

# IONOSPHERIC DATA IN JAPAN

FOR December 2022

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NATIONAL INSTITUTE OF INFORMATION  
AND COMMUNICATIONS TECHNOLOGY  
TOKYO, JAPAN

# INTRODUCTION

This Series contains data on ionosphere obtained at the following stations under the National Institute of Information

and Communications Technology, Japan.

| Stations            | Geographic (WGS84) |           | Geomagnetic (IGRF-13 (2022)) |           | Technical Method  |
|---------------------|--------------------|-----------|------------------------------|-----------|-------------------|
|                     | Latitude           | Longitude | Latitude                     | Longitude |                   |
| *Wakkanai/Sarobetsu | 45°10'N            | 141°45'E  | 37.1°N                       | 149.9°W   | Vertical Sounding |
| Kokubunji           | 35°43'N            | 139°29'E  | 27.5°N                       | 150.8°W   | Vertical Sounding |
| Yamagawa            | 31°12'N            | 130°37'E  | 22.4°N                       | 158.5°W   | Vertical Sounding |
| Okinawa             | 26°41'N            | 128°09'E  | 17.8°N                       | 160.5°W   | Vertical Sounding |

\*We moved the observation facilities at Wakkanai to Sarobetsu in 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.

### 1. 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 (  $foF2$ ,  $fEs$ ,  $fmin$  ) and monthly medians of two factors (  $h'Es$ ,  $h'F$  ), daily Summary Plots and monthly medians plot of  $foF2$ .

#### a. Characteristics of Ionosphere

|   |   |
|---|---|
| <b><math>foF2</math></b>                            | Ordinary wave critical frequency for the <b><math>F2</math></b> layer   |
| <b><math>fEs</math></b>                             | Highest frequency of the <b><math>Es</math></b> layer whether it may be ordinary or extraordinary                         |
| <b><math>fmin</math></b>                            | Lowest frequency which shows vertical iono-spheric reflections  |
| <b><math>h'Es</math></b><br><b><math>h'F</math></b> | Minimum virtual height on the ordinary wave for the <b><math>Es</math></b> and <b><math>F</math></b> layers, respectively |

#### b. Descriptive Letters

The following descriptive letters are used in the tables.

- A Impossible measurement because of the presence of a lower thin layer, for example  $Es$  ( for  $foF2$  ).
- 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 automatic 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  $foF2$ ,  $fEs$  and  $fmin$  were scaled within a difference of 1 MHz from about 90, 90 and 99%, respectively of the test ionograms.

#### e. Summary Plot

Daily Summary Plots which are made from quarter-hourly digital ionograms are published to present general ionosphere conditions. The upper and middle parts of a Summary Plot show the diurnal variation of the frequency range of the echoes reflected from the  $F$  and  $E$  regions, respectively. The two solid arcing lines indicate the predicted values of  $fxE$  and  $foE$  calculated by the method described in the CCIR report 340. The lower part shows the diurnal variation of the virtual height where the echo traces become horizontal.

### 2. 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>foF2</math></b><br><b><math>foF1</math></b><br><b><math>foE</math></b><br><b><math>foEs</math></b> | Ordinary wave critical frequency for the <b><math>F2</math></b> , <b><math>F1</math></b> , <b><math>E</math></b> , and <b><math>Es</math></b> (including particle type <b><math>E</math></b> ) layers, respectively |
| <b><math>fbEs</math></b>  | Blanketing frequency of the <b><math>Es</math></b> layer, e.g. the lowest ordinary wave frequency visible through <b><math>Es</math></b>  |
| <b><math>fmin</math></b>  | Lowest frequency that shows vertical ionospheric reflections  |
| <b><math>M(3000)F2</math></b><br><b><math>M(3000)F1</math></b>  | Maximum usable frequency factor for a path of 3000 km for transmission by the <b><math>F2</math></b> and <b><math>F1</math></b> layers, respectively  |
| <b><math>h'F2</math></b><br><b><math>h'F</math></b><br><b><math>h'E</math></b><br><b><math>h'Es</math></b>  | Minimum virtual height on the ordinary wave for the <b><math>F2</math></b> , whole <b><math>F</math></b> , <b><math>E</math></b> and <b><math>Es</math></b> layers, respectively                                    |
| <b>Types of <math>Es</math></b>   | See below b. (iii)  |

#### b. Symbols

## (i) Descriptive Letters

The following letters are entered after, or used to replace a numerical value on the monthly tabulation sheets, if necessary.

- A** Measurement influenced by, or impossible because of, the presence of a lower thin layer, for example *Es*.
- B** Measurement influenced by, or impossible because of, absorption in the vicinity of *fmin*.
- C** Measurement influenced by, or impossible because of, any non-ionospheric reason.
- D** Measurement influenced by, or impossible because of, the upper limit of the normal frequency range in use.
- E** Measurement influenced by, or impossible because of, the lower limit of the normal frequency range in use.
- F** Measurement influenced by, or impossible because of, the presence of spread echoes.
- G** Measurement influenced by, or impossible because the ionization density of the layer is too small to enable it to be made accurately.
- H** Measurement influenced by, or impossible because of, the presence of a stratification.
- K** Presence of particle *E* layer.
- L** Measurement influenced or impossible because the trace has no sufficiently definite cusp between layers.
- M** Interpretation of measurement questionable because the ordinary and extraordinary components are not distinguishable.
- N** Conditions are such that the measurement cannot be interpreted.
- O** Measurement refers to the ordinary component.
- P** Man-made perturbations of the observed parameter; or spur type spread *F* present.
- Q** Range spread present.
- R** Measurement influenced by, or impossible because of, attenuation in the vicinity of a critical frequency.
- S** Measurement influenced by, or impossible because of, interference or atmospherics.
- T** Value determined by a sequence of observations, the actual observation being inconsistent or doubtful.
- V** Forked trace which may influence the measurement.
- W** Measurement influenced or impossible because the echo lies outside the height range recorded.
- X** Measurement refers to the extraordinary component.
- Y** Lacuna phenomena, severe layer tilt.
- Z** Third magneto-electronic component present.

## (ii) Qualifying Letters

The following letters are entered in the first column before a numerical value on the monthly tabulation sheets, if necessary.

- A** Less than. Used only when *fbEs* is deduced from *foEs* because total blanketing of higher layer is present.
- D** Greater than.
- E** Less than.
- I** Missing value has been replaced by an interpolated value.
- J** Ordinary component characteristic deduced from the extraordinary component.

**M** Mode interpretation uncertain.

**O** Extraordinary component characteristic deduced from the ordinary component. ( Used for x-characteristics only.)

**T** Value determined by a sequence of observations, the actual observation being inconsistent or doubtful.

**U** Uncertain or doubtful numerical value.

**Z** Measurement deduced from the third magneto-electronic component.

(iii) Description of Types of *Es*

When more than one type of *Es* trace are present on the ionogram, the type for the trace used to determine *foEs* must be written first. The number of multiple trace is indicated after the type letter.

The types are:

- f** An *Es* trace which shows no appreciable increase of height with frequency.
- l** A flat *Es* trace at or below the normal *E* layer minimum virtual height or below the 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. 2022

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

| H<br>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      | 33 | 33 | 31 | 32 | 31 | 25 | A  | A  | 86  | 81  | 87  | 107 | 90  | 86  | 80  | 79 | 79 | 59 | 41 | 27 | A  | A  | 35 | 39 |    |
| 2      | 37 | 32 | 33 | A  | 32 | 31 | 29 | 55 | 79  | 75  | 91  | 87  | 79  | 84  | 75  | 75 | 65 | 39 | 32 | 31 | 29 | 31 | 31 | 36 |    |
| 3      | 39 | 32 | 32 | 32 | 33 | 32 | 32 | 55 | 65  | 76  | 79  | 82  | 84  | 95  | 67  | 82 | 63 | 38 | 32 | 36 | 35 | 31 | 31 | 34 |    |
| 4      | 35 | 32 | 31 | 33 | 31 | 33 | 33 | 51 | 65  | 83  | 87  | 90  | 94  | 85  | 70  | 69 | 55 | 41 | 33 | 26 | 31 | 31 | 30 | 31 |    |
| 5      | 32 | 32 | 32 | 33 | 33 | 35 | 24 | 55 | 74  | N   | 101 | 87  | 106 | 89  | 77  | 75 | 74 | 57 | 39 | 33 | 32 | 32 | 30 | 31 | 33 |
| 6      | 34 | 31 | 32 | 35 | 31 | 32 | 31 | 51 | 80  | 94  | 88  | 81  | 86  | 83  | 74  | 75 | 54 | 36 | 32 | 31 | 27 | 31 | 32 | 32 |    |
| 7      | 33 | 33 | 33 | 32 | 33 | 32 | A  | 50 | 66  | 89  | 97  | 81  | 79  | 70  | 73  | 89 | 64 | 38 | A  | 33 | A  | 33 | 35 | 32 |    |
| 8      | 34 | 33 | 33 | 31 | 33 | 34 | 34 | 55 | 105 | 128 | 111 | 111 | 105 | 77  | 75  | 90 | 61 | 45 | 39 | 27 | 25 | 29 | 27 | 31 |    |
| 9      | 31 | 32 | 31 | 34 | 33 | 33 | 27 | 52 | 76  | 92  | N   | 101 | 94  | 89  | 95  | 77 | 86 | 71 | 51 | A  | 34 | 33 | 31 | 35 | 39 |
| 10     | 34 | N  | 33 | 35 | 36 | 41 | 38 | 48 | 70  | 95  | 98  | 103 | 87  | 89  | 84  | 85 | 66 | 51 | A  | 49 | A  | A  | A  | 35 |    |
| 11     | 33 | 31 | 35 | 36 | 36 | 36 | 34 | 51 | 72  | 85  | 99  | 100 | 101 | 82  | 85  | 85 | 69 | 63 | A  | A  | A  | A  | 45 | 39 |    |
| 12     | 40 | 48 | 41 | 41 | 40 | 37 | 32 | 47 | 84  | 102 | 88  | 104 | 95  | 92  | 76  | 85 | 73 | 51 | 44 | 40 | A  | A  | A  | 32 |    |
| 13     | 35 | 36 | 37 | 35 | 37 | 36 | 34 | 52 | 89  | 91  | 97  | 95  | 84  | 80  | 86  | 76 | 66 | 50 | 41 | 40 | 35 | 33 | 37 | 35 |    |
| 14     | 37 | 40 | 41 | 37 | 38 | 38 | 33 | 53 | 77  | 98  | 107 | 103 | 83  | 79  | 83  | 75 | 64 | 54 | 37 | A  | 29 | 30 | 30 | 31 |    |
| 15     | 32 | 33 | 34 | 34 | 33 | 33 | 30 | 49 | 79  | 90  | 111 | 109 | 79  | 89  | 87  | 81 | 70 | 50 | 35 | 38 | 39 | 39 | 49 | 52 |    |
| 16     | 47 | 53 | 52 | 53 | 49 | 51 | 35 | 58 | 79  | 98  | 117 | 114 | 91  | 97  | 94  | 84 | 78 | 55 | 53 | 52 | 55 | 55 | 58 | 59 |    |
| 17     | 59 | 64 | 64 | 63 | 53 | 53 | 39 | 55 | 75  | 109 | 113 | 104 | 91  | 101 | 89  | 95 | 73 | 50 | 41 | 36 | 37 | 40 | 37 | 39 |    |
| 18     | 40 | 41 | 40 | 39 | 40 | 40 | 33 | 45 | 68  | 93  | 101 | 96  | 92  | 81  | 89  | 95 | 59 | 42 | 35 | 37 | A  | 37 | 33 | 35 | 39 |
| 19     | 37 | A  | A  | 38 | 41 | 48 | 39 | 59 | 79  | 105 | 103 | 115 | 93  | 111 | 101 | 87 | 85 | 76 | 49 | 41 | 39 | 40 | 40 |    |    |
| 20     | 41 | 41 | 40 | 41 | 41 | 37 | 33 | 48 | 93  | 101 | 99  | 110 | 97  | 114 | 89  | 90 | 72 | A  | 39 | 33 | 36 | 36 | 33 | 32 |    |
| 21     | 35 | 36 | 37 | 36 | 39 | 38 | 32 | 43 | 68  | 92  | 87  | 109 | 93  | 105 | 91  | 76 | 65 | 55 | 44 | 35 | 35 | 39 | 37 | 37 |    |
| 22     | 36 | 34 | 36 | 39 | 40 | 33 | 34 | 47 | 72  | 92  | 105 | 102 | 83  | 95  | 88  | 84 | 64 | 39 | 44 | A  | A  | 33 | 39 | 37 |    |
| 23     | 37 | 39 | 38 | 37 | 41 | 38 | 35 | 47 | 85  | 69  | 110 | 118 | 87  | 85  | 85  | N  | 79 | 57 | 56 | 52 | 36 | 32 | 33 | 36 | 25 |
| 24     | A  | 31 | 31 | 36 | 32 | 24 | A  | A  | 76  | 100 | 120 | 111 | 94  | 85  | 80  | 75 | 69 | 57 | 40 | 34 | 31 | 34 | 36 | 37 |    |
| 25     | 38 | 39 | 35 | 35 | 36 | 35 | 37 | 49 | 74  | 79  | 109 | 95  | 79  | 87  | 95  | 81 | 52 | 43 | 39 | 37 | 34 | 38 | 45 | 36 |    |
| 26     | 35 | 34 | 37 | 38 | 35 | 36 | 32 | 45 | 82  | 75  | 100 | 80  | 97  | 93  | 91  | 81 | 61 | 39 | 49 | 36 | 35 | 37 | 55 | 35 |    |
| 27     | 30 | 33 | 35 | 35 | 41 | 36 | 37 | 49 | 76  | 87  | 97  | 109 | 87  | 87  | 90  | 71 | 66 | 57 | 59 | 37 | 24 | A  | 31 | 33 |    |
| 28     | 35 | 35 | 34 | 31 | 31 | A  | 32 | 49 | 69  | 77  | 119 | 104 | 81  | 97  | 79  | 76 | 69 | 42 | 43 | 36 | 35 | 33 | 34 | 36 |    |
| 29     | 36 | 37 | 39 | 39 | 38 | 40 | 31 | 43 | 63  | 76  | 103 | 93  | 88  | 79  | 77  | 72 | 65 | 40 | 32 | 34 | 33 | 31 | 31 | 32 |    |
| 30     | 33 | 34 | 31 | 32 | 31 | 31 | 29 | 48 | 76  | 94  | 97  | 93  | 93  | 87  | 62  | 91 | 67 | 55 | 48 | 42 | 37 | 33 | 32 | 32 |    |
| 31     | A  | 33 | 35 | 40 | 30 | 30 | 30 | 49 | 80  | 104 | 108 | 110 | 90  | 86  | 90  | 72 | 79 | 53 | 49 | 31 | 30 | 32 | 34 | 31 |    |
|        | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08  | 09  | 10  | 11  | 12  | 13  | 14  | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |    |
| CNT    | 29 | 30 | 30 | 30 | 31 | 30 | 28 | 29 | 31  | 31  | 31  | 31  | 31  | 31  | 31  | 31 | 31 | 30 | 27 | 28 | 24 | 26 | 29 | 31 |    |
| MED    | 35 | 34 | 35 | 36 | 36 | 36 | 33 | 49 | 76  | 92  | 100 | 103 | 89  | 87  | 84  | 81 | 66 | 50 | 41 | 36 | 34 | 33 | 35 | 35 |    |
| U Q    | 37 | 39 | 38 | 39 | 40 | 38 | 34 | 54 | 80  | 100 | 109 | 109 | 93  | 95  | 89  | 86 | 71 | 55 | 48 | 37 | 35 | 37 | 38 | 39 |    |
| L Q    | 33 | 32 | 32 | 33 | 32 | 32 | 31 | 47 | 70  | 81  | 91  | 93  | 84  | 82  | 75  | 75 | 61 | 40 | 35 | 32 | 30 | 31 | 31 | 32 |    |

HOURLY VALUES OF fEs                      AT Wakkanai

DEC. 2022

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

| H<br>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      | 28 | 36 | 28  | G   | 25  | G   | 172 | 70 | 40 | 54  | 36  | 41 | 52 | 28 | 34 | 29 | 39 | 33 | 11  | 28 | 46 | 60  | 30 | 32 |    |
| 2      | 39 | 31 | 26  | 36  | 26  | G   | G   | 26 | 47 | 56  | 38  | 54 | 56 | 28 | 25 | G  | 26 | G  | G   | G  | G  | G   | G  | G  |    |
| 3      | G  | G  | G   | G   | G   | G   | G   | 26 | 61 | 52  | 35  | 53 | 34 | 58 | G  | 31 | G  | G  | G   | G  | G  | G   | G  | G  |    |
| 4      | G  | G  | G   | G   | 117 | G   | G   | 11 | 24 | 42  | 33  | 52 | 53 | 54 | 43 | G  | 11 | G  | G   | G  | G  | G   | G  | G  |    |
| 5      | G  | G  | G   | G   | G   | G   | G   | G  | 32 | 34  | 28  | 33 | 30 | 35 | 48 | 24 | 11 | G  | G   | G  | G  | G   | G  | G  |    |
| 6      | G  | G  | G   | G   | G   | G   | G   | G  | 31 | 138 | 50  | 32 | 29 | 49 | 26 | 26 | 20 | 30 | G   | G  |    | G   | G  | 33 |    |
| 7      | 32 | 32 | G   | G   | G   | 30  | 33  | 28 | 23 | 48  | 38  | 29 | 53 | 28 | 29 | 26 | 49 | 33 | 54  | 32 | 39 | 28  | G  | G  |    |
| 8      | G  | G  | G   | G   | G   | 161 | G   | 26 | G  | 32  | 31  | 34 | 32 | 31 | 37 | 33 | 35 | 38 | G   | G  |    | G   | G  | G  |    |
| 9      | G  | G  | G   | G   | G   | G   | G   | 25 | 54 |     | 29  | 29 | 29 | 28 | 45 | 39 | 37 | 34 | 38  | G  | G  | G   | 24 | 29 |    |
| 10     | G  | G  | G   | G   | G   | G   | G   | 11 | 22 | 29  | 29  | 31 | 36 | 33 | 40 | 46 | 11 | 40 | 132 |    | 91 | 71  | 57 | 32 |    |
| 11     | 38 | 32 | 159 | G   |     | 41  | 40  | 33 | 27 | 26  | G   | G  | G  | G  | G  | 25 | 37 | 92 | 74  | 69 | 60 | 59  | 37 | 33 |    |
| 12     | 27 | 28 | G   | G   | 29  | 26  | 27  | 32 | 50 | 27  | 29  | 29 | G  | G  |    | 27 | 29 | 34 | 33  | 33 | 70 | 48  | 40 | 32 | 27 |
| 13     | 34 | 35 | 31  | G   | 28  | G   | 27  | 33 | 59 | 35  | 28  | G  | 28 | 31 | 28 | G  | 62 | 33 | 47  | 60 | 30 | G   | G  | 30 |    |
| 14     | 28 | G  | 26  | G   | G   | 40  | G   | 30 | G  | 48  | 29  | 30 | 31 | 31 | 94 | G  | G  | 39 | 35  | 60 | 27 | G   | G  | G  |    |
| 15     | 32 | G  | G   | 70  | G   | G   | G   | 19 | 27 | G   | G   | G  | 31 | 29 | 28 | 28 | 27 | 11 | G   | 29 | G  | 116 | G  | G  |    |
| 16     | G  | G  | G   | G   | G   | 11  | G   | 33 | 60 | 174 | 94  | 33 | 38 | 57 | 30 | G  | 11 | 11 | G   | G  | 31 | 25  | 30 | 32 |    |
| 17     | 26 | 28 | G   | G   | 11  | G   | G   | 11 | G  | 28  | 29  | G  | G  | G  | G  | 27 | 28 | G  | G   | G  | G  | G   | G  | G  |    |
| 18     | 32 | G  | G   | G   | G   | G   | G   | 30 | 28 | G   | G   | G  | G  | G  |    | G  | 11 | G  | 32  | 27 | 33 | G   | 27 | 26 |    |
| 19     | 32 | 38 | 46  | 35  | G   | G   | G   | 30 | 27 | 36  | 30  | 31 | 31 | 28 | 26 | G  | G  | 21 | 32  | 33 | 34 | G   | G  | G  |    |
| 20     | G  | 27 | G   | 113 | G   | G   | G   | G  | 24 | 27  | 35  | 45 | 31 | 33 | 29 | G  | 20 | 53 | G   | G  | G  | G   | G  | G  |    |
| 21     | G  | G  | G   | G   | G   | G   | G   | 26 | 55 | 28  | 31  | 34 | 32 | 31 | 28 | G  | 49 | 32 | 27  | 27 | 28 | G   | G  | 24 |    |
| 22     | 30 | G  | G   | G   | G   | 28  | G   | 25 | 48 | 48  | 149 | 34 | 32 | 29 | 28 | G  | 11 | G  | 40  | 33 | 43 | 32  | 32 | 32 |    |
| 23     | G  |    | G   | G   | G   | 26  | G   | G  | 32 | 145 | 116 | 32 | 27 | 28 | 26 | G  | 11 | G  | G   | G  | G  | G   | G  | G  |    |
| 24     | 29 | 29 | G   | G   | G   | 28  | 33  | 54 | 62 | 34  | 28  | 28 | G  | 27 | G  | G  | G  | 43 | G   | 28 | G  | G   | G  | 28 |    |
| 25     | 28 | G  | G   | G   | G   | 27  | G   | 25 | G  | G   | G   | G  | G  | 34 | G  | G  | 11 | G  | G   | G  | G  | G   | G  | G  |    |
| 26     | G  | G  | G   | G   | G   | G   | G   | G  | G  | 27  | G   | 31 | 50 | G  | G  | G  | 11 | G  | G   | G  | G  | G   | G  | G  |    |
| 27     | G  | G  | G   | G   | 32  |     | 33  | G  | 31 | G   | G   | G  | G  | G  | G  | 27 | G  | G  | G   | G  | G  | 32  | 29 | G  |    |
| 28     | G  | G  | G   | G   | G   | 72  | 40  | 34 | G  | G   | G   | 36 | G  | G  | G  | G  | 11 | G  | G   | G  | G  | G   | G  | G  |    |
| 29     | G  | G  | G   | G   | G   | G   | G   | G  | 11 | 24  | 28  | 30 | 32 | 32 | 29 | G  | 11 | G  | G   | G  | G  | 24  |    | G  |    |
| 30     | G  | 28 | G   | G   | G   | G   | G   | G  | 40 | 48  | 29  | 70 | 52 | 31 | 70 | 32 | 11 | G  | G   | G  | G  | G   | G  | 28 |    |
| 31     | 34 | G  | G   | G   | G   | 26  | G   | 39 | 43 | 32  | 32  | 31 | 32 | 33 | 28 | 25 | G  | 31 | 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    | 31 | 30 | 31  | 31  | 30  | 30  | 31  | 31 | 31 | 30  | 31  | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31  | 30 | 29 | 31  | 29 | 31 |    |
| MED    | G  | G  | G   | G   | G   | G   | G   | 26 | 31 | 33  | 29  | 31 | 31 | 29 | 28 | G  | 11 | 11 | G   | G  | G  | G   | G  | G  |    |
| U Q    | 32 | 28 | G   | G   | G   | 27  | 27  | 32 | 48 | 48  | 35  | 34 | 36 | 33 | 34 | 28 | 34 | 33 | 33  | 29 | 33 | 28  | 28 | 29 |    |
| L Q    | G  | G  | G   | G   | G   | G   | G   | 11 | 23 | 27  | 28  | 28 | G  | 27 | G  | G  | 11 | G  | G   | G  | G  | G   | G  | G  |    |

HOURLY VALUES OF fmin AT Wakkanai

DEC. 2022

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                                    | 16 | 15 | 16 | 16 | 16 | 14 | 16 | 15 | 15 | 16 | 15 | 16 | 17 | 15 | 15 | 16 | 15 | 15 | 15 | 13 | 15  | 15 | 17 | 17 |
| 2                                    | 15 | 16 | 15 | 15 | 15 | 14 | 15 | 15 | 15 | 15 | 15 | 16 | 15 | 14 | 15 | 15 | 15 | 15 | 16 | 15 | 15  | 15 | 14 | 15 |
| 3                                    | 14 | 14 | 14 | 14 | 14 | 16 | 17 | 15 | 15 | 17 | 16 | 17 | 17 | 16 | 15 | 15 | 16 | 16 | 14 | 14 | 15  | 14 | 15 | 14 |
| 4                                    | 14 | 15 | 15 | 15 | 16 | 14 | 14 | 15 | 16 | 16 | 17 | 17 | 17 | 15 | 15 | 15 | 15 | 16 | 14 | 15 | 14  | 14 | 16 | 14 |
| 5                                    | 15 | 14 | 16 | 14 | 14 | 15 | 20 | 15 | 16 | 16 | 15 | 17 | 15 | 16 | 16 | 15 | 16 | 14 | 16 | 14 | 15  | 14 | 14 | 14 |
| 6                                    | 15 | 16 | 15 | 14 | 16 | 16 | 15 | 17 | 16 | 15 | 16 | 17 | 16 | 15 | 16 | 15 | 16 | 15 | 15 | 14 | 140 | 15 | 16 | 16 |
| 7                                    | 16 | 16 | 15 | 16 | 15 | 16 | 15 | 15 | 15 | 15 | 16 | 16 | 17 | 17 | 15 | 15 | 16 | 16 | 16 | 16 | 17  | 15 | 15 | 20 |
| 8                                    | 15 | 15 | 15 | 14 | 16 | 61 | 17 | 15 | 15 | 16 | 17 | 16 | 15 | 15 | 15 | 15 | 14 | 15 | 14 | 16 | 15  | 14 | 15 | 14 |
| 9                                    | 16 | 16 | 15 | 14 | 16 | 16 | 14 | 16 | 16 | 15 | 15 | 17 | 15 | 15 | 15 | 13 | 16 | 16 | 15 | 17 | 16  | 15 | 16 | 16 |
| 10                                   | 15 | 16 | 14 | 14 | 17 | 15 | 17 | 16 | 15 | 15 | 15 | 17 | 15 | 15 | 15 | 15 | 18 | 15 | 15 | 11 | 17  | 16 | 15 | 17 |
| 11                                   | 15 | 16 | 15 | 14 |    | 13 | 15 | 15 | 17 | 28 | 32 | 34 | 33 | 28 | 28 | 15 | 14 | 15 | 15 | 16 | 16  | 16 | 16 | 15 |
| 12                                   | 15 | 16 | 16 | 11 | 15 | 16 | 15 | 15 | 16 | 16 | 29 | 33 | 30 | 30 | 28 | 16 | 15 | 15 | 15 | 15 | 15  | 15 | 17 | 16 |
| 13                                   | 15 | 15 | 17 | 16 | 17 | 15 | 15 | 14 | 17 | 18 | 29 | 30 | 29 | 28 | 27 | 15 | 13 | 14 | 16 | 15 | 15  | 16 | 17 | 15 |
| 14                                   | 15 | 15 | 16 | 15 | 14 | 15 | 16 | 15 | 16 | 15 | 16 | 17 | 21 | 16 | 26 | 26 | 15 | 15 | 15 | 14 | 15  | 16 | 15 | 15 |
| 15                                   | 16 | 16 | 16 | 15 | 14 | 14 | 14 | 15 | 26 | 29 | 33 | 35 | 23 | 16 | 16 | 17 | 16 | 16 | 15 | 16 | 14  | 14 | 14 | 15 |
| 16                                   | 15 | 15 | 15 | 16 | 15 | 15 | 16 | 16 | 15 | 18 | 15 | 18 | 16 | 14 | 15 | 14 | 16 | 14 | 14 | 14 | 16  | 16 | 15 | 16 |
| 17                                   | 15 | 16 | 16 | 17 | 14 | 14 | 14 | 16 | 24 | 16 | 23 | 35 | 36 | 35 | 28 | 16 | 16 | 16 | 14 | 14 | 15  | 16 | 15 | 15 |
| 18                                   | 15 | 14 | 15 | 14 | 16 | 14 | 16 | 14 | 21 | 28 | 30 | 38 | 33 | 29 | 28 | 14 | 16 | 16 | 17 | 15 | 16  | 15 | 17 | 15 |
| 19                                   | 16 | 15 | 15 | 15 | 15 | 14 | 14 | 16 | 15 | 15 | 15 | 16 | 17 | 22 | 15 | 22 | 16 | 16 | 16 | 16 | 15  | 15 | 14 | 16 |
| 20                                   | 15 | 15 | 15 | 60 | 14 | 15 | 14 | 15 | 15 | 16 | 17 | 17 | 17 | 17 | 16 | 15 | 16 | 15 | 15 | 14 | 16  | 15 | 15 | 14 |
| 21                                   | 15 | 15 | 14 | 14 | 14 | 14 | 14 | 16 | 16 | 16 | 17 | 19 | 32 | 21 | 15 | 15 | 15 | 16 | 15 | 15 | 15  | 15 | 15 | 16 |
| 22                                   | 17 | 15 | 17 | 14 | 14 | 14 | 14 | 16 | 15 | 15 | 16 | 15 | 17 | 15 | 15 | 15 | 15 | 15 | 15 | 14 | 16  | 16 | 16 | 16 |
| 23                                   | 14 |    | 14 | 14 | 18 | 15 | 14 | 15 | 16 | 16 | 28 | 23 | 30 | 22 | 26 | 14 | 17 | 14 | 14 | 14 | 14  | 14 | 15 | 15 |
| 24                                   | 15 | 15 | 15 | 14 | 14 | 16 | 16 | 15 | 16 | 26 | 27 | 28 | 28 | 27 | 26 | 21 | 15 | 14 | 14 | 15 | 16  | 17 | 17 | 15 |
| 25                                   | 15 | 16 | 16 | 14 | 14 | 15 | 15 | 15 | 16 | 15 | 28 | 34 | 29 | 27 | 27 | 21 | 15 | 14 | 14 | 14 | 14  | 14 | 16 | 15 |
| 26                                   | 14 | 14 | 14 | 14 | 16 | 15 | 20 | 14 | 15 | 16 | 29 | 28 | 36 | 33 | 28 | 27 | 15 | 16 | 14 | 14 | 14  | 15 | 14 | 14 |
| 27                                   | 14 | 14 | 14 | 15 | 13 | 15 | 14 | 14 | 17 | 27 | 34 | 34 | 30 | 32 | 28 | 17 | 15 | 14 | 14 | 14 | 21  | 15 | 16 | 14 |
| 28                                   | 15 | 14 | 14 | 14 | 14 | 14 | 15 | 13 | 16 | 26 | 34 | 30 | 36 | 40 | 30 | 26 | 18 | 14 | 14 | 14 | 15  | 19 | 15 | 14 |
| 29                                   | 14 | 14 | 14 | 16 | 15 | 14 | 15 | 14 | 16 | 15 | 17 | 22 | 21 | 29 | 26 | 23 | 17 | 15 | 16 | 17 | 15  | 16 | 16 | 14 |
| 30                                   | 16 | 15 | 14 | 14 | 15 | 14 | 14 | 14 | 15 | 15 | 15 | 15 | 17 | 15 | 15 | 14 | 15 | 16 | 16 | 15 | 16  | 15 | 15 | 15 |
| 31                                   | 15 | 15 | 15 | 15 | 14 | 15 | 15 | 15 | 17 | 17 | 16 | 16 | 16 | 17 | 16 | 15 | 17 | 15 | 16 | 16 | 14  | 18 | 16 | 14 |
|                                      | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20  | 21 | 22 | 23 |
| CNT                                  | 31 | 30 | 31 | 31 | 30 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31  | 31 | 31 | 31 |
| MED                                  | 15 | 15 | 15 | 14 | 15 | 15 | 15 | 15 | 16 | 16 | 17 | 17 | 17 | 17 | 16 | 15 | 16 | 15 | 15 | 15 | 15  | 15 | 15 | 15 |
| U Q                                  | 15 | 16 | 16 | 15 | 16 | 15 | 16 | 16 | 16 | 18 | 29 | 30 | 30 | 28 | 27 | 17 | 16 | 16 | 16 | 16 | 16  | 16 | 16 | 16 |
| L Q                                  | 15 | 15 | 14 | 14 | 14 | 14 | 14 | 15 | 15 | 15 | 15 | 16 | 16 | 15 | 15 | 15 | 15 | 14 | 14 | 14 | 15  | 15 | 15 | 14 |

HOURLY VALUES OF fof2 AT Kokubunji  
 DEC. 2022  
 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                                    | 38 | 35 | A  | 30 | 31 | 30 | 34 | 65 | 77  | 82  | 102 | 103 | 104 | 94  | 94  | 89  | 80  | 63 | 39 | 37 | 30 | 32 | 35 | 39 |    |
| 2                                    | 40 | 34 | 31 | 30 | 31 | 30 | 31 | 72 | 101 | 81  | 92  | 103 | 100 | 87  | 88  | 81  | 72  | 47 | 41 | 37 | A  | 32 | 32 | 34 |    |
| 3                                    | 34 | 35 | 34 | 34 | 33 | 33 | 33 | 62 | 89  | 99  | 98  | 96  | 97  | 85  | 87  | 75  | 69  | 54 | 38 | 36 | 35 | 33 | 31 | 25 |    |
| 4                                    | 33 | 33 | 32 | 31 | 31 | 32 | 33 | 63 | 88  | 83  | 98  | 99  | 82  | 84  | 76  | 79  | 67  | 43 | A  | 38 | A  | 33 | 31 | 34 |    |
| 5                                    | 34 | 35 | 34 | 34 | 32 | 33 | 35 | 59 | 96  | 124 | 115 | 110 | 98  | 88  | 70  | 78  | 79  | A  | 39 | 44 | 37 | 32 | 31 | 31 |    |
| 6                                    | 32 | N  | 37 | 31 | 26 | A  | 30 | 30 | 68  | 95  | 100 | 101 | 109 | 87  | 85  | 79  | 79  | 65 | 41 | 32 | 37 | 32 | 30 | 27 | 31 |
| 7                                    | 33 | 36 | 32 | 35 | 31 | 32 | A  | 65 | 82  | 87  | 80  | 84  | 87  | 76  | 87  | 75  | 81  | 43 | 39 | 35 | 36 | 32 | 31 | 33 |    |
| 8                                    | 33 | N  | 33 | 36 | A  | 33 | 36 | 43 | 89  | 96  | 140 | 140 | 115 | 93  | 92  | 79  | 67  | 67 | 37 | 39 | 37 | 31 | N  | 26 | 31 |
| 9                                    | 32 | 34 | 31 | 35 | 34 | 32 | 31 | 62 | 89  | 103 | 95  | 89  | 98  | 92  | 85  | 83  | 85  | 60 | 39 | 35 | 33 | 36 | 32 | 28 |    |
| 10                                   | 34 | 33 | 34 | 33 | 34 | 37 | 36 | 66 | 84  | 83  | 92  | 103 | 100 | 102 | 93  | 94  | 75  | 64 | 43 | 34 | 37 | 34 | 31 | 33 |    |
| 11                                   | 34 | 25 | 31 |    | 31 | 31 | 35 | 55 | 79  | 95  | 102 | 93  | 82  | 85  | 83  | 86  | 81  | A  | A  | A  | A  | A  | A  | A  |    |
| 12                                   | 33 | 34 | A  | 35 | 38 | 34 | 37 | 65 | 80  | 100 | 117 | 113 | 99  | 81  | 87  | 87  | 86  | 61 | 54 | 42 | 35 | A  | A  | 25 |    |
| 13                                   | A  | 31 | 31 | 32 | 29 | 31 | 33 | 62 | 81  | 108 | 107 | 84  | 88  | 88  | 85  | 88  | 78  | 57 | 51 | 49 | A  | 25 | A  | A  |    |
| 14                                   | 31 | 31 | 32 | 32 | 31 | 31 | 35 | 65 | 83  | 91  | 88  | 99  | 97  | 93  | 71  | 85  | 69  | 61 | 44 | 43 | A  | 25 | 31 | 31 |    |
| 15                                   | 33 | 34 | 34 | 35 | 31 | 32 | 30 | 68 | 71  | 90  | 104 | 93  | 93  | 89  | 87  | 103 | 79  | 56 | 52 | A  | A  | 34 | A  | 34 |    |
| 16                                   | 33 | 36 | 37 | 41 | 35 | 34 | N  | 31 | 68  | 77  | 87  | 100 | 115 | 117 | 96  | 92  | 90  | 73 | 68 | 61 | 48 | 43 | A  | A  |    |
| 17                                   | 37 | 40 | 40 | 41 | 34 | 30 | 34 | 63 | 83  | 90  | 113 | 93  | 103 | 88  | 91  | 100 | 79  | 61 | 50 | 41 | 33 | 32 | 34 | 35 |    |
| 18                                   | 37 | 35 | 36 | 36 | 35 | 33 | 35 | 58 | 73  | 81  | 93  | 103 | 114 | 86  | 92  | 89  | 81  | 52 | 39 | 36 | 37 | 31 | 31 | 31 |    |
| 19                                   | 38 | 39 | 40 | 40 | 41 | 41 | 43 | 59 | 84  | 95  | 117 | 116 | 97  | 87  | 97  | 108 | 86  | 66 | 62 | 42 | 49 | 31 | 39 | A  |    |
| 20                                   | 39 | 39 | 39 | 38 | 35 | 36 | 41 | 57 | 81  | 118 | 114 | 111 | 106 | 95  | 108 | 80  | 67  | 87 | 56 | 33 | 33 | 35 | 34 | 32 |    |
| 21                                   | 32 | 35 | 35 | 37 | 35 | 36 | N  | 37 | 61  | 74  | 87  | 98  | 113 | 103 | 85  | 100 | 90  | 78 | 71 | 56 | 41 | 37 | 39 | 36 | 33 |
| 22                                   | 34 | 33 | 34 | 35 | 37 | 41 | 35 | 67 | 78  | 77  | 108 | 125 | 102 | 90  | 82  | 99  | 87  | 44 | 41 | 34 | 33 | N  | 37 | 31 | 34 |
| 23                                   | 33 | 35 | 35 | 39 | 51 | 31 | 34 | 59 | 87  | 72  | 113 | 95  | 100 | 88  | 89  | 86  | 66  | 56 | 61 | 62 | 27 | 25 | 27 | 32 |    |
| 24                                   | 31 | 31 | 31 | 31 | 35 | 29 | 29 | 61 | 70  | 95  | 135 | 107 | 83  | 80  | 82  | 89  | 67  | 68 | 65 | 45 | 39 | 30 | 33 | 33 |    |
| 25                                   | 39 | 38 | 34 | 31 | 32 | 33 | 46 | 50 | 69  | 103 | 121 | 98  | 97  | 85  | 79  | 84  | 75  | 48 | 41 | 39 | A  | A  | 31 | 26 |    |
| 26                                   | 32 | 31 | 31 | 31 | 31 | 30 | 33 | 61 | 85  | 85  | 105 | 101 | 77  | 85  | 93  | 81  | 72  | 65 | 28 | 39 | 43 | 30 | 33 | A  |    |
| 27                                   | 31 | 31 | 31 | 36 | 32 | 31 | 34 | 68 | 109 | 99  | 101 | 100 | 95  | 89  | 78  | 89  | 81  | 57 | 54 | 54 | 40 | 31 | 31 | 34 |    |
| 28                                   | 38 | 35 | 28 | 31 | 31 | 31 | 35 | 69 | 97  | 104 | 81  | 102 | 101 | 88  | 84  | 76  | 70  | 50 | 38 | 39 | 39 | 38 | 37 | 35 |    |
| 29                                   | A  | 38 | A  | 36 | 38 | 34 | 37 | 58 | 81  | 82  | 86  | 93  | 96  | 90  | 89  | 85  | 67  | 63 | 40 | 37 | 41 | 34 | 26 | 30 |    |
| 30                                   | A  | A  | 33 | 35 | 33 | 25 | 27 | 56 | 80  | 105 | 100 | 94  | 82  | 89  | 89  | 66  | 100 | 72 | 45 | 44 | 43 | 41 |    | 34 |    |
| 31                                   | A  | A  | 35 | 38 | 25 | N  | 25 | 24 | 62  | 86  | 107 | 129 | 95  | 92  | 78  | 98  | 88  | 71 | 62 | 50 | 45 | 38 | 37 | 34 | 33 |
| 00                                   | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09  | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18 | 19 | 20 | 21 | 22 | 23 |    |    |
| CNT                                  | 27 | 29 | 28 | 29 | 30 | 31 | 30 | 31 | 31  | 31  | 31  | 31  | 31  | 31  | 31  | 31  | 31  | 29 | 29 | 29 | 24 | 27 | 25 | 26 |    |
| MED                                  | 33 | 35 | 34 | 35 | 33 | 32 | 34 | 62 | 83  | 95  | 102 | 101 | 97  | 88  | 87  | 86  | 75  | 61 | 43 | 39 | 37 | 32 | 31 | 33 |    |
| U Q                                  | 37 | 36 | 35 | 36 | 35 | 34 | 36 | 67 | 89  | 103 | 114 | 110 | 101 | 90  | 92  | 89  | 81  | 65 | 54 | 44 | 39 | 35 | 34 | 34 |    |
| L Q                                  | 32 | 33 | 31 | 31 | 31 | 30 | 31 | 59 | 78  | 83  | 95  | 94  | 88  | 85  | 82  | 79  | 69  | 51 | 39 | 36 | 33 | 31 | 31 | 31 |    |



HOURLY VALUES OF fEs                      AT Kokubunji

DEC. 2022

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     | 31  | 37 | 34 | G  | G  | G  | G  | 47 | 33  | 34 | 40 | 31 | 40 | 54  | G  | G  | G  | 33 | 25 | G  | G   | G   | 40 | 49 |
| 2     | 115 | G  | G  | G  | G  | G  | G  | G  | G   | G  | G  | 40 | 38 | 37  | 28 | 42 | 35 | 33 | G  | G  | 35  | G   | G  | G  |
| 3     | G   | G  | G  | G  | G  | G  | G  | G  | 33  | 34 | 31 | 36 | 57 | G   | 34 | 26 | G  | 11 | G  | G  | G   | G   | G  |    |
| 4     | G   | G  | G  | G  |    | G  | G  | G  | 33  | 29 | N  | 33 | 33 | 56  | 31 | 29 | G  | 44 | 33 | 31 | 32  | 23  | G  | G  |
| 5     | G   | G  | G  | G  | G  | G  | G  | G  | 180 | 37 | 29 | 34 | 33 | G   | 28 | 27 | G  | 37 | 24 | 23 | G   | G   | G  | G  |
| 6     | G   | G  | G  | G  | 23 |    | G  | G  | 25  | 29 | 29 | 29 | 32 | 31  | 29 | 28 | G  | 32 | G  | G  | 11  |     | G  | G  |
| 7     |     | G  |    | G  | G  |    | 25 | 48 | 25  | 35 | 31 | G  | G  | 29  | 35 | 41 | 43 | 40 | G  | G  | G   | G   | G  | G  |
| 8     | 24  | G  | 26 | 32 | G  | G  | G  | G  | 35  | 29 | 34 | 37 | 43 | 32  | 36 | 26 | G  | 11 | G  | G  | G   | G   | G  |    |
| 9     | G   | G  | G  | G  | G  | 27 |    |    | G   | 28 | G  | 31 | 32 | 32  | 28 | 29 | 24 | 11 | G  | G  | G   | G   | G  | G  |
| 10    | G   | G  | G  |    | G  | G  | G  | G  | G   | 30 | G  | 43 | 37 | 41  | 31 | 26 | G  | 36 | 50 | G  | 25  | G   | G  | 25 |
| 11    | G   | G  |    |    | G  | G  | 26 | G  | 31  | 48 | 33 | 31 | G  | 31  | G  | G  | 28 | 61 | 78 | 92 | 117 | 106 | 66 | 32 |
| 12    | G   | G  | 29 | G  | G  | G  | 25 | 30 | 32  | 53 | G  | G  | G  | 30  | 30 | 45 | 21 | 11 | 27 | 40 | G   | 39  | 29 |    |
| 13    | 173 | G  | G  | G  |    | G  | G  | 27 | 25  | G  | G  | G  | G  | G   | G  | 26 | G  | G  | 35 | 25 | 60  | G   | 57 | 27 |
| 14    | G   |    | G  | G  | G  | G  | G  | 26 | 36  | 30 | 56 | 33 | 34 | 37  | 31 | G  | G  | 11 | 41 | 46 | 82  | G   | G  | G  |
| 15    |     | G  | G  | G  | G  | G  | G  | G  | 33  | 54 | 34 | 33 | 33 | 34  | 30 | G  | G  | 45 | G  | 47 | 35  | 54  | 49 | G  |
| 16    | G   | G  | G  | G  | G  | G  | G  | G  | 27  | 40 | 43 | G  | 36 | 37  | G  | 26 | G  | 29 | G  | 30 | 27  | 40  | 33 | 40 |
| 17    | G   | G  | G  | G  | G  | G  | G  | G  | 34  | 30 | 35 | 33 | 34 | G   | 37 | G  | G  | 28 | G  | G  | G   | G   | G  | G  |
| 18    | G   | G  | G  |    | 25 | 26 |    |    | G   | G  | G  | G  | G  | 39  | 43 | 43 | 32 | 29 |    | 47 |     |     |    | G  |
| 19    | G   | 33 | G  | G  | G  | G  | G  | G  | 33  | 37 | 41 | 34 | 33 | 45  | 42 | 37 | 31 | 40 | 32 | G  | 35  | G   | G  | 50 |
| 20    | G   | G  | G  | G  | G  | G  | G  | G  | 34  | 39 | 39 | 34 | 33 | 31  | 39 | G  | G  | G  | G  | G  | G   | G   | G  | G  |
| 21    | G   | G  | G  | G  | G  | G  | G  | G  | 47  | 33 | G  | 32 | 32 | 48  | 35 | 26 | 22 | G  | G  | G  | G   | 23  | G  | G  |
| 22    | G   | G  | G  | G  | G  | 84 |    |    | 25  | 28 | 33 | 34 | 48 | 51  | 78 | 26 | 34 | 39 |    |    | G   | G   | G  | G  |
| 23    | G   | G  | G  | G  | G  | G  | G  | G  | 53  | 29 | 29 |    | 55 | 62  | 48 | 40 | 33 | 23 | G  | 56 | G   |     | G  | G  |
| 24    | G   | G  | G  | G  | G  | G  | G  | G  | G   | G  | 30 | 31 | 47 | 55  | 37 | G  | G  | 11 | G  | G  | G   | G   | G  | G  |
| 25    | G   | G  | G  | G  | G  | G  | G  | 31 | 53  | 28 | G  | G  | 30 | G   | 29 | 26 | G  | 41 | G  | 33 | 26  | 48  |    |    |
| 26    |     | G  | G  | G  | G  | G  | G  | 31 | 47  | 31 | G  | G  | G  | G   | G  | G  | G  | G  |    | 31 | G   | G   | 27 | 29 |
| 27    | G   |    | G  | G  | G  | G  | G  | G  | 85  | 55 | G  | G  | G  | G   | G  | G  | G  | G  | 33 | 52 | G   | G   | G  | G  |
| 28    | 29  |    |    |    | G  | G  | G  | 59 | 42  | 76 | 59 | G  | G  | G   | G  | G  | G  | G  |    | G  | G   | G   | G  | G  |
| 29    | 49  | 34 | 46 | 33 | 33 | G  | G  | G  | 26  | 31 | 33 | 33 |    |     |    |    |    |    |    |    |     |     |    | G  |
| 30    | 31  | 33 | 29 | G  | G  | G  | G  | G  | 38  | 40 | 39 | 40 | 33 | 33  | 33 | 26 | 31 | 52 | 40 | 29 | 33  | G   | G  | G  |
| 31    | 35  | 39 | G  | G  | G  | G  |    | G  | 30  | 46 | 87 |    | 34 | 112 | 48 | 50 | 36 | 28 | 11 | 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   | 28  | 28 | 29 | 28 | 29 | 30 | 30 | 30 | 31  | 31 | 30 | 29 | 31 | 31  | 31 | 31 | 31 | 31 | 29 | 31 | 31  | 29  | 26 | 27 |
| MED   | G   | G  | G  | G  | G  | G  | G  | G  | 33  | 31 | 32 | 33 | 33 | 32  | 30 | 26 | G  | 29 | G  | G  | G   | G   | G  | G  |
| U Q   | 26  | G  | G  | G  | G  | G  | G  | 26 | 38  | 40 | 39 | 34 | 38 | 45  | 36 | 29 | 28 | 40 | 32 | 31 | 32  | 12  | 27 | 25 |
| L Q   | G   | G  | G  | G  | G  | G  | G  | G  | 25  | 29 | G  | G  | G  | G   | G  | G  | G  | 11 | G  | G  | G   | G   | G  | G  |

HOURLY VALUES OF fmin AT Kokubunji

DEC. 2022

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                                    | 16 | 15 | 16 | 15 | 15 | 15 | 15 | 15 | 16 | 14 | 17 | 24 | 18 | 16 | 17 | 15 | 15 | 14 | 15 | 13 | 17 | 15 | 15 | 15 |
| 2                                    | 15 | 16 | 15 | 13 | 14 | 17 | 14 | 18 | 16 | 16 | 15 | 15 | 17 | 14 | 16 | 15 | 15 | 16 | 15 | 14 | 15 | 15 | 18 | 14 |
| 3                                    | 15 | 15 | 14 | 14 | 13 | 15 | 15 | 14 | 14 | 17 | 15 | 17 | 15 | 14 | 17 | 15 | 22 | 14 | 14 | 14 | 63 | 13 | 18 | 15 |
| 4                                    | 13 | 15 | 14 | 14 |    | 13 | 14 | 15 | 15 | 16 | 15 | 39 | 16 | 17 | 16 | 16 | 24 | 15 | 15 | 15 | 16 | 15 | 15 | 14 |
| 5                                    | 14 | 14 | 14 | 15 | 13 | 14 | 21 | 16 | 16 | 17 | 17 | 16 | 15 | 40 | 15 | 15 | 26 | 15 | 15 | 15 | 13 | 13 | 14 | 13 |
| 6                                    | 14 | 14 | 15 | 15 | 15 | 15 | 15 | 30 | 15 | 16 | 35 | 33 | 16 | 17 | 15 | 14 | 14 | 15 | 21 | 13 | 13 | 13 | 13 | 14 |
| 7                                    | 15 | 14 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 14 | 16 | 14 | 17 | 17 | 16 | 15 | 14 | 15 | 15 | 16 | 14 | 15 | 14 | 14 |
| 8                                    | 16 | 16 | 16 | 15 | 15 | 14 | 13 | 20 | 15 | 15 | 14 | 15 | 17 | 14 | 15 | 15 | 21 | 13 | 14 | 17 | 14 | 22 | 15 |    |
| 9                                    | 21 | 14 | 13 | 13 | 15 | 15 | 15 |    | 14 | 15 | 35 | 16 | 16 | 16 | 15 | 23 | 15 | 14 | 14 | 14 | 22 | 14 | 20 | 14 |
| 10                                   | 21 | 13 | 15 |    | 14 | 15 | 15 | 15 | 15 | 16 | 18 | 16 | 22 | 17 | 22 | 26 | 22 | 14 | 14 | 14 | 15 | 21 | 23 | 15 |
| 11                                   | 15 | 14 |    |    | 14 | 17 | 15 | 21 | 15 | 17 | 16 | 23 | 36 | 35 | 16 | 30 | 15 | 21 | 15 | 13 | 9  | 13 | 16 | 15 |
| 12                                   | 15 | 16 | 15 | 13 | 14 | 14 | 16 | 15 | 14 | 34 | 33 | 35 | 43 | 15 | 15 | 15 | 15 | 16 | 15 | 15 | 15 | 15 | 16 |    |
| 13                                   | 18 | 15 | 14 | 15 |    | 13 | 16 | 16 | 14 | 43 | 35 | 38 | 42 | 44 | 33 | 15 | 23 | 14 | 15 | 16 | 15 | 15 | 16 | 15 |
| 14                                   | 15 |    | 23 | 14 | 14 | 15 | 12 | 15 | 13 | 15 | 16 | 16 | 17 | 16 | 15 | 15 | 23 | 13 | 15 | 15 | 14 | 15 | 15 | 17 |
| 15                                   | 16 | 15 | 13 | 14 | 17 | 15 | 13 | 21 | 15 | 15 | 14 | 17 | 16 | 16 | 15 | 15 | 15 | 17 | 14 | 15 | 15 | 15 | 15 | 15 |
| 16                                   | 13 | 13 | 14 | 13 | 13 | 14 | 15 | 15 | 15 | 15 | 15 | 45 | 21 | 19 | 31 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 15 |
| 17                                   | 16 | 15 | 15 | 13 | 13 | 18 | 14 | 22 | 16 | 16 | 15 | 16 | 16 | 15 | 15 | 14 | 15 | 15 | 15 | 13 | 14 | 14 | 14 | 15 |
| 18                                   | 15 | 16 | 15 | 15 | 16 | 16 | 17 | 23 | 14 | 31 | 18 | 22 | 16 | 16 | 16 | 28 | 30 | 15 | 14 | 13 | 14 | 13 | 14 | 14 |
| 19                                   | 14 | 15 | 14 | 14 | 14 | 13 | 14 | 20 | 16 | 14 | 14 | 17 | 15 | 18 | 18 | 15 | 15 | 14 | 15 | 13 | 15 | 14 | 18 | 15 |
| 20                                   | 16 | 21 | 15 | 18 | 14 | 15 | 13 | 21 | 17 | 14 | 15 | 16 | 15 | 17 | 15 | 16 | 14 | 15 | 15 | 15 | 15 | 17 | 16 | 25 |
| 21                                   | 14 | 15 | 15 | 15 | 16 | 14 | 13 | 20 | 14 | 15 | 15 | 31 | 17 | 19 | 17 | 15 | 15 | 14 | 14 | 16 | 13 | 15 | 14 | 14 |
| 22                                   | 13 | 13 | 13 | 13 | 14 | 17 | 14 | 18 | 15 | 16 | 14 | 14 | 19 | 15 | 11 | 14 | 15 | 14 | 13 | 13 | 14 | 13 | 13 | 13 |
| 23                                   | 16 | 15 | 16 | 13 | 13 | 14 | 14 | 18 | 14 | 16 | 15 | 15 | 16 | 16 | 17 | 15 | 14 | 16 | 16 | 16 | 14 | 15 | 15 | 16 |
| 24                                   | 21 | 14 | 13 | 21 | 13 | 14 | 15 | 22 | 15 | 15 | 15 | 15 | 15 | 15 | 14 | 15 | 22 | 13 | 15 | 15 | 15 | 15 | 16 | 14 |
| 25                                   | 15 | 15 | 16 | 13 | 14 | 15 | 15 | 15 | 14 | 15 | 15 | 14 | 33 | 33 | 15 | 15 | 24 | 13 | 13 | 15 | 15 | 15 | 15 | 15 |
| 26                                   |    | 14 | 15 | 14 | 14 | 15 | 15 | 16 | 15 | 16 | 35 | 35 | 15 | 34 | 34 | 30 | 30 | 24 |    | 16 | 14 | 16 | 15 | 15 |
| 27                                   | 15 | 15 | 14 | 20 | 14 | 15 | 15 | 20 | 16 | 15 | 34 | 35 | 34 | 33 | 35 | 28 | 25 | 15 | 16 | 14 | 14 | 14 | 15 | 15 |
| 28                                   | 16 | 15 |    |    | 15 | 17 | 14 | 15 | 15 | 17 | 18 | 39 | 42 | 42 | 40 | 33 | 30 | 17 | 15 | 15 | 20 | 14 | 16 | 16 |
| 29                                   | 16 | 16 | 15 | 15 | 15 | 15 | 16 | 15 | 25 | 22 | 31 | 25 | 38 | 34 | 35 | 28 | 23 | 15 | 14 | 13 | 16 | 17 |    | 15 |
| 30                                   | 16 | 16 | 16 | 15 | 16 | 15 | 14 | 18 | 16 | 16 | 16 | 16 | 16 | 17 | 17 | 16 | 16 | 15 | 16 | 15 | 15 | 16 |    | 15 |
| 31                                   | 16 | 15 | 13 | 13 | 20 | 21 | 15 | 15 | 15 | 16 | 14 | 15 | 16 | 14 | 13 | 13 | 15 | 15 | 16 | 17 | 15 | 15 | 17 | 14 |
|                                      | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT                                  | 30 | 30 | 29 | 28 | 29 | 31 | 31 | 30 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 30 | 31 | 31 | 31 | 29 | 29 |
| MED                                  | 15 | 15 | 15 | 14 | 14 | 15 | 15 | 17 | 15 | 16 | 16 | 17 | 17 | 17 | 16 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| U Q                                  | 16 | 15 | 15 | 15 | 15 | 15 | 15 | 20 | 16 | 17 | 18 | 33 | 22 | 33 | 18 | 23 | 23 | 15 | 15 | 15 | 15 | 15 | 16 | 15 |
| L Q                                  | 15 | 14 | 14 | 13 | 14 | 14 | 14 | 15 | 14 | 15 | 15 | 15 | 16 | 15 | 15 | 15 | 15 | 14 | 14 | 13 | 14 | 14 | 14 | 14 |

HOURLY VALUES OF fof2 AT Yamagawa  
 DEC. 2022  
 LAT. 31°12.0'N LON. 130°37.0'E SWEEP 1.0MHz TO 30.0MHz AUTOMATIC SCALING

| H<br>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      | 34      | 36 | 31      | 35 | 31      | 31      | 32 | 47 | 65 | 65  | 94  | 128 | 97  | 89  | 105 | 99  | 93  | 75  | 42 | 43 | 42 |         | 42 | 37 |         |    |
| 2      | 37      | A  | A       | A  | A       |         | 32 | 34 | 56 | 89  | 83  | 85  | 113 | 107 | 98  | 95  | 86  | 74  | 66 | 50 | 49 | 42      | 39 | 37 | B<br>30 |    |
| 3      | 32      | 37 | 35      | 36 | 37      | 37      | 31 | 49 | 72 | 99  | 107 | 88  | 83  | 94  | 102 | 73  | 78  | 81  | 49 | 39 | 47 | 46      | 40 | 33 |         |    |
| 4      | 31      | 36 | 34      | 33 | 33      | 35      | 35 | 50 | 69 | 109 | 106 | 85  | 88  | 87  | 92  | 83  | 84  | 64  | 45 | 39 | 49 | 38      | A  | 37 |         |    |
| 5      | 39      | A  |         | 39 | 41      | 40      | 32 | 35 | 51 | 95  | 119 | 121 | 107 | 89  | 95  | 92  | 75  | 86  | 74 | 46 | 51 | 63      | 59 | 41 | 35      |    |
| 6      | 33      | 33 | 39      | 27 | 31      | 30      | 27 | 42 | 90 | 119 |     | C   | C   | C   | C   | C   | C   |     | 66 | 47 | 41 | 40      | 37 | 33 | 27      |    |
| 7      | 31      | 33 | 35      | 33 | 33      | 29      | 27 | 47 | 79 |     | C   | C   | C   | C   | C   | C   | C   |     | 70 | 49 | 37 | 42      | 46 | 45 | 41      |    |
| 8      | 43      | 49 | 39      | 33 | 34      | 35      | 42 | 62 | 95 | 153 |     | C   | C   | C   | C   |     | 80  | 73  | 75 | 78 | 47 | 40      | 51 | 44 | 30      | 30 |
| 9      | 31      | 34 | 35      | 35 | 35      | 32      | 33 | 49 | 77 | 87  | 101 | 97  | 97  | 94  | 83  | 89  | 90  | 80  | 64 | 37 | 38 | 44      | 42 | 42 |         |    |
| 10     | 26      | 33 | 32      | 32 | 31      | 32      | 39 | 45 | 73 | 92  | 81  | 101 | 83  | 107 | 118 | 106 | 99  | 86  | 76 | 52 | A  | A       | 56 | 35 | 30      |    |
| 11     | 35      | 25 | B<br>24 | 29 | 31      | 30      | 36 | 49 | 69 | 84  | 87  | 88  | 96  | 92  | 91  | 92  | 92  | 76  | 58 |    |    |         | 42 | 35 | 30      |    |
| 12     | 30      | A  | A       | A  |         | 37      | 37 | 31 | 47 | 71  | 93  | 109 | 101 | 94  | 87  | 97  | 97  | 97  | 91 | 69 | 71 | 60      | 53 | 39 | 33      |    |
| 13     | 30      | 31 | 31      | 31 | 35      | 31      | 32 | 49 | 86 | 98  | 101 | 104 | 104 | 105 | 108 | 95  | 97  | 88  | 59 | 65 | 53 | 35      | 26 | 31 |         |    |
| 14     | A       | 30 | A       |    | 32      | 36      | 32 | 30 | 51 | 84  | 90  | 86  | 101 | 105 | 110 | 111 | 92  | 84  | 71 | 63 | 67 | 58      | 43 | 39 | 35      |    |
| 15     | 35      | 33 | 33      | 33 | 36      | 32      | 33 | 53 | 81 | 86  | 96  | 106 | 101 | 114 | 105 | 107 | 110 | 86  | 60 | 50 | 50 | 46      | 33 | 30 |         |    |
| 16     | 35      | 34 | 34      | 39 | 37      | 31      | 30 | 46 | 82 | 83  | 87  | 110 | 113 | 105 | 100 | 100 | 92  | 83  | 67 | 57 | 44 | 39      | A  | 34 |         |    |
| 17     | 35      | 36 | 37      | 39 | 35      | B<br>25 | 30 | 48 | 75 | 89  | 90  | 87  | 112 | 115 | 101 | 92  | 93  | 90  | 60 | 42 | 43 | 42      | 36 | 34 |         |    |
| 18     | 34      | 36 | 32      | 37 | 41      | 32      | 35 | 49 | 81 | 85  | 87  | 98  | 115 | 116 | 100 | 100 | 97  | 95  | 59 | 50 | 56 | 58      | 32 | 30 |         |    |
| 19     | 32      | 35 | A       |    | 34      | 35      | 34 | 34 | 49 | 69  | 79  | 99  | 110 | 109 | 92  | 90  | 107 | 94  | 88 | 63 | 63 | 69      | 45 | A  | A       |    |
| 20     | 39      | A  |         | 42 | 40      | 35      | 30 | 35 | 49 | 70  | 95  | 116 | 119 | 109 | 105 | 117 | 104 | 91  | 76 | 83 | 43 | 41      | 37 | 35 | 35      |    |
| 21     | 34      | A  |         | 35 | 35      | 39      | 33 | 34 | 49 | 85  | 83  | 76  | 112 | 121 | 116 | 107 | 107 | 103 | 85 | 65 | 59 | 49      | 41 | 34 | B<br>31 |    |
| 22     | 34      | 35 | 38      | 35 | 35      | 35      | 34 | 48 | 71 | 84  | 111 | 124 | 118 | 117 | 99  | 96  | 99  | 78  | 52 | 41 | 34 | 37      | 31 | 31 |         |    |
| 23     | 35      | 33 | 33      | 35 | 35      | B<br>25 | 30 | 42 | 86 | 91  | 90  | 110 | 93  | 114 | 102 | 93  | 84  | 72  | 62 | 73 | 43 | B<br>27 | A  | 30 |         |    |
| 24     | 29      | 30 | 35      | 30 | 26      | 31      | 27 | 42 | 86 | 90  | 115 | 110 | 99  | 74  | 84  | 95  | 91  | 86  | 67 | 73 | 33 | 30      | 31 | 34 |         |    |
| 25     | 39      | 35 | 35      | 32 | 31      | 31      | 32 | 44 | 66 | 87  | 123 | 97  | 101 | 99  | 88  | 91  | 105 | 95  | 44 | 41 | 46 | 35      | 37 | 32 |         |    |
| 26     | B<br>35 | A  |         | 34 | 35      | 33      | 32 | 31 | 39 | 86  | 84  | 98  | 82  | 91  | 77  | 97  | 107 | 84  | 71 | 56 | 33 | 47      | 49 | 32 | 35      |    |
| 27     | 34      | 31 | 33      | 35 | 35      | 34      | 32 | 44 | 99 | 119 | 117 | 101 | 119 | 114 | 100 | 105 | 119 | 115 | 97 | 89 | A  | A       | 52 | 39 | 35      |    |
| 28     | 41      | 40 | 32      | A  |         | 30      | 31 | 29 | 47 | 94  | 107 | 85  | 96  | 107 | 107 | 99  | 92  | 79  | 76 | 55 |    |         | 54 | 36 | A       |    |
| 29     | 33      | 37 | 42      | 35 | 38      | 34      | 32 | 43 | 84 | 90  | 91  | 81  | 101 | 105 | 116 | 114 | 108 | 85  | 72 | 55 | 57 | 52      | 44 | 32 |         |    |
| 30     | 33      | 35 | 37      | 34 | 34      | 31      | 30 | 38 | 97 | 86  | 100 | 103 | 92  | 103 | 121 | 87  | 91  | 113 | 69 | 58 | 61 | 57      | 47 | A  |         |    |
| 31     | A       | A  | A       | A  | B<br>23 | A       | B  |    | 44 | 68  | 99  | 129 | 113 | 100 | 90  | 104 | 101 | 77  | 76 | 79 | 47 | 43      | 45 | 49 | 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      | 24 | 26      | 27 | 30      | 30      | 30 | 31 | 31 | 30  | 28  | 28  | 28  | 28  | 29  | 29  | 29  | 31  | 31 | 29 | 29 | 30      | 27 | 27 |         |    |
| MED    | 34      | 34 | 35      | 35 | 35      | 32      | 32 | 48 | 81 | 90  | 98  | 102 | 101 | 104 | 100 | 95  | 92  | 80  | 60 | 50 | 47 | 44      | 36 | 33 |         |    |
| U Q    | 35      | 36 | 37      | 35 | 36      | 34      | 34 | 49 | 86 | 99  | 110 | 110 | 109 | 112 | 106 | 104 | 98  | 88  | 67 | 61 | 57 | 52      | 41 | 35 |         |    |
| L Q    | 31      | 33 | 33      | 32 | 31      | 31      | 30 | 44 | 71 | 84  | 87  | 96  | 93  | 92  | 92  | 90  | 84  | 74  | 49 | 41 | 42 | 38      | 33 | 30 |         |    |

HOURLY VALUES OF fEs AT Yamagawa

DEC. 2022

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     | 31 | G  | 25  | G  | G  | G  | G  | 11  | 32  | 37 | 45 | 91 | 45 | 46 | 32 | 28 | G  | 32 | 34 | 29 | G  | G  | G  | 35 |
| 2     | 38 | 57 | 59  | 41 | 33 | G  | G  | G   | G   | 34 | 31 | 34 | 58 | 58 | 35 | 29 | 32 | G  | 26 | G  | 25 | G  | G  | B  |
| 3     | G  | G  | 25  | G  | G  | G  | G  | G   | 33  | 36 | 39 | 39 | 39 | 49 | 32 | 35 | 32 | 32 | 30 | G  | G  | G  | G  | G  |
| 4     | G  | G  | G   | G  | G  | G  | G  | G   | 48  | 32 | 40 | 40 | 40 | 32 | 53 | 31 | 32 | G  | G  | 33 | G  | G  | 33 | G  |
| 5     | 27 | 34 | G   | G  | G  | G  | G  | G   | 32  | 35 | 36 | 38 | 59 | 41 | 32 | 35 | 36 | G  | 29 | 26 | G  | 24 | G  | G  |
| 6     | G  | G  | G   | G  | 23 | G  | G  | 39  | 32  | 36 | C  | C  | C  | C  | C  | C  | C  | G  | 24 | G  | G  | G  | G  | G  |
| 7     | G  | G  | G   | G  | 34 | G  | G  | G   | 39  | C  | C  | C  | C  | C  | C  | C  | C  | 40 | 35 | 26 | G  | G  | G  | G  |
| 8     | G  | G  | G   | G  | G  | G  | G  | G   | 26  | 40 | C  | C  | C  | C  | 38 | 60 | 49 | 31 | 33 | G  | G  | G  | G  | G  |
| 9     | G  | G  | 25  | G  | G  | G  | G  | G   | 32  | 32 | 35 | 37 | 38 | 40 | 43 | 44 | 42 | G  | 11 | 11 | G  | G  | G  | G  |
| 10    | G  | G  | 28  | G  | G  | G  | G  | 11  | 48  | 32 | 40 | 48 | 57 | 53 | 43 | 53 | 49 | 22 | 38 | 26 | G  | 30 | 30 | 26 |
| 11    | G  | G  | B   | G  | G  | G  | G  | 21  | 49  | 36 | 39 | 55 | 40 | 34 | 46 | 49 | 31 | 26 | 56 | 88 | 58 | 32 | G  | G  |
| 12    | G  | 56 | 59  | 49 | G  | G  | G  | G   | 56  | 75 | 48 | 41 | 36 | 42 | 46 | 45 | 47 | 35 | 47 | 57 | 38 | 33 | 24 | G  |
| 13    | G  | G  | G   | G  | G  | G  | G  | 130 | 150 | 39 | 40 | 35 | 41 | 40 | 41 | 40 | 35 | 32 | 40 | 32 | 11 | G  | 25 | G  |
| 14    | 40 | G  | 33  | 28 | G  | G  | G  | G   | 30  | 37 | 40 | 44 | 46 | 37 | 38 | 44 | 48 | 34 | 50 | G  | 38 | 41 | 30 | G  |
| 15    | G  | 24 | 32  | G  | G  | G  | G  | G   | 30  | 39 | 52 | 43 | 43 | 43 | 39 | 53 | 65 | 34 | 31 | 32 | 38 | G  | G  | G  |
| 16    | G  | G  | G   | G  | G  | G  | G  | 24  | 32  | 40 | 42 | 44 | 55 | 35 | 41 | 44 | 37 | G  | 11 | G  | 24 | 33 | 28 | G  |
| 17    | 33 | 24 | G   | G  | 11 | B  | G  | G   | 23  | 38 | 45 | 65 | 49 | 43 | 59 | 46 | 35 | 47 | 24 | G  | G  | G  | G  | G  |
| 18    | 28 | G  | G   | G  | G  | G  | 28 | 30  | 27  | 41 | 43 | 44 | 44 | 45 | 39 | 33 | 28 | G  | 48 | 26 | G  | 23 | G  | G  |
| 19    | G  | G  | 30  | G  | G  | G  | G  | G   | 32  | 40 | 44 | 45 | 43 | 48 | 39 | 40 | 34 | G  | G  | 28 | 27 | 39 | 33 | 29 |
| 20    | 31 | 56 | 32  | G  | G  | G  | G  | G   | 31  | 43 | 45 | 46 | 45 | 45 | 46 | 46 | 44 | 40 | 39 | 28 | G  | G  | G  | 24 |
| 21    | G  | 56 | 26  | 24 | G  | G  | G  | G   | 30  | 38 | 40 | 41 | 43 | 36 | 40 | 36 | 33 | 24 | 22 | 26 | G  | G  | G  | B  |
| 22    | G  | G  | G   | G  | G  | G  | G  | G   | 30  | 54 | 40 | 41 | 40 | 40 | 38 | 33 | 40 | G  | 40 | 28 | 28 | G  | G  | G  |
| 23    | G  | G  | 26  | 34 | G  | B  | G  | G   | 30  | 34 | 41 | 45 | 42 | 42 | 41 | 38 | 36 | 24 | 11 | 28 | 25 | B  | 30 | G  |
| 24    | 27 | G  | G   | G  | G  | G  | G  | G   | 150 | 36 | 40 | 84 | 40 | 41 | 38 | 38 | 36 | 32 | 35 | 27 | 35 | G  | G  | G  |
| 25    | G  | G  | G   | G  | G  | G  | G  | G   | 41  | 39 | 54 | 38 | 47 | 40 | 32 | 47 | 26 | 48 | 39 | 34 | 35 | 24 | G  | G  |
| 26    | B  | 28 | G   | G  | G  | G  | G  | G   | 52  | 56 | 38 | 41 | 41 | 41 | N  | 30 | 31 | 31 | 11 | G  | 25 | G  | 25 | G  |
| 27    | 24 | G  | G   | 29 | G  | G  | G  | G   | 32  | 37 | 41 | 41 | 49 | 35 | 34 | 41 | 45 | 40 | 11 | 29 | 40 | G  | G  | G  |
| 28    | G  | 24 | G   | 27 | G  | G  | 46 | 25  | 33  | 40 | 43 | 36 | 57 | 34 | 41 | 64 | 40 | 53 | 48 | 55 | 72 | 80 | 82 | 26 |
| 29    | 27 | 32 | 26  | G  | G  | G  | G  | 26  | 48  | 38 | 45 | 49 | 53 | 49 | 44 | 32 | 29 | G  | 31 | 28 | G  | G  | G  | G  |
| 30    | G  | G  | 122 | G  | G  | G  | G  | G   | 31  | 41 | 44 | 36 | 39 | 35 | 45 | 44 | 33 | G  | 33 | G  | 31 | G  | G  | 33 |
| 31    | 45 | 39 | 49  | 41 | B  | B  | G  | G   | 50  | 44 | 47 | 49 | 66 | 57 | 60 | 47 | 34 | 33 | 32 | G  | G  | G  | G  | 39 |
|       | 00 | 01 | 02  | 03 | 04 | 05 | 06 | 07  | 08  | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT   | 30 | 31 | 30  | 31 | 30 | 28 | 30 | 31  | 31  | 30 | 28 | 28 | 28 | 28 | 28 | 29 | 29 | 31 | 31 | 31 | 31 | 30 | 31 | 29 |
| MED   | G  | G  | 13  | G  | G  | G  | G  | G   | 32  | 38 | 41 | 42 | 44 | 41 | 40 | 41 | 35 | 31 | 32 | 26 | 11 | G  | G  | G  |
| U Q   | 27 | 28 | 30  | 24 | G  | G  | G  | 11  | 48  | 40 | 45 | 47 | 51 | 45 | 44 | 46 | 43 | 34 | 39 | 29 | 35 | 24 | 25 | 25 |
| L Q   | G  | G  | G   | G  | G  | G  | G  | G   | 30  | 36 | 40 | 38 | 40 | 36 | 38 | 34 | 32 | G  | 22 | G  | G  | G  | G  | G  |

HOURLY VALUES OF fmin AT Yamagawa

DEC. 2022

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

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

HOURLY VALUES OF fof2                      AT Okinawa

DEC. 2022

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

| $\begin{matrix} H \\ D \end{matrix}$ | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08  | 09  | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22 | 23 |    |    |
|--------------------------------------|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|
| 1                                    | 40 | 40 | 31 | 35 | 31 | 25 | 25 | 53 | 61  | 71  | 111 | 135 | 119 | 116 | 125 | 139 | 117 | 97  | 60  | 52  | 71  | 58  | 52 | 53 |    |    |
| 2                                    | 34 | 40 | 35 | A  | 29 | 30 | 37 | 57 | 88  | 102 | 102 | 119 | 113 | 117 | 111 | 111 | 86  | 80  | 83  | 64  | 66  | 58  | 53 | 35 |    |    |
| 3                                    | 29 | 31 | 31 | 34 | 35 | B  | N  | 25 | 24  | 49  | 70  | 104 | 97  | 103 | 89  | 108 | 126 | 114 | 92  | 95  | 92  | 49  | 77 | 85 | 62 | 45 |
| 4                                    | 37 | 38 | 41 | 39 | 39 | 39 | 35 | 53 | 73  | 112 | 147 | 101 | 91  | 112 | 108 | 115 | 100 | 87  | 75  | 51  | 66  | 71  | 52 | 56 |    |    |
| 5                                    | 52 | 55 | 57 | 55 | 45 | 37 | 35 | 54 | 92  | 143 | 137 | 112 | 107 | 117 | 115 | 111 | 93  | 95  | 82  | 61  | 89  | 84  | 63 | 49 |    |    |
| 6                                    | 49 | 49 | 47 | 51 | 32 | A  | N  | 23 | 43  | 87  | 120 | 145 | 122 | 119 | 122 | 108 | 101 | 97  | 89  | 75  | 63  | 76  | 63 | 55 | 45 |    |
| 7                                    | 34 | 35 | 38 | 33 | 34 | 25 | 24 | 48 | 79  | 100 | 106 | 97  | 93  | 105 | 103 | 84  | 87  | 77  | 76  | 55  | 56  | 77  | 61 | 61 |    |    |
| 8                                    | 56 | 67 | 64 | 59 | 41 | 45 | 51 | 63 | 96  | 152 | 157 | 127 | 119 | 113 | 98  | 89  | 83  | 81  | 68  | 54  | 65  | 82  | 51 | 30 |    |    |
| 9                                    | A  | A  | 34 | 37 | 36 | 29 | 31 | 49 | 73  | 107 | 96  | 101 | 103 | 99  | 93  | 101 | 85  | 103 | 73  | 49  | 55  | 66  | 67 | 53 |    |    |
| 10                                   | 29 | 25 | 30 | 33 | 33 | 33 | 32 | 49 | 73  | 85  | 102 | 97  | 105 | 115 | 123 | 149 | 148 | 140 | 106 | 123 | 117 | 112 | 72 | 59 |    |    |
| 11                                   | 53 | 45 | N  | B  | 31 | A  | 31 | 50 | 72  | 86  | 92  | 100 | 80  | 109 | 120 | 110 | 106 | 95  | 71  | 63  | 63  | 63  | 43 | 34 |    |    |
| 12                                   | 30 | 29 | 35 | 40 | 55 | 35 | 29 | 44 | 81  | 95  | 104 | C   | C   | C   | C   | C   | C   | C   | C   | 91  | 97  | 81  | 72 | 42 |    |    |
| 13                                   | 38 | 37 | 35 | 41 | 42 | 46 | 35 | 50 | 93  | 123 | C   | C   | 145 | C   | 159 | 165 | 137 | 148 | 94  | 89  | 103 | 70  | 41 | 41 |    |    |
| 14                                   | 37 | 39 | 31 | 31 | 35 | 26 | 26 | 48 | 89  | 90  | 101 | 85  | 111 | 129 | 142 | 134 | 115 | A   | 77  | 78  | 97  | 78  | 68 | 44 |    |    |
| 15                                   | 41 | 37 | 36 | 35 | 31 | 30 | 31 | 49 | 95  | 111 | 88  | 110 | 117 | 143 | 151 | 139 | 141 | 124 | 86  | 65  | 79  | 71  | 56 | 38 |    |    |
| 16                                   | 35 | 39 | 38 | 39 | 39 | B  | 25 | 41 | 77  | 99  | 89  | 87  | 104 | 129 | 113 | 119 | 108 | 100 | 91  | 68  | 68  | 63  | 66 | 55 |    |    |
| 17                                   | 43 | 35 | 35 | 33 | 31 | B  | B  | 45 | 80  | 95  | 101 | 97  | 121 | 144 | 143 | 117 | 119 | 123 | 91  | 58  | 60  | 66  | 49 | 41 |    |    |
| 18                                   | 41 | 36 | 34 | 35 | 36 | 25 | N  | 24 | 42  | 89  | 92  | 84  | 87  | 115 | 128 | 128 | 121 | 128 | 121 | 106 | 81  | 92  | 92 | 60 | 32 |    |
| 19                                   | 34 | 35 | 31 | 32 | 32 | 33 | 30 | 45 | 80  | 83  | 98  | 104 | 128 | 114 | 113 | 115 | 111 | 101 | 91  | 76  | 81  | 73  | 46 | 42 |    |    |
| 20                                   | 46 | 38 | 34 | A  | 35 | B  | 22 | 29 | 49  | 88  | 110 | 106 | 120 | 127 | 128 | 140 | 140 | 134 | 115 | 101 | 94  | 56  | 68 | 45 | 42 |    |
| 21                                   | 37 | 33 | 35 | 35 | 39 | 25 | 29 | 43 | 90  | 94  | 98  | 101 | 132 | 145 | 125 | 152 | 140 | 126 | 107 | 73  | 81  | 70  | 43 | 34 |    |    |
| 22                                   | 33 | 37 | 42 | 37 | 30 | 31 | 31 | 43 | 77  | 98  | 118 | 143 | 143 | 157 | 157 | 131 | 125 | 111 | 76  | 53  | 42  | 49  | 48 | 33 |    |    |
| 23                                   | 34 | 35 | 33 | 39 | 33 | N  | 29 | 23 | 39  | 93  | 117 | 102 | 110 | 128 | 136 | 157 | 129 | 121 | 113 | 110 | 73  | 83  | 44 | 35 | A  |    |
| 24                                   | A  | 32 | 42 | 36 | B  | N  | 23 | 24 | 40  | 92  | 98  | 121 | 123 | 94  | 88  | 111 | 125 | 113 | 105 | 99  | 75  | 61  | 48 | 37 | 43 |    |
| 25                                   | 52 | 49 | 31 | 31 | 30 | 30 | 33 | 43 | 85  | 117 | 144 | 105 | 116 | 137 | 147 | 143 | 140 | 157 | 101 | 45  | 64  | 76  | 62 | A  |    |    |
| 26                                   | 43 | 40 | 42 | 54 | 45 | 32 | 30 | 43 | 84  | 90  | 106 | 96  | 103 | 102 | 108 | 132 | 119 | 101 | 71  | 56  | 56  | 73  | 69 | 67 |    |    |
| 27                                   | 37 | 35 | 35 | 39 | 39 | 35 | 34 | 45 | 86  | 130 | 148 | 119 | 129 | 162 | 161 | 158 | 159 | 156 | 150 | 129 | 125 | 88  | 65 | 47 |    |    |
| 28                                   | 54 | 55 | 48 | 35 | 36 | 32 | 31 | 44 | 97  | 106 | 92  | 91  | 89  | 121 | 123 | 123 | 113 | 97  | 86  | 60  | 61  | 64  | 45 | A  |    |    |
| 29                                   | 34 | A  | 35 | 31 | 31 | 32 | 29 | 40 | 85  | 97  | 109 | 101 | 111 | 130 | 159 | 173 | 174 | 157 | 144 | 110 | 94  | 81  | 77 | 51 |    |    |
| 30                                   | 49 | 54 | 63 | 30 | 32 | B  | B  | 38 | 109 | 103 | 102 | 126 | 123 | 143 | 161 | 166 | 152 | 143 | 128 | 96  | 101 | 106 | 78 | 44 |    |    |
| 31                                   | 43 | 55 | 67 | 30 | A  | A  | A  | 42 | 84  | 103 | 151 | 127 | 95  | 85  | 119 | 123 | 100 | 84  | 86  | 72  | 54  | 62  | 58 | 49 |    |    |
|                                      | 00 | 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 | 31 | 29 | 29 | 25 | 29 | 31 | 31  | 31  | 30  | 29  | 30  | 29  | 30  | 30  | 30  | 29  | 30  | 31  | 31  | 31  | 31 | 28 |    |    |
| MED                                  | 38 | 38 | 35 | 35 | 35 | 30 | 30 | 45 | 85  | 102 | 103 | 104 | 114 | 121 | 124 | 124 | 116 | 103 | 88  | 65  | 71  | 71  | 56 | 44 |    |    |
| U Q                                  | 47 | 47 | 42 | 39 | 39 | 34 | 32 | 49 | 92  | 112 | 121 | 121 | 123 | 136 | 147 | 140 | 137 | 125 | 101 | 81  | 92  | 81  | 66 | 52 |    |    |
| L Q                                  | 34 | 35 | 33 | 32 | 31 | 25 | 24 | 43 | 77  | 94  | 98  | 97  | 103 | 110 | 111 | 114 | 100 | 95  | 76  | 55  | 61  | 63  | 46 | 39 |    |    |

HOURLY VALUES OF fEs                      AT Okinawa

DEC. 2022

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     | 29  | G  | G  | 28 | G  | G  | G  | 46  | 48  | 38 | 48 | 55 | 42 | 43 | 59  | 38 | 35  | 32  | 33 | 28  | 39 | G  | G  | G  |
| 2     | G   | G  | 32 | 38 | 29 | G  | G  | 26  | 29  | 34 | 36 | 48 | 46 | 43 | 38  | 37 | 32  | 48  | 24 | 31  | 49 | G  | 29 | G  |
| 3     | G   | G  | G  | 26 | 26 | B  | G  | G   | 26  | 40 | 36 | 38 | 49 | 51 | 39  | 38 | 40  | 36  | 34 | 28  | G  | 11 | G  | G  |
| 4     | G   | G  | G  | G  | G  | G  | G  | G   | 25  | 42 | 49 | 51 | 52 | 51 | 55  | 43 | 38  | G   | 11 | G   | 31 | G  | G  | G  |
| 5     | G   | 32 | G  | G  | G  | G  | G  | G   | 146 | 33 | 41 | 56 | 40 | 43 | 43  | 40 | 59  | 48  | 30 | 11  | G  | G  | 11 | G  |
| 6     | G   | G  | G  | G  | G  | 28 | G  | G   | 32  | G  | 36 | 35 | 43 | 38 | 62  | 38 | 33  | 30  | 48 | G   | G  | G  | G  | G  |
| 7     | G   | G  | G  | G  | G  | G  | G  | G   | 30  | 31 | 39 | 40 | 44 | 50 | 45  | 56 | 52  | 34  | 31 | 33  | 26 | G  | G  | G  |
| 8     | G   | G  | G  | G  | G  | 29 | 26 | G   | 27  | 91 | 40 | 41 | 47 | 44 | 41  | 39 | 56  | 30  | 25 | 24  | 28 | 41 | 33 | 66 |
| 9     | 93  | 59 | 26 | 24 | G  | G  | G  | G   | 30  | 37 | 37 | 39 | 41 | N  | 46  | 38 | 50  | 32  | 31 | 34  | 29 | G  | G  | 11 |
| 10    | G   | G  | G  | 26 | G  | G  | G  | G   | 30  | 35 | 38 | 46 | 48 | 50 | 100 | 50 | 34  | G   | 50 | 11  | 11 | 11 | 11 | 27 |
| 11    | G   | G  | G  | B  | G  | 27 | G  | 24  | 33  | 35 | 38 | 38 | 38 | 40 | 39  | 45 | 36  | 41  | 40 | G   | G  | 11 | G  | 24 |
| 12    | G   | G  | G  | G  | G  | 95 | G  | G   | 32  | 38 | G  | C  | C  | C  | C   | C  | C   | C   | C  | 57  | 23 | 11 | G  | 26 |
| 13    | 31  | G  | G  | G  | G  | G  | G  | G   | 27  | 37 | C  | C  | 49 | C  | G   | 43 | 39  | 32  | 53 | G   | 23 | 11 | 11 | G  |
| 14    | G   | G  | 57 | 25 | G  | G  | 57 | 95  | 31  | 38 | 41 | 44 | 78 | 51 | 48  | 70 | 92  | 116 | 28 | G   | G  | 11 | G  | G  |
| 15    | 106 | G  | G  | G  | G  | G  | G  | 24  | 43  | 40 | 44 | 49 | 48 | 56 | 57  | 51 | 39  | 40  | 32 | G   | 26 | 22 | 11 | G  |
| 16    | G   | G  | G  | G  | G  | B  | G  | 26  | 38  | 39 | 49 | 54 | 51 | 50 | 43  | 40 | 41  | 31  | 33 | 50  | 24 | G  | G  | G  |
| 17    | G   | G  | G  | G  | 11 | B  | B  | G   | 48  | 38 | 41 | 42 | 47 | 48 | 43  | 40 | 44  | 29  | 23 | 11  | G  | G  | G  | G  |
| 18    | G   | G  | G  | G  | G  | G  | G  | G   | 34  | 45 | 51 | 60 | 52 | 46 | 47  | 40 | 36  | G   | 23 | 25  | G  | 11 | 11 | G  |
| 19    | G   | G  | G  | G  | G  | G  | G  | 148 | 31  | 43 | 49 | 58 | 67 | 50 | 44  | 40 | 37  | 34  | 25 | 34  | 32 | 30 | 27 | G  |
| 20    | G   | G  | 28 | 43 | 29 | B  | G  | G   | 33  | 82 | 51 | 50 | 60 | 54 | 100 | 57 | 78  | 47  | 35 | 41  | 26 | 27 | G  | 24 |
| 21    | 29  | G  | 94 | G  | 30 | G  | G  | G   | 52  | 38 | 42 | 42 | 42 | 42 | 41  | 38 | 110 | 30  | 48 | G   | G  | G  | G  | G  |
| 22    | G   | G  | G  | G  | G  | G  | G  | G   | 31  | 84 | 49 | 46 | 42 | 50 | 38  | 41 | 35  | 35  | 25 | 33  | G  | G  | G  | G  |
| 23    | G   | G  | G  | G  | 26 | G  | G  | G   | 31  | 36 | 42 | 45 | 47 | 56 | 49  | 45 | 40  | 28  | 33 | 11  | 11 | G  | 26 | 27 |
| 24    | 29  | 25 | G  | 20 | G  | B  | G  | G   | 31  | 40 | 45 | 45 | 59 | 43 | 47  | 42 | 49  | 39  | 36 | 40  | 28 | 32 | 27 | G  |
| 25    | G   | G  | G  | G  | G  | G  | G  | G   | 40  | 34 | 37 | 55 | 48 | 41 | 40  | 38 | 35  | 39  | 44 | 26  | 28 | G  | 11 | 60 |
| 26    | 29  | 26 | 26 | G  | 25 | G  | G  | G   | 35  | 40 | 41 | 38 | 51 | 41 | 39  | 92 | 39  | 39  | 40 | 116 | 56 | 39 | G  | G  |
| 27    | G   | G  | G  | G  | G  | G  | G  | G   | 30  | 40 | 40 | 52 | 50 | 43 | 42  | 46 | 42  | 44  | 23 | 29  | 48 | 24 | G  | G  |
| 28    | G   | 32 | 24 | G  | 30 | 27 | G  | 24  | 26  | 43 | 34 | 60 | 50 | 52 | 66  | 78 | 59  | 52  | 39 | 32  | 27 | G  | 34 | 45 |
| 29    | 36  | 72 | 28 | 24 | 25 | G  | G  | G   | 26  | 36 | 46 | 38 | 49 | 72 | 40  | 41 | 60  | 41  | 32 | 34  | 48 | 46 | G  | 11 |
| 30    | G   | G  | G  | G  | G  | B  | B  | G   | 29  | 38 | 47 | 42 | 43 | 42 | 43  | 56 | 36  | 40  | 40 | 31  | 28 | 31 | 22 | G  |
| 31    | G   | G  | 28 | 25 | 58 | 39 | 44 | G   | 34  | 40 | 46 | 47 | 47 | 43 | 46  | 43 | 33  | 31  | 38 | 28  | 35 | 29 | G  | G  |
|       | 00  | 01 | 02 | 03 | 04 | 05 | 06 | 07  | 08  | 09 | 10 | 11 | 12 | 13 | 14  | 15 | 16  | 17  | 18 | 19  | 20 | 21 | 22 | 23 |
| CNT   | 30  | 31 | 31 | 30 | 31 | 25 | 28 | 31  | 31  | 31 | 30 | 29 | 30 | 28 | 30  | 30 | 30  | 30  | 30 | 31  | 31 | 31 | 31 | 31 |
| MED   | G   | G  | G  | G  | G  | G  | G  | G   | 31  | 38 | 41 | 46 | 48 | 47 | 44  | 42 | 40  | 34  | 33 | 28  | 26 | 11 | G  | G  |
| U Q   | 29  | G  | 26 | 24 | 25 | 14 | G  | 24  | 35  | 40 | 47 | 53 | 51 | 51 | 49  | 50 | 52  | 41  | 40 | 34  | 31 | 27 | 11 | 24 |
| L Q   | G   | G  | G  | G  | G  | G  | G  | G   | 29  | 36 | 38 | 40 | 43 | 43 | 40  | 39 | 36  | 30  | 25 | 11  | G  | G  | G  | G  |

HOURLY VALUES OF fmin AT Okinawa

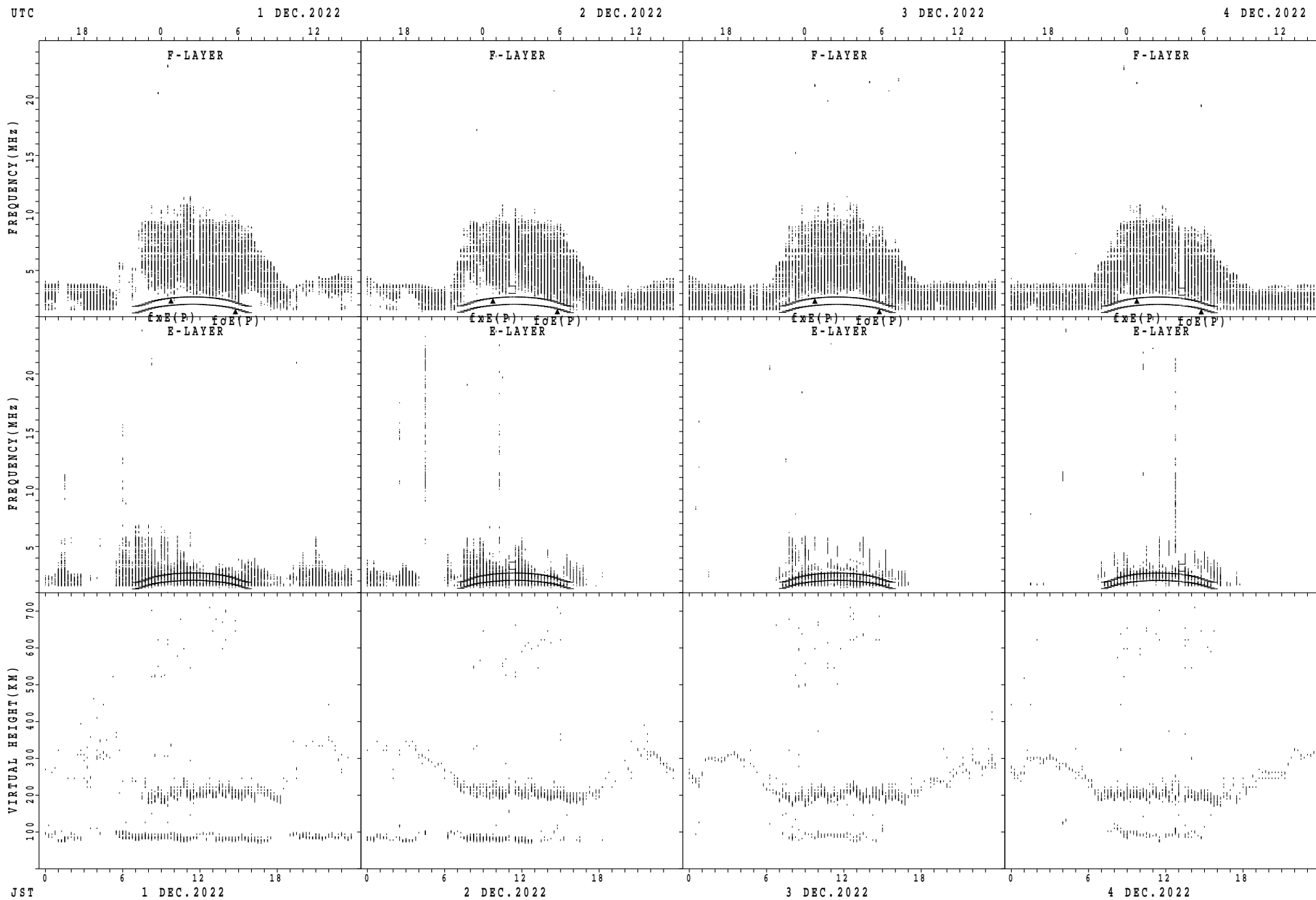
DEC. 2022

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

| $\begin{matrix} H \\ D \end{matrix}$ | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07  | 08 | 09 | 10 | 11 | 12 | 13 | 14  | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |    |
|--------------------------------------|----|----|----|----|----|----|----|-----|----|----|----|----|----|----|-----|----|----|----|----|----|----|----|----|----|----|
| 1                                    | 16 | 16 | 15 | 15 | 16 | 15 | 15 | 16  | 15 | 15 | 14 | 14 | 14 | 18 | 17  | 15 | 17 | 15 | 16 | 15 | 15 | 15 | 16 | 14 |    |
| 2                                    | 14 | 14 | 16 | 16 | 16 | 16 | 14 | 15  | 16 | 16 | 16 | 15 | 17 | 16 | 16  | 14 | 17 | 15 | 14 | 15 | 15 | 15 | 16 | 15 |    |
| 3                                    | 15 | 15 | 17 | 15 | 16 | B  | 15 | 15  | 16 | 16 | 16 | 17 | 15 | 16 | 17  | 15 | 15 | 15 | 16 | 16 | 15 | 14 | 14 | 15 |    |
| 4                                    | 15 | 15 | 14 | 15 | 15 | 14 | 16 | 16  | 15 | 15 | 14 | 18 | 19 | 18 | 15  | 14 | 17 | 15 | 17 | 15 | 16 | 16 | 14 | 16 |    |
| 5                                    | 15 | 17 | 14 | 17 | 16 | 14 | 18 | 16  | 16 | 15 | 15 | 16 | 15 | 15 | 15  | 14 | 15 | 15 | 16 | 16 | 15 | 18 | 14 | 15 |    |
| 6                                    | 14 | 15 | 16 | 17 | 14 | 15 | 15 | 17  | 16 | 15 | 14 | 17 | 19 | 20 | 17  | 17 | 17 | 15 | 15 | 15 | 15 | 15 | 15 | 17 |    |
| 7                                    | 15 | 15 | 15 | 15 | 15 | 14 | 16 | 16  | 15 | 17 | 16 | 17 | 20 | 20 | 15  | 16 | 15 | 15 | 16 | 16 | 15 | 16 | 15 | 14 |    |
| 8                                    | 16 | 14 | 14 | 14 | 14 | 15 | 15 | 15  | 16 | 15 | 15 | 15 | 16 | 16 | 16  | 15 | 16 | 15 | 16 | 15 | 16 | 15 | 16 | 16 |    |
| 9                                    | 12 | 15 | 16 | 16 | 15 | 15 | 15 | 15  | 15 | 16 | 18 | 15 | 18 | 16 | 16  | 15 | 14 | 15 | 16 | 15 | 15 | 16 | 14 | 14 |    |
| 10                                   | 17 | 15 | 20 | 15 | 15 | 15 | 15 | 16  | 15 | 15 | 17 | 18 | 15 | 15 | 12  | 14 | 15 | 20 | 14 | 14 | 14 | 14 | 14 | 16 |    |
| 11                                   | 16 | 16 | 17 | B  | 15 | 15 | 15 | 16  | 16 | 15 | 15 | 15 | 17 | 16 | 15  | 14 | 17 | 16 | 16 | 16 | 14 | 15 | 16 | 16 |    |
| 12                                   | 15 | 15 | 14 | 15 | 17 | 17 | 15 | 16  | 16 | 15 | 69 | C  | C  | C  | C   | C  | C  | C  | C  |    | 15 | 15 | 14 | 15 | 15 |
| 13                                   | 16 | 15 | 14 | 15 | 16 | 15 | 15 | 15  | 15 | 15 | C  | C  |    | C  | 105 | 14 | 13 | 16 | 15 | 15 | 15 | 15 | 16 | 17 |    |
| 14                                   | 14 | 15 | 12 | 15 | 15 | 15 | 15 | 17  | 15 | 15 | 14 | 16 | 6  | 15 | 16  | 15 | 14 | 13 | 15 | 15 | 17 | 15 | 15 | 16 |    |
| 15                                   | 15 | 16 | 14 | 14 | 15 | 15 | 16 | 16  | 14 | 15 | 16 | 19 | 17 | 15 | 16  | 18 | 15 | 15 | 16 | 14 | 15 | 15 | 15 | 14 |    |
| 16                                   | 14 | 14 | 14 | 14 | 17 | B  |    | 14  | 15 | 16 | 15 | 15 | 25 | 20 | 17  | 21 | 17 | 16 | 15 | 16 | 15 | 16 | 14 | 15 | 14 |
| 17                                   | 14 | 16 | 14 | 15 | 16 | B  | B  |     | 16 | 15 | 16 | 15 | 15 | 15 | 16  | 17 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| 18                                   | 14 | 15 | 15 | 14 | 16 | 14 | 14 | 16  | 16 | 14 | 13 | 18 | 14 | 15 | 18  | 17 | 15 | 15 | 15 | 15 | 15 | 14 | 14 | 15 |    |
| 19                                   | 15 | 14 | 14 | 15 | 14 | 14 | 15 | 15  | 15 | 16 | 14 | 13 | 16 | 15 | 17  | 15 | 15 | 16 | 16 | 16 | 16 | 16 | 15 | 15 |    |
| 20                                   | 14 | 15 | 15 | 15 | 16 | B  | 15 | 143 | 14 | 15 | 14 | 15 | 17 | 18 | 15  | 16 | 19 | 15 | 15 | 15 | 15 | 15 | 14 | 16 |    |
| 21                                   | 15 | 15 | 14 | 15 | 15 | 14 | 15 | 16  | 15 | 15 | 14 | 16 | 15 | 16 | 15  | 15 | 15 | 16 | 15 | 15 | 14 | 14 | 14 | 14 |    |
| 22                                   | 14 | 21 | 15 | 14 | 14 | 15 | 15 | 15  | 15 | 15 | 14 | 15 | 17 | 15 | 18  | 13 | 16 | 16 | 14 | 15 | 15 | 14 | 14 | 15 |    |
| 23                                   | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 14  | 15 | 14 | 13 | 16 | 15 | 19 | 15  | 14 | 14 | 16 | 16 | 14 | 15 | 15 | 16 | 15 |    |
| 24                                   | 16 | 15 | 15 | 14 | 15 | B  |    | 15  | 14 | 15 | 16 | 14 | 15 | 15 | 15  | 14 | 15 | 15 | 15 | 15 | 16 | 16 | 16 | 15 |    |
| 25                                   | 15 | 15 | 15 | 14 | 14 | 14 | 14 | 15  | 15 | 16 | 15 | 14 | 15 | 16 | 15  | 16 | 17 | 15 | 17 | 16 | 15 | 14 | 15 | 16 |    |
| 26                                   | 15 | 16 | 16 | 16 | 15 | 15 | 14 | 14  | 16 | 17 | 16 | 16 | 17 | 14 | 15  | 15 | 14 | 15 | 15 | 17 | 15 | 15 | 15 | 15 |    |
| 27                                   | 16 | 15 | 15 | 14 | 17 | 15 | 14 | 14  | 15 | 14 | 16 | 19 | 17 | 15 | 15  | 14 | 15 | 15 | 15 | 15 | 15 | 16 | 14 | 15 |    |
| 28                                   | 14 | 15 | 15 | 15 | 16 | 15 | 17 | 14  | 15 | 15 | 17 | 13 | 23 | 21 | 19  | 15 | 19 | 17 | 15 | 15 | 15 | 15 | 15 | 15 |    |
| 29                                   | 15 | 14 | 16 | 15 | 16 | 15 | 15 | 14  | 15 | 17 | 17 | 16 | 17 | 17 | 15  | 16 | 16 | 14 | 16 | 15 | 15 | 15 | 16 | 16 |    |
| 30                                   | 15 | 15 | 14 | 14 | 14 | B  | B  | 15  | 15 | 16 | 15 | 15 | 16 | 14 | 14  | 15 | 15 | 14 | 15 | 15 | 15 | 16 | 16 | 15 |    |
| 31                                   | 71 | 16 | 15 | 15 | 17 | 15 | 16 | 16  | 15 | 17 | 15 | 15 | 15 | 16 | 17  | 17 | 15 | 15 | 15 | 15 | 16 | 15 | 15 | 15 |    |
|                                      | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07  | 08 | 09 | 10 | 11 | 12 | 13 | 14  | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |    |
| CNT                                  | 31 | 31 | 31 | 31 | 31 | 29 | 30 | 31  | 31 | 31 | 30 | 29 | 30 | 29 | 30  | 30 | 30 | 30 | 30 | 31 | 31 | 31 | 31 | 31 |    |
| MED                                  | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15  | 15 | 15 | 15 | 16 | 16 | 16 | 16  | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |    |
| U Q                                  | 16 | 16 | 16 | 15 | 16 | 15 | 15 | 16  | 16 | 16 | 16 | 17 | 17 | 17 | 17  | 16 | 16 | 16 | 16 | 15 | 16 | 16 | 16 | 16 |    |
| L Q                                  | 14 | 15 | 14 | 14 | 15 | 14 | 15 | 15  | 15 | 15 | 14 | 15 | 15 | 15 | 15  | 14 | 15 | 15 | 15 | 15 | 15 | 14 | 14 | 15 |    |

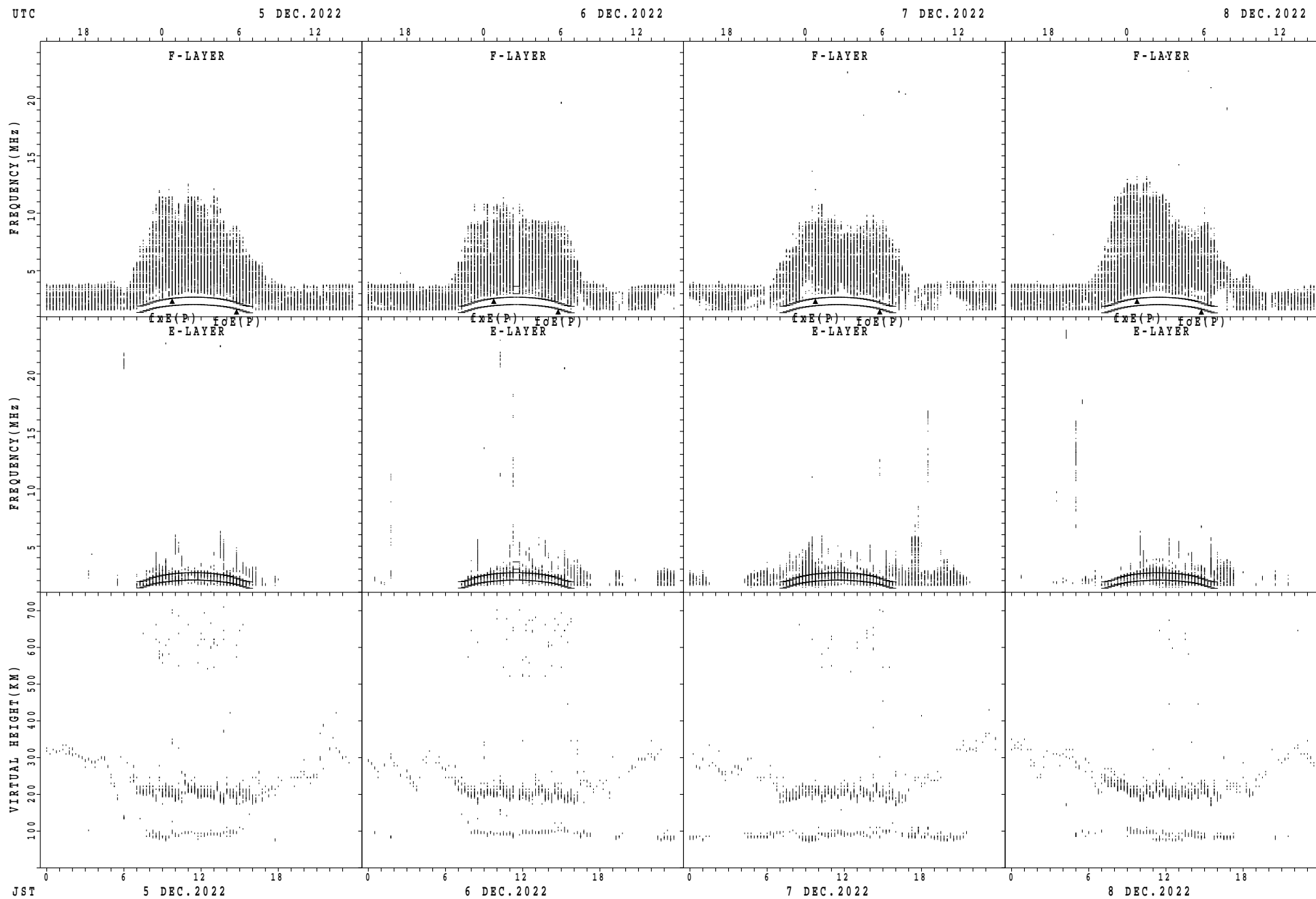


SUMMARY PLOTS AT Wakkanai



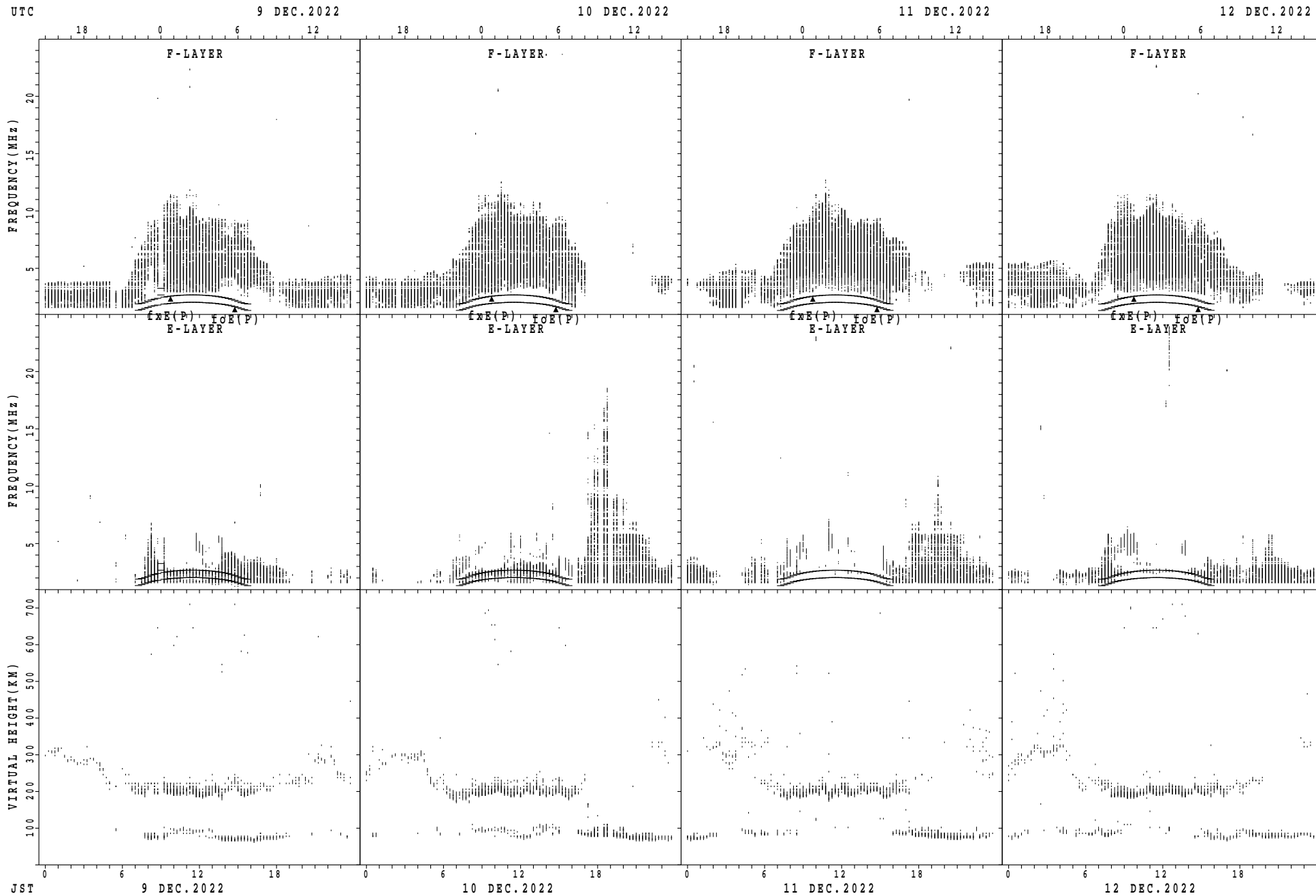
$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $f_oE(P)$ ; PREDICTED VALUE FOR  $f_oE$

## SUMMARY PLOTS AT Wakkanai



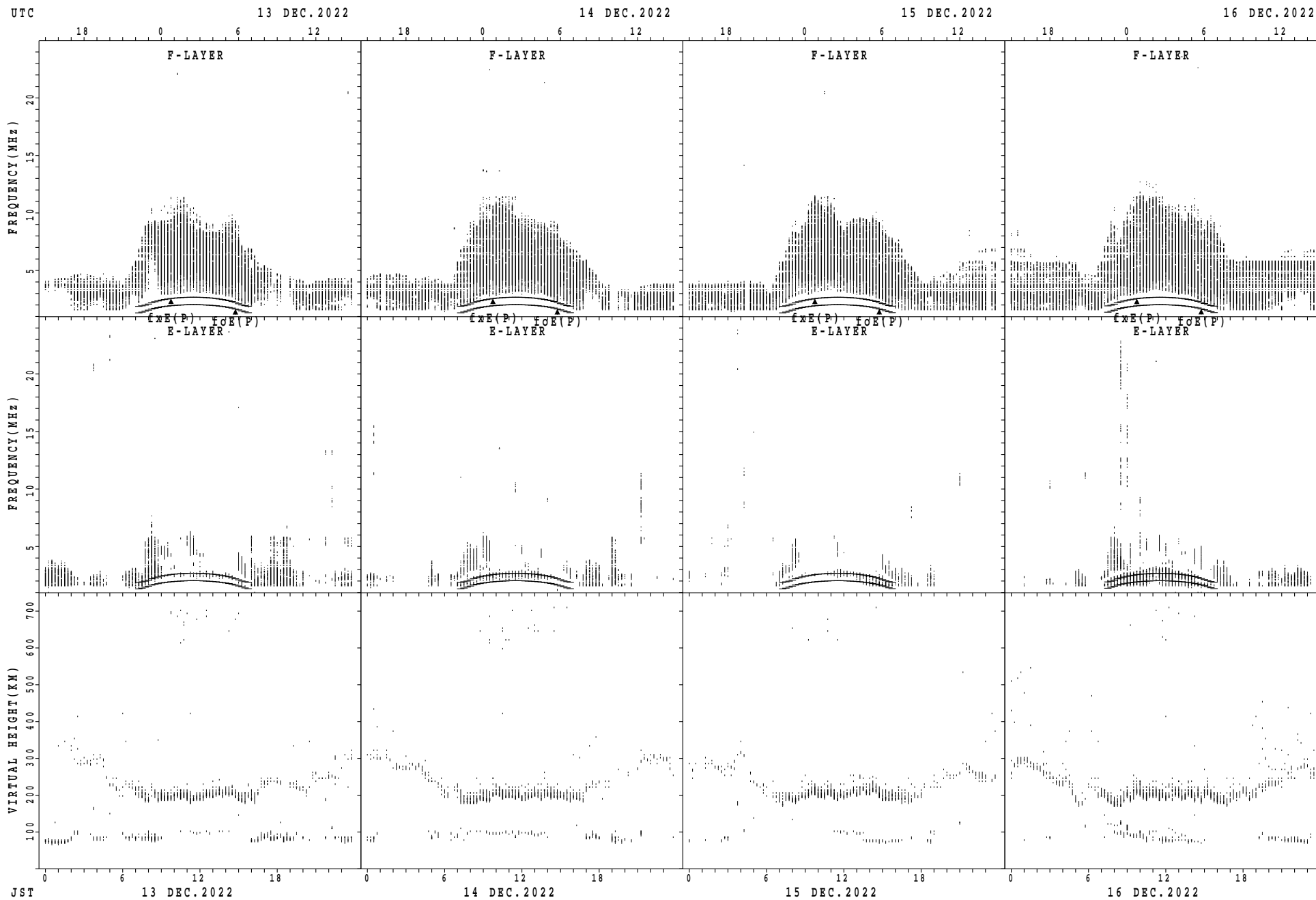
$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $f_oE(P)$ ; PREDICTED VALUE FOR  $f_oE$

SUMMARY PLOTS AT Wakkanai



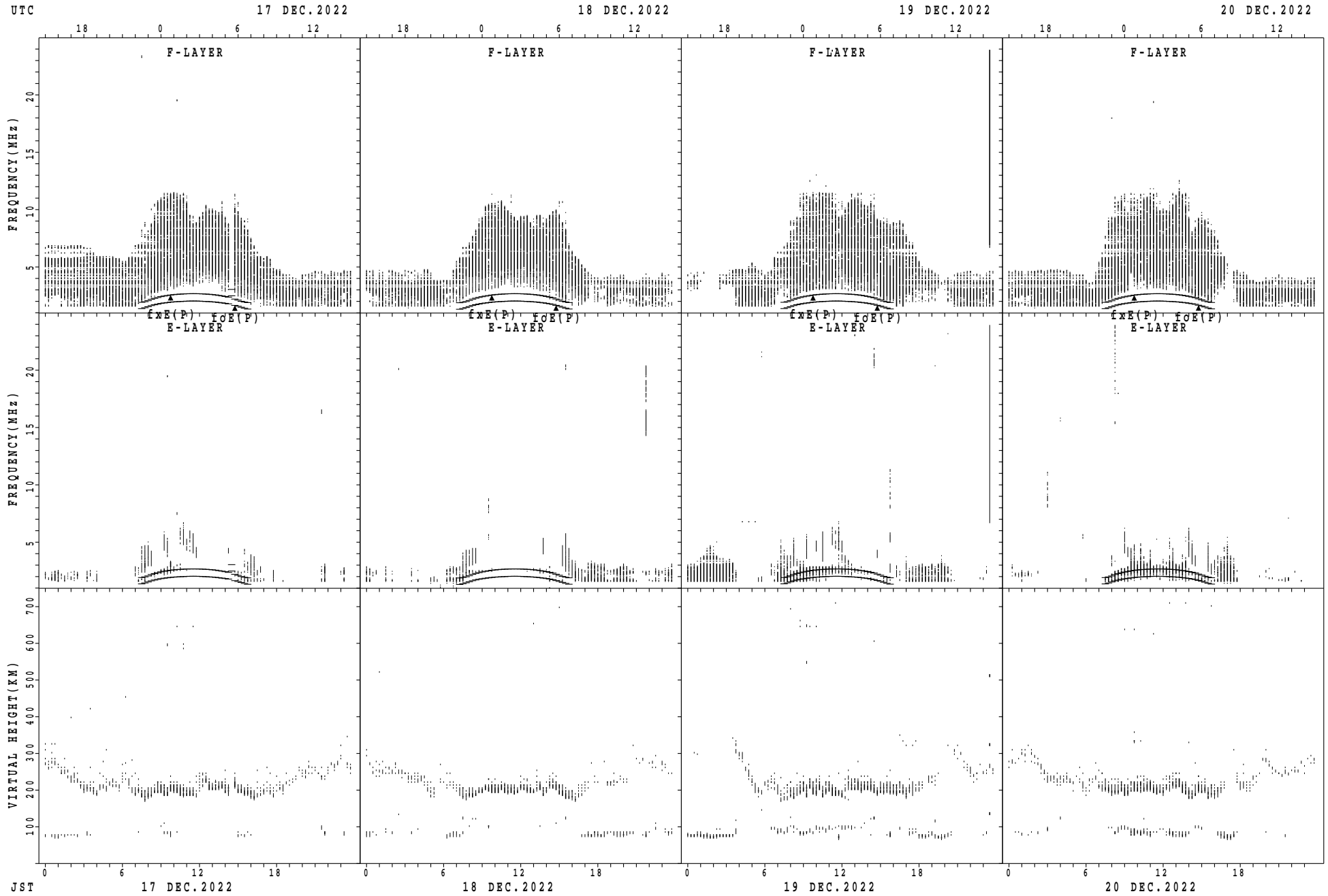
$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $foE(P)$ ; PREDICTED VALUE FOR  $foE$

SUMMARY PLOTS AT Wakkanai



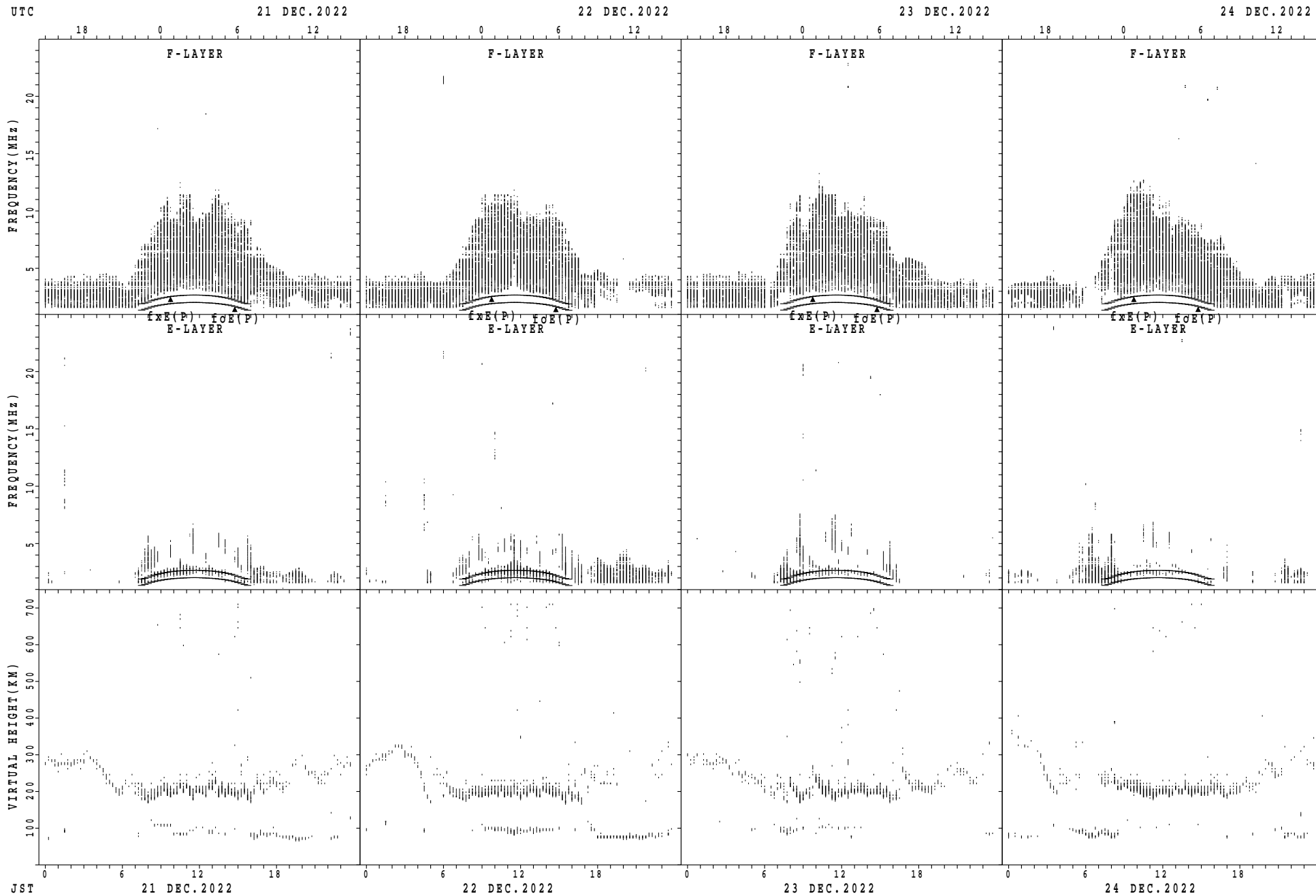
$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $foE(P)$ ; PREDICTED VALUE FOR  $foE$

SUMMARY PLOTS AT Wakkanai



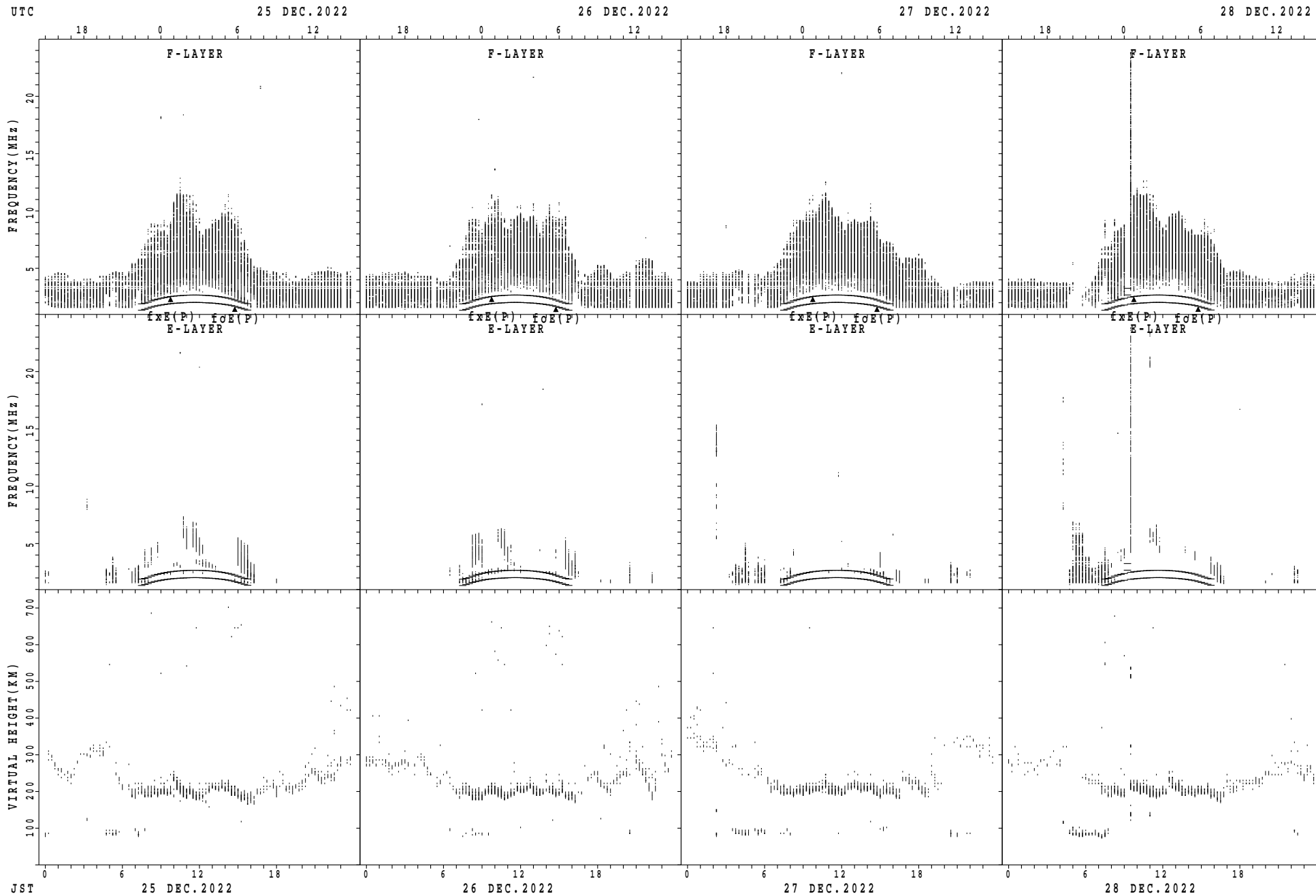
$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $f_oE(P)$ ; PREDICTED VALUE FOR  $f_oE$

SUMMARY PLOTS AT Wakkanai



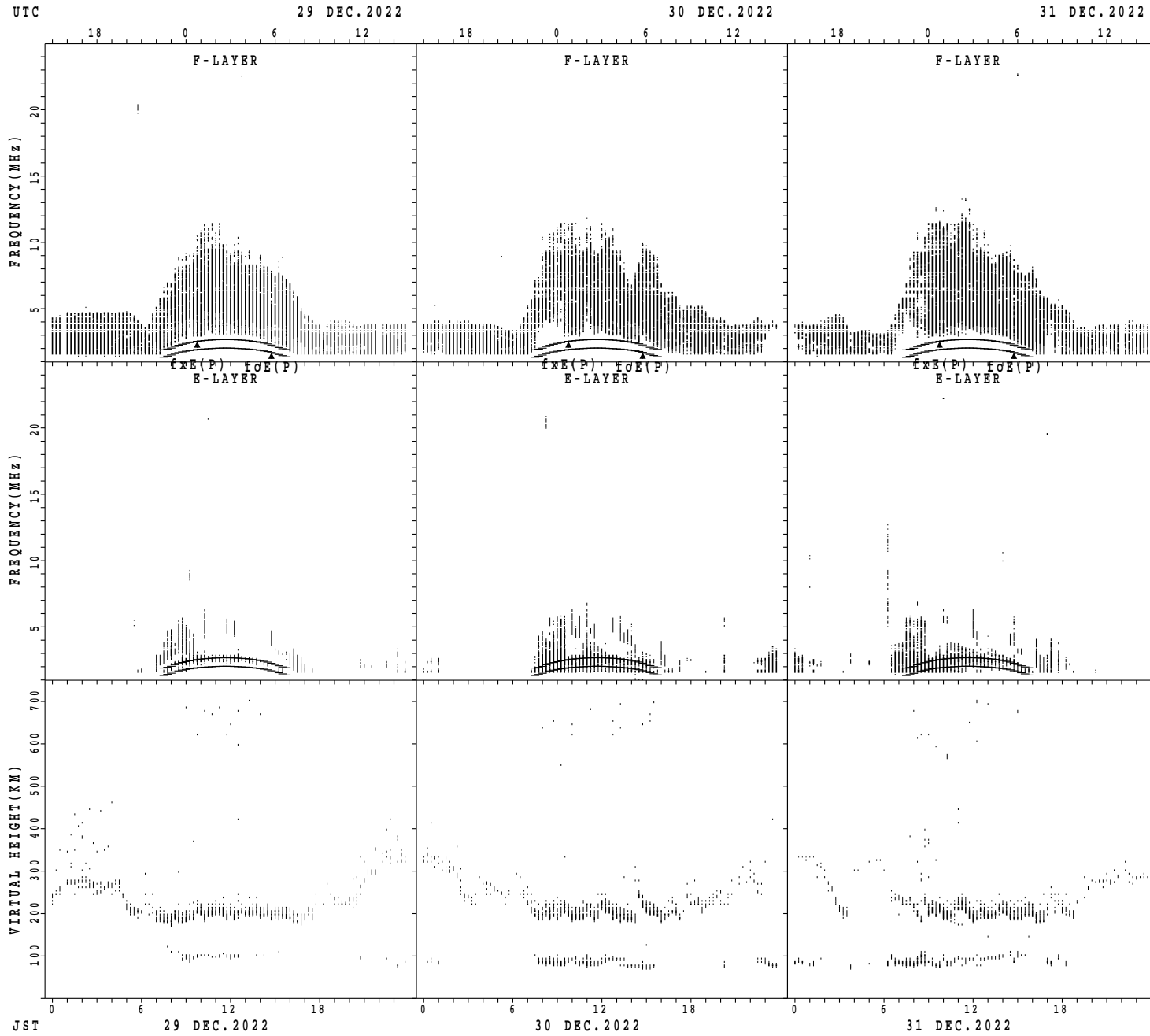
fxE(P); PREDICTED VALUE FOR fxE  
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Wakkanai



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

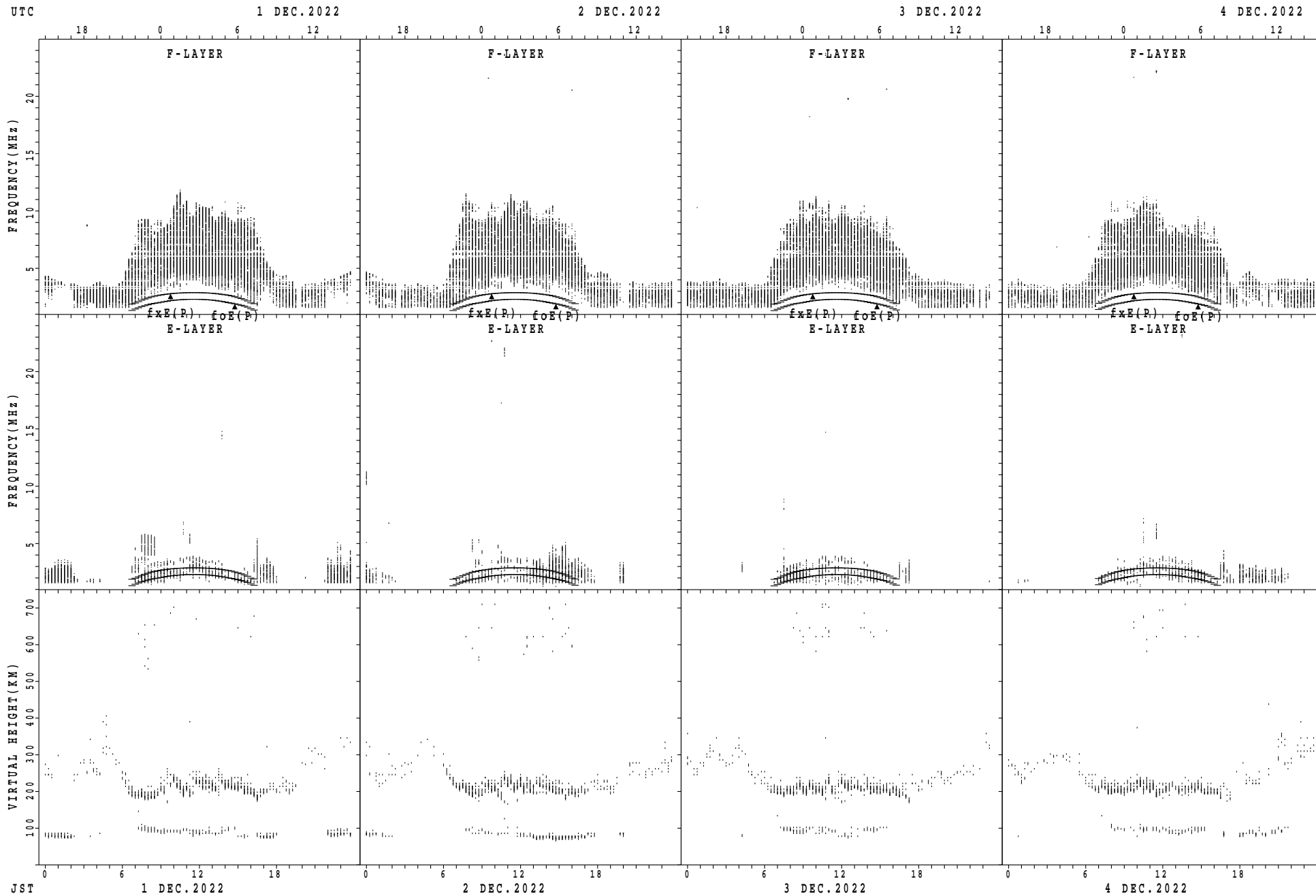
SUMMARY PLOTS AT Wakkanai



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

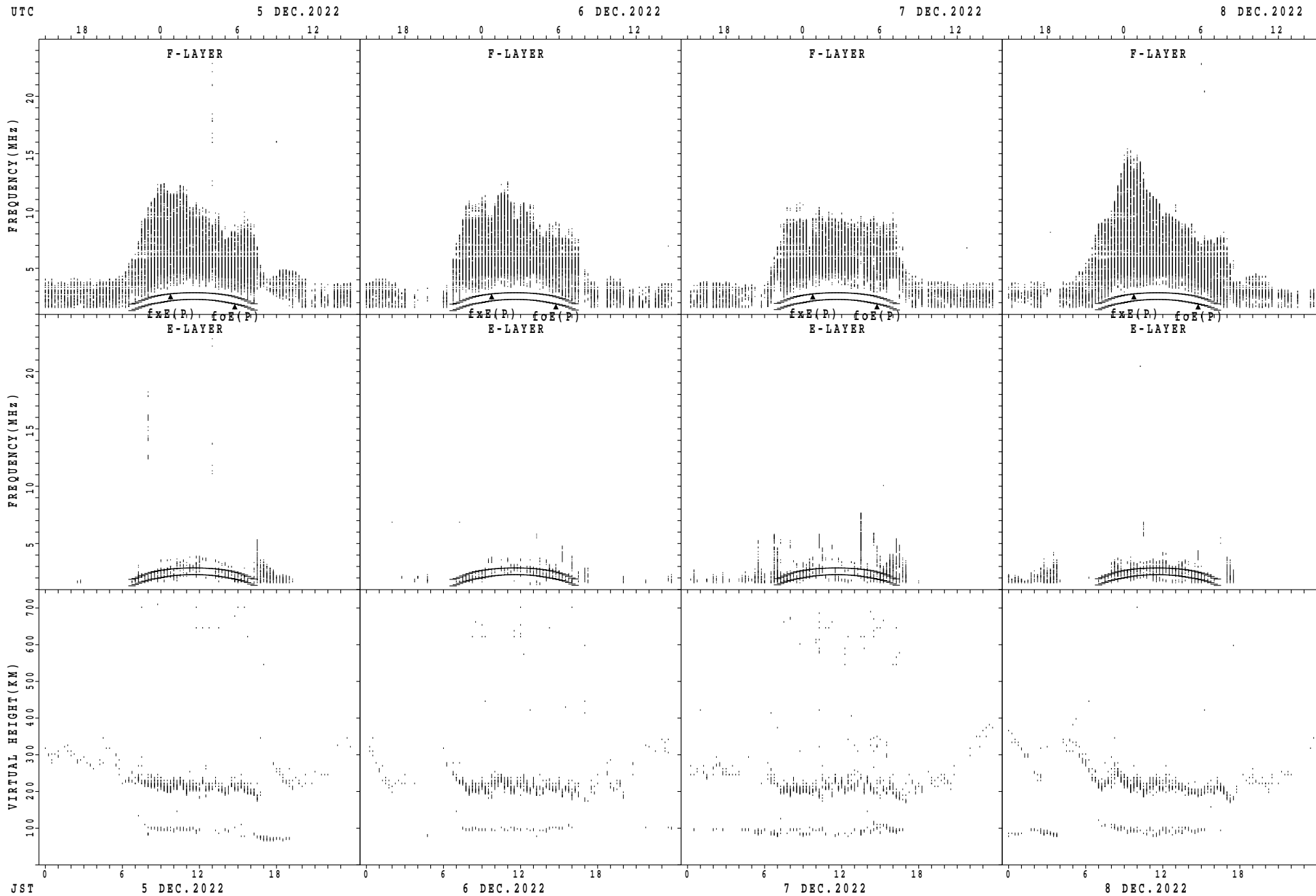


SUMMARY PLOTS AT Kokubunji



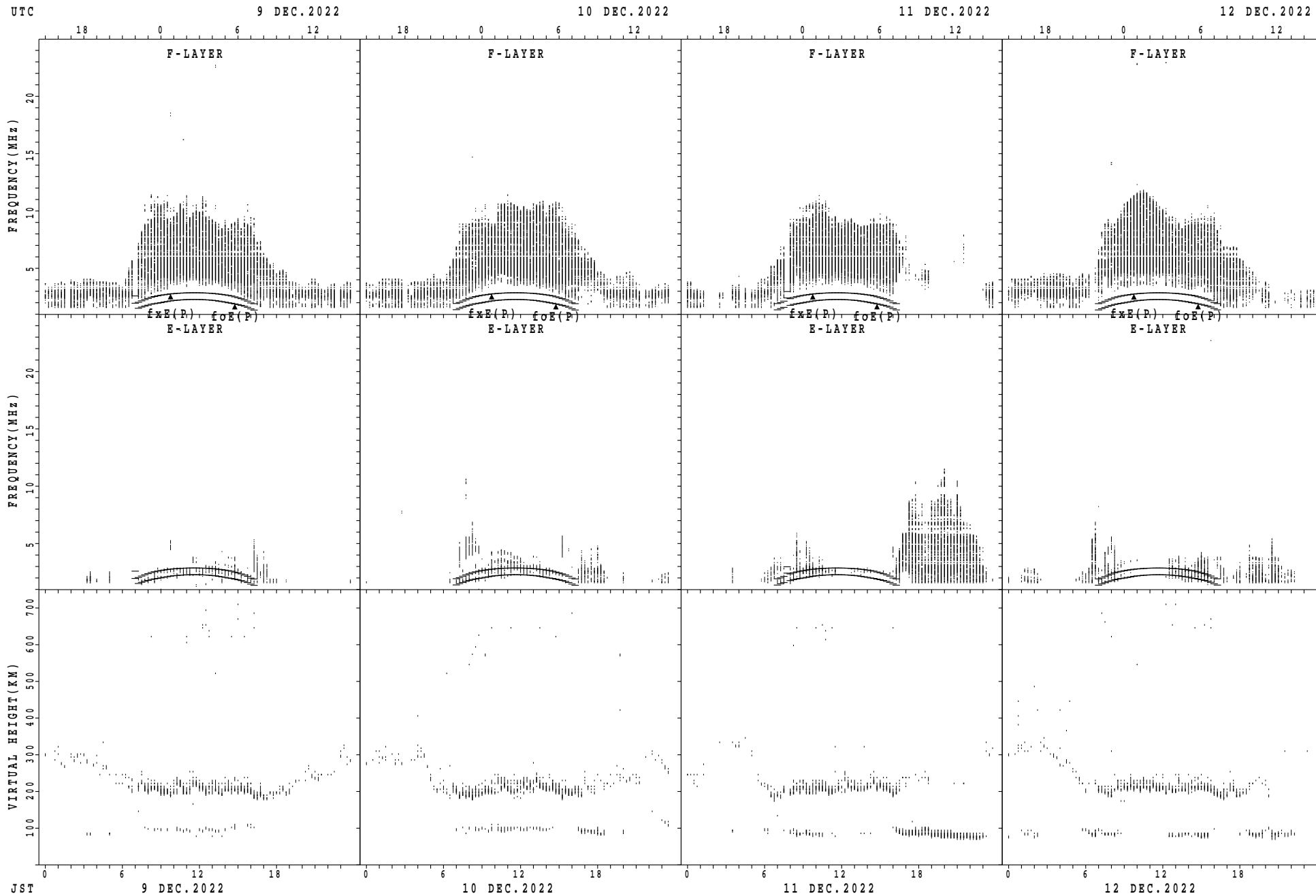
$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $foE(P)$ ; PREDICTED VALUE FOR  $foE$

