F-876

# IONOSPHERIC DATA IN JAPAN

FOR December 2021

VOL. 73 NO. 12

CONTENTS



≪WDC for Ionosphere and Space Weather ･･･ https://wdc.nict.go.jp/IONO/wdc/index.html ≫

NATIONAL INSTITUTE OF INFORMATION
AND COMMUNICATIONS TECHNOLOGY
TOKYO, JAPAN

# INTRODUCTION

This Series contains data on ionosphere (I) and solar radio emission (S) obtained at the following stations under the National Institute of Information and Communications Technology , Japan.

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

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

# IONOSPHERE

Ionospheric observations are carried out at the above four stations in Japan by means of vertical sounding using ionosondes. The ionosonde produces ionograms, which are recorded digitally on a computer storage medium. The digitally-recorded ionograms are collected from each station by the central computer and reduced to numerical values and Summary Plots by the automatic processing system. The ionograms obtained at Kokubunji are manually scaled by experienced specialists to supplement automatically-scaled parameters.

**A1. Automatic Scaling**

Digital ionograms are automatically scaled by the pattern recognition method. The following five characteristics of the ionospheric are listed below. The reliability of these factors has been ascertained by comparison of the automatically-scaled parameters with the manually-scaled values of large amounts of test ionograms.

The published data consist of tabulations of hourly values of three factors ( *foF2, fEs*, *fmin* ) and monthly medians of two factors ( *h'Es* ,*h'F* ), daily Summary Plots and monthly medians plot of *foF2*.

a. Characteristics of Ionosphere

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

b. Descriptive Letters

The following descriptive letters are used in the tables.

A Impossible measurement because of the presence of a lower thin layer, for example *Es* ( for *foF2* ).

C Impossible measurement because of any failure in observation.

G Impossible automatic scaling because of very small ionization density of the layer ( for *fEs* ).

N Impossible automatic scaling because of complex echoes.

Blank No digital record because of problems occurring in the auto matic data processing system, but existence of film record.

c. Definitions of CNT, MED, UQ ,and LQ

***Median count*** ( **CNT** ) is the number of numerical values from which the median has been computed. In addition to numerical values, the count may include a descriptive letter G.

***Median*** ( **MED** ) is defined as the middle value when the numerical values are arranged in order of magnitude, or the average of the two middle values if there is an even number of values.

***Upper quartile*** ( **UQ** ) is the median value of the upper half of the values when they are ranked according to magnitude; the ***lower quartile*** ( **LQ** ) is the median value of the lower half.

If CNT is less than 10, there are blank spaces left.

d. Reliability of Automatic Scaling

The results of the comparison between automatically-scaled values and manually-scaled ones showed that hourly values of *foF2 , fEs* and *fmin* were scaled within a difference of 1 MHz from about 90, 90 and 99%, respectively of the test ionograms.

e. Summary Plot

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

**A2. Manual Scaling**

The published data consist of tabulations of hourly values of the ionospheric characteristics and figures of daily *f*-plot.

All symbols and terminology in the tables or figures of ionospheric data are used in accordance with the "URSI 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

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

b. Symbols

(i) Descriptive Letters

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

**A** Measurement influenced by, or impossible because of, the presence of a lower thin layer, for example *Es*.

**B** Measurement influenced by, or impossible because of, absorption in the vicinity of *fmin*.

**C** Measurement influenced by, or impossible because of, any non-ionospheric reason.

**D** Measurement influenced by, or impossible because of, the upper limit of the normal frequency range in use.

**E** Measurement influenced by, or impossible because of, the lower limit of the normal frequency range in use.

**F** Measurement influenced by, or impossible because of, the presence of spread echoes.

**G** Measurement influenced 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-sociated with high absorption and large *fmin*.

n The designation 'n' is used to denote an *Es* trace which cannot be classified into one of the standard types.

k The designation 'k' is used to show the presence of particle *E*. When *foEs* > *foE* ( particle *E* ) the *Es* type precedes k.

c. Definitions of the CNT, MED, UQ and LQ

***Median count*** ( **CND** ) is the number of values from which the median has been computed. In addition to numerical values, the count may include certain descriptive letters.

***Median*** ( **MED** ) is the middle value when the numerical values are arranged in order of magnitude, or the average of the two middle values if there is an even number of values.

***Upper quartile*** ( **UQ** ) is the median value of the upper half of the values when they are ranked according to magnitude; the ***lower quartile*** ( **LQ** ) is the median value of the lower half.

# HOURLY VALUES OF foF2 AT Wakkanai

## DEC.2021

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

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

# HOURLY VALUES OF fEs AT Wakkanai

## DEC.2021

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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | G | G | G | G | G | G | G | G | 32 | 39 | 34 | 37 | 36 | 28 | G | G | 30 | 46 | 25 | G | G | G | G | G |
| 2 | G | G | G | G | G | G | G | 28 | G | 38 | 36 | 133 | | 28 | G | G | 11 | G | G | G | G | G | G | G |
| 3 | 27 | G | G | G | 26 | G | G | 152 | G | 40 | 36 | 57 | | 27 | 38 | 36 | 30 | 38 | 36 | G | G | G | G | G |
| 4 | G | G | G | G | G | G | G | 11 | 34 | 36 | 30 | 30 | 30 | 28 | 33 | 35 | 37 | 34 | 29 | | 29 | G | 30 | 28 |
| 5 | 27 | 29 | G | 28 | G | G | G | 11 | 33 | 34 | 58 | | 35 | 34 | 33 | G | 28 | 32 | G | G | 30 | G | 25 | G |
| 6 | G | 29 | 151 | G | 27 | G | G | 11 | 34 | 38 | 36 | 39 | 36 | 32 | 31 | G | 42 | G | G | G | G | G | G | G |
| 7 | G | G | G | G | G | G | G | 41 | 30 | 34 | 36 | 36 | 36 | 34 | 31 | G | 41 | | G | G | G | G | G | G |
| 8 | G | G | G | G | G | 116 | | 11 | 30 | 36 | 36 | 56 | 35 | 33 | 32 | G | 25 | G | G | G | | G | G | G |
| 9 | G | G | G | G | G | G | G | 11 | 31 | 33 | 52 | 69 | 34 | 34 | 132 | G | 39 | G | | G | G | G | 31 | G |
| 10 | G | G | G | G | G | G | G | 11 | 48 | 56 | 54 | 28 | G | G | 48 | G | 39 | G | 34 | G | G | G | 94 | G |
| 11 | 94 | G | G | G | G | G | G | G | 48 | 36 | 47 | 50 | 34 | 37 | G | G | 40 | | G | G | G | G | G | G |
| 12 | G | G | G | G | G | G | G | 25 | 32 | 35 | 28 | 49 | 38 | 48 | G | G | 43 | G | | 60 | G | | G | G |
| 13 | G | 32 | G | 25 | G | G | G | 11 | 47 | G | 27 | 33 | 30 | G | 48 | 24 | 33 | G | 27 | G | | G | 32 | 28 |
| 14 | G | G | G | 27 | 24 | G | G | 156 | 44 | 34 | 41 | 41 | 44 | 38 | G | 49 | 11 | G | 159 | 26 | G | G | 54 | G |
| 15 | 28 | 33 | G | G | G | G | | 36 | 47 | 61 | 44 | 39 | 106 | 39 | 130 | G | 28 | 11 | 26 | 33 | 32 | 32 | 28 | G |
| 16 | G | G | G | G | G | G | G | 40 | 49 | 34 | 41 | 42 | 33 | 61 | 59 | 38 | 29 | G | 32 | 93 | G | 28 | G | 38 |
| 17 | 26 | G | 152 | G | G | G | G | 11 | 48 | 34 | 36 | 36 | 35 | 35 | 25 | 29 | 40 | G | 149 | G | 27 | 32 | G | 28 |
| 18 | G | 40 | G | G | G | G | 33 | 11 | 48 | 38 | 36 | 37 | 36 | 34 | 33 | 49 | 32 | 57 | 95 | 93 | 53 | 29 | G | 33 |
| 19 | 36 | 33 | 27 | G | 25 | G | G | G | 50 | 29 | 32 | 30 | 31 | 40 | G | 23 | 11 | 29 | 32 | 46 | 53 | 28 | 37 | G |
| 20 | G | G | G | G | G | G | G | G | 32 | 56 | 31 | 28 | 29 | 29 | 26 | G | 11 | 11 | G | G | G | G | 24 | 31 |
| 21 | 44 | 32 | 28 | G | G | G | 112 | 25 | G | 26 | 28 | 50 | 29 | 49 | 25 | G | 11 | G | G | G | G | G | G | G |
| 22 | G | G | G | G | G | G | G | G | G | 26 | 28 | 29 | 52 | 40 | 29 | 24 | 37 | G | G | G | 26 | G | 31 | 32 |
| 23 | 34 | G | G | G | G | G | G | | G | 29 | N | G | G | G | G | G | 11 | G | 27 | G | G | G | G | G |
| 24 | G | G | G | G | G | 11 | G | G | 32 | 49 | 49 | 28 | 31 | 30 | 32 | G | 11 | G | G | G | G | 26 | G | G |
| 25 | G | G | | 28 | G | G | G | 11 | G | 28 | 28 | G | G | 49 | 29 | G | 11 | G | G | G | G | G | G | G |
| 26 | G | G | G | G | G | G | G | G | 23 | 31 | 30 | 32 | 50 | 30 | 28 | G | 11 | G | G | G | 30 | | G | G |
| 27 | | G | G | G | G | G | G | G | 48 | 49 | 28 | 37 | 52 | 50 | 32 | 39 | 40 | 55 | 35 | 31 | 28 | G | G | G |
| 28 | G | G | G | | G | G | G | 29 | 32 | 34 | 30 | 30 | 31 | 29 | 48 | G | 11 | G | G | G | | G | G | G |
| 29 | G | G | 32 | 33 | 30 | 27 | G | G | 48 | 48 | 49 | 30 | 30 | 32 | G | G | 11 | G | G | | G | G | G | G |
| 30 | G | 32 | 33 | 109 | 31 | G | G | 38 | 32 | 48 | 30 | 31 | 36 | 93 | 27 | G | 35 | G | G | G | G | | 48 | 28 |
| 31 | 27 | G | G | G | 27 | 30 | G | 130 | 31 | 34 | 36 | 38 | 56 | 55 | 43 | 49 | 11 | G | G | G | | G | G | G |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 30 | 31 | 30 | 30 | 31 | 31 | 29 | 30 | 31 | 31 | 30 | 30 | 29 | 31 | 31 | 31 | 31 | 29 | 29 | 29 | 27 | 28 | 31 | 31 |
| MED | G | G | G | G | G | G | G | 11 | 32 | 35 | 36 | 36 | 35 | 34 | 31 | G | 29 | G | G | G | G | G | G | G |
| U Q | 27 | 29 | G | G | G | G | G | 29 | 48 | 40 | 41 | 42 | 37 | 40 | 38 | 29 | 39 | 20 | 32 | 13 | 28 | G | 30 | 28 |
| L Q | G | G | G | G | G | G | G | G | 30 | 33 | 30 | 30 | 30 | 29 | G | G | 11 | G | G | G | G | G | G | G |

# HOURLY VALUES OF fmin AT Wakkanai

## DEC.2021

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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 14 | 14 | 14 | 14 | 15 | 15 | 15 | 18 | 16 | 15 | 14 | 16 | 16 | 15 | 15 | 15 | 16 | 16 | 16 | 14 | 15 | 14 | 15 | 22 |
| 2 | 15 | 14 | 15 | 15 | 15 | 15 | 15 | 15 | 14 | 14 | 16 | 7 | 17 | 15 | 17 | 15 | 14 | 14 | 15 | 15 | 15 | 14 | 16 | 15 |
| 3 | 16 | 16 | 14 | 16 | 16 | 16 | 16 | 15 | 20 | 15 | 16 | 14 | 14 | 15 | 14 | 16 | 16 | 15 | 16 | 15 | 16 | 14 | 15 | 16 |
| 4 | 15 | 15 | 15 | 7 | 17 | 15 | 18 | 16 | 16 | 15 | 17 | 15 | 17 | 17 | 16 | 14 | 15 | 16 | 15 | 15 | 15 | 14 | 16 | 16 |
| 5 | 16 | 16 | 15 | 16 | 15 | 14 | 14 | 16 | 16 | 16 | 14 | 16 | 16 | 15 | 15 | 15 | 16 | 16 | 16 | 16 | 16 | 15 | 16 | 14 |
| 6 | 16 | 16 | 16 | 16 | 15 | 16 | 14 | 15 | 14 | 13 | 14 | 14 | 16 | 15 | 15 | 18 | 16 | 16 | 14 | 14 | 15 | 14 | 14 | 14 |
| 7 | 14 | 15 | 14 | 14 | 15 | 14 | 14 | 14 | 15 | 14 | 15 | 14 | 16 | 16 | 16 | 15 | 15 | 17 | 16 | 15 | 14 | 14 | 14 | 15 |
| 8 | 14 | 14 | 16 | 15 | 15 | 16 |  | 14 | 16 | 16 | 16 | 17 | 15 | 17 | 16 | 15 | 16 | 16 | 15 | 15 |  | 16 | 14 | 14 |
| 9 | 15 | 15 | 16 | 14 | 14 | 126 | 15 | 14 | 16 | 16 | 16 | 15 | 16 | 17 | 15 | 15 | 15 | 16 |  | 15 | 14 | 16 | 14 | 16 |
| 10 | 16 | 15 | 14 | 14 | 15 | 15 | 15 | 181 | 15 | 14 | 15 | 16 | 15 | 15 | 15 | 15 | 16 | 15 | 15 | 15 | 15 | 15 | 14 | 16 |
| 11 | 16 | 15 | 15 | 15 | 15 | 14 | 16 | 14 | 15 | 15 | 16 | 17 | 16 | 15 | 15 | 15 | 14 | 15 | 16 | 16 | 15 | 16 | 14 | 15 |
| 12 | 15 | 15 | 15 | 14 | 16 | 14 | 15 | 14 | 16 | 14 | 17 | 16 | 17 | 16 | 15 | 14 | 14 | 15 | 15 | 17 | 15 | 16 | 16 | 15 |
| 13 | 20 | 15 | 17 | 15 | 16 | 14 | 15 | 15 | 14 | 15 | 27 | 24 | 17 | 27 | 16 | 15 | 16 | 14 | 15 | 17 | 16 | 20 | 16 | 17 |
| 14 | 17 | 15 | 15 | 17 | 16 | 17 | 15 | 8 | 16 | 15 | 15 | 14 | 14 | 17 | 15 | 15 | 16 | 16 | 15 | 15 | 15 | 16 | 5 | 16 |
| 15 | 16 | 16 | 14 | 16 | 14 | 17 | 15 | 16 | 15 | 16 | 15 | 15 | 17 | 15 | 16 | 15 | 15 | 16 | 16 | 15 | 16 | 16 | 15 | 14 |
| 16 | 18 | 14 | 14 | 15 | 14 | 15 | 15 | 16 | 15 | 16 | 16 | 17 | 14 | 14 | 13 | 15 | 15 | 16 | 17 | 17 | 15 | 15 | 17 | 16 |
| 17 | 16 | 16 | 17 | 16 | 14 | 15 | 17 | 14 | 15 | 17 | 14 | 15 | 14 | 14 | 15 | 15 | 14 | 16 | 15 | 15 | 16 | 16 | 15 | 16 |
| 18 | 15 | 15 | 15 | 15 | 14 | 15 | 15 | 15 | 14 | 14 | 16 | 14 | 14 | 14 | 16 | 15 | 16 | 15 | 15 | 15 | 16 | 16 | 15 | 16 |
| 19 | 16 | 15 | 16 | 16 | 16 | 14 | 15 | 14 | 15 | 16 | 17 | 16 | 17 | 15 | 16 | 15 | 14 | 16 | 17 | 15 | 17 | 15 | 15 | 16 |
| 20 | 15 | 14 | 16 | 15 | 14 | 14 | 14 | 15 | 15 | 14 | 17 | 17 | 16 | 16 | 15 | 15 | 16 | 14 | 14 | 16 | 14 | 16 | 16 | 16 |
| 21 | 15 | 16 | 16 | 17 | 14 | 14 | 14 | 15 | 15 | 15 | 15 | 16 | 29 | 21 | 15 | 14 | 14 | 14 | 15 | 14 | 20 | 14 | 15 | 15 |
| 22 | 14 | 15 | 14 | 14 | 14 | 14 | 14 | 15 | 15 | 14 | 22 | 17 | 28 | 27 | 16 | 15 | 15 | 16 | 18 | 14 | 15 | 16 | 15 | 16 |
| 23 | 16 | 14 | 17 | 20 | 14 | 14 | 15 |  | 15 | 17 | 15 | 30 | 28 | 27 | 27 | 15 | 16 | 14 | 16 | 16 | 14 | 14 | 16 | 15 |
| 24 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 15 | 16 | 17 | 13 | 15 | 22 | 28 | 23 | 15 | 15 | 14 | 14 | 15 | 14 | 15 | 15 | 16 |
| 25 | 15 | 16 | 15 | 15 | 14 | 14 | 14 | 14 | 15 | 17 | 22 | 30 | 32 | 29 | 21 | 15 | 17 | 14 | 15 | 14 | 14 | 14 | 15 | 16 |
| 26 | 14 | 14 | 14 | 15 | 20 | 14 | 14 | 14 | 15 | 16 | 16 | 22 | 17 | 22 | 21 | 15 | 16 | 15 | 14 | 16 | 16 | 16 | 15 | 16 |
| 27 |  | 15 | 14 | 14 | 14 | 15 | 14 | 15 | 15 | 17 | 21 | 19 | 23 | 19 | 18 | 16 | 14 | 16 | 16 | 16 | 16 | 14 | 14 | 14 |
| 28 | 16 | 15 | 14 | 14 | 14 | 14 | 16 | 15 | 16 | 14 | 17 | 15 | 22 | 16 | 15 | 15 | 16 | 14 | 15 | 16 |  | 20 | 14 | 14 |
| 29 | 17 | 16 | 16 | 17 | 15 | 16 | 14 | 16 | 16 | 16 | 16 | 21 | 17 | 18 | 15 | 16 | 16 | 17 | 16 |  | 15 | 15 | 15 | 16 |
| 30 | 15 | 16 | 16 | 15 | 14 | 16 | 14 | 16 | 15 | 15 | 16 | 16 | 15 | 16 | 15 | 15 | 14 | 14 | 15 | 14 | 15 | 15 | 15 | 16 |
| 31 | 16 | 14 | 17 | 15 | 14 | 15 | 15 | 15 | 16 | 16 | 15 | 15 | 12 | 13 | 13 | 16 | 16 | 16 | 14 | 14 |  | 15 | 14 | 17 |
|  | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 30 | 31 | 31 | 31 | 31 | 31 | 30 | 30 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 30 | 30 | 28 | 31 | 31 | 31 |
| MED | 16 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 16 | 16 | 16 | 15 | 15 | 16 | 16 | 15 | 15 | 15 | 15 | 15 | 16 |
| U Q | 16 | 16 | 16 | 16 | 15 | 16 | 15 | 16 | 16 | 16 | 17 | 17 | 17 | 19 | 16 | 15 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| L Q | 15 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 15 | 14 | 15 | 15 | 15 | 15 | 15 | 15 | 14 | 14 | 15 | 15 | 15 | 14 | 14 | 15 |

# HOURLY VALUES OF foF2 AT Kokubunji

## DEC.2021

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 | 33 | 31 | 32 | 37 | 33 | 28 | 29 | 57 | A | 56 | 93 | 87 | 88 | 66 | 65 | 71 | 75 | 43 | 34 | 33 | 34 | 35 | 31 | 32 |
| 2 | 31 | 33 | 40 | 34 | 25 | N 23 | 25 | 56 | 77 | 69 | 104 | 77 | 72 | 75 | 71 | 67 | 62 | 37 | 32 | 33 | 37 | 31 | 31 | 30 |
| 3 | 31 | A | 32 | 33 | 35 | | 24 | 55 | 61 | 67 | 68 | 78 | 74 | 84 | A | 72 | 52 | 32 | N 23 | 26 | 26 | 30 | 30 | 30 |
| 4 | 30 | 30 | 31 | 29 | 26 | 29 | 30 | 47 | 59 | 71 | 89 | 95 | 78 | 73 | 66 | 64 | 49 | 33 | 33 | 35 | 28 | 32 | 23 | 26 |
| 5 | 30 | 29 | 31 | 31 | 40 | A | 24 | 50 | 57 | 63 | 75 | 85 | 77 | 65 | 67 | 68 | 55 | 35 | A | A | 25 | 30 | 25 | 25 |
| 6 | 27 | A | A | 30 | 33 | | 26 | 43 | 51 | 65 | 69 | 85 | 62 | 63 | 61 | 57 | 48 | 39 | 31 | A | A | A | N 24 | A |
| 7 | 29 | 26 | 26 | 31 | 30 | 25 | 30 | 48 | 53 | 59 | 75 | 77 | 74 | 62 | 65 | 59 | 49 | 38 | A | 30 | 39 | A | A | 25 |
| 8 | 26 | 26 | 29 | 30 | 28 | | N 24 | 44 | 59 | 57 | 62 | 65 | 64 | 69 | 67 | 58 | 44 | A | 25 | 25 | 30 | A | 25 | 25 |
| 9 | 31 | 31 | 31 | 31 | 34 | 25 | N 23 | 40 | 50 | 50 | 55 | 77 | 56 | 56 | 59 | 53 | 45 | 33 | 25 | 32 | 30 | 25 | 27 | 27 |
| 10 | 30 | 30 | 30 | A | 29 | 25 | N 25 | 51 | 49 | 47 | 61 | 76 | 67 | 60 | 57 | 49 | 52 | 40 | A | N 23 | 31 | 25 | 30 | 25 |
| 11 | 26 | 30 | 25 | 27 | 30 | 23 | 25 | 41 | 49 | 56 | 57 | 62 | 63 | 59 | 63 | 63 | 57 | 35 | 32 | 25 | N 24 | 24 | 26 | 30 |
| 12 | 30 | 30 | 30 | 32 | 28 | N 24 | 23 | 45 | 57 | 56 | 68 | 69 | 63 | 57 | 59 | 65 | 50 | 37 | 30 | 25 | 30 | 28 | 27 | 26 |
| 13 | 27 | 26 | 27 | 30 | 31 | 33 | 23 | 51 | 53 | 53 | 61 | 83 | 67 | 61 | 53 | 59 | 52 | A | A | 33 | 27 | 24 | 23 | 24 |
| 14 | 31 | A | 30 | 27 | 33 | 25 | N 23 | 41 | 55 | 56 | 59 | 58 | 66 | 59 | 50 | 62 | 55 | 34 | 25 | | A | 29 | A | 25 |
| 15 | 27 | 30 | 26 | 25 | 28 | A | N 24 | 42 | 54 | 57 | 60 | 61 | 72 | 65 | 69 | 59 | 51 | 35 | 31 | 31 | 34 | 34 | 30 | 31 |
| 16 | 30 | A | A | 32 | 32 | 33 | 40 | 49 | 55 | 61 | 69 | 72 | 90 | 61 | 61 | 60 | 61 | 40 | 30 | 31 | 32 | A | A | A |
| 17 | 31 | 33 | 35 | A | 33 | 31 | 34 | 55 | 59 | 70 | 69 | 82 | 83 | 66 | 85 | 65 | 68 | A | A | 35 | 28 | 26 | A | A |
| 18 | A | A | A | A | 31 | 31 | 31 | 50 | 63 | 57 | 72 | 65 | 71 | 76 | 65 | 74 | 57 | 38 | 33 | 31 | A | A | 28 | 26 |
| 19 | A | 31 | 31 | 33 | 39 | N 23 | 23 | 48 | 58 | 66 | 76 | 75 | 77 | 70 | 85 | 73 | 68 | 47 | 31 | 33 | 39 | 33 | 26 | 24 |
| 20 | 30 | 29 | 30 | 27 | 25 | 25 | 32 | 54 | 57 | 85 | 93 | 76 | 64 | 81 | 75 | 89 | 75 | 45 | 41 | 33 | 34 | 38 | 41 | 38 |
| 21 | 39 | 40 | 39 | 41 | 43 | 52 | 52 | 62 | 62 | 83 | 112 | 98 | 81 | 67 | 71 | 71 | 66 | 41 | 35 | 39 | 35 | 31 | 30 | 31 |
| 22 | 33 | 35 | 39 | 35 | 39 | 33 | 31 | 52 | 81 | 81 | 93 | 69 | 83 | 70 | 77 | 78 | 62 | 37 | 37 | 27 | 29 | 31 | 31 | 33 |
| 23 | 34 | 35 | 39 | 34 | 38 | 36 | 32 | 49 | 63 | 90 | 81 | 85 | 77 | 75 | 79 | 67 | 74 | 43 | 34 | 30 | 25 | 27 | 27 | 31 |
| 24 | 33 | 33 | 35 | 34 | 31 | 32 | 32 | 53 | 59 | 66 | 69 | 84 | 99 | 77 | 71 | 60 | 73 | 47 | 31 | 33 | 36 | 30 | 32 | 33 |
| 25 | 34 | 39 | 43 | 41 | 39 | 38 | 33 | 50 | 57 | 72 | 73 | 85 | 67 | 64 | 72 | 72 | 68 | 45 | 33 | 32 | 34 | 30 | 31 | 31 |
| 26 | 32 | 35 | 36 | 35 | 33 | 35 | 33 | 57 | 62 | 65 | 85 | 102 | 78 | 74 | 71 | 72 | 66 | 50 | 40 | 32 | 35 | | 25 | 31 |
| 27 | 34 | 32 | 33 | 35 | 33 | 35 | 36 | 55 | 61 | 68 | 71 | 82 | 75 | 69 | 65 | 75 | 59 | A | 37 | 33 | 34 | 34 | 31 | 33 |
| 28 | 33 | 36 | N 23 | N 23 | | N 24 | 29 | 50 | 60 | 78 | 97 | 80 | 87 | 76 | 71 | 76 | 53 | 42 | 41 | 40 | 35 | 25 | 25 | 31 |
| 29 | 31 | 31 | 31 | 33 | 31 | 31 | 30 | 50 | 65 | 65 | 78 | 78 | 85 | 67 | 64 | 71 | 51 | 55 | 37 | 33 | 31 | A | A | A |
| 30 | 31 | 31 | 31 | 31 | 29 | 26 | 25 | 52 | 59 | 69 | 79 | 79 | 65 | 69 | 65 | 57 | 55 | 52 | 34 | 33 | 26 | 27 | 30 | 31 |
| 31 | 33 | A | A | A | A | A | 24 | 45 | 67 | 64 | 71 | 65 | 77 | 66 | 67 | 63 | 52 | A | 32 | 33 | 24 | 25 | 25 | 30 |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 29 | 25 | 27 | 27 | 29 | 25 | 31 | 31 | 30 | 31 | 31 | 31 | 31 | 31 | 30 | 31 | 31 | 26 | 26 | 28 | 28 | 24 | 26 | 27 |
| MED | 31 | 31 | 31 | 32 | 32 | 29 | 29 | 50 | 59 | 65 | 72 | 78 | 74 | 67 | 66 | 65 | 55 | 40 | 32 | 32 | 31 | 30 | 28 | 30 |
| U Q | 33 | 34 | 35 | 34 | 34 | 33 | 32 | 54 | 62 | 70 | 85 | 85 | 81 | 74 | 71 | 72 | 66 | 45 | 35 | 33 | 34 | 31 | 31 | 31 |
| L Q | 30 | 30 | 30 | 30 | 29 | 25 | 24 | 45 | 55 | 57 | 68 | 69 | 66 | 62 | 63 | 59 | 51 | 35 | 31 | 30 | 27 | 25 | 25 | 25 |

# HOURLY VALUES OF fEs AT Kokubunji

## DEC.2021

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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | G | 27 | 29 | 33 | 27 | 27 | G | G | 65 | 116 | 82 | 50 | 40 | 30 | 31 | G | G | 37 | G | G | G | G | G | G |
| 2 | G | 134 | G | G | G | G | G | 29 | 34 | 40 | 40 | 39 | 42 | 40 | 39 | 58 | 42 | 35 | 25 | G | G | G | G | G |
| 3 | G | 31 | G | G | 26 | | | 28 | 36 | 34 | 32 | 40 | 37 | 40 | 85 | 42 | 32 | 22 | G | G | G | G | G | G |
| 4 | G | G | G | G | G | G | G | 43 | 31 | 36 | 40 | 46 | 40 | 165 | 34 | 25 | G | 33 | G | G | G | G | G | G |
| 5 | G | G | G | G | G | 26 | G | 46 | 48 | 31 | 41 | 38 | 42 | 33 | 145 | 36 | 35 | 34 | 41 | 117 | 24 | G | G | G |
| 6 | 28 | 40 | 90 | 23 | 25 | G | G | G | 52 | 69 | 47 | 40 | 146 | 45 | 40 | 35 | 33 | 26 | 29 | 33 | 53 | 41 | G | 33 |
| 7 | G | G | G | G | G | G | G | 47 | 29 | 33 | 40 | 39 | 37 | 34 | 34 | 29 | G | 33 | 35 | 23 | 24 | 26 | 29 | 28 |
| 8 | G | G | G | G | G | G | G | 40 | 32 | 36 | 39 | 36 | 35 | 35 | 154 | 33 | 38 | 29 | 24 | | 24 | 25 | | 23 |
| 9 | G | G | G | G | G | 11 | G | 29 | G | 46 | 38 | 52 | 54 | 36 | 34 | G | G | G | | G | G | | 24 | G |
| 10 | G | G | 24 | 24 | G | G | 28 | 21 | 32 | 33 | | 54 | 47 | 42 | 49 | 28 | 31 | 28 | 23 | G | G | G | G | G |
| 11 | G | 130 | G | G | G | 11 | | G | 50 | 32 | 37 | 36 | 43 | 35 | 52 | 30 | G | 11 | G | G | G | G | G | G |
| 12 | G | G | G | G | G | G | | 23 | 33 | 40 | 41 | 39 | 37 | 35 | 35 | 34 | G | 11 | G | G | G | G | G | G |
| 13 | G | G | G | G | G | 23 | G | 40 | G | 43 | 37 | 31 | 31 | 31 | 33 | 39 | 40 | 34 | 29 | G | 25 | | G | G |
| 14 | G | 40 | 28 | G | G | 115 | G | 31 | 52 | 33 | 33 | 39 | 35 | N | 40 | 31 | 47 | 23 | G | | 28 | G | 46 | G |
| 15 | G | G | G | G | G | 24 | G | G | 33 | 35 | 39 | 49 | 39 | 53 | 52 | 41 | 36 | G | 25 | G | 30 | G | G | G |
| 16 | 57 | 72 | 58 | 26 | G | G | G | G | 32 | 53 | 40 | G | | 36 | 35 | 33 | G | 11 | | 25 | G | 29 | 71 | 36 |
| 17 | 31 | 24 | G | 31 | 25 | G | G | G | 35 | 37 | 33 | 42 | 37 | 34 | 38 | 48 | 39 | 115 | 33 | 31 | G | G | 80 | 41 |
| 18 | 60 | 38 | 32 | 43 | 26 | G | G | G | G | 33 | 43 | 42 | 42 | 36 | 36 | 32 | G | 27 | G | G | 27 | 32 | 25 | 27 |
| 19 | 36 | 26 | 24 | G | G | G | | 24 | 154 | 37 | 39 | 153 | 38 | 38 | 37 | G | G | 40 | 31 | 25 | G | G | | G |
| 20 | G | G | G | G | G | G | 90 | G | 33 | 43 | 41 | 37 | 36 | 37 | 29 | 33 | G | 41 | 23 | G | G | G | G | 24 |
| 21 | G | 30 | G | G | G | G | G | G | 31 | 35 | 36 | 32 | 54 | 32 | 49 | 32 | G | 23 | G | G | G | G | G | 23 |
| 22 | 29 | 28 | 27 | G | G | G | G | 47 | 47 | 38 | 30 | 57 | 48 | 39 | G | G | G | G | G | 29 | G | G | G | G |
| 23 | G | G | G | G | G | G | G | 46 | G | 30 | 32 | 110 | 32 | G | 29 | 31 | 24 | 29 | G | G | G | G | G | G |
| 24 | G | 24 | G | G | G | G | G | 24 | G | 33 | 47 | 36 | 33 | 37 | 36 | 26 | G | 11 | G | G | G | G | G | G |
| 25 | G | G | G | G | G | G | G | G | 32 | 36 | 32 | 32 | 33 | 56 | 43 | 27 | G | 11 | 29 | 24 | G | G | G | G |
| 26 | G | G | G | G | G | G | G | G | 35 | 40 | 42 | 43 | 31 | 32 | 29 | 33 | G | G | G | G | G | | G | G |
| 27 | G | G | 32 | G | G | 26 | G | G | G | 35 | 34 | 50 | 33 | 31 | 47 | 37 | 23 | 43 | 31 | 22 | G | G | G | G |
| 28 | G | G | G | G | | G | | 28 | 45 | 59 | 37 | 35 | 37 | 34 | 36 | 47 | 34 | G | G | G | G | | G | G |
| 29 | G | G | G | G | G | G | G | G | 47 | 36 | 38 | 38 | 35 | G | G | 29 | G | G | 25 | G | G | 41 | 36 | 33 |
| 30 | 26 | G | 28 | G | G | G | G | G | 47 | 38 | 40 | 33 | 54 | 38 | 37 | 26 | G | 11 | G | G | | G | G | G |
| 31 | G | 71 | 43 | 70 | 30 | 27 | | G | 31 | 36 | 39 | 40 | 38 | 36 | 47 | 33 | 27 | 38 | G | 23 | | 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 | 31 | 31 | 31 | 30 | 30 | 25 | 31 | 31 | 31 | 30 | 31 | 30 | 30 | 31 | 31 | 31 | 31 | 29 | 29 | 29 | 27 | 29 | 31 |
| MED | G | G | G | G | G | G | G | 21 | 33 | 36 | 39 | 39 | 38 | 36 | 37 | 32 | G | 26 | G | G | G | G | G | G |
| U Q | G | 31 | 28 | G | G | 11 | G | 31 | 47 | 40 | 41 | 49 | 42 | 39 | 47 | 36 | 34 | 34 | 29 | 23 | 24 | G | 12 | 23 |
| L Q | G | G | G | G | G | G | G | G | 31 | 33 | 36 | 36 | 35 | 33 | 34 | 27 | G | 11 | G | G | G | G | G | G |

