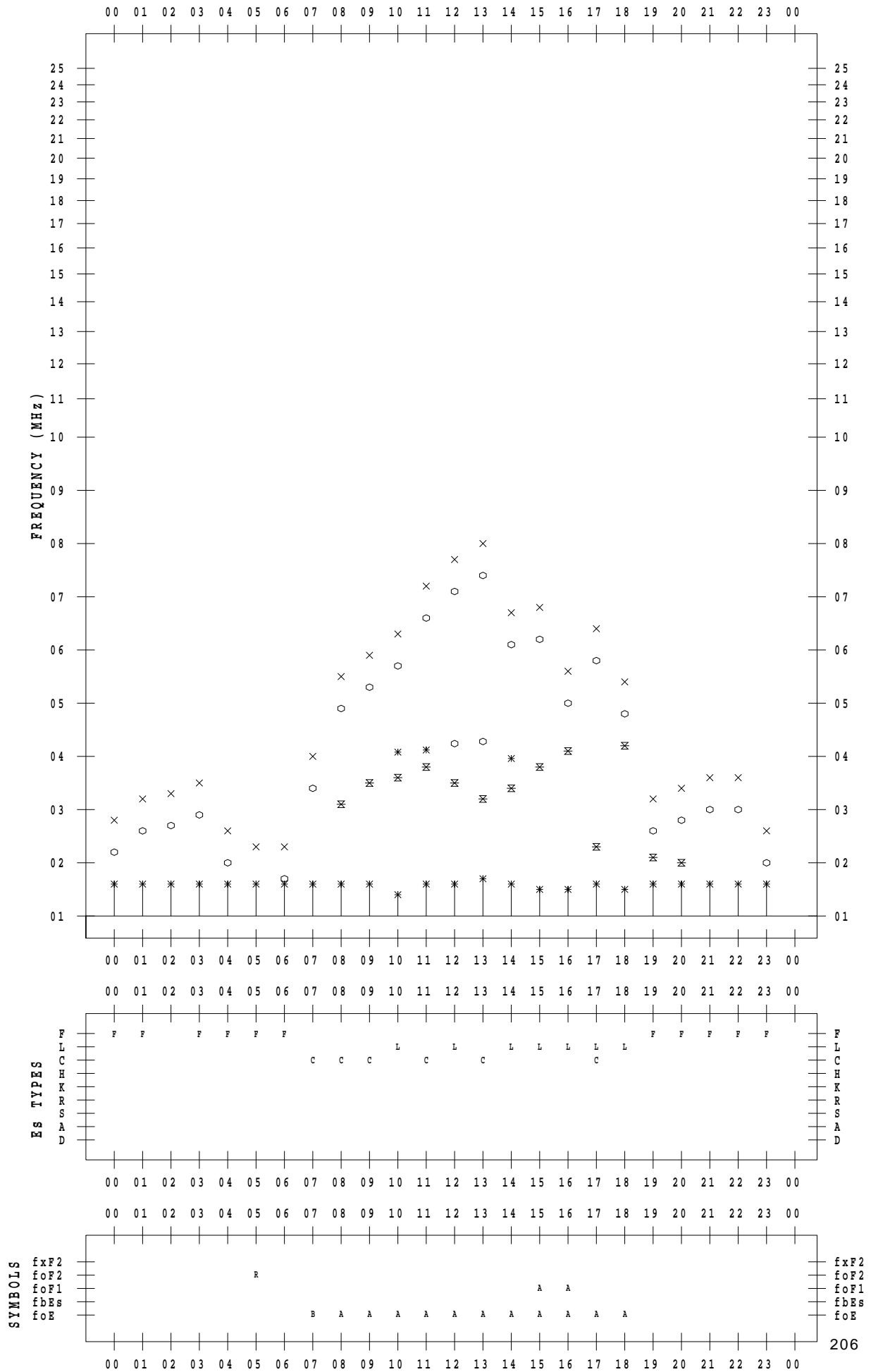
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/ 6

135 ° E MEAN TIME



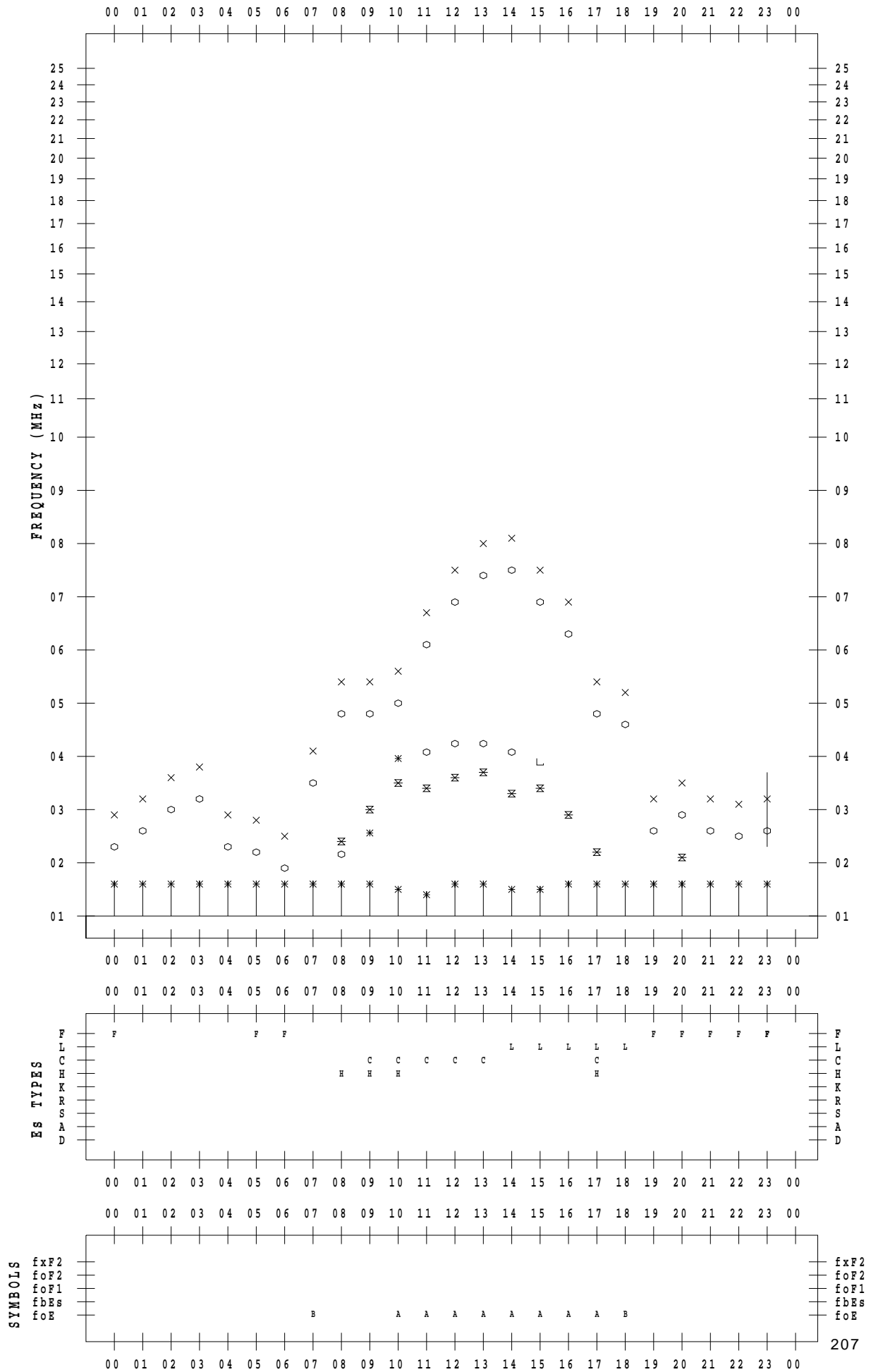
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/7

135 ° E MEAN TIME





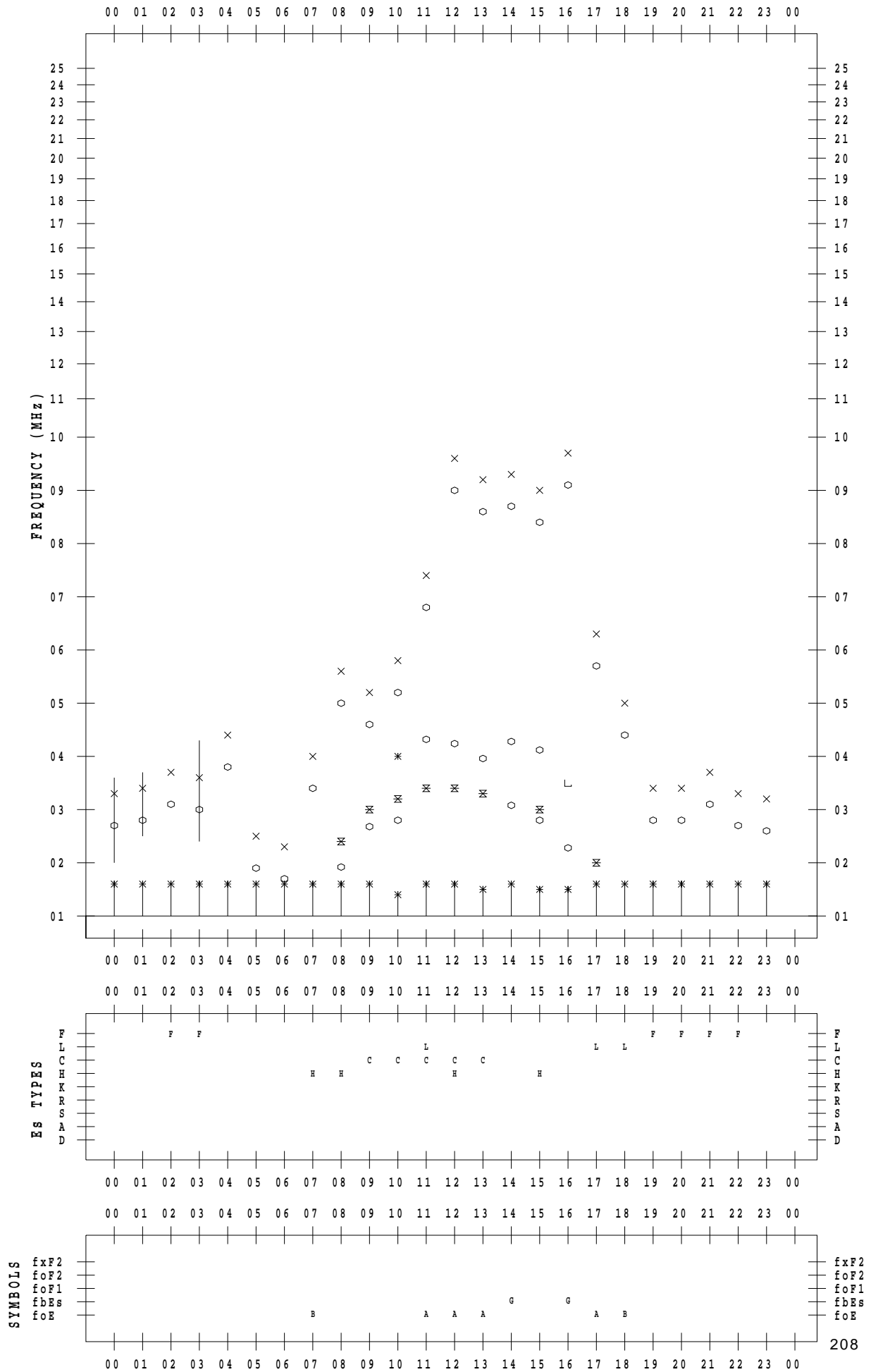
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/ 8