SUMMARY PLOTS AT Kokubunji



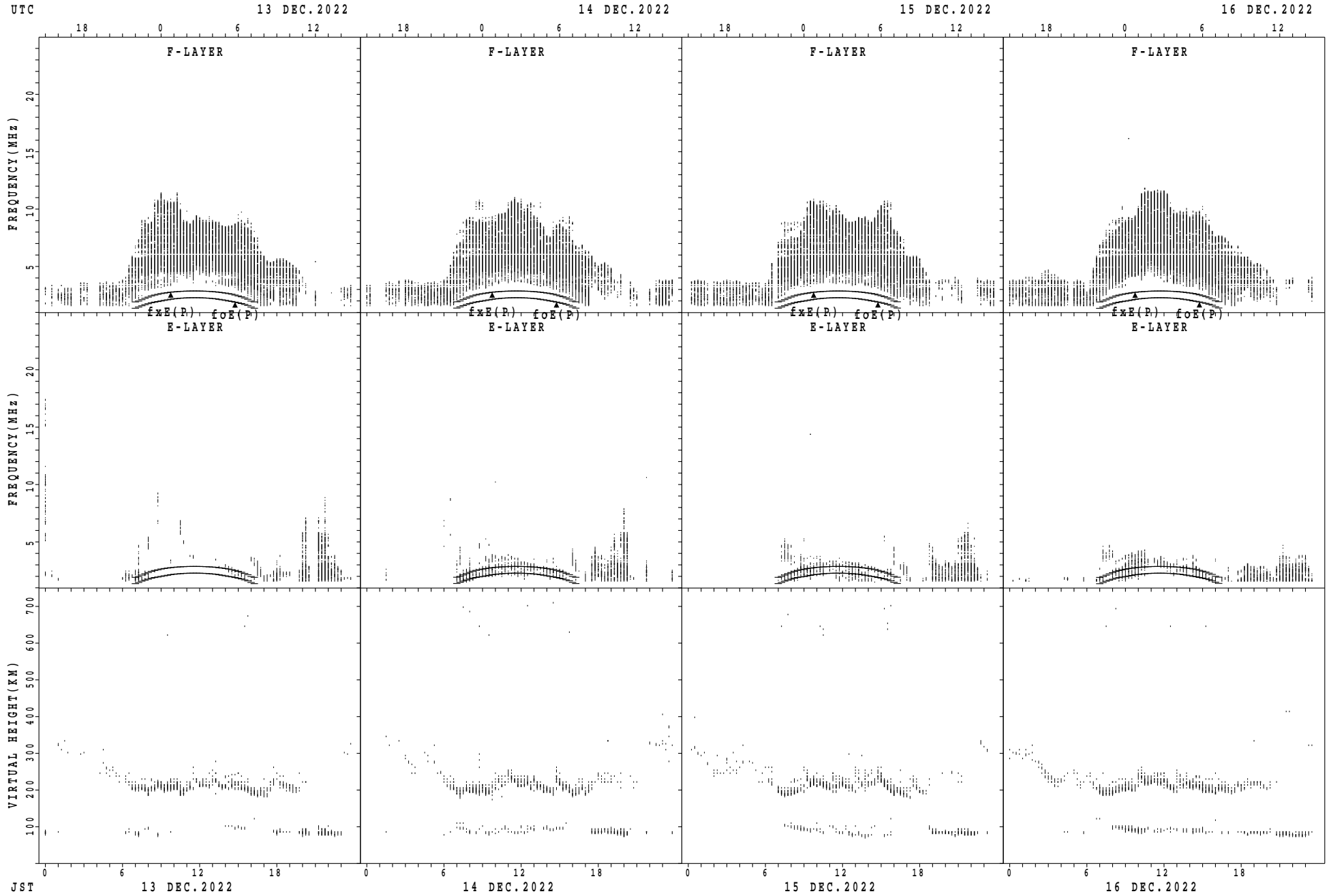
$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $foE(P)$ ; PREDICTED VALUE FOR  $foE$

SUMMARY PLOTS AT Kokubunji



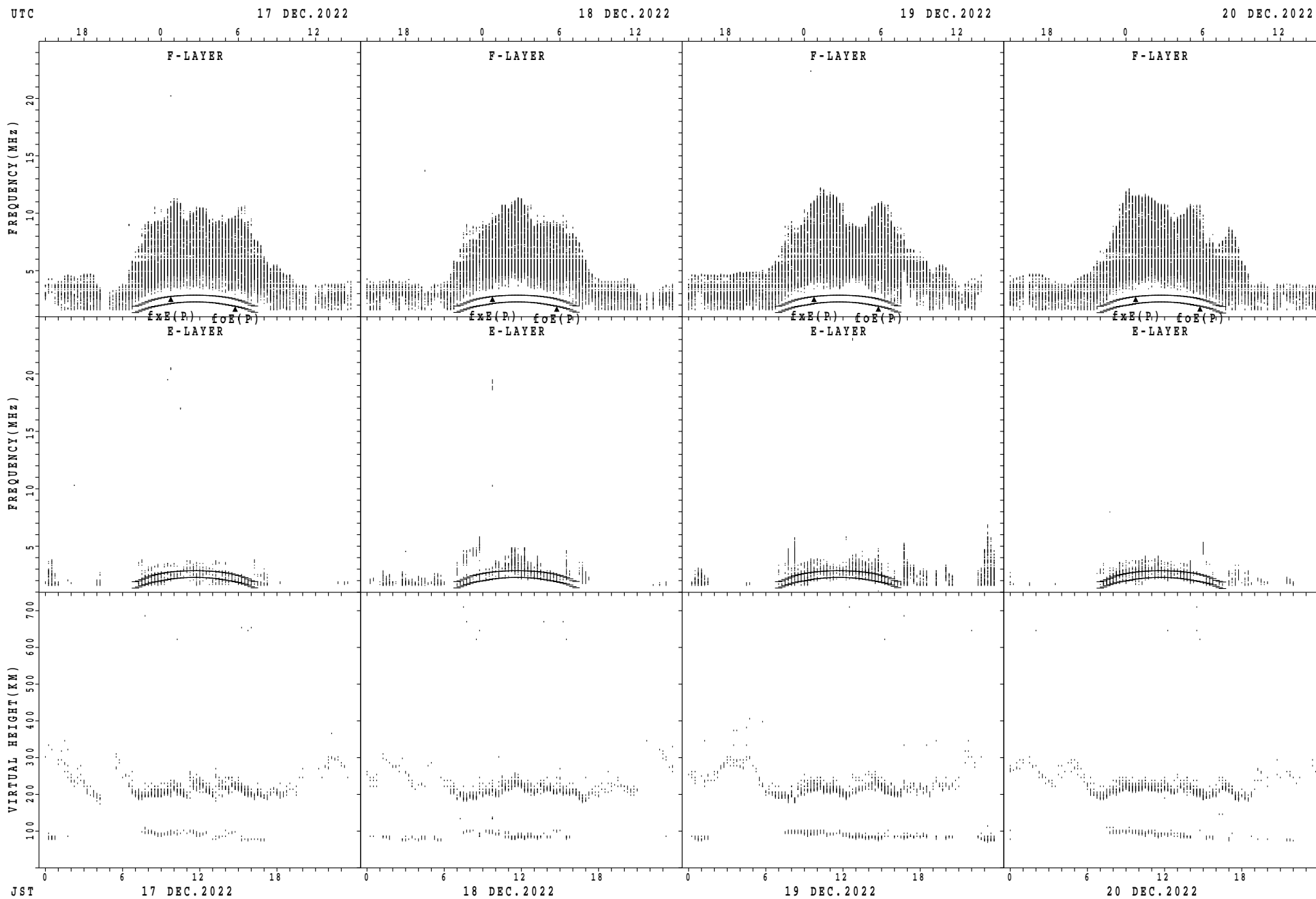
fxE(P); PREDICTED VALUE FOR fxE  
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Kokubunji



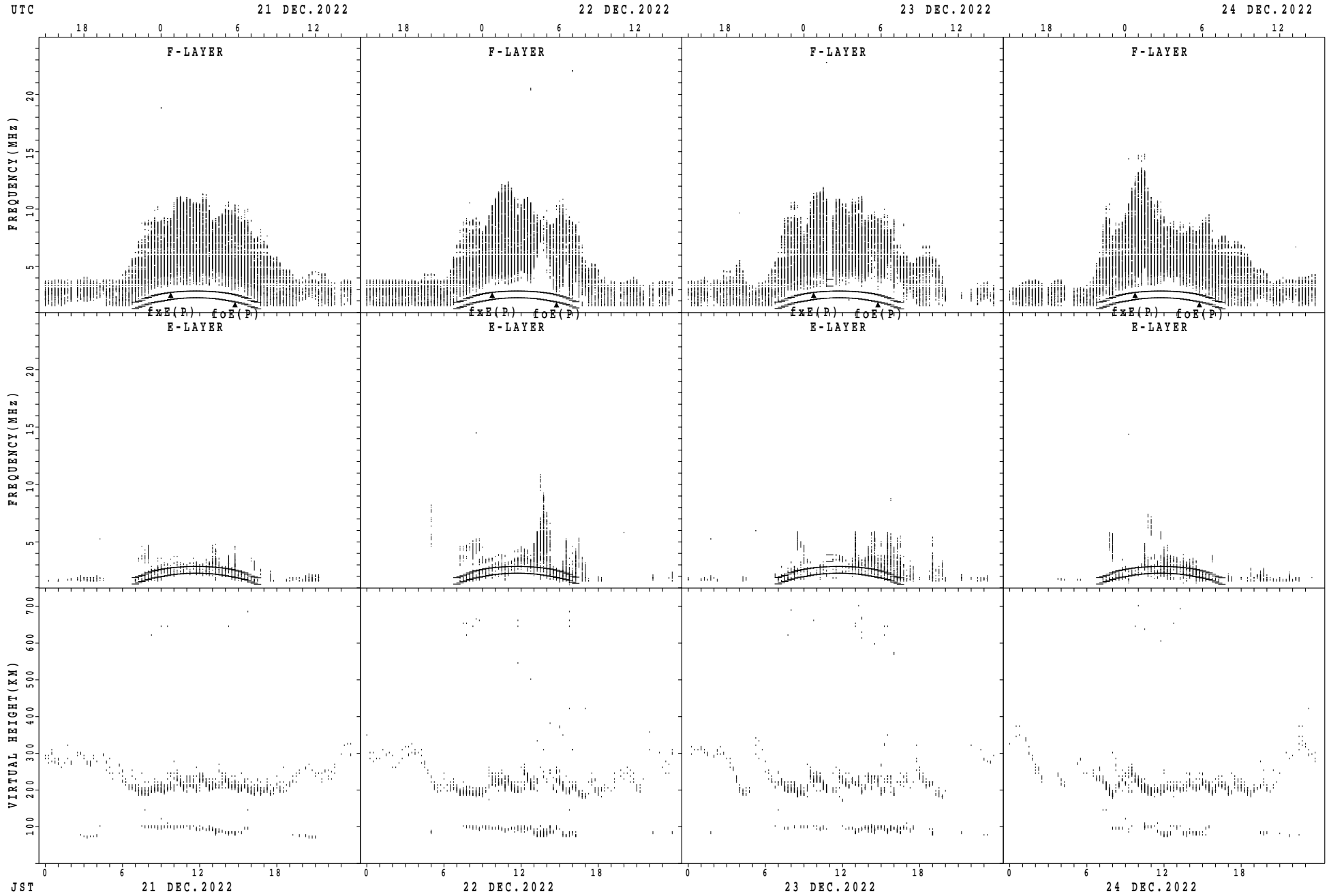
$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $foE(P)$ ; PREDICTED VALUE FOR  $foE$

## SUMMARY PLOTS AT Kokubunji



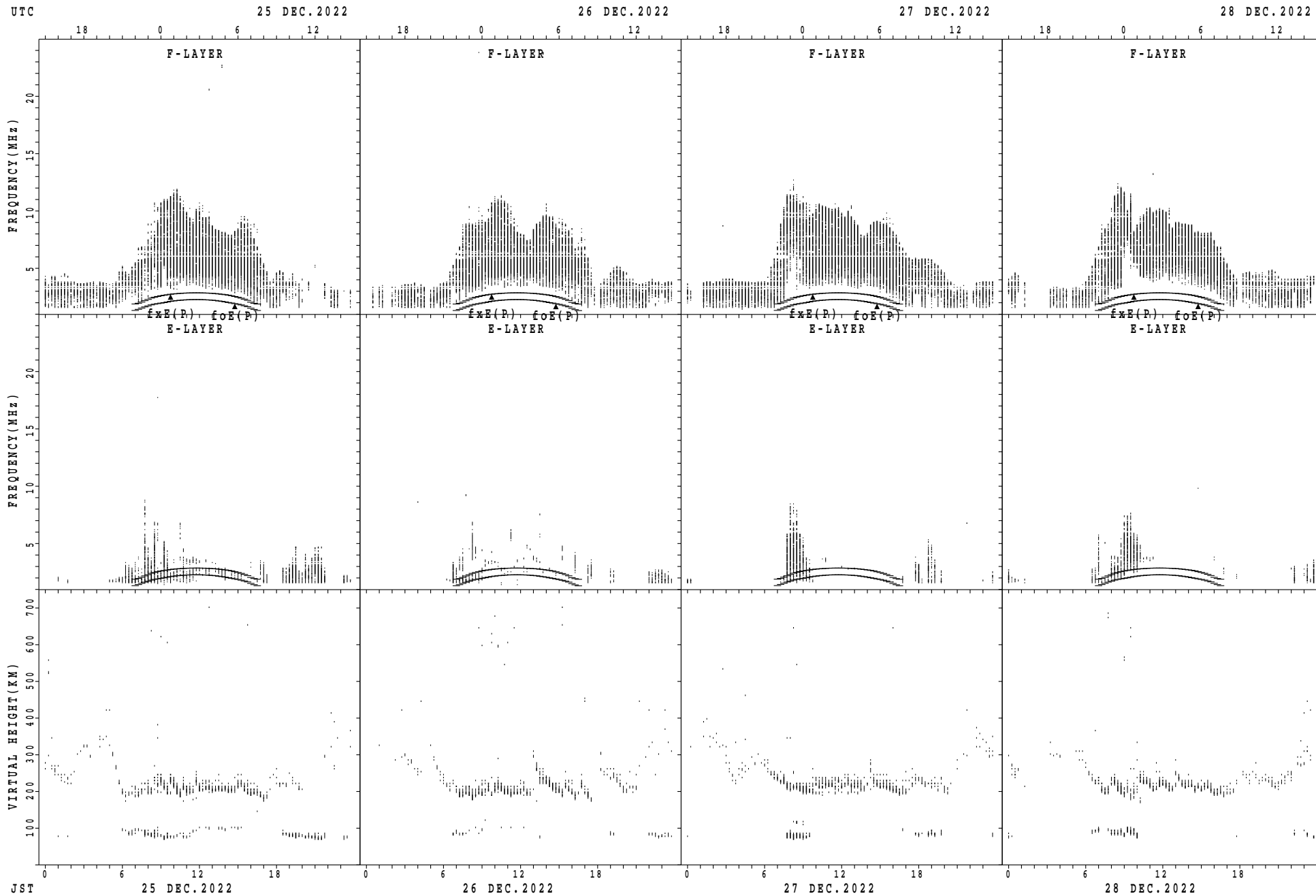
$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $foE(P)$ ; PREDICTED VALUE FOR  $foE$

SUMMARY PLOTS AT Kokubunji



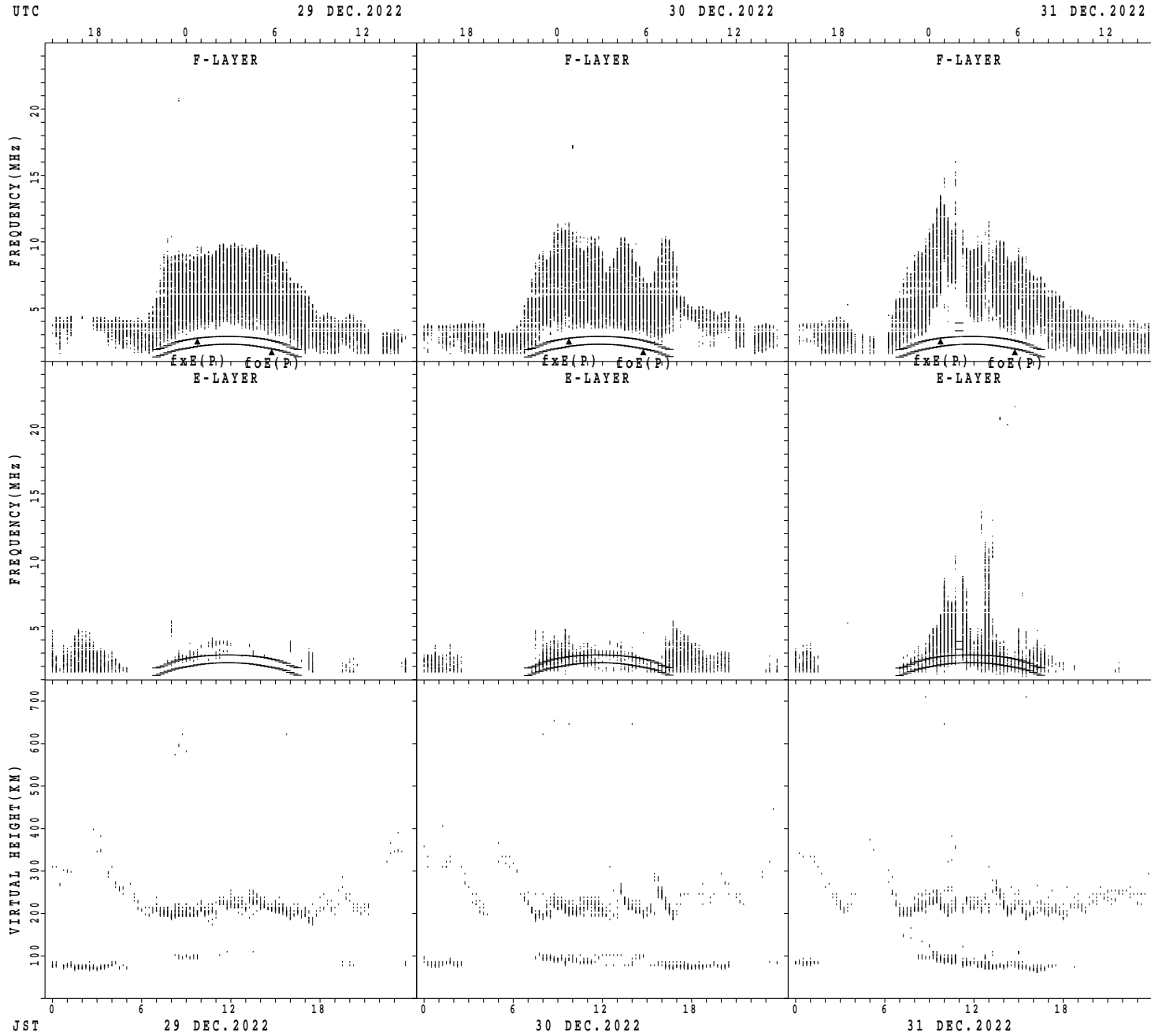
$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $foE(P)$ ; PREDICTED VALUE FOR  $foE$

SUMMARY PLOTS AT Kokubunji



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

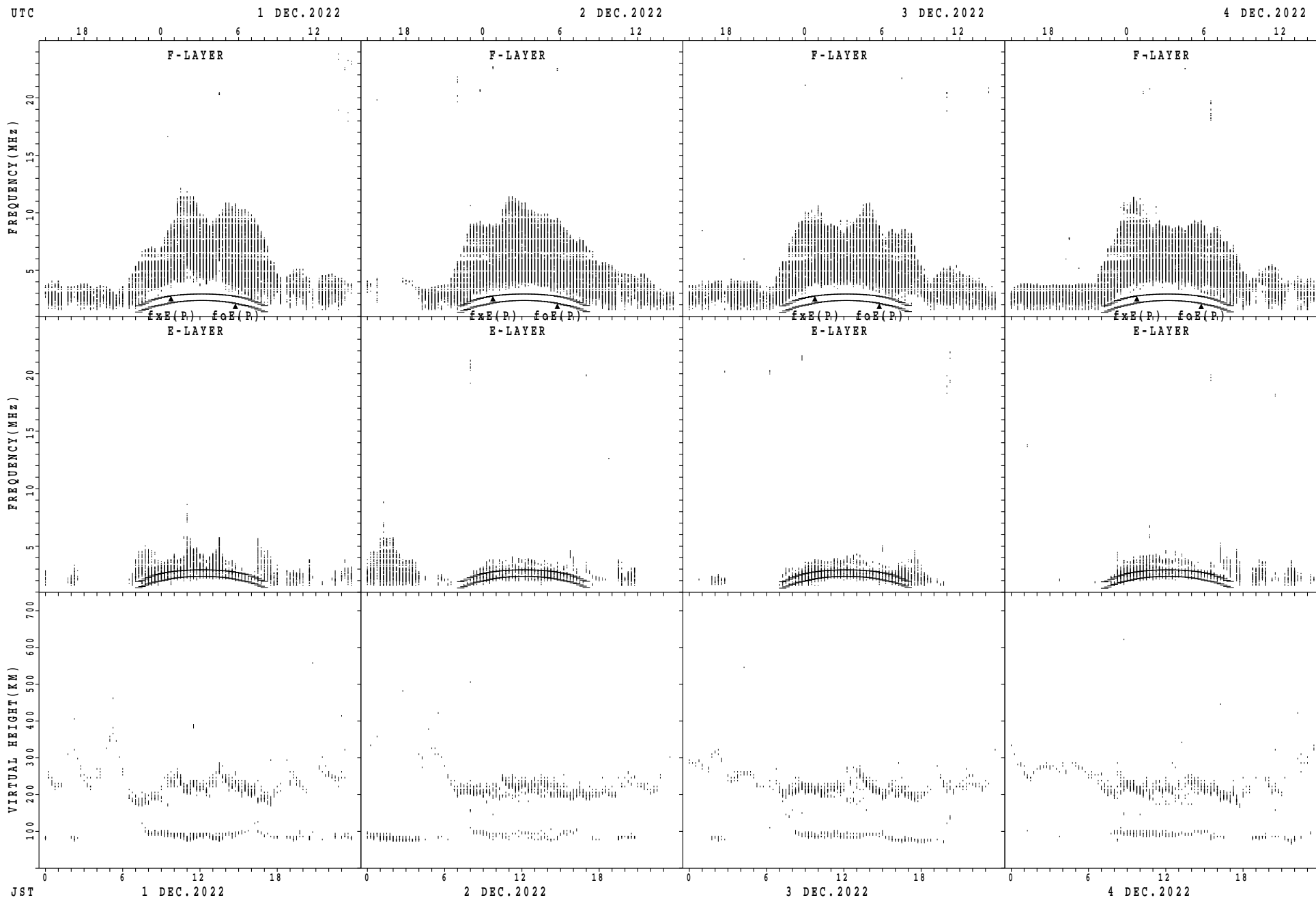
SUMMARY PLOTS AT Kokubunji



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

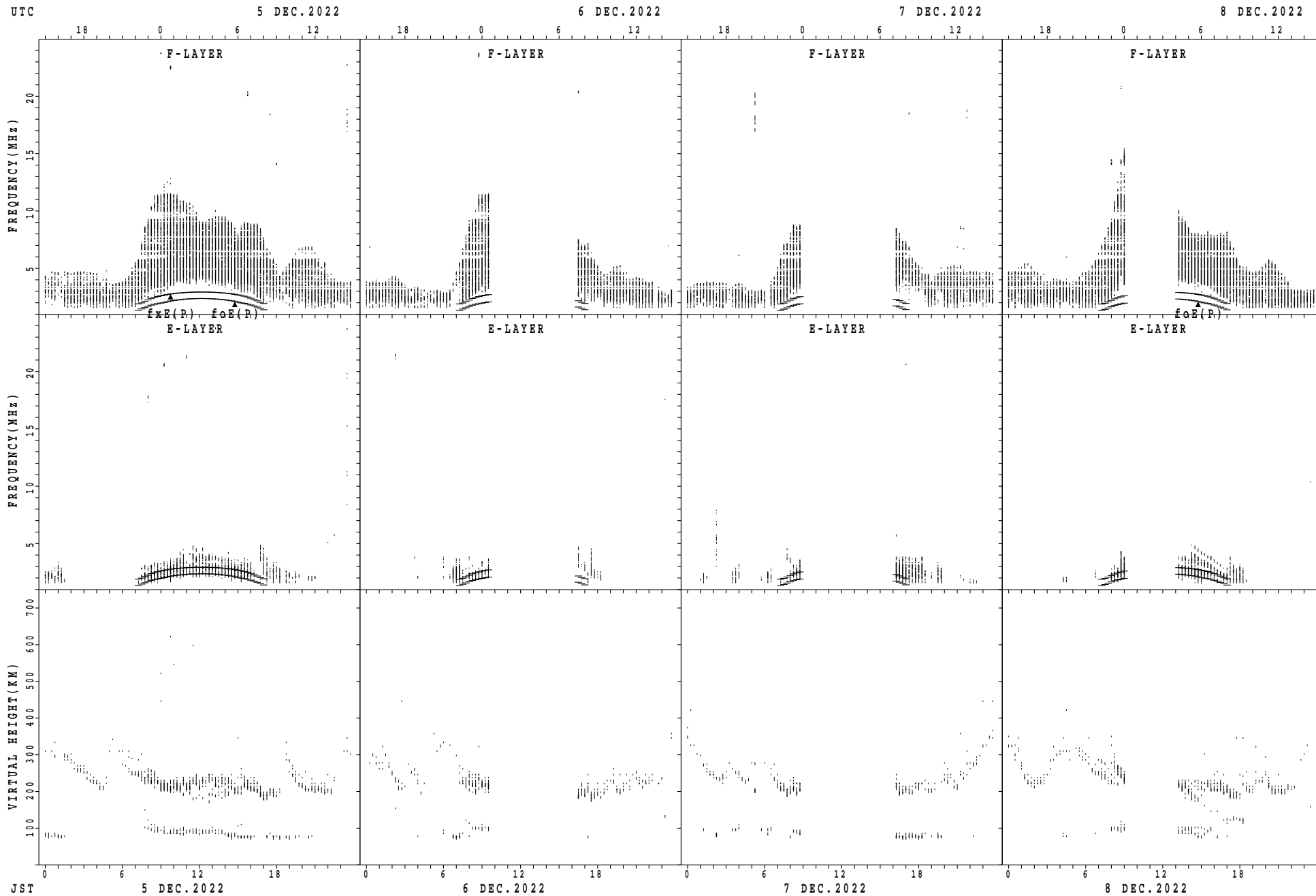


SUMMARY PLOTS AT Yamagawa



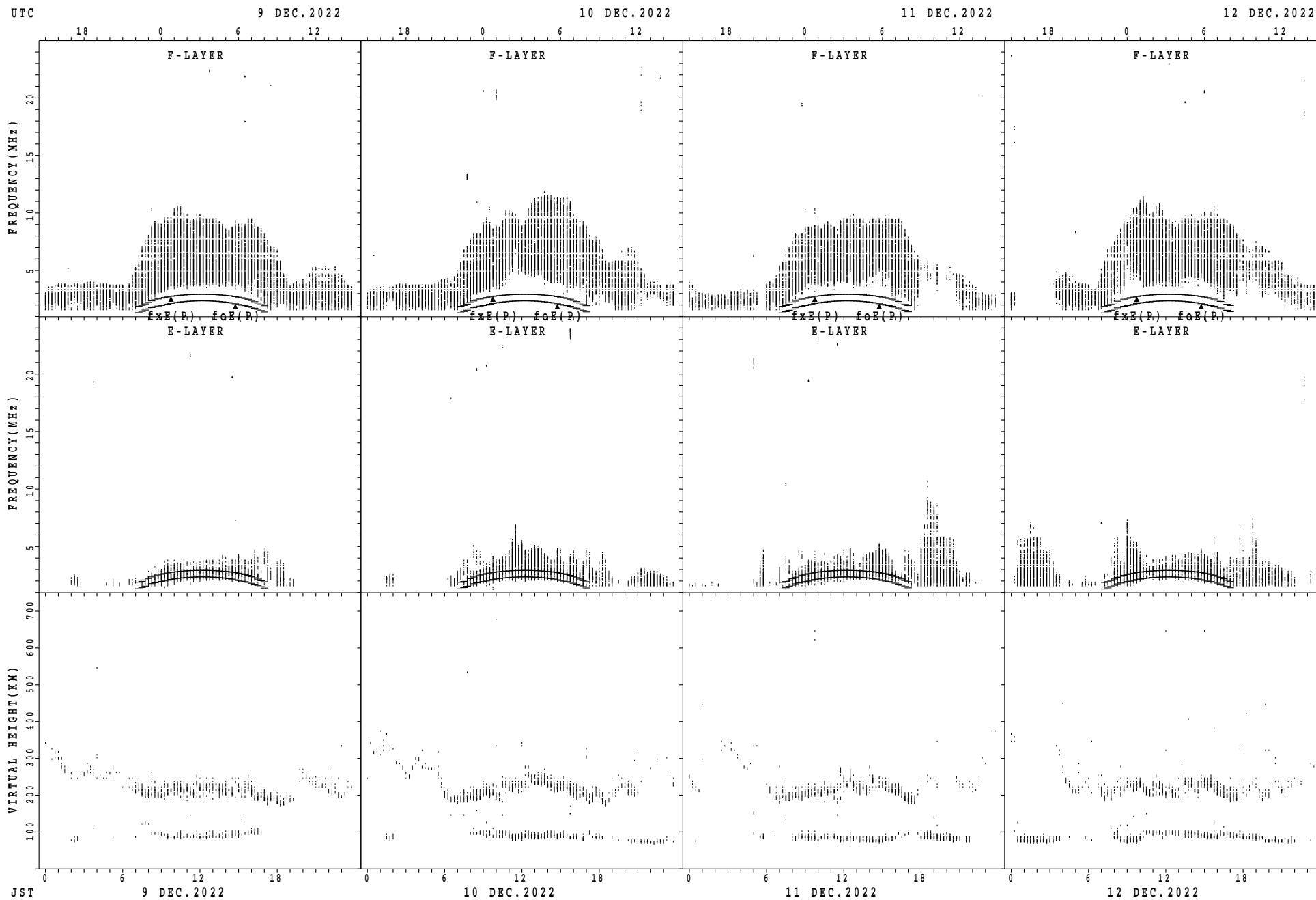
$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $foE(P)$ ; PREDICTED VALUE FOR  $foE$

SUMMARY PLOTS AT Yamagawa



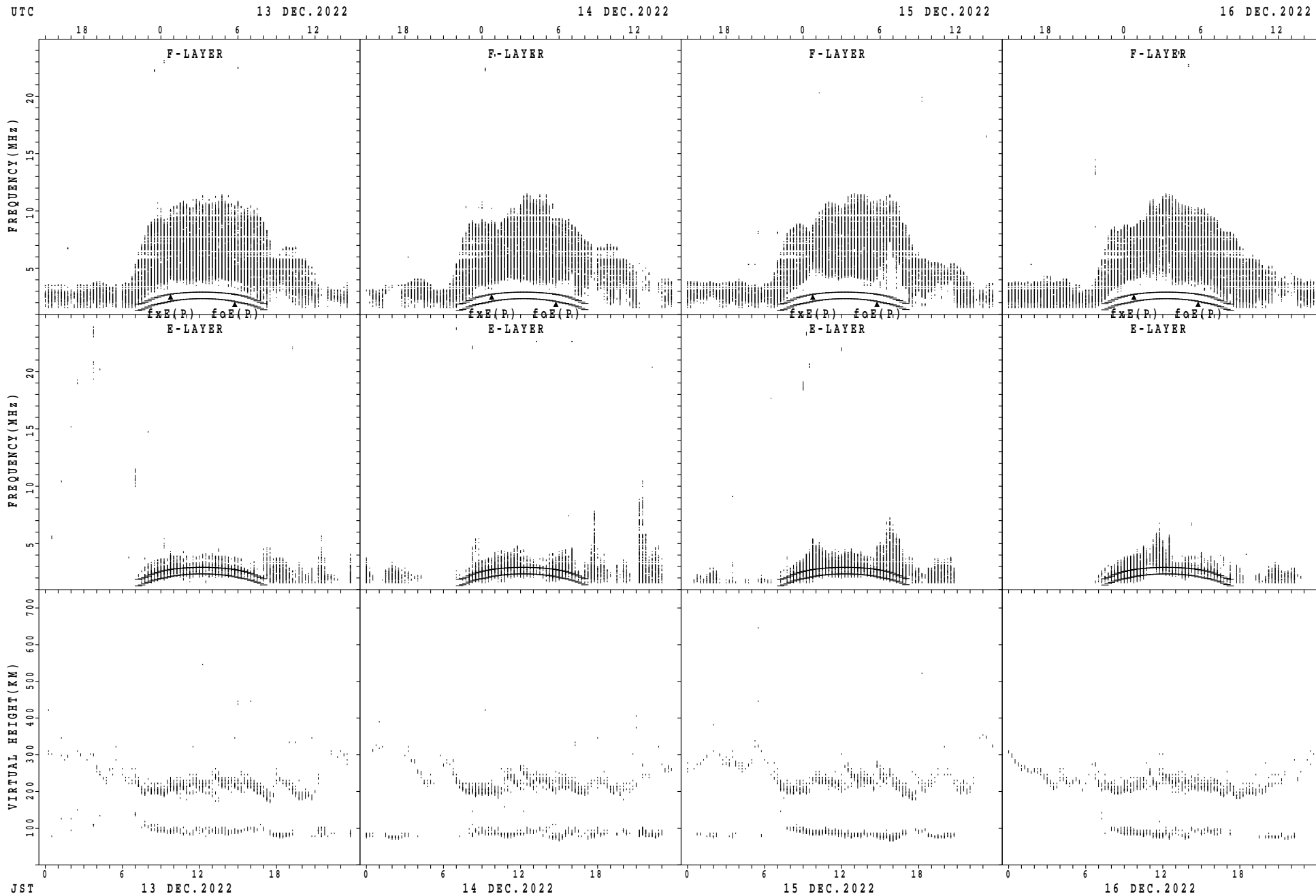
$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $f_oE(P)$ ; PREDICTED VALUE FOR  $f_oE$

SUMMARY PLOTS AT Yamagawa



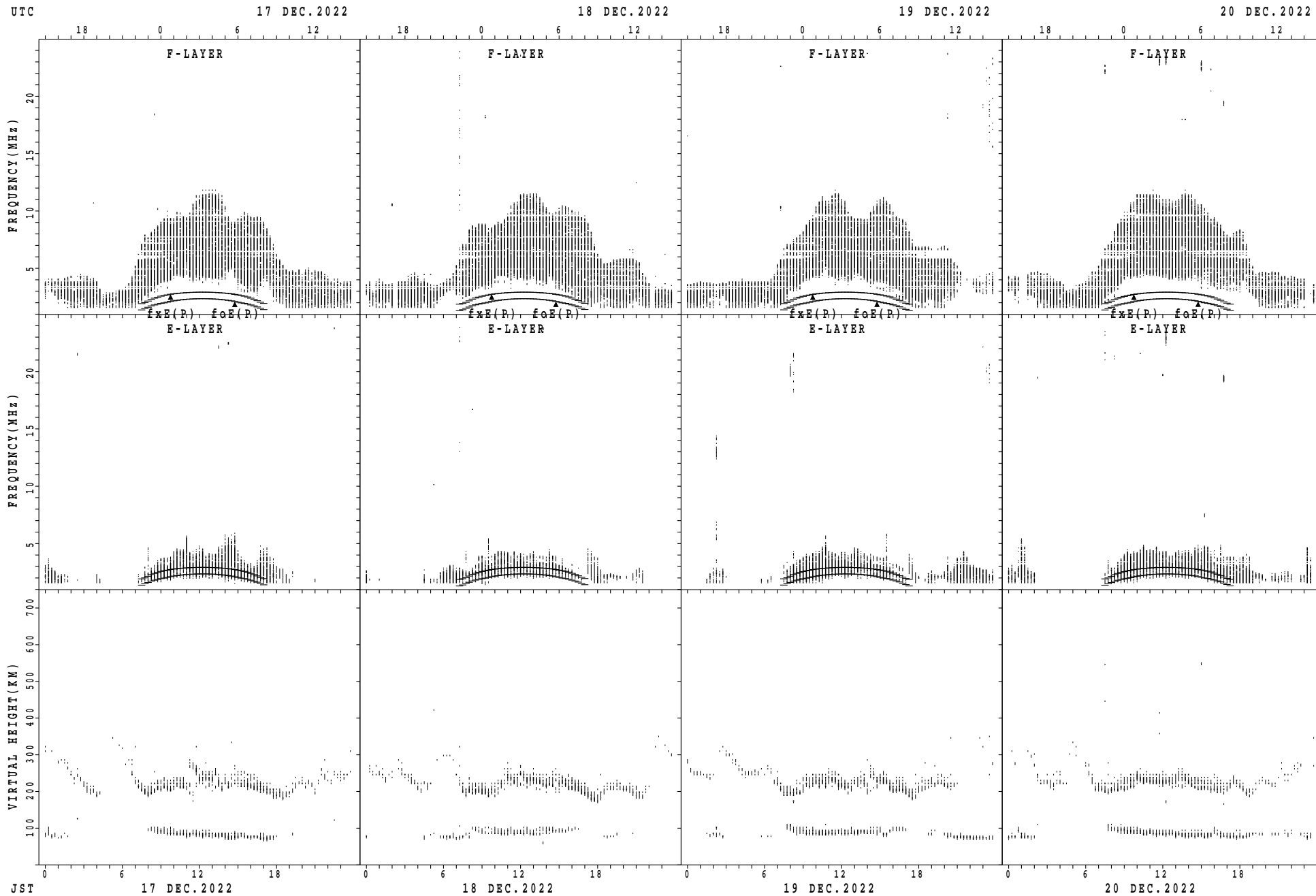
$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $f_oE(P)$ ; PREDICTED VALUE FOR  $f_oE$

SUMMARY PLOTS AT Yamagawa



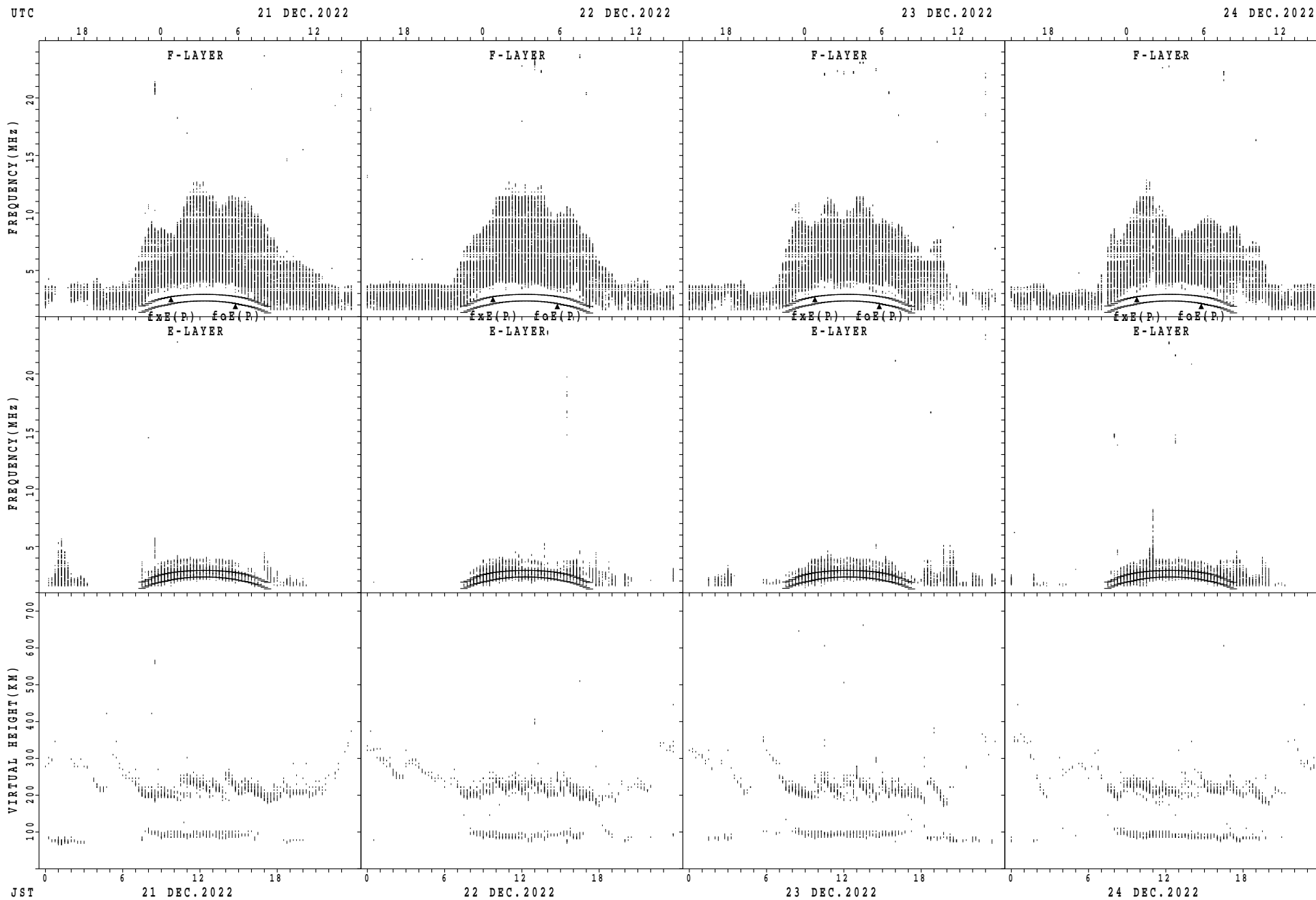
$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $f_oE(P)$ ; PREDICTED VALUE FOR  $f_oE$

SUMMARY PLOTS AT Yamagawa



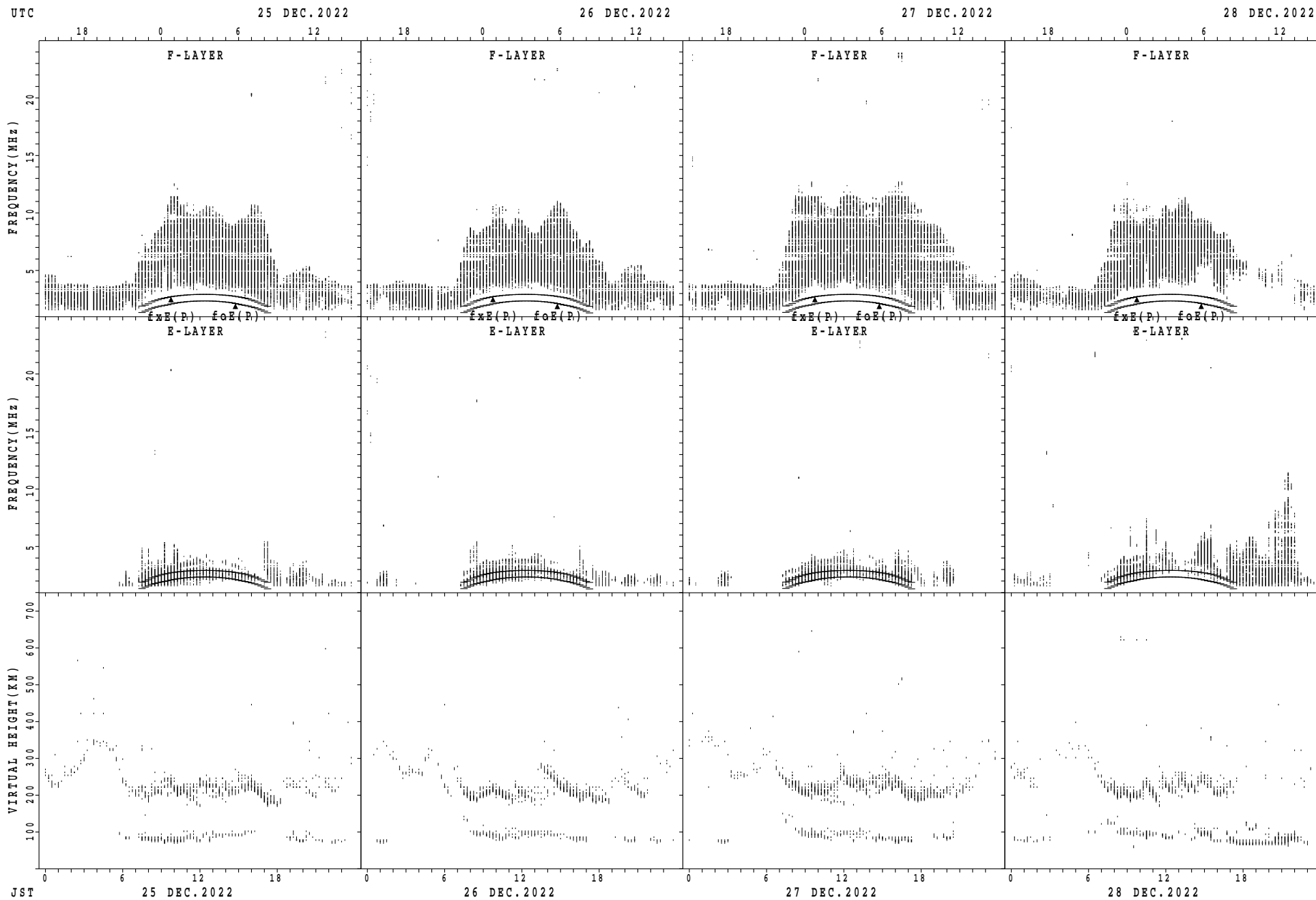
$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $foE(P)$ ; PREDICTED VALUE FOR  $foE$

SUMMARY PLOTS AT Yamagawa



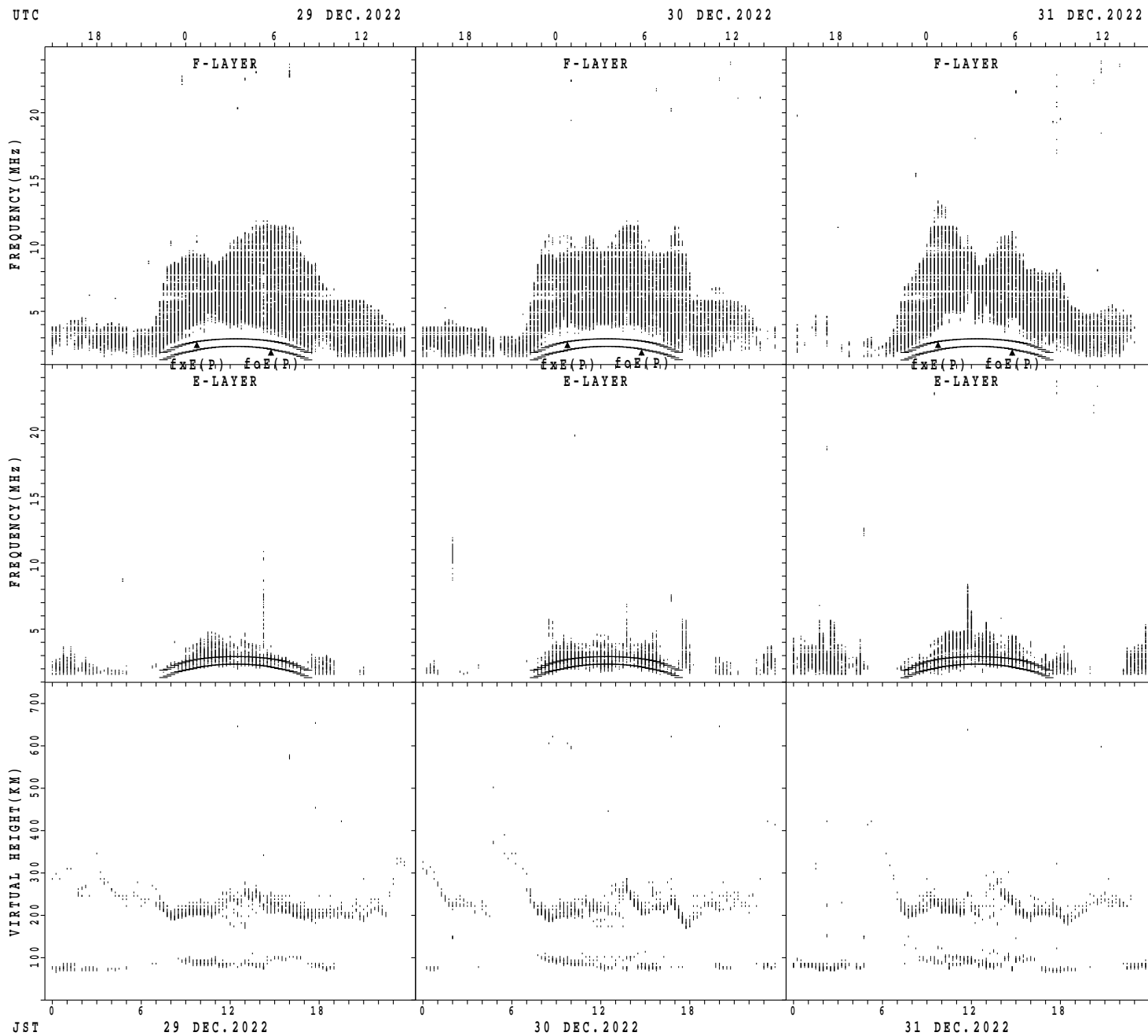
$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $f_oE(P)$ ; PREDICTED VALUE FOR  $f_oE$

SUMMARY PLOTS AT Yamagawa



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

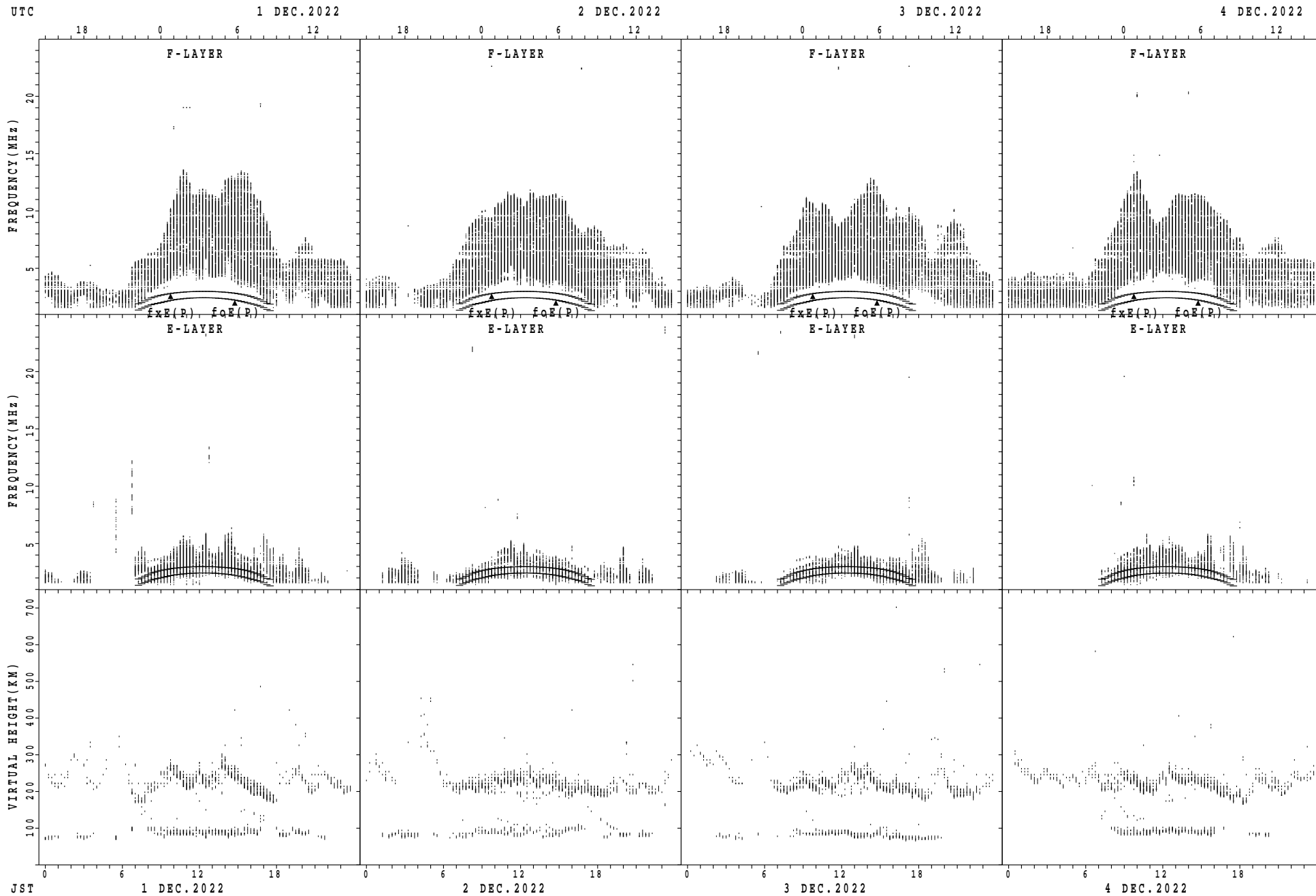
SUMMARY PLOTS AT Yamagawa



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

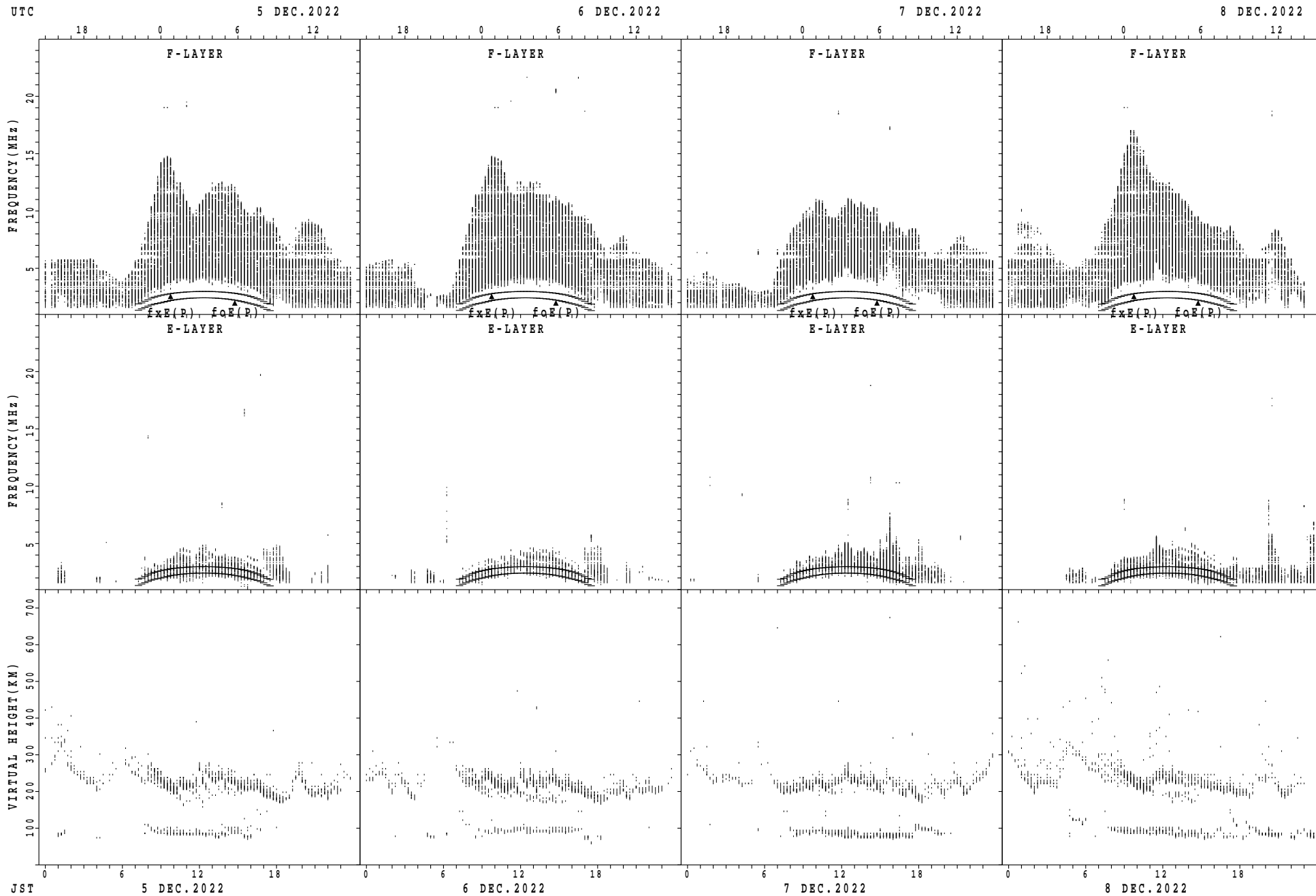


SUMMARY PLOTS AT Okinawa



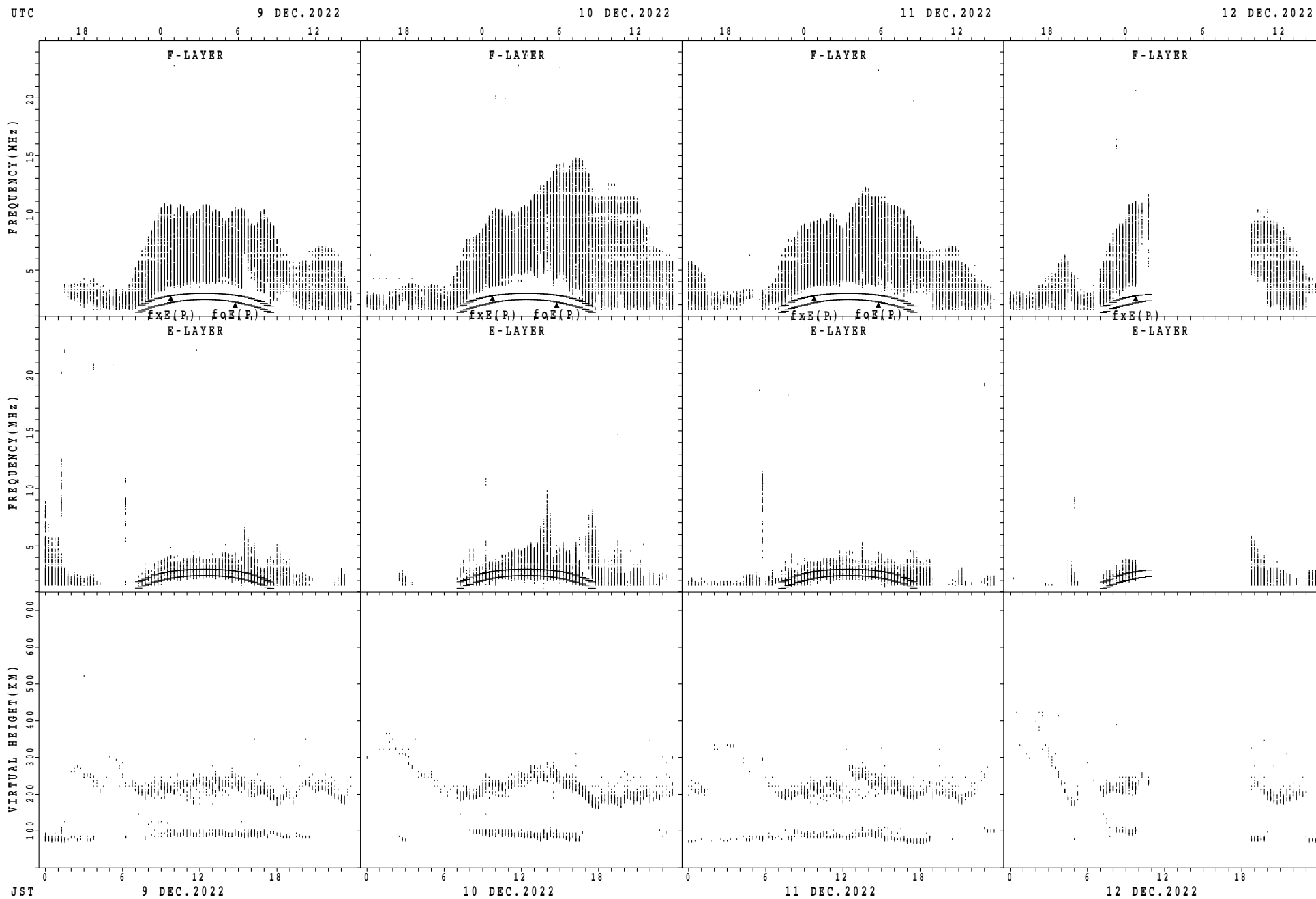
$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $f_oE(P)$ ; PREDICTED VALUE FOR  $f_oE$

SUMMARY PLOTS AT Okinawa



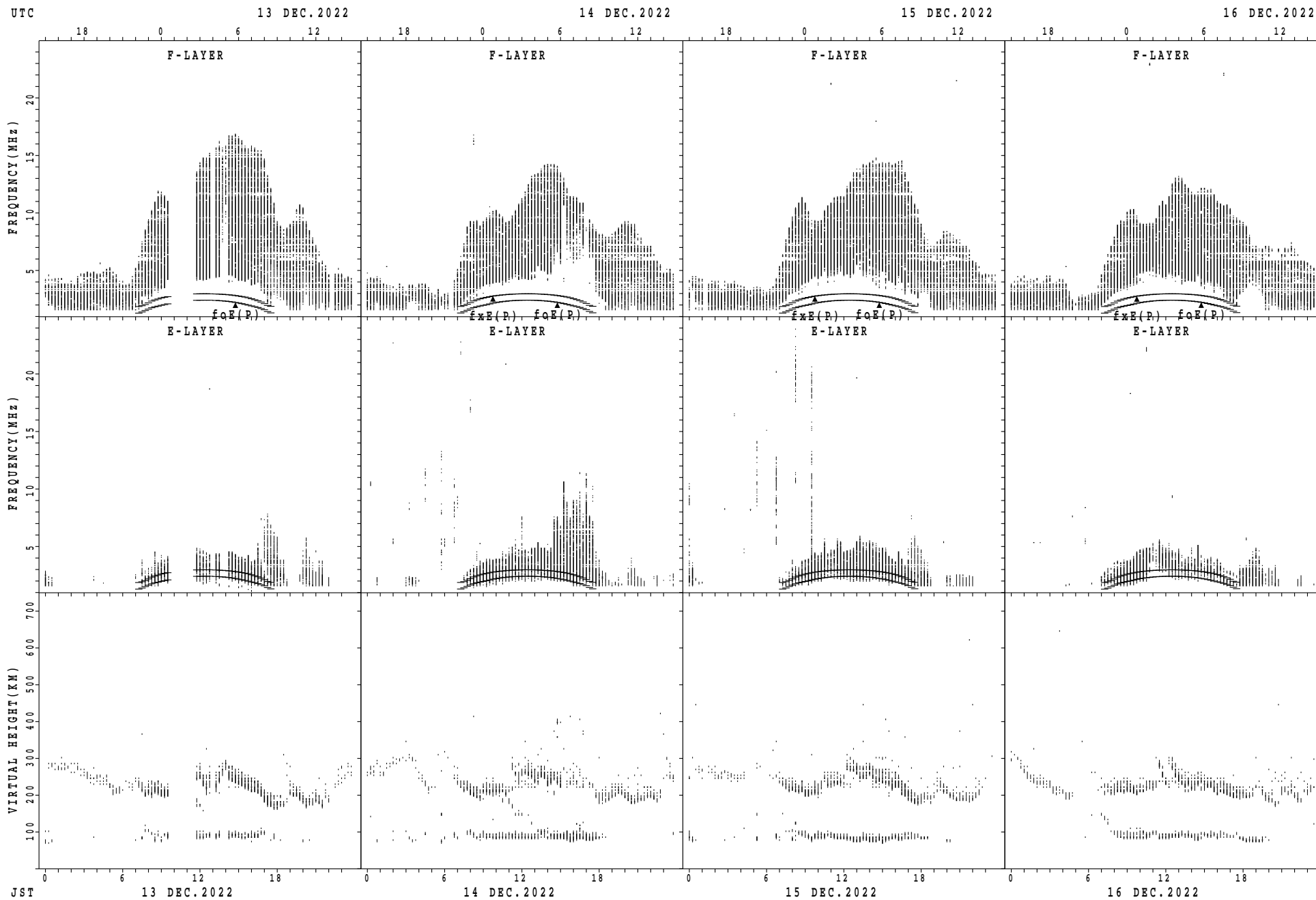
$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $f_oE(P)$ ; PREDICTED VALUE FOR  $f_oE$

## SUMMARY PLOTS AT Okinawa



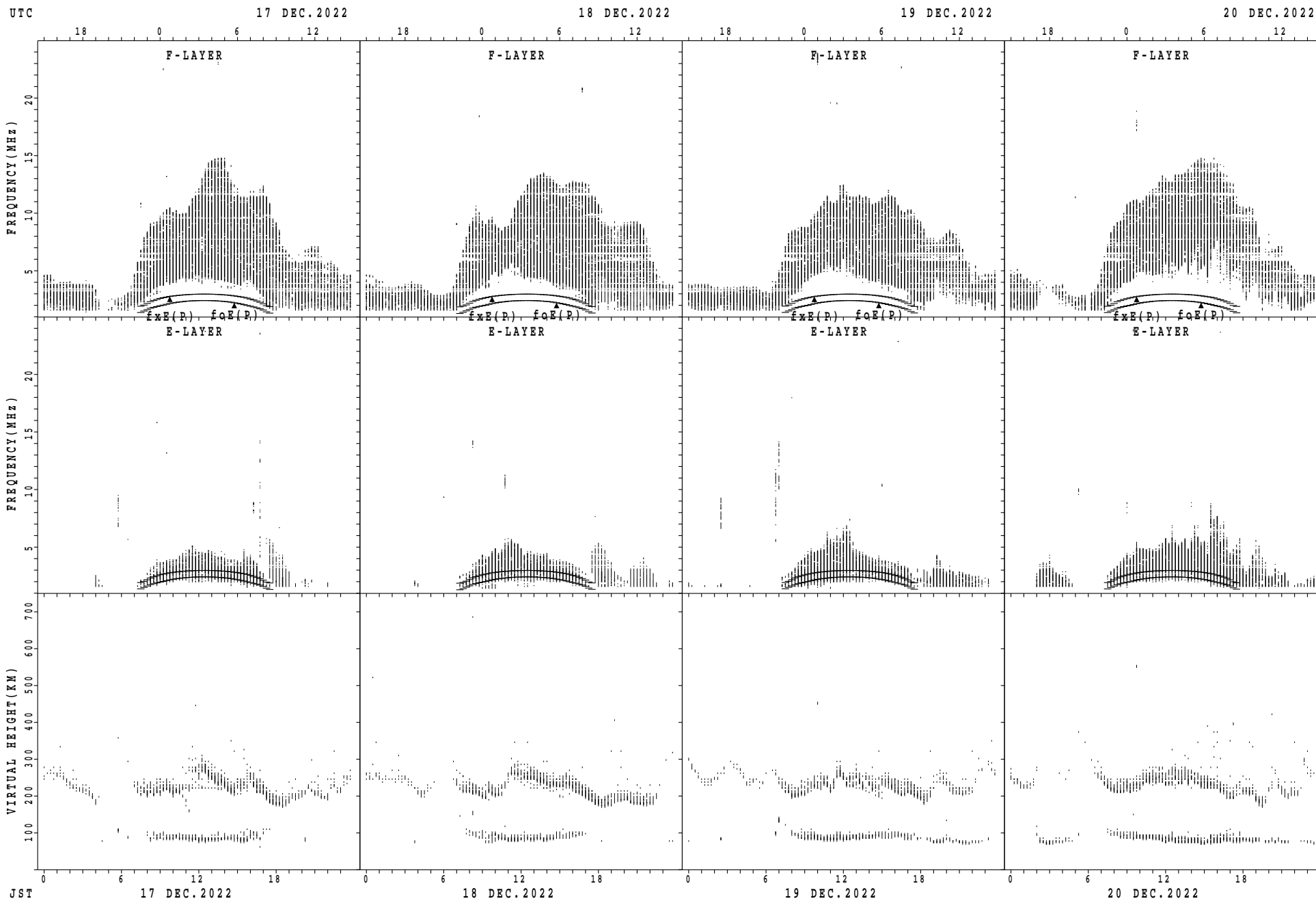
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 $f_oE(P)$ ; PREDICTED VALUE FOR  $f_oE$

SUMMARY PLOTS AT Okinawa



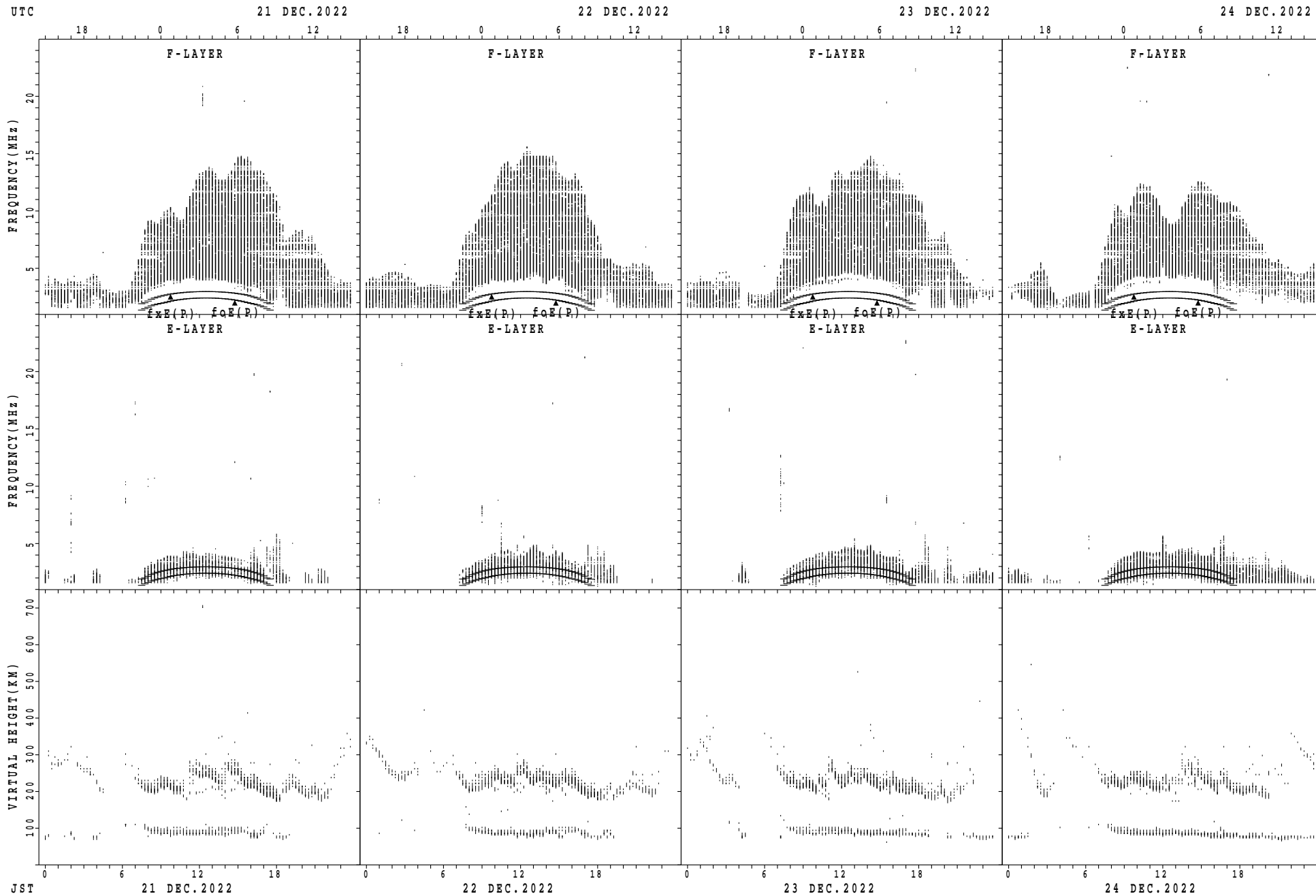
$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $foE(P)$ ; PREDICTED VALUE FOR  $foE$

SUMMARY PLOTS AT Okinawa



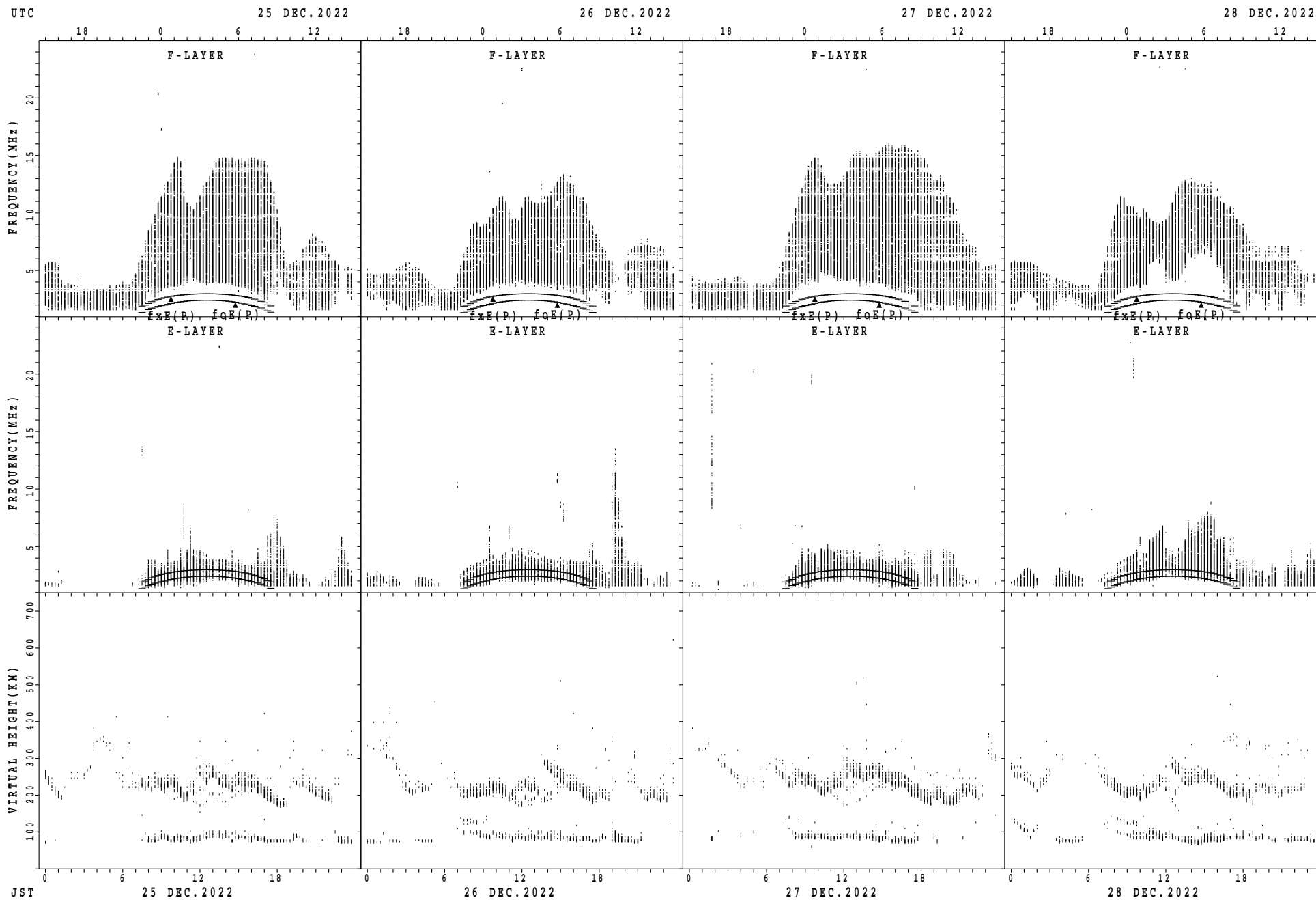
$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $f_oE(P)$ ; PREDICTED VALUE FOR  $f_oE$

SUMMARY PLOTS AT Okinawa



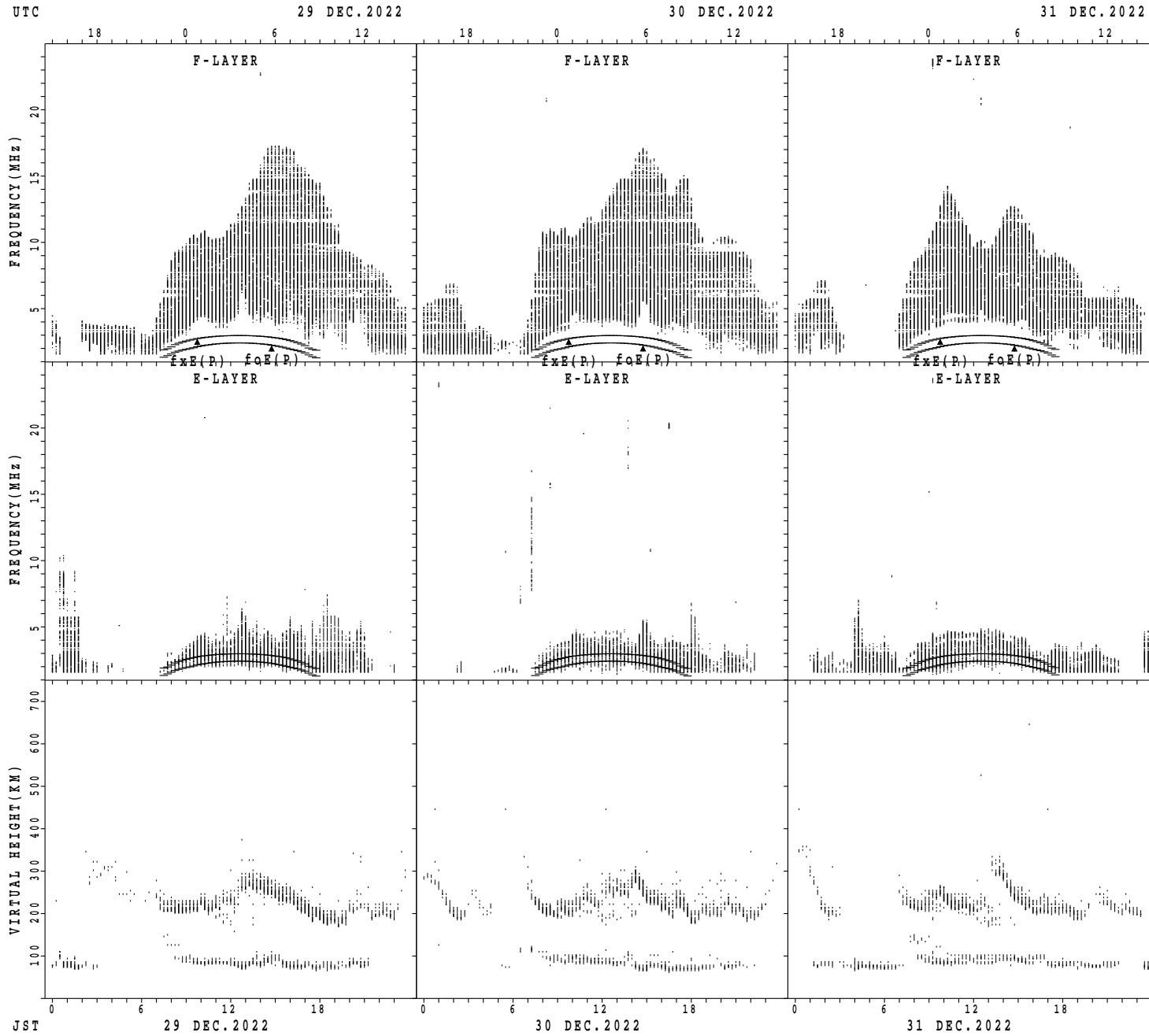
$f_xE(P)$ ; PREDICTED VALUE FOR  $f_xE$   
 $foE(P)$ ; PREDICTED VALUE FOR  $foE$

SUMMARY PLOTS AT Okinawa



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

SUMMARY PLOTS AT Okinawa



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



MONTHLY MEDIANS OF h'F AND h'Es  
 DEC.2022 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 |    |    |    |    |    |    |    |    | 25  | 29  | 31  | 31  | 31  | 30  | 29  | 31  | 13  |    |    |    |    |    |    |    |
| MED |    |    |    |    |    |    |    |    | 216 | 200 | 202 | 202 | 206 | 212 | 210 | 216 | 224 |    |    |    |    |    |    |    |
| U Q |    |    |    |    |    |    |    |    | 230 | 214 | 206 | 208 | 218 | 218 | 218 | 222 | 233 |    |    |    |    |    |    |    |
| L Q |    |    |    |    |    |    |    |    | 208 | 194 | 198 | 198 | 198 | 208 | 206 | 208 | 217 |    |    |    |    |    |    |    |

h'Es

|     | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10  | 11  | 12  | 13  | 14  | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|-----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|
| CNT | 21 | 24 | 20 | 16 | 18 | 22 | 19 | 26 | 30 | 26 | 23  | 23  | 22  | 24  | 22  | 24 | 22 | 23 | 20 | 19 | 21 | 22 | 22 | 18 |
| MED | 96 | 96 | 96 | 96 | 96 | 98 | 98 | 98 | 98 | 97 | 98  | 100 | 98  | 99  | 98  | 98 | 97 | 96 | 96 | 96 | 96 | 96 | 96 | 96 |
| U Q | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 102 | 104 | 104 | 104 | 100 | 98 | 98 | 98 | 98 | 98 | 96 | 98 | 98 | 98 |
| L Q | 96 | 95 | 96 | 94 | 96 | 96 | 96 | 96 | 96 | 96 | 96  | 96  | 98  | 98  | 96  | 96 | 94 | 94 | 94 | 94 | 92 | 94 | 96 | 96 |

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 |    |    |    |    |    |    |    | 10  | 31  | 31  | 31  | 21  | 16  | 31  | 31  | 29  | 24  | 2   | 1   |    |    |    |    |    |
| MED |    |    |    |    |    |    |    | 222 | 210 | 214 | 216 | 214 | 218 | 222 | 224 | 224 | 214 | 221 | 232 |    |    |    |    |    |
| U Q |    |    |    |    |    |    |    | 226 | 224 | 224 | 224 | 222 | 222 | 234 | 230 | 231 | 227 | 232 | 116 |    |    |    |    |    |
| L Q |    |    |    |    |    |    |    | 216 | 198 | 204 | 206 | 203 | 213 | 208 | 214 | 216 | 208 | 210 | 116 |    |    |    |    |    |

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 | 20 | 19 | 14 | 9  | 9  | 10 | 12 | 13 | 30 | 29  | 26  | 25  | 25  | 24 | 25 | 25 | 17 | 22  | 20 | 19 | 19 | 15 | 16 | 19 |
| MED | 96 | 96 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 96  | 98  | 98  | 98  | 96 | 96 | 98 | 98 | 98  | 97 | 96 | 96 | 98 | 96 | 96 |
| U Q | 98 | 96 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 100 | 100 | 100 | 100 | 98 | 98 | 98 | 98 | 100 | 98 | 98 | 96 | 98 | 98 | 98 |
| L Q | 95 | 94 | 96 | 95 | 96 | 96 | 97 | 95 | 96 | 84  | 94  | 94  | 94  | 88 | 94 | 86 | 91 | 94  | 96 | 94 | 92 | 92 | 93 | 94 |

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 |    |    |    |    |    |    |    |    | 26  | 29  | 28  | 17  |    |    | 29  | 29  | 28  | 26  | 5   | 4   |    |    |    |    |
| MED |    |    |    |    |    |    |    |    | 219 | 216 | 214 | 220 |    |    | 226 | 230 | 221 | 218 | 232 | 232 |    |    |    |    |
| U Q |    |    |    |    |    |    |    |    | 232 | 224 | 223 | 231 |    |    | 240 | 236 | 229 | 228 | 234 | 244 |    |    |    |    |
| L Q |    |    |    |    |    |    |    |    | 208 | 206 | 208 | 208 |    |    | 222 | 215 | 215 | 208 | 225 | 224 |    |    |    |    |

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 | 19 | 25 | 26 | 18 | 18 | 11 | 16 | 18 | 31 | 30  | 28  | 28  | 28  | 28  | 29 | 29  | 29  | 27 | 28 | 27 | 23 | 22 | 21 | 17 |
| MED | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 98 | 100 | 98  | 98  | 98  | 98  | 98 | 98  | 98  | 96 | 96 | 96 | 96 | 96 | 96 | 96 |
| U Q | 96 | 98 | 96 | 96 | 98 | 98 | 96 | 98 | 98 | 100 | 100 | 100 | 100 | 100 | 99 | 100 | 100 | 98 | 98 | 98 | 98 | 98 | 96 | 96 |
| L Q | 94 | 93 | 94 | 94 | 96 | 94 | 96 | 96 | 96 | 98  | 98  | 98  | 97  | 98  | 96 | 96  | 96  | 94 | 94 | 96 | 96 | 96 | 95 | 95 |

MONTHLY MEDIANS OF h'F AND h'Es  
 DEC.2022 135E MEAN TIME(UTC+9H) AUTOMATIC SCALING

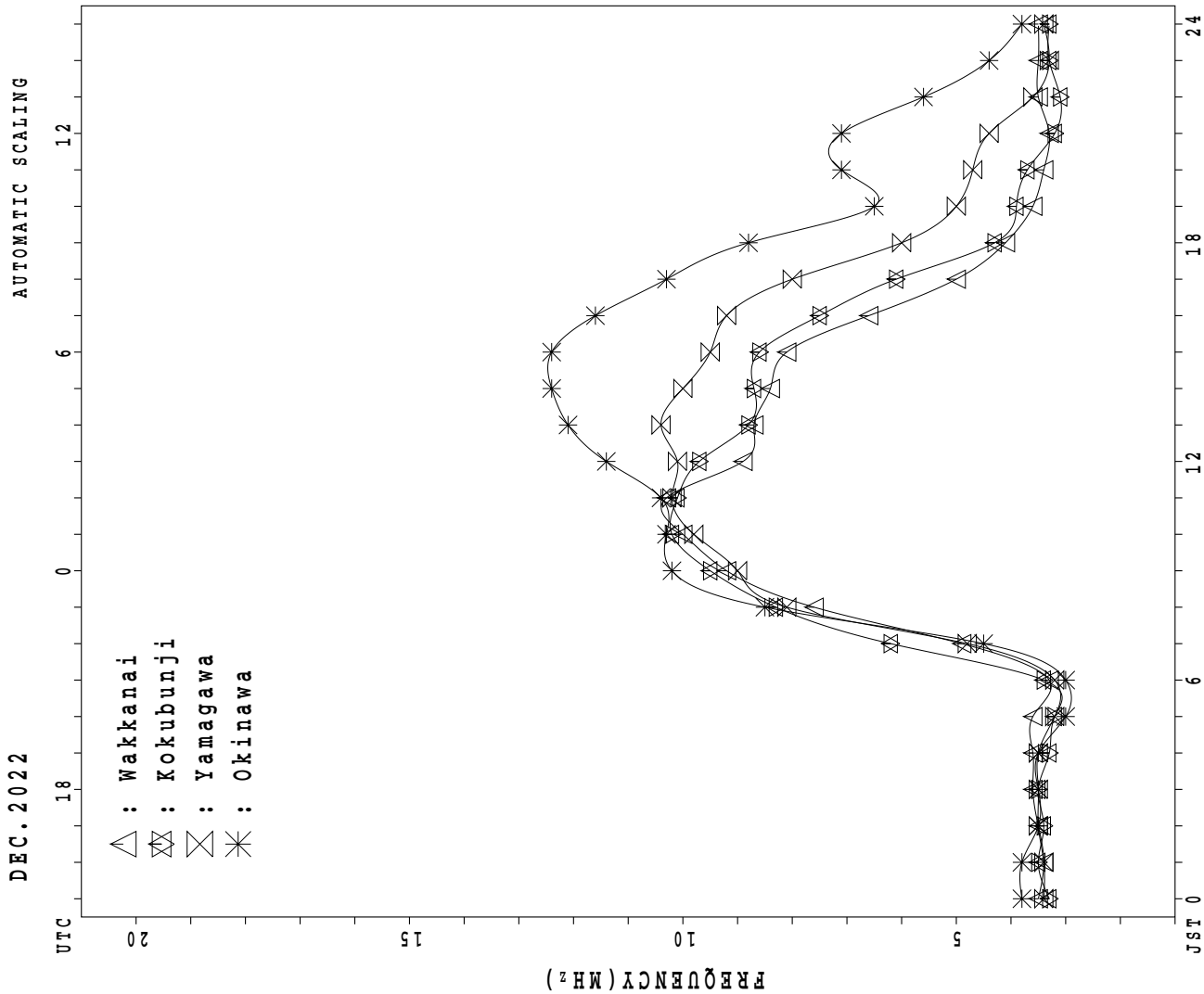
h'F STATION Okinawa LAT. 26°41.0'N LON. 128°09.0'E

|     | 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   |    |    |    |    |    | 28  | 30  | 30  |    |    |    |    | 30  | 30  | 29  | 24  | 10  | 13  | 14  | 4   |    |
| MED |    |    | 234 |    |    |    |    |    | 230 | 222 | 214 |    |    |    |    | 230 | 218 | 214 | 205 | 227 | 234 | 234 | 239 |    |
| U Q |    |    | 117 |    |    |    |    |    | 239 | 232 | 226 |    |    |    |    | 238 | 228 | 231 | 224 | 232 | 256 | 242 | 256 |    |
| L Q |    |    | 117 |    |    |    |    |    | 217 | 214 | 206 |    |    |    |    | 220 | 210 | 200 | 200 | 214 | 212 | 224 | 229 |    |

h'Es

|     | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09  | 10  | 11 | 12 | 13 | 14 | 15  | 16  | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|-----|----|----|----|----|----|----|----|----|----|-----|-----|----|----|----|----|-----|-----|----|----|----|----|----|----|----|
| CNT | 13 | 15 | 15 | 18 | 22 | 18 | 15 | 21 | 31 | 31  | 29  | 29 | 30 | 29 | 29 | 30  | 30  | 29 | 30 | 26 | 25 | 21 | 15 | 18 |
| MED | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 98 | 98 | 98  | 98  | 98 | 98 | 96 | 96 | 98  | 98  | 96 | 96 | 96 | 96 | 96 | 98 | 96 |
| U Q | 98 | 98 | 98 | 98 | 96 | 96 | 98 | 98 | 98 | 100 | 100 | 98 | 98 | 98 | 98 | 100 | 100 | 98 | 98 | 98 | 98 | 98 | 98 | 98 |
| L Q | 95 | 94 | 96 | 94 | 94 | 96 | 92 | 96 | 96 | 96  | 98  | 94 | 94 | 92 | 94 | 92  | 92  | 94 | 94 | 92 | 96 | 94 | 96 | 94 |

MONTHLY MEDIANS PLOT OF fOF2



## IONOSPHERIC DATA STATION Wakkanai

DEC.2022 fxI (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  | X  | X  | X  |    | X  |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     | 41 | 41 | 39 | 40 | 39 | 33 |    |    |    |    |    |    |    |    |    |    |    |    | 49 | 34 | 41 | 42 | 44 | 44 | 46 |
| 2   | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     | 44 | 40 | 39 | 39 | 40 | 38 |    |    |    |    |    |    |    |    |    |    |    |    | 41 | 37 | 36 | 37 | 41 | 41 | 44 |
| 3   | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     | 45 | 40 | 40 | 40 | 40 | 39 |    |    |    |    |    |    |    |    |    |    |    |    | 39 | 43 | 42 | 39 | 40 | 40 | 43 |
| 4   | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     | 44 | 39 | 39 | 40 | 40 | 39 |    |    |    |    |    |    |    |    |    |    |    |    | 42 | 35 | 39 | 39 | 39 | 39 | 40 |
| 5   | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     | 41 | 40 | 41 | 40 | 41 | 43 |    |    |    |    |    |    |    |    |    |    |    |    | 40 | 38 | 40 | 37 | 38 | 41 | 41 |
| 6   | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     | 42 | 40 | 38 | 42 | 38 | 38 |    |    |    |    |    |    |    |    |    |    |    |    | 39 | 32 | 37 | 38 | 40 | 40 | 40 |
| 7   | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     | 40 | 41 | 42 | 41 | 40 | 39 |    |    |    |    |    |    |    |    |    |    |    |    | 39 | 41 | 41 | 42 | 43 | 42 | 42 |
| 8   | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     | 43 | 41 | 41 | 41 | 41 | 43 |    |    |    |    |    |    |    |    |    |    |    |    | 47 | 36 | 33 | 36 | 36 | 36 | 38 |
| 9   | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     | 38 | 39 | 41 | 40 | 40 | 41 |    |    |    |    |    |    |    |    |    |    |    |    | 41 | 41 | 41 | 39 | 43 | 43 | 46 |
| 10  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    | A  | A  | X  | A  | X  | X  | X  |
|     | 43 | 41 | 42 | 43 | 43 | 49 |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 37 |    | 42 | 44 | 44 |
| 11  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     | 42 | 41 | 41 | 50 | 55 | 54 | 44 |    |    |    |    |    |    |    |    |    |    |    | 50 | 41 | 49 | 54 | 53 | 55 | 55 |
| 12  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     | 56 | 54 | 56 | 58 | 58 | 45 |    |    |    |    |    |    |    |    |    |    |    |    | 51 | 47 | 42 | 34 | 37 | 41 | 41 |
| 13  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     | 41 | 45 | 46 | 46 | 46 | 45 |    |    |    |    |    |    |    |    |    |    |    |    | 49 | 48 | 43 | 40 | 45 | 44 | 44 |
| 14  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     | 46 | 46 | 46 | 45 | 45 | 45 |    |    |    |    |    |    |    |    |    |    |    |    | 44 | 36 | 38 | 38 | 39 | 39 | 39 |
| 15  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     | 39 | 41 | 43 | 42 | 41 | 41 |    |    |    |    |    |    |    |    |    |    |    |    | 44 | 47 | 47 | 48 | 54 | 55 | 55 |
| 16  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     | 91 | 56 | 59 | 59 | 58 | 58 |    |    |    |    |    |    |    |    |    |    |    |    | 61 | 59 | 59 | 63 | 65 | 65 | 65 |
| 17  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     | 66 | 67 | 70 | 67 | 62 | 58 | 57 | 70 |    |    |    |    |    |    |    |    |    |    | 48 | 43 | 44 | 47 | 46 | 47 | 47 |
| 18  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     | 48 | 48 | 48 | 48 | 48 | 47 |    |    |    |    |    |    |    |    |    |    |    |    | 42 | 45 | 43 | 41 | 43 | 47 | 47 |
| 19  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     | 46 | 45 | 44 | 45 | 49 | 54 |    |    |    |    |    |    |    |    |    |    |    |    | 58 | 48 | 41 | 45 | 48 | 48 | 48 |
| 20  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     | 48 | 48 | 48 | 51 | 50 | 45 |    |    |    |    |    |    |    |    |    |    |    |    | 46 | 40 | 43 | 45 | 43 | 42 | 42 |
| 21  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     | 44 | 44 | 46 | 46 | 46 | 46 |    |    |    |    |    |    |    |    |    |    |    |    | 53 | 43 | 44 | 47 | 45 | 45 | 45 |
| 22  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     | 45 | 45 | 45 | 46 | 48 | 40 |    |    |    |    |    |    |    |    |    |    |    |    | 51 | 42 | 39 | 43 | 46 | 46 | 46 |
| 23  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     | 46 | 46 | 46 | 46 | 49 | 46 |    |    |    |    |    |    |    |    |    |    |    |    | 60 | 45 | 38 | 42 | 43 | 37 | 37 |
| 24  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     | 37 | 39 | 39 | 43 | 36 | 33 |    |    |    |    |    |    |    |    |    |    |    |    | 49 | 42 | 39 | 45 | 45 | 45 | 45 |
| 25  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     | 46 | 47 | 44 | 44 | 44 | 44 |    |    |    |    |    |    |    |    |    |    |    |    | 48 | 45 | 42 | 49 | 54 | 48 | 48 |
| 26  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     | 44 | 45 | 46 | 46 | 45 | 45 |    |    |    |    |    |    |    |    |    |    |    |    | 53 | 45 | 47 | 58 | 59 | 48 | 48 |
| 27  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     | 37 | 46 | 47 | 46 | 48 | 44 |    |    |    |    |    |    |    |    |    |    |    |    | 66 | 45 | 36 | 38 | 40 | 41 | 41 |
| 28  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     |    | 44 | 41 | 40 | 40 | 39 |    |    |    |    |    |    |    |    |    |    |    |    | 51 | 45 | 42 | 41 | 43 | 48 | 48 |
| 29  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     | 45 | 52 | 48 | 47 | 45 | 48 |    |    |    |    |    |    |    |    |    |    |    |    | 40 | 42 | 41 | 39 | 39 | 39 | 39 |
| 30  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     | 40 | 42 | 41 | 41 | 39 | 38 |    |    |    |    |    |    |    |    |    |    |    |    | 54 | 50 | 46 | 42 | 42 | 42 | 42 |
| 31  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     | 42 | 42 | 45 | 47 | 35 | 36 |    |    |    |    |    |    |    |    |    |    |    |    | 53 | 39 | 38 | 41 | 41 | 41 | 41 |
|     |    | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT |    | 30 | 31 | 31 | 31 | 31 | 31 | 2  | 1  |    |    |    |    |    |    |    |    |    | 30 | 30 | 31 | 30 | 31 | 31 | 31 |
| MED |    | X  | X  | X  | X  | X  | X  | 50 | 70 |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
| U Q |    | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     |    | 46 | 46 | 46 | 47 | 48 | 46 |    |    |    |    |    |    |    |    |    |    |    | 53 | 45 | 43 | 45 | 46 | 47 | 47 |
| L Q |    | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     |    | 41 | 41 | 41 | 41 | 40 | 39 |    |    |    |    |    |    |    |    |    |    |    | 42 | 39 | 38 | 39 | 40 | 41 | 41 |

DEC.2022 fxI (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Wakkanai

DEC.2022 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   | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08  | 09  | 10  | 11  | 12  | 13  | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|-----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|
| 1   | 34 | 34 | 32 | 33 | F  | 26 | 26 | 58 | 84  | 80  | 88  | 103 | 88  | 83  | 79 | 79 | 76 | 58 | 42 | 27 | 34 | 35 | 37 | 39 |
| 2   | 37 | 33 | 32 | 32 | 33 | 31 | 30 | 56 | 78  | 72  | 88  | 86  | 79  | 84  | 75 | 74 | 64 | 39 | 34 | 30 | 29 | 30 | 34 | 37 |
| 3   | 38 | 33 | 33 | 33 | 33 | 32 | 31 | 55 | 66  | 76  | 86  | 82  | 84  | 93  | 70 | 79 | 63 | 39 | 32 | 36 | 35 | 32 | 33 | 36 |
| 4   | 37 | 32 | 32 | 33 | 33 | 32 | 33 | 52 | 67  | 80  | 84  | 86  | 92  | 83  | 70 | 69 | 55 | 44 | 35 | 28 | 32 | 32 | 32 | 33 |
| 5   | 34 | 33 | 34 | 33 | 34 | 36 | 27 | 55 | 74  | 97  | 87  | 100 | 88  | 84  | 77 | 75 | 57 | 41 | 33 | 31 | 33 | 30 | 31 | 34 |
| 6   | 35 | 33 | 31 | 35 | 31 | 31 | 31 | 52 | 81  | 90  | 91  | 82  | 88  | 80  | 75 | 73 | 56 | 37 | 32 | 25 | 30 | 31 | 33 | 33 |
| 7   | 33 | 34 | 35 | 34 | 33 | 32 | 29 | 52 | 66  | 85  | 91  | 82  | 76  | 74  | 74 | 83 | 63 | 39 | 32 | 34 | 34 | 35 | 36 | 35 |
| 8   | 36 | 34 | 34 | 34 | 34 | 36 | 36 | 56 | 102 | 126 | 113 | 115 | 104 | 79  | 76 | 87 | 60 | 45 | 40 | 29 | 26 | 29 | 29 | 31 |
| 9   | 31 | 32 | 34 | 33 | 33 | 34 | 26 | 52 | 75  | 87  | 98  | 94  | 87  | 90  | 76 | 83 | 70 | 50 | 34 | 34 | 34 | F  | 36 | 40 |
| 10  | 36 | 34 | 35 | 36 | 36 | 42 | 40 | 50 | 70  | 94  | 96  | 100 | 89  | 92  | 84 | 84 | 67 | 51 | A  | A  | 30 | A  | 35 | 37 |
| 11  | 35 | 34 | 34 | F  | F  | F  | F  | 51 | 72  | 84  | 96  | 97  | 96  | 82  | 82 | 82 | 70 | 63 | 43 | 34 | F  | F  | 46 | F  |
| 12  | F  | 47 | 41 | F  | F  | 38 | 32 | 49 | 84  | 97  | 88  | 100 | 92  | 88  | 74 | 81 | 70 | 52 | 44 | 40 | 35 | 27 | 30 | 34 |
| 13  | 34 | 38 | 39 | 39 | 39 | 38 | 34 | 54 | 84  | 88  | 94  | 92  | 81  | 79  | 84 | 74 | 64 | 48 | 42 | 41 | 36 | 33 | 38 | 37 |
| 14  | 39 | 39 | 40 | 38 | 38 | 38 | 33 | 54 | 75  | 95  | 105 | 98  | 84  | 80  | 81 | 74 | 64 | 54 | 37 | 29 | 31 | 31 | 32 | 32 |
| 15  | 32 | 34 | 36 | 35 | 34 | 34 | 30 | 51 | 79  | 90  | 108 | 104 | 81  | 87  | 88 | 80 | 70 | 51 | 37 | 40 | 40 | 41 | 47 | 48 |
| 16  | 46 | 49 | 52 | 52 | 51 | 51 | 37 | 56 | 78  | 95  | 114 | 111 | 94  | 94  | 91 | 84 | 77 | 56 | 54 | 52 | 52 | 56 | 58 | 58 |
| 17  | 59 | 60 | 63 | 60 | 55 | 51 | F  | F  | 74  | 103 | 110 | 101 | 90  | 95  | 90 | 93 | 70 | 49 | 41 | 36 | 37 | 40 | 39 | 40 |
| 18  | 41 | 41 | 41 | 41 | 41 | 40 | 34 | 47 | 68  | 94  | 98  | 94  | 90  | 82  | 87 | 92 | 60 | 44 | 35 | 38 | 36 | 34 | 36 | 40 |
| 19  | 39 | 38 | 37 | 38 | 42 | 47 | 39 | 59 | 75  | 101 | 105 | 108 | 95  | 106 | 97 | 86 | 85 | 76 | 51 | 41 | 34 | 38 | 41 | 41 |
| 20  | 41 | 41 | 41 | 44 | 43 | 38 | 34 | 48 | 88  | 100 | 96  | 106 | 93  | 109 | 90 | 86 | 72 | 46 | 39 | 33 | 36 | 38 | 36 | 35 |
| 21  | 37 | 37 | 39 | 39 | 39 | 39 | 32 | 47 | 69  | 90  | 84  | 103 | 88  | 102 | 88 | 76 | 64 | 57 | 46 | 36 | 37 | 40 | 38 | 38 |
| 22  | 38 | 38 | 38 | 39 | 41 | 33 | 35 | 48 | 72  | 90  | 101 | 99  | 85  | 90  | 86 | 82 | 63 | 41 | 44 | 35 | 32 | 36 | 39 | 39 |
| 23  | 39 | 39 | 39 | 39 | 42 | 39 | 36 | 47 | 82  | 69  | 107 | 111 | 90  | 90  | 82 | 78 | 59 | 56 | 53 | 38 | 31 | 35 | 36 | 30 |
| 24  | 30 | 32 | 32 | 36 | 29 | 26 | 28 | 40 | 73  | 101 | 116 | 106 | 90  | 84  | 78 | 74 | 68 | 59 | H  | 42 | 35 | 32 | 38 | 38 |
| 25  | 39 | 40 | 37 | 37 | 37 | 37 | 38 | 49 | 70  | 77  | 104 | 94  | 78  | 85  | 91 | 78 | 53 | 44 | 41 | 38 | 35 | 42 | F  | F  |
| 26  | 37 | 38 | 39 | 39 | 38 | 38 | 32 | 46 | 80  | 74  | 95  | 78  | 94  | 90  | 90 | 80 | 60 | 39 | 46 | 38 | V  | F  | F  | F  |
| 27  | 30 | F  | 40 | 39 | 41 | 37 | 38 | 50 | 75  | 88  | 94  | 103 | 87  | 87  | 86 | 70 | 67 | 57 | 59 | 38 | 29 | 31 | 33 | 34 |
| 28  | 37 | 37 | 34 | 33 | 33 | 32 | 34 | 51 | 70  | 76  | 115 | 100 | 80  | 94  | 79 | 74 | 66 | 44 | 44 | 38 | 35 | 34 | 36 | F  |
| 29  | 38 | F  | 41 | 40 | 38 | 41 | 31 | 44 | 60  | 75  | 98  | 92  | 85  | 78  | 75 | 71 | 66 | 42 | 33 | 35 | 34 | 32 | 32 | 32 |
| 30  | 33 | 35 | 34 | 34 | 32 | 31 | 28 | 48 | 77  | 92  | 96  | 93  | 93  | 86  | 62 | 88 | 67 | 55 | 47 | 43 | 39 | 35 | 35 | 35 |
| 31  | 35 | 35 | 38 | 40 | 28 | 29 | 27 | 48 | 79  | 103 | 108 | 114 | 92  | 84  | 88 | 72 | 77 | 52 | 46 | 32 | 31 | 34 | 34 | 34 |
|     | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08  | 09  | 10  | 11  | 12  | 13  | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 30 | 31 | 31 | 29 | 28 | 30 | 29 | 31 | 31  | 31  | 31  | 31  | 31  | 31  | 31 | 31 | 31 | 31 | 30 | 30 | 30 | 28 | 30 | 27 |
| MED | 37 | 35 | 37 | 37 | 36 | 36 | 32 | 51 | 75  | 90  | 96  | 100 | 88  | 86  | 82 | 79 | 66 | 49 | 42 | 36 | 34 | 34 | 36 | 36 |
| U Q | 39 | 39 | 40 | 39 | 41 | 39 | 36 | 55 | 80  | 97  | 107 | 104 | 92  | 92  | 88 | 84 | 70 | 56 | 46 | 38 | 36 | 38 | 38 | 39 |
| L Q | 34 | 34 | 34 | 34 | 33 | 32 | 30 | 48 | 70  | 80  | 91  | 92  | 84  | 82  | 75 | 74 | 60 | 42 | 35 | 32 | 31 | 31 | 33 | 34 |

DEC.2022 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Wakkanai

DEC.2022 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<br>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<br>324 | L<br>392 | L<br>A   | L<br>L   | L<br>L   | L        |     |    |    |    |    |    |    |    |  |
| 2      |    |    |    |    |    |          |          |          |          |          | L        | 380      | L<br>352 | L<br>328 | L<br>224 |          |     |    |    |    |    |    |    |    |  |
| 3      |    |    |    |    |    |          |          |          |          | U<br>312 | L<br>312 | L<br>372 | L<br>344 | L<br>324 | L        | L<br>248 |     |    |    |    |    |    |    |    |  |
| 4      |    |    |    |    |    |          |          |          |          | L        | L        | L<br>388 | L<br>392 | L<br>360 | L<br>316 |          |     |    |    |    |    |    |    |    |  |
| 5      |    |    |    |    |    | U<br>212 | L<br>188 | L<br>240 | L<br>340 | L        | L        | L        | L        | L        | L        | L        |     |    |    |    |    |    |    |    |  |
| 6      |    |    |    |    |    |          |          |          |          | U<br>344 | L        | L<br>392 | L<br>356 | L        |          |          |     |    |    |    |    |    |    |    |  |
| 7      |    |    |    |    |    |          |          |          |          |          |          | L        | L        | L        | L        |          |     |    |    |    |    |    |    |    |  |
| 8      |    |    |    |    |    |          |          |          | 264      | 308      | 344      | L        | L        | L        | L        |          |     |    |    | L  |    |    |    |    |  |
| 9      |    |    |    |    |    |          |          |          |          | L        |          |          | L        | L        | L        |          |     |    |    |    |    |    |    |    |  |
| 10     |    |    |    |    |    |          |          |          | L        | L        | L        | L        | L        | L        | L        |          |     |    |    |    |    |    |    |    |  |
| 11     |    |    |    |    |    |          |          |          |          |          |          |          | L        |          |          |          |     |    |    |    |    |    |    |    |  |
| 12     |    |    |    |    |    |          |          |          |          |          | L        | 300      |          |          |          |          |     |    |    |    |    |    |    |    |  |
| 13     |    |    |    |    |    |          | L        | L        |          |          | L        | L        | L        |          |          |          |     |    |    |    |    |    |    |    |  |
| 14     |    |    |    |    |    |          |          |          | 252      | 300      | 312      | 316      | L        | L        | L        |          |     |    |    |    |    |    |    |    |  |
| 15     |    |    |    |    |    |          |          |          |          | 184      |          |          |          |          |          |          |     |    |    |    |    |    |    |    |  |
| 16     |    |    |    |    |    | L        | 212      |          |          |          | L        | L        |          |          |          |          |     |    |    |    |    |    |    |    |  |
| 17     |    |    |    |    |    |          |          |          |          | E<br>292 | A        | L        | L        |          |          |          |     |    |    |    |    |    |    |    |  |
| 18     |    |    |    |    |    |          |          |          |          | L        |          |          | L        |          |          |          |     |    |    |    |    |    |    |    |  |
| 19     |    |    |    |    |    |          |          |          |          |          |          | L<br>396 | L        | L        | L        |          |     |    |    |    |    |    |    |    |  |
| 20     |    |    |    |    |    |          |          |          |          |          |          |          | L        | L        |          |          |     |    |    |    |    |    |    |    |  |
| 21     |    |    |    |    |    |          | L        |          |          |          |          | L        | L        |          |          |          |     |    |    |    |    |    |    |    |  |
| 22     |    |    |    |    |    |          |          |          |          | 268      |          |          | L        | L        | L        | L        | L   | L  | L  | L  |    |    |    |    |  |
| 23     |    |    |    |    |    |          |          |          |          |          | L<br>380 | L        | L        | L        | L        | L        | L   | L  | L  | L  |    |    |    |    |  |
| 24     |    |    |    |    |    |          | A        |          |          |          | L<br>380 | L<br>400 | L<br>352 | L        | L        |          |     |    |    |    |    |    |    |    |  |
| 25     |    |    |    |    |    |          |          |          |          |          | L<br>324 | L        | L        | L        | L        | L        | L   | L  | L  | L  |    |    |    |    |  |
| 26     |    |    |    |    |    |          |          |          |          |          | L        | L        | L        | L        | L        | L        | L   | L  | L  | L  |    |    |    |    |  |
| 27     |    |    |    |    |    |          | L        |          |          |          |          | L        | L        | L        |          |          |     |    |    |    |    |    |    |    |  |
| 28     |    |    |    |    |    |          |          | L        | L        | L        | L        | L        |          |          |          |          |     |    |    |    |    |    |    |    |  |
| 29     |    |    |    |    |    |          |          |          | L        | L        | L        | L        |          |          |          |          |     |    |    |    |    |    |    |    |  |
| 30     |    |    |    |    |    |          |          |          | L        | L        | L        | L        | L        | L        | L        | L        |     |    |    |    |    |    |    |    |  |
| 31     |    |    |    |    |    |          |          |          |          |          | L<br>396 | L<br>396 | L        | L        |          |          |     |    |    |    |    |    |    |    |  |
|        | 00 | 01 | 02 | 03 | 04 | 05       | 06       | 07       | 08       | 09       | 10       | 11       | 12       | 13       | 14       | 15       | 16  | 17 | 18 | 19 | 20 | 21 | 22 | 23 |  |
| CNT    |    |    |    |    |    |          | 2        | 2        | 5        | 8        | 7        | 9        | 4        | 12       | 2        | 5        | 1   |    |    |    |    |    |    |    |  |
| MED    |    |    |    |    |    |          | L<br>212 | 186      | 264      | 304      | 344      | 388      | 374      | 352      | 322      | 240      | 180 |    |    |    |    |    |    |    |  |
| U Q    |    |    |    |    |    |          |          |          |          | L<br>268 | L<br>318 | L<br>380 | L<br>396 | L<br>392 | L<br>354 | L        | L   | L  | L  | L  |    |    |    |    |  |
| L Q    |    |    |    |    |    |          |          |          |          |          | L<br>246 | L<br>294 | L<br>312 | L<br>344 | L<br>350 | L<br>318 | L   | L  | L  | L  |    |    |    |    |  |

DEC.2022 foF1 (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Wakkanai

DEC.2022 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<br>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   | A   |     |     |     |     |     |     |     |     | A   | B   |    |    |    |    |    |    |
| 2      |     |    |    |    |    |    | A   |     |     |     |     |     |     |     |     |     |     |     | B  |    |    |    |    |    |
| 3      |     |    |    |    |    |    | B   |     |     |     |     |     |     |     |     |     |     | B   | B  |    |    |    |    |    |
| 4      |     |    |    |    |    |    | 196 | B   |     |     |     |     |     |     |     |     |     | B   | B  |    |    |    |    |    |
| 5      |     |    |    |    |    |    | B   |     |     |     |     |     |     |     |     |     |     |     | B  |    |    |    |    |    |
| 6      |     |    |    |    |    |    | A   | A   |     |     |     |     |     |     |     |     |     | A   | A  |    |    |    |    |    |
| 7      |     |    |    |    |    |    | B   |     |     |     |     |     |     |     |     |     |     | A   | A  |    |    |    |    |    |
| 8      |     |    |    |    |    |    | 192 | 192 | 200 | 232 | 280 | 284 | 284 | 284 | 240 |     |     | A   | B  |    |    |    |    |    |
| 9      |     |    |    |    |    |    | B   |     | A   |     |     |     |     |     |     |     |     | A   | A  |    |    |    |    |    |
| 10     |     |    |    |    |    |    | B   |     |     |     |     |     |     |     |     |     |     | A   | A  |    |    |    |    |    |
| 11     |     |    |    |    |    |    | A   | A   | A   |     | B   | B   | B   | B   | B   |     |     | A   | A  |    |    |    |    |    |
| 12     |     |    |    |    |    |    | A   |     | A   |     |     |     |     |     |     |     |     | A   | A  |    |    |    |    |    |
| 13     |     |    |    |    |    |    | 184 | 180 | 256 |     | 300 | 312 | 312 | 284 | 260 | 196 |     | A   | A  |    |    |    |    |    |
| 14     |     |    |    |    |    |    | B   |     |     |     |     |     |     |     |     |     | B   | B   | A  |    |    |    |    |    |
| 15     |     |    |    |    |    |    | B   |     |     |     |     |     |     |     |     |     | A   | A   | A  |    |    |    |    |    |
| 16     |     |    |    |    |    |    | 192 | 208 | 244 | 248 | 308 | 332 | 332 | 312 | 272 | 212 |     | A   | B  |    |    |    |    |    |
| 17     |     |    |    |    |    |    | B   | A   | B   |     |     |     | B   | B   | B   | A   |     | 200 | A  |    |    |    |    |    |
| 18     |     |    |    |    |    |    | B   |     | B   |     | B   |     | B   | 312 | 300 | 184 |     | B   | A  |    |    |    |    |    |
| 19     |     |    |    |    |    |    | B   | A   |     |     |     |     |     |     |     |     |     | A   | A  |    |    |    |    |    |
| 20     |     |    |    |    |    |    | B   |     |     |     |     |     |     |     |     |     | A   | A   | A  |    |    |    |    |    |
| 21     |     |    |    |    |    |    | B   |     |     |     |     |     |     |     |     |     |     | A   |    |    |    |    |    |    |
| 22     |     |    |    |    |    |    | B   | A   |     |     |     |     |     |     |     |     |     | B   | B  |    |    |    |    |    |
| 23     |     |    |    |    |    |    | B   |     |     |     |     |     |     |     |     |     |     | B   | B  |    |    |    |    |    |
| 24     |     |    |    |    |    |    | A   | A   |     |     |     |     |     |     |     |     |     | B   | B  | A  |    |    |    |    |
| 25     |     |    |    |    |    |    | B   |     |     |     |     |     |     |     |     |     |     | B   | B  | B  |    |    |    |    |
| 26     |     |    |    |    |    |    | B   | A   |     |     |     |     |     |     |     |     |     | B   | B  | B  |    |    |    |    |
| 27     |     |    |    |    |    |    | 204 | 180 |     |     |     |     |     |     |     |     |     | B   | B  | B  |    |    |    |    |
| 28     | 160 |    |    |    |    |    | A   | A   |     |     |     |     |     |     |     |     |     | B   | B  | B  |    |    |    |    |
| 29     |     |    |    |    |    |    | B   | B   |     |     |     |     |     |     |     |     |     | B   | A  | B  |    |    |    |    |
| 30     |     |    |    |    |    |    | B   | B   | A   |     |     |     |     |     |     |     |     | A   | A  |    |    |    |    |    |
| 31     |     |    |    |    |    |    | B   | A   |     |     |     |     |     |     |     |     |     | B   | 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   |    |    |    |    |    | 5   | 18  | 24  | 27  | 28  | 29  | 26  | 26  | 25  | 19  | 6   | 3   |    |    |    |    |    |    |
| MED    | 160 |    |    |    |    |    | 192 | 186 | 230 | 264 | 292 | 296 | 300 | 288 | 256 | 224 | 188 | 236 |    |    |    |    |    |    |
| U Q    |     |    |    |    |    |    | 200 | 200 | 242 | 276 | 296 | 312 | 312 | 296 | 270 | 240 | 252 | 252 |    |    |    |    |    |    |
| L Q    |     |    |    |    |    |    | 188 | 180 | 216 | 256 | 276 | 288 | 288 | 280 | 248 | 200 | 176 | 232 |    |    |    |    |    |    |

DEC.2022 foE (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Wakkanai

DEC.2022 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<br>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 28 | A 35 | J 10 | A 25 | J 20 | A 23 | J 52 | A 63 | J 35 | A 36 | J 30 | A 37 | J 35 | A 32 | J 29 | A 26 | J 35 | A 43 | J 23 | A 34 | J 41 | A 52 | J 25 | A 29 |      |
| 2      | J 40 | A 25 | J 23 | A 33 | J 22 | A 27 | J 28 | A 19 | J 50 | A 51 | J 32 | A 35 | J 53 | A 31 | J 25 | A 31 | J 22 | A 24 | J 24 | A 23 | J 18 | A 16 | J 16 | A 21 |      |
| 3      | J 17 | A 16 | E 19 | B 16 | E 16 | B 22 | J 25 | A 25 | J 30 | A 28 | J 29 | A 32 | J 34 | A 32 | J 28 | A 34 | J 24 | A 24 | E 16 | B 16 | E 16 | B 16 | E 16 | B 16 |      |
| 4      | E 16 | B 23 | J 19 | A 24 | E 16 | B 16 | G 22 | J 22 | A 25 | J 37 | A 33 | J 31 | A 31 | G 32 | J 28 | G 28 | E 16 | B 24 | A 16 | B 16 | J 30 | E 16 | B 16 | E 16 |      |
| 5      | E 16 | B 50 | J 19 | A 20 | J 19 | A 20 | E 16 | B 20 | J 25 | A 28 | J 30 | A 32 | G 35 | J 30 | A 32 | J 26 | A 16 | B 22 | J 16 | A 19 | E 16 | B 16 | J 16 | A 21 |      |
| 6      | E 16 | B 20 | J 22 | A 20 | J 57 | A 65 | J 28 | A 25 | J 26 | A 28 | J 29 | A 35 | J 34 | A 30 | J 30 | A 26 | J 21 | A 23 | E 16 | J 29 | A 26 | J 23 | A 29 | J 29 |      |
| 7      | J 25 | A 31 | J 24 | A 19 | J 18 | A 28 | J 32 | A 23 | J 25 | A 47 | J 30 | A 37 | J 33 | A 30 | J 25 | A 26 | J 26 | A 26 | J 26 | A 25 | J 49 | A 21 | J 21 | A 16 |      |
| 8      | E 17 | J 23 | A 16 | B 16 | J 23 | A 20 | J 22 | A 21 | J 23 | A 28 | J 31 | A 33 | J 32 | A 33 | J 30 | A 26 | J 31 | A 33 | E 16 | B 20 | J 19 | A 23 | E 16 | B 16 |      |
| 9      | J 20 | A 21 | E 16 | B 16 | J 25 | A 22 | J 16 | A 26 | J 51 | A 52 | G 51 | A 52 | G 51 | A 52 | J 38 | A 31 | J 33 | A 37 | J 31 | A 52 | J 28 | A 22 | J 25 | A 24 |      |
| 10     | J 22 | A 24 | E 16 | B 16 | J 27 | A 20 | J 25 | A 23 | J 22 | A 30 | J 32 | A 31 | J 31 | A 34 | J 34 | A 39 | J 17 | A 32 | J 16 | A 12 | J 87 | A 67 | J 52 | A 27 |      |
| 11     | J 33 | A 30 | J 22 | A 16 | J 16 | A 37 | J 35 | A 28 | J 26 | A 34 | J 32 | A 38 | J 31 | A 30 | J 29 | A 29 | J 29 | A 60 | J 74 | A 69 | J 69 | A 50 | J 50 | A 32 |      |
| 12     | J 27 | A 25 | J 25 | A 70 | J 22 | A 21 | J 22 | A 28 | J 48 | G 48 | G 48 | G 48 | G 48 | G 48 | G 48 | J 29 | A 27 | J 25 | A 47 | J 65 | A 51 | J 37 | A 28 | J 24 |      |
| 13     | J 31 | A 34 | J 28 | A 23 | J 24 | A 26 | J 20 | A 25 | J 52 | A 34 | G 34 | G 34 | G 34 | G 34 | J 32 | A 29 | J 24 | A 58 | J 28 | A 47 | J 33 | A 23 | J 16 | A 21 |      |
| 14     | J 28 | A 26 | J 26 | A 19 | J 16 | A 33 | J 16 | A 23 | G 23 | G 23 | G 23 | G 23 | G 23 | G 23 | J 32 | A 28 | E 25 | B 16 | J 34 | A 33 | J 59 | A 25 | J 25 | A 16 |      |
| 15     | J 29 | A 27 | J 31 | A 10 | E 16 | B 16 | J 16 | A 27 | G 27 | G 27 | G 27 | G 27 | G 27 | G 27 | J 27 | A 26 | J 26 | A 26 | E 16 | B 28 | J 16 | A 16 | E 16 | B 26 |      |
| 16     | J 23 | A 33 | J 27 | A 30 | J 22 | A 19 | J 23 | A 26 | J 26 | A 34 | J 96 | G 96 | J 36 | A 60 | J 34 | A 25 | J 24 | A 16 | B 16 | J 16 | A 28 | J 21 | A 25 | J 25 |      |
| 17     | J 25 | A 25 | J 31 | A 24 | E 16 | B 16 | J 23 | A 20 | J 25 | A 83 | G 83 | E 83 | A 34 | B 36 | J 29 | A 29 | J 31 | A 23 | E 16 | B 16 | J 16 | A 16 | E 16 | B 21 |      |
| 18     | J 25 | A 31 | J 20 | A 82 | J 26 | A 26 | J 18 | A 23 | J 28 | A 32 | G 32 | E 32 | A 33 | B 32 | G 32 | G 32 | J 17 | A 25 | J 27 | A 20 | J 28 | A 26 | J 25 | A 25 |      |
| 19     | J 25 | A 33 | J 49 | A 33 | J 19 | A 16 | J 16 | A 27 | J 24 | A 52 | G 52 | G 52 | G 52 | G 52 | J 28 | A 26 | J 25 | A 29 | J 28 | A 31 | J 22 | A 27 | J 24 | A 24 |      |
| 20     | J 24 | A 21 | J 21 | A 21 | E 16 | B 16 | J 16 | A 25 | J 21 | A 28 | J 32 | A 37 | J 24 | A 32 | J 31 | A 22 | J 24 | A 52 | J 18 | A 21 | J 21 | A 19 | J 22 | A 23 |      |
| 21     | J 19 | A 21 | E 16 | B 16 | E 16 | B 16 | J 16 | A 26 | J 24 | A 29 | J 31 | A 33 | G 31 | A 27 | J 22 | A 31 | J 29 | A 25 | J 21 | A 23 | J 24 | A 20 | J 20 | A 20 |      |
| 22     | J 31 | A 21 | J 40 | A 16 | E 16 | B 16 | J 53 | A 23 | J 23 | A 28 | J 31 | A 35 | J 33 | A 33 | J 20 | A 17 | E 16 | B 33 | J 27 | A 42 | J 29 | A 25 | J 30 | A 30 |      |
| 23     | E 16 | B 16 | E 16 | B 16 | J 25 | A 25 | J 16 | A 24 | J 28 | A 33 | G 33 | G 33 | G 33 | G 33 | J 27 | A 16 | E 16 | B 16 | J 16 | A 16 | E 16 | B 16 | J 16 | A 16 |      |
| 24     | J 23 | A 23 | J 28 | A 16 | E 16 | B 16 | J 25 | A 26 | J 32 | A 63 | G 63 | G 63 | G 63 | G 63 | J 22 | A 16 | E 16 | B 49 | J 16 | A 21 | J 16 | A 25 | J 25 | A 28 |      |
| 25     | J 24 | A 25 | J 25 | A 25 | E 16 | B 16 | J 25 | A 23 | J 21 | A 21 | G 21 | G 21 | E 31 | B 33 | G 33 | A 22 | E 16 | B 16 | J 16 | A 16 | J 16 | A 16 | E 16 | B 20 |      |
| 26     | E 15 | B 20 | J 25 | A 15 | E 16 | B 16 | J 26 | A 20 | J 25 | A 43 | G 43 | G 43 | E 33 | B 34 | G 34 | A 22 | E 16 | B 16 | J 16 | A 16 | J 16 | A 16 | E 16 | B 16 |      |
| 27     | E 16 | B 16 | E 16 | B 24 | J 29 | A 47 | J 34 | A 22 | J 30 | A 28 | J 31 | A 32 | G 33 | B 30 | J 27 | E 16 | B 16 | J 16 | A 16 | J 16 | A 15 | J 27 | A 27 | E 16 |      |
| 28     | J 26 | A 19 | E 16 | B 16 | E 16 | B 16 | J 69 | A 49 | J 30 | A 26 | J 35 | A 35 | E 35 | B 42 | J 29 | E 24 | A 17 | E 16 | B 16 | J 16 | A 22 | J 52 | A 22 | E 16 |      |
| 29     | E 16 | B 20 | J 16 | A 25 | J 24 | A 15 | E 21 | J 16 | A 24 | G 24 | G 24 | G 24 | G 24 | G 24 | J 24 | A 27 | J 20 | A 23 | J 26 | A 16 | J 26 | A 26 | J 26 | A 25 |      |
| 30     | J 25 | A 25 | J 16 | A 16 | E 29 | A 15 | E 16 | B 16 | J 37 | A 51 | J 30 | A 66 | G 66 | J 31 | A 67 | J 28 | A 25 | J 32 | A 25 | J 20 | A 25 | J 25 | A 20 | J 23 |      |
| 31     | J 32 | A 26 | J 26 | A 23 | J 27 | A 20 | J 20 | A 42 | J 52 | A 34 | J 55 | G 55 | J 34 | A 32 | G 32 | J 17 | A 30 | J 23 | A 22 | J 16 | A 20 | J 25 | A 32 | J 32 |      |
|        | 00   | 01   | 02   | 03   | 04   | 05   | 06   | 07   | 08   | 09   | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 20   | 21   | 22   | 23   |      |
| CNT    | 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    | J 24 | A 25 | J 22 | A 20 | J 20 | A 22 | J 22 | A 24 | J 25 | A 28 | G 28 | E 31 | G 31 | G 31 | G 31 | J 28 | A 25 | J 24 | A 25 | J 23 | A 21 | J 23 | A 23 | J 25 | A 23 |
| U Q    | J 28 | A 30 | J 27 | A 25 | J 25 | A 26 | J 28 | A 27 | J 35 | A 36 | G 36 | J 35 | A 34 | J 33 | A 30 | J 28 | A 27 | J 32 | A 29 | J 28 | A 30 | J 26 | A 26 | J 27 | A 27 |
| L Q    | E 17 | B 21 | E 16 | B 16 | E 16 | B 16 | J 16 | A 21 | J 23 | A 31 | G 31 | G 31 | G 33 | A 32 | G 32 | J 17 | E 16 | B 16 | J 16 | A 16 | E 16 | B 16 | J 20 | A 16 |      |

DEC.2022 foEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



## IONOSPHERIC DATA STATION Wakkanai

DEC.2022 fbEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

| H<br>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 | 16  | E B | E B | E B | E B | 17  | 21  | 29 | 27  | 28  | G   | 30  | G   | G   | G   | 21  | 17  | 16  | 18  | 18  | 17  | 16  | E B |
| 2      | E B | 16  | E B | E B | E B | E B | E B | G   | G  | G   | G   | G   | 28  | 25  | 28  | 24  | 20  | 15  | 16  | 16  | 16  | 16  | 16  | 16  |
| 3      | E B | 16  | E B | E B | E B | E B | E B | G   | G  | G   | G   | G   | G   | G   | G   | G   | 18  | 16  | 16  | 16  | 16  | 16  | 16  | 16  |
| 4      | E B | 16  | E B | E B | E B | E B | E B | G   | G  | G   | G   | G   | G   | 31  | 24  | G   | 16  | 16  | 16  | 16  | 16  | 16  | 16  | 16  |
| 5      | E B | 16  | E B | E B | E B | E B | E B | G   | G  | G   | G   | G   | G   | G   | G   | G   | 17  | 16  | 16  | 16  | 16  | 16  | 16  | 16  |
| 6      | E B | 16  | E B | E B | E B | E B | E B | 16  | 23 | 26  | 28  | 31  | 30  | G   | 28  | 27  | 23  | 18  | 17  | E B | E B | E B | E B | E B |
| 7      | E B | 16  | E B | E B | E B | E B | 18  | 18  | 17 | 22  | 26  | 29  | 29  | 31  | G   | 27  | 24  | 20  | 20  | 16  | 16  | 16  | 16  | 16  |
| 8      | E B | 17  | E B | E B | E B | E B | E B | 17  | 22 | 23  | 28  | 32  | 28  | 28  | G   | 23  | 24  | G   | E B | E B | E B | E B | E B | E B |
| 9      | E B | 16  | E B | E B | E B | E B | E B | E B | 28 | 24  | G   | G   | G   | G   | G   | 28  | 24  | 24  | 24  | 22  | 16  | 16  | 16  | 16  |
| 10     | E B | 16  | E B | E B | E B | E B | E B | E B | G  | G   | G   | G   | G   | G   | G   | E B | 16  | 20  | 16  | 12  | 12  | 17  | 19  | 67  |
| 11     | 16  | 16  | E B | E B | E B | E B | 20  | 18  | 17 | E A | E A | E B | E B | E B | E B | E B | 22  | 20  | 21  | 21  | 19  | 23  | E B | E B |
| 12     | E B | 16  | E B | E B | E B | E B | E B | E B | G  | G   | G   | G   | G   | G   | G   | E B | 26  | 23  | 24  | E B | 16  | 21  | 20  | 20  |
| 13     | 19  | 22  | 16  | E B | E B | E B | E B | E B | 24 | 29  | G   | G   | G   | G   | 29  | 27  | 18  | 18  | 16  | 16  | 19  | 17  | 16  | 17  |
| 14     | E B | 16  | E B | E B | E B | E B | E B | E B | G  | G   | G   | G   | G   | G   | 29  | 30  | 28  | 25  | 16  | 21  | 20  | 22  | E B | E B |
| 15     | E B | 16  | E B | E B | E B | E B | E B | E B | G  | G   | G   | G   | G   | G   | G   | 26  | 24  | 17  | 16  | 16  | 16  | 16  | 16  | 16  |
| 16     | E B | 16  | E B | E B | E B | E B | E B | E B | 25 | 26  | 28  | G   | G   | G   | G   | G   | 25  | 22  | 17  | E B | E B | E B | E B | E B |
| 17     | E B | 16  | E B | E B | E B | E B | E B | E B | G  | G   | G   | G   | E B | E B | E B | E B | 34  | 36  | 29  | 24  | 18  | 16  | 16  | 16  |
| 18     | 16  | E B | E B | E B | E B | E B | E B | E B | G  | E B | G   | E B | G   | G   | G   | G   | 17  | 18  | 17  | 16  | 16  | 16  | 16  | 16  |
| 19     | 16  | 19  | 21  | 19  | E B | E B | E B | E B | 23 | 28  | G   | G   | G   | G   | G   | 27  | G   | E B | E B | E B | E B | E B | E B | E B |
| 20     | E B | 16  | E B | E B | E B | E B | E B | E B | G  | G   | G   | G   | G   | G   | G   | G   | 21  | 18  | 22  | E B | E B | E B | E B | E B |
| 21     | E B | 16  | E B | E B | E B | E B | E B | E B | G  | G   | G   | G   | G   | G   | G   | G   | 21  | 16  | 16  | 16  | 16  | 16  | 16  | 16  |
| 22     | E B | 16  | E B | E B | E B | E B | E B | E B | 20 | 26  | 29  | 30  | 29  | G   | G   | 26  | 20  | 17  | 16  | 22  | 18  | 20  | 16  | 16  |
| 23     | E B | 16  | E B | E B | E B | E B | E B | E B | G  | G   | G   | G   | G   | G   | G   | G   | 16  | 16  | 16  | 16  | 16  | 16  | 16  | 16  |
| 24     | 17  | 16  | E B | E B | E B | E B | E B | E B | 26 | G   | G   | G   | G   | G   | G   | E B | 22  | 16  | 16  | 16  | 20  | 16  | 16  | 16  |
| 25     | E B | 16  | E B | E B | E B | E B | E B | E B | G  | G   | G   | G   | E B | 31  | 33  | G   | 22  | 16  | 16  | 16  | 16  | 16  | 16  | 16  |
| 26     | E B | 15  | E B | E B | E B | E B | E B | E B | G  | G   | G   | G   | E B | 30  | 34  | G   | 22  | 16  | 16  | 16  | 16  | 16  | 16  | 16  |
| 27     | E B | 16  | E B | E B | E B | E B | E B | E B | 27 | 28  | 35  | 30  | G   | G   | E B | 28  | 30  | 25  | 16  | 16  | 16  | 16  | 15  | 16  |
| 28     | E B | 16  | E B | E B | E B | E B | E B | E B | G  | E B | E B | E B | G   | E B | E B | E B | 35  | 42  | 29  | 24  | 17  | 16  | 16  | 16  |
| 29     | E B | 16  | E B | E B | E B | E B | E B | E B | G  | G   | G   | G   | G   | G   | G   | G   | 24  | 16  | 16  | 16  | 16  | 16  | 16  | 16  |
| 30     | E B | 16  | E B | E B | E B | E B | E B | E B | 24 | 24  | 28  | 29  | G   | G   | G   | G   | 25  | 24  | 16  | 16  | 16  | 16  | 16  | 16  |
| 31     | E B | 16  | E B | E B | E B | E B | E B | E B | G  | G   | G   | G   | G   | G   | G   | G   | 17  | 16  | 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  | 30  | 31  | 31 | 31  | 31  | 31  | 31  | 31  | 31  | 31  | 31  | 31  | 31  | 31  | 31  | 31  | 31  | 31  |
| MED    | E B | 16  | E B | E B | E B | E B | E B | E B | 16 | 23  | 26  | G   | G   | G   | G   | G   | 24  | 17  | 16  | 16  | 16  | 16  | 16  | 16  |
| U Q    | 16  | 16  | E B | E B | E B | E B | 16  | 16  | 17 | 24  | 30  | G   | G   | G   | G   | G   | 18  | 20  | 16  | 18  | 17  | 16  | 16  | 16  |
| L Q    | E B | 16  | E B | E B | E B | E B | E B | E B | G  | G   | G   | G   | G   | G   | G   | G   | E B | E B | E B | E B | E B | E B | E B | E B |