# HOURLY VALUES OF fmin AT Kokubunji

## DEC.2021

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 | 16 | 15 | 16 | 16 | 15 | 16 | 15 | 18 | 16 | 14 | 11 | 14 | 15 | 16 | 17 | 15 | 15 | 15 | 17 | 15 | 16 | 15 | 15 | 15 |
| 2 | 17 | 15 | 14 | 13 | 14 | 17 | 14 | 15 | 17 | 15 | 14 | 13 | 15 | 14 | 13 | 15 | 16 | 16 | 16 | 14 | 15 | 13 | 15 | 15 |
| 3 | 15 | 16 | 15 | 16 | 15 | 15 | 15 | 13 | 17 | 16 | 17 | 15 | 15 | 14 | 16 | 15 | 16 | 15 | 16 | 13 | 17 | 14 | 13 | 16 |
| 4 | 15 | 14 | 14 | 14 | 15 | 13 | 15 | 18 | 15 | 17 | 15 | 14 | 13 | 15 | 16 | 15 | 17 | 15 | 13 | 15 | 14 | 14 | 15 | 13 |
| 5 | 15 | 14 | 14 | 13 | 13 | 15 | 15 | 21 | 14 | 14 | 15 | 15 | 15 | 16 | 15 | 15 | 16 | 15 | 15 | 16 | 16 | 15 | 15 | 16 |
| 6 | 17 | 15 | 17 | 16 | 15 | 15 | 13 | 15 | 15 | 15 | 15 | 15 | 16 | 14 | 13 | 15 | 16 | 16 | 16 | 16 | 15 | 15 | 16 | 16 |
| 7 | 13 | 13 | 15 | 15 | 13 | 15 | 15 | 15 | 15 | 16 | 16 | 13 | 15 | 14 | 16 | 16 | 16 | 16 | 15 | 15 | 16 | 16 | 16 | 15 |
| 8 | 15 | 13 | 13 | 13 | 13 | 15 | 14 | 17 | 16 | 16 | 15 | 15 | 16 | 16 | 99 | 14 | 15 | 16 | 16 | 15 | 16 | 16 | 15 | 16 |
| 9 | 17 | 15 | 15 | 15 | 16 | 15 | 15 | 13 | 16 | 16 | 13 | 15 | 15 | 14 | 15 | 14 | 15 | 17 | 15 | 15 | 15 |  | 15 | 15 |
| 10 | 14 | 15 | 16 | 16 | 15 | 16 | 15 | 15 | 15 | 17 | 16 | 15 | 15 | 13 | 14 | 15 | 17 | 16 | 16 | 14 | 15 | 15 | 16 | 13 |
| 11 | 14 | 24 | 13 | 15 | 13 | 13 |  | 16 | 16 | 17 | 14 | 14 | 14 | 15 | 16 | 15 | 15 | 15 | 13 | 21 | 19 | 18 | 15 | 15 |
| 12 | 16 | 14 | 15 | 13 | 17 | 14 |  | 16 | 16 | 15 | 14 | 14 | 14 | 15 | 15 | 14 | 15 | 13 | 13 | 13 | 14 | 16 | 13 | 14 |
| 13 | 15 | 15 | 13 | 14 | 15 | 15 | 15 | 16 | 15 | 15 | 14 | 14 | 21 | 14 | 14 | 15 | 16 | 15 | 16 | 14 | 17 | 15 | 15 | 14 |
| 14 | 15 | 15 | 15 | 17 | 19 | 13 | 15 | 17 | 15 | 15 | 15 | 14 | 14 | 15 | 14 | 15 | 14 | 17 | 15 | 16 | 15 | 14 | 16 | 13 |
| 15 | 15 | 13 | 16 | 15 | 15 | 16 | 17 | 18 | 16 | 15 | 15 | 14 | 15 | 14 | 14 | 15 | 15 | 13 | 16 | 14 | 17 | 13 | 14 | 14 |
| 16 | 16 | 15 | 14 | 15 | 13 | 16 | 16 | 15 | 16 | 16 | 14 | 13 | 14 | 15 | 14 | 15 | 15 | 13 |  | 15 | 14 | 16 | 15 | 15 |
| 17 | 17 | 16 | 16 | 17 | 15 | 15 | 13 | 15 | 15 | 15 | 15 | 14 | 15 | 14 | 14 | 14 | 15 | 16 | 17 | 16 | 22 | 15 | 16 | 15 |
| 18 | 15 | 15 | 16 | 15 | 16 | 16 | 14 | 15 | 16 | 15 | 14 | 15 | 17 | 15 | 15 | 15 | 18 | 16 | 15 | 17 | 15 | 16 | 16 | 16 |
| 19 | 16 | 16 | 15 | 16 | 13 | 15 |  | 15 | 15 | 15 | 15 | 15 | 15 | 14 | 15 | 15 | 21 | 15 | 16 | 16 | 15 | 15 |  | 14 |
| 20 | 17 | 14 | 15 | 17 | 14 | 15 | 14 | 18 | 16 | 15 | 14 | 15 | 13 | 13 | 22 | 15 | 21 | 15 | 16 | 15 | 16 | 14 | 13 | 16 |
| 21 | 15 | 16 | 15 | 15 | 13 | 15 | 13 | 16 | 15 | 16 | 15 | 13 | 12 | 18 | 13 | 15 | 15 | 16 | 14 | 15 | 15 | 15 | 16 | 16 |
| 22 | 16 | 15 | 16 | 16 | 16 | 13 | 15 | 18 | 15 | 15 | 14 | 33 | 24 | 15 | 33 | 14 | 15 | 15 | 15 | 16 | 16 | 17 | 14 | 13 |
| 23 | 14 | 13 | 14 | 13 | 14 | 14 | 14 | 17 | 13 | 16 | 14 | 23 | 17 | 33 | 22 | 14 | 23 | 16 | 14 | 14 | 13 | 17 | 14 | 13 |
| 24 | 15 | 16 | 15 | 15 | 15 | 14 | 14 | 15 | 14 | 15 | 15 | 14 | 15 | 17 | 14 | 15 | 14 | 13 | 14 | 13 | 118 | 15 | 13 | 15 |
| 25 | 16 | 16 | 15 | 13 | 13 | 16 | 14 | 14 | 16 | 17 | 13 | 16 | 23 | 25 | 15 | 14 | 15 | 13 | 16 | 16 | 15 | 15 | 18 | 13 |
| 26 | 15 | 15 | 14 | 16 | 15 | 16 | 16 | 17 | 16 | 15 | 14 | 14 | 23 | 15 | 20 | 15 | 14 | 14 | 15 | 14 | 17 |  | 14 | 15 |
| 27 | 16 | 16 | 15 | 15 | 13 | 15 | 17 | 18 | 26 | 15 | 20 | 12 | 14 | 15 | 14 | 15 | 16 | 15 | 16 | 17 | 13 | 14 | 20 | 13 |
| 28 | 15 | 13 | 15 | 17 | 16 | 13 | 17 | 16 | 15 | 15 | 15 | 16 | 13 | 14 | 13 | 15 | 15 | 16 | 16 | 16 | 14 |  | 14 | 15 |
| 29 | 14 | 13 | 13 | 15 | 17 | 14 | 16 | 15 | 13 | 15 | 14 | 15 | 16 | 14 | 15 | 14 | 22 | 16 | 16 | 14 | 16 | 15 | 15 | 15 |
| 30 | 15 | 16 | 16 | 17 | 13 | 13 | 15 | 17 | 14 | 15 | 14 | 14 | 14 | 15 | 16 | 15 | 15 | 15 | 18 | 13 | 15 | 13 | 14 | 13 |
| 31 | 14 | 16 | 15 | 16 | 15 | 15 | 15 | 15 | 15 | 14 | 15 | 14 | 14 | 14 | 15 | 14 | 15 | 15 | 15 | 15 | 15 | 17 | 15 | 15 |
|  | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 31 | 31 | 31 | 31 | 31 | 31 | 28 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 30 | 31 | 31 | 28 | 30 | 31 |
| MED | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 15 | 15 | 15 | 14 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 15 | 15 | 15 | 15 | 15 |
| U Q | 16 | 16 | 16 | 16 | 15 | 16 | 15 | 17 | 16 | 16 | 15 | 15 | 16 | 15 | 16 | 15 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 15 |
| L Q | 15 | 14 | 14 | 14 | 13 | 14 | 14 | 15 | 15 | 15 | 14 | 14 | 14 | 14 | 14 | 14 | 15 | 15 | 15 | 14 | 15 | 14 | 14 | 13 |

# HOURLY VALUES OF foF2 AT Yamagawa

## DEC.2021

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

| HD | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 35 | 30 | 33 | 33 | 33 | 33 | 25 | 40 | 60 | 53 | 71 | 102 | 85 | 76 | 69 | 76 | 90 | 71 | 45 | 33 | 36 | 35 | 34 | 31 |
| 2 | 31 | 31 | 41 | 37 | 31 | 27 | N 24 | 44 | 65 | 82 | 84 | 90 | 78 | A | 79 | 67 | 74 | 59 | 37 | 36 | 40 | 33 | 29 | 30 |
| 3 | 30 | 32 | 31 | 33 | 37 | N 26 | B 23 | 36 | 57 | 66 | 75 | 81 | 79 | 71 | 87 | 68 | 63 | 52 | 38 | 30 | 25 | 29 | 32 | 30 |
| 4 | 31 | 29 | 30 | 31 | 29 | B 29 | N 23 | 40 | 60 | 69 | 84 | 111 | 96 | 80 | 72 | 77 | 67 | 47 | 40 | 42 | 30 | 30 | A | 23 |
| 5 | A | 30 | 31 | 33 | 36 | 33 | N 24 | 35 | 60 | 62 | 68 | 83 | A | 73 | 75 | 67 | 67 | A | A | 31 | A | A | 31 | 25 |
| 6 | 33 | 31 | 32 | 33 | 32 | 26 | A | 42 | 55 | 50 | 71 | 79 | 74 | 72 | 63 | A | 66 | 54 | 34 | 30 | A | A | A | A |
| 7 | A | A | A | 30 | 32 | 31 | 24 | 35 | 62 | 61 | 73 | 79 | 73 | 72 | 76 | 67 | 57 | 55 | 38 | A | A | A | 32 | 30 |
| 8 | 26 | A | A | 32 | 35 | 30 | N 24 | 35 | 63 | 54 | 57 | 69 | 78 | 98 | 94 | 74 | 61 | 47 | 32 | N 23 | A | 31 | 27 | B 24 |
| 9 | 24 | 30 | 29 | 32 | 32 | 35 | 31 | 32 | 49 | 59 | 55 | 70 | 65 | 60 | 61 | 63 | 62 | 51 | 37 | A | 35 | 30 | N 25 | A |
| 10 | 29 | 29 | 31 | 30 | 31 | 25 | 28 | 32 | 49 | 51 | 52 | 62 | 65 | 66 | 63 | 57 | 57 | 57 | 42 | A | 31 | 27 | 25 | 27 |
| 11 | N 29 | 29 | 29 | 30 | 33 | 33 | 25 | 32 | 50 | 53 | 55 | 62 | 57 | 60 | 63 | 58 | 60 | 66 | 32 | 33 | A | 25 | 30 | 31 |
| 12 | 30 | 32 | A | 32 | 33 | 33 | N 24 | 35 | 53 | 60 | 66 | 60 | 65 | 67 | 63 | 55 | 57 | 65 | A | A | A | A | A | A |
| 13 | 27 | A | A | 33 | 34 | 30 | 26 | 35 | 49 | 60 | 67 | 75 | 68 | 66 | 66 | 54 | 53 | 61 | A | 33 | 34 | 24 | N 29 | 25 |
| 14 | 30 | 32 | 32 | 33 | 33 | 31 | N 24 | 33 | 56 | 61 | 68 | 62 | 72 | 75 | 58 | 61 | 71 | 55 | 45 | 31 | B 23 | 31 | 31 | B 24 |
| 15 | B 31 | 29 | 31 | 33 | 33 | 30 | A | 33 | 56 | 59 | 61 | 64 | 68 | 72 | 72 | 67 | 65 | 50 | 41 | 33 | 31 | 35 | 27 | 27 |
| 16 | B 24 | 31 | 30 | A | 30 | 32 | 37 | 35 | 59 | 63 | 69 | 79 | 85 | 63 | 72 | 55 | 67 | 65 | 37 | 33 | 31 | 31 | 32 | 29 |
| 17 | 31 | 32 | 34 | 32 | 37 | 27 | 30 | 38 | 59 | 67 | 66 | 77 | 101 | 70 | 89 | 91 | 74 | 53 | 39 | 44 | 33 | 33 | 31 | 29 |
| 18 | 27 | 31 | A | A | 34 | 35 | 26 | 38 | 60 | 62 | 65 | 71 | 67 | 76 | 79 | 77 | 76 | 61 | 38 | 35 | 37 | 35 | 32 | A |
| 19 | B 26 | A | A | 33 | 32 | 27 | N 24 | 36 | 62 | 69 | 77 | 73 | 72 | 81 | 73 | 93 | 59 | 66 | 50 | A | A | 48 | 38 | N 24 |
| 20 | 27 | A | 27 | 30 | 32 | 25 | 32 | 42 | 53 | 64 | 103 | 97 | 72 | 81 | 73 | 101 | 85 | 69 | 35 | 39 | 39 | 43 | 43 | 31 |
| 21 | 31 | 32 | 33 | 38 | 37 | 34 | 37 | 46 | 66 | 72 | 93 | 102 | 89 | 86 | 75 | 82 | 70 | 65 | 47 | 40 | 41 | 34 | N 24 | A |
| 22 | 31 | 32 | 35 | 37 | 37 | 25 | 30 | 41 | 68 | 73 | 82 | 97 | 92 | 85 | 87 | 87 | 87 | 63 | 49 | 39 | 37 | 35 | 33 | 30 |
| 23 | 31 | 34 | 37 | 34 | 31 | 30 | 37 | 41 | 62 | 82 | 83 | 83 | 82 | 95 | 87 | 75 | 84 | 65 | 45 | 40 | 30 | 27 | B 29 | 28 |
| 24 | 34 | 32 | 33 | 33 | 34 | 26 | 27 | 35 | 55 | 60 | 65 | 76 | 95 | 103 | 88 | 66 | 94 | 70 | 56 | 37 | 39 | 35 | 30 | 31 |
| 25 | 34 | 36 | 37 | 38 | 49 | 41 | 31 | 40 | 56 | 68 | 84 | 90 | 83 | 79 | 84 | 69 | 85 | 76 | A | 35 | 40 | 43 | 36 | 27 |
| 26 | 32 | 33 | 35 | 35 | 36 | 36 | 35 | 42 | 67 | 71 | 77 | 93 | 93 | 101 | 82 | 93 | 87 | 75 | 51 | 49 | 39 | 37 | 31 | 31 |
| 27 | 32 | 33 | 33 | 35 | 36 | 33 | 37 | 51 | 66 | 63 | 67 | 82 | 89 | 87 | 73 | 83 | 85 | 72 | 44 | 37 | 41 | 43 | 41 | 34 |
| 28 | 35 | 40 | 28 | N 24 | 24 | 29 | N 25 | 36 | 64 | 80 | 85 | 85 | 101 | 115 | 113 | 103 | 87 | 68 | 53 | 43 | 50 | 42 | 29 | 30 |
| 29 | 31 | N 30 | 31 | 34 | 33 | 32 | B 23 | 35 | 59 | 69 | 69 | 69 | 103 | 89 | 78 | 80 | 77 | 65 | 56 | 45 | 39 | 33 | 28 | 27 |
| 30 | 31 | 31 | A | A | A | 27 | A | 33 | 67 | 83 | 80 | 73 | 81 | 84 | 82 | 81 | 62 | 76 | 67 | 49 | 41 | A | 33 | 35 |
| 31 | 33 | 30 | 32 | A | A | A | A | 30 | 61 | 71 | 75 | 65 | 81 | 78 | 68 | 58 | 66 | 58 | 44 | 31 | A | 29 | 31 | B 27 |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 29 | 26 | 24 | 27 | 29 | 30 | 27 | 31 | 31 | 31 | 31 | 31 | 30 | 30 | 31 | 30 | 31 | 30 | 27 | 26 | 23 | 26 | 28 | 26 |
| MED | 31 | 31 | 32 | 33 | 33 | 30 | 26 | 36 | 60 | 63 | 71 | 79 | 80 | 77 | 75 | 72 | 67 | 64 | 42 | 36 | 37 | 33 | 31 | 29 |
| U Q | 32 | 32 | 33 | 34 | 36 | 33 | 31 | 41 | 63 | 71 | 82 | 90 | 89 | 86 | 84 | 82 | 85 | 68 | 49 | 40 | 40 | 35 | 32 | 31 |
| L Q | 28 | 30 | 30 | 32 | 32 | 27 | 24 | 35 | 55 | 60 | 66 | 69 | 72 | 71 | 68 | 63 | 62 | 55 | 37 | 33 | 31 | 30 | 29 | 27 |

# HOURLY VALUES OF fEs AT Yamagawa

## DEC.2021

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 | 37 | 124 | 112 | G | G | 35 | G | 24 | 160 | 39 | 41 | 45 | 39 | 61 | 78 | 46 | 49 | G | 11 | G | 24 | G | G | G |
| 2 | 28 | G | G | G | G | G | G | G | 30 | 33 | 46 | 76 | 61 | 84 | 57 | 59 | 39 | 31 | G | 32 | 27 | 28 | G | G |
| 3 | G | 30 | 29 | G | 28 | G | B | 26 | 33 | 38 | 38 | 48 | 39 | 39 | 43 | 35 | 25 | 32 | 32 | 26 | G | G | G | G |
| 4 | G | G | G | G | G | B | 106 | G | 30 | 36 | 42 | 49 | 40 | 46 | 44 | 48 | 58 | 57 | 32 | 26 | 24 | G | 28 | G |
| 5 | 24 | G | G | G | G | 11 | G | 22 | 35 | 46 | 47 | 96 | 105 | 60 | 56 | 56 | 43 | 50 | 40 | 29 | 40 | 28 | G | G |
| 6 | 25 | 38 | G | 35 | 26 | G | 27 | G | 43 | 71 | 54 | 61 | 58 | 45 | 38 | 69 | 45 | 42 | 32 | G | 49 | 33 | 50 | 72 |
| 7 | 43 | 34 | 38 | G | G | G | G | G | 32 | 54 | 40 | 44 | 50 | 52 | 39 | 40 | 50 | 40 | 32 | 36 | 33 | 24 | 24 | 30 |
| 8 | G | 33 | 33 | G | 11 | G | G | G | 48 | 34 | 39 | 46 | 39 | 41 | 35 | 34 | 43 | 30 | G | G | 31 | G | G | B |
| 9 | G | G | 25 | G | G | G | 32 | 23 | 160 | 56 | 42 | 62 | 59 | 38 | 41 | 42 | 49 | 31 | 11 | 34 | G | 23 | G | 32 |
| 10 | G | G | G | G | G | G | 32 | 180 | 28 | 38 | 42 | 47 | 56 | 45 | 39 | 39 | 38 | 27 | 43 | 38 | 24 | G | G | G |
| 11 | G | G | G | G | G | 170 | G | 11 | 48 | 47 | 34 | 44 | 45 | 47 | 37 | 29 | 33 | 26 | 25 | 32 | 32 | G | G | G |
| 12 | G | G | 33 | G | G |  | G | G | 31 | 37 | 42 | 39 | 146 | 44 | 76 | 38 | 26 | 31 | 40 | 57 | 54 | 41 | 33 | 28 |
| 13 | G | 38 | 33 | 25 | G | G | 26 | G | 46 | 54 | 48 | 43 | 42 | 46 | 55 | 50 | 56 | 56 | 49 | 28 | G | G | G | G |
| 14 | G | G | 27 | 24 | 28 | G | G | G | 125 | 32 | 36 | 40 | 39 | 62 | 46 | 35 | 32 | 40 | 29 | G | B | G | G | B |
| 15 | B | G | G | G | G |  | 95 | 20 | 28 | 35 | 36 | 49 | 44 | 50 | 40 | 36 | 33 | 23 | 30 | 26 | G | G | G | G |
| 16 | B | G | 25 | 40 | G | 35 | 28 | G | 28 | 39 | 58 | 36 | 61 | 40 | 38 | 41 | 38 | 28 | 23 | 27 | G | G | G | 28 |
| 17 | 28 | G | G | G | 24 | 61 | G | 23 | 49 | 35 | 44 | 44 | 49 | 51 | 50 | 56 | 52 | 58 | 60 | 30 | G | 28 | G | G |
| 18 | G | G | 36 | 28 | 26 | 26 | 27 | 26 | 29 | 35 | 40 | 44 | 54 | 40 | 44 | 54 | 40 | 36 | 34 | 31 | 26 | G | G | 27 |
| 19 | B | 56 | 30 | 31 | G | G | G | G | 50 | 56 | 43 | 44 | 46 | 42 | 41 | 36 | 33 | 48 | 33 | 42 | 40 | 36 | G | G |
| 20 | 27 | 29 | G | G | G | G | G | G | 28 | 46 | 40 | 53 | 46 | 40 | 40 | 38 | 32 | G | 34 | G | 24 | G | G | G |
| 21 | G | G | 25 | G | 23 | G | G | G | 27 | 34 | 41 | 38 | 40 | 40 | 38 | 36 | 25 | G | 26 | 26 | G | 36 | G | 58 |
| 22 | 28 | 26 | G | 29 | G | G | G | G | 29 | 56 | 37 | 62 | 40 | 40 | 39 | 31 | 25 | 32 | 34 | 26 | G | 27 | 26 | G |
| 23 | G | G | G | G | G | G | G | G | 28 | 38 | 44 | 42 | 42 | 41 | 40 | 36 | 32 | 35 | 43 | G | 30 | G | B | G |
| 24 | 29 | G | G | 202 | G | G | G | G | 49 | 33 | 38 | 45 | 42 | 41 | 41 | 36 | 29 | 38 | 28 | G | G | G | G | G |
| 25 | G | G | 28 | 23 | G | G | G | 128 | 32 | 39 | 46 | 49 | 44 | 48 | 46 | 38 | 32 | 41 | 58 | 26 | 31 | 32 | G | G |
| 26 | G | G | G | G | G | G | G | G | 24 | 40 | 66 | 58 | 78 | 56 | 40 | 40 | 35 | 32 | 43 | 44 | G | G | 24 | G |
| 27 | G | G | G | G | G | G | G | G | 29 | 34 | 60 | 41 | 58 | 61 | 52 | 40 | 42 | 24 | 26 | G | G | G | G | G |
| 28 | G | G | G | G | G | G | G | G | 30 | 40 | 43 | 44 | 53 | 71 | 56 | 35 | 39 | 32 | 30 | 24 | G | G | G | G |
| 29 | G | G | G | G | G | 11 | B | G | G | 32 | 40 | 48 | 40 | 39 | 38 | 37 | 33 | 21 | 32 | 26 | G | G | G | G |
| 30 | G | 30 | 39 | 35 | 39 | G | 24 | G | 48 | 56 | 42 | 45 | 45 | 41 | 38 | 38 | 32 | 37 | 39 | 31 | 25 | 24 | G | G |
| 31 | G | G | G | 38 | 33 | 32 | 25 | G | 28 | 35 | 42 | 48 | 43 | 56 | 60 | 52 | 40 | G | 11 | 32 | 38 | 25 | G | B |
|  | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 28 | 31 | 31 | 31 | 31 | 28 | 29 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 30 | 31 | 30 | 28 |
| MED | G | G | G | G | G | G | G | G | 31 | 38 | 42 | 45 | 45 | 45 | 41 | 38 | 38 | 32 | 32 | 26 | 24 | G | G | G |
| U Q | 26 | 30 | 30 | 28 | 23 | 11 | 26 | 22 | 48 | 47 | 46 | 49 | 58 | 56 | 52 | 48 | 43 | 40 | 40 | 32 | 31 | 28 | G | 14 |
| L Q | G | G | G | G | G | G | G | G | 28 | 35 | 40 | 44 | 40 | 40 | 39 | 36 | 32 | 26 | 26 | G | G | G | G | G |

# HOURLY VALUES OF fmin AT Yamagawa

## DEC.2021

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 | 15 | 59 | 15 | 17 | 15 | 16 | 17 | 16 | 15 | 15 | 14 | 15 | 16 | 14 | 15 | 13 | 15 | 17 | 16 | 15 | 16 | 15 | 15 | 14 |
| 2 | 17 | 15 | 15 | 14 | 14 | 15 | 15 | 16 | 16 | 14 | 14 | 13 | 17 | 17 | 19 | 15 | 14 | 16 | 16 | 16 | 16 | 16 | 15 | 16 |
| 3 | 16 | 16 | 15 | 15 | 15 | 15 | B 15 | 16 | 15 | 14 | 15 | 15 | 15 | 18 | 15 | 15 | 15 | 16 | 15 | 16 | 16 | 14 | 14 | 15 |
| 4 | 14 | 14 | 14 | 15 | 15 | B 15 | 16 | 14 | 15 | 16 | 14 | 14 | 14 | 14 | 14 | 15 | 15 | 15 | 16 | 16 | 16 | 16 | 15 | 14 |
| 5 | 15 | 15 | 15 | 14 | 14 | 15 | 17 | 15 | 16 | 15 | 15 | 15 | 14 | 19 | 17 | 17 | 14 | 15 | 15 | 16 | 15 | 16 | 17 | 16 |
| 6 | 16 | 15 | 16 | 15 | 16 | 16 | 16 | 16 | 15 | 15 | 13 | 14 | 14 | 14 | 15 | 16 | 15 | 15 | 16 | 16 | 14 | 15 | 15 | 15 |
| 7 | 16 | 16 | 15 | 15 | 15 | 16 | 15 | 16 | 16 | 15 | 13 | 15 | 13 | 16 | 15 | 15 | 15 | 14 | 15 | 15 | 16 | 16 | 16 | 16 |
| 8 | 16 | 16 | 15 | 15 | 15 | 14 | 15 | 18 | 15 | 14 | 14 | 15 | 15 | 17 | 16 | 17 | 14 | 16 | 15 | 17 | 16 | 15 | 14 | B 15 |
| 9 | 15 | 15 | 15 | 15 | 16 | 14 | 14 | 16 | 15 | 15 | 15 | 14 | 16 | 15 | 14 | 15 | 15 | 15 | 16 | 16 | 16 | 16 | 15 | 16 |
| 10 | 15 | 15 | 15 | 15 | 15 | 15 | 14 | 14 | 15 | 15 | 15 | 14 | 15 | 15 | 16 | 15 | 15 | 15 | 15 | 15 | 16 | 15 | 16 | 15 |
| 11 | 15 | 14 | 14 | 14 | 14 | 15 | 15 | 16 | 16 | 16 | 15 | 14 | 15 | 18 | 14 | 15 | 16 | 17 | 16 | 16 | 15 | 15 | 14 | 14 |
| 12 | 14 | 15 | 16 | 14 | 15 | 15 | 15 | 14 | 16 | 14 | 15 | 14 | 15 | 14 | 15 | 15 | 16 | 15 | 14 | 15 | 16 | 15 | 16 | 16 |
| 13 | 16 | 15 | 16 | 16 | 15 | 15 | 16 | 16 | 16 | 16 | 14 | 15 | 15 | 15 | 15 | 15 | 16 | 15 | 15 | 15 | 15 | 14 | 17 | 16 |
| 14 | 14 | 17 | 15 | 16 | 16 | 16 | 16 | 17 | 15 | 15 | 15 | 16 | 15 | 15 | 15 | 14 | 13 | 15 | 16 | 16 | B | 16 | 15 | B |
| 15 | B 15 | 15 | 14 | 14 | 14 | 17 | 12 | 16 | 15 | 15 | 14 | 14 | 16 | 17 | 15 | 17 | 16 | 15 | 15 | 16 | 16 | 14 | 16 | 15 |
| 16 | B | 14 | 15 | 15 | 16 | 15 | 15 | 15 | 15 | 13 | 14 | 16 | 16 | 16 | 15 | 15 | 14 | 16 | 17 | 15 | 16 | 15 | 17 | 16 |
| 17 | 16 | 14 | 16 | 15 | 16 | 15 | 14 | 16 | 15 | 16 | 16 | 18 | 18 | 19 | 15 | 13 | 14 | 14 | 14 | 15 | 16 | 16 | 15 | 15 |
| 18 | 14 | 15 | 15 | 16 | 16 | 16 | 15 | 15 | 15 | 14 | 15 | 15 | 15 | 15 | 16 | 15 | 15 | 15 | 16 | 15 | 16 | 15 | 15 | 15 |
| 19 | B 15 | 16 | 16 | 16 | 15 | 15 | 16 | 14 | 15 | 15 | 15 | 14 | 15 | 17 | 15 | 15 | 16 | 15 | 16 | 14 | 15 | 15 | 16 | 18 |
| 20 | 16 | 15 | 16 | 15 | 16 | 16 | 14 | 14 | 16 | 16 | 14 | 14 | 16 | 16 | 15 | 14 | 16 | 18 | 15 | 15 | 16 | 15 | 16 | 15 |
| 21 | 15 | 14 | 16 | 16 | 16 | 16 | 15 | 14 | 15 | 15 | 14 | 15 | 16 | 16 | 16 | 14 | 15 | 16 | 15 | 15 | 16 | 15 | 15 | 15 |
| 22 | 16 | 16 | 16 | 15 | 16 | 16 | 14 | 17 | 15 | 15 | 16 | 17 | 17 | 17 | 17 | 16 | 16 | 14 | 14 | 16 | 16 | 16 | 16 | 15 |
| 23 | 15 | 14 | 16 | 14 | 14 | 17 | 14 | 15 | 15 | 15 | 15 | 16 | 16 | 17 | 15 | 16 | 16 | 15 | 16 | 15 | 16 | 15 | B | 15 |
| 24 | 16 | 16 | 16 | 17 | 15 | 14 | 15 | 15 | 15 | 14 | 15 | 14 | 17 | 17 | 17 | 17 | 17 | 15 | 16 | 15 | 15 | 16 | 15 | 14 |
| 25 | 14 | 14 | 16 | 16 | 15 | 14 | 15 | 17 | 16 | 13 | 14 | 15 | 19 | 18 | 17 | 17 | 15 | 14 | 15 | 16 | 16 | 16 | 15 | 15 |
| 26 | 16 | 15 | 16 | 15 | 15 | 15 | 15 | 15 | 15 | 14 | 13 | 14 | 17 | 15 | 18 | 15 | 15 | 16 | 14 | 14 | 15 | 16 | 17 | 16 |
| 27 | 15 | 15 | 15 | 15 | 14 | 15 | 15 | 16 | 15 | 16 | 14 | 17 | 18 | 17 | 17 | 15 | 15 | 15 | 16 | 16 | 15 | 14 | 15 | 15 |
| 28 | 14 | 16 | 14 | 14 | 14 | 15 | 16 | 14 | 15 | 15 | 16 | 14 | 15 | 17 | 15 | 16 | 14 | 16 | 16 | 17 | 15 | 16 | 14 | 15 |
| 29 | 15 | 15 | 16 | 14 | 15 | 14 | B | 16 | 15 | 16 | 14 | 15 | 17 | 15 | 16 | 15 | 16 | 15 | 16 | 15 | 15 | 14 | 14 | 15 |
| 30 | 16 | 16 | 15 | 15 | 15 | 15 | 15 | 15 | 17 | 16 | 15 | 15 | 19 | 14 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 16 | 16 | 14 |
| 31 | 15 | 15 | 14 | 15 | 16 | 16 | 16 | 15 | 15 | 17 | 14 | 13 | 15 | 17 | 14 | 15 | 14 | 15 | 15 | 15 | 15 | 15 | 16 | B 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 | 30 | 31 | 31 | 31 | 31 | 31 | 30 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 30 | 31 | 30 | 30 |
| MED | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 15 | 15 | 14 | 15 | 16 | 16 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 15 | 15 | 15 |
| U Q | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 15 | 15 | 17 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| L Q | 15 | 15 | 15 | 14 | 15 | 15 | 15 | 15 | 15 | 14 | 14 | 14 | 15 | 15 | 15 | 15 | 14 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |

# HOURLY VALUES OF foF2 AT Okinawa

## DEC.2021

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 | 33 | 29 | 30 | A | 33 | A | A | 37 | 52 | 61 | 71 | 96 | 92 | 87 | 74 | 83 | 99 | 95 | 78 | 39 | 48 | 43 | 34 | 30 |
| 2 | 31 | 32 | 34 | 30 | N 24 | B | | 43 | 65 | 98 | 79 | 85 | 93 | 73 | 73 | 78 | 77 | 71 | 56 | 48 | 45 | 48 | 35 | 31 |
| 3 | 28 | N 30 | 31 | A | 34 | B 23 | B | 38 | 55 | 65 | 86 | 88 | 84 | 83 | 93 | 95 | 61 | 67 | 54 | 35 | 33 | B 24 | 25 | 24 |
| 4 | 26 | 30 | 30 | 26 | N 24 | B 23 | B | 39 | 59 | 75 | 88 | 118 | 129 | 102 | 90 | 106 | 86 | 65 | 61 | 59 | 45 | 31 | N 22 | B |
| 5 | N 24 | 27 | 29 | 30 | 34 | 29 | B 24 | 33 | 57 | 71 | 65 | 83 | 90 | 85 | 92 | 75 | 74 | 74 | 47 | A | A | 30 | 30 | 31 |
| 6 | 29 | 34 | 33 | 29 | 31 | 25 | B 25 | 39 | 61 | 61 | 57 | 87 | 95 | 94 | 68 | A | 77 | 68 | 46 | 33 | 25 | A | 34 | A |
| 7 | A | 30 | A | A | 35 | 44 | B 23 | 34 | 58 | 74 | 81 | 78 | 73 | A | 103 | 101 | 76 | 83 | 44 | A | A | A | A | 27 |
| 8 | 31 | 31 | B 33 | 35 | 39 | A | A | 34 | 49 | 71 | 73 | 66 | 95 | 140 | 151 | 115 | 83 | 71 | 51 | A | A | A | A | A |
| 9 | A | A | B 31 | 31 | 35 | 43 | A | 31 | 47 | 59 | 61 | 69 | 60 | 68 | 80 | 66 | 67 | 63 | 62 | A | 34 | A | A | B 23 |
| 10 | A | 31 | 31 | 31 | 31 | 37 | 34 | 31 | 45 | 60 | 65 | 59 | 57 | 77 | 77 | 97 | 79 | 84 | 57 | A | A | A | 30 | 31 |
| 11 | 25 | B 30 | 29 | 30 | 34 | 32 | 25 | 33 | 48 | 61 | 61 | 63 | 66 | 73 | 81 | 71 | 59 | 71 | 56 | 30 | N 25 | 24 | 31 | 37 |
| 12 | 34 | 30 | B 32 | 26 | 30 | 25 | 26 | 33 | 53 | 59 | 62 | 67 | 61 | 81 | 73 | 64 | 62 | 63 | 55 | 31 | 31 | N 26 | 26 | 30 |
| 13 | B 29 | 30 | A | 33 | 37 | 35 | 32 | 39 | 49 | 58 | 87 | 81 | 75 | 108 | 95 | 75 | 63 | 64 | 60 | 49 | 42 | 37 | 33 | 33 |
| 14 | 31 | 34 | 33 | 34 | 35 | 33 | 23 | 34 | 49 | 69 | 72 | 79 | 70 | 82 | 89 | 79 | 80 | 69 | 62 | 37 | 30 | 31 | 35 | 27 |
| 15 | 26 | N 29 | 31 | 31 | 37 | 24 | N 25 | 35 | 53 | 56 | 63 | 69 | 66 | 77 | 73 | 70 | 84 | 62 | 55 | 39 | 36 | 39 | 41 | N 23 |
| 16 | B 23 | A | 30 | 31 | 31 | 35 | 31 | 35 | 62 | 94 | 95 | 89 | 75 | 90 | 96 | 78 | 71 | 75 | 70 | 35 | 38 | A | 34 | 31 |
| 17 | 30 | 30 | A | 35 | 38 | A | A | 37 | 57 | 65 | 72 | 81 | 111 | 96 | 96 | 115 | 90 | 75 | 71 | 67 | 62 | 49 | 44 | 36 |
| 18 | 35 | 35 | 32 | 32 | 39 | 39 | B 24 | 34 | 64 | 69 | 74 | 68 | 73 | 89 | 99 | 82 | 89 | 86 | 64 | 47 | 54 | 51 | 36 | 35 |
| 19 | 30 | 29 | 31 | A | 33 | A | B 23 | 35 | 61 | 67 | 81 | 79 | 85 | 92 | 93 | 99 | 105 | 92 | 93 | 58 | 53 | 57 | 57 | 37 |
| 20 | 30 | 30 | 30 | 32 | N 31 | 25 | N 24 | 42 | 55 | 59 | 97 | 93 | 86 | 87 | 96 | 108 | 108 | 91 | 62 | 43 | 53 | 59 | 54 | 26 |
| 21 | A | A | 30 | 30 | 39 | 29 | N 22 | 36 | 67 | 81 | 91 | 98 | 107 | 111 | 90 | 95 | 89 | 83 | 74 | 49 | 59 | 60 | 34 | N 26 |
| 22 | A | 30 | 33 | 33 | 38 | B | B | 38 | 77 | 75 | 82 | 116 | 129 | 149 | 121 | 132 | 113 | 86 | 73 | 49 | 57 | 57 | 44 | 31 |
| 23 | 32 | 33 | 35 | 40 | 25 | B 22 | N 25 | 43 | 62 | 76 | 81 | 81 | 91 | 105 | 116 | 97 | 105 | 102 | 80 | 53 | 48 | 41 | 33 | 31 |
| 24 | 29 | 34 | 31 | 33 | 31 | B | B 23 | 34 | 58 | 64 | 71 | 70 | 95 | 120 | 142 | 134 | 141 | 145 | 113 | 60 | 52 | 51 | 37 | 33 |
| 25 | 31 | 33 | 37 | 41 | 53 | 51 | 35 | 43 | 63 | 75 | 88 | 91 | 102 | 103 | 94 | 105 | 108 | 111 | 99 | 49 | 60 | 60 | 54 | 38 |
| 26 | 35 | 37 | 36 | 34 | 35 | 30 | A | 40 | 65 | 82 | 86 | 85 | 93 | 116 | 153 | 139 | 148 | 143 | 134 | 78 | 72 | 72 | 57 | 51 |
| 27 | 50 | 43 | 33 | 33 | 31 | 30 | B 30 | 39 | 69 | 74 | 76 | 78 | 90 | 113 | 115 | 114 | 122 | 119 | 92 | 65 | 70 | 70 | 56 | 42 |
| 28 | 40 | 42 | 31 | N 25 | 31 | | N 23 | 38 | 70 | 82 | 106 | 79 | 119 | 154 | 139 | 121 | 143 | 105 | 82 | 64 | 72 | 85 | 49 | 32 |
| 29 | 32 | 32 | 31 | N 32 | 36 | 32 | 25 | 35 | 66 | 82 | 85 | 69 | 104 | 136 | 137 | 111 | 111 | 112 | 107 | 69 | 64 | 63 | 37 | 30 |
| 30 | 29 | 32 | 32 | 37 | 39 | 25 | N 29 | 33 | 61 | 92 | 114 | 87 | 100 | 111 | 99 | 116 | 94 | 97 | 124 | 89 | 74 | 51 | 44 | 47 |
| 31 | 25 | 30 | N 31 | 33 | 32 | B | A | A | 63 | 72 | 76 | 75 | 77 | 87 | 87 | 75 | 66 | 66 | 53 | 38 | 40 | 37 | 35 | 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 | 26 | 28 | 28 | 27 | 31 | 22 | 21 | 30 | 31 | 31 | 31 | 31 | 31 | 30 | 31 | 30 | 31 | 31 | 31 | 26 | 27 | 25 | 28 | 28 |
| MED | 30 | 30 | 31 | 32 | 34 | 30 | 25 | 36 | 59 | 71 | 79 | 81 | 90 | 93 | 94 | 97 | 86 | 83 | 62 | 49 | 48 | 49 | 35 | 31 |
| U Q | 32 | 33 | 33 | 34 | 37 | 35 | 29 | 39 | 64 | 76 | 87 | 88 | 100 | 111 | 115 | 114 | 108 | 97 | 82 | 60 | 60 | 59 | 44 | 35 |
| L Q | 28 | 30 | 30 | 30 | 31 | 25 | 23 | 34 | 53 | 61 | 71 | 69 | 73 | 83 | 81 | 78 | 74 | 68 | 55 | 38 | 36 | 34 | 33 | 28 |