135 ° E MEAN TIME



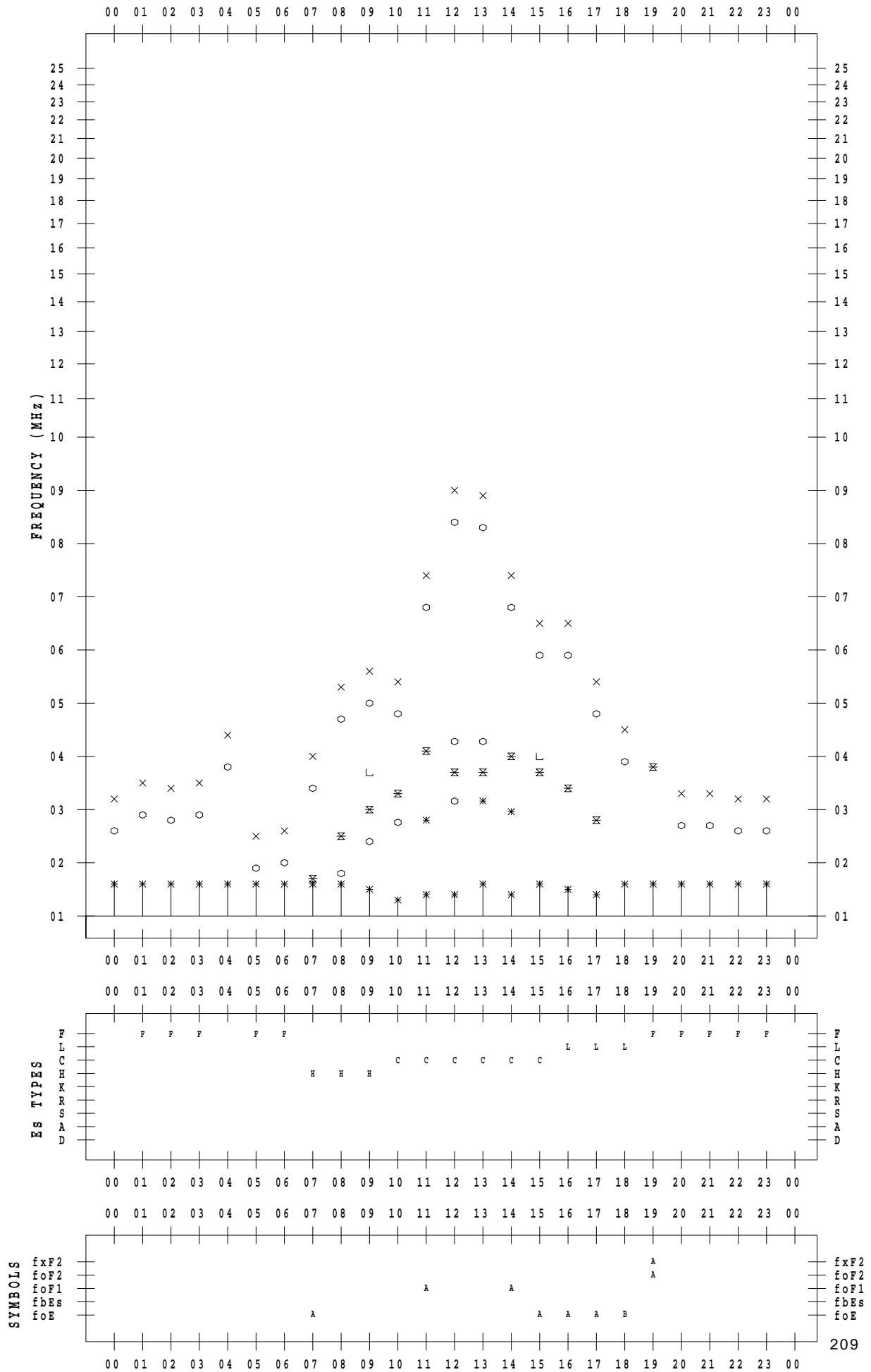
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/ 9

135 ° E MEAN TIME



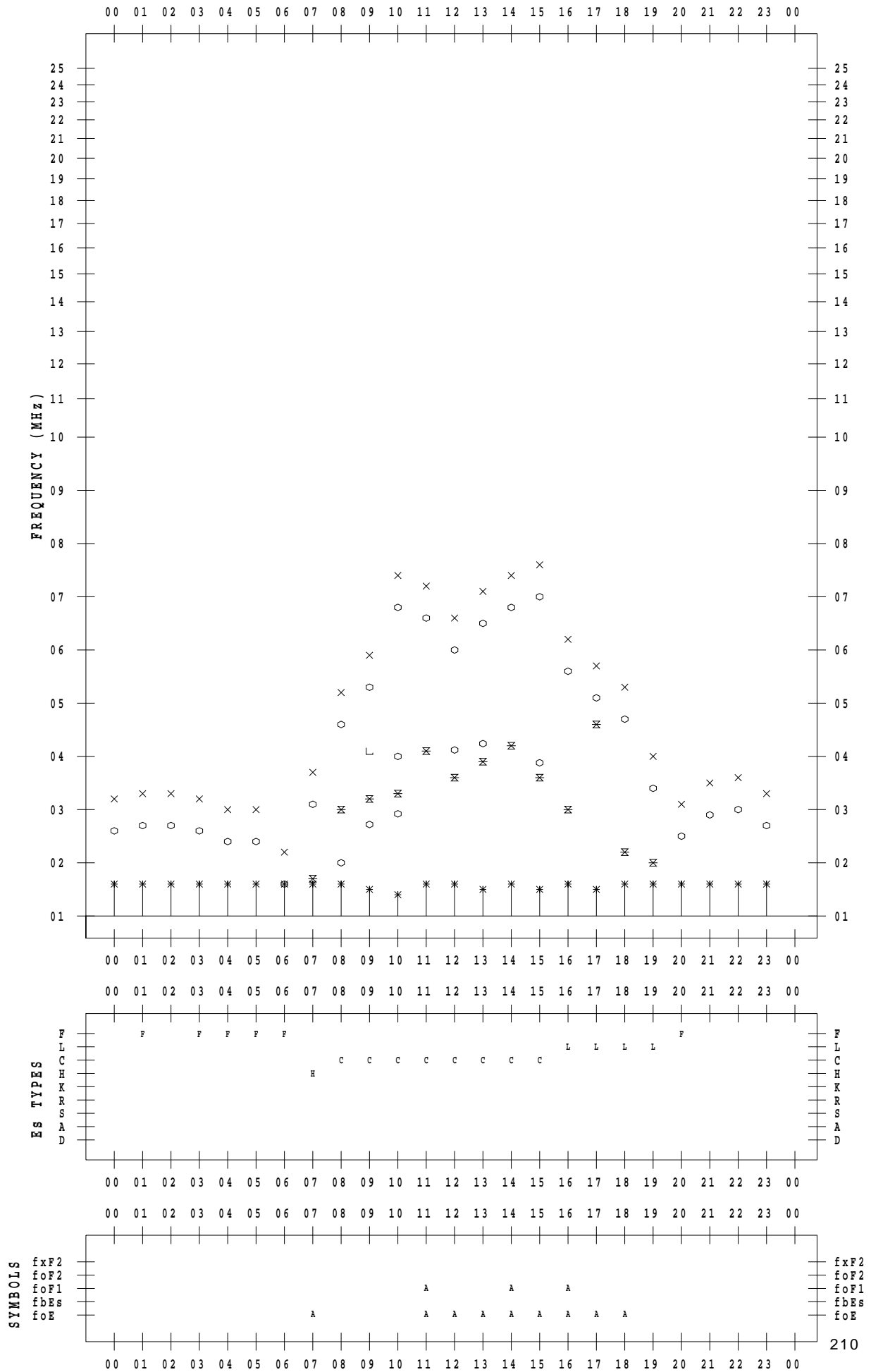
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SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/10

135 ° E MEAN TIME



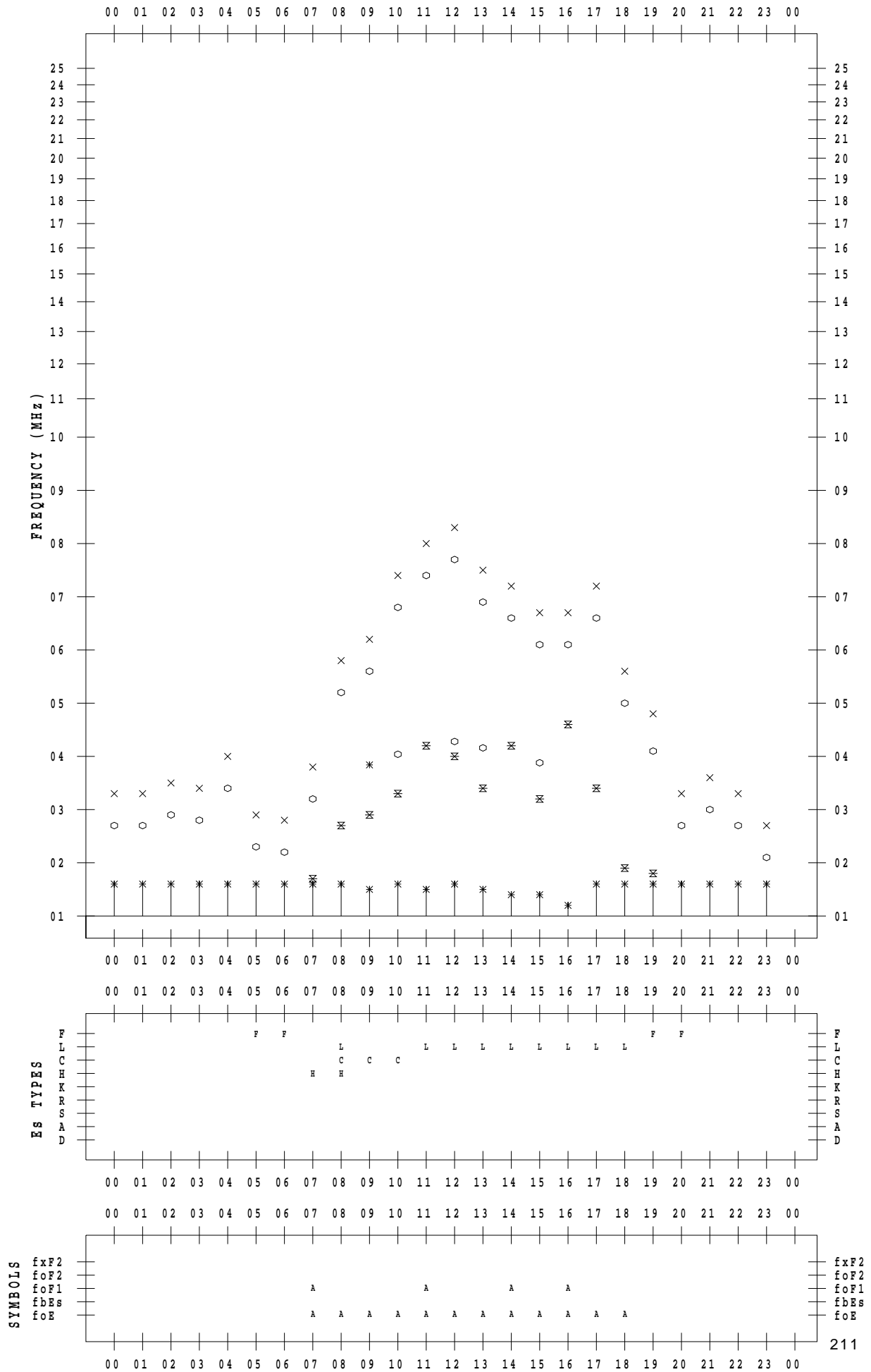
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SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/11