DEC.2022 fbEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Wakkanai

DEC.2022 fmin (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

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

DEC.2022 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Wakkanai

DEC.2022 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   |   | 295 | 295 | 294 | 261 | F   | 293 | 292 | 326 | 378 | 393 | 343 | 344 | 355 | 354 | 333 | 344 | 343 | 343 | 348 | 340 | 291 | 289 | 257 | 306 |     |
| 2   |   | 306 | 296 | 296 | 308 | 281 | 288 | 304 | 329 | 370 | 350 | 348 | 348 | 368 | 366 | 355 | 355 | 342 | 336 | 335 | 334 | 287 | 277 | 265 | 292 |     |
| 3   |   | 313 | 300 | 287 | 275 | 291 | 308 | 335 | 334 | 386 | 365 | 313 | H   | H   | H   | H   | 369 | 333 | 347 | 323 | 323 | 323 | 277 | 276 | 284 |     |
| 4   |   | 283 | 282 | 282 | 281 | 295 | 308 | 321 | 367 | 347 | 347 | 364 | 364 | 358 | 358 | H   | 367 | 356 | 334 | 334 | 312 | 302 | 302 | 267 | 273 |     |
| 5   |   | 272 | 279 | 270 | 288 | 288 | 307 | H   | 341 | 340 | 366 | 366 | 363 | 352 | H   | H   | 373 | 323 | 322 | 332 | 302 | 302 | 275 | 275 | 275 |     |
| 6   |   | 282 | 284 | 303 | 303 | 288 | 287 | 299 | 329 | 349 | H   | H   | 339 | 318 | H   | H   | 366 | 332 | 310 | 335 | 334 | 311 | 274 | 272 | 289 |     |
| 7   |   | 310 | 297 | 285 | 284 | 294 | 297 | 315 | 352 | 353 | 363 | 376 | 357 | 356 | H   | H   | 348 | H   | 365 | 324 | 328 | 302 | 279 | 267 | 247 |     |
| 8   |   | 269 | 268 | 284 | 274 | 283 | 282 | 282 | 297 | 326 | 339 | 331 | 306 | 348 | H   | H   | 348 | 348 | 345 | 318 | 318 | 317 | 279 | 279 | 279 |     |
| 9   |   | 292 | 276 | 276 | 284 | 286 | 337 | 322 | 340 | 362 | 346 | 360 | 325 | 344 | H   | H   | 355 | 352 | 339 | 314 | 314 | 314 | 268 | 266 | 320 |     |
| 10  |   | 296 | 296 | 286 | 286 | 285 | 322 | 321 | 348 | 347 | 354 | 343 | 356 | 335 | H   | H   | 344 | 335 | 322 | A   | A   | 259 | A   | 283 | 282 |     |
| 11  |   | 293 | 291 | 254 | F   | F   | F   | F   | 346 | 333 | 378 | 350 | 369 | 343 | 319 | 343 | 343 | 339 | 341 | 338 | 337 | F   | F   | 291 | F   |     |
| 12  |   | F   | 289 | F   | 272 | F   | 297 | 368 | 334 | 371 | 371 | 342 | 348 | 348 | 342 | 341 | 355 | 330 | 334 | 352 | 349 | 347 | 341 | 264 | 268 |     |
| 13  |   | 307 | 283 | 261 | 260 | 279 | 304 | 321 | 342 | 367 | 363 | 349 | 368 | 350 | H   | 329 | 348 | 347 | 321 | 320 | 331 | 343 | 284 | 284 | 283 |     |
| 14  |   | 283 | 269 | 282 | 281 | 291 | 339 | 357 | 329 | 360 | 368 | 331 | 360 | 300 | H   | 352 | 351 | 350 | 326 | 350 | 331 | 331 | 300 | 299 | 273 | 273 |
| 15  |   | 321 | 282 | 288 | 287 | 275 | 305 | 329 | 333 | 372 | 325 | 348 | 355 | 340 | H   | 320 | 346 | 328 | 355 | 342 | 291 | 290 | 277 | 295 | 308 |     |
| 16  |   | 284 | 281 | 278 | 283 | 309 | 338 | 304 | 331 | 365 | 365 | 359 | 334 | 311 | H   | 345 | 354 | 324 | 351 | 341 | 315 | 315 | 287 | 285 | 287 | 286 |
| 17  |   | 286 | 286 | 308 | 337 | 313 | 293 | F   | F   | 329 | 356 | 363 | 352 | 350 | 322 | 336 | 336 | 340 | 346 | 344 | 324 | 324 | 323 | 307 | 281 | 281 |
| 18  |   | 291 | 302 | 301 | 301 | 315 | 342 | 335 | 331 | 361 | 268 | R   | 351 | 359 | 344 | 330 | 311 | 354 | 341 | 326 | 326 | 341 | 341 | 287 | 286 | 286 |
| 19  |   | 285 | 293 | 293 | 275 | 274 | 312 | 328 | 367 | 365 | 352 | 325 | H   | 368 | 302 | 327 | 344 | 343 | 331 | 331 | 362 | 348 | 284 | 284 | 308 | 290 |
| 20  |   | 290 | 290 | 278 | 307 | 306 | 306 | 338 | 338 | 352 | 351 | 350 | 353 | 333 | 333 | H   | 351 | 332 | 329 | 351 | 333 | 297 | 297 | 297 | 290 |     |
| 21  |   | 288 | 287 | 288 | 280 | 294 | 312 | 360 | 340 | 362 | 330 | 345 | 349 | 340 | H   | 328 | 346 | 332 | 365 | 325 | 330 | 319 | 287 | 307 | 307 | 307 |
| 22  |   | 305 | 275 | 274 | 273 | 285 | 292 | 337 | 352 | 351 | 330 | 353 | 337 | H   | H   | 341 | 348 | 344 | 350 | 325 | 322 | 321 | 320 | 295 | 297 | 287 |
| 23  |   | 287 | 287 | 287 | 287 | 315 | 314 | 369 | 341 | 367 | 338 | 338 | 359 | H   | H   | 340 | 340 | 367 | 328 | 310 | 332 | 331 | 330 | 292 | 335 | 296 |
| 24  |   | 274 | 274 | 273 | 326 | 281 | 324 | 270 | 324 | 323 | 315 | 340 | 367 | 357 | 346 | 357 | 335 | 326 | H   | 357 | 355 | 284 | 283 | 283 | 283 | F   |
| 25  |   | 283 | 300 | 300 | 277 | 277 | 276 | 343 | 351 | 350 | 350 | 337 | 348 | 355 | 322 | 349 | 367 | 355 | 319 | 341 | 340 | 340 | 263 | F   | F   | F   |
| 26  |   | 262 | 261 | 298 | 266 | 266 | 297 | 297 | 330 | 369 | 336 | 371 | 327 | 340 | H   | 300 | 336 | 359 | 287 | 338 | 340 | V   | F   | F   | F   | F   |
| 27  |   | 236 | 235 | 242 | 259 | 310 | 310 | 309 | 339 | 370 | 346 | 347 | 348 | 347 | H   | 338 | 338 | 337 | 298 | 339 | 302 | 270 | 274 | 272 | 272 | F   |
| 28  |   | 290 | 290 | 301 | 294 | 283 | 283 | 347 | 324 | 337 | 337 | 358 | 370 | 365 | 327 | 344 | 346 | 356 | 304 | 318 | 320 | 320 | 307 | 282 |     |     |
| 29  |   | 281 | 265 | 258 | 270 | 285 | 326 | 346 | 343 | 374 | 355 | 369 | 343 | 360 | H   | 352 | 306 | 338 | 333 | 323 | 324 | 323 | 287 | 254 | 253 |     |
| 30  |   | 260 | 266 | 265 | 282 | 282 | 302 | 283 | 332 | 350 | 373 | 358 | 297 | 322 | 347 | 345 | 346 | 346 | 345 | 313 | 321 | 306 | 284 | 283 | 265 |     |
| 31  |   | 264 | 264 | 273 | 328 | 282 | 304 | 304 | 343 | 337 | 333 | 354 | H   | 283 | 341 | 330 | 330 | 329 | 352 | 335 | 332 | 309 | 286 | 286 | 286 | 285 |
|     |   | 00  | 01  | 02  | 03  | 04  | 05  | 06  | 07  | 08  | 09  | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  |     |
| CNT |   | 30  | 31  | 30  | 30  | 28  | 30  | 29  | 31  | 31  | 31  | 31  | 31  | 31  | 31  | 31  | 31  | 31  | 31  | 30  | 30  | 30  | 28  | 30  | 27  |     |
| MED |   | 286 | 284 | 284 | 282 | 286 | 306 | 321 | 338 | 360 | 350 | 349 | 349 | 343 | 339 | 341 | 346 | 342 | 333 | 332 | 326 | 302 | 284 | 282 | 284 |     |
| U Q |   | 295 | 293 | 294 | 294 | 294 | 314 | 340 | 343 | 369 | 365 | 358 | 360 | 355 | 347 | 346 | 355 | 351 | 343 | 339 | 337 | 323 | 296 | 291 | 290 |     |
| L Q |   | 281 | 274 | 273 | 274 | 282 | 293 | 302 | 329 | 347 | 336 | 340 | 337 | H   | H   | 329 | 340 | 332 | 321 | 323 | 318 | 287 | 277 | 272 | 273 |     |

DEC.2022 M(3000)F2 (0.01)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Wakkanai

DEC.2022 M(3000)F1 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E 0SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

| H<br>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<br>358 | U<br>393 | L<br>A   | L        | L        | L        |          |    |    |    |     |    |    |    |  |
| 2      |    |    |    |    |    |          |          |     |          |     | L        | 417      | L<br>413 | U<br>409 | L<br>442 |          |          |    |    |    |     |    |    |    |  |
| 3      |    |    |    |    |    |          |          |     |          | 462 | U<br>429 | L<br>425 | L<br>419 | L<br>434 |          | L<br>428 |          |    |    |    |     |    |    |    |  |
| 4      |    |    |    |    |    |          |          |     |          | L   | L        | L<br>392 | U<br>410 | L<br>406 | L<br>405 |          |          |    |    |    |     |    |    |    |  |
| 5      |    |    |    |    |    | U<br>353 | L<br>433 | 427 | 410      | L   | L        | L        | L        | L        | L        |          |          |    |    |    |     |    |    |    |  |
| 6      |    |    |    |    |    |          |          |     |          |     | U<br>436 | L<br>385 | U<br>382 | L        |          |          |          |    |    |    |     |    |    |    |  |
| 7      |    |    |    |    |    |          |          |     | 430      | 413 | 411      | L        | L        | L        | L        |          |          |    |    |    |     |    |    |    |  |
| 8      |    |    |    |    |    |          |          |     | L        | L   | L        | L        | L        |          | L        |          |          |    | L  |    |     |    |    |    |  |
| 9      |    |    |    |    |    |          |          |     |          | L   |          |          | L        | L        | 462      |          |          |    |    |    |     |    |    |    |  |
| 10     |    |    |    |    |    |          |          |     | L        | L   | L        | L        | L        | L        |          |          |          |    |    |    |     |    |    |    |  |
| 11     |    |    |    |    |    |          |          |     |          |     |          |          | L        |          |          |          |          |    |    |    |     |    |    |    |  |
| 12     |    |    |    |    |    |          |          |     |          |     | L        | 496      |          |          |          |          |          |    |    |    |     |    |    |    |  |
| 13     |    |    |    |    |    |          | L        | L   |          |     | L        | L        | L        |          |          |          |          |    |    |    |     |    |    |    |  |
| 14     |    |    |    |    |    |          |          |     | 393      | 416 | 426      | 420      | L        | L        | L        |          |          |    |    |    |     |    |    |    |  |
| 15     |    |    |    |    |    |          |          | 415 |          |     |          |          |          |          |          |          |          |    |    |    |     |    |    |    |  |
| 16     |    |    |    |    |    | L        | 372      |     |          | 371 | L        | L        |          | 392      |          |          |          |    |    |    |     |    |    |    |  |
| 17     |    |    |    |    |    |          |          |     | E<br>408 | A   | L        | L        |          |          |          |          |          |    |    |    |     |    |    |    |  |
| 18     |    |    |    |    |    |          |          |     | L        |     |          | L        |          |          |          |          |          |    |    |    |     |    |    |    |  |
| 19     |    |    |    |    |    |          |          |     |          |     |          | L<br>392 | L        | L<br>413 |          |          |          |    |    |    |     |    |    |    |  |
| 20     |    |    |    |    |    |          |          |     |          |     |          |          |          |          |          | 412      |          |    |    |    |     |    |    |    |  |
| 21     |    |    |    |    |    | L        |          |     |          |     |          | L        | L        |          |          | L        |          | L  |    |    |     |    |    |    |  |
| 22     |    |    |    |    |    |          |          | 410 |          |     |          |          | L        | L        | L<br>427 | U<br>426 |          |    |    |    |     |    |    |    |  |
| 23     |    |    |    |    |    |          |          |     |          | L   | U<br>383 | L        | L        | L        |          | 387      |          | L  |    |    |     |    |    |    |  |
| 24     |    |    |    |    |    | A        |          |     |          | L   | U<br>392 | L<br>397 | U<br>410 | L        | L        |          |          |    |    |    |     |    |    |    |  |
| 25     |    |    |    |    |    |          |          |     |          | L   | L        | L        | L        |          | L        |          |          |    |    |    | 411 |    |    |    |  |
| 26     |    |    |    |    |    |          |          |     |          | L   | L        | L        |          | L        | L        | L        | L        |    |    |    |     |    |    |    |  |
| 27     |    |    |    |    |    | L        |          |     |          |     |          | L        | L        | L        |          |          |          |    |    |    |     |    |    |    |  |
| 28     |    |    |    |    |    |          |          | L   | L        | L   | L        | L        |          |          |          |          |          |    |    |    |     |    |    |    |  |
| 29     |    |    |    |    |    |          |          |     | L        | L   | L        | L        |          |          |          |          |          |    |    |    |     |    |    |    |  |
| 30     |    |    |    |    |    |          |          |     | L        | L   | L        | L        | L        | L        | L        |          |          |    |    |    |     |    |    |    |  |
| 31     |    |    |    |    |    |          |          |     |          |     | L        | U<br>423 | L        | L        |          |          |          |    |    |    |     |    |    |    |  |
|        | 00 | 01 | 02 | 03 | 04 | 05       | 06       | 07  | 08       | 09  | 10       | 11       | 12       | 13       | 14       | 15       | 16       | 17 | 18 | 19 | 20  | 21 | 22 | 23 |  |
| CNT    |    |    |    |    |    |          | 2        | 2   | 5        | 8   | 7        | 9        | 4        | 12       | 2        | 5        | 1        |    |    |    |     |    |    |    |  |
| MED    |    |    |    |    |    |          | L<br>362 | 424 | 425      | 409 | U<br>411 | L<br>417 | L<br>414 | L<br>413 | L<br>407 | L<br>426 | L<br>411 |    |    |    |     |    |    |    |  |
| U Q    |    |    |    |    |    |          |          |     | 428      | 414 | U<br>429 | L<br>424 | L<br>421 | L<br>430 |          | 435      |          |    |    |    |     |    |    |    |  |
| L Q    |    |    |    |    |    |          |          |     | 402      | 398 | U<br>383 | L<br>392 | L<br>398 | L<br>406 |          | 400      |          |    |    |    |     |    |    |    |  |

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NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Wakkanai

DEC.2022 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<br>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      |    |    |    |    |    |    |            |     |     | 214 | 226 | 234 | 226 | 226 | 226 | 226 |     |     |    |    |    |    |    |    |
| 2      |    |    |    |    |    |    |            |     |     |     | 224 | 234 | 220 | 234 | 220 | 220 |     |     |    |    |    |    |    |    |
| 3      |    |    |    |    |    |    |            |     |     | 200 | 220 | 216 | 240 | 228 | 212 | 232 |     |     |    |    |    |    |    |    |
| 4      |    |    |    |    |    |    |            |     |     |     | 226 | 228 | 244 | 226 | 236 | 224 |     |     |    |    |    |    |    |    |
| 5      |    |    |    |    |    |    | 252        | 232 | 232 | 226 | 224 | 230 | 224 | 222 | 236 |     |     |     |    |    |    |    |    |    |
| 6      |    |    |    |    |    |    |            |     |     |     | 236 | 224 | 232 | 232 |     |     |     |     |    |    |    |    |    |    |
| 7      |    |    |    |    |    |    |            |     | 220 | 222 | 228 | 224 |     | 204 |     |     |     |     |    |    |    |    |    |    |
| 8      |    |    |    |    |    |    |            |     | 260 | 234 | 218 | 230 | 224 |     | 224 |     |     | 222 |    |    |    |    |    |    |
| 9      |    |    |    |    |    |    |            |     |     | 232 |     |     | 214 | 228 |     |     |     |     |    |    |    |    |    |    |
| 10     |    |    |    |    |    |    |            |     |     | 222 | 230 | 236 | 234 | 224 | 224 |     |     |     |    |    |    |    |    |    |
| 11     |    |    |    |    |    |    |            |     |     |     |     |     | 232 |     |     |     |     |     |    |    |    |    |    |    |
| 12     |    |    |    |    |    |    |            |     |     |     | 216 |     | 232 |     |     |     |     |     |    |    |    |    |    |    |
| 13     |    |    |    |    |    |    | 220        | 222 |     |     | 234 | 222 | 226 |     |     |     |     |     |    |    |    |    |    |    |
| 14     |    |    |    |    |    |    |            |     | 218 | 218 | 234 | 224 | 224 | 232 | 238 |     |     |     |    |    |    |    |    |    |
| 15     |    |    |    |    |    |    |            | 222 |     |     |     | 226 |     |     |     |     |     |     |    |    |    |    |    |    |
| 16     |    |    |    |    |    |    | 238        |     |     | 228 | 230 | 238 |     | 236 |     |     |     |     |    |    |    |    |    |    |
| 17     |    |    |    |    |    |    |            |     |     | 236 | 226 | 222 |     |     |     |     |     |     |    |    |    |    |    |    |
| 18     |    |    |    |    |    |    |            |     |     | 230 |     | 230 |     |     |     |     |     |     |    |    |    |    |    |    |
| 19     |    |    |    |    |    |    |            |     |     |     |     | 230 | 226 | 234 |     |     |     |     |    |    |    |    |    |    |
| 20     |    |    |    |    |    |    |            |     |     |     |     | 230 | 240 |     |     | 228 |     |     |    |    |    |    |    |    |
| 21     |    |    |    |    |    |    |            | 234 |     |     |     | 238 | 228 |     |     | 222 |     | 214 |    |    |    |    |    |    |
| 22     |    |    |    |    |    |    |            |     | 214 |     |     |     | 216 | 236 | 236 | 230 |     |     |    |    |    |    |    |    |
| 23     |    |    |    |    |    |    |            |     |     | 212 | 250 | 232 | 224 | 232 |     | 220 | 260 |     |    |    |    |    |    |    |
| 24     |    |    |    |    |    |    | E A<br>280 |     |     | 254 | 230 | 222 | 224 | 238 | 224 |     |     |     |    |    |    |    |    |    |
| 25     |    |    |    |    |    |    |            |     |     | 224 | 258 | 214 | 208 |     | 230 |     | 214 |     |    |    |    |    |    |    |
| 26     |    |    |    |    |    |    |            |     |     | 214 | 222 | 222 |     | 226 | 270 | 232 | 232 |     |    |    |    |    |    |    |
| 27     |    |    |    |    |    |    | 310        |     |     |     |     | 230 | 218 | 232 |     |     |     |     |    |    |    |    |    |    |
| 28     |    |    |    |    |    |    |            |     | 216 | 226 | 230 | 218 |     |     |     |     |     |     |    |    |    |    |    |    |
| 29     |    |    |    |    |    |    |            |     |     | 222 | 222 | 224 |     |     |     |     |     |     |    |    |    |    |    |    |
| 30     |    |    |    |    |    |    |            |     |     | 216 | 216 | 236 | 246 | 230 | 218 |     |     |     |    |    |    |    |    |    |
| 31     |    |    |    |    |    |    |            |     |     |     | 216 | 244 | 218 | 230 |     |     |     |     |    |    |    |    |    |    |
|        | 00 | 01 | 02 | 03 | 04 | 05 | 06         | 07  | 08  | 09  | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT    |    |    |    |    |    |    | 6          | 3   | 7   | 20  | 21  | 28  | 22  | 19  | 12  | 8   | 3   | 2   |    |    |    |    |    |    |
| MED    |    |    |    |    |    |    | 240        | 222 | 220 | 225 | 228 | 230 | 224 | 232 | 225 | 227 | 232 | 218 |    |    |    |    |    |    |
| U Q    |    |    |    |    |    |    | 280        | 232 | 232 | 230 | 234 | 234 | 228 | 234 | 236 | 231 | 260 |     |    |    |    |    |    |    |
| L Q    |    |    |    |    |    |    | 234        | 222 | 216 | 216 | 222 | 223 | 220 | 226 | 222 | 221 | 214 |     |    |    |    |    |    |    |

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NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Wakkanai

DEC. 2022 h'F (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT. 45°10.0'N LON. 141°45.0'E PSWEEP 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     | 268              | 270              | 250              | 268 <sup>Q</sup> | 304 <sup>Q</sup> | 300   | 278 | 234 | 204 | 200 | 198 | 188 | A   | 196 | 208 | 212 | 218 | 216 | 212 | 236 | 286              | 304              | 348              | 268              |
| 2     | 260              | 286              | 258              | 282              | 304              | 292   | 270 | 250 | 218 | 218 | 178 | 178 | 200 | 188 | 202 | 182 | 214 | 208 | 212 | 244 | 284              | 284              | 306              | 296              |
| 3     | 274              | 258              | 302              | 288              | 296              | 284   | 218 | 202 | 194 | 168 | 190 | 186 | 236 | 168 | 188 | 180 | 230 | 204 | 228 | 244 | 236              | 274              | 288              | 274              |
| 4     | 274              | 260              | 294              | 300              | 280              | 260   | 244 | 212 | 212 | 204 | 196 | 196 | 204 | 190 | 176 | 218 | 204 | 222 | 228 | 234 | 264              | 254              | 308              | 308              |
| 5     | 318              | 318              | 326              | 292              | 296              | 258   | 214 | 172 | 180 | 186 | 204 | 210 | 196 | 190 | 180 | 230 | 208 | 208 | 242 | 268 | 276              | 244              | 316              | 298              |
| 6     | 298              | 282              | 276              | 272              | 238              | 286   | 266 | 248 | 226 | 228 | 174 | 196 | 198 | 188 | 218 | 222 | 198 | 240 | 228 | 256 | 268              | 302              | 300 <sup>Q</sup> | 300              |
| 7     | 278              | 268              | 282              | 264              | 276              | 278   | 248 | 208 | 184 | 192 | 180 | 188 | 234 | 170 | 212 | 234 | 190 | 214 | 246 | 242 | 268              | 304              | 332              | 342              |
| 8     | 310              | 322              | 274              | 282              | 314              | 290   | 284 | 238 | 222 | 212 | 194 | 194 | 220 | 212 | 204 | 234 | 202 | 196 | 254 | 240 | 246              | 282              | 314              | 306              |
| 9     | 284              | 312              | 286              | 286              | 280              | 232   | 260 | 230 | 218 | 190 | 222 | 224 | 194 | 170 | 210 | 220 | 216 | 226 | 226 | 250 | 250              | 288              | 286              | 250              |
| 10    | 254              | 254              | 304              | 300              | 294              | 252   | 232 | 200 | 176 | 194 | 206 | 196 | 188 | 198 | 218 | 228 | 212 | 230 | A   | A   | A                | A                | A                | 306              |
| 11    | 272              | 284              | 318              | 308 <sup>Q</sup> | 328 <sup>Q</sup> | 274   | 218 | 220 | 214 | 218 | 226 | 206 | 196 | 210 | 224 | 218 | 214 | 214 | 216 | 206 | 248              | 290              | 276              | 270 <sup>Q</sup> |
| 12    | 268 <sup>Q</sup> | 292              | 324              | 312              | 330 <sup>Q</sup> | 252   | 208 | 228 | 206 | 200 | 210 | 184 | 212 | 218 | 214 | 218 | 218 | 208 | 214 | 232 | 226              | 254              | 272              | 322              |
| 13    | 296              | 284              | 302 <sup>Q</sup> | 298              | 282              | 234   | 202 | 202 | 204 | 212 | 186 | 202 | 202 | 226 | 224 | 210 | 218 | 226 | 226 | 228 | 234              | 268              | 288              | 262              |
| 14    | 286              | 298              | 298              | 272              | 290              | 240   | 212 | 226 | 184 | 184 | 186 | 192 | 200 | 200 | 208 | 224 | 222 | 214 | 238 | 212 | 256              | 266              | 284              | 298 <sup>Q</sup> |
| 15    | 278              | 282              | 274              | 276              | 318              | 230   | 212 | 180 | 208 | 218 | 216 | 206 | 218 | 226 | 224 | 208 | 216 | 210 | 216 | 244 | 264              | 262              | 268              | 258              |
| 16    | 264              | 306              | 290              | 266              | 252              | 204   | 200 | 238 | 198 | 196 | 214 | 214 | 212 | 212 | 220 | 218 | 208 | 210 | 232 | 218 | 246              | 252              | 256              | 272              |
| 17    | 282              | 282              | 250              | 226              | 204              | 234   | 244 | 214 | 210 | 200 | 208 | 184 | 226 | 220 | 218 | 218 | 210 | 214 | 220 | 234 | 252              | 266              | 266              | 290              |
| 18    | 274              | 252              | 260              | 248              | 244              | 210   | 240 | 214 | 206 | 198 | 218 | 212 | 232 | 222 | 228 | 212 | 206 | 226 | 236 | 226 | 226              | 286              | 286              | 286              |
| 19    | 268              | 288              | 288              | 324              | 302 <sup>Q</sup> | 234   | 222 | 208 | 218 | 230 | 226 | 198 | 188 | 196 | 230 | 218 | 228 | 194 | 212 | 224 | 288              | 308              | 260              | 254              |
| 20    | 264              | 288              | 288              | 252              | 240              | 222   | 214 | 244 | 220 | 202 | 216 | 218 | 194 | 244 | 204 | 204 | 208 | 226 | 226 | 246 | 276              | 258              | 258              | 266              |
| 21    | 280              | 276              | 276              | 290              | 282              | 230   | 196 | 212 | 202 | 230 | 214 | 214 | 202 | 242 | 206 | 200 | 200 | 178 | 234 | 250 | 282              | 254              | 254              | 272              |
| 22    | 272              | 288              | 310              | 302              | 270              | 184   | 246 | 212 | 172 | 224 | 220 | 218 | 184 | 184 | 202 | 184 | 204 | 246 | 246 | 200 | 204              | 266              | 274              | 284              |
| 23    | 300              | 308              | 290              | 290              | 280              | 250   | 224 | 240 | 246 | 192 | 194 | 194 | 194 | 194 | 220 | 206 | 188 | 266 | 228 | 212 | 232              | 264              | 242              | 242              |
| 24    | 358              | 344              | 330              | 242              | 194              | 226   | A   | 228 | 248 | 198 | 198 | 194 | 194 | 186 | 204 | 218 | 224 | 212 | 226 | 222 | 286              | 250 <sup>Q</sup> | 288              | 304 <sup>Q</sup> |
| 25    | 290              | 260              | 252              | 300              | 316              | 314   | 232 | 214 | 218 | 200 | 196 | 200 | 192 | 222 | 216 | 202 | 174 | 224 | 210 | 216 | 228              | 260 <sup>Q</sup> | 248              | 288 <sup>Q</sup> |
| 26    | 288              | 294 <sup>Q</sup> | 276              | 286 <sup>Q</sup> | 300              | 248   | 232 | 224 | 216 | 194 | 198 | 184 | 222 | 214 | 202 | 200 | 192 | 284 | 248 | 220 | 256 <sup>Q</sup> | 292 <sup>Q</sup> | 224              | 326 <sup>Q</sup> |
| 27    | E 340            | B 314            | E 314            | B 270            | 276              | 236   | 246 | 232 | 214 | 216 | 228 | 208 | 196 | 188 | 222 | 206 | 224 | 266 | 240 | 246 | 260              | 310              | 348              | 278 <sup>Q</sup> |
| 28    | 294              | 294              | E 236            | B 270            | 260              | A 238 | 240 | 212 | 200 | 218 | 204 | 220 | 230 | 214 | 214 | 214 | 242 | 236 | 234 | 242 | 272              | 288              | 244 <sup>Q</sup> |                  |
| 29    | 242 <sup>Q</sup> | 276 <sup>Q</sup> | 290 <sup>Q</sup> | 260 <sup>Q</sup> | 266              | 228   | 210 | 212 | 200 | 196 | 210 | 200 | 220 | 222 | 222 | 212 | 224 | 202 | 250 | 246 | 244              | 270              | 318 <sup>Q</sup> | 338 <sup>Q</sup> |
| 30    | 338              | 322              | 298              | 234              | 276              | 256   | 284 | 250 | 206 | 206 | 206 | 198 | 196 | 202 | 192 | 234 | 208 | 216 | 248 | 234 | 248              | 288              | 292              | 310              |
| 31    | 352              | 334              | 302              | 230              | 270              | 288   | 292 | 222 | 214 | 216 | 208 | 190 | 194 | 200 | 228 | 228 | 228 | 212 | 224 | 232 | 244              | 292              | 284              | 280              |
|       | 00               | 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               | 30    | 30  | 31  | 31  | 31  | 31  | 31  | 30  | 31  | 31  | 31  | 31  | 31  | 30  | 30  | 30               | 30               | 30               | 31               |
| MED   | 279              | 287              | 290              | 282              | 280              | 249   | 232 | 222 | 210 | 200 | 206 | 198 | 200 | 200 | 214 | 218 | 212 | 214 | 228 | 234 | 251              | 271              | 286              | 286              |
| U Q   | 298              | 308              | 302              | 298              | 302              | 278   | 248 | 238 | 218 | 216 | 216 | 208 | 220 | 222 | 222 | 222 | 218 | 226 | 240 | 244 | 268              | 290              | 306              | 306              |
| L Q   | 268              | 276              | 274              | 264              | 266              | 230   | 214 | 212 | 200 | 194 | 194 | 190 | 194 | 188 | 204 | 206 | 204 | 208 | 220 | 222 | 242              | 260              | 266              | 268              |

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NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Wakkanai

DEC.2022 h'E (KM)

135°E MEAN TIME (G.M.T. + 9 H)

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

| H<br>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   | A   |     |     |     |     |     |     |     |     | A   | B   |    |    |    |    |    |    |
| 2      |    |    |    |    |    |    | A   |     |     |     |     |     |     |     |     |     |     |     | B  |    |    |    |    |    |
| 3      |    |    |    |    |    |    | B   |     |     |     |     |     |     |     |     |     |     | B   | B  |    |    |    |    |    |
| 4      |    |    |    |    |    |    | 90  | B   |     |     |     |     |     |     |     |     |     | B   | B  |    |    |    |    |    |
| 5      |    |    |    |    |    |    | B   |     |     |     |     |     |     |     |     |     |     |     | B  |    |    |    |    |    |
| 6      |    |    |    |    |    |    | A   | A   |     |     |     |     |     |     |     |     |     | A   | A  |    |    |    |    |    |
| 7      |    |    |    |    |    |    | B   |     |     |     |     |     |     |     |     |     |     | A   | A  |    |    |    |    |    |
| 8      |    |    |    |    |    |    | 96  | 110 | 90  | 98  | 102 | 102 | 102 | 102 | 102 |     | A   | 104 | B  |    |    |    |    |    |
| 9      |    |    |    |    |    |    | B   | 98  | A   |     |     |     |     |     |     | A   | A   |     | 96 | 96 |    |    |    |    |
| 10     |    |    |    |    |    |    | B   |     |     |     |     |     |     |     |     |     | A   |     | A  |    |    |    |    |    |
| 11     |    |    |    |    |    |    | A   | A   | A   |     |     |     |     |     |     |     |     | A   | A  |    |    |    |    |    |
| 12     |    |    |    |    |    |    | A   |     | A   |     |     |     |     |     |     |     |     | A   | A  |    |    |    |    |    |
| 13     |    |    |    |    |    |    | 100 | 100 | 100 |     | 108 | 108 | 110 | 106 | 102 | 114 |     | A   | A  |    |    |    |    |    |
| 14     |    |    |    |    |    |    | B   |     |     |     |     |     |     |     |     |     | B   | B   | A  |    |    |    |    |    |
| 15     |    |    |    |    |    |    | B   |     |     |     |     |     |     |     |     |     | A   | A   | A  |    |    |    |    |    |
| 16     |    |    |    |    |    |    | 96  | 96  | 98  | 108 | 108 | 100 | 100 | 100 | 96  | 98  |     | A   | B  |    |    |    |    |    |
| 17     |    |    |    |    |    |    | B   | A   | B   |     |     |     |     |     |     |     |     | 98  | A  |    |    |    |    |    |
| 18     |    |    |    |    |    |    | B   |     | B   |     |     |     |     |     |     |     |     | B   | A  |    |    |    |    |    |
| 19     |    |    |    |    |    |    | B   | 98  | A   |     |     |     |     |     |     |     |     | A   | A  |    |    |    |    |    |
| 20     |    |    |    |    |    |    | B   |     |     |     |     |     |     |     |     |     | A   | A   | A  |    |    |    |    |    |
| 21     |    |    |    |    |    |    | B   |     |     |     |     |     |     |     |     |     |     | A   |    |    |    |    |    |    |
| 22     |    |    |    |    |    |    | B   |     |     |     |     |     |     |     |     |     |     | B   | B  |    |    |    |    |    |
| 23     |    |    |    |    |    |    | B   |     |     |     |     |     |     |     |     |     |     |     | B  |    |    |    |    |    |
| 24     |    |    |    |    |    |    | A   | A   |     |     |     |     |     |     |     |     |     | B   | B  | A  |    |    |    |    |
| 25     |    |    |    |    |    |    | B   |     |     |     |     |     |     |     |     |     |     | B   | B  | B  |    |    |    |    |
| 26     |    |    |    |    |    |    | B   | A   |     |     |     |     |     |     |     |     |     | B   | B  | B  |    |    |    |    |
| 27     |    |    |    |    |    |    | 104 | 104 |     |     |     |     |     |     |     |     |     | B   | B  |    |    |    |    |    |
| 28     |    |    |    |    |    |    | A   | A   |     |     |     |     |     |     |     |     |     | B   | B  | B  |    |    |    |    |
| 29     |    |    |    |    |    |    | B   | B   |     |     |     |     |     |     |     |     |     | B   | A  | B  |    |    |    |    |
| 30     |    |    |    |    |    |    | B   | B   |     |     |     |     |     |     |     |     |     | A   | A  |    |    |    |    |    |
| 31     |    |    |    |    |    |    | B   | A   |     |     |     |     |     |     |     |     |     | B   | A  |    |    |    |    |    |
|        | 00 | 01 | 02 | 03 | 04 | 05 | 06  | 07  | 08  | 09  | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT    |    |    |    |    |    |    | 5   | 18  | 24  | 27  | 27  | 29  | 25  | 26  | 25  | 19  | 7   | 3   |    |    |    |    |    |    |
| MED    |    |    |    |    |    |    | 96  | 105 | 107 | 108 | 106 | 106 | 110 | 109 | 108 | 110 | 98  | 96  |    |    |    |    |    |    |
| U Q    |    |    |    |    |    |    | 102 | 110 | 113 | 114 | 110 | 111 | 112 | 112 | 112 | 118 | 104 | 100 |    |    |    |    |    |    |
| L Q    |    |    |    |    |    |    | 93  | 100 | 101 | 104 | 104 | 104 | 104 | 104 | 102 | 100 | 96  | 96  |    |    |    |    |    |    |

DEC.2022 h'E (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Wakkanai

DEC.2022 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

| H<br>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      | 106 | 98  | 98  | 98  | 118 | 102 | 104 | 98  | 106 | 100 | 102 | 98  | 158 | 114 | 96  | 96  | 96  | 84  | 106 | 106 | 106 | 106 | 102 | 102 |
| 2      | 96  | 96  | 96  | 96  | 96  | 96  | 110 | 110 | 98  | 98  | 94  | 164 | 90  | 118 | 96  | 90  | 90  | 90  | 90  | 102 |     | B   | B   | 94  |
| 3      | 94  | B   | 94  | B   | B   | 94  | 102 | 100 | 100 | 128 | 128 | 136 | 170 | 166 | 152 | 116 | 92  | 90  | B   | B   | B   | B   | B   | B   |
| 4      | B   | 96  | 88  | 88  | B   | B   | G   | 100 | 142 | 104 | 114 | 118 | G   | 148 | 158 | G   | B   | 100 | B   | B   | 114 | B   | B   | B   |
| 5      | B   | 102 | 94  | 94  | 94  | 94  | B   | 92  | 98  | 100 | 148 | 134 | G   | 110 | 162 | 126 | 96  | B   | B   | B   | 86  | B   | B   | 106 |
| 6      | B   | 98  | 96  | 100 | 100 | 100 | 96  | 96  | 144 | 144 | 114 | 124 | 122 | 140 | 178 | 130 | 104 | 104 | 88  | B   | 110 | 110 | 110 | 96  |
| 7      | 96  | 90  | 96  | 94  | 94  | 100 | 100 | 100 | 162 | 90  | 114 | 126 | 166 | G   | 148 | 112 | 104 | 104 | 98  | 98  | 98  | 98  | 98  | B   |
| 8      | B   | 90  | B   | B   | 92  | 104 | 94  | 102 | 100 | 118 | 118 | 106 | 106 | 106 | 106 | 98  | 98  | 98  | B   | 94  | 94  | 98  | B   | B   |
| 9      | 100 | 98  | B   | B   | 98  | 100 | B   | 108 | 92  | 90  | G   | G   | G   | G   | 84  | 84  | 78  | 90  | 90  | 82  | 96  | 116 | 100 | 98  |
| 10     | 100 | 94  | B   | B   | 98  | 88  | 94  | 102 | 118 | 110 | 94  | 98  | 102 | 116 | 116 | 110 | 88  | 100 | 104 | 106 | 102 | 90  | 94  | 94  |
| 11     | 94  | 90  | 92  | B   | B   | 98  | 98  | 100 | 100 | 98  | B   | B   | B   | B   | B   | G   | 104 | 102 | 102 | 100 | 100 | 94  | 94  | 94  |
| 12     | 94  | 94  | 94  | 94  | 106 | 106 | 106 | 108 | 102 | G   | G   | G   | G   | G   | G   | 102 | 90  | 84  | 98  | 98  | 94  | 100 | 90  | 96  |
| 13     | 88  | 88  | 94  | 94  | 90  | 94  | 98  | 98  | 96  | 96  | G   | G   | G   | 130 | 112 | 112 | 88  | 102 | 102 | 102 | 94  | B   | 96  | 96  |
| 14     | 96  | 96  | 96  | 96  | B   | 98  | B   | 98  | G   | G   | G   | G   | 154 | 112 | 150 | B   | B   | 104 | 98  | 98  | 84  | 92  | 92  | B   |
| 15     | 86  | 88  | 98  | 92  | B   | B   | B   | 100 | G   | G   | G   | G   | G   | G   | 88  | 92  | 86  | 86  | B   | 94  | B   | B   | 94  |     |
| 16     | 94  | 84  | 84  | 94  | 96  | 96  | 92  | 148 | 120 | 112 | 112 | G   | 90  | 90  | 88  | 88  | 88  | B   | B   | B   | 96  | 96  | 92  | 92  |
| 17     | 86  | 86  | 86  | 90  | B   | B   | 106 | 106 | B   | G   | 106 | G   | B   | B   | B   | 90  | 90  | 90  | B   | B   | B   | B   | 108 | 98  |
| 18     | 96  | 96  | 96  | 124 | 102 | 90  | 96  | 94  | 116 | G   | B   | G   | B   | 116 | G   | G   | B   | 88  | 90  | 90  | 90  | 90  | 94  | 104 |
| 19     | 94  | 96  | 90  | 92  | 94  | B   | B   | 100 | 100 | 100 | G   | G   | G   | G   | 176 | G   | 86  | 92  | 92  | 92  | 92  | 100 | 100 | 88  |
| 20     | 102 | 94  | 94  | 90  | B   | B   | B   | 110 | 110 | 170 | 132 | 98  | 96  | 96  | 96  | 106 | 94  | 82  | 96  | 96  | 96  | 84  | 84  | 84  |
| 21     | 84  | 90  | B   | B   | B   | B   | B   | 98  | 96  | 204 | 98  | 96  | G   | 100 | 92  | 124 | 88  | 96  | 92  | 88  | 88  | 92  | 92  | 92  |
| 22     | 98  | 90  | 96  | B   | B   | B   | 112 | 92  | 104 | 138 | 138 | 110 | 120 | G   | 104 | 116 | B   | B   | 90  | 92  | 92  | 92  | 92  | 92  |
| 23     | B   | B   | B   | B   | 94  | 106 | B   | 114 | 102 | G   | G   | 118 | G   | G   | G   | G   | 86  | B   | B   | B   | B   | B   | 94  | B   |
| 24     | 94  | 88  | 92  | B   | B   | 100 | 100 | 100 | 92  | G   | G   | G   | G   | G   | G   | B   | B   | 86  | B   | 90  | B   | 96  | 96  | 96  |
| 25     | 96  | 96  | 96  | 96  | B   | 102 | 104 | 104 | G   | G   | G   | G   | B   | 152 | G   | B   | B   | B   | B   | B   | B   | B   | 94  | 102 |
| 26     | B   | 92  | 92  | B   | 92  | 96  | B   | 120 | 104 | 90  | G   | G   | 160 | B   | G   | B   | B   | B   | B   | 96  | B   | 116 | B   | B   |
| 27     | B   | B   | B   | 112 | 106 | 104 | 104 | 104 | 92  | B   | 122 | 128 | G   | 162 | B   | 116 | B   | B   | B   | B   | B   | 92  | 94  | B   |
| 28     | 94  | 94  | B   | B   | 100 | 98  | 98  | G   | B   | B   | G   | B   | B   | B   | B   | B   | B   | B   | B   | B   | 112 | 98  | 100 | B   |
| 29     | B   | 100 | B   | B   | B   | B   | B   | 114 | G   | 114 | G   | G   | G   | G   | B   | 90  | 90  | 98  | 98  | B   | 102 | 102 | 102 |     |
| 30     | 102 | 100 | B   | B   | 94  | B   | B   | 102 | 102 | 164 | 96  | G   | 114 | 88  | 88  | 96  | 94  | 94  | 102 | 96  | 92  | 92  | 98  |     |
| 31     | 98  | 98  | 100 | 100 | 94  | 94  | 102 | 102 | 120 | 116 | 104 | G   | 162 | 144 | G   | G   | B   | 96  | 96  | 96  | B   | 86  | 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  | 28  | 22  | 19  | 19  | 22  | 20  | 29  | 26  | 20  | 18  | 15  | 13  | 18  | 19  | 19  | 21  | 23  | 19  | 21  | 21  | 22  | 24  | 22  |
| MED    | 96  | 94  | 94  | 94  | 96  | 99  | 100 | 100 | 102 | 103 | 114 | 118 | 122 | 116 | 106 | 106 | 90  | 92  | 96  | 96  | 96  | 96  | 94  | 96  |
| U Q    | 98  | 97  | 96  | 98  | 100 | 102 | 104 | 107 | 116 | 123 | 128 | 128 | 161 | 144 | 152 | 116 | 96  | 100 | 98  | 99  | 102 | 100 | 100 | 98  |
| L Q    | 94  | 90  | 92  | 92  | 94  | 94  | 96  | 98  | 98  | 98  | 104 | 98  | 99  | 110 | 92  | 90  | 88  | 88  | 90  | 91  | 92  | 92  | 92  | 92  |

DEC.2022 h'Es (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



## IONOSPHERIC DATA STATION Wakkanai

DEC.2022 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   | F  | F  | FQ | F  | F  | L  | L  | L  | L  | C  | CL | LC | HL | C  | LC | LC | L  | L  | F  | F  | F  | F  | F  | F  | F  |  |
| 2   | F  | F  | F  | FF | F  | FF | LC | L  | L  | L  | HL | LC | C  | CL | LC | C  | L  | F  | F  | F  | F  |    |    |    | F  |  |
| 3   | F  |    | F  |    |    | F  | L  | LC | LC | CL | C  | C  | H  | HL | HL | CH | L  | L  |    |    |    |    |    |    |    |  |
| 4   |    | F  | F  | F  |    |    |    | L  | C  | C  | C  | C  |    | C  | H  |    |    | L  |    |    |    | F  |    |    |    |  |
| 5   |    | F  | F  | F  | F  | F  |    | CL | LC | LC | HL | H  |    | C  | H  | C  | LC |    | F  |    |    | F  |    |    | F  |  |
| 6   |    | F  | FF | F  | F  | L  | L  | L  | HL | HL | C  | C  | H  | H  | C  | C  | L  | F  |    |    | F  | F  | F  | F  | F  |  |
| 7   | FQ | F  | F  | F  | F  | F  | L  | C  | C  | CL | C  | C  | HL |    | C  | C  | L  | L  | F  | F  | F  | F  | F  | F  |    |  |
| 8   |    | F  |    |    | FF | F  | C  | LC | LC | C  | C  | C  | C  | C  | C  | L  | C  | L  |    | F  | F  | F  | F  |    |    |  |
| 9   | F  | F  |    |    | F  | F  |    | C  | L  | LC |    |    |    |    | L  | L  | C  | C  | F  | F  | F  | F  | F  | F  | F  |  |
| 10  | F  | F  |    |    | F  | F  | L  | C  | C  | C  | CL | C  | C  | C  | C  | L  | L  | L  | F  | FQ | FQ | FQ | FQ | FQ | FQ |  |
| 11  | F  | F  | F  |    |    | L  | L  | L  | L  | LC |    |    |    |    |    |    | L  | L  | F  | F  | FQ | FQ | FQ | FQ | FQ |  |
| 12  | F  | F  | F  | F  | F  | F  | L  | C  | C  |    |    |    |    |    | C  | L  | L  | F  | F  | F  | FQ | FQ | FQ | FQ | FQ |  |
| 13  | F  | FQ | FQ | FQ | FF | F  | C  | LC | C  | L  |    |    |    | C  | C  | C  | L  | L  | FQ | FQ | F  |    | F  | F  | F  |  |
| 14  | F  | F  | F  | F  |    | F  |    | C  |    |    |    |    | H  | C  | H  |    |    | L  | F  | F  | F  | F  | F  | F  | F  |  |
| 15  | F  | F  | F  | F  |    |    |    | C  |    |    |    |    |    |    | L  | L  | L  | C  |    | F  |    |    |    |    | F  |  |
| 16  | F  | F  | F  | F  | F  | F  | F  | H  | C  | C  | C  |    | LC | C  | LH | LH | L  |    |    |    |    | F  | F  | FQ | FQ |  |
| 17  | F  | F  | F  | F  |    |    | L  | L  |    |    | L  |    |    |    |    | L  | C  |    |    |    |    |    | F  | F  | F  |  |
| 18  | F  | F  | F  | F  | F  | F  | L  | C  | C  |    |    |    |    | C  |    |    | L  | F  | F  | F  | F  | F  | FQ | FQ | FQ |  |
| 19  | FQ | FQ | FQ | FQ | F  |    |    | L  | C  | C  |    |    |    | H  |    | L  | L  | F  | F  | F  | F  | F  | F  | F  | F  |  |
| 20  | F  | F  | F  | F  |    |    |    | LC | LC | H  | H  | L  | L  | LC | L  | L  | L  | L  | F  | F  | F  | F  | F  | F  | F  |  |
| 21  | F  | F  |    |    |    |    |    | C  | LC | C  | LC | LC |    | LC | LC | C  | L  | CL | F  | F  | F  | F  | F  | F  | FF |  |
| 22  | F  | F  | F  |    |    |    | F  | L  | LC | H  | H  | LC | C  |    | CL | CL |    |    | F  | F  | F  | F  | F  | F  | FQ |  |
| 23  |    |    |    |    | F  | F  |    | LC | LC |    |    | C  |    |    |    |    | L  |    |    |    |    |    |    | F  |    |  |
| 24  | F  | F  | F  |    |    | F  | L  | LQ | LQ |    |    |    |    |    |    |    |    | L  |    | F  |    |    | FF | F  | F  |  |
| 25  | F  | F  | F  | F  |    | F  | L  | C  |    |    |    |    |    | H  |    |    |    |    |    |    |    |    |    | F  | F  |  |
| 26  |    | F  | F  |    | F  | F  |    | L  | LC | LC |    |    | H  |    |    |    |    |    | FC |    |    | F  |    |    |    |  |
| 27  |    |    |    | F  | F  | F  | LC | L  | L  |    | C  | C  |    | H  |    | C  |    |    |    |    |    |    | F  | F  | F  |  |
| 28  | F  | F  |    |    |    | F  | L  | L  |    |    |    |    |    |    |    |    |    |    |    |    |    | F  | F  | F  |    |  |
| 29  |    | F  |    | F  | F  | L  |    | C  |    | C  |    |    |    |    |    |    | L  | L  | F  | F  | F  | F  | F  | F  | F  |  |
| 30  | F  | F  |    |    | F  |    |    | L  | C  | H  | LC |    |    | C  | LC | LC | L  | L  | F  | F  | F  | F  | F  | F  | F  |  |
| 31  | F  | F  | F  | F  | F  | L  | L  | CL | CL | C  |    |    | H  | H  |    |    |    | L  | 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 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |

DEC.2022 TYPES OF Es

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Kokubunji

DEC.2022 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  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 45 | 43 | 39 | 36 | 40 | 35 |    |    |    |    |    |    |    |    |    |    |    |    | 47 | 44 | 38 | 40 | 43 | 45 | 45 |    |
| 2   | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 48 | 44 | 39 | 37 | 38 | 37 |    |    |    |    |    |    |    |    |    |    |    |    | 49 | 44 | 38 | 40 | 39 | 42 | 42 |    |
| 3   | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 42 | 42 | 41 | 42 | 40 | 40 |    |    |    |    |    |    |    |    |    |    |    |    | 45 | 42 | 43 | 39 | 39 | 36 | 36 |    |
| 4   | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 40 | 40 | 38 | 38 | 38 | 40 |    |    |    |    |    |    |    |    |    |    |    |    | 44 | 46 | 39 | 41 | 41 | 42 | 42 |    |
| 5   | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 44 | 42 | 42 | 43 | 42 | 42 |    |    |    |    |    |    |    |    |    |    |    |    | 47 | 51 | 44 | 40 | 38 | 38 | 38 |    |
| 6   | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 39 | 44 | 39 | 34 | 34 | 35 |    |    |    |    |    |    |    |    |    |    |    |    | 38 | 45 | 35 | 36 | 36 | 39 | 39 |    |
| 7   | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 40 | 40 | 40 | 40 | 39 | 38 |    |    |    |    |    |    |    |    |    |    |    |    | 45 | 42 | 43 | 40 | 40 | 40 | 40 |    |
| 8   | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 41 | 43 | 44 | 40 | 40 | 45 |    |    |    |    |    |    |    |    |    |    |    |    | 43 | 46 | 45 | 36 | 36 | 37 | 37 |    |
| 9   | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 39 | 41 | 42 | 42 | 41 | 40 |    |    |    |    |    |    |    |    |    |    |    |    | 48 | 43 | 40 | 42 | 39 | 39 | 39 |    |
| 10  | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 42 | 42 | 42 | 41 | 42 | 45 |    |    |    |    |    |    |    |    |    |    |    |    | 50 | 44 | 47 | 43 | 37 | 40 | 40 |    |
| 11  | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 41 | 34 | 36 | 37 | 38 | 38 |    |    |    |    |    |    |    |    |    |    |    |    | 56 | 50 | A  | A  | A  | A  | 39 |    |
| 12  | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 42 | 44 | 44 | 44 | 46 | 43 |    |    |    |    |    |    |    |    |    |    |    |    | 62 | 50 | 43 | 31 | 34 | 33 | 33 |    |
| 13  | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 34 | 36 | 36 | 38 | 39 | 39 |    |    |    |    |    |    |    |    |    |    |    |    | 58 | 55 | 43 | 32 | 36 | 37 | 37 |    |
| 14  | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 37 | 37 | 38 | 40 | 38 | 38 |    |    |    |    |    |    |    |    |    |    |    |    | 53 | 52 | A  | 34 | 38 | 38 | 38 |    |
| 15  | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 39 | 40 | 40 | 41 | 40 | 38 |    |    |    |    |    |    |    |    |    |    |    |    | 59 | 41 | 42 | 41 | 39 | 41 | 41 |    |
| 16  | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 42 | 43 | 45 | 50 | 43 | 42 |    |    |    |    |    |    |    |    |    |    |    |    | 66 | 54 | 50 | 40 | 40 | 44 | 44 |    |
| 17  | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 45 | 46 | 47 | 49 | 42 | 35 |    |    |    |    |    |    |    |    |    |    |    |    | 57 | 48 | 40 | 40 | 41 | 42 | 42 |    |
| 18  | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 45 | 42 | 44 | 44 | 41 | 39 |    |    |    |    |    |    |    |    |    |    |    |    | 46 | 43 | 45 | 37 | 36 | 39 | 39 |    |
| 19  | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 45 | 48 | 48 | 47 | 50 | 51 |    |    |    |    |    |    |    |    |    |    |    |    | 68 | 51 | 55 | 42 | 47 | 46 | 46 |    |
| 20  | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 47 | 47 | 47 | 46 | 44 | 45 | 48 |    |    |    |    |    |    |    |    |    |    |    | 63 | 41 | 40 | 42 | 42 | 40 | 40 |    |
| 21  | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 41 | 43 | 42 | 44 | 43 | 43 | 44 |    |    |    |    |    |    |    |    |    |    |    | 61 | 49 | 45 | 47 | 44 | 40 | 40 |    |
| 22  | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 43 | 42 | 43 | 42 | 44 | 47 | 42 |    |    |    |    |    |    |    |    |    |    |    | 50 | 42 | 40 | 43 | 38 | 42 | 42 |    |
| 23  | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 41 | 43 | 45 | 47 | 58 | 37 | 41 |    |    |    |    |    |    |    |    |    |    |    | 65 | 67 | 33 | 33 | 35 | 39 | 39 |    |
| 24  | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 37 | 38 | 39 | 36 | 40 | 34 | 36 |    |    |    |    |    |    |    |    |    |    |    | 73 | 52 | 46 | 40 | 41 | 43 | 43 |    |
| 25  | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 45 | 45 | 43 | 39 | 40 | 39 | 53 |    |    |    |    |    |    |    |    |    |    |    | 48 | 45 | 44 | A  | 37 | 35 | 35 |    |
| 26  | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 36 | 37 | 37 | 38 | 38 | 36 | 40 |    |    |    |    |    |    |    |    |    |    |    | 38 | 47 | 49 | 38 | 41 | 39 | 39 |    |
| 27  | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 38 | 38 | 38 | 44 | 40 | 38 | 42 |    |    |    |    |    |    |    |    |    |    |    | 62 | 62 | 48 | 38 | 38 | 42 | 42 |    |
| 28  | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 45 | 42 | 35 | 36 | 37 | 36 | 41 |    |    |    |    |    |    |    |    |    |    |    | 45 | 47 | 48 | 47 | 42 | 43 | 43 |    |
| 29  | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 45 | 45 | 45 | 44 | 44 | 42 | 43 |    |    |    |    |    |    |    |    |    |    |    | 46 | 45 | 47 | 39 | 34 | 36 | 36 |    |
| 30  | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 38 | 39 | 37 | 40 | 39 | 34 | 35 |    |    |    |    |    |    |    |    |    |    |    | 53 | 52 | 48 | 48 | 38 | 40 | 40 |    |
| 31  | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |    |
|     | 40 | 41 | 42 | 46 | 32 | 32 | 32 |    |    |    |    |    |    |    |    |    |    |    | 58 | 51 | 45 | 44 | 41 | 40 | 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 | 31 | 31 | 31 | 31 | 31 | 12 |    |    |    |    |    |    |    |    |    |    |    | 31 | 31 | 29 | 29 | 30 | 31 |    |
| MED |    | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
| U Q |    | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
| L Q |    | X  | X  | X  | X  | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    | X  | X  | X  | X  | X  | X  | X  |
|     |    | 39 | 40 | 38 | 38 | 38 | 36 | 38 |    |    |    |    |    |    |    |    |    |    |    | 46 | 44 | 40 | 38 | 37 | 38 | 38 |

DEC.2022 f<sub>XI</sub> (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Kokubunji

DEC.2022 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

| $\begin{matrix} H \\ D \end{matrix}$ | 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                                    | 39 | 37 | 33 | 30 | 34 | 29              | 36 | 65 | 75  | 80              | 97              | 101             | 100             | 92              | 93  | 88              | 79              | 63              | 41 | 38 | 32 | 34 | 37 | 39 |
| 2                                    | 42 | 38 | 33 | 31 | 32 | 31              | 33 | 72 | 97  | 79              | 92              | 101             | 98              | 88 <sup>V</sup> | 86  | 78              | 70              | 50              | 43 | 38 | 32 | 34 | 33 | 36 |
| 3                                    | 36 | 36 | 35 | 36 | 34 | 34              | 33 | 62 | 85  | 94              | 94              | 94              | 94              | 85              | 83  | 74              | 69              | 55              | 39 | 36 | 37 | 33 | 33 | 30 |
| 4                                    | 34 | 34 | 32 | 32 | 32 | 34              | 37 | 64 | 84  | 81              | 96              | 96              | 83              | 82              | 73  | 76              | 67              | 47              | 38 | 40 | 33 | 35 | 35 | 36 |
| 5                                    | 38 | 36 | 36 | 37 | 36 | 36              | 38 | 60 | 97  | 118             | 112             | 108             | 95              | 84              | 72  | 77              | 76              | 40              | 41 | 45 | 38 | 34 | 32 | 32 |
| 6                                    |    | 38 | 33 | 28 | 28 | 29              | 30 | 68 | 97  | 96              | 99              | 107             | 87              | 84              | 79  | 76              | 70              | 44              | 32 | 39 | 29 | 30 | 30 | 33 |
| 7                                    | 34 | 34 | 34 | 34 | 33 | 32              | 32 | 64 | 80  | 86 <sup>H</sup> | 80              | 83 <sup>V</sup> | 86              | 78              | 82  | 73              | 79              | 44              | 39 | 36 | 37 | 34 | 34 | 34 |
| 8                                    | 35 | 37 | 38 | 34 | 34 | 39              | 49 | 87 | 95  | 137             | 136             | 111             | 92              | 89              | 81  | 67              | 68              | 63              | 37 | 40 | 38 | 30 | 30 | 31 |
| 9                                    | 33 | 35 | 36 | 36 | 35 | 34              | 32 | 61 | 85  | 102             | 91              | 87              | 94              | 88              | 84  | 82              | 82              | 63              | 41 | 37 | 34 | 36 | 33 | 33 |
| 10                                   | 36 | 36 | 36 | 35 | 36 | 39              | 37 | 65 | 82  | 85              | 89              | 100             | 97              | 97              | 95  | 92              | 75              | 62              | 44 | 38 | 41 | 37 | 31 | 34 |
| 11                                   | 35 | 28 | 30 | 31 | 32 | 32              | 36 | 55 | 77  | 91              | 98              | 88              | 84 <sup>Z</sup> | 86              | 82  | 84              | 80              | 57              | 50 | 44 | A  | A  | A  | 33 |
| 12                                   | 36 | 38 | 38 | 38 | 40 | 37              | 37 | 62 | 78  | 96              | 112             | 108             | 96              | 82              | 84  | 85              | 85              | 62              | 56 | 44 | 37 | 25 | 28 | 27 |
| 13                                   | 28 | 30 | 30 | 32 | 33 | 33              | 34 | 61 | 83  | 104             | 102             | 84              | 88              | 85              | 80  | 84              | 77              | 57              | 52 | 49 | 37 | 26 | 30 | 31 |
| 14                                   | 31 | 31 | 32 | 34 | 32 | 32              | 36 | 64 | 81  | 85              | 87              | 97              | 95              | 90              | 73  | 82              | 70              | 62              | 47 | 46 | A  | 28 | 32 | 32 |
| 15                                   | 33 | 34 | 34 | 35 | 34 | 32              | 32 | 66 | 72  | 88              | 99              | 90              | 90              | 87              | 85  | 99              | 79              | 58              | 53 | 35 | 36 | 35 | 33 | 35 |
| 16                                   | 36 | 37 | 39 | 44 | 37 | 36              | 31 | 64 | 75  | 86              | 96              | 112             | 112             | 93              | 92  | 89              | 72              | 67              | 60 | 48 | 44 | 34 | 34 | 38 |
| 17                                   | 39 | 40 | 41 | 43 | 36 | 29              | 35 | 63 | 81  | 89              | 107             | 89              | 101             | 89              | 89  | 94              | 79              | 61              | 51 | 42 | 34 | 34 | 35 | 36 |
| 18                                   | 38 | 36 | 38 | 38 | 35 | 33              | 36 | 60 | 74  | 80              | 94              | 100             | 108             | 86              | 89  | 86              | 78              | 54              | 40 | 37 | 39 | 31 | 30 | 33 |
| 19                                   | 39 | 42 | 42 | 41 | 44 | 43 <sup>F</sup> | 44 | 59 | 82  | 92              | 113             | 114             | 94              | 85              | 94  | 105             | 83              | 67              | 62 | 45 | 49 | 36 | 41 | 40 |
| 20                                   | 41 | 41 | 41 | 40 | 38 | 39              | 42 | 57 | 79  | 114             | 111             | 108             | 103             | 92              | 101 | 78              | 67              | 82              | 57 | 35 | 34 | 36 | 36 | 34 |
| 21                                   | 35 | 37 | 36 | 38 | 37 | 37              | 38 | 61 | 73  | 86              | 95              | 107             | 100             | 85              | 95  | 89              | 77              | 70              | 55 | 43 | 39 | 41 | 38 | 34 |
| 22                                   | 37 | 36 | 37 | 37 | 38 | 41              | 36 | 65 | 76  | 76              | 105             | 119             | 100             | 92              | 85  | 96              | 83              | 52 <sup>H</sup> | 44 | 36 | 34 | 37 | 32 | 36 |
| 23                                   | 35 | 37 | 39 | 42 | 52 | 31              | 35 | 58 | 85  | 77              | 108             | 92              | 97              | 91              | 86  | 88 <sup>H</sup> | 67              | 56              | 59 | 61 | 26 | 27 | 29 | 33 |
| 24                                   | 31 | 32 | 33 | 30 | 34 | 28              | 30 | 60 | 74  | 93              | 126             | 104             | 81              | 78              | 80  | 84              | 66              | 68              | 67 | 46 | 40 | 34 | 35 | 37 |
| 25                                   | 39 | 39 | 37 | 33 | 34 | 33              | 47 | 51 | 72  | 98              | 114             | 94              | 95              | 83              | 76  | 80              | 77              | 52              | 42 | 39 | 38 | A  | 31 | 29 |
| 26                                   | 30 | 31 | 31 | 32 | 32 | 30              | 34 | 61 | 80  | 84 <sup>H</sup> | 102             | 95              | 76              | 82              | 93  | 80              | 73 <sup>V</sup> | 65              | 32 | 41 | 43 | 32 | 35 | 33 |
| 27                                   | 32 | 32 | 32 | 38 | 34 | 32              | 36 | 69 | 104 | 96              | 97              | 99              | 93              | 87              | 78  | 87              | 79              | 60              | 56 | 56 | 42 | 32 | 32 | 36 |
| 28                                   | 39 | 36 | 29 | 30 | 31 | 30              | 35 | 70 | 94  | 105             | 84 <sup>V</sup> | 100             | 97              | 86              | 84  | 76              | 71              | 50              | 39 | 41 | 42 | 41 | 36 | 37 |
| 29                                   | 39 | 39 | 39 | 38 | 38 | 36              | 36 | 58 | 80  | 80              | 85              | 90              | 93              | 91 <sup>H</sup> | 89  | 84              | 70              | 61              | 40 | 39 | 41 | 33 | 28 | 30 |
| 30                                   | 32 | 33 | 31 | 34 | 33 | 28              | 29 | 58 | 80  | 102             | 96              | 92              | 84              | 94              | 85  | 65              | 96              | 80              | 47 | 46 | 42 | 41 | 32 | 34 |
| 31                                   | 34 | 35 | 36 | 40 | 26 | 26              | 26 | 61 | 82  | 103             | 124             | A               | 90              | 80              | 95  | 84              | 70              | 62              | 52 | 44 | 39 | 38 | 35 | 34 |
|                                      | 00 | 01 | 02 | 03 | 04 | 05              | 06 | 07 | 08  | 09              | 10              | 11              | 12              | 13              | 14  | 15              | 16              | 17              | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT                                  | 30 | 31 | 31 | 31 | 31 | 31              | 31 | 31 | 31  | 31              | 31              | 30              | 31              | 31              | 31  | 31              | 31              | 31              | 31 | 31 | 29 | 29 | 30 | 31 |
| MED                                  | 36 | 36 | 36 | 35 | 34 | 33              | 36 | 62 | 81  | 91              | 98              | 100             | 94              | 86              | 85  | 84              | 76              | 61              | 44 | 41 | 38 | 34 | 33 | 34 |
| U Q                                  | 39 | 38 | 38 | 38 | 37 | 36              | 37 | 65 | 85  | 102             | 111             | 107             | 98              | 91              | 92  | 88              | 79              | 63              | 55 | 45 | 41 | 36 | 35 | 36 |
| L Q                                  | 33 | 34 | 32 | 32 | 32 | 30              | 32 | 60 | 76  | 84              | 94              | 92              | 88              | 84              | 80  | 77              | 70              | 52              | 40 | 38 | 34 | 32 | 31 | 32 |

DEC.2022 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Kokubunji

DEC.2022 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<br>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<br>452 | L        | L        | L        |          |          |          |    |    |    |    |    |    |    |
| 2      |    |    |    |    |    |    |    |     |    |    | L        | L        |          | L        | L        |          |          |    |    |    |    |    |    |    |
| 3      |    |    |    |    |    |    |    |     |    |    | L        | L        | L        | L        | L        |          |          |    |    |    |    |    |    |    |
| 4      |    |    |    |    |    |    |    |     |    | L  | L        | L        | L        | L        |          |          |          |    |    |    |    |    |    |    |
| 5      |    |    |    |    |    |    |    |     |    | L  | L        |          | L        | L        | L        |          |          |    |    |    |    |    |    |    |
| 6      |    |    |    |    |    |    |    |     |    | L  | L        | L        | L        | L        | 368      | 300      |          |    |    |    |    |    |    |    |
| 7      |    |    |    |    |    |    |    |     |    | L  | L        |          |          | L        | L        | L        |          |    |    |    |    |    |    |    |
| 8      |    |    |    |    |    |    |    |     |    | L  | L        | L        | L        | L        | L        |          |          |    |    |    |    |    |    |    |
| 9      |    |    |    |    |    |    |    |     |    |    | L        | L        | L        |          |          |          |          |    |    |    |    |    |    |    |
| 10     |    |    |    |    |    |    |    |     |    | L  |          | L        | U<br>432 | L        |          |          |          |    |    |    |    |    |    |    |
| 11     |    |    |    |    |    |    |    |     |    | L  | L        | 432      |          | L        |          |          |          |    |    |    |    |    |    |    |
| 12     |    |    |    |    |    |    |    |     |    | L  | L        | L        |          | L        |          |          |          |    |    |    |    |    |    |    |
| 13     |    |    |    |    |    |    |    |     |    |    | L        |          | L        | L        | L        |          |          |    |    |    |    |    |    |    |
| 14     |    |    |    |    |    |    |    |     |    |    | U<br>412 | L        | L        | L        | L        |          |          |    |    |    |    |    |    |    |
| 15     |    |    |    |    |    |    |    |     |    |    | L        | L        | L        | L        |          |          |          |    |    |    |    |    |    |    |
| 16     |    |    |    |    |    |    |    |     |    |    | L        |          | L        | L        |          |          |          |    |    |    |    |    |    |    |
| 17     |    |    |    |    |    |    |    |     |    |    | L        | L        | L        |          |          | L        |          |    |    |    |    |    |    |    |
| 18     |    |    |    |    |    |    |    |     |    |    |          | L        | L        | L        | L        |          |          |    |    |    |    |    |    |    |
| 19     |    |    |    |    |    |    |    | 188 |    |    | L        | L        | L        |          | L        |          |          |    |    |    |    |    |    |    |
| 20     |    |    |    |    |    |    |    |     |    | L  | L        | L        | L        | L        | L        |          | 236      |    |    |    |    |    |    |    |
| 21     |    |    |    |    |    |    |    |     |    |    |          | L        | L        | L        | L        |          |          |    |    |    |    |    |    |    |
| 22     |    |    |    |    |    |    |    |     |    |    | L        | L        | L        | L        |          |          |          |    |    |    |    |    |    |    |
| 23     |    |    |    |    |    |    |    |     |    |    | L        | L        | L        |          |          | L        |          |    |    |    |    |    |    |    |
| 24     |    |    |    |    |    |    |    |     |    |    | L        | L        | L        | L        | L        | 352      |          |    |    |    |    |    |    |    |
| 25     |    |    |    |    |    |    |    |     |    | L  | L        | L        | L        | L        | L        |          |          |    |    |    |    |    |    |    |
| 26     |    |    |    |    |    |    |    |     |    |    |          |          |          | L        | 548      |          |          |    |    |    |    |    |    |    |
| 27     |    |    |    |    |    |    |    |     |    | L  | L        | L        | L        | L        | 388      | 376      |          |    |    |    |    |    |    |    |
| 28     |    |    |    |    |    |    |    | L   | A  |    |          |          | L        | L        | L        |          |          |    |    |    |    |    |    |    |
| 29     |    |    |    |    |    |    |    |     |    |    | L        | L        | L        | U<br>424 | L        |          |          |    |    |    |    |    |    |    |
| 30     |    |    |    |    |    |    |    |     |    | L  | L        | L        | L        |          |          | L        |          |    |    |    |    |    |    |    |
| 31     |    |    |    |    |    |    |    |     |    | L  |          | A        | L        | L        |          |          |          |    |    |    |    |    |    |    |
|        | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07  | 08 | 09 | 10       | 11       | 12       | 13       | 14       | 15       | 16       | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT    |    |    |    |    |    |    |    | 1   |    |    | 7        | 2        | 5        | 3        | 3        | 1        | 1        |    |    |    |    |    |    |    |
| MED    |    |    |    |    |    |    |    | 188 |    |    | L<br>440 | L<br>438 | L<br>444 | L<br>440 | L<br>368 | L<br>300 | L<br>236 |    |    |    |    |    |    |    |
| U Q    |    |    |    |    |    |    |    |     |    |    | L<br>452 |          | L<br>452 | L<br>548 | L<br>376 |          |          |    |    |    |    |    |    |    |
| L Q    |    |    |    |    |    |    |    |     |    |    | L<br>416 |          | L<br>428 | L<br>388 | L<br>352 |          |          |    |    |    |    |    |    |    |

DEC.2022 foF1 (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Kokubunji

DEC.2022 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<br>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   | 316 | A   | A   | 308 | 284 | 244 | A   | B   |    |    |    |    |    |    |  |
| 2      |    |    |    |    |    |    | B   | A   | 236 | 300 | 316 | 328 | 324 | 308 | 284 | A   | A   | A   |    |    |    |    |    |    |  |
| 3      |    |    |    |    |    |    | B   | A   | A   | 284 | 320 | A   | 324 | 308 | 284 | 260 | A   | B   |    |    |    |    |    |    |  |
| 4      |    |    |    |    |    |    | B   | A   | 264 | 300 | 320 | A   | 336 | 312 | 288 | 268 | 208 | B   |    |    |    |    |    |    |  |
| 5      |    |    |    |    |    |    | B   | A   | 252 | 292 | 324 | A   | A   | 316 | 288 | 264 | A   | A   |    |    |    |    |    |    |  |
| 6      |    |    |    |    |    |    | B   | A   | 248 | 296 | 316 | 332 | 332 | 316 | 292 | 248 | 192 | B   |    |    |    |    |    |    |  |
| 7      |    |    |    |    |    |    | A   | A   | 252 | 304 | 328 | 332 | 340 | 324 | 304 | 260 | A   | B   |    |    |    |    |    |    |  |
| 8      |    |    |    |    |    |    | B   | A   | 244 | 284 | 304 | 324 | 328 | 320 | 288 | 256 | A   | B   |    |    |    |    |    |    |  |
| 9      |    |    |    |    |    |    | B   | A   | 228 | 280 | 308 | 332 | 336 | 324 | 288 | 256 | A   | B   |    |    |    |    |    |    |  |
| 10     |    |    |    |    |    |    | B   | A   | 228 | A   | 312 | 328 | 328 | 308 | 304 | 256 | 196 | A   |    |    |    |    |    |    |  |
| 11     |    |    |    |    |    |    | B   | A   | A   | 288 | 312 | U   | R   | U   | R   | A   | A   | A   | A  |    |    |    |    |    |  |
| 12     |    |    |    |    |    |    | A   | A   | A   | B   | B   | B   | B   | 332 | 308 | A   | A   | B   |    |    |    |    |    |    |  |
| 13     |    |    |    |    |    |    | B   | A   | 252 | B   | A   | B   | B   | B   | 320 | 272 | 204 | B   |    |    |    |    |    |    |  |
| 14     |    |    |    |    |    |    | B   | A   | 260 | 308 | 320 | 340 | 348 | 332 | 300 | 268 | A   | B   |    |    |    |    |    |    |  |
| 15     |    |    |    |    |    |    | B   | A   | 260 | 312 | 336 | 356 | 344 | 332 | 304 | 264 | 208 | B   |    |    |    |    |    |    |  |
| 16     |    |    |    |    |    |    | B   | A   | 272 | A   | A   | B   | A   | 336 | A   | 272 | 212 | B   |    |    |    |    |    |    |  |
| 17     |    |    |    |    |    |    | B   | B   | A   | 308 | 332 | 340 | 344 | 320 | 300 | 268 | A   | A   |    |    |    |    |    |    |  |
| 18     |    |    |    |    |    |    | B   | A   | 244 | 292 | 304 | A   | A   | 328 | 308 | 280 | B   | B   |    |    |    |    |    |    |  |
| 19     |    |    |    |    |    |    | B   | B   | 268 | A   | A   | 344 | 348 | A   | A   | 280 | A   | A   |    |    |    |    |    |    |  |
| 20     |    |    |    |    |    |    | A   | A   | 304 | A   | A   | 332 | 340 | 336 | A   | 272 | 184 | B   |    |    |    |    |    |    |  |
| 21     |    |    |    |    |    |    | A   | A   | 228 | 288 | A   | 336 | 336 | 332 | 312 | 268 | A   | B   |    |    |    |    |    |    |  |
| 22     |    |    |    |    |    |    | A   | A   | 244 | 288 | 332 | 332 | A   | A   | A   | 264 | A   | B   |    |    |    |    |    |    |  |
| 23     |    |    |    |    |    |    | 196 | A   | 224 | 288 | 308 | 324 | 316 | A   | A   | A   | A   | B   |    |    |    |    |    |    |  |
| 24     |    |    |    |    |    |    | A   | A   | 216 | 256 | 312 | 320 | A   | 320 | 292 | 252 | A   | B   |    |    |    |    |    |    |  |
| 25     |    |    |    |    |    |    | A   | A   | 276 | 308 | 308 | 312 | 308 | 304 | 264 | 200 | B   |     |    |    |    |    |    |    |  |
| 26     |    |    |    |    |    |    | A   | A   | 220 | 276 | 316 | 328 | 332 | G   | 332 | 308 | 280 | 196 |    |    |    |    |    |    |  |
| 27     |    |    |    |    |    |    | A   | A   | A   | 320 | B   | G   | B   | B   | B   | U   | G   | B   |    |    |    |    |    |    |  |
| 28     |    |    |    |    |    |    | A   | A   | A   | A   | B   | B   | B   | B   | B   | B   | B   | B   |    |    |    |    |    |    |  |
| 29     |    |    |    |    |    |    | B   | A   | 288 | 320 | 336 | 344 | 336 | 320 | B   | A   | B   |     |    |    |    |    |    |    |  |
| 30     |    |    |    |    |    |    | B   | A   | A   | 324 | 336 | 348 | 324 | 316 | 268 | A   | A   |     |    |    |    |    |    |    |  |
| 31     |    |    |    |    |    |    | A   | A   | 244 | 296 | A   | A   | 340 | 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    |    |    |    |    |    |    |     | 1   | 20  | 23  | 23  | 21  | 22  | 24  | 22  | 23  | 10  |     |    |    |    |    |    |    |  |
| MED    |    |    |    |    |    |    |     | 196 | 244 | 288 | 316 | 332 | 338 | 324 | 302 | 264 | 202 |     |    |    |    |    |    |    |  |
| U Q    |    |    |    |    |    |    |     |     | 256 | 300 | 324 | 338 | 344 | 332 | 308 | 272 | 208 |     |    |    |    |    |    |    |  |
| L Q    |    |    |    |    |    |    |     |     | 228 | 284 | 312 | 328 | 328 | 314 | 288 | 256 | 196 |     |    |    |    |    |    |    |  |

DEC.2022 foE (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Kokubunji

DEC.2022 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<br>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  | J  | A  | J  | A  | J  | A  | J  | A  | J  | A  | J  | A  | J  | A  | J  | A  | J  | A |
| 2      | 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 8      | 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 |
| 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 |
| 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 |
| 11     | 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 |
| 12     | 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 |
| 13     | 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 |
| 14     | 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 |
| 15     | 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 |
| 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 |
| 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 |
| 18     | J  | A  | J  | A  | J  | A  | J  | A  | J  | A  | J  | A  | J  | A  | J  | A  | J  | A  | J  | A  | J  | A  | J  | A  | J  | A |
| 19     | 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 31     | J  | A  | J  | A  | J  | A  | J  | A  | J  | A  | J  | A  | J  | A  | J  | A  | J  | A  | J  | A  | J  | A  | J  | A  | J  | A |
|        | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |    |   |
| CNT    | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 |   |
| MED    | 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 |
| 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  | E  | B |

DEC.2022 foEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



## IONOSPHERIC DATA STATION Kokubunji

DEC.2022 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

| $\begin{matrix} H \\ D \end{matrix}$ | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|--------------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 1                                    | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 18 | 23 | 18 | 18 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 2                                    | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 20 | 17 | 16 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 3                                    | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 15 | 16 | 16 | 13 | 17 | 18 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 4                                    | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 16 | 16 | 17 | 23 | 19 | 19 | 18 | 16 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 5                                    | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 18 | 18 | 25 | 18 | 16 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 17 |
| 6                                    | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 16 | 20 | 20 | 22 | 21 | 16 | 18 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 7                                    | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 18 | 20 | 18 | 18 | 21 | 16 | 16 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 8                                    | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 18 | 17 | 18 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 9                                    | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 16 | 17 | 22 | 18 | 20 | 16 | 22 | 20 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 10                                   | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 19 | 18 | 20 | 20 | 22 | 22 | 21 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 11                                   | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 18 | 18 | 25 | 28 | 24 | 22 | 26 | 20 | 23 | 16 | 16 | 16 | 16 | 16 | 16 |
| 12                                   | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 21 | 34 | 24 | 34 | 17 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 13                                   | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 31 | 26 | 37 | 38 | 37 | 22 | 18 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 14                                   | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 20 | 22 | 18 | 22 | 17 | 17 | 18 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 15                                   | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 17 | 18 | 18 | 18 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 16                                   | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 16 | 18 | 44 | 27 | 20 | 22 | 18 | 14 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 17                                   | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 18 | 16 | 17 | 17 | 20 | 16 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 18                                   | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 25 | 20 | 22 | 20 | 21 | 20 | 20 | 23 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 19                                   | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 18 | 19 | 21 | 21 | 21 | 18 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 20                                   | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 20 | 21 | 21 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 21                                   | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 15 | 18 | 21 | 20 | 20 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 22                                   | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 18 | 18 | 18 | 25 | 17 | 18 | 14 | 14 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 23                                   | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 18 | 18 | 18 | 19 | 18 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 24                                   | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 17 | 17 | 16 | 16 | 16 | 16 | 14 | 16 | 16 | 16 | 16 | 16 | 16 |
| 25                                   | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 18 | 16 | 16 | 20 | 18 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 26                                   | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 30 | 14 | 16 | 25 | 25 | 21 | 16 | 17 | 16 | 16 | 16 | 16 | 16 | 16 |
| 27                                   | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 27 | 35 | 27 | 27 | 32 | 28 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 28                                   | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 18 | 18 | 23 | 35 | 38 | 36 | 36 | 32 | 28 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 29                                   | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 18 | 20 | 22 | 25 | 26 | 29 | 27 | 25 | 28 | 20 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 30                                   | 16 | 16 | 16 | 16 | 16 | 16 | 15 | 16 | 17 | 17 | 18 | 20 | 16 | 16 | 17 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 31                                   | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 18 | 16 | 18 | 18 | 17 | 14 | 15 | 15 | 16 | 17 | 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 | 17 | 18 | 20 | 19 | 20 | 18 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| U Q                                  | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 18 | 20 | 23 | 25 | 22 | 22 | 20 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| L Q                                  | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 18 | 17 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |

DEC.2022 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



## IONOSPHERIC DATA STATION Kokubunji

DEC.2022 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

| $\begin{matrix} H \\ D \end{matrix}$ | 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                                    | 314 | 323 | 307 | 298 | 306 | 288              | 317 | 379 | 380 | 360              | 345              | 343              | 334              | 341              | 344 | 333              | 361              | 355 | 343 | 356 | 279 | 283 | 293 | 283 |
| 2                                    | 288 | 327 | 308 | 294 | 297 | 279              | 293 | 358 | 373 | 351              | 359              | 338              | 361              | 331 <sup>V</sup> | 346 | 360              | 364              | 352 | 317 | 364 | 319 | 301 | 313 | 293 |
| 3                                    | 295 | 304 | 291 | 300 | 283 | 323              | 326 | 365 | 381 | 381              | 363              | 354              | 346              | 328              | 357 | 353              | 357              | 368 | 347 | 340 | 328 | 313 | 302 | 268 |
| 4                                    | 302 | 336 | 307 | 294 | 288 | 297              | 311 | 353 | 370 | 349              | 360              | 362              | 335              | 328              | 339 | 363              | 343              | 352 | 305 | 353 | 306 | 280 | 283 | 280 |
| 5                                    | 281 | 282 | 282 | 296 | 286 | 269              | 296 | 322 | 334 | 349              | 351              | 362              | 313              | 322              | 350 | 330              | 367              | 328 | 311 | 335 | 334 | 299 | 288 | 282 |
| 6                                    | 273 | 308 | 343 | 336 | 282 | 295              | 286 | 328 | 357 | 356              | 340              | 356              | 343              | 368              | 318 | 360              | 323              | 346 | 340 | 356 | 409 | 306 | 280 | 277 |
| 7                                    | 302 | 304 | 307 | 315 | 302 | 305              | 303 | 352 | 381 | 355 <sup>H</sup> | 363              | 355 <sup>V</sup> |                  | 348              | 364 | 324              | 382              | 354 | 341 | 346 | 323 | 284 | 280 | 266 |
| 8                                    | 267 | 287 | 304 | 282 | 274 | 264              | 278 | 324 | 300 | 339              | 341              | 343              | 336              | 344              | 353 | 337              | 334              | 387 | 320 | 323 | 359 | 326 | 291 | 284 |
| 9                                    | 288 | 300 | 284 | 284 | 300 | 311              | 329 | 345 | 354 | 354              | 340              | 343              | 350              | 349              | 335 | 338              | 369              | 341 | 345 | 339 | 312 | 337 | 313 | 266 |
| 10                                   | 294 | 286 | 290 | 299 | 279 | 339              | 351 | 362 | 379 | 351              | 326              | 354              | 329              | 331              | 323 | 363              | 332              | 338 | 351 | 317 | 311 | 317 | 291 | 302 |
| 11                                   | 335 | 312 | 277 | 285 | 274 | 295              | 347 | 371 | 363 | 364              | 360              | 374              | 313 <sup>Z</sup> | 342              | 340 | 349              | 353              | 347 | 355 | 362 | A   | A   | A   | 292 |
| 12                                   | 294 | 290 | 266 | 276 | 288 | 298              | 372 | 370 | 383 | 342              | 340              | 349              | 349              | 333              | 338 | 343              | 348              | 327 | 348 | 353 | 341 | 338 | 295 | 294 |
| 13                                   | 290 | 278 | 279 | 289 | 309 | 312              | 332 | 363 | 357 | 364              | 357              | 344              | 339              | 341              | 334 | 345              | 343              | 332 | 333 | 363 | 378 | 297 | 278 | 294 |
| 14                                   | 293 | 282 | 292 | 303 | 293 | 292              | 333 | 374 | 365 | 355              | 327              | 333              | 347              | 349              | 340 | 355              | 345              | 327 | 325 | 348 | A   | 307 | 274 | 271 |
| 15                                   | 279 | 287 | 316 | 308 | 294 | 308              | 311 | 375 | 366 | 324              | 356              | 330              | 346              | 323              | 333 | 338              | 356              | 329 | 361 | 333 | 311 | 335 | 266 | 289 |
| 16                                   | 287 | 283 | 299 | 325 | 324 | 306              | 327 | 369 | 361 | 349              | 330              | 333              | 338              | 331              | 335 | 356              | 331              | 335 | 355 | 350 | 335 | 274 | 278 | 287 |
| 17                                   | 285 | 285 | 307 | 320 | 369 | 285              | 307 | 347 | 353 | 336              | 353              | 317              | 337              | 308              | 323 | 350              | 356              | 354 | 361 | 356 | 315 | 300 | 296 | 293 |
| 18                                   | 315 | 294 | 285 | 308 | 329 | 303              | 325 | 347 | 371 | 358              | 343              | 334              | 349              | 334              | 333 | 351              | 339              | 347 | 329 | 337 | 337 | 343 | 278 | 282 |
| 19                                   | 294 | 324 | 303 | 282 | 283 | 285 <sup>F</sup> | 338 | 348 | 375 | 332              | 333              | 338              | 364              | 331              | 312 | 344              | 353              | 332 | 346 | 312 | 336 | 277 | 286 | 305 |
| 20                                   | 297 | 284 | 302 | 302 | 297 | 296              | 344 | 359 | 347 | 347              | 350              | 344              | 350              | 330              | 346 | 366              | 327              | 345 | 341 | 310 | 315 | 303 | 319 | 290 |
| 21                                   | 296 | 295 | 295 | 295 | 296 | 308              | 330 | 350 | 370 | 366              | 325              | 336              | 339              | 349              | 343 | 342              | 345              | 335 | 345 | 340 | 300 | 318 | 311 | 277 |
| 22                                   | 284 | 286 | 295 | 277 | 282 | 324              | 331 | 366 | 369 | 337              | 336              | 351              | 313              | 338              | 339 | 347              | 330              | 313 | 358 | 342 | 320 | 363 | 269 | 303 |
| 23                                   | 278 | 279 | 273 | 281 | 351 | 282              | 307 | 341 | 361 | 322              | 356              | 365              | 348              | 336              | 353 | 346 <sup>H</sup> | 369              | 344 | 323 | 375 | 397 | 287 | 282 | 312 |
| 24                                   | 278 | 267 | 323 | 290 | 362 | 292              | 299 | 330 | 340 | 324              | 355              | 371              | 345              | 346              | 342 | 337              | 325              | 345 | 349 | 337 | 372 | 264 | 277 | 282 |
| 25                                   | 294 | 312 | 316 | 275 | 282 | 281              | 376 | 357 | 364 | 348              | 365              | 360              | 353              | 351              | 346 | 331              | 339              | 330 | 314 | 334 | 356 | A   | 339 | 300 |
| 26                                   | 292 | 284 | 291 | 283 | 312 | 278              | 345 | 349 | 385 | 340 <sup>H</sup> | 370              | 378              | 350              | 298              | 352 | 358              | 358 <sup>V</sup> | 345 | 290 | 322 | 357 | 334 | 276 | 279 |
| 27                                   | 295 | 258 | 269 | 288 | 295 | 303              | 300 | 332 | 372 | 361              | 340              | 340              | 338              | 343              | 300 | 332              | 339              | 319 | 310 | 324 | 345 | 296 | 277 | 269 |
| 28                                   | 300 | 342 | 289 | 273 | 287 | 284              | 304 | 353 | 327 | 348 <sup>V</sup> | 313 <sup>H</sup> | 349              | 345              | 340              | 338 | 340              | 348              | 342 | 298 | 325 | 326 | 309 | 325 | 281 |
| 29                                   | 305 | 296 | 314 | 278 | 302 | 301              | 352 | 351 | 379 | 371              | 359              | 328              | 332              | 315 <sup>H</sup> | 345 | 347              | 343              | 357 | 326 | 325 | 333 | 361 | 271 | 261 |
| 30                                   | 284 | 299 | 280 | 305 | 354 | 289              | 296 | 324 | 353 | 351              | 359              | 339              | 353              | 282              | 346 | 320              | 335              | 293 | 301 | 306 | 301 | 325 | 279 | 281 |
| 31                                   | 275 | 278 | 286 | 348 | 327 | 276              | 279 | 352 | 339 | 334              | 366              | A                | 328              | 308              | 354 | 330              | 348              | 330 | 337 | 334 | 331 | 321 | 308 | 326 |
|                                      | 00  | 01  | 02  | 03  | 04  | 05               | 06  | 07  | 08  | 09               | 10               | 11               | 12               | 13               | 14  | 15               | 16               | 17  | 18  | 19  | 20  | 21  | 22  | 23  |
| CNT                                  | 31  | 31  | 31  | 31  | 31  | 31               | 31  | 31  | 31  | 31               | 31               | 30               | 30               | 31               | 31  | 31               | 31               | 31  | 31  | 31  | 29  | 29  | 30  | 31  |
| MED                                  | 293 | 290 | 295 | 294 | 296 | 295              | 325 | 352 | 365 | 349              | 351              | 344              | 344              | 334              | 340 | 345              | 345              | 342 | 340 | 339 | 331 | 307 | 284 | 283 |
| U Q                                  | 297 | 308 | 307 | 305 | 312 | 306              | 338 | 365 | 375 | 358              | 359              | 356              | 349              | 344              | 346 | 355              | 357              | 352 | 348 | 353 | 350 | 330 | 302 | 294 |
| L Q                                  | 284 | 283 | 284 | 282 | 283 | 284              | 300 | 345 | 353 | 339              | 340              | 338              | 335              | 328              | 334 | 337              | 335              | 330 | 317 | 325 | 314 | 292 | 278 | 277 |

DEC.2022 M(3000)F2 (0.01)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Kokubunji

DEC.2022 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<br>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<br>392      | L        | L        | L             |          |     |     |    |    |    |    |    |    |    |
| 2      |    |    |    |    |    |    |    |     |    |          | L<br>407      |          |          | L             | L        |     |     |    |    |    |    |    |    |    |
| 3      |    |    |    |    |    |    |    |     |    |          | L<br>395      | L<br>412 | L<br>385 | L             | L        |     |     |    |    |    |    |    |    |    |
| 4      |    |    |    |    |    |    |    |     |    | L<br>409 | L<br>408      | L        | L        | L             |          |     |     |    |    |    |    |    |    |    |
| 5      |    |    |    |    |    |    |    |     |    | L        | L             |          | L        | L             | L        |     |     |    |    |    |    |    |    |    |
| 6      |    |    |    |    |    |    |    |     |    | L        | L             | L        | L        | L             | 447      | A   |     |    |    |    |    |    |    |    |
| 7      |    |    |    |    |    |    |    |     |    | L        | L             |          |          | L             | L        | L   |     |    |    |    |    |    |    |    |
| 8      |    |    |    |    |    |    |    |     |    | L        | L             | L        | L        | L             | L        |     |     |    |    |    |    |    |    |    |
| 9      |    |    |    |    |    |    |    |     |    |          | L             | L        | L        |               |          |     |     |    |    |    |    |    |    |    |
| 10     |    |    |    |    |    |    |    |     |    | L        |               | L<br>407 | U<br>L   | L             |          |     |     |    |    |    |    |    |    |    |
| 11     |    |    |    |    |    |    |    |     |    | L        | L<br>414      |          | L        |               |          |     |     |    |    |    |    |    |    |    |
| 12     |    |    |    |    |    |    |    |     |    | L        | L             | L        |          | L             |          |     |     |    |    |    |    |    |    |    |
| 13     |    |    |    |    |    |    |    |     |    |          | L             |          | L        | L             | L        |     |     |    |    |    |    |    |    |    |
| 14     |    |    |    |    |    |    |    |     |    |          | U<br>L<br>430 | L        | L        | L             | L        |     |     |    |    |    |    |    |    |    |
| 15     |    |    |    |    |    |    |    |     |    |          | L             | L        | L        | L             |          |     |     |    |    |    |    |    |    |    |
| 16     |    |    |    |    |    |    |    |     |    |          | L             |          | L        | L             |          |     |     |    |    |    |    |    |    |    |
| 17     |    |    |    |    |    |    |    |     |    |          | L             | L        | L        |               |          | L   |     |    |    |    |    |    |    |    |
| 18     |    |    |    |    |    |    |    |     |    |          |               | L        | L        | L             | L        |     |     |    |    |    |    |    |    |    |
| 19     |    |    |    |    |    |    |    | 456 |    |          | L             | L        |          | L             |          |     |     |    |    |    |    |    |    |    |
| 20     |    |    |    |    |    |    |    |     |    | L        | L             | L        | L        | L             | L        |     | 443 |    |    |    |    |    |    |    |
| 21     |    |    |    |    |    |    |    |     |    |          |               | L        | L        | L             | L        |     |     |    |    |    |    |    |    |    |
| 22     |    |    |    |    |    |    |    |     |    |          | L             | L        | L        | L             |          |     |     |    |    |    |    |    |    |    |
| 23     |    |    |    |    |    |    |    |     |    |          | L<br>381      | L        | L        |               |          | L   |     |    |    |    |    |    |    |    |
| 24     |    |    |    |    |    |    |    |     |    |          | L             | L        | L        | L             | L        | 426 |     |    |    |    |    |    |    |    |
| 25     |    |    |    |    |    |    |    |     |    | L        | L<br>400      | L        | L<br>388 | L             | L        |     |     |    |    |    |    |    |    |    |
| 26     |    |    |    |    |    |    |    |     |    |          |               |          |          | L<br>355      |          |     |     |    |    |    |    |    |    |    |
| 27     |    |    |    |    |    |    |    |     |    |          | L             | L        | L        | L             | 423      | 419 |     |    |    |    |    |    |    |    |
| 28     |    |    |    |    |    |    |    | L   | A  |          |               |          | L        | L             | L        |     |     |    |    |    |    |    |    |    |
| 29     |    |    |    |    |    |    |    |     |    |          | L             | L        | L        | U<br>L<br>422 |          | L   |     |    |    |    |    |    |    |    |
| 30     |    |    |    |    |    |    |    |     |    |          | L             | L        | L        | L             |          | L   |     |    |    |    |    |    |    |    |
| 31     |    |    |    |    |    |    |    |     |    | L        |               | A        | L<br>405 | L             | L        |     |     |    |    |    |    |    |    |    |
|        | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07  | 08 | 09       | 10            | 11       | 12       | 13            | 14       | 15  | 16  | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT    |    |    |    |    |    |    |    | 1   |    |          | 7             | 2        | 5        | 3             | 3        |     | 1   |    |    |    |    |    |    |    |
| MED    |    |    |    |    |    |    |    | 456 |    |          | L<br>407      | L<br>402 | L<br>407 | L<br>385      | L<br>426 |     | 443 |    |    |    |    |    |    |    |
| U Q    |    |    |    |    |    |    |    |     |    |          | L<br>414      |          | L<br>417 | L<br>423      | L<br>447 |     |     |    |    |    |    |    |    |    |
| L Q    |    |    |    |    |    |    |    |     |    |          | L<br>392      |          | L<br>396 | L<br>355      | L<br>419 |     |     |    |    |    |    |    |    |    |

DEC.2022 M(3000)F1 (0.01)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Kokubunji

DEC.2022 h'F2 (KM)

135°E MEAN TIME (G.M.T. + 9 H)

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

| H<br>D | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07  | 08  | 09  | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|--------|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|
| 1      |    |    |    |    |    |    |    |     |     | 220 | 244 | 220 | 240 | 220 |     |     |     |    |    |    |    |    |    |    |
| 2      |    |    |    |    |    |    |    |     |     |     | 220 |     |     | 212 | 230 |     |     |    |    |    |    |    |    |    |
| 3      |    |    |    |    |    |    |    |     |     |     | 214 | 236 | 240 | 228 | 232 |     |     |    |    |    |    |    |    |    |
| 4      |    |    |    |    |    |    |    |     |     |     | 214 | 234 | 218 | 216 | 214 |     |     |    |    |    |    |    |    |    |
| 5      |    |    |    |    |    |    |    |     |     |     | 232 | 232 |     | 218 | 222 | 208 |     |    |    |    |    |    |    |    |
| 6      |    |    |    |    |    |    |    |     |     |     | 230 | 242 | 232 | 228 | 228 | 226 | 234 |    |    |    |    |    |    |    |
| 7      |    |    |    |    |    |    |    |     |     |     | 218 | 220 |     |     | 240 | 244 | 232 |    |    |    |    |    |    |    |
| 8      |    |    |    |    |    |    |    |     |     |     | 238 | 234 | 228 | 224 | 232 | 210 |     |    |    |    |    |    |    |    |
| 9      |    |    |    |    |    |    |    |     |     |     |     | 214 | 210 | 226 |     |     |     |    |    |    |    |    |    |    |
| 10     |    |    |    |    |    |    |    |     |     |     | 212 |     | 222 | 222 |     |     |     |    |    |    |    |    |    |    |
| 11     |    |    |    |    |    |    |    |     |     |     | 226 | 222 |     | 222 |     |     |     |    |    |    |    |    |    |    |
| 12     |    |    |    |    |    |    |    |     |     |     | 224 | 226 | 222 |     | 218 |     |     |    |    |    |    |    |    |    |
| 13     |    |    |    |    |    |    |    |     |     |     | 220 |     | 222 | 224 | 224 |     |     |    |    |    |    |    |    |    |
| 14     |    |    |    |    |    |    |    |     |     |     | 218 | 240 | 228 | 238 | 218 |     |     |    |    |    |    |    |    |    |
| 15     |    |    |    |    |    |    |    |     |     |     | 228 | 220 | 230 | 246 |     |     |     |    |    |    |    |    |    |    |
| 16     |    |    |    |    |    |    |    |     |     |     | 250 |     | 238 | 240 |     |     |     |    |    |    |    |    |    |    |
| 17     |    |    |    |    |    |    |    |     |     |     | 232 | 214 | 244 |     | 232 |     |     |    |    |    |    |    |    |    |
| 18     |    |    |    |    |    |    |    |     |     |     |     | 230 | 238 | 220 | 234 |     |     |    |    |    |    |    |    |    |
| 19     |    |    |    |    |    |    |    | 200 |     |     | 234 | 226 |     | 220 |     |     |     |    |    |    |    |    |    |    |
| 20     |    |    |    |    |    |    |    |     |     | 240 | 234 | 228 | 238 | 232 | 234 |     | 208 |    |    |    |    |    |    |    |
| 21     |    |    |    |    |    |    |    |     |     |     |     | 232 | 238 | 220 | 240 |     |     |    |    |    |    |    |    |    |
| 22     |    |    |    |    |    |    |    |     |     | 204 | 240 | 236 | 268 |     |     |     |     |    |    |    |    |    |    |    |
| 23     |    |    |    |    |    |    |    |     |     |     | 238 | 212 | 238 |     | 236 |     |     |    |    |    |    |    |    |    |
| 24     |    |    |    |    |    |    |    |     |     |     | 230 | 206 | 206 | 220 | 224 |     |     |    |    |    |    |    |    |    |
| 25     |    |    |    |    |    |    |    |     |     | 242 | 230 | 214 | 220 | 218 |     |     |     |    |    |    |    |    |    |    |
| 26     |    |    |    |    |    |    |    |     |     |     |     |     |     | 318 |     |     |     |    |    |    |    |    |    |    |
| 27     |    |    |    |    |    |    |    |     |     | 216 | 236 | 234 | 228 | 224 | 232 |     |     |    |    |    |    |    |    |    |
| 28     |    |    |    |    |    |    |    | 238 | 202 |     |     |     | 232 | 264 | 230 |     |     |    |    |    |    |    |    |    |
| 29     |    |    |    |    |    |    |    |     |     |     | 224 | 222 | 232 |     | 230 |     |     |    |    |    |    |    |    |    |
| 30     |    |    |    |    |    |    |    |     |     | 228 | 220 | 236 | 214 |     | 232 |     |     |    |    |    |    |    |    |    |
| 31     |    |    |    |    |    |    |    |     |     | 242 |     | A   | 228 | 224 |     |     |     |    |    |    |    |    |    |    |
|        | 00 | 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   | 16  | 25  | 22  | 26  | 23  | 18  | 2   | 1   |    |    |    |    |    |    |    |
| MED    |    |    |    |    |    |    |    | 200 | 238 | 225 | 230 | 224 | 228 | 224 | 231 | 233 | 208 |    |    |    |    |    |    |    |
| U Q    |    |    |    |    |    |    |    |     |     | 235 | 235 | 232 | 238 | 238 | 234 |     |     |    |    |    |    |    |    |    |
| L Q    |    |    |    |    |    |    |    |     |     | 215 | 220 | 218 | 222 | 220 | 224 |     |     |    |    |    |    |    |    |    |

DEC.2022 h'F2 (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Kokubunji

DEC. 2022 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

| H<br>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      | 254        | 248        | 256        | 258        | 254        | 288 | 242 | 196 | 196 | 200 | 210 | 198 | 184 | 186 | 226 | 220 | 206 | 194        | 200        | 202        | 284        | 288        | 270        | 314        |    |
| 2      | 274        | 222        | 246        | 246        | 274        | 312 | 268 | 224 | 210 | 208 | 204 | 234 | 232 | 198 | 204 | 208 | 208 | 198        | 216        | 200        | 236        | 254        | 238        | 254        |    |
| 3      | 268        | 254        | 310        | 266        | 296        | 244 | 216 | 206 | 206 | 212 | 198 | 198 | 182 | 176 | 214 | 212 | 212 | 192        | 202        | 220        | 224        | 238        | 242        | 280        |    |
| 4      | 270        | 230        | 264        | 278        | 294        | 268 | 232 | 208 | 212 | 202 | 208 | 194 | 194 | 178 | 206 | 214 | 208 | 184        | E A<br>292 | 214        | 268        | 276        | 260        | 294        |    |
| 5      | 304        | 294        | 302        | 272        | 260        | 298 | 222 | 230 | 232 | 216 | 218 | 210 | 194 | 202 | 194 | 214 | 208 | 256        | 238        | 218        | 208        | 232        | 246        | 300        |    |
| 6      | 310        | 264        | 206        | 232        | E A<br>316 | 286 | 288 | 240 | 210 | 222 | 218 | 184 | 196 | 222 | 188 | 218 | 196 | 176        | 200        | 218        | 190        | 242        | 306        | 312        |    |
| 7      | 266        | 258        | 250        | 246        | 254        | 254 | 270 | 216 | 204 | 210 | 206 | 220 | 230 | 212 | 234 | 194 | 206 | 184        | 208        | 228        | 228        | 262        | 296        | 334        |    |
| 8      | 342        | 294        | 258        | 272        | 306        | 312 | 278 | 226 | 224 | 224 | 210 | 206 | 210 | 208 | 206 | 202 | 208 | 196        | 230        | 222        | 220        | 222        | 240        | 280        |    |
| 9      | 278        | 284        | 282        | 286        | 258        | 244 | 226 | 214 | 214 | 210 | 198 | 200 | 218 | 212 | 220 | 210 | 206 | 194        | 194        | 202        | 238        | 230        | 240        | 288        |    |
| 10     | 260        | 286        | 284        | 260        | 298        | 230 | 208 | 210 | 200 | 202 | 204 | 214 | 192 | 212 | 220 | 212 | 202 | 218        | 206        | 216        | 232        | 226        | 264        | 268        |    |
| 11     | 240        | 232        | 314        | 308        | 328        | 280 | 208 | 200 | 206 | 200 | 200 | 208 | 198 | 224 | 222 | 230 | 202 | E A<br>276 | E A<br>230 | 212        | A          | A          | A          | 290        |    |
| 12     | 282        | 292        | 290        | 294        | 268        | 250 | 206 | 212 | 202 | 212 | 194 | 208 | 220 | 202 | 208 | 224 | 206 | 198        | 192        | 206        | 210        | E A<br>254 | E A<br>258 | 264        |    |
| 13     | 302        | 296        | 306        | 286        | 254        | 240 | 218 | 212 | 202 | 218 | 212 | 208 | 210 | 200 | 218 | 220 | 202 | 192        | 226        | 208        | 194        | 248        | 314        | 276        |    |
| 14     | 274        | 310        | 312        | 276        | 254        | 262 | 230 | 204 | 206 | 210 | 184 | 194 | 222 | 206 | 208 | 230 | 198 | 198        | 232        | 206        | A          | 208        | 316        | 318        |    |
| 15     | 290        | 294        | 240        | 256        | 256        | 260 | 232 | 208 | 202 | 208 | 222 | 210 | 206 | 202 | 224 | 240 | 204 | 190        | 202        | E A<br>242 | E A<br>248 | E A<br>220 | E A<br>376 | 296        |    |
| 16     | 290        | 296        | 280        | 234        | 220        | 242 | 216 | 208 | 204 | 214 | 206 | 234 | 214 | 200 | 224 | 214 | 204 | 200        | 204        | 212        | 200        | E A<br>280 | E A<br>306 | E A<br>338 |    |
| 17     | 268        | 274        | 240        | 230        | 194        | 278 | 246 | 208 | 206 | 210 | 212 | 202 | 218 | 208 | 202 | 230 | 208 | 194        | 208        | 210        | 232        | 252        | 270        | 266        |    |
| 18     | 240        | 242        | 260        | 248        | 214        | 264 | 226 | 198 | 206 | 212 | 214 | 218 | 220 | 210 | 220 | 222 | 216 | 194        | 200        | 214        | 216        | 208        | 310        | 300        |    |
| 19     | 254        | 226        | 246        | 286        | 278        | 266 | 208 | 174 | 210 | 212 | 214 | 214 | 212 | 198 | 224 | 230 | 210 | 206        | 220        | 220        | 214        | 226        | 292        | E A<br>320 |    |
| 20     | 258        | 274        | 258        | 230        | 246        | 268 | 224 | 202 | 218 | 224 | 218 | 216 | 206 | 204 | 204 | 202 | 172 | 220        | 196        | 222        | 228        | 246        | 234        | 254        |    |
| 21     | 276        | 266        | 268        | 270        | 268        | 246 | 230 | 210 | 200 | 212 | 208 | 208 | 206 | 206 | 210 | 212 | 208 | 200        | 212        | 220        | 242        | 228        | 230        | 294        |    |
| 22     | 290        | 286        | 272        | 296        | 282        | 222 | 212 | 210 | 204 | 194 | 214 | 196 | 204 | 220 | 214 | 230 | 214 | 188        | 196        | 208        | 234        | 208        | 312        | 266        |    |
| 23     | 276        | 304        | 272        | 280        | 206        | 316 | 258 | 228 | 212 | 202 | 206 | 198 | 230 | 220 | 222 | 204 | 200 | 222        | 244        | 210        | 190        | 242        | 294        | 272        |    |
| 24     | 304        | 344        | 256        | 276        | 218        | 286 | 250 | 240 | 194 | 224 | 212 | 196 | 192 | 182 | 196 | 226 | 208 | 202        | 210        | 194        | 202        | 230        | 270        | 306        |    |
| 25     | 268        | 250        | 224        | 298        | 306        | 312 | 196 | 200 | 206 | 204 | 194 | 192 | 182 | 208 | 220 | 228 | 206 | 188        | 226        | 226        | 206        | A<br>230   | 272        |            |    |
| 26     | 304        | 302        | 284        | 286        | 250        | 302 | 230 | 206 | 206 | 206 | 216 | 210 | 202 | 192 | 236 | 214 | 206 | 198        | 262        | 244        | 206        | 210        | 298        | 292        |    |
| 27     | 254        | 360        | 326        | 278        | 242        | 264 | 266 | 246 | 214 | 200 | 200 | 206 | 208 | 202 | 200 | 226 | 216 | 206        | 238        | 214        | 202        | 260        | 296        | 324        |    |
| 28     | 274        | 226        | 266        | 310        | 272        | 290 | 272 | 220 | 220 | A   | 200 | 228 | 210 | 200 | 212 | 216 | 204 | 196        | 224        | 226        | 236        | 214        | 238        | 272        |    |
| 29     | 268        | 276        | E A<br>284 | E A<br>320 | 256        | 240 | 214 | 218 | 204 | 210 | 192 | 188 | 176 | 218 | 214 | 222 | 204 | 210        | 208        | 206        | 234        | 210        | 304        | 346        |    |
| 30     | 310        | 286        | 330        | 254        | 204        | 312 | 284 | 228 | 202 | 218 | 212 | 192 | 208 | 194 | 222 | 208 | 254 | 206        | 232        | 238        | E A<br>254 | E A<br>230 | 216        | 288        |    |
| 31     | E A<br>358 | E A<br>316 | 266        | 220        | 240        | 330 | 306 | 212 | 220 | 228 | 220 | A   | 186 | 202 | 232 | 224 | 214 | 210        | 196        | 224        | 224        | 234        | 246        | 226        |    |
|        | 00         | 01         | 02         | 03         | 04         | 05  | 06  | 07  | 08  | 09  | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17         | 18         | 19         | 20         | 21         | 22         | 23         |    |
| CNT    | 31         | 31         | 31         | 31         | 31         | 31  | 31  | 31  | 31  | 30  | 31  | 30  | 31  | 31  | 31  | 31  | 31  | 31         | 31         | 31         | 31         | 29         | 29         | 30         | 31 |
| MED    | 274        | 280        | 267        | 272        | 256        | 268 | 230 | 210 | 206 | 210 | 208 | 207 | 206 | 202 | 214 | 218 | 206 | 198        | 209        | 214        | 222        | 231        | 266        | 289        |    |
| U Q    | 302        | 296        | 290        | 286        | 282        | 298 | 266 | 224 | 212 | 216 | 214 | 214 | 218 | 212 | 222 | 226 | 208 | 206        | 230        | 222        | 236        | 253        | 304        | 312        |    |
| L Q    | 266        | 250        | 256        | 248        | 242        | 246 | 216 | 206 | 202 | 204 | 200 | 196 | 194 | 198 | 206 | 212 | 204 | 192        | 200        | 208        | 206        | 221        | 240        | 272        |    |

DEC. 2022 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Kokubunji

DEC.2022 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<br>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   | 102 | A   | A   | 100 | 102 | 104 | A   | B  |    |    |    |    |    |    |  |
| 2      |    |    |    |    |    |    | B   | A   | 104 | 102 | 102 | 100 | 102 | 102 | 102 | A   | A   | A  |    |    |    |    |    |    |  |
| 3      |    |    |    |    |    |    | B   | A   | A   | 100 | 100 | A   | 100 | 100 | 100 | 104 | A   | B  |    |    |    |    |    |    |  |
| 4      |    |    |    |    |    |    | B   | A   | 112 | 102 | 100 | A   | 102 | 102 | 102 | 102 | 132 | B  |    |    |    |    |    |    |  |
| 5      |    |    |    |    |    |    | B   | A   | 108 | 104 | 102 | A   | A   | 100 | 104 | 102 | A   | A  |    |    |    |    |    |    |  |
| 6      |    |    |    |    |    |    | B   | A   | 104 | 104 | 104 | 104 | 102 | 102 | 102 | 110 | 112 | B  |    |    |    |    |    |    |  |
| 7      |    |    |    |    |    |    | A   | A   | 104 | 110 | 96  | 104 | 104 | 104 | 100 | 104 | A   | B  |    |    |    |    |    |    |  |
| 8      |    |    |    |    |    |    | B   | A   | 110 | 110 | 102 | 102 | 102 | 102 | 102 | 102 | A   | B  |    |    |    |    |    |    |  |
| 9      |    |    |    |    |    |    | B   | A   | 108 | 102 | 102 | 102 | 102 | 104 | 106 | 106 | A   | B  |    |    |    |    |    |    |  |
| 10     |    |    |    |    |    |    | B   | A   | 106 | A   | 102 | 102 | 102 | 102 | 104 | 108 | 118 | A  |    |    |    |    |    |    |  |
| 11     |    |    |    |    |    |    | B   | A   | A   | 100 | 102 | 102 | 104 | A   | A   | A   | A   | A  |    |    |    |    |    |    |  |
| 12     |    |    |    |    |    |    | A   | A   | A   | 108 | B   | 106 | B   | 106 | 102 | A   | A   | B  |    |    |    |    |    |    |  |
| 13     |    |    |    |    |    |    | B   | A   | 102 | B   | A   | B   | B   | B   | 106 | 106 | 108 | B  |    |    |    |    |    |    |  |
| 14     |    |    |    |    |    |    | B   | A   | 106 | 102 | 98  | 100 | 100 | 106 | 102 | 104 | A   | B  |    |    |    |    |    |    |  |
| 15     |    |    |    |    |    |    | B   | A   | 108 | 102 | 102 | 102 | 98  | 100 | 100 | 98  | 100 | B  |    |    |    |    |    |    |  |
| 16     |    |    |    |    |    |    | B   | A   | 104 | A   | A   | B   | A   | 102 | A   | 106 | 118 | B  |    |    |    |    |    |    |  |
| 17     |    |    |    |    |    |    | B   | B   | A   | 102 | 104 | 104 | 104 | 100 | 100 | 100 | A   | A  |    |    |    |    |    |    |  |
| 18     |    |    |    |    |    |    | B   | A   | 108 | 108 | 102 | A   | A   | 106 | 100 | 108 | B   | B  |    |    |    |    |    |    |  |
| 19     |    |    |    |    |    |    | B   | B   | 104 | A   | A   | 102 | 102 | A   | A   | 102 | A   | A  |    |    |    |    |    |    |  |
| 20     |    |    |    |    |    |    | A   | A   | A   | 102 | A   | 104 | 104 | 100 | A   | 100 | 114 | B  |    |    |    |    |    |    |  |
| 21     |    |    |    |    |    |    | A   | 108 | 104 | A   | 104 | 106 | 104 | 100 | 100 | A   | A   | B  |    |    |    |    |    |    |  |
| 22     |    |    |    |    |    |    | A   | 108 | 104 | 106 | 100 | A   | A   | A   | 102 | A   | B   |    |    |    |    |    |    |    |  |
| 23     |    |    |    |    |    |    | 150 | 106 | 106 | 104 | 100 | 100 | A   | A   | A   | A   | B   |    |    |    |    |    |    |    |  |
| 24     |    |    |    |    |    |    | A   | 104 | 102 | 108 | 100 | A   | 100 | 100 | 100 | A   | B   |    |    |    |    |    |    |    |  |
| 25     |    |    |    |    |    |    | A   | A   | 108 | 106 | 102 | 98  | 100 | 108 | 108 | 116 | B   |    |    |    |    |    |    |    |  |
| 26     |    |    |    |    |    |    | A   | 102 | 100 | 128 | 96  | 98  | 104 | 98  | 106 | 116 | B   |    |    |    |    |    |    |    |  |
| 27     |    |    |    |    |    |    | A   | A   | A   | 110 | B   | 106 | 106 | B   | B   | 108 | B   |    |    |    |    |    |    |    |  |
| 28     |    |    |    |    |    |    | A   | A   | A   | A   | B   | B   | B   | B   | B   | B   | B   |    |    |    |    |    |    |    |  |
| 29     |    |    |    |    |    |    | B   | A   | 106 | 102 | 104 | 114 | 108 | 108 | B   | A   | B   |    |    |    |    |    |    |    |  |
| 30     |    |    |    |    |    |    | B   | A   | A   | 104 | 104 | 100 | 100 | 100 | 104 | A   | A   |    |    |    |    |    |    |    |  |
| 31     |    |    |    |    |    |    | A   | 102 | 102 | A   | A   | 100 | 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    |    |    |    |    |    |    |     | 1   | 20  | 23  | 23  | 21  | 22  | 24  | 22  | 23  | 10  |    |    |    |    |    |    |    |  |
| MED    |    |    |    |    |    |    |     | 150 | 106 | 102 | 102 | 102 | 102 | 102 | 102 | 104 | 115 |    |    |    |    |    |    |    |  |
| U Q    |    |    |    |    |    |    |     |     | 108 | 106 | 104 | 104 | 104 | 104 | 104 | 106 | 118 |    |    |    |    |    |    |    |  |
| L Q    |    |    |    |    |    |    |     |     | 104 | 102 | 102 | 100 | 100 | 100 | 100 | 102 | 108 |    |    |    |    |    |    |    |  |

DEC.2022 h'E (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Kokubunji

DEC.2022 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   | 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   | 92  | 94 | 90  | 92  | 96  | B   | B   | 158 | 110 | 102 | 176 | 102 | 98  | G   | 152 | 140 | 126 | 90  | 94  | B  | 100 | 92  | 100 | 98  |    |
| 2   | 98  | 98 | 88  | B   | B   | B   | B   | 148 | G   | G   | G   | 172 | 164 | 134 | 88  | 86  | 88  | 86  | 88  | B  | 94  | B   | B   | B   |    |
| 3   | B   | B  | B   | B   | B   | B   | B   | 138 | 160 | G   | G   | 106 | G   | G   | G   | G   | 126 | B   | B   | B  | B   | B   | B   | 94  |    |
| 4   | B   | 92 | B   | B   | B   | B   | B   | 170 | G   | G   | 166 | 112 | G   | G   | G   | G   | G   | 96  | 92  | 98 | 94  | 108 | B   | B   |    |
| 5   | B   | B  | B   | B   | B   | B   | B   | 136 | G   | G   | G   | 104 | 128 | G   | G   | G   | 168 | 86  | 82  | 82 | B   | B   | B   | B   |    |
| 6   | B   | B  | 96  | 90  | 92  | 98  | B   | 154 | G   | G   | 186 | G   | G   | G   | G   | 106 | G   | B   | B   | B  | B   | B   | B   | B   |    |
| 7   | 112 | B  | 104 | 104 | 102 | 108 | 100 | 96  | 140 | 96  | G   | 168 | 192 | 178 | 144 | 114 | 104 | 102 | 98  | 92 | 88  | B   | B   | B   |    |
| 8   | 92  | 96 | 102 | 98  | 94  | B   | B   | 126 | 120 | 190 | 114 | 110 | 104 | G   | G   | G   | 156 | B   | B   | B  | B   | B   | 100 | B   |    |
| 9   | B   | B  | B   | B   | 94  | 98  | 96  | 146 | G   | G   | G   | G   | G   | G   | G   | 130 | 112 | 112 | B   | B  | B   | B   | B   | B   |    |
| 10  | 90  | B  | B   | B   | B   | B   | B   | 106 | 136 | 108 | 112 | 110 | 120 | 108 | G   | G   | G   | 102 | 102 | B  | 98  | B   | B   | 124 |    |
| 11  | 112 | B  | 108 | B   | 100 | B   | 102 | 142 | 100 | 98  | G   | G   | G   | 90  | 92  | 118 | 112 | 100 | 100 | 96 | 96  | 94  | 92  | 88  |    |
| 12  | 88  | 94 | 90  | B   | B   | B   | 102 | 98  | 94  | 170 | B   | G   | B   | 88  | G   | 90  | 100 | B   | 96  | 96 | 98  | 98  | 96  | B   |    |
| 13  | 92  | 94 | 86  | 84  | 82  | B   | 100 | 92  | G   | B   | 90  | B   | B   | B   | G   | G   | G   | B   | 94  | 96 | 94  | B   | 94  | 90  |    |
| 14  | 88  | B  | B   | B   | B   | B   | 90  | 116 | 96  | G   | G   | 168 | G   | G   | G   | G   | 112 | B   | 98  | 98 | 94  | 100 | 102 | 98  |    |
| 15  | 94  | 88 | B   | B   | B   | B   | B   | 144 | G   | G   | G   | G   | G   | G   | G   | G   | G   | B   | B   | 98 | 96  | 94  | 94  | 96  |    |
| 16  | B   | 90 | B   | B   | B   | 90  | 96  | 138 | G   | G   | 102 | 102 | 102 | G   | 98  | G   | G   | 96  | 96  | 96 | 96  | 92  | 94  | 90  |    |
| 17  | 94  | 94 | 94  | B   | B   | B   | B   | B   | 120 | G   | G   | G   | G   | G   | G   | G   | 90  | 86  | B   | B  | B   | B   | B   | 98  |    |
| 18  | 94  | 98 | 94  | 90  | 90  | 92  | 88  | 144 | G   | G   | 104 | 100 | 98  | 96  | G   | G   | B   | 88  | B   | B  | B   | B   | 92  | 100 |    |
| 19  | 110 | 90 | B   | B   | B   | 92  | B   | B   | G   | 104 | 106 | G   | G   | 96  | 92  | 92  | 94  | 98  | 98  | B  | 96  | B   | B   | 88  |    |
| 20  | 90  | B  | 98  | B   | 88  | B   | 136 | 116 | G   | 108 | 100 | G   | G   | 94  | G   | 92  | 90  | 86  | 94  | 88 | B   | 84  | 96  | B   |    |
| 21  | B   | 86 | 88  | 88  | 86  | 90  | B   | 150 | 156 | 120 | 114 | G   | G   | 100 | 94  | G   | 134 | B   | B   | 84 | 86  | 84  | B   | B   |    |
| 22  | B   | B  | B   | B   | B   | B   | B   | 186 | G   | G   | G   | G   | 104 | 98  | 94  | G   | 94  | B   | B   | B  | B   | B   | 94  | B   |    |
| 23  | 96  | 92 | 98  | B   | B   | B   | B   | G   | 156 | G   | G   | G   | 178 | 98  | 104 | 108 | 104 | 116 | 98  | 94 | B   | 106 | 90  | 92  |    |
| 24  | B   | 94 | B   | B   | 110 | 110 | 100 | 150 | 126 | G   | G   | G   | 90  | 112 | 118 | G   | 164 | B   | 136 | 94 | 94  | 92  | 90  | 90  |    |
| 25  | B   | 90 | 92  | B   | B   | 104 | 102 | 100 | 94  | 90  | 90  | G   | G   | G   | G   | G   | 160 | B   | B   | 94 | 88  | 92  | 88  | 88  |    |
| 26  | 88  | B  | B   | B   | B   | B   | B   | 100 | 160 | 144 | 158 | G   | B   | G   | G   | B   | B   | G   | B   | B  | 96  | B   | 92  | 92  | 90 |
| 27  | 92  | 82 | B   | B   | B   | 114 | 144 | 92  | 88  | G   | B   | B   | B   | B   | B   | B   | B   | 102 | 96  | 98 | B   | B   | 88  | 90  |    |
| 28  | 90  | 84 | 86  | B   | B   | B   | B   | 106 | 100 | 96  | 92  | 170 | B   | B   | B   | B   | B   | B   | 88  | 86 | B   | B   | 102 | 100 |    |
| 29  | 88  | 94 | 88  | 86  | 92  | 84  | 84  | B   | 124 | G   | G   | G   | G   | G   | G   | B   | 150 | 92  | B   | B  | 88  | B   | B   | 104 |    |
| 30  | 104 | 92 | 90  | B   | 94  | B   | B   | 106 | 102 | 160 | G   | G   | G   | G   | G   | G   | 90  | 90  | 86  | 86 | 86  | 86  | B   | 98  |    |
| 31  | 96  | 96 | B   | B   | B   | B   | 102 | 180 | 152 | 130 | 106 | 102 | G   | 90  | 90  | 116 | 84  | 84  | 80  | 82 | 110 | 86  | 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 | 21  | 20 | 17  | 9   | 13  | 11  | 11  | 26  | 20  | 17  | 16  | 13  | 11  | 12  | 13  | 10  | 21  | 17  | 19  | 19 | 19  | 14  | 17  | 20  |    |
| MED | 92  | 93 | 92  | 90  | 94  | 98  | 100 | 138 | 120 | 104 | 110 | 110 | 104 | 98  | 94  | 110 | 112 | 92  | 96  | 94 | 94  | 92  | 94  | 95  |    |
| U Q | 97  | 94 | 98  | 95  | 98  | 108 | 102 | 148 | 151 | 128 | 159 | 168 | 164 | 110 | 124 | 116 | 142 | 101 | 98  | 96 | 96  | 98  | 98  | 98  |    |
| L Q | 90  | 90 | 88  | 87  | 89  | 90  | 90  | 106 | 100 | 97  | 103 | 102 | 98  | 93  | 92  | 92  | 93  | 87  | 88  | 86 | 88  | 92  | 90  | 90  |    |

DEC.2022 h'Es (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Kokubunji

DEC.2022 TYPES OF Es 135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E pSWEEP 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 | F3 | F3 | F1 | F1 |    |    |      | H1   | C2   | C1   | H1 | C1 | L1 |      | H1   | H1 | CL11 | L3 | F1 |    | F1 | F1 | F3 | F3 |
| 2   | F3 | F1 | F1 |    |    |    |    |      | H1   |      |      |    | H1 | H1 | HL11 | L1   | L2 | L2   | L2 | F1 |    | F2 |    |    |    |
| 3   |    |    |    |    |    |    |    |      | H1   | HC11 |      |    | C2 |    |      |      |    | C1   |    |    |    |    |    |    | F1 |
| 4   |    | F1 |    |    |    |    |    |      | H1   |      |      | H1 | C1 |    |      |      |    |      | L1 | F3 | F3 | F2 | F3 |    |    |
| 5   |    |    |    | F1 |    |    |    |      | H1   |      | C1   | C1 | C1 | C1 |      |      |    | H1   | L3 | F2 | F2 |    |    |    |    |
| 6   |    |    | F1 | F1 | F1 | F1 |    |      | H1   |      |      | H1 |    |    |      |      | C1 |      |    |    |    |    |    |    |    |
| 7   | F2 |    | F2 | F1 | F1 | F1 | L3 | L2   | H1   | L1   |      | H1 | H1 | H1 | H1   | C1   | C2 | C1   | F1 | F1 | F1 |    |    |    |    |
| 8   | F2 | F2 | F2 | F3 | F2 |    |    |      | C1   | C1   | H1   | C1 | C1 | C1 |      |      |    | H1   |    |    |    |    |    | F2 |    |
| 9   |    |    |    | F2 | F3 | L1 | H1 |      |      |      |      |    |    |    | H1   | C1   | C1 | C1   |    |    |    |    |    |    |    |
| 10  | F1 |    |    |    |    |    |    |      | C1   | C1   | C1   | C1 | C1 | C1 |      |      |    |      | C3 | F4 |    | F1 |    |    | F2 |
| 11  | F1 |    | F1 |    | F1 |    | C1 | H1   | C1   | L1   |      |    |    | L1 | L1   | C1   | C1 | C5   | F3 | F3 | F3 | F3 | F4 | F3 | F2 |
| 12  | F2 | F1 | F2 |    |    |    | C2 | L2   | L1   | H1   |      |    |    | L1 |      |      | L2 | C1   |    | F1 | F3 | F2 | F3 | F1 |    |
| 13  | F2 | F1 | F1 | F1 | F1 |    | L1 | L1   |      |      |      | L1 |    |    |      |      |    |      |    | F4 | F1 | F5 |    | F2 | F2 |
| 14  | F1 |    |    |    |    |    | L1 | C1   | LH11 |      |      | H1 |    |    |      |      |    | C1   |    | F2 | F2 | F4 | F1 | F1 | F1 |
| 15  | F2 | F1 |    |    |    |    |    |      | H1   |      |      |    |    |    |      |      |    |      |    |    | F3 | F2 | F3 | F2 | F1 |
| 16  |    | F1 |    |    |    | F1 | L2 | H2   |      | C2   | C2   |    | C1 |    | L1   |      |    |      | L1 | F3 | F3 | F2 | F2 | F3 | F3 |
| 17  | F2 | F1 | F1 |    |    |    |    |      | CL11 |      |      |    |    |    |      |      |    | L1   | L2 |    |    |    |    |    | F1 |
| 18  | F1 | F1 | F1 | F2 | F3 | F2 | L1 | H1   |      |      | C1   | C1 | L2 | L1 |      |      |    |      | L1 |    |    |    |    | F1 | F1 |
| 19  | F1 | F2 |    |    |    | F1 |    |      |      |      | C1   | C1 |    | L1 | L2   | L1   | L1 | L3   | F4 |    |    | F3 |    |    | F3 |
| 20  | F2 |    | F2 |    | F1 |    |    | H1   | C1   |      | C1   | L1 |    |    | L1   |      | L1 | L2   | F1 | F1 | F1 | F1 | F1 | F1 | F1 |
| 21  |    | F1 | F2 | F2 | F2 | F1 |    | H1   | H1   | C1   | C1   |    |    | L1 | L1   |      | H1 |      |    | F1 | F1 | F1 | F2 |    |    |
| 22  |    |    |    |    |    |    |    | H1   |      |      |      |    |    | C2 | L3   | L2   |    | LC21 |    |    |    |    |    | F1 |    |
| 23  | F2 | F2 | F2 |    |    |    |    |      | H1   |      |      |    |    | H1 | L1   | C2   | C1 | C1   | C1 | F1 | F3 |    | F1 | F1 | F2 |
| 24  |    | F1 |    |    | F1 | F1 |    | C1   | H1   | C1   |      |    |    | L2 | C1   | C1   |    | H1   |    | F1 | F1 | F2 | F2 | F2 | F1 |
| 25  |    | F1 | F1 |    |    | F1 | F2 | C2   | L1   | L1   | L1   |    |    |    |      |      |    | H1   |    |    | F2 | F2 | F4 | F1 | F1 |
| 26  | F1 |    |    |    |    |    |    | C1   | H1   | H1   | H1   |    |    |    |      |      |    |      |    |    | F2 |    | F1 | F1 | F2 |
| 27  | F1 | F1 |    |    |    | F1 |    | H1   | L3   | L1   |      |    |    |    |      |      |    |      | C1 | F3 | F2 |    |    | F1 | F1 |
| 28  | F1 | F1 | F1 |    |    |    |    | CH11 | C2   | L2   | C2   | H1 |    |    |      |      |    |      |    | F1 | F1 |    |    | F1 | F2 |
| 29  | F2 | F2 | F3 | F4 | F1 | F2 | F1 |      | C1   |      |      |    |    |    |      |      |    | H1   | L1 |    |    | F2 |    |    | F1 |
| 30  | F1 | F1 | F2 |    | F1 |    |    |      | C2   | CH11 | HL11 |    |    |    |      |      |    | L1   | L2 | F4 | F2 | F2 | F1 |    | F1 |
| 31  | F3 | F3 |    |    |    | F1 | H1 | H1   | H2   | C3   | C2   |    |    | L2 | L1   | CL11 | L2 | L1   | F1 | F1 | F1 | F1 | F1 |    |    |
|     | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07   | 08   | 09   | 10   | 11 | 12 | 13 | 14   | 15   | 16 | 17   | 18 | 19 | 20 | 21 | 22 | 23 |    |
| CNT |    |    |    |    |    |    |    |      |      |      |      |    |    |    |      |      |    |      |    |    |    |    |    |    |    |
| MED |    |    |    |    |    |    |    |      |      |      |      |    |    |    |      |      |    |      |    |    |    |    |    |    |    |
| U Q |    |    |    |    |    |    |    |      |      |      |      |    |    |    |      |      |    |      |    |    |    |    |    |    |    |
| L Q |    |    |    |    |    |    |    |      |      |      |      |    |    |    |      |      |    |      |    |    |    |    |    |    |    |

DEC.2022 TYPES OF Es

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Yamagawa

DEC.2022 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<br>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<br>41 | X<br>40 | X<br>38 | X<br>40 | X<br>38 | X<br>36 | X<br>38 |    |    |    |    |    |    |    |    |    |    |    |         | X<br>50 | X<br>50 | X<br>50 | X<br>48 | X<br>45 |
| 2      | X<br>42 | X<br>42 | A       | X<br>43 | X<br>36 | X<br>37 | X<br>40 |    |    |    |    |    |    |    |    |    |    |    |         | X<br>56 | X<br>50 | X<br>46 | X<br>44 | X<br>36 |
| 3      | X<br>38 | X<br>42 | X<br>41 | X<br>50 | X<br>43 | X<br>42 | X<br>37 |    |    |    |    |    |    |    |    |    |    |    | X<br>57 | X<br>45 | X<br>56 | X<br>54 | X<br>48 | X<br>39 |
| 4      | X<br>37 | X<br>41 | X<br>40 | X<br>40 | X<br>39 | X<br>40 | X<br>40 |    |    |    |    |    |    |    |    |    |    |    |         | X<br>48 | X<br>57 | X<br>48 | X<br>45 | X<br>44 |
| 5      | X<br>47 | X<br>48 | X<br>50 | X<br>49 | X<br>47 | X<br>39 | X<br>41 |    |    |    |    |    |    |    |    |    |    |    |         | X<br>57 | X<br>71 | X<br>66 | X<br>50 | X<br>40 |
| 6      | X<br>41 | X<br>41 | X<br>45 | X<br>36 | X<br>36 | X<br>33 | X<br>33 |    |    |    | C  | C  | C  | C  | C  | C  | C  |    |         | X<br>50 | X<br>53 | X<br>45 | X<br>41 | X<br>34 |
| 7      | X<br>36 | X<br>39 | X<br>41 | X<br>38 | X<br>38 | X<br>34 | X<br>34 |    |    | C  | C  | C  | C  | C  | C  | C  | C  |    |         | X<br>46 | X<br>50 | X<br>56 | X<br>52 | X<br>50 |
| 8      | X<br>51 | X<br>56 | X<br>50 | X<br>45 | X<br>42 | X<br>44 | X<br>50 |    |    |    | C  | C  | C  | C  |    |    |    |    | X<br>55 | X<br>49 | X<br>58 | X<br>51 | X<br>39 | X<br>35 |
| 9      | X<br>37 | X<br>40 | X<br>43 | X<br>41 | X<br>41 | X<br>40 | X<br>40 |    |    |    |    |    |    |    |    |    |    |    |         | X<br>45 | X<br>47 | X<br>52 | X<br>54 | X<br>50 |
| 10     | X<br>36 | X<br>37 | X<br>38 | X<br>39 | X<br>40 | X<br>40 | X<br>46 |    |    |    |    |    |    |    |    |    |    |    |         | X<br>61 | X<br>70 | X<br>68 | X<br>42 | X<br>39 |
| 11     | X<br>40 | X<br>32 | X<br>31 | X<br>34 | X<br>37 | X<br>36 | X<br>40 |    |    |    |    |    |    |    |    |    |    |    |         | X<br>65 | X<br>51 | X<br>48 | X<br>40 | X<br>32 |
| 12     | X<br>35 | X<br>35 | A       | X<br>38 | X<br>51 | X<br>44 | X<br>39 |    |    |    |    |    |    |    |    |    |    |    |         | X<br>79 | X<br>70 | X<br>64 | X<br>50 | X<br>40 |
| 13     | X<br>38 | X<br>38 | X<br>37 | X<br>38 | X<br>40 | X<br>37 | X<br>38 |    |    |    |    |    |    |    |    |    |    |    |         | X<br>71 | X<br>60 | X<br>46 | X<br>36 | X<br>36 |
| 14     | X<br>37 | X<br>36 | X<br>37 | X<br>38 | X<br>43 | X<br>38 | X<br>36 |    |    |    |    |    |    |    |    |    |    |    |         | X<br>73 | X<br>73 | X<br>55 | X<br>48 | X<br>44 |
| 15     | X<br>42 | X<br>40 | X<br>40 | X<br>40 | X<br>42 | X<br>38 | X<br>39 |    |    |    |    |    |    |    |    |    |    |    |         | X<br>58 | X<br>58 | X<br>55 | X<br>44 | X<br>37 |
| 16     | X<br>40 | X<br>40 | X<br>42 | X<br>46 | X<br>44 | X<br>38 | X<br>35 |    |    |    |    |    |    |    |    |    |    |    |         | X<br>65 | X<br>53 | X<br>50 | X<br>45 | X<br>41 |
| 17     | X<br>42 | X<br>43 | X<br>45 | X<br>46 | X<br>40 | X<br>34 | X<br>36 |    |    |    |    |    |    |    |    |    |    |    |         | X<br>50 | X<br>53 | X<br>53 | X<br>47 | X<br>42 |
| 18     | X<br>42 | X<br>43 | X<br>42 | X<br>45 | X<br>48 | X<br>40 | X<br>40 |    |    |    |    |    |    |    |    |    |    |    |         | X<br>58 | X<br>64 | X<br>64 | X<br>44 | X<br>36 |
| 19     | X<br>38 | X<br>41 | X<br>39 | X<br>41 | X<br>43 | X<br>42 | X<br>42 |    |    |    |    |    |    |    |    |    |    |    |         | X<br>70 | X<br>72 | X<br>56 | X<br>42 | X<br>46 |
| 20     | X<br>46 | X<br>45 | X<br>49 | X<br>47 | X<br>41 | X<br>37 | X<br>42 |    |    |    |    |    |    |    |    |    |    |    |         | X<br>54 | X<br>48 | X<br>48 | X<br>45 | X<br>42 |
| 21     | X<br>39 | X<br>40 | X<br>42 | X<br>42 | X<br>45 | X<br>39 | X<br>40 |    |    |    |    |    |    |    |    |    |    |    |         | X<br>66 | X<br>58 | X<br>51 | X<br>41 | X<br>37 |
| 22     | X<br>40 | X<br>42 | X<br>45 | X<br>42 | X<br>42 | X<br>42 | X<br>40 |    |    |    |    |    |    |    |    |    |    |    |         | X<br>49 | X<br>41 | X<br>44 | X<br>37 | X<br>38 |
| 23     | X<br>40 | X<br>40 | X<br>40 | X<br>42 | X<br>43 | X<br>34 | X<br>36 |    |    |    |    |    |    |    |    |    |    |    |         | X<br>77 | X<br>52 | X<br>37 | X<br>34 | X<br>36 |
| 24     | X<br>37 | X<br>37 | X<br>42 | X<br>33 | X<br>34 | X<br>35 | X<br>35 |    |    |    |    |    |    |    |    |    |    |    |         | X<br>77 | X<br>41 | X<br>38 | X<br>38 | X<br>42 |
| 25     | X<br>47 | X<br>44 | X<br>41 | X<br>39 | X<br>38 | X<br>37 | X<br>39 |    |    |    |    |    |    |    |    |    |    |    | X<br>55 | X<br>50 | X<br>53 | X<br>41 | X<br>44 | X<br>38 |
| 26     | X<br>41 | X<br>42 | X<br>41 | X<br>42 | X<br>40 | X<br>38 | X<br>38 |    |    |    |    |    |    |    |    |    |    |    |         | X<br>41 | X<br>53 | X<br>56 | X<br>38 | X<br>44 |
| 27     | X<br>40 | X<br>38 | X<br>39 | X<br>41 | X<br>41 | X<br>39 | X<br>37 |    |    |    |    |    |    |    |    |    |    |    |         | X<br>94 | X<br>82 | X<br>59 | X<br>53 | X<br>42 |
| 28     | X<br>47 | X<br>46 | X<br>39 | X<br>37 | X<br>38 | X<br>37 | X<br>36 |    |    |    |    |    |    |    |    |    |    |    |         | A       | X<br>55 | X<br>60 | X<br>45 | X<br>41 |
| 29     | X<br>42 | X<br>44 | X<br>47 | X<br>42 | X<br>44 | X<br>41 | X<br>39 |    |    |    |    |    |    |    |    |    |    |    |         | X<br>62 | X<br>72 | X<br>60 | X<br>55 | X<br>40 |
| 30     | X<br>40 | X<br>42 | X<br>44 | X<br>41 | X<br>39 | X<br>32 | X<br>34 |    |    |    |    |    |    |    |    |    |    |    |         | X<br>66 | X<br>72 | X<br>64 | X<br>54 | X<br>40 |
| 31     | X<br>40 | X<br>45 | X<br>47 | X<br>38 | X<br>29 | X<br>32 | X<br>28 |    |    |    |    |    |    |    |    |    |    |    |         | X<br>55 | X<br>52 | X<br>54 | X<br>55 | X<br>41 |
|        | 00      | 01      | 02      | 03      | 04      | 05      | 06      | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18      | 19      | 20      | 21      | 22      | 23      |
| CNT    | 31      | 31      | 29      | 31      | 31      | 31      | 31      |    |    |    |    |    |    |    |    |    |    |    | 3       | 30      | 31      | 31      | 31      | 31      |
| MED    | X<br>40 | X<br>41 | X<br>41 | X<br>41 | X<br>38 | X<br>39 | X       |    |    |    |    |    |    |    |    |    |    |    | X<br>55 | X<br>58 | X<br>55 | X<br>53 | X<br>45 | X<br>40 |
| U Q    | X<br>42 | X<br>43 | X<br>45 | X<br>43 | X<br>43 | X<br>40 | X<br>40 |    |    |    |    |    |    |    |    |    |    |    | X<br>57 | X<br>66 | X<br>70 | X<br>59 | X<br>50 | X<br>42 |
| L Q    | X<br>38 | X<br>39 | X<br>39 | X<br>38 | X<br>38 | X<br>36 | X<br>36 |    |    |    |    |    |    |    |    |    |    |    | X<br>55 | X<br>50 | X<br>51 | X<br>48 | X<br>41 | X<br>37 |