# HOURLY VALUES OF fEs AT Okinawa

## DEC.2021

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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | G | G | G | 28 | 28 | 34 | 30 | 11 | 31 | 38 | 40 | 42 | 44 | 47 | 36 | 45 | 47 | 50 | 11 | 26 | G | G | G | G |
| 2 | G | G | G | 11 | G | B | G | 24 | 26 | 36 | 46 | 50 | 37 | 59 | 38 | 37 | 33 | 35 | 26 | 31 | 27 | G | 11 | 24 |
| 3 | G | G | G | 35 | 25 | B | B | 107 | 40 | 35 | 40 | 44 | 46 | 46 | 41 | 40 | 33 | 29 | 33 | 24 | 11 | B | G | G |
| 4 | G | G | G | G | G | B | B | G | 28 | 32 | 39 | 41 | 41 | 40 | 41 | 42 | 54 | 33 | 43 | 40 | 28 | G | G | B |
| 5 | G | G | G | G | G | 11 | B | 25 | 35 | 40 | 46 | 47 | 51 | 50 | 55 | 45 | 36 | 40 | 40 | 56 | 31 | 24 | G | G |
| 6 | G | G | G | G | 60 | G | B | 166 | 30 | 55 | 46 | 48 | 60 | 57 | 60 | 84 | 60 | 36 | 41 | 22 | 25 | 26 | 30 | 40 |
| 7 | 36 | G | 36 | 38 | 34 | G | B | 27 | 178 | 40 | 41 | 42 | 66 | 108 | 48 | 46 | 36 | 43 | 54 | 34 | 56 | 35 | 26 | G |
| 8 | 27 | G | B | G | G | 25 | 26 | G | 131 | 149 | 41 | 43 | 68 | 46 | 37 | 32 | 28 | 44 | 31 | 34 | 36 | 48 | 40 | 38 |
| 9 | 34 | 29 | B | G | 27 | 23 | 30 | G | 45 | 157 | 40 | 49 | 50 | 46 | 41 | 46 | 49 | 40 | 36 | 48 | 27 | 41 | 43 | B |
| 10 | 24 | G | G | G | G | G | 36 | 31 | 46 | 41 | 45 | 44 | 47 | 46 | 55 | 40 | 50 | 36 | 32 | 78 | 56 | 28 | 48 | 32 |
| 11 | G | B | G | G | G | G | 11 | G | 57 | 52 | 50 | 35 | 47 | 48 | 38 | 31 | 36 | 40 | 11 | 29 | G | G | G | G |
| 12 | G | G | B | G | 105 | G | G | G | 31 | 37 | 43 | 46 | 44 | 42 | 42 | 42 | 37 | 33 | 48 | 33 | G | 30 | G | G |
| 13 | B | G | 55 | 26 | G | 28 | G | G | 149 | 141 | 42 | 34 | 46 | 44 | 41 | 38 | 49 | 42 | 40 | 32 | 34 | 27 | G | G |
| 14 | G | G | G | G | 25 | 34 | G | G | 158 | 55 | 42 | 38 | 40 | 45 | 43 | 57 | 39 | 33 | 31 | 33 | G | G | G | G |
| 15 | 94 | G | G | G | G | G | G | G | 148 | 44 | 41 | 43 | 37 | 46 | 60 | 38 | 34 | 32 | 24 | 27 | G | 26 | G | G |
| 16 | B | 33 | G | G | G | 31 | 26 | G | 26 | 40 | 59 | 37 | 54 | 44 | 45 | 42 | 34 | 47 | 26 | 24 | G | 35 | G | G |
| 17 | G | G | 32 | G | 22 | 27 | 25 | G | 50 | 33 | 40 | 47 | 50 | 56 | 57 | 42 | 58 | 50 | 33 | 43 | 11 | G | G | G |
| 18 | G | G | G | G | 29 | 28 | B | G | 49 | 30 | 40 | 50 | 45 | 61 | 47 | 61 | 44 | 33 | 55 | 40 | 24 | G | 29 | G |
| 19 | G | G | G | 35 | 29 | 118 | B | G | 28 | 58 | 44 | 45 | 47 | 48 | 43 | 48 | 41 | 32 | 31 | 32 | 11 | G | G | 23 |
| 20 | G | G | G | 26 | 23 | G | G | G | 27 | 33 | 42 | 50 | 60 | 41 | 40 | 38 | 34 | G | 48 | 25 | G | 23 | G | G |
| 21 | 24 | 27 | G | G | G | G | G | G | G | 31 | 40 | 40 | 50 | 40 | 40 | 38 | 35 | G | 11 | 26 | 40 | 40 | 30 | G |
| 22 | 26 | G | G | G | 26 | B | B | G | 48 | 40 | 45 | 46 | 43 | 41 | 41 | 50 | 49 | 38 | 31 | 30 | 41 | G | G | G |
| 23 | G | G | G | G | G | B | G | G | 28 | 36 | 41 | 49 | 50 | 47 | 42 | 38 | 77 | G | 11 | 11 | G | G | G | G |
| 24 | G | G | 31 | G | G | B | B | G | 49 | 33 | 36 | 43 | 42 | 50 | 38 | 37 | 39 | 33 | 38 | 31 | G | 11 | G | G |
| 25 | G | G | G | 25 | G | G | G | 66 | 39 | 46 | 48 | 43 | 47 | 47 | 46 | 46 | 39 | G | 24 | 34 | 32 | 34 | 29 | 27 |
| 26 | G | G | G | G | 30 | 27 | 34 | 30 | 50 | 34 | 43 | 60 | 71 | 61 | 92 | 50 | 35 | G | 11 | 48 | 31 | 33 | 25 | G |
| 27 | 28 | 56 | G | G | G | G | B | G | G | 33 | 43 | 48 | 52 | 40 | 38 | 47 | 35 | 91 | 48 | G | G | 33 | G | G |
| 28 | G | G | G | G | G | G | G | G | 28 | 48 | 45 | 61 | 42 | 48 | 50 | 60 | 70 | 59 | 38 | 28 | 31 | 11 | G | G |
| 29 | G | G | 93 | G | G | G | G | G | 167 | 48 | 36 | 56 | 50 | 35 | 78 | 53 | 41 | 34 | 28 | 48 | G | G | G | G |
| 30 | 27 | G | G | G | G | 24 | 60 | 26 | 43 | 38 | 42 | 40 | 42 | 48 | 38 | 55 | 48 | 58 | 33 | 11 | 54 | G | 36 | G |
| 31 | G | G | G | G | G | B | 26 | 26 | 25 | 54 | 43 | 47 | 57 | 49 | 82 | 57 | 39 | 40 | 32 | 11 | G | G | G | G |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 29 | 30 | 28 | 31 | 31 | 24 | 21 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 30 | 31 | 29 |
| MED | G | G | G | G | G | 6 | G | G | 40 | 40 | 42 | 45 | 47 | 47 | 42 | 45 | 39 | 36 | 32 | 31 | 24 | 17 | G | G |
| U Q | 25 | G | G | 11 | 27 | 27 | 28 | 26 | 50 | 52 | 45 | 49 | 52 | 50 | 55 | 50 | 49 | 43 | 40 | 40 | 32 | 33 | 29 | G |
| L Q | G | G | G | G | G | G | G | G | 28 | 34 | 40 | 42 | 43 | 44 | 40 | 38 | 35 | 32 | 26 | 25 | G | G | G | G |

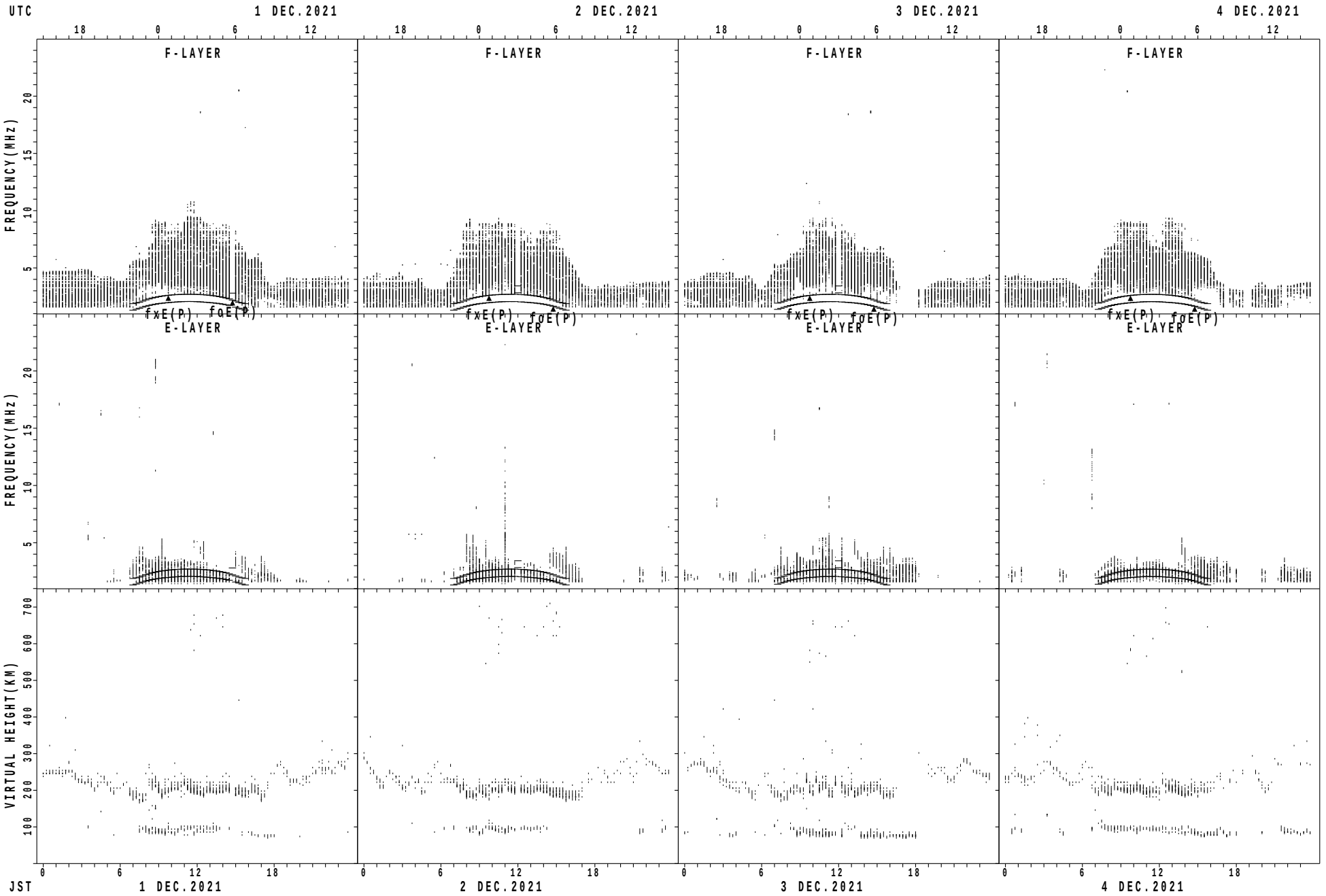
# HOURLY VALUES OF fmin AT Okinawa

## DEC.2021

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

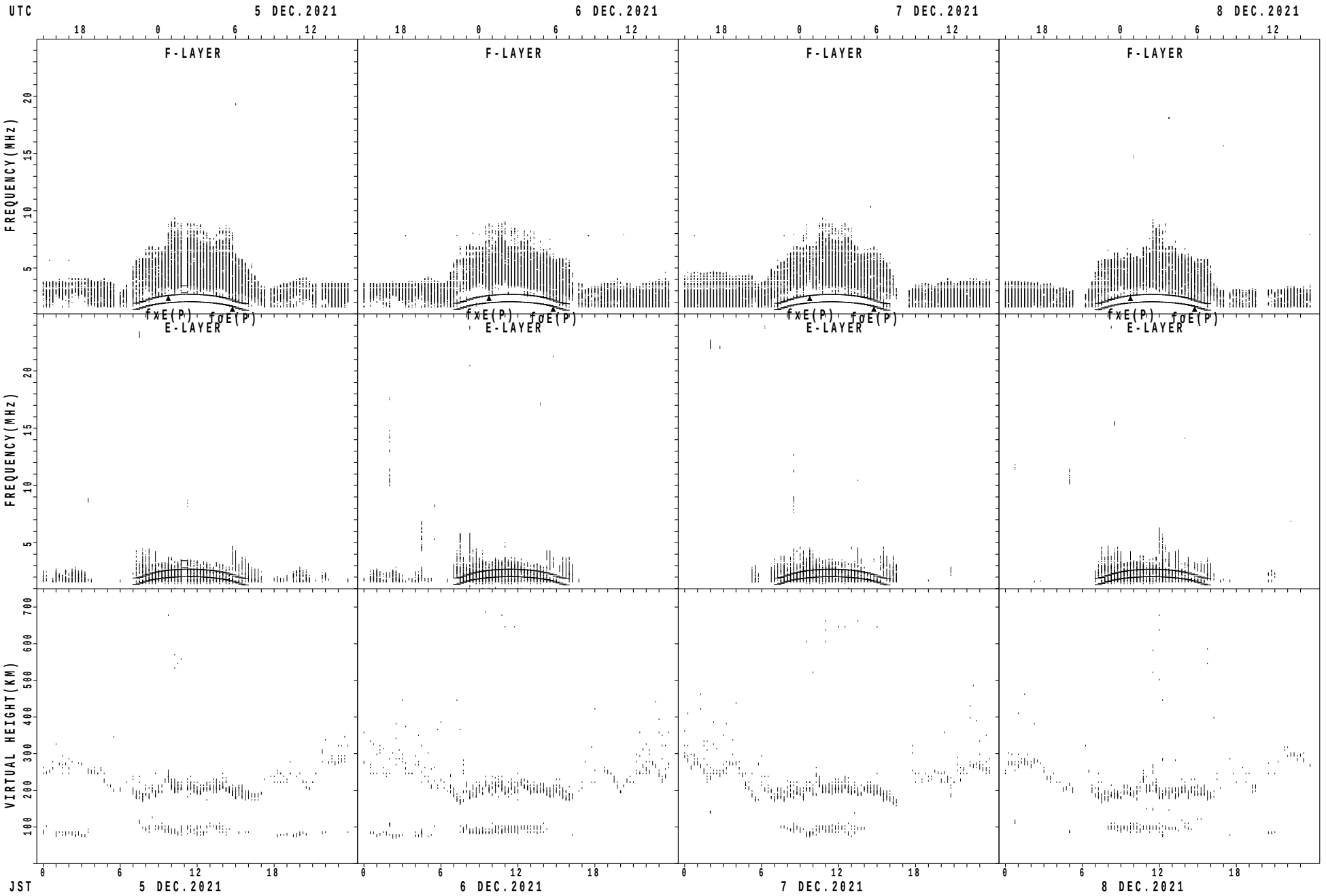
| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 16 | 14 | 14 | 16 | 15 | 15 | 17 | 15 | 16 | 16 | 15 | 15 | 17 | 15 | 14 | 14 | 16 | 15 | 16 | 16 | 15 | 17 | 14 | 15 |
| 2 | 14 | 14 | 15 | 16 | 14 | B | 17 | 15 | 15 | 17 | 15 | 14 | 15 | 19 | 15 | 15 | 17 | 16 | 15 | 16 | 15 | 15 | 14 | 16 |
| 3 | 15 | 15 | 15 | 15 | 17 | B | B 15 | 15 | 15 | 16 | 15 | 14 | 17 | 15 | 15 | 14 | 16 | 14 | 15 | 15 | 16 | B | 14 | 15 |
| 4 | 15 | 14 | 15 | 15 | 15 | B | B | 15 | 15 | 15 | 16 | 14 | 17 | 15 | 16 | 15 | 16 | 16 | 15 | 15 | 15 | 15 | 15 | B 15 |
| 5 | 15 | 15 | 23 | 14 | 16 | 15 | B | 15 | 16 | 15 | 13 | 16 | 16 | 15 | 15 | 16 | 15 | 16 | 15 | 16 | 15 | 16 | 15 | 17 |
| 6 | 14 | 15 | 16 | 15 | 15 | 15 | B 16 | 16 | 15 | 15 | 14 | 13 | 15 | 14 | 15 | 16 | 15 | 15 | 15 | 16 | 15 | 16 | 16 | 15 |
| 7 | 16 | 15 | 17 | 15 | 16 | 16 | B 16 | 16 | 16 | 15 | 13 | 14 | 15 | 13 | 15 | 14 | 15 | 15 | 14 | 16 | 15 | 15 | 15 | 15 |
| 8 | 15 | 15 | B 16 | 14 | 15 | 15 | 15 | 16 | 15 | 15 | 14 | 16 | 15 | 15 | 16 | 15 | 15 | 15 | 16 | 16 | 15 | 15 | 15 | 15 |
| 9 | 16 | 17 | B 15 | 16 | 15 | 16 | 17 | 15 | 15 | 17 | 15 | 16 | 15 | 16 | 14 | 15 | 15 | 15 | 16 | 15 | 15 | 15 | 15 | B 15 |
| 10 | 16 | 15 | 15 | 14 | 15 | 14 | 14 | 14 | 15 | 15 | 15 | 15 | 19 | 18 | 16 | 15 | 15 | 16 | 17 | 12 | 15 | 15 | 15 | 16 |
| 11 | 15 | B | 15 | 15 | 14 | 14 | 15 | 15 | 14 | 15 | 15 | 17 | 16 | 15 | 15 | 15 | 16 | 16 | 14 | 14 | 20 | 14 | 14 | 14 |
| 12 | 15 | 15 | B 15 | 15 | 10 | 14 | 7 | 14 | 16 | 15 | 16 | 15 | 15 | 15 | 15 | 14 | 15 | 16 | 15 | 15 | 15 | 15 | 15 | 14 |
| 13 | B | 15 | 16 | 15 | 16 | 16 | 16 | 15 | 15 | 17 | 14 | 14 | 14 | 15 | 14 | 15 | 16 | 15 | 15 | 15 | 15 | 16 | 15 | 15 |
| 14 | 14 | 14 | 14 | 16 | 15 | 15 | 19 | 14 | 16 | 15 | 15 | 15 | 16 | 15 | 15 | 13 | 14 | 16 | 16 | 16 | 15 | 14 | 14 | 14 |
| 15 | 14 | 15 | 15 | 15 | 16 | 16 | 15 | 14 | 15 | 16 | 15 | 16 | 17 | 18 | 18 | 15 | 16 | 16 | 15 | 15 | 11 | 15 | 15 | 14 |
| 16 | B 15 | 16 | 15 | 15 | 15 | 16 | 15 | 16 | 16 | 15 | 14 | 15 | 16 | 16 | 14 | 15 | 16 | 15 | 15 | 16 | 14 | 15 | 15 | 14 |
| 17 | 14 | 14 | 16 | 15 | 16 | 15 | 15 | 16 | 15 | 14 | 17 | 15 | 17 | 13 | 16 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 14 |
| 18 | 15 | 15 | 15 | 14 | 16 | 16 | B 15 | 15 | 15 | 16 | 15 | 14 | 14 | 14 | 15 | 13 | 15 | 15 | 15 | 16 | 16 | 16 | 16 | 15 |
| 19 | 14 | 14 | 14 | 15 | 16 | 18 | B 15 | 14 | 15 | 16 | 14 | 15 | 14 | 15 | 17 | 16 | 15 | 16 | 16 | 16 | 15 | 15 | 16 | 16 |
| 20 | 15 | 15 | 16 | 16 | 15 | 14 | 15 | 14 | 15 | 15 | 14 | 14 | 16 | 15 | 17 | 15 | 15 | 14 | 14 | 16 | 16 | 17 | 16 | 15 |
| 21 | 16 | 15 | 15 | 16 | 16 | 15 | 15 | 15 | 15 | 15 | 13 | 20 | 17 | 17 | 18 | 15 | 16 | 15 | 15 | 16 | 15 | 15 | 15 | 20 |
| 22 | 16 | 16 | 15 | 15 | 15 | B | B | 15 | 14 | 15 | 16 | 17 | 18 | 17 | 15 | 17 | 15 | 14 | 15 | 15 | 15 | 16 | 15 | 14 |
| 23 | 15 | 15 | 16 | 14 | 14 | B | 17 | 14 | 15 | 15 | 14 | 14 | 17 | 16 | 17 | 15 | 16 | 15 | 14 | 16 | 14 | 14 | 14 | 14 |
| 24 | 15 | 15 | 16 | 15 | 16 | B 15 | B 15 | 14 | 15 | 16 | 16 | 15 | 20 | 20 | 14 | 15 | 15 | 15 | 14 | 16 | 15 | 15 | 15 | 15 |
| 25 | 15 | 14 | 16 | 15 | 15 | 14 | 16 | 13 | 15 | 14 | 15 | 17 | 17 | 18 | 18 | 17 | 15 | 15 | 16 | 16 | 16 | 16 | 15 | 16 |
| 26 | 15 | 15 | 66 | 13 | 15 | 15 | 16 | 15 | 15 | 16 | 15 | 14 | 15 | 16 | 17 | 16 | 15 | 15 | 14 | 15 | 15 | 15 | 16 | 15 |
| 27 | 15 | 14 | 14 | 14 | 15 | 15 | B 14 | 14 | 14 | 15 | 14 | 15 | 17 | 15 | 16 | 16 | 17 | 14 | 14 | 16 | 14 | 16 | 16 | 16 |
| 28 | 14 | 14 | 15 | 14 | 15 | 66 | 15 | 14 | 15 | 15 | 15 | 18 | 17 | 21 | 16 | 14 | 15 | 15 | 15 | 14 | 15 | 15 | 14 | 14 |
| 29 | 15 | 14 | 15 | 15 | 15 | 15 | 16 | 14 | 15 | 16 | 17 | 15 | 16 | 19 | 15 | 15 | 15 | 15 | 16 | 15 | 14 | 14 | 16 | 14 |
| 30 | 15 | 14 | 14 | 15 | 15 | 15 | 41 | 16 | 15 | 16 | 14 | 14 | 15 | 18 | 16 | 13 | 14 | 15 | 15 | 14 | 15 | 15 | 15 | 16 |
| 31 | 15 | 14 | 14 | 14 | 15 | B | 16 | 15 | 15 | 17 | 15 | 15 | 16 | 19 | 19 | 17 | 15 | 15 | 16 | 14 | 15 | 14 | 14 | 17 |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 30 | 30 | 31 | 31 | 31 | 25 | 28 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 30 | 31 | 31 |
| MED | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 15 | 15 | 15 | 15 |
| U Q | 15 | 15 | 16 | 15 | 16 | 16 | 16 | 15 | 15 | 16 | 15 | 16 | 17 | 18 | 17 | 16 | 16 | 16 | 16 | 16 | 15 | 16 | 15 | 16 |
| L Q | 15 | 14 | 15 | 14 | 15 | 15 | 15 | 14 | 15 | 15 | 14 | 14 | 15 | 15 | 15 | 14 | 15 | 15 | 15 | 15 | 15 | 15 | 14 | 14 |