135 ° E MEAN TIME



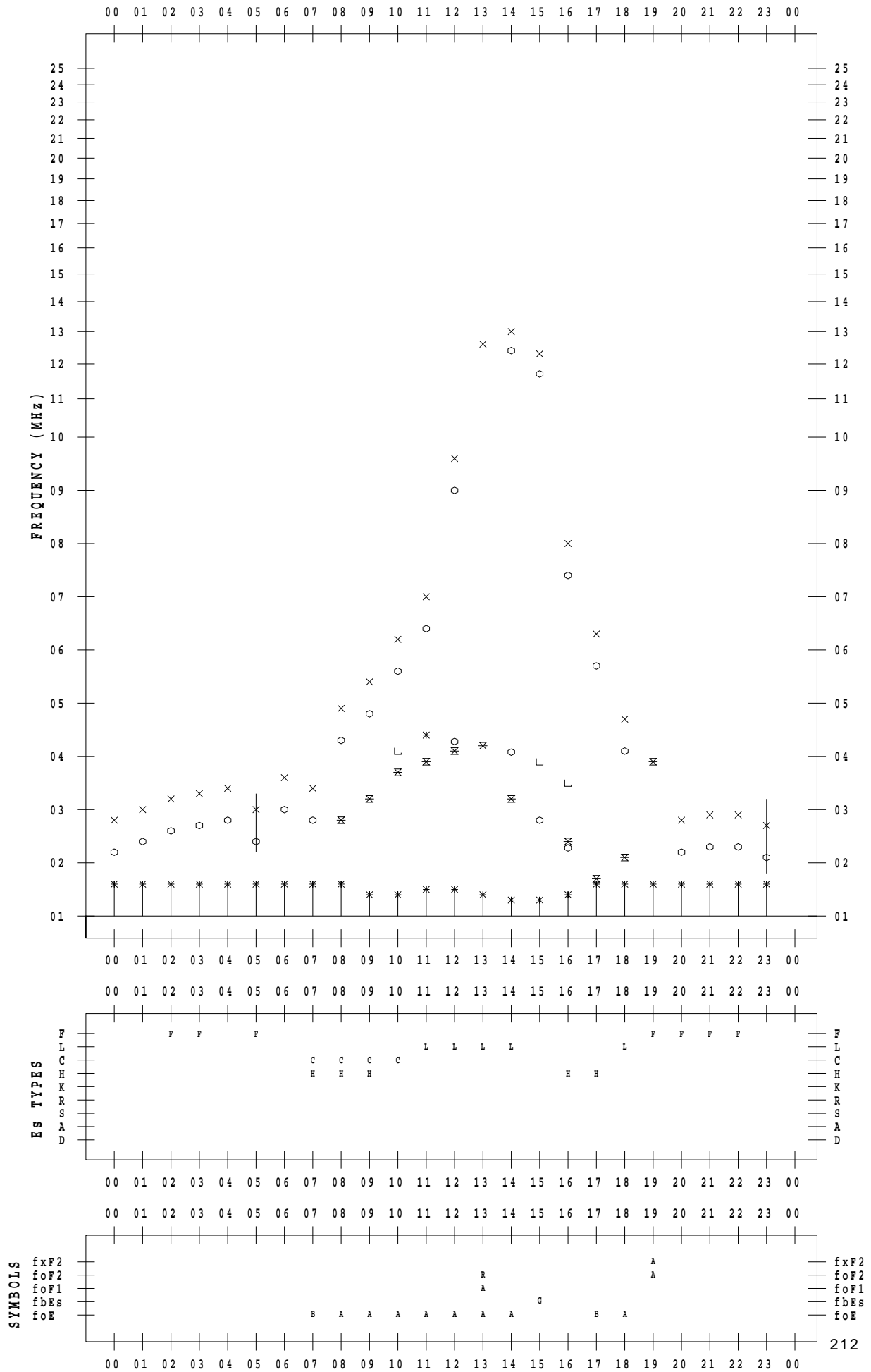
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SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/12

135 ° E MEAN TIME



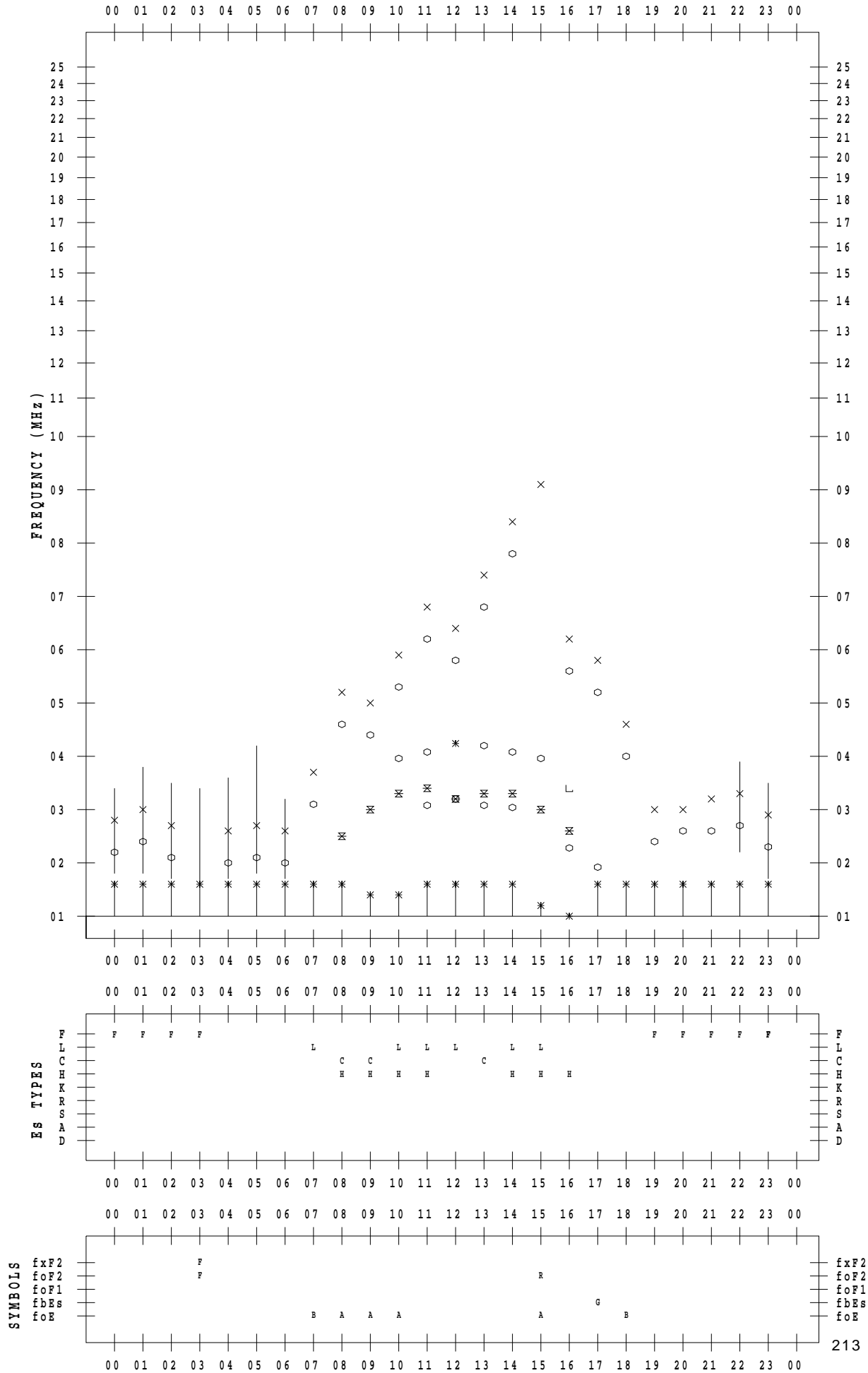
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/13

135 ° E MEAN TIME



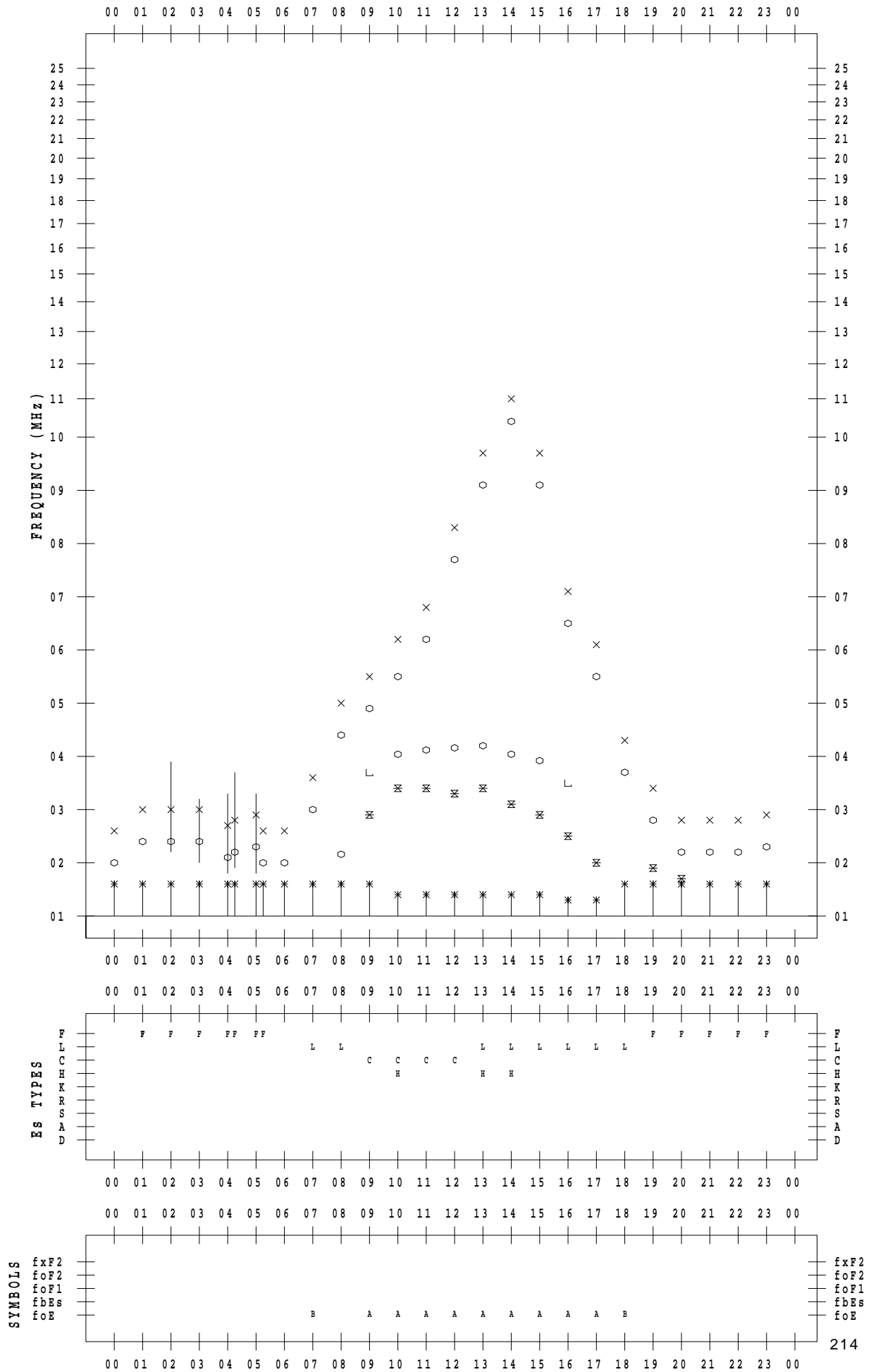
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/14