DEC.2022 f<sub>XI</sub> (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



## IONOSPHERIC DATA STATION Yamagawa

DEC.2022 foF2 (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

| $\begin{matrix} H \\ D \end{matrix}$ | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09  | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18 | 19  | 20 | 21 | 22 | 23 |    |    |
|--------------------------------------|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|-----|----|----|----|----|----|----|
| 1                                    | 35 | 34 | 32 | 34 | 32 | 30 | 32 | 48 | 66 | 68  | 92  | 125 | 95  | 88  | 106 | 102 | 96  | 74  | 44 | 44  | 44 | 44 | 43 | 39 |    |    |
| 2                                    | 36 | 36 | A  | 37 | 30 | 31 | 34 | 58 | 86 | 85  | 90  | 112 | 106 | 96  | 94  | 88  | 73  | 69  | 52 | 50  | 44 | 40 | 38 | 30 |    |    |
| 3                                    | 32 | 36 | 35 | 44 | 37 | 36 | 31 | 50 | 75 | 97  | 102 | 87  | 81  | 92  | 105 | 74  | 77  | 78  | 51 | 39  | 50 | 48 | 41 | 33 |    |    |
| 4                                    | 31 | 34 | 34 | 34 | 33 | 34 | 34 | 50 | 73 | 105 | 104 | 86  | 86  | 85  | 86  | 85  | 84  | 64  | 45 | 42  | 51 | 42 | 39 | 38 |    |    |
| 5                                    | 41 | 42 | 44 | 43 | 41 | 33 | 35 | 53 | 93 | 126 | 121 | 103 | 88  | 93  | 92  | 78  | 84  | 73  | 50 | 51  | 65 | 60 | 44 | 34 |    |    |
| 6                                    | 35 | 34 | 39 | 30 | 30 | 27 | 27 | 42 | 88 | 115 | C   | C   | C   | C   | C   | C   | C   | 68  | 49 | 44  | H  | 47 | 39 | 35 | 28 |    |
| 7                                    | 30 | 33 | 35 | 32 | 32 | 28 | 28 | 48 | 77 | C   | C   | C   | C   | C   | C   | C   | C   | 69  | 50 | 41  | 44 | 50 | 46 | 44 |    |    |
| 8                                    | 45 | 50 | 44 | 39 | 36 | 38 | 44 | 63 | 94 | 151 | C   | C   | C   | C   | 82  | 75  | 74  | 76  | 49 | 43  | 52 | 45 | 33 | 29 |    |    |
| 9                                    | 31 | 34 | 37 | 35 | 35 | 34 | 34 | 50 | 78 | 86  | 100 | 96  | 94  | 93  | 83  | 88  | 93  | 80  | 63 | 39  | 41 | 46 | 48 | 44 |    |    |
| 10                                   | 30 | 31 | 32 | 33 | 34 | 34 | 40 | 49 | 74 | 88  | H   | 84  | 99  | 86  | 108 | 119 | 108 | 102 | 85 | 73  | 55 | 64 | 62 | 36 | 33 |    |
| 11                                   | 34 | 26 | 25 | 28 | 31 | 30 | 34 | 51 | 71 | 85  | 88  | 88  | 93  | 92  | 89  | 92  | 90  | 75  | 59 | 59  | 45 | 42 | 34 | 26 |    |    |
| 12                                   | 29 | 31 | A  | 32 | F  | 44 | 38 | 33 | 48 | 71  | 91  | 108 | 99  | H   | 94  | 88  | 95  | 97  | 95 | 88  | 72 | 73 | 64 | 58 | 44 | 34 |
| 13                                   | 32 | 32 | 31 | 32 | 34 | 31 | 32 | 50 | 82 | 98  | 100 | 102 | 105 | 104 | 106 | 102 | 96  | 86  | 60 | 65  | 54 | 40 | 30 | 30 |    |    |
| 14                                   | 31 | 30 | 31 | 32 | 37 | 32 | 30 | 50 | 84 | 90  | 86  | 97  | 103 | 109 | 109 | 90  | 84  | 72  | 64 | 67  | 67 | 49 | 42 | 38 |    |    |
| 15                                   | 36 | 34 | 34 | 34 | 36 | 32 | 33 | 52 | 80 | 83  | 93  | 104 | 100 | 114 | 110 | 106 | 109 | 83  | 59 | 52  | 52 | 49 | 38 | 31 |    |    |
| 16                                   | 34 | 34 | 36 | 40 | 38 | 32 | 29 | 48 | 80 | 82  | 86  | 106 | 109 | 106 | 100 | 98  | 90  | 80  | 65 | 59  | 47 | 44 | 39 | 35 |    |    |
| 17                                   | 36 | 37 | 39 | 40 | 34 | 28 | 30 | 48 | 73 | 87  | 91  | 94  | 111 | 115 | 98  | 90  | 92  | 87  | 59 | 44  | 47 | 47 | 41 | 36 |    |    |
| 18                                   | 36 | 37 | 36 | 39 | 42 | 34 | 35 | 49 | 79 | 84  | 86  | 96  | 111 | 114 | 100 | 98  | 98  | 93  | 62 | 52  | 58 | 58 | 37 | 30 |    |    |
| 19                                   | 32 | 35 | 33 | 35 | 37 | 36 | 36 | 50 | 70 | 79  | 99  | 108 | 107 | 92  | 90  | 107 | 95  | 86  | 64 | 64  | 66 | 50 | 36 | 41 |    |    |
| 20                                   | 40 | 39 | 43 | 41 | 35 | 31 | 36 | 48 | 71 | 94  | 113 | 116 | 109 | 107 | 116 | 104 | 91  | 76  | 79 | R   | 48 | R  | 42 | 39 | 36 |    |
| 21                                   | 33 | 34 | 36 | 36 | 39 | 33 | 34 | 50 | 84 | 82  | 78  | 110 | 121 | 112 | 108 | 111 | 103 | 87  | 70 | 60  | 52 | 45 | 35 | 31 |    |    |
| 22                                   | 34 | 36 | 39 | 36 | 36 | 36 | 34 | 48 | 71 | 83  | 110 | 124 | 118 | 116 | 102 | 99  | 97  | 76  | 52 | 43  | 35 | 38 | 31 | 32 |    |    |
| 23                                   | 34 | 34 | 34 | 36 | 37 | 28 | 30 | 43 | 84 | 90  | 89  | 108 | 93  | 110 | 100 | 91  | 83  | 73  | 62 | 71  | 46 | 31 | 28 | 30 |    |    |
| 24                                   | 31 | 31 | 36 | 27 | 28 | 29 | 29 | 43 | 84 | 87  | 113 | 110 | 92  | R   | 77  | 80  | 94  | 87  | R  | 84  | 67 | 71 | 35 | 32 | 36 |    |
| 25                                   | 41 | 38 | 35 | 33 | 32 | 31 | 33 | 45 | 66 | 84  | 124 | 97  | 98  | 104 | 88  | 90  | 103 | 98  | 49 | 44  | 47 | 35 | 38 | 32 |    |    |
| 26                                   | 35 | 36 | 35 | 36 | 34 | 32 | 32 | 39 | 83 | 82  | 96  | 81  | 90  | 78  | 95  | 105 | 83  | 70  | 57 | 35  | 47 | 50 | 32 | 38 |    |    |
| 27                                   | 34 | 32 | 33 | 35 | 35 | 33 | 31 | 48 | 99 | 115 | 117 | 101 | 118 | 111 | 102 | 110 | 123 | 118 | R  | 102 | 88 | 76 | 53 | 47 | 36 |    |
| 28                                   | 41 | 40 | 33 | 31 | 33 | 31 | 30 | 49 | 90 | 105 | 87  | 92  | 101 | 106 | 98  | 92  | 77  | 73  | 54 | A   | 49 | 54 | 39 | 35 |    |    |
| 29                                   | 36 | 38 | 41 | 36 | 38 | 35 | 33 | 45 | 82 | 88  | 90  | 82  | 98  | 105 | 116 | 113 | 109 | 88  | R  | J   | R  | 66 | 54 | 49 | 34 |    |
| 30                                   | 34 | 36 | 38 | 35 | 33 | 26 | 28 | 40 | 95 | 86  | 99  | 102 | 94  | 104 | 120 | 100 | 92  | 111 | 75 | 60  | 66 | 58 | 47 | 34 |    |    |
| 31                                   | 34 | 39 | 41 | 32 | 23 | 26 | 22 | 46 | 72 | 98  | 128 | 109 | 96  | 88  | 102 | 97  | 78  | 75  | 76 | 49  | 46 | 48 | 49 | 35 |    |    |
|                                      | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09  | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18 | 19  | 20 | 21 | 22 | 23 |    |    |
| CNT                                  | 31 | 31 | 29 | 31 | 31 | 31 | 31 | 31 | 31 | 30  | 28  | 28  | 28  | 28  | 29  | 29  | 29  | 31  | 31 | 30  | 31 | 31 | 31 | 31 |    |    |
| MED                                  | 34 | 34 | 35 | 35 | 35 | 32 | 33 | 48 | 80 | 88  | 98  | 102 | 98  | 104 | 100 | 97  | 92  | 78  | 60 | 52  | 49 | 47 | 39 | 34 |    |    |
| U Q                                  | 36 | 37 | 39 | 37 | 37 | 34 | 34 | 50 | 84 | 98  | 109 | 108 | 108 | 110 | 107 | 104 | 98  | 87  | 70 | 60  | 64 | 53 | 44 | 36 |    |    |
| L Q                                  | 32 | 33 | 33 | 32 | 32 | 30 | 30 | 46 | 72 | 84  | 88  | 95  | 93  | 92  | 91  | 90  | 84  | 73  | 51 | 44  | 45 | 42 | 35 | 31 |    |    |

DEC.2022 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Yamagawa

DEC.2022 foF1 (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

| H<br>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      |    |    |    |    |    |    |    |    | 272 | 336 | L   | L   | U   | L   | L   | L   |     |    |    |    |    |    |    |    |  |
| 2      |    |    |    |    |    |    |    |    |     |     | 456 | 476 | 460 | 480 | 440 |     |     |    |    |    |    |    |    |    |  |
| 3      |    |    |    |    |    |    |    |    |     |     | L   | L   |     |     | 424 |     |     |    |    |    |    |    |    |    |  |
| 4      |    |    |    |    |    |    |    |    | 300 |     | L   |     | 480 | 420 | 448 | 412 | 344 |    |    |    |    |    |    |    |  |
| 5      |    |    |    |    |    |    |    |    | L   | L   | L   | L   | 480 | 472 |     |     |     |    |    |    |    |    |    |    |  |
| 6      |    |    |    |    |    |    |    |    | L   | L   | C   | C   | C   | C   | C   | C   | C   | C  |    |    |    |    |    |    |  |
| 7      |    |    |    |    |    |    |    |    |     | C   | C   | C   | C   | C   | C   | C   | C   | C  |    |    |    |    |    |    |  |
| 8      |    |    |    |    |    |    |    |    |     | L   | C   | C   | C   | C   | L   |     |     |    |    |    |    |    |    |    |  |
| 9      |    |    |    |    |    |    |    |    | 284 |     | L   | L   | L   | L   | L   | L   | A   |    |    |    |    |    |    |    |  |
| 10     |    |    |    |    |    |    |    |    | 272 |     | L   | L   |     | 468 |     |     |     |    |    |    |    |    |    |    |  |
| 11     |    |    |    |    |    |    |    |    |     | 352 | L   |     | 408 |     | L   | L   | A   |    |    |    |    |    |    |    |  |
| 12     |    |    |    |    |    |    |    |    | 304 |     | L   | U   | L   | L   |     | L   | L   |    |    |    |    |    |    |    |  |
| 13     |    |    |    |    |    |    |    |    |     | L   | L   | L   | L   | U   | L   |     | L   |    |    |    |    |    |    |    |  |
| 14     |    |    |    |    |    |    |    |    |     |     | L   | L   | L   | L   | L   | L   |     |    |    |    |    |    |    |    |  |
| 15     |    |    |    |    |    |    |    |    |     |     |     | L   | L   | L   | L   | L   | A   |    |    |    |    |    |    |    |  |
| 16     |    |    |    |    |    |    |    |    |     |     |     | 520 |     | L   | L   | L   | L   |    |    |    |    |    |    |    |  |
| 17     |    |    |    |    |    |    |    |    |     |     | L   | L   | L   | L   | L   | L   |     |    |    |    |    |    |    |    |  |
| 18     |    |    |    |    |    |    |    |    |     |     | L   | L   | 520 | L   | L   | L   |     |    |    |    |    |    |    |    |  |
| 19     |    |    |    |    |    |    |    |    |     |     | L   | L   | L   | L   |     | L   |     |    |    |    |    |    |    |    |  |
| 20     |    |    |    |    |    |    |    |    |     |     | L   | L   | L   | L   | L   |     |     |    |    |    |    |    |    |    |  |
| 21     |    |    |    |    |    |    |    |    |     |     |     | L   | L   | L   | L   |     | L   |    |    |    |    |    |    |    |  |
| 22     |    |    |    |    |    |    |    |    |     |     | L   | L   | L   | L   | L   |     |     |    |    |    |    |    |    |    |  |
| 23     |    |    |    |    |    |    |    |    |     |     | L   | L   | L   | 500 | L   | L   |     |    |    |    |    |    |    |    |  |
| 24     |    |    |    |    |    |    |    |    |     | L   | L   | L   | U   | L   | L   | L   |     |    |    |    |    |    |    |    |  |
| 25     |    |    |    |    |    |    |    |    | 368 |     | L   | L   | 460 | 636 |     | L   | L   |    |    |    |    |    |    |    |  |
| 26     |    |    |    |    |    |    |    |    |     | L   | L   | L   | 432 | 432 | 456 |     | L   |    |    |    |    |    |    |    |  |
| 27     |    |    |    |    |    |    |    |    | L   | L   | L   | L   | L   | L   | L   | L   |     |    |    |    |    |    |    |    |  |
| 28     |    |    |    |    |    |    |    |    |     |     | L   | L   | 544 | L   | L   | L   | A   |    |    |    |    |    |    |    |  |
| 29     |    |    |    |    |    |    |    |    |     | L   |     | L   | 504 | L   | L   | L   |     |    |    |    |    |    |    |    |  |
| 30     |    |    |    |    |    |    |    |    |     | L   | 444 | 460 | 512 | L   | L   | L   |     |    |    |    |    |    |    |    |  |
| 31     |    |    |    |    |    |    |    |    |     | L   | L   | L   | U   | 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    |    |    |    |    |    |    |    |    | 5   | 3   | 2   | 9   | 12  | 10  | 7   | 1   |     |    |    |    |    |    |    |    |  |
| MED    |    |    |    |    |    |    |    |    | 284 | 352 | 456 | 468 | 460 | 476 | 440 | 344 |     |    |    |    |    |    |    |    |  |
| U Q    |    |    |    |    |    |    |    |    | 302 | 368 |     | 490 | 492 | 500 | 456 |     |     |    |    |    |    |    |    |    |  |
| L Q    |    |    |    |    |    |    |    |    | 272 | 336 |     | 438 | 438 | 468 | 412 |     |     |    |    |    |    |    |    |    |  |

DEC.2022 foF1 (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Yamagawa

DEC.2022 foE (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

| H<br>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   | 316 | 276 | 232 | A   | B  |    |    |    |    |    |  |
| 2      |    |    |    |    |    |    |    | B  | 228 | 272 | 308 | 324 | 340 | 324 | 324 | 292 | 256 | A   | A  |    |    |    |    |    |  |
| 3      |    |    |    |    |    |    |    | B  | 220 | A   | 292 | A   | 328 | 344 | 316 | 300 | 248 | A   |    |    |    |    |    |    |  |
| 4      |    |    |    |    |    |    |    | B  | 220 | 276 | 312 | 340 | 328 | 328 | 320 | 308 | A   | B   | B  |    |    |    |    |    |  |
| 5      |    |    |    |    |    |    |    | B  | 232 | 276 | 320 | 344 | 344 | 340 | 324 | 300 | A   | A   | A  |    |    |    |    |    |  |
| 6      |    |    |    |    |    |    |    | A  | 240 | 284 | C   | C   | C   | C   | C   | C   | C   | B   | B  |    |    |    |    |    |  |
| 7      |    |    |    |    |    |    |    | B  | 216 | C   | C   | C   | C   | C   | C   | C   | C   | A   | A  |    |    |    |    |    |  |
| 8      |    |    |    |    |    |    |    | B  | 240 | 280 | C   | C   | C   | C   | 316 | 284 | 244 | A   |    |    |    |    |    |    |  |
| 9      |    |    |    |    |    |    |    | B  | 212 | 264 | 300 | 328 | 340 | 336 | 324 | 304 | 248 | A   | B  |    |    |    |    |    |  |
| 10     |    |    |    |    |    |    |    | B  | 224 | 288 | 320 | 332 | 324 | 336 | A   | A   | A   | B   | B  |    |    |    |    |    |  |
| 11     |    |    |    |    |    |    |    | B  | 212 | A   | 304 | 324 | A   | 336 | A   | A   | 256 | A   | A  |    |    |    |    |    |  |
| 12     |    |    |    |    |    |    |    | B  | 228 | A   | 312 | 344 | 360 | 360 | A   | A   | A   | A   | A  |    |    |    |    |    |  |
| 13     |    |    |    |    |    |    |    | B  | 208 | A   | 308 | 340 | 352 | 352 | 336 | A   | 268 | A   | A  |    |    |    |    |    |  |
| 14     |    |    |    |    |    |    |    | B  | 236 | 304 | 332 | A   | 348 | 336 | 336 | A   | A   | A   | B  |    |    |    |    |    |  |
| 15     |    |    |    |    |    |    |    | B  | 232 | 292 | A   | 356 | 352 | 344 | 336 | A   | A   | A   | A  |    |    |    |    |    |  |
| 16     |    |    |    |    |    |    |    | B  | 244 | 284 | 320 | A   | 360 | 348 | 344 | 324 | A   | 208 | B  |    |    |    |    |    |  |
| 17     |    |    |    |    |    |    |    | B  | 224 | A   | A   | A   | A   | 348 | A   | A   | A   | A   | B  |    |    |    |    |    |  |
| 18     |    |    |    |    |    |    |    | B  | 232 | 288 | 312 | 312 | 352 | 352 | 340 | 312 | 268 | B   | B  |    |    |    |    |    |  |
| 19     |    |    |    |    |    |    |    | B  | A   | 280 | 308 | A   | A   | A   | 340 | 320 | 268 | A   | B  |    |    |    |    |    |  |
| 20     |    |    |    |    |    |    |    | B  | 236 | 276 | 296 | A   | 352 | A   | A   | A   | 264 | A   | A  |    |    |    |    |    |  |
| 21     |    |    |    |    |    |    |    | B  | 224 | 280 | 320 | 340 | 352 | 352 | 328 | 304 | 256 | B   | B  |    |    |    |    |    |  |
| 22     |    |    |    |    |    |    |    | B  | A   | 276 | 312 | 328 | 344 | 332 | 332 | 296 | A   | A   | B  |    |    |    |    |    |  |
| 23     |    |    |    |    |    |    |    | B  | 228 | 276 | 300 | A   | 336 | A   | A   | 288 | A   | A   | B  |    |    |    |    |    |  |
| 24     |    |    |    |    |    |    |    | B  | 216 | 276 | 312 | A   | 332 | 336 | 324 | A   | A   | A   | B  |    |    |    |    |    |  |
| 25     |    |    |    |    |    |    |    | B  | A   | A   | A   | 316 | 332 | 332 | 324 | 296 | 268 | A   |    |    |    |    |    |    |  |
| 26     |    |    |    |    |    |    |    | B  | 220 | 260 | 320 | 336 | 344 | 344 | 328 | 304 | 252 | A   | B  |    |    |    |    |    |  |
| 27     |    |    |    |    |    |    |    | B  | 236 | 292 | 328 | 344 | 352 | 352 | 332 | A   | A   | A   | B  |    |    |    |    |    |  |
| 28     |    |    |    |    |    |    |    | B  | A   | 292 | 308 | 336 | A   | 364 | 348 | 308 | 264 | A   | A  |    |    |    |    |    |  |
| 29     |    |    |    |    |    |    |    | B  | 220 | 256 | A   | 340 | 344 | 352 | 336 | 320 | 280 | 212 | A  |    |    |    |    |    |  |
| 30     |    |    |    |    |    |    |    | B  | A   | A   | A   | 340 | 348 | 352 | 352 | 328 | 272 | A   | B  |    |    |    |    |    |  |
| 31     |    |    |    |    |    |    |    | B  | 212 | 248 | 312 | 340 | 340 | 352 | 344 | 312 | 272 | 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    |    |    |    |    |    |    |    |    | 25  | 23  | 22  | 19  | 23  | 24  | 23  | 19  | 17  | 2   |    |    |    |    |    |    |  |
| MED    |    |    |    |    |    |    |    |    | 224 | 280 | 312 | 340 | 344 | 344 | 332 | 304 | 264 | 210 |    |    |    |    |    |    |  |
| U Q    |    |    |    |    |    |    |    |    | 234 | 288 | 320 | 340 | 352 | 352 | 340 | 312 | 268 |     |    |    |    |    |    |    |  |
| L Q    |    |    |    |    |    |    |    |    | 218 | 276 | 308 | 328 | 336 | 336 | 324 | 296 | 250 |     |    |    |    |    |    |    |  |

DEC.2022 foE (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Yamagawa

DEC.2022 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<br>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 25 | A 16 | B 30 | E 16 | B 16 | B 18 | B 16 | E 16 | J 28 | A 41 | J 87 | A 38 | J 40 | G    | G    | G    | J 26 | A 26 | J 32 | A 25 | J 24 | A 20 | E 16 | J 32 |      |    |
| 2      | J 41 | A 53 | J 65 | A 42 | J 29 | A 19 | J 21 | A 16 | G    | 31   | 34   | 35   | G    | 38   | J 41 | G    | G    | 20   | J 24 | A 16 | J 30 | A 16 | E 16 | B 16 |      |    |
| 3      | E 16 | B 21 | J 20 | A 20 | E 16 | B 16 | B 16 | B 19 | 26   | 32   | 33   | 37   | G    | 40   | G    | G    | J 32 | A 26 | J 26 | A 17 | A 16 | E 16 | B 16 | B 16 |      |    |
| 4      | E 16 | B 16 | B 16 | B 16 | E 16 | B 16 | B 16 | B 16 | 26   | 32   | 36   | G    | G    | G    | G    | G    | 29   | E 18 | B 16 | J 30 | A 16 | E 16 | B 30 | B 16 |      |    |
| 5      | J 21 | A 31 | A 21 | A 16 | E 16 | B 16 | B 16 | B 16 | G    | 30   | G    | G    | G    | G    | G    | J 28 | A 30 | A 24 | A 26 | A 20 | A 16 | E 16 | J 24 | A 17 |      |    |
| 6      | E 16 | B 18 | A 18 | A 18 | J 28 | A 16 | B 39 | A 34 | G    | G    | C    | C    | C    | C    | C    | C    | C    | J 20 | A 23 | E 17 | B 16 | E 16 | B 16 | B 16 |      |    |
| 7      | E 16 | B 16 | B 16 | B 16 | J 30 | A 16 | B 16 | B 16 | 24   | C    | C    | C    | C    | C    | C    | C    | C    | J 33 | A 30 | A 22 | A 16 | E 16 | B 16 | B 19 |      |    |
| 8      | 20   | J 19 | A 16 | B 16 | E 21 | A 17 | A 16 | B 18 | G    | 34   | C    | C    | C    | C    | G    | 36   | 31   | J 28 | A 30 | A 16 | E 16 | B 16 | B 16 | B 16 |      |    |
| 9      | J 19 | A 17 | A 18 | A 16 | E 16 | B 28 | A 16 | B 25 | 25   | 31   | 33   | G    | G    | G    | 36   | 35   | 33   | 20   | E 16 | B 16 | E 16 | B 20 | E 16 | B 16 |      |    |
| 10     | E 16 | B 16 | B 24 | A 16 | E 16 | B 16 | B 16 | B 16 | 26   | 32   | 34   | 41   | J 52 | A 46 | J 36 | A 48 | A 47 | A 25 | A 33 | A 20 | A 16 | E 25 | A 26 | A 22 |      |    |
| 11     | 19   | 19   | 18   | 18   | J 16 | A 17 | A 16 | A 16 | 24   | 30   | G    | 35   | 40   | 37   | 40   | 44   | G    | J 24 | A 54 | A 85 | A 53 | A 26 | A 22 | A 16 |      |    |
| 12     | E 16 | B 61 | A 66 | A 49 | A 21 | A 16 | A 24 | A 16 | 60   | 70   | 36   | G    | G    | G    | G    | G    | 42   | 39   | 44   | 31   | 85   | 54   | 39   | 29   | 21   | 20 |
| 13     | E 16 | B 16 | B 16 | B 16 | E 16 | B 23 | A 16 | B 16 | 27   | 32   | G    | G    | G    | G    | G    | G    | 31   | 32   | G    | 24   | 34   | 30   | 16   | 23   | 20   | 25 |
| 14     | J 41 | A 16 | A 40 | A 42 | A 23 | A 16 | A 16 | A 25 | 41   | G    | G    | 39   | 39   | 37   | G    | J 44 | A 42 | A 28 | A 52 | A 26 | A 41 | A 16 | A 40 | A 26 |      |    |
| 15     | E 16 | B 23 | A 31 | A 21 | J 34 | A 20 | J 20 | A 16 | 26   | G    | 50   | G    | G    | J 41 | A 35 | J 49 | A 68 | A 28 | A 27 | A 27 | A 32 | A 20 | E 16 | B 20 |      |    |
| 16     | E 16 | B 16 | B 16 | B 16 | E 16 | B 16 | B 16 | B 18 | 28   | 32   | 35   | 41   | 53   | G    | J 34 | A 37 | A 31 | G    | J 26 | A 16 | A 18 | A 30 | A 24 | A 16 |      |    |
| 17     | J 32 | A 24 | A 17 | A 16 | J 17 | A 16 | B 16 | B 16 | 26   | J 34 | A 39 | A 62 | A 44 | G    | J 63 | A 45 | A 29 | A 48 | A 18 | A 16 | A 16 | A 16 | A 16 | A 16 |      |    |
| 18     | J 22 | A 20 | E 16 | B 16 | B 16 | J 18 | A 27 | A 25 | 27   | 35   | 35   | 36   | G    | J 40 | A    | G    | G    | E 20 | B 16 | B 19 | A 16 | A 16 | A 19 | A 16 |      |    |
| 19     | E 16 | B 20 | J 26 | A 25 | A 15 | A 16 | A 18 | A 16 | 25   | 33   | J 38 | A 40 | 39   | A 44 | G    | G    | G    | 22   | J 18 | A 21 | A 22 | A 33 | A 26 | A 23 |      |    |
| 20     | J 26 | A 52 | A 32 | A 24 | A 16 | A 16 | A 16 | A 16 | G    | J 37 | A 39 | A 40 | A 40 | A 39 | A 40 | A 44 | G    | J 37 | A 36 | A 22 | A 16 | A 22 | A 22 | A 27 |      |    |
| 21     | E 16 | B 52 | A 25 | A 17 | A 16 | A 16 | A 16 | A 16 | G    | G    | G    | G    | G    | G    | G    | G    | G    | 19   | E 16 | A 24 | A 20 | A 16 | A 16 | A 19 |      |    |
| 22     | J 18 | A 16 | A 16 | A 16 | E 16 | B 16 | A 16 | A 16 | 24   | 33   | 36   | G    | G    | G    | G    | 33   | 34   | 20   | E 16 | A 24 | A 22 | A 16 | A 35 | A 16 |      |    |
| 23     | E 16 | B 16 | A 22 | A 16 | A 16 | A 16 | A 17 | A 17 | G    | G    | 34   | 36   | G    | 35   | 34   | 32   | 29   | 23   | J 17 | A 33 | A 21 | A 18 | A 26 | A 20 |      |    |
| 24     | J 25 | A 16 | B 16 | B 16 | A 12 | A 16 | A 16 | A 26 | 24   | G    | 34   | 78   | G    | G    | G    | J 33 | A 30 | A 35 | A 35 | A 23 | A 16 | A 16 | A 16 | A 16 |      |    |
| 25     | E 16 | B 16 | B 16 | B 16 | E 16 | B 16 | A 18 | A 16 | 36   | 36   | 47   | G    | J 34 | A    | G    | G    | 34   | 28   | E 16 | A 29 | A 29 | A 19 | A 20 | A 15 |      |    |
| 26     | J 15 | A 26 | A 21 | A 16 | E 19 | B 16 | B 16 | B 16 | 26   | 31   | G    | G    | G    | G    | G    | 35   | G    | 28   | J 26 | A 16 | A 19 | A 19 | A 16 | A 22 | A 16 |    |
| 27     | J 24 | A 16 | A 19 | A 26 | A 16 | A 16 | A 16 | A 16 | G    | G    | G    | G    | G    | G    | G    | J 42 | A 43 | A 48 | A 16 | A 24 | A 42 | A 18 | A 16 | A 16 |      |    |
| 28     | E 16 | B 21 | A 27 | A 25 | A 21 | A 16 | A 16 | A 19 | 25   | 34   | 37   | G    | J 54 | A    | G    | 40   | J 59 | A 34 | A 47 | A 46 | A 50 | A 47 | A 63 | A 87 | A 22 |    |
| 29     | J 22 | A 30 | A 17 | A 25 | A 19 | A 25 | A 20 | A 20 | 26   | 31   | 40   | 43   | G    | G    | J 46 | A    | G    | G    | J 25 | A 26 | A 19 | A 16 | A 16 | A 16 |      |    |
| 30     | E 16 | B 26 | A 16 | A 19 | E 16 | B 16 | A 16 | A 27 | 24   | J 37 | A 39 | G    | J 28 | A 38 | 38   | J 39 | A 48 | A 21 | A 24 | A 18 | A 24 | A 26 | A 18 | A 29 |      |    |
| 31     | J 38 | A 34 | A 45 | A 38 | A 20 | A 18 | A 20 | A 22 | 24   | 31   | 39   | 44   | J 60 | A 52 | 37   | 40   | G    | J 28 | A 34 | A 16 | A 18 | A 16 | A 16 | A 36 |      |    |
|        | 00   | 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   | 30   | 28   | 28   | 28   | 28   | 29   | 29   | 29   | 31   | 31   | 31   | 31   | 31   | 31   | 31   |      |    |
| MED    | 16   | 19   | J 19 | A 17 | E 16 | B 16 | B 16 | B 16 | 25   | 32   | 35   | 35   | G    | G    | 34   | 34   | 29   | J 24 | A 26 | A 22 | A 19 | A 18 | A 18 | A 16 |      |    |
| U Q    | J 24 | A 26 | A 27 | A 25 | A 21 | A 17 | A 18 | A 20 | 26   | 34   | 39   | 40   | 40   | 40   | 39   | 43   | 34   | 28   | 34   | 27   | A 24 | A 24 | A 24 | A 22 |      |    |
| L Q    | E 16 | B 16 | B 16 | B 16 | E 16 | B 16 | B 16 | B 16 | G    | G    | G    | G    | G    | G    | G    | G    | G    | E 20 | B 16 | B 17 | A 16 | A 16 | A 16 | A 16 |      |    |

DEC.2022 foEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Yamagawa

DEC.2022 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<br>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  | 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
|        | 00 | 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 | 30 | 28 | 28 | 28 | 28 | 29 | 29 | 29 | 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  | 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  | 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  | E  | B |

DEC.2022 fbEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Yamagawa

DEC.2022 fmin (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

| $\frac{H}{D}$ | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 1             | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 22 | 23 | 22 | 20 | 21 | 20 | 18 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 2             | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 18 | 20 | 22 | 18 | 18 | 20 | 20 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 3             | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 18 | 18 | 16 | 20 | 20 | 19 | 21 | 15 | 16 | 16 | 16 | 16 | 17 | 16 | 16 |
| 4             | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 20 | 21 | 23 | 20 | 23 | 20 | 18 | 16 | 16 | 16 | 16 | 16 | 16 |
| 5             | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 19 | 21 | 20 | 22 | 20 | 19 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 6             | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 16 | C  | C  | C  | C  | C  | C  | C  | 20 | 20 | 17 | 16 | 16 | 16 | 16 |
| 7             | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 18 | C  | C  | C  | C  | C  | C  | C  | C  | 16 | 15 | 16 | 16 | 16 | 16 | 16 |
| 8             | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 18 | 18 | 18 | C  | C  | C  | C  | C  | 16 | 16 | 18 | 16 | 16 | 16 | 16 | 16 | 16 |
| 9             | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 15 | 17 | 20 | 20 | 20 | 20 | 19 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 10            | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 19 | 21 | 21 | 21 | 18 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 11            | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 18 | 20 | 19 | 21 | 21 | 20 | 18 | 18 | 16 | 16 | 16 | 16 | 16 | 16 |
| 12            | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 15 | 17 | 17 | 21 | 21 | 20 | 18 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 18 |
| 13            | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 19 | 21 | 21 | 21 | 20 | 20 | 20 | 18 | 16 | 16 | 16 | 16 | 16 | 16 |
| 14            | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 14 | 16 | 19 | 19 | 19 | 20 | 17 | 18 | 19 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 15            | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 19 | 22 | 20 | 20 | 21 | 16 | 18 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 16            | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 32 | 24 | 23 | 20 | 23 | 20 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 17            | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 17 | 19 | 19 | 20 | 18 | 18 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 18            | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 14 | 18 | 16 | 21 | 19 | 19 | 21 | 20 | 20 | 16 | 16 | 16 | 16 | 16 | 16 |
| 19            | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 22 | 23 | 20 | 18 | 18 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 20            | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 20 | 21 | 21 | 20 | 18 | 16 | 15 | 16 | 16 | 16 | 16 | 16 | 16 |
| 21            | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 18 | 20 | 21 | 21 | 20 | 20 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 22            | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 19 | 22 | 20 | 19 | 19 | 19 | 21 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 23            | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 14 | 18 | 19 | 19 | 20 | 21 | 20 | 17 | 17 | 16 | 16 | 16 | 16 | 16 | 16 |
| 24            | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 19 | 19 | 19 | 19 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 25            | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 19 | 22 | 22 | 21 | 17 | 16 | 16 | 16 | 16 | 16 | 16 |
| 26            | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 18 | 20 | 20 | 19 | 23 | 20 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 27            | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 19 | 20 | 15 | 22 | 22 | 22 | 20 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 28            | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 22 | 24 | 26 | 28 | 24 | 22 | 20 | 18 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 29            | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 18 | 20 | 20 | 22 | 22 | 22 | 21 | 22 | 22 | 18 | 16 | 16 | 16 | 16 | 16 | 16 |
| 30            | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 17 | 19 | 18 | 18 | 19 | 19 | 19 | 16 | 16 | 16 | 16 | 16 | 26 | 18 | 16 |
| 31            | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 17 | 16 | 17 | 22 | 22 | 22 | 22 | 20 | 16 | 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 | 30 | 28 | 28 | 28 | 28 | 29 | 29 | 29 | 31 | 31 | 31 | 31 | 31 | 31 | 31 |
| MED           | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 18 | 20 | 21 | 20 | 20 | 20 | 18 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| U Q           | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 19 | 21 | 22 | 22 | 21 | 21 | 20 | 17 | 16 | 16 | 16 | 16 | 16 | 16 |
| L Q           | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 20 | 20 | 19 | 18 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |

DEC.2022 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Yamagawa

DEC. 2022 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

| $\begin{matrix} H \\ D \end{matrix}$ | 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                                    | 300 | 338 | 291 | 329 | 300 | 269 | 318 | 387 | 366 | 320 | 318 | 355 | 349 | 319 | 339 | 333 | 333 | 364 | 353 | 319 | 318 | 295 | 306 | 299 |     |
| 2                                    | 305 | 312 | A   | 305 | 304 | 274 | 314 | 326 | 357 | 363 | 328 | V   | 356 | 345 | 350 | 353 | 362 | 351 | 348 | 322 | 350 | 306 | 320 | 356 | 288 |
| 3                                    | 288 | 299 | 277 | 305 | 306 | 321 | 302 | 341 | 365 | 365 | 372 | 363 | 344 | 320 | 344 | 366 | 350 | 359 | 344 | 290 | 313 | 308 | 312 | 328 |     |
| 4                                    | 282 | 320 | 303 | 302 | 295 | 291 | 309 | 331 | 322 | 363 | 376 | 335 | 344 | 354 | 336 | 362 | 362 | 336 | 348 | 296 | 317 | 304 | 285 | 274 |     |
| 5                                    | 277 | 292 | 276 | 310 | 329 | 271 | 296 | 292 | 334 | 330 | R   | R   | 364 | 342 | 331 | 340 | 326 | 346 | 364 | 324 | 304 | 321 | 341 | 345 | 279 |
| 6                                    | 290 | 301 | 316 | 313 | 354 | 281 | 283 | 307 | 344 | 355 | C   | C   | C   | C   | C   | C   | C   | C   | 336 | 353 | 296 | H   | 315 | 318 | 327 |
| 7                                    | 256 | 296 | 323 | 326 | 324 | 298 | 312 | 341 | 347 | C   | C   | C   | C   | C   | C   | C   | C   | C   | 367 | 368 | 327 | 307 | 298 | 294 | 265 |
| 8                                    | 256 | 288 | 315 | 272 | 269 | 272 | 278 | 286 | 285 | 348 | C   | C   | C   | C   | C   | 352 | 340 | 345 | 359 | 321 | 304 | 318 | 344 | 329 | 275 |
| 9                                    | 279 | 289 | 314 | 301 | 308 | 295 | 323 | 339 | 351 | 337 | 357 | H   | 361 | 346 | 343 | 348 | 348 | 354 | 376 | 364 | 354 | 280 | 306 | 306 | 315 |
| 10                                   | 283 | 283 | 300 | 317 | 286 | 289 | 356 | 327 | 365 | 361 | 328 | 355 | 325 | 326 | 336 | 324 | 346 | 373 | 355 | 306 | 308 | 283 | 307 | 293 |     |
| 11                                   | 318 | 291 | 277 | 268 | 294 | 279 | 324 | 338 | 363 | 352 | 358 | 363 | 337 | 331 | 321 | 340 | 340 | 362 | 334 | 356 | 293 | 321 | 329 | 307 |     |
| 12                                   | 265 | 247 | A   | 266 | F   | 270 | 335 | 314 | 335 | 349 | 351 | 350 | 335 | H   | 312 | 336 | 332 | 353 | 346 | 321 | 352 | 336 | 297 | 288 | 300 |
| 13                                   | 289 | 284 | 289 | 293 | 306 | 302 | 304 | 332 | 369 | 365 | 351 | 333 | 318 | 322 | 317 | 295 | 340 | 356 | 323 | 340 | 331 | 290 | 279 | 278 |     |
| 14                                   | 292 | 290 | 270 | 286 | 320 | 342 | 300 | 343 | 361 | 364 | 358 | 326 | 316 | 326 | 344 | 332 | 351 | 340 | 332 | 351 | 287 | 298 | 327 | 293 |     |
| 15                                   | 306 | 295 | 288 | 298 | 304 | 281 | 302 | 336 | 363 | 371 | 340 | 338 | 311 | 322 | 303 | 318 | 341 | 342 | 326 | 321 | 300 | 328 | 296 | 269 |     |
| 16                                   | 282 | 307 | 298 | 337 | 314 | 312 | 300 | 318 | 367 | 356 | 344 | 336 | 328 | 334 | 325 | 330 | 344 | 336 | 345 | 344 | 323 | 318 | 286 | 288 |     |
| 17                                   | 300 | 296 | 317 | 334 | 386 | 260 | 279 | 331 | 369 | 348 | 338 | 306 | 322 | 325 | 338 | 321 | 338 | 356 | 359 | 333 | 323 | 283 | 309 | 326 |     |
| 18                                   | 289 | 308 | 282 | 313 | 347 | 293 | 292 | 323 | 363 | 369 | 329 | 332 | 325 | 340 | 334 | 325 | 333 | 348 | 327 | 317 | 321 | 353 | 272 | 281 |     |
| 19                                   | 295 | 318 | 306 | 286 | 294 | 298 | 300 | 331 | 370 | 340 | 342 | 329 | 345 | 331 | 302 | 328 | 338 | 353 | 318 | 319 | R   | R   | 321 | 275 | 285 |
| 20                                   | 315 | 285 | 299 | 316 | 337 | 267 | 294 | 341 | 344 | 348 | 334 | 337 | 334 | 314 | 335 | 324 | 329 | 333 | 356 | 330 | 316 | 268 | 275 | 284 |     |
| 21                                   | 293 | 294 | 296 | 299 | 333 | 283 | 303 | 321 | 357 | 366 | 325 | 324 | 333 | 335 | 307 | 302 | 339 | 341 | 330 | 335 | 324 | 311 | 296 | 268 |     |
| 22                                   | 270 | 283 | 308 | 284 | 289 | 292 | 317 | 337 | 345 | 339 | 333 | 322 | 330 | 334 | 321 | 312 | 340 | 359 | 332 | 344 | 316 | 322 | 323 | 267 |     |
| 23                                   | 278 | 282 | 295 | 305 | 334 | 270 | 284 | 309 | 362 | 370 | 341 | 362 | 318 | 337 | 331 | 351 | 326 | 349 | 344 | 347 | 371 | 268 | 256 | 267 |     |
| 24                                   | 265 | 265 | 324 | 313 | 302 | 296 | 313 | 319 | 347 | 342 | 343 | 366 | 377 | 303 | 321 | 332 | 339 | 333 | 342 | 362 | 369 | 309 | 269 | 288 |     |
| 25                                   | 306 | 319 | 293 | 285 | 269 | 270 | 321 | 340 | 364 | 334 | 348 | 355 | 330 | 306 | 332 | 321 | 336 | 357 | R   | 338 | 325 | 330 | 338 | 339 | 311 |
| 26                                   | 280 | 275 | 287 | 303 | 294 | 272 | 318 | 319 | 372 | 366 | 365 | 368 | 342 | 311 | 318 | 344 | 331 | 327 | 356 | 307 | 328 | 348 | 292 | 287 |     |
| 27                                   | 286 | 266 | 273 | 300 | 307 | 295 | 291 | 295 | 333 | 358 | 342 | 332 | 317 | 329 | 297 | 303 | 306 | 320 | R   | 322 | A   | 314 | 308 | 256 | 256 |
| 28                                   | 294 | 316 | 293 | 265 | 281 | 281 | 280 | 318 | 349 | 381 | 350 | 369 | 347 | 325 | 335 | 339 | 349 | 353 | 324 | A   | 307 | 332 | 325 | 307 |     |
| 29                                   | 287 | 295 | 330 | 272 | 305 | 324 | 313 | 307 | 373 | 354 | 364 | 337 | 319 | 317 | 326 | 324 | 320 | 323 | R   | 327 | J   | R   | 308 | 310 | 270 |
| 30                                   | 279 | 304 | 339 | 318 | 344 | 283 | 269 | 288 | 364 | 357 | 357 | 338 | 325 | 308 | 334 | 271 | 314 | 342 | 299 | 281 | 289 | 308 | 323 | 263 |     |
| 31                                   | 257 | 283 | 335 | 309 | 263 | 252 | 269 | 296 | 349 | 326 | 357 | 366 | 360 | 310 | 327 | 364 | 326 | 330 | 351 | 327 | 303 | 310 | 324 | 340 |     |
|                                      | 00  | 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  | 29  | 31  | 31  | 31  | 31  | 31  | 31  | 30  | 28  | 28  | 28  | 28  | 29  | 29  | 29  | 31  | 31  | 30  | 31  | 31  | 31  | 31  |     |
| MED                                  | 287 | 294 | 298 | 303 | 305 | 283 | 302 | 327 | 361 | 356 | 344 | 338 | 332 | 326 | 334 | 330 | 340 | 348 | 334 | 326 | 316 | 309 | 306 | 287 |     |
| U Q                                  | 295 | 307 | 316 | 313 | 329 | 298 | 314 | 338 | 365 | 365 | 357 | 362 | 344 | 334 | 338 | 342 | 348 | 359 | 353 | 344 | 324 | 322 | 324 | 307 |     |
| L Q                                  | 278 | 283 | 288 | 286 | 294 | 272 | 291 | 309 | 347 | 342 | 336 | 332 | 320 | 316 | 321 | 321 | 332 | 336 | 324 | 307 | 303 | 298 | 285 | 270 |     |

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NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Yamagawa

DEC.2022 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<br>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      |    |    |    |    |    |    |    |    | 436 | 434 | L   | L   | U   | L   | L   | L   |    |    |    |    |    |    |    |    |
| 2      |    |    |    |    |    |    |    |    |     |     | 405 | 392 | 392 | 385 | 393 |     |    |    |    |    |    |    |    |    |
| 3      |    |    |    |    |    |    |    |    |     |     | L   | L   | 402 | 406 |     | 381 |    |    |    |    |    |    |    |    |
| 4      |    |    |    |    |    |    |    |    | 423 | L   |     | 402 | 438 | 406 | 402 | 408 |    |    |    |    |    |    |    |    |
| 5      |    |    |    |    |    |    |    |    | L   | L   | L   | L   | 406 | 405 |     |     |    |    |    |    |    |    |    |    |
| 6      |    |    |    |    |    |    |    |    | L   | L   | C   | C   | C   | C   | C   | C   | C  | C  |    |    |    |    |    |    |
| 7      |    |    |    |    |    |    |    |    |     | C   | C   | C   | C   | C   | C   | C   | C  | C  |    |    |    |    |    |    |
| 8      |    |    |    |    |    |    |    |    |     | L   | C   | C   | C   | C   | L   |     |    |    |    |    |    |    |    |    |
| 9      |    |    |    |    |    |    |    |    | 416 |     | L   | L   | L   | L   | L   | A   |    |    |    |    |    |    |    |    |
| 10     |    |    |    |    |    |    |    |    | 449 |     | L   | L   |     | L   | L   | L   |    |    |    |    |    |    |    |    |
| 11     |    |    |    |    |    |    |    |    |     | 418 | L   | 421 | L   | L   | L   | A   |    |    |    |    |    |    |    |    |
| 12     |    |    |    |    |    |    |    |    | 420 |     | L   | U   | L   | L   |     | L   | L  |    |    |    |    |    |    |    |
| 13     |    |    |    |    |    |    |    |    |     | L   | L   | L   | L   | U   | L   |     | L  |    |    |    |    |    |    |    |
| 14     |    |    |    |    |    |    |    |    |     |     | L   | L   | L   | L   | L   | L   |    |    |    |    |    |    |    |    |
| 15     |    |    |    |    |    |    |    |    |     |     |     | L   | L   | L   | L   | L   | A  |    |    |    |    |    |    |    |
| 16     |    |    |    |    |    |    |    |    |     |     |     | 373 | L   | L   | L   | L   |    |    |    |    |    |    |    |    |
| 17     |    |    |    |    |    |    |    |    |     |     | L   | L   | L   | L   | L   | L   |    |    |    |    |    |    |    |    |
| 18     |    |    |    |    |    |    |    |    |     |     | L   | L   | 383 | L   | L   | L   |    |    |    |    |    |    |    |    |
| 19     |    |    |    |    |    |    |    |    |     |     | L   | L   | L   | L   |     | L   |    |    |    |    |    |    |    |    |
| 20     |    |    |    |    |    |    |    |    |     |     | L   | L   | L   | L   | L   |     |    |    |    |    |    |    |    |    |
| 21     |    |    |    |    |    |    |    |    |     |     |     | L   | L   | L   | L   |     | L  |    |    |    |    |    |    |    |
| 22     |    |    |    |    |    |    |    |    |     |     | L   | L   | L   | L   | L   |     |    |    |    |    |    |    |    |    |
| 23     |    |    |    |    |    |    |    |    |     |     | L   | L   | L   | L   | L   | L   |    |    |    |    |    |    |    |    |
| 24     |    |    |    |    |    |    |    |    |     | L   | L   | L   | U   | L   | L   | L   |    |    |    |    |    |    |    |    |
| 25     |    |    |    |    |    |    |    |    | 396 | L   | L   | L   | 399 | 356 | L   | L   | L  |    |    |    |    |    |    |    |
| 26     |    |    |    |    |    |    |    |    |     | L   | L   | L   | 407 | 418 | 389 |     |    |    |    |    |    |    |    |    |
| 27     |    |    |    |    |    |    |    |    | L   | L   | L   | L   | L   | L   | L   | L   |    |    |    |    |    |    |    |    |
| 28     |    |    |    |    |    |    |    |    |     |     | L   | L   | 364 | L   | L   | A   |    |    |    |    |    |    |    |    |
| 29     |    |    |    |    |    |    |    |    |     | L   | L   | L   | 391 | L   | L   | L   |    |    |    |    |    |    |    |    |
| 30     |    |    |    |    |    |    |    |    |     | L   | L   | U   | L   | L   | L   | L   |    |    |    |    |    |    |    |    |
| 31     |    |    |    |    |    |    |    |    |     | L   | 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    |    |    |    |    |    |    |    |    | 5   | 3   | 2   | 9   | 12  | 10  | 7   | 1   |    |    |    |    |    |    |    |    |
| MED    |    |    |    |    |    |    |    |    | 423 | 418 | 400 | 402 | 406 | 384 | 393 | 408 |    |    |    |    |    |    |    |    |
| U Q    |    |    |    |    |    |    |    |    | 442 | 434 |     | 412 | 414 | 405 | 402 |     |    |    |    |    |    |    |    |    |
| L Q    |    |    |    |    |    |    |    |    | 418 | 396 |     | 391 | 392 | 378 | 381 |     |    |    |    |    |    |    |    |    |

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NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



## IONOSPHERIC DATA STATION Yamagawa

DEC.2022 h'F2 (KM)

135°E MEAN TIME (G.M.T. + 9 H)

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

| H<br>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      |    |    |    |    |    |    |    |    | 194 | 206 | 252 | 220 | 228 | 248 | 252 | 228 |     |    |    |    |    |    |    |    |  |
| 2      |    |    |    |    |    |    |    |    |     |     | 226 | 234 | 236 | 238 | 234 | 214 |     |    |    |    |    |    |    |    |  |
| 3      |    |    |    |    |    |    |    |    |     | 224 | 230 | 230 | 226 | 270 | 234 |     |     |    |    |    |    |    |    |    |  |
| 4      |    |    |    |    |    |    |    |    | 210 | 238 |     | 226 | 228 | 226 | 234 | 222 |     |    |    |    |    |    |    |    |  |
| 5      |    |    |    |    |    |    |    |    | 256 | 222 | 230 | 222 | 220 | 234 | 232 |     |     |    |    |    |    |    |    |    |  |
| 6      |    |    |    |    |    |    |    |    | 244 | 232 | C   | C   | C   | C   | C   | C   | C   |    |    |    |    |    |    |    |  |
| 7      |    |    |    |    |    |    |    |    |     | C   | C   | C   | C   | C   | C   | C   | C   |    |    |    |    |    |    |    |  |
| 8      |    |    |    |    |    |    |    |    |     | 244 | C   | C   | C   | C   | 214 |     |     |    |    |    |    |    |    |    |  |
| 9      |    |    |    |    |    |    |    |    | 214 |     | 236 | 232 | 234 | 236 | 220 | 228 |     |    |    |    |    |    |    |    |  |
| 10     |    |    |    |    |    |    |    |    | 206 |     | 216 | 232 |     | 250 | 242 | 228 |     |    |    |    |    |    |    |    |  |
| 11     |    |    |    |    |    |    |    |    |     | 216 | 220 | 220 | 260 | 234 | 270 | 236 |     |    |    |    |    |    |    |    |  |
| 12     |    |    |    |    |    |    |    |    | 210 |     | 240 | 224 | 220 |     | 242 | 240 |     |    |    |    |    |    |    |    |  |
| 13     |    |    |    |    |    |    |    |    |     | 212 | 224 | 216 | 232 | 232 | 230 |     | 228 |    |    |    |    |    |    |    |  |
| 14     |    |    |    |    |    |    |    |    |     | 218 | 252 | 272 | 238 | 244 | 228 |     |     |    |    |    |    |    |    |    |  |
| 15     |    |    |    |    |    |    |    |    |     |     | 242 | 224 | 254 | 240 | 254 | 228 |     |    |    |    |    |    |    |    |  |
| 16     |    |    |    |    |    |    |    |    |     |     | 262 | 260 | 238 | 238 | 224 |     |     |    |    |    |    |    |    |    |  |
| 17     |    |    |    |    |    |    |    |    |     | 224 | 220 | 254 | 248 | 236 | 236 |     |     |    |    |    |    |    |    |    |  |
| 18     |    |    |    |    |    |    |    |    |     | 216 | 260 | 262 | 248 | 232 | 242 |     |     |    |    |    |    |    |    |    |  |
| 19     |    |    |    |    |    |    |    |    |     | 246 | 242 | 230 | 240 |     | 244 |     |     |    |    |    |    |    |    |    |  |
| 20     |    |    |    |    |    |    |    |    |     | 256 | 240 | 238 | 242 | 238 |     |     |     |    |    |    |    |    |    |    |  |
| 21     |    |    |    |    |    |    |    |    |     |     | 252 | 244 | 246 | 266 |     | 226 |     |    |    |    |    |    |    |    |  |
| 22     |    |    |    |    |    |    |    |    |     |     | 254 | 240 | 232 | 242 | 218 |     |     |    |    |    |    |    |    |    |  |
| 23     |    |    |    |    |    |    |    |    |     |     | 230 | 226 | 252 | 264 | 236 | 246 |     |    |    |    |    |    |    |    |  |
| 24     |    |    |    |    |    |    |    |    |     | 242 | 240 | 212 | 220 | 328 | 240 | 242 |     |    |    |    |    |    |    |    |  |
| 25     |    |    |    |    |    |    |    |    |     | 220 | 228 | 216 | 242 | 230 | 230 | 262 |     |    |    |    |    |    |    |    |  |
| 26     |    |    |    |    |    |    |    |    |     |     | 224 | 212 | 226 | 224 | 276 | 238 |     |    |    |    |    |    |    |    |  |
| 27     |    |    |    |    |    |    |    |    | 250 | 220 | 222 | 234 | 274 | 248 | 242 |     |     |    |    |    |    |    |    |    |  |
| 28     |    |    |    |    |    |    |    |    |     | 218 | 220 | 238 | 244 | 238 | 232 |     |     |    |    |    |    |    |    |    |  |
| 29     |    |    |    |    |    |    |    |    |     | 218 |     | 218 | 246 | 266 | 252 | 242 |     |    |    |    |    |    |    |    |  |
| 30     |    |    |    |    |    |    |    |    |     |     | 220 | 246 | 218 | 268 | 256 |     |     |    |    |    |    |    |    |    |  |
| 31     |    |    |    |    |    |    |    |    |     | 256 | 224 | 226 | 226 | 264 | 270 |     |     |    |    |    |    |    |    |    |  |
|        | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08  | 09  | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17 | 18 | 19 | 20 | 21 | 22 | 23 |  |
| CNT    |    |    |    |    |    |    |    |    | 8   | 13  | 23  | 28  | 27  | 27  | 28  | 19  | 3   |    |    |    |    |    |    |    |  |
| MED    |    |    |    |    |    |    |    |    | 212 | 222 | 226 | 228 | 234 | 244 | 238 | 236 | 228 |    |    |    |    |    |    |    |  |
| U Q    |    |    |    |    |    |    |    |    | 247 | 240 | 240 | 241 | 252 | 254 | 248 | 242 | 228 |    |    |    |    |    |    |    |  |
| L Q    |    |    |    |    |    |    |    |    | 208 | 217 | 220 | 220 | 226 | 236 | 233 | 228 | 226 |    |    |    |    |    |    |    |  |

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NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Yamagawa

DEC. 2022 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<br>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      | 278 | 226 | 280 | 236 | 248 | 334 | 258 | 188 | 176 | 194 | 222 | 218 | 214 | 198 | 214 | 218 | 210 | 198 | 196 | 240 | 204 | 260 | 258 | 226 |     |
| 2      | 266 | 254 | A   | 266 | 248 | 326 | 254 | 214 | 222 | 210 | 206 | 198 | 188 | 220 | 206 | 204 | 202 | 206 | 206 | 206 | 214 | 228 | 210 | 254 |     |
| 3      | 278 | 270 | 292 | 242 | 252 | 240 | 242 | 222 | 218 | 218 | 202 | 196 | 192 | 236 | 194 | 204 | 210 | 204 | 186 | 268 | 210 | 218 | 228 | 214 |     |
| 4      | 296 | 256 | 264 | 270 | 266 | 272 | 250 | 228 | 202 | 230 | 218 | 200 | 188 | 190 | 180 | 202 | 216 | 196 | 206 | E A | 226 | 204 | 282 | 292 |     |
| 5      | 306 | 286 | 286 | 250 | 222 | 276 | 270 | 254 | 238 | 214 | 208 | 208 | 188 | 208 | 200 | 218 | 218 | 196 | 188 | 264 | 218 | 208 | 204 | 294 |     |
| 6      | 272 | 256 | 250 | 208 | 212 | 312 | 302 | 250 | 218 | 226 | C   | C   | C   | C   | C   | C   | C   | 200 | 194 | 216 | 198 | 236 | 222 | 230 |     |
| 7      | 346 | 286 | 238 | 236 | 242 | 264 | 252 | 228 | 210 | C   | C   | C   | C   | C   | C   | C   | C   | 208 | 218 | 200 | 234 | 212 | 256 | 294 |     |
| 8      | 330 | 266 | 220 | 240 | 278 | 286 | 288 | 258 | 236 | 238 | C   | C   | C   | C   | 208 | 216 | 220 | 216 | 190 | 208 | 240 | 204 | 202 | 282 |     |
| 9      | 310 | 288 | 250 | 258 | 242 | 250 | 214 | 224 | 202 | 214 | 216 | 202 | 208 | 202 | 210 | A   | 220 | 202 | 192 | 192 | 254 | 228 | 212 | 194 |     |
| 10     | 238 | 308 | 294 | 256 | 292 | 258 | 208 | 196 | 194 | 216 | 204 | 204 | 226 | 208 | 236 | 214 | 212 | 200 | 198 | 200 | 232 | 204 | 228 | 246 |     |
| 11     | 238 | 284 | 294 | 324 | 284 | 304 | 230 | 198 | 208 | 198 | 198 | 190 | 224 | 222 | 206 | A   | 220 | 196 | 230 | 222 | 218 | 220 | 212 | 260 |     |
| 12     | E A | 400 | A   | E A | 330 | 266 | 210 | 214 | 214 | 192 | 226 | 204 | 202 | 200 | 202 | 222 | 222 | 220 | 200 | 194 | 216 | 194 | E A | 270 |     |
| 13     | 274 | 292 | 286 | 286 | 264 | 246 | 246 | 240 | 214 | 206 | 200 | 194 | 220 | 198 | 194 | 224 | 222 | 200 | 226 | 214 | 190 | 204 | 248 | 290 |     |
| 14     | 276 | 294 | 344 | 294 | 252 | 216 | 270 | 238 | 212 | 210 | 202 | 204 | 226 | 220 | 218 | 208 | 216 | 208 | 208 | 208 | 194 | 216 | 210 | 252 |     |
| 15     | 252 | 258 | 280 | 274 | 266 | 274 | 266 | 238 | 212 | 214 | 214 | 210 | 202 | 186 | 226 | 226 | A   | 206 | 206 | 216 | 244 | 206 | E A | 314 |     |
| 16     | 308 | 264 | 254 | 230 | 240 | 226 | 222 | 230 | 218 | 218 | 216 | 200 | 200 | 206 | 208 | 216 | 224 | 212 | 196 | 204 | 202 | 208 | 272 | 242 |     |
| 17     | 272 | 266 | 244 | 222 | 194 | 276 | 276 | 238 | 206 | 218 | 204 | 202 | 234 | 210 | 194 | 218 | 226 | 210 | 194 | 202 | 224 | 200 | 230 | 242 |     |
| 18     | 260 | 246 | 240 | 242 | 216 | 216 | 260 | 240 | 216 | 214 | 200 | 198 | 216 | 220 | 212 | 210 | 220 | 208 | 186 | 212 | 212 | 196 | E A | 316 |     |
| 19     | 276 | 248 | 246 | 274 | 264 | 248 | 244 | 234 | 206 | 216 | 222 | 198 | 222 | 194 | 204 | 216 | 218 | 212 | 204 | 218 | 220 | 232 | E A | 294 |     |
| 20     | E A | E A | E A | 260 | 222 | 226 | 298 | 272 | 218 | 216 | 224 | 218 | 216 | 210 | 202 | 212 | 220 | 218 | 210 | 216 | 194 | 228 | 240 | 244 | 258 |
| 21     | 274 | 306 | 278 | 264 | 230 | 272 | 260 | 242 | 214 | 218 | 210 | 198 | 196 | 206 | 198 | 222 | 220 | 202 | 198 | 208 | 210 | 212 | 240 | 310 |     |
| 22     | 318 | 298 | 262 | 276 | 276 | 248 | 228 | 234 | 212 | 224 | 222 | 202 | 216 | 186 | 208 | 230 | 214 | 210 | 186 | 200 | 240 | 218 | 216 | 314 |     |
| 23     | 314 | 296 | 254 | 270 | 228 | 256 | 296 | 258 | 230 | 212 | 208 | 208 | 196 | 200 | 206 | 212 | 216 | 218 | 202 | 230 | 182 | 236 | 276 | 316 |     |
| 24     | 326 | 342 | 244 | 230 | 254 | 284 | 248 | 254 | 212 | 206 | 216 | 206 | 186 | 202 | 194 | 200 | 224 | 228 | 196 | 208 | 188 | 202 | 320 | 282 |     |
| 25     | 258 | 226 | 262 | 296 | 340 | 326 | 236 | 214 | 200 | 206 | 220 | 182 | 178 | 204 | 192 | 220 | 232 | 200 | 184 | 226 | 226 | 196 | 228 | 226 |     |
| 26     | 294 | 314 | 298 | 256 | 270 | 306 | 224 | 252 | 204 | 214 | 208 | 194 | 200 | 180 | 212 | 230 | 214 | 206 | 200 | 206 | 242 | 214 | 240 | 240 |     |
| 27     | 292 | 326 | 318 | 276 | 252 | 258 | 288 | 262 | 226 | 210 | 196 | 192 | 182 | 218 | 200 | 232 | 232 | 202 | 198 | 208 | 200 | 216 | 210 | 338 |     |
| 28     | 274 | 246 | 222 | 322 | 278 | 288 | 298 | 250 | 220 | 214 | 208 | 206 | 206 | 208 | 218 | A   | 218 | 226 | 240 | A   | E A | E A | E A | 236 |     |
| 29     | 270 | 278 | 246 | 314 | 252 | 228 | 232 | 236 | 206 | 210 | 220 | 198 | 192 | 176 | 180 | 214 | 224 | 210 | 202 | 206 | 206 | 194 | 220 | 268 |     |
| 30     | 308 | 264 | 222 | 228 | 228 | 326 | 310 | 270 | 216 | 210 | 208 | 196 | 186 | 214 | 244 | 222 | 232 | 232 | 186 | 222 | 220 | 224 | E A | 344 |     |
| 31     | E A | E A | E A | E A | 374 | 378 | 354 | 252 | 218 | 224 | 220 | 222 | 220 | 222 | 230 | 222 | 208 | 214 | 208 | 198 | 232 | 236 | 230 | 204 |     |
|        | 00  | 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  | 29  | 31  | 31  | 31  | 31  | 31  | 31  | 30  | 28  | 28  | 28  | 28  | 29  | 26  | 28  | 31  | 31  | 30  | 31  | 31  | 31  | 31  |     |
| MED    | 278 | 275 | 260 | 259 | 252 | 272 | 254 | 238 | 212 | 214 | 208 | 201 | 201 | 205 | 208 | 218 | 219 | 206 | 198 | 208 | 216 | 213 | 225 | 264 |     |
| U Q    | 310 | 306 | 286 | 276 | 270 | 304 | 276 | 252 | 218 | 218 | 218 | 206 | 218 | 216 | 216 | 222 | 223 | 212 | 206 | 222 | 232 | 228 | 248 | 294 |     |
| L Q    | 270 | 256 | 245 | 236 | 230 | 248 | 232 | 222 | 206 | 210 | 204 | 197 | 190 | 198 | 196 | 212 | 215 | 200 | 192 | 204 | 202 | 204 | 210 | 240 |     |

DEC. 2022 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Yamagawa

DEC.2022 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<br>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   |     | 102 | 102 | 102 | A  | B  |    |    |    |    |
| 2      |    |    |    |    |    |    |    | B  |     | 102 |     |     |     |     |     |     |     |     | A  | A  |    |    |    |    |
| 3      |    |    |    |    |    |    |    | B  | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 106 |     | A  |    |    |    |    |    |
| 4      |    |    |    |    |    |    |    | B  |     | A   |     | A   |     |     |     |     |     | A   |    |    |    |    |    |    |
| 5      |    |    |    |    |    |    |    | B  | 104 |     | 100 |     | 102 | 102 | 102 | 102 | 100 |     | A  | B  | B  |    |    |    |
| 6      |    |    |    |    |    |    |    | B  | 106 | 104 | 104 | 102 | 102 | 102 | 102 | 112 |     | A   | A  | A  |    |    |    |    |
| 7      |    |    |    |    |    |    |    | B  | 100 | 100 | 102 | 102 | 102 | 102 | 102 | 102 |     | A   | A  | A  |    |    |    |    |
| 8      |    |    |    |    |    |    |    | A  | 108 | 100 |     | C   | C   | C   | C   | C   | C   | C   | B  | B  |    |    |    |    |
| 9      |    |    |    |    |    |    |    | B  |     | C   | C   | C   | C   | C   | C   | C   | C   | C   | A  | A  |    |    |    |    |
| 10     |    |    |    |    |    |    |    | B  | 100 |     | C   | C   | C   | C   |     |     |     | A   |    |    |    |    |    |    |
| 11     |    |    |    |    |    |    |    | B  | 104 | 104 |     | C   | C   | C   | C   |     |     |     |    |    |    |    |    |    |
| 12     |    |    |    |    |    |    |    | B  | 104 | 104 |     | C   | C   | C   | C   |     |     |     | A  |    |    |    |    |    |
| 13     |    |    |    |    |    |    |    | B  | 104 | 104 |     | C   | C   | C   | C   |     |     |     |    |    |    |    |    |    |
| 14     |    |    |    |    |    |    |    | B  | 108 | 102 | 102 | 102 | 102 | 102 | 102 | 102 | 102 |     | A  | B  |    |    |    |    |
| 15     |    |    |    |    |    |    |    | B  | 108 | 104 | 102 | 102 | 102 | 102 | 102 | 102 | 102 |     | A  | B  | B  |    |    |    |
| 16     |    |    |    |    |    |    |    | B  | 108 | 104 | 102 | 102 | 102 | 102 | 102 | 102 | 102 |     | A  | B  | B  |    |    |    |
| 17     |    |    |    |    |    |    |    | B  | 108 | 104 | 102 | 102 | 102 | 102 | 102 | 102 | 102 |     | A  | B  | B  |    |    |    |
| 18     |    |    |    |    |    |    |    | B  | 108 | 104 | 102 | 102 | 102 | 102 | 102 | 102 | 102 |     | A  | B  | B  |    |    |    |
| 19     |    |    |    |    |    |    |    | B  | 108 | 104 | 102 | 102 | 102 | 102 | 102 | 102 | 102 |     | A  | B  | B  |    |    |    |
| 20     |    |    |    |    |    |    |    | B  | 108 | 104 | 102 | 102 | 102 | 102 | 102 | 102 | 102 |     | A  | B  | B  |    |    |    |
| 21     |    |    |    |    |    |    |    | B  | 108 | 104 | 102 | 102 | 102 | 102 | 102 | 102 | 102 |     | A  | B  | B  |    |    |    |
| 22     |    |    |    |    |    |    |    | B  | 108 | 104 | 102 | 102 | 102 | 102 | 102 | 102 | 102 |     | A  | B  | B  |    |    |    |
| 23     |    |    |    |    |    |    |    | B  | 108 | 104 | 102 | 102 | 102 | 102 | 102 | 102 | 102 |     | A  | B  | B  |    |    |    |
| 24     |    |    |    |    |    |    |    | B  | 108 | 104 | 102 | 102 | 102 | 102 | 102 | 102 | 102 |     | A  | B  | B  |    |    |    |
| 25     |    |    |    |    |    |    |    | B  | 108 | 104 | 102 | 102 | 102 | 102 | 102 | 102 | 102 |     | A  | B  | B  |    |    |    |
| 26     |    |    |    |    |    |    |    | B  | 108 | 104 | 102 | 102 | 102 | 102 | 102 | 102 | 102 |     | A  | B  | B  |    |    |    |
| 27     |    |    |    |    |    |    |    | B  | 108 | 104 | 102 | 102 | 102 | 102 | 102 | 102 | 102 |     | A  | B  | B  |    |    |    |
| 28     |    |    |    |    |    |    |    | B  | 108 | 104 | 102 | 102 | 102 | 102 | 102 | 102 | 102 |     | A  | B  | B  |    |    |    |
| 29     |    |    |    |    |    |    |    | B  | 108 | 104 | 102 | 102 | 102 | 102 | 102 | 102 | 102 |     | A  | B  | B  |    |    |    |
| 30     |    |    |    |    |    |    |    | B  | 108 | 104 | 102 | 102 | 102 | 102 | 102 | 102 | 102 |     | A  | B  | B  |    |    |    |
| 31     |    |    |    |    |    |    |    | B  | 108 | 104 | 102 | 102 | 102 | 102 | 102 | 102 | 102 |     | A  | 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    |    |    |    |    |    |    |    |    | 25  | 23  | 22  | 19  | 23  | 23  | 23  | 19  | 16  | 2   |    |    |    |    |    |    |
| MED    |    |    |    |    |    |    |    |    | 108 | 102 | 102 | 102 | 102 | 102 | 102 | 104 | 102 | 116 |    |    |    |    |    |    |
| U Q    |    |    |    |    |    |    |    |    | 111 | 104 | 104 | 102 | 102 | 102 | 102 | 106 | 107 |     |    |    |    |    |    |    |
| L Q    |    |    |    |    |    |    |    |    | 104 | 102 | 102 | 102 | 102 | 100 | 102 | 102 | 102 |     |    |    |    |    |    |    |

DEC.2022 h'E (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Yamagawa

DEC.2022 h'Es (KM)

135°E MEAN TIME (G.M.T. + 9 H)

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

| H<br>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      | 94  | B   | 90 | B  | B   | B   | 92  | B   | 106 | G   | 102 | 90  | 102 | 98  | G   | G   | 164 | 96  | 96  | 96  | 96  | 96  | B  | 96 |
| 2      | 98  | 94  | 94 | 92 | 92  | 110 | 92  | B   | G   | 182 | 150 | 132 | G   | 182 | 88  | G   | G   | 88  | 92  | B   | 102 | B   | B  | B  |
| 3      | B   | 102 | 96 | 92 | B   | B   | B   | 184 | 152 | 160 | 130 | 108 | G   | 176 | G   | G   | 86  | 90  | 86  | 86  | B   | B   | B  | B  |
| 4      | B   | B   | B  | B  | B   | B   | B   | B   | 180 | 150 | 146 | G   | G   | G   | G   | G   | 100 | B   | B   | 98  | B   | B   | 92 | B  |
| 5      | 92  | 90  | 94 | B  | B   | B   | B   | B   | G   | 172 | G   | G   | G   | G   | G   | 90  | 88  | 92  | 88  | 88  | B   | 88  | B  | 82 |
| 6      | B   | 98  | 98 | 98 | 94  | B   | 94  | 88  | G   | G   | C   | C   | C   | C   | C   | C   | C   | 98  | 88  | B   | B   | B   | B  | B  |
| 7      | B   | B   | B  | B  | 110 | B   | B   | B   | 148 | C   | C   | C   | C   | C   | C   | C   | C   | 92  | 88  | 90  | B   | B   | B  | 86 |
| 8      | 92  | 96  | B  | B  | 98  | 96  | B   | B   | G   | 128 | C   | C   | C   | C   | G   | 174 | 154 | 130 | 136 | B   | B   | B   | B  | B  |
| 9      | 100 | 98  | 90 | B  | B   | 120 | B   | 94  | 136 | 142 | 126 | G   | G   | G   | 120 | 132 | 116 | 112 | B   | B   | B   | 100 | B  |    |
| 10     | B   | B   | 98 | B  | B   | B   | B   | B   | 188 | 150 | 116 | 102 | 102 | 104 | 106 | 102 | 100 | 102 | 96  | 96  | B   | 88  | 86 | 86 |
| 11     | 86  | 86  | 90 | 88 | B   | 102 | B   | 100 | 150 | 108 | G   | 178 | 184 | 178 | 94  | 94  | G   | 108 | 100 | 100 | 96  | 96  | 96 | B  |
| 12     | B   | 96  | 92 | 92 | 108 | B   | 94  | B   | 98  | 88  | 140 | G   | G   | G   | 106 | 106 | 100 | 106 | 98  | 98  | 90  | 90  | 82 | 86 |
| 13     | B   | B   | B  | B  | B   | 86  | B   | B   | 122 | 108 | G   | G   | G   | G   | 98  | 102 | G   | 110 | 96  | 96  | B   | 96  | 94 | 94 |
| 14     | 94  | B   | 86 | 92 | 88  | B   | B   | 88  | 88  | G   | G   | 174 | 144 | 146 | G   | 88  | 100 | 106 | 108 | 94  | 104 | B   | 94 | 94 |
| 15     | B   | 94  | 90 | 90 | 94  | 88  | 94  | B   | 172 | G   | 104 | G   | G   | G   | 92  | 178 | 88  | 88  | 104 | 104 | 96  | 94  | 96 | 86 |
| 16     | B   | B   | B  | B  | B   | B   | B   | 90  | 160 | 168 | 164 | 96  | 92  | G   | 88  | 98  | 98  | G   | B   | B   | 92  | 88  | 88 | B  |
| 17     | 92  | 86  | 86 | B  | 86  | B   | B   | B   | 154 | 108 | 100 | 96  | 100 | G   | 92  | 90  | 90  | 84  | 88  | B   | B   | B   | B  | B  |
| 18     | 92  | 92  | B  | B  | B   | 88  | 92  | 84  | 148 | 122 | 106 | 102 | G   | 98  | G   | G   | G   | B   | B   | 90  | 94  | 98  | 92 | B  |
| 19     | B   | 92  | 94 | 94 | 94  | B   | 86  | B   | 108 | 108 | 106 | 106 | 102 | 102 | G   | G   | G   | 102 | 100 | 98  | 96  | 88  | 88 | 88 |
| 20     | 88  | 92  | 88 | 88 | B   | B   | B   | B   | G   | G   | G   | G   | G   | G   | G   | G   | G   | 136 | B   | 86  | 88  | B   | B  | 88 |
| 21     | B   | 88  | 88 | 88 | B   | B   | B   | B   | 110 | 168 | 148 | G   | G   | G   | G   | 152 | 106 | 126 | B   | 98  | 92  | B   | 90 | B  |
| 22     | 90  | B   | B  | B  | B   | B   | B   | B   | 110 | 168 | 148 | G   | G   | G   | G   | 152 | 106 | 126 | B   | 98  | 92  | B   | 90 | B  |
| 23     | B   | B   | 94 | 94 | B   | B   | 108 | 104 | G   | G   | 106 | 104 | G   | 112 | 110 | 158 | 110 | 154 | 118 | 98  | 96  | 92  | 92 | 94 |
| 24     | 94  | B   | B  | B  | 116 | B   | B   | 114 | 152 | G   | 112 | 106 | G   | G   | G   | 100 | 98  | 116 | 98  | 98  | 98  | 94  | B  | B  |
| 25     | B   | B   | B  | B  | B   | B   | 106 | B   | 94  | 94  | 90  | G   | G   | G   | G   | 172 | 168 | 156 | B   | 94  | 88  | 88  | 88 | 84 |
| 26     | 86  | 86  | 88 | B  | 90  | B   | B   | B   | 132 | 162 | G   | G   | G   | G   | 170 | G   | 158 | 92  | B   | 102 | 96  | 92  | 90 | B  |
| 27     | 90  | B   | 86 | 86 | B   | B   | B   | B   | G   | G   | G   | G   | G   | G   | G   | 96  | 90  | 90  | B   | 98  | 98  | 84  | B  | B  |
| 28     | B   | 88  | 86 | 86 | 90  | B   | B   | 130 | 136 | 124 | 118 | G   | G   | G   | 124 | 110 | 114 | 100 | 86  | 126 | 104 | 98  | 98 | 82 |
| 29     | 84  | 88  | 84 | 82 | 80  | 82  | 90  | 94  | 160 | 102 | 100 | 100 | G   | G   | 90  | G   | G   | G   | 90  | 90  | 92  | B   | B  | B  |
| 30     | B   | 88  | B  | 84 | B   | B   | B   | 88  | 114 | 108 | 106 | G   | 88  | 178 | 166 | 90  | 86  | 132 | 88  | 82  | 88  | B   | B  | 94 |
| 31     | 94  | 94  | 90 | 92 | 92  | 92  | 100 | 98  | 164 | 170 | 124 | 114 | 106 | 108 | 186 | 108 | G   | 86  | 84  | 82  | 84  | B   | B  | 94 |
|        | 00  | 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  | 19  | 21 | 16 | 14  | 9   | 11  | 13  | 23  | 22  | 21  | 15  | 13  | 13  | 16  | 20  | 20  | 27  | 23  | 25  | 21  | 18  | 15 | 16 |
| MED    | 92  | 92  | 90 | 91 | 93  | 92  | 94  | 94  | 148 | 126 | 112 | 104 | 102 | 108 | 106 | 101 | 100 | 102 | 92  | 96  | 96  | 93  | 92 | 88 |
| U Q    | 94  | 96  | 94 | 92 | 98  | 106 | 100 | 109 | 160 | 162 | 135 | 114 | 120 | 177 | 145 | 121 | 115 | 116 | 100 | 98  | 97  | 96  | 94 | 94 |
| L Q    | 89  | 88  | 87 | 87 | 90  | 87  | 92  | 88  | 110 | 108 | 105 | 100 | 95  | 98  | 93  | 92  | 90  | 92  | 88  | 90  | 91  | 88  | 88 | 86 |

DEC.2022 h'Es (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Yamagawa

DEC.2022 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 |    | F1 |    |    |    | F1 |    | C1   |      | C1   | L1   | C1   | L2   |      |      | H1   | L1   | L3    | F3   | F1   | F1   |    | F1 |    |    |
| 2   | F2 | F3 | F4 | F4 | F2 | F1 | F1 |    |      | H1   | H1   | HL11 |      | H1   | L1   |      |      | L1   | L1    |      |      | F2   |    |    |    |    |
| 3   |    | F1 | F1 | F1 |    |    |    |    | H1   | H1   | HL11 | H1   | C1   |      | H1   |      |      | L1   | L1    | L3   | F1   |      |    |    |    |    |
| 4   |    |    |    |    |    |    |    |    |      | H1   | H1   | H1   |      |      |      |      |      | C1   |       |      | F3   |      |    | F2 |    |    |
| 5   | F1 | F2 | F1 |    |    |    |    |    |      |      | H1   |      |      | H1   |      |      | L1   | L1   | L1    | L1   | F2   |      | F1 |    | F1 |    |
| 6   |    | F1 | F1 | F1 | F1 |    | F1 | L3 |      |      |      |      |      |      |      |      |      | L1   | L1    |      |      |      |    |    |    |    |
| 7   |    |    |    |    | F1 |    |    |    |      | H1   |      |      |      |      |      |      |      |      | L3    | L4   | F1   |      |    |    | F1 |    |
| 8   | F1 | F1 |    |    | F1 | F1 |    |    |      |      | C2   |      |      |      |      |      | H1   | H1   | HL21  | HL21 |      |      |    |    |    |    |
| 9   | F1 | F1 | F2 |    |    | F1 |    | L1 | H1   | H1   | C1   |      |      |      | C1   | HC21 | C2   | C2   |       |      |      |      | F1 |    |    |    |
| 10  |    |    | F2 |    |    |    |    |    | H1   | H1   | C1   | C2   | C4   | C2   | C1   | C1   | C2   | C1   | C3    | C3   |      |      | F5 | F4 | F2 |    |
| 11  | F2 | F1 | F1 | F1 |    | F1 |    | C1 | H1   | C1   |      | H1   | HL11 | H1   | L2   | L2   |      | C1   | C5    | F4   | F3   | F3   | F1 |    |    |    |
| 12  |    | F3 | F5 | F3 | F1 |    | F1 |    | L1   | L2   | H1   |      |      |      | C1   | C2   | C2   | C2   | L3    | F3   | F2   | F3   | F2 | F1 | F1 |    |
| 13  |    |    |    |    |    | F1 |    |    | F1   | C2   |      |      |      |      | L1   | C1   |      | C2   | L7    | F3   |      | F1   | F2 | F1 | F1 |    |
| 14  | F2 |    | F3 | F1 | F1 |    |    | L1 | L1   |      |      | HL12 | H1   | H1   |      | L3   | C2   | C1   | CL11  | F1   | F1   |      | F3 | F1 | F1 |    |
| 15  |    | F1 | F1 | F1 | F1 | F1 | F1 |    | H1   |      | C1   |      |      | L1   | H1   | L2   | L3   | C3   | C2    | F3   | F3   | F1   |    | F1 | F1 |    |
| 16  |    |    |    |    |    |    |    | L1 | H1   | H1   | H1   | L1   | L1   | L1   | L1   | L2   | L2   |      | L1    |      |      | F2   | F3 | F1 |    |    |
| 17  | F2 | F2 | F1 |    | F1 |    |    |    | H1   | C2   | C2   | L2   | CH11 |      | L2   | L2   | L3   |      |       |      |      |      |    |    |    |    |
| 18  | F2 | F1 |    |    |    | F1 | F2 | L2 | HL11 | C2   | C2   | C2   |      | L1   |      |      |      |      |       |      | F3   | F1   | F1 | F1 |    |    |
| 19  |    | F1 | F1 | F1 | F1 |    | F1 |    | C3   | C3   | C2   | C1   | C1   | C1   |      |      |      | C1   | C1    | F3   | F2   | F6   | F5 | F4 | F4 |    |
| 20  | F2 | F4 | F1 | F1 |    |    |    |    |      | C1   | C1   | C2   | L1   | L2   | L2   | L1   |      | L3   | L4    | F3   | F1   | F2   | F1 | F2 | F2 |    |
| 21  |    | F3 | F2 | F2 |    |    |    |    |      |      |      |      |      |      |      |      |      | H1   |       | F3   | F1   |      |    | F1 | F1 |    |
| 22  | F1 |    |    |    |    |    |    |    | C2   | H1   | H1   |      |      |      |      |      | H1   | C2   | C1    |      | F2   | F2   |    | F1 |    |    |
| 23  |    |    | F2 | F2 |    |    | F1 | C1 |      |      | C1   | C1   |      | C1   | C1   | L1   | C1   | H2   | H1    | F3   | F3   | F2   | F2 | F1 | F1 |    |
| 24  | F2 |    |    |    | F1 |    |    | C1 | H1   |      | C2   | C1   |      |      |      |      | C2   | L3   | CLH11 | L3   | F1   | F1   | F1 |    |    |    |
| 25  |    |    |    |    |    |    | F1 |    | LH31 | L3   | L3   |      |      | L1   |      |      | H1   | H1   | H1    |      | F4   | F4   | F2 | F2 | F1 | F1 |
| 26  | F1 | F2 | F1 |    | F1 |    |    |    | H1   | HC11 |      |      |      |      |      |      | H1   | HL11 | L1    |      | F1   | F2   | F1 | F1 |    |    |
| 27  | F1 |    | F1 | F2 |    |    |    |    |      |      |      |      |      |      |      |      | LH11 | L2   | L1    |      | F1   | F2   | F1 |    |    |    |
| 28  |    | F2 | F1 | F1 | F1 |    |    | H1 | H2   | C1   | C2   |      | L1   |      | C1   | C1   | CL11 | C3   | L5    | FF35 | FF33 | FF33 | F2 | F2 | F2 |    |
| 29  | F2 | F2 | F2 | F1 | F1 | F1 | F1 | L1 | H1   | C1   | C2   | L1   |      |      | L1   |      |      |      | L1    | F1   | F1   | F1   |    |    |    |    |
| 30  |    | F1 |    | F1 |    |    |    | L1 | C1   | C1   | C1   |      | L1   | H1   | H1   | L1   | L1   | HL11 | L1    | F1   | F2   |      |    |    | F3 | F3 |
| 31  | F2 | F2 | F4 | F3 | F2 | F1 | F1 | L1 | H1   | HC11 | C2   | C3   | C2   | CL22 | HL11 | CH21 |      | L2   | L2    | F1   | F1   |      |    |    | F3 | F3 |
|     |    | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07   | 08   | 09   | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17    | 18   | 19   | 20   | 21 | 22 | 23 |    |
| CNT |    |    |    |    |    |    |    |    |      |      |      |      |      |      |      |      |      |      |       |      |      |      |    |    |    |    |
| MED |    |    |    |    |    |    |    |    |      |      |      |      |      |      |      |      |      |      |       |      |      |      |    |    |    |    |
| U Q |    |    |    |    |    |    |    |    |      |      |      |      |      |      |      |      |      |      |       |      |      |      |    |    |    |    |
| L Q |    |    |    |    |    |    |    |    |      |      |      |      |      |      |      |      |      |      |       |      |      |      |    |    |    |    |

DEC.2022 TYPES OF Es

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Okinawa

DEC.2022 f<sub>XI</sub> (0.1MHz)

135°E MEAN TIME (G.M.T. + 9 H)

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

| H<br>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<br>48 | X<br>47 | X<br>37 | X<br>42 | X<br>38 | X<br>34 | X<br>32 |    |    |    |     |     |     |    |     |    |    |    |         | X<br>60  | X<br>76  | X<br>68  | X<br>61 | X<br>62 |
| 2      | X<br>44 | X<br>48 | X<br>42 | X<br>36 | X<br>34 | X<br>37 | X<br>42 |    |    |    |     |     |     |    |     |    |    |    |         | X<br>76  | X<br>76  | X<br>65  | X<br>59 | X<br>43 |
| 3      | X<br>36 | X<br>37 | X<br>37 | X<br>40 | X<br>41 | X<br>34 | X<br>32 |    |    |    |     |     |     |    |     |    |    |    |         | X<br>66  | X<br>82  | X<br>94  | X<br>68 | X<br>53 |
| 4      | X<br>47 | X<br>45 | X<br>48 | X<br>47 | X<br>46 | X<br>50 | X<br>43 |    |    |    |     |     |     |    |     |    |    |    |         | X<br>62  | X<br>73  | X<br>78  | X<br>62 | X<br>64 |
| 5      | X<br>59 | X<br>60 | X<br>62 | X<br>61 | X<br>53 | X<br>46 | X<br>43 |    |    |    |     |     |     |    |     |    |    |    |         | X<br>80  | X<br>94  | X<br>93  | X<br>76 | X<br>60 |
| 6      | X<br>58 | X<br>58 | X<br>59 | X<br>58 | X<br>38 | X<br>32 | X<br>29 |    |    |    |     |     |     |    |     |    |    |    |         | X<br>72  | X<br>82  | X<br>68  | X<br>61 | X<br>53 |
| 7      | X<br>44 | X<br>44 | X<br>46 | X<br>39 | X<br>38 | X<br>32 | X<br>32 |    |    |    |     |     |     |    |     |    |    |    |         | X<br>64  | X<br>68  | X<br>80  | X<br>72 | X<br>68 |
| 8      | X<br>62 | X<br>72 | X<br>70 | X<br>62 | X<br>53 | X<br>52 | X<br>56 |    |    |    | 167 | 135 | 126 |    | 108 |    |    |    |         | X<br>62  | X<br>72  | X<br>83  | X<br>59 | X<br>39 |
| 9      | A       | X<br>41 | X<br>42 | X<br>44 | X<br>43 | X<br>34 | X<br>38 |    |    |    |     |     |     |    |     |    |    |    |         | X<br>59  | X<br>63  | X<br>72  | X<br>72 | X<br>60 |
| 10     | X<br>36 | X<br>33 | X<br>35 | X<br>38 | X<br>39 | X<br>39 | X<br>38 |    |    |    |     |     |     |    |     |    |    |    |         | X<br>134 | X<br>123 | X<br>115 | X<br>90 | X<br>69 |
| 11     | X<br>60 | X<br>52 | X<br>34 | X<br>35 | X<br>36 | X<br>37 | X<br>37 |    |    |    |     |     |     |    |     |    |    |    |         | X<br>69  | X<br>74  | X<br>70  | X<br>52 | X<br>41 |
| 12     | X<br>35 | X<br>35 | X<br>35 | X<br>47 | X<br>64 | X<br>47 | X<br>36 |    |    |    |     | C   | C   | C  | C   | C  | C  | C  | C       | X<br>99  | X<br>105 | X<br>87  | X<br>80 | X<br>54 |
| 13     | X<br>46 | X<br>47 | X<br>45 | X<br>52 | X<br>51 | X<br>54 | X<br>43 |    |    |    | C   | C   |     | C  |     |    |    |    |         | X<br>93  | X<br>108 | X<br>76  | X<br>52 | X<br>54 |
| 14     | X<br>46 | X<br>46 | X<br>40 | X<br>42 | X<br>41 | X<br>35 | X<br>33 |    |    |    |     |     |     |    |     |    |    |    |         | X<br>82  | X<br>97  | X<br>94  | X<br>73 | X<br>53 |
| 15     | X<br>50 | X<br>47 | X<br>44 | X<br>42 | X<br>40 | X<br>38 | X<br>37 |    |    |    |     |     |     |    |     |    |    |    |         | X<br>78  | X<br>87  | X<br>79  | X<br>66 | X<br>56 |
| 16     | X<br>45 | X<br>48 | X<br>47 | X<br>47 | X<br>45 | X<br>30 | X<br>32 |    |    |    |     |     |     |    |     |    |    |    |         | X<br>74  | X<br>78  | X<br>71  | X<br>74 | X<br>62 |
| 17     | X<br>51 | X<br>44 | X<br>42 | X<br>41 | X<br>36 | X<br>28 | X<br>31 |    |    |    |     |     |     |    |     |    |    |    |         | X<br>68  | X<br>71  | X<br>73  | X<br>57 | X<br>50 |
| 18     | X<br>48 | X<br>44 | X<br>42 | X<br>42 | X<br>42 | X<br>34 | X<br>32 |    |    |    |     |     |     |    |     |    |    |    |         | X<br>104 | X<br>112 | X<br>98  | X<br>74 | X<br>52 |
| 19     | X<br>41 | X<br>42 | X<br>39 | X<br>38 | X<br>38 | X<br>38 | X<br>37 |    |    |    |     |     |     |    |     |    |    |    |         | X<br>82  | X<br>85  | X<br>80  | X<br>58 | X<br>52 |
| 20     | X<br>54 | X<br>46 | X<br>42 | X<br>42 | X<br>40 | X<br>32 | X<br>34 |    |    |    |     |     |     |    |     |    |    |    |         | X<br>98  | X<br>66  | X<br>75  | X<br>54 | X<br>48 |
| 21     | X<br>45 | X<br>42 | X<br>41 | X<br>42 | X<br>45 | X<br>32 | X<br>34 |    |    |    |     |     |     |    |     |    |    |    |         | X<br>78  | X<br>86  | X<br>78  | X<br>55 | X<br>42 |
| 22     | X<br>42 | X<br>44 | X<br>50 | X<br>45 | X<br>37 | X<br>39 | X<br>36 |    |    |    |     |     |     |    |     |    |    |    |         | X<br>61  | X<br>54  | X<br>56  | X<br>54 | X<br>40 |
| 23     | X<br>42 | X<br>43 | X<br>42 | X<br>47 | X<br>39 | X<br>32 | X<br>31 |    |    |    |     |     |     |    |     |    |    |    |         | X<br>78  | X<br>85  | X<br>54  | X<br>43 | X<br>36 |
| 24     | X<br>37 | X<br>39 | X<br>50 | X<br>44 | X<br>26 | X<br>30 | X<br>33 |    |    |    |     |     |     |    |     |    |    |    |         | X<br>78  | X<br>67  | X<br>56  | X<br>50 | X<br>50 |
| 25     | X<br>58 | X<br>56 | X<br>38 | X<br>38 | X<br>37 | X<br>36 | X<br>41 |    |    |    |     |     |     |    |     |    |    |    |         | X<br>62  | X<br>72  | X<br>80  | X<br>68 | X<br>54 |
| 26     | X<br>52 | X<br>48 | X<br>52 | X<br>59 | X<br>52 | X<br>38 | X<br>37 |    |    |    |     |     |     |    |     |    |    |    |         | X<br>65  | X<br>66  | X<br>76  | X<br>77 | X<br>84 |
| 27     | X<br>48 | X<br>43 | X<br>43 | X<br>45 | X<br>46 | X<br>42 | X<br>40 |    |    |    |     |     |     |    |     |    |    |    |         | X<br>134 | X<br>128 | X<br>93  | X<br>75 | X<br>58 |
| 28     | X<br>59 | X<br>62 | X<br>57 | X<br>46 | X<br>44 | X<br>40 | X<br>37 |    |    |    |     |     |     |    |     |    |    |    |         | X<br>65  | X<br>72  | X<br>72  | X<br>58 | X<br>48 |
| 29     | X<br>38 | X<br>41 | X<br>42 | X<br>39 | X<br>38 | X<br>38 | X<br>35 |    |    |    |     |     |     |    |     |    |    |    |         | X<br>116 | X<br>99  | X<br>86  | X<br>82 | X<br>61 |
| 30     | X<br>55 | X<br>62 | X<br>72 | X<br>36 | X<br>37 | X<br>27 | X<br>26 |    |    |    |     |     |     |    |     |    |    |    |         | X<br>103 | X<br>108 | X<br>107 | X<br>89 | X<br>60 |
| 31     | X<br>57 | X<br>64 | X<br>74 | X<br>35 | A       | X<br>28 | A       |    |    |    |     |     |     |    |     |    |    |    |         | X<br>79  | X<br>61  | X<br>69  | X<br>64 | X<br>55 |
|        | 00      | 01      | 02      | 03      | 04      | 05      | 06      | 07 | 08 | 09 | 10  | 11  | 12  | 13 | 14  | 15 | 16 | 17 | 18      | 19       | 20       | 21       | 22      | 23      |
| CNT    | 30      | 31      | 31      | 31      | 30      | 31      | 30      |    |    |    | 1   | 1   | 1   |    | 1   |    |    |    |         | 31       | 31       | 31       | 31      | 31      |
| MED    | X<br>48 | X<br>46 | X<br>42 | X<br>42 | X<br>40 | X<br>36 | X<br>36 |    |    |    | 167 | 135 | 126 |    | 108 |    |    |    | X<br>78 | X<br>78  | X<br>78  | X<br>64  | X<br>54 |         |
| U Q    | X<br>55 | X<br>52 | X<br>50 | X<br>47 | X<br>45 | X<br>39 | X<br>38 |    |    |    |     |     |     |    |     |    |    |    |         | X<br>93  | X<br>97  | X<br>87  | X<br>74 | X<br>60 |
| L Q    | X<br>42 | X<br>42 | X<br>40 | X<br>39 | X<br>38 | X<br>32 | X<br>32 |    |    |    |     |     |     |    |     |    |    |    |         | X<br>65  | X<br>71  | X<br>70  | X<br>57 | X<br>48 |

DEC.2022 f<sub>XI</sub> (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Okinawa

DEC.2022 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

| $\begin{matrix} H \\ D \end{matrix}$ | 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                                    | 42              | 41 | 31 | 36 | 32              | 28 | 26 | 53 | 59  | 69  | 105              | 130              | 115              | 112              | 123             | 126 | 121              | 96               | 64              | 54               | 70               | 62              | 55              | 56              |    |
| 2                                    | 38              | 42 | 36 | 30 | 28              | 31 | 36 | 58 | 82  | 95  | 99               | 113              | 107              | 113              | 108             | 108 | 92               | 77               | 82              | 68               | 70               | 59              | 53              | 37              |    |
| 3                                    | 30              | 31 | 31 | 34 | 35              | 28 | 26 | 49 | 70  | 98  | 98               | 98               | 87               | 103              | 120             | 112 | 91               | 93               | 89              | 59 <sup>H</sup>  | 76               | 88              | 62              | 47              |    |
| 4                                    | 41              | 39 | 42 | 41 | 40              | 44 | 37 | 54 | 75  | 107 | 130              | 97               | 90               | 109              | 108             | 109 | 96               | 84               | 73              | 56               | 67               | 72              | 56              | 58              |    |
| 5                                    | 53              | 54 | 56 | 55 | 47              | 40 | 37 | 53 | 88  | 138 | 131              | 107              | 102              | 118              | 119             | 111 | 93               | 93               | 86 <sup>R</sup> | 74               | 88               | 87              | 70              | 54 <sup>H</sup> |    |
| 6                                    | 52 <sup>H</sup> | 52 | 53 | 52 | 32              | 26 | 24 | 44 | 88  | 117 | 142              | 118              | 121              | 121              | 114             | 107 | 98               | 93 <sup>H</sup>  | 74              | 66               | 76               | 62              | 55              | 47              |    |
| 7                                    | 38              | 38 | 40 | 33 | 32              | 26 | 26 | 48 | 76  | 94  | 103 <sup>V</sup> | 94               | 98               | 102              | 98              | 87  | 86               | 75               | 78              | 58               | 62               | 74              | 66              | 62              |    |
| 8                                    | 56              | 66 | 64 | 56 | 47              | 46 | 50 | 64 | 94  | 147 | 158 <sup>F</sup> | 126 <sup>F</sup> | 118 <sup>F</sup> | 110 <sup>F</sup> | 98 <sup>F</sup> | 85  | 81               | 79               | 66              | 56               | 66               | 77              | 53              | 34              |    |
| 9                                    | A               | 35 | 36 | 38 | 37              | 28 | 32 | 48 | 75  | 100 | 95               | 96               | 99               | 98               | 90              | 99  | 87               | 98               | 74              | 53               | 57               | 66              | 66              | 54              |    |
| 10                                   | 30              | 26 | 29 | 32 | 33              | 33 | 32 | 49 | 72  | 82  | 100              | 94               | 102              | 112              | 124             | 139 | 142              | 138              | 124             | 128 <sup>R</sup> | 117              | 109             | 84 <sup>R</sup> | 63              |    |
| 11                                   | 54              | 46 | 28 | 29 | 30              | 31 | 31 | 50 | 72  | 88  | 89               | 94               | 84               | 105              | 119             | 110 | 102              | 93               | 73              | 63               | 68               | 64              | 46              | 35              |    |
| 12                                   | 29              | 29 | 29 | 41 | 58              | 41 | 30 | 47 | 78  | 94  | 104              | C                | C                | C                | C               | C   | C                | C                | C               | 93               | 99               | 81              | 74              | 48              |    |
| 13                                   | 40              | 41 | 39 | 46 | 45              | 48 | 37 | 50 | 91  | 114 | C                | C                | 139              | CU               | C               | 165 | 163              | 155              | 145             | 95               | 87               | 102             | 70              | 46              | 48 |
| 14                                   | 40              | 40 | 34 | 36 | 35              | 29 | 27 | 47 | 89  | 88  | 99               | 90               | 108              | 128              | 139             | 134 | 112              | 98               | 80              | 76               | 91               | 88 <sup>R</sup> | 67              | 47              |    |
| 15                                   | 44              | 41 | 38 | 36 | 34              | 32 | 31 | 51 | 92  | 104 | 89               | 105              | 114              | 134              | 141             | 141 | 140              | 125              | 90              | 72               | 81               | 73              | 60              | 49              |    |
| 16                                   | 39              | 42 | 41 | 41 | 39              | 24 | 26 | 43 | 76  | 96  | 88               | 90               | 104              | 128              | 116             | 119 | 108              | 101              | 89              | 68               | 72               | 65              | 68              | 56              |    |
| 17                                   | 45              | 38 | 36 | 35 | 30              | 23 | 25 | 45 | 80  | 93  | 98               | 96               | 120              | 142              | 143             | 122 | 116              | 120              | 89              | 62               | 65               | 67              | 51              | 44              |    |
| 18                                   | 42              | 38 | 36 | 36 | 36              | 28 | 26 | 43 | 85  | 90  | 85               | 86               | 112              | 127              | 129             | 120 | 124              | 123              | 108             | 98 <sup>R</sup>  | 106 <sup>R</sup> | 92              | 68              | 46              |    |
| 19                                   | 35              | 36 | 33 | 32 | 32              | 32 | 31 | 48 | 80  | 84  | 98               | 105              | 120              | 112              | 109             | 109 | 109              | 99               | 92              | 76               | 79               | 74              | 52              | 46              |    |
| 20                                   | 48              | 40 | 36 | 36 | 34              | 26 | 28 | 48 | 84  | 103 | 105              | 117              | 126              | 129              | 139             | 143 | 143              | 133              | 105             | 92               | 60               | 69              | 48              | 42              |    |
| 21                                   | 39              | 36 | 35 | 36 | 39              | 26 | 28 | 45 | 87  | 91  | 95               | 101              | 128              | 133              | 126             | 144 | 140              | 133              | 112             | 72               | 80               | 72              | 49              | 36              |    |
| 22                                   | 36              | 38 | 44 | 39 | 31              | 33 | 30 | 43 | 77  | 97  | 120              | 139              | 142              | 150              | 146             | 135 | 127              | 112              | 76              | 55               | 48               | 50              | 48              | 34              |    |
| 23                                   | 36              | 37 | 36 | 41 | 33              | 26 | 25 | 40 | 89  | 110 | 102              | 107              | 128              | 133              | 140             | 131 | 130              | 118              | 108             | 72               | 79               | 48              | 37              | 30              |    |
| 24                                   | 31              | 33 | 44 | 38 | 20 <sup>F</sup> | 24 | 27 | 40 | 85  | 94  | 116              | 118              | 92               | 87               | 112             | 122 | 111              | 103              | 98              | 72               | 61               | 50              | 44              | 44              |    |
| 25                                   | 52              | 50 | 32 | 32 | 30              | 31 | 35 | 45 | 80  | 112 | 139              | 105              | 112              | 138              | 147             | 144 | 145              | 142              | 102             | 56               | 66               | 74              | 62              | 48              |    |
| 26                                   | 46              | 42 | 46 | 53 | 46              | 32 | 31 | 44 | 82  | 86  | 102              | 96               | 100              | 110              | 111             | 128 | 121              | 106              | 72              | 59               | 60 <sup>V</sup>  | 69              | 71              | 78 <sup>R</sup> |    |
| 27                                   | 42 <sup>V</sup> | 37 | 37 | 39 | 40              | 36 | 34 | 46 | 88  | 128 | 143              | 122              | 128              | 152              | 147             | 156 | 154              | 154              | 151             | 128              | 122              | 87              | 69              | 52              |    |
| 28                                   | 53              | 56 | 51 | 40 | 38              | 34 | 31 | 47 | 94  | 102 | 94               | 89               | 91               | 119              | 126             | 122 | 120 <sup>H</sup> | 107 <sup>H</sup> | 86              | 59               | 66               | 66              | 52              | 42              |    |
| 29                                   | 32              | 35 | 36 | 33 | 32              | 32 | 29 | 40 | 82  | 94  | 102              | 102              | 110              | 136              | 156             | 168 | 168              | 154              | 141             | 110              | 93               | 80              | 76              | 55              |    |
| 30                                   | 49              | 56 | 66 | 30 | 31              | 21 | 20 | 39 | 103 | 101 | 100              | 117              | 124              | 143              | 151             | 164 | 151              | 138              | 131             | 97               | 102              | 101             | 83 <sup>H</sup> | 54              |    |
| 31                                   | 51              | 58 | 68 | 29 | A               | 22 | A  | 44 | 81  | 98  | 134              | 119              | 93               | 95               | 116             | 121 | 104              | 84               | 84              | 73               | 55               | 63              | 58              | 49              |    |
|                                      | 00              | 01 | 02 | 03 | 04              | 05 | 06 | 07 | 08  | 09  | 10               | 11               | 12               | 13               | 14              | 15  | 16               | 17               | 18              | 19               | 20               | 21              | 22              | 23              |    |
| CNT                                  | 30              | 31 | 31 | 31 | 30              | 31 | 30 | 31 | 31  | 31  | 30               | 29               | 30               | 29               | 30              | 30  | 30               | 30               | 30              | 31               | 31               | 31              | 31              | 31              |    |
| MED                                  | 42              | 40 | 36 | 36 | 34              | 31 | 30 | 47 | 82  | 97  | 102              | 105              | 111              | 119              | 124             | 122 | 118              | 104              | 89              | 72               | 72               | 72              | 58              | 48              |    |
| U Q                                  | 49              | 46 | 44 | 41 | 39              | 33 | 32 | 50 | 88  | 107 | 120              | 118              | 121              | 134              | 141             | 141 | 140              | 133              | 105             | 87               | 91               | 81              | 68              | 54              |    |
| L Q                                  | 36              | 36 | 34 | 33 | 32              | 26 | 26 | 44 | 76  | 91  | 98               | 95               | 99               | 110              | 112             | 110 | 98               | 93               | 76              | 59               | 65               | 64              | 51              | 42              |    |

DEC.2022 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Okinawa

DEC.2022 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<br>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   | L   | L   |     |    |    |    |    |    |    |    |
| 2      |    |    |    |    |    |    |    |    |     | L   | L   | L   | L   | L   | L   | L   |     |    |    |    |    |    |    |    |
| 3      |    |    |    |    |    |    |    |    |     | L   | L   | L   | L   | L   | L   | L   | L   |    |    |    |    |    |    |    |
| 4      |    |    |    |    |    |    |    |    | 316 | L   | L   | L   | L   | L   | L   | L   | L   | L  |    |    |    |    |    |    |
| 5      |    |    |    |    |    |    |    |    |     | L   | L   | L   | L   | L   | L   | L   | L   | L  |    |    |    |    |    |    |
| 6      |    |    |    |    |    |    |    |    |     | L   | L   | L   | L   | L   | L   | L   | L   | L  |    |    |    |    |    |    |
| 7      |    |    |    |    |    |    |    |    |     | L   | L   | L   | L   | L   | L   | L   | L   | L  | A  |    |    |    |    |    |
| 8      |    |    |    |    |    |    |    |    | 472 | L   | L   | L   | L   | L   | L   | L   | L   | L  |    |    |    |    |    |    |
| 9      |    |    |    |    |    |    |    |    |     | L   | L   | L   | L   | L   | L   | L   | L   | L  |    |    |    |    |    |    |
| 10     |    |    |    |    |    |    |    |    |     |     | L   | L   | L   | L   | L   | L   | L   | L  |    |    |    |    |    |    |
| 11     |    |    |    |    |    |    |    |    |     | L   | L   | L   | L   | L   | L   | L   | L   | L  |    |    |    |    |    |    |
| 12     |    |    |    |    |    |    |    |    |     | L   | C   | C   | C   | C   | C   | C   | C   | C  | C  | C  |    |    |    |    |
| 13     |    |    |    |    |    |    |    |    |     | L   | C   | C   | L   | C   | L   | L   |     |    |    |    |    |    |    |    |
| 14     |    |    |    |    |    |    |    |    | 388 | L   | L   | L   | L   | L   | L   | L   |     |    |    |    |    |    |    |    |
| 15     |    |    |    |    |    |    |    |    |     | L   | L   | L   | L   | L   | L   | L   | L   | L  |    |    |    |    |    |    |
| 16     |    |    |    |    |    |    |    |    |     | L   | L   | L   | L   | L   | L   | L   | L   | L  | A  |    |    |    |    |    |
| 17     |    |    |    |    |    |    |    |    |     | L   | L   | L   | L   | L   | L   | L   | L   | L  | L  |    |    |    |    |    |
| 18     |    |    |    |    |    |    |    |    |     | L   | L   | L   | L   | L   | L   | L   | L   | L  | L  |    |    |    |    |    |
| 19     |    |    |    |    |    |    |    |    |     | L   | L   | L   | L   | L   | L   | L   | L   | L  |    |    |    |    |    |    |
| 20     |    |    |    |    |    |    |    |    |     | L   | L   | L   | L   | L   | L   | L   | L   | L  | A  |    |    |    |    |    |
| 21     |    |    |    |    |    |    |    |    |     | L   | L   | L   | L   | L   | L   | L   | L   | L  |    |    |    |    |    |    |
| 22     |    |    |    |    |    |    |    |    |     | L   | L   | L   | L   | L   | L   | L   | L   | L  | L  |    |    |    |    |    |
| 23     |    |    |    |    |    |    |    |    | L   | L   | L   | L   | L   | L   | L   | L   | L   | L  | L  |    |    |    |    |    |
| 24     |    |    |    |    |    |    |    |    |     | L   | L   | L   | L   | L   | L   | L   | L   | L  | L  |    |    |    |    |    |
| 25     |    |    |    |    |    |    |    |    |     | L   | L   | L   | L   | L   | L   | L   | L   | L  | L  |    |    |    |    |    |
| 26     |    |    |    |    |    |    |    |    |     | L   | L   | L   | L   | L   | L   | L   | L   | L  | L  |    |    |    |    |    |
| 27     |    |    |    |    |    |    |    |    |     | L   | L   | L   | L   | L   | L   | L   | L   | L  | L  |    |    |    |    |    |
| 28     |    |    |    |    |    |    |    |    |     | L   | L   | L   | L   | L   | L   | L   | L   | L  | L  |    |    |    |    |    |
| 29     |    |    |    |    |    |    |    |    |     | L   | L   | L   | L   | L   | L   | L   | L   | L  | L  |    |    |    |    |    |
| 30     |    |    |    |    |    |    |    |    |     | L   | L   | L   | L   | L   | L   | L   | L   | L  | L  |    |    |    |    |    |
| 31     |    |    |    |    |    |    |    |    |     | L   | L   | L   | L   | L   | 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   | 5   | 14  | 16  | 20  | 17  | 4   | 2   |    |    |    |    |    |    |    |
| MED    |    |    |    |    |    |    |    |    | 316 | 430 | 480 | 480 | 484 | 496 | 504 | 440 | 312 |    |    |    |    |    |    |    |
| U Q    |    |    |    |    |    |    |    |    |     |     | L   | L   | L   | L   | L   | L   | L   |    |    |    |    |    |    |    |
| L Q    |    |    |    |    |    |    |    |    |     |     | L   | L   | L   | L   | L   | L   | L   |    |    |    |    |    |    |    |

DEC.2022 foF1 (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



## IONOSPHERIC DATA STATION Okinawa

DEC.2022 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<br>D | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08  | 09  | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19 | 20 | 21 | 22 | 23 |
|--------|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|
| 1      |    |    |    |    |    |    |    | B  | U A | 216 | 256 | 288 | A   | 336 | A   | A   | A   | 264 | 176 | B  |    |    |    |    |
| 2      |    |    |    |    |    |    |    | B  |     | 196 | 284 | 308 | 332 | 344 | 344 | 336 | 312 | 276 | 216 | B  |    |    |    |    |
| 3      |    |    |    |    |    |    |    | B  |     | 224 | 268 | 312 | 328 | 340 | A   | 340 | 304 | 252 | A   | A  |    |    |    |    |
| 4      |    |    |    |    |    |    |    | B  |     | 244 | 280 | 312 | 316 | A   | A   | 340 | A   | 276 | 208 | B  |    |    |    |    |
| 5      |    |    |    |    |    |    |    | B  |     | 240 | 284 | 324 | 344 | 344 | 352 | 324 | 304 | 284 | 188 | A  |    |    |    |    |
| 6      |    |    |    |    |    |    |    | B  |     | 240 | 272 | 324 | 344 | 344 | 348 | 336 | 316 | 264 | A   | B  |    |    |    |    |
| 7      |    |    |    |    |    |    |    | B  |     | 232 | 292 | 340 | 348 | A   | A   | A   | A   | A   | A   | A  |    |    |    |    |
| 8      |    |    |    |    |    |    |    | B  |     | 224 | A   | 328 | 348 | 352 | 356 | 332 | 308 | 272 | 212 | A  |    |    |    |    |
| 9      |    |    |    |    |    |    |    | B  |     | 228 | 276 | 320 | 340 | 348 | 352 | 344 | 292 | 268 | A   | B  |    |    |    |    |
| 10     |    |    |    |    |    |    |    | B  |     | 232 | 276 | 312 | 336 | 348 | 364 | A   | A   | 280 | 196 | B  |    |    |    |    |
| 11     |    |    |    |    |    |    |    | B  | A   | 284 | 312 | 336 | 344 | 344 | 336 | 308 | 276 | A   | A   |    |    |    |    |    |
| 12     |    |    |    |    |    |    |    | B  |     | 248 | 296 | E C | C   | C   | C   | C   | C   | C   | C   | C  |    |    |    |    |
| 13     |    |    |    |    |    |    |    | B  |     | 252 | 308 | C   | C   | C   | C   | C   | 336 | 292 | 196 | B  |    |    |    |    |
| 14     |    |    |    |    |    |    |    | B  |     | 240 | 296 | 336 | 348 | 356 | 356 | 348 | A   | A   | A   | B  |    |    |    |    |
| 15     |    |    |    |    |    |    |    | B  |     | 244 | 300 | 324 | A   | A   | A   | A   | A   | A   | A   | A  |    |    |    |    |
| 16     |    |    |    |    |    |    |    | A  |     | 252 | 312 | 324 | B   | A   | A   | 364 | 344 | A   | 208 | A  |    |    |    |    |
| 17     |    |    |    |    |    |    |    | B  |     | 232 | 312 | A   | 356 | A   | 360 | 344 | 320 | 280 | 216 | B  |    |    |    |    |
| 18     |    |    |    |    |    |    |    | B  |     | 236 | 300 | 324 | A   | 336 | A   | A   | 328 | 292 | 212 | B  |    |    |    |    |
| 19     |    |    |    |    |    |    |    | B  |     | 244 | 296 | A   | A   | A   | A   | 356 | 336 | 300 | A   | B  |    |    |    |    |
| 20     |    |    |    |    |    |    |    | B  |     | 244 | 284 | A   | A   | A   | A   | A   | A   | A   | A   | A  |    |    |    |    |
| 21     |    |    |    |    |    |    |    | B  |     | 228 | 276 | 312 | 340 | 360 | 360 | 348 | 320 | 284 | A   | B  |    |    |    |    |
| 22     |    |    |    |    |    |    |    | B  |     | 220 | 284 | A   | 340 | A   | A   | 336 | A   | 272 | A   | A  |    |    |    |    |
| 23     |    |    |    |    |    |    |    | B  |     | 232 | 252 | 292 | 332 | U A | 340 | 348 | A   | A   | A   | A  |    |    |    |    |
| 24     |    |    |    |    |    |    |    | B  | A   | 276 | 316 | 324 | A   | A   | A   | A   | A   | A   | A   | B  |    |    |    |    |
| 25     |    |    |    |    |    |    |    | B  | A   | 260 | 320 | A   | 348 | 344 | 332 | 304 | 292 | A   | B   |    |    |    |    |    |
| 26     |    |    |    |    |    |    |    | B  |     | 212 | 280 | 320 | 332 | 352 | 352 | 340 | 320 | A   | A   | B  |    |    |    |    |
| 27     |    |    |    |    |    |    |    | B  |     | 212 | A   | A   | A   | 360 | 364 | 344 | 320 | 280 | A   | B  |    |    |    |    |
| 28     |    |    |    |    |    |    |    | B  |     | 204 | 284 | 312 | 340 | A   | A   | A   | A   | A   | A   | B  |    |    |    |    |
| 29     |    |    |    |    |    |    |    | B  |     | 204 | 272 | A   | 348 | 352 | A   | 352 | 348 | A   | A   | A  |    |    |    |    |
| 30     |    |    |    |    |    |    |    | B  |     | 212 | 276 | 312 | 340 | 360 | 360 | 360 | A   | 300 | A   | A  |    |    |    |    |
| 31     |    |    |    |    |    |    |    | B  |     | 204 | 276 | 320 | 336 | 352 | 360 | 352 | 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    |    |    |    |    |    |    |    |    | 28  | 29  | 23  | 21  | 20  | 16  | 20  | 17  | 19  | 10  |     |    |    |    |    |    |
| MED    |    |    |    |    |    |    |    |    | 232 | 284 | 320 | 340 | 348 | 354 | 342 | 320 | 280 | 208 |     |    |    |    |    |    |
| U Q    |    |    |    |    |    |    |    |    | 242 | 296 | 324 | 346 | 354 | 360 | 350 | 332 | 292 | 212 |     |    |    |    |    |    |
| L Q    |    |    |    |    |    |    |    |    | 214 | 276 | 312 | 332 | 344 | 348 | 336 | 306 | 272 | 196 |     |    |    |    |    |    |

DEC.2022 foE (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Okinawa

DEC.2022 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<br>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 | J A | E B | J A |     |     |     | J A | G   | J A |     |     |     | J A | J A | J A | J A | J A |     | 19  | 19  |     |     |     |    |
| 2      | E B | 16  | 18  | J A | J A | J A | E B | J A |     | G   |     |     |     | G   | G   |     |     |     | J A | J A | J A | J A | J A | J A | E B | 16  |     |     |    |
| 3      | E B | 16  | 16  | E B | J A | J A | J A | J A |     |     |     |     |     | J A |     |     | G   | J A | J A | J A | J A | J A | E B | E B | E B | 16  |     |     |    |
| 4      | E B | 16  | 16  | E B | E B | E B | E B | E B |     | G   |     | J A | J A | J A | J A | G   | J A |     | G   | E B |     | J A | J A | J A | E B | J A |     |     |    |
| 5      | E B | 16  | 29  | A E | E B | E B |     | E B | E B | E B |     |     |     | G   | G   |     |     |     |     |     | E B | E B | E B | E B | E B | 16  |     |     |    |
| 6      | E B | 16  | 16  | J A |     | E B | J A |     | E B |     | G   | G   | G   |     |     |     |     |     | J A | J A | A E | E B | E B | E B | J A | 20  |     |     |    |
| 7      |     | E B | 16  | 16  | E B | E B | E B | E B |     | G   |     | G   | G   |     |     | J A | J A | J A | J A | J A | J A | J A | J A | E B | E B | 16  |     |     |    |
| 8      | E B | 16  | 18  | 16  | E B | E B | 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 | 18  |     |    |
| 9      | J A | J A | J A | J A | J A | A E | J A | E B |     |     |     | G   |     |     |     |     |     | J A |     | J A | J A | A E | E B | J A | E B | 16  |     |     |    |
| 10     | E B | 16  | 16  | E B | J A | J A | A E | E B | E B | E B |     |     |     | J A | J A | J A |     |     | G   | E B | E B | E B | E B | E B | J A | 21  |     |     |    |
| 11     | J A | J A | J A | J A | J A | J A | J A | J A | J A |     |     |     |     | G   |     | G   | J A |     | J A | J A | J A | A E | E B |     | J A | 17  |     |     |    |
| 12     | J A |     | 18  | 18  | J A |     | J A | A E | E B | E B |     |     |     | C   | C   | C   | C   | C   | C   | C   | C   | J A | J A | A E | E B | E B | J A |     |    |
| 13     | J A | J A | A E | E B | E B | J A | J A | J A | J A |     | G   | J A | C   | C   | G   | C   | C   |     |     | J A | J A | J A | J A | J A | J A | A E | E B |     |    |
| 14     | E B | 16  | 23  | 20  | 21  | 21  | 21  | 16  | 16  |     |     |     |     | 41  | 44  | 41  | J A | J A | J A | J A |     | J A | J A | A E | E B | J A | 32  |     |    |
| 15     | J A | 64  | 21  | 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 | A E | E B | J A |     | E B | E B | 16  |     |    |
| 16     | E B | 16  | 16  | E B | E B | E B | E B | E B | E B |     | G   | J A | J A | J A | J A | G   |     | G   | J A |     | J A | J A | A E | E B | E B | E B | 16  |     |    |
| 17     | E B | 16  | 16  | E B | J A | J A | A E | E B | E B | E B |     | G   | J A | G   |     | G   |     |     |     | G   | E B | E B | J A |     | E B | E B | 16  |     |    |
| 18     | E B | 16  | 16  | E B | E B | J A | A E | E B | E B | E B |     | J A | J A | J A | J A | J A | J A |     | G   | G   | E B | J A | J A | A E | E B | E B | 16  |     |    |
| 19     |     | E B | 16  | 18  | J A | A E | E B | E B | E B | E B |     | G   | J A | J A | J A | J A | J A |     | G   | G   | J A | J A | J A | J A | J A | J A | J A | 20  |    |
| 20     | E B | 16  | 16  | J A | J A | J A | A E | 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 | J A | J A | J A | J A | J A | 17  |    |
| 21     | J A | A E | E B | J A | A E | E B | E B | J A |     |     |     |     |     | G   | G   | G   |     |     | G   | J A | J A | J A | A E | E B | E B | E B | E B | 16  |    |
| 22     | E B | 16  | 16  | E B | E B | E B | E B | E B | J A |     |     |     |     | J A |     | G   |     |     | J A | J A | J A | J A | A E | E B | E B | E B | E B | 16  |    |
| 23     | E B | 16  | 18  | 16  | E B | J A |     | J A | A E | E B |     |     |     | J A | J A | J A |     |     | J A |     | J A | A E | E B | E B | J A | J A | J A | 22  |    |
| 24     | J A | J A | J A |     | J A | A E | E B | E B | E B |     |     |     |     | J A |     | J A |     |     | J A | J A | J A | J A | J A | J A | J A | J A | J A | J A | 16 |
| 25     | J A | J A | J A |     | E B | E B | E B | E B | E B | J A |     | J A | J A | J A | J A | J A | J A |     |     | G   | J A | J A | J A | J A | A E | E B | J A | 54  |    |
| 26     | J A | J A | J A | J A | J A | J A | A E | E B | E B |     |     |     |     | G   |     | G   | J A |     | J A | J A | J A | J A | J A | J A | J A | A E | E B | J A | 19 |
| 27     | J A | A E | E B | E B | E B | E B | E B | E B |     | J A |     | J A |     | G   | G   | G   | J A | J A | J A | J A | J A | A E | E B | J A | A E | E B | J A | 18  |    |
| 28     | J A | J A | J A | J A | J A | J A | A E | 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 | 44 |
| 29     | J A | J A | J A | J A | J A | J A | A E | E B | E B |     |     | J A |     | G   | J A | J A | J A |     |     | G   | J A | J A | J A | J A | J A | J A | J A | J A | 16 |
| 30     | E B | 16  | 16  | E B | E B | E B | E B | J A | J A |     |     |     |     | G   | 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 | 20 |
| 31     | J A | J A | J A | J A | J A | J A | J A | J A | J A |     |     |     |     | G   |     | J A |     |     | J A | J A | J A | J A | J A | J A | J A | J A | A E | E B | 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  | 29  | 30  | 29  | 30  | 30  | 30  | 30  | 30  | 30  | 31  | 31  | 31  | 31  | 31  |     |     |     |    |
| MED    | 16  | 17  | 17  | 18  | J A | 19  | 18  | 16  | 16  | 26  | 32  | 36  | 39  | 40  | 38  | 38  | 36  | 33  | J A | J A | J A | J A | J A | J A | A E | E B | 17  |     |    |
| 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 | J A | J A | 20 |
| L Q    | E B | 16  | 16  | 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 | 16 |

DEC.2022 foEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Okinawa

DEC.2022 fbEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

| H<br>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      | 18      | E B E B | 16 | 16 | 19      | E B E B | E B E B | E B E B |    |    |    |    | G  | 35 | 40    | 35 | 29 | 23      | E B E B | 16      | 16      | 29      | E B E B | E B E B |         |         |
| 2      | E B E B | 16      | 16 | 16 | E B E B | E B E B | E B E B | E B E B |    | G  |    |    |    | G  | G     | G  |    | 32      | 24      | E B     | 16      | 21      | 40      | E B E B | E B E B |         |
| 3      | E B E B | 16      | 16 | 16 | E B E B | E B E B | E B E B | E B E B |    |    |    |    |    |    |       | G  |    | 27      | 24      | 20      | 19      | 19      | 16      | E B E B | E B E B |         |
| 4      | E B E B | 16      | 16 | 16 | E B E B | E B E B | E B E B | E B E B |    | G  |    |    |    |    | G     |    | G  | E B E B | E B E B | E B E B | E B E B | 16      | 16      | E B E B | E B E B |         |
| 5      | E B E B | 16      | 16 | 16 | E B E B | E B E B | E B E B | E B E B |    |    | G  | G  | G  | G  | G     |    |    |         |         | 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 | 16      | 16 | 16 | 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 E B | E B E B | E B E B |         |
| 7      | E B E B | 16      | 16 | 16 | E B E B | E B E B | E B E B | E B E B |    | G  |    | G  | G  |    |       |    |    |         |         |         |         |         |         | E B E B | E B E B |         |
| 8      | E B E B | 16      | 16 | 16 | E B E B | E B E B | E B E B | E B E B |    |    |    | G  | G  |    | G     | G  |    |         |         | E B E B | E B E B |         | E B E B | E B E B |         |         |
| 9      | A A E B | 16      | 16 | 16 | E B E B | E B E B | E B E B | E B E B |    |    |    | G  | G  |    |       |    |    |         | E B     | E B     | 16      | 18      | 16      | E B E B | E B E B |         |
| 10     | E B E B | 16      | 16 | 16 | E B E B | E B E B | E B E B | E B E B |    |    |    |    |    |    |       |    |    |         | G       | 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 | 16      | 16 | 16 | E B E B | E B E B | E B E B | E B E B |    |    |    |    |    | G  | G     |    |    |         |         | 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 | 16      | 16 | 16 | E B E B | E B E B | E B E B | E B E B |    |    |    | G  | C  | C  | C     | C  | C  | C       | C       |         |         | 26      | 16      | E B E B | E B E B |         |
| 13     | E B E B | 16      | 16 | 16 | E B E B | E B E B | E B E B | E B E B |    | G  | G  | C  | C  | G  | C E C |    |    |         | E B E B | 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 | 16      | 16 | 16 | E B E B | E B E B | E B E B | E B E B |    | G  | G  | G  | G  |    |       |    |    |         | E B E B | 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 | 16      | 16 | 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 |         |
| 16     | E B E B | 16      | 16 | 16 | E B E B | E B E B | E B E B | 18      |    | G  |    |    |    |    | G     | G  |    |         |         | 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 | 16      | 16 | 16 | E B E B | E B E B | E B E B | E B E B |    |    |    |    |    |    | G     | G  |    |         | G       | 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 | 16      | 16 | 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 |         |
| 19     | E B E B | 16      | 16 | 16 | E B E B | E B E B | E B E B | E B E B |    | G  |    |    |    |    |       |    |    |         |         | E B     | E B     | 20      | 16      | E B E B | E B E B |         |
| 20     | E B E B | 16      | 16 | 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 |         |
| 21     | E B E B | 19      | 16 | 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 |         |
| 22     | E B E B | 16      | 16 | 16 | E B E B | E B E B | E B E B | E B E B |    |    |    |    |    |    |       | G  |    |         |         | 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 | 16      | 16 | 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 |         |
| 24     | E B E B | 16      | 16 | 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 | 19      | 18      | E B E B | E B E B |
| 25     | E B E B | 16      | 16 | 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 |         |
| 26     | E B E B | 19      | 16 | 16 | E B E B | E B E B | E B E B | E B E B |    |    |    |    |    |    | G     |    |    |         |         | 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 | 16      | 16 | 16 | E B E B | E B E B | E B E B | E B E B |    |    |    |    |    |    | G     | G  | G  | G       | G       | 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     | 16      | 23 | 16 | E B E B | E B E B | E B E B | E B E B |    |    |    |    |    |    |       |    |    |         |         | E B     | E B     | 20      | 19      | 16      | E B E B | E B E B |
| 29     | E B     | 16      | 22 | 16 | E B E B | E B E B | E B E B | E B E B |    |    |    |    |    |    | G     | G  | G  |         |         |         |         |         |         | E B E B | E B E B |         |
| 30     | E B E B | 16      | 16 | 16 | E B E B | E B E B | E B E B | E B E B |    |    |    |    |    |    |       |    |    |         |         | E B     | E B     | 20      | 20      | 21      | E B E B | E B E B |
| 31     | E B E B | 16      | 16 | 18 | E B A A | E B A A | E B A A | E B     |    |    |    |    |    |    | G     |    |    |         |         | E B     | E B     | 20      | 21      | 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 | 29 | 30 | 29 | 30    | 30 | 30 | 30      | 30      | 30      | 31      | 31      | 31      | 31      |         |         |
| MED    | E B E B | 16      | 16 | 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 |         |
| U Q    | E B     | 16      | 16 | 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 |         |
| L Q    | E B E B | 16      | 16 | 16 | 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 E B | E B E B | E B E B | E B E B | E B E B | E B E B |         |

DEC.2022 fbEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Okinawa

DEC.2022 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

| H<br>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 | 14        | 14 | 14 | 21 | 20 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 2      | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17        | 17 | 19 | 20 | 18 | 16 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 3      | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16        | 19 | 19 | 20 | 22 | 16 | 15 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 4      | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 14        | 19 | 20 | 22 | 20 | 19 | 20 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 5      | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 17 | 19        | 17 | 17 | 21 | 20 | 17 | 17 | 17 | 16 | 16 | 16 | 16 | 16 | 16 |
| 6      | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 14 | 20        | 19 | 23 | 23 | 18 | 20 | 18 | 14 | 16 | 16 | 16 | 16 | 16 | 16 |
| 7      | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 19 | 20        | 19 | 22 | 23 | 18 | 18 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 8      | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 17        | 18 | 21 | 20 | 18 | 18 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 9      | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16        | 20 | 22 | 22 | 20 | 18 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 10     | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 18 | 16        | 21 | 20 | 18 | 18 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 11     | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17        | 17 | 20 | 20 | 19 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 12     | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 18 | E C<br>64 | C  | C  | C  | C  | C  | C  | C  | C  |    | 16 | 16 | 16 | 16 |
| 13     | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 18 | C         | C  | 17 | C  | 49 | 14 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 14     | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16        | 17 | 19 | 18 | 18 | 18 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 15     | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 20        | 22 | 22 | 21 | 18 | 18 | 18 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 16     | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 18        | 37 | 25 | 21 | 22 | 22 | 20 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 17     | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 20 | 19        | 21 | 20 | 19 | 20 | 19 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 18     | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 14 | 13        | 18 | 19 | 17 | 18 | 19 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 19     | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 15        | 15 | 20 | 20 | 20 | 20 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 20     | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 15        | 21 | 21 | 20 | 19 | 20 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 21     | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 18        | 18 | 18 | 18 | 20 | 18 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 22     | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 15        | 17 | 19 | 21 | 22 | 15 | 16 | 16 | 13 | 16 | 16 | 16 | 16 | 16 |
| 23     | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 13        | 19 | 18 | 22 | 20 | 18 | 14 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 24     | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16        | 16 | 18 | 18 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 25     | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16        | 16 | 18 | 19 | 20 | 16 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 26     | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16        | 19 | 19 | 18 | 20 | 18 | 17 | 17 | 16 | 16 | 16 | 16 | 16 | 16 |
| 27     | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 18        | 20 | 20 | 20 | 19 | 18 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 28     | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 16        | 16 | 24 | 24 | 22 | 20 | 22 | 18 | 16 | 16 | 16 | 16 | 16 | 16 |
| 29     | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 20 | 18        | 20 | 21 | 21 | 16 | 20 | 18 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 30     | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 18 | 16        | 18 | 16 | 14 | 19 | 18 | 15 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 31     | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 17        | 17 | 20 | 19 | 18 | 21 | 16 | 16 | 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        | 29 | 30 | 29 | 30 | 30 | 30 | 30 | 30 | 31 | 31 | 31 | 31 | 31 |
| MED    | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16        | 18 | 20 | 20 | 20 | 18 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| U Q    | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 18        | 20 | 21 | 21 | 20 | 19 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| L Q    | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16        | 17 | 18 | 18 | 18 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |

DEC.2022 fmin (0.1MHz)

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## IONOSPHERIC DATA STATION Okinawa

DEC.2022 M(3000)F2 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

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

| $\begin{matrix} H \\ D \end{matrix}$ | 00               | 01  | 02  | 03  | 04               | 05  | 06  | 07  | 08  | 09  | 10  | 11  | 12  | 13  | 14  | 15  | 16               | 17               | 18               | 19               | 20               | 21  | 22               | 23               |     |     |
|--------------------------------------|------------------|-----|-----|-----|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------------------|------------------|------------------|------------------|------------------|-----|------------------|------------------|-----|-----|
| 1                                    | 307              | 318 | 288 | 326 | 337              | 277 | 299 | 338 | 359 | 328 | 333 | 354 | 329 | 320 | 318 | 331 | 336              | 370              | 326              | 296              | 318              | 298 | 304              | 339              |     |     |
| 2                                    | 289              | 296 | 337 | 290 | 305              | 288 | 343 | 350 | 353 | 369 | 334 | 349 | 343 | 340 | 325 | 335 | 297              | 329              | 335              | 314              | 313              | 310 | 335              | 301              |     |     |
| 3                                    | 286              | 286 | 304 | 317 | 361              | 292 | 298 | 345 | 351 | 342 | 337 | 365 | 321 | 322 | 330 | 343 | 324              | 342              | 365              | 301 <sup>H</sup> | 311              | 313 | 359              | 298              |     |     |
| 4                                    | 276              | 309 | 333 | 304 | 329              | 275 | 310 | 321 | 330 | 336 | 364 | 368 | 324 | 327 | 318 | 343 | 343              | 357              | 367              | 277              | 308              | 337 | 288              | 294              |     |     |
| 5                                    | 292              | 265 | 286 | 307 | 344              | 285 | 280 | 295 | 302 | 347 | 374 | 353 | 323 | 312 | 312 | 329 | 330              | 358              | 324 <sup>R</sup> | 252              | 306              | 320 | 312              | 271 <sup>H</sup> |     |     |
| 6                                    | 268 <sup>H</sup> | 272 | 290 | 325 | 350              | 291 | 276 | 285 | 317 | 332 | 359 | 352 | 305 | 334 | 291 | 326 | 342              | 330              | 354              | 294              | 339              | 334 | 336              | 341              |     |     |
| 7                                    | 269              | 284 | 324 | 329 | 339              | 352 | 300 | 335 | 356 | 367 | 350 | 333 | 308 | 327 | 339 | 348 | 345              | 337              | 341              | 332              | 296              | 312 | 306              | 287              |     |     |
| 8                                    | 263              | 295 | 304 | 298 | 271              | 277 | 290 | 285 | 284 | 334 | 329 | 323 | 317 | 324 | 323 | 340 | 330              | 334              | 346              | 325              | 293              | 349 | 344              | 272              |     |     |
| 9                                    | 293 <sup>A</sup> | 319 | 301 | 348 | 292              | 318 | 350 | 351 | 353 | 347 | 351 | 330 | 326 | 333 | 332 | 337 | 362              | 353              | 345              | 281              | 299              | 327 | 352              |                  |     |     |
| 10                                   | 278              | 284 | 271 | 299 | 302              | 320 | 336 | 370 | 375 | 352 | 346 | 341 | 319 | 319 | 305 | 326 | 323              | 348              | 262              | 295 <sup>R</sup> | 291              | 337 | 280              | 293              |     |     |
| 11                                   | 307              | 320 | 288 | 273 | 285              | 325 | 322 | 344 | 369 | 349 | 353 | 353 | 299 | 315 | 335 | 322 | 332              | 348              | 324              | 317              | 303              | 344 | 324              | 313              |     |     |
| 12                                   | 263              | 282 | 297 | 288 | 312              | 339 | 288 | 331 | 356 | 338 | 345 |     | C   | C   | C   | C   | C                | C                | C                | 300              | 316              | 326 | 319              | 265              |     |     |
| 13                                   | 292              | 270 | 274 | 264 | 299              | 309 | 300 | 314 | 349 | 368 |     | C   | C   | CU  | C   | 317 | 307              | 314              | 319              | 341              | 333              | 318 | 348              | 347              | 302 | 258 |
| 14                                   | 282              | 293 | 274 | 258 | 315              | 335 | 297 | 319 | 367 | 349 | 347 | 294 | 307 | 313 | 311 | 317 | 320              | 340              | 320              | 317              | 330              | 285 | 336              | 283              |     |     |
| 15                                   | 300              | 289 | 302 | 318 | 306              | 285 | 295 | 303 | 352 | 379 | 337 | 325 | 295 | 315 | 308 | 303 | 313              | 336              | 318              | 282              | 305              | 325 | 322              | 234              |     |     |
| 16                                   | 266              | 289 | 299 | 323 | 360              | 338 | 309 | 314 | 338 | 357 | 349 | 321 | 316 | 333 | 302 | 317 | 316              | 324              | 347              | 323              | 306              | 300 | 332              | 322              |     |     |
| 17                                   | 296              | 290 | 330 | 346 | 380              | 270 | 281 | 317 | 355 | 342 | 342 | 302 | 301 | 321 | 323 | 290 | 312              | 342              | 345              | 325              | 287              | 311 | 314              | 323              |     |     |
| 18                                   | 303              | 305 | 306 | 322 | 358              | 331 | 298 | 318 | 349 | 363 | 356 | 310 | 323 | 322 | 321 | 313 | 327              | 330              | 330              | 261 <sup>R</sup> | 253 <sup>R</sup> | 325 | 317              | 213              |     |     |
| 19                                   | 292              | 320 | 307 | 296 | 304              | 321 | 301 | 309 | 365 | 344 | 330 | 334 | 341 | 316 | 327 | 320 | 334              | 320              | 323              | 304              | 313              | 327 | 280              | 273              |     |     |
| 20                                   | 297              | 312 | 296 | 322 | 347              | 264 | 285 | 315 | 354 | 346 | 330 | 326 | 326 | 315 | 313 | 310 | 310              | 286              | 297              | 378              | 281              | 317 | 318              | 303              |     |     |
| 21                                   | 293              | 288 | 307 | 303 | 355              | 304 | 289 | 310 | 360 | 354 | 354 | 299 | 321 | 326 | 292 | 320 | 314              | 313              | 319              | 310              | 316              | 326 | 289              | 277              |     |     |
| 22                                   | 261              | 284 | 311 | 329 | 301              | 288 | 316 | 309 | 353 | 333 | 323 | 332 | 312 | 304 | 320 | 299 | 316              | 350              | 359              | 344              | 293              | 319 | 352              | 276              |     |     |
| 23                                   | 279              | 257 | 302 | 322 | 372              | 295 | 275 | 296 | 342 | 360 | 339 | 307 | 331 | 317 | 337 | 321 | 307              | 321              | 344              | 338              | 373              | 308 | 310              | 272              |     |     |
| 24                                   | 262              | 267 | 311 | 356 | 259 <sup>F</sup> | 281 | 283 | 308 | 354 | 358 | 348 | 361 | 342 | 308 | 293 | 321 | 327              | 331              | 339              | 342              | 384              | 298 | 252              | 284              |     |     |
| 25                                   | 305              | 340 | 303 | 305 | 258              | 271 | 308 | 310 | 342 | 348 | 353 | 330 | 312 | 307 | 305 | 308 | 309              | 345              | 353              | 262              | 307              | 332 | 348              | 309              |     |     |
| 26                                   | 259 <sup>V</sup> | 277 | 297 | 343 | 341              | 335 | 306 | 314 | 360 | 369 | 356 | 361 | 308 | 305 | 289 | 313 | 316              | 322              | 334              | 333              | 289              | 338 | 310              | 285              |     |     |
| 27                                   | 262              | 265 | 272 | 297 | 331              | 300 | 297 | 304 | 306 | 335 | 355 | 315 | 298 | 314 | 303 | 308 | 307              | 317              | 324              | 313              | 318              | 314 | 316              | 238              |     |     |
| 28                                   | 291              | 321 | 302 | 269 | 289              | 284 | 274 | 288 | 342 | 360 | 328 | 343 | 309 | 317 | 311 | 317 | 296 <sup>H</sup> | 292 <sup>H</sup> | 323              | 324              | 303              | 313 | 335              | 315              |     |     |
| 29                                   | 321              | 290 | 314 | 292 | 282              | 308 | 327 | 314 | 358 | 361 | 355 | 328 | 308 | 281 | 302 | 312 | 312              | 329              | 341              | 349              | 326              | 314 | 318              | 303              |     |     |
| 30                                   | 273              | 290 | 337 | 341 | 358              | 264 | 248 | 295 | 377 | 341 | 337 | 334 | 292 | 300 | 295 | 317 | 313              | 313              | 331              | 303              | 300              | 301 | 305 <sup>H</sup> | 252              |     |     |
| 31                                   | 221              | 258 | 340 | 359 | 240 <sup>A</sup> | 288 | 288 | 355 | 331 | 351 | 353 | 337 | 276 | 305 | 324 | 317 | 323              | 338              | 356              | 300              | 312              | 318 | 343              |                  |     |     |
|                                      | 00               | 01  | 02  | 03  | 04               | 05  | 06  | 07  | 08  | 09  | 10  | 11  | 12  | 13  | 14  | 15  | 16               | 17               | 18               | 19               | 20               | 21  | 22               | 23               |     |     |
| CNT                                  | 30               | 31  | 31  | 31  | 30               | 31  | 30  | 31  | 31  | 31  | 31  | 30  | 29  | 30  | 29  | 30  | 30               | 30               | 30               | 30               | 31               | 31  | 31               | 31               |     |     |
| MED                                  | 284              | 289 | 303 | 307 | 330              | 292 | 298 | 314 | 353 | 349 | 347 | 334 | 317 | 317 | 312 | 320 | 318              | 332              | 334              | 317              | 306              | 317 | 318              | 287              |     |     |
| U Q                                  | 296              | 305 | 314 | 326 | 350              | 321 | 309 | 331 | 359 | 360 | 354 | 353 | 326 | 325 | 323 | 329 | 330              | 345              | 346              | 333              | 318              | 332 | 335              | 313              |     |     |
| L Q                                  | 266              | 277 | 290 | 296 | 301              | 277 | 285 | 303 | 342 | 338 | 337 | 322 | 308 | 310 | 303 | 313 | 312              | 322              | 324              | 296              | 293              | 310 | 305              | 272              |     |     |