# SUMMARY PLOTS AT Wakkanai



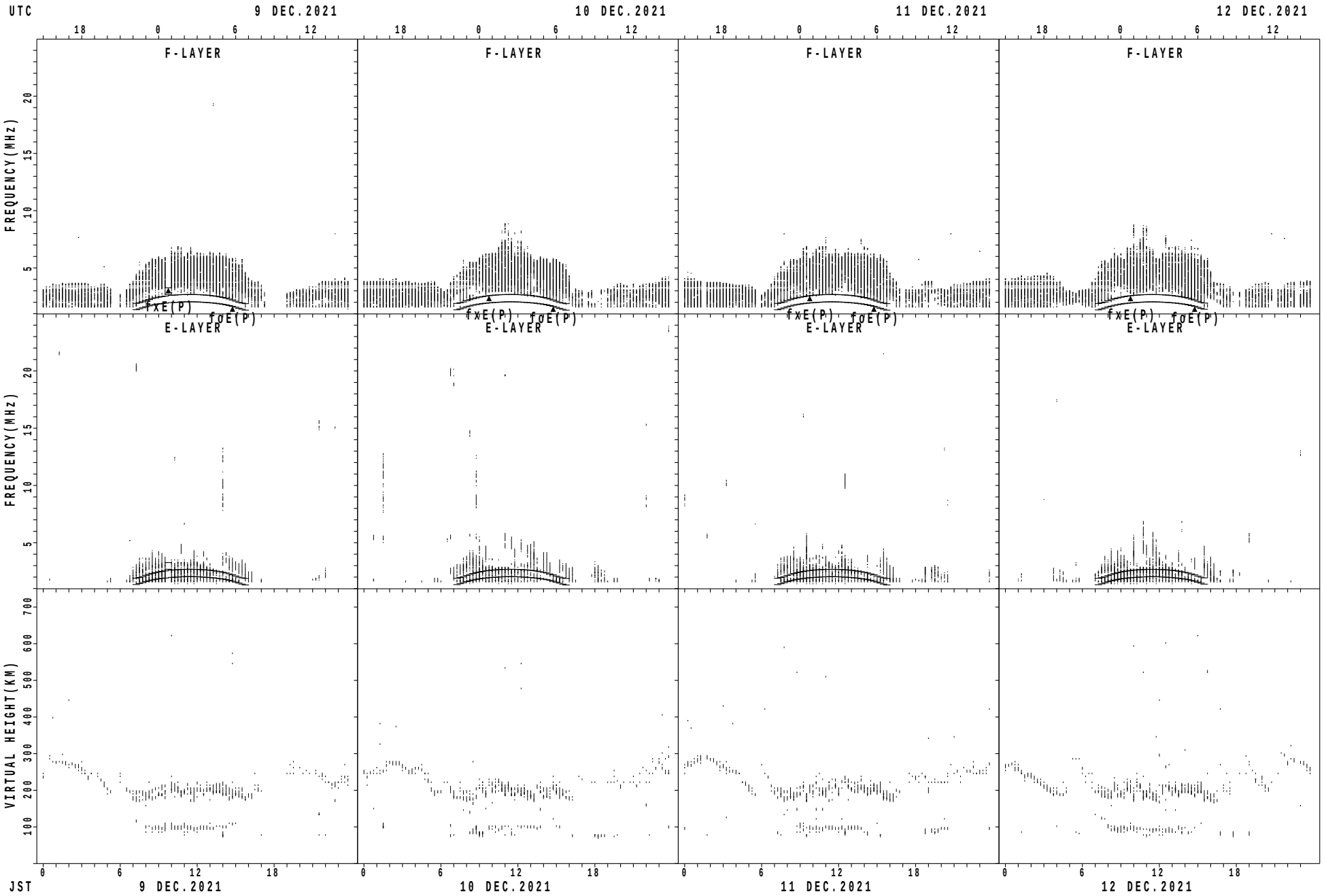

fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

# SUMMARY PLOTS AT Wakkanai



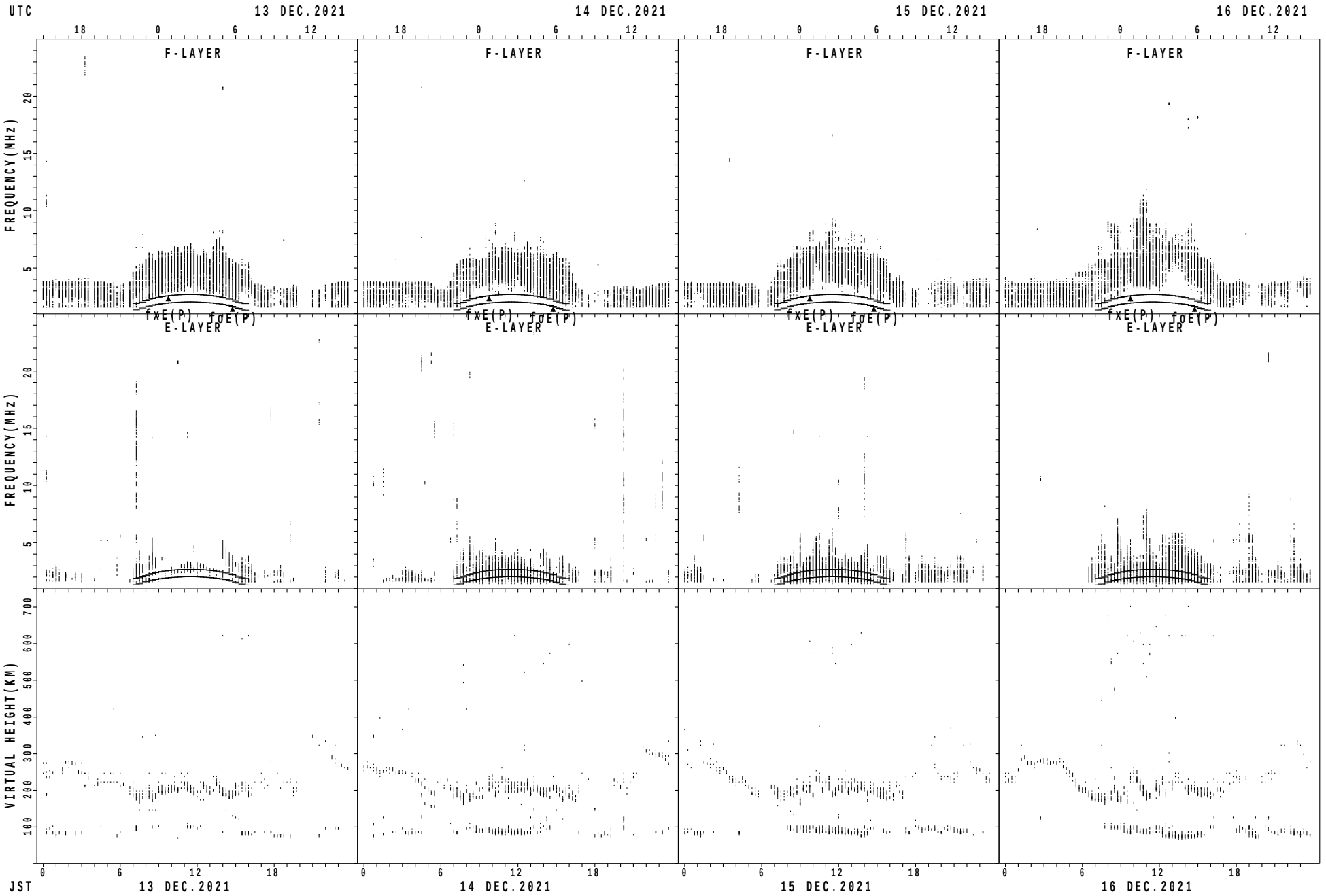

fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

# SUMMARY PLOTS AT Wakkanai



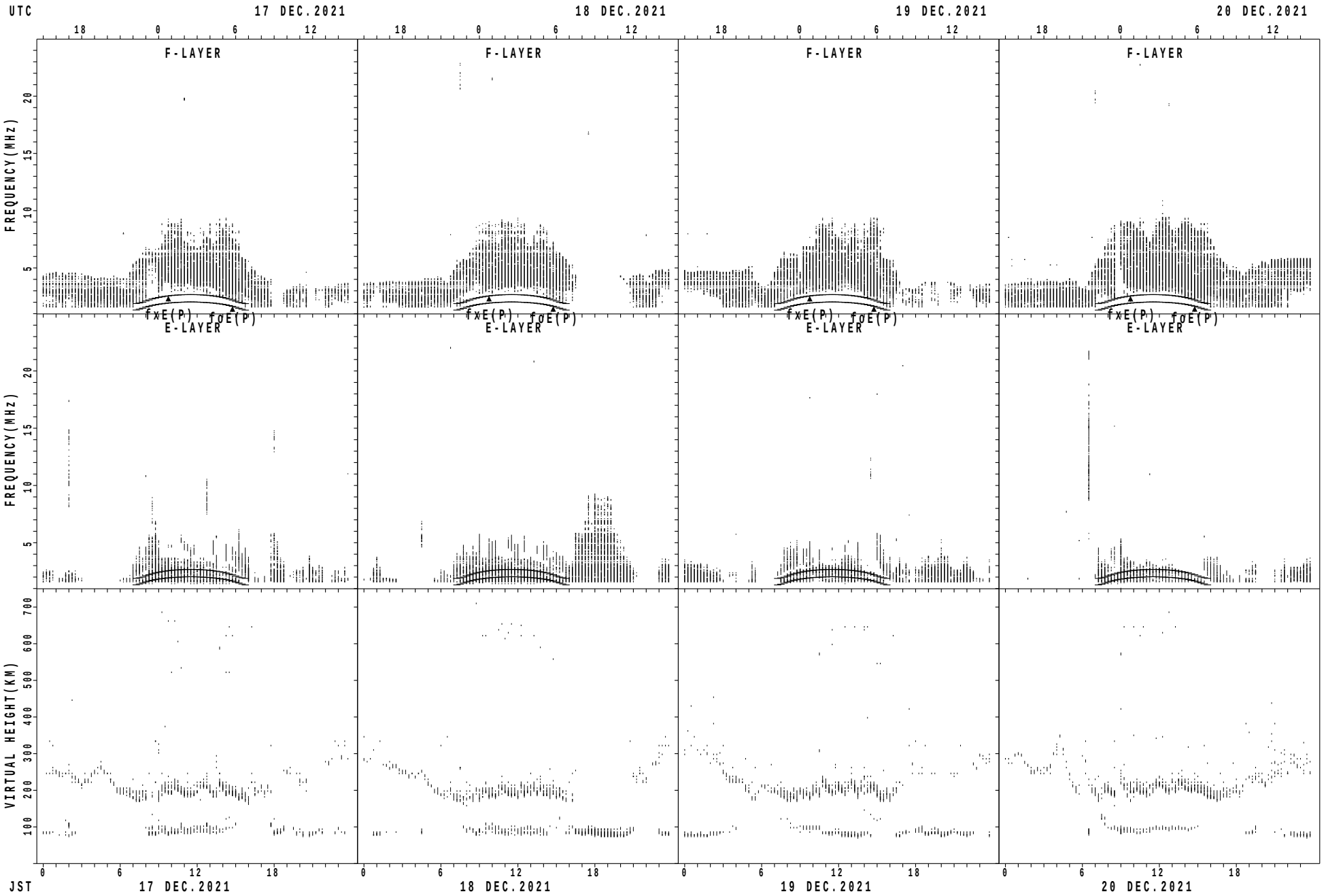

fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

# SUMMARY PLOTS AT Wakkanai



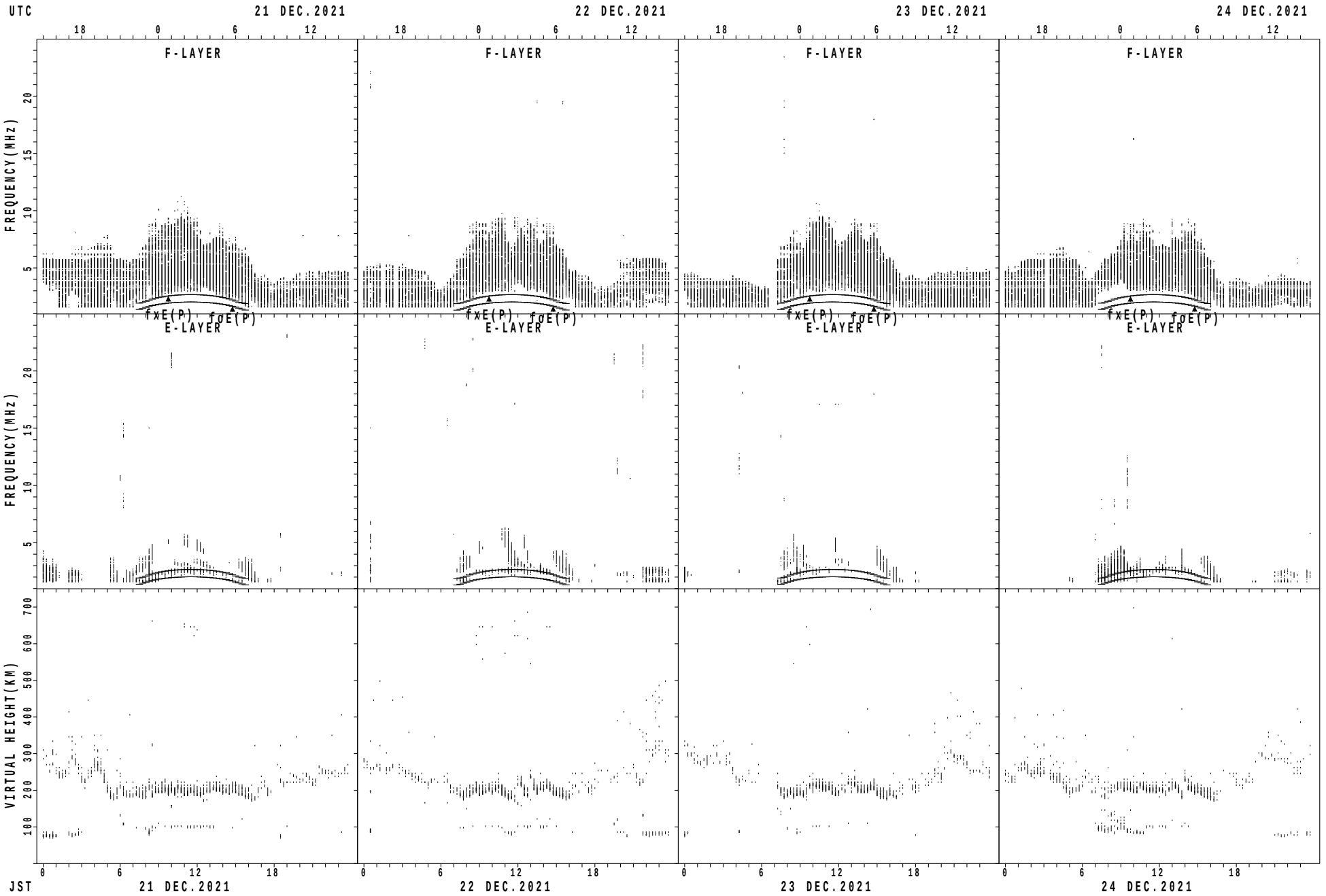

fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

# SUMMARY PLOTS AT Wakkanai



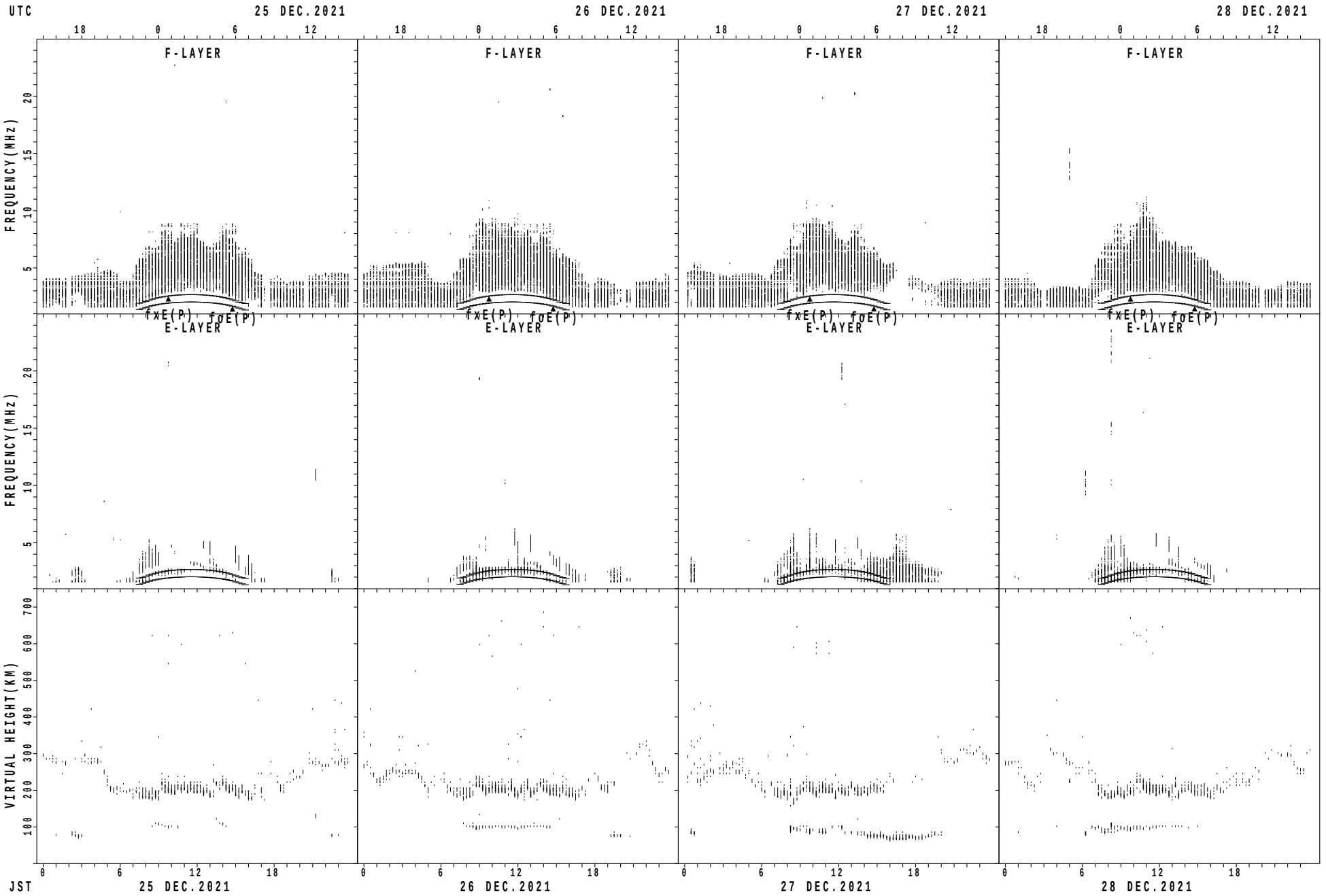

fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

# SUMMARY PLOTS AT Wakkanai



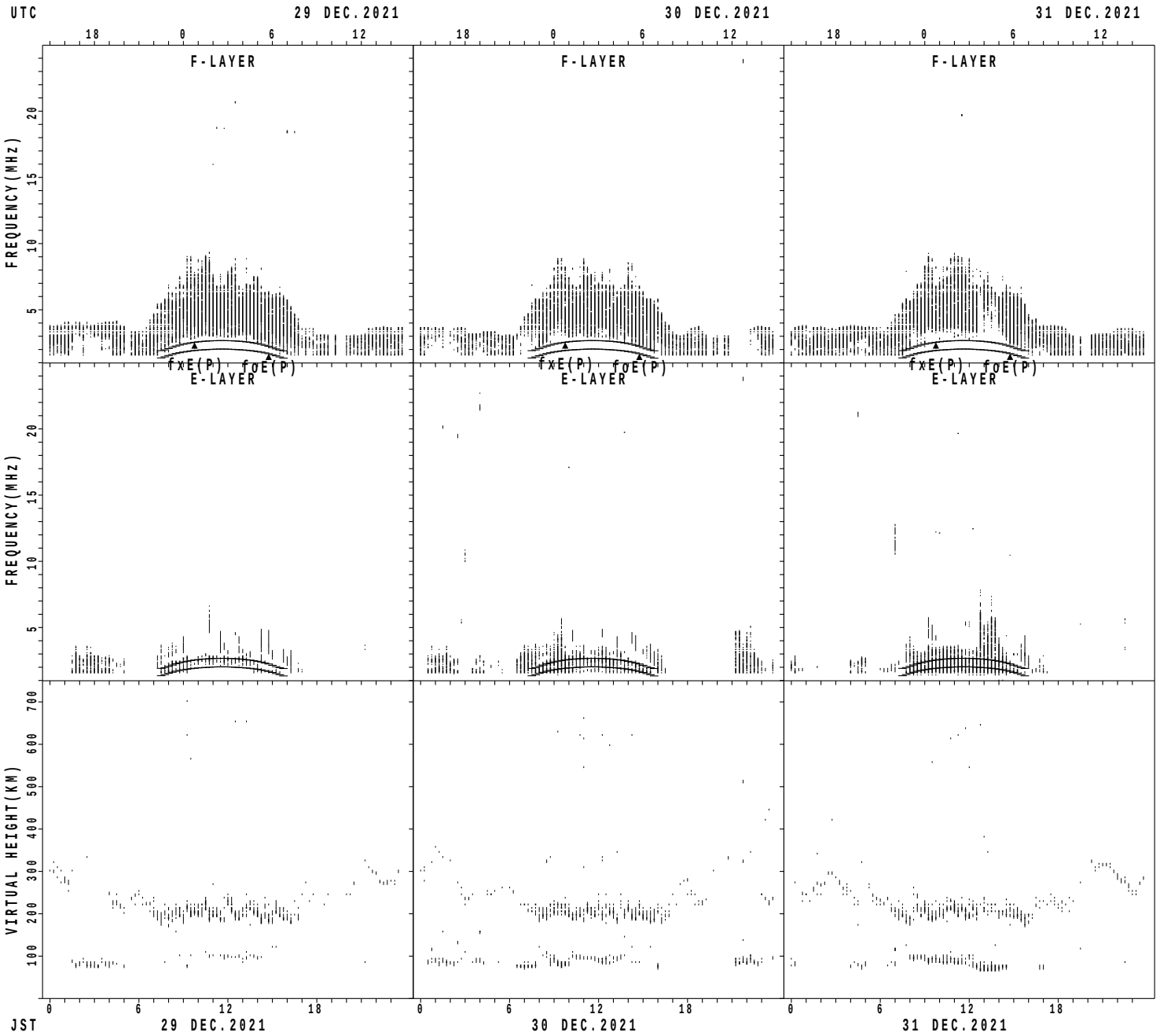

fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

# SUMMARY PLOTS AT Wakkanai

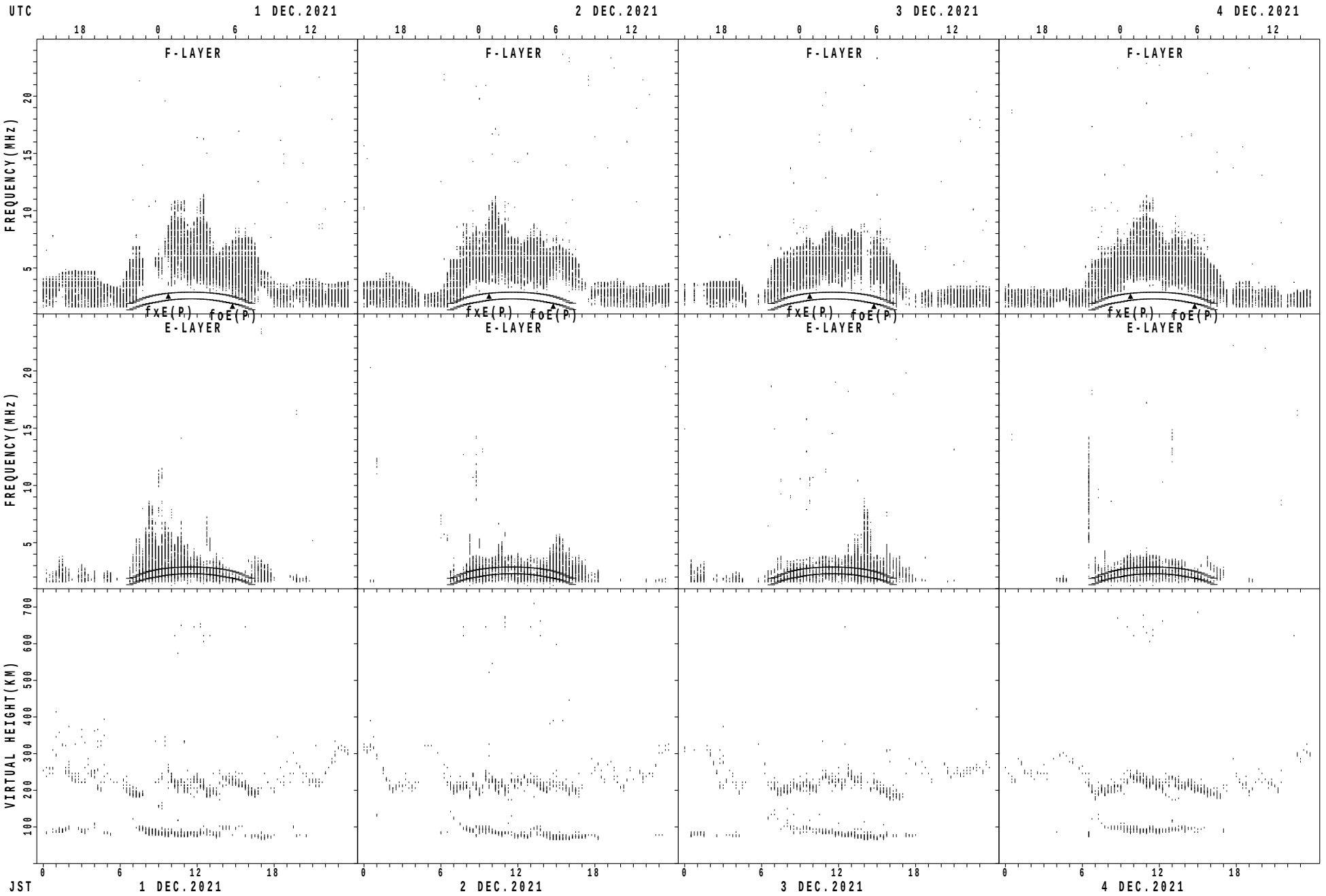



fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

# SUMMARY PLOTS AT Wakkanai

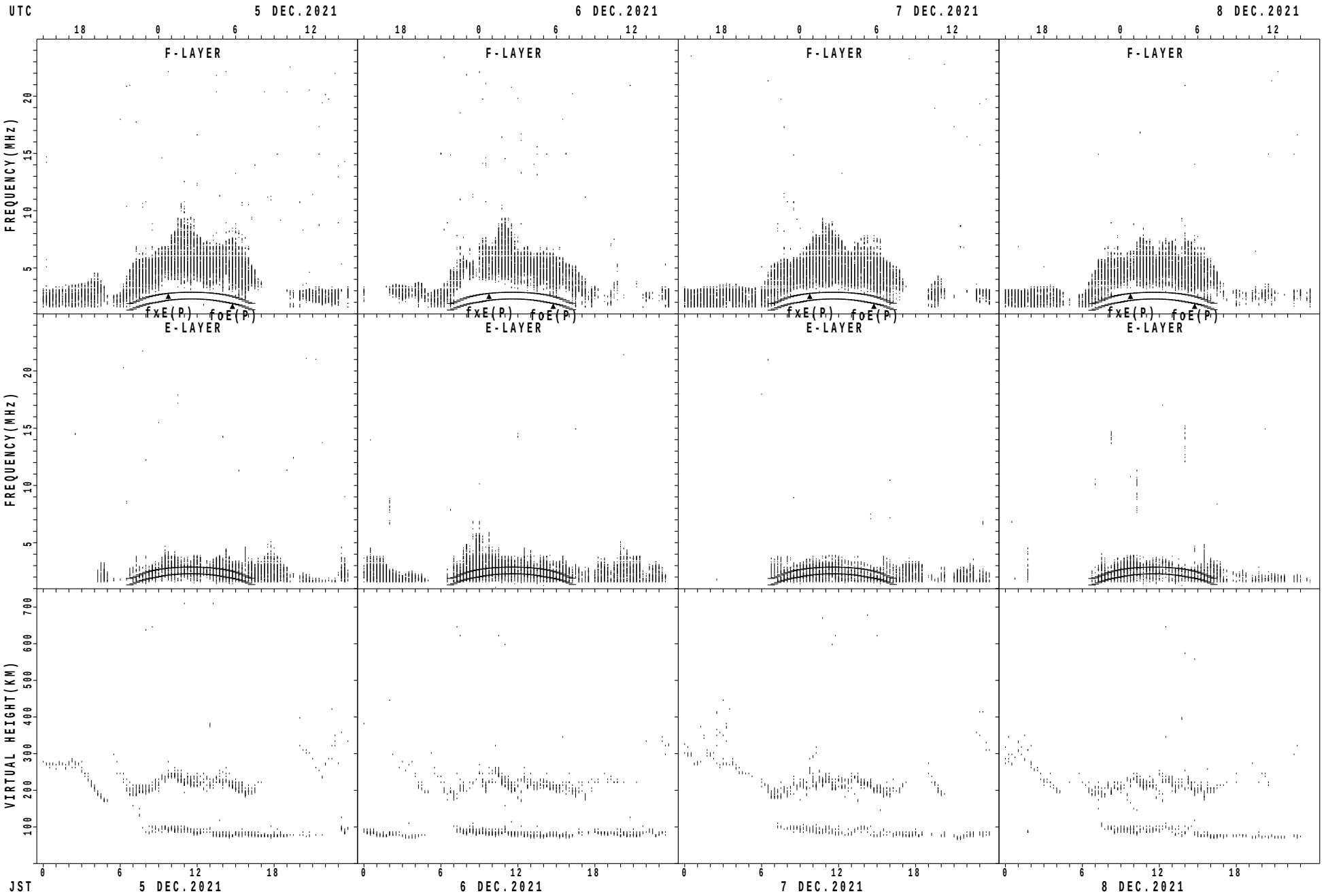


# SUMMARY PLOTS AT Kokubunji



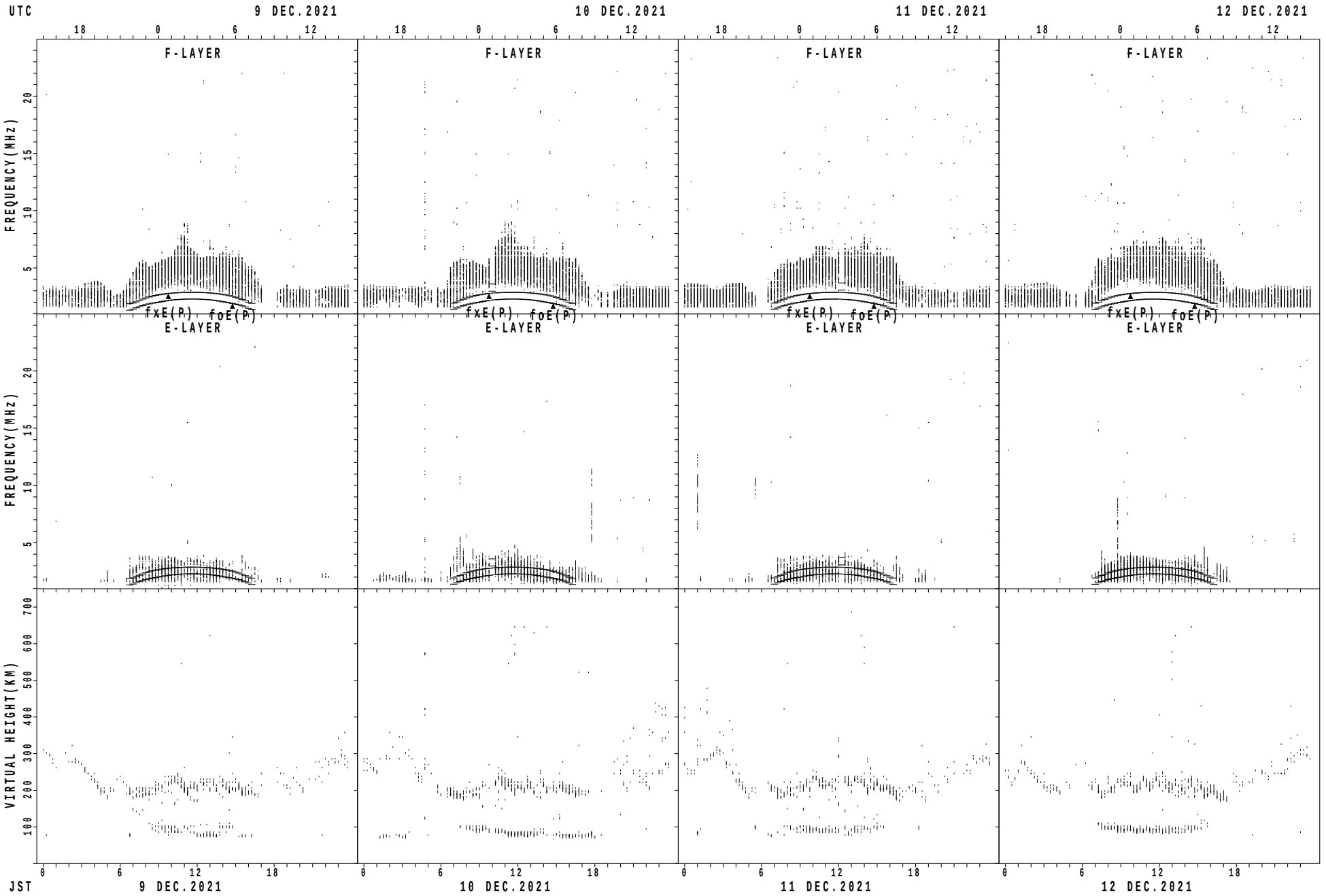

fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

# SUMMARY PLOTS AT Kokubunji



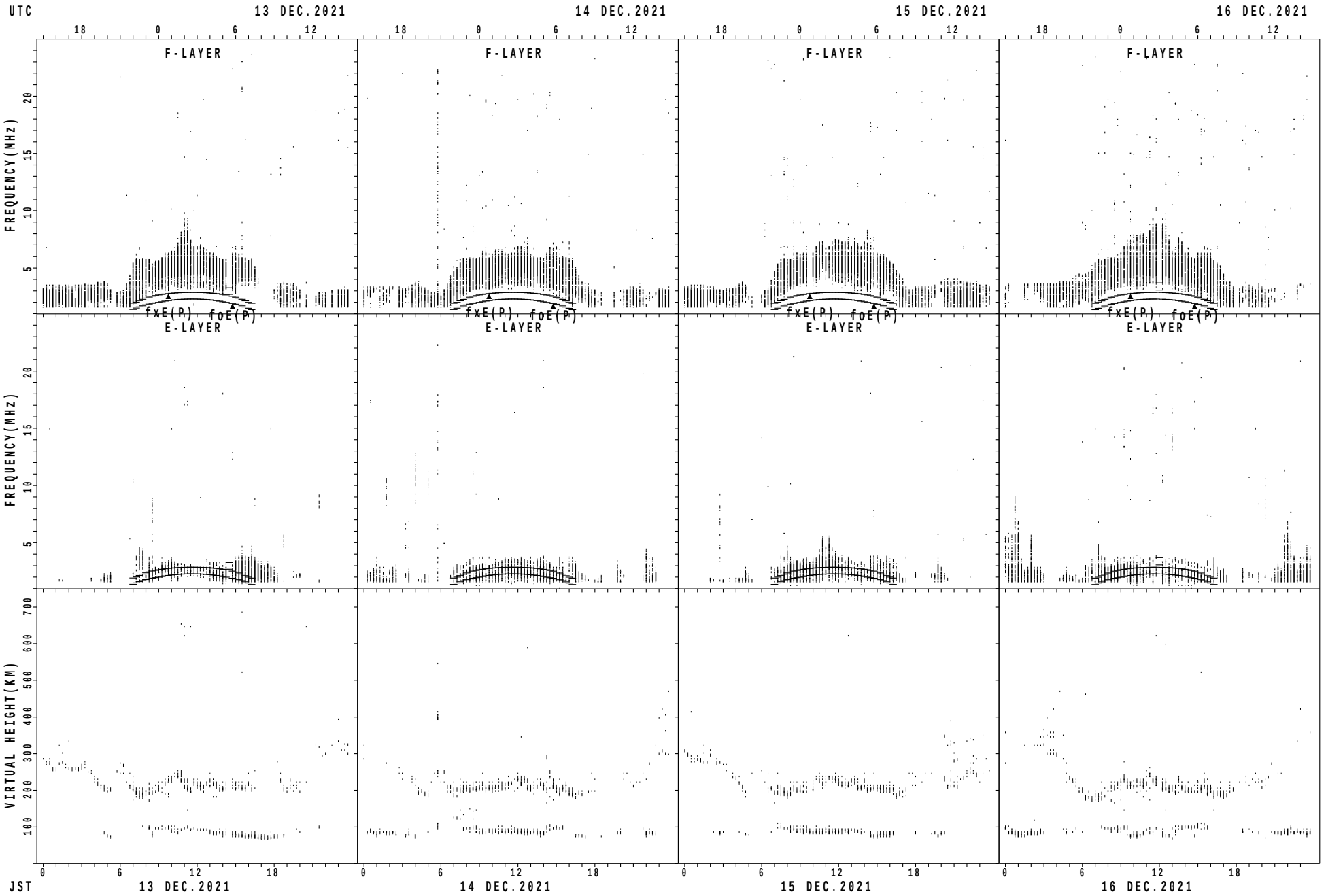

fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

# SUMMARY PLOTS AT Kokubunji



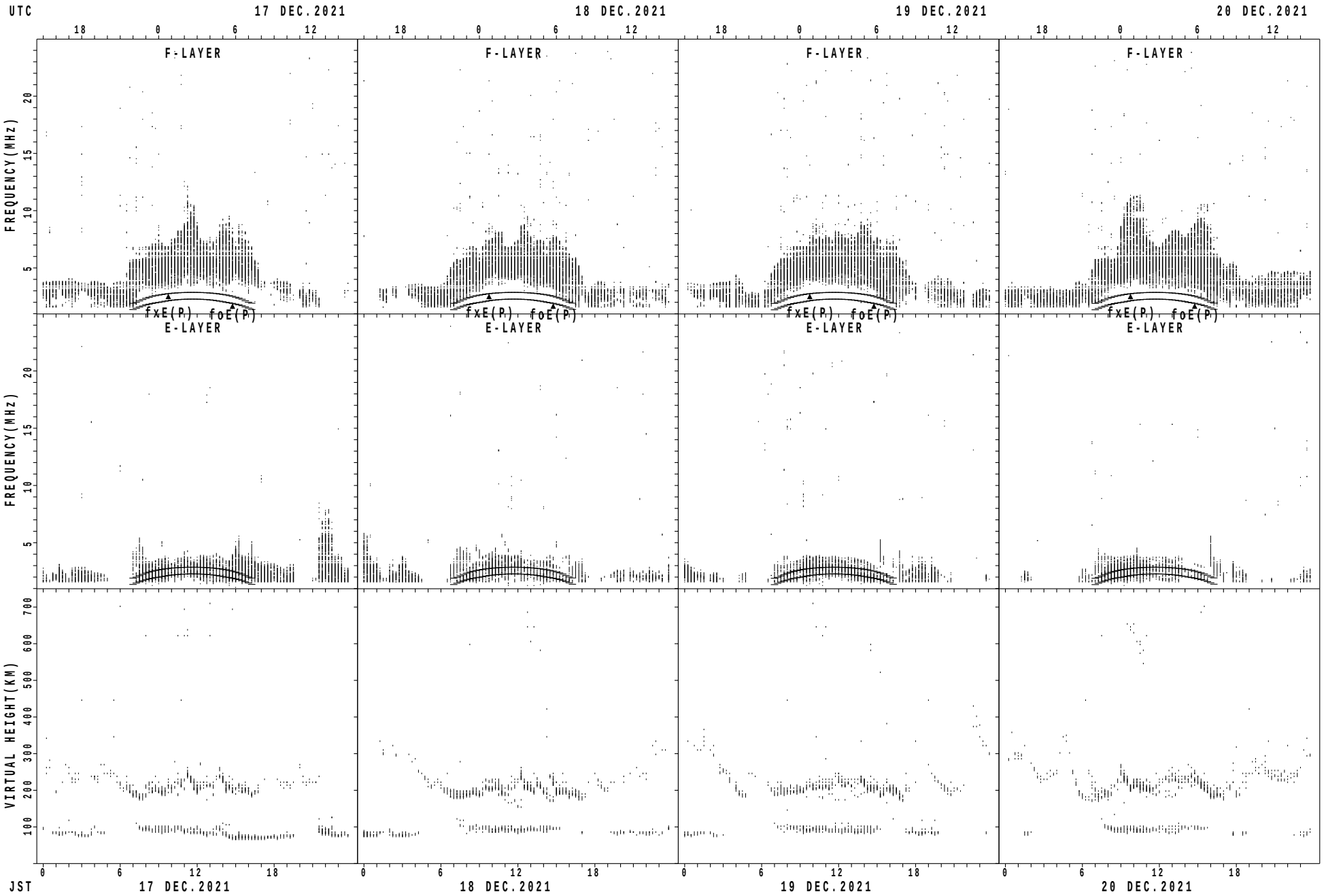

fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

# SUMMARY PLOTS AT Kokubunji



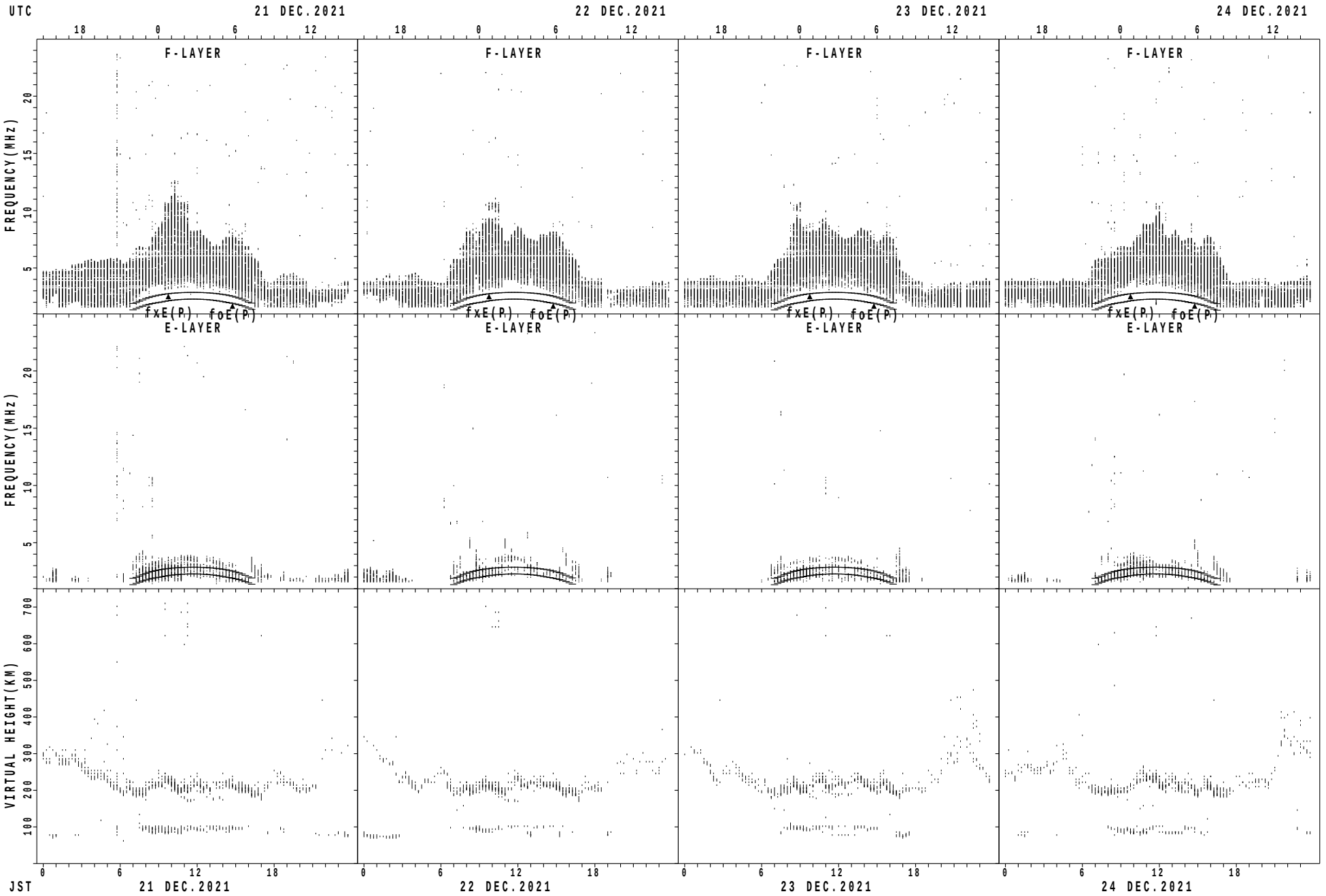

fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

# SUMMARY PLOTS AT Kokubunji



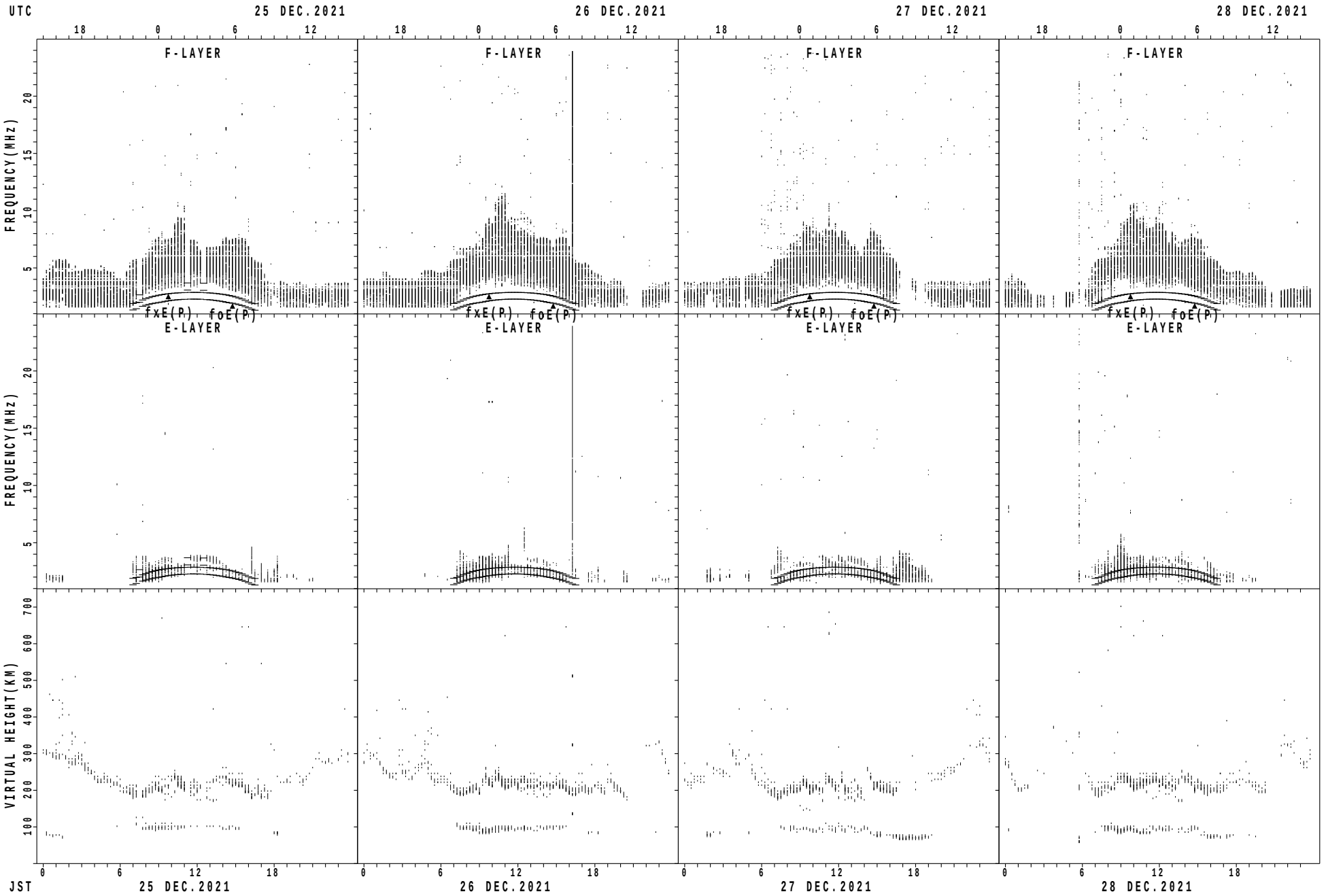

fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

# SUMMARY PLOTS AT Kokubunji



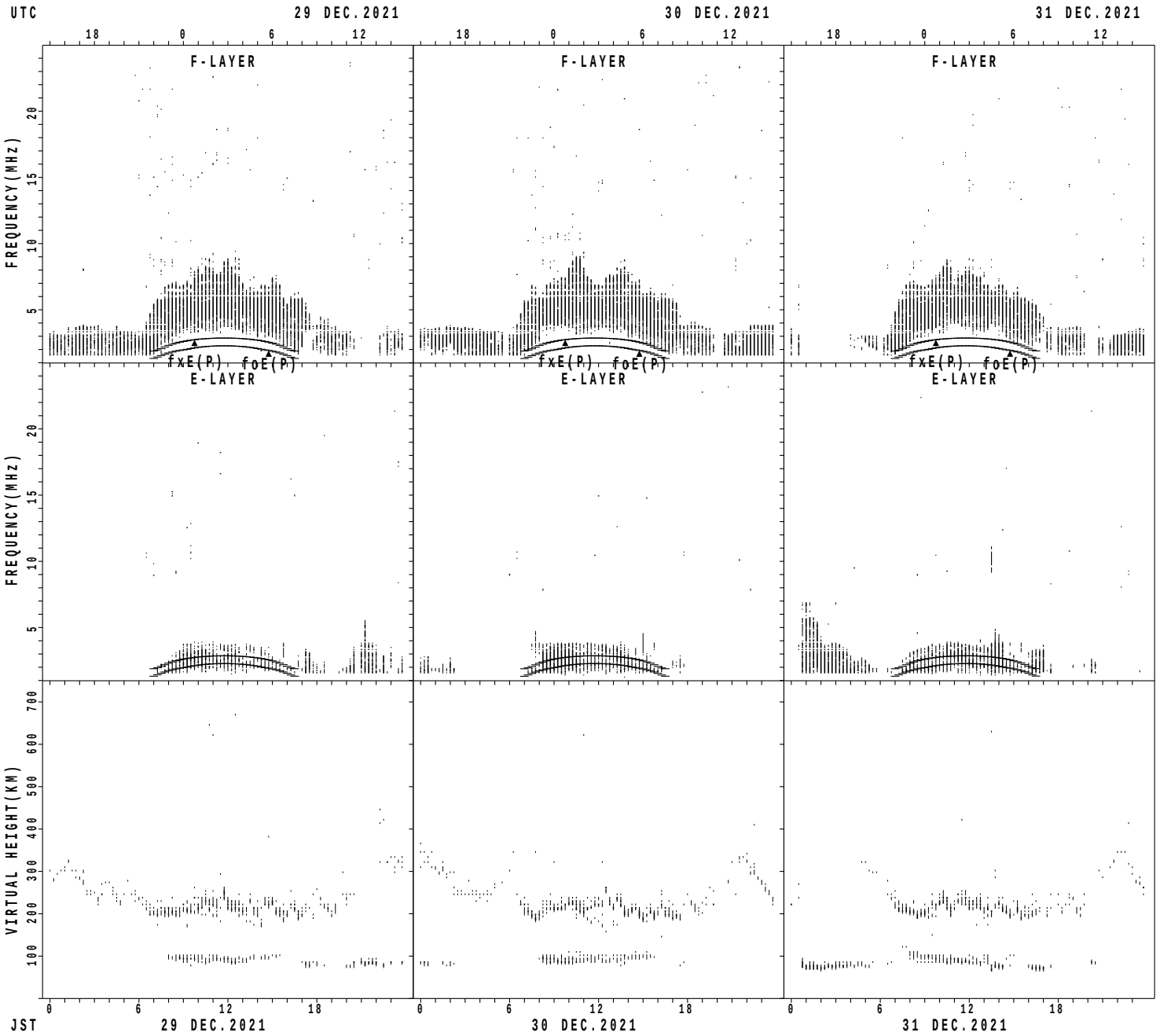

fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

# SUMMARY PLOTS AT Kokubunji



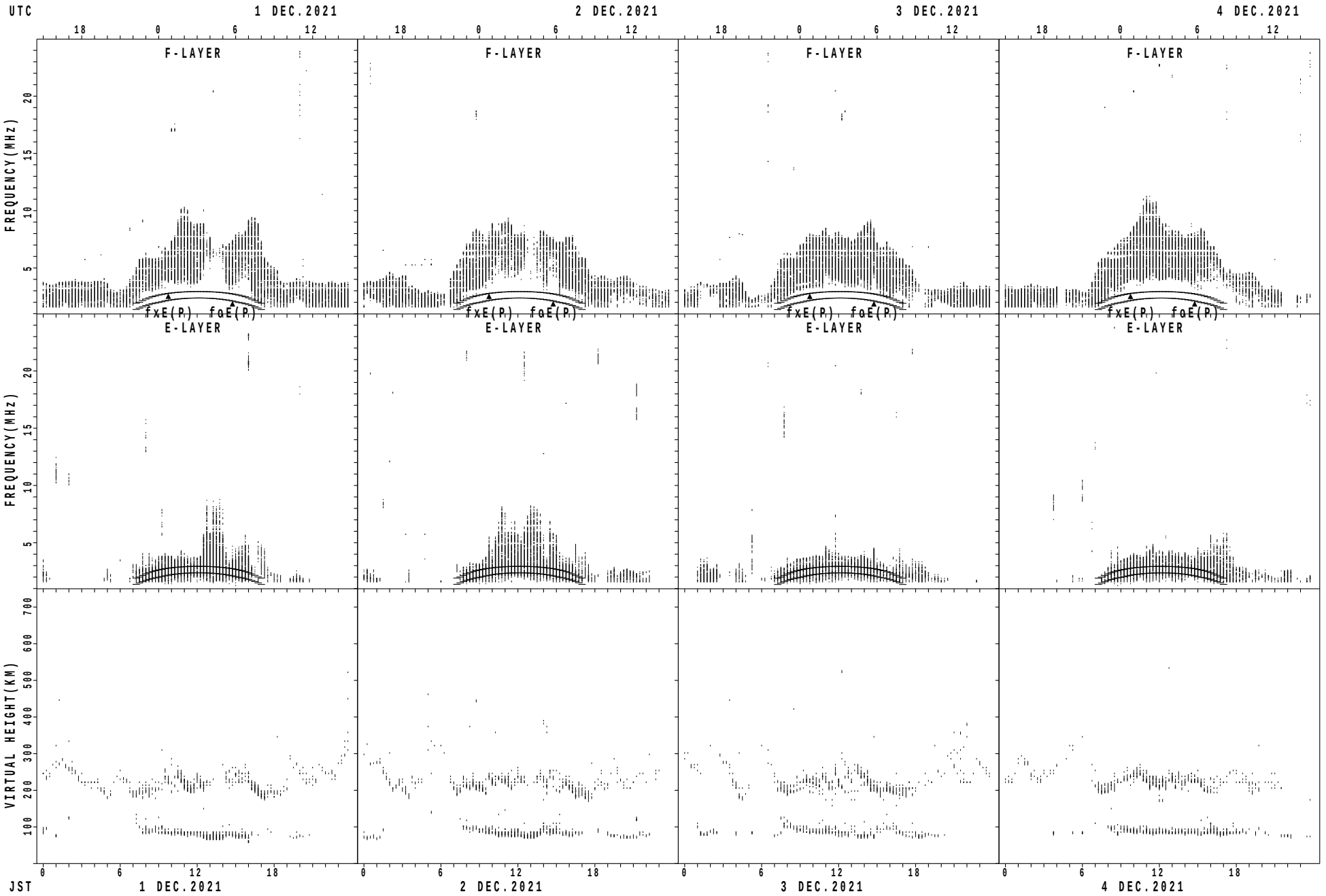

fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

# SUMMARY PLOTS AT Kokubunji



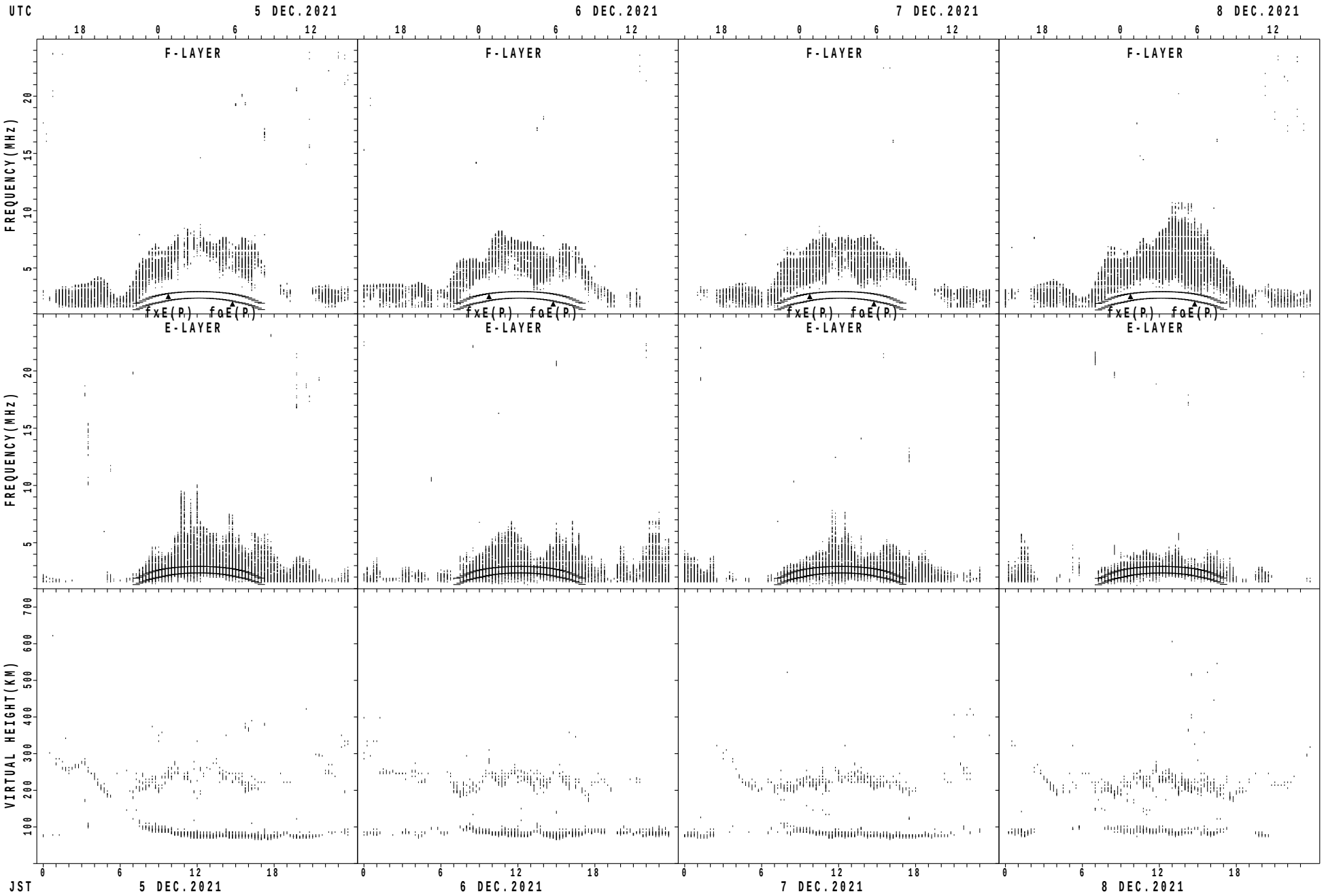

fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

## SUMMARY PLOTS AT Yamagawa



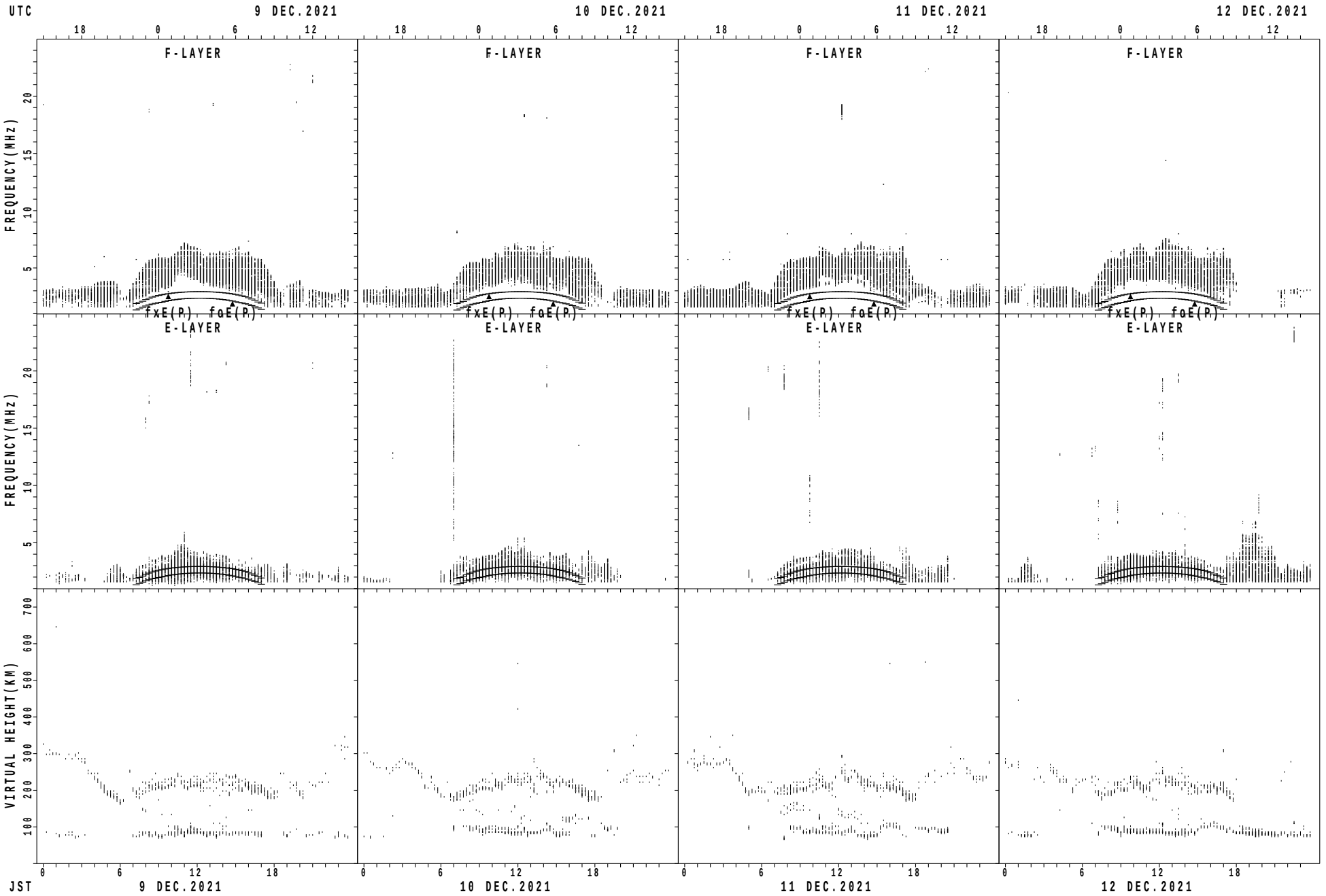

fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

# SUMMARY PLOTS AT Yamagawa



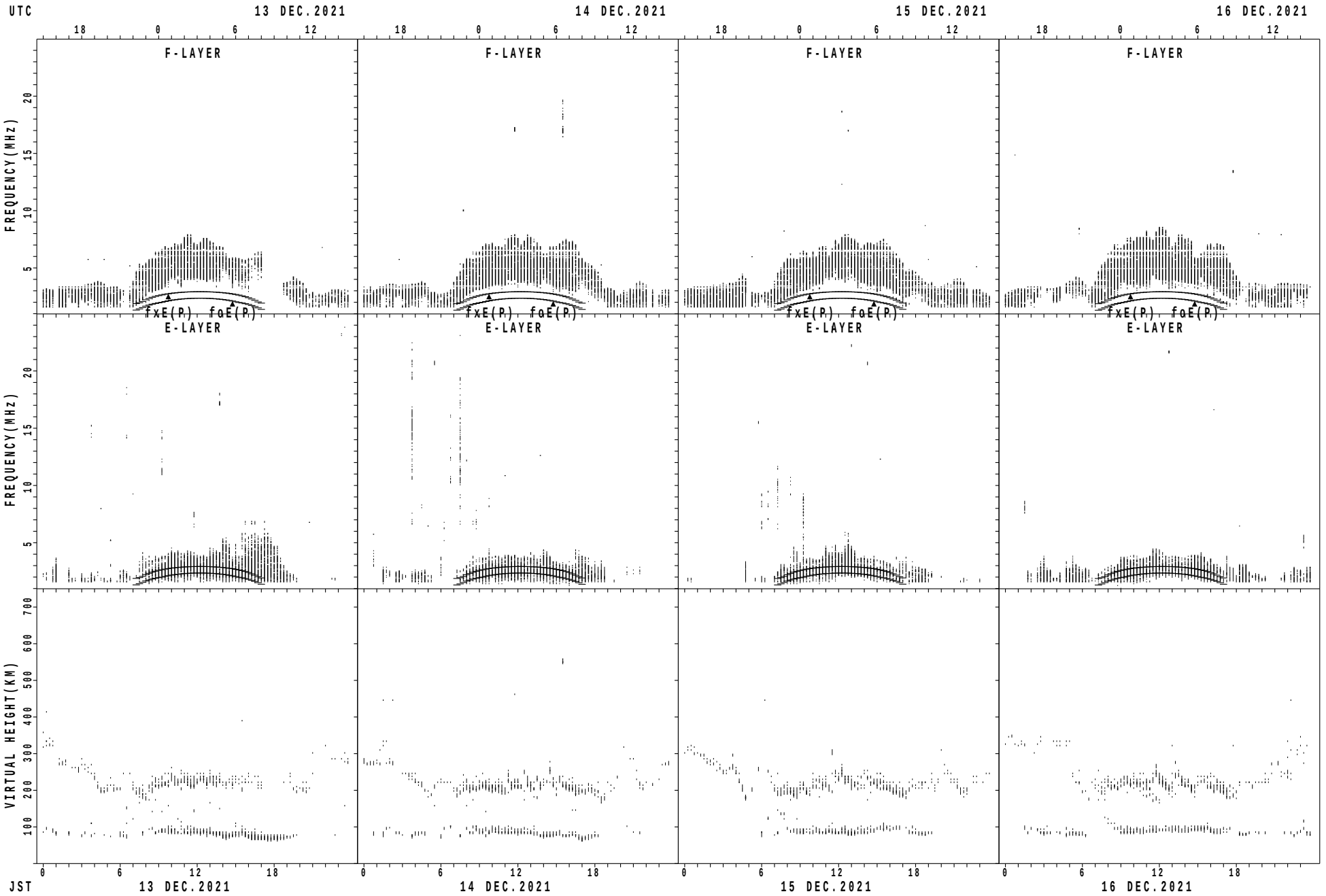

fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

# SUMMARY PLOTS AT Yamagawa



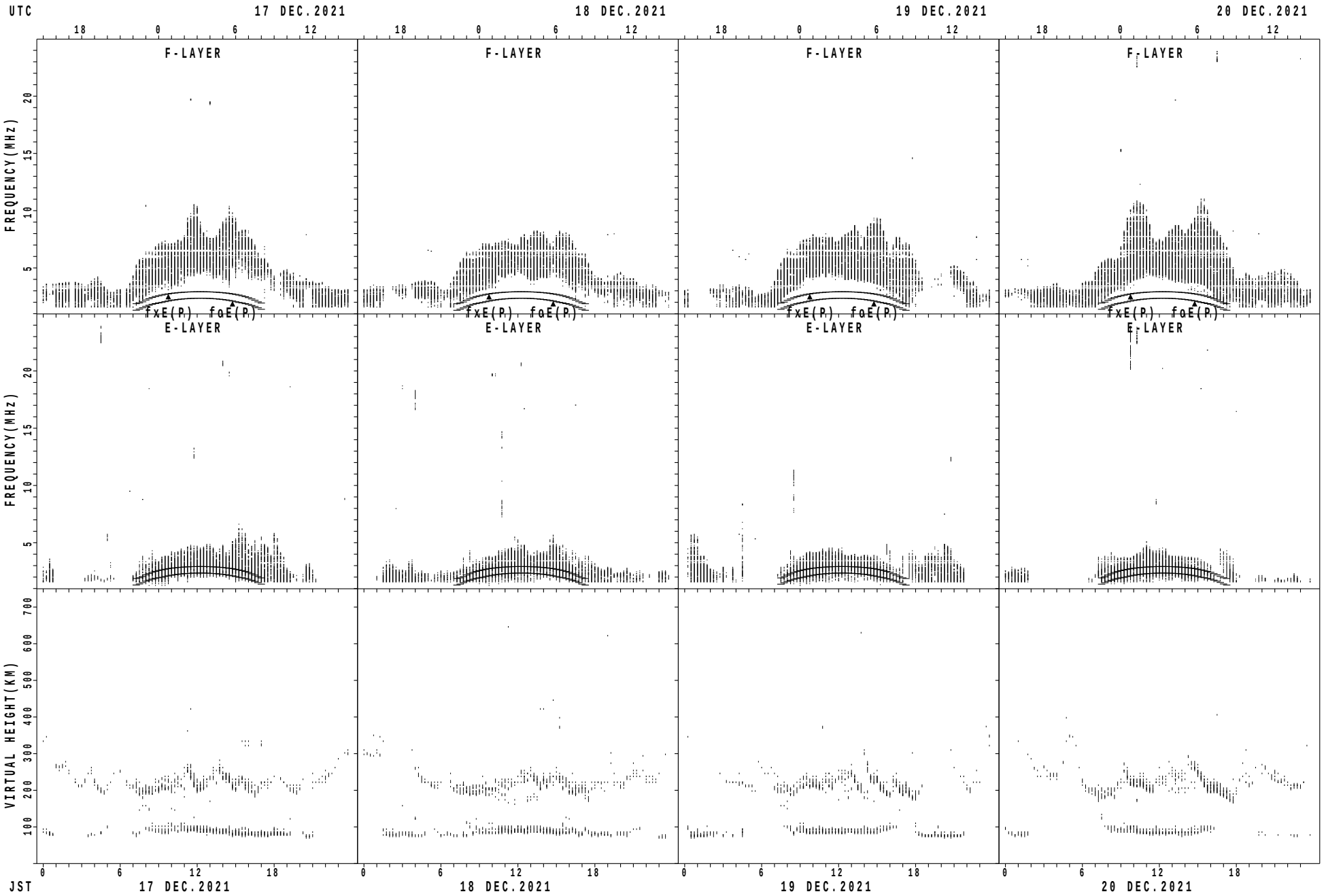

fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

## SUMMARY PLOTS AT Yamagawa



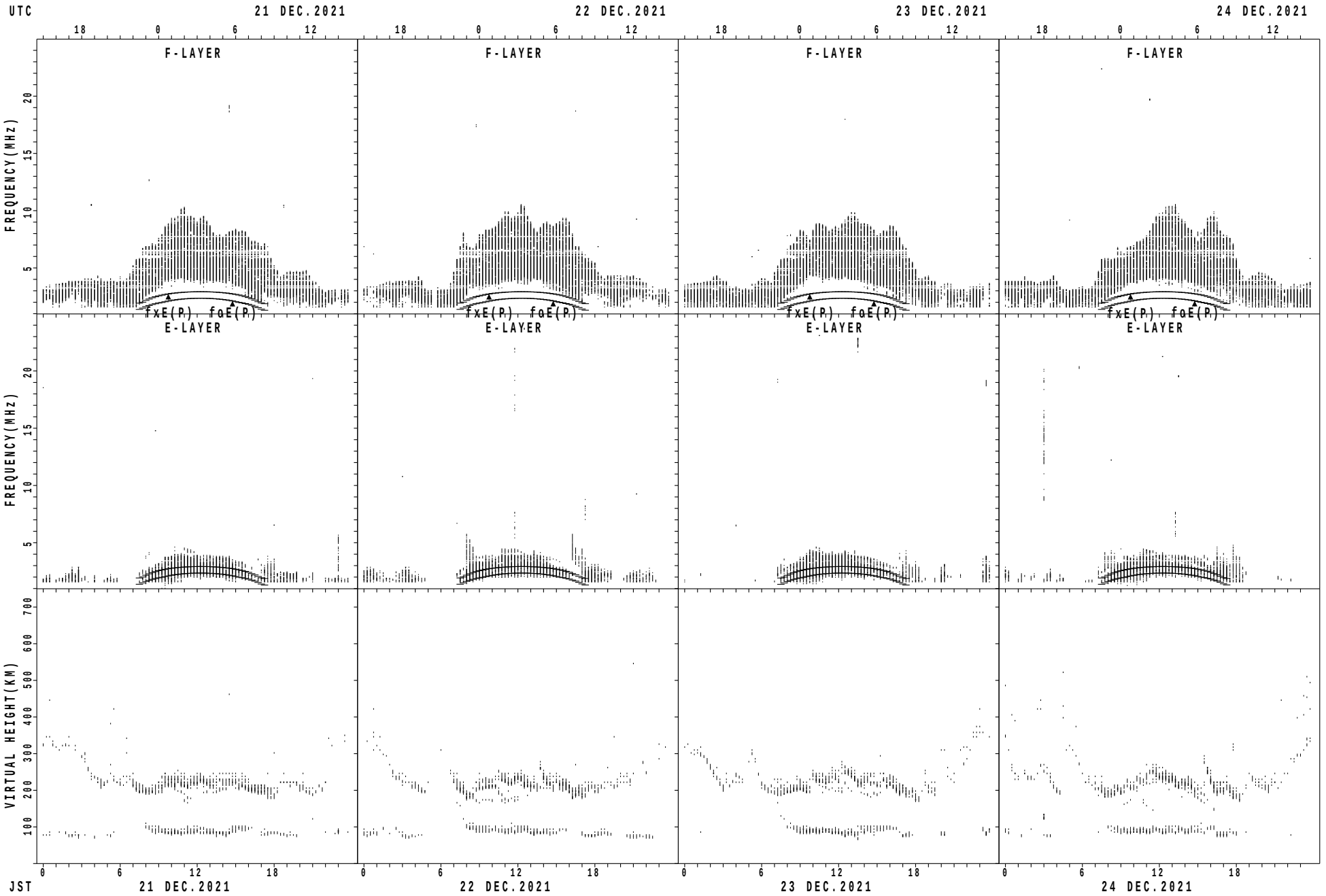

fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

## SUMMARY PLOTS AT Yamagawa



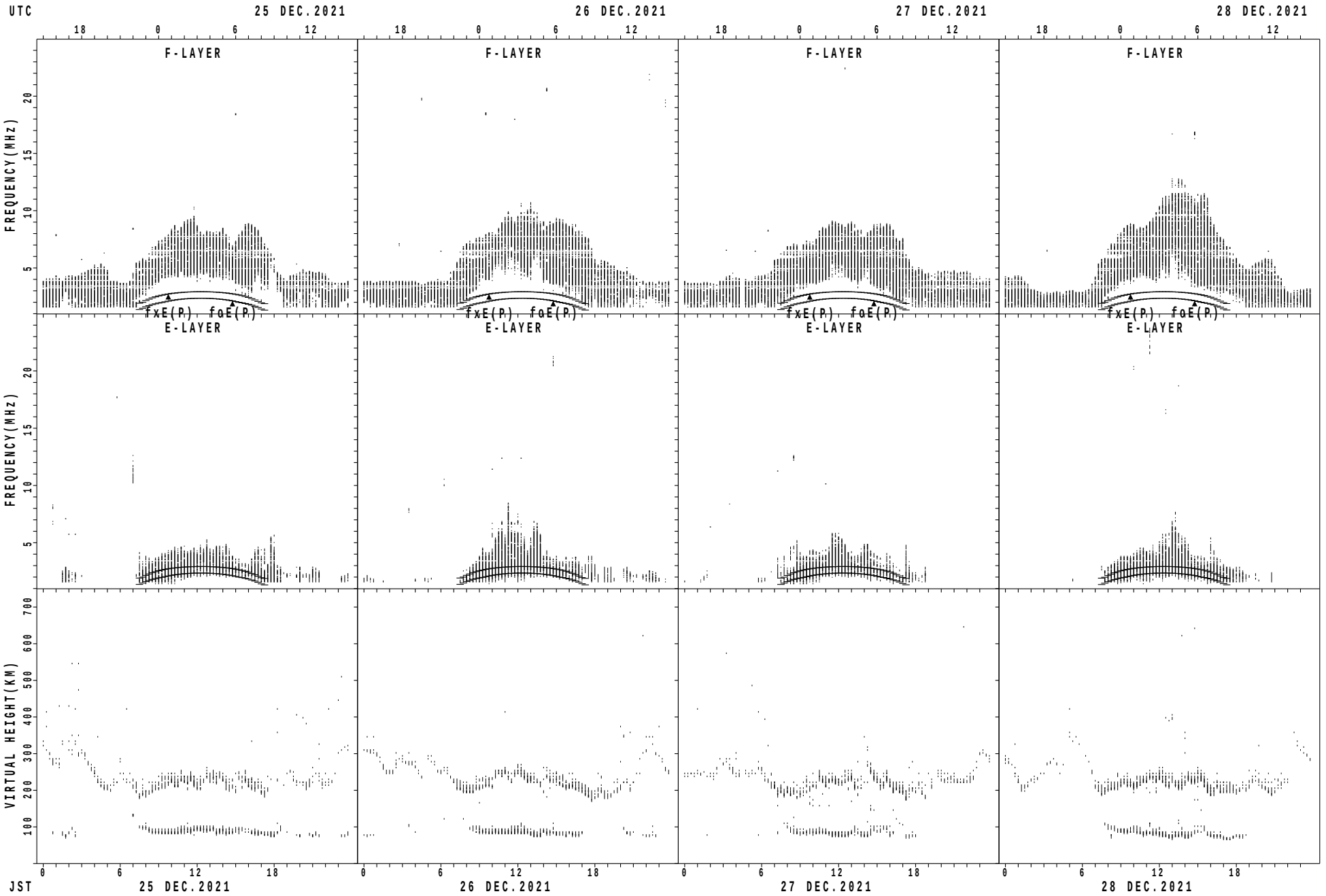

fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

## SUMMARY PLOTS AT Yamagawa



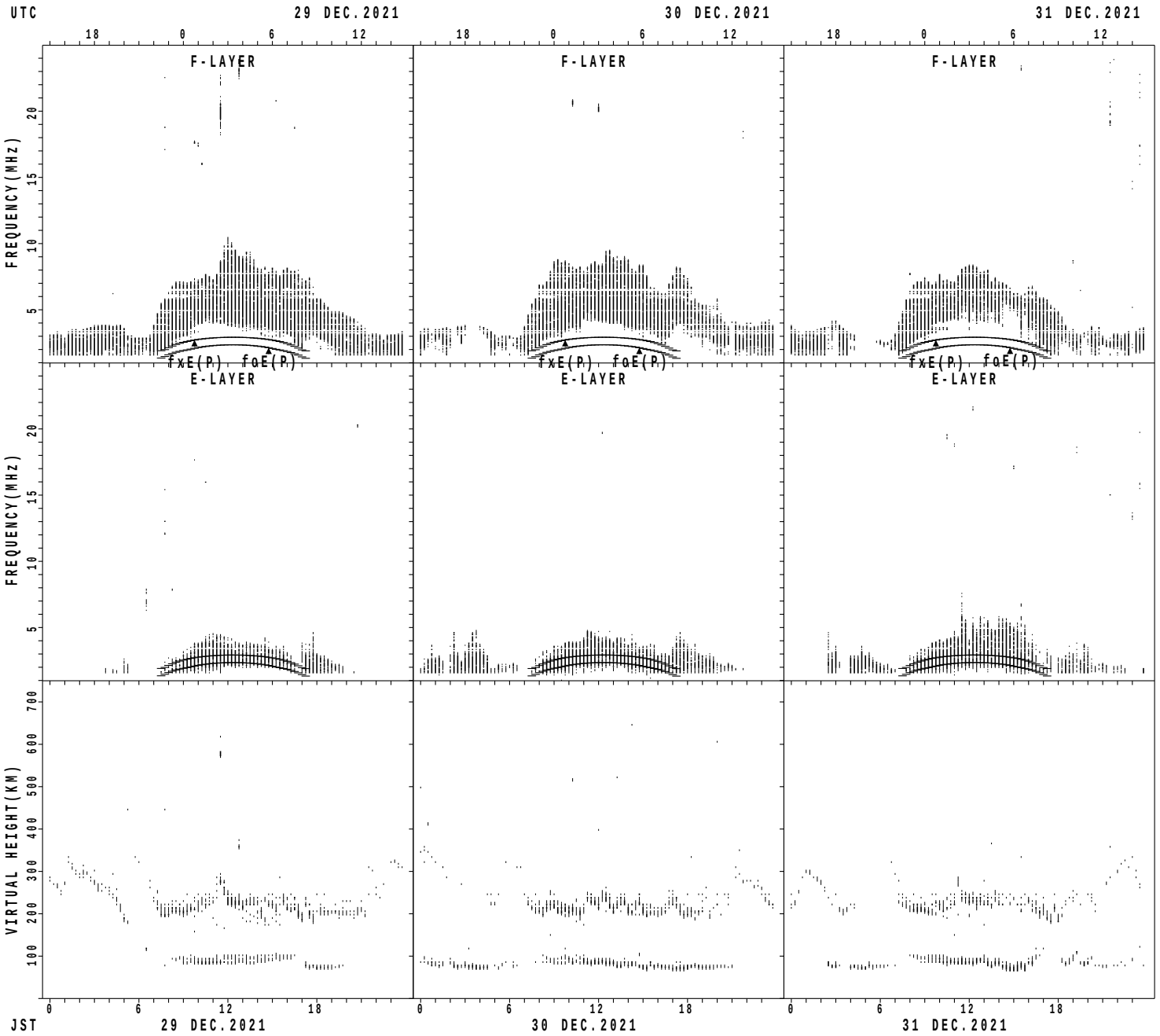

fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

# SUMMARY PLOTS AT Yamagawa



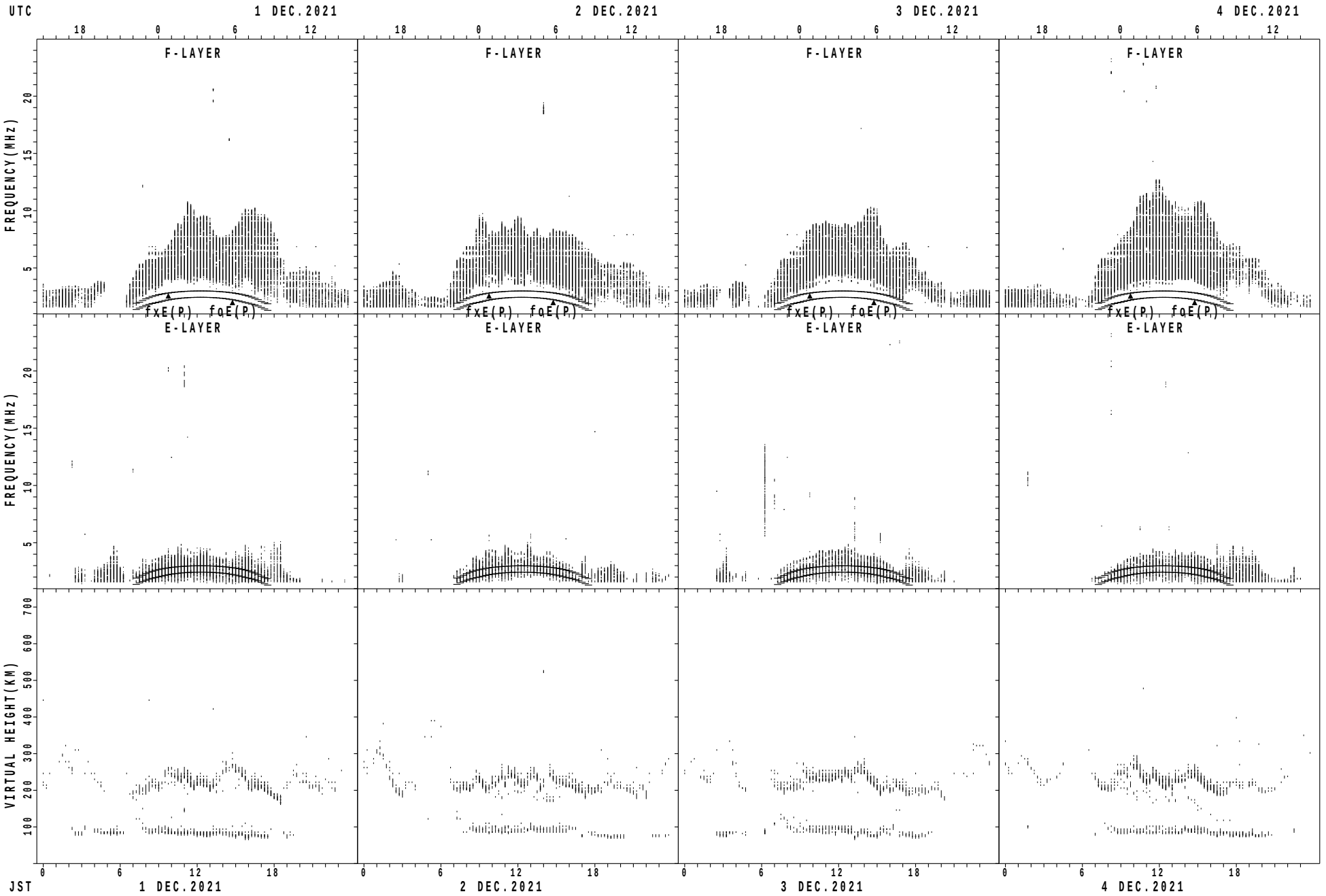

fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

## SUMMARY PLOTS AT Yamagawa



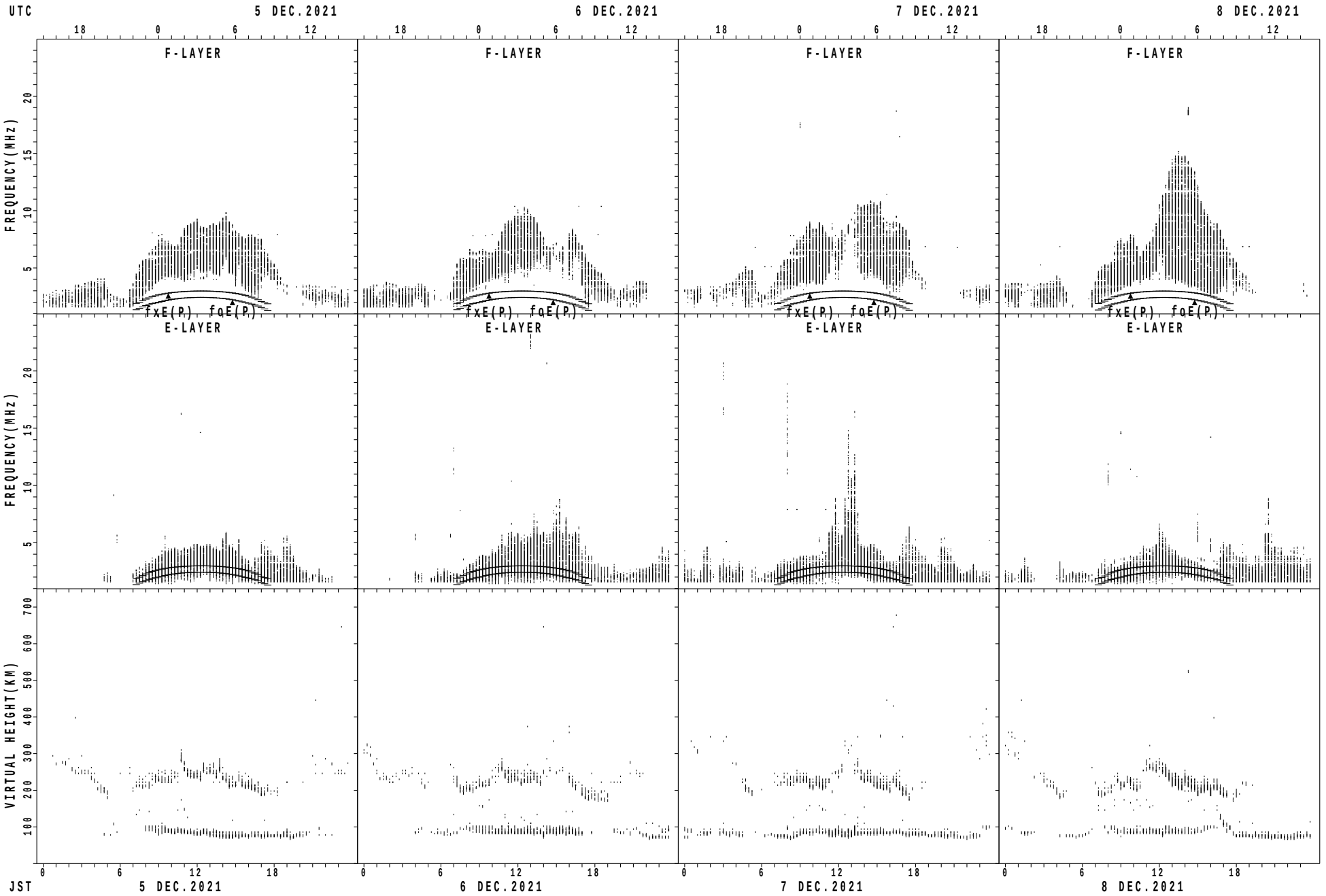

fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

# SUMMARY PLOTS AT Okinawa



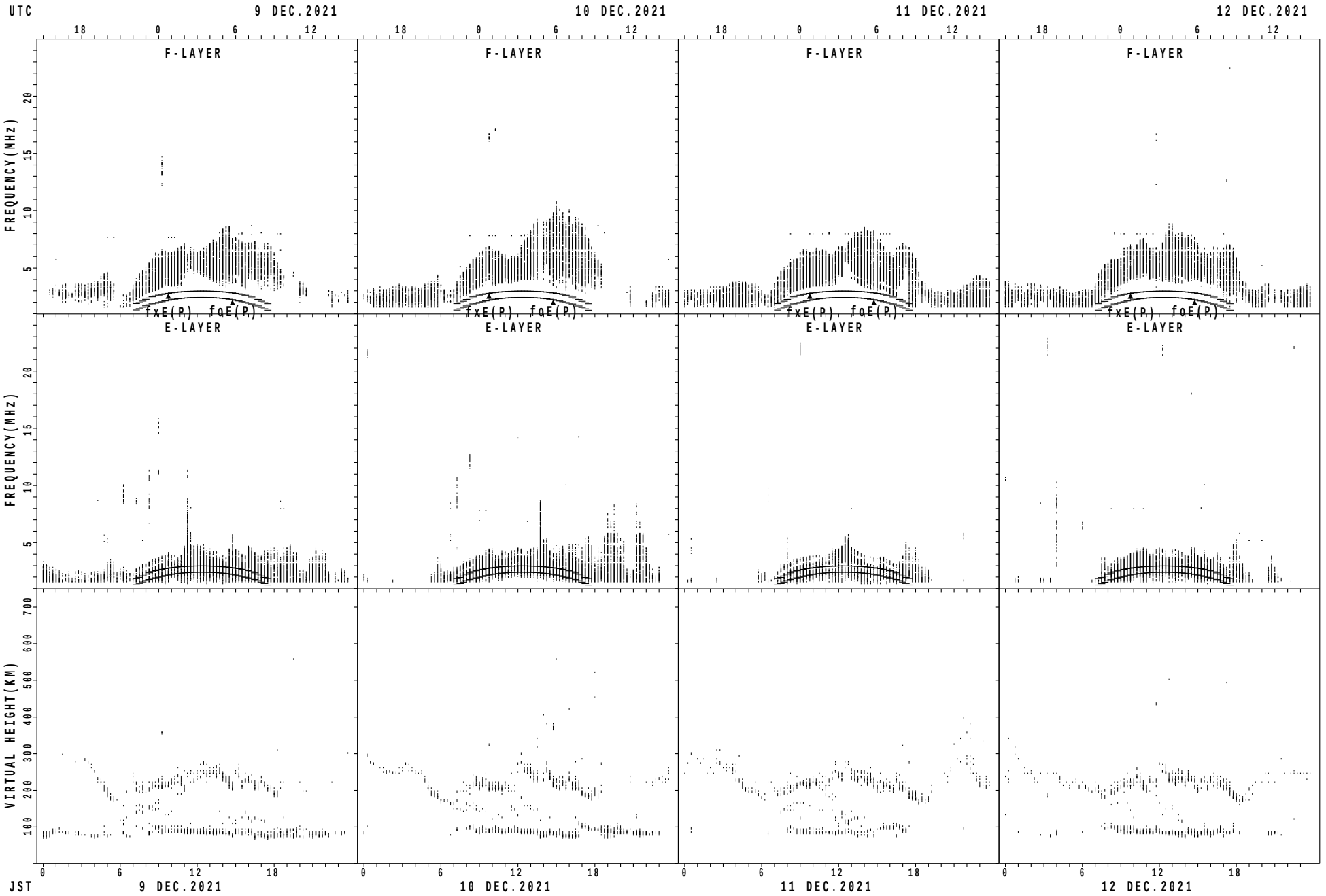

fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

## SUMMARY PLOTS AT Okinawa



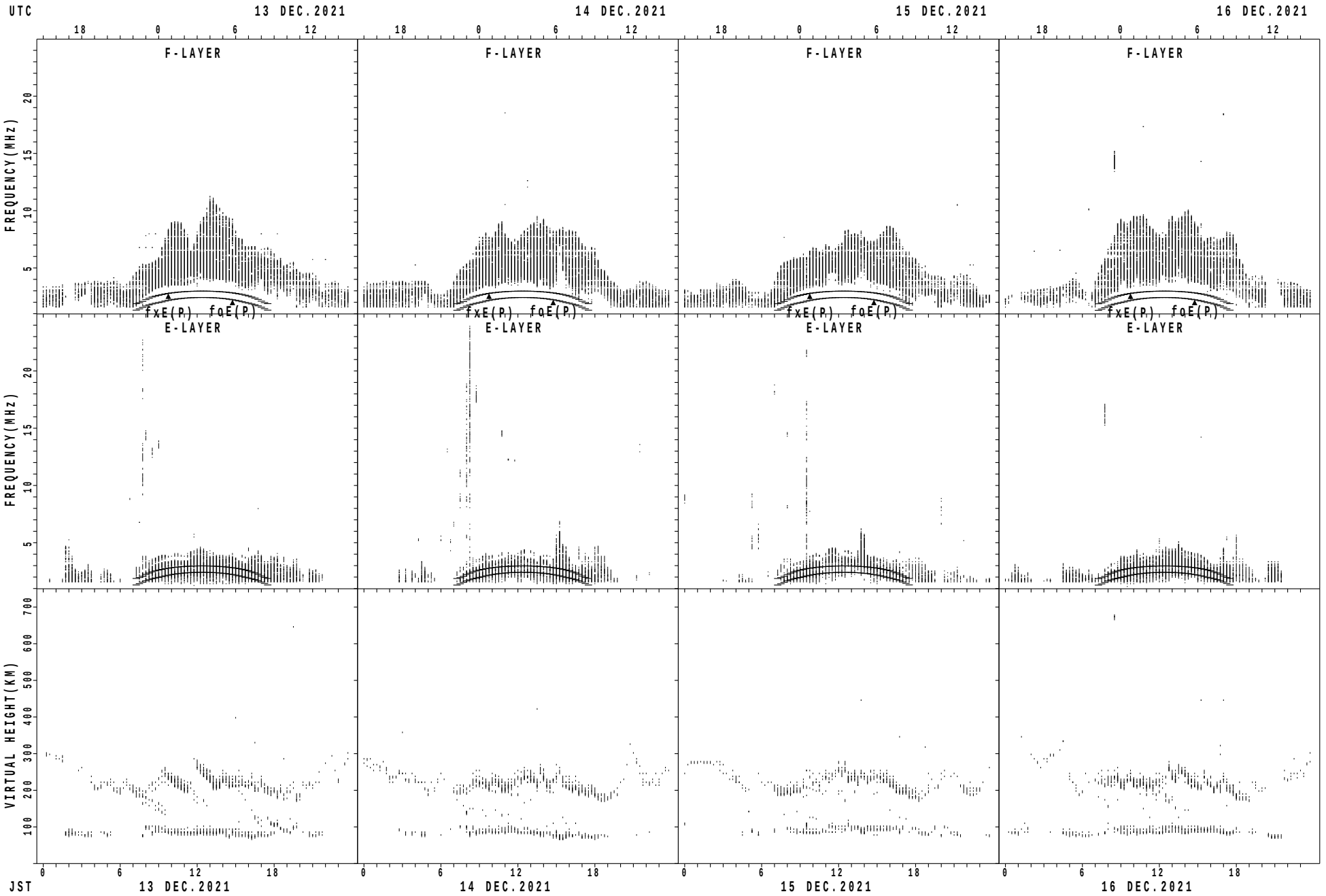

fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

# SUMMARY PLOTS AT Okinawa



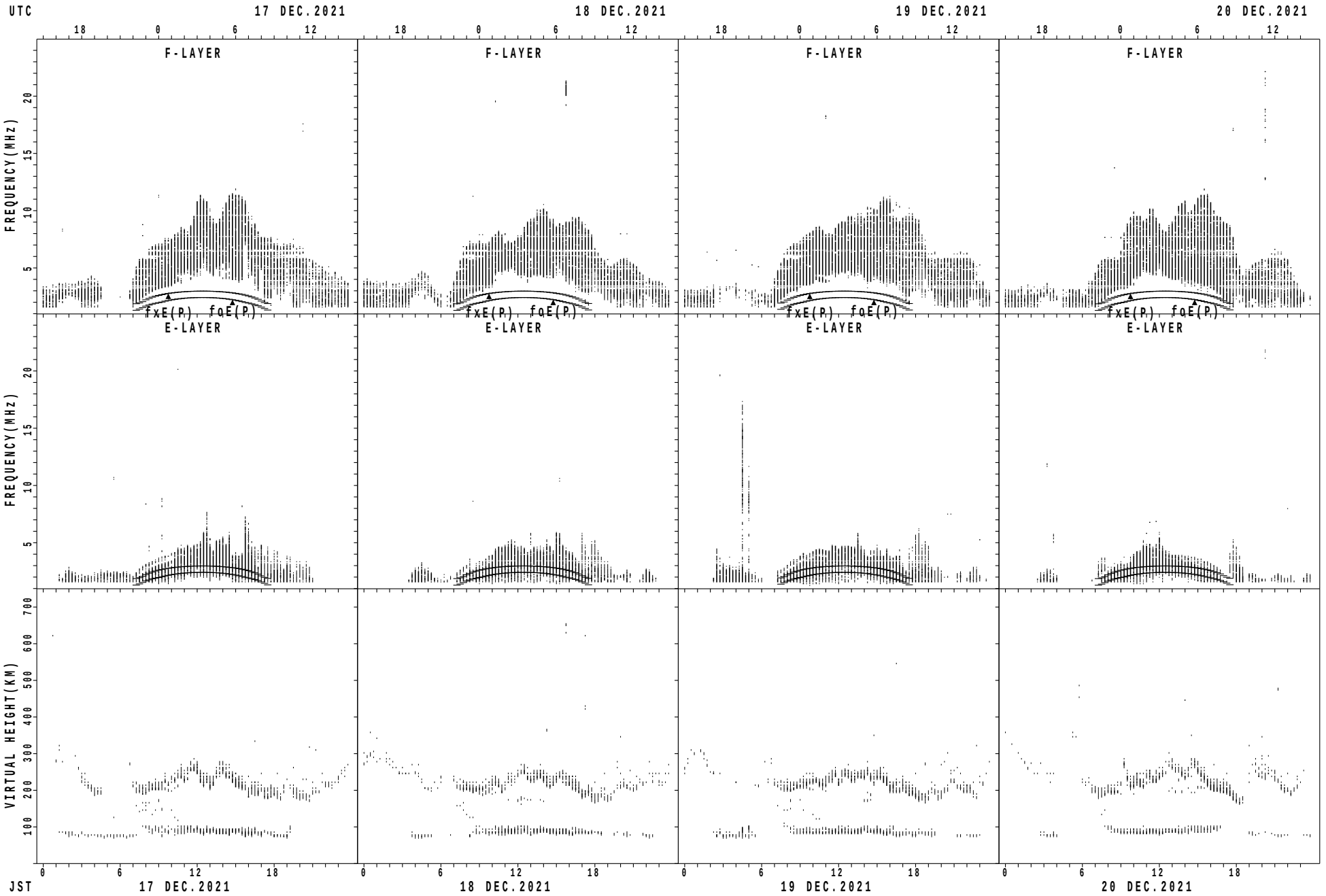

fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

# SUMMARY PLOTS AT Okinawa



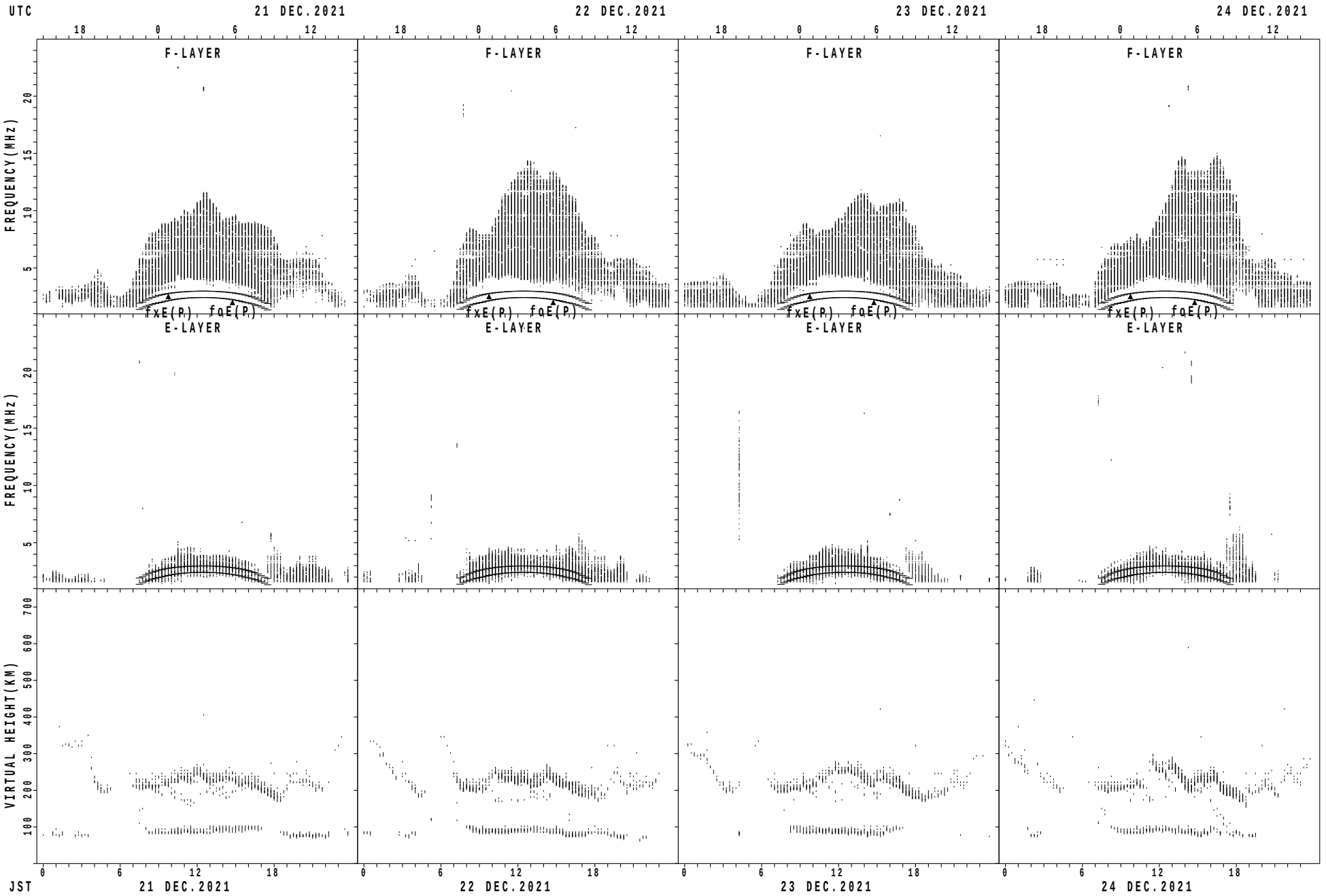

fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

# SUMMARY PLOTS AT Okinawa



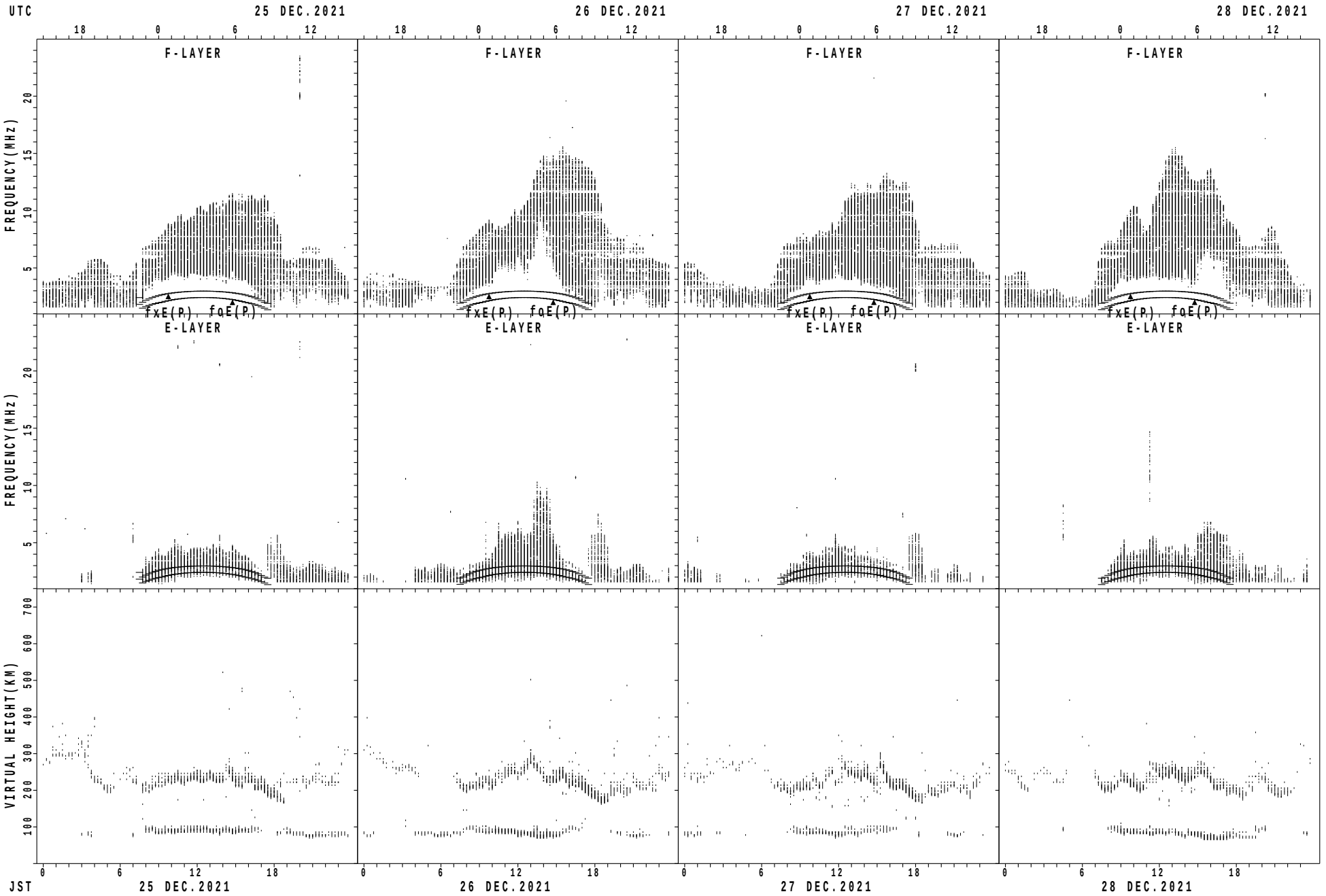

fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

## SUMMARY PLOTS AT Okinawa



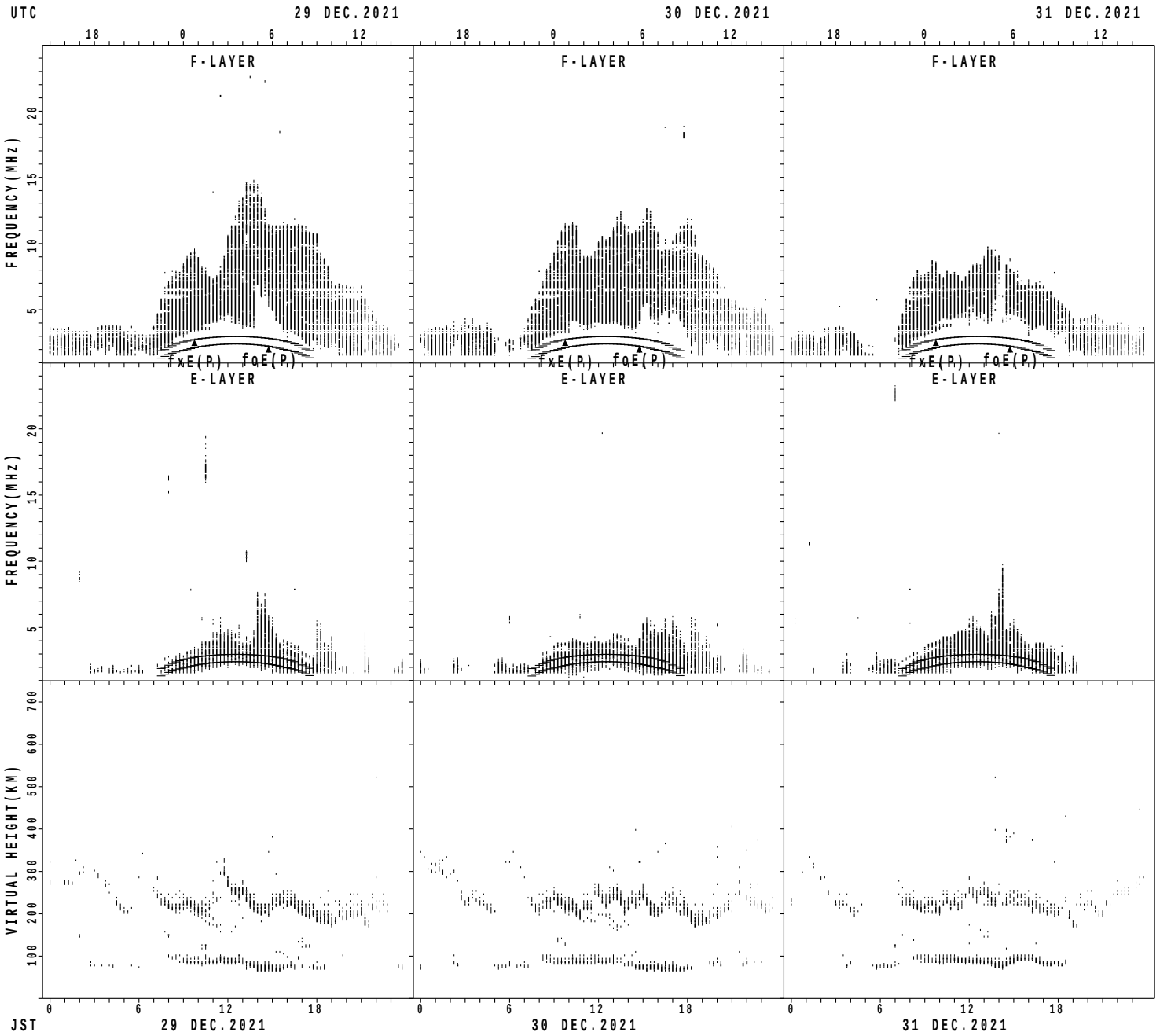

fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

# SUMMARY PLOTS AT Okinawa




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

# SUMMARY PLOTS AT Okinawa




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

# MONTHLY MEDIANS OF h′F AND h′Es

DEC.2021 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 | | | | | | 1 | | | 8 | 18 | 26 | 28 | 21 | 22 | 21 | 9 | 1 | | | | | | | |