135 ° E MEAN TIME



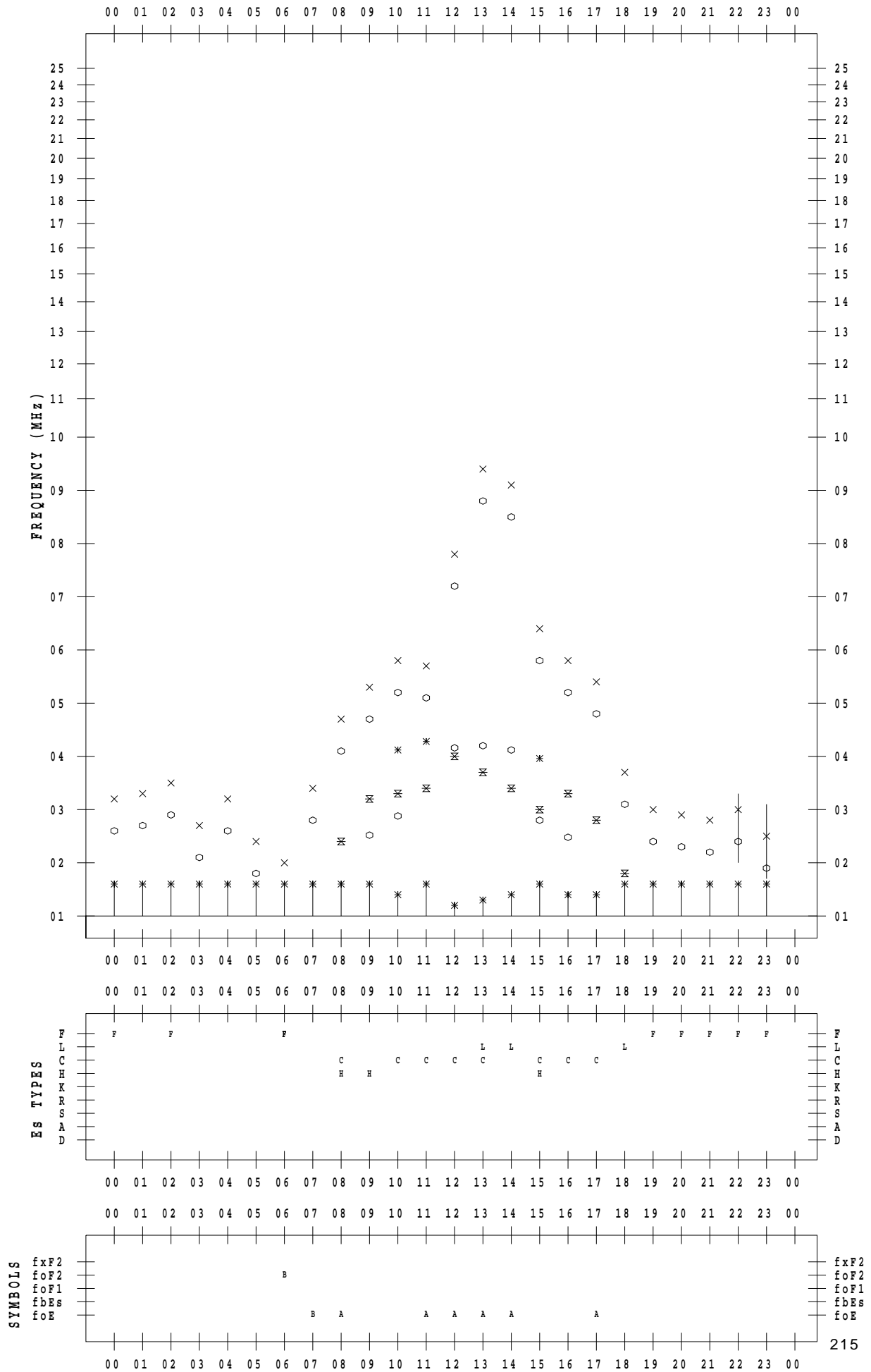
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/15

135 ° E MEAN TIME





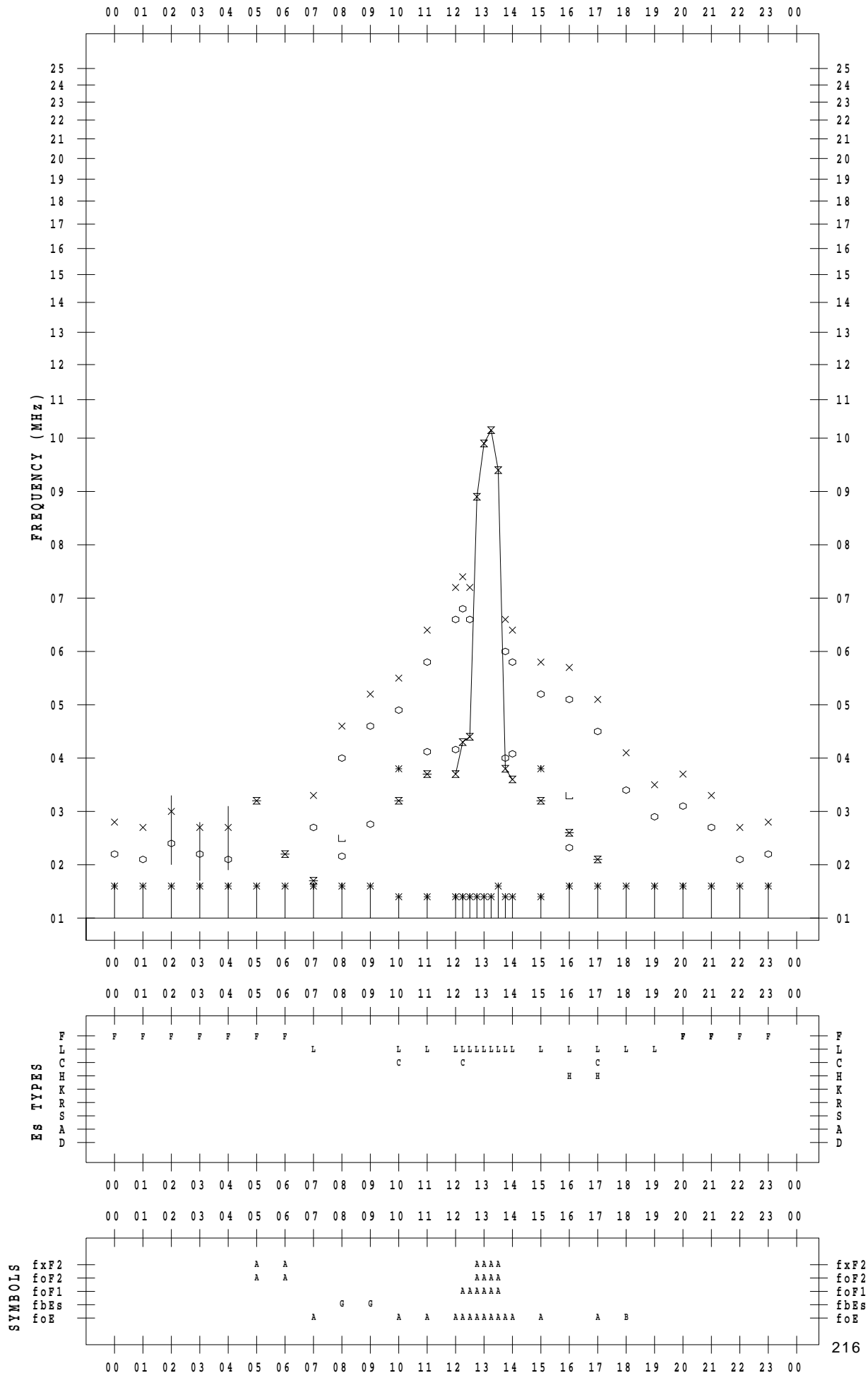
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/16

135 ° E MEAN TIME



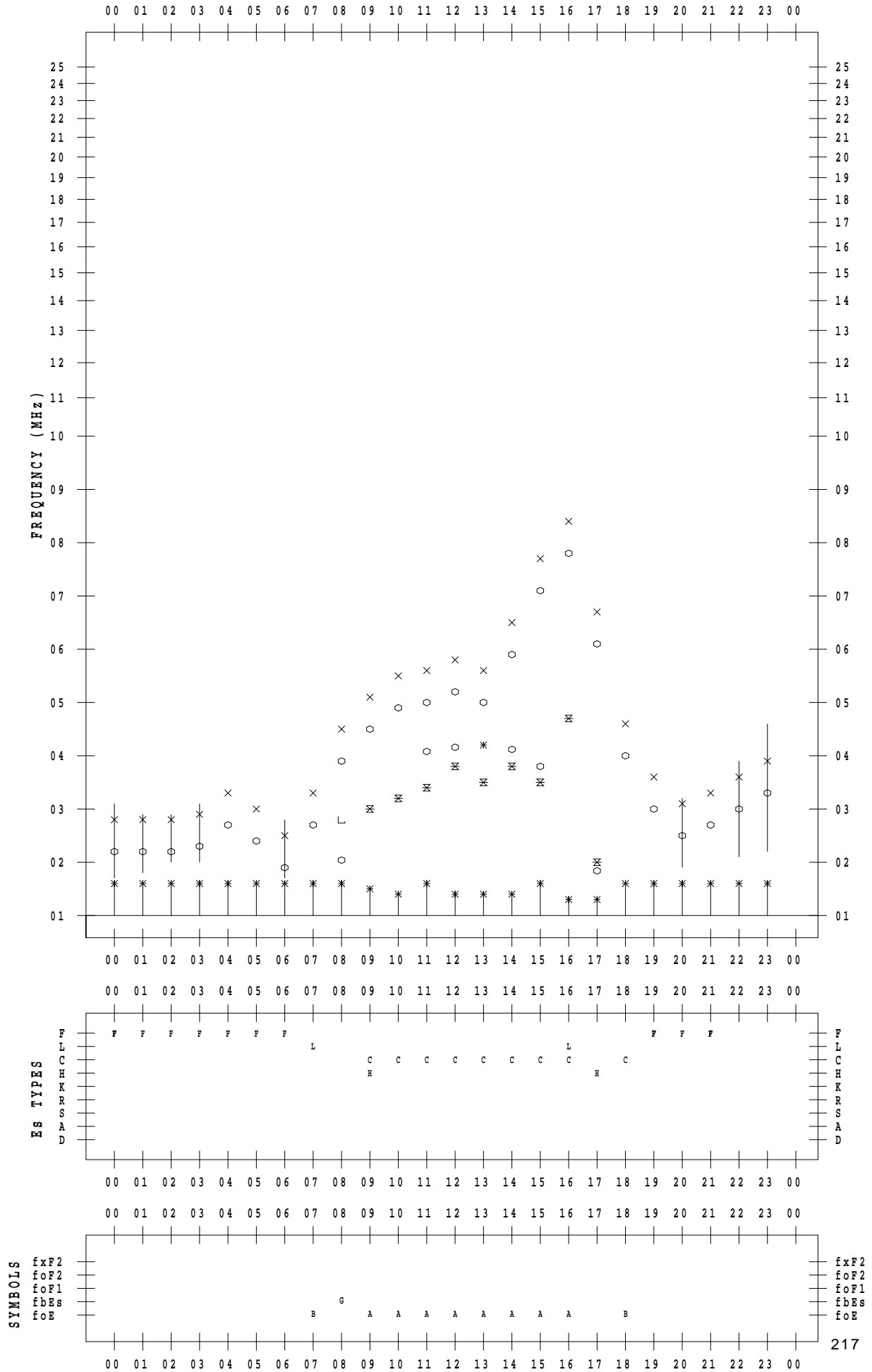
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/17

135 ° E MEAN TIME



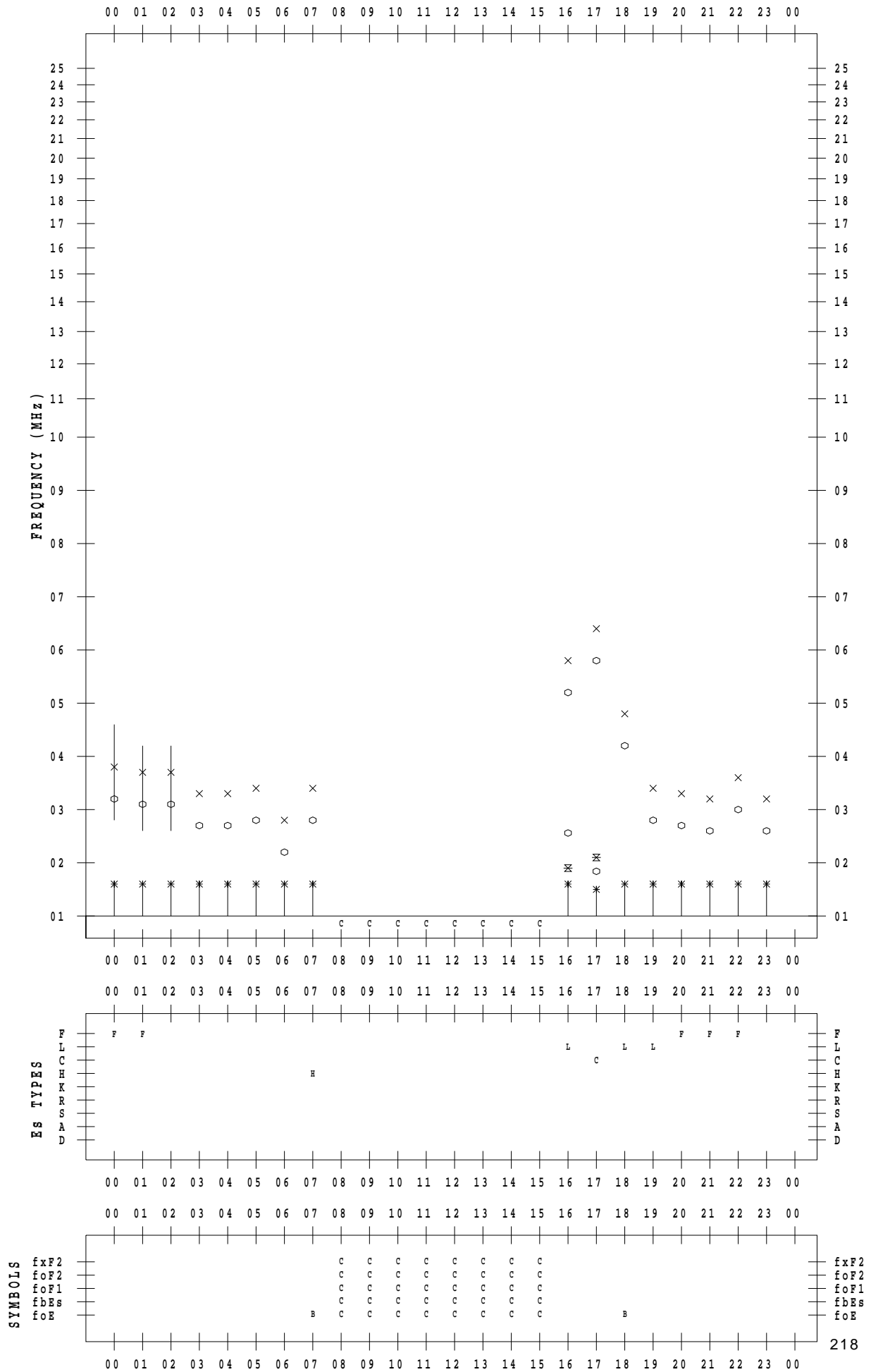
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/18