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NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Okinawa

DEC.2022 M(3000)F1 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E 0SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

| H<br>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<br>357 | L<br>384 | L<br>368 | L<br>368 | L<br>368 | L        |     |    |     |    |    |    |    |    |  |
| 2      |    |    |    |    |    |    |    |    |     | L<br>383 | L<br>381 | L<br>387 | L<br>380 | L<br>409 | L<br>400 |          |     |    |     |    |    |    |    |    |  |
| 3      |    |    |    |    |    |    |    |    |     | L<br>383 | L<br>381 | L<br>387 | L<br>380 | L<br>409 | L<br>400 |          |     |    |     |    |    |    |    |    |  |
| 4      |    |    |    |    |    |    |    |    | 418 | L<br>415 | L<br>412 | U<br>412 | L<br>386 | L<br>384 | L<br>384 | L        |     |    |     |    |    |    |    |    |  |
| 5      |    |    |    |    |    |    |    |    |     | L<br>415 | L<br>388 | H<br>388 | L<br>398 | L<br>398 | L        |          |     |    |     |    |    |    |    |    |  |
| 6      |    |    |    |    |    |    |    |    |     | L<br>389 | L<br>437 | L<br>389 | L<br>389 | L<br>389 | L        |          |     |    |     |    |    |    |    |    |  |
| 7      |    |    |    |    |    |    |    |    |     | L<br>373 | L<br>396 | L<br>391 | L<br>385 | L<br>385 | L        |          |     |    |     |    |    |    |    |    |  |
| 8      |    |    |    |    |    |    |    |    |     | L<br>385 | L<br>372 | H<br>408 | L<br>443 | H<br>443 | L        |          |     |    |     |    |    |    |    |    |  |
| 9      |    |    |    |    |    |    |    |    |     | L        | L        | L        | L        | L        | L        |          |     |    |     |    |    |    |    |    |  |
| 10     |    |    |    |    |    |    |    |    |     | L        | L        | L        | L        | L        | L        |          |     |    |     |    |    |    |    |    |  |
| 11     |    |    |    |    |    |    |    |    |     | L        | L        | U<br>415 | L        | L        | L        | L        | L   |    |     |    |    |    |    |    |  |
| 12     |    |    |    |    |    |    |    |    |     | L        | C        | C        | C        | C        | C        | C        | C   | C  | C   | C  | C  | C  |    |    |  |
| 13     |    |    |    |    |    |    |    |    |     | L<br>408 | C        | C        | L<br>384 | C        | L        | L        |     |    |     |    |    |    |    |    |  |
| 14     |    |    |    |    |    |    |    |    |     | L        | L        | L        | L        | L        | L        |          |     |    |     |    |    |    |    |    |  |
| 15     |    |    |    |    |    |    |    |    |     | L        | L        | U<br>413 | L<br>360 | L        | L        | L        | L   |    |     |    |    |    |    |    |  |
| 16     |    |    |    |    |    |    |    |    |     | L        | L        | L        | L        | L        | L        | L        | L   | A  |     |    |    |    |    |    |  |
| 17     |    |    |    |    |    |    |    |    |     | L        | L        | L        | L        | L        | L        | L        | L   | L  |     |    |    |    |    |    |  |
| 18     |    |    |    |    |    |    |    |    |     | L        | L        | U<br>394 | L        | L        | L        | L        | L   | L  |     |    |    |    |    |    |  |
| 19     |    |    |    |    |    |    |    |    |     | L        | L        | L        | L        | L        | L        | L        | L   | L  |     |    |    |    |    |    |  |
| 20     |    |    |    |    |    |    |    |    |     | L        | L        | L        | L        | L        | L        | L        | A   |    |     |    |    |    |    |    |  |
| 21     |    |    |    |    |    |    |    |    |     | L        | L        | U<br>380 | L        | L        | L        | L        | L   | L  |     |    |    |    |    |    |  |
| 22     |    |    |    |    |    |    |    |    |     | L        | L        | L        | L        | L        | L        | L        | L   | L  |     |    |    |    |    |    |  |
| 23     |    |    |    |    |    |    |    |    | L   | L        | U<br>386 | L<br>388 | L<br>376 | L<br>378 | L<br>415 | L        |     |    |     |    |    |    |    |    |  |
| 24     |    |    |    |    |    |    |    |    |     | L        | L        | L        | U<br>407 | U<br>404 | U<br>363 | L        | L   | L  | 434 |    |    |    |    |    |  |
| 25     |    |    |    |    |    |    |    |    |     | L        | L        | L        | L        | L        | L        | L        | L   | L  |     |    |    |    |    |    |  |
| 26     |    |    |    |    |    |    |    |    |     | L        | L        | L        | L        | L        | L        | L        | L   | L  |     |    |    |    |    |    |  |
| 27     |    |    |    |    |    |    |    |    |     | L        | L        | L        | L        | L        | L        | L        | L   | L  |     |    |    |    |    |    |  |
| 28     |    |    |    |    |    |    |    |    |     | L        | L        | A<br>409 | L<br>411 | L<br>367 | L        | L        | L   | L  |     |    |    |    |    |    |  |
| 29     |    |    |    |    |    |    |    |    |     | L        | L        | L        | L        | L        | L        | L        | L   | L  |     |    |    |    |    |    |  |
| 30     |    |    |    |    |    |    |    |    |     | L        | L        | L        | L        | L        | L        | L        | L   | L  |     |    |    |    |    |    |  |
| 31     |    |    |    |    |    |    |    |    |     | L        | L        | L        | L        | 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        | 5        | 14       | 16       | 20       | 17       | 4        | 2   |    |     |    |    |    |    |    |  |
| MED    |    |    |    |    |    |    |    |    | 418 | 396      | 375      | 395      | 390      | 386      | 381      | 402      | 428 |    |     |    |    |    |    |    |  |
| U Q    |    |    |    |    |    |    |    |    |     |          | L<br>388 | U<br>415 | U<br>412 | L<br>396 | L<br>402 | L<br>409 |     |    |     |    |    |    |    |    |  |
| L Q    |    |    |    |    |    |    |    |    |     |          | L<br>365 | L<br>384 | L<br>386 | L<br>376 | L<br>366 | L<br>394 |     |    |     |    |    |    |    |    |  |

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135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E 0SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

| H<br>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      |    |    |    |    |    |    |    |     |     |     | 262 | 226 | 266 | 260 | 278 | 252 |     |    |    |    |    |    |    |    |  |
| 2      |    |    |    |    |    |    |    |     |     | 228 | 250 | 238 | 246 | 242 | 238 | 224 |     |    |    |    |    |    |    |    |  |
| 3      |    |    |    |    |    |    |    |     |     | 252 | 220 | 236 | 248 | 262 | 264 | 228 | 208 |    |    |    |    |    |    |    |  |
| 4      |    |    |    |    |    |    |    |     | 224 | 254 | 232 | 216 | 244 | 250 | 244 | 238 | 222 |    |    |    |    |    |    |    |  |
| 5      |    |    |    |    |    |    |    |     | 244 |     | 224 | 276 | 250 | 230 | 222 | 228 |     |    |    |    |    |    |    |    |  |
| 6      |    |    |    |    |    |    |    |     | 244 | 224 | 220 | 258 | 232 | 214 | 232 |     |     |    |    |    |    |    |    |    |  |
| 7      |    |    |    |    |    |    |    |     | 242 | 242 | 230 | 246 | 244 | 234 | 216 | 220 |     |    |    |    |    |    |    |    |  |
| 8      |    |    |    |    |    |    |    |     | 260 | 228 | 226 | 256 | 244 | 236 |     |     |     |    |    |    |    |    |    |    |  |
| 9      |    |    |    |    |    |    |    |     | 232 | 222 | 242 | 252 | 232 | 236 | 236 |     |     |    |    |    |    |    |    |    |  |
| 10     |    |    |    |    |    |    |    |     |     | 238 | 240 | 252 | 268 | 246 | 252 | 234 |     |    |    |    |    |    |    |    |  |
| 11     |    |    |    |    |    |    |    |     | 222 | 232 | 244 | 226 | 262 | 246 | 236 | 224 |     |    |    |    |    |    |    |    |  |
| 12     |    |    |    |    |    |    |    |     | 244 | 236 |     | C   | C   | C   | C   | C   | C   | C  | C  |    |    |    |    |    |  |
| 13     |    |    |    |    |    |    |    |     | 218 |     | C   | C   |     | C   |     |     |     |    |    |    |    |    |    |    |  |
| 14     |    |    |    |    |    |    |    |     | 226 | 224 | 230 | 274 | 258 | 250 |     |     |     |    |    |    |    |    |    |    |  |
| 15     |    |    |    |    |    |    |    |     |     | 222 | 248 | 240 | 278 | 276 | 256 | 244 |     |    |    |    |    |    |    |    |  |
| 16     |    |    |    |    |    |    |    |     | 234 | 230 |     | 250 | 258 | 232 | 248 | 224 |     |    |    |    |    |    |    |    |  |
| 17     |    |    |    |    |    |    |    |     | 232 | 228 | 230 | 274 | 264 | 242 | 242 | 262 |     |    |    |    |    |    |    |    |  |
| 18     |    |    |    |    |    |    |    |     |     | 222 | 264 | 264 | 262 | 248 | 248 | 242 |     |    |    |    |    |    |    |    |  |
| 19     |    |    |    |    |    |    |    |     |     | 242 | 228 | 260 | 268 | 248 | 248 |     |     |    |    |    |    |    |    |    |  |
| 20     |    |    |    |    |    |    |    |     | 240 | 238 | 260 | 248 | 252 | 260 | 238 |     |     |    |    |    |    |    |    |    |  |
| 21     |    |    |    |    |    |    |    |     | 232 | 222 | 252 | 260 | 250 | 262 | 264 |     |     |    |    |    |    |    |    |    |  |
| 22     |    |    |    |    |    |    |    |     |     | 250 | 240 | 262 | 238 | 240 | 238 | 244 |     |    |    |    |    |    |    |    |  |
| 23     |    |    |    |    |    |    |    | 244 |     | 218 | 256 | 232 | 246 | 248 | 224 |     |     |    |    |    |    |    |    |    |  |
| 24     |    |    |    |    |    |    |    |     | 232 | 248 |     | 224 | 248 | 280 | 254 | 224 |     |    |    |    |    |    |    |    |  |
| 25     |    |    |    |    |    |    |    |     | 242 | 242 | 216 | 278 | 272 | 238 | 254 | 242 |     |    |    |    |    |    |    |    |  |
| 26     |    |    |    |    |    |    |    |     |     | 234 | 206 |     | 236 | 288 | 258 | 236 |     |    |    |    |    |    |    |    |  |
| 27     |    |    |    |    |    |    |    |     | 248 | 228 | 226 | 244 | 266 | 274 | 262 | 250 |     |    |    |    |    |    |    |    |  |
| 28     |    |    |    |    |    |    |    |     |     | 220 | 234 | 274 | 246 | 254 | 234 |     |     |    |    |    |    |    |    |    |  |
| 29     |    |    |    |    |    |    |    |     | 226 | 236 | 234 | 246 | 276 | 278 | 256 | 250 |     |    |    |    |    |    |    |    |  |
| 30     |    |    |    |    |    |    |    |     |     | 214 | 254 | 250 | 272 | 284 | 248 |     |     |    |    |    |    |    |    |    |  |
| 31     |    |    |    |    |    |    |    |     | 242 | 250 | 228 | 224 | 226 | 298 | 254 | 226 |     |    |    |    |    |    |    |    |  |
|        | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07  | 08  | 09  | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17 | 18 | 19 | 20 | 21 | 22 | 23 |  |
| CNT    |    |    |    |    |    |    |    |     | 2   | 21  | 28  | 27  | 29  | 29  | 30  | 28  | 18  |    |    |    |    |    |    |    |  |
| MED    |    |    |    |    |    |    |    |     | 234 | 240 | 232 | 230 | 250 | 258 | 248 | 248 | 234 |    |    |    |    |    |    |    |  |
| U Q    |    |    |    |    |    |    |    |     | 244 | 242 | 244 | 262 | 267 | 274 | 254 | 244 |     |    |    |    |    |    |    |    |  |
| L Q    |    |    |    |    |    |    |    |     | 230 | 223 | 226 | 244 | 244 | 238 | 236 | 224 |     |    |    |    |    |    |    |    |  |

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NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Okinawa

DEC. 2022 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<br>D | 00         | 01  | 02  | 03  | 04       | 05       | 06  | 07  | 08  | 09  | 10     | 11       | 12     | 13       | 14         | 15       | 16       | 17       | 18     | 19     | 20         | 21  | 22  | 23         |     |
|--------|------------|-----|-----|-----|----------|----------|-----|-----|-----|-----|--------|----------|--------|----------|------------|----------|----------|----------|--------|--------|------------|-----|-----|------------|-----|
| 1      | 252        | 220 | 262 | 252 | 218      | 288      | 284 | 186 | 214 | 226 | 210    | 218      | 184    | 198      | 226        | 238      | 214      | 200      | 186    | 216    | 238        | 210 | 240 | 220        |     |
| 2      | 214        | 264 | 214 | 256 | 268      | 300      | 222 | 218 | 224 | 214 | 210    | 212      | 198    | 194      | 202        | 202      | 206      | 216      | 206    | 212    | E A<br>236 | 198 | 198 | 208        |     |
| 3      | 270        | 300 | 276 | 264 | 210      | 232      | 292 | 222 | 220 | 226 | 204    | 226      | 184    | 192      | 224        | 210      | 196      | 210      | 196    | 190    | 240        | 200 | 200 | 206        |     |
| 4      | 254        | 258 | 230 | 254 | 224      | 234      | 226 | 240 | 200 | 224 | 222    | 204      | 186    | 210      | 188        | 212      | 208      | 208      | 200    | 204    | 234        | 214 | 214 | 240        |     |
| 5      | 258        | 292 | 270 | 242 | 210      | 240      | 262 | 258 | 244 | 226 | 210    | 180      | 184    | 190      | 202        | 202      | 216      | 204      | 188    | 192    | 236        | 194 | 192 | 206        |     |
| 6      | 234        | 252 | 204 | 226 | 216      | 228      | 336 | 268 | 232 | 208 | 208    | 202      | 202    | 186      | 178        | 222      | 216      | 204      | 188    | 200    | 212        | 214 | 212 | 210        |     |
| 7      | 246        | 266 | 226 | 242 | 230      | 224      | 256 | 230 | 214 | 216 | 208    | 200      | 194    | 186      | 218        |          | A<br>204 | A<br>194 | 198    | 196    | 232        | 210 | 250 |            |     |
| 8      | 310        | 250 | 208 | 230 | 230      | 284      | 268 | 268 | 242 | 214 | 224    | 200      | 190    | 202      | 196        | 230      | 222      | 214      | 204    | 206    | 226        | 206 | 200 | 218        |     |
| 9      | A<br>302   | 252 | 242 | 222 | 262      | 238      | 228 | 218 | 202 | 218 | 200    | 194      | 216    | 208      | 226        | 218      | 216      | 190      | 184    | 226    | 218        | 220 | 190 |            |     |
| 10     | 264        | 316 | 314 | 284 | 244      | 242      | 218 | 220 | 204 | 214 | 212    | 202      | 210    | 202      | E A<br>226 | 236      | 224      | 206      | 172    | 192    | 188        | 196 | 196 | 204        |     |
| 11     | 206        | 216 | 286 | 302 | 294      | 242      | 242 | 206 | 204 | 208 | 218    | 212      | 190    | 218      | 224        | 224      | 214      | 208      | 192    | 204    | 204        | 190 | 198 | 232        |     |
| 12     | 322        | 312 | 300 | 308 | 234      | 180      | 260 | 224 | 228 | 222 | C<br>C | C<br>C   | C<br>C | C<br>C   | C<br>C     | C<br>C   | C<br>C   | C<br>C   | C<br>C | C<br>C | 200        | 196 | 194 | 210        | 206 |
| 13     | 264        | 270 | 270 | 254 | 244      | 230      | 216 | 252 | 222 | 196 | C<br>C | C<br>C   | 174    | C<br>230 | C<br>216   | 226      | 226      | 198      | 178    | 216    | 194        | 196 | 190 | 244        |     |
| 14     | 258        | 254 | 282 | 290 | 250      | 212      | 266 | 246 | 220 | 204 | 196    | 190      | 212    | 232      | 222        | 244      | 228      | 212      | 194    | 206    | 206        | 196 | 206 | 228        |     |
| 15     | 240        | 248 | 252 | 248 | 248      | 282      | 254 | 248 | 230 | 216 | 202    | 204      | 190    | 236      | 226        | 228      | 224      | 208      | 184    | 198    | 216        | 194 | 194 | 248        |     |
| 16     | 298        | 262 | 234 | 228 | 214      | 200      | 254 | 236 | 222 | 226 | 212    | 226      | 200    | 204      | 204        | 218      | A<br>216 | 204      | 212    | 196    | 214        | 206 | 214 |            |     |
| 17     | 254        | 254 | 226 | 218 | 192      | 328      | 294 | 242 | 218 | 218 | 220    | 186      | 218    | 204      | 218        | 202      | 218      | 226      | 194    | 192    | 210        | 210 | 198 | 216        |     |
| 18     | 258        | 248 | 250 | 242 | 216      | 222      | 256 | 246 | 226 | 216 | 210    | 208      | 236    | 212      | 210        | 216      | 218      | 214      | 192    | 186    | 200        | 188 | 188 | 266        |     |
| 19     | 286        | 244 | 240 | 266 | 264      | 236      | 242 | 252 | 216 | 222 | 212    | 214      | 192    | 208      | 208        | 206      | A<br>230 | 228      | 206    | 220    | 226        | 214 | 208 | 264        |     |
| 20     | 254        | 228 | 246 | 242 | 228      | 258      | 298 | 258 | 232 | 222 | 216    | 212      | 220    | 220      | 200        |          | 228      | 208      | 214    | 202    | 206        | 218 | 214 | 258        |     |
| 21     | 268        | 270 | 280 | 258 | 224      | 256      | 288 | 248 | 218 | 220 | 210    | 196      | 196    | 208      | 198        | 212      | 226      | 208      | 188    | 218    | 206        | 202 | 198 | 292        |     |
| 22     | 320        | 296 | 252 | 242 | 246      | 278      | 230 | 264 | 214 | 220 | 206    | 204      | 188    | 224      | 206        | 220      | 228      | 208      | 194    | 208    | 196        | 214 | 206 | 260        |     |
| 23     | 296        | 338 | 262 | 220 | 204      | 272      | 330 | 270 | 230 | 228 | 210    | 192      | 202    | 202      | 216        | 208      | 230      | 212      | 208    | 190    | 196        | 214 | 240 | E A<br>352 |     |
| 24     | 350        | 348 | 256 | 196 | 392      | 306      | 282 | 266 | 236 | 226 | 210    | 226      | 206    | 190      | 190        | 206      | 198      | 228      | 204    | 202    | 194        | 236 | 252 | 298        |     |
| 25     | 252        | 212 | 244 | 246 | 338      | 326      | 230 | 230 | 238 | 232 | 208    | 192      | 230    | 214      | 214        | 210      | 226      | 214      | 186    | 180    | 234        | 212 | 198 | E A<br>264 |     |
| 26     | E A<br>314 | 304 | 290 | 226 | 224      | 222      | 234 | 232 | 216 | 220 | 210    | 196      | 228    | 184      | 200        | 230      | 220      | 208      | 198    | 206    | 234        | 214 | 210 | 194        |     |
| 27     | 284        | 306 | 306 | 272 | 230      | 238      | 256 | 268 | 234 | 222 | 216    | 196      | 180    | 198      | 208        | 228      | 228      | 232      | 202    | 200    | 186        | 196 | 214 | 276        |     |
| 28     | 274        | 242 | 220 | 264 | 270      | 284      | 290 | 262 | 232 | 212 | 208    | A<br>192 | 212    | 230      |            | A<br>214 | A<br>206 | 210      | 212    | 210    | 198        | 236 |     |            |     |
| 29     | E A<br>228 | 304 | 238 | 276 | 274      | 240      | 216 | 252 | 224 | 218 | 210    | 184      | 178    | 206      | 194        | 220      | 222      | 220      | 204    | 188    | 204        | 204 | 208 | 196        |     |
| 30     | 288        | 270 | 208 | 214 | 210      | 382      | 412 | 272 | 220 | 212 | 206    | 204      | 196    | 182      | 208        | 234      | 226      | 228      | 194    | 210    | 196        | 206 | 202 | 218        |     |
| 31     | 334        | 300 | 212 | 208 | A<br>484 | A<br>262 | 230 | 224 | 214 | 218 | 206    | 180      | 182    | 232      | 218        | 220      | 212      | 198      | 236    | 232    | 206        | 204 |     |            |     |
|        | 00         | 01  | 02  | 03  | 04       | 05       | 06  | 07  | 08  | 09  | 10     | 11       | 12     | 13       | 14         | 15       | 16       | 17       | 18     | 19     | 20         | 21  | 22  | 23         |     |
| CNT    | 30         | 31  | 31  | 31  | 30       | 31       | 30  | 31  | 31  | 31  | 29     | 28       | 30     | 29       | 30         | 27       | 27       | 30       | 30     | 31     | 31         | 31  | 31  | 31         |     |
| MED    | 262        | 265 | 252 | 246 | 230      | 242      | 256 | 248 | 222 | 220 | 210    | 203      | 195    | 204      | 208        | 220      | 222      | 212      | 194    | 202    | 206        | 210 | 206 | 223        |     |
| U Q    | 296        | 302 | 276 | 264 | 250      | 284      | 288 | 262 | 232 | 224 | 215    | 212      | 206    | 213      | 222        | 230      | 226      | 216      | 204    | 210    | 234        | 214 | 212 | 260        |     |
| L Q    | 252        | 248 | 226 | 228 | 216      | 230      | 234 | 230 | 216 | 214 | 208    | 196      | 188    | 191      | 200        | 210      | 216      | 208      | 188    | 192    | 196        | 196 | 198 | 206        |     |

DEC. 2022 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



## IONOSPHERIC DATA STATION Okinawa

DEC.2022 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<br>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   | 104 | 114 | B   |    |    |    |    |    |  |
| 2      |    |    |    |    |    |    |    | B  | 106 | 104 | 100 |     | 100 |     |     |     |     |     |     | B  |    |    |    |    |  |
| 3      |    |    |    |    |    |    |    | B  | 104 | 102 | 102 | 102 | 100 | 100 | 100 | 100 | 106 | 110 |     | B  |    |    |    |    |  |
| 4      |    |    |    |    |    |    |    | B  | 106 | 100 | 100 | 100 | 100 |     | A   | 100 | 104 | 100 |     | A  | A  |    |    |    |  |
| 5      |    |    |    |    |    |    |    | B  | 108 | 102 | 102 | 102 |     | A   | A   | 106 |     | 102 | 100 | B  |    |    |    |    |  |
| 6      |    |    |    |    |    |    |    | B  | 110 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |     | A  | A  |    |    |    |  |
| 7      |    |    |    |    |    |    |    | B  | 108 | 102 | 102 | 102 | 102 | 100 | 102 | 102 | 102 | 102 |     | A  | B  |    |    |    |  |
| 8      |    |    |    |    |    |    |    | B  | 104 | 104 | 106 | 102 |     | A   | A   | A   | A   | A   | A   | A  | A  |    |    |    |  |
| 9      |    |    |    |    |    |    |    | B  | 108 |     | 102 | 102 | 102 | 100 | 100 | 100 | 100 | 100 | 98  | A  | A  |    |    |    |  |
| 10     |    |    |    |    |    |    |    | B  | 102 | 102 | 102 | 102 | 100 | 100 | 100 | 100 | 100 | 100 |     | A  | B  |    |    |    |  |
| 11     |    |    |    |    |    |    |    | B  | 106 | 106 | 104 | 104 | 102 | 102 |     |     |     | 98  | 102 | B  |    |    |    |    |  |
| 12     |    |    |    |    |    |    |    | B  | A   |     |     |     |     |     |     |     |     |     | A   | A  |    |    |    |    |  |
| 13     |    |    |    |    |    |    |    | B  | 102 | 102 | 100 | 98  | 98  | 102 | 102 | 102 | 102 | 102 |     | C  | C  |    |    |    |  |
| 14     |    |    |    |    |    |    |    | B  | 114 | 106 |     | C   | C   | C   | C   | C   | C   | C   | C   | C  | C  |    |    |    |  |
| 15     |    |    |    |    |    |    |    | B  | 104 | 102 |     | C   | C   |     | C   | C   |     |     |     | B  |    |    |    |    |  |
| 16     |    |    |    |    |    |    |    | B  | 104 | 104 | 102 | 102 | 102 | 102 | 102 |     | 102 | 102 | 110 |    |    |    |    |    |  |
| 17     |    |    |    |    |    |    |    | B  | 104 | 104 | 102 | 102 | 102 | 102 | 102 |     | A   | A   | A   | B  |    |    |    |    |  |
| 18     |    |    |    |    |    |    |    | B  | 108 | 104 | 100 |     | A   | A   | A   | A   | A   | A   | A   |    |    |    |    |    |  |
| 19     |    |    |    |    |    |    |    | B  | 102 | 102 | 100 |     | B   | A   | A   |     | A   | A   | A   |    |    |    |    |    |  |
| 20     |    |    |    |    |    |    |    | B  | 102 | 102 | 102 | 102 | 100 | 100 | 100 | 100 | 100 | 100 |     | A  | A  |    |    |    |  |
| 21     |    |    |    |    |    |    |    | B  | 102 | 102 | 100 |     | A   | A   | A   | A   | A   | 102 | A   |    |    |    |    |    |  |
| 22     |    |    |    |    |    |    |    | B  | 100 | 98  | A   | 100 | A   | 100 | 100 | 102 | 102 | 106 |     | B  |    |    |    |    |  |
| 23     |    |    |    |    |    |    |    | B  | 106 | 106 | 104 |     | A   | 98  | A   | A   | 102 | 108 | 108 | B  |    |    |    |    |  |
| 24     |    |    |    |    |    |    |    | B  | 106 | 102 |     | A   | A   | A   | A   | 102 | 102 | 104 | A   | B  |    |    |    |    |  |
| 25     |    |    |    |    |    |    |    | B  | 108 | 100 |     | A   | A   | A   | A   | A   | A   | A   | A   | A  |    |    |    |    |  |
| 26     |    |    |    |    |    |    |    | B  | 106 | 102 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | A   | B  |    |    |    |    |  |
| 27     |    |    |    |    |    |    |    | B  | 106 | 102 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |     | A  | A  |    |    |    |  |
| 28     |    |    |    |    |    |    |    | B  | 100 | 102 |     | A   |     | A   |     | A   |     |     |     |    |    |    |    |    |  |
| 29     |    |    |    |    |    |    |    | B  | 108 | 102 | 102 | 102 | 102 | 102 |     | 102 | 102 |     | A   | A  |    |    |    |    |  |
| 30     |    |    |    |    |    |    |    | B  | 104 | 104 | 102 |     | A   | A   | A   | A   | A   | A   | B   |    |    |    |    |    |  |
| 31     |    |    |    |    |    |    |    | B  | A   |     |     | A   |     | A   | A   | A   | A   | A   | A   | B  |    |    |    |    |  |
|        |    |    |    |    |    |    |    | B  | 102 | 102 |     | 100 | 100 | 102 | 102 | 104 |     | A   | A   | B  |    |    |    |    |  |
|        |    |    |    |    |    |    |    | B  | 104 | 104 | 102 | 102 | 102 | 102 | 102 | 104 |     | A   | A   | B  |    |    |    |    |  |
|        |    |    |    |    |    |    |    | B  | 104 |     | A   | A   |     | 104 | 104 | 102 | 104 | 100 |     | A  | B  |    |    |    |  |
|        |    |    |    |    |    |    |    | B  | 110 | 104 | 104 | 100 |     | A   | A   | A   | A   | A   | B   |    |    |    |    |    |  |
|        |    |    |    |    |    |    |    | B  | 110 | 104 | 104 | 100 |     | A   | A   | A   | A   | A   | A   |    |    |    |    |    |  |
|        |    |    |    |    |    |    |    | B  | 104 | 102 |     | A   | 102 | 102 |     | 102 | 102 |     | A   | A  |    |    |    |    |  |
|        |    |    |    |    |    |    |    | B  | 108 | 102 | 100 | 100 | 100 | 102 | 102 |     | A   | 104 |     | A  | A  |    |    |    |  |
|        |    |    |    |    |    |    |    | B  | 112 | 104 | 102 | 102 | 102 | 102 | 106 |     | 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    |    |    |    |    |    |    |    |    | 28  | 29  | 23  | 21  | 20  | 16  | 20  | 17  | 19  | 10  |     |    |    |    |    |    |  |
| MED    |    |    |    |    |    |    |    |    | 106 | 102 | 102 | 102 | 101 | 100 | 102 | 102 | 102 | 104 |     |    |    |    |    |    |  |
| U Q    |    |    |    |    |    |    |    |    | 108 | 104 | 102 | 102 | 102 | 102 | 102 | 103 | 104 | 110 |     |    |    |    |    |    |  |
| L Q    |    |    |    |    |    |    |    |    | 104 | 102 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |     |    |    |    |    |    |  |

DEC.2022 h'E (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Okinawa

DEC.2022 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<br>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      | 86  | 90  | 90  | 90  | 90 | 86  | B   | 90  | 178 | 180 | 106 | 106 | G   | 102 | 102 | 162 | 148 | 130 | 106 | 92  | 100 | 86  | 82  | 84  |
| 2      | B   | 94  | 94  | 94  | 88 | 94  | B   | 88  | 126 | G   | 174 | 120 | 116 | G   | G   | G   | 178 | 174 | 144 | 118 | 96  | 96  | 96  | B   |
| 3      | B   | B   | B   | 88  | 86 | 86  | 86  | 86  | 186 | 162 | 136 | 194 | 144 | 92  | 168 | G   | 92  | 88  | 86  | 88  | 88  | B   | B   | B   |
| 4      | B   | B   | B   | B   | B  | B   | B   | B   | G   | 154 | 130 | 104 | 104 | 104 | G   | 100 | G   | G   | B   | 98  | 94  | 94  | B   | 94  |
| 5      | B   | 96  | B   | B   | 86 | B   | B   | B   | 166 | G   | G   | G   | G   | G   | G   | 114 | 110 | 168 | 158 | 122 | B   | B   | B   | B   |
| 6      | B   | B   | 96  | 94  | B  | 90  | 94  | B   | G   | G   | G   | G   | 116 | G   | G   | 170 | 172 | 88  | 88  | B   | B   | B   | 112 | 110 |
| 7      | 108 | B   | B   | B   | B  | B   | 104 | B   | G   | G   | G   | G   | 100 | 98  | 94  | 104 | 98  | 94  | 114 | 106 | 98  | 100 | B   | B   |
| 8      | B   | 114 | B   | B   | B  | 132 | 130 | 100 | 174 | 106 | G   | G   | 114 | G   | G   | 186 | 158 | 160 | 92  | 110 | 96  | 96  | 92  | 102 |
| 9      | 94  | 92  | 96  | 96  | 92 | B   | 104 | B   | 160 | 132 | 182 | G   | G   | 168 | 138 | 138 | 108 | 108 | 98  | 98  | 96  | B   | 110 | B   |
| 10     | B   | B   | B   | 90  | 92 | B   | B   | B   | 158 | 172 | 148 | 110 | 108 | 104 | 98  | 100 | G   | G   | B   | B   | B   | B   | B   | 98  |
| 11     | 86  | 88  | 88  | 86  | 88 | 96  | 100 | 100 | 92  | 174 | 182 | 188 | G   | 178 | G   | 112 | 142 | 86  | 86  | 92  | B   | 86  | 90  | 120 |
| 12     | 116 | 118 | 92  | 86  | 86 | 90  | B   | B   | 184 | 152 | G   | C   | C   | C   | C   | C   | C   | C   | C   | 94  | 100 | B   | B   | 92  |
| 13     | 84  | 84  | B   | B   | 90 | 92  | 94  | 82  | G   | 86  | C   | C   | G   | C   | C   | 108 | 104 | 110 | 104 | 88  | 84  | 88  | 88  | B   |
| 14     | B   | 104 | 108 | 108 | 92 | 90  | B   | B   | G   | G   | G   | G   | 148 | 128 | 114 | 104 | 102 | 100 | 100 | 82  | 86  | 88  | B   | 88  |
| 15     | 104 | 90  | B   | B   | B  | B   | B   | 90  | 90  | 108 | 106 | 102 | 102 | 98  | 98  | 94  | 100 | 100 | 98  | B   | 90  | 88  | B   | B   |
| 16     | B   | B   | B   | B   | B  | B   | B   | B   | 148 | 146 | 116 | 104 | 102 | 104 | G   | G   | 100 | 132 | 98  | 92  | 90  | B   | B   | B   |
| 17     | B   | B   | B   | 92  | 96 | B   | B   | B   | 174 | 104 | G   | G   | 174 | G   | G   | G   | 110 | G   | B   | B   | 94  | 88  | B   | B   |
| 18     | B   | B   | B   | B   | 88 | B   | B   | B   | 154 | 116 | 112 | 98  | 100 | 102 | 98  | G   | G   | G   | B   | 94  | 92  | B   | B   | B   |
| 19     | 88  | B   | 88  | 94  | B  | B   | B   | B   | G   | 116 | 106 | 100 | 100 | 100 | G   | G   | G   | 100 | 98  | 92  | 100 | 88  | 84  | 92  |
| 20     | B   | B   | 118 | 86  | 88 | 88  | B   | B   | G   | 104 | 104 | 104 | 96  | 96  | 94  | 94  | 94  | 96  | 96  | 94  | 94  | 92  | 92  | 88  |
| 21     | 86  | B   | 88  | B   | 88 | B   | B   | B   | 88  | 176 | 110 | G   | G   | G   | G   | G   | 94  | 110 | 88  | 88  | B   | B   | B   | B   |
| 22     | B   | B   | B   | B   | B  | B   | B   | B   | 108 | 166 | 172 | 176 | 150 | 126 | 96  | G   | 164 | 164 | 100 | 86  | 98  | 88  | B   | B   |
| 23     | B   | 120 | B   | B   | 94 | 102 | 92  | B   | G   | 116 | 116 | 112 | 106 | 104 | 102 | 100 | 100 | 186 | 98  | B   | B   | 94  | 92  | 88  |
| 24     | 88  | 92  | 92  | 90  | 90 | B   | B   | B   | 110 | 110 | 106 | 182 | 100 | 102 | 102 | 100 | 96  | 96  | 94  | 94  | 88  | 88  | 90  | 86  |
| 25     | 86  | 86  | 86  | B   | B  | B   | B   | B   | 90  | 164 | 94  | 96  | 174 | 182 | 192 | 138 | 92  | 92  | 90  | 92  | 90  | B   | 102 | 92  |
| 26     | 86  | 86  | 86  | 86  | 86 | 86  | B   | B   | 128 | 124 | 140 | 142 | 172 | G   | 170 | 146 | 140 | 96  | 94  | 116 | 92  | 92  | B   | 92  |
| 27     | 86  | B   | B   | B   | B  | 104 | B   | B   | 196 | 106 | 128 | 96  | G   | G   | G   | 94  | 90  | 90  | 96  | 96  | 96  | 96  | B   | 96  |
| 28     | 146 | 120 | 124 | 98  | 92 | 88  | B   | B   | 138 | 166 | 134 | 158 | 116 | 102 | 162 | 90  | 108 | 96  | 96  | 100 | 98  | 98  | 96  | 94  |
| 29     | 90  | 92  | 90  | 88  | 92 | 88  | B   | B   | 146 | 124 | 100 | G   | 96  | 90  | 90  | G   | 90  | 88  | 88  | 90  | 96  | 92  | 86  | B   |
| 30     | B   | B   | B   | B   | B  | 88  | 88  | 96  | 156 | 118 | 106 | 106 | G   | 90  | G   | 88  | 88  | 114 | 110 | 84  | 92  | 88  | 90  | 90  |
| 31     | 108 | 114 | 94  | 90  | 90 | 90  | 88  | 92  | 152 | 150 | 118 | 118 | 114 | G   | 118 | 106 | 124 | 96  | 96  | 92  | 92  | 92  | 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    | 16  | 17  | 16  | 17  | 20 | 17  | 10  | 13  | 23  | 24  | 24  | 20  | 22  | 20  | 17  | 22  | 26  | 26  | 26  | 25  | 24  | 20  | 15  | 17  |
| MED    | 88  | 92  | 92  | 90  | 90 | 90  | 94  | 92  | 158 | 128 | 116 | 108 | 107 | 102 | 102 | 107 | 101 | 100 | 97  | 94  | 93  | 92  | 92  | 92  |
| U Q    | 106 | 114 | 96  | 94  | 92 | 95  | 104 | 104 | 174 | 162 | 144 | 131 | 126 | 116 | 128 | 138 | 142 | 114 | 100 | 98  | 96  | 95  | 96  | 97  |
| L Q    | 86  | 89  | 88  | 87  | 88 | 88  | 88  | 88  | 128 | 113 | 106 | 103 | 100 | 97  | 96  | 100 | 94  | 94  | 90  | 91  | 90  | 88  | 88  | 88  |

DEC.2022 h'Es (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION Okinawa

DEC.2022 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   | F4 | F2 | F1 | F2 | F1   | F1   |      | L1 | H2   | HC11 | C1   | CH11 |      | C1   | C2   | HC11 | H1   | H1   | C1   | F1   | F7   | F1   | F1 | F1 |    |
| 2   |    | F1 | F1 | F2 | F2   | F1   |      | L1 | C1   |      | H1   | C2   | C1   |      |      |      | H1   | H1   | H1   | F3   | F9   | F1   | F3 |    |    |
| 3   |    |    |    | F2 | F2   | F1   | F2   | L1 | H1   | H1   | H1   | H1   | H1   | L3   | H1   |      | L2   | L3   | L3   | F2   | F1   | F1   |    |    |    |
| 4   |    |    |    |    |      |      |      |    |      | H1   | H2   | C2   | C1   | C2   |      | C1   |      |      |      |      | F1   | F2   | F1 | F1 |    |
| 5   |    | F2 |    |    | F1   |      |      |    |      | H1   |      |      |      |      | C1   | C1   | HL21 | HL11 | H1   |      |      |      |    |    |    |
| 6   |    |    | F1 | F1 |      | F2   | F1   |    |      |      |      |      |      | C1   |      |      | H1   | H1   | L1   | L1   |      |      | F1 | F1 |    |
| 7   | F1 |    |    |    |      |      | F1   |    |      | H1   |      |      |      | L1   | L1   | L1   | CL12 | CL12 | L2   | C1   | FF21 | F1   | F1 |    |    |
| 8   |    | F1 |    |    |      | FF11 | FF11 | C1 | H1   | C1   |      |      |      | C1   |      |      | H1   | H1   | H1   | L1   | FF11 | F3   | F2 | F1 |    |
| 9   | F4 | F4 | F2 | F1 | F1   |      | F1   |    | H1   | H1   | HC11 |      |      | H1   | HC11 | HC11 | C3   | C2   | L1   | F3   | F2   |      | F1 |    |    |
| 10  |    |    |    | F2 | F1   |      |      |    | H1   | H1   | H1   | H1   | C1   | C1   | L2   | L2   |      |      |      |      |      |      |    | F1 |    |
| 11  | F1 | F1 | F1 | F1 | F1   | F2   | F1   | C1 | L2   | H1   | H1   | H1   |      | H1   |      |      | C1   | HL11 | L2   | L3   | F1   |      | F1 | F1 |    |
| 12  | F1 | F1 | F1 | F1 | F1   | F1   |      |    | H1   | H1   |      |      |      |      |      |      |      |      |      |      | FQ31 | FQ11 |    | F3 |    |
| 13  | F2 | F1 |    |    | F1   | F1   | F1   | F1 |      | L1   |      |      |      |      |      |      | C1   | C1   | C2   | C3   | F1   | F1   | F1 |    |    |
| 14  |    | F1 | F1 | F1 | F1   | F1   |      |    |      |      |      |      |      | HC11 | C1   | C1   | C3   | C3   | C5   | C4   | F1   | F1   | F1 | F1 |    |
| 15  | F2 | F1 |    |    |      |      |      | L1 | LH11 | C1   | C2   | C1   | C1   | C1   | L3   | L2   | L4   | C2   | C3   | L2   |      | F2   | F1 |    |    |
| 16  |    |    |    |    |      |      |      | H2 | H2   |      | C2   | C1   | C1   | C1   |      |      |      | C1   | H1   | L2   | F7   | F1   |    |    |    |
| 17  |    |    |    | F1 | F1   |      |      |    | H1   |      | C1   |      |      | HL11 |      |      |      | C1   |      |      |      | F1   | F1 |    |    |
| 18  |    |    |    | F1 |      |      |      |    | H2   | H2   | C2   | L3   | C2   | C2   | C2   | L1   |      |      |      |      | F1   | F1   |    |    |    |
| 19  | F1 |    | F1 | F1 |      |      |      |    |      | C1   | C1   | C1   | C2   | C1   |      |      |      | C2   | L1   | F3   | F2   | F4   | F1 | F1 |    |
| 20  |    |    | F1 | F3 | F1   | F1   |      |    |      | C1   | C2   | C2   | L2   | L2   | L2   | L3   | L6   | L2   | L4   | F7   | F2   | F3   | F1 | F2 |    |
| 21  | F4 |    | F1 |    | F2   |      |      | L1 | H1   |      | C1   |      |      |      |      |      | L1   | C1   | L1   | F1   |      |      |    |    |    |
| 22  |    |    |    |    |      |      |      | F1 | HC11 | HC11 | HC11 | HC11 | CL11 | L2   |      |      | HC11 | H1   | CH11 | L1   | F3   | F1   |    |    |    |
| 23  |    | F1 |    |    | F1   | F1   | F1   |    |      | C1   | C1   | C2   | C2   | C2   | C2   | C2   | C3   | C3   | HL11 | L3   |      |      | F1 | F2 | F3 |
| 24  | F3 | F1 | F1 | F1 | F1   |      |      |    | C1   | C2   | C2   | HC12 | C2   | C1   | C1   | C2   | C3   | L1   | L3   | L3   | FQ41 | F6   | F5 | F2 | F2 |
| 25  | F2 | F1 | F1 |    |      |      |      |    | L2   | H1   | L1   | L1   | H1   | H1   | H1   | H1   | L1   | LH21 | L5   | F3   | F2   |      | F1 | F4 |    |
| 26  | F3 | F1 | F2 | F1 | F1   | F2   |      |    | C2   | CL11 | H1   | HL11 | H1   |      | H1   | H1   | HL12 | LC21 | L3   | FF24 | F4   | F4   |    | F1 |    |
| 27  | F1 |    |    |    |      | F1   |      |    | H1   | C1   | CL11 | L1   |      |      |      | L1   | L2   | L1   | L1   | F1   |      | F1   | F1 | F1 |    |
| 28  | F1 | F3 | F1 | F1 | FQ11 | FQ11 |      | H1 | H1   | H1   | HL11 | C3   | C1   | HL11 | L3   | CL42 | LH31 | L1   | L1   | F1   | F2   | F1   | F3 | F3 |    |
| 29  | F3 | F4 | F3 | F1 | F1   | F1   |      |    | H1   | C1   | C1   |      | L1   | L2   | L1   |      | L2   | L1   | L2   | F3   | F3   | F3   | F1 | F1 |    |
| 30  |    |    |    |    | F1   | F1   | L1   |    | HC11 | C1   | C3   | C1   |      | L1   |      | LH31 | L2   | L23  | CL33 | F2   | F1   | F1   | F1 | F1 |    |
| 31  | F1 | F1 | F2 | F1 | F6   | F4   | F5   | L1 | H2   | H1   | C1   | C1   | C1   |      | C1   | CH11 | CL11 | L1   | L3   | F1   | F4   | F1   |    |    |    |
|     | 00 | 01 | 02 | 03 | 04   | 05   | 06   | 07 | 08   | 09   | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 20   | 21   | 22 | 23 |    |
| CNT |    |    |    |    |      |      |      |    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |    |    |    |
| MED |    |    |    |    |      |      |      |    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |    |    |    |
| U Q |    |    |    |    |      |      |      |    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |    |    |    |
| L Q |    |    |    |    |      |      |      |    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |    |    |    |

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NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## f-PLOTS OF IONOSPHERIC DATA

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

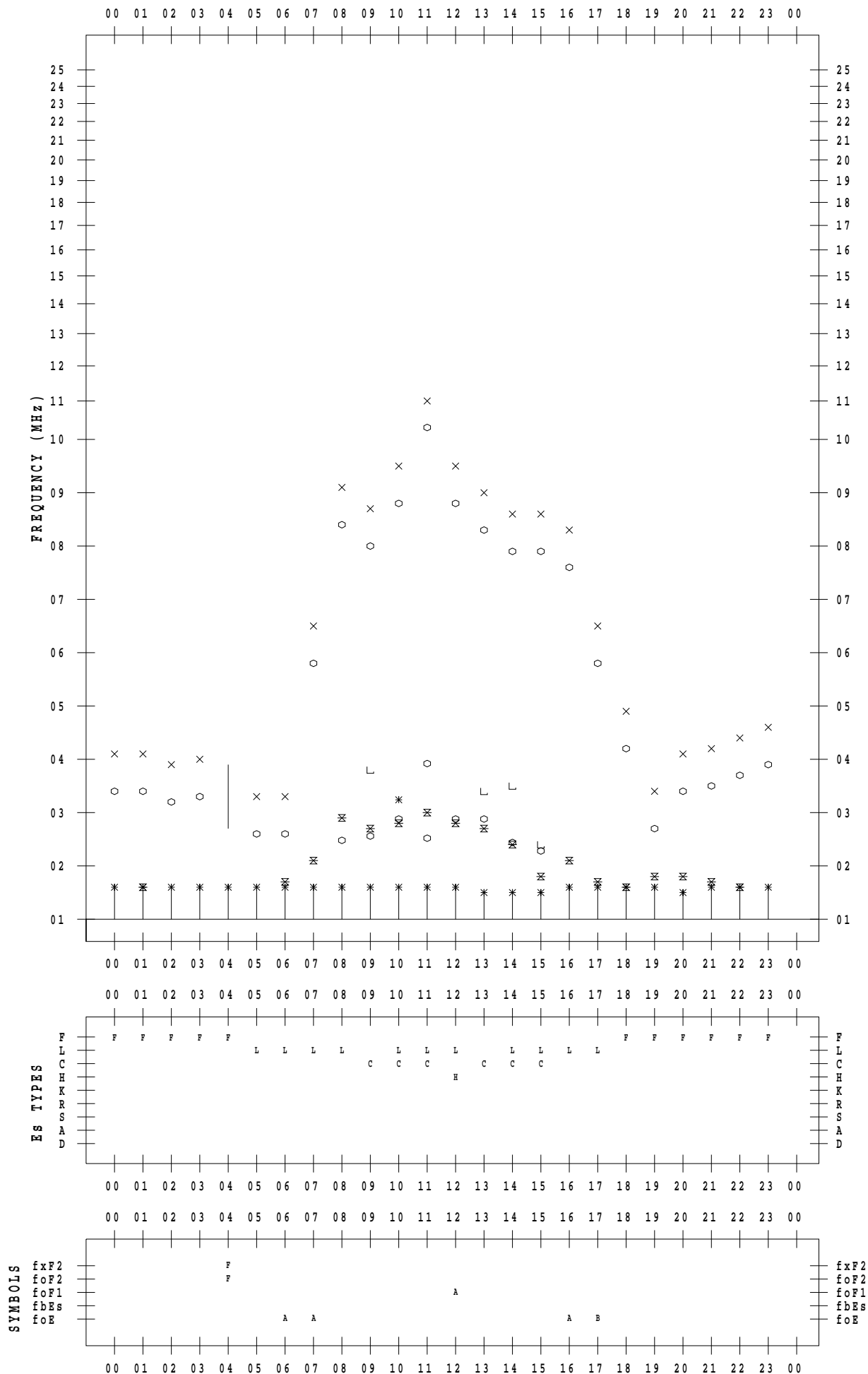
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/ 1

135 ° E MEAN TIME



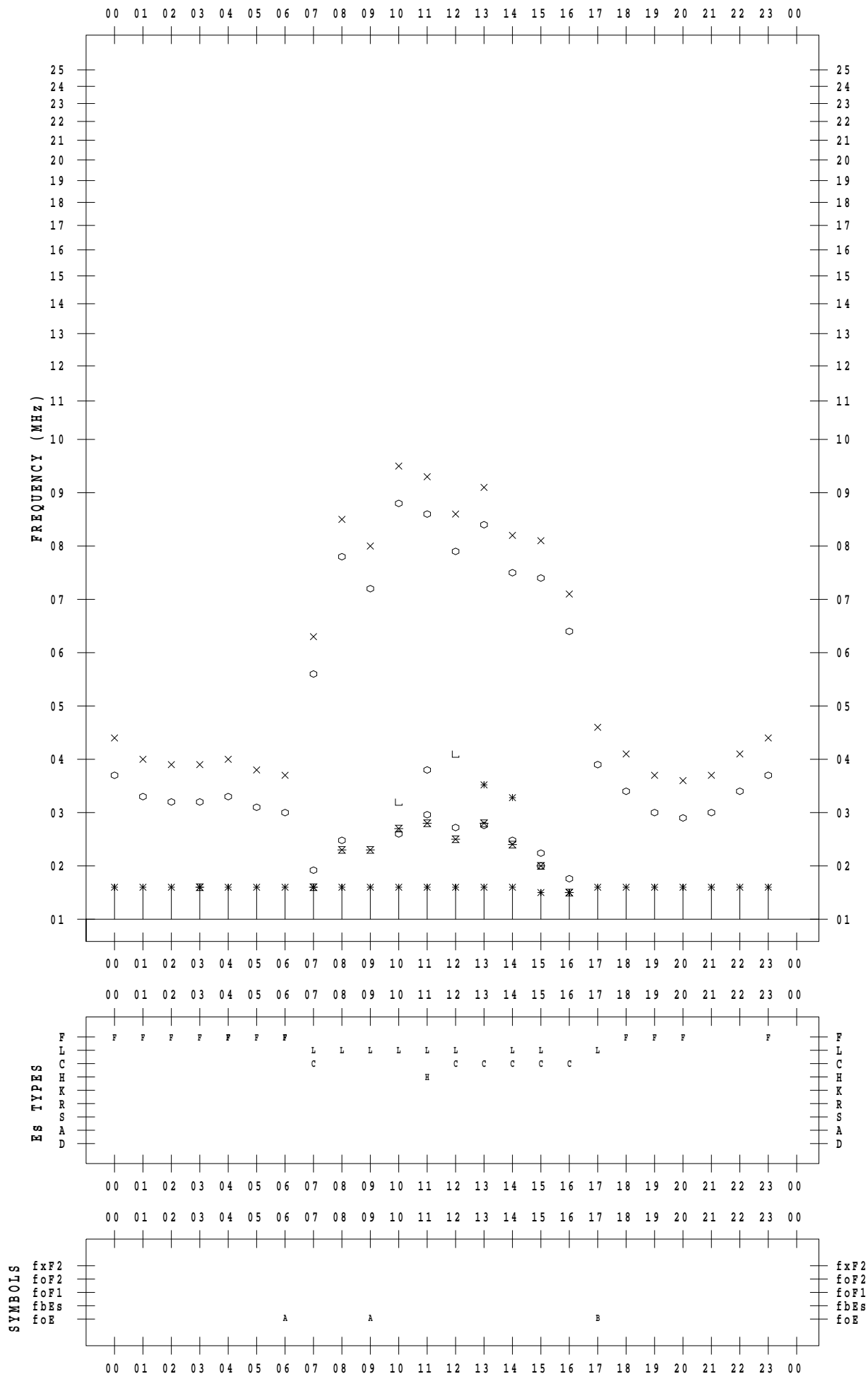
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/ 2

135 ° E MEAN TIME



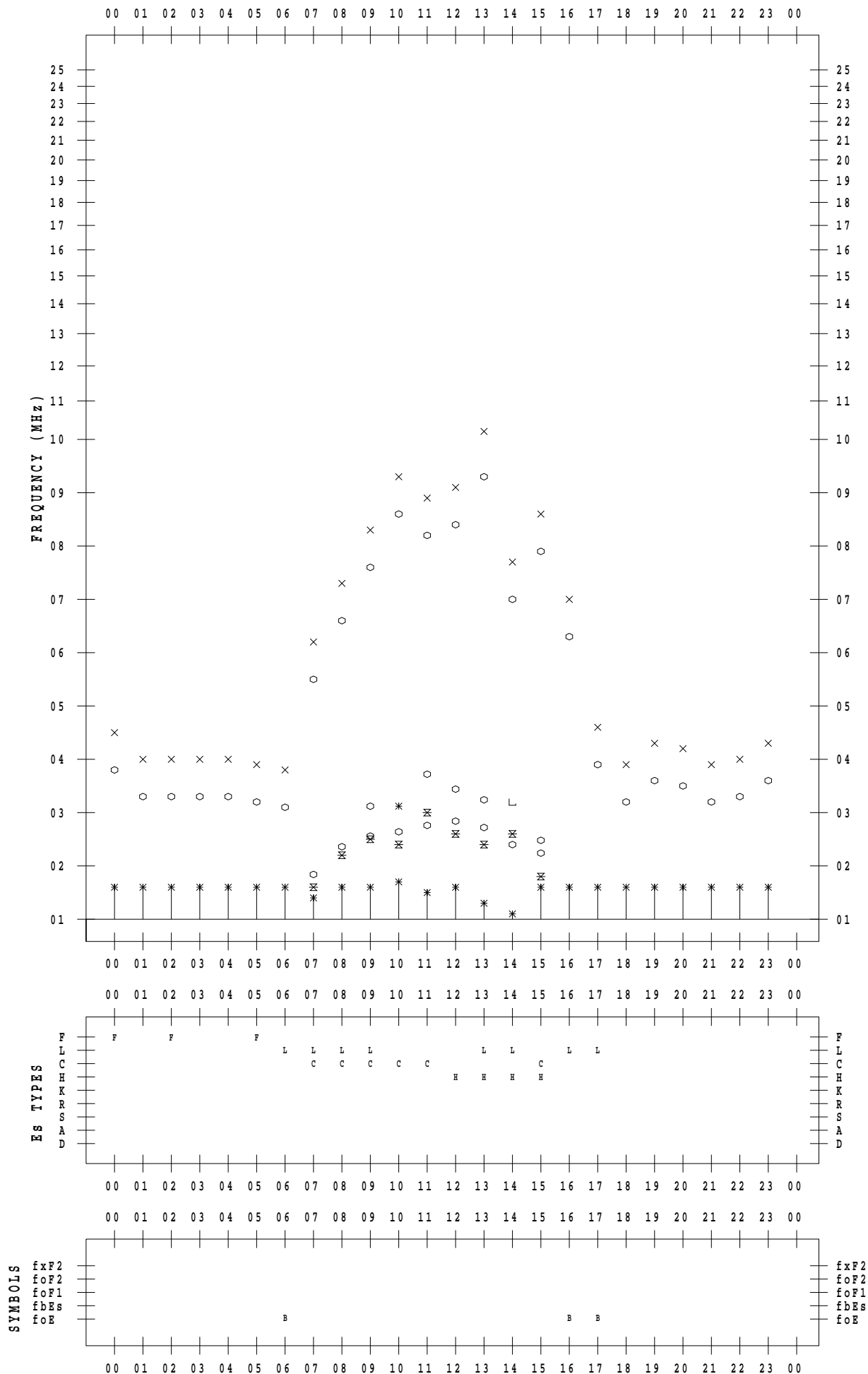
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SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/ 3

135 ° E MEAN TIME



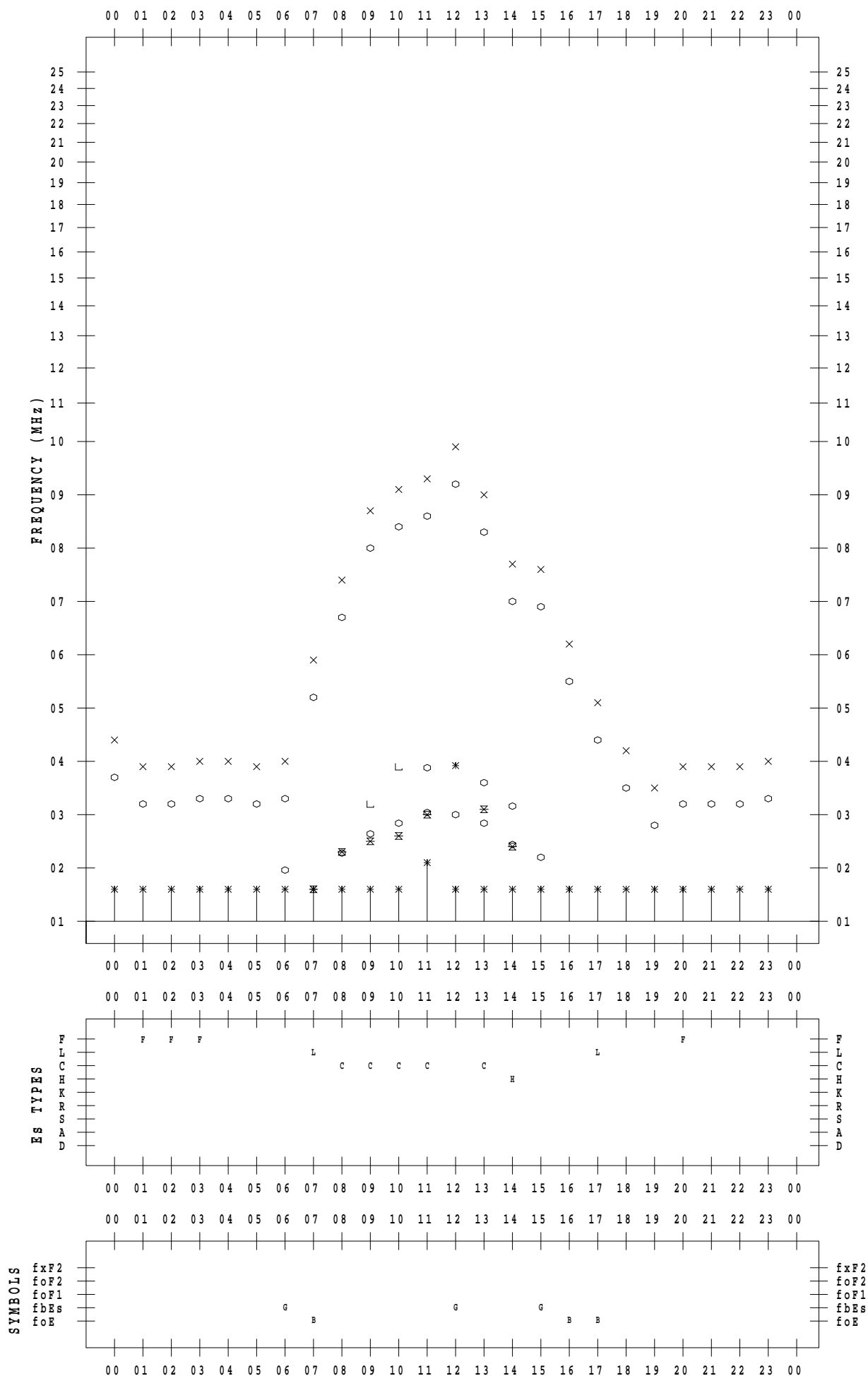
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/ 4

135 ° E MEAN TIME





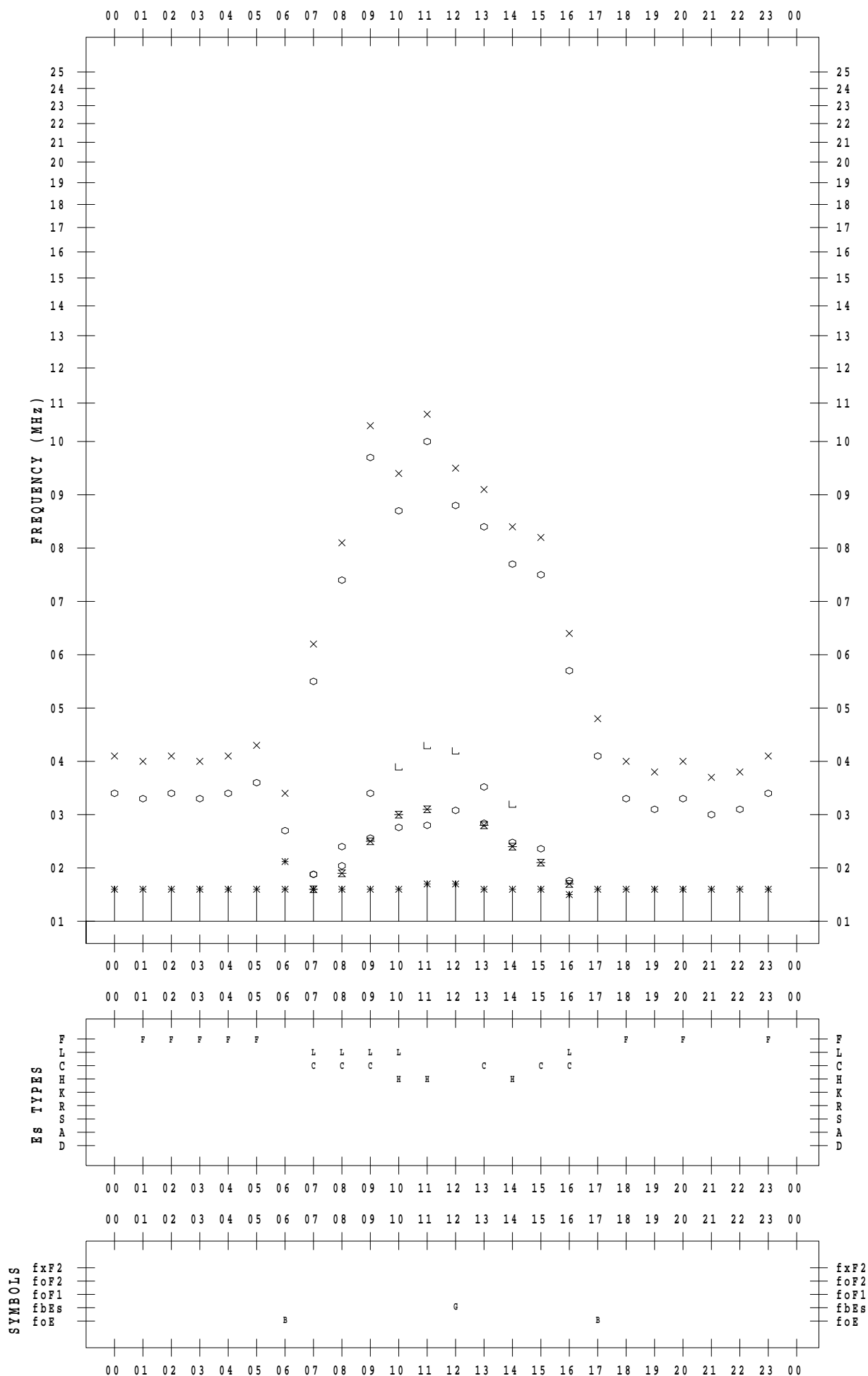
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SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/ 5

135 ° E MEAN TIME



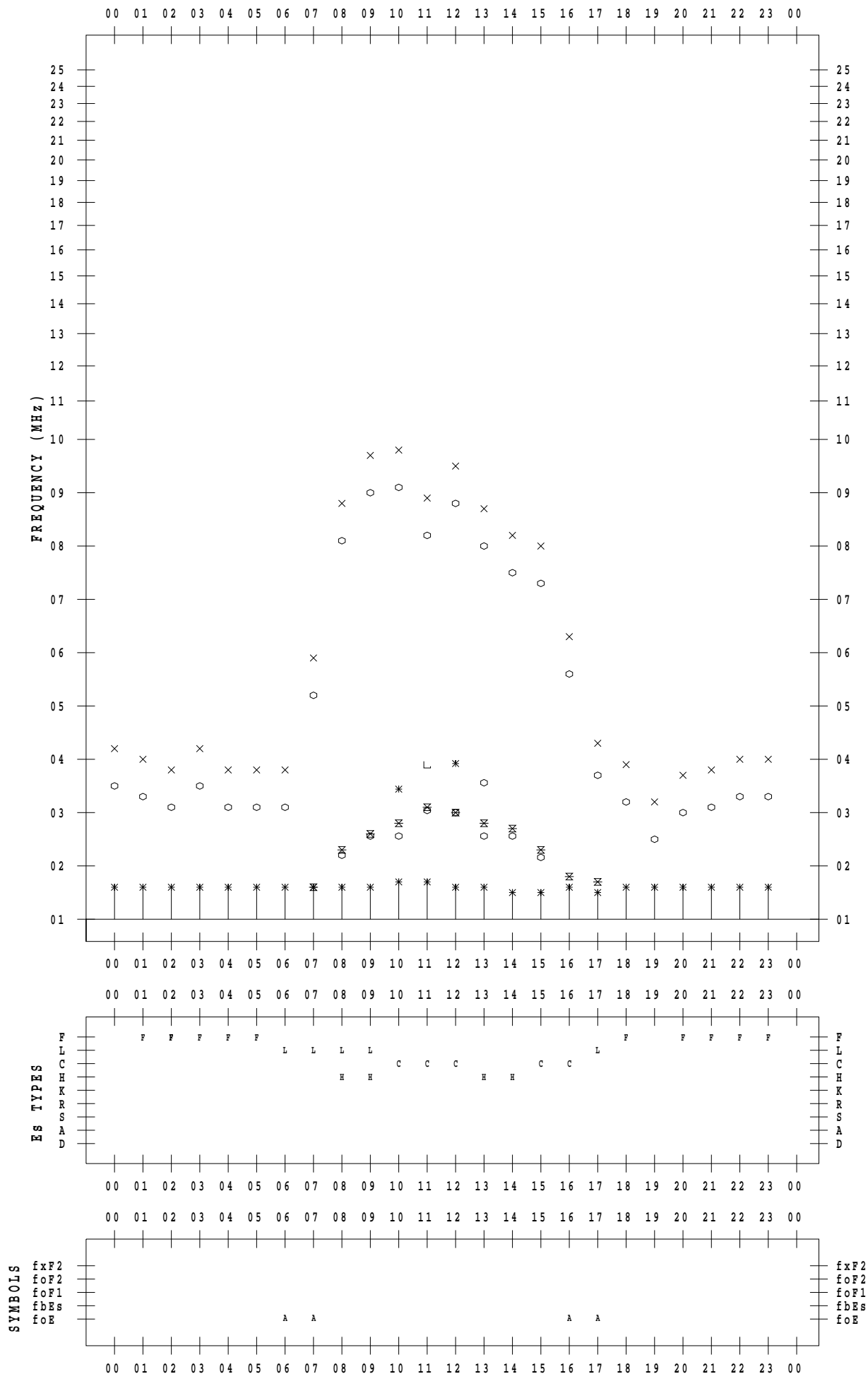
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/ 6

135 ° E MEAN TIME



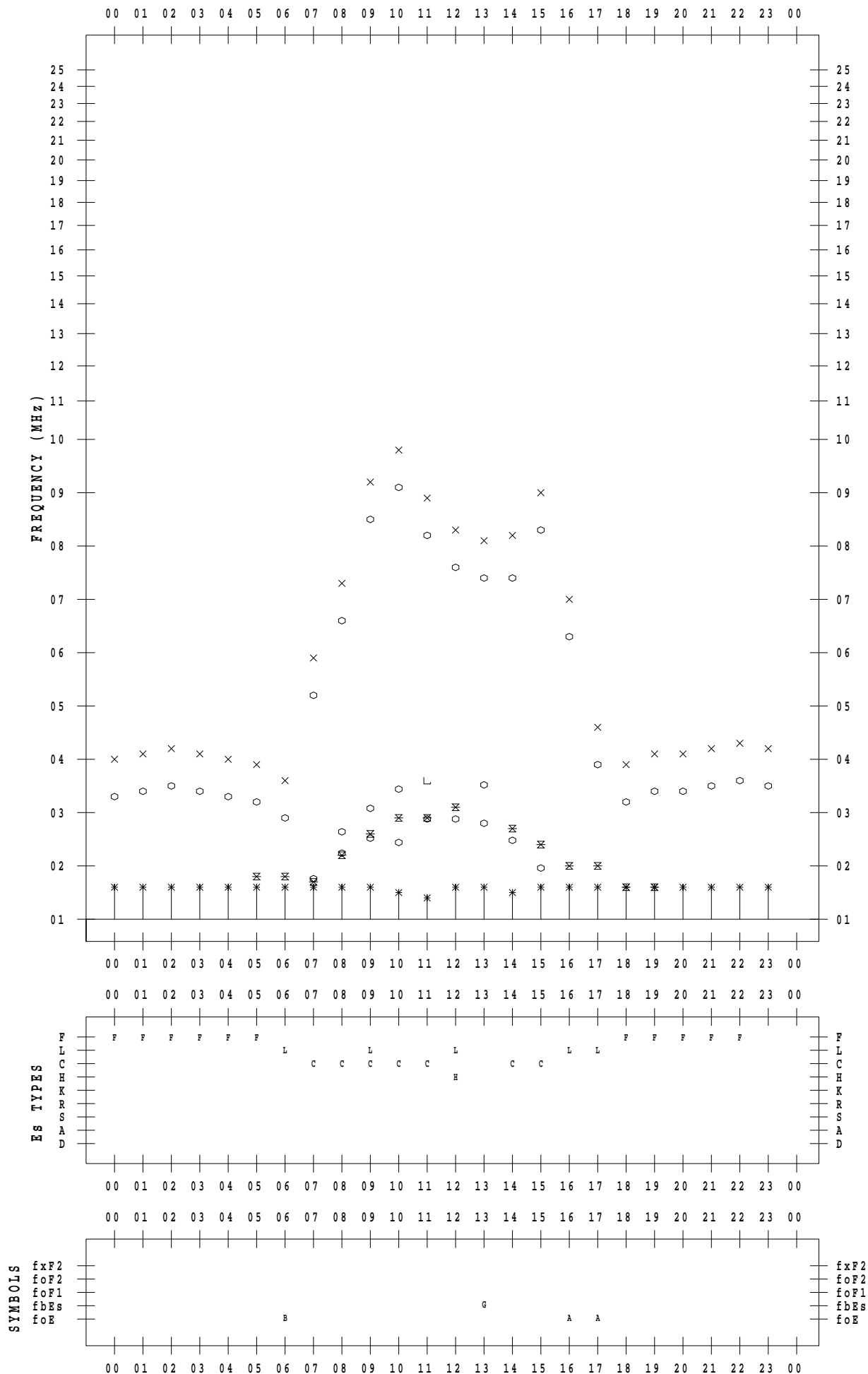
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SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/ 7

135 ° E MEAN TIME



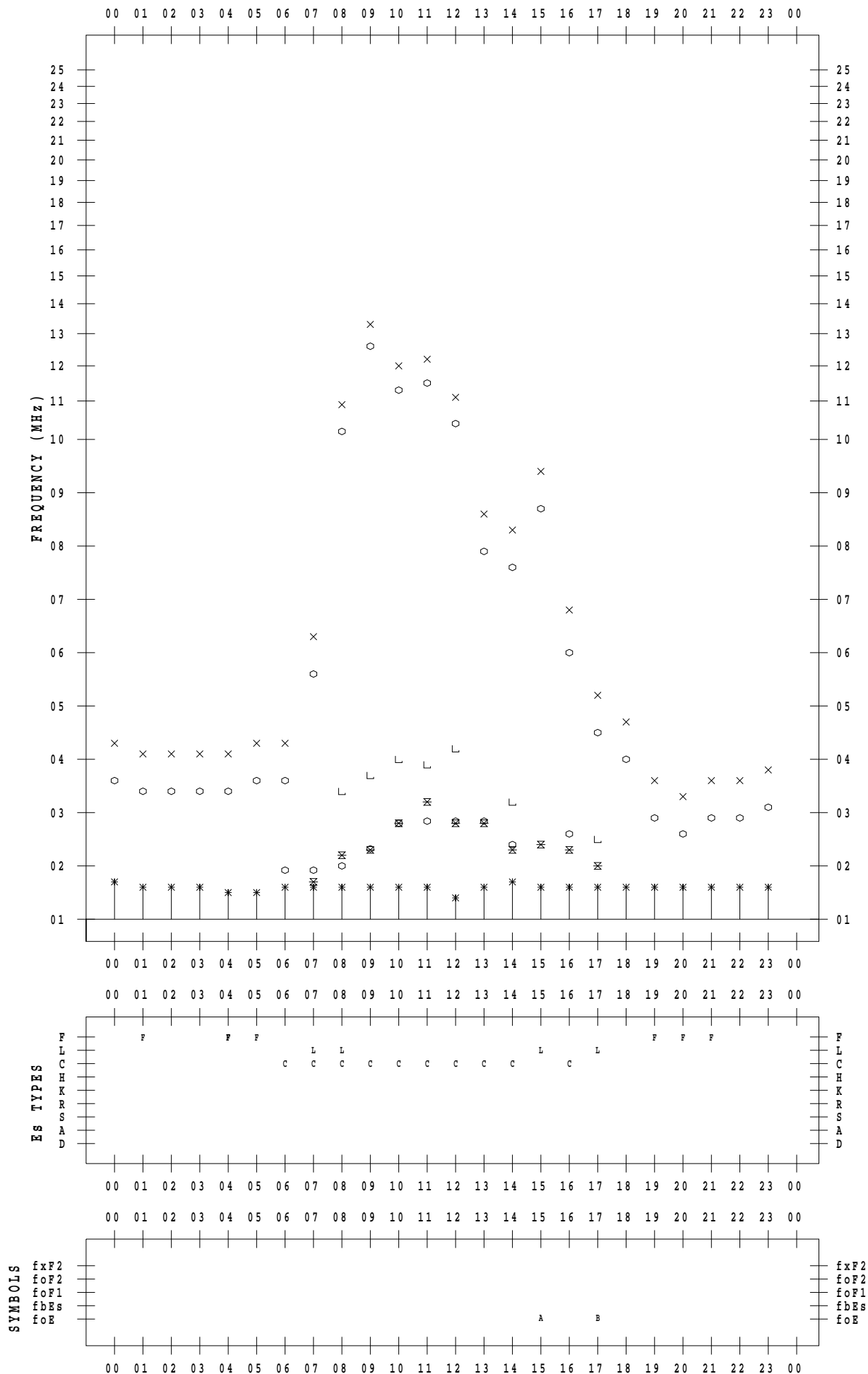
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SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/ 8

135 ° E MEAN TIME



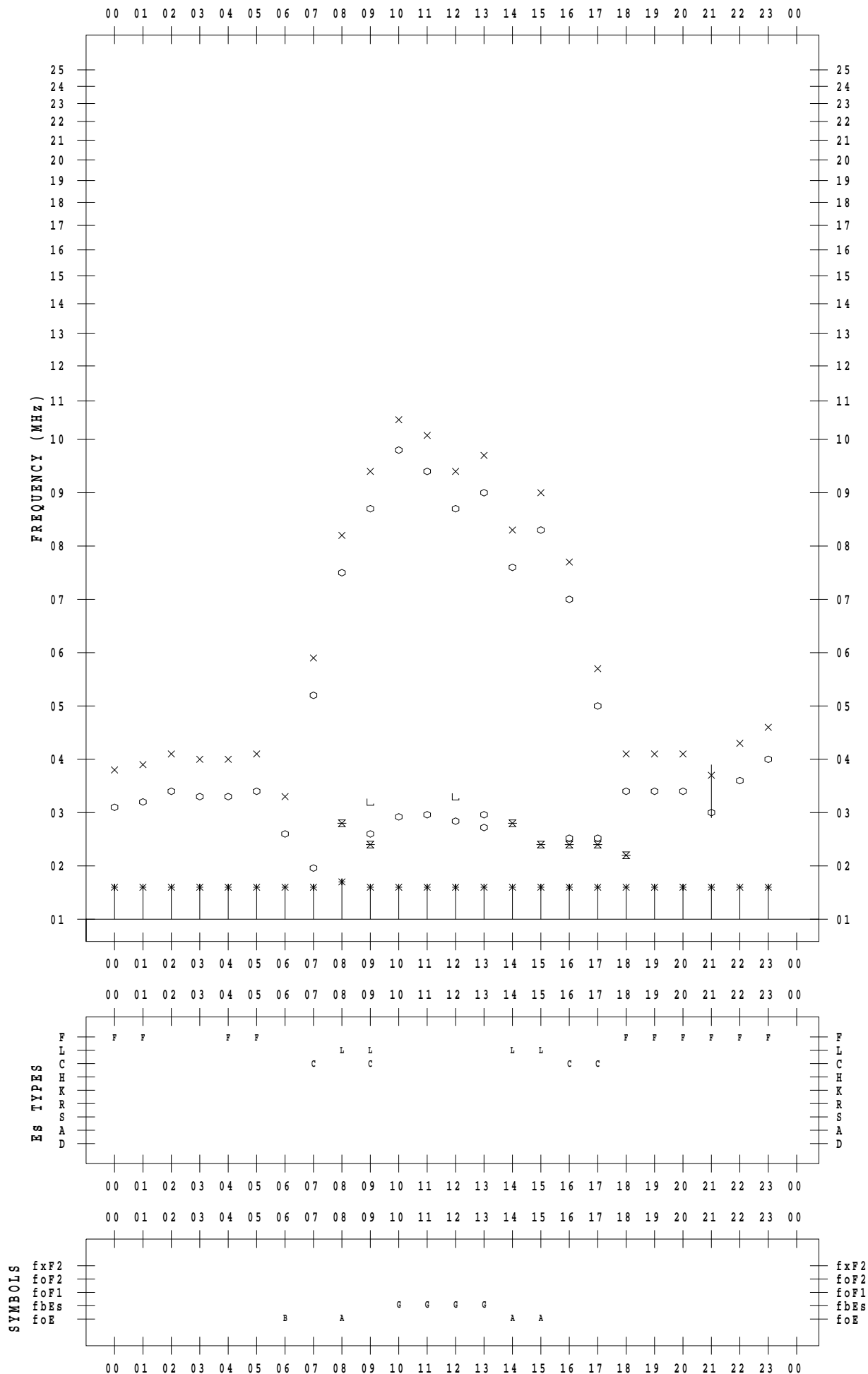
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SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/ 9

135 ° E MEAN TIME



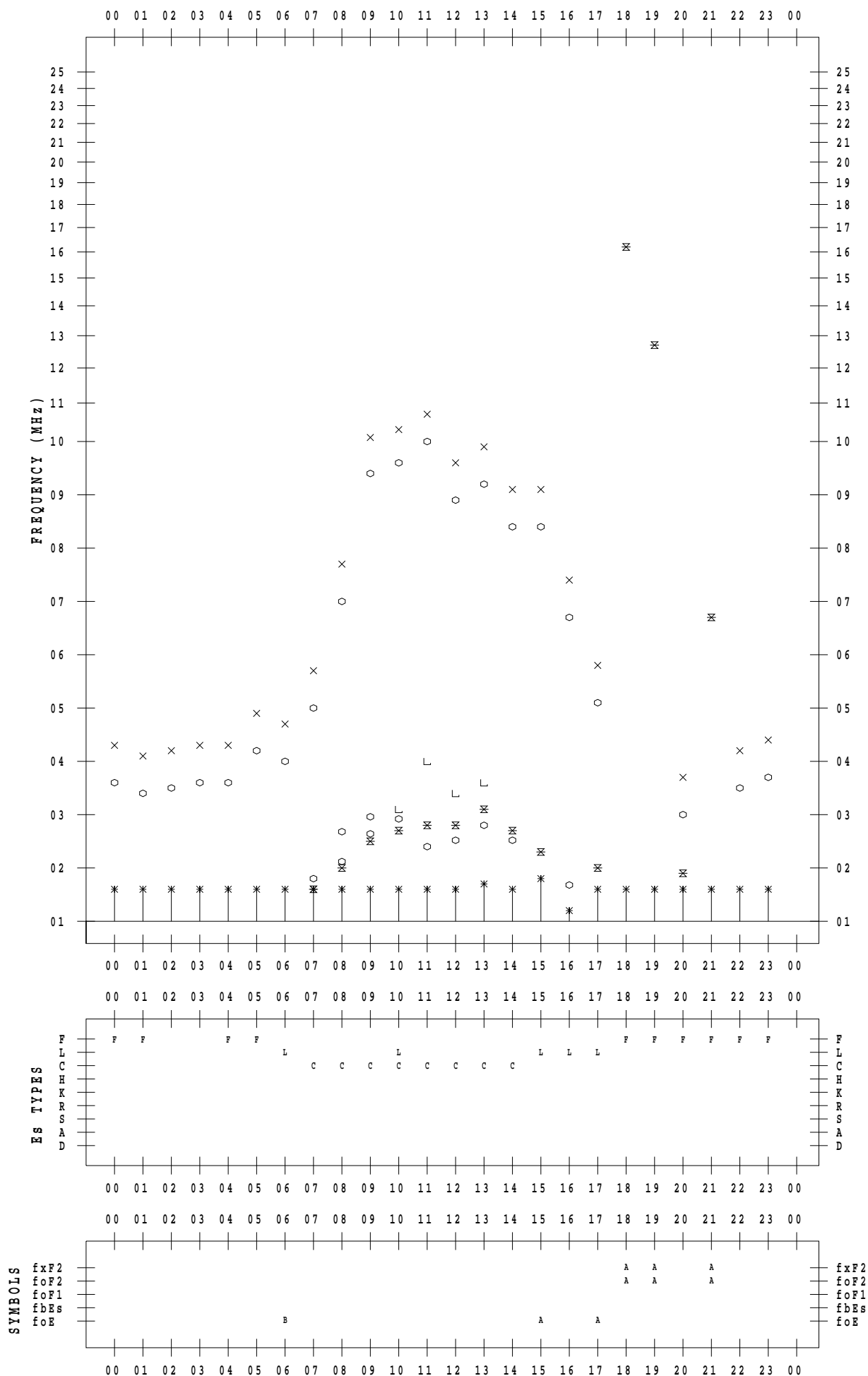
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SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/10

135 ° E MEAN TIME



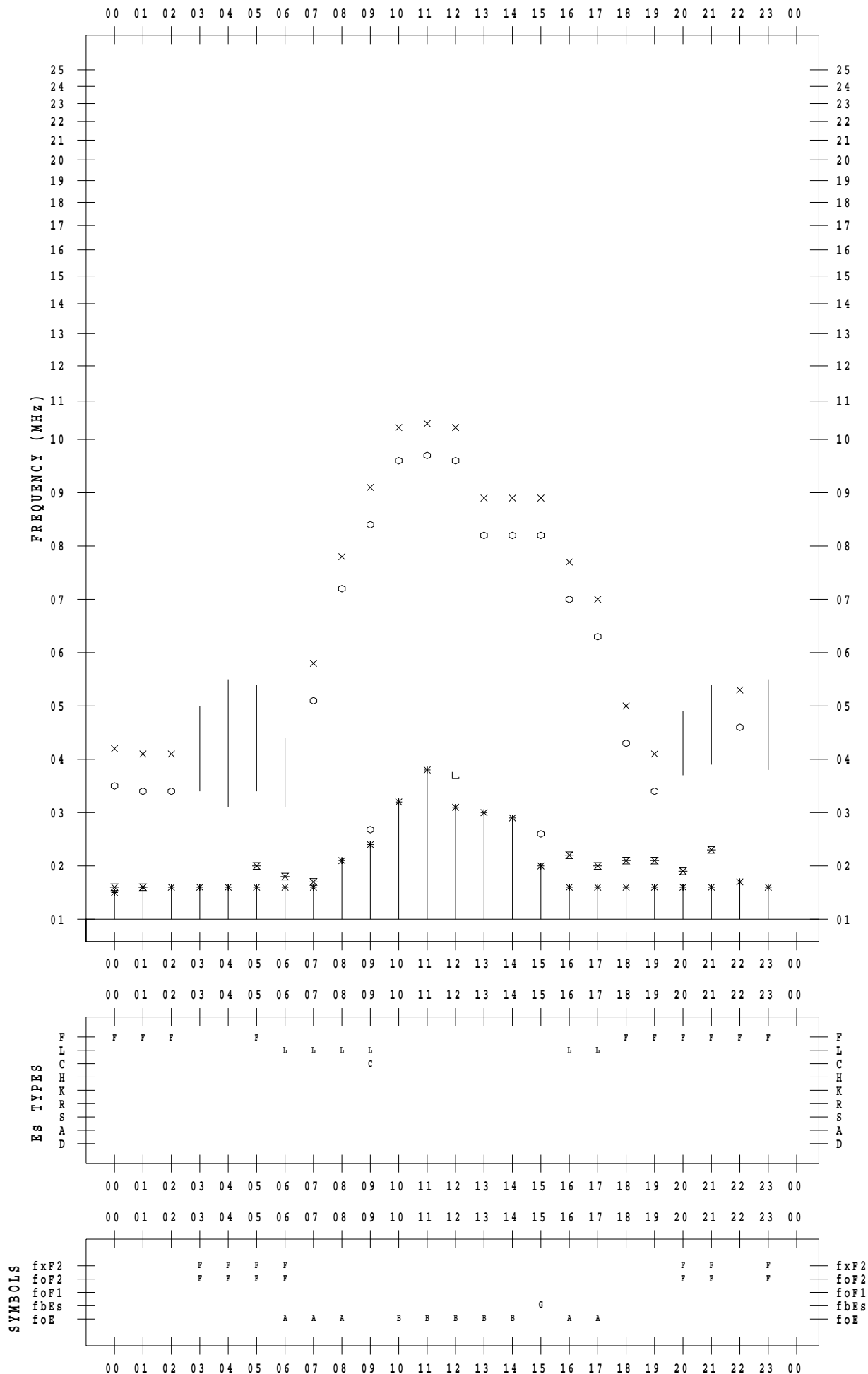
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SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/11

135 ° E MEAN TIME



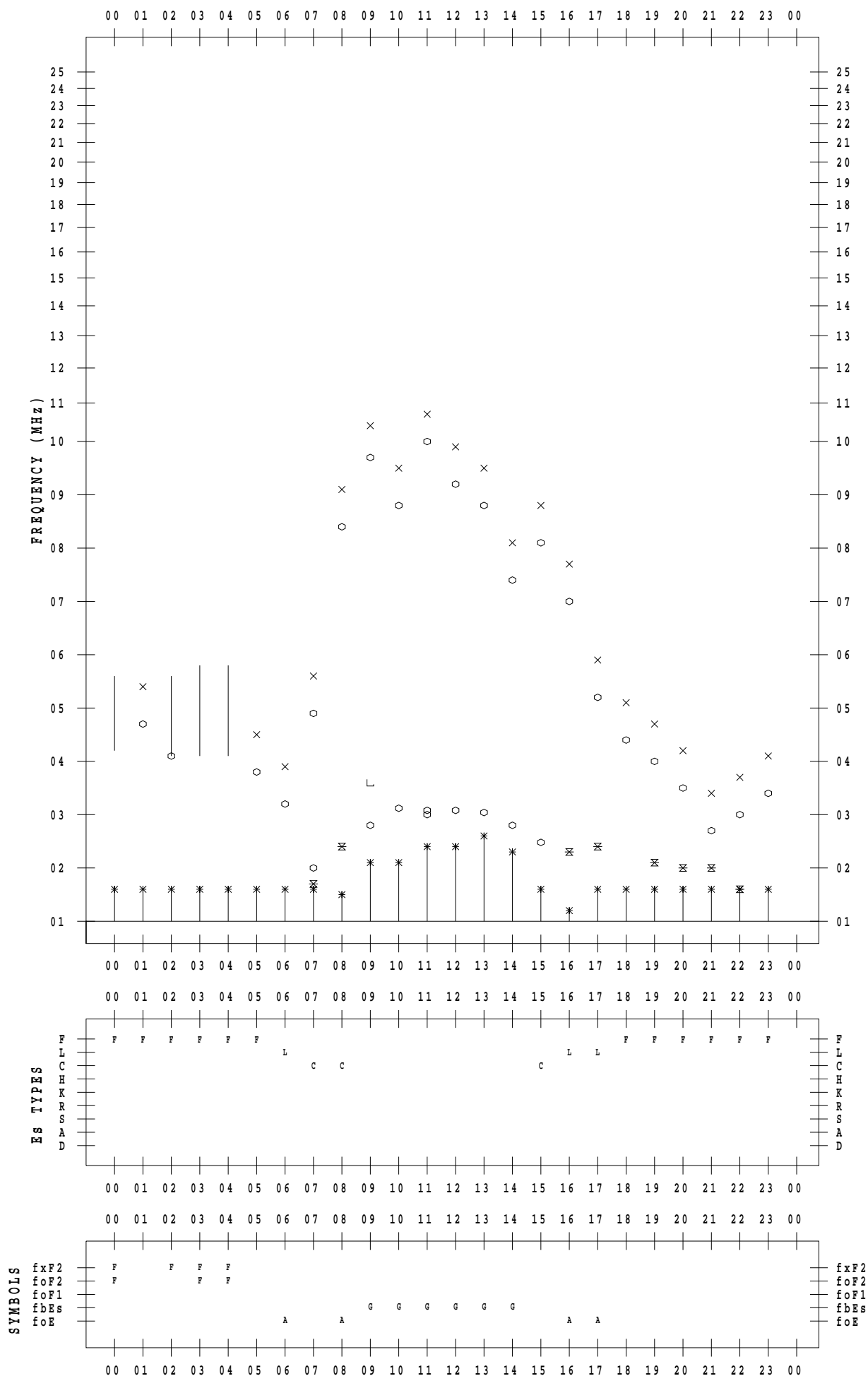
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SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/12

135 ° E MEAN TIME





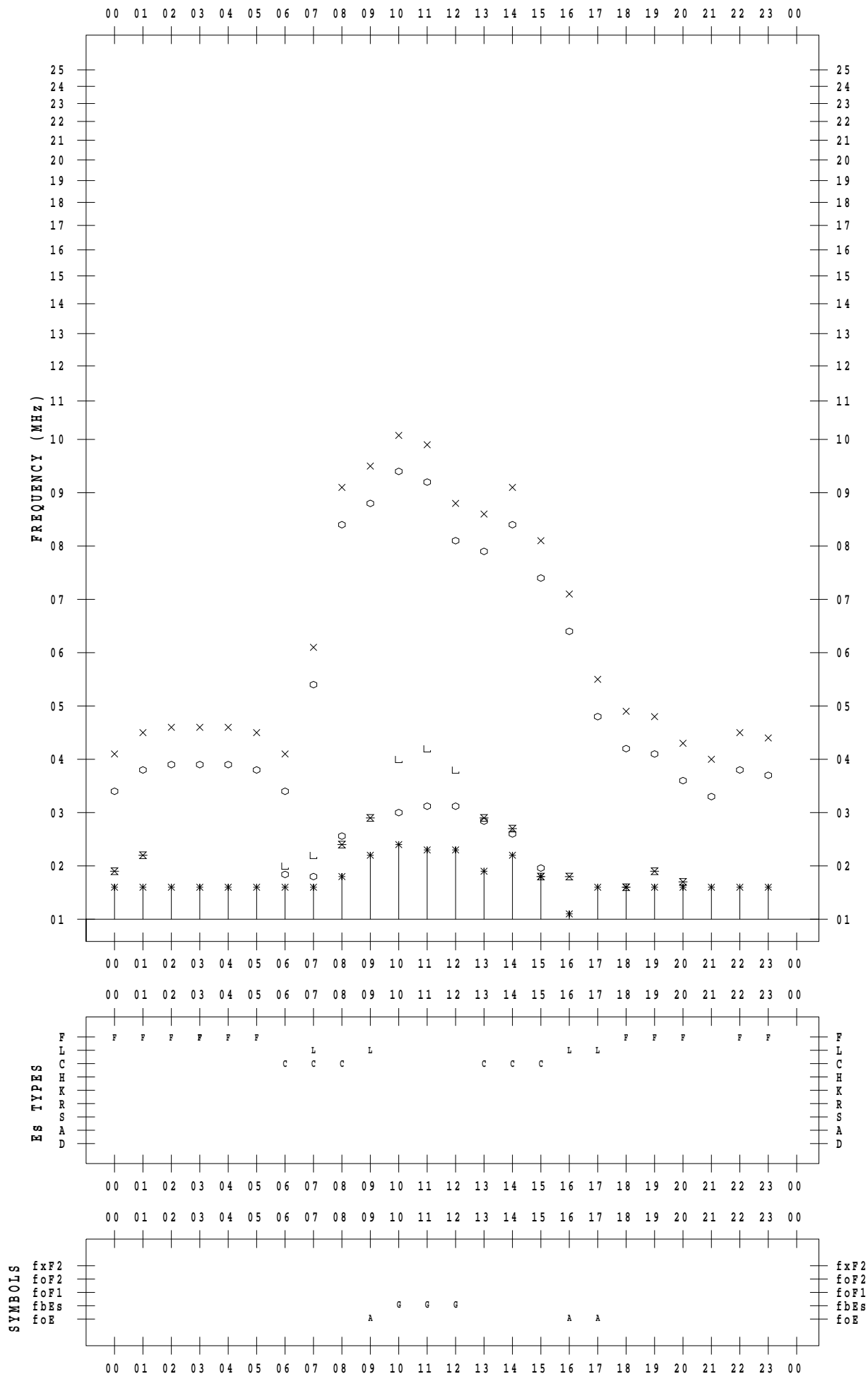
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SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/13

135 ° E MEAN TIME



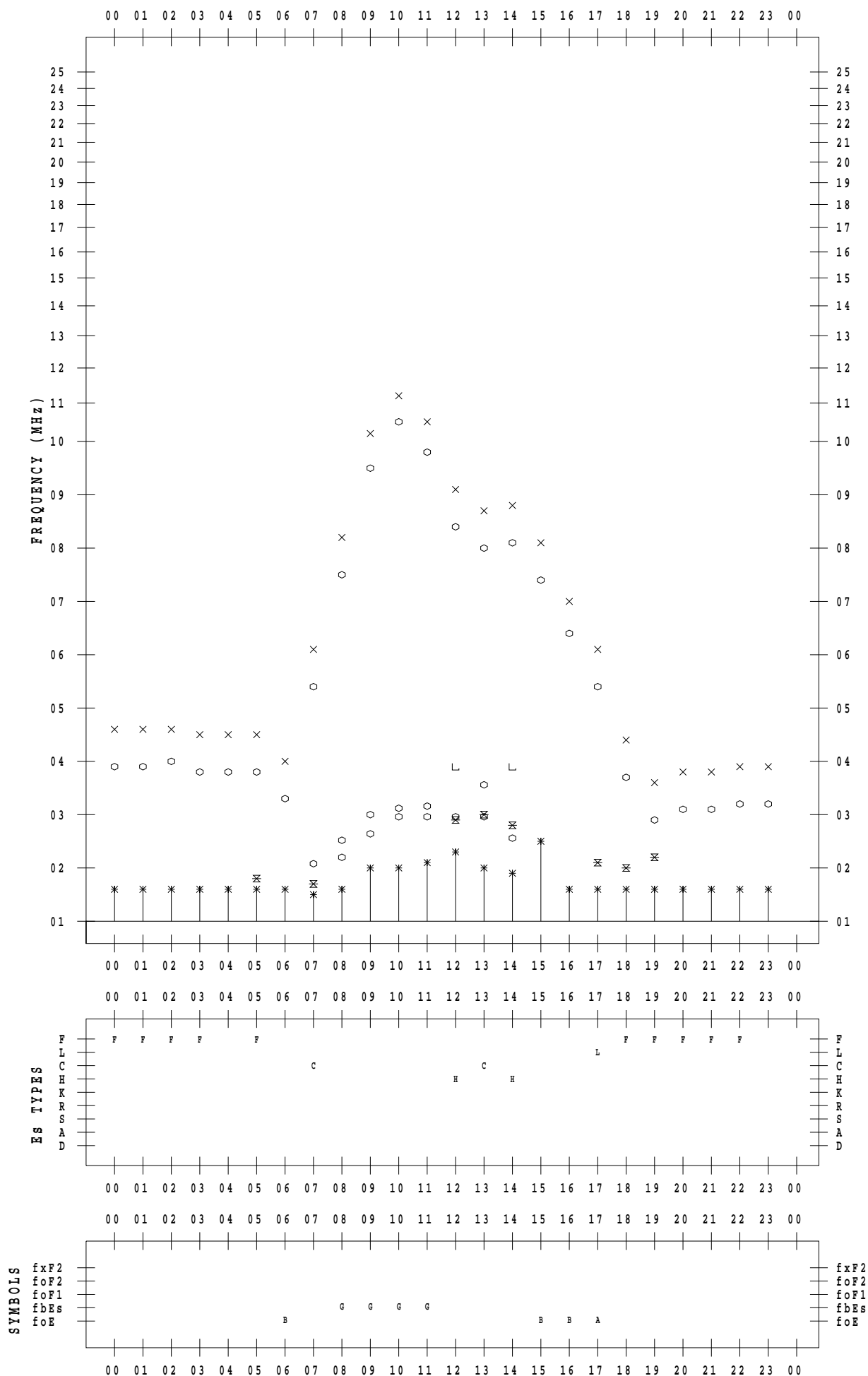
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SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/14

135 ° E MEAN TIME



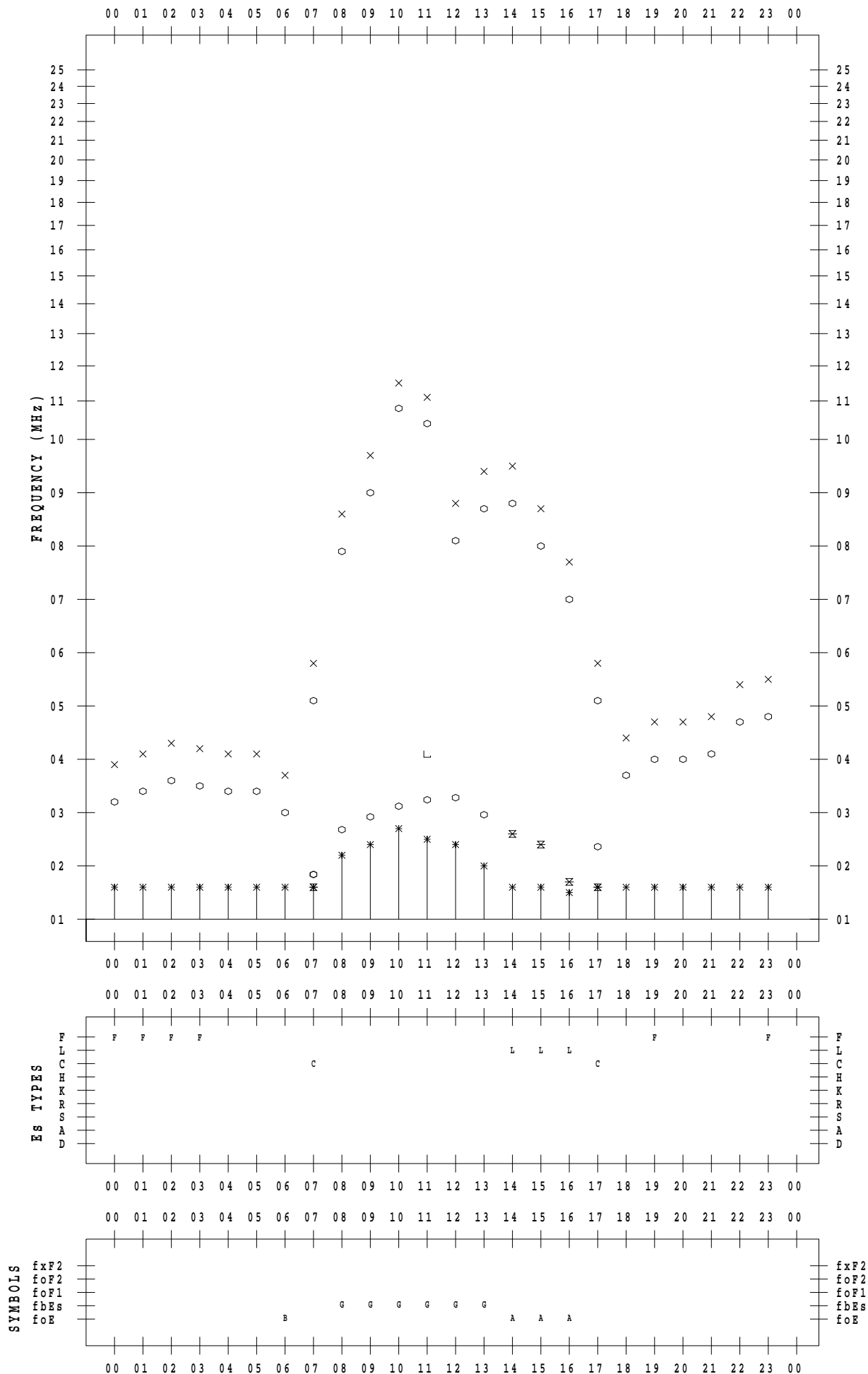
# f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/15

135 ° E MEAN TIME



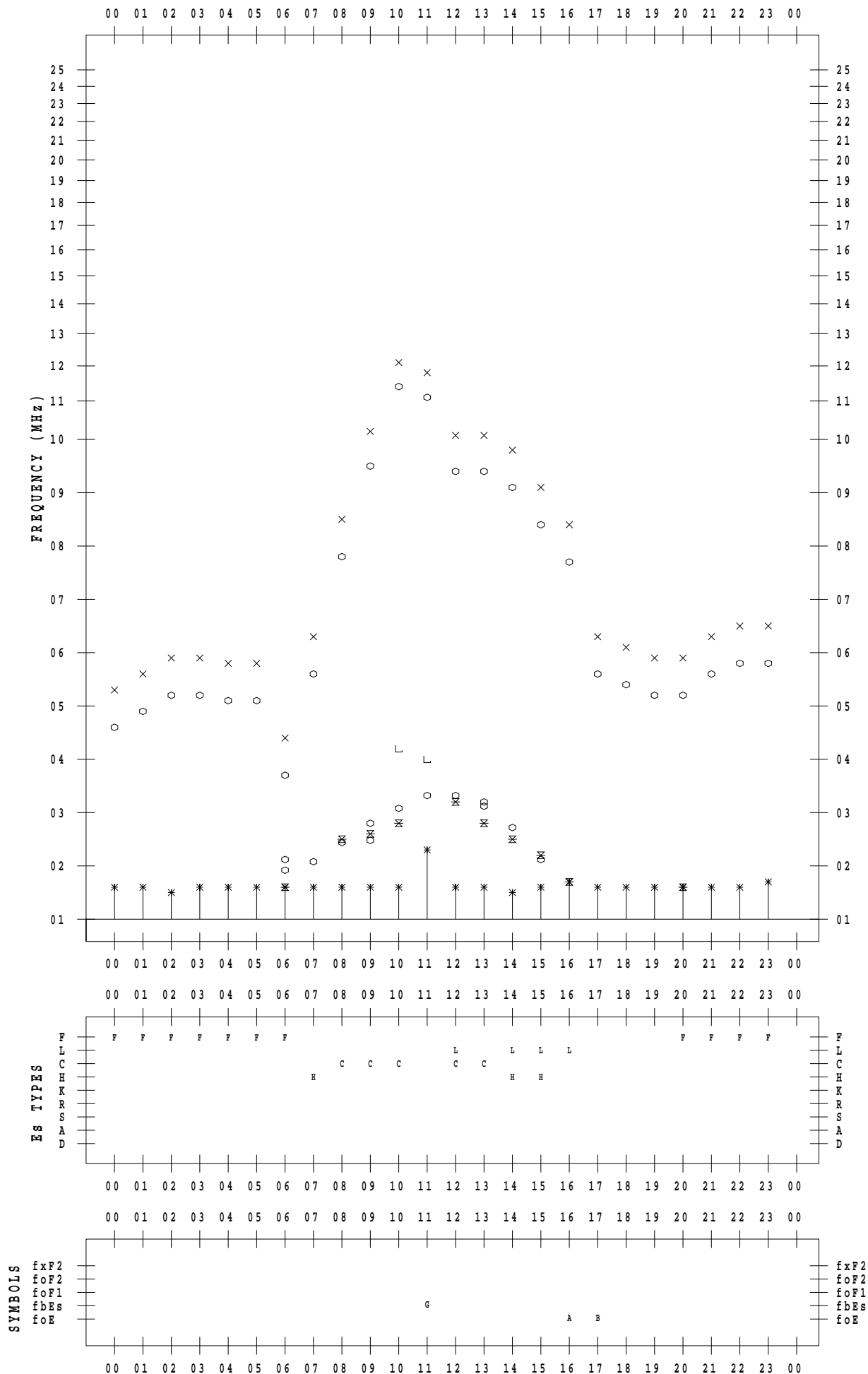
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SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/16

135 ° E MEAN TIME



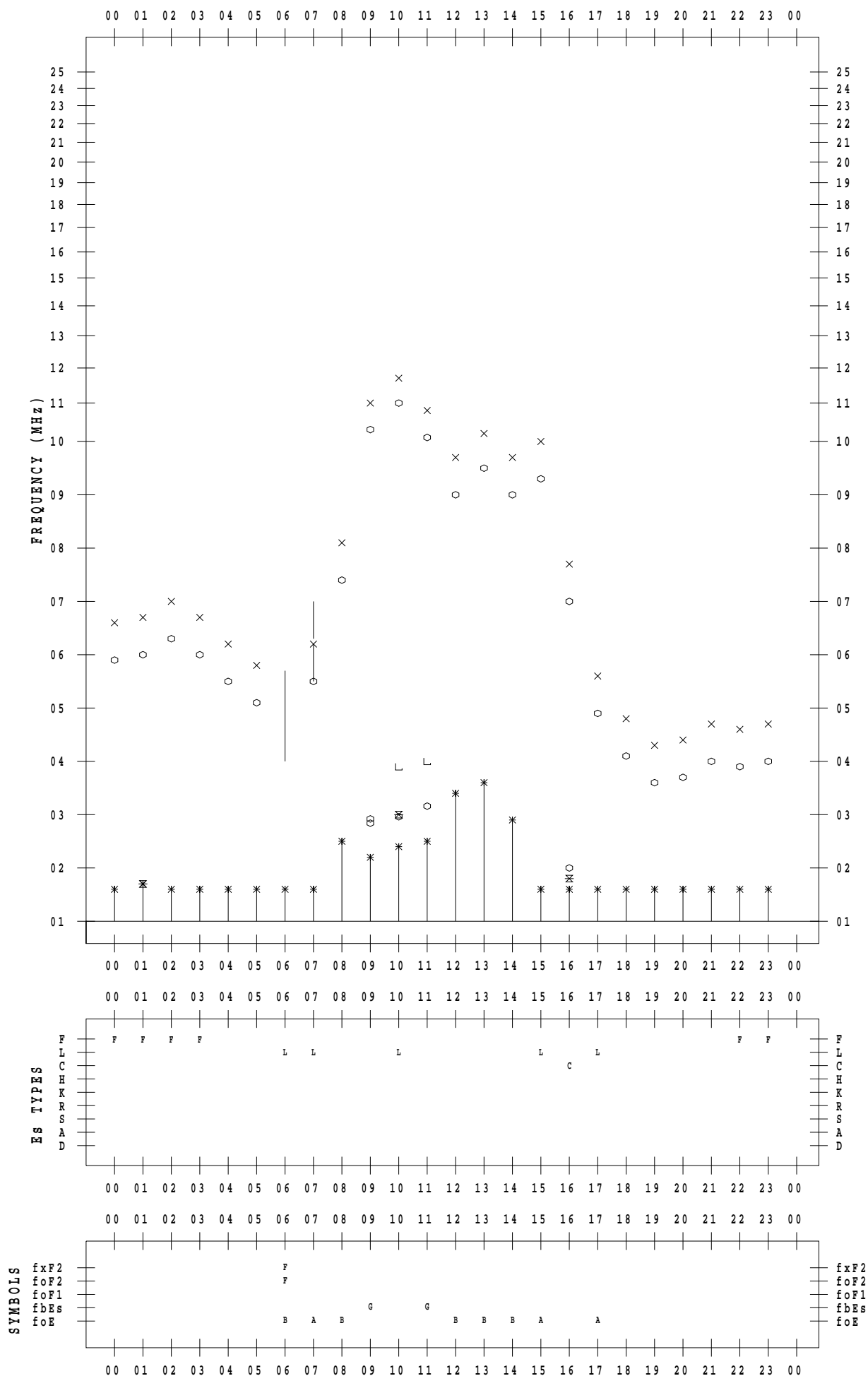
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SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/17

135 ° E MEAN TIME



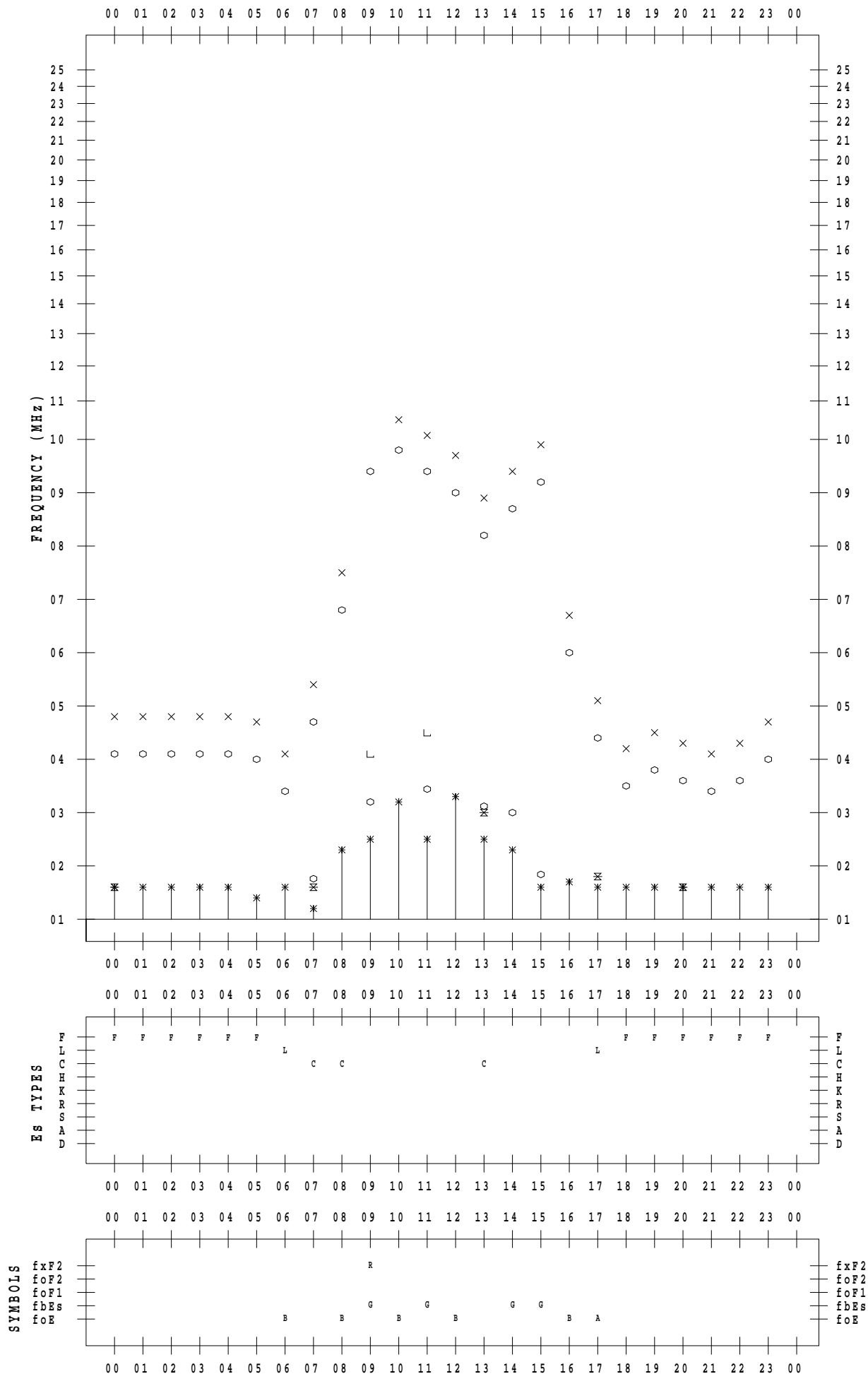
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SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/18

135 ° E MEAN TIME



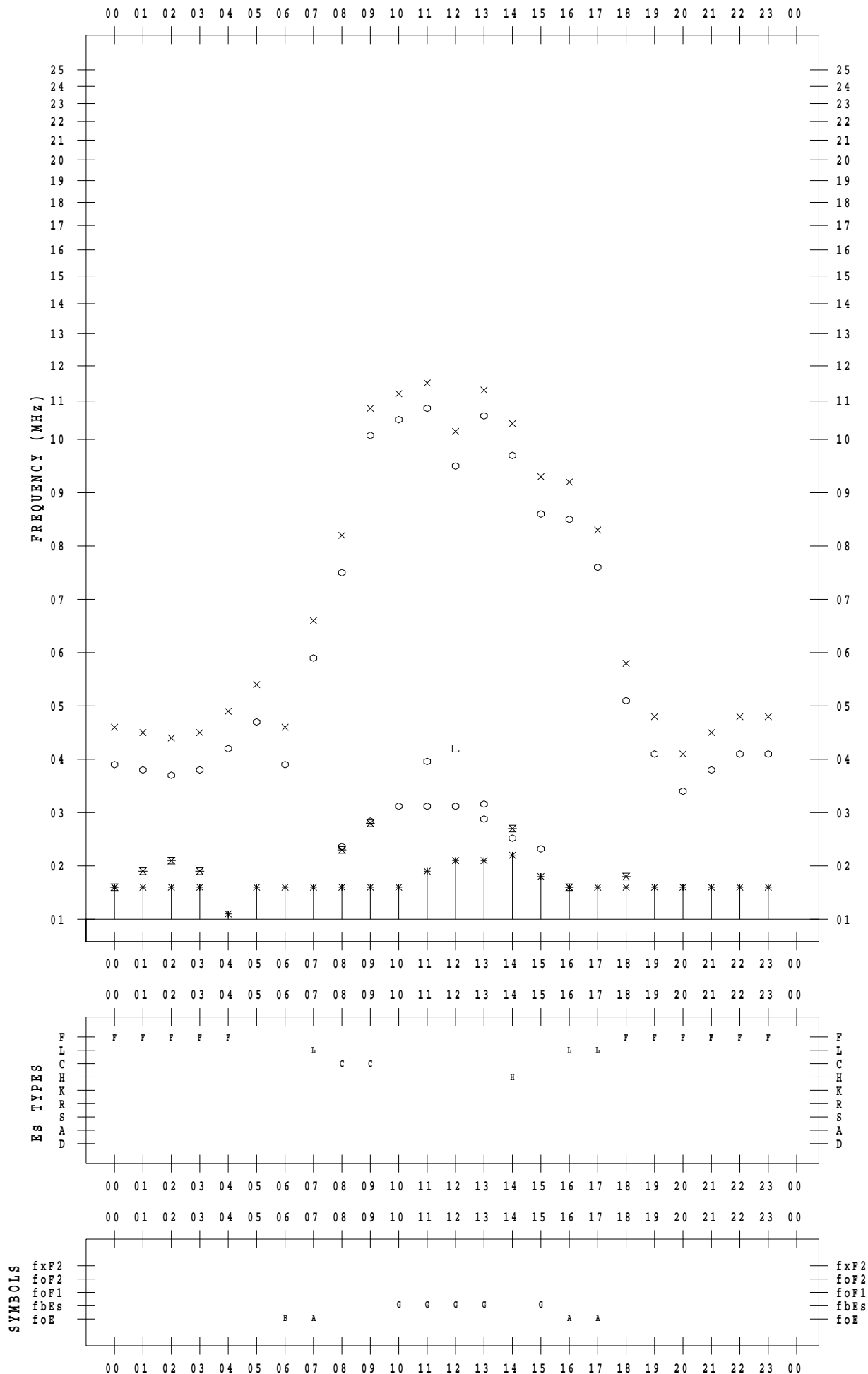
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SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/19

135 ° E MEAN TIME



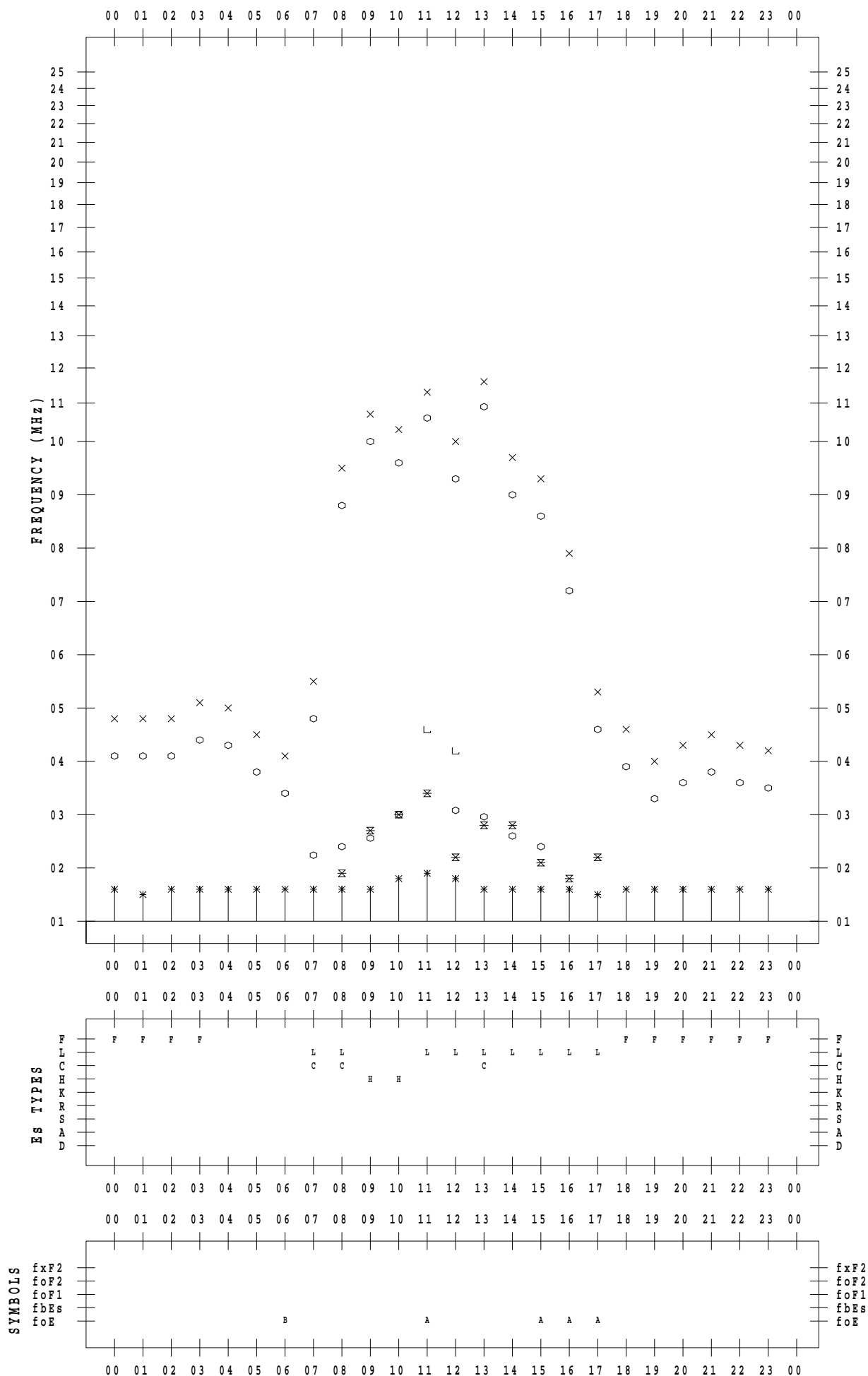
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SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/20

135 ° E MEAN TIME





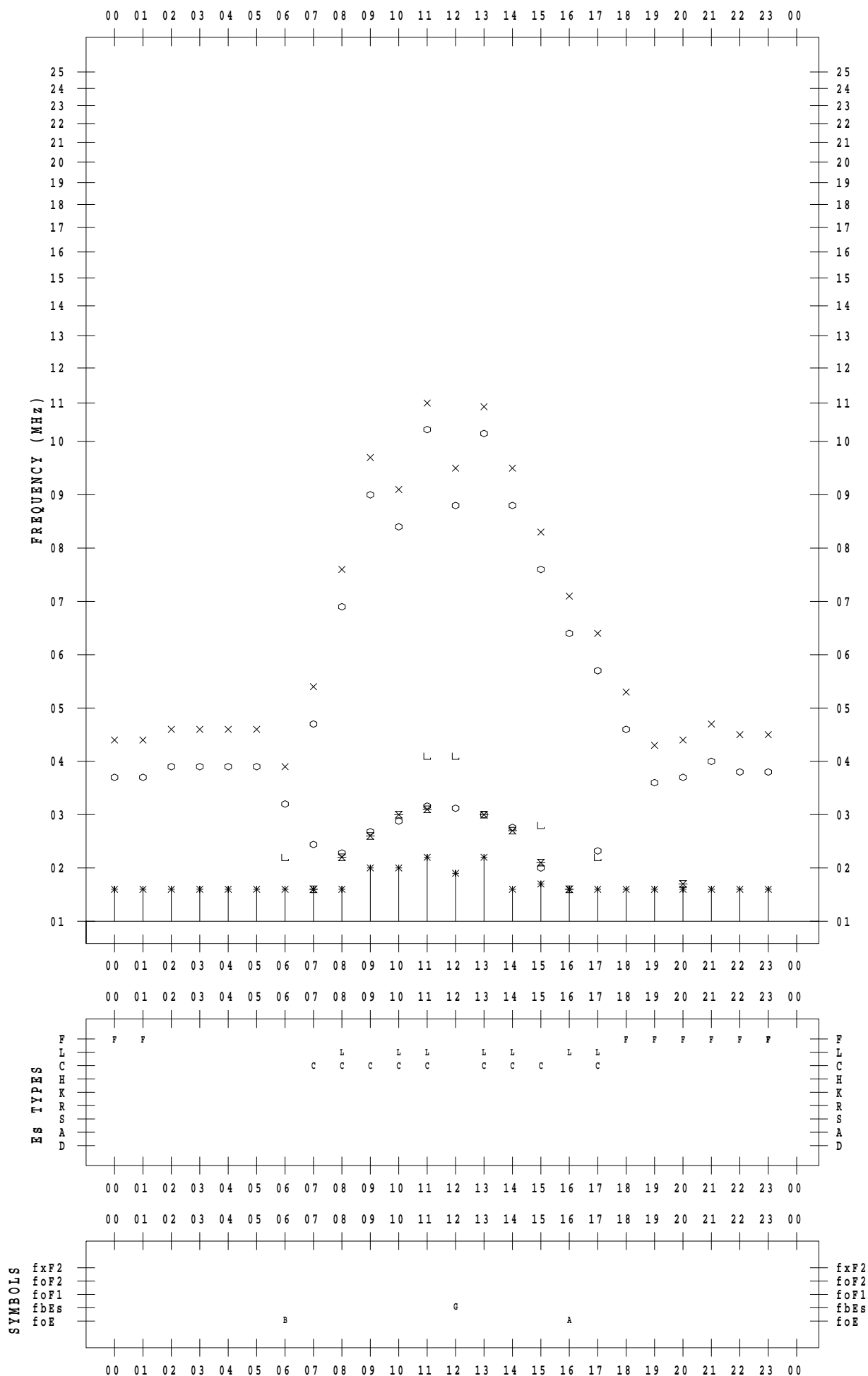
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SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/21

135 ° E MEAN TIME



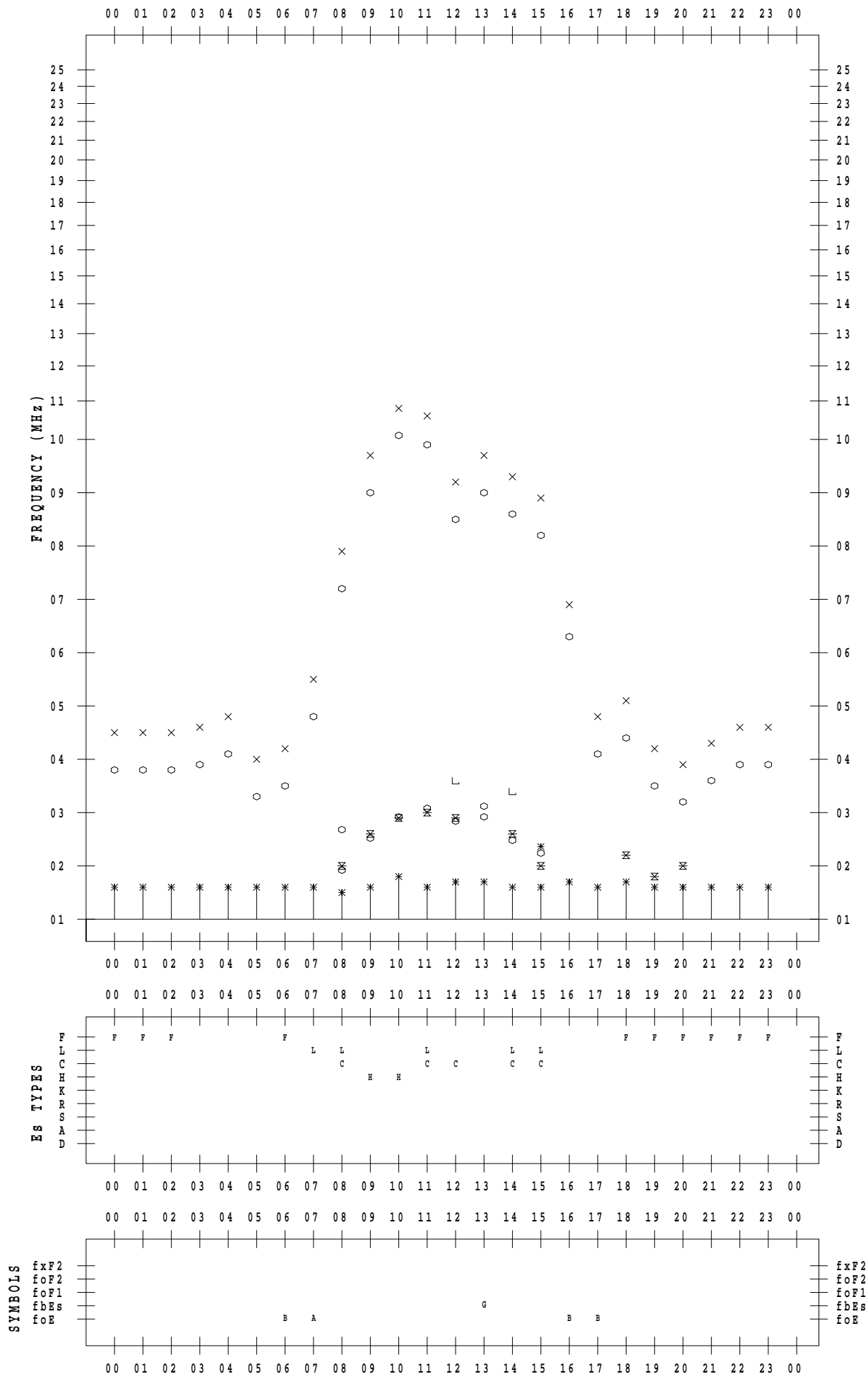
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SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/22

135 ° E MEAN TIME



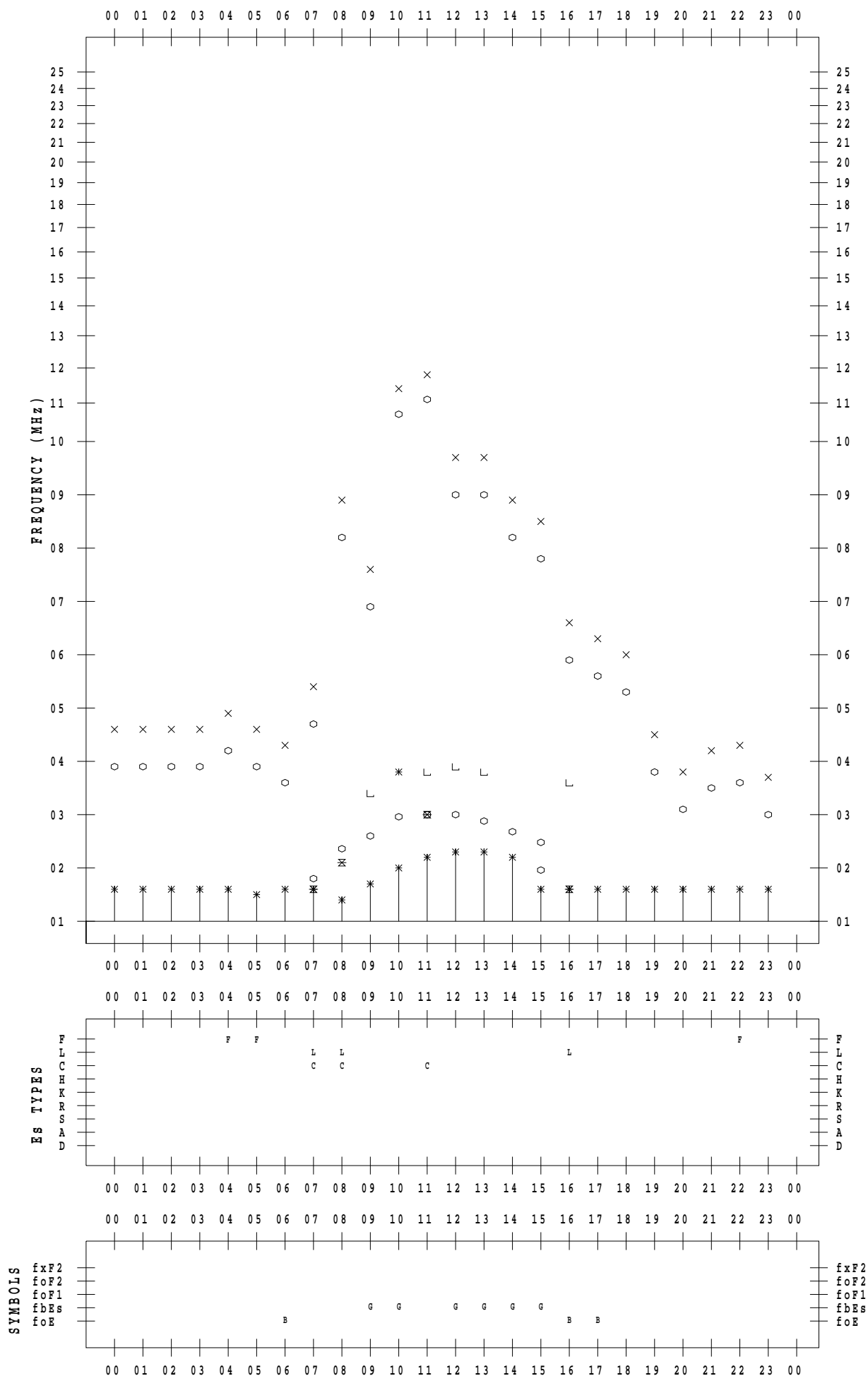
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SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/23

135 ° E MEAN TIME



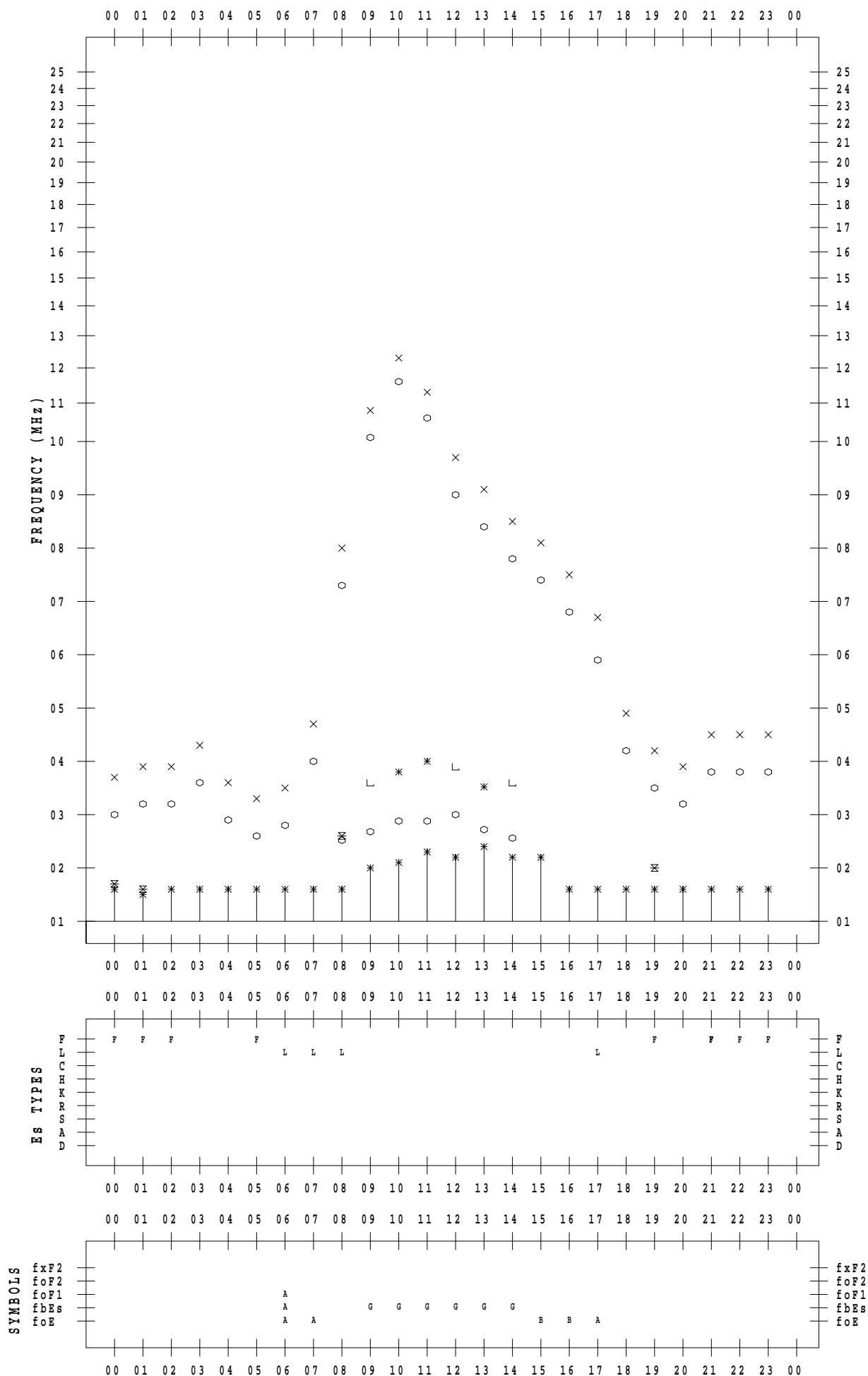
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SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/24

135 ° E MEAN TIME



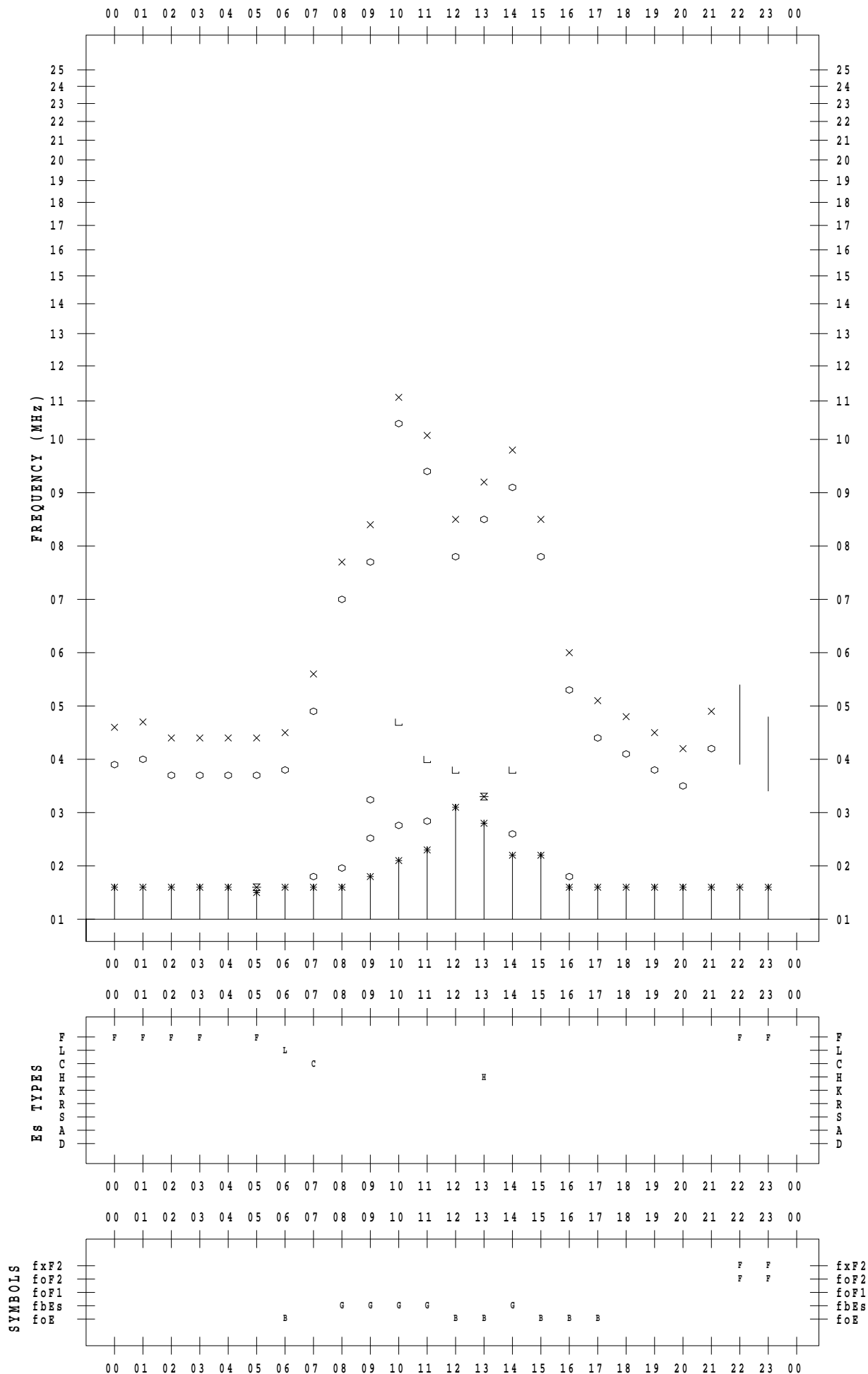
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SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/25