| MED | | | | | | 224 | | | 214 | 216 | 209 | 207 | 216 | 218 | 218 | 212 | 240 | | | | | | | |
| U Q | | | | | | 112 | | | 218 | 230 | 224 | 211 | 228 | 232 | 229 | 223 | 120 | | | | | | | |
| L Q | | | | | | 112 | | | 208 | 208 | 202 | 201 | 202 | 210 | 213 | 203 | 120 | | | | | | | |

## 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 | 21 | 20 | 19 | 18 | 18 | 13 | 15 | 30 | 31 | 30 | 29 | 29 | 29 | 30 | 30 | 24 | 20 | 23 | 21 | 19 | 16 | 22 | 22 |
| MED | 96 | 96 | 96 | 96 | 96 | 97 | 98 | 98 | 98 | 98 | 98 | 100 | 100 | 98 | 98 | 98 | 98 | 96 | 96 | 96 | 96 | 98 | 96 | 98 |
| U Q | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 100 | 100 | 100 | 100 | 102 | 102 | 100 | 98 | 99 | 98 | 98 | 98 | 98 | 98 | 98 | 98 |
| L Q | 96 | 95 | 96 | 96 | 96 | 96 | 97 | 98 | 98 | 98 | 98 | 96 | 98 | 98 | 96 | 98 | 96 | 94 | 94 | 94 | 96 | 97 | 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 | | | | | | | | 1 | 4 | 16 | 26 | 23 | 14 | 21 | 20 | 16 | 10 | | | | | | | |
| MED | | | | | | | | 216 | 220 | 226 | 225 | 216 | 223 | 230 | 231 | 227 | 217 | | | | | | | |
| U Q | | | | | | | | 108 | 222 | 240 | 234 | 228 | 246 | 236 | 248 | 240 | 228 | | | | | | | |
| L Q | | | | | | | | 108 | 218 | 221 | 214 | 208 | 210 | 218 | 222 | 218 | 210 | | | | | | | |

## 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 | 21 | 21 | 20 | 16 | 20 | 13 | 23 | 30 | 31 | 31 | 31 | 31 | 30 | 30 | 30 | 27 | 24 | 23 | 19 | 21 | 12 | 16 | 18 |
| MED | 94 | 96 | 96 | 96 | 97 | 98 | 96 | 98 | 97 | 98 | 96 | 96 | 98 | 94 | 95 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 |
| U Q | 96 | 97 | 98 | 98 | 98 | 98 | 96 | 139 | 100 | 100 | 98 | 98 | 98 | 98 | 96 | 96 | 96 | 96 | 96 | 96 | 98 | 96 | 96 | 96 |
| L Q | 94 | 94 | 95 | 91 | 96 | 96 | 94 | 96 | 96 | 96 | 94 | 92 | 94 | 92 | 94 | 94 | 94 | 94 | 94 | 94 | 96 | 94 | 94 | 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 | | | | | | | | | 6 | 16 | 24 | 15 | | | 24 | 19 | 21 | 7 | | | | | | |
| MED | | | | | | | | | 221 | 225 | 226 | 224 | | | 234 | 232 | 218 | 218 | | | | | | |
| U Q | | | | | | | | | 226 | 238 | 241 | 242 | | | 243 | 246 | 226 | 222 | | | | | | |
| L Q | | | | | | | | | 216 | 218 | 216 | 214 | | | 229 | 224 | 214 | 212 | | | | | | |

## 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 | 22 | 23 | 26 | 19 | 23 | 20 | 22 | 25 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 29 | 31 | 30 | 29 | 25 | 21 | 22 |
| MED | 96 | 96 | 96 | 96 | 96 | 98 | 96 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 96 | 96 | 96 | 96 | 96 | 97 | 98 | 96 | 96 | 96 |
| U Q | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 100 | 100 | 98 | 98 | 98 | 100 | 100 | 100 | 98 | 98 | 98 | 98 | 98 | 98 | 96 |
| L Q | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 98 | 98 | 96 | 94 | 94 | 96 | 92 | 94 | 92 | 93 | 94 | 96 | 96 | 96 | 95 | 96 |

# MONTHLY MEDIANS OF h'F AND h'Es

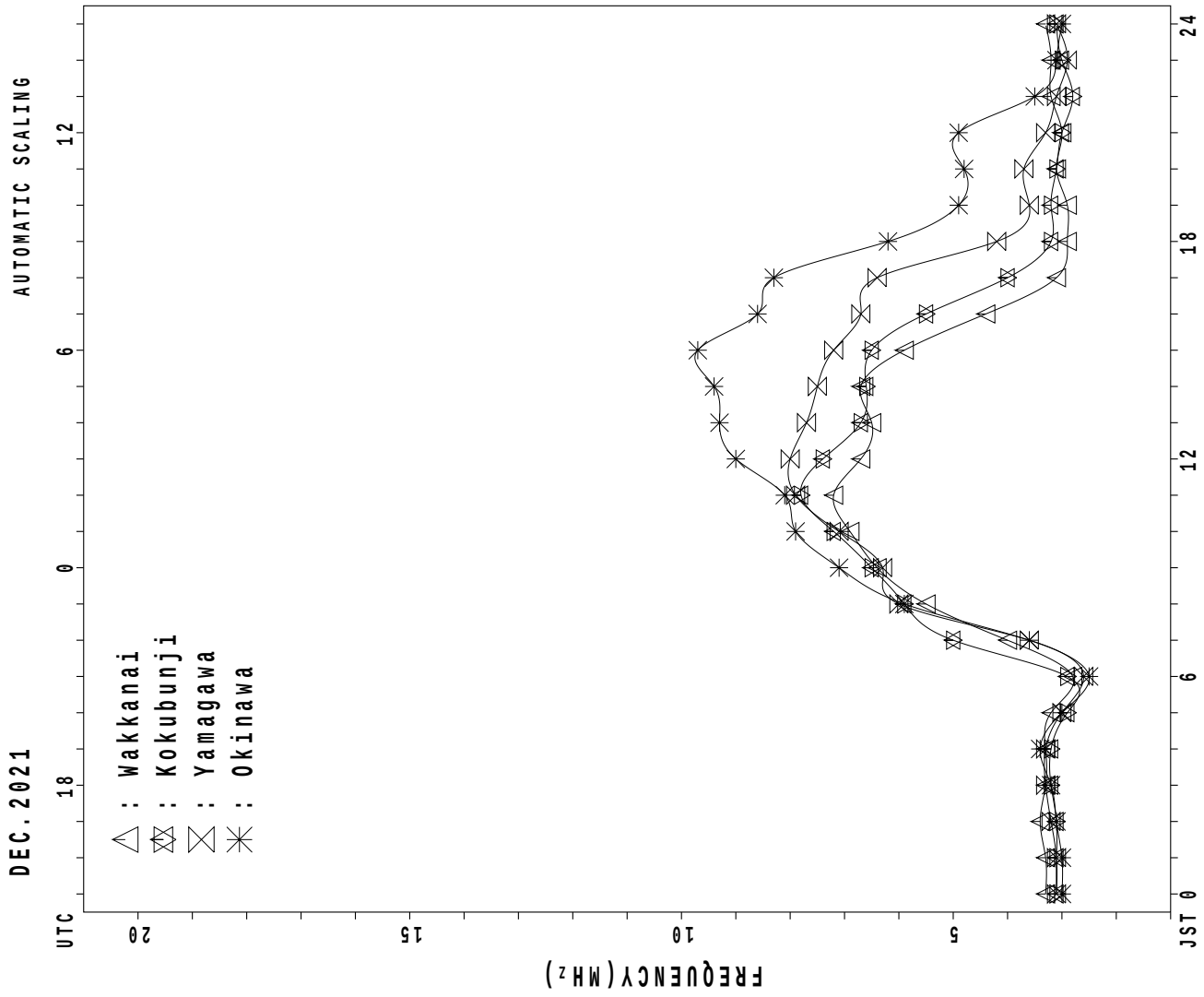
DEC.2021 135E MEAN TIME(UTC+9H) AUTOMATIC SCALING

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 | | | | | | | | | 8 | 19 | 28 | | | | | 28 | 27 | 25 | 12 | 1 | | 3 | | |
| MED | | | | | | | | | 228 | 226 | 221 | | | | | 224 | 224 | 212 | 202 | 222 | | 244 | | |
| U Q | | | | | | | | | 234 | 240 | 232 | | | | | 238 | 232 | 218 | 208 | 111 | | 294 | | |
| L Q | | | | | | | | | 219 | 222 | 214 | | | | | 215 | 210 | 205 | 193 | 111 | | 214 | | |

h'Es

| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CNT | 18 | 13 | 15 | 21 | 23 | 19 | 21 | 22 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 29 | 29 | 24 | 22 | 20 | 16 |
| MED | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 98 | 98 | 98 | 98 | 98 | 96 | 98 | 96 | 96 | 98 | 98 | 96 | 96 | 98 | 96 | 96 | 98 |
| U Q | 98 | 96 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 102 | 100 | 98 | 98 | 98 | 98 | 98 | 100 | 98 | 98 | 98 | 98 | 98 | 98 | 98 |
| L Q | 96 | 96 | 96 | 95 | 96 | 94 | 94 | 98 | 98 | 98 | 98 | 94 | 94 | 96 | 94 | 90 | 96 | 92 | 94 | 94 | 96 | 94 | 95 | 96 |


MONTHLY MEDIANS PLOT OF foF2
DEC.2021
AUTOMATIC SCALING
: Wakkanai
: Kokubunji
: Yamagawa
: Okinawa
UTC
0
6
12
18