135 ° E MEAN TIME



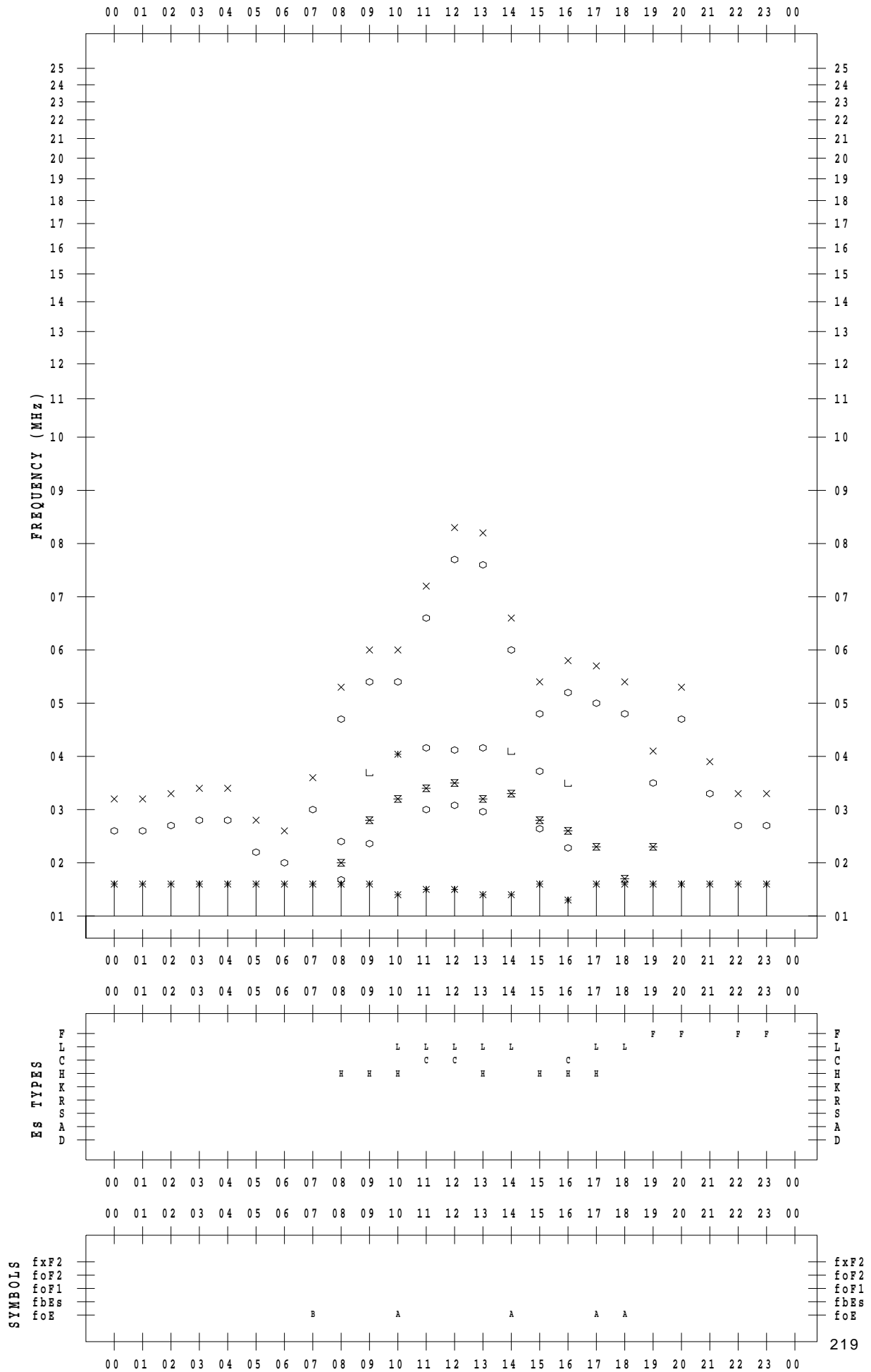
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/19

135 ° E MEAN TIME



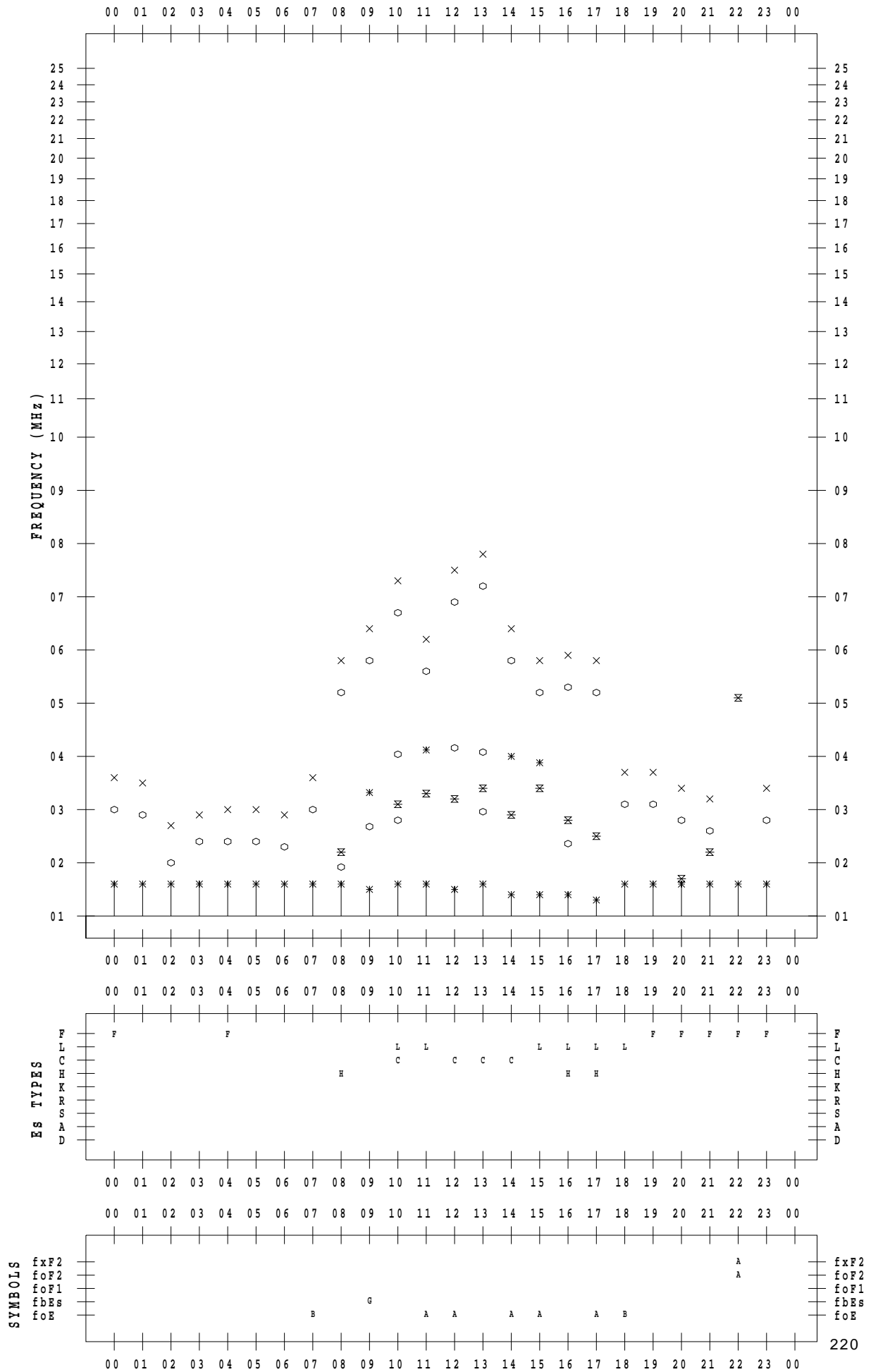
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/20

135 ° E MEAN TIME



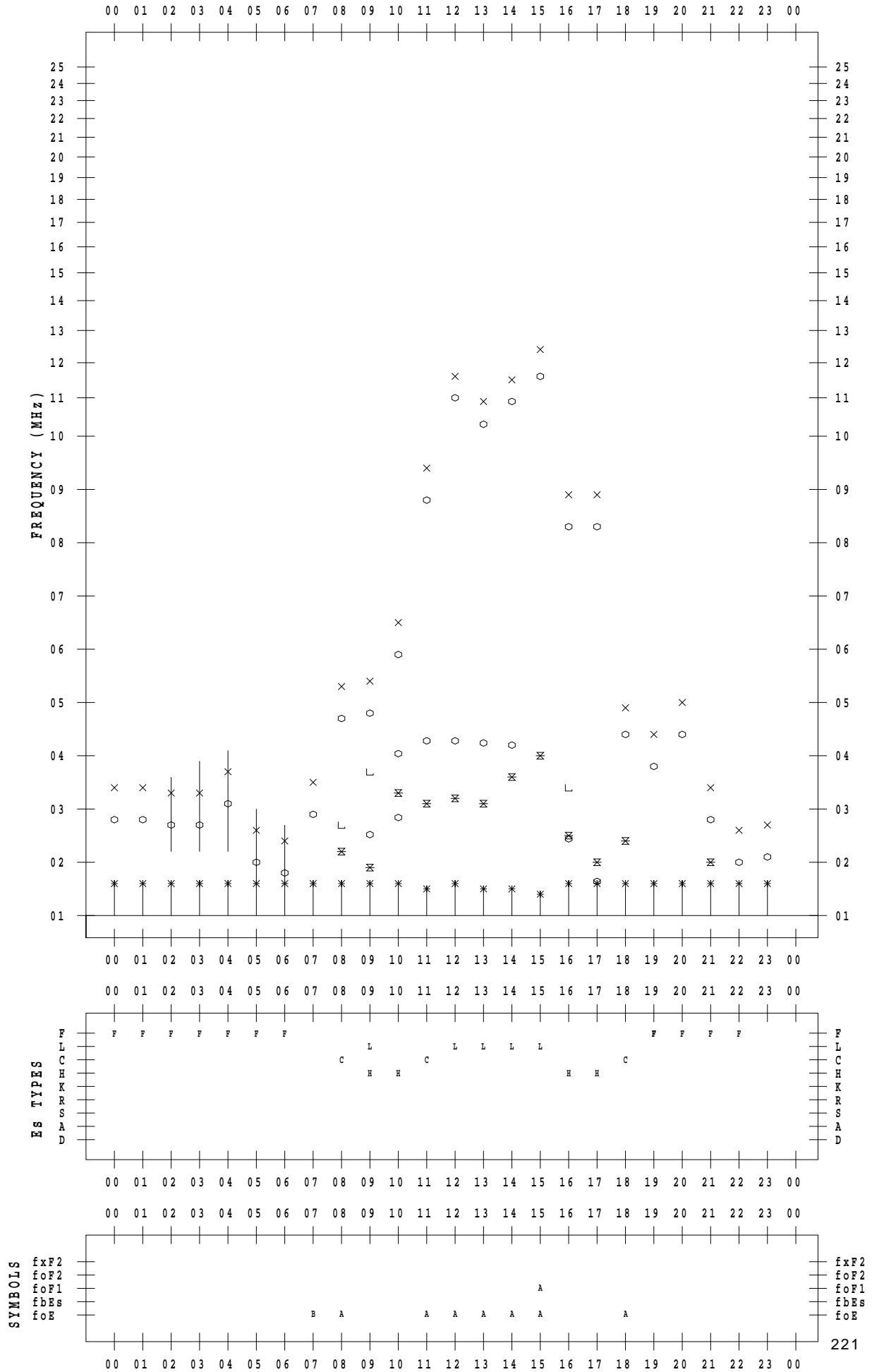
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/21