135 ° E MEAN TIME



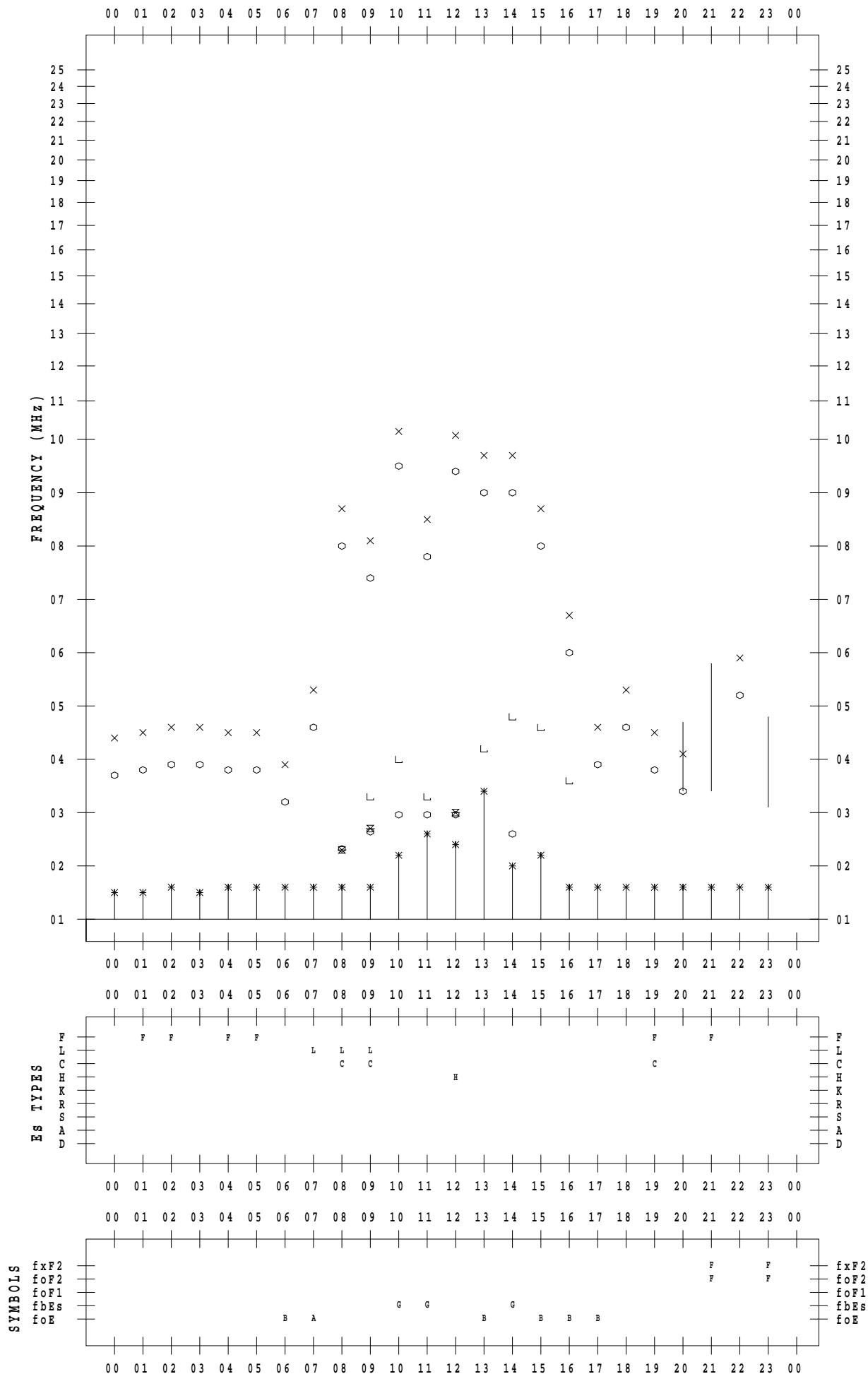
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SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/26

135 ° E MEAN TIME



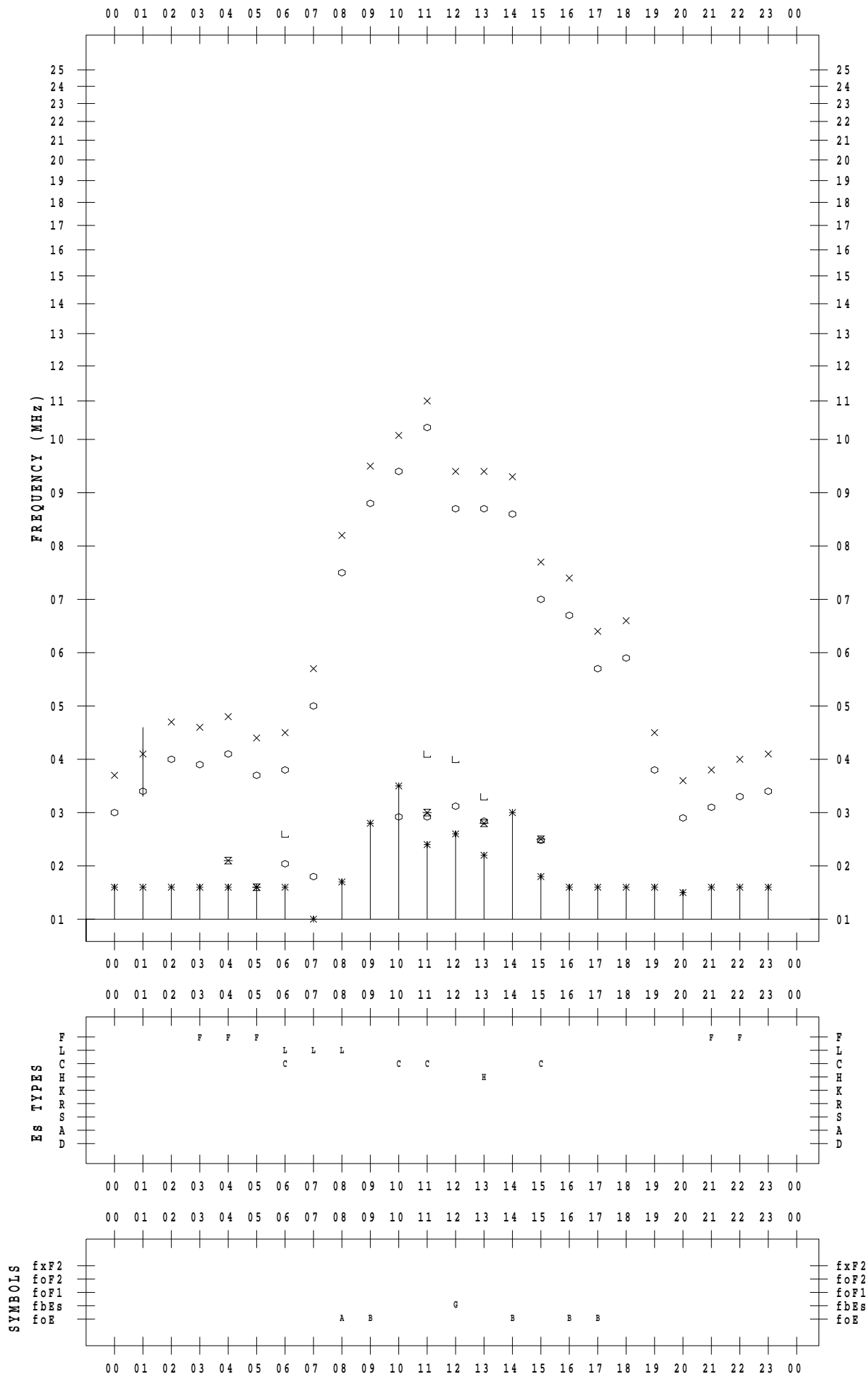
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SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/27

135 ° E MEAN TIME



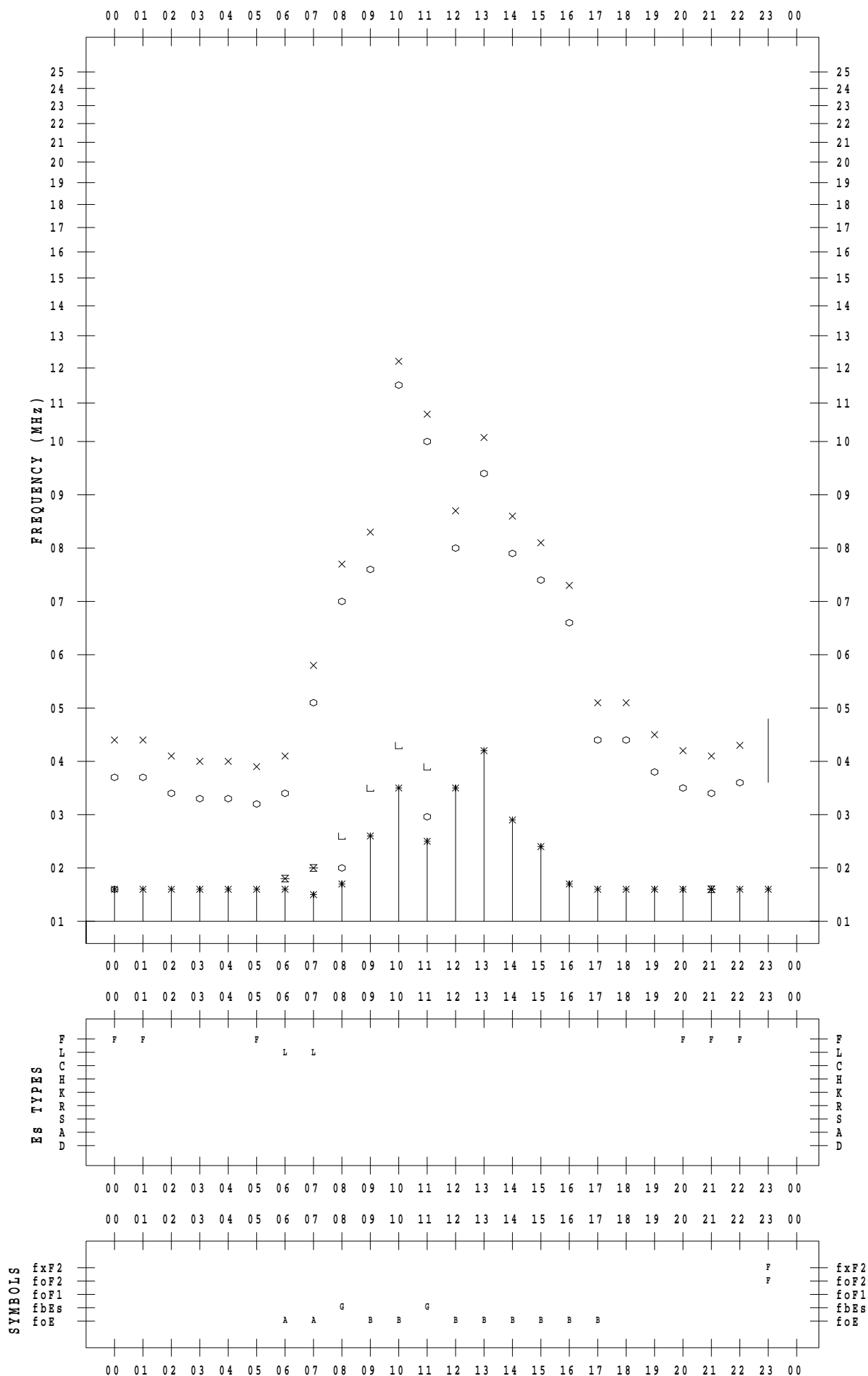
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SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/28

135 ° E MEAN TIME





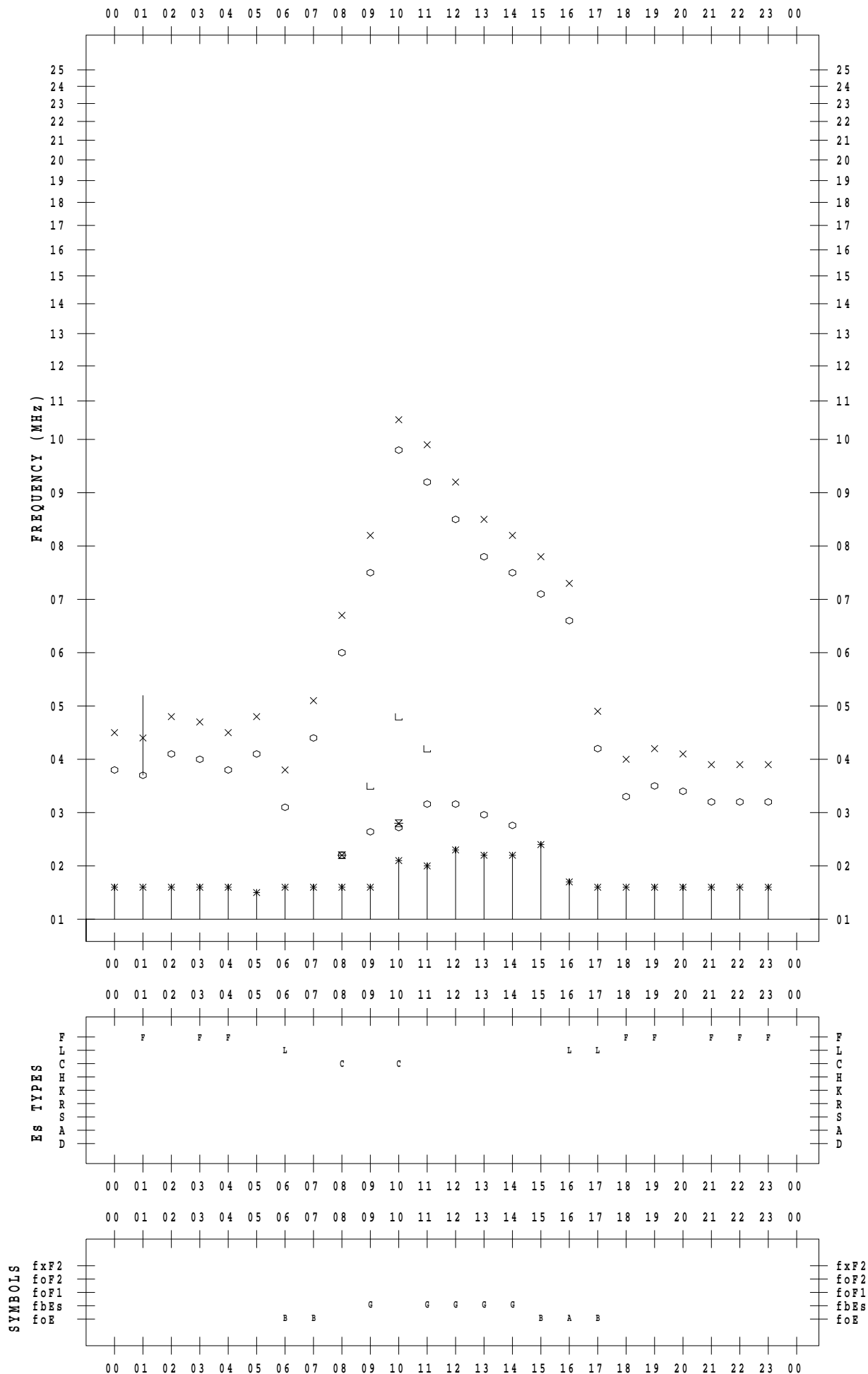
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SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/29

135 ° E MEAN TIME



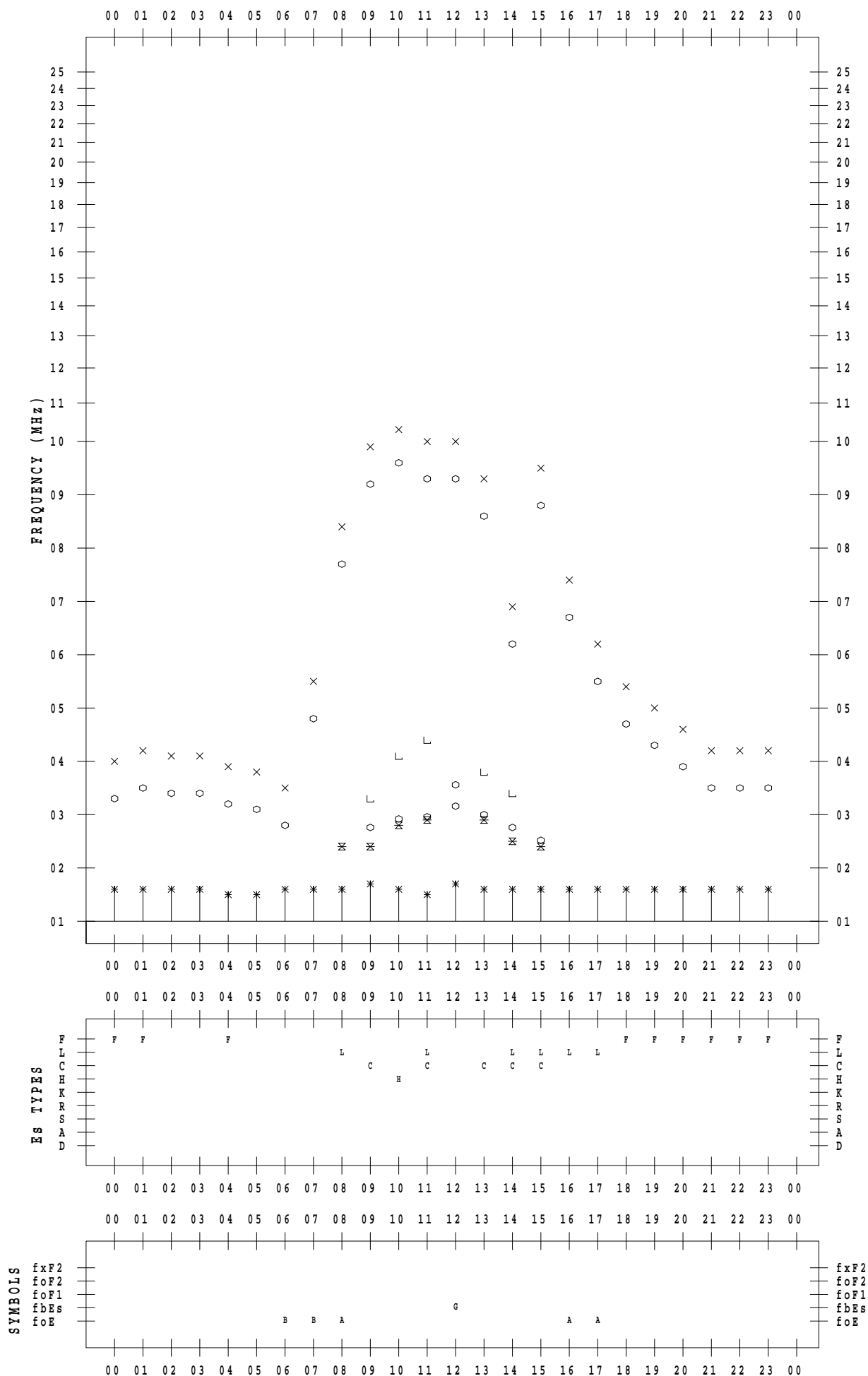
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SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/30

135 ° E MEAN TIME



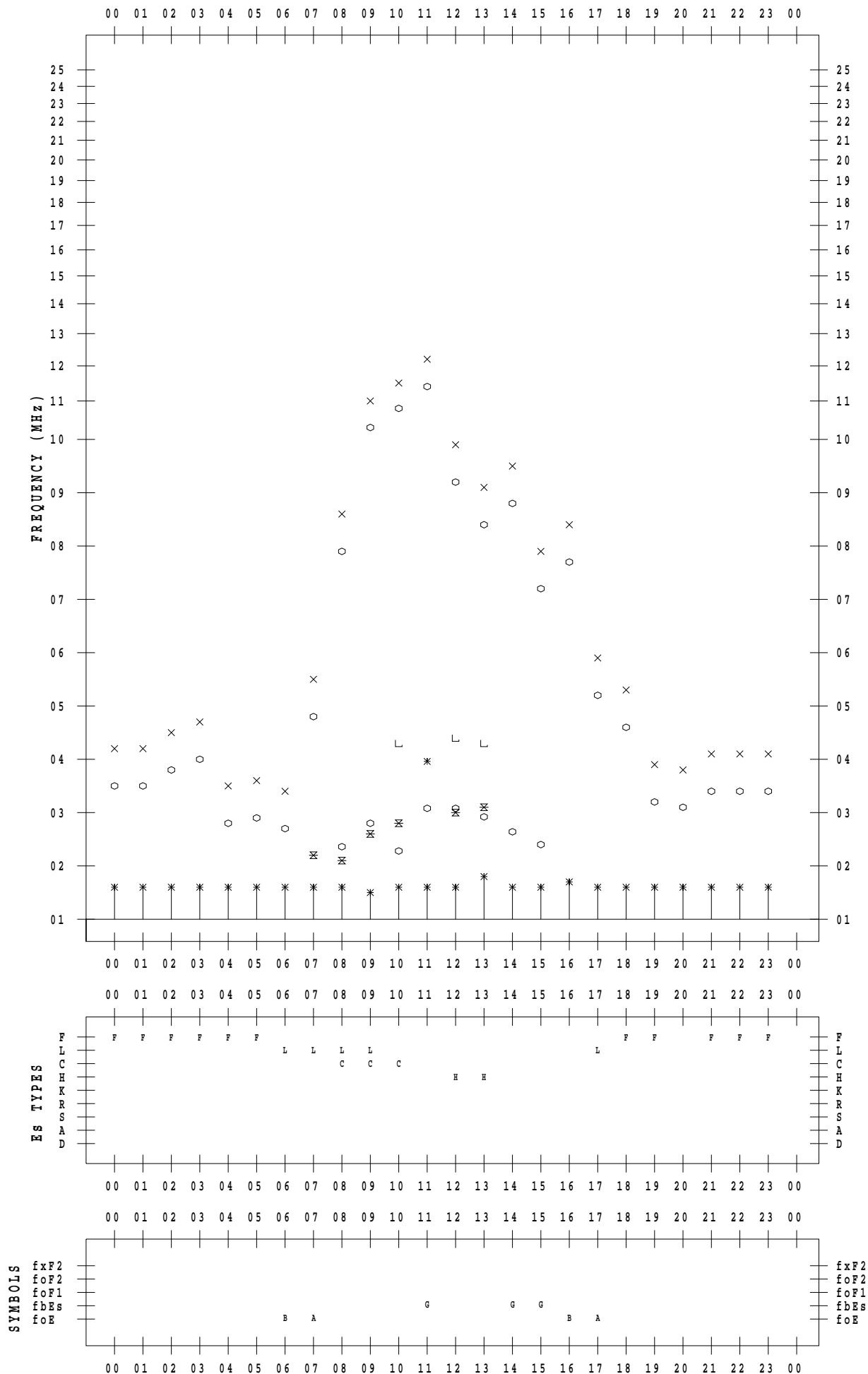
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SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2022/12/31

135 ° E MEAN TIME



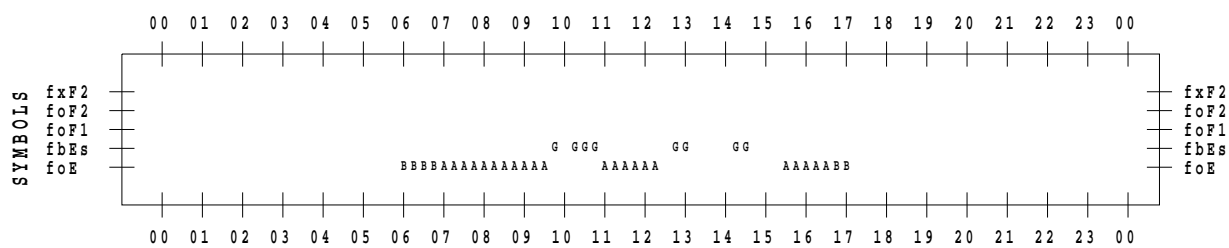
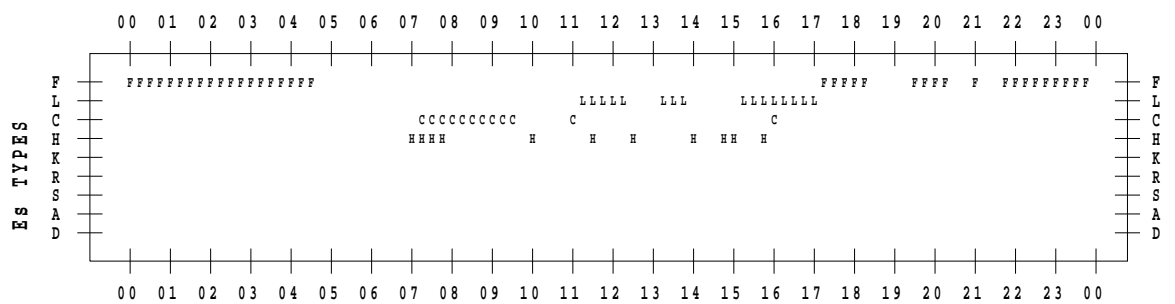
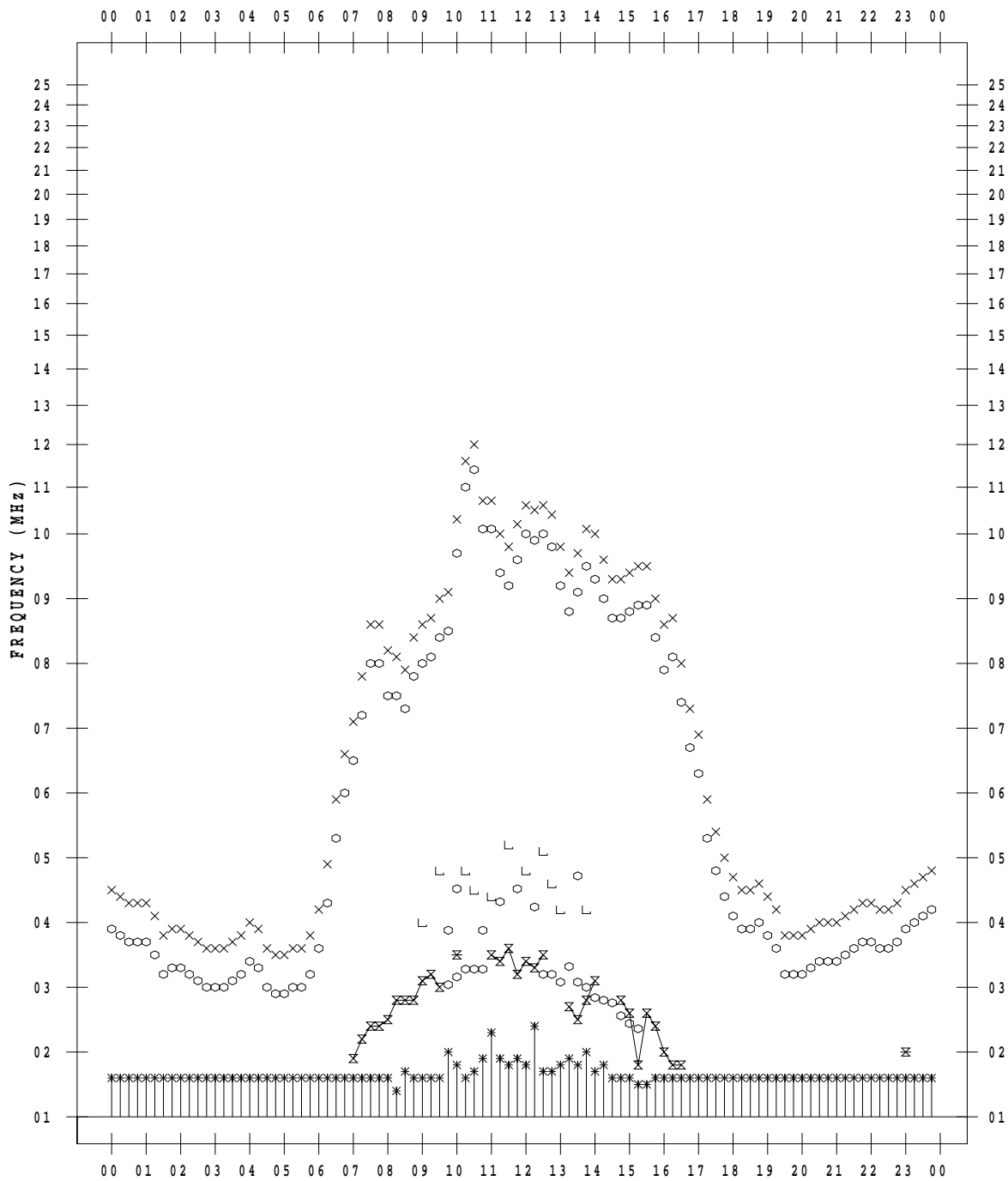
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/ 1

135 ° E MEAN TIME



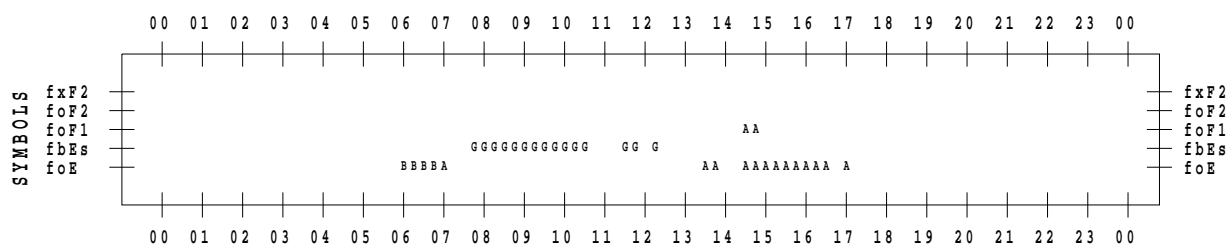
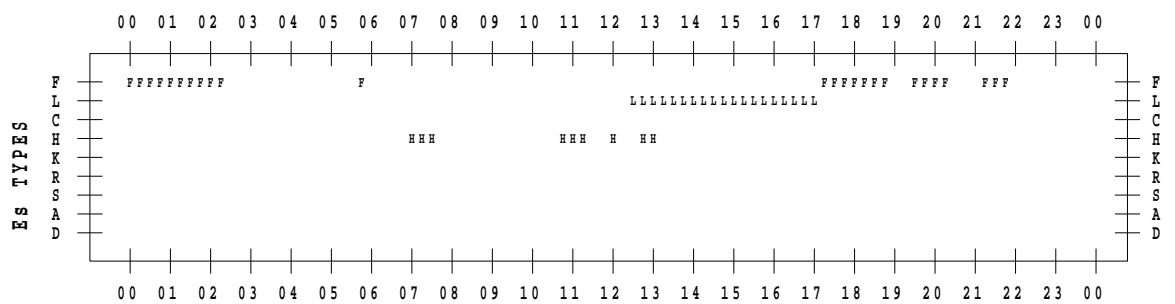
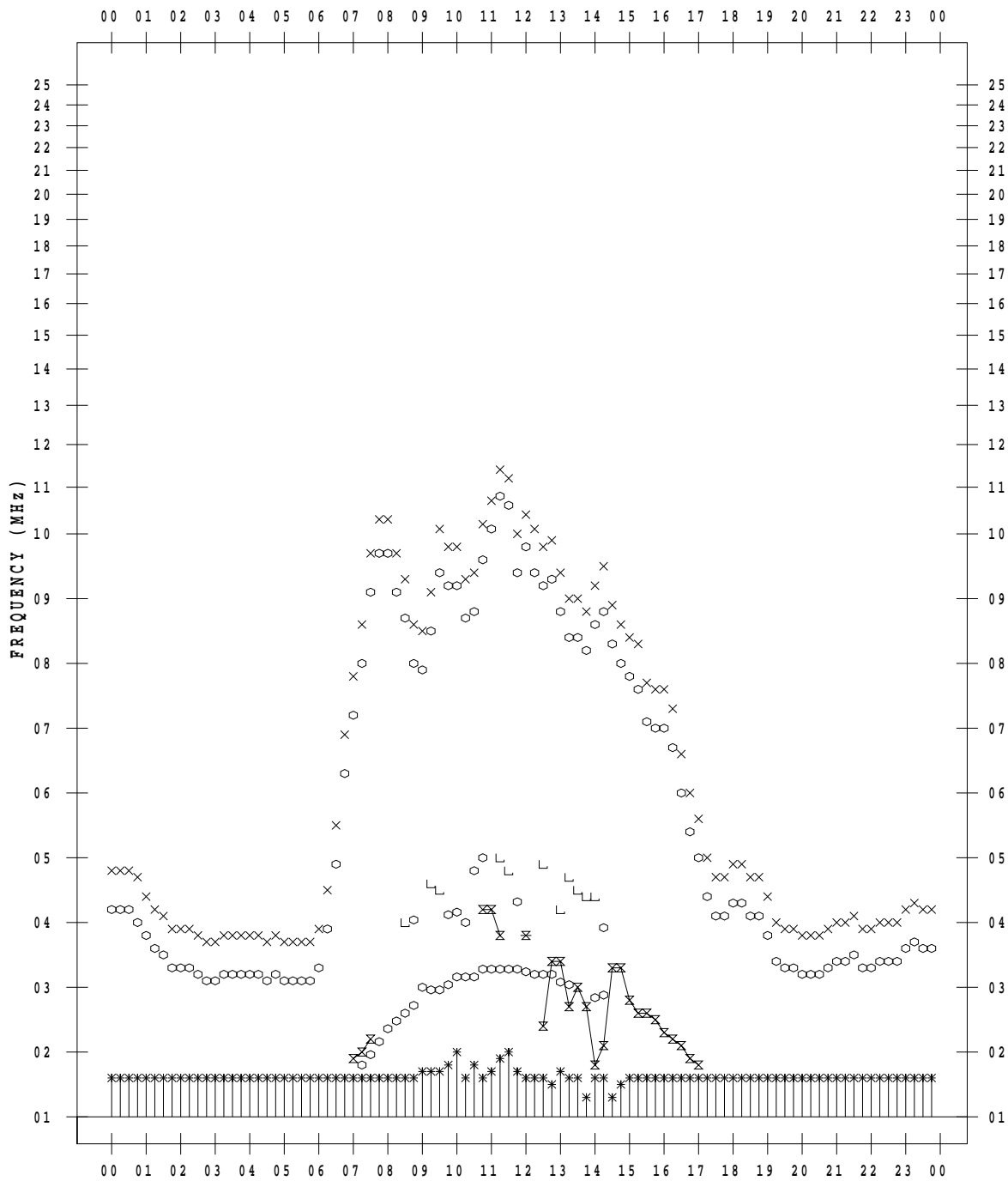
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/ 2

135 ° E MEAN TIME



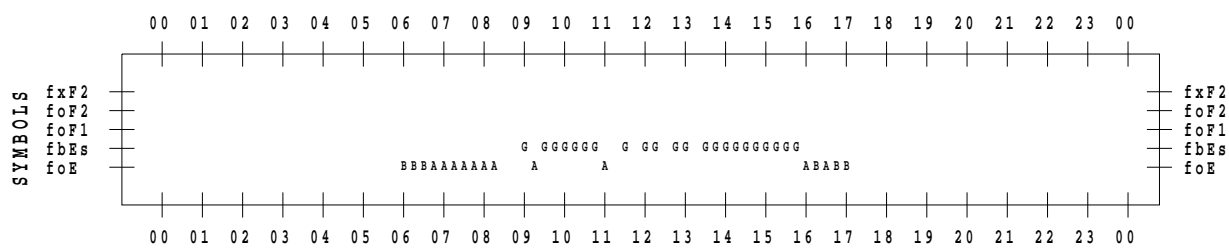
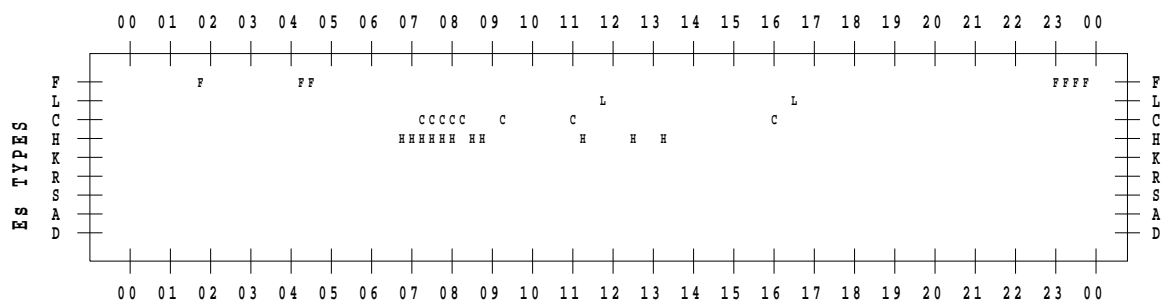
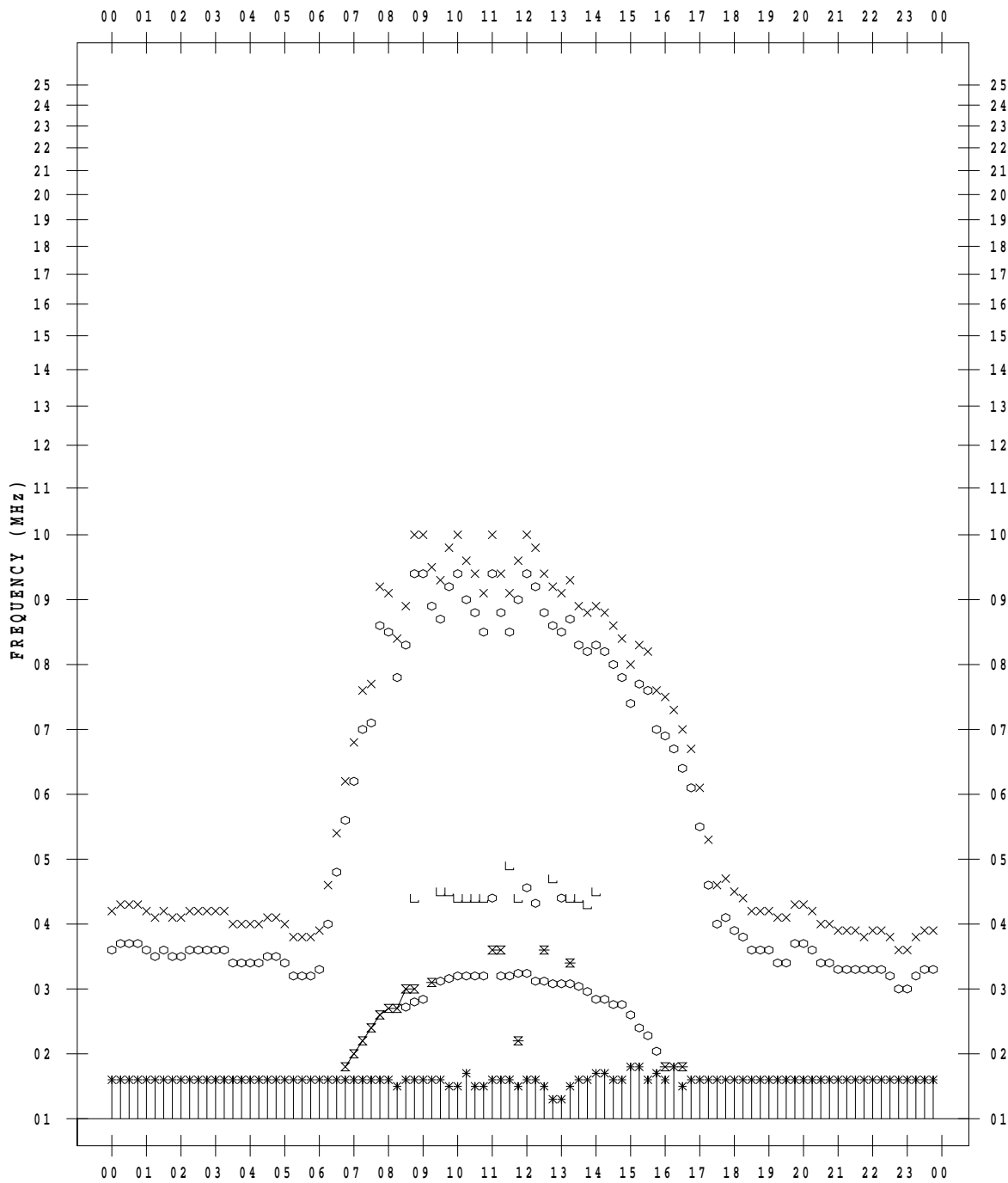
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SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/ 3

135 ° E MEAN TIME



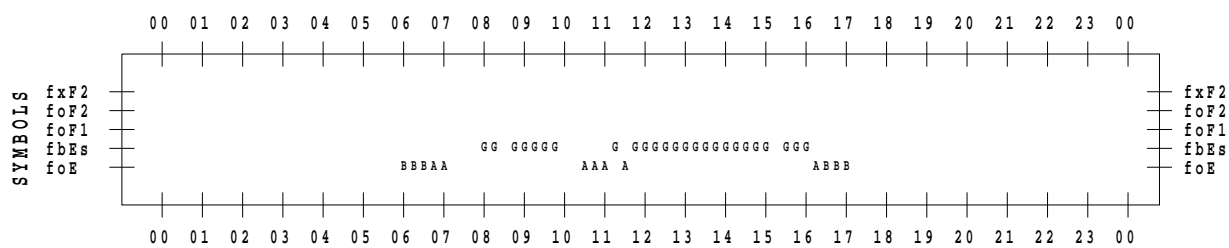
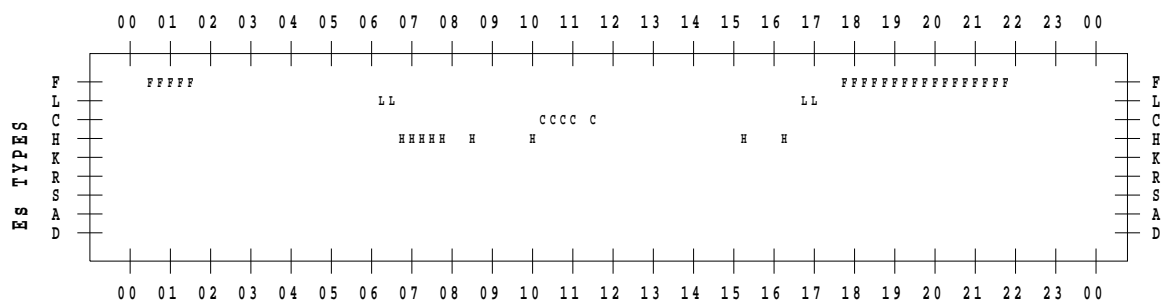
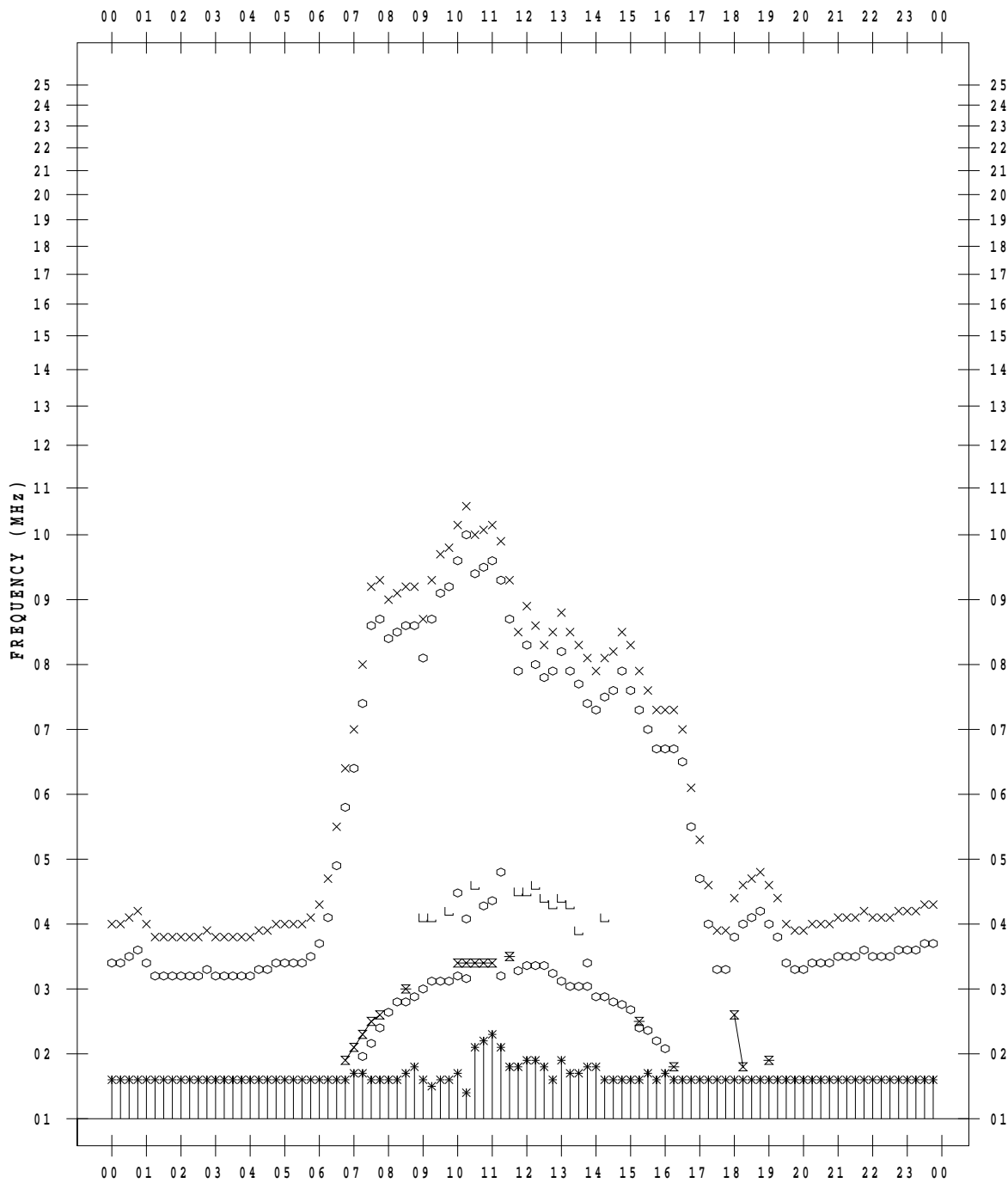
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SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/ 4

135 ° E MEAN TIME



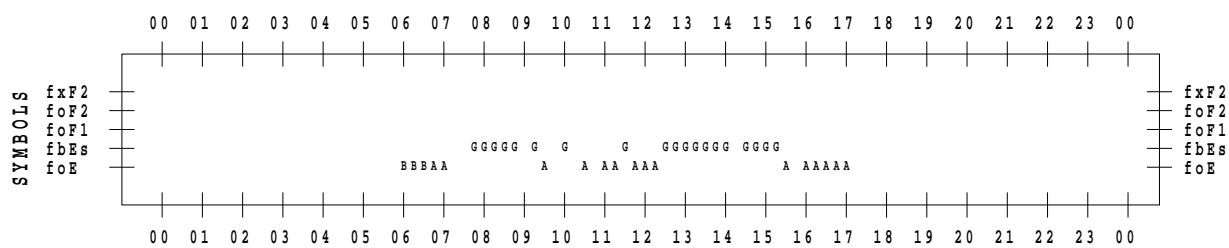
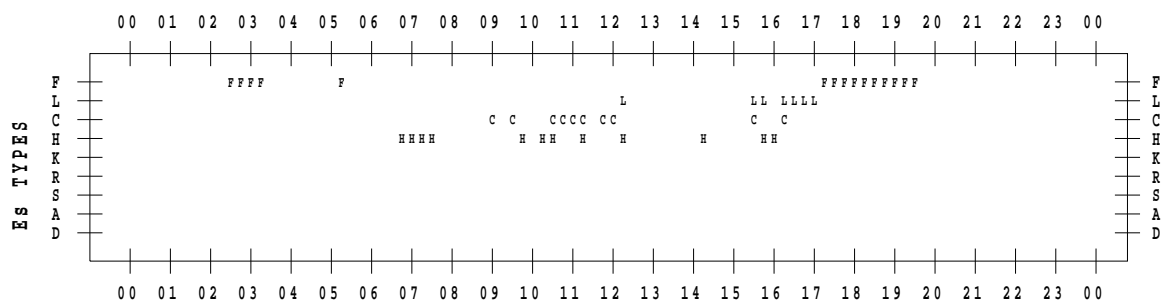
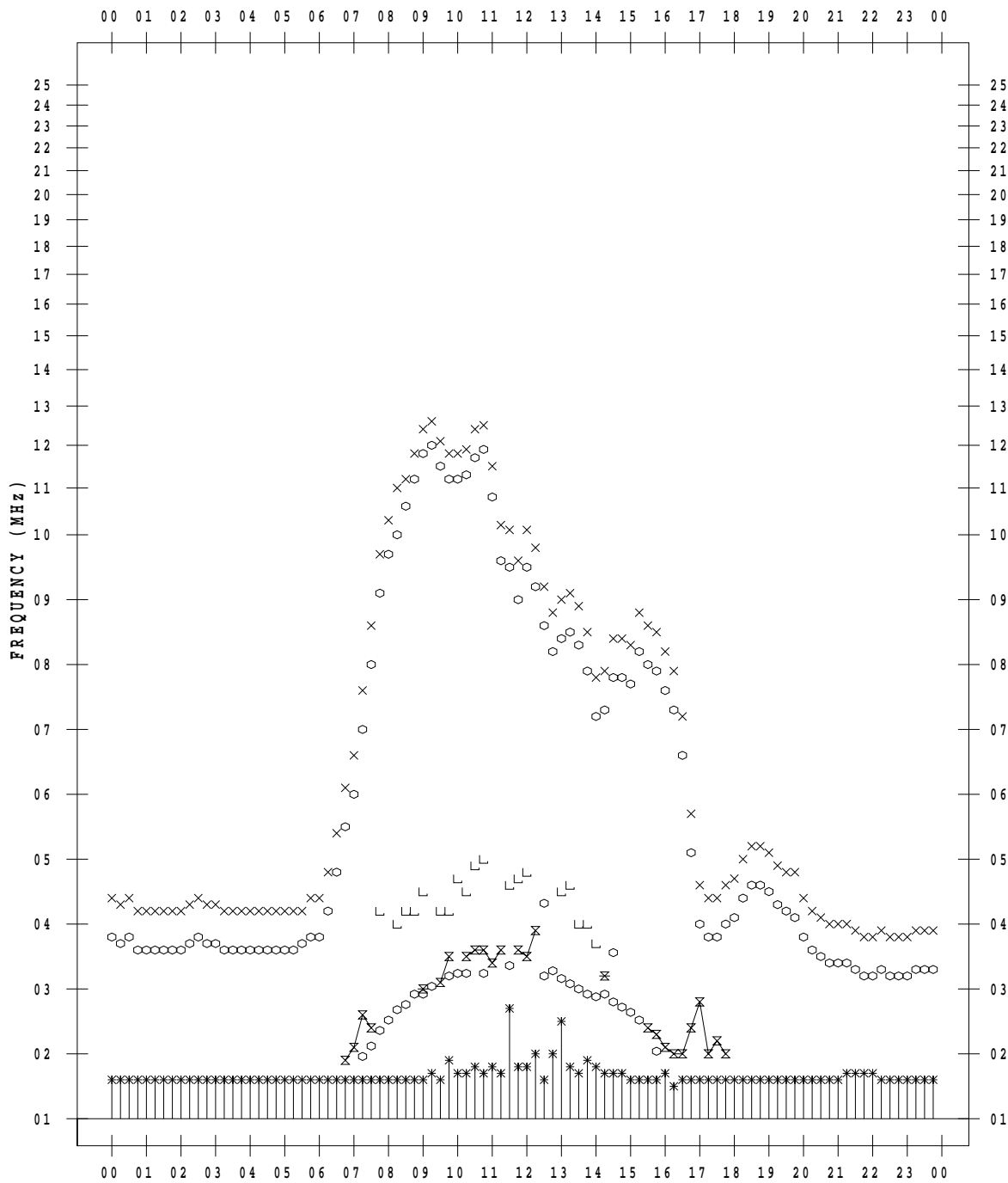
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SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/ 5

135 ° E MEAN TIME





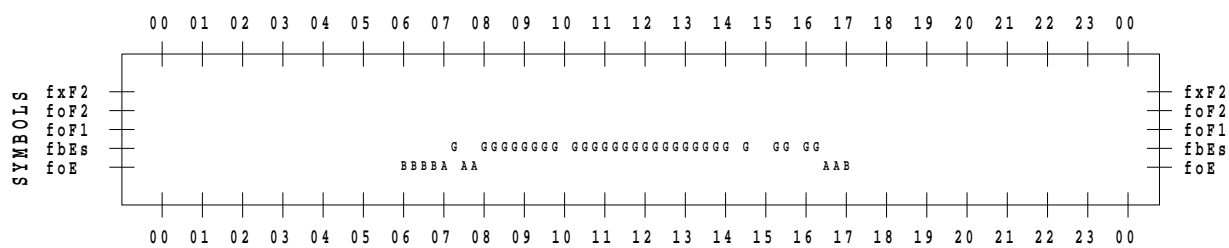
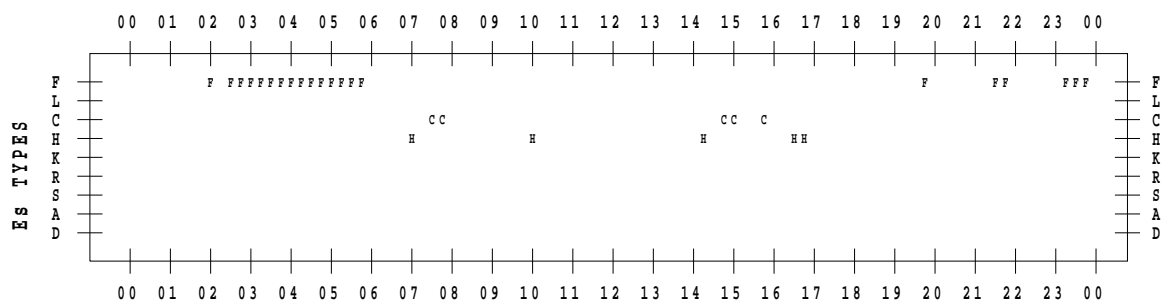
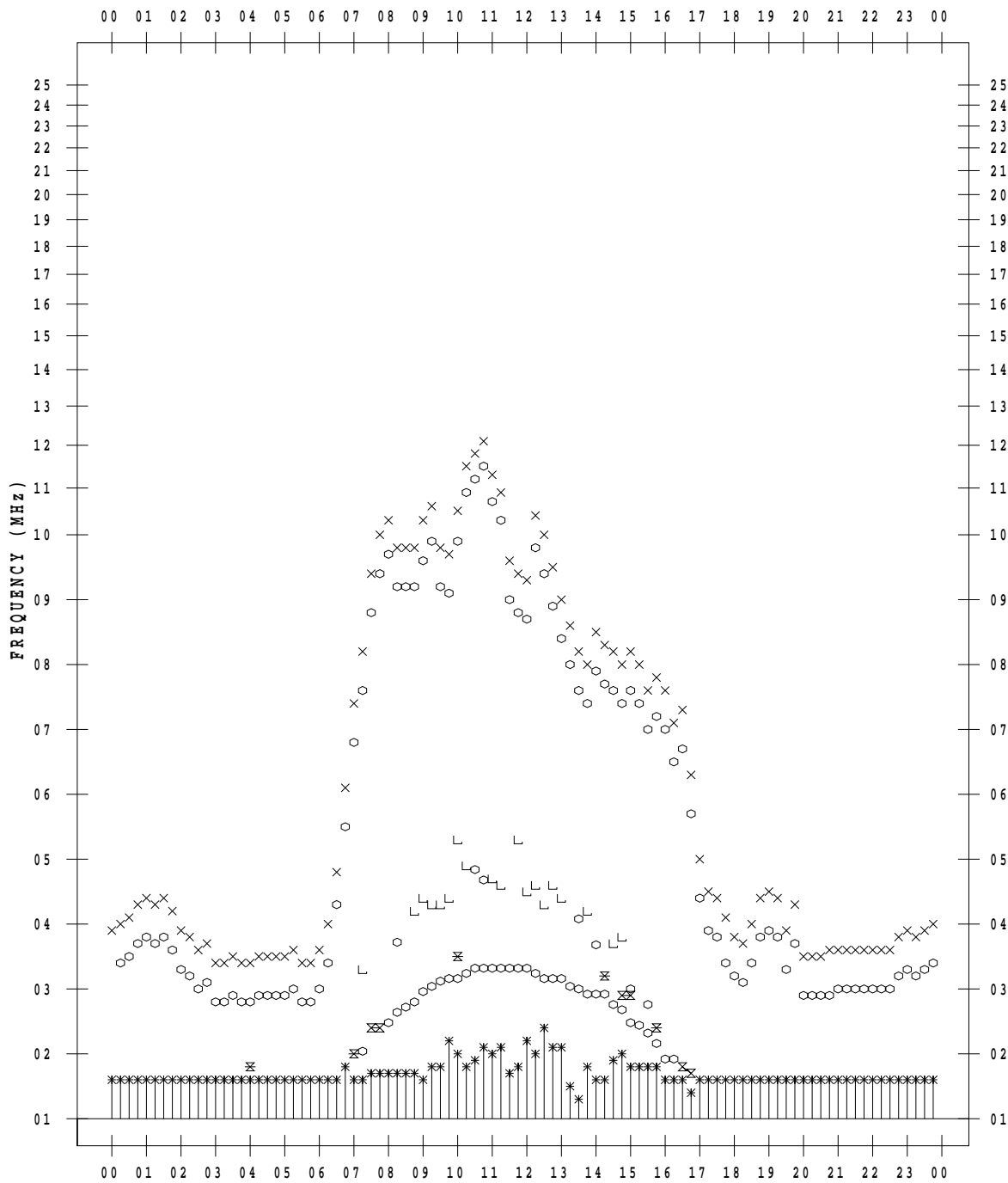
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SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/ 6

135 ° E MEAN TIME



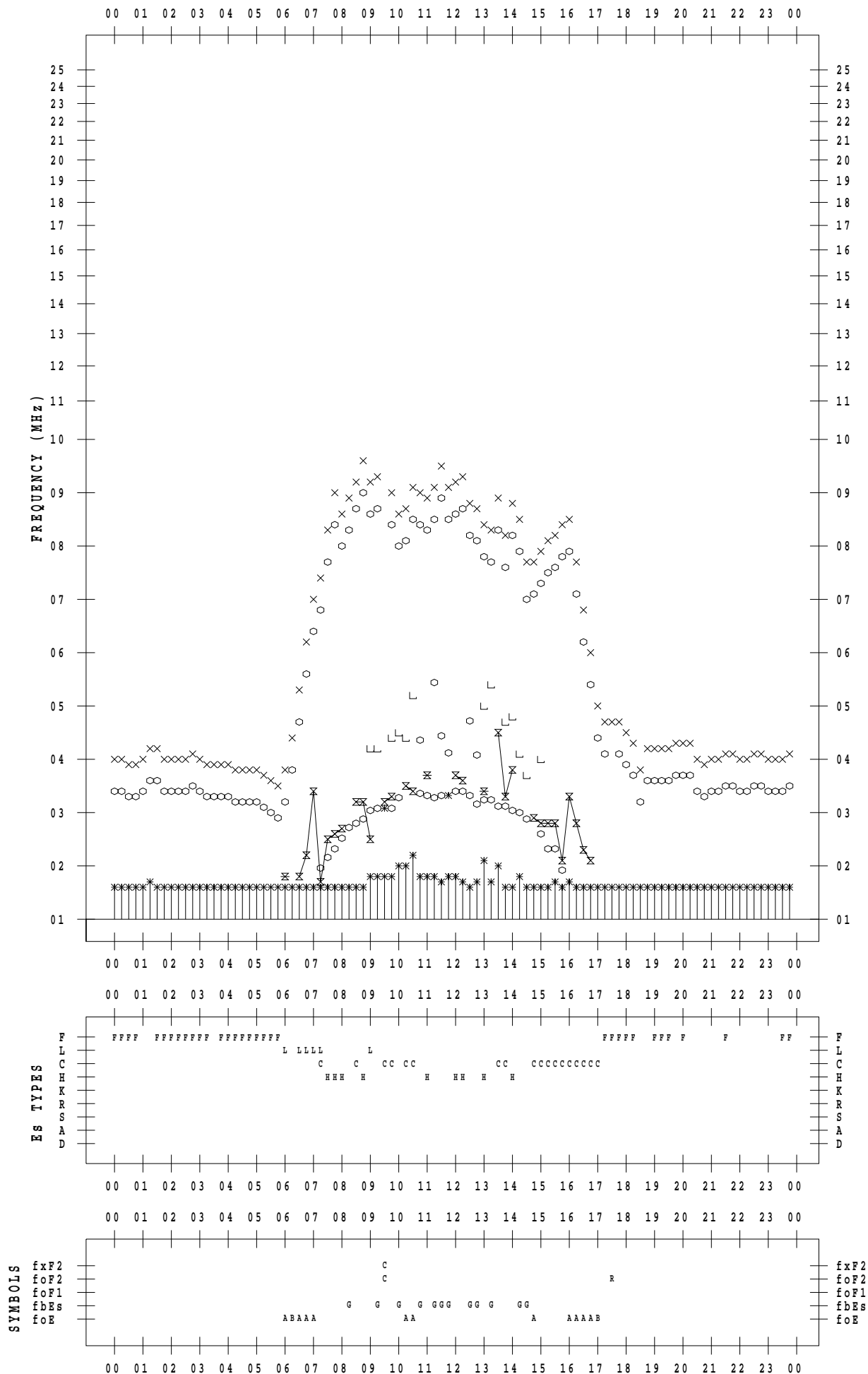
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SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/ 7

135 ° E MEAN TIME



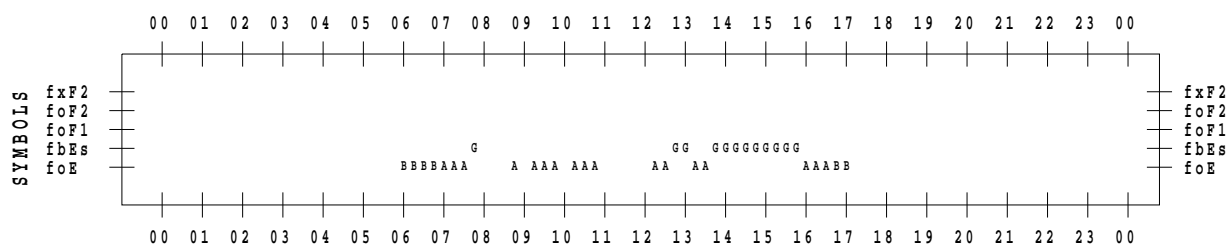
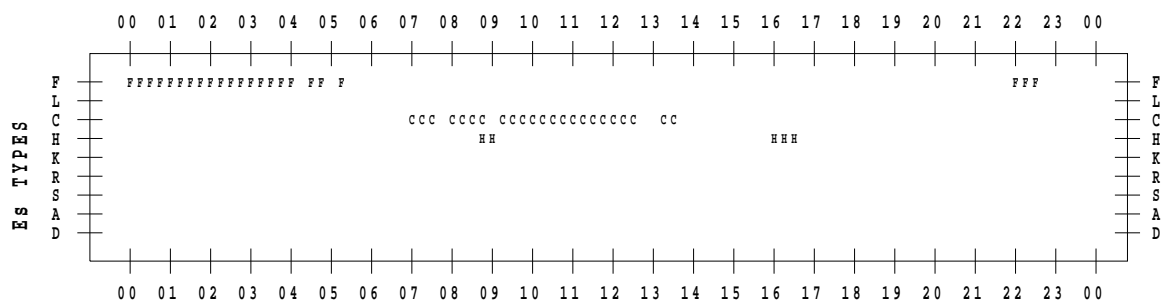
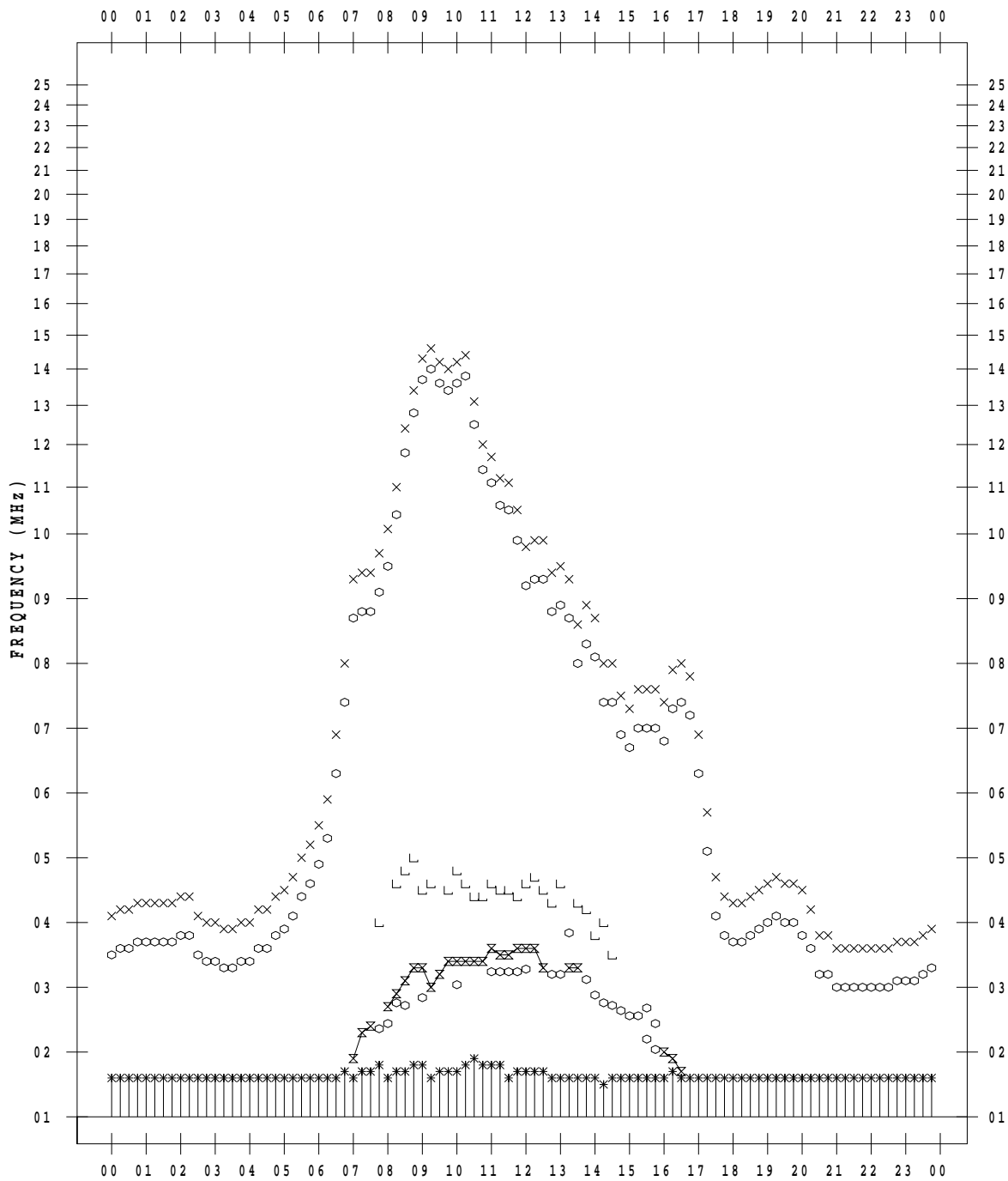
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/ 8

135 ° E MEAN TIME



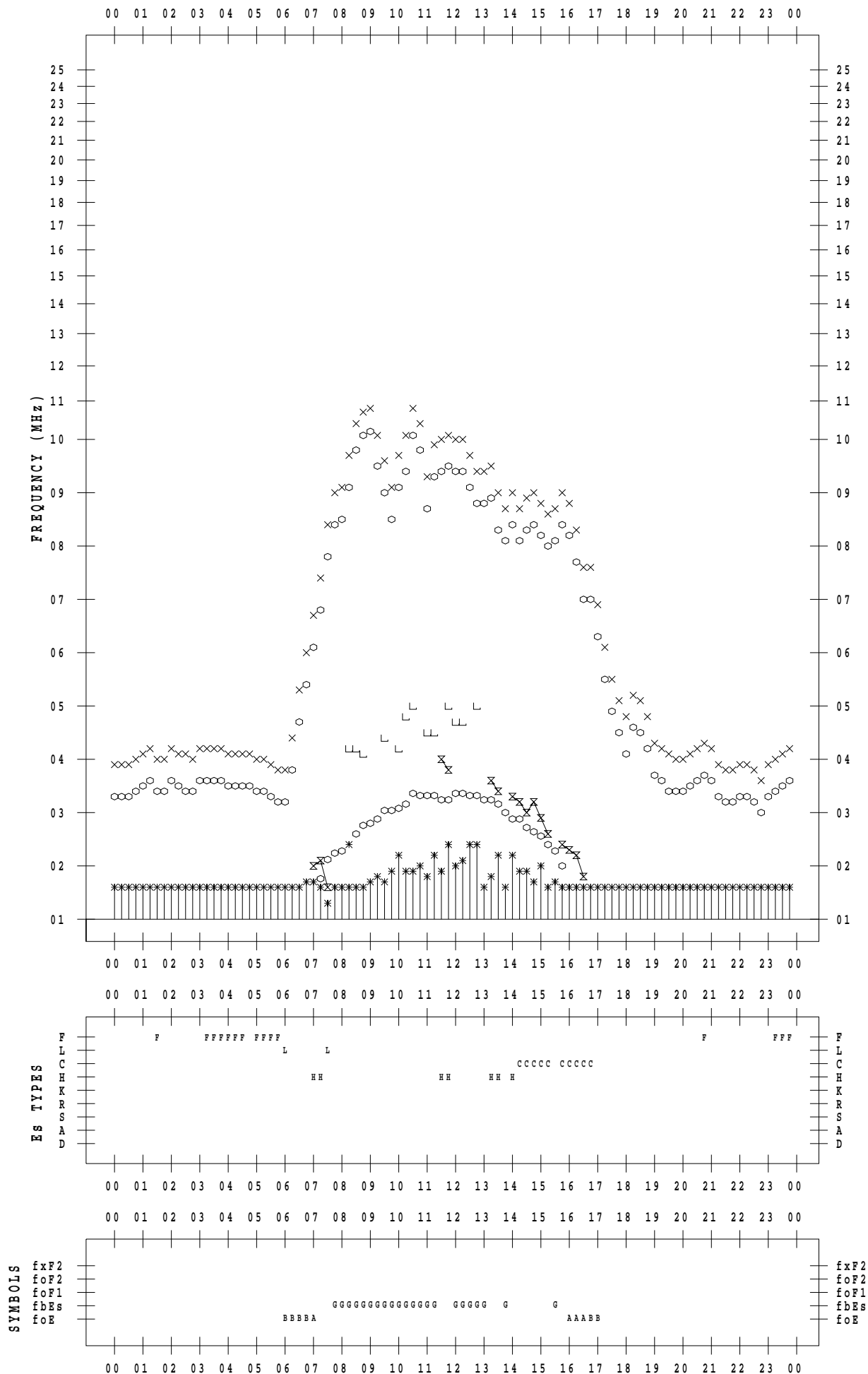
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/ 9

135 ° E MEAN TIME



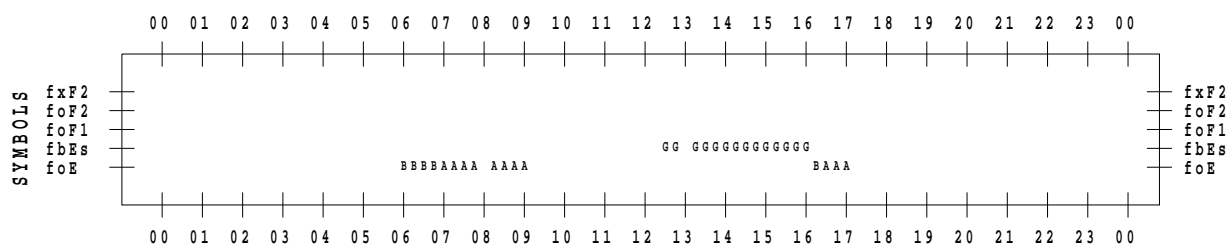
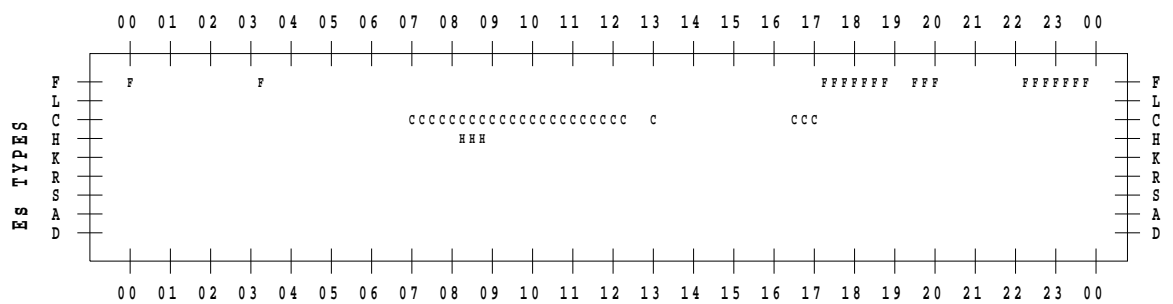
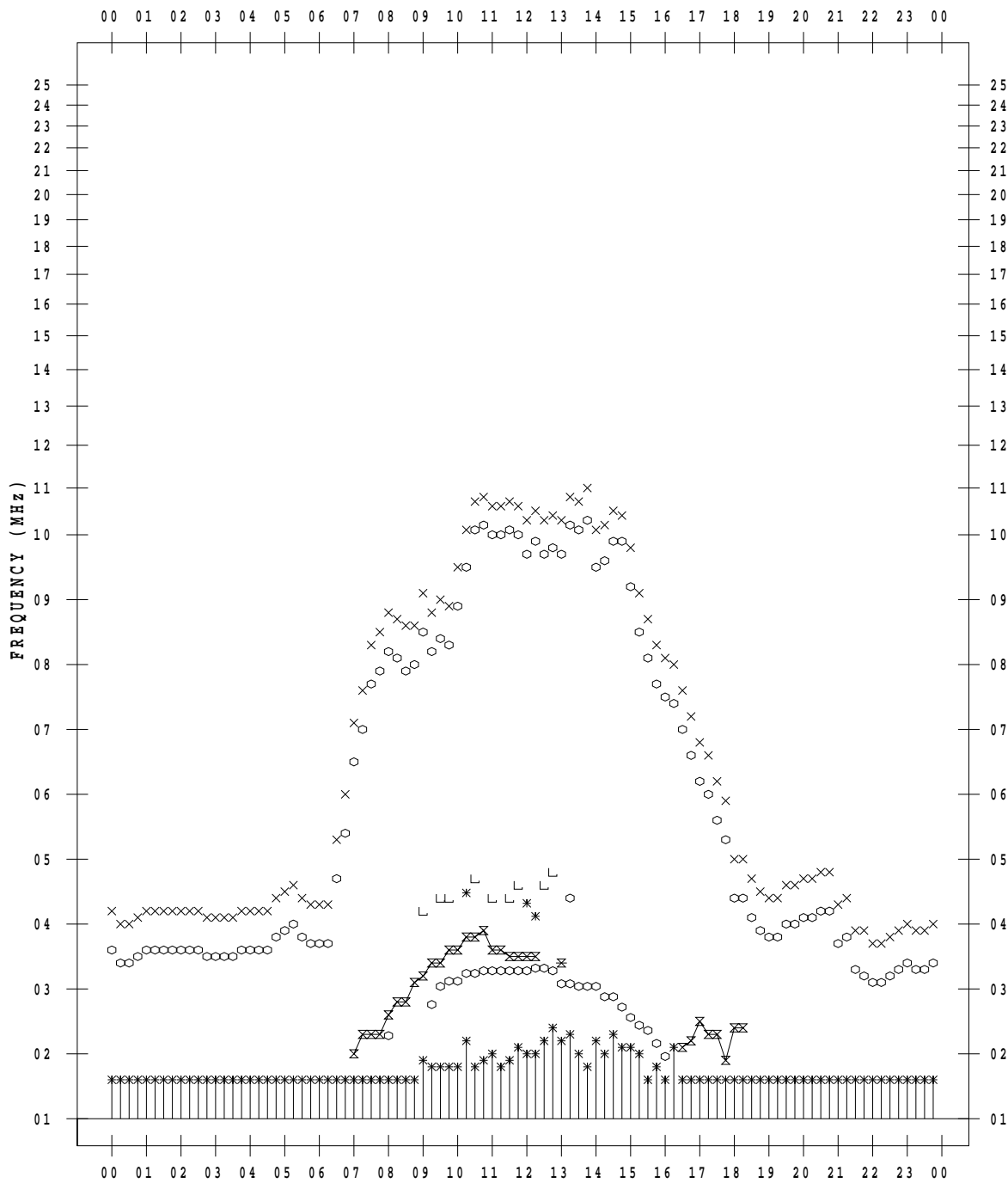
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SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/10

135 ° E MEAN TIME



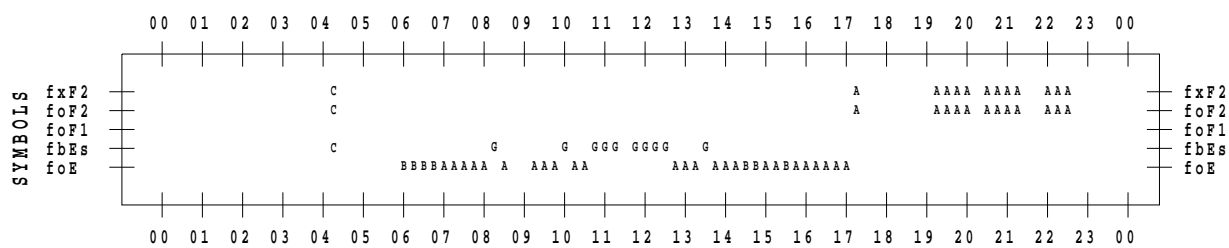
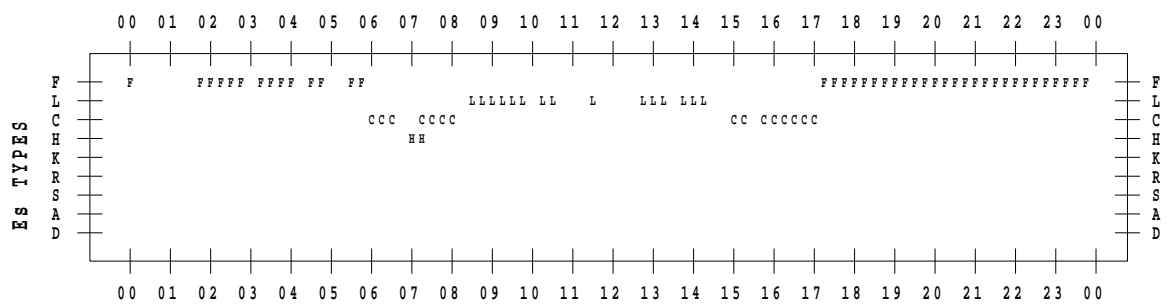
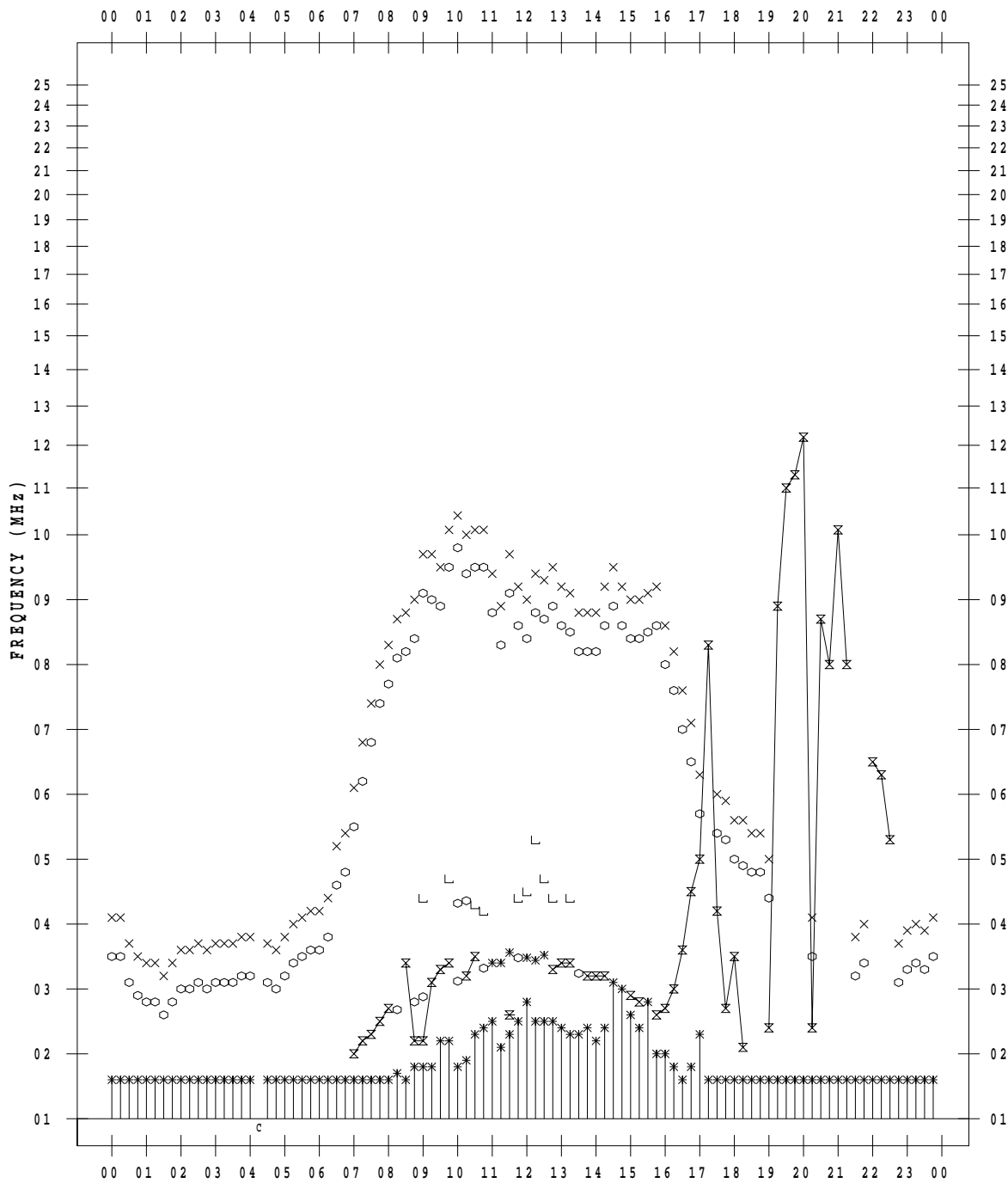
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/11

135 ° E MEAN TIME



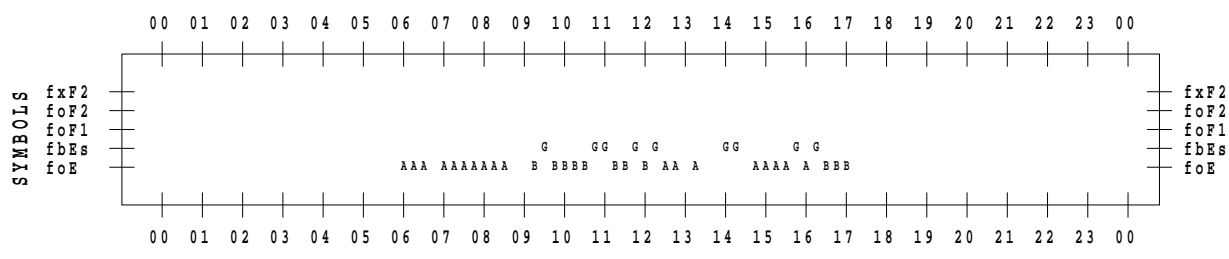
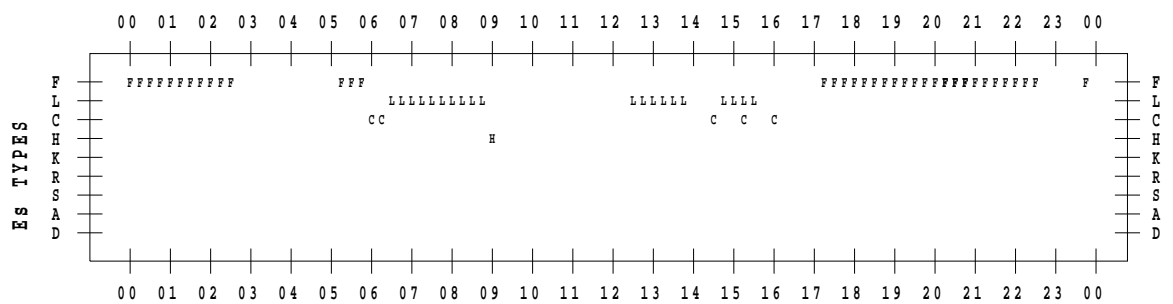
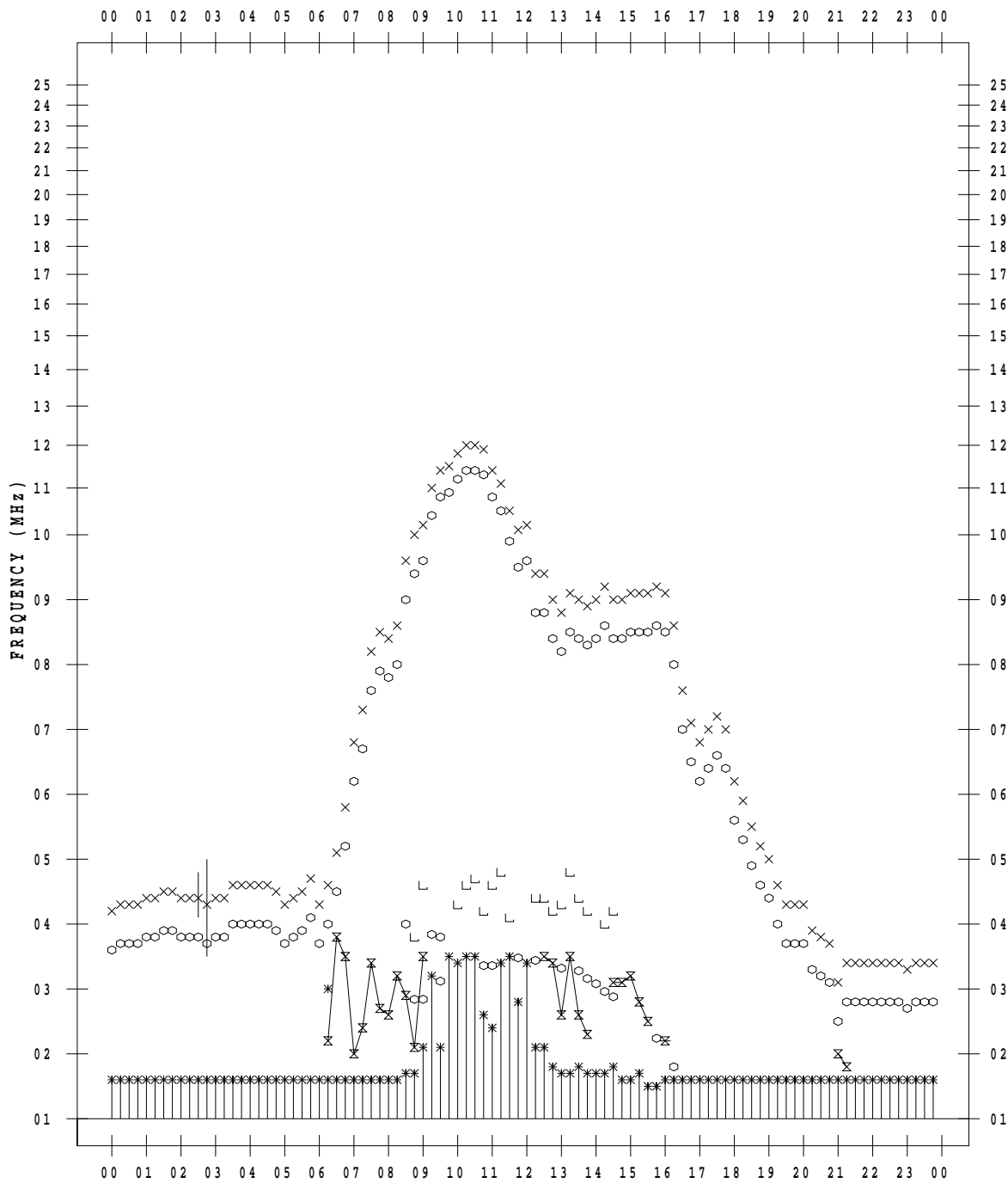
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/12

135 ° E MEAN TIME



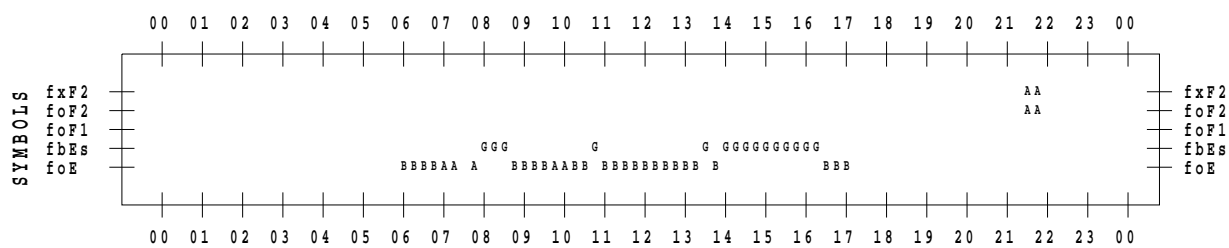
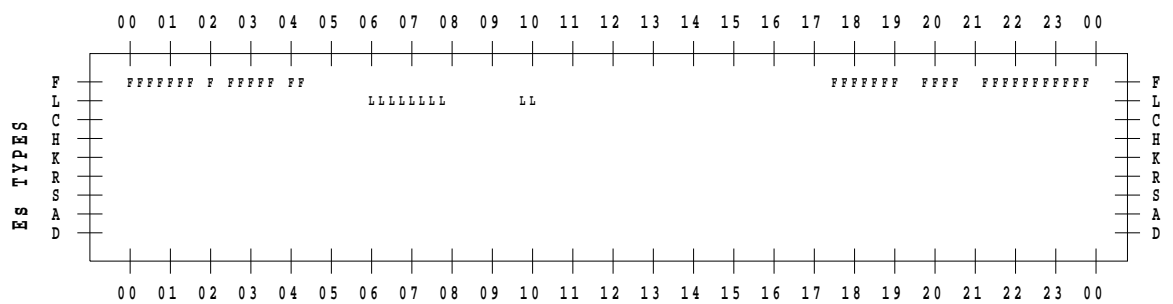
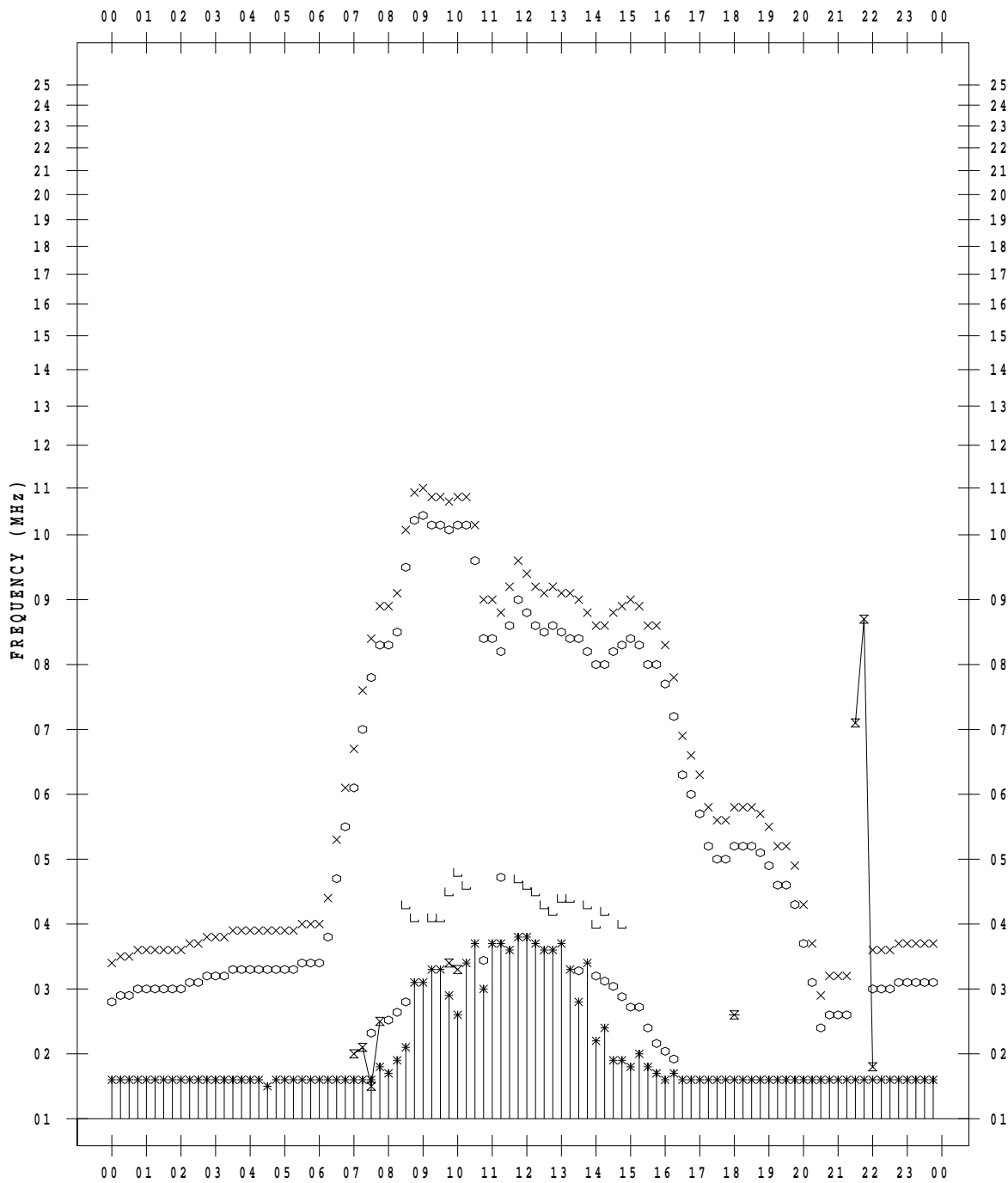
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/13

135 ° E MEAN TIME





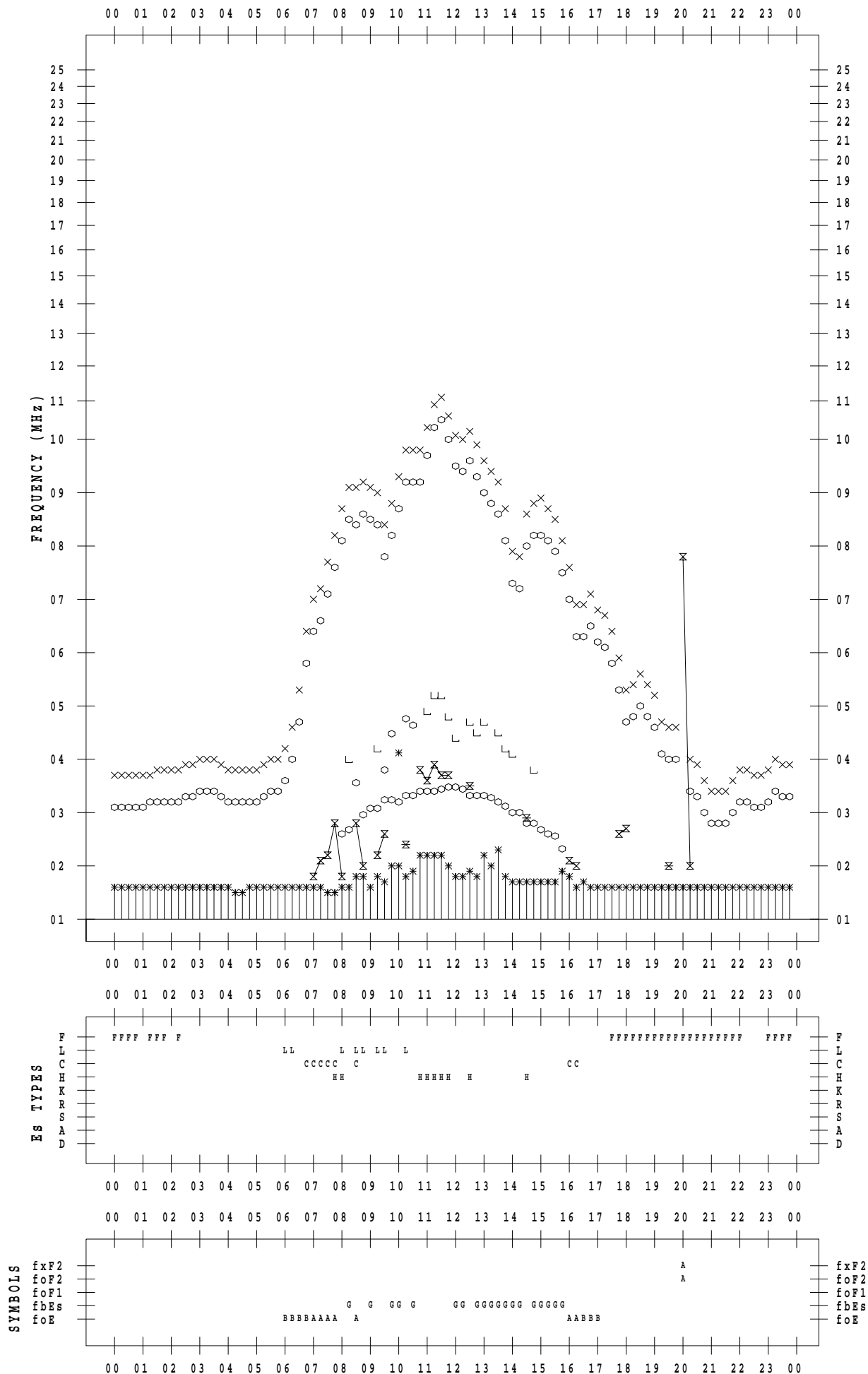
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/14

135 ° E MEAN TIME



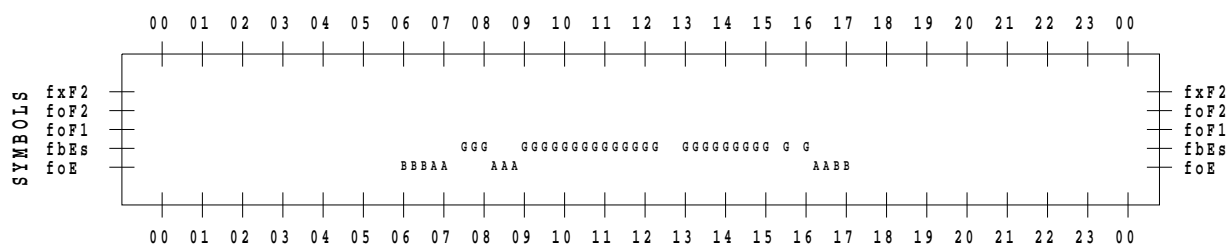
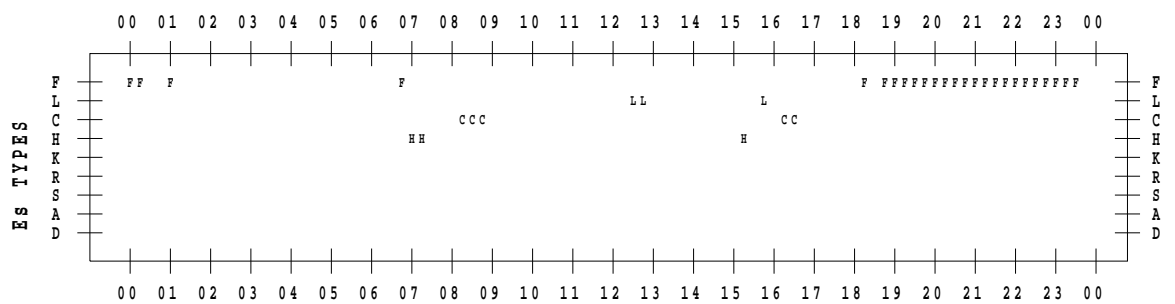
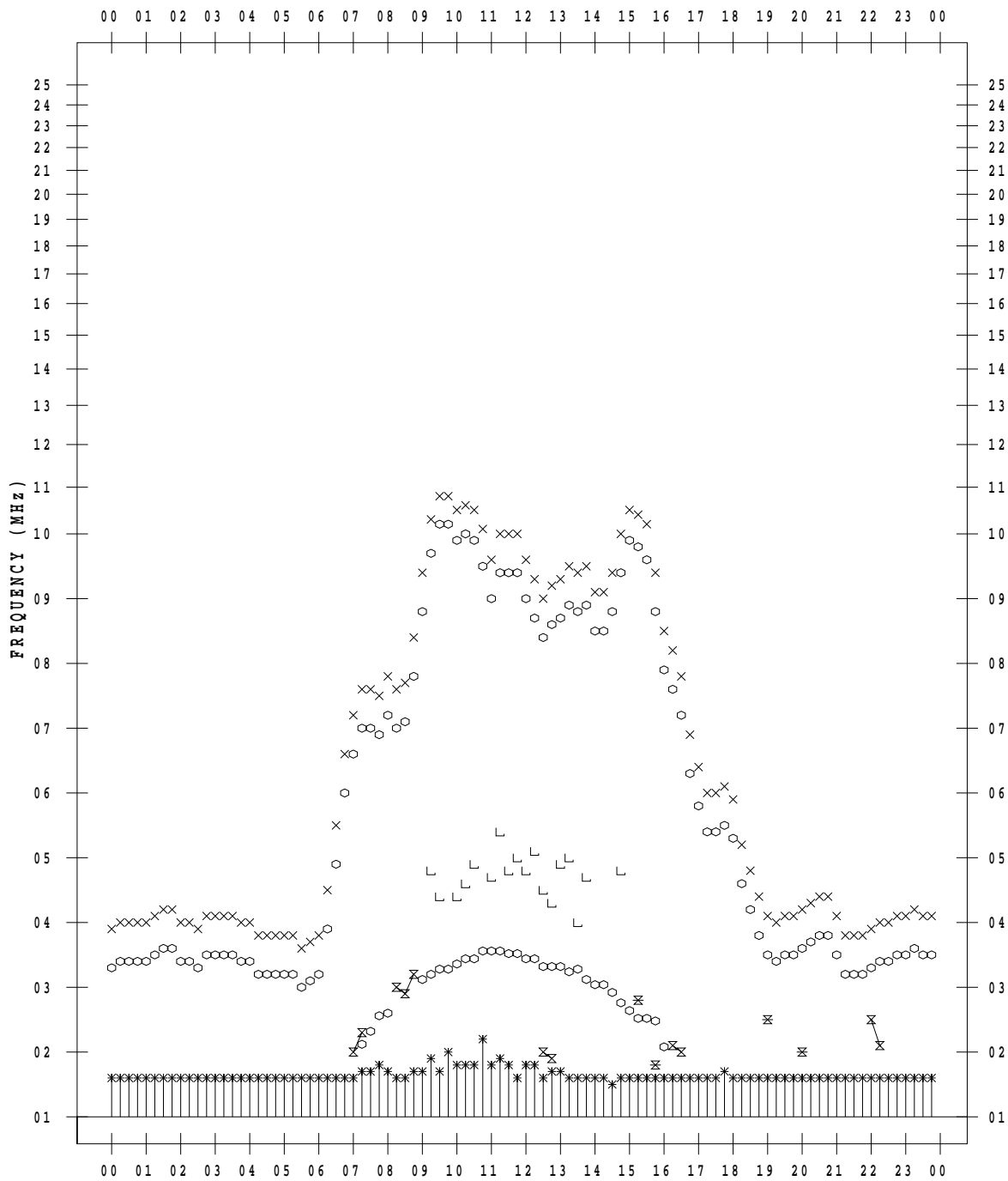
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/15

135 ° E MEAN TIME



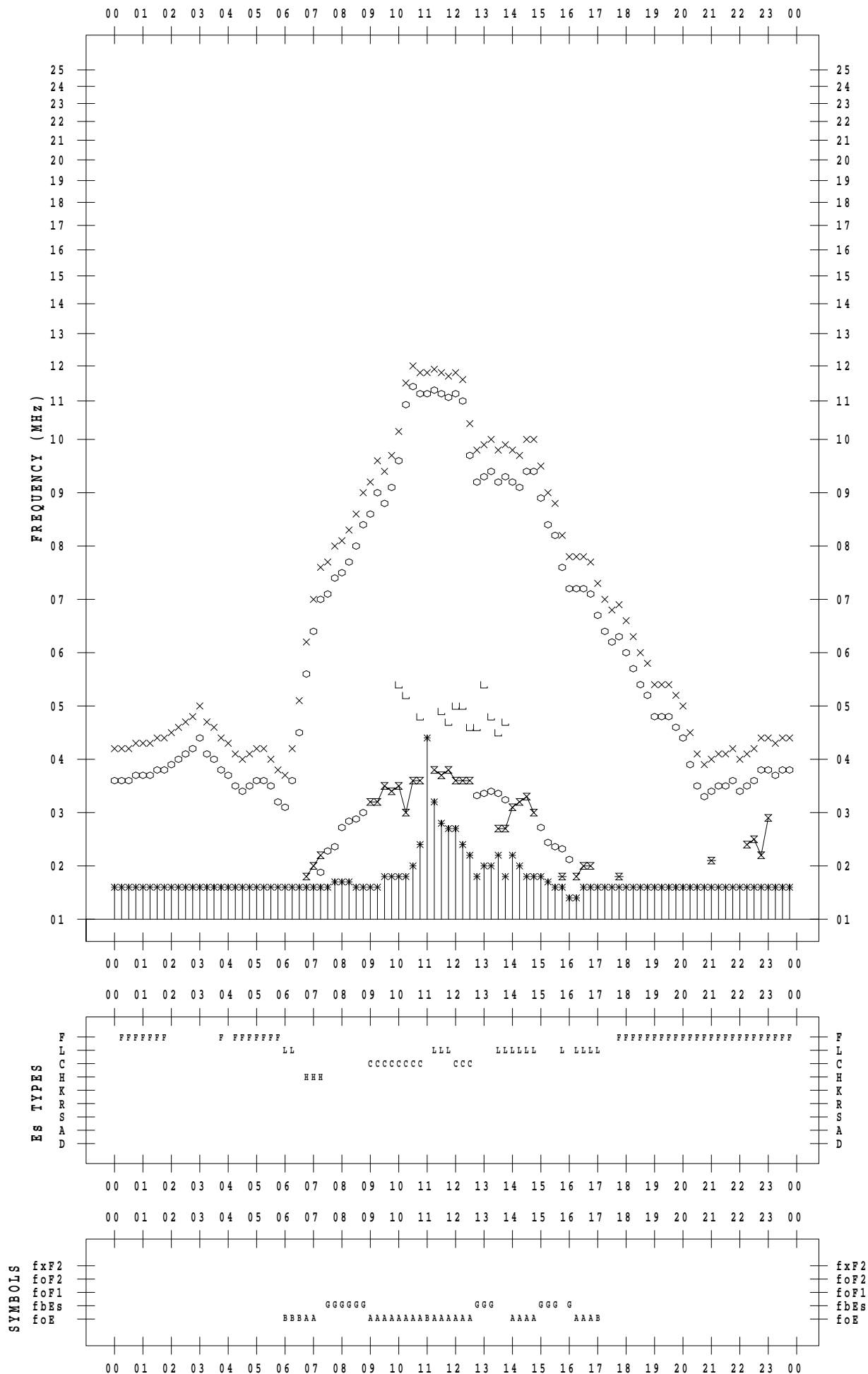
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/16

135 ° E MEAN TIME



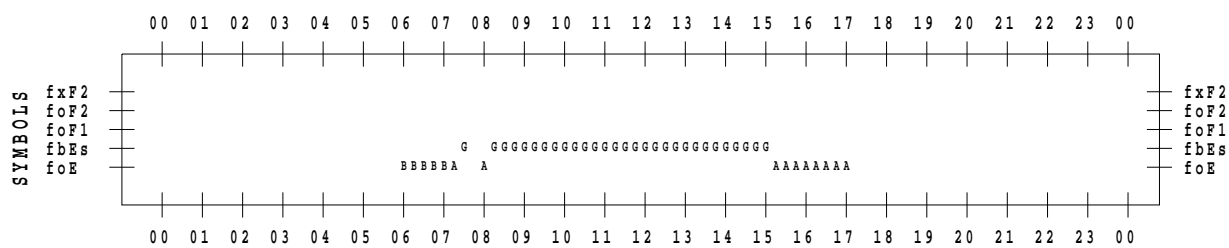
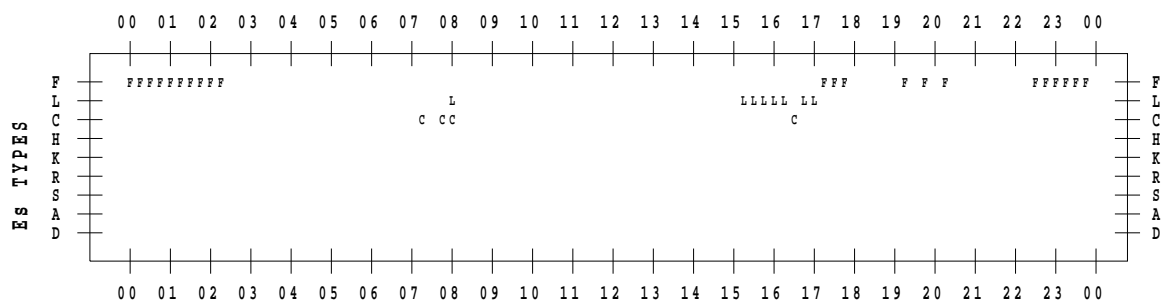
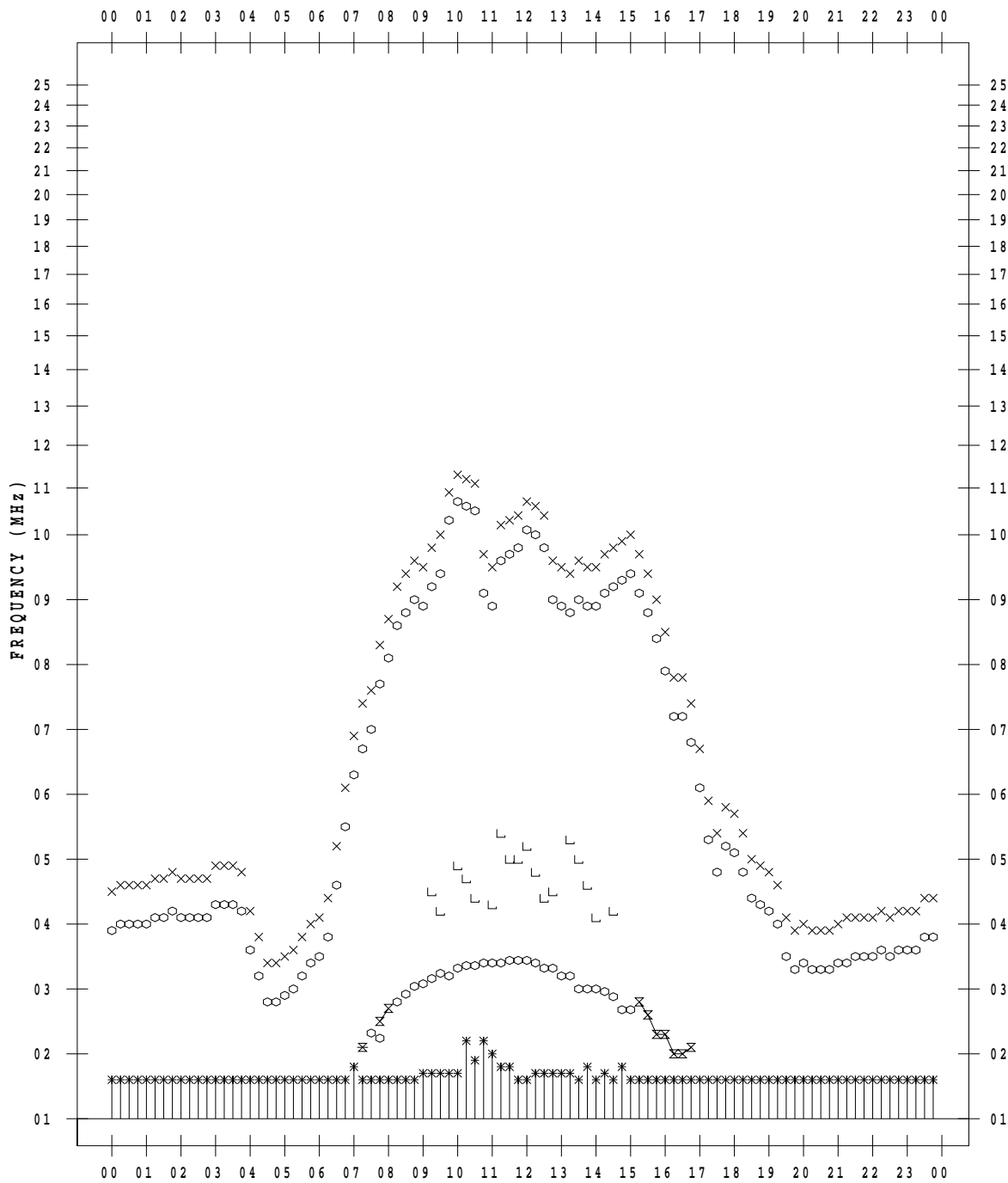
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/17

135 ° E MEAN TIME



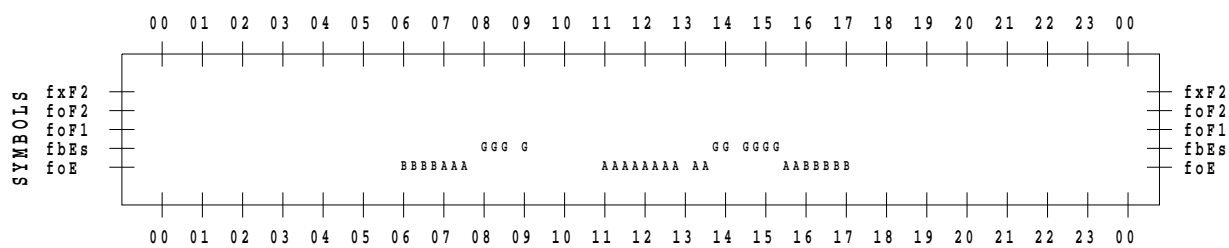
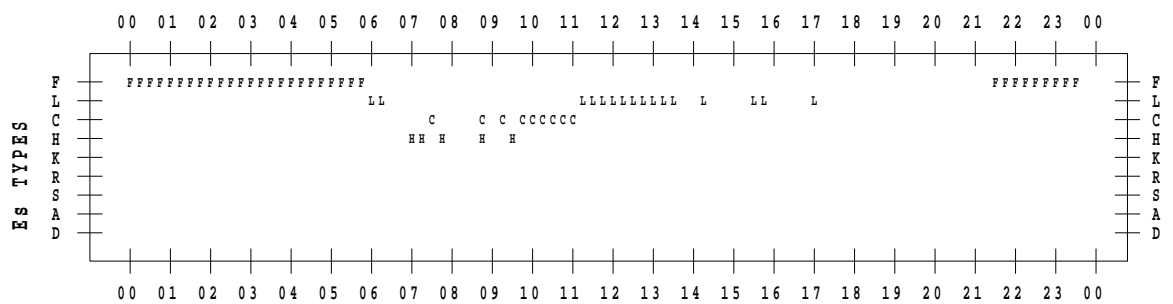
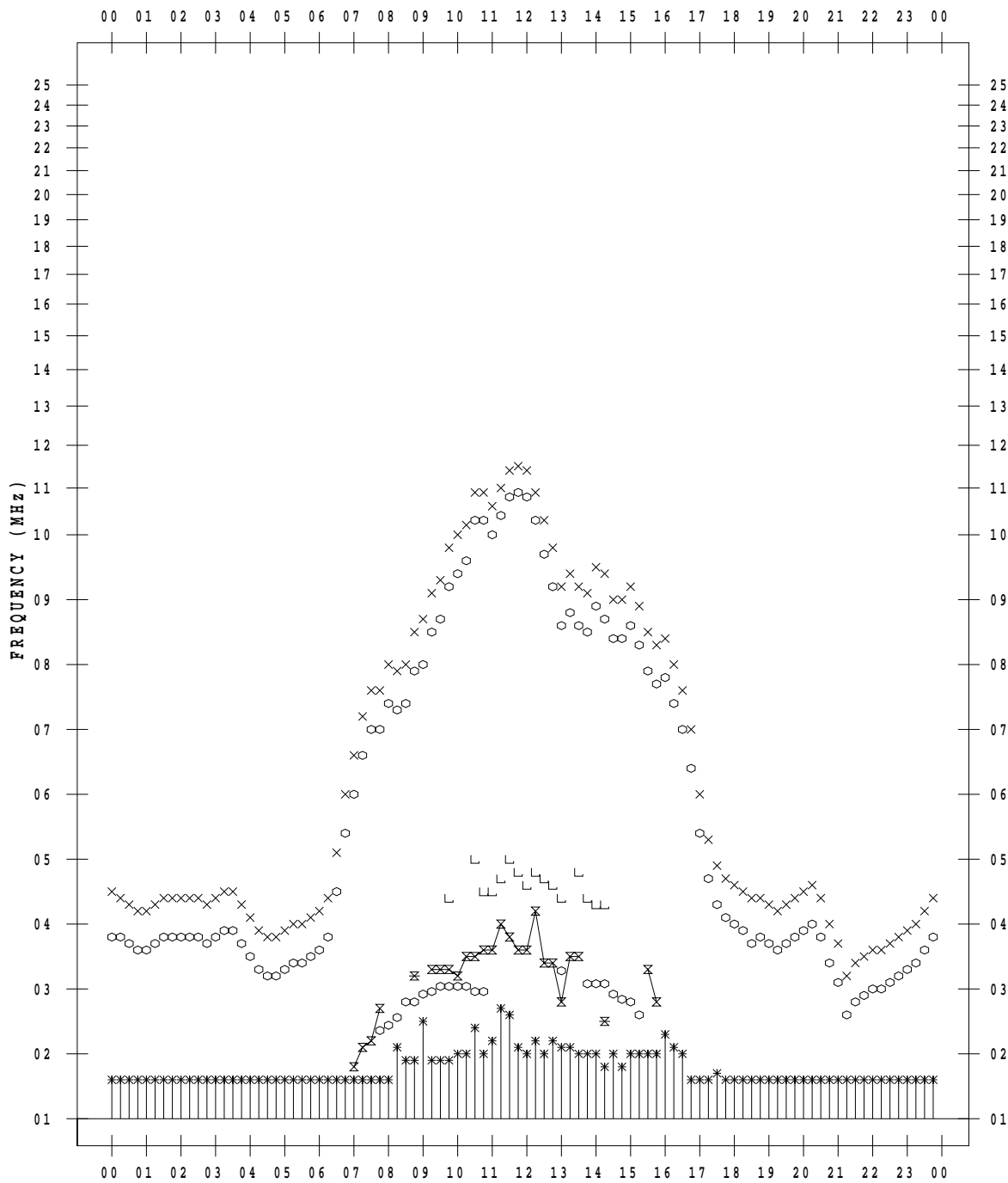
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/18

135 ° E MEAN TIME



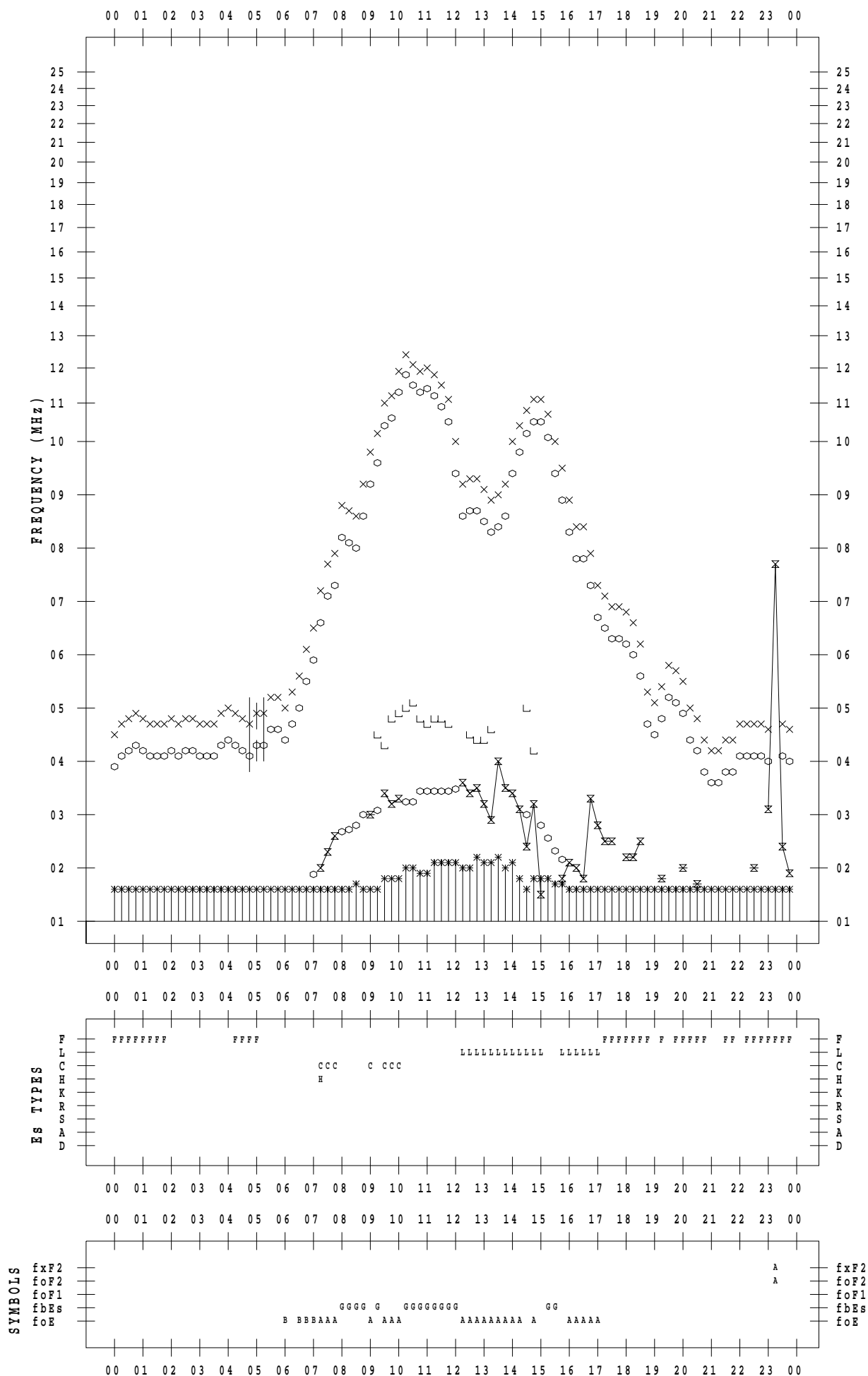
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/19

135 ° E MEAN TIME



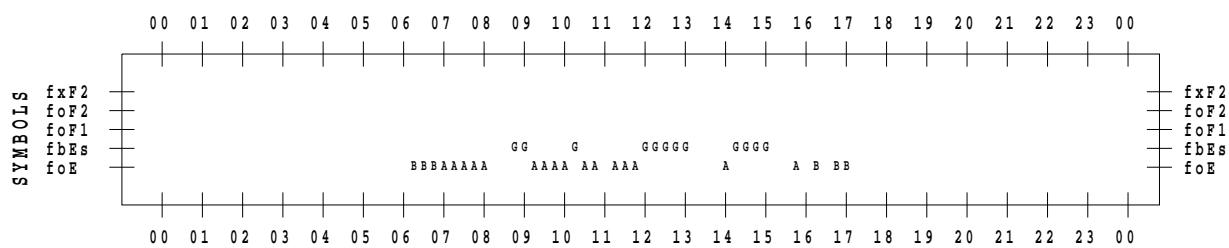
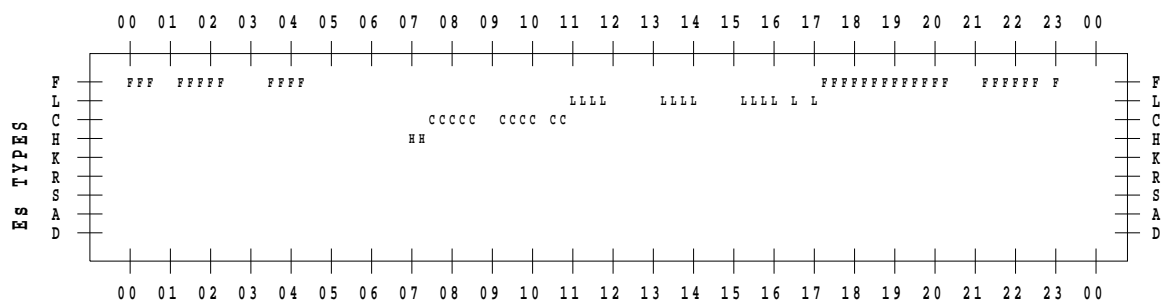
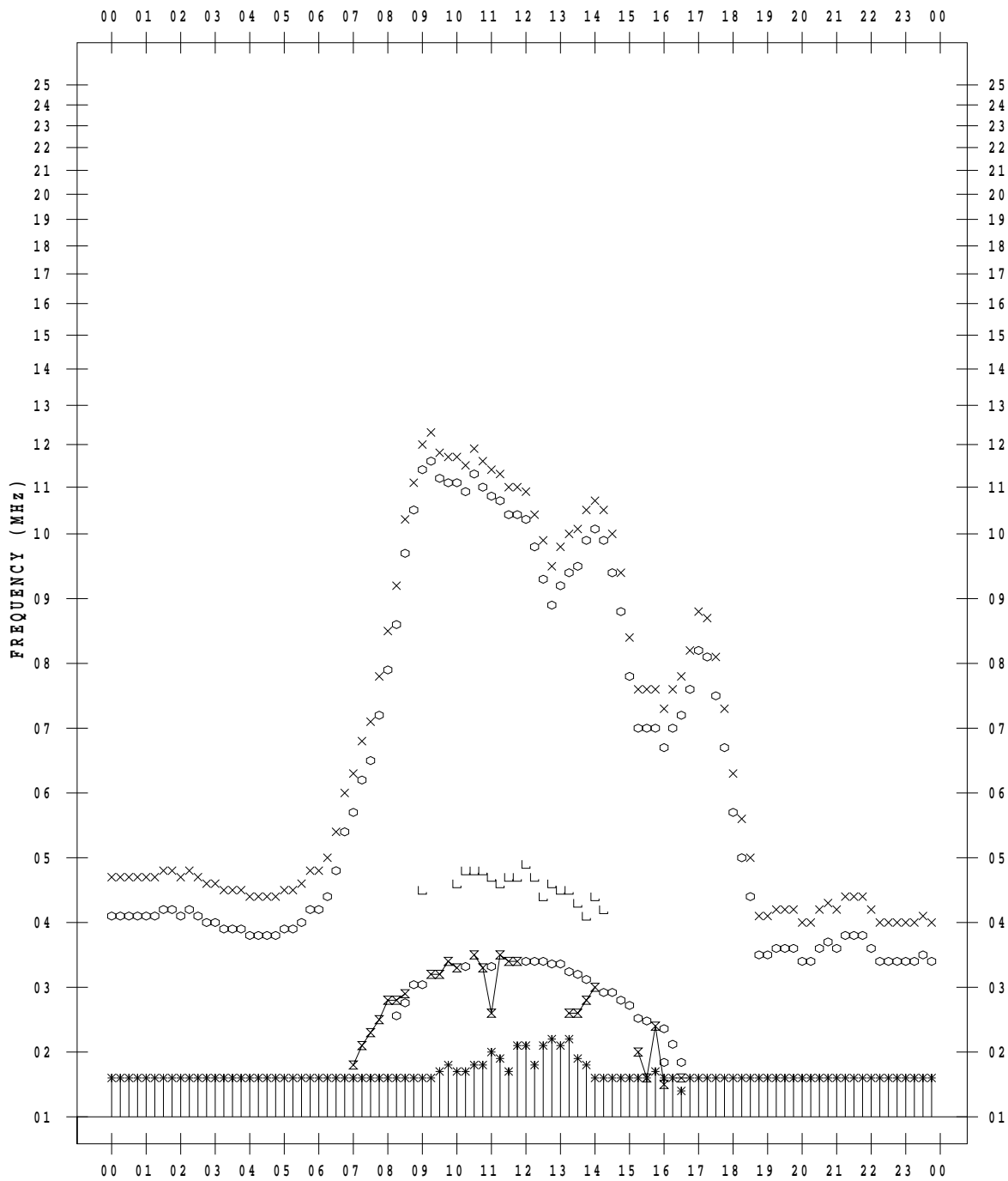
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/20

135 ° E MEAN TIME



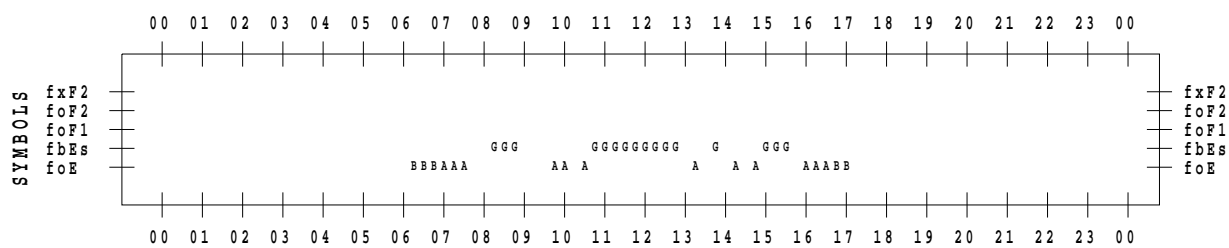
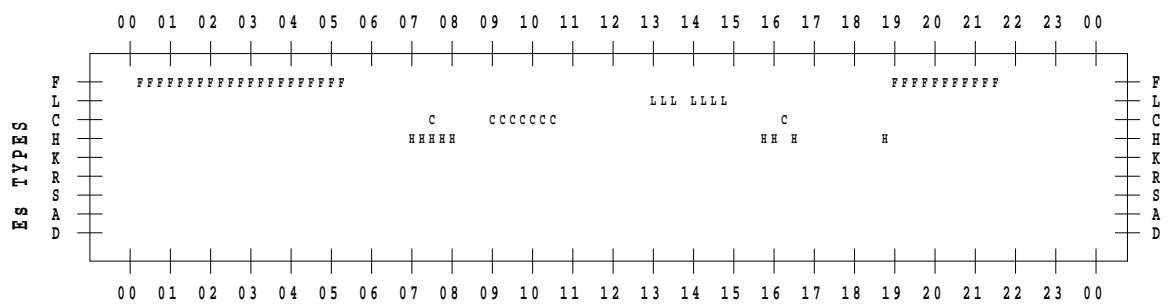
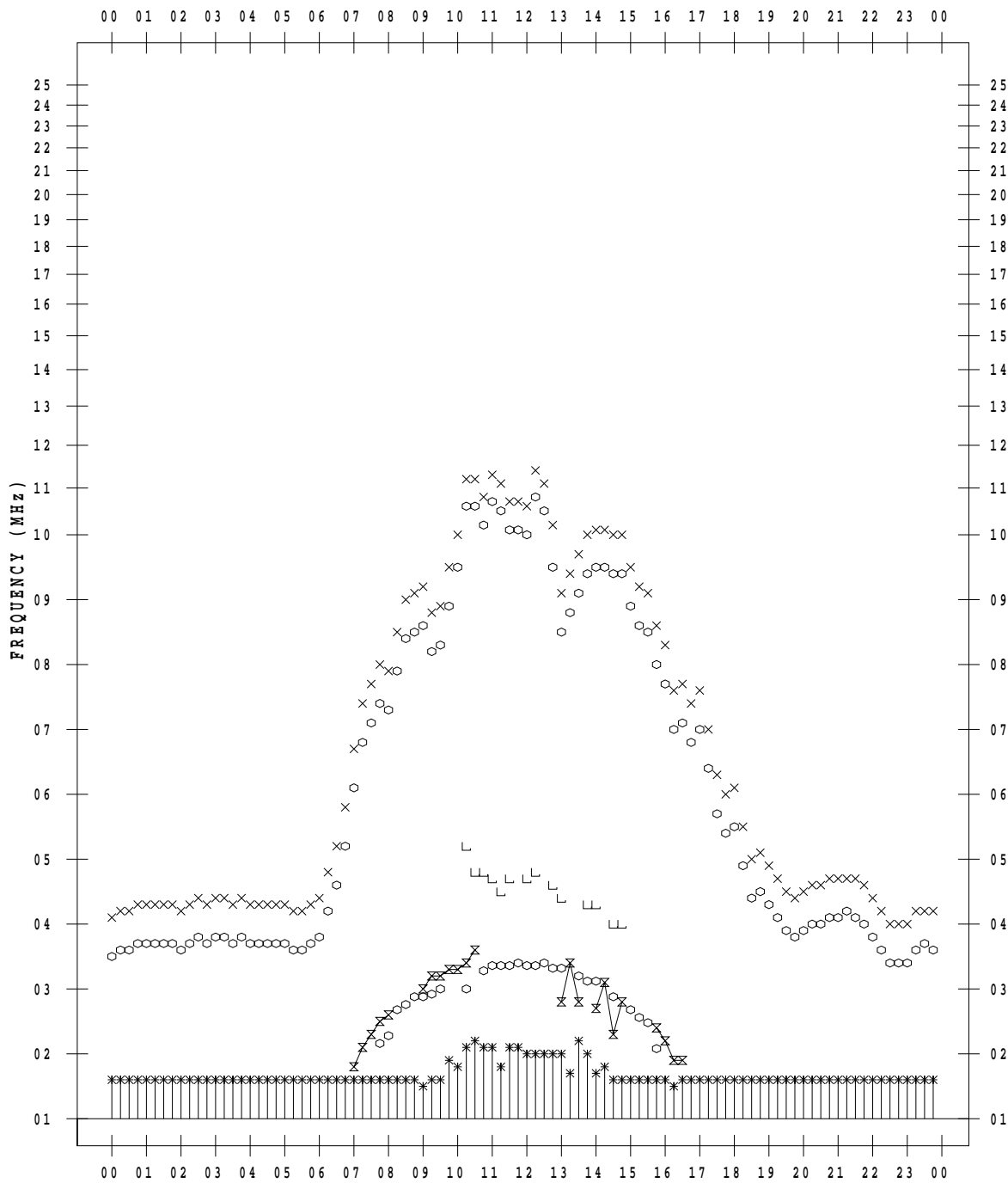
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/21

135 ° E MEAN TIME





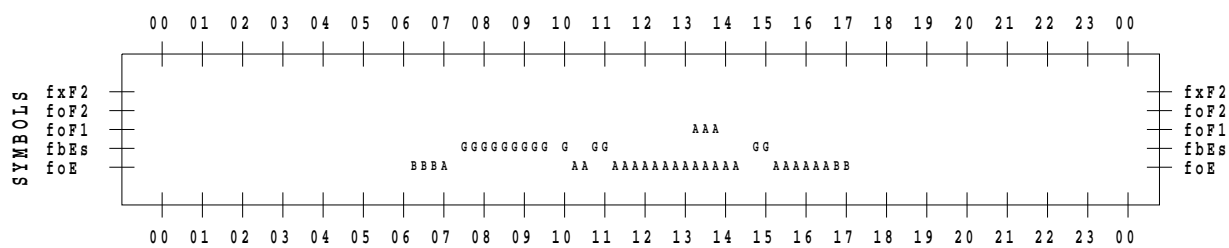
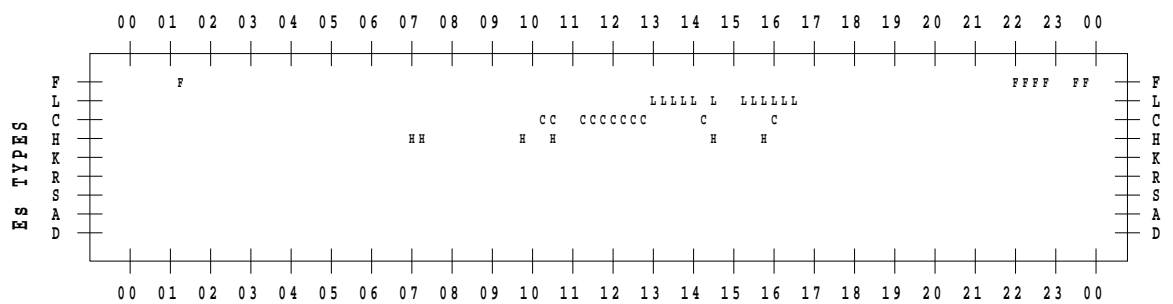
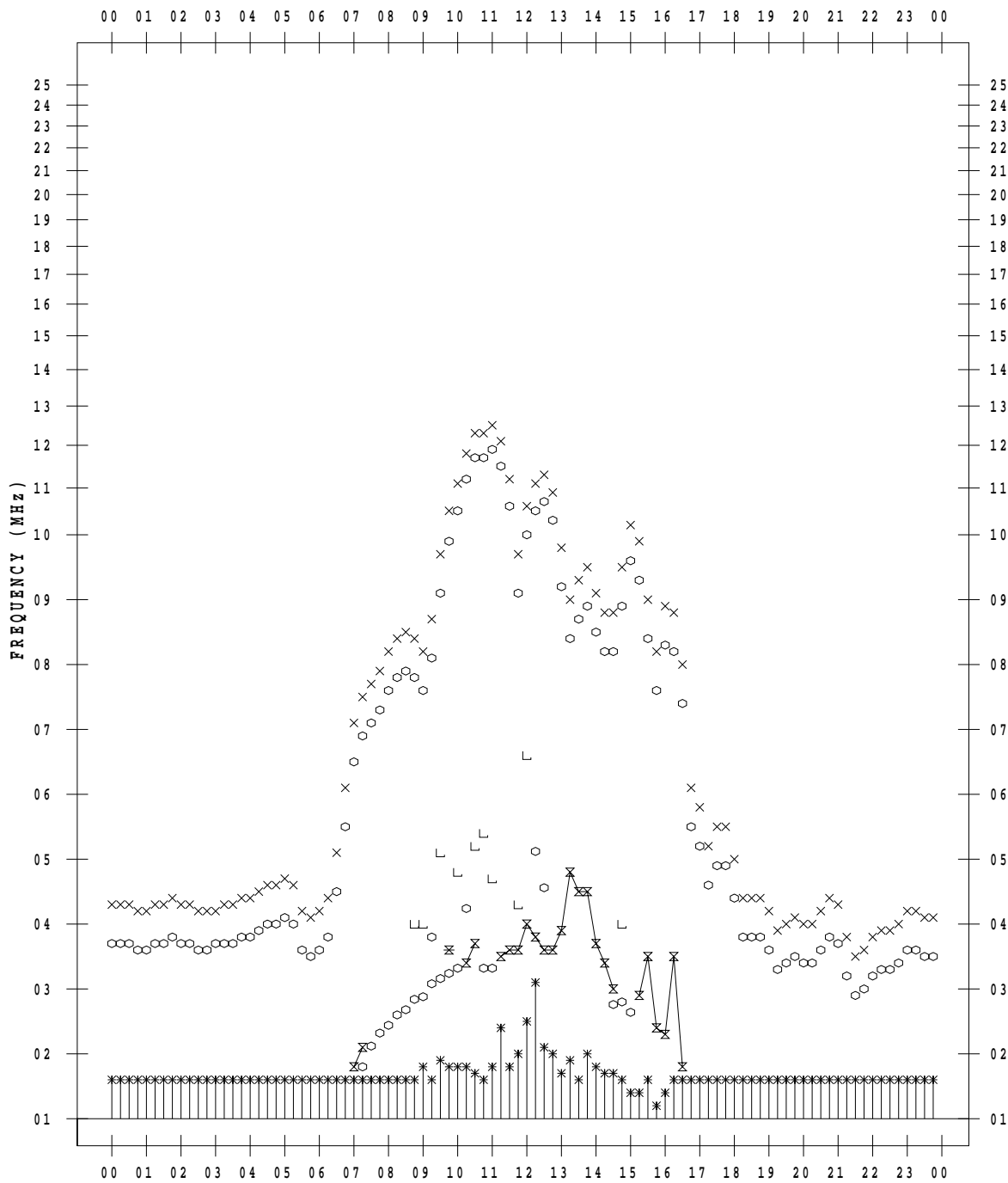
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/22