JST 0
6
12
18
24
5
10
15
20
FREQUENCY(MHz)

# IONOSPHERIC DATA STATION Wakkanai

**DEC.2021** 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 48 | X 49 | X 49 | X 50 | X 44 | X 45 | | | | | | | | | | | | | X 37 | X 43 | X 41 | X 42 | X 44 | X 44 |
| 2 | X 43 | X 47 | X 43 | X 45 | X 39 | X 34 | | | | | | | | | | | | | X 34 | X 35 | X 35 | X 39 | X 39 | X 40 |
| 3 | X 41 | X 41 | X 45 | X 44 | X 41 | X 45 | 58 | | | | | | | | | | | | X 30 | X 35 | X 39 | X 39 | X 41 | X 41 |
| 4 | X 44 | X 44 | X 41 | X 39 | X 43 | X 41 | | | | | | | | | | | | | X 33 | X 31 | X 39 | X 34 | X 36 | X 37 |
| 5 | X 38 | X 39 | X 42 | X 43 | X 41 | X 38 | | | | | | | | | | | | | X 34 | X 37 | X 41 | X 35 | 42 | X 37 |
| 6 | X 38 | X 34 | X 38 | 39 | X 37 | 44 | 38 | | | | | | | | | | | | X 35 | X 37 | X 38 | 34 | X 37 | X 41 |
| 7 | 48 | 48 | 48 | 48 | 54 | 48 | | | | | | | | | | | | | X 36 | X 36 | X 38 | X 37 | 48 | 46 |
| 8 | X 37 | 46 | 40 | X 35 | X 34 | X 29 | | | | | | | | | | | | | X 32 | X 31 | O X 30 | X 31 | X 33 | X 35 |
| 9 | X 32 | X 36 | X 37 | X 37 | X 37 | X 35 | | | | | | | | | | | | | X 27 | X 30 | X 33 | X 35 | X 40 | X 39 |
| 10 | X 38 | X 41 | X 39 | X 39 | X 38 | X 38 | | | | | | | | | | | | | X 31 | X 33 | X 38 | X 36 | X 37 | X 37 |
| 11 | 54 | X 38 | X 38 | X 38 | X 37 | X 35 | | | | | | | | | | | | | X 34 | X 39 | X 32 | X 36 | X 37 | X 41 |
| 12 | X 41 | X 43 | X 44 | X 44 | X 39 | X 30 | | | | | | | | | | | | | X 29 | X 33 | X 37 | X 33 | X 38 | X 39 |
| 13 | X 39 | X 41 | X 41 | X 41 | X 40 | X 38 | | | | | | | | | | | | | X 35 | X 34 | X 33 | X 31 | X 36 | X 38 |
| 14 | X 38 | X 38 | X 39 | X 36 | X 38 | X 38 | | | | | | | | | | | | | X 30 | X 33 | X 35 | X 33 | X 35 | X 36 |
| 15 | X 38 | X 39 | X 37 | X 37 | X 37 | X 37 | | | | | | | | | | | | | X 32 | X 34 | X 41 | X 40 | X 39 | X 41 |
| 16 | X 42 | X 39 | X 41 | X 39 | X 41 | X 43 | | | | | | | | | | | | | X 41 | X 38 | X 37 | X 39 | X 40 | X 44 |
| 17 | X 44 | X 45 | X 45 | X 45 | X 43 | X 43 | | | | | | | | | | | | | X 37 | X 32 | X 38 | X 33 | X 36 | X 38 |
| 18 | X 39 | X 39 | X 41 | X 41 | X 40 | X 43 | | | | | | | | | | | | | A | X 41 | X 43 | X 45 | X 42 | X 49 |
| 19 | X 50 | X 48 | 52 | X 45 | X 47 | 55 | | | | | | | | | | | | | X 35 | X 39 | X 41 | X 38 | X 37 | X 36 |
| 20 | X 37 | X 38 | X 42 | X 41 | 41 | X 41 | | | | | 86 | | | | | | | | X 49 | 52 | X 55 | 59 | 59 | X 59 |
| 21 | X 60 | X 59 | X 59 | 70 | X 67 | 83 | 59 | | | | | | | | | | | | X 38 | X 39 | X 46 | X 47 | X 48 | X 48 |
| 22 | X 48 | X 52 | X 51 | X 50 | X 50 | X 47 | | | | | | | | | | | | | X 36 | X 36 | X 39 | X 57 | 59 | 59 |
| 23 | X 45 | X 45 | X 41 | X 41 | X 44 | X 37 | | | | | | | | | | | | | X 42 | X 43 | 47 | 50 | 52 | X 46 |
| 24 | X 47 | 52 | 60 | 66 | 68 | X 61 | 50 | | | | | | | | | | | | X 44 | X 37 | X 37 | X 41 | X 39 | X 39 |
| 25 | X 42 | X 43 | X 43 | X 44 | 57 | 51 | 43 | | | | | | | | | | | | X 44 | X 38 | X 38 | X 45 | X 46 | 47 |
| 26 | 47 | X 52 | X 53 | X 55 | X 55 | X 46 | | | | | | | | | | | | | X 40 | X 40 | X 34 | X 38 | X 41 | X 43 |
| 27 | X 47 | 53 | X 47 | X 44 | X 45 | X 45 | | | | | | | | | | | | | X 43 | X 36 | X 39 | X 42 | X 40 | X 41 |
| 28 | X 44 | X 42 | X 41 | X 29 | X 35 | X 35 | | | | | | | | | | | | | X 42 | X 38 | X 32 | X 36 | X 39 | X 39 |
| 29 | X 39 | X 43 | X 43 | X 40 | X 43 | X 38 | | | | | | | | | | | | | X 34 | X 31 | X 33 | X 33 | X 38 | X 39 |
| 30 | X 38 | X 38 | X 38 | X 38 | X 35 | X 35 | | | | | | | | | | | | | X 37 | X 37 | X 32 | X 34 | X 36 | X 37 |
| 31 | X 35 | X 39 | X 38 | X 37 | X 40 | X 38 | X 37 | | | | | | | | | | | | X 39 | X 32 | X 31 | X 34 | X 37 | X 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 | 31 | 31 | 31 | 31 | 31 | 31 | 6 | | | | 1 | | | | | | | | 30 | 31 | 31 | 31 | 31 | 31 |
| MED | X 42 | X 43 | X 42 | X 41 | X 41 | X 41 | 46 | | | | 86 | | | | | | | | X 36 | X 36 | X 38 | X 37 | X 39 | X 40 |
| U Q | X 47 | X 48 | X 47 | X 45 | X 45 | 45 | 58 | | | | | | | | | | | | X 40 | X 39 | X 41 | X 42 | 42 | X 44 |
| L Q | X 38 | X 39 | X 39 | X 38 | X 38 | X 37 | 38 | | | | | | | | | | | | X 33 | X 33 | X 33 | X 34 | X 37 | X 38 |