135 ° E MEAN TIME



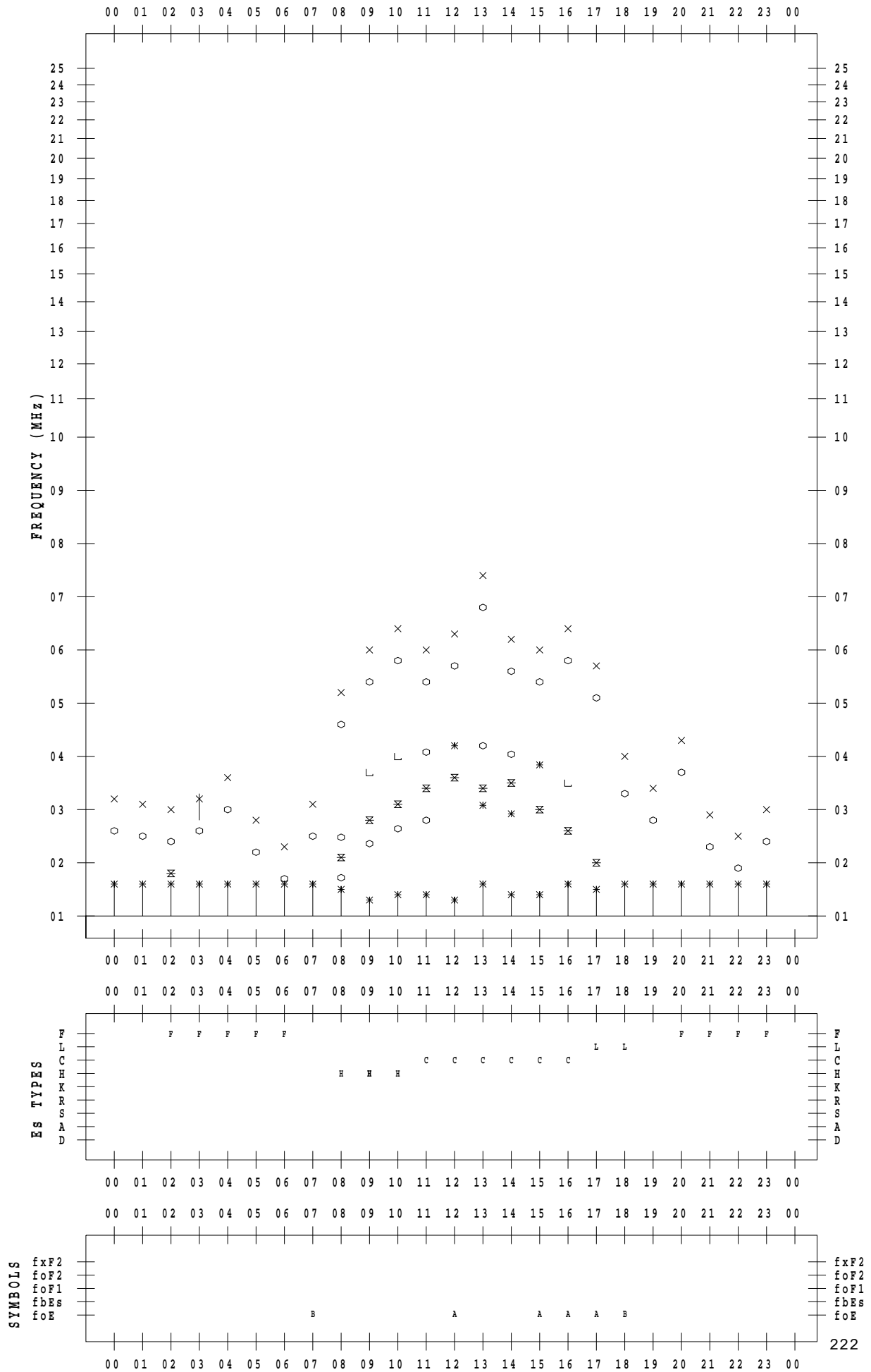
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/22

135 ° E MEAN TIME



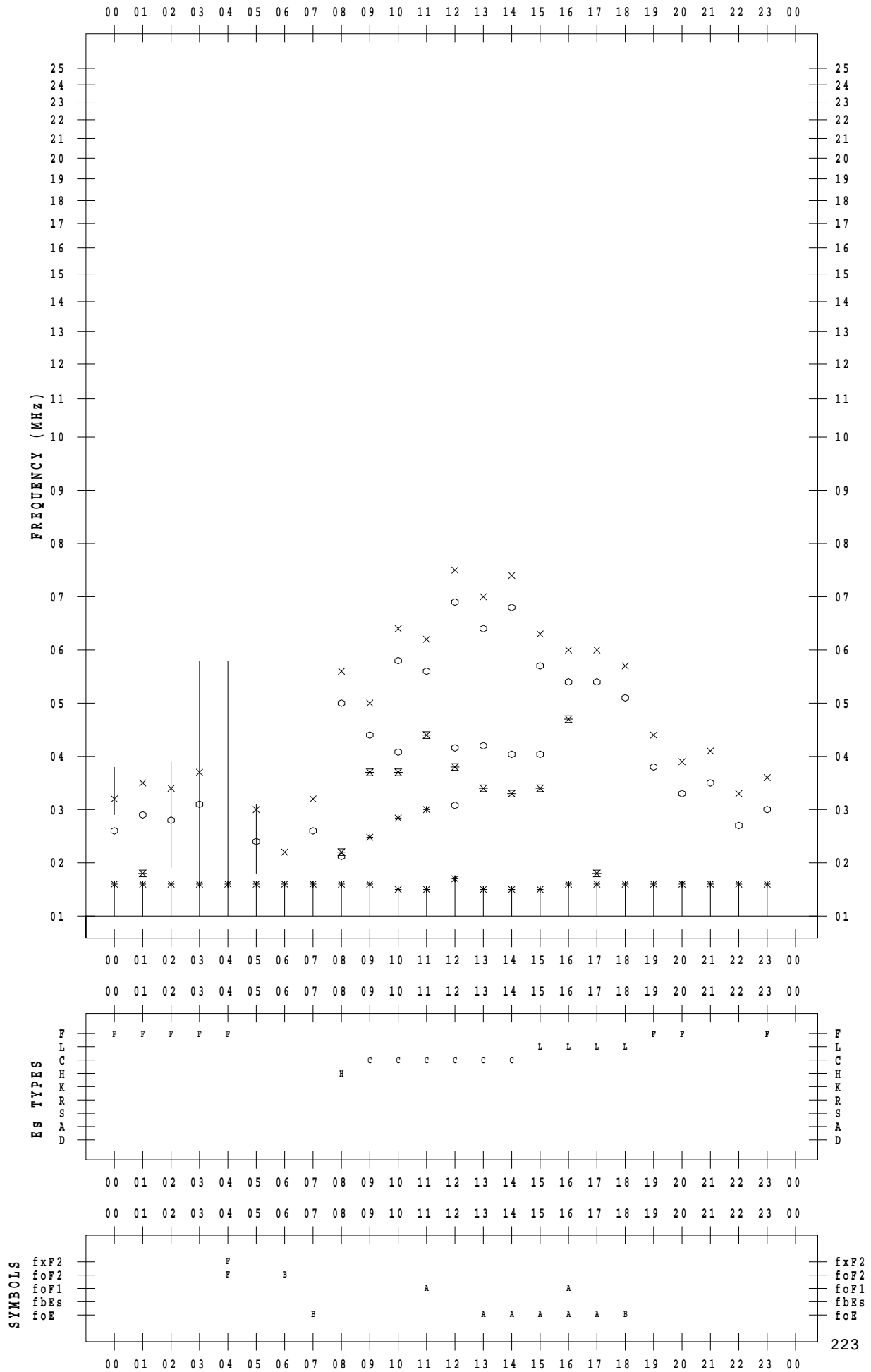
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/23

135 ° E MEAN TIME





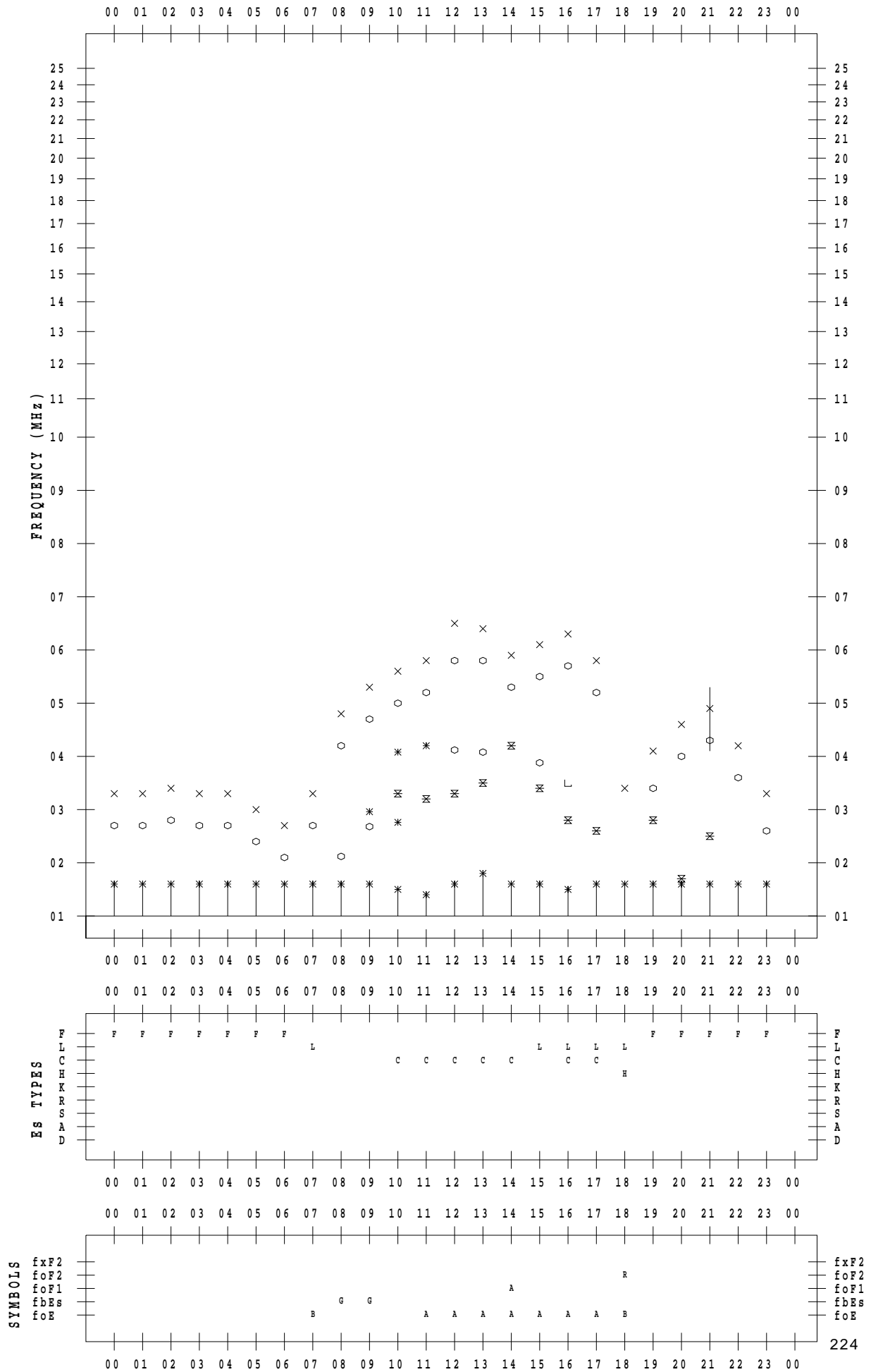
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/24