135 ° E MEAN TIME



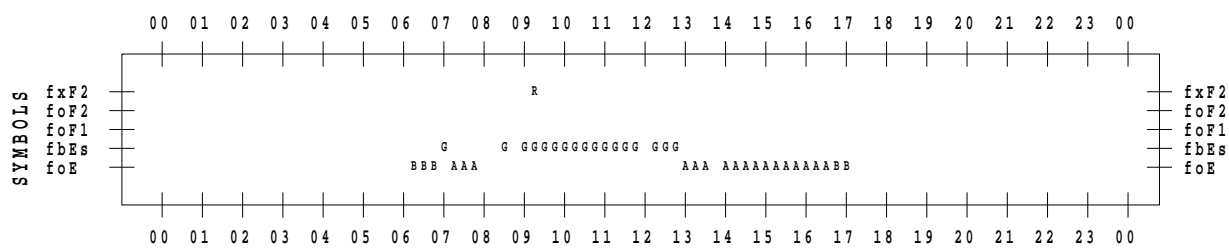
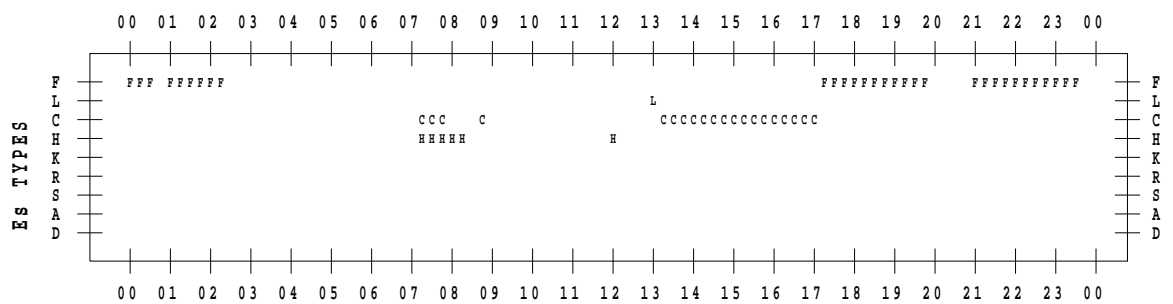
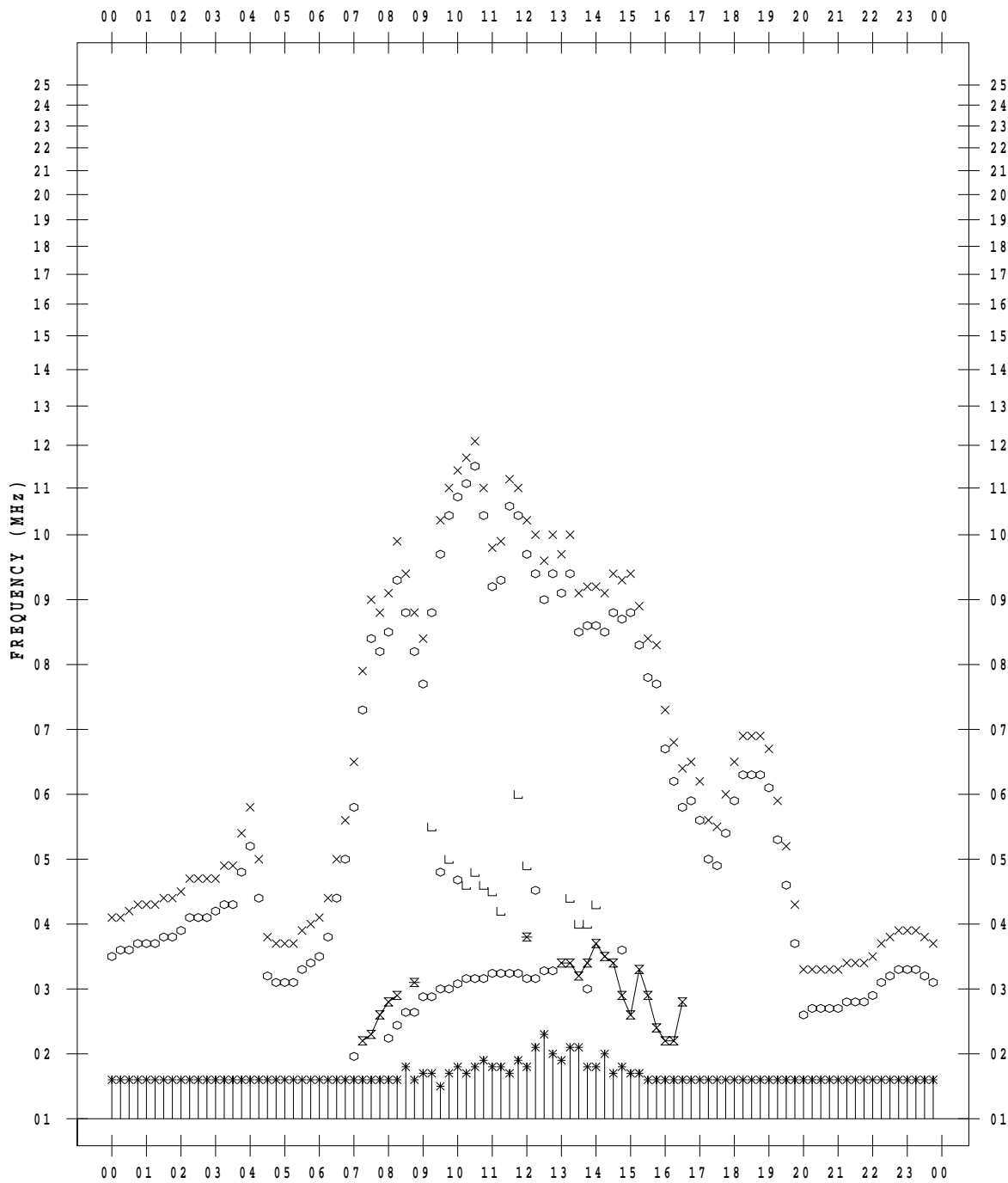
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/23

135 ° E MEAN TIME



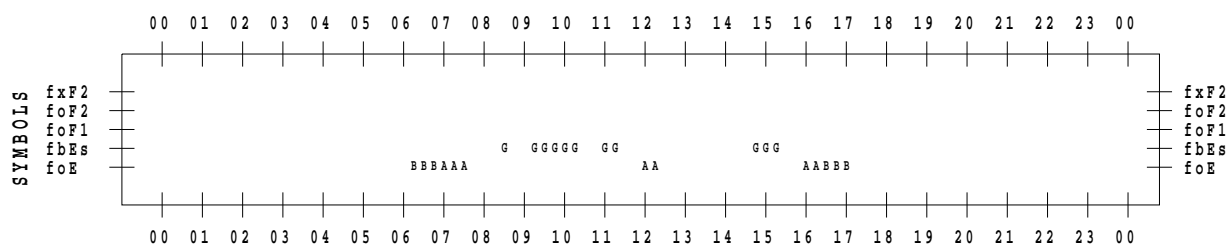
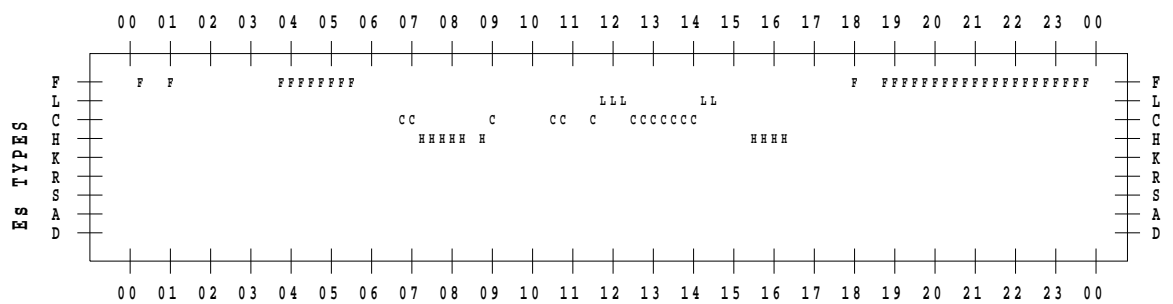
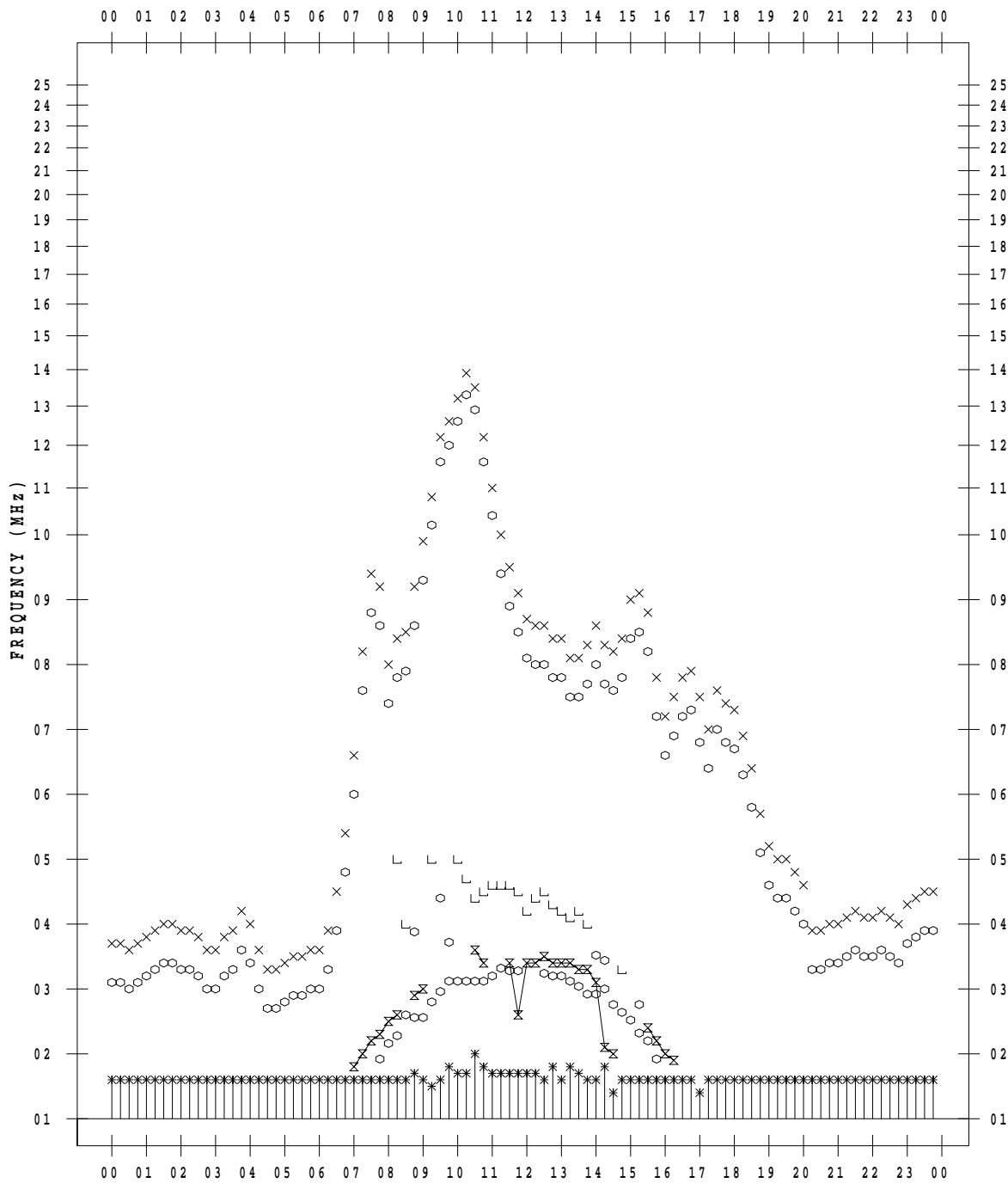
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/24

135 ° E MEAN TIME



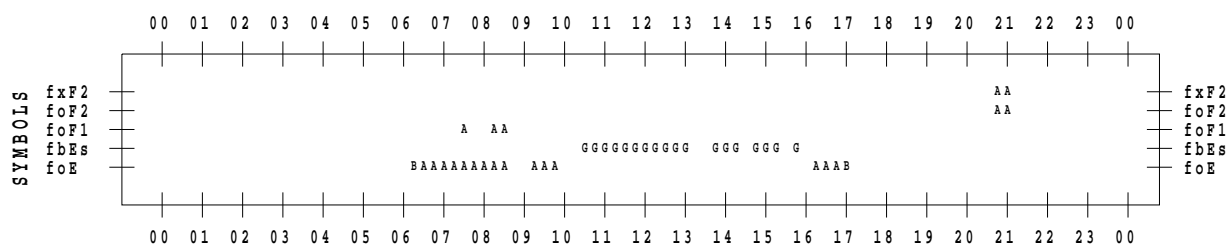
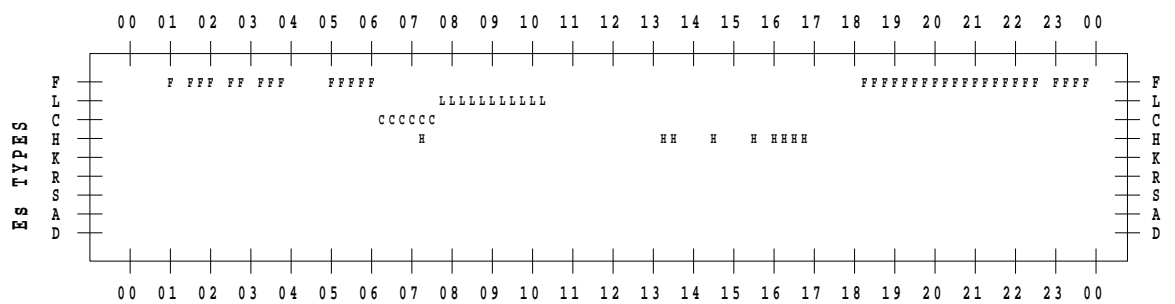
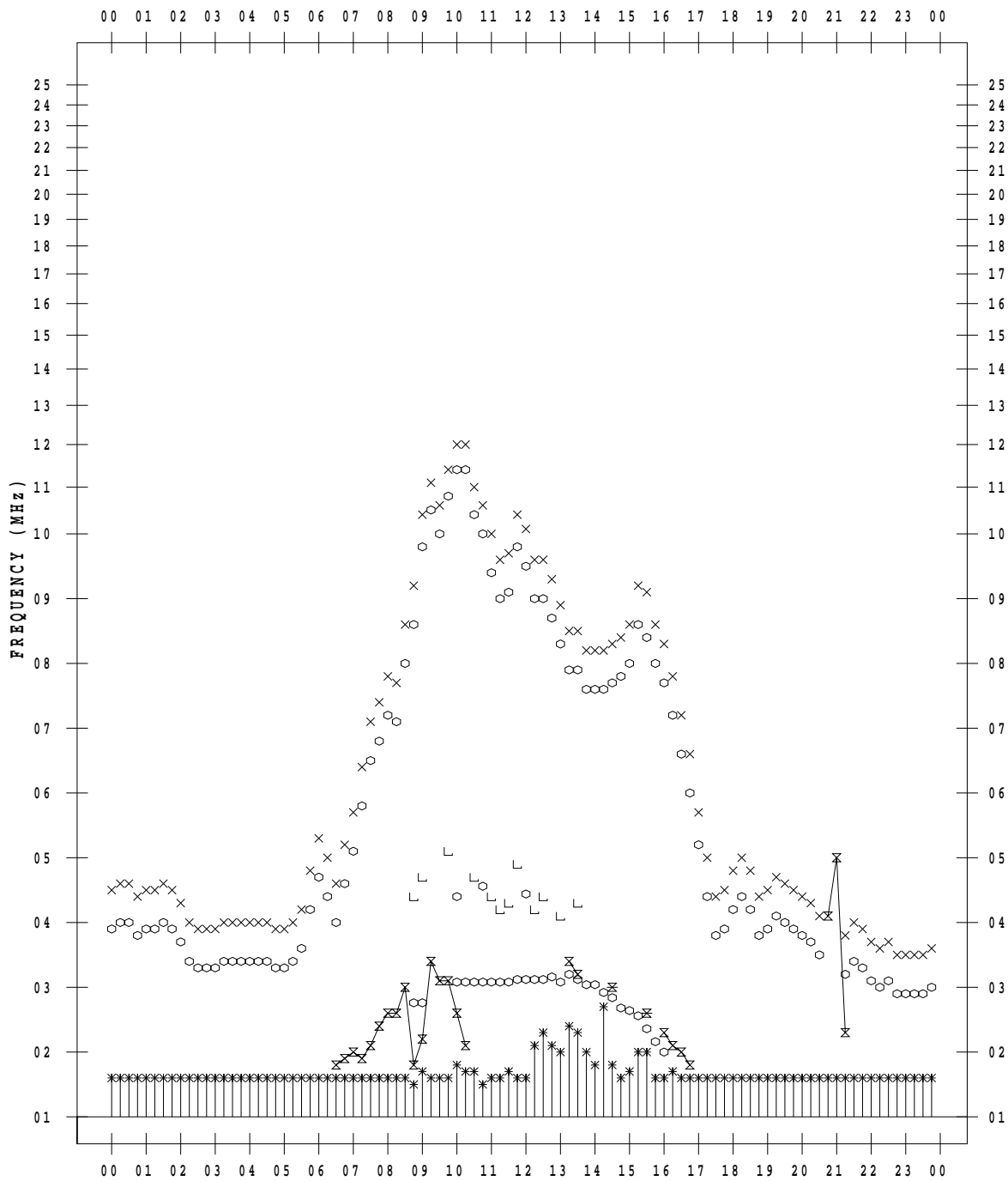
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/25

135 ° E MEAN TIME



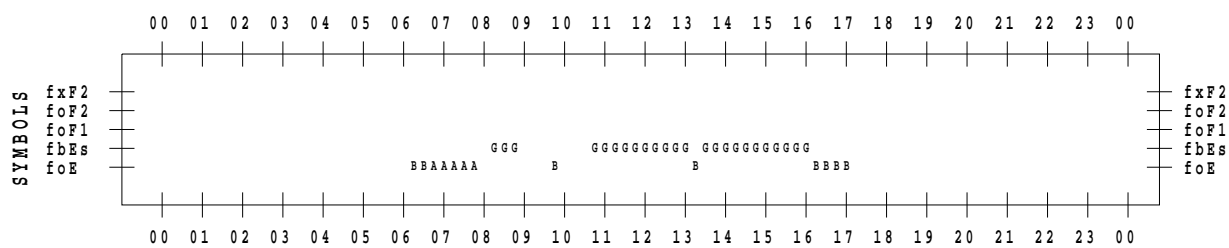
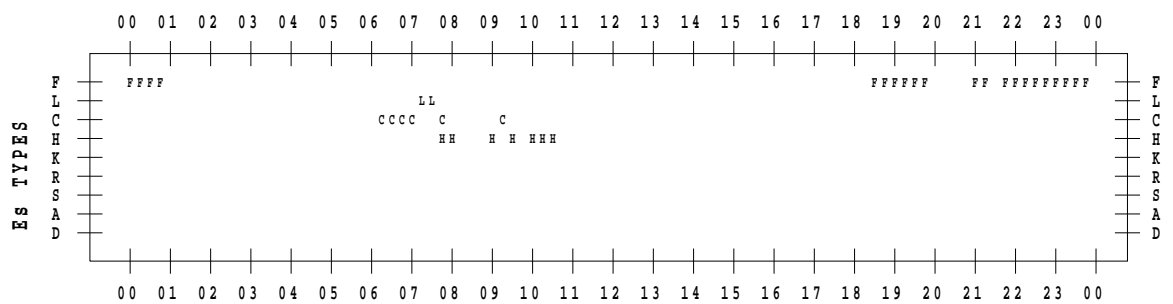
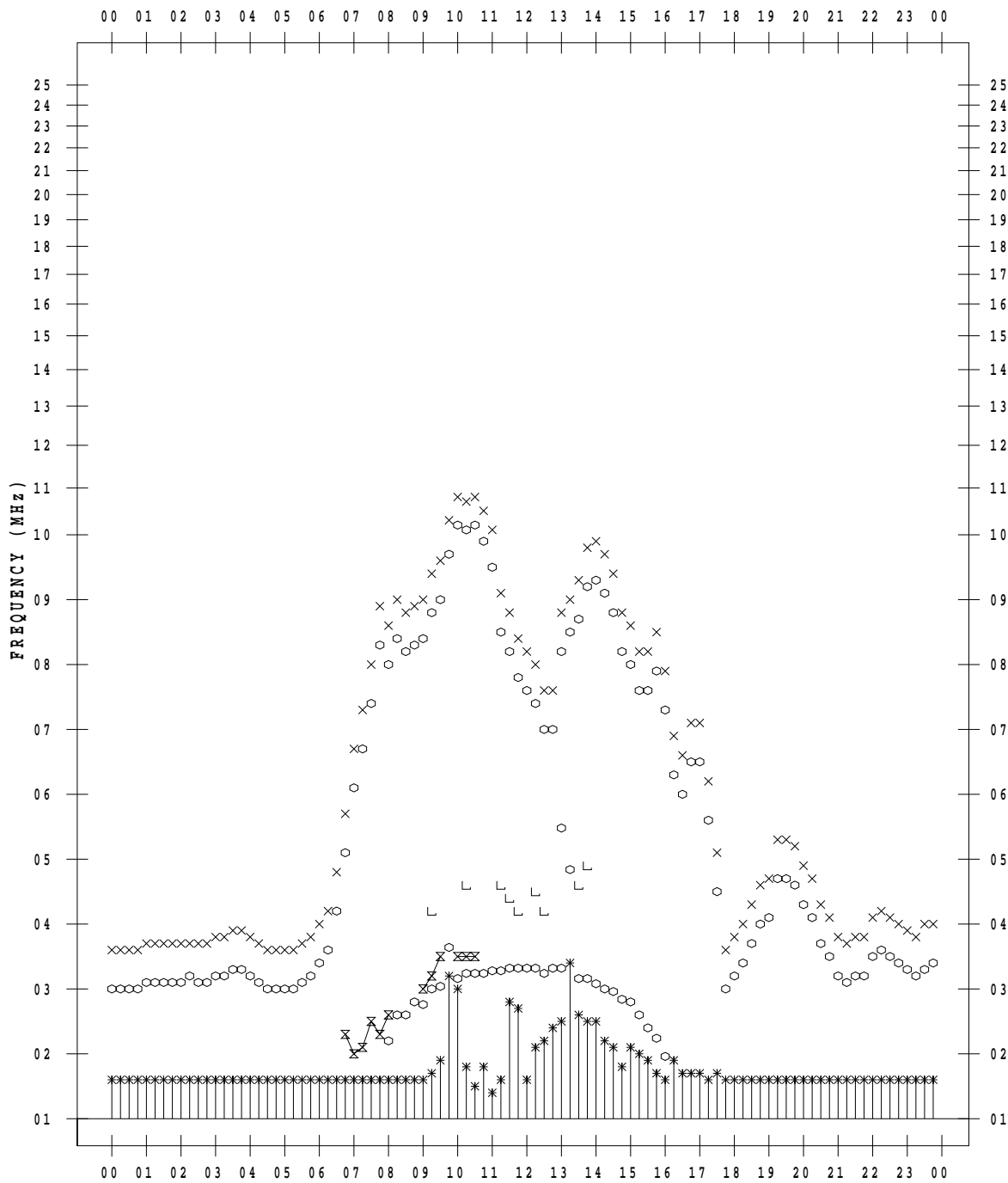
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/26

135 ° E MEAN TIME



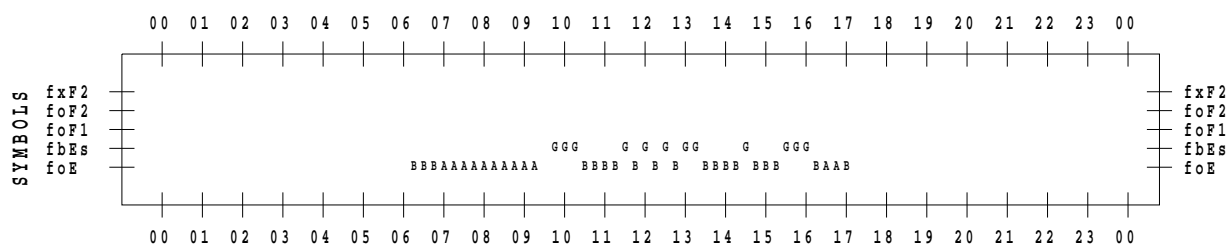
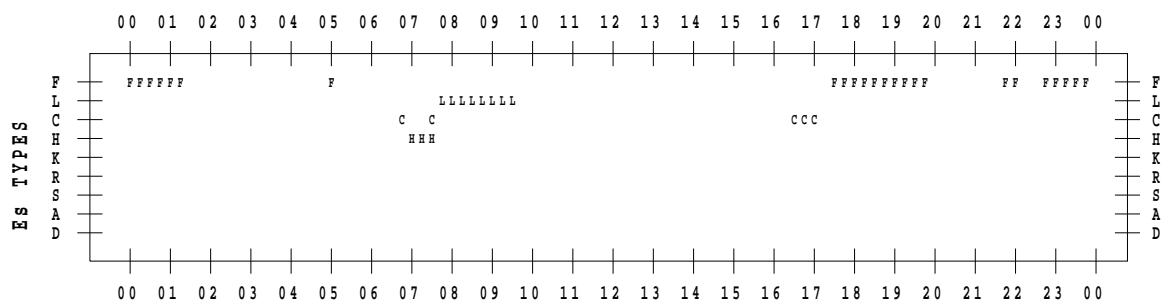
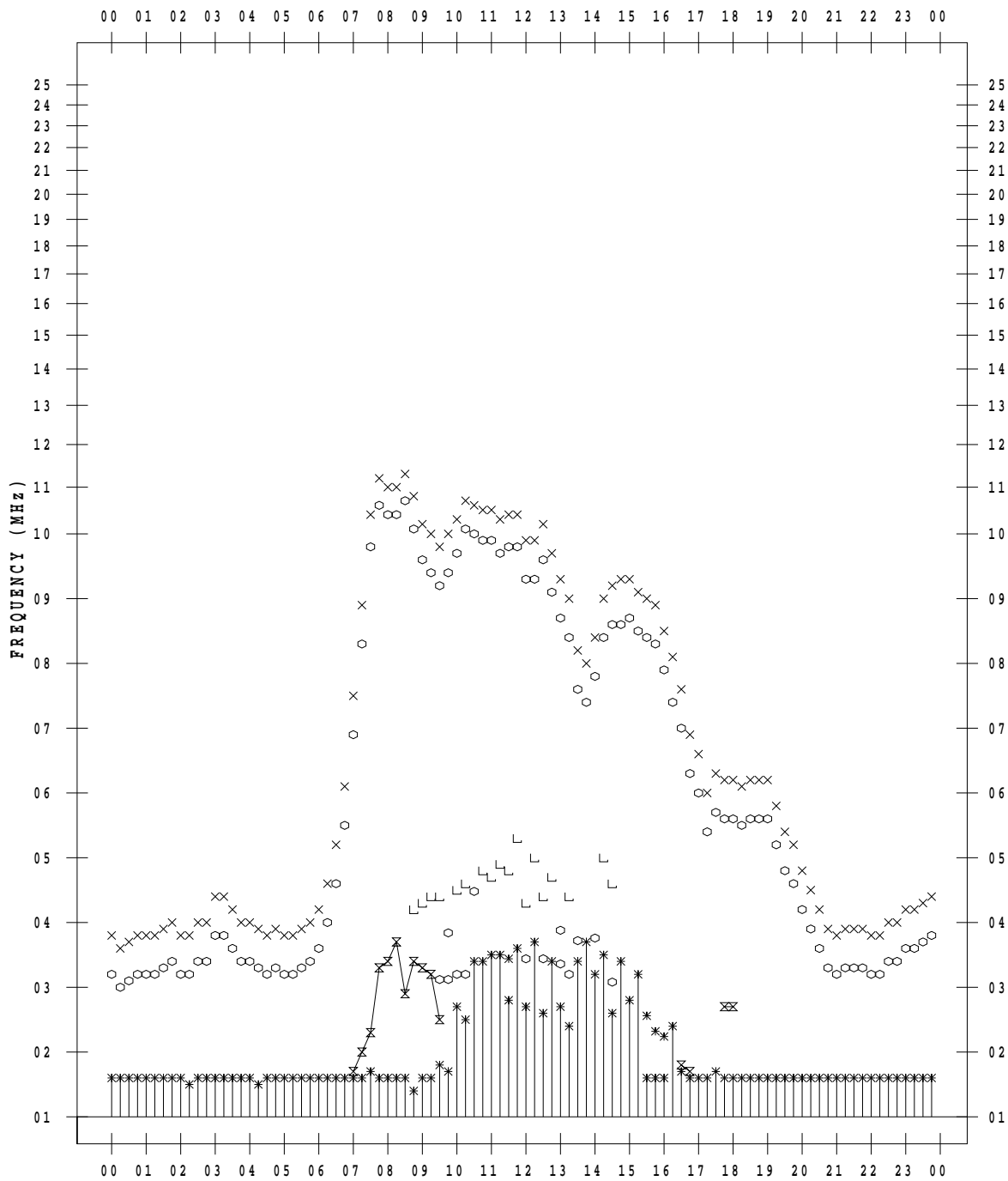
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/27

135 ° E MEAN TIME



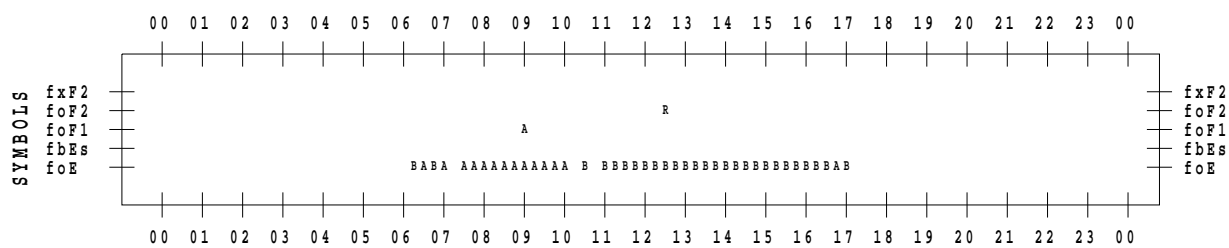
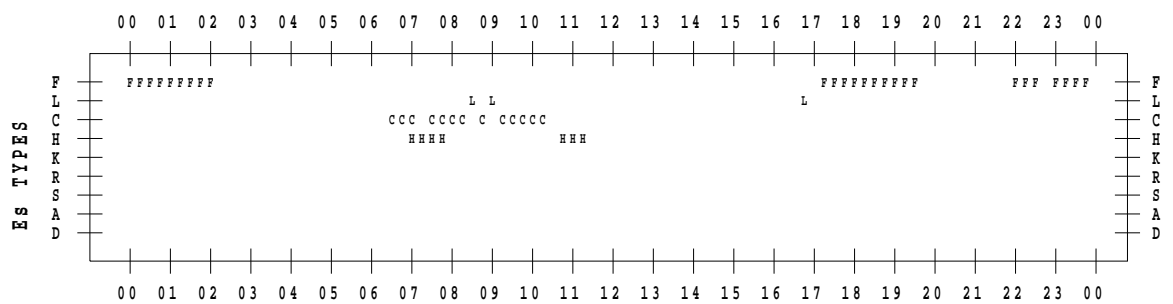
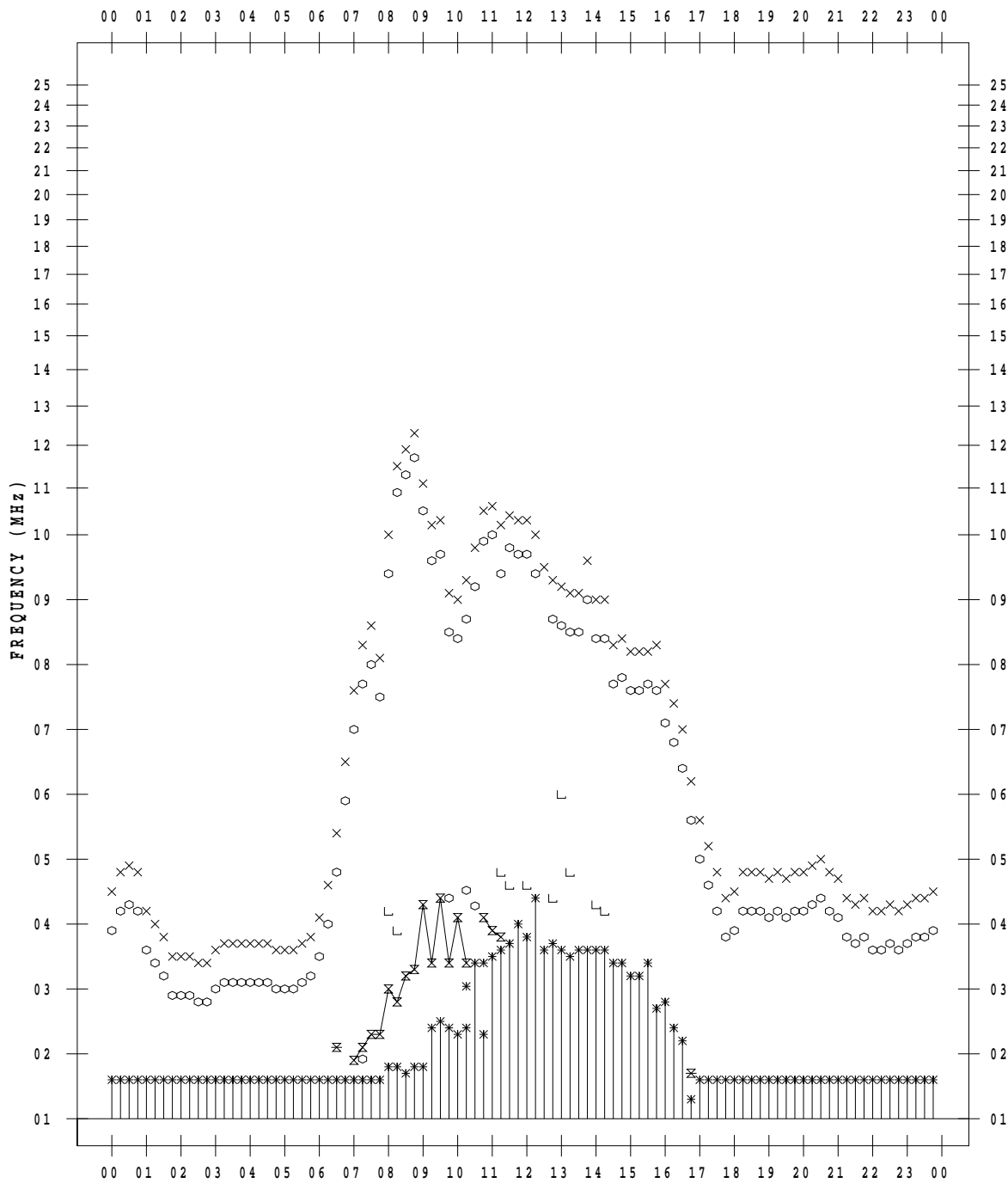
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/28

135 ° E MEAN TIME



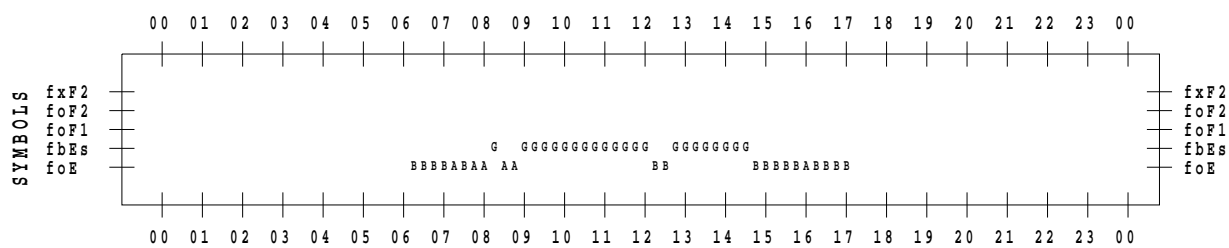
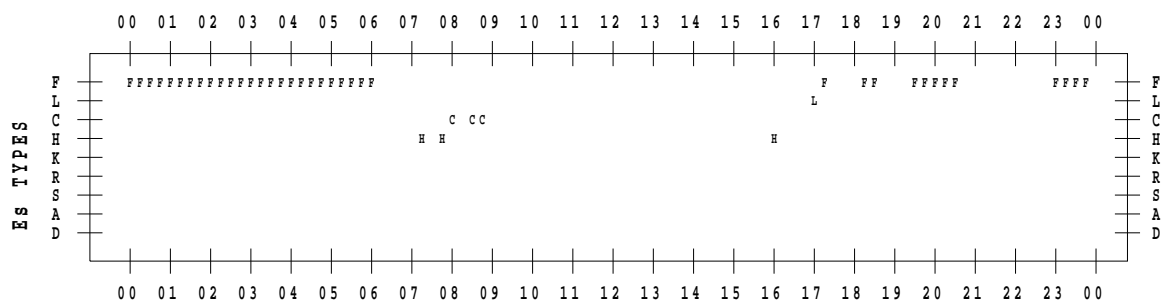
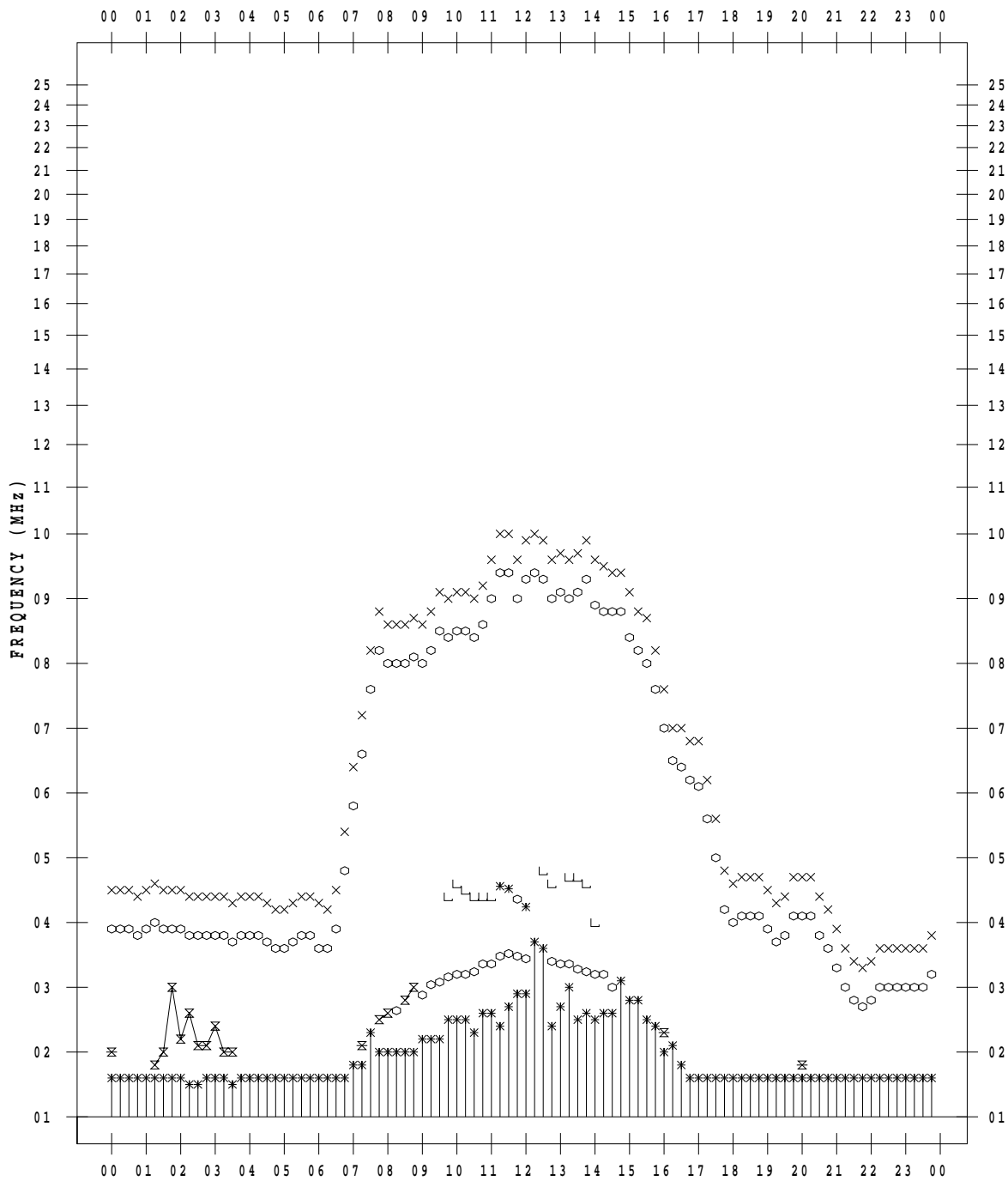
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/29

135 ° E MEAN TIME





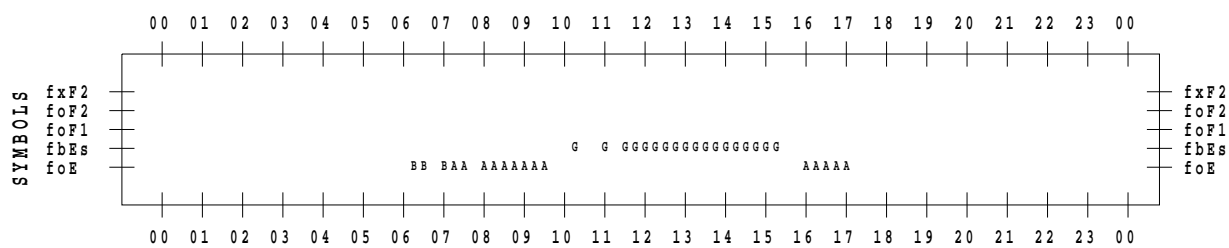
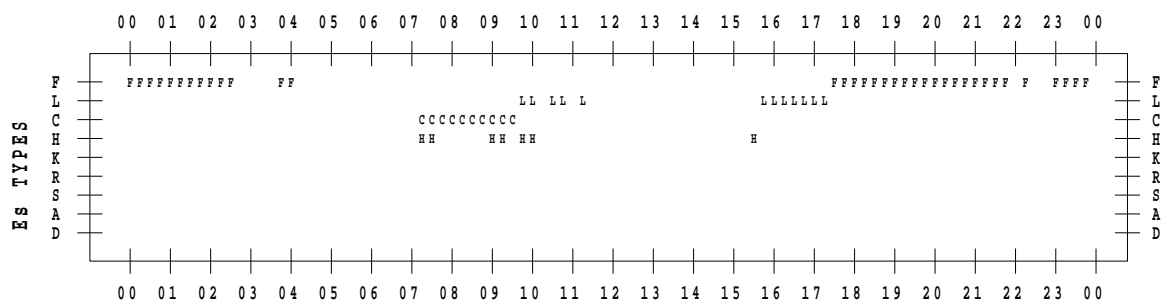
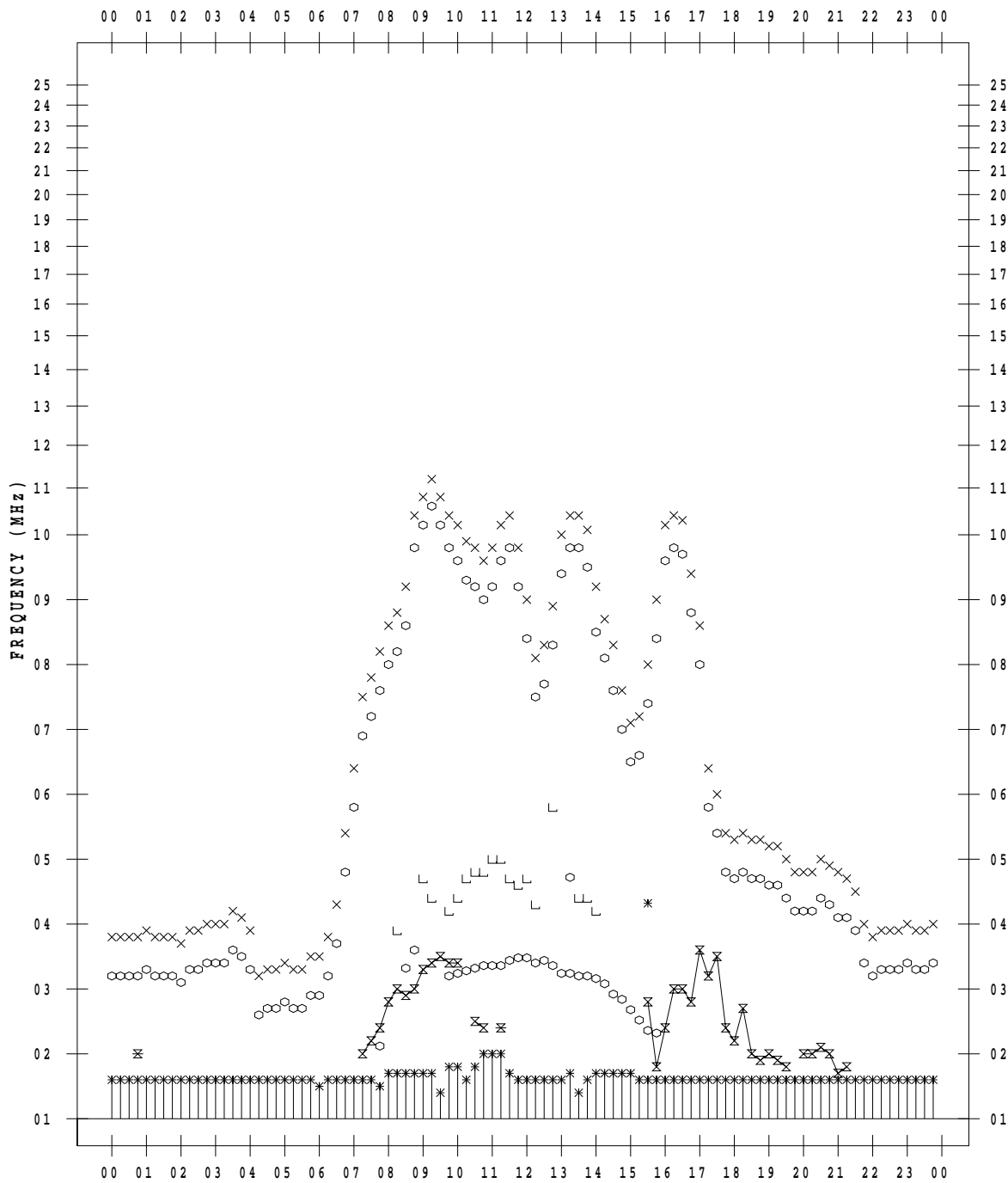
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/30

135 ° E MEAN TIME



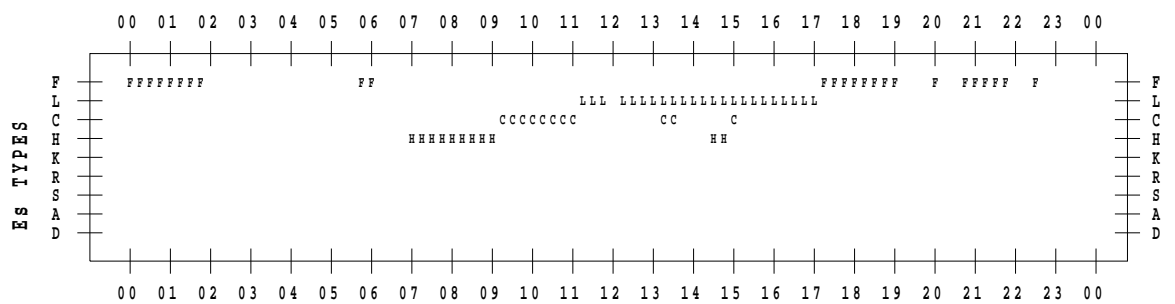
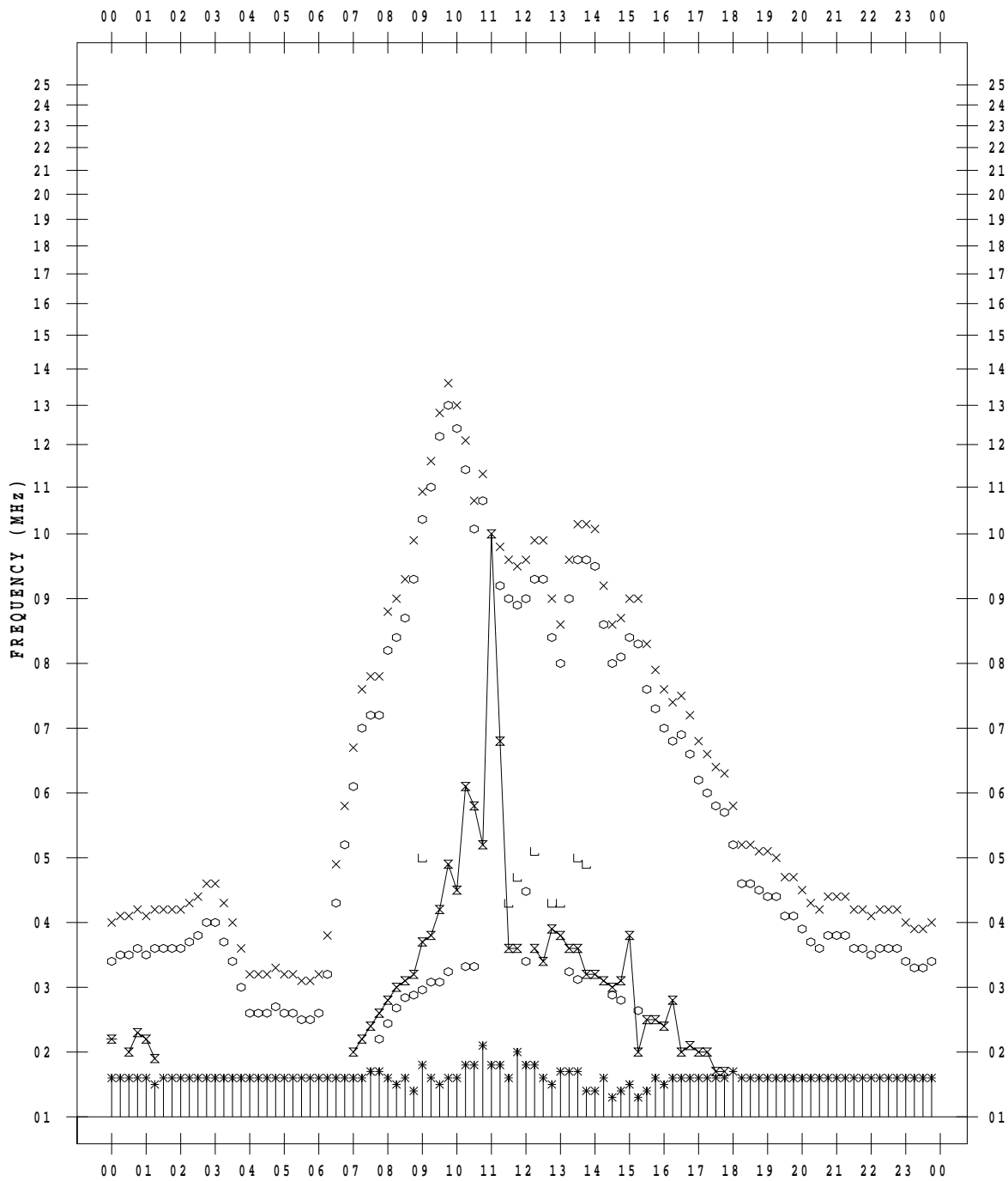
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Kokubunji

DATE : 2022/12/31

135 ° E MEAN TIME



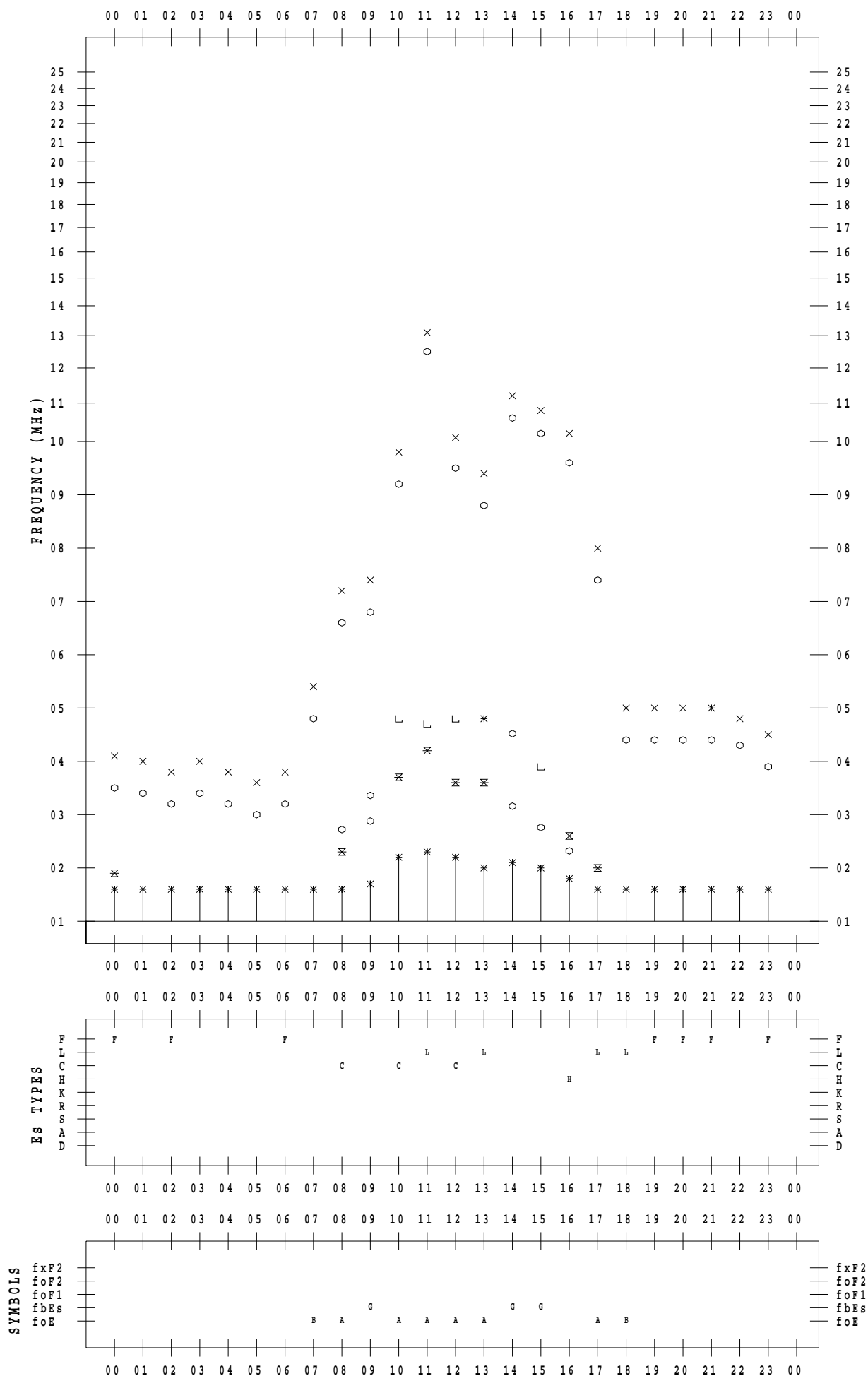
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Yamagawa

DATE : 2022/12/ 1

135 ° E MEAN TIME



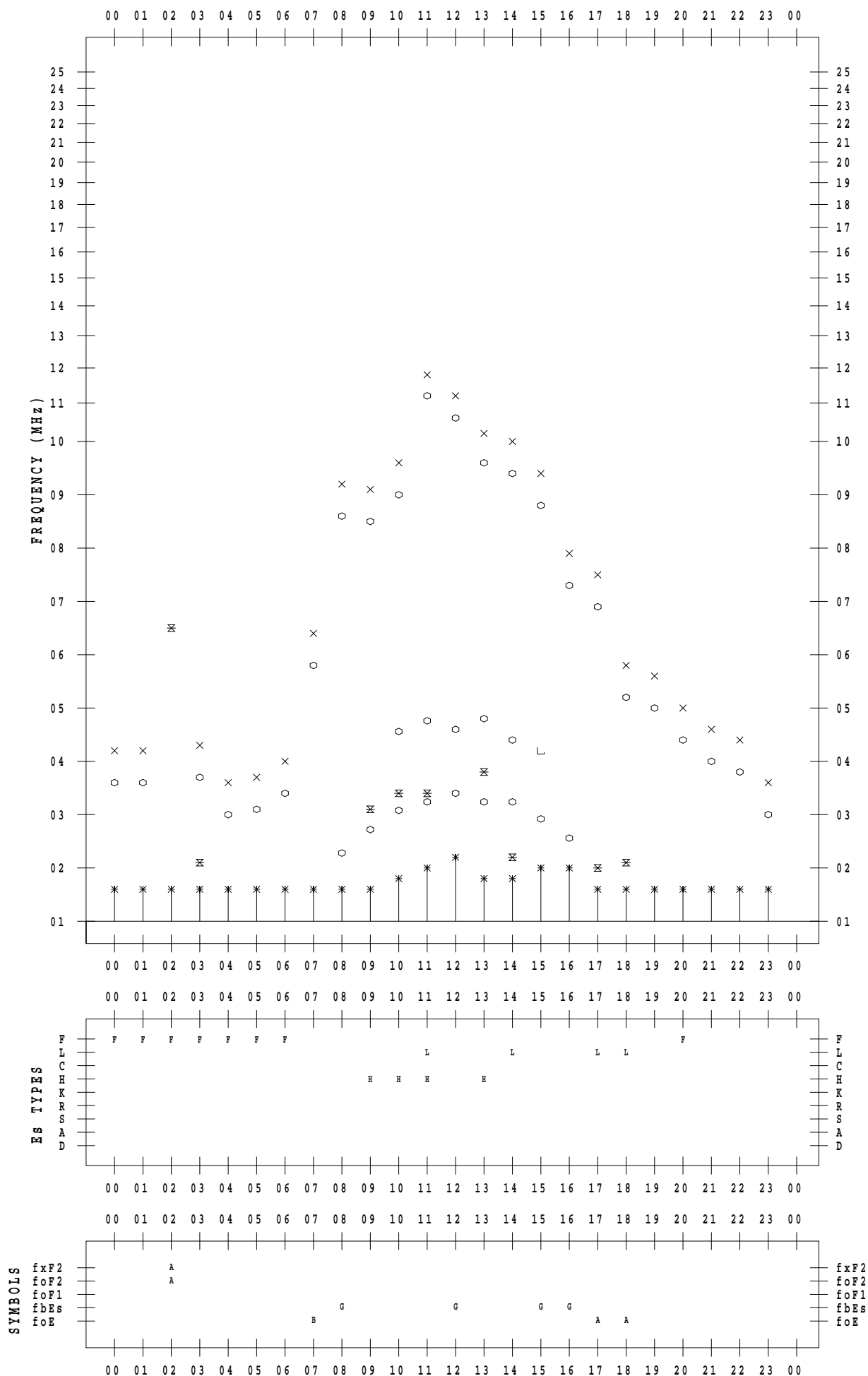
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Yamagawa

DATE : 2022/12/ 2

135 ° E MEAN TIME



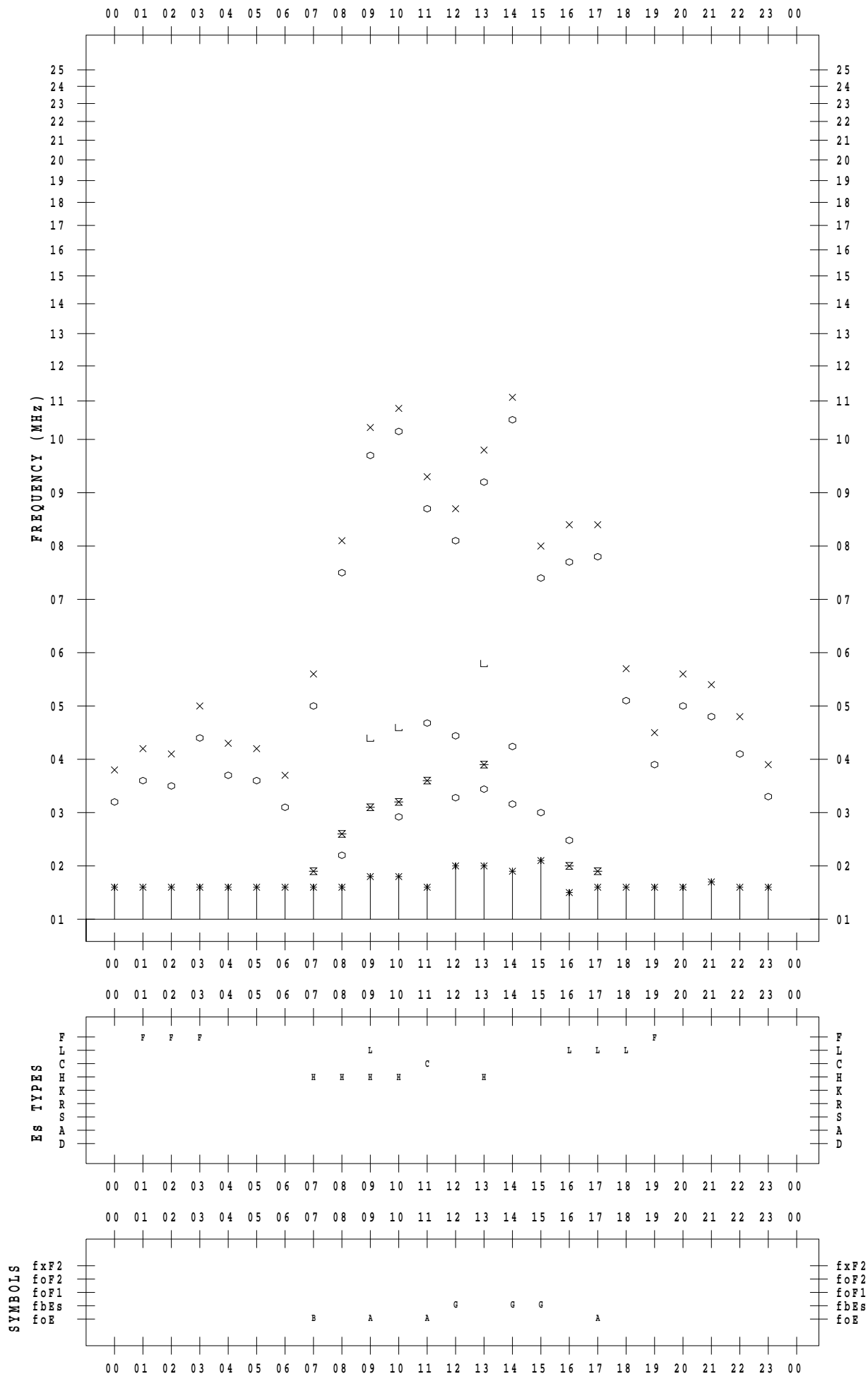
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Yamagawa

DATE : 2022/12/ 3

135 ° E MEAN TIME



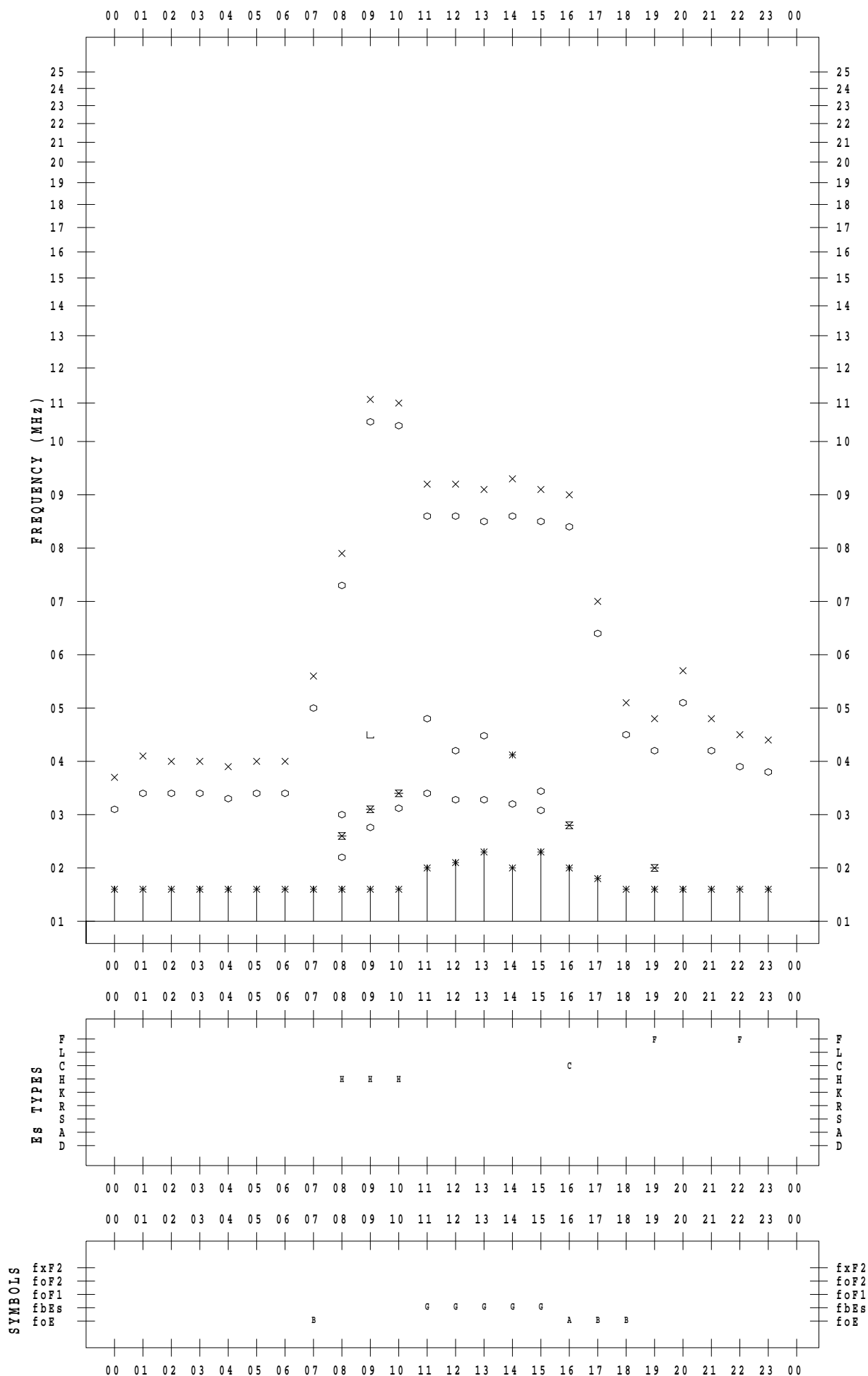
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Yamagawa

DATE : 2022/12/ 4

135 ° E MEAN TIME



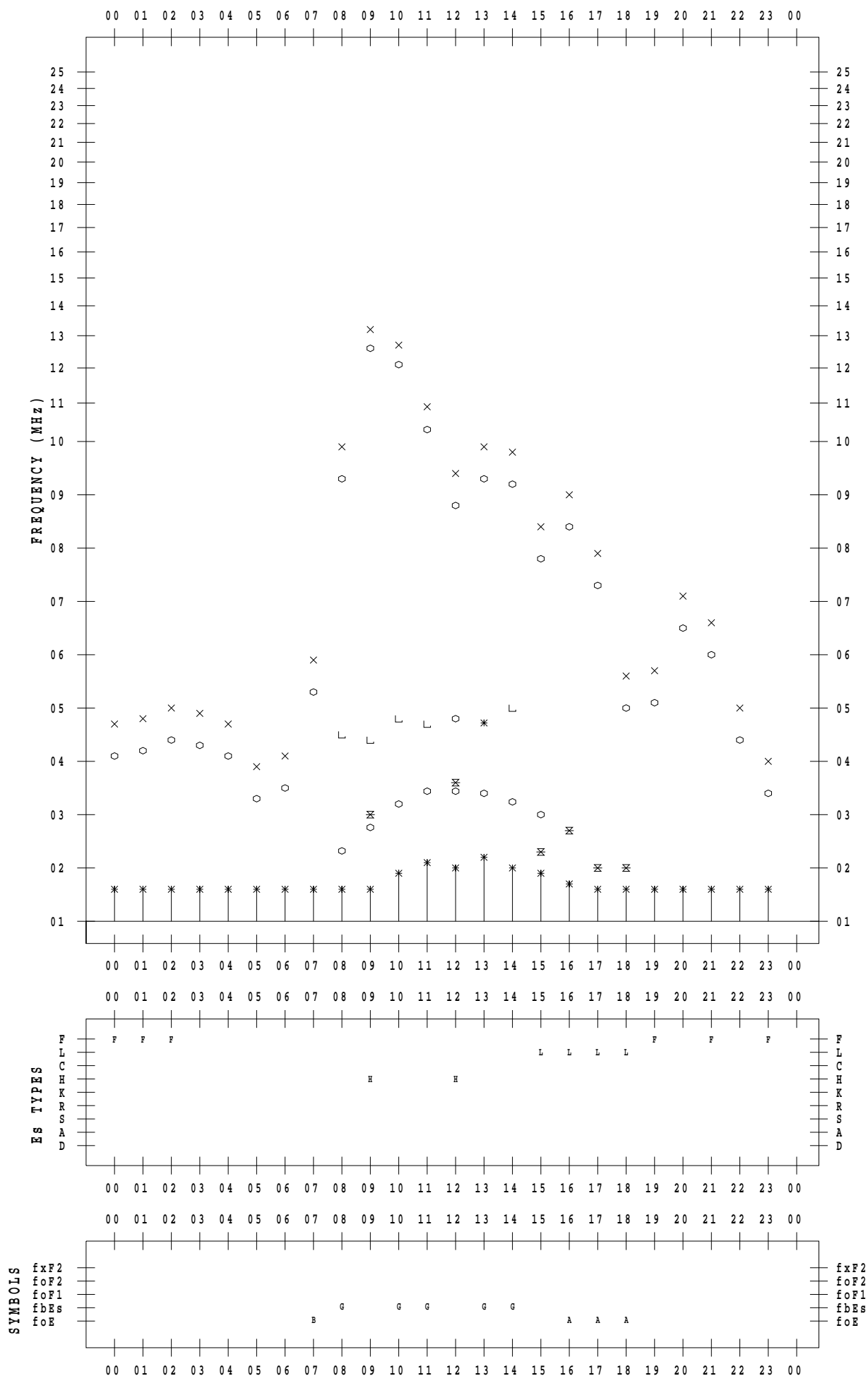
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Yamagawa

DATE : 2022/12/ 5

135 ° E MEAN TIME







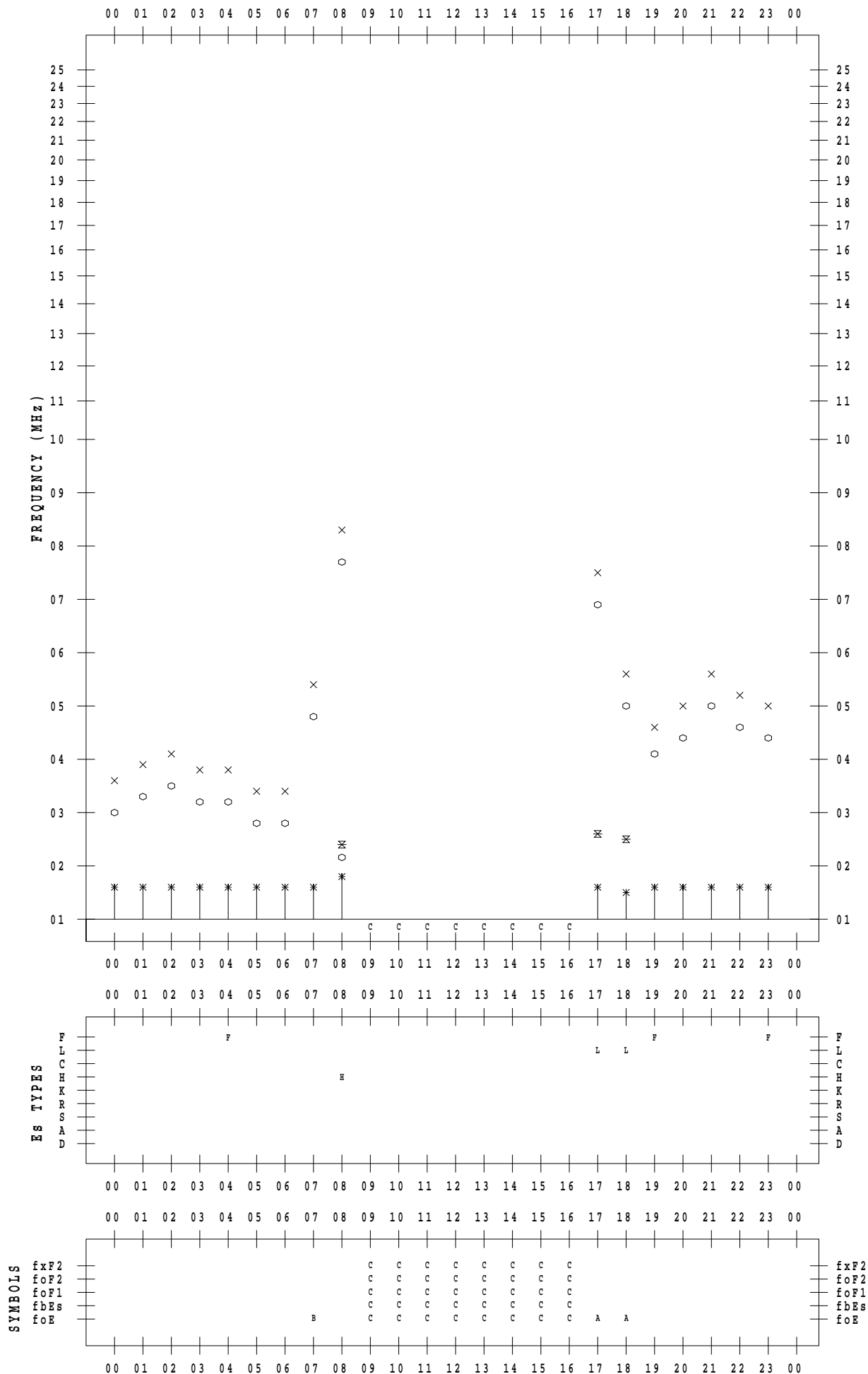
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Yamagawa

DATE : 2022/12/ 7

135 ° E MEAN TIME



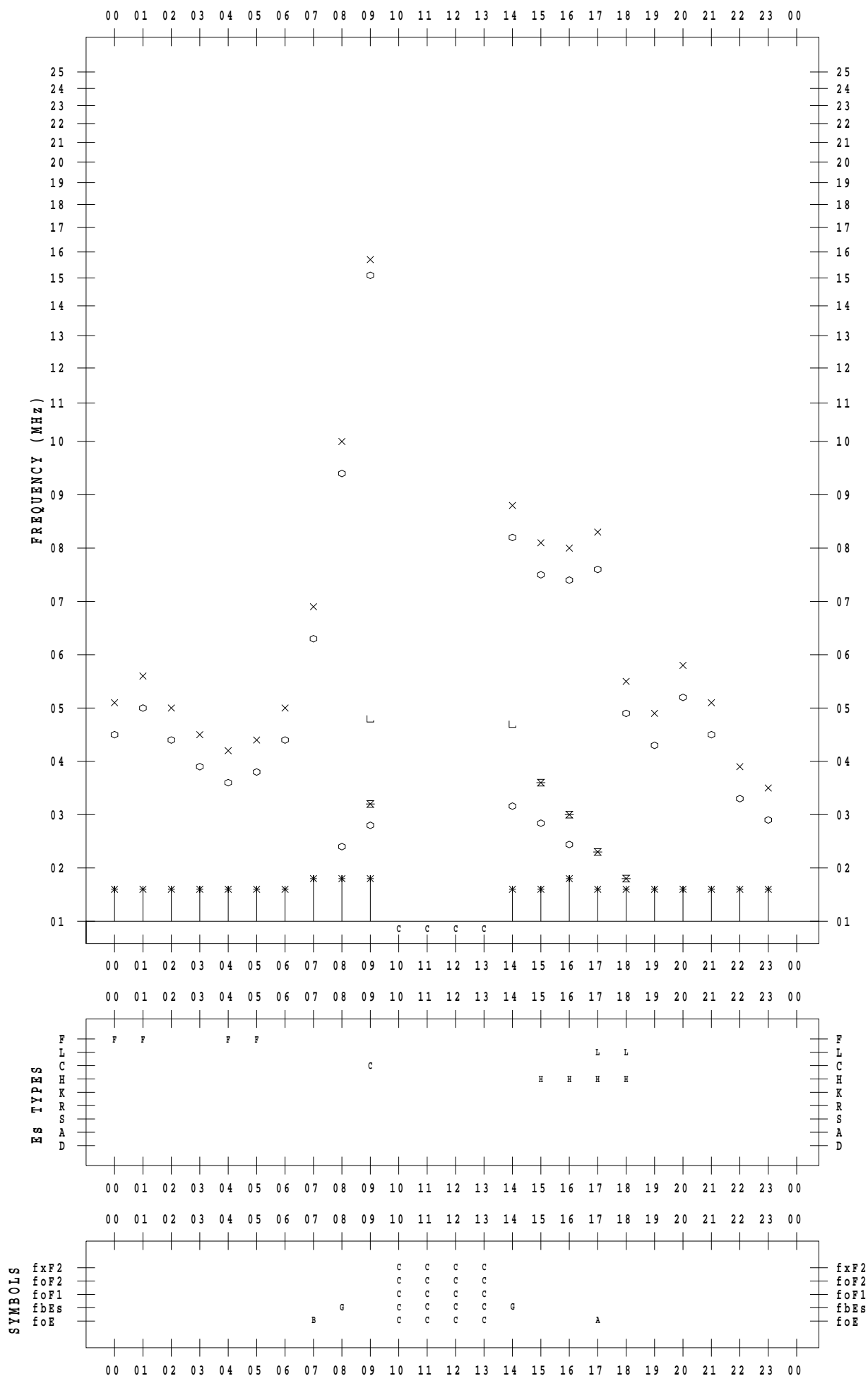
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Yamagawa

DATE : 2022/12/ 8

135 ° E MEAN TIME



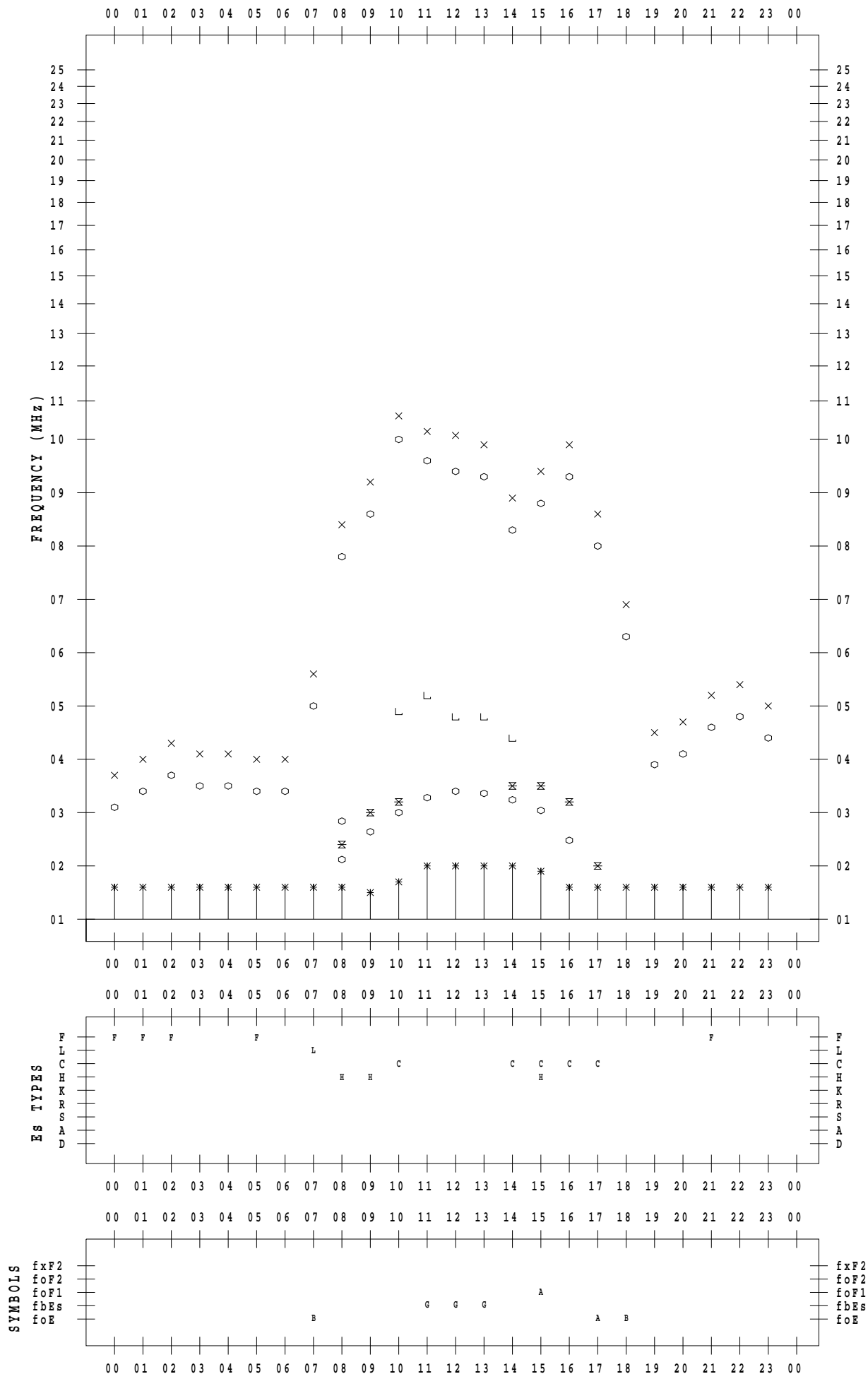
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Yamagawa

DATE : 2022/12/ 9

135 ° E MEAN TIME



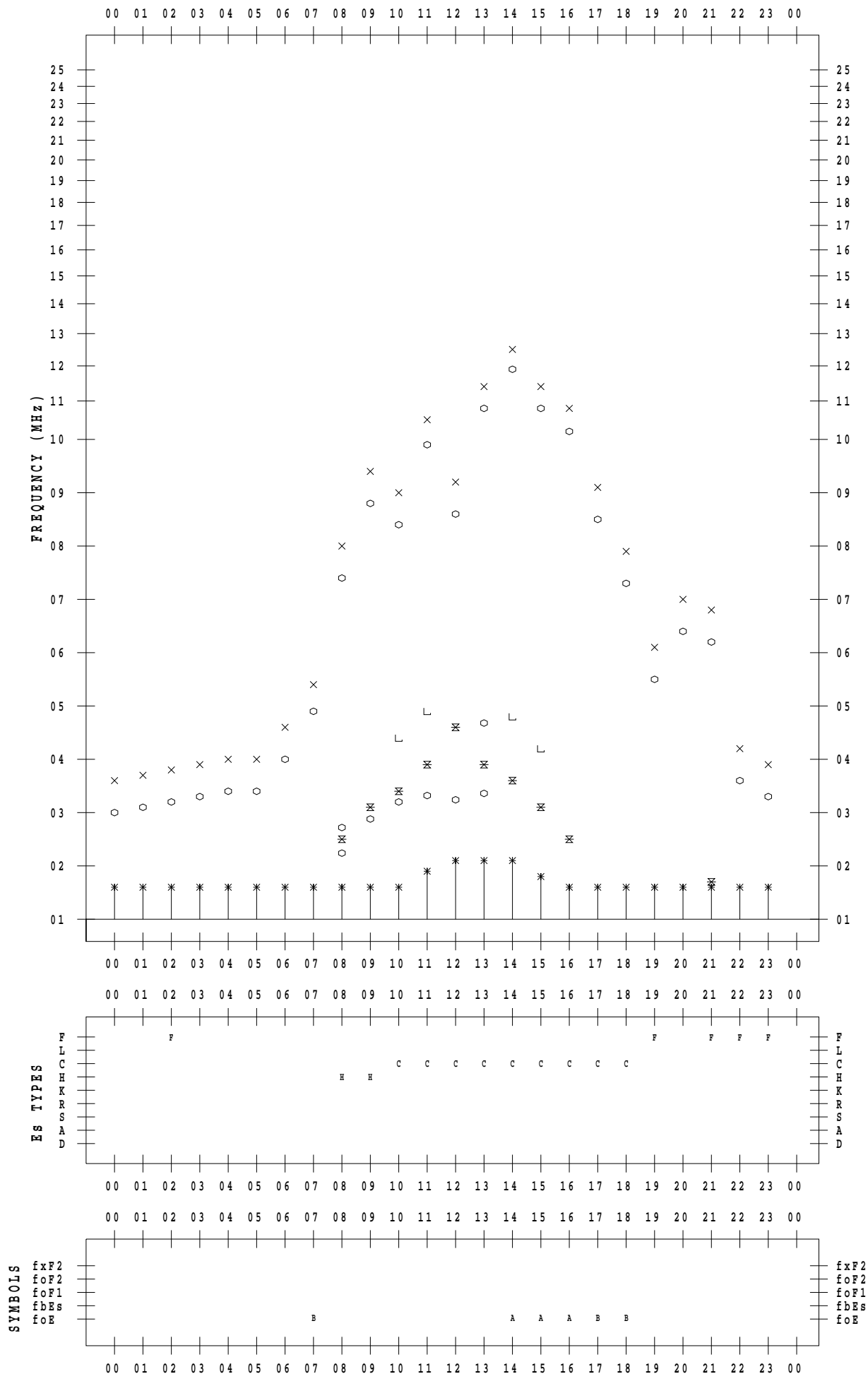
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Yamagawa

DATE : 2022/12/10

135 ° E MEAN TIME



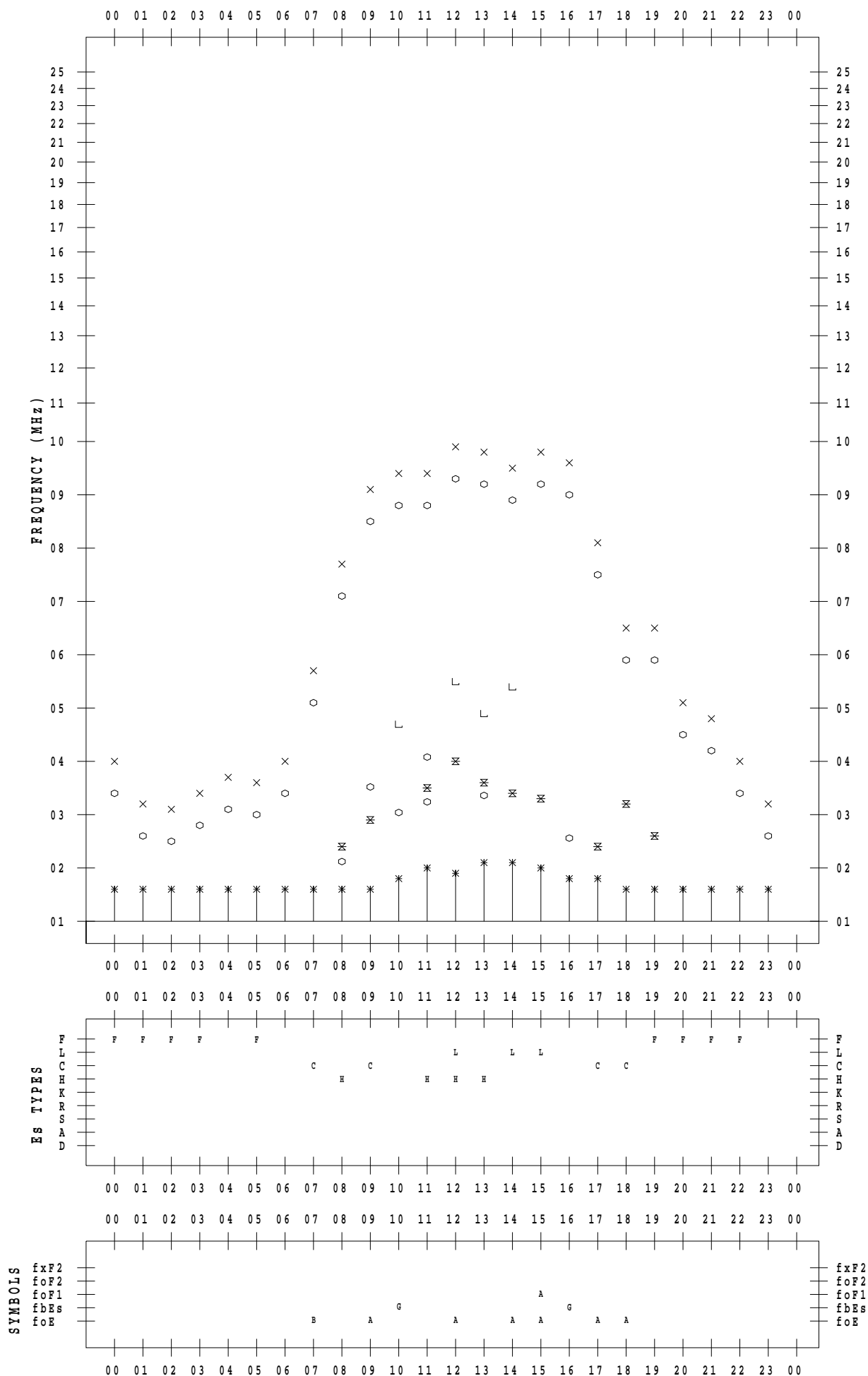
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Yamagawa

DATE : 2022/12/11

135 ° E MEAN TIME



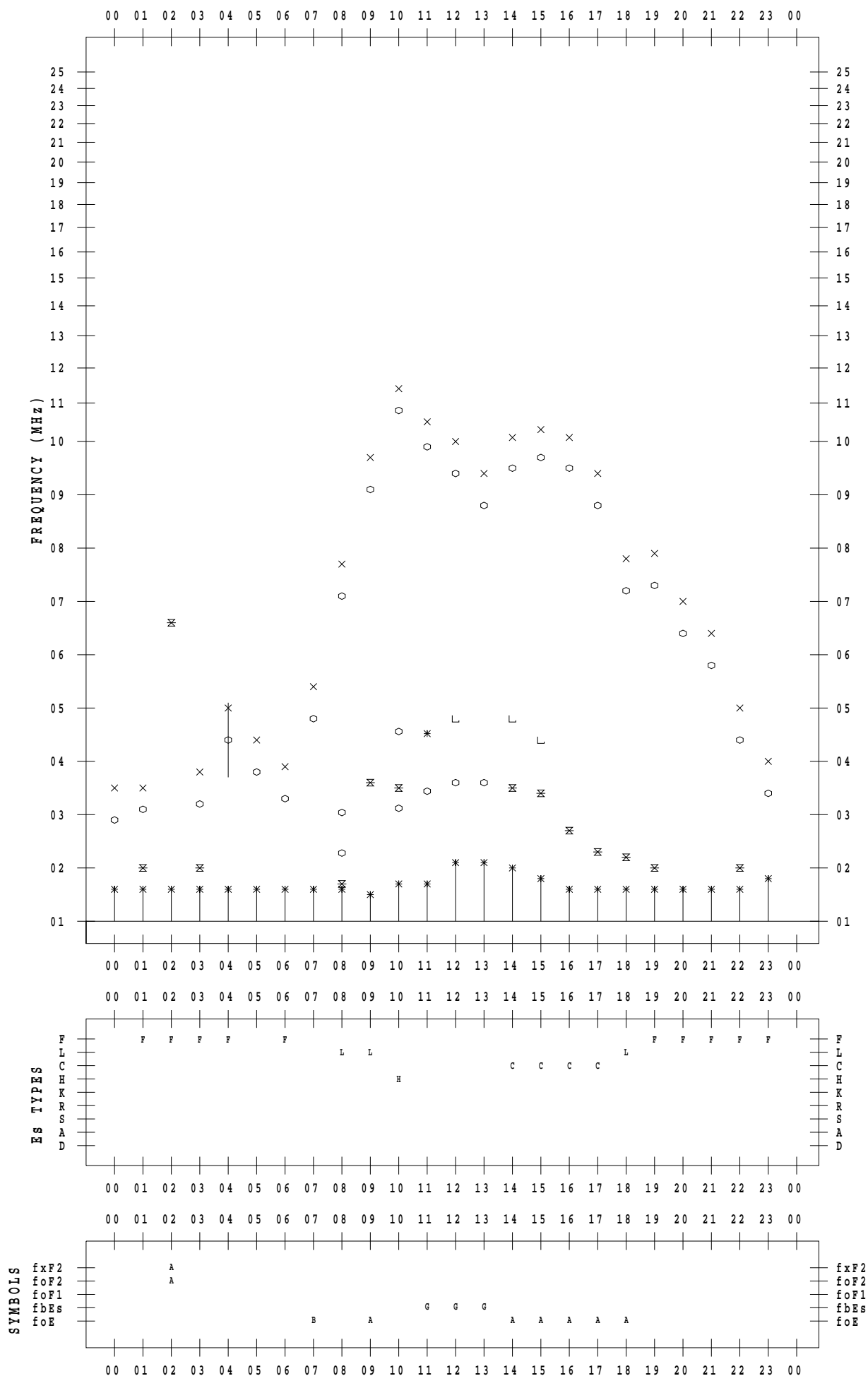
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Yamagawa

DATE : 2022/12/12

135 ° E MEAN TIME



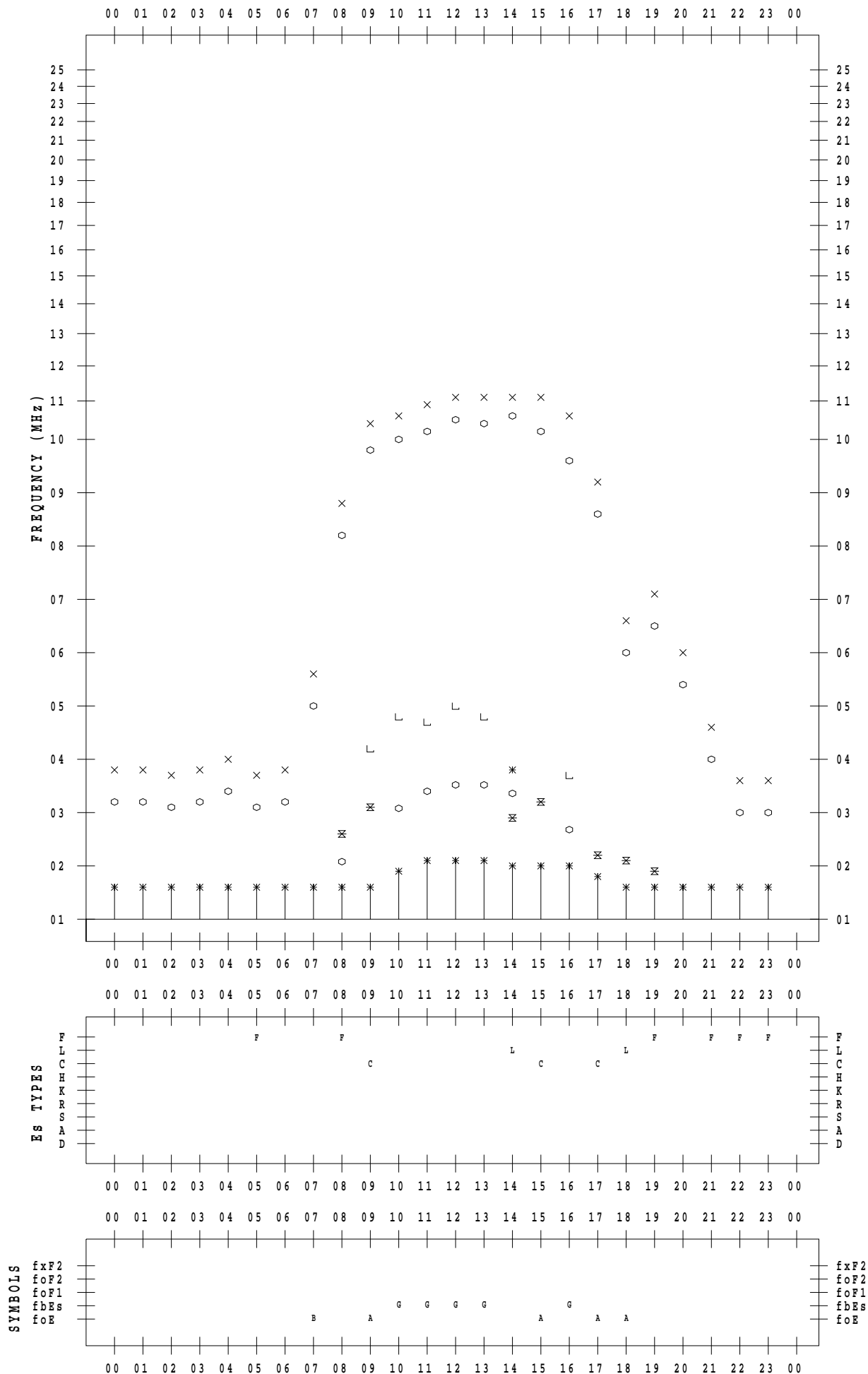
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Yamagawa

DATE : 2022/12/13

135 ° E MEAN TIME



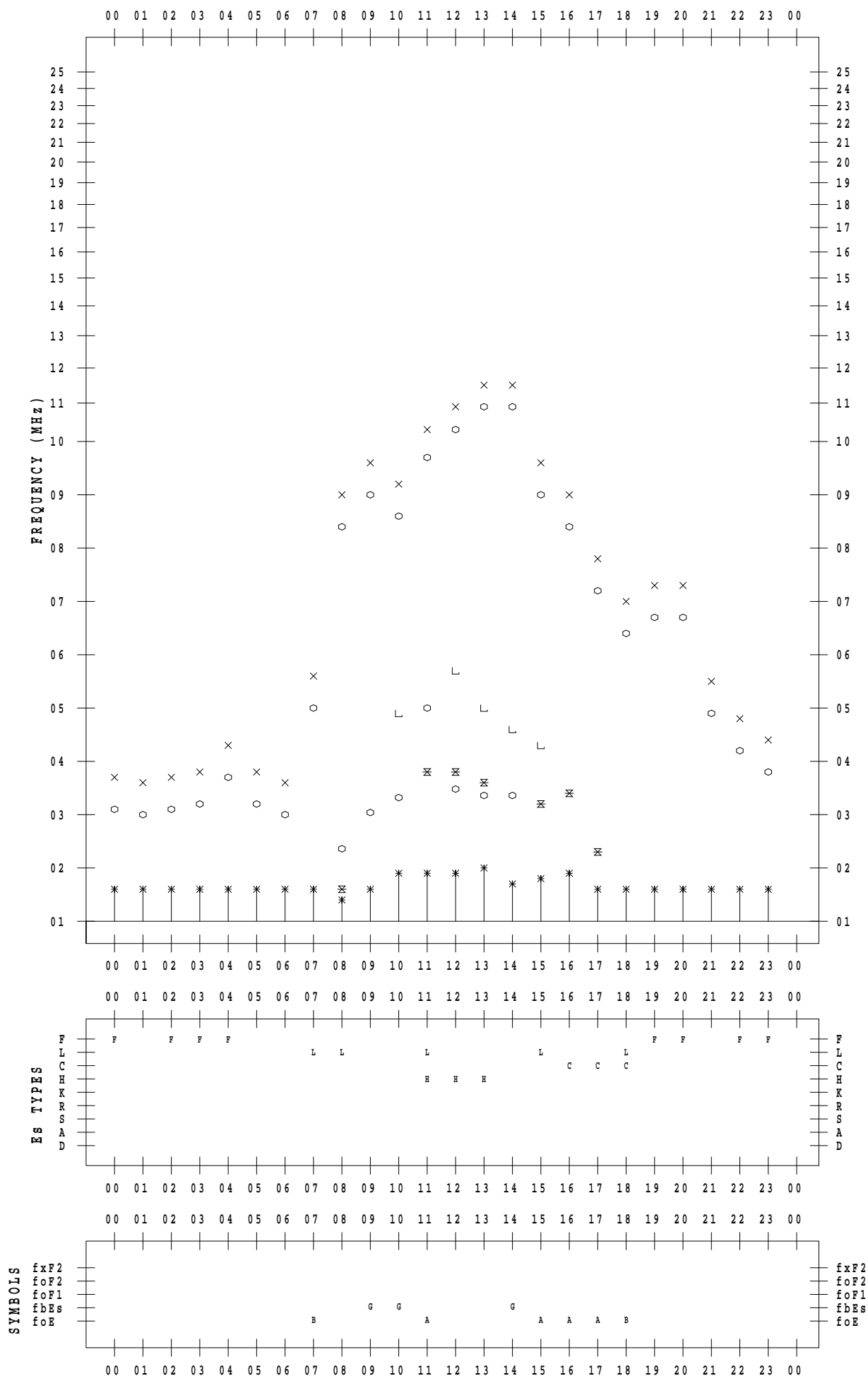
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Yamagawa

DATE : 2022/12/14

135 ° E MEAN TIME





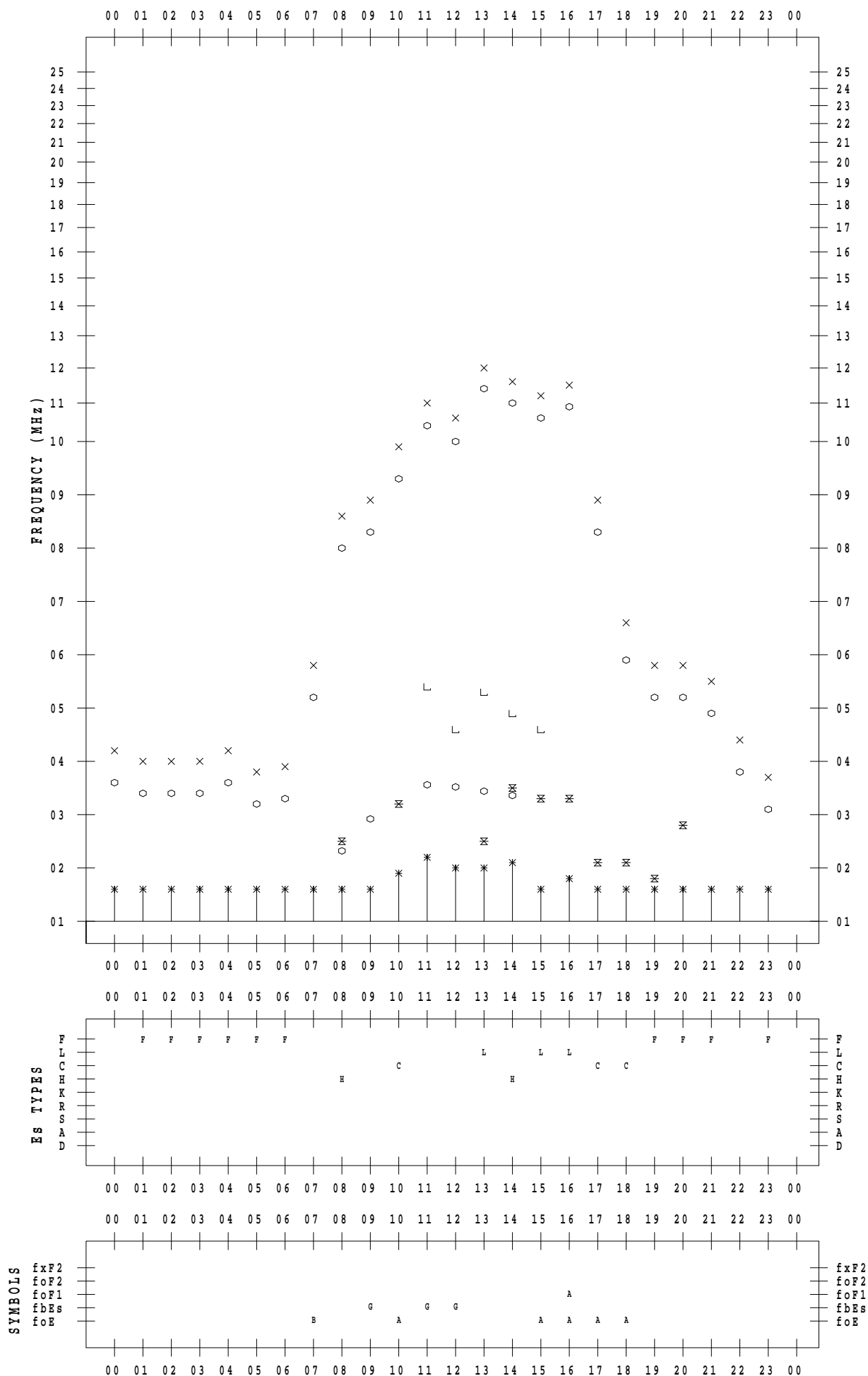
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Yamagawa

DATE : 2022/12/15

135 ° E MEAN TIME



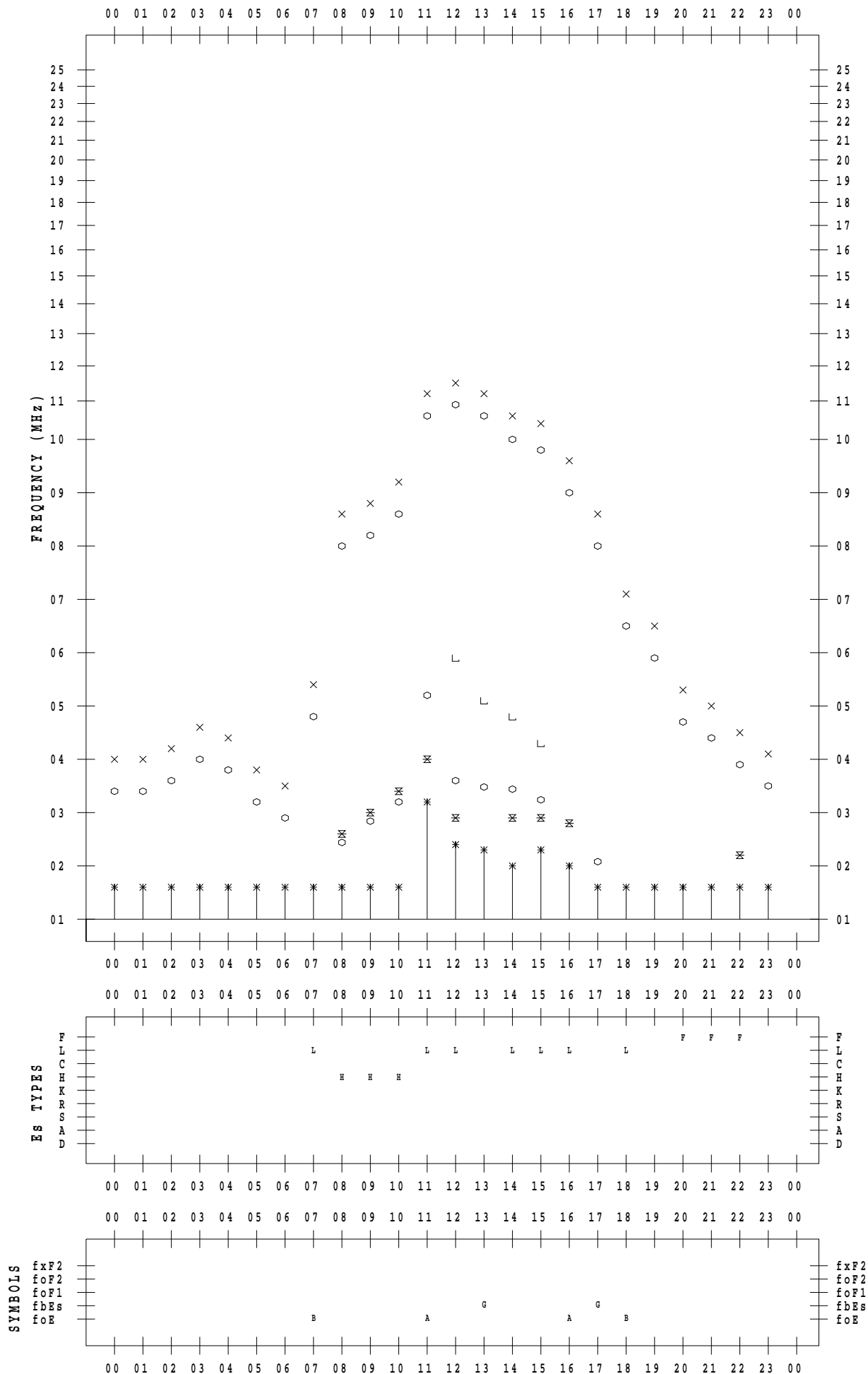
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Yamagawa

DATE : 2022/12/16

135 ° E MEAN TIME



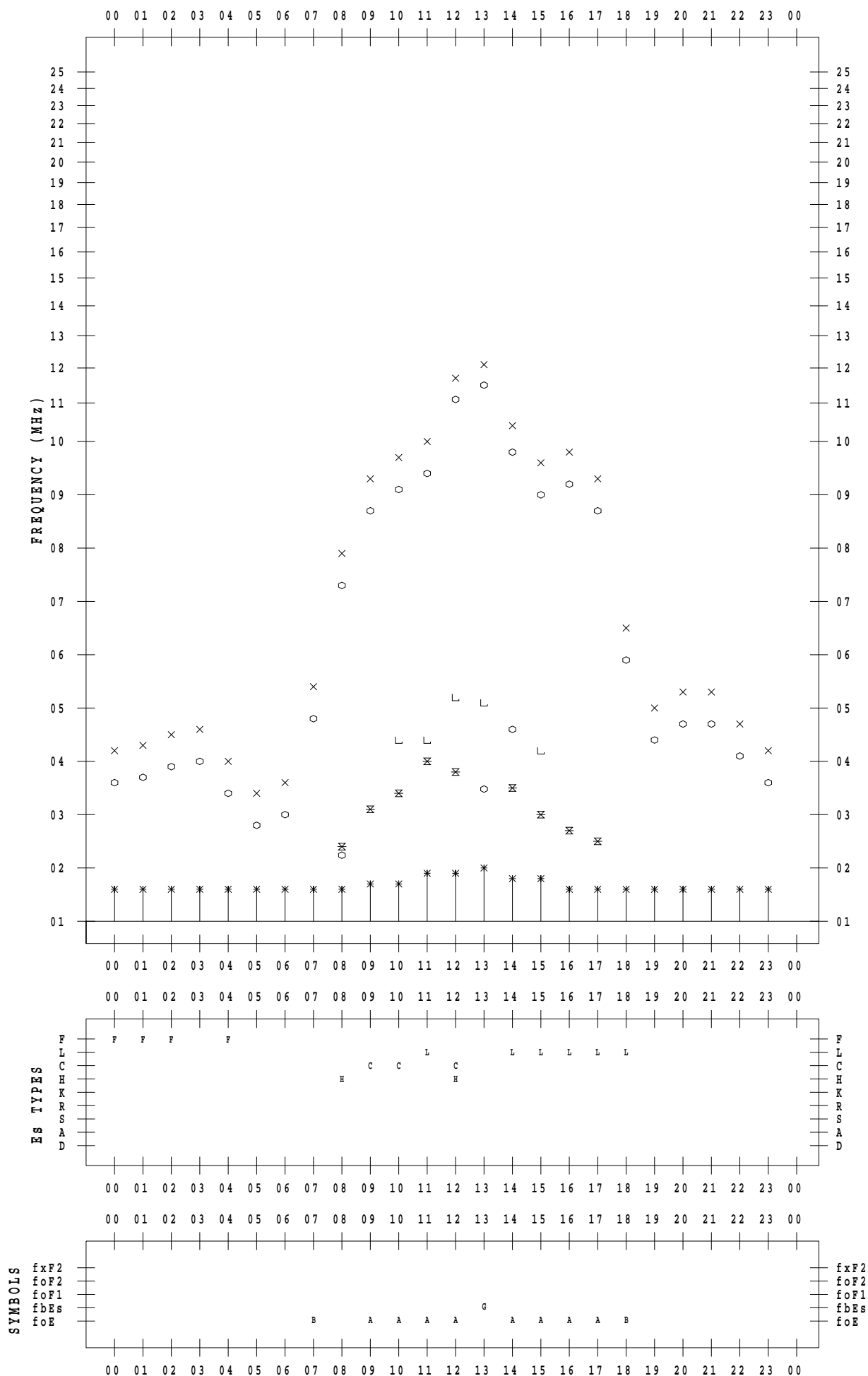
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Yamagawa

DATE : 2022/12/17

135 ° E MEAN TIME



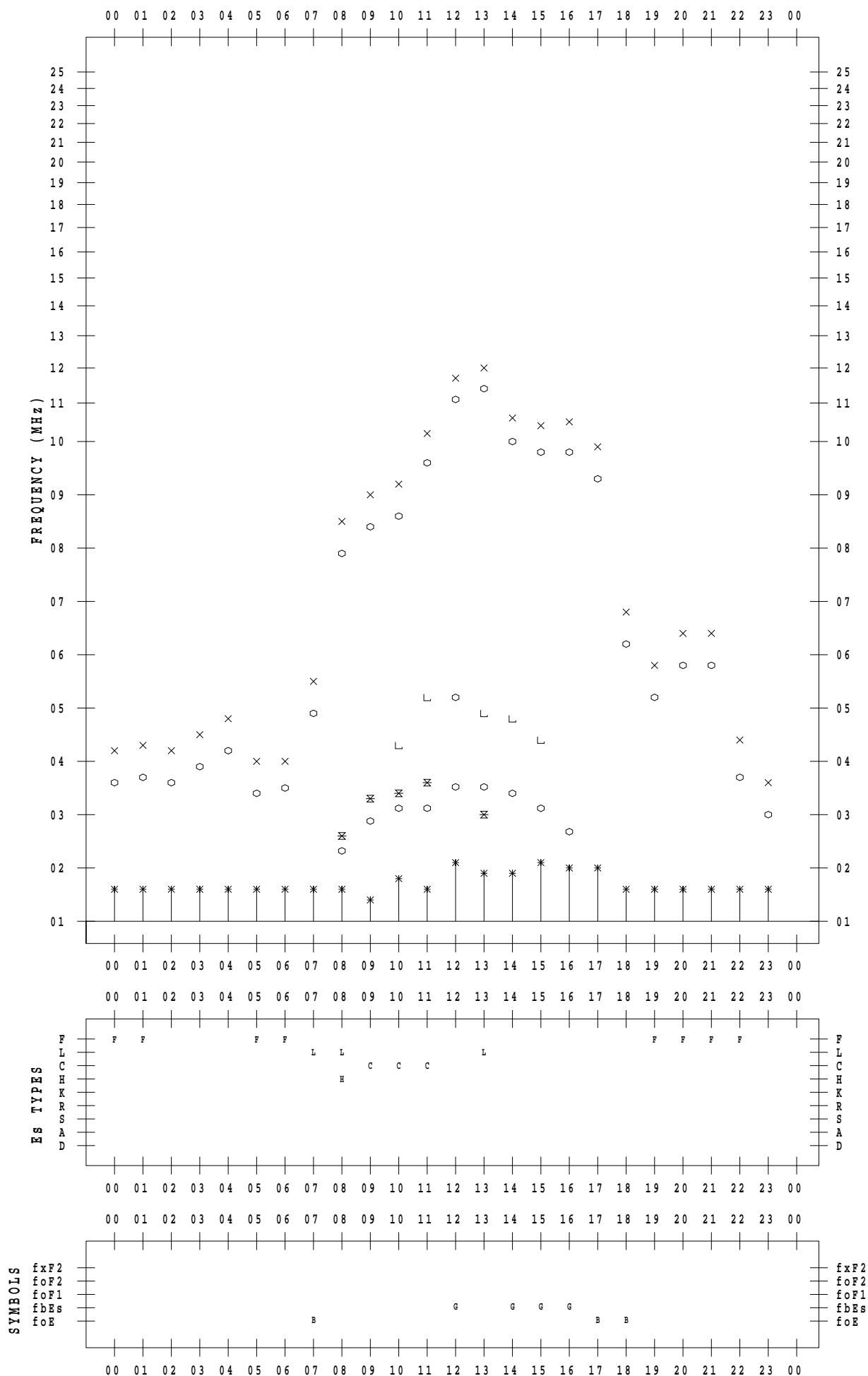
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Yamagawa

DATE : 2022/12/18

135 ° E MEAN TIME



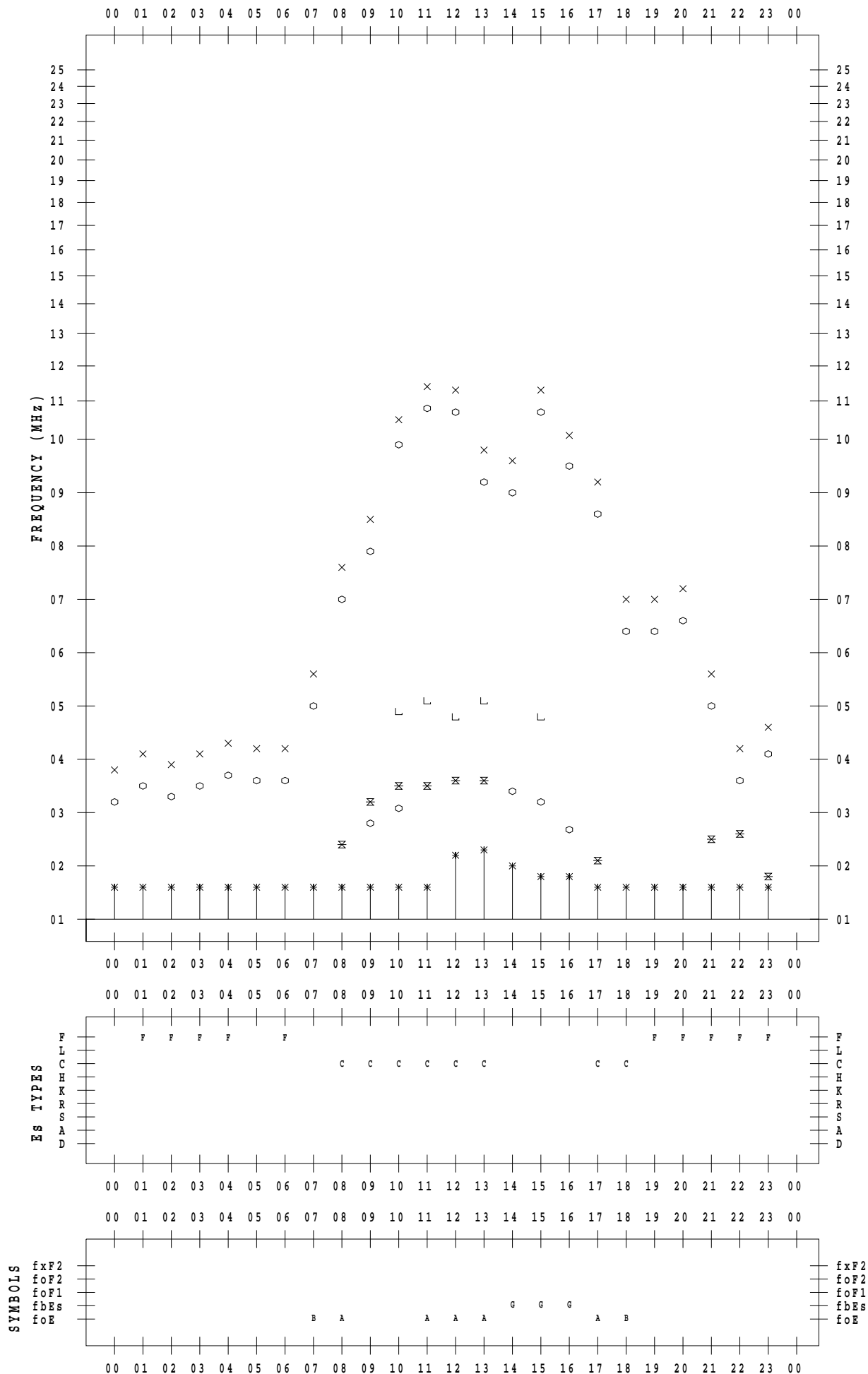
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Yamagawa

DATE : 2022/12/19

135 ° E MEAN TIME



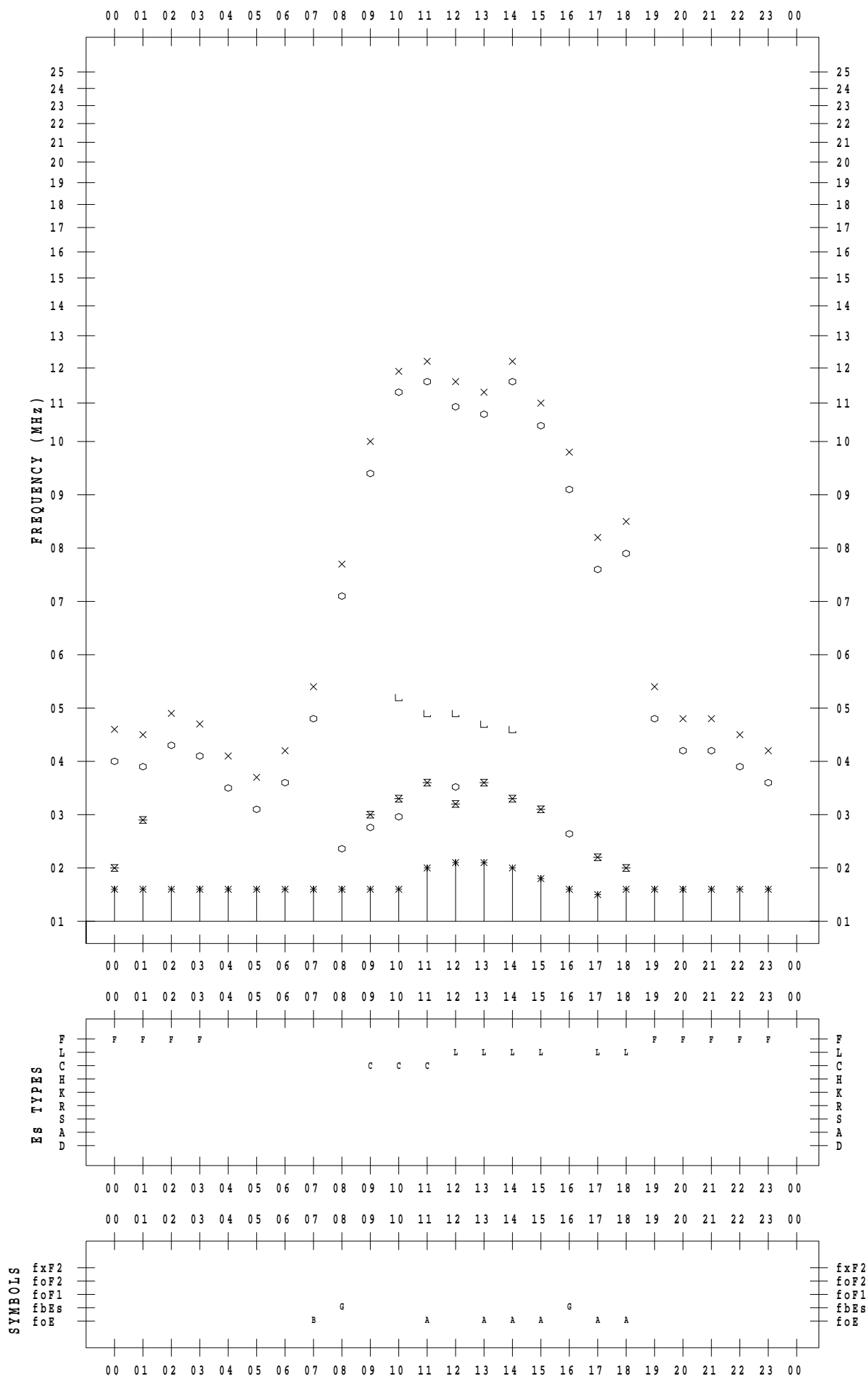
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Yamagawa

DATE : 2022/12/20

135 ° E MEAN TIME



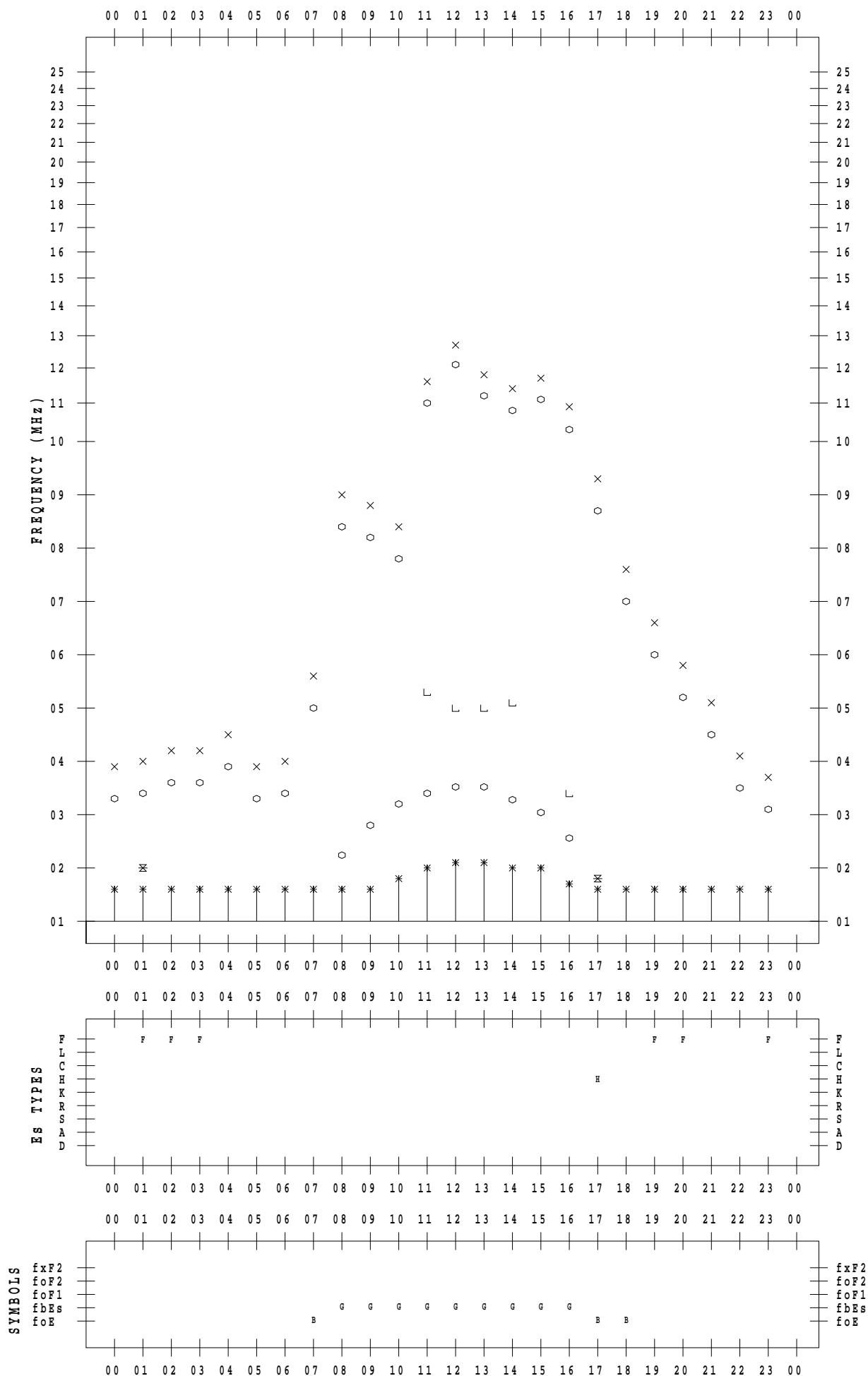
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Yamagawa

DATE : 2022/12/21

135 ° E MEAN TIME



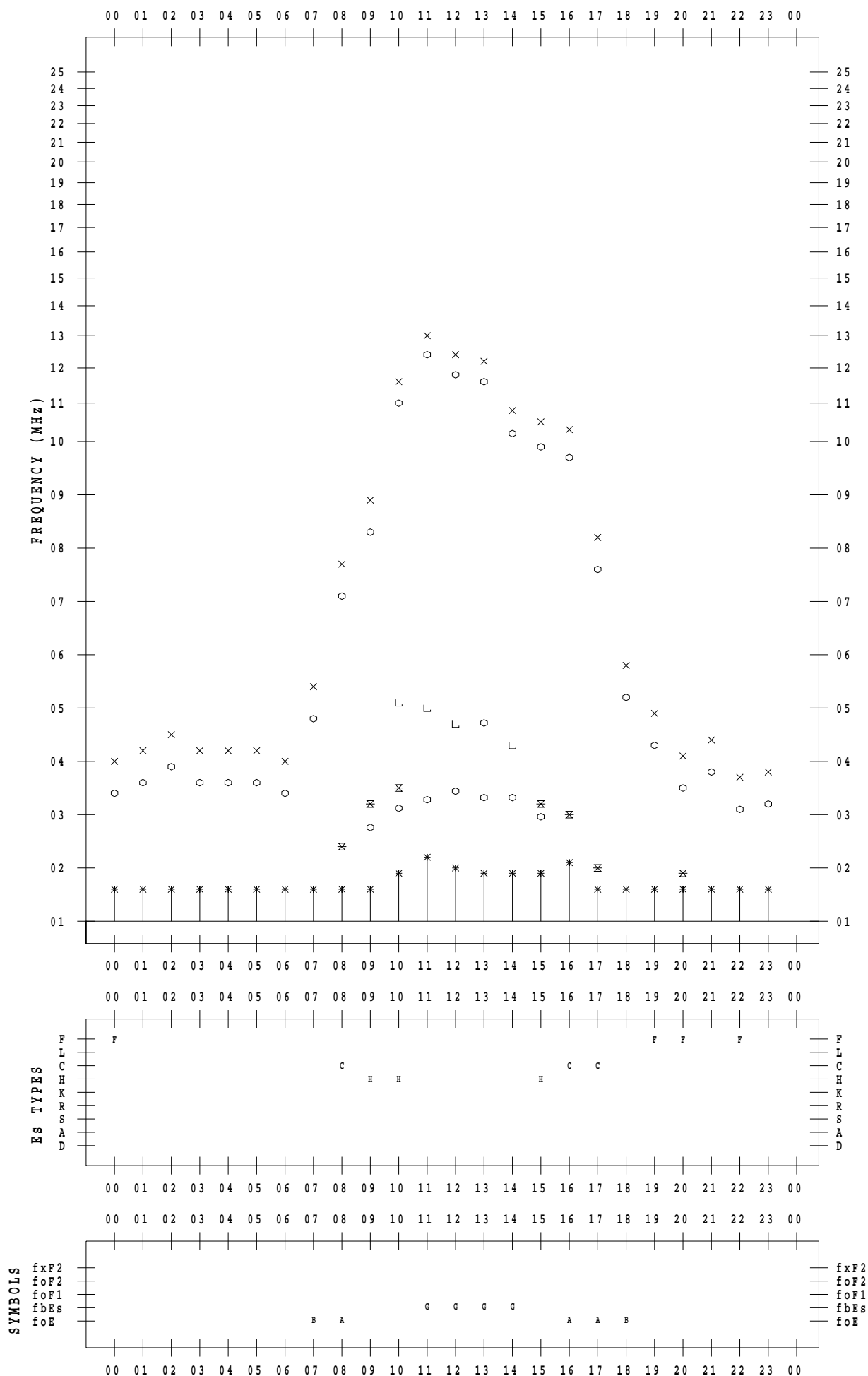
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Yamagawa

DATE : 2022/12/22

135 ° E MEAN TIME





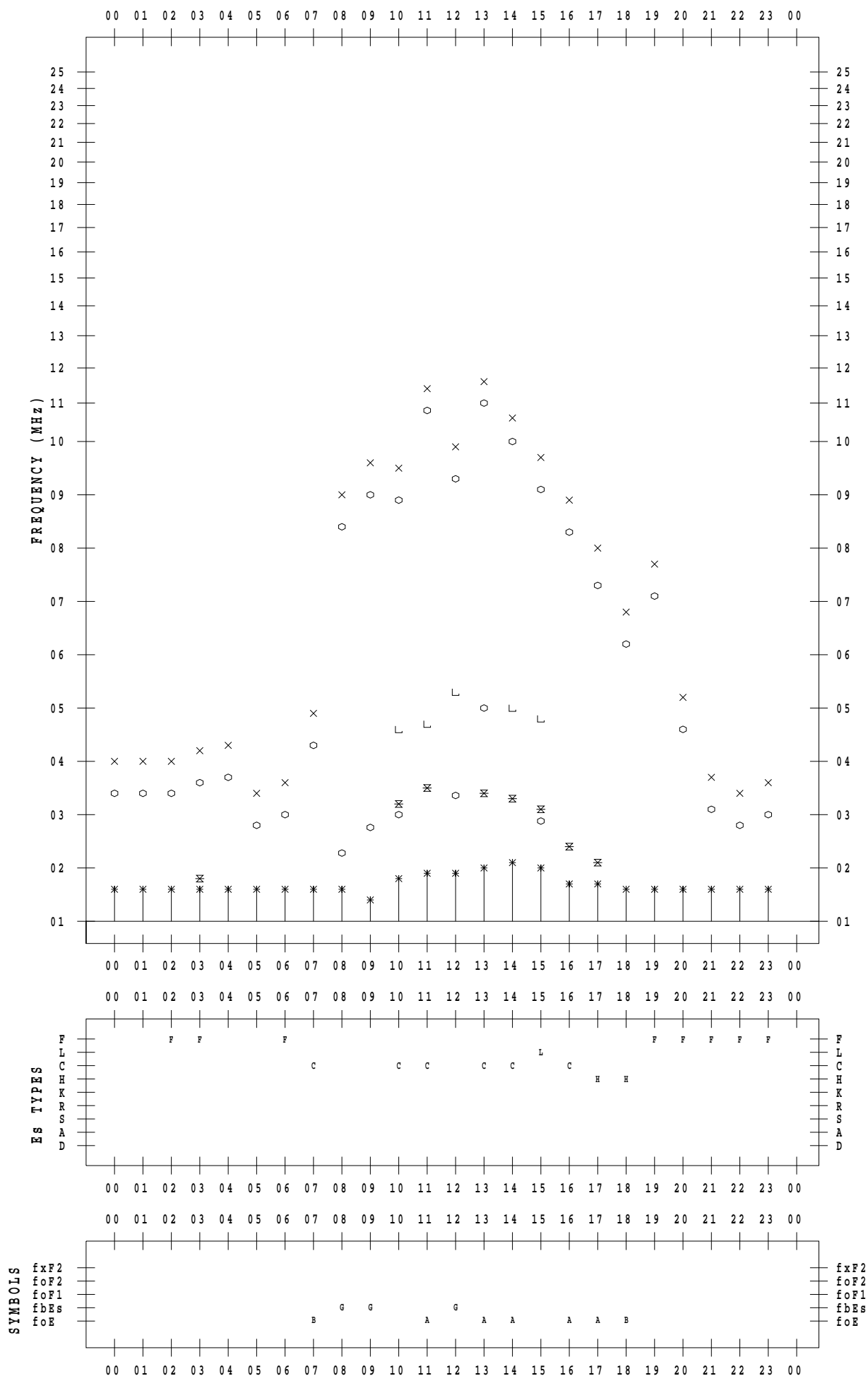
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Yamagawa

DATE : 2022/12/23

135 ° E MEAN TIME



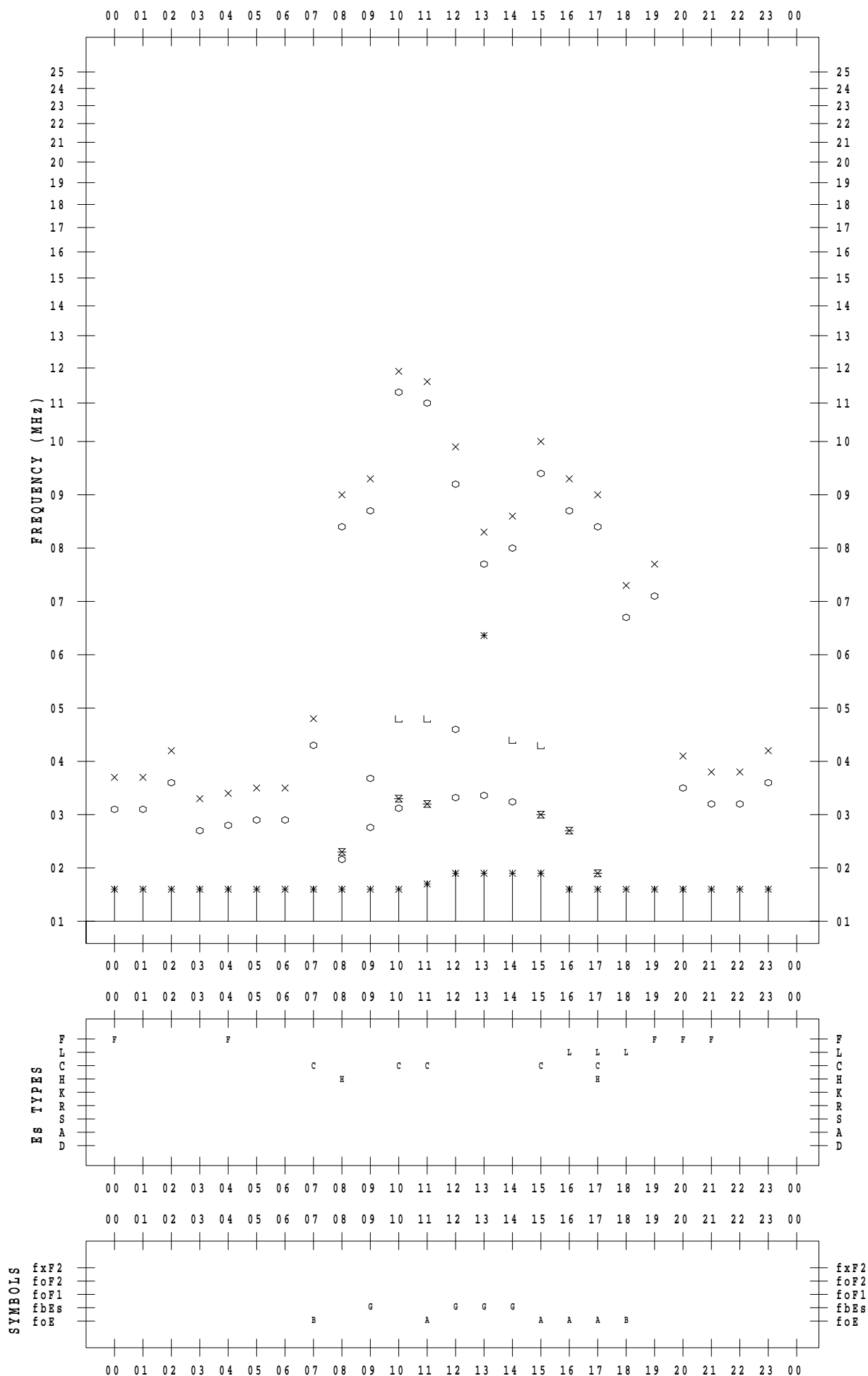
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Yamagawa