**DEC.2021** fxI (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Wakkanai

**DEC.2021** foF2 (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

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

# IONOSPHERIC DATA STATION Wakkanai

**DEC.2021** 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

| 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 | | | | | | | | | | L | L 380 | L | L | L | | | | | | | | | | |
| 2 | | | | | | | | | | | 352 | L | L | L | | | | | | | | | | |
| 3 | | | | | | | | | L | | 324 | L | L 316 | | L | L | | | | | | | | |
| 4 | | | | | | | | | | L | L | L | L 352 | L | L | | | | | | | | | |
| 5 | | | | | | | | | | | L 408 | L 404 | L | L | 276 | | | | | | | | | |
| 6 | | | | | | | | | | 312 | L | U L 368 | L | L | L | | | | | | | | | |
| 7 | | | | | | | | | | L | L 316 | | L | L | 292 | | | | | | | | | |
| 8 | | | | | | | | | L | | L | L | | L | | | | | | | | | | |
| 9 | | | | | | | | | | | L | L | L 364 | L 340 | | | | | | | | | | |
| 10 | | | | | | | | | | L | | L | L | | L | | | | | | | | | |
| 11 | | | | | | | | | | | L | L | L | L | | | | | | | | | | |
| 12 | | | | | | | | | | | | L | H 456 | | L | | | | | | | | | |
| 13 | | | | | | | | | | | | L | L 352 | | 308 | | | | | | | | | |
| 14 | | | | | | | | | | 320 | L | L | | 364 | 292 | L | | | | | | | | |
| 15 | | | | | | | | | | | 340 | 368 | 348 | L | L | | | | | | | | | |
| 16 | | | | | | | | | L | L | L | L | L | L | | | | | | | | | | |
| 17 | | | | | | | | | 252 | | L | L | 336 | | | | | | | | | | | |
| 18 | | | | | | | | | 292 | 320 | 320 | L | L | L | 288 | | | | | | | | | |
| 19 | | | | | | | | 168 | | | L | L | L | L 400 | | | | | | | | | | |
| 20 | | | | | | | | | | | 364 | L | L | L | L | | | | | | | | | |
| 21 | | | | | | | | | | L | L | 376 | L | 328 | | | | | | | | | | |
| 22 | | | | | | | | | | 276 | | L | 396 | 356 | | | | | | | | | | |
| 23 | | | | | | | | 276 | | | | L | L | L | | | | | | | | | | |
| 24 | | | | | | | | L | L | L | | L | 376 | | 348 | | | | | | | | | |
| 25 | | | | | | | | | | L | | | 360 | | L | | | | | | | | | |
| 26 | | | | | | | | | | | | L | L | L | L | | | | | | | | | |
| 27 | | | | | | | | | L | | L | 364 | 332 | L | L | | | 360 | | | | | | |
| 28 | | | | | | | | | | L | L | L | 352 | 376 | 308 | L | | | | | | | | |
| 29 | | | | | | | | | 244 | 280 | L | L | L 408 | L 364 | L | 244 | | | | | | | | |
| 30 | | | | | | | | | | | L | L | 340 | L | | | | | | | | | | |
| 31 | | | | | | | | | | | U L 392 | 340 | L | 384 | | | | | | | | | | |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | | | | | | | | 2 | 3 | 5 | 8 | 7 | 12 | 9 | 8 | 1 | | 1 | | | | | | |
| MED | | | | | | | | 222 | 252 | 312 | 358 | 368 | 356 | 356 | 300 | 244 | | 360 | | | | | | |
| U Q | | | | | | | | | 292 | 320 | L 386 | 376 | 386 | 370 | 328 | | | | | | | | | |
| L Q | | | | | | | | | 244 | 278 | 332 | 340 | 344 | 334 | 290 | | | | | | | | | |

**DEC.2021** foF1 (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Wakkanai

**DEC.2021** foE (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

| H / D | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | B | B | 228 | 256 | 268 | 276 | 264 | 272 | 228 | 196 | 228 | A | | | | | | |
| 2 | | | | | | | B | A | 204 | 260 | 260 | 272 | 272 | 252 | 240 | 188 | B | B | | | | | | |
| 3 | | | | | | | B | 188 | 204 | A | A | 272 | A | 248 | A | 196 | A | A | | | | | | |
| 4 | | | | | | | B | 220 | A | 232 | 272 | 284 | 284 | 264 | 240 | 204 | A | A | | | | | | |
| 5 | | | | | | | B | B | 200 | 244 | 264 | 284 | 284 | 276 | 236 | 192 | A | A | | | | | | |
| 6 | | | | | | | B | B | 224 | 252 | 264 | 280 | 268 | 252 | 220 | 192 | A | A | | | | | | |
| 7 | | | | | | | B | B | 220 | 260 | 268 | 276 | 280 | 264 | 228 | 204 | A | A | | | | | | |
| 8 | | | | | | | B | B | 200 | 244 | 260 | 260 | 260 | 248 | 240 | 192 | 176 | B | | | | | | |
| 9 | | | | | | | B | B | 220 | 256 | 256 | 264 | 272 | 268 | 228 | 180 | B | A | | | | | | |
| 10 | | | | | | | B | A | 184 | 224 | 296 | 268 | 272 | 260 | 228 | 216 | A | B | | | | | | |
| 11 | | | | | | | A | B | 180 | 240 | 260 | 264 | 268 | 264 | 252 | 204 | B | 196 | | | | | | |
| 12 | | | | | | | B | 228 | 220 | 256 | 280 | 288 | 276 | 288 | 244 | 204 | B | 172 | | | | | | |
| 13 | | | | | | | A | B | 208 | 236 | 264 | 284 | 276 | 252 | A | 188 | A | B | | | | | | |
| 14 | | | | | | | 192 | A | 216 | 256 | 268 | 268 | 268 | 264 | 244 | 196 | A | A | | | | | | |
| 15 | | | | | | | B | 204 | 240 | 252 | 276 | 284 | 284 | 268 | 232 | 204 | A | 216 | | | | | | |
| 16 | | | | | | | B | A | 216 | 252 | 268 | 268 | 284 | 280 | 256 | 188 | A | A | | | | | | |
| 17 | | | | | | | B | B | 188 | 244 | 292 | 248 | 276 | 252 | 240 | 200 | B | 160 | | | | | | |
| 18 | | | | | | | B | B | 200 | 256 | 256 | 288 | 272 | 276 | 248 | 232 | 224 | A | | | | | | |
| 19 | | | | | | | B | 224 | 232 | 244 | 296 | 288 | 276 | 288 | 236 | 228 | B | B | | | | | | |
| 20 | | | | | | | B | B | 228 | A | 280 | 284 | 284 | 284 | 240 | 196 | B | B | | | | | | |
| 21 | | | | | | | B | A | 212 | 248 | 284 | 296 | 296 | 284 | 248 | 228 | B | B | | | | | | |
| 22 | | | | | | | B | B | 212 | 252 | 292 | 292 | 292 | 256 | 280 | A | B | B | | | | | | |
| 23 | | | | | | | B | A | 228 | 252 | 280 | 280 | 296 | 276 | 276 | A | B | B | | | | | | |
| 24 | | | | | | | B | A | 232 | 240 | 264 | 272 | 288 | 296 | 248 | A | B | B | | | | | | |
| 25 | | | | | | | B | B | 212 | 272 | 280 | 280 | A | 280 | 280 | 212 | B | B | | | | | | |
| 26 | | | | | | | B | A | 196 | 268 | 288 | 288 | 284 | 292 | 256 | 192 | B | B | | | | | | |
| 27 | | | | | | | B | B | 196 | 260 | 272 | 288 | 288 | 288 | 244 | A | A | A | | | | | | |
| 28 | | | | | | | B | A | 212 | 268 | 276 | 288 | 304 | 292 | 256 | 224 | B | B | | | | | | |
| 29 | | | | | | | B | A | 192 | 236 | 264 | 280 | 272 | 276 | 240 | 192 | A | A | | | | | | |
| 30 | | | | | | | B | A | 192 | 264 | 264 | 264 | 276 | 276 | 252 | 208 | A | B | | | | | | |
| 31 | | | | | | | | B | 196 | 256 | 280 | 296 | 280 | A | A | 212 | A | A | | | | | | |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | | | | | | | 1 | 6 | 30 | 29 | 30 | 31 | 29 | 30 | 28 | 27 | 3 | 4 | | | | | | |
| MED | | | | | | | 192 | 212 | 212 | 252 | 270 | 280 | 276 | 274 | 242 | 200 | 224 | 184 | | | | | | |
| U Q | | | | | | | | 224 | 220 | 258 | 280 | 288 | 284 | 284 | 252 | 212 | 228 | 206 | | | | | | |
| L Q | | | | | | | | 188 | 196 | 244 | 264 | 268 | 272 | 260 | 236 | 192 | 176 | 166 | | | | | | |

**DEC.2021** foE (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Wakkanai

**DEC.2021** 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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | E B 16 | E B 16 | E B 16 | E B 16 | 28 | 20 | 20 | E B 17 | J A 25 | J A 38 | J A 28 | 32 | 30 | J A 28 | 25 | J A 30 | J A 31 | J A 31 | J A 26 | E B 16 | J A 21 | E B 16 | E B 16 | E B 16 |
| 2 | 20 | 20 | E B 16 | J A 24 | J A 20 | 20 | J A 19 | J A 23 | J A 29 | J A 31 | J A 33 | J A 223 | J A 29 | J A 28 | J A 25 | 21 | E B 16 | E B 16 | J A 24 | J A 33 | B 36 | E B 16 | J A 21 | 24 |
| 3 | J A 25 | J A 24 | E B 16 | 24 | J A 23 | J A 21 | J A 21 | J A 25 | G J A 19 | J A 33 | J A 29 | J A 76 | J A 47 | 27 | J A 31 | J A 48 | J A 27 | J A 33 | J A 51 | J A 26 | J A 39 | E B 16 | J A 25 | 18 |
| 4 | J A 27 | J A 82 | J A 19 | J A 117 | J A 43 | J A 21 | E B 17 | 25 | J A 27 | J A 31 | J A 28 | J A 51 | J A 29 | J A 28 | J A 27 | J A 28 | J A 34 | J A 30 | J A 24 | 24 | J A 23 | E B 16 | J A 31 | J A 27 |
| 5 | J A 27 | J A 25 | J A 24 | J A 26 | J A 25 | E B 16 | 18 | E B J A 17 | 29 | 28 | 32 | 30 | 30 | 28 | 26 | J A 27 | J A 29 | J A 24 | J A 23 | J A 17 | J A 25 | 20 | J A 21 | 18 |
| 6 | J A 21 | J A 31 | 27 | J A 26 | J A 25 | J A 21 | E B 16 | E B 16 | J A 33 | J A 33 | J A 28 | J A 33 | J A 28 | 28 | 26 | 20 | J A 27 | J A 31 | 19 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 7 | E B 16 | E B 16 | E B 16 | E B 16 | 22 | E B 16 | E B 16 | E B 16 | J A 25 | J A 30 | J A 30 | J A 30 | 30 | J A 33 | 27 | J A 24 | J A 31 | J A 31 | J A 26 | 20 | E B 16 | E B 16 | E B 16 | J A 19 |
| 8 | 19 | J A 17 | J A 24 | J A 18 | 20 | J A E 126 | E B 16 | E B 16 | J A 23 | J A 28 | J A 27 | 30 | 30 | 28 | 28 | 20 | 20 | J A 25 | J A E 107 | E B 16 | E B 16 | 20 | E B E 16 | E B 16 |
| 9 | 20 | J A 21 | J A 31 | E B E 16 | E B 16 | E B E 16 | E B E 16 | E B J A 16 | 30 | 27 | 29 | J A 61 | J A 28 | J A 26 | 45 | 21 | E B J A 16 | J A 31 | J A 19 | E B 16 | E B 16 | 21 | J A 31 | 25 |
| 10 | J A 31 | J A 22 | E B 16 | J A 21 | 20 | J A 26 | E B 16 | J A 23 | 21 | J A 49 | J A 31 | 30 | J A 51 | G | G | J A 23 | J A 26 | E B 16 | J A 29 | J A 24 | 20 | 19 | E B 16 | J A 39 |
| 11 | J A 94 | 26 | 26 | J A 21 | J A 22 | E B 16 | J A 42 | E B 16 | 23 | J A 33 | 32 | 30 | 32 | J A 31 | G 23 | G 20 | E B 16 | G 20 | 20 | J A 24 | J A 24 | 23 | E B 16 | 19 |
| 12 | 29 | J A 23 | J A 27 | E B 16 | 20 | 19 | 19 | J A 51 | 32 | J A 31 | J A 29 | 33 | 30 | J A 31 | G | 21 | E B 16 | 18 | 28 | J A 77 | 28 | J A 47 | J A 51 | 22 |
| 13 | E B 16 | J A 63 | 43 | J A 33 | J A 25 | E B 16 | E B 16 | 20 | 23 | 26 | 30 | 33 | G 30 | 29 | 26 | 24 | J A 26 | E B 16 | J A 27 | 46 | J A 51 | J A 20 | J A 28 | J A 26 |
| 14 | 32 | 25 | J A 27 | J A 29 | J A 29 | J A 28 | J A 25 | J A 153 | J A 27 | J A 31 | J A 38 | J A 49 | J A 56 | 30 | J A 29 | 24 | J A 24 | J A 24 | 28 | 27 | E B 16 | 28 | J A 50 | J A 53 |
| 15 | J A 24 | J A 34 | 20 | 20 | 19 | 28 | 18 | J A 23 | J A 25 | J A 26 | J A 41 | J A 32 | J A 31 | J A 35 | 47 | J A 20 | J A 26 | J A 26 | J A 31 | J A 28 | J A 25 | J A 28 | J A 25 | J A 25 |
| 16 | E B 16 | E B 16 | E B 16 | J A 25 | J A 26 | E B 16 | 20 | J A 25 | J A 24 | J A 27 | 32 | 34 | 32 | J A 61 | J A 56 | J A 31 | J A 24 | J A 24 | J A 52 | J A 101 | J A 24 | 20 | J A 26 | J A 34 |
| 17 | 26 | J A 22 | J A 28 | J A 21 | J A E 16 | 21 | J A 25 | E B J A 16 | J A 30 | J A 47 | J A 40 | 30 | 30 | 30 | 27 | J A 21 | E B 16 | J A 21 | J A 60 | J A 25 | 24 | 32 | J A 20 | J A 24 |
| 18 | J A 24 | J A 31 | 19 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | J A 24 | 31 | 29 | G | J A 33 | J A 29 | J A 26 | J A 78 | 32 | J A 55 | J A 96 | J A 87 | J A 52 | J A 23 | 19 | J A 30 |
| 19 | J A 31 | J A 31 | J A 26 | J A 27 | J A 27 | E B 16 | E B 16 | J A 23 | J A 24 | 28 | 31 | 32 | 32 | J A 41 | J A 103 | G | E B 16 | J A 26 | J A 29 | J A 47 | J A 51 | J A 27 | J A 37 | J A 22 |
| 20 | J A 17 | E B J 16 | J A 18 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 24 | J A 50 | 29 | 31 | 31 | G 29 | 26 | G | 30 | E B 16 | E B 16 | J A 24 | E B J A 16 | 25 | J A 25 | J A 27 |
| 21 | J A 40 | J A 28 | J A 25 | J A 28 | E B 16 | E B 16 | E B 16 | J A 25 | J A 44 | G | G | G | G | G | G 24 | G | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 20 | J A 20 |
| 22 | E B 16 | J A 23 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G 21 | G | G | G 30 | G | 29 | 33 | G 23 | 18 | J A 23 | J A E 103 | E B 15 | J A 18 | 24 | J A 28 | J A 28 |
| 23 | J A 28 | J A 26 | J A 26 | E B 16 | E B 16 | E B 16 | E B 16 | J A 16 | J A 25 | 29 | 32 | 31 | G | G | G | 21 | E B 17 | E B 16 | J A 39 | J A 23 | E B 16 | 19 | J A 25 | 19 |
| 24 | E B 16 | E B 16 | E B 17 | E B 16 | E B 16 | E B 16 | E B 17 | B J A 21 | J A 31 | J A 41 | J A 53 | 30 | 31 | 32 | J A 29 | 23 | E B 16 | E B 16 | E B 16 | E B 16 | 19 | J A 21 | J A 21 | J A 21 |
| 25 | J A 22 | J A 24 | J A 27 | J A 24 | E B 15 | E B 16 | E B 16 | E B 16 | G | G | G | 32 | 36 | 32 | G | G | E B 16 | E B 16 | E B 17 | E B 16 | E B 16 | E B 16 | E B 16 | 30 |
| 26 | E B 17 | E B 16 | E B 16 | E B 16 | E B 15 | E B 16 | E B 16 | 21 | 23 | J A 51 | 32 | J A 117 | 32 | G | 28 | G | E B 16 | E B 16 | E B 16 | B J A 24 | J A 29 | J A 23 | J A 25 | 26 |
| 27 | E B 16 | J A 22 | E B 15 | E B 16 | 22 | 21 | E B 16 | E B 16 | 23 | 30 | 31 | 37 | 32 | J A 49 | J A 83 | J A 36 | J A 33 | J A 52 | J A 27 | J A 29 | J A 29 | E B 15 | E B 16 | E B 16 |
| 28 | J A 27 | J A 23 | J A 23 | J A 24 | J A 83 | E B 16 | J A 61 | J A 24 | J A 29 | J A 51 | 30 | G | G | G | G 29 | G | E B 16 | E B 16 | E B 16 | B J A 24 | E B 16 | E B 16 | E B 16 | E B 16 |
| 29 | E B 15 | J A 34 | J A 26 | J A 32 | 32 | J A 31 | E B 16 | 21 | J A 47 | 28 | 31 | 30 | G J 26 | J A 30 | G | G | J A 24 | J A 29 | J A 24 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 30 | J A 20 | J A 30 | J A 28 | J A 19 | J A 23 | J A 20 | E B 16 | J A 33 | J A 24 | J A 45 | J A 52 | J A 34 | G 28 | G | 29 | J A 26 | J A 28 | J A 21 | J A 22 | 21 | E B 16 | J A 24 | J A 46 | J A 23 |
| 31 | J A 22 | E B J 16 | A 30 | 20 | J A 20 | J A 25 | 21 | 24 | J A 27 | 34 | J A 29 | J A 30 | J A 85 | J A 75 | J A 50 | J A 25 | J A 47 | J A 32 | A E 16 | B E 16 | E B 16 | E B 16 | E B 16 | J A 25 |
| | 00 | 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 A 22 | J A 23 | J A 24 | J A 21 | 20 | E B 16 | E B 16 | 21 | J A 25 | J A 31 | 30 | 32 | 30 | 29 | G | G | 24 | J A 24 | J A 26 | J A 24 | 20 | 20 | J A 21 | J A 23 |
| U Q | J A 27 | J A 30 | J A 27 | J A 26 | J A 25 | J A 21 | J A 20 | J A 24 | J A 29 | J A 38 | J A 32 | J A 34 | J A 32 | J A 32 | J A 31 | J A 26 | J A 29 | J A 31 | J A 31 | J A 28 | J A 28 | J A 24 | J A 28 | J A 27 |
| L Q | E B 16 | E B 17 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 23 | 28 | 29 | 30 | G | 28 | 26 | 21 | E B 16 | E B 16 | E B 19 | E B 16 | E B 16 | E B 16 | E B 16 | E B 18 |

**DEC.2021** foEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Wakkanai

**DEC.2021** fbEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 17 | 24 | 27 | G 26 | 28 | 29 | 28 | 23 | G 19 | G 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 2 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 16 | 21 | G 23 | 27 | G 26 | 28 | 26 | G 24 | G 19 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 3 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 20 | G 19 | 29 | 26 | G 27 | 31 | 26 | 26 | 21 | E B 16 | 17 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 4 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 17 | E B 17 | 22 | 27 | G 27 | G 28 | G 28 | G 26 | 26 | G 20 | 20 | 16 | 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 5 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 17 | 22 | G 24 | 30 | G 28 | G 28 | G 25 | G 24 | G 18 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 6 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G 20 | G 24 | G 26 | G 27 | G 26 | 26 | 23 | 20 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 7 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G 21 | G 26 | 28 | G 27 | 28 | G 26 | 25 | 22 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 8 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 21 | G 24 | 26 | 29 | 28 | 26 | 25 | 20 | G 17 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 9 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 22 | 26 | 28 | 28 | G 27 | G 24 | 24 | 19 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 10 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 21 | 24 | G 30 | 30 | G 27 | G | G | G 21 | 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 11 | E B 16 | E B 16 | E B 16 | 16 | E B 16 | E B 16 | E B 16 | E B 16 | 19 | 25 | 28 | 28 | 31 | 27 | G 22 | G 18 | E B 16 | E B 16 | E B 16 | 17 | E B 16 | E B 16 | E B 16 | E B 16 |
| 12 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 22 | G 25 | G 27 | G 29 | 30 | G 28 | G | G 19 | E B 16 | E B 16 | 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 13 | E B 16 | 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 22 | 25 | 29 | 30 | G 28 | 28 | 26 | 21 | E B 16 | E B 16 | 16 | E B 16 | 16 | E B 16 | E B 16 | E B 16 |
| 14 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G 21 | G 24 | 29 | G 24 | G 27 | 28 | G 24 | G 17 | 17 | 16 | 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 15 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G 21 | G 24 | 28 | G 28 | G 27 | G 26 | G 25 | G 20 | E B 16 | G 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 18 |
| 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 16 | E B 16 | G 20 | G 25 | 31 | 33 | 29 | G 25 | G 24 | 22 | 17 | E B 17 | E B 16 | 17 | E B 16 | E B 16 | E B 16 | 16 |
| 17 | E B 17 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G 18 | 29 | G 29 | 29 | G 28 | 27 | 26 | G 20 | E B 16 | G 16 | 22 | 16 | E B 16 | 16 | E B 16 | E B 16 |
| 18 | E B 16 | 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G 19 | G 26 | 27 | G | G 27 | G 26 | G 24 | G 23 | G 21 | 21 | A A 96 | 20 | 20 | E B 16 | E B 16 | E B 16 |
| 19 | 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G 23 | 25 | G 28 | 31 | 30 | G 28 | 27 | G | E B 16 | E B 16 | E B 16 | 16 | 16 | E B 16 | E B 16 | E B 16 |
| 20 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G 22 | 26 | 28 | 29 | 29 | G 28 | 25 | G | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 21 | 23 | 19 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G 20 | G | G | G | G | G | G 24 | G | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 22 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G 20 | G | G | G 29 | G | 27 | G 27 | G 21 | E B 17 | E B 16 | E B 16 | E B 15 | E B 16 | E B 16 | E B 16 | E B 16 |
| 23 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 23 | E B 26 | G 28 | G 27 | G | G | G | 21 | E B 17 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 24 | E B 16 | E B 16 | E B 17 | E B 16 | E B 16 | E B 16 | E B 17 | E B 16 | 25 | 40 | 30 | 28 | 29 | G 29 | 28 | 22 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 25 | E B 16 | E B 16 | E B 16 | E B 16 | E B 15 | E B 16 | E B 16 | E B 16 | G | G | G | 30 | 29 | 29 | G | G | E B 16 | E B 16 | E B 17 | E B 16 | E B 16 | E B 16 | E B 16 | E B 17 |
| 26 | E B 17 | E B 16 | E B 16 | E B 16 | E B 15 | E B 16 | E B 16 | E B 16 | 22 | 27 | 30 | 30 | 30 | G | 27 | G | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 27 | E B 16 | E B 16 | E B 15 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 22 | 28 | 28 | 35 | 32 | G 28 | 26 | 25 | 23 | 18 | 20 | E B 16 | E B 16 | E B 15 | E B 16 | E B 16 |
| 28 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G 20 | G 25 | 29 | G | G | G | G 25 | G | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 29 | E B 15 | E B 16 | 16 | E A 18 | E B 16 | E B 16 | E B 16 | E B 16 | 22 | 26 | 30 | 29 | G 26 | 28 | G | G | 17 | E B 17 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 30 | E B 16 | 16 | E B 16 | E B 16 | E B 16 | A E 16 | E B 16 | E B 16 | 20 | G 25 | 28 | 28 | G 27 | G | 28 | 22 | 21 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 18 | E B 16 |
| 31 | E B 16 | E B 16 | E B 16 | E B 16 | 17 | E B 16 | E B 16 | E B 16 | 20 | G 26 | G 27 | G 28 | G 27 | 30 | 27 | 23 | 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 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 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 |
| MED | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 21 | G 26 | 28 | 29 | G | G 28 | 26 | G 21 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| U Q | E B 16 | 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 22 | 26 | G | 29 | 29 | G | G | G | 17 | 16 | 16 | 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| L Q | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G 20 | G 25 | G 27 | G 28 | G 27 | G 26 | G 24 | G 20 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |

**DEC.2021** fbEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Wakkanai

**DEC.2021** 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

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

# IONOSPHERIC DATA STATION Wakkanai

## DEC.2021 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 | 303 | 302 | 294 | 329 | 329 | 328 | 347 | 372 | 359 | 372 | 358 | 340 | 376 | 358 | 356 | 366 | 346 | 358 | 307 | 314 | 313 | 313 | 312 | 290 |
| 2 | 290 | 327 | 295 | 350 | 350 | 298 | 350 | 333 | 378 | 335 | 369 | 365 | 358 | 357 | 367 | 363 | 362 | 336 | 336 | 324 | 297 | 326 | 304 | 317 |
| 3 | 303 | 302 | 302 | 302 | 360 | Z 346 | 296 | 356 | 377 | 370 | 348 | 366 | 359 | H 352 | 384 | 347 | 389 | 301 | 300 | 321 | 320 | 319 | 282 | 317 |
| 4 | 317 | 329 | 329 | 285 | 308 | 344 | 299 | 349 | 365 | 364 | 373 | 375 | 343 | 373 | 361 | 360 | 359 | 359 | 336 | 296 | 364 | 272 | 298 | 299 |
| 5 | 317 | 306 | 316 | 319 | 311 | 349 | 393 | 368 | 368 | 368 | 367 | 368 | 356 | 369 | 350 | 372 | 380 | 381 | 318 | 317 | 317 | 339 | F 285 | 266 |
| 6 | 265 | 323 | 280 | F | 286 | F 307 | F | 382 | 355 | 355 | 343 | 377 | 337 | 383 | 362 | 362 | 383 | 382 | V 301 | 310 | 366 | F | 296 | 260 |
| 7 | F | F | F 304 | F 287 | F | F 317 | 337 | 372 | 351 | 366 | 365 | 349 | 362 | 375 | 369 | 363 | 368 | 292 | 301 | 321 | 318 | 264 | F 264 | F 263 |
| 8 | 267 | F 256 | F 292 | 291 | 352 | 381 | 279 | 373 | 395 | 363 | 371 | 390 | 406 | 362 | 361 | 349 | 381 | 383 | 371 | 345 | 300 | 300 | 303 | 298 |
| 9 | 360 | 299 | 299 | 325 | 324 | 362 | 366 | 366 | 384 | 373 | 366 | 384 | 371 | 371 | 371 | 371 | 366 | 374 | 356 | 332 | 332 | 331 | 331 | 331 |
| 10 | 330 | 283 | 283 | 306 | 283 | 339 | 360 | 379 | 395 | 372 | 371 | 392 | 358 | 388 | 377 | 358 | 362 | 349 | 324 | 324 | 369 | 338 | 314 | 295 |
| 11 | F 273 | 298 | 286 | 286 | 312 | 358 | 333 | 358 | 380 | 380 | 372 | 378 | 366 | 366 | 365 | 364 | 358 | 294 | 330 | 359 | 343 | 305 | 305 | 308 |
| 12 | 303 | 307 | 306 | 334 | 364 | 314 | 330 | 346 | 345 | 379 | 398 | 358 | 335 | 354 | 328 | 384 | 381 | 369 | 340 | 326 | 326 | 285 | 301 | 295 |
| 13 | 315 | 314 | 308 | 319 | 327 | 327 | 347 | 365 | 374 | 386 | H 308 | 360 | 377 | 357 | 381 | 381 | 391 | 342 | 342 | 341 | 341 | 288 | 292 | 291 |
| 14 | 321 | 318 | 316 | 328 | 327 | 374 | 348 | 367 | 374 | 374 | 373 | 373 | 363 | 334 | H 342 | 367 | 367 | 366 | 349 | 343 | 342 | 323 | 255 | 271 |
| 15 | 290 | 271 | 292 | 291 | 338 | 352 | 351 | 358 | 332 | 390 | 380 | 350 | 367 | 363 | H 365 | H 350 | 347 | 349 | 333 | 290 | 331 | 330 | 291 | 320 |
| 16 | 321 | 309 | 309 | 301 | 305 | 312 | 368 | 385 | 383 | 370 | 331 | 379 | 379 | 377 | 352 | 376 | 356 | 355 | 345 | 345 | 331 | 314 | 296 | 282 |
| 17 | 300 | 328 | 317 | 339 | 303 | 321 | 358 | 364 | 386 | 363 | 362 | 365 | 355 | H 334 | 369 | 369 | 365 | 347 | 383 | 325 | 355 | 308 | 308 | 291 |
| 18 | 296 | 319 | 311 | 311 | 311 | 334 | 377 | 350 | 379 | 375 | 375 | 363 | 362 | 359 | 384 | 367 | 344 | 323 | A | 322 | 347 | 316 | 304 | 298 |
| 19 | 273 | 290 | F 287 | 292 | 318 | F | 356 | 353 | 375 | C | 369 | 368 | 375 | 333 | 345 | 394 | 363 | 356 | 306 | 344 | 343 | 329 | 290 | 290 |
| 20 | 289 | 288 | 322 | 315 | F | 315 | 292 | 343 | 364 | 326 | F 338 | 363 | 338 | 348 | 340 | 339 | 348 | 336 | 343 | F | 286 | F | F | 284 |
| 21 | 281 | 298 | 277 | 314 | 254 | F | 319 | H 323 | 363 | 347 | 347 | 359 | 364 | 348 | 347 | 346 | 345 | 309 | 308 | 342 | 341 | V 332 | V 299 | 296 |
| 22 | 295 | 271 | 277 | 294 | 294 | 301 | 313 | 345 | 354 | 384 | 358 | 391 | 308 | 347 | 313 | 377 | 354 | 329 | 352 | 329 | 311 | 282 | F 274 | F |
| 23 | 274 | 273 | 285 | 285 | 306 | 318 | 310 | 309 | 367 | 366 | 334 | 374 | 347 | 332 | 362 | 362 | 352 | 350 | 342 | 327 | F 300 | F | F | 283 |
| 24 | 298 | F | F | F | F | 314 | F | 327 | 360 | 345 | 370 | 363 | 374 | 353 | 352 | 342 | 355 | 302 | 344 | 344 | 287 | 284 | 285 | 285 |
| 25 | 276 | 305 | 296 | 295 | F | F 311 | F 348 | 348 | 360 | H 319 | 353 | 362 | 380 | 385 | 352 | 357 | 366 | 363 | 317 | 316 | 315 | 288 | 288 | F 265 |
| 26 | F | 315 | 308 | 305 | 283 | 345 | 329 | 360 | 351 | 360 | 334 | 375 | H 303 | 373 | 354 | 367 | 351 | 356 | 300 | 366 | 297 | 283 | 269 | 310 |
| 27 | 310 | F | 278 | 281 | 281 | 307 | 349 | 346 | 368 | 351 | 367 | 378 | 370 | 345 | 372 | 369 | 335 | 266 | 353 | 312 | 281 | 294 | 289 | 274 |
| 28 | 295 | 294 | 344 | 281 | 281 | 280 | 313 | 348 | 376 | 376 | 325 | 378 | 368 | H 312 | 347 | 354 | 350 | 315 | 325 | 335 | 309 | 280 | 293 | 303 |
| 29 | 278 | 290 | 303 | 302 | 311 | 356 | 325 | 347 | 375 | 354 | 367 | H 357 | 329 | 351 | 380 | H 328 | 344 | 360 | 365 | 335 | 322 | 295 | 294 | 306 |
| 30 | 299 | 298 | 299 | 330 | 308 | 323 | 323 | 354 | 353 | 362 | 372 | 313 | 364 | 363 | 376 | 370 | 357 | 328 | 306 | 344 | 301 | 300 | 298 | 327 |
| 31 | 326 | 325 | 305 | 296 | 324 | 324 | 323 | 327 | 385 | 377 | 338 | 372 | 349 | 366 | 370 | 357 | 355 | 332 | 351 | 351 | 303 | 296 | 296 | 300 |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 29 | 28 | 30 | 29 | 27 | 29 | 29 | 31 | 31 | 30 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 30 | 30 | 31 | 28 | 29 | 30 |
| MED | 298 | 302 | 300 | 302 | 311 | 324 | 337 | 354 | 368 | 367 | 366 | 368 | 362 | 358 | 362 | 363 | 358 | 349 | 336 | 328 | 320 | 302 | 296 | 295 |
| U Q | 316 | 316 | 309 | 322 | 327 | 348 | 354 | 367 | 379 | 375 | 371 | 378 | 371 | 371 | 371 | 370 | 367 | 360 | 349 | 344 | 342 | 324 | 304 | 306 |
| L Q | 280 | 290 | 287 | 291 | 294 | 313 | 316 | 346 | 359 | 355 | 343 | 360 | 347 | 348 | 350 | 354 | 350 | 323 | 308 | 321 | 301 | 286 | 286 | 283 |

# IONOSPHERIC DATA STATION Wakkanai

**DEC.2021** M(3000)F1 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

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

| 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 | | | | | | | | | | L | L 396 | L | L | L | | | | | | | | | | |
| 2 | | | | | | | | | | | 391 | L | L | L | | | | | | | | | | |
| 3 | | | | | | | | | L | | 433 | L | L 429 | | L | L | | | | | | | | |
| 4 | | | | | | | | | | L | L | L | L | L 375 | L | | | | | | | | | |
| 5 | | | | | | | | | | | L 375 | L 393 | L | L | 409 | | | | | | | | | |
| 6 | | | | | | | | | | 408 | L | U L 403 | L | L | L | | | | | | | | | |
| 7 | | | | | | | | | | L | L | 431 | L | L | 422 | | | | | | | | | |
| 8 | | | | | | | | | L | | L | L | | L | | | | | | | | | | |
| 9 | | | | | | | | | | | L | L | L 417 | L 403 | | | | | | | | | | |
| 10 | | | | | | | | | | L | | L | L | | L | | | | | | | | | |
| 11 | | | | | | | | | | | L | L | L | L | | | | | | | | | | |
| 12 | | | | | | | | | | | | L | H 370 | | L | | | | | | | | | |
| 13 | | | | | | | | | | | | L | L 430 | | 406 | | | | | | | | | |
| 14 | | | | | | | | | | 438 | L | L | | 413 | 413 | L | | | | | | | | |
| 15 | | | | | | | | | | | 424 | 416 | 412 | L | L | | | | | | | | | |
| 16 | | | | | | | | | L | L | L | L | L | L | | | | | | | | | | |
| 17 | | | | | | | | | 406 | | L | L | 426 | | | | | | | | | | | |
| 18 | | | | | | | | | 424 | 421 | 415 | L | L | L | 422 | | | | | | | | | |
| 19 | | | | | | | | 421 | | | L | L | L | L | 396 | | | | | | | | | |
| 20 | | | | | | | | | | | 409 | L | L | L | L | | | | | | | | | |
| 21 | | | | | | | | | | L | L | 400 | L | 415 | | | | | | | | | | |
| 22 | | | | | | | | | | 438 | | L | 424 | 420 | | | | | | | | | | |
| 23 | | | | | | | | 370 | | | | L | L | L | | | | | | | | | | |
| 24 | | | | | | | | L | L | L | | L | 401 | | 372 | | | | | | | | | |
| 25 | | | | | | | | | | L | | | 417 | | L | | | | | | | | | |
| 26 | | | | | | | | | | | | L | L | L | L | | | | | | | | | |
| 27 | | | | | | | | | L | | L | 417 | 448 | | L | L | | 317 | | | | | | |
| 28 | | | | | | | | | | L | L | L | 394 | 429 | 428 | L | | | | | | | | |
| 29 | | | | | | | | | 433 | 408 | L | L | L 373 | L 422 | L | 445 | | | | | | | | |
| 30 | | | | | | | | | | | L | L | 415 | L | | | | | | | | | | |
| 31 | | | | | | | | | | | U L 387 | 387 | L | 405 | | | | | | | | | | |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | | | | | | | | 2 | 3 | 5 | 8 | 7 | 12 | 9 | 8 | 1 | | 1 | | | | | | |
| MED | | | | | | | | 396 | 424 | 421 | 402 | 403 | 416 | 415 | 411 | 445 | | 317 | | | | | | |
| U Q | | | | | | | | | 433 | 438 | 420 | 417 | 425 | 426 | 422 | | | | | | | | | |
| L Q | | | | | | | | | 406 | 408 | L 389 | 393 | 398 | L 404 | 401 | | | | | | | | | |

**DEC.2021** M(3000)F1 (0.01)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Wakkanai

**DEC.2021** 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

| 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 | | | | | | | | | | 224 | 224 | 240 | 222 | 228 | | | | | | | | | | |
| 2 | | | | | | | | | | | 242 | 234 | 234 | 242 | | | | | | | | | | |
| 3 | | | | | | | | | 214 | | 214 | 236 | 238 | 242 | 240 | 236 | | | | | | | | |
| 4 | | | | | | | | | | 234 | 234 | 230 | 240 | 234 | 220 | | | | | | | | | |
| 5 | | | | | | | | | | | 240 | 232 | 226 | 240 | 250 | | | | | | | | | |
| 6 | | | | | | | | | | 234 | 238 | 216 | 230 | 230 | 232 | | | | | | | | | |
| 7 | | | | | | | | | | 224 | 222 | 232 | 234 | 222 | 238 | | | | | | | | | |
| 8 | | | | | | | | | 206 | | 222 | 222 | | 232 | | | | | | | | | | |
| 9 | | | | | | | | | | | 238 | 224 | 224 | 224 | | | | | | | | | | |
| 10 | | | | | | | | | | 238 | | 214 | 230 | | 212 | | | | | | | | | |
| 11 | | | | | | | | | | | 226 | 234 | 218 | 236 | | | | | | | | | | |
| 12 | | | | | | | | | | | | 220 | 322 | | 230 | | | | | | | | | |
| 13 | | | | | | | | | | | | 242 | 216 | | 204 | | | | | | | | | |
| 14 | | | | | | | | | | 202 | 226 | 226 | | 222 | 208 | 222 | | | | | | | | |
| 15 | | | | | | | | | | | 208 | 252 | 236 | 240 | 214 | | | | | | | | | |
| 16 | | | | | | | | | 212 | 190 | | 198 | 216 | 226 | | | | | | | | | | |
| 17 | | | | | | | | | 208 | | 216 | 216 | 218 | | | | | | | | | | | |
| 18 | | | | | | | | | 204 | 204 | 216 | 216 | 216 | 234 | 216 | | | | | | | | | |
| 19 | | | | | | | | 234 | | | 222 | 240 | 230 | 252 | 256 | | | | | | | | | |
| 20 | | | | | | | | | | | 232 | 238 | 250 | 250 | 240 | | | | | | | | | |
| 21 | | | | | | | | | | 234 | 230 | 228 | 222 | 222 | | | | | | | | | | |
| 22 | | | | | | | | | | 222 | | 212 | 248 | 262 | | | | | | | | | | |
| 23 | | | | | | | | 232 | | | | 222 | 226 | 252 | | | | | | | | | | |
| 24 | | | | | | | | 246 | 220 | 252 | | 234 | 220 | | 256 | | | | | | | | | |
| 25 | | | | | | | | | | 204 | | | 228 | | 256 | | | | | | | | | |
| 26 | | | | | | | | | | | | 224 | 216 | 212 | 232 | | | | | | | | | |
| 27 | | | | | | | | | 206 | | 224 | 228 | 226 | 240 | 226 | | | 226 | | | | | | |
| 28 | | | | | | | | | | 224 | 230 | 220 | 220 | 222 | 226 | 218 | | | | | | | | |
| 29 | | | | | | | | | 218 | 212 | 220 | 220 | 244 | 226 | 222 | 216 | | | | | | | | |
| 30 | | | | | | | | | | | 226 | 222 | 248 | 236 | | | | | | | | | | |
| 31 | | | | | | | | | | | 240 | 242 | 224 | 238 | | | | | | | | | | |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | | | | | | | | 3 | 8 | 14 | 22 | 30 | 29 | 25 | 19 | 4 | | 1 | | | | | | |
| MED | | | | | | | | 234 | 210 | 224 | 226 | 227 | 226 | 234 | 230 | 220 | | 226 | | | | | | |
| U Q | | | | | | | | 246 | 216 | 234 | 234 | 234 | 237 | 241 | 240 | 229 | | | | | | | | |
| L Q | | | | | | | | 232 | 206 | 204 | 222 | 220 | 220 | 225 | 216 | 217 | | | | | | | | |