135 ° E MEAN TIME



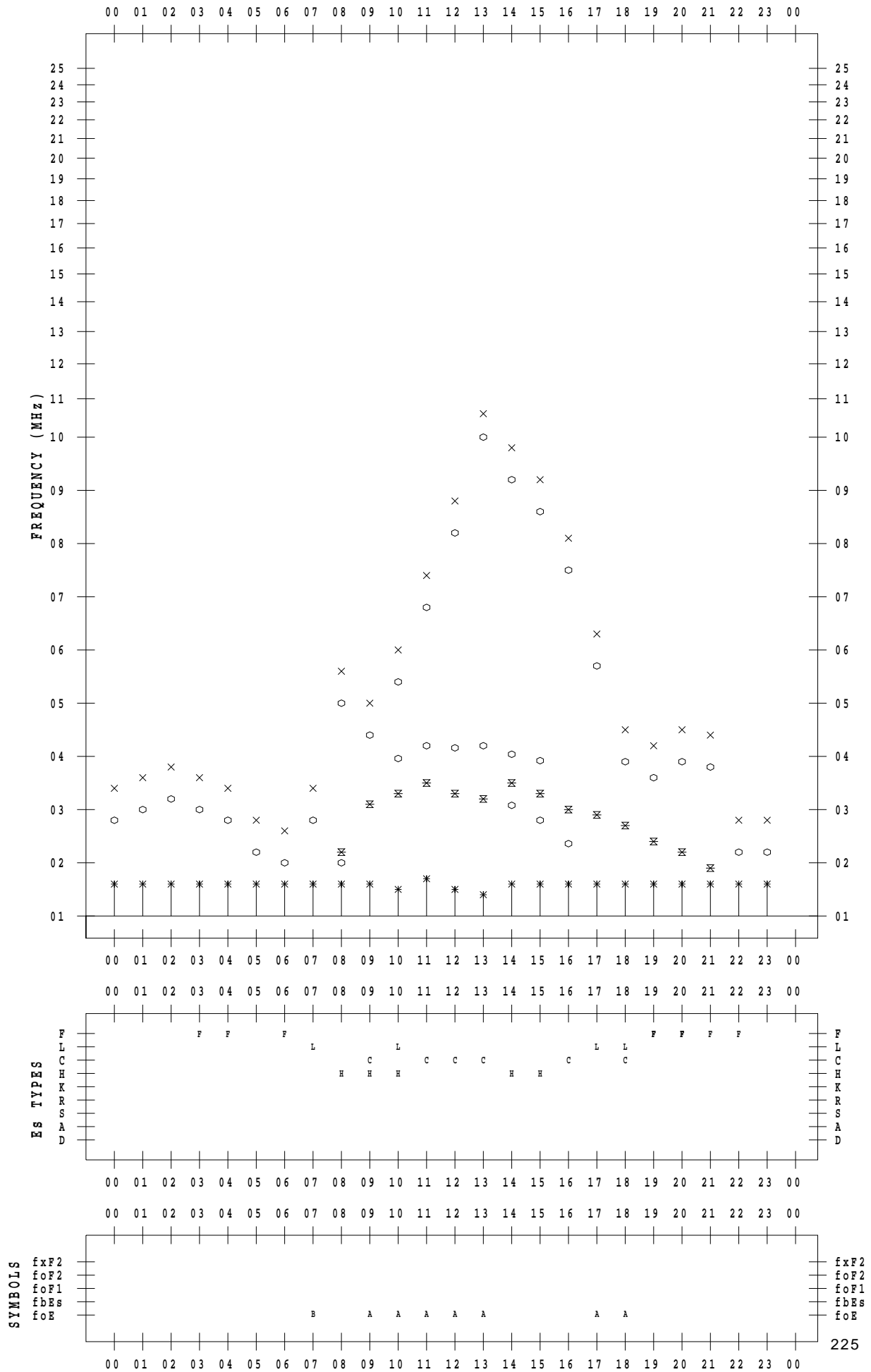
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/25

135 ° E MEAN TIME



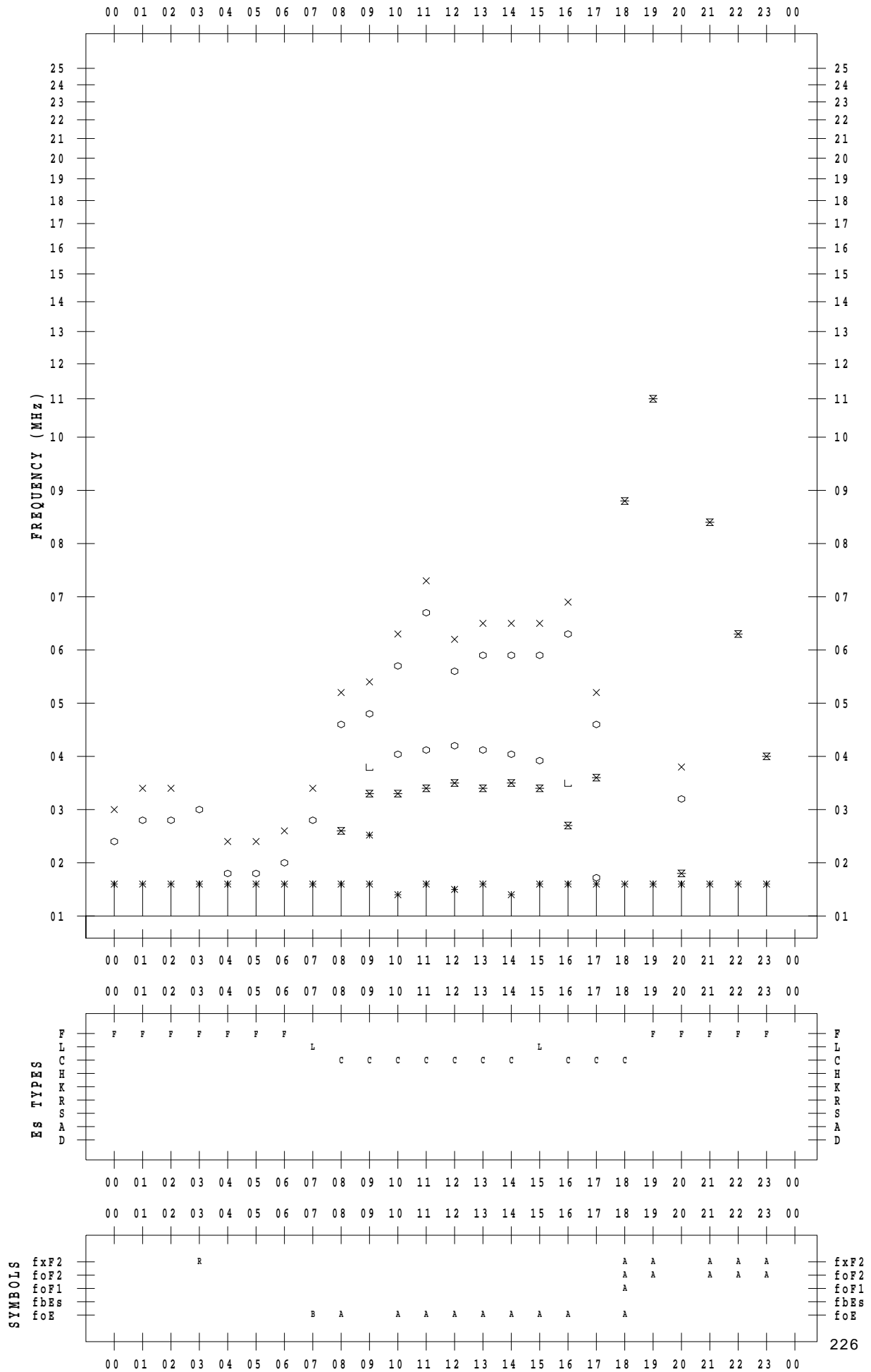
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/26

135 ° E MEAN TIME



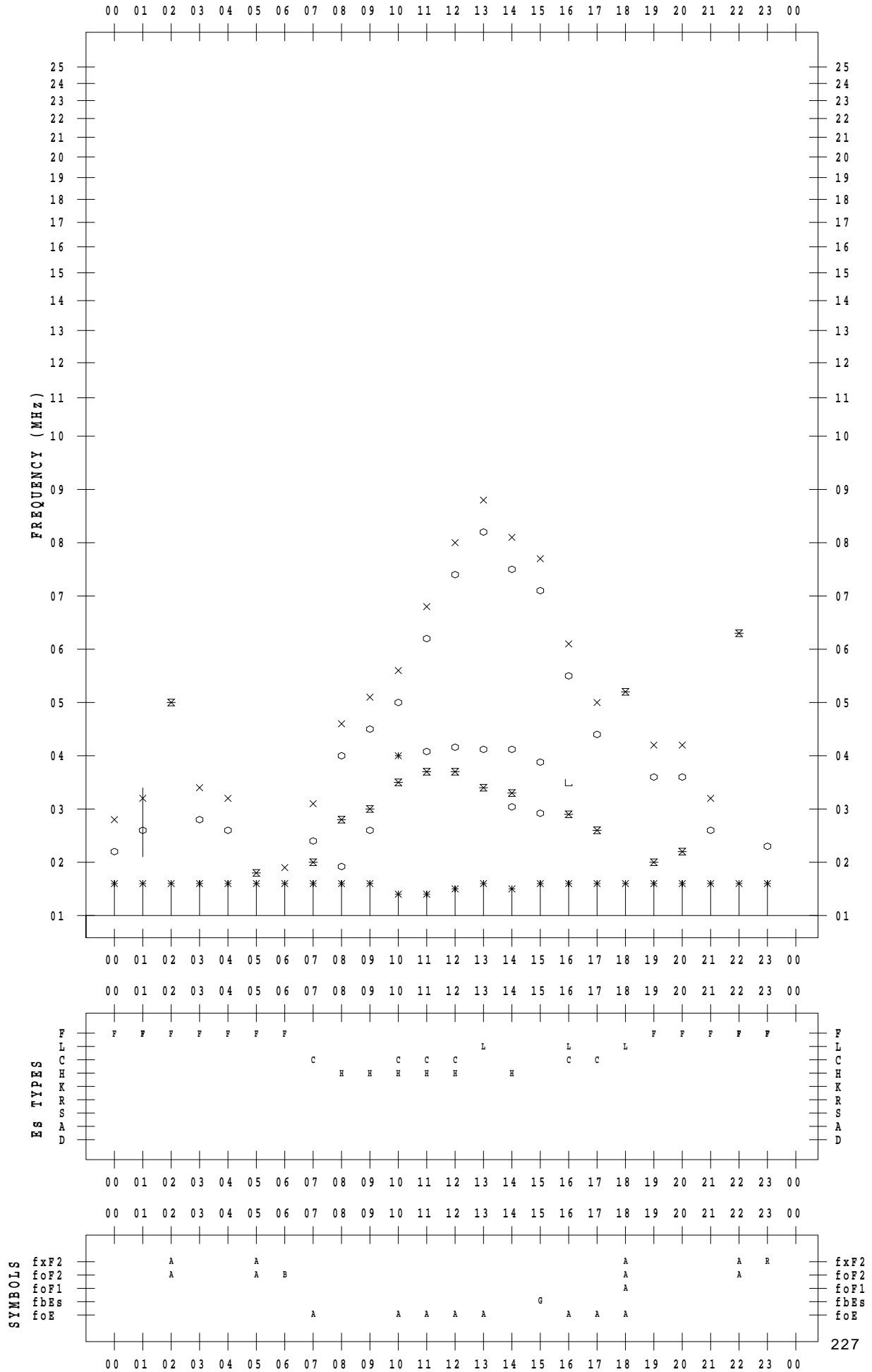
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/27