DATE : 2022/12/24

135 ° E MEAN TIME



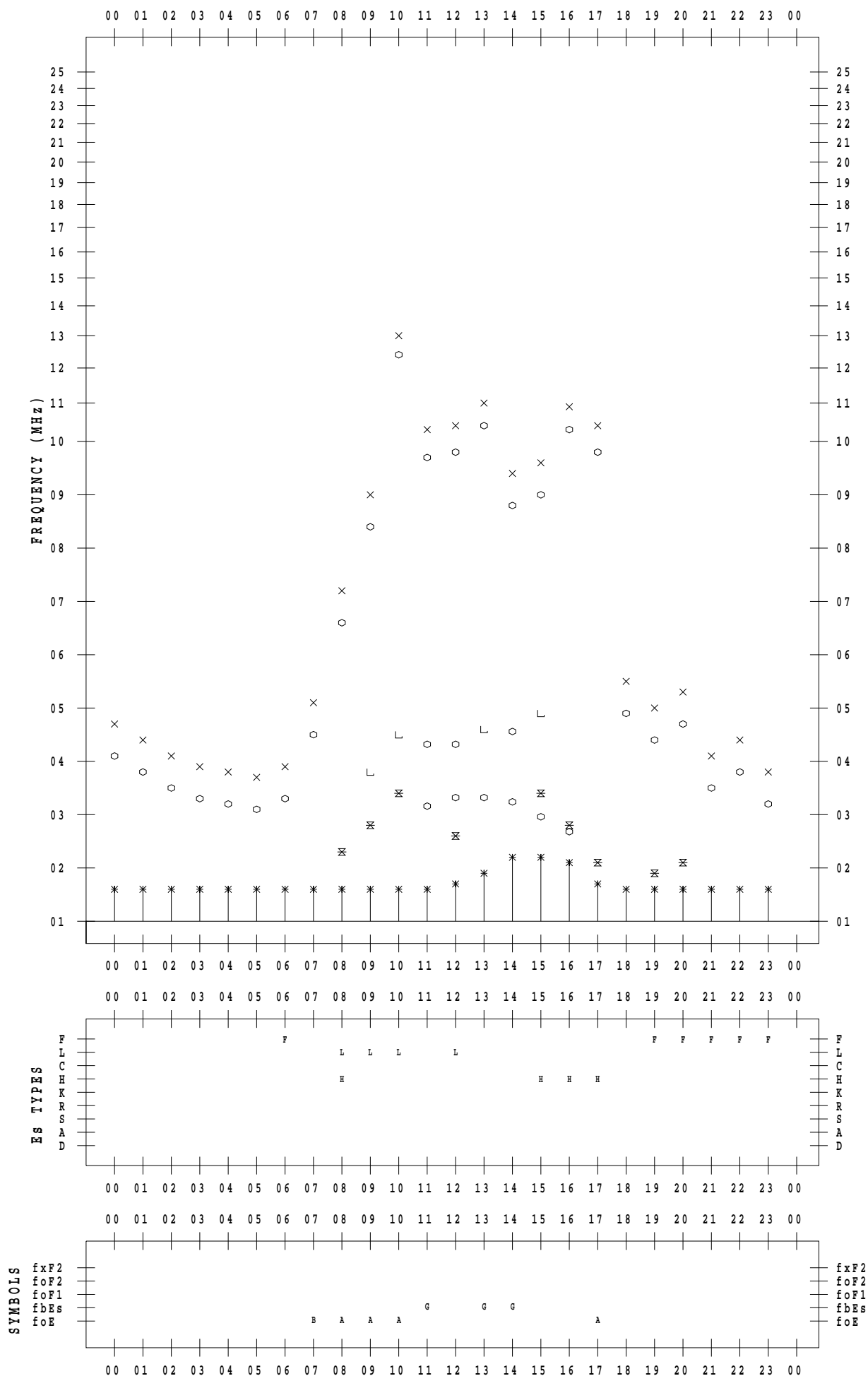
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Yamagawa

DATE : 2022/12/25

135 ° E MEAN TIME



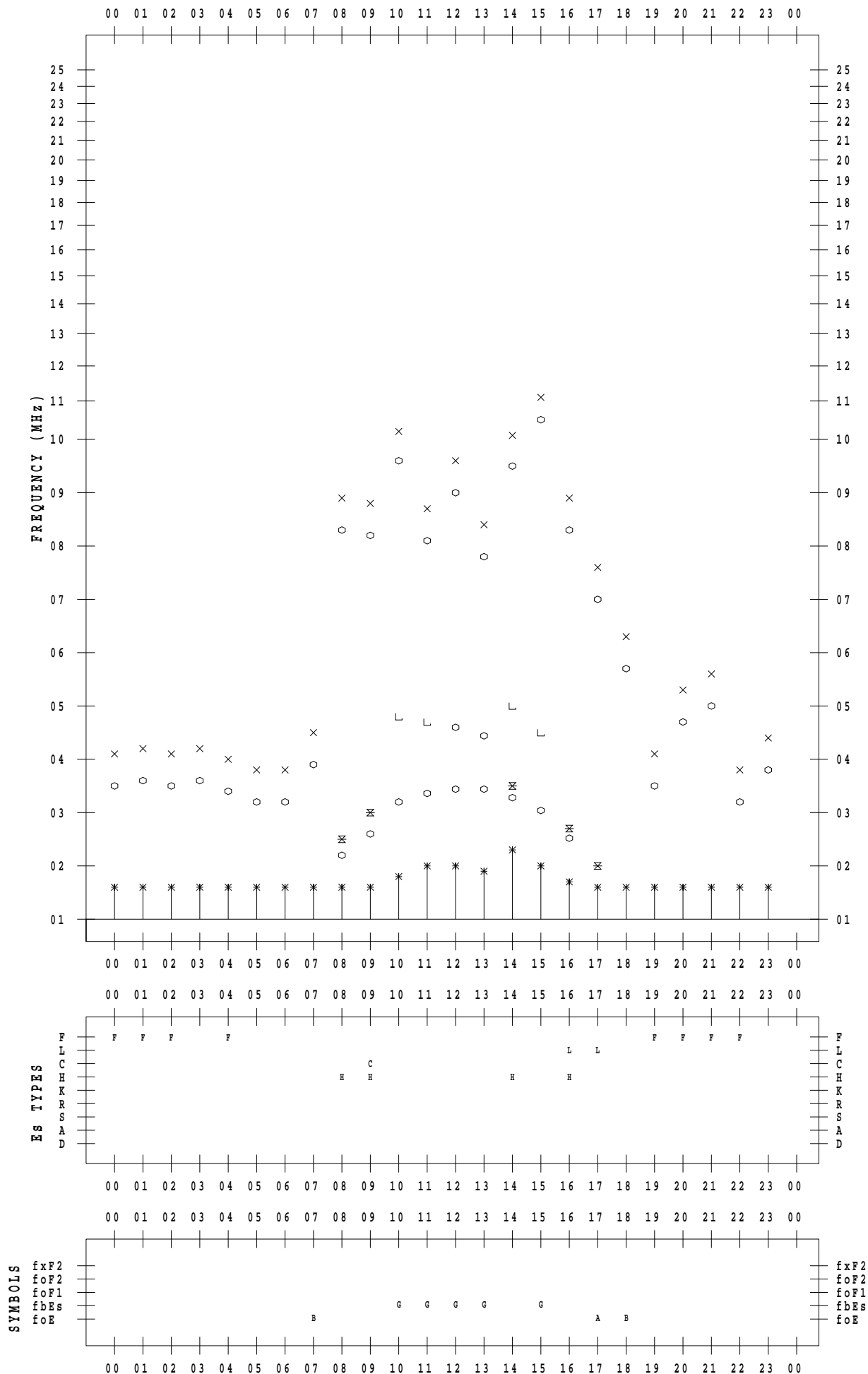
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Yamagawa

DATE : 2022/12/26

135 ° E MEAN TIME



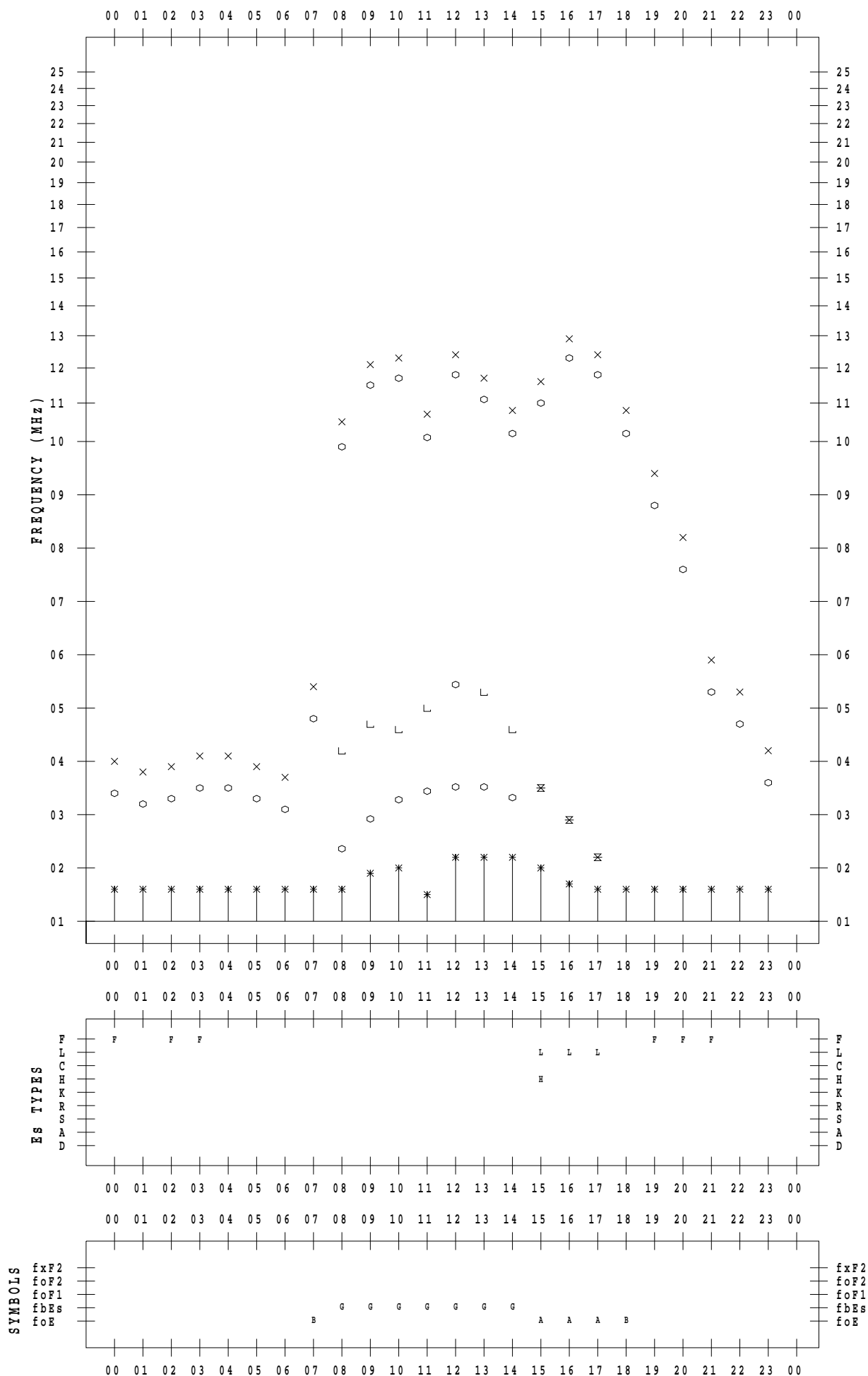
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Yamagawa

DATE : 2022/12/27

135 ° E MEAN TIME



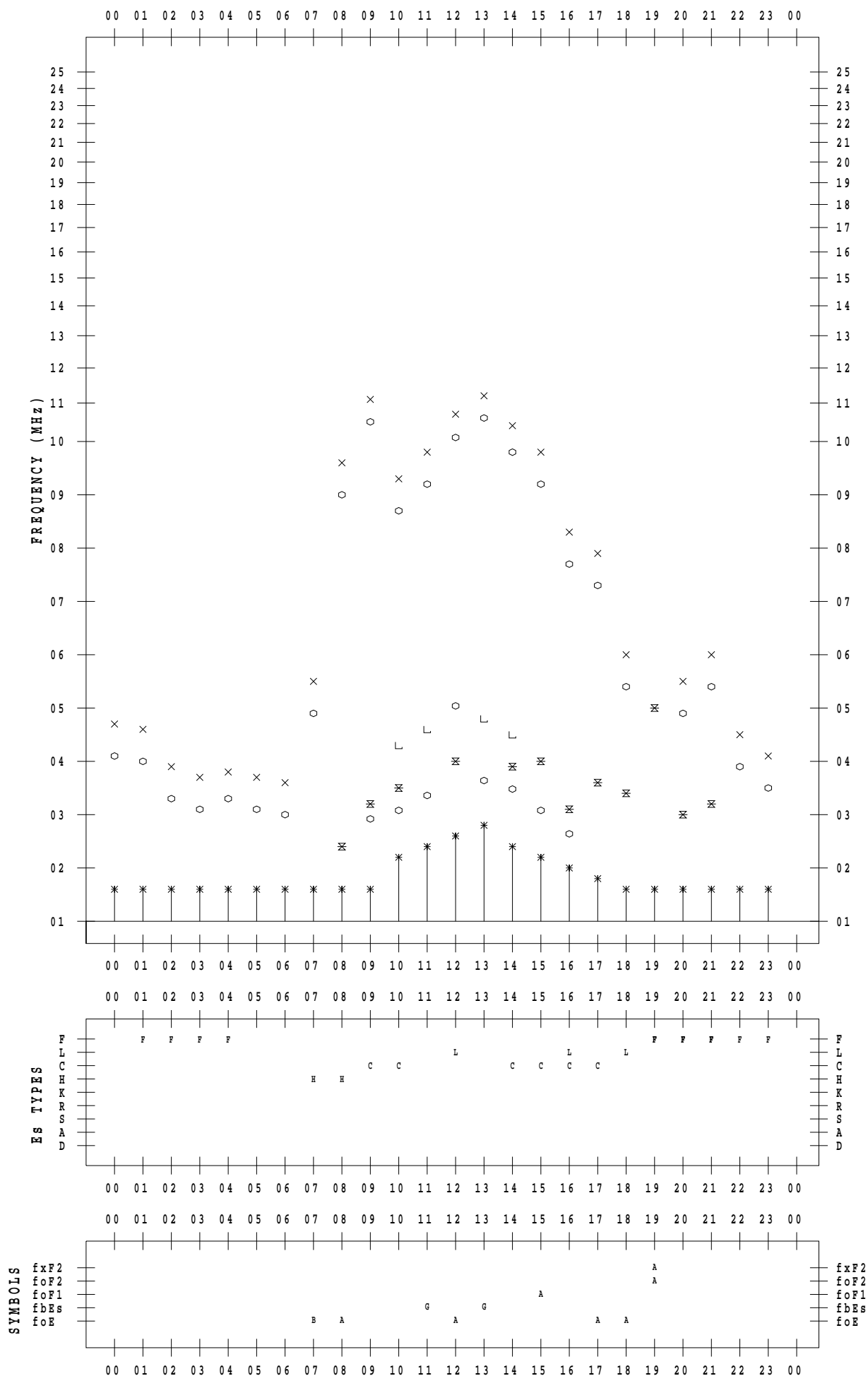
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Yamagawa

DATE : 2022/12/28

135 ° E MEAN TIME



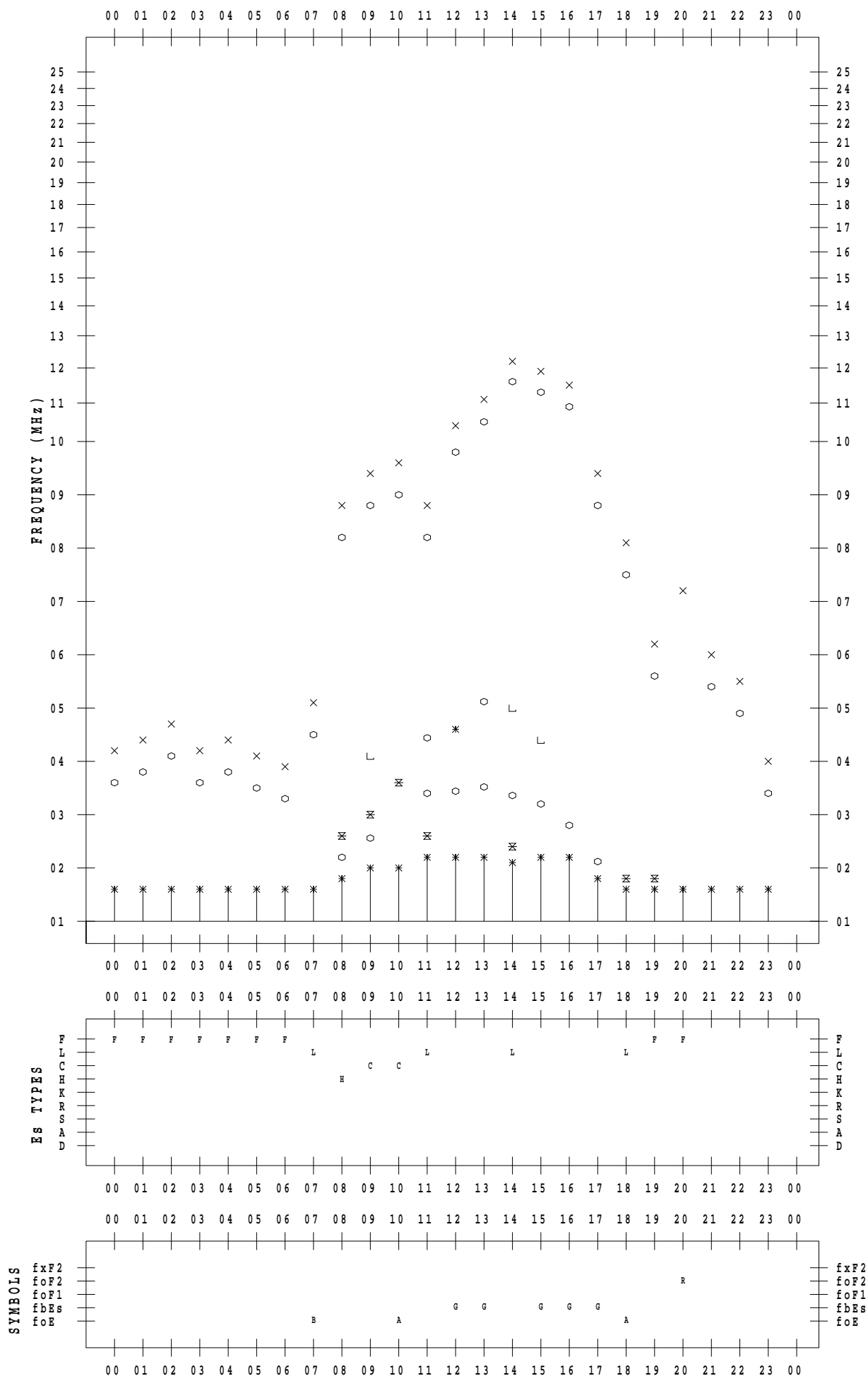
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Yamagawa

DATE : 2022/12/29

135 ° E MEAN TIME



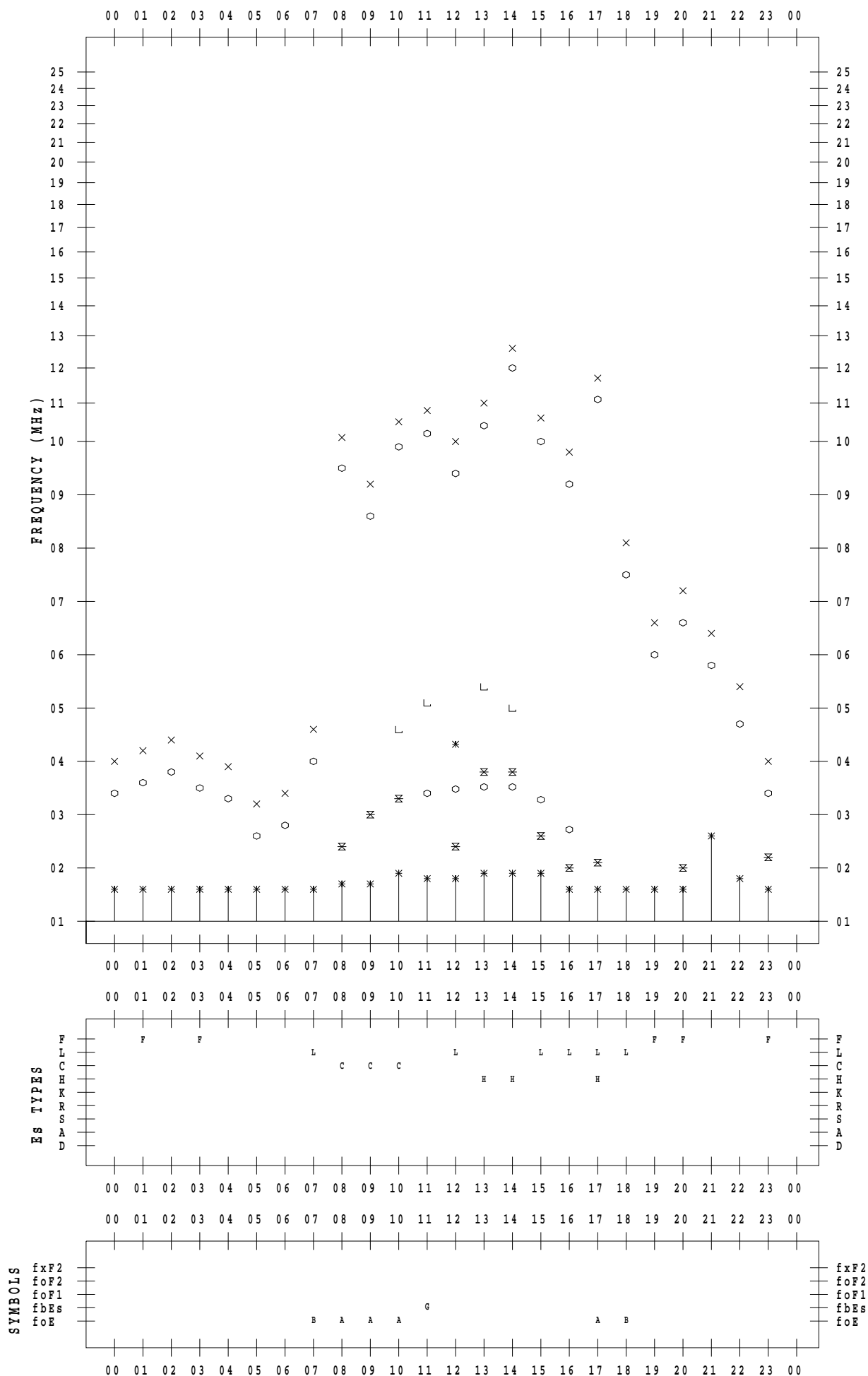
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Yamagawa

DATE : 2022/12/30

135 ° E MEAN TIME





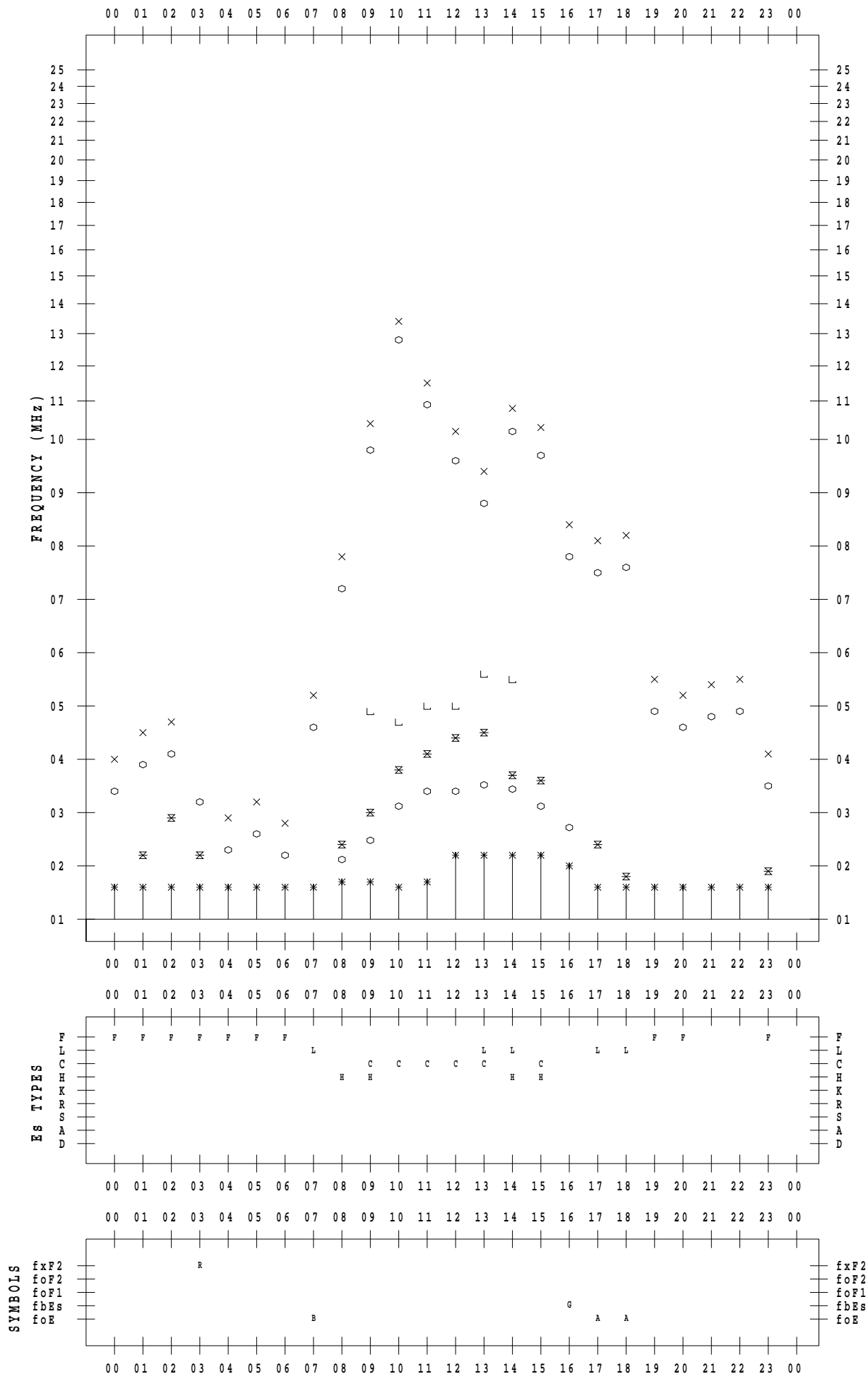
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Yamagawa

DATE : 2022/12/31

135 ° E MEAN TIME



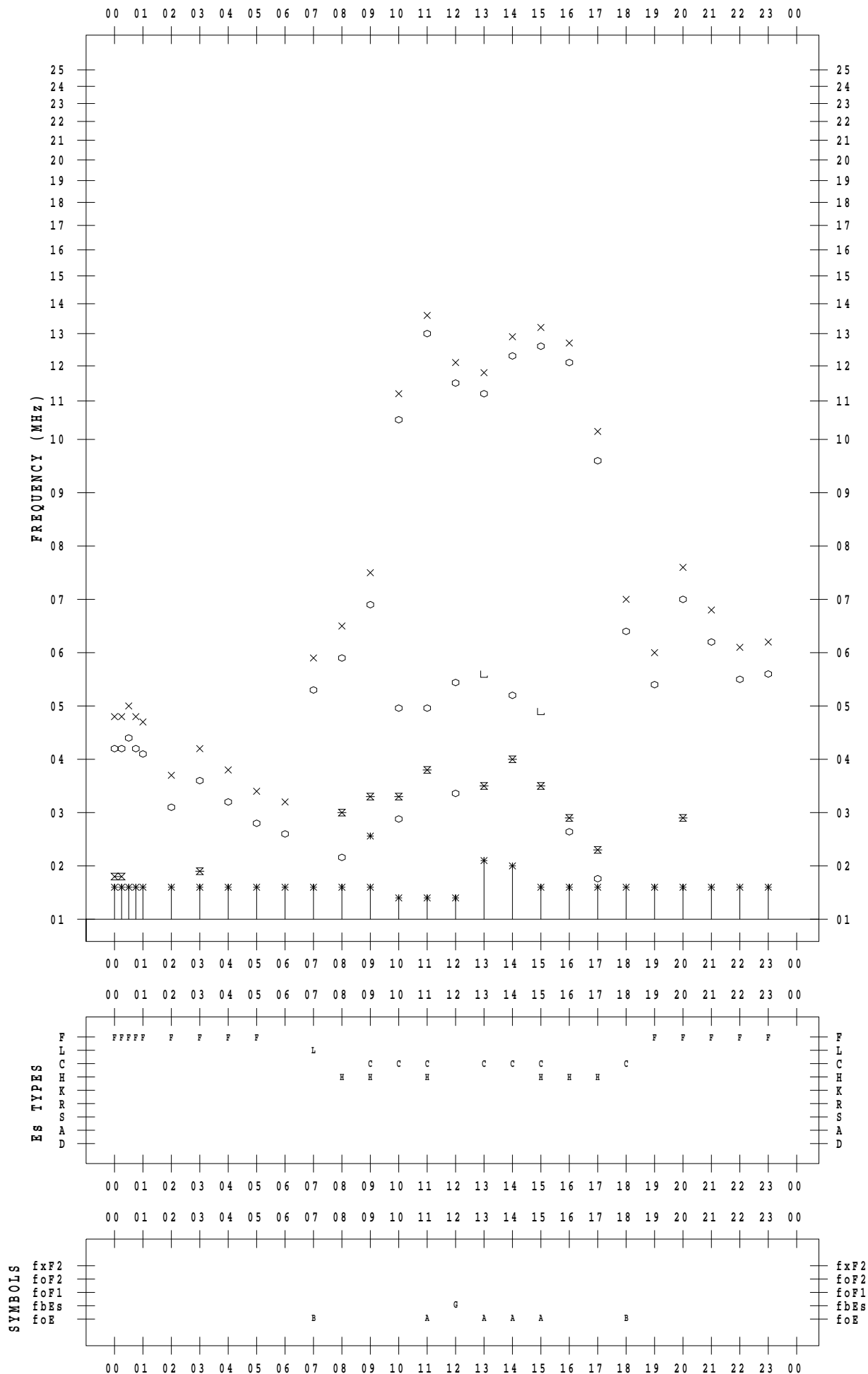
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/ 1

135 ° E MEAN TIME



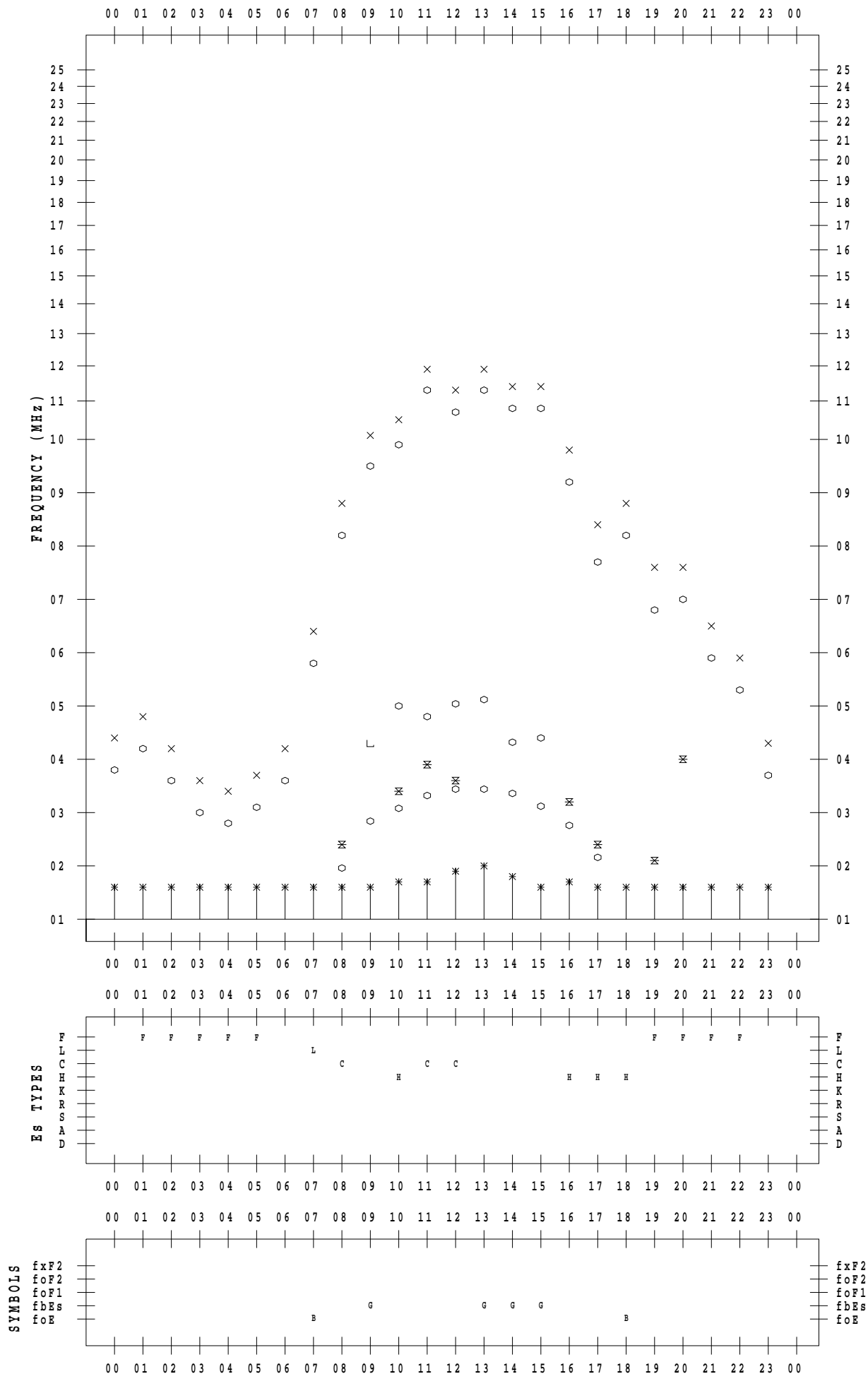
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/ 2

135 ° E MEAN TIME



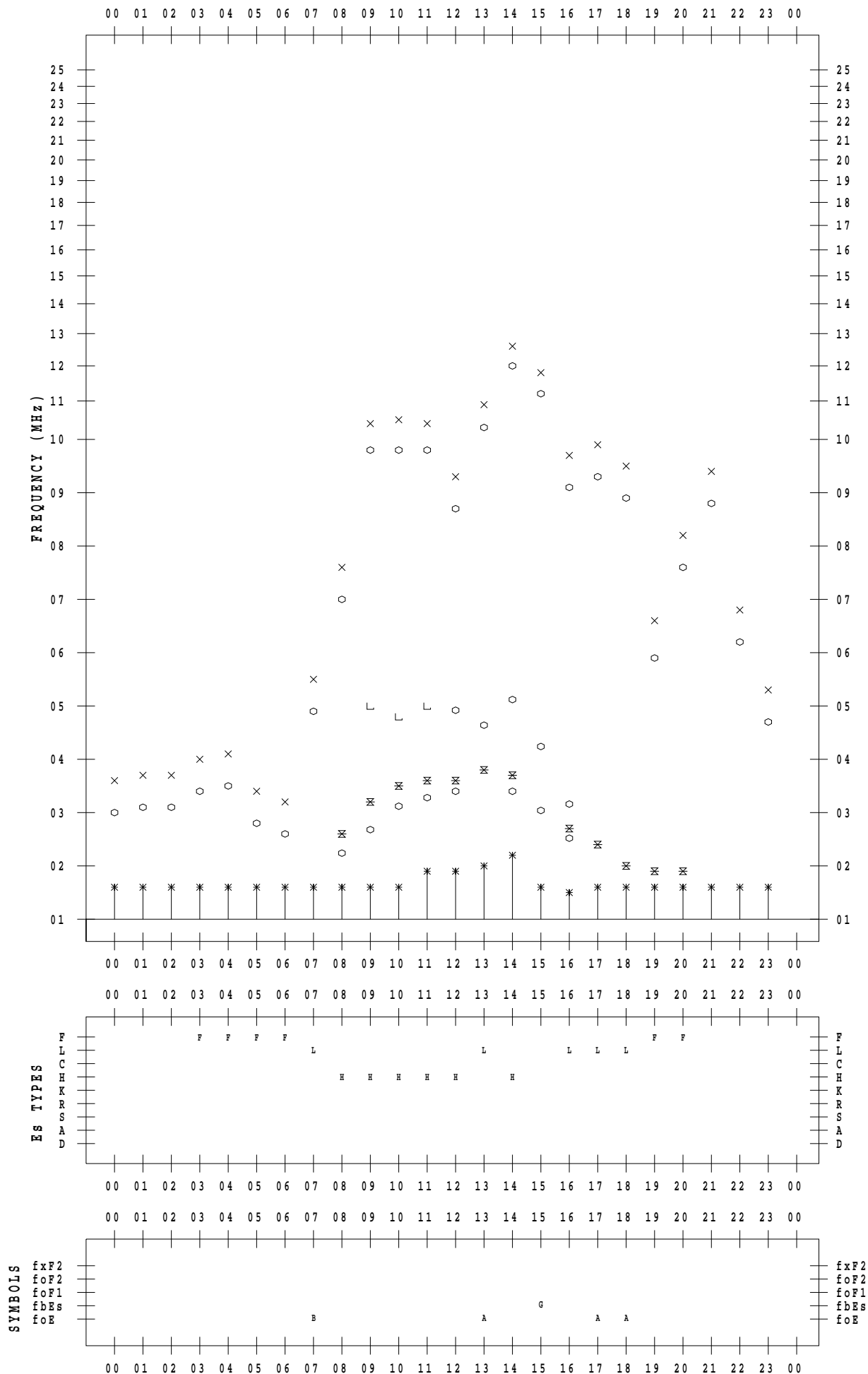
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/ 3

135 ° E MEAN TIME



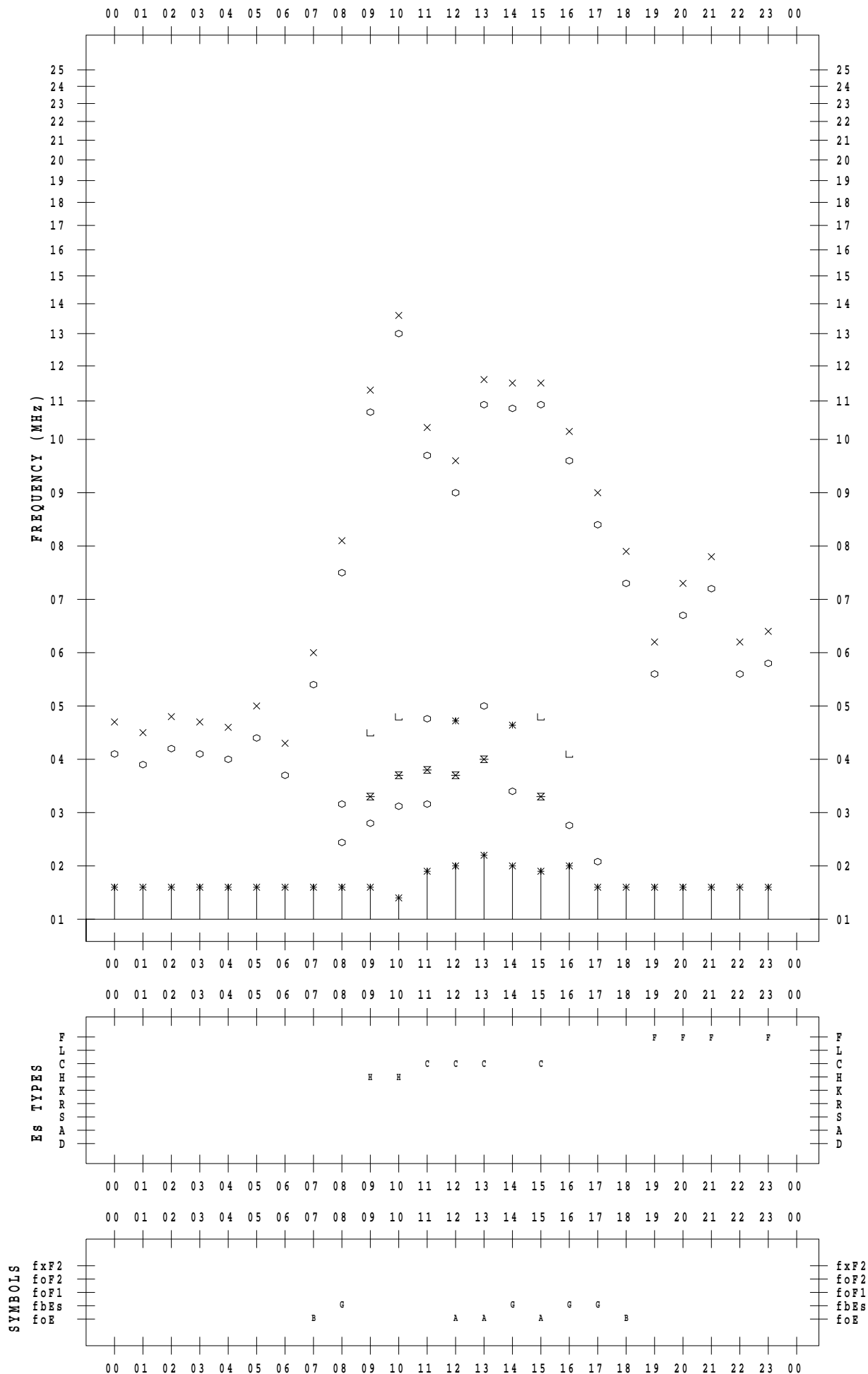
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/ 4

135 ° E MEAN TIME



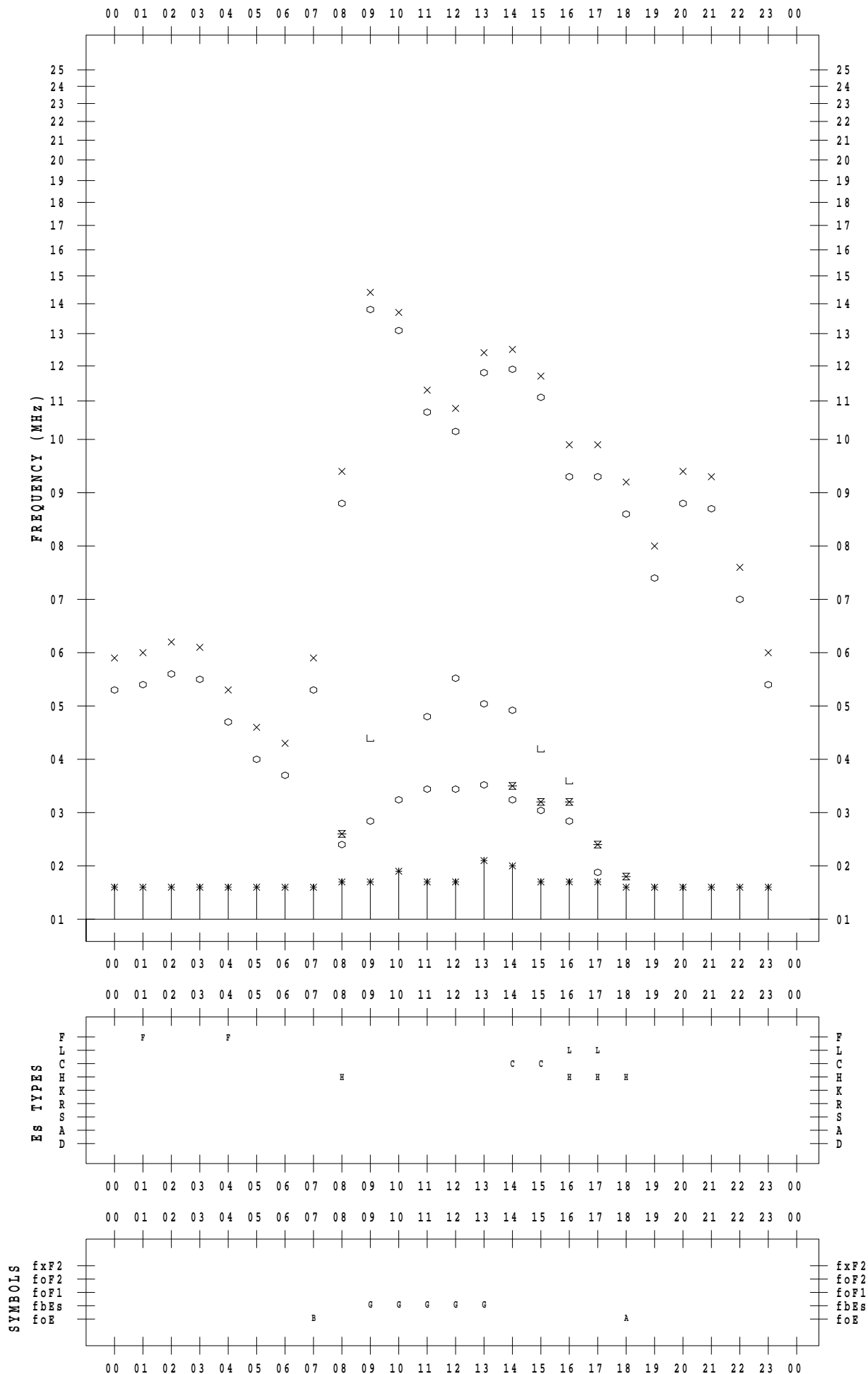
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/ 5

135 ° E MEAN TIME



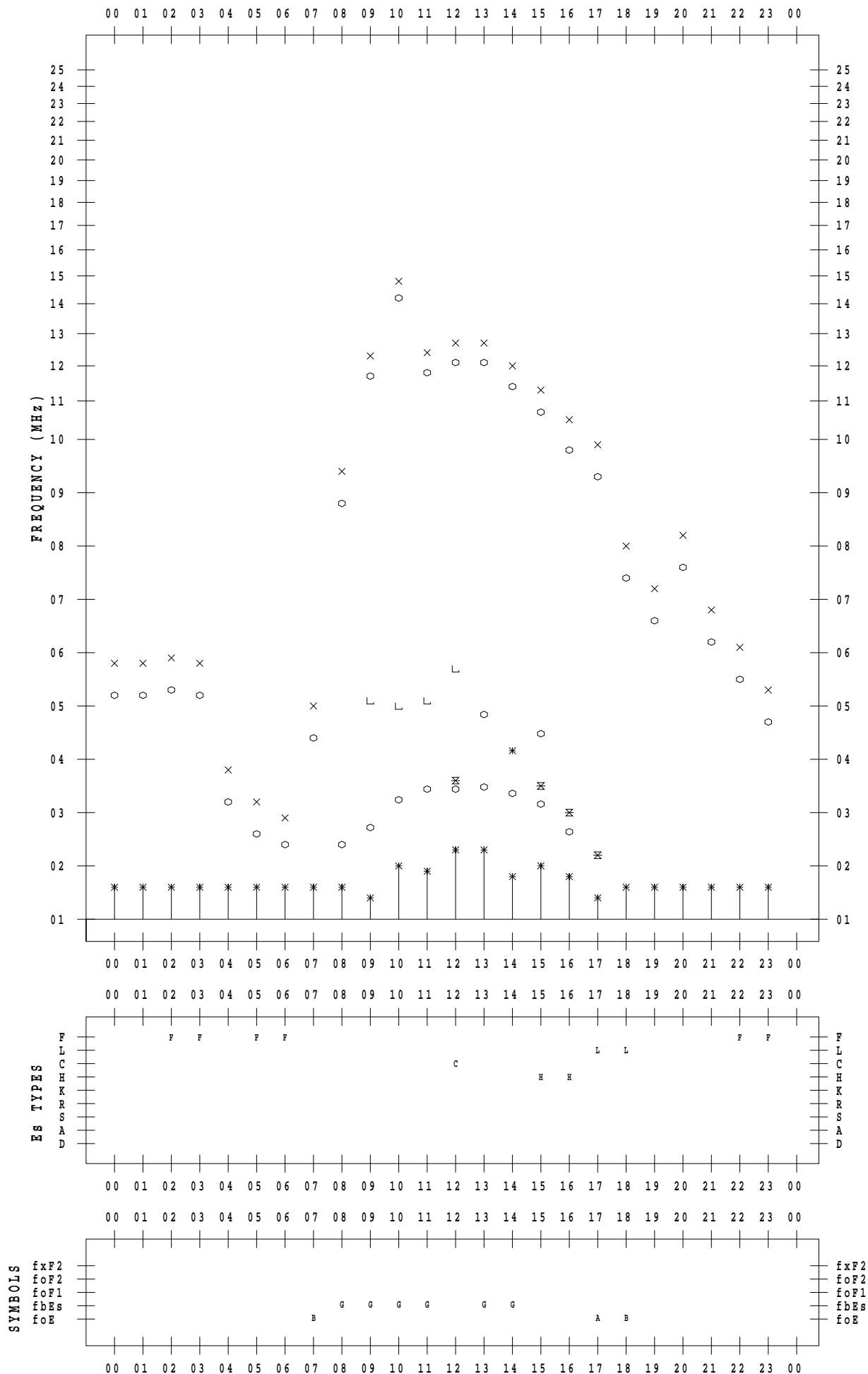
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/ 6

135 ° E MEAN TIME



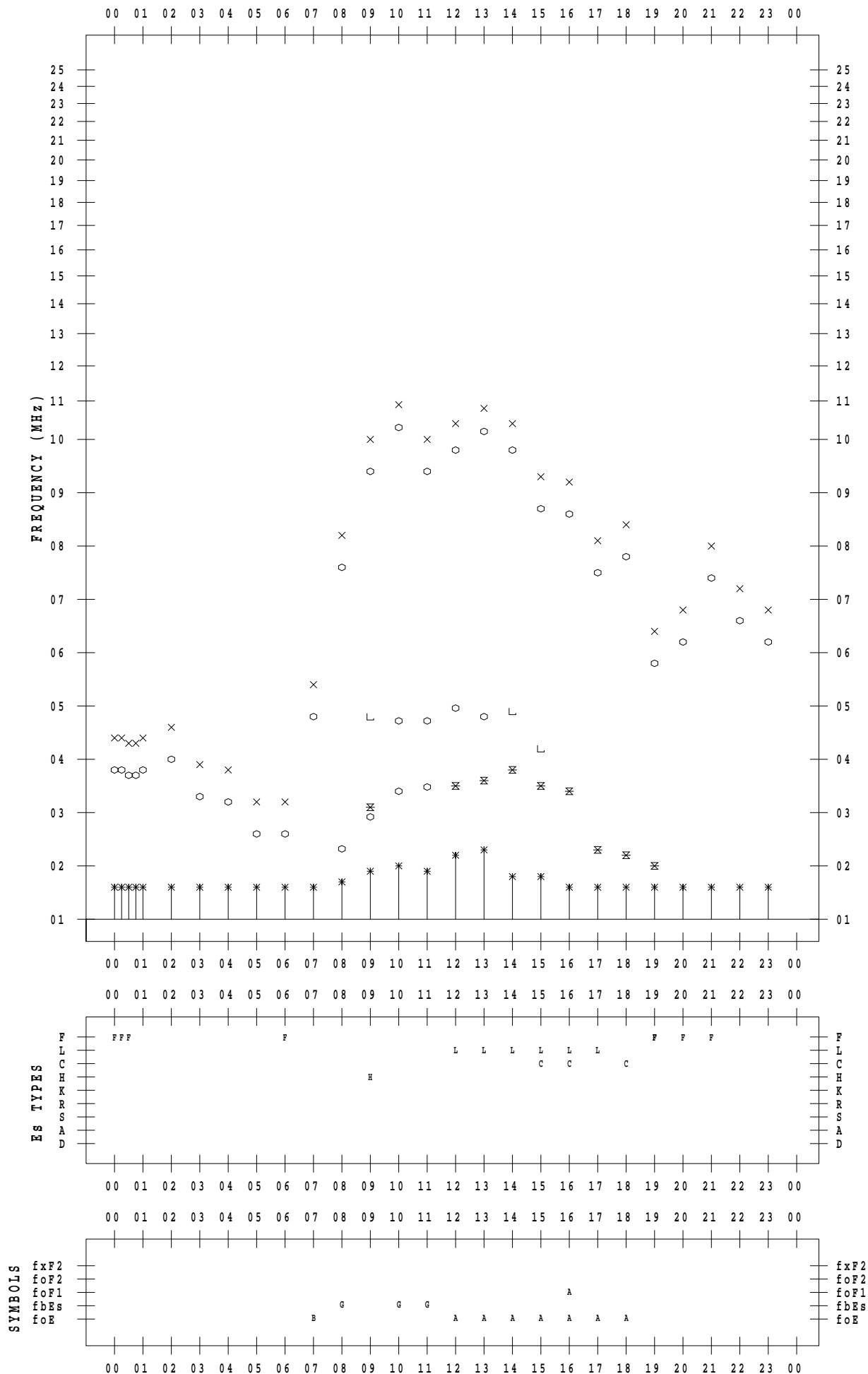
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/ 7

135 ° E MEAN TIME





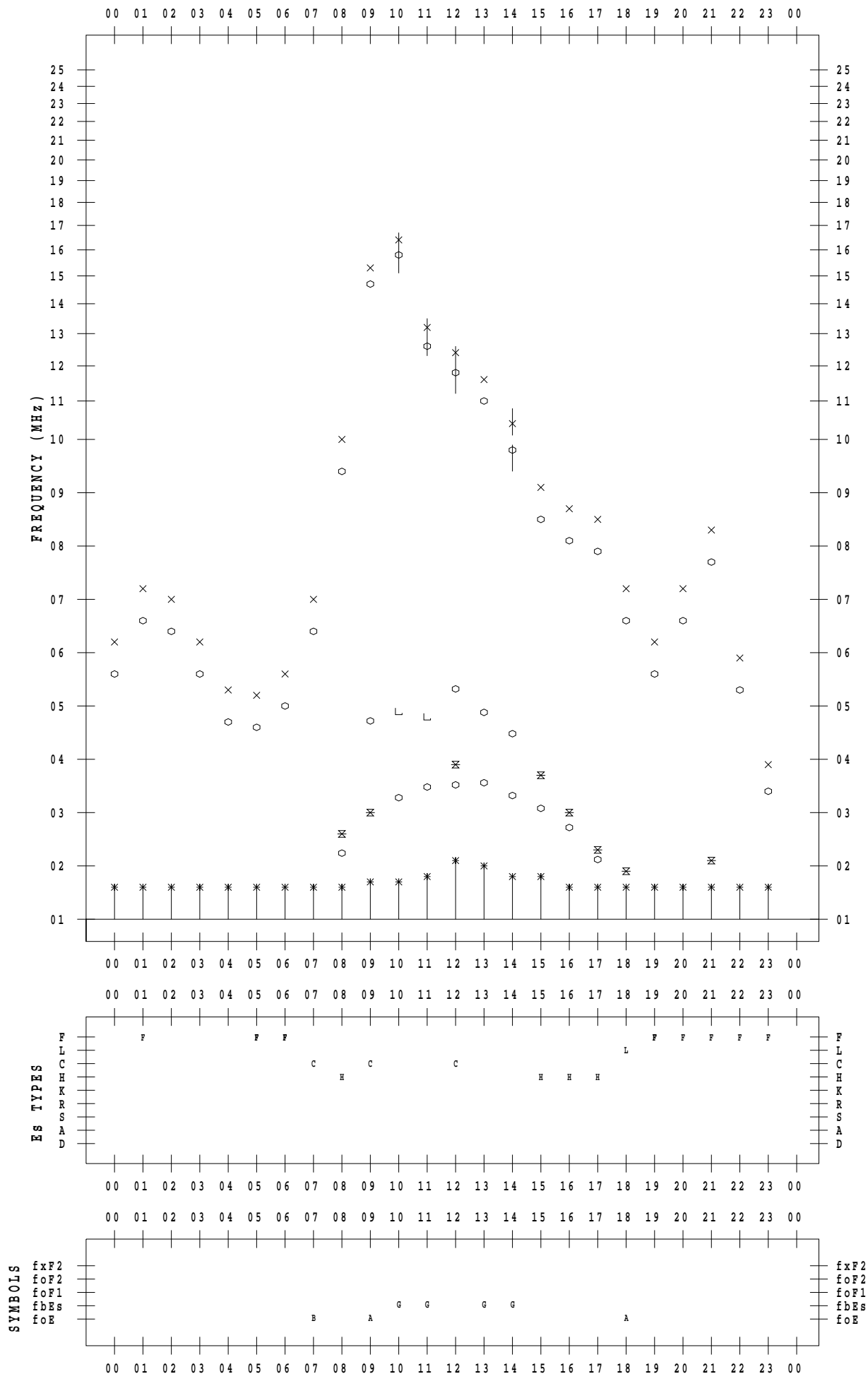
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/ 8

135 ° E MEAN TIME



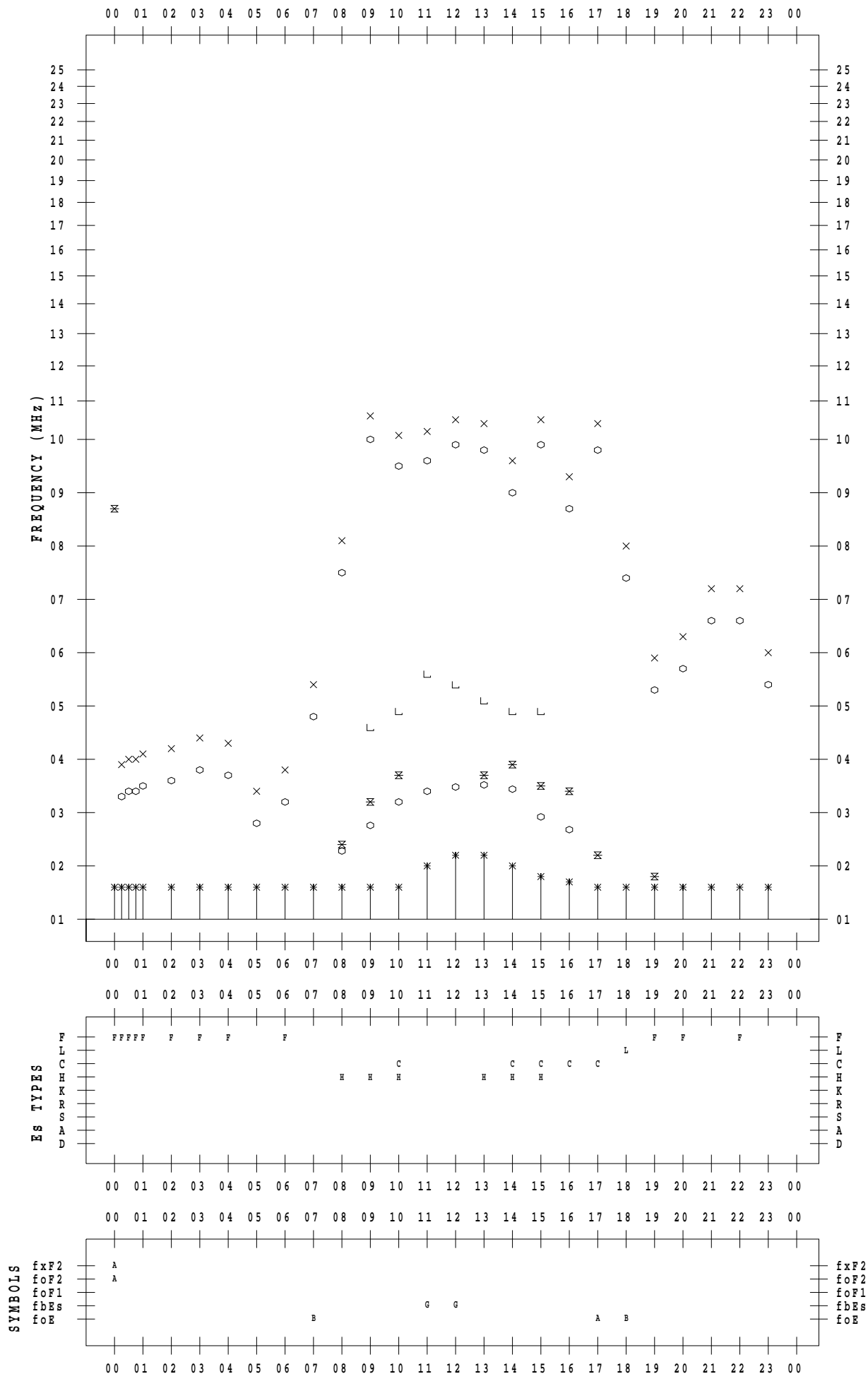
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/ 9

135 ° E MEAN TIME



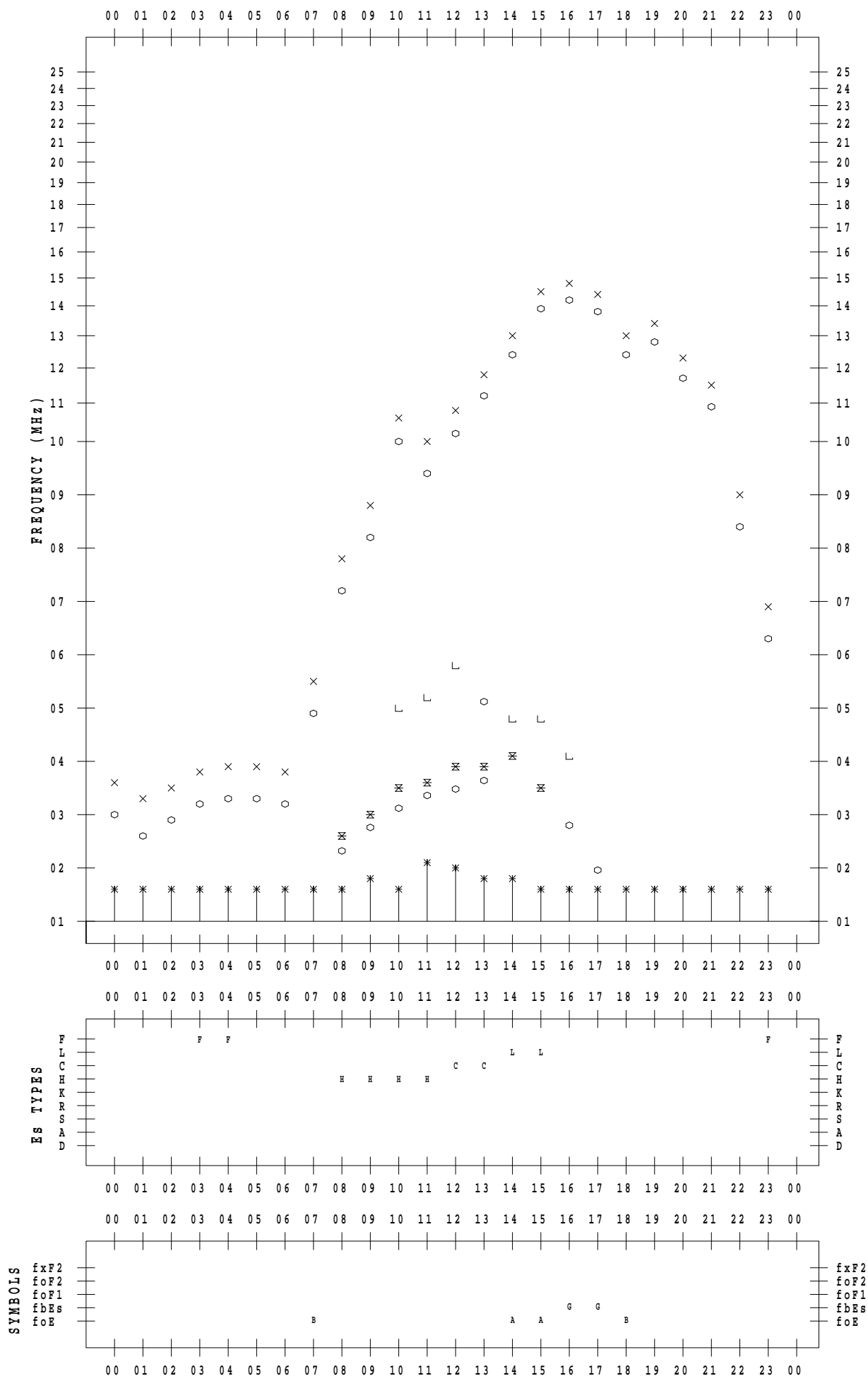
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/10

135 ° E MEAN TIME



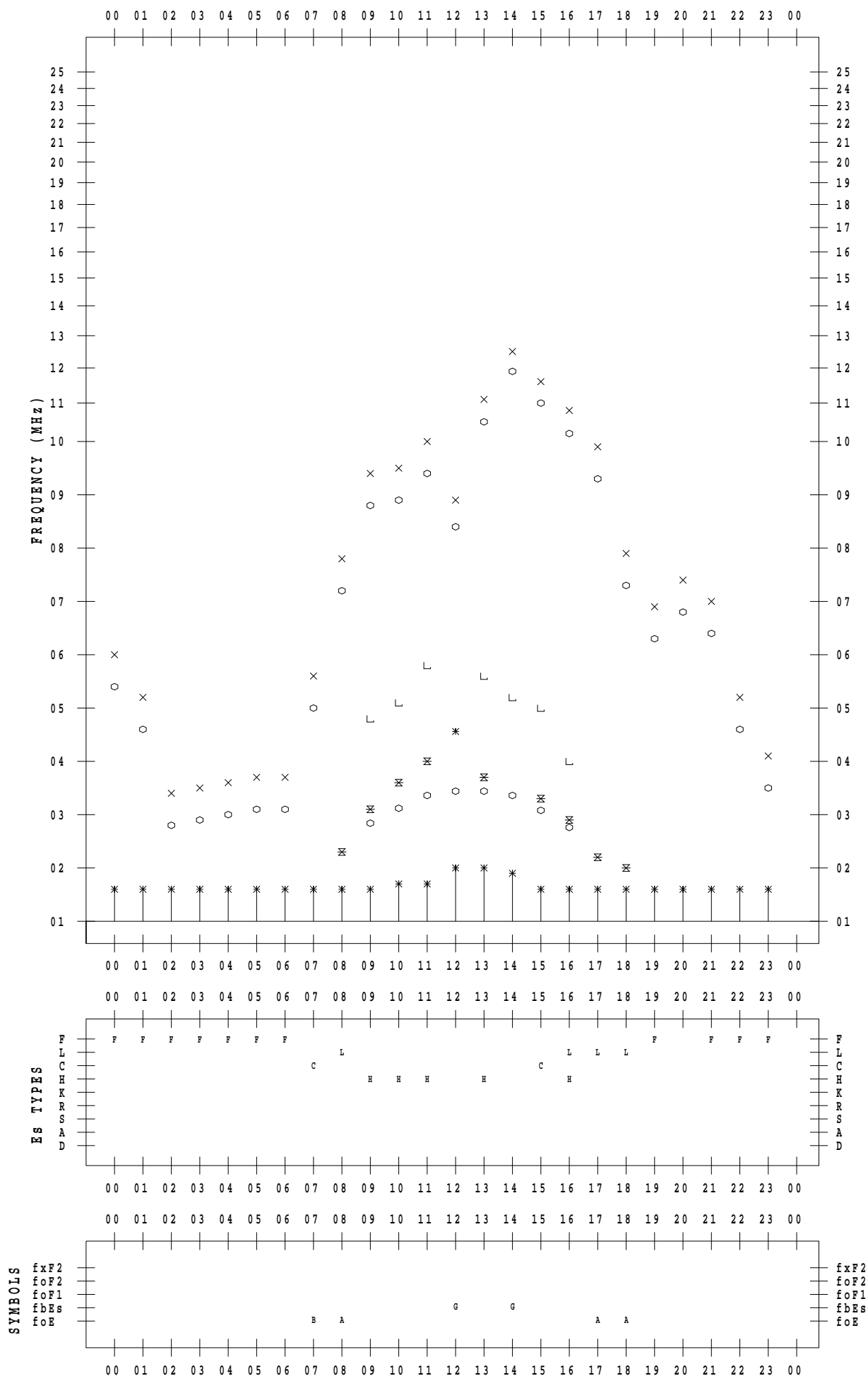
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/11

135 ° E MEAN TIME



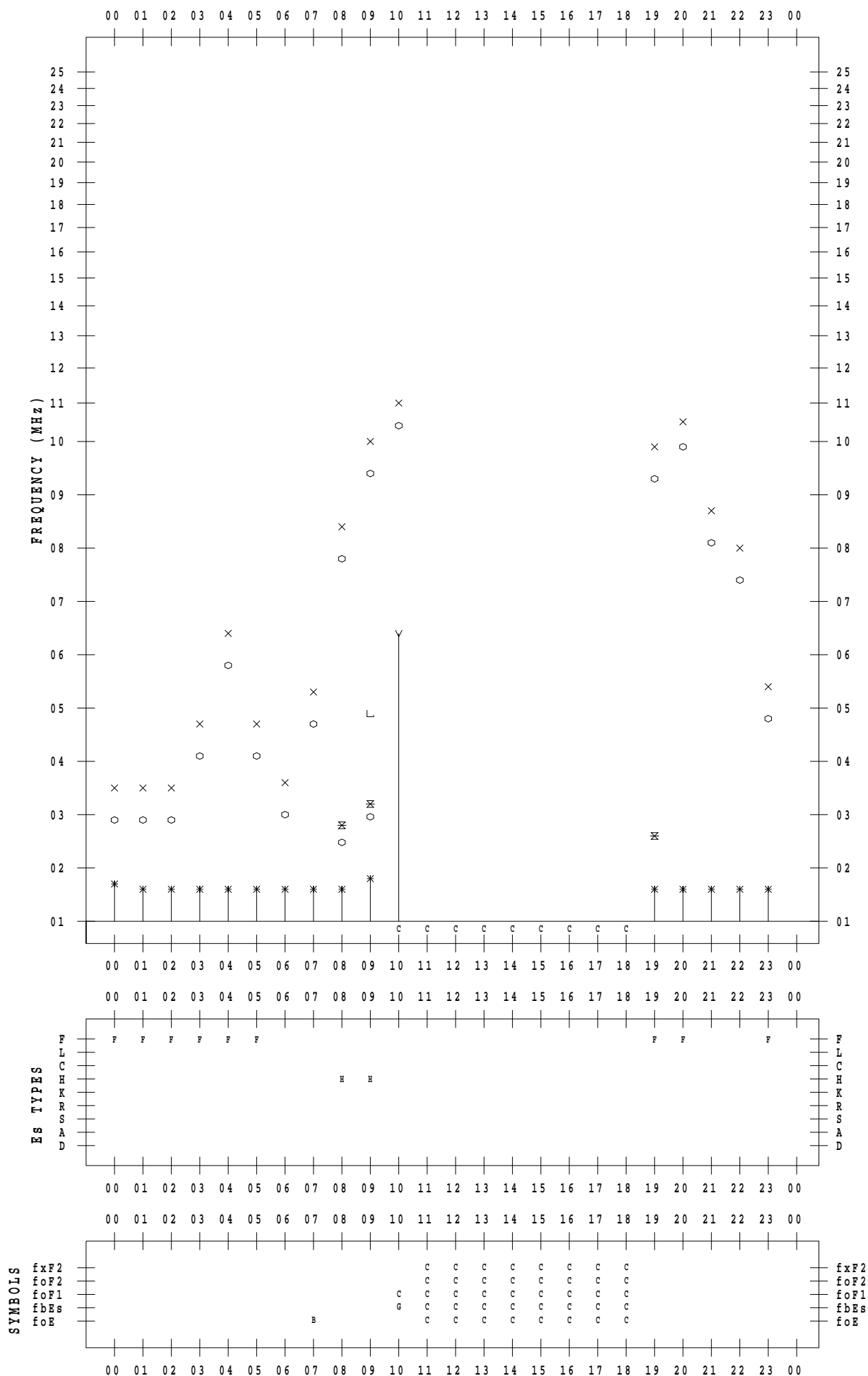
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/12

135 ° E MEAN TIME



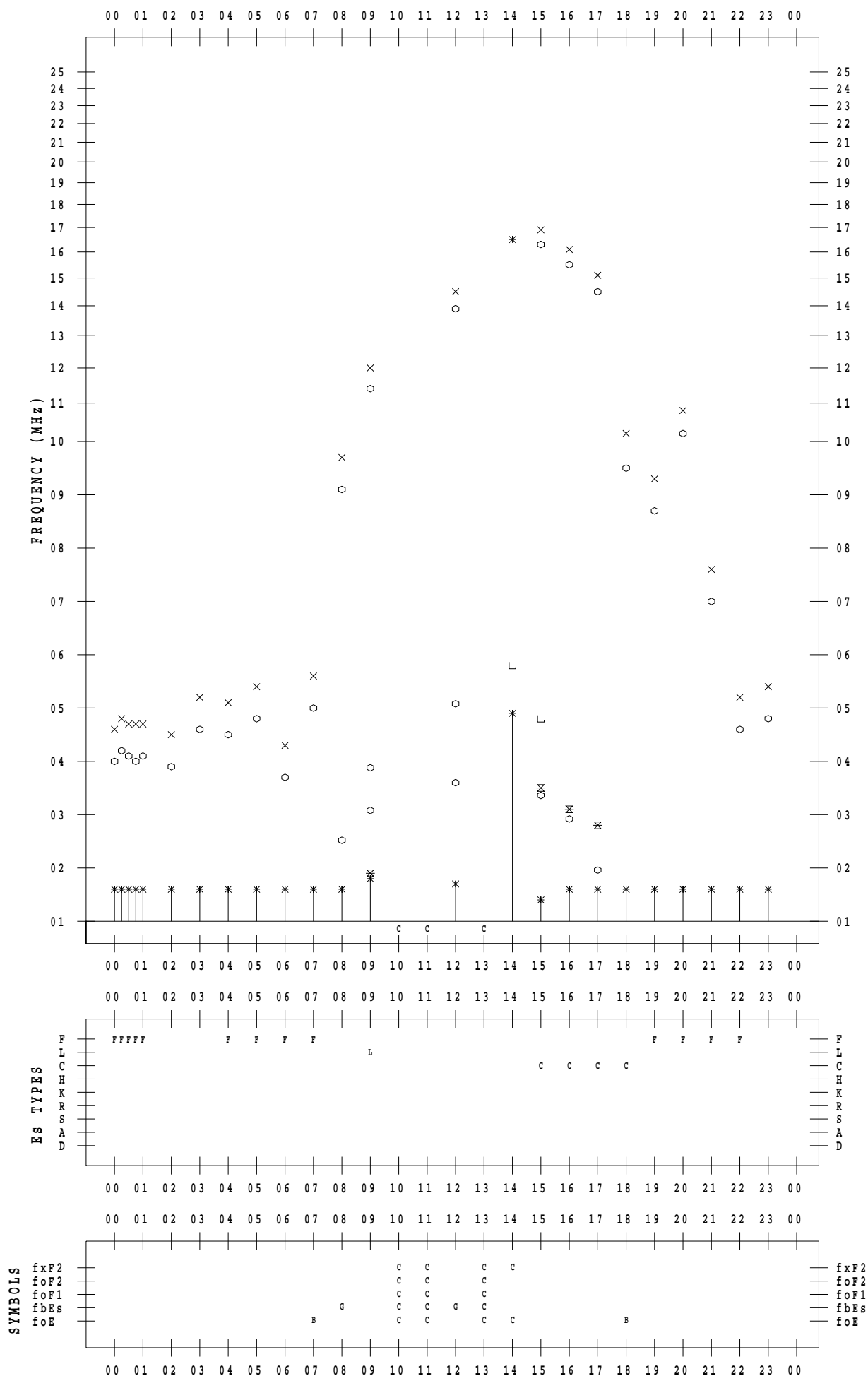
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/13

135 ° E MEAN TIME



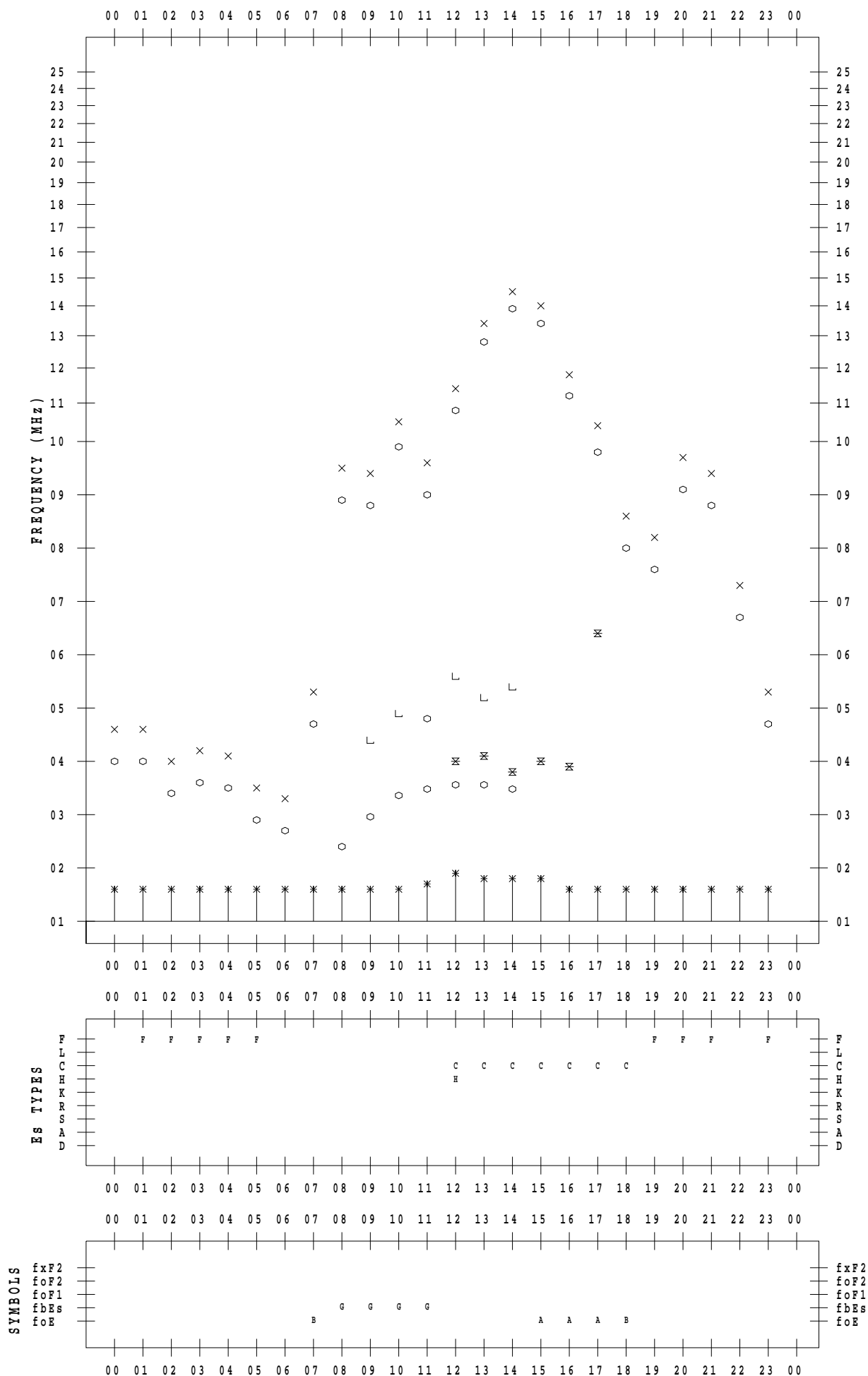
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/14

135 ° E MEAN TIME



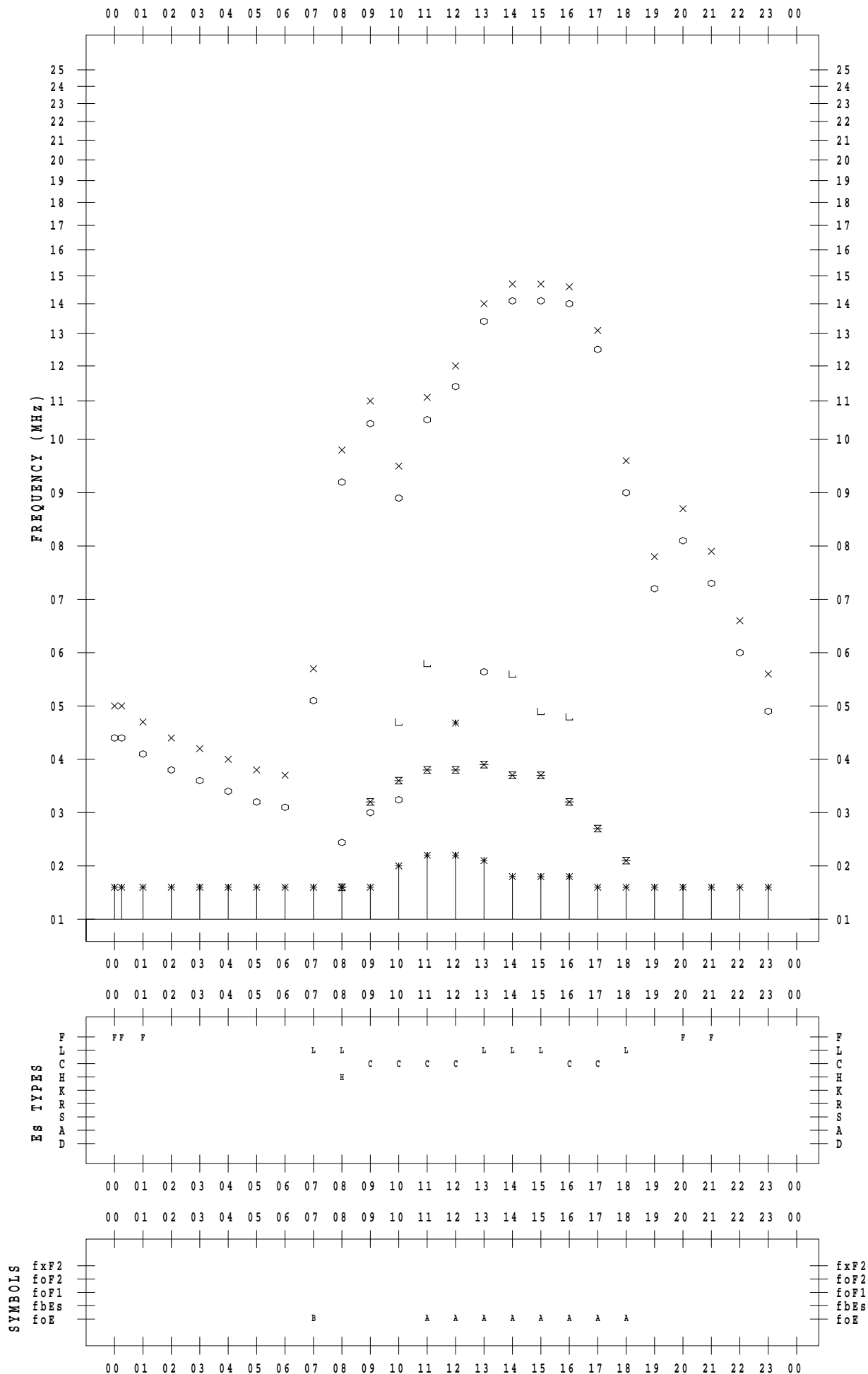
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/15

135 ° E MEAN TIME





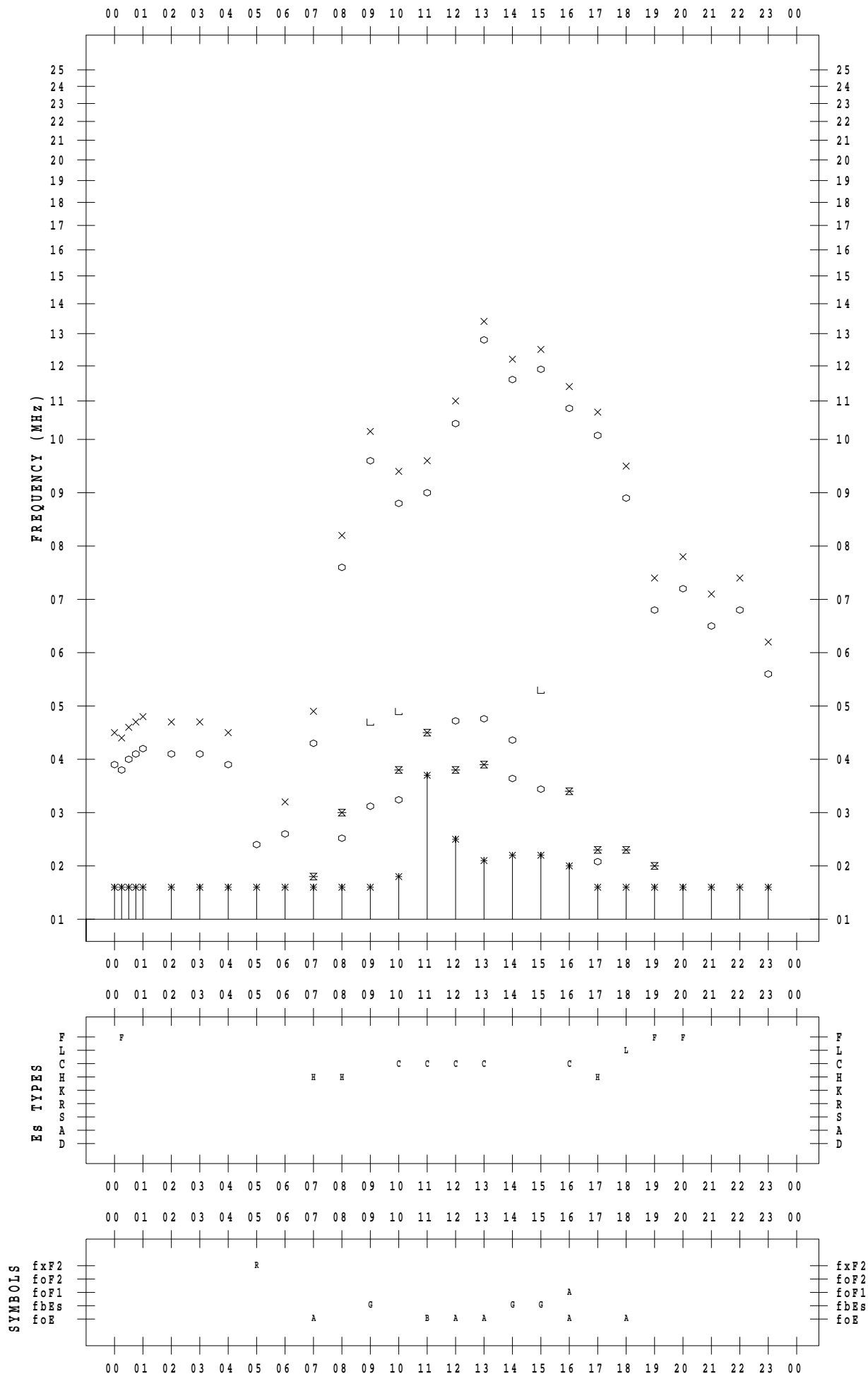
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/16

135 ° E MEAN TIME



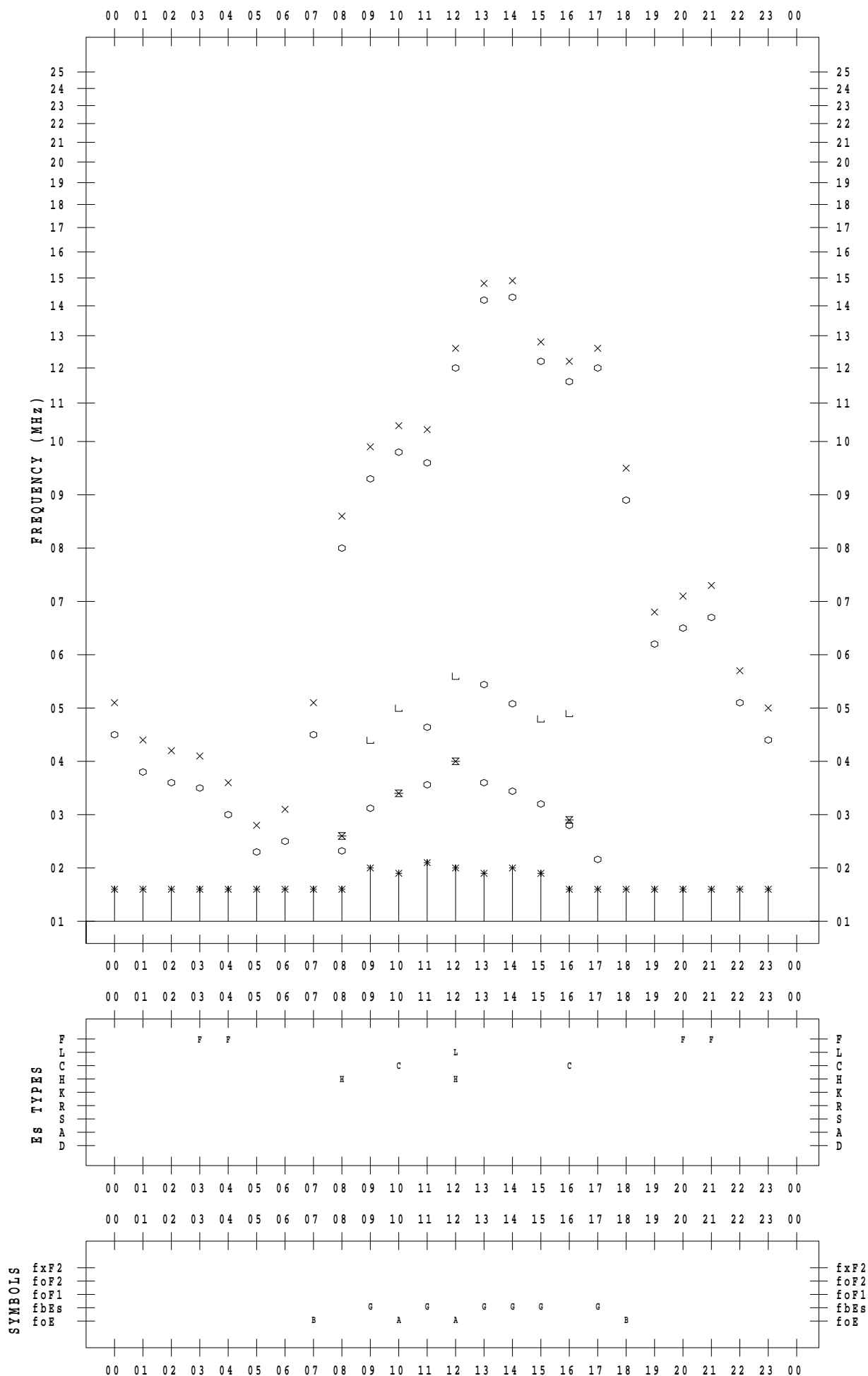
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/17

135 ° E MEAN TIME



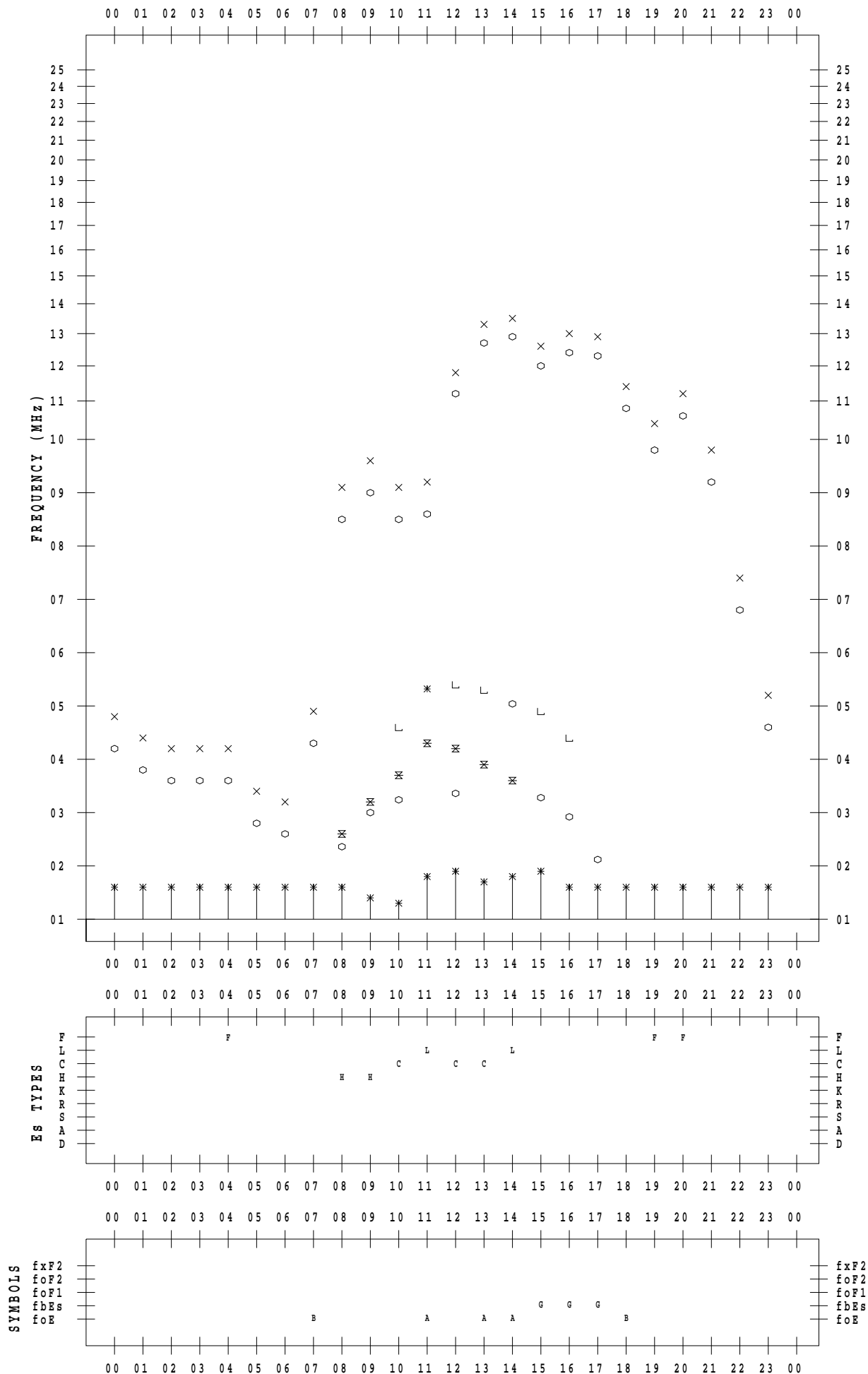
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/18

135 ° E MEAN TIME



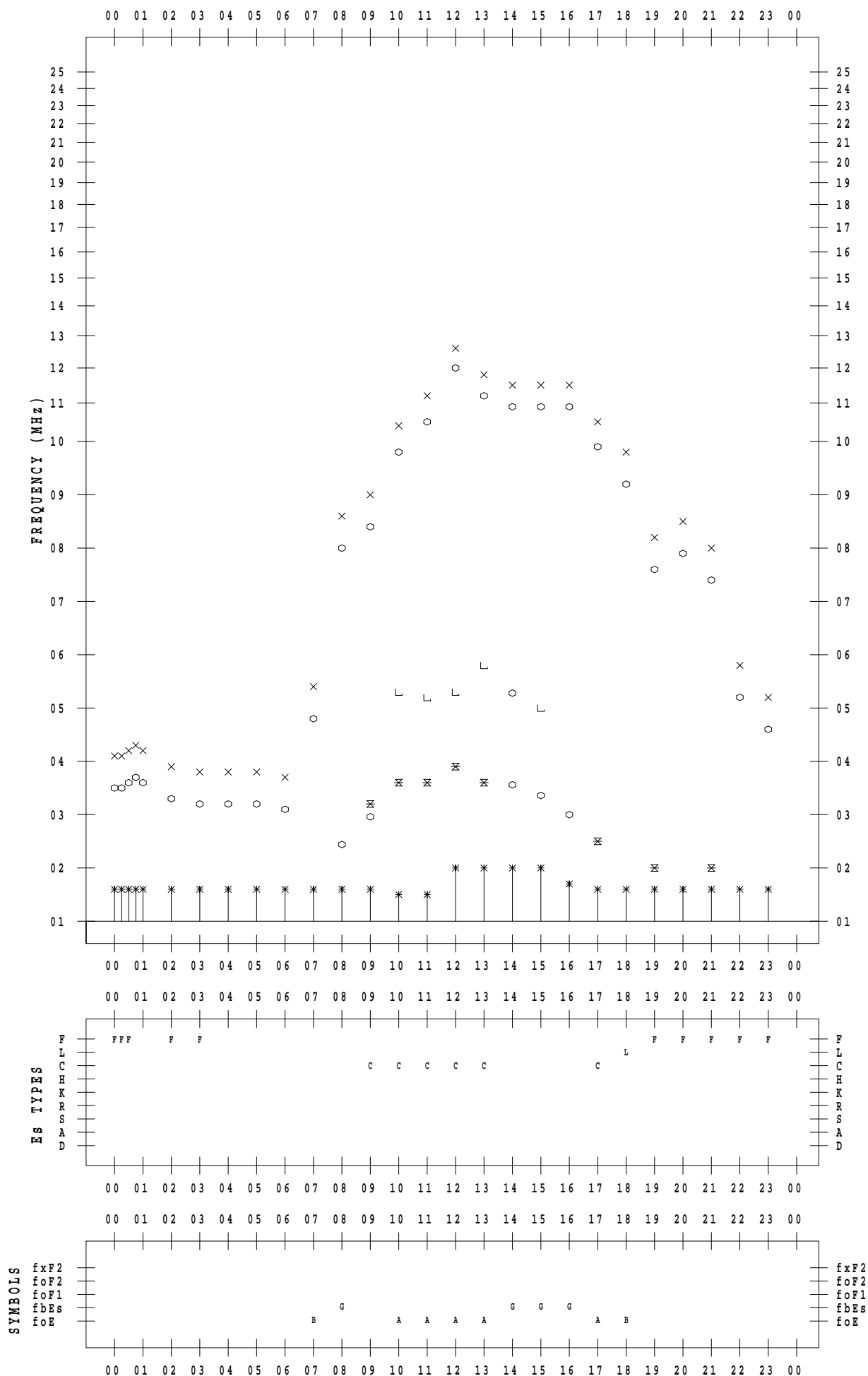
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/19

135 ° E MEAN TIME



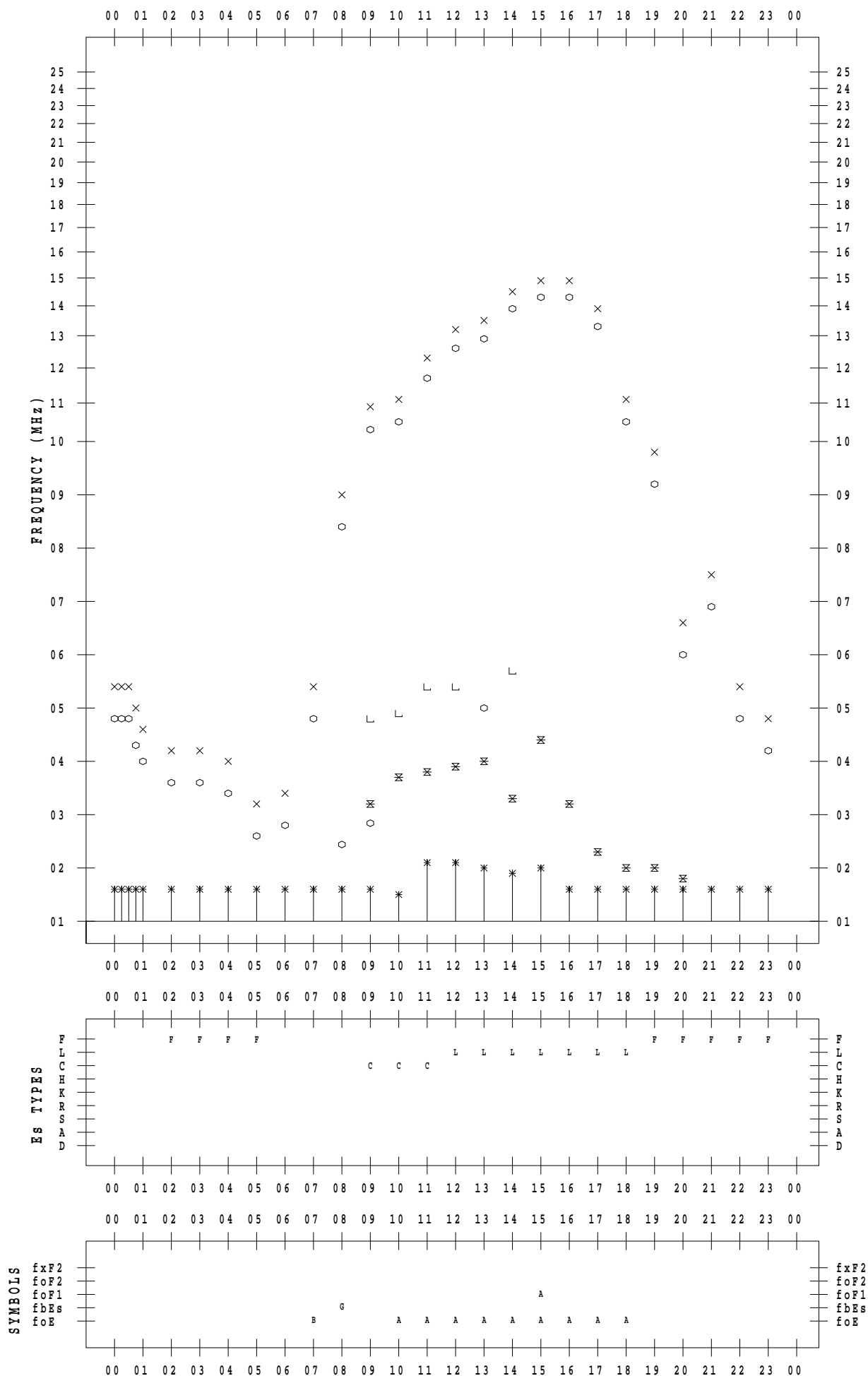
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SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/20

135 ° E MEAN TIME



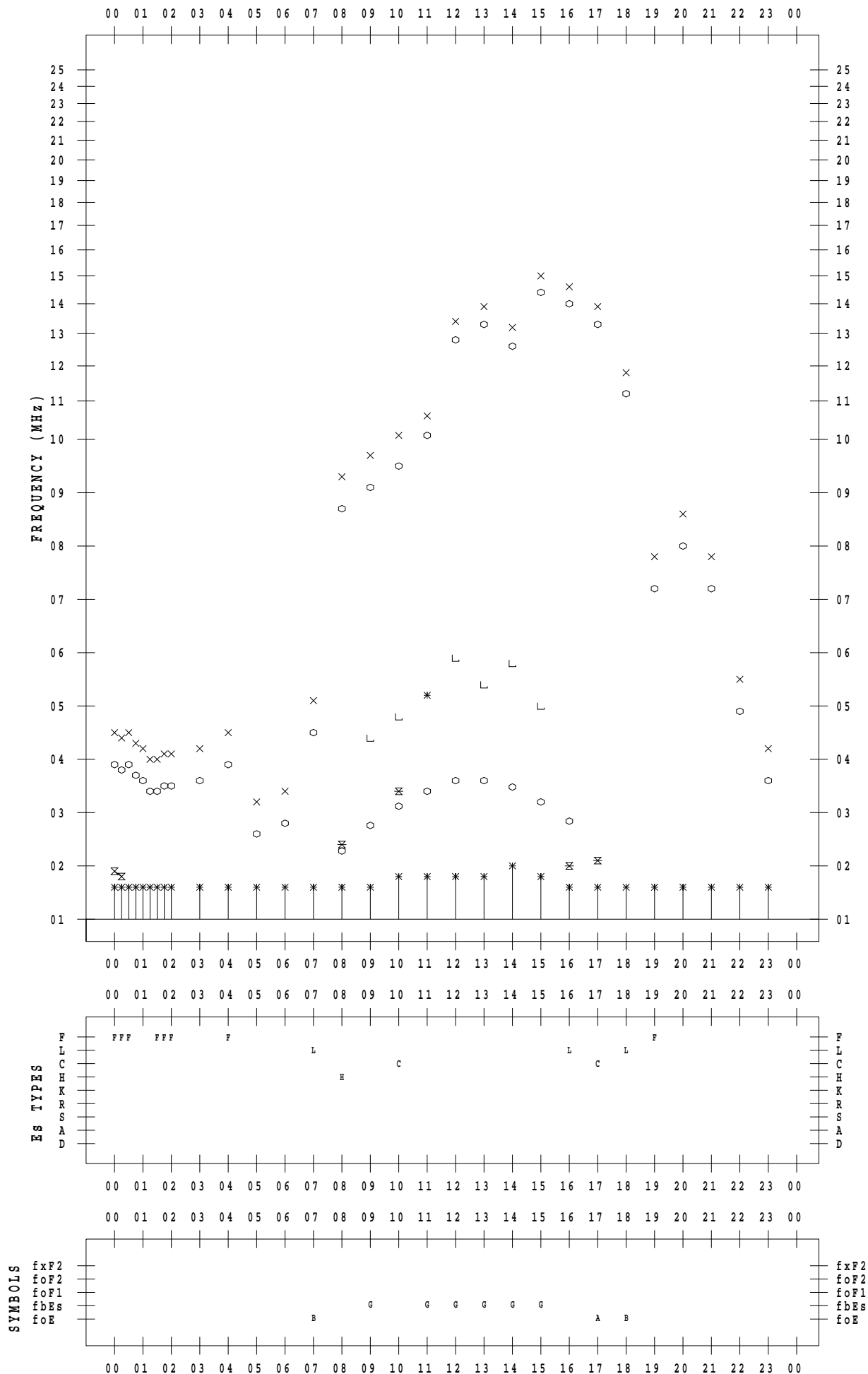
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/21

135 ° E MEAN TIME



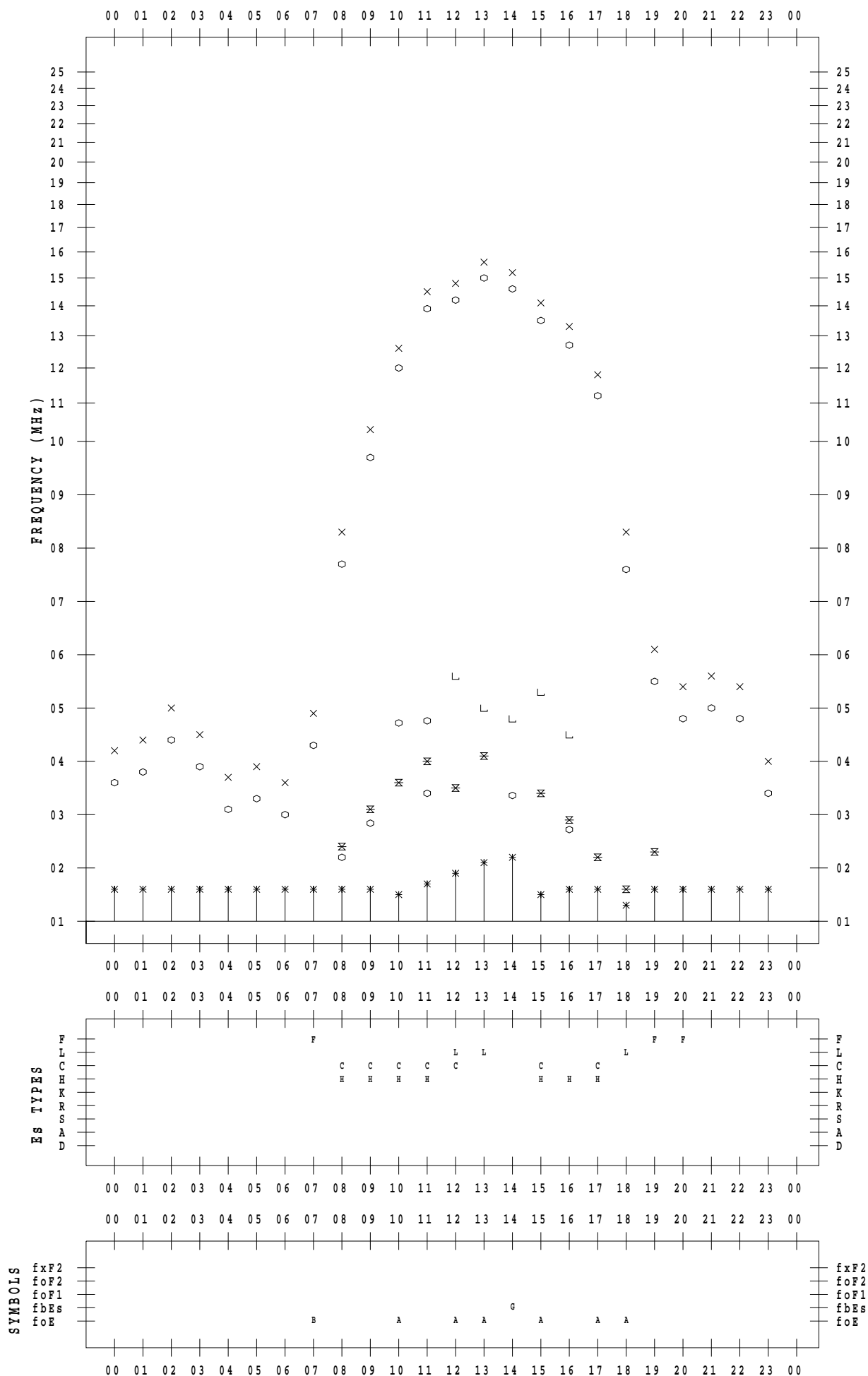
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/22

135 ° E MEAN TIME



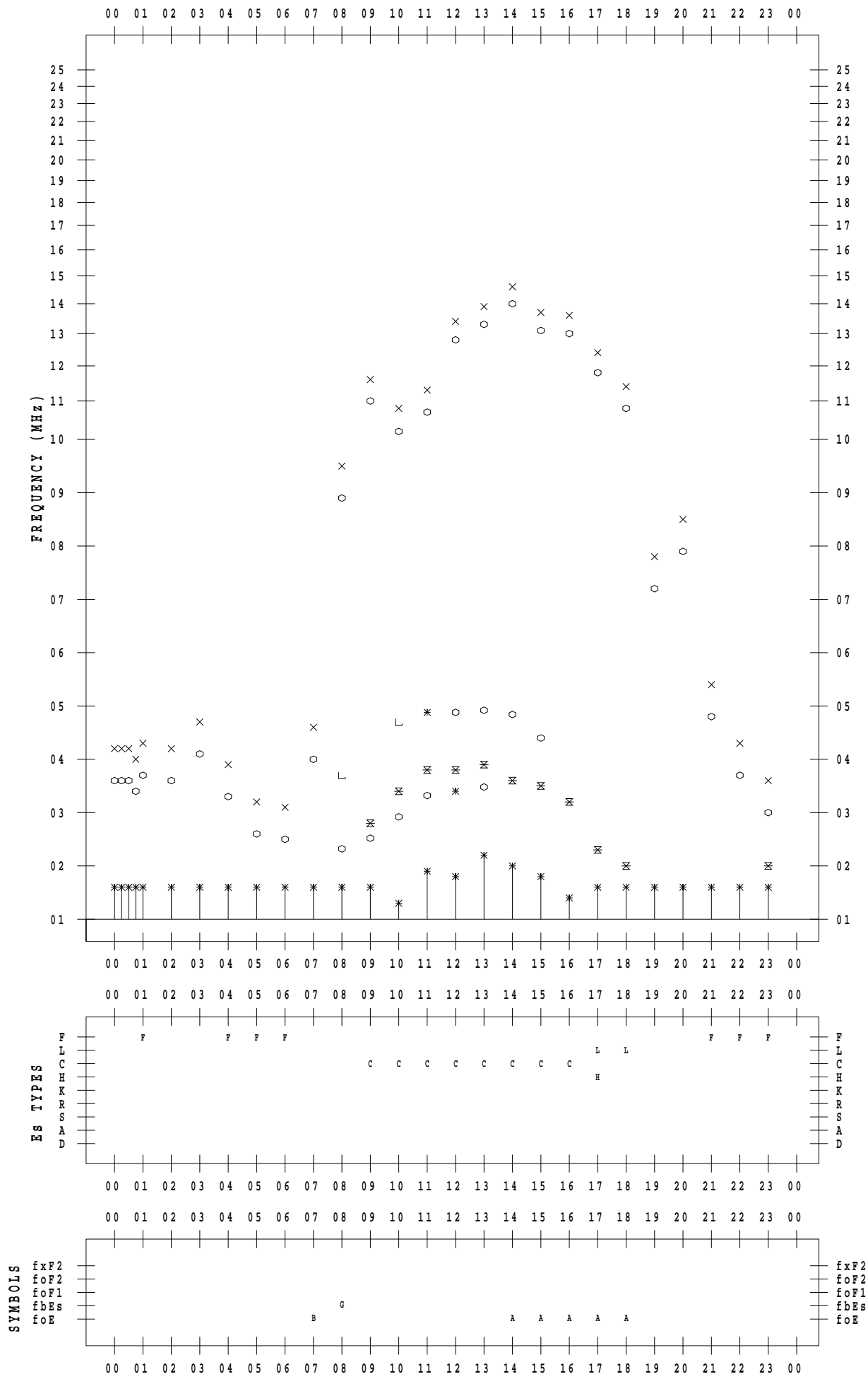
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/23

135 ° E MEAN TIME





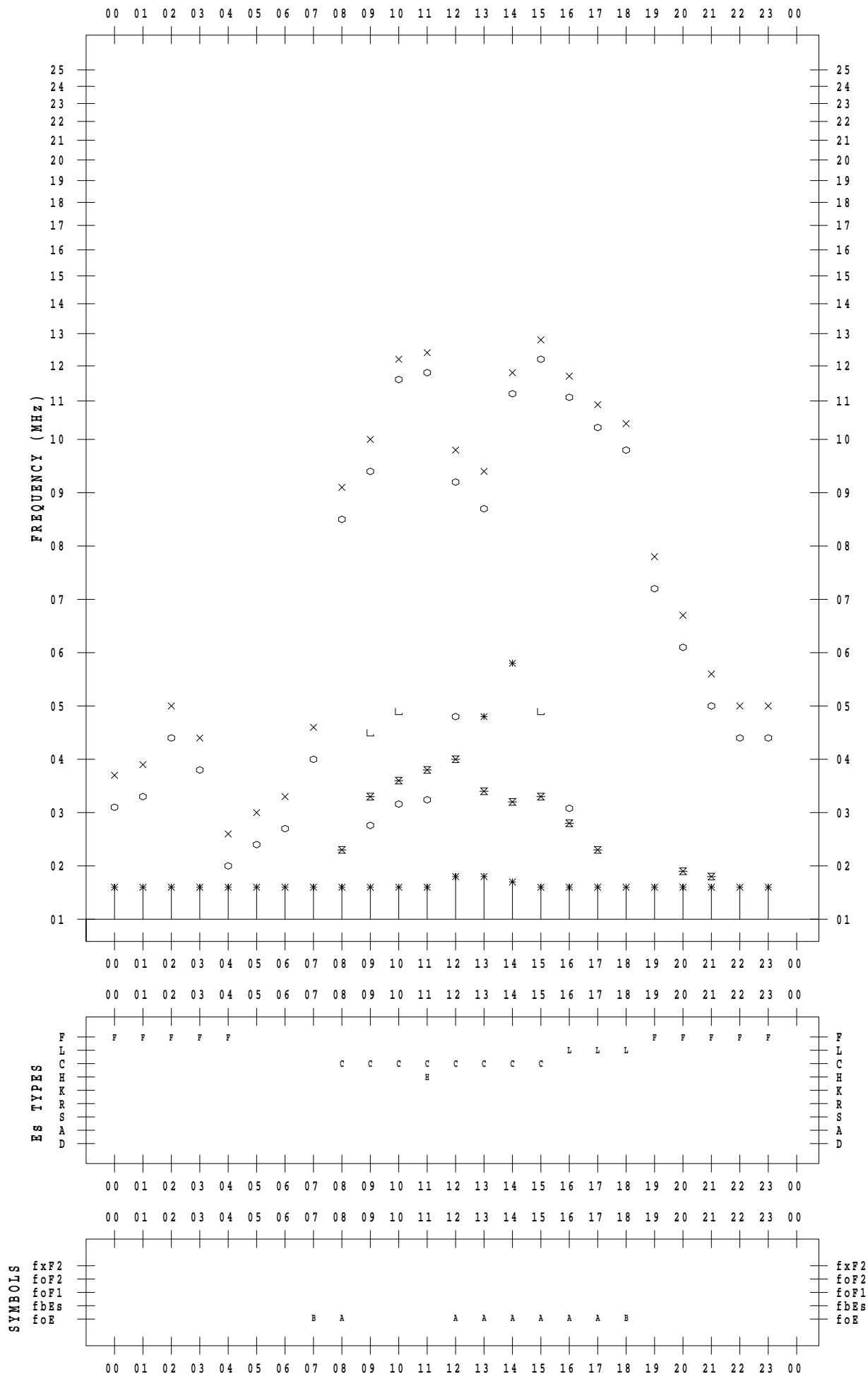
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/24

135 ° E MEAN TIME



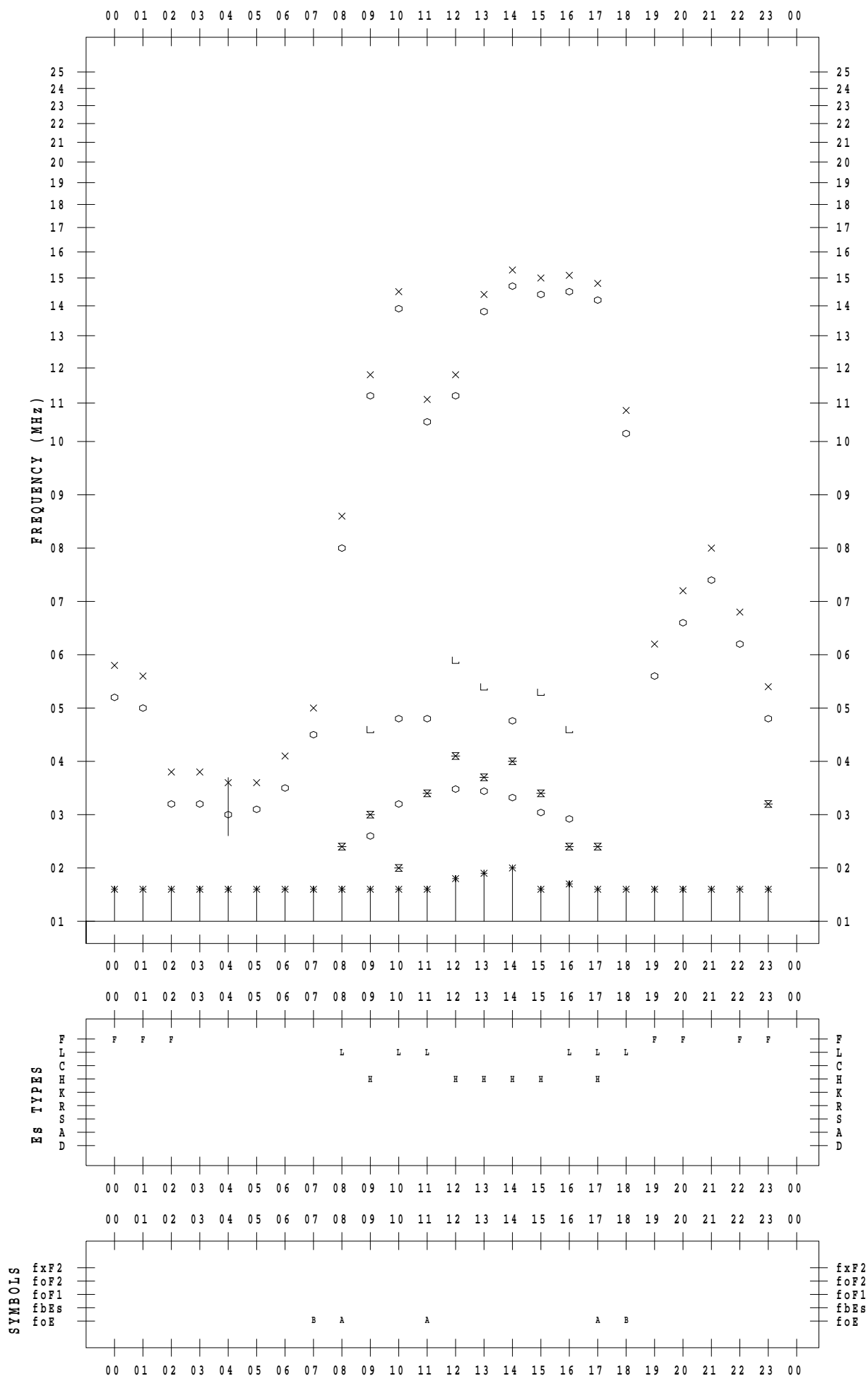
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/25

135 ° E MEAN TIME



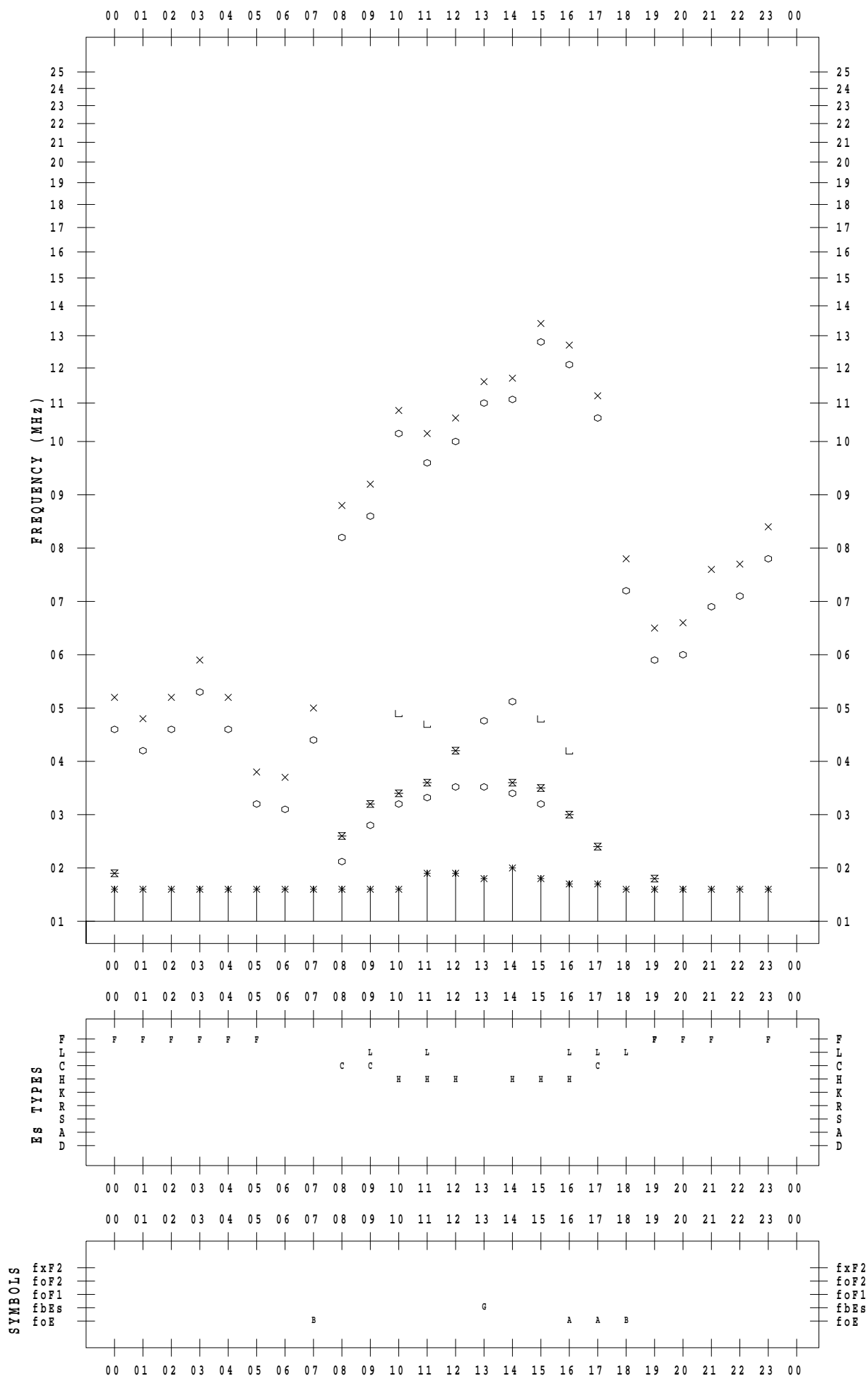
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/26

135 ° E MEAN TIME



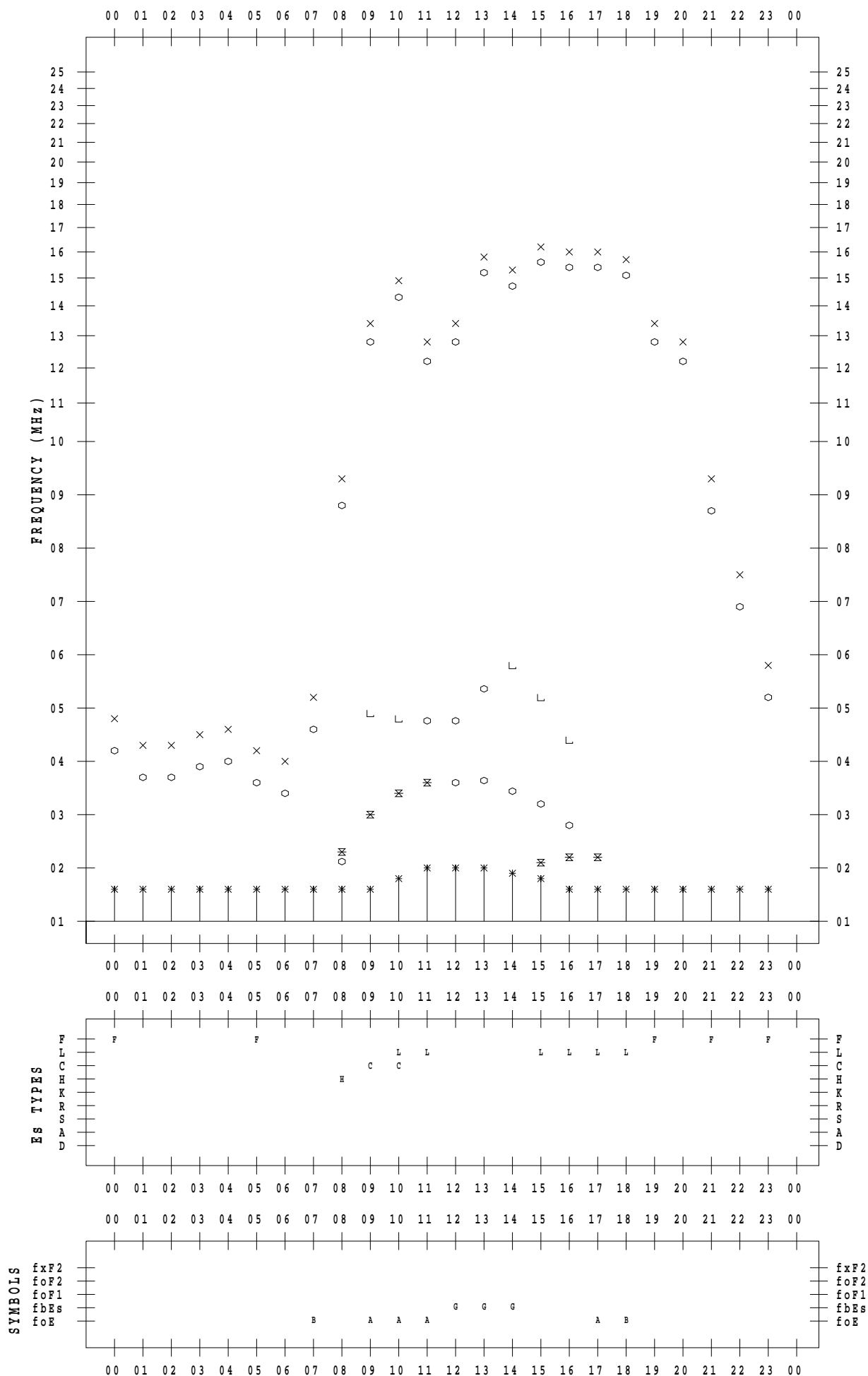
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/27

135 ° E MEAN TIME



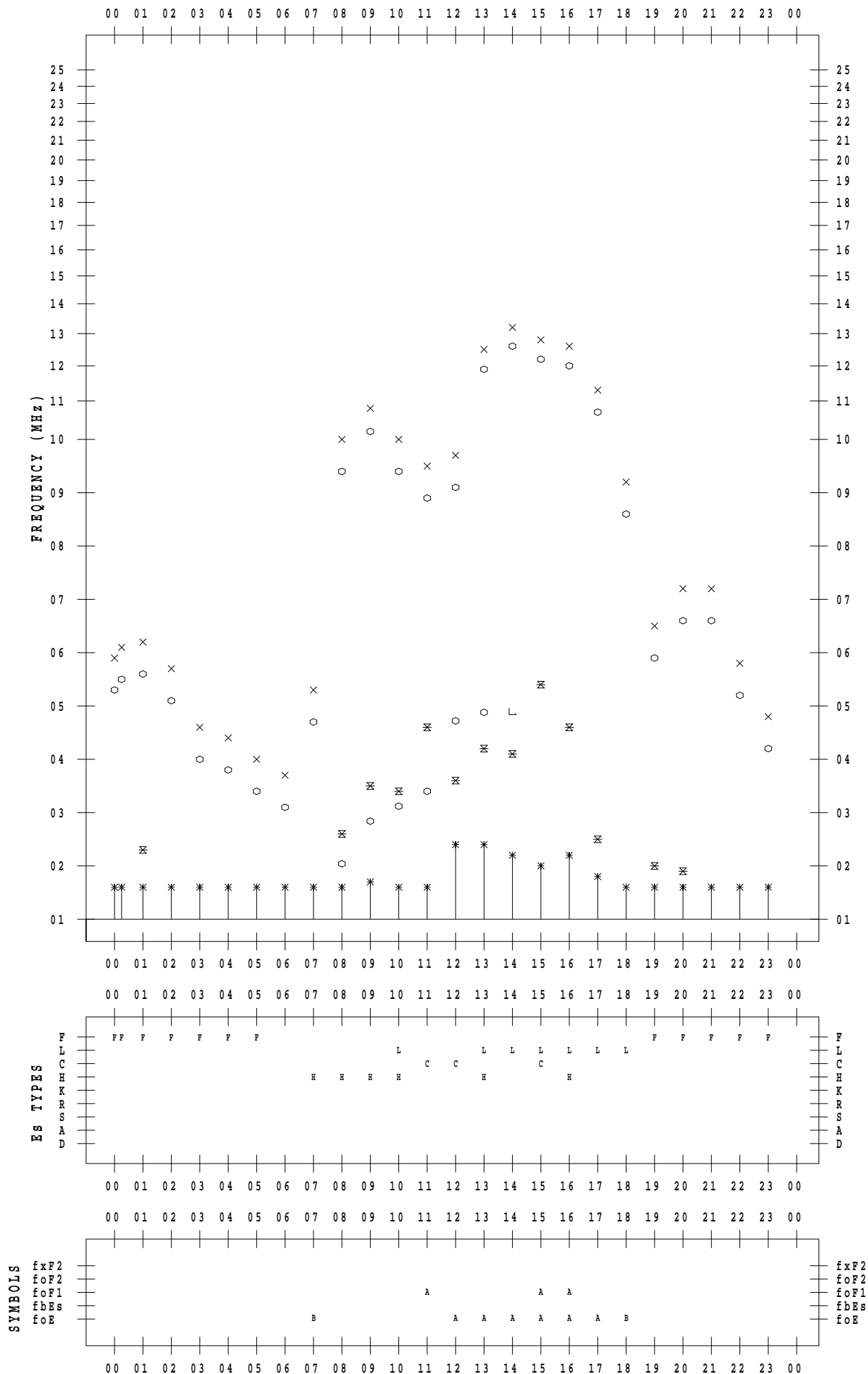
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/28

135 °E MEAN TIME



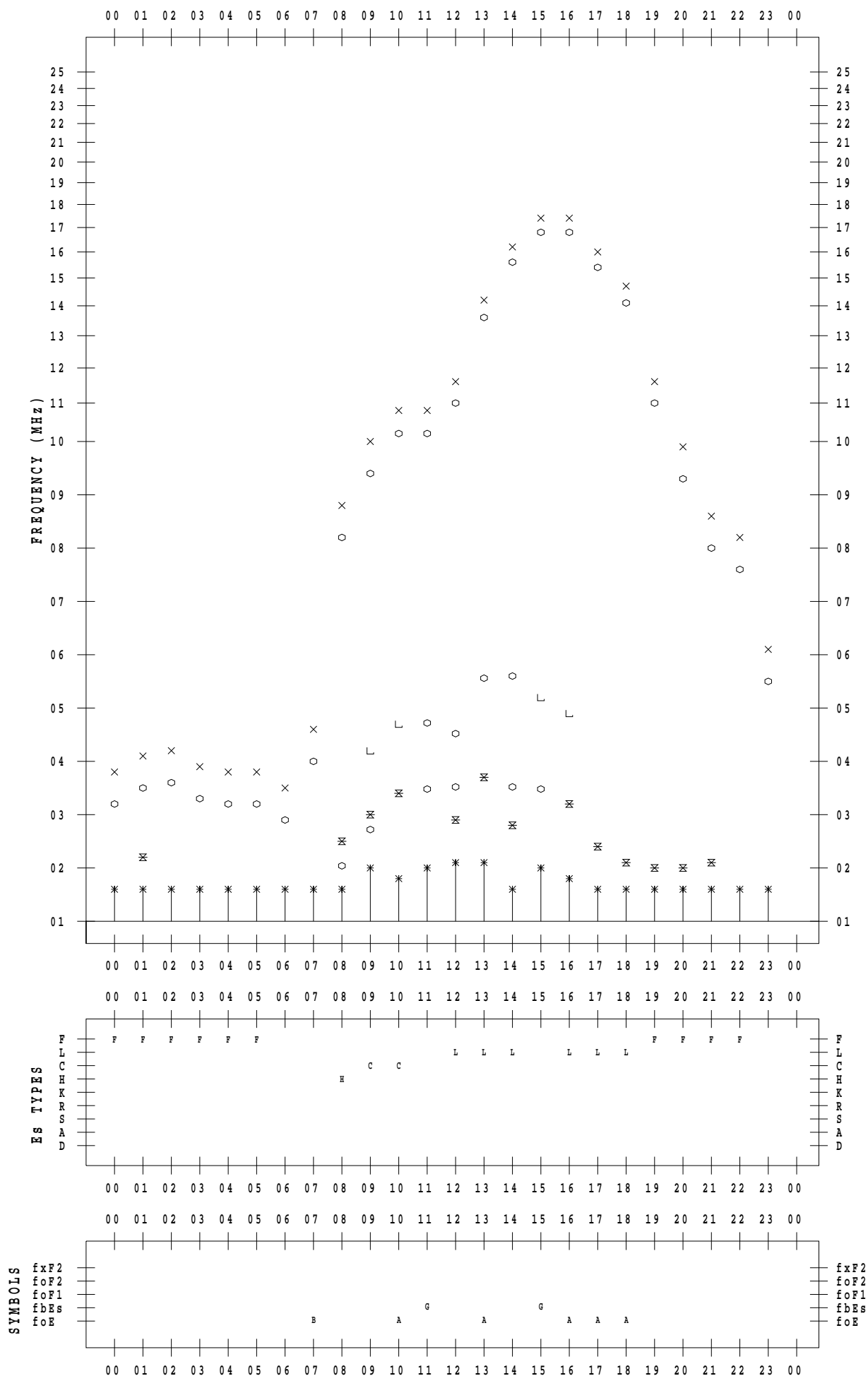
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/29

135 ° E MEAN TIME



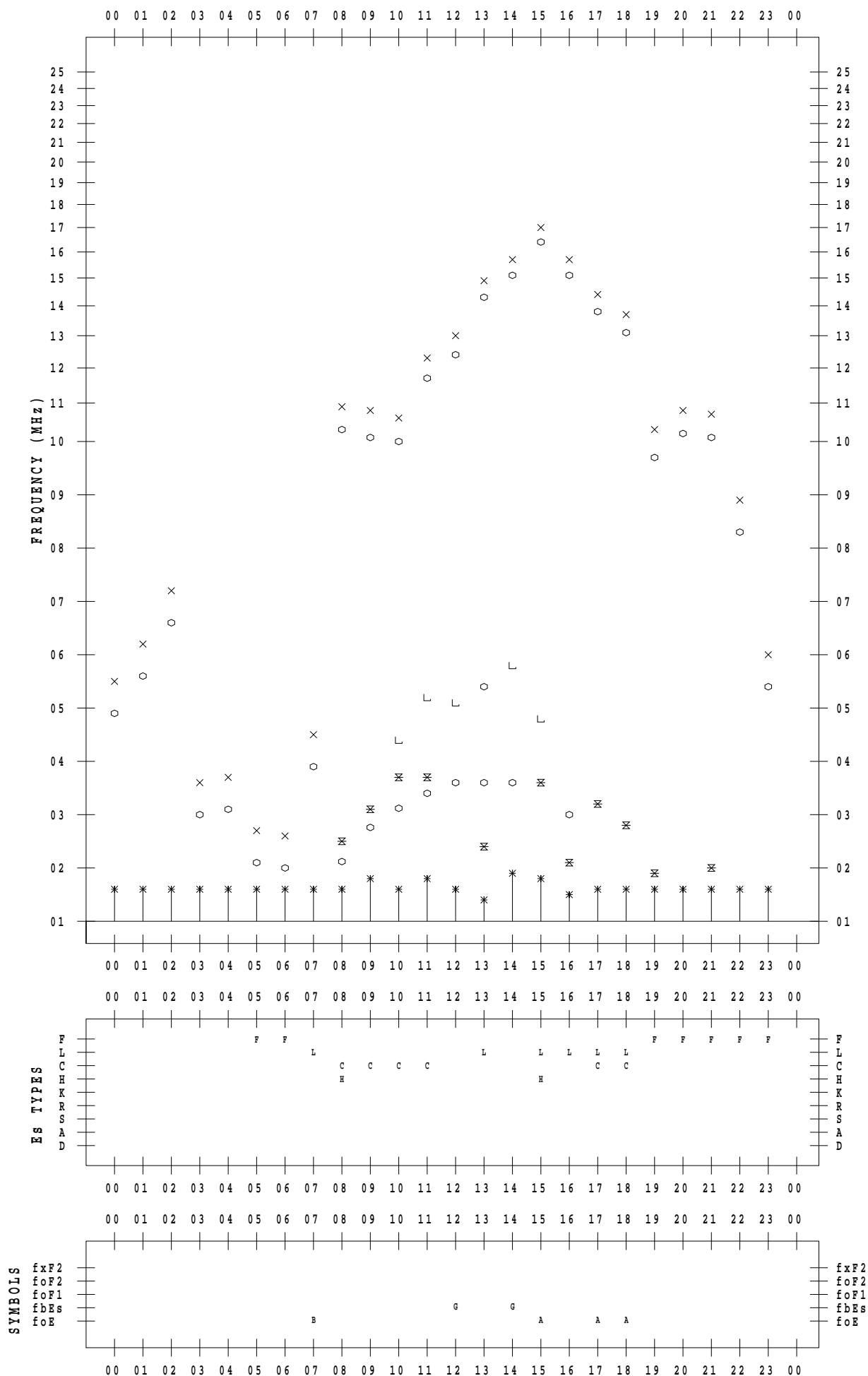
# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/30

135 ° E MEAN TIME



# f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2022/12/31

135 ° E MEAN TIME