135 ° E MEAN TIME



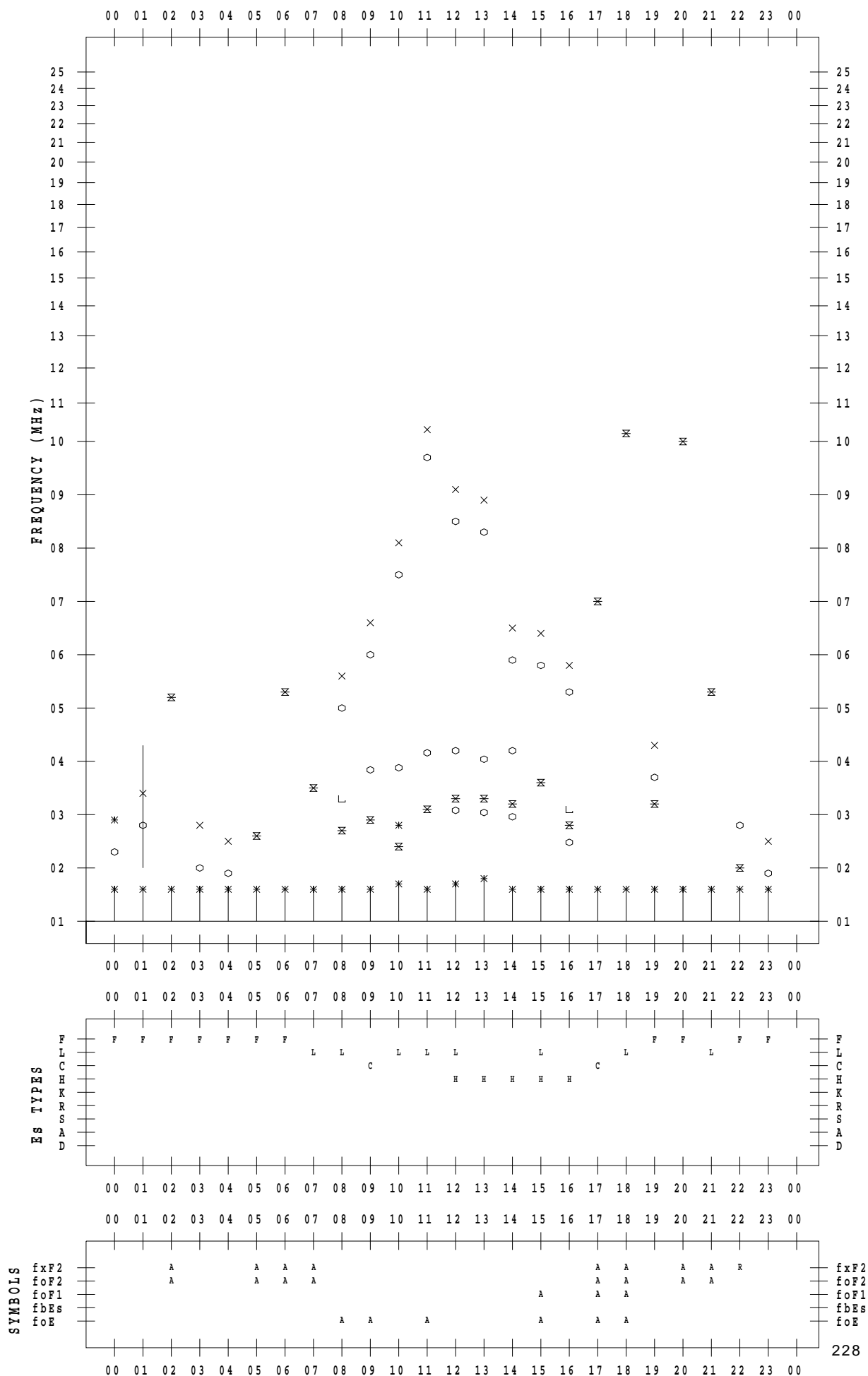
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/28

135 ° E MEAN TIME



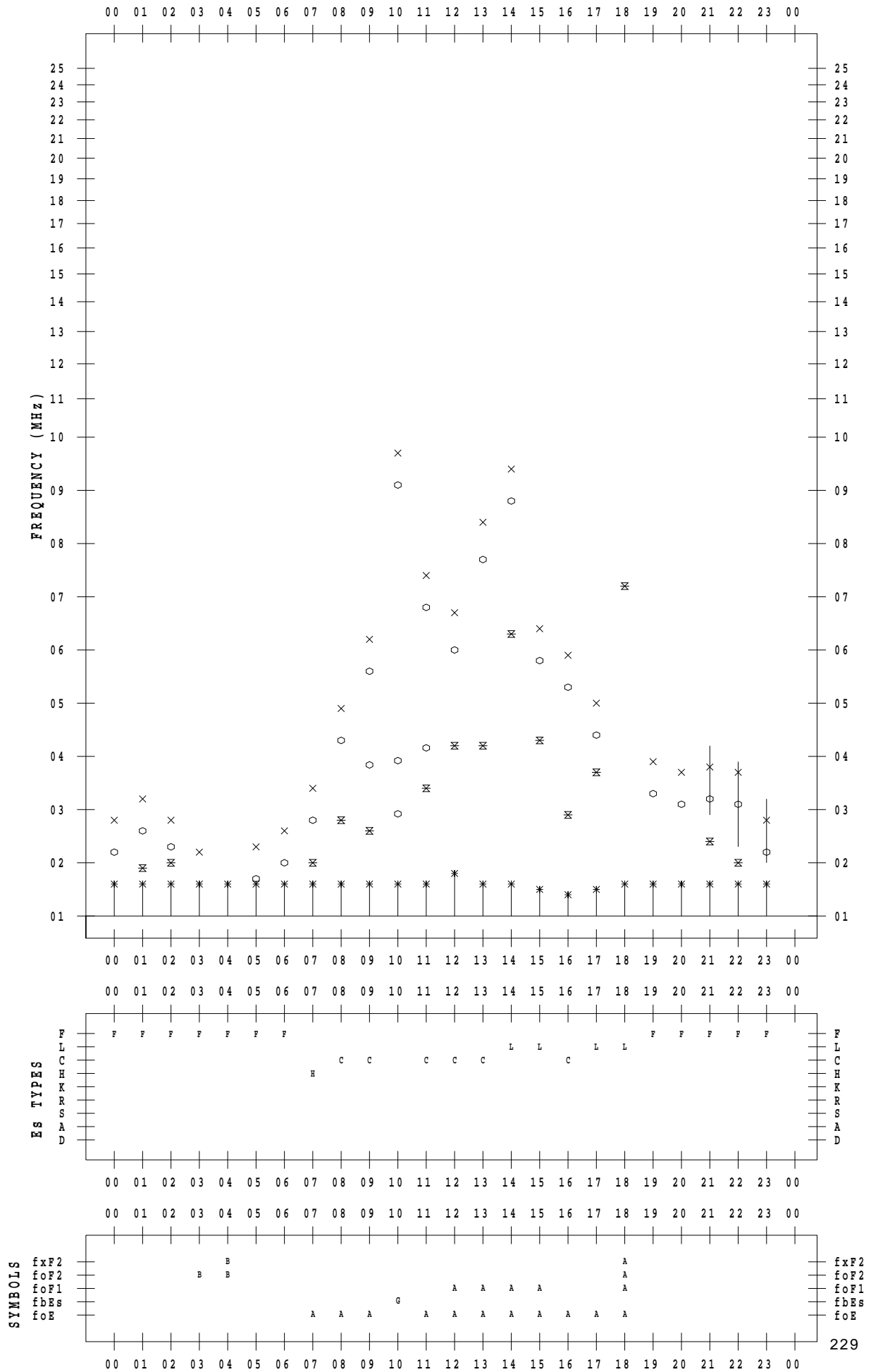
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/29

135 ° E MEAN TIME



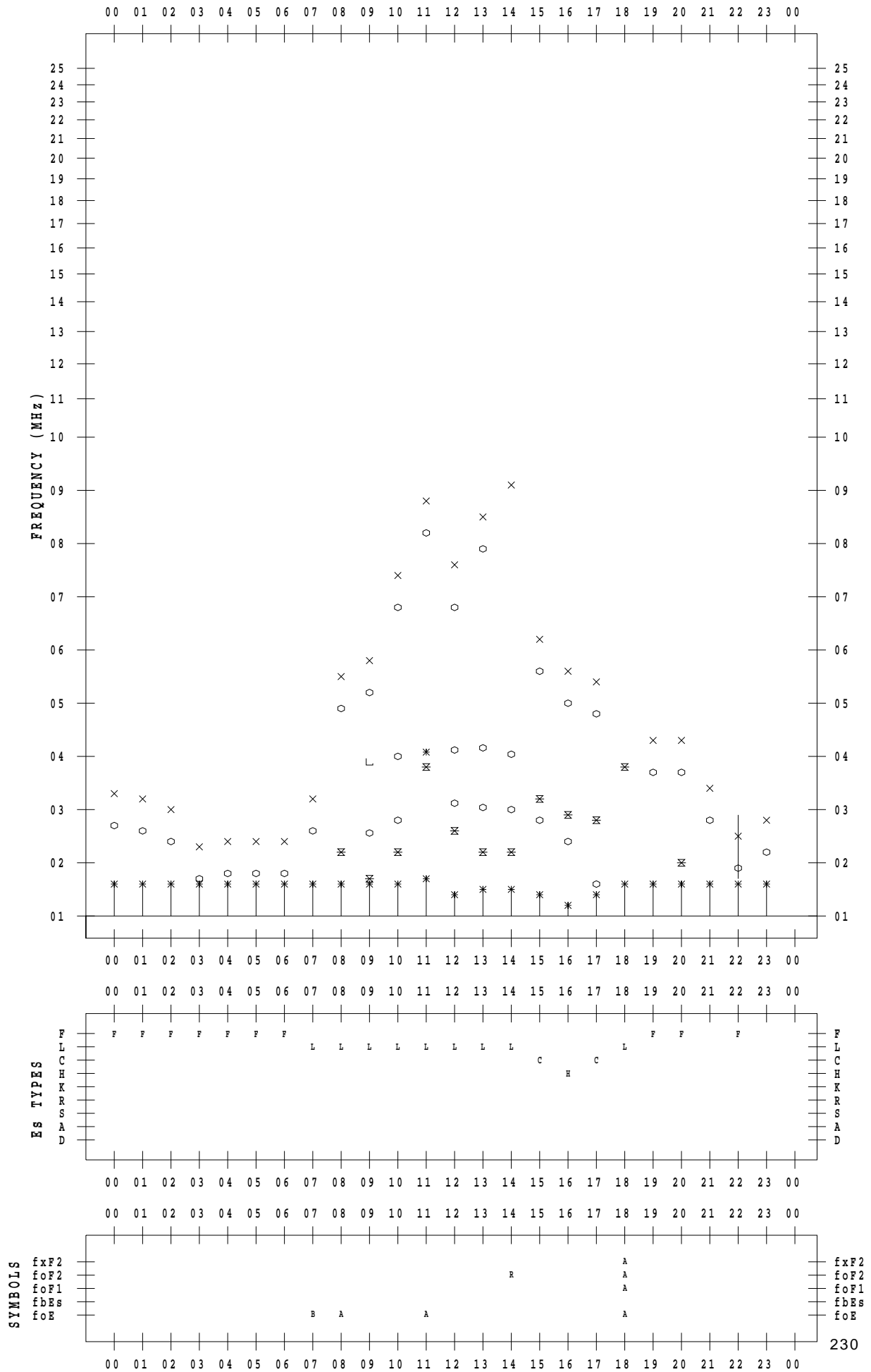
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/30

135 ° E MEAN TIME



# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2018/12/31

135 ° E MEAN TIME