**DEC.2021** h'F2 (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Wakkanai

**DEC.2021** h'F (KM) 135°E MEAN TIME (G.M.T. + 9 H)

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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 260 | 262 | 278 | 232 | 220 | 226 | 236 | 216 | 206 | 208 | 184 | 192 | 200 | 202 | 224 | 218 | 214 | 210 | 244 | 254 | 224 | 270 | 258 | 270 |
| 2 | 292 | 244 | 254 | 218 | 224 | 236 | 242 | 234 | 210 | 232 | 180 | 192 | 192 | 198 | 226 | 222 | 212 | 212 | 254 | 238 | 264 | 244 | 294 | 272 |
| 3 | Q 268 | 272 | Q 264 | 238 | 218 | 226 | 264 | 216 | 186 | 222 | 170 | 200 | 210 | 180 | 214 | 202 | 208 | 208 | E B 254 | 264 | 252 | 236 | 284 | 270 |
| 4 | 244 | 258 | 250 | 274 | 256 | 228 | 254 | 248 | 220 | 220 | 220 | 196 | 184 | 192 | 204 | 210 | 212 | 236 | 236 | 282 | 228 | 272 | 268 | 268 |
| 5 | 262 | 266 | 266 | 266 | 272 | 222 | 204 | 220 | 214 | 228 | 210 | 210 | 210 | 198 | 192 | 210 | 210 | 200 | 242 | 242 | 244 | 236 | Q 270 | Q 282 |
| 6 | Q 268 | 250 | 260 | 278 | 262 | Q 242 | Q 232 | 214 | 234 | 176 | 200 | 200 | 194 | 212 | 200 | 228 | 206 | 216 | 248 | 256 | Q 208 | Q 208 | Q 246 | Q 254 |
| 7 | Q 274 | Q 284 | Q 236 | Q 256 | Q 278 | Q 210 | 242 | 192 | 224 | 190 | 180 | 182 | 204 | 202 | 196 | 228 | 200 | E B 246 | 242 | 230 | Q 238 | Q 218 | Q 260 | Q 280 |
| 8 | Q 246 | Q 264 | Q 272 | 252 | 230 | 218 | E B 270 | 216 | 198 | 202 | 182 | 212 | 198 | 206 | 224 | 208 | 208 | 228 | 246 | 232 | 232 | 258 | 294 | 298 |
| 9 | 240 | 282 | 276 | 258 | 258 | 206 | 238 | 196 | 206 | 214 | 200 | 192 | 168 | 168 | 216 | 214 | 206 | 210 | 248 | 260 | 250 | 250 | 250 | 230 |
| 10 | 252 | 260 | 284 | 276 | 282 | 246 | 206 | 200 | 200 | 182 | 226 | 208 | 194 | 200 | 196 | 216 | 204 | 258 | 248 | 252 | 216 | 250 | 260 | 272 |
| 11 | 264 | 286 | 288 | 286 | 250 | 212 | 266 | 210 | 202 | 218 | 198 | 186 | 186 | 198 | 214 | 216 | 194 | 204 | 238 | 218 | 218 | 242 | 260 | 250 |
| 12 | 272 | 270 | 246 | 218 | 208 | 198 | 256 | 212 | 208 | 210 | 204 | 196 | 182 | 214 | 188 | 224 | 190 | 222 | 246 | 268 | 246 | 258 | 286 | 286 |
| 13 | 246 | 256 | 282 | 254 | 220 | 226 | 216 | 212 | 214 | 214 | 216 | 206 | 184 | 220 | 202 | 216 | 196 | 222 | 224 | 224 | 214 | 284 | 296 | 282 |
| 14 | 274 | 258 | 262 | 252 | 232 | 208 | 220 | 202 | 220 | 182 | 198 | 198 | 198 | 198 | 190 | 216 | 202 | 226 | 244 | 248 | 214 | 242 | Q 298 | Q 298 |
| 15 | 276 | Q 308 | Q 270 | 264 | 232 | 220 | 202 | 208 | 204 | 186 | 186 | 200 | 194 | 194 | 186 | 206 | 206 | 206 | 246 | 298 | 230 | 230 | 268 | 268 |
| 16 | 234 | 252 | 286 | 286 | 292 | 258 | 208 | 198 | 184 | 160 | 224 | 200 | 184 | 184 | 216 | 204 | 202 | 232 | 230 | 230 | 240 | 258 | 284 | 306 |
| 17 | 274 | 260 | 262 | 224 | 248 | 252 | 212 | 198 | 178 | 198 | 198 | 194 | 176 | 218 | 228 | 210 | 190 | 226 | 202 | 256 | 230 | 252 | 282 | 296 |
| 18 | 272 | 284 | 284 | 254 | 222 | 232 | 202 | 208 | 168 | 182 | 170 | 200 | 180 | 194 | 182 | 210 | 204 | 260 | A | 208 | 228 | 240 | 240 | Q 288 |
| 19 | 288 | 292 | 272 | 272 | 236 | 214 | 214 | 184 | 200 | 204 | 184 | 216 | 216 | 202 | 202 | 210 | 200 | 204 | 290 | 244 | 244 | 226 | 278 | 286 |
| 20 | 286 | 298 | 256 | 268 | Q 316 | 246 | 274 | 216 | 224 | 210 | 196 | 192 | 192 | 192 | 214 | 220 | 216 | 216 | 218 | 246 | Q 234 | Q 274 | 258 | 254 |
| 21 | Q 270 | 270 | 270 | 264 | Q 288 | 208 | 240 | 220 | 208 | 198 | 202 | 190 | 190 | 174 | 212 | 224 | 206 | 234 | 234 | 226 | 232 | 228 | 260 | 248 |
| 22 | 290 | 272 | 260 | 260 | 248 | 222 | 258 | 212 | 206 | 192 | 220 | 204 | 174 | 174 | 234 | 210 | 208 | 248 | 240 | 210 | 248 | 266 | Q 276 | Q 312 |
| 23 | 294 | 294 | 294 | 282 | 240 | 258 | 236 | 198 | 212 | 216 | 238 | 172 | 186 | 192 | 230 | 212 | 220 | 220 | 214 | 228 | 242 | Q 314 | Q 284 | 256 |
| 24 | 264 | Q 252 | Q 254 | Q 256 | Q 250 | 212 | 210 | 198 | 186 | 218 | 228 | 204 | 186 | 236 | 196 | 234 | 204 | 272 | 240 | 238 | 284 | 284 | 288 | 264 |
| 25 | 300 | 274 | 292 | 276 | 280 | 230 | 206 | 208 | 208 | 184 | 218 | 234 | 186 | 202 | 218 | 206 | 206 | 212 | 218 | 218 | 238 | 278 | 266 | Q 292 |
| 26 | Q 274 | 238 | 254 | 254 | 254 | 208 | 240 | 208 | 208 | 236 | 232 | 198 | 186 | 200 | 200 | 214 | 210 | 220 | 244 | 214 | 240 | 270 | E B 298 | 244 |
| 27 | 250 | Q 240 | Q 262 | Q 266 | Q 258 | 250 | 220 | 224 | 210 | 218 | 214 | 186 | 186 | 204 | 202 | 214 | 244 | 240 | 232 | 236 | 302 | 278 | 302 | E B 296 |
| 28 | 284 | 280 | 228 | E B 266 | 292 | 270 | 258 | 240 | 214 | 192 | 192 | 192 | 192 | 182 | 182 | 182 | 208 | 222 | 230 | 230 | 236 | 278 | 294 | 258 |
| 29 | 316 | 292 | 292 | 272 | 248 | 222 | 254 | 228 | 182 | 182 | 198 | 208 | 190 | 186 | 206 | 186 | 212 | 212 | 226 | 242 | 266 | 286 | 300 | 280 |
| 30 | 306 | 302 | 314 | 242 | 284 | 252 | 258 | 228 | 216 | 224 | 202 | 192 | 200 | 198 | 226 | 214 | 214 | 234 | 272 | 224 | 282 | 316 | 226 | 244 |
| 31 | 254 | 244 | 262 | 282 | 252 | 248 | 232 | 210 | 196 | 232 | 242 | 194 | 200 | 198 | 210 | 220 | 202 | 244 | 226 | 228 | 290 | 306 | 278 | 248 |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 30 | 31 | 31 | 31 | 31 | 31 |
| MED | 272 | 270 | 266 | 262 | 250 | 226 | 236 | 212 | 208 | 208 | 200 | 198 | 190 | 198 | 206 | 214 | 206 | 222 | 240 | 238 | 238 | 258 | 277 | 271 |
| U Q | 286 | 284 | 284 | 274 | 278 | 246 | 256 | 220 | 214 | 218 | 220 | 204 | 198 | 202 | 218 | 220 | 212 | 236 | 246 | 254 | 250 | 278 | 294 | 288 |
| L Q | 254 | 256 | 256 | 252 | 232 | 212 | 212 | 200 | 198 | 186 | 186 | 192 | 184 | 192 | 196 | 210 | 202 | 212 | 230 | 226 | 228 | 240 | 260 | 254 |

**DEC.2021** h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Wakkanai

**DEC.2021** h'E (KM) 135°E MEAN TIME (G.M.T. + 9 H)

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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | B | B | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 98 | 98 | A | | | | | | |
| 2 | | | | | | | B | A | 100 | 110 | 110 | 110 | 110 | 112 | 112 | 104 | B | B | | | | | | |
| 3 | | | | | | | B | E B 126 | 116 | A | A | 104 | A | 104 | A | 104 | A | A | | | | | | |
| 4 | | | | | | | B | 122 | A | 102 | 114 | 114 | 114 | 110 | 100 | 100 | A | A | | | | | | |
| 5 | | | | | | | B | B | 120 | 112 | 112 | 108 | 108 | 108 | 102 | 100 | A | A | | | | | | |
| 6 | | | | | | | B | B | 106 | 106 | 106 | 114 | 108 | 108 | 108 | 112 | A | A | | | | | | |
| 7 | | | | | | | B | B | 116 | 116 | 116 | 108 | 112 | 96 | 112 | 112 | A | A | | | | | | |
| 8 | | | | | | | B | B | 112 | 112 | 100 | 100 | 108 | 108 | 104 | 116 | 94 | B | | | | | | |
| 9 | | | | | | | B | B | 116 | 108 | 112 | 104 | 104 | 104 | 104 | 104 | B | A | | | | | | |
| 10 | | | | | | | B | A | 104 | 104 | 104 | 104 | 104 | 106 | 94 | 102 | A | B | | | | | | |
| 11 | | | | | | | A | B | 88 | 104 | 104 | 104 | 112 | 112 | 112 | 106 | B | 88 | | | | | | |
| 12 | | | | | | | B | 110 | 118 | 102 | 110 | 98 | 98 | 102 | 106 | 104 | B | 94 | | | | | | |
| 13 | | | | | | | A | B | 102 | 102 | 110 | 100 | 110 | 98 | 106 | 92 | A | B | | | | | | |
| 14 | | | | | | | 92 | A | 114 | 114 | 114 | 112 | 112 | 112 | 108 | 108 | A | A | | | | | | |
| 15 | | | | | | | B | 88 | 116 | 112 | 114 | 114 | 114 | 110 | 98 | 102 | A | 88 | | | | | | |
| 16 | | | | | | | B | A | 110 | 110 | 102 | 102 | 104 | 104 | 98 | 106 | A | A | | | | | | |
| 17 | | | | | | | B | B | 106 | 102 | 102 | 92 | 92 | 100 | 110 | 110 | B | A | | | | | | |
| 18 | | | | | | | B | B | 110 | 110 | 104 | 100 | 100 | 100 | 118 | 100 | 94 | A | | | | | | |
| 19 | | | | | | | B | 98 | 116 | 104 | 106 | 106 | 106 | 106 | 98 | 134 | B | B | | | | | | |
| 20 | | | | | | | B | B | 122 | A | 108 | 106 | 106 | 108 | 106 | 108 | B | B | | | | | | |
| 21 | | | | | | | B | 134 | 112 | 106 | 110 | 110 | 114 | 114 | 114 | 114 | B | B | | | | | | |
| 22 | | | | | | | B | B | 118 | 106 | 106 | 106 | 106 | 114 | 114 | A | B | B | | | | | | |
| 23 | | | | | | | B | A | 114 | 108 | 114 | 114 | 110 | 104 | 110 | A | B | B | | | | | | |
| 24 | | | | | | | B | A | 110 | 110 | 100 | 104 | 104 | 116 | 116 | A | B | B | | | | | | |
| 25 | | | | | | | B | B | 116 | 116 | 116 | 100 | A | 106 | 116 | 116 | B | B | | | | | | |
| 26 | | | | | | | B | A | 120 | 120 | 120 | 90 | 114 | 108 | 108 | 104 | B | B | | | | | | |
| 27 | | | | | | | B | B | 116 | 116 | 116 | 100 | 108 | 102 | 96 | A | A | A | | | | | | |
| 28 | | | | | | | B | A | 116 | 116 | 108 | 108 | 110 | 112 | 100 | 112 | B | B | | | | | | |
| 29 | | | | | | | B | A | 108 | 108 | 108 | 108 | 112 | 112 | 114 | 110 | A | A | | | | | | |
| 30 | | | | | | | B | A | 102 | 110 | 104 | 104 | 98 | 104 | 100 | 106 | A | B | | | | | | |
| 31 | | | | | | | | B | 112 | 112 | 112 | 112 | 102 | A | A | 102 | A | A | | | | | | |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | | | | | | | 1 | 6 | 30 | 29 | 30 | 31 | 29 | 30 | 29 | 27 | 3 | 3 | | | | | | |
| MED | | | | | | | 92 | 110 | 113 | 110 | 110 | 106 | 108 | 108 | 108 | 106 | 94 | 88 | | | | | | |
| U Q | | | | | | | | 126 | 116 | 112 | 114 | 110 | 112 | 112 | 112 | 112 | 98 | 94 | | | | | | |
| L Q | | | | | | | | 98 | 108 | 105 | 104 | 100 | 104 | 104 | 100 | 102 | 94 | 88 | | | | | | |

**DEC.2021** h'E (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Wakkanai

**DEC.2021** h'Es (KM) 135°E MEAN TIME (G.M.T. + 9 H)

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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | B | B | B | B | 92 | 92 | 98 | B | 106 | 106 | 122 | 168 | 172 | 126 | 148 | 94 | 98 | 90 | 90 | B | 90 | B | B | B |
| 2 | 88 | 92 | B | 92 | 92 | 98 | 112 | 106 | 92 | 102 | 112 | 108 | 114 | 128 | 124 | 138 | B | B | 94 | 94 | 90 | B | 100 | 100 |
| 3 | 100 | 100 | B | 96 | 92 | 96 | 96 | 96 | 102 | 102 | 102 | 102 | 92 | 122 | 90 | 98 | 94 | 94 | 94 | 102 | 94 | B | 94 | 94 |
| 4 | 98 | 98 | 98 | 88 | 100 | 100 | B | 144 | 108 | 104 | 104 | 104 | 104 | 104 | 94 | 94 | 94 | 94 | 94 | 94 | 102 | B | 102 | 102 |
| 5 | 102 | 94 | 100 | 94 | 92 | B | 92 | B | 110 | 134 | 156 | 136 | 136 | 128 | 114 | 96 | 96 | 96 | 96 | 94 | 96 | 96 | 98 | 98 |
| 6 | 98 | 92 | 92 | 92 | 92 | 92 | B | B | 120 | 100 | 122 | 108 | 114 | 164 | 156 | 136 | 86 | 86 | 86 | B | B | B | B | B |
| 7 | B | B | B | B | 94 | B | B | B | 104 | 108 | 122 | 108 | 176 | 94 | 138 | 96 | 90 | 94 | 94 | 90 | B | B | B | 108 |
| 8 | 94 | 90 | 90 | 84 | 92 | 92 | B | B | 116 | 112 | 112 | 142 | 138 | 138 | 124 | 160 | 94 | 88 | 138 | B | B | 94 | B | B |
| 9 | 96 | 104 | 94 | B | B | B | B | B | 106 | 106 | 160 | 86 | 118 | 118 | 102 | 116 | B | 82 | 86 | B | B | 94 | 94 | 88 |
| 10 | 90 | 90 | B | 98 | 92 | 92 | B | 96 | 146 | 92 | 152 | 138 | 100 | G | G | 124 | 86 | B | 90 | 94 | 94 | 88 | B | 88 |
| 11 | 104 | 90 | 92 | 98 | 90 | B | 90 | B | 150 | 122 | 164 | 134 | 178 | 110 | 94 | 114 | B | 94 | 90 | 106 | 106 | 96 | B | 96 |
| 12 | 100 | 106 | 90 | B | 90 | 90 | 94 | 100 | 146 | 138 | 130 | 118 | 120 | 148 | G | 140 | B | 98 | 92 | 92 | 92 | 92 | 92 | 88 |
| 13 | B | 88 | 104 | 88 | 88 | B | B | 98 | 140 | 140 | 140 | 130 | 102 | 168 | 146 | 132 | 92 | B | 92 | 92 | 92 | 92 | 98 | 100 |
| 14 | 100 | 100 | 100 | 96 | 96 | 96 | 96 | 96 | 110 | 104 | 104 | 102 | 126 | 126 | 126 | 150 | 94 | 106 | 90 | 92 | B | 90 | 90 | 90 |
| 15 | 96 | 98 | 98 | 94 | 94 | 86 | 92 | 86 | 146 | 118 | 110 | 106 | 114 | 100 | 100 | 116 | 94 | 90 | 116 | 114 | 100 | 100 | 100 | 116 |
| 16 | B | B | B | 108 | 98 | B | 110 | 92 | 112 | 112 | 164 | 124 | 132 | 108 | 92 | 98 | 114 | 98 | 116 | 110 | 108 | 104 | 104 | 98 |
| 17 | 100 | 96 | 96 | 96 | B | 94 | 94 | B | 106 | 118 | 134 | 108 | 132 | 170 | 178 | 116 | B | 104 | 104 | 114 | 104 | 94 | 104 | 102 |
| 18 | 96 | 96 | 96 | B | B | B | B | B | 100 | 150 | 108 | G | 98 | 122 | 126 | 102 | 102 | 102 | 102 | 104 | 104 | 104 | 96 | 96 |
| 19 | 100 | 100 | 98 | 98 | 104 | B | B | 96 | 138 | 122 | 122 | 156 | 156 | 94 | 94 | G | B | 98 | 98 | 98 | 98 | 108 | 96 | 96 |
| 20 | 98 | B | 92 | B | B | B | B | B | 124 | 114 | 114 | 134 | 128 | 116 | 116 | G | 88 | B | B | 102 | B | 98 | 98 | 98 |
| 21 | 98 | 94 | 98 | 96 | B | B | B | 138 | 92 | G | G | G | G | G | 108 | G | B | B | B | B | B | B | 82 | 90 |
| 22 | B | 96 | B | B | B | B | B | B | 104 | G | G | 96 | G | 142 | 106 | 106 | 90 | 94 | 94 | B | 94 | 94 | 94 | 94 |
| 23 | 94 | 100 | 92 | B | B | B | B | 110 | 110 | 108 | 164 | 164 | G | G | G | 110 | B | B | 92 | 92 | B | 90 | 98 | 98 |
| 24 | B | B | B | B | B | B | B | 110 | 106 | 132 | 92 | 154 | 120 | 160 | 112 | 112 | B | B | B | B | 104 | 98 | 92 | 98 |
| 25 | 98 | 96 | 96 | 90 | B | B | B | B | G | G | G | 160 | 108 | 156 | G | G | B | B | B | B | B | B | B | 90 |
| 26 | B | B | B | B | B | B | B | 118 | 118 | 132 | 122 | 86 | 142 | G | 190 | G | B | B | B | 94 | 88 | 96 | 88 | 96 |
| 27 | B | 114 | B | B | 100 | 90 | B | B | 148 | 148 | 166 | 96 | 104 | 102 | 96 | 92 | 90 | 90 | 88 | 88 | 92 | B | B | B |
| 28 | 92 | 96 | 92 | 96 | 96 | B | 98 | 112 | 100 | 100 | 120 | G | G | G | 90 | G | B | B | B | 90 | B | B | B | B |
| 29 | B | 90 | 90 | 96 | 92 | 92 | B | 92 | 96 | 150 | 134 | 114 | 108 | 102 | G | G | 90 | 84 | 94 | B | B | B | B | B |
| 30 | 114 | 114 | 100 | 104 | 98 | 98 | B | 94 | 126 | 98 | 110 | 102 | 102 | G | 172 | 96 | 92 | 90 | 90 | 90 | B | 100 | 98 | 98 |
| 31 | 92 | B | 92 | 96 | 92 | 92 | 92 | 92 | 106 | 170 | 106 | 102 | 108 | 94 | 88 | 160 | 90 | 84 | B | B | B | B | B | 106 |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 22 | 24 | 21 | 20 | 21 | 15 | 12 | 18 | 30 | 28 | 28 | 28 | 27 | 25 | 26 | 24 | 19 | 21 | 24 | 21 | 18 | 19 | 20 | 25 |
| MED | 98 | 96 | 96 | 96 | 92 | 92 | 95 | 97 | 110 | 113 | 122 | 111 | 118 | 122 | 113 | 113 | 92 | 94 | 94 | 94 | 95 | 96 | 97 | 98 |
| U Q | 100 | 100 | 98 | 97 | 97 | 96 | 98 | 110 | 126 | 133 | 146 | 137 | 136 | 145 | 138 | 134 | 94 | 98 | 97 | 103 | 104 | 100 | 99 | 100 |
| L Q | 94 | 92 | 92 | 92 | 92 | 92 | 92 | 94 | 104 | 104 | 110 | 102 | 104 | 103 | 94 | 97 | 90 | 89 | 90 | 92 | 92 | 92 | 93 | 92 |

**DEC.2021** h'Es (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Wakkanai

**DEC.2021** 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 | | | | | FF 11 | F 1 | L 1 | | LC 21 | LCQ 22 | CL 21 | CL 21 | C 2 | C 2 | C 1 | LC 11 | L 1 | L 1 | F 2 | | F 2 | | | |
| 2 | F 1 | F 1 | | F 1 | F 1 | F 1 | L 1 | L 2 | LH 11 | LH 11 | C 2 | LC 11 | C 1 | C 2 | C 2 | H 1 | | | F 1 | F 1 | F 1 | | F 1 | F 1 |
| 3 | F 1 | F 1 | | F 1 | F 2 | F 1 | L 1 | LH 11 | LC 21 | L 2 | L 2 | L 2 | L 3 | C 1 | L 2 | LC 11 | L 5 | L 4 | F 1 | F 1 | F 1 | | F 1 | F 1 |
| 4 | F 1 | F 1 | F 1 | F 1 | F 1 | F 1 | | H 1 | C 1 | C 2 | C 1 | C 1 | C 1 | C 1 | LC 11 | C 2 | L 3 | L 2 | F 3 | F 1 | F 2 | | F 4 | F 2 |
| 5 | FQ 21 | FQ 21 | FQ 31 | F 2 | F 1 | | L 1 | | LH 21 | HL 21 | HL 11 | HL 11 | HL 21 | C 2 | C 2 | LC 11 | L 1 | L 1 | F 1 | F 2 | FQ 21 | F 1 | F 1 | F 1 |
| 6 | F 1 | FQ 31 | F 1 | F 2 | FQ 11 | F 2 | | | CL 31 | CL 21 | CL 21 | LC 22 | C 2 | HC 11 | HC 11 | HL 21 | L 2 | L 1 | F 1 | | | | | |
| 7 | | | | | F 1 | | | | L 3 | L 2 | CL 32 | C 2 | H 2 | LC 11 | CL 21 | LC 21 | L 1 | L 1 | F 1 | F 1 | | | | F 1 |
| 8 | F 1 | F 1 | F 1 | F 1 | F 1 | F 1 | | | L 3 | C 2 | C 2 | H 2 | H 2 | H 2 | C 2 | H 2 | L 1 | L 1 | L 1 | | | F 1 | | |
| 9 | F 1 | F 2 | F 1 | | | | | | LC 11 | LC 11 | HL 21 | LC 11 | C 2 | C 1 | LC 11 | C 1 | | L 1 | F 1 | | | F 1 | F 1 | F 1 |
| 10 | F 1 | F 1 | | F 1 | F 1 | F 1 | | L 1 | H 1 | LC 11 | H 2 | H 2 | LC 11 | | | CL 21 | L 1 | | F 2 | F 1 | F 1 | F 1 | | F 2 |
| 11 | F 1 | F 1 | F 1 | F 1 | F 1 | | L 1 | | H 1 | C 2 | H 1 | H 2 | H 1 | C 1 | LC 11 | C 1 | | L 1 | F 1 | FF 31 | F 1 | F 1 | | F 1 |
| 12 | F 1 | F 1 | F 1 | | F 1 | F 2 | L 1 | LC 11 | HL 22 | H 2 | C 2 | C 2 | C 2 | HL 22 | | HL 21 | | L 1 | F 2 | F 1 | F 1 | F 1 | F 1 | F 1 |
| 13 | | F 4 | F 2 | F 1 | F 1 | | | L 1 | H 1 | H 1 | H 1 | H 1 | C 1 | H 1 | H 1 | H 1 | C 3 | | F 4 | F 1 | F 1 | F 1 | F 2 | FQ 11 |
| 14 | F 1 | F 1 | F 1 | F 1 | F 1 | F 1 | L 1 | L 1 | LC 21 | LC 11 | LC 22 | LC 21 | CL 21 | C 2 | C 2 | H 2 | L 2 | L 1 | F 2 | F 2 | | F 1 | F 1 | F 1 |
| 15 | F 2 | F 2 | F 1 | F 1 | F 1 | F 1 | L 1 | L 2 | HL 22 | C 2 | LC 22 | C 2 | CL 21 | LC 21 | L 3 | C 2 | L 3 | LC 21 | F 1 | F 2 | F 2 | F 2 | FF 21 | F 2 |
| 16 | | | | F 1 | F 1 | | L 1 | L 1 | L 1 | C 2 | HL 21 | HL 21 | HL 21 | L 2 | C 2 | LC 21 | L 3 | L 1 | F 1 | F 3 | F 1 | F 2 | FQ 11 | F 4 |
| 17 | F 2 | F 1 | F 2 | F 1 | | F 1 | F 1 | | C 2 | CH 11 | HL 21 | C 2 | HL 21 | HL 21 | HL 21 | C 3 | | L 1 | F 4 | FQ 11 | F 2 | F 4 | F 1 | F 2 |
| 18 | F 1 | F 3 | F 1 | | | | | | LH 21 | HL 21 | C 2 | | LC 21 | CL 22 | CL 22 | CL 22 | C 4 | LQ 31 | FQ 31 | FQ 31 | FQ 31 | F 2 | F 1 | F 2 |
| 19 | FQ 31 | FQ 31 | FQ 11 | F 1 | FQ 11 | | | L 1 | L 1 | C 1 | C 1 | HL 11 | HL 21 | C 2 | LC 11 | | | L 1 | F 1 | F 2 | F 3 | FQ 21 | FQ 21 | F 1 |
| 20 | F 1 | | F 1 | | | | | | C 2 | L 3 | CL 21 | H 2 | C 2 | CL 21 | C 1 | | L 1 | | | L 1 | | F 1 | FF 11 | FQ 21 |
| 21 | FQ 21 | F 3 | F 3 | F 1 | | | | CL 11 | LC 11 | | | | | | LC 11 | | | | | | | | FC 11 | F 1 |
| 22 | | F 1 | | | | | | | LC 11 | | | LC 11 | | H 1 | LC 11 | L 1 | L 1 | L 1 | F 1 | | F 1 | F 1 | F 2 | F 2 |
| 23 | FQ 31 | F 1 | F 1 | | | | | L 1 | L 1 | C 1 | H 1 | H 1 | | | | L 1 | | | F 1 | F 1 | | F 1 | F 1 | F 1 |
| 24 | | | | | | | | F 1 | LC 21 | CL 21 | LC 11 | H 1 | C 1 | H 1 | C 1 | C 1 | | | | | F 1 | F 1 | F 1 | F 1 |
| 25 | F 1 | F 2 | F 1 | F 2 | | | | | | | | H 1 | L 1 | H 1 | | | | | | | | | | F 1 |
| 26 | | | | | | | | L 1 | C 1 | CL 11 | C 1 | LC 11 | HL 21 | | H 1 | | | | | F 1 | F 1 | F 1 | F 1 | F 1 |
| 27 | | F 1 | | | F 1 | F 1 | | | H 1 | HL 11 | HL 11 | L 2 | LH 11 | LH 11 | LC 11 | L 1 | L 4 | L 3 | F 3 | F 2 | F 1 | | | |
| 28 | F 1 | F 1 | F 1 | F 1 | F 1 | | L 1 | LC 11 | LC 21 | LC 11 | C 1 | | | | LC 11 | | | | | F 1 | | | | |
| 29 | | F 1 | F 3 | F 4 | F 3 | F 2 | | L 1 | LH 11 | HL 11 | HL 11 | C 1 | LC 11 | LC 11 | | | L 1 | L 1 | F 1 | | | | | |
| 30 | F 1 | F 2 | F 3 | F 2 | F 4 | F 2 | | F 4 | C 1 | LC 11 | C 1 | C 2 | LC 11 | | H 1 | LH 21 | L 2 | L 1 | F 1 | F 1 | | F 1 | F 8 | F 2 |
| 31 | F 2 | | F 1 | F 1 | F 4 | F 2 | F 1 | C 1 | C 2 | H 1 | LC 11 | LC 22 | CL 21 | C 5 | L 2 | HL 21 | L 1 | L 1 | | | | | | F 1 |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | | | | | | | | | | | | | | | | | | | | | | | | |
| MED | | | | | | | | | | | | | | | | | | | | | | | | |
| U Q | | | | | | | | | | | | | | | | | | | | | | | | |
| L Q | | | | | | | | | | | | | | | | | | | | | | | | |

**DEC.2021** TYPES OF Es

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Kokubunji

**DEC.2021** fxI (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 | 44 | 47 | 51 | 51 | 48 | X 36 | | | | | | | | | | | | | X 42 | X 38 | X 42 | X 42 | X 37 | X 38 |
| 2 | X 39 | X 40 | X 47 | X 40 | X 33 | X 29 | | | | | | | | | | | | | X 38 | X 40 | X 44 | X 36 | X 37 | X 37 |
| 3 | X 37 | X 38 | X 39 | X 39 | X 39 | X 24 | | | | | | | | | | | | | X 30 | X 32 | X 34 | X 36 | X 36 | X 36 |
| 4 | X 36 | X 35 | X 36 | X 35 | X 34 | X 34 | | | | | | | | | | | | | X 39 | X 41 | X 36 | X 37 | X 29 | X 32 |
| 5 | X 34 | X 35 | X 36 | X 38 | X 47 | X 29 | | | | | | | | | | X 73 | | | X 36 | X 32 | X 32 | X 34 | X 34 | X 34 |
| 6 | X 35 | X 35 | X 36 | X 36 | X 38 | X 30 | | | | | | | | | | | | | X 37 | X 32 | | X 30 | X 31 | X 32 |
| 7 | X 33 | X 34 | X 34 | X 35 | X 36 | X 33 | | | | | | | | | | | | X 44 | X 29 | X 35 | X 42 | X 30 | X 32 | X 32 |
| 8 | X 33 | X 34 | X 34 | X 35 | X 35 | X 28 | | | | | | | | | | | | X 39 | X 33 | X 32 | X 35 | X 34 | X 32 | X 33 |
| 9 | X 35 | X 37 | X 37 | X 37 | X 40 | X 33 | X 30 | | | | | | | | | | | X 38 | X 31 | X 37 | X 35 | X 34 | X 34 | X 35 |
| 10 | X 36 | X 37 | X 36 | X 35 | X 36 | X 33 | | | | | | | | | | | | X 45 | X 30 | X 30 | X 37 | X 33 | 36 | 36 |
| 11 | 37 | X 36 | X 33 | X 34 | 40 | X 31 | | | | | | | | | | | | | X 38 | X 32 | X 32 | X 31 | X 33 | X 34 |
| 12 | X 37 | X 36 | X 37 | X 38 | X 36 | X 29 | | | | | | | | | | | | | X 35 | X 32 | X 34 | X 36 | X 35 | 35 |
| 13 | X 35 | X 35 | X 36 | X 36 | X 36 | X 38 | | | | | | | | | | | | X 38 | X 35 | X 38 | X 34 | X 28 | X 32 | X 32 |
| 14 | X 36 | X 36 | X 36 | X 36 | X 40 | X 34 | | | | | | | | | | | | | X 32 | X 29 | X 34 | X 36 | X 32 | X 32 |
| 15 | 38 | X 35 | X 35 | X 33 | X 35 | X 29 | | | | | | | | | | | | | X 37 | X 38 | X 40 | 46 | 40 | X 37 |
| 16 | X 37 | X 37 | X 37 | X 38 | X 38 | X 38 | | | | | | | | | | | | | X 37 | X 38 | X 39 | X 38 | X 32 | X 38 |
| 17 | X 38 | X 40 | X 42 | X 38 | X 38 | X 37 | | | | | | | | | | | | | X 42 | X 40 | X 34 | X 34 | X 32 | A |
| 18 | X 34 | X 35 | X 36 | X 37 | X 37 | X 37 | | | | | | | | | | | | | X 38 | X 36 | X 36 | X 36 | X 36 | X 34 |
| 19 | X 38 | X 38 | X 36 | X 38 | X 46 | X 31 | | | | | | | | | | | | | X 37 | X 40 | X 46 | X 38 | X 32 | X 32 |
| 20 | X 35 | X 36 | X 36 | X 34 | X 33 | X 33 | | | | | | | | | | | | | X 50 | X 38 | X 44 | X 47 | X 48 | X 48 |
| 21 | X 50 | X 51 | X 52 | 59 | 60 | X 58 | | | | | | | | | | | | | X 42 | X 45 | X 43 | X 37 | X 37 | X 37 |
| 22 | X 39 | X 43 | X 47 | X 43 | X 46 | X 40 | | | | | | | | | | | | | X 44 | X 34 | X 35 | X 37 | X 38 | X 39 |
| 23 | X 38 | X 42 | X 44 | X 42 | X 45 | X 44 | | | | | | | | | | | | | X 41 | X 36 | X 34 | 38 | X 37 | X 37 |
| 24 | X 40 | X 40 | X 42 | X 41 | X 38 | X 40 | | | | | | | | | | | | | X 39 | X 39 | X 43 | X 38 | X 39 | 47 |
| 25 | X 43 | 59 | 59 | 54 | X 48 | X 45 | | X 58 | | | | | | | | | | | X 38 | X 38 | X 40 | X 37 | X 38 | X 38 |
| 26 | X 38 | X 42 | X 44 | 45 | X 38 | 52 | 46 | | | | | | | | | | | | X 47 | X 38 | X 41 | X 30 | X 34 | X 36 |
| 27 | X 41 | X 38 | X 40 | X 42 | 46 | 48 | | | | | | | | | | | | | X 44 | X 39 | X 41 | X 41 | X 38 | X 40 |
| 28 | X 45 | X 43 | X 31 | X 28 | X 28 | X 30 | X 34 | | | | | | | | | | | X 52 | X 49 | X 48 | X 41 | X 31 | X 33 | X 36 |
| 29 | X 36 | X 37 | X 38 | X 39 | X 38 | X 37 | | | | | | | | | | | | | X 44 | X 40 | X 36 | X 34 | X 34 | X 35 |
| 30 | X 36 | X 38 | X 38 | X 38 | X 37 | X 36 | | | | | | | | | | | | | X 42 | X 38 | X 37 | X 34 | X 36 | X 39 |
| 31 | X 39 | X 34 | X 38 | X 38 | X 32 | X 32 | | | | | | | | | | | | | X 38 | X 40 | X 31 | X 32 | X 32 | X 35 |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 31 | 31 | 31 | 31 | 31 | 31 | 3 | 1 | | | | | | | | 1 | | 6 | 31 | 31 | 30 | 31 | 31 | 30 |
| MED | X 37 | X 37 | X 37 | X 38 | X 38 | X 34 | X 34 | X 58 | | | | | | | | X 73 | | X 42 | X 38 | X 38 | X 36 | X 36 | X 34 | X 36 |
| U Q | X 39 | X 40 | X 42 | 41 | X 45 | X 38 | 46 | | | | | | | | | | | X 45 | X 42 | X 40 | X 41 | X 38 | X 37 | X 38 |
| L Q | X 35 | X 35 | X 36 | X 35 | X 36 | X 30 | X 30 | | | | | | | | | | | X 38 | X 35 | X 32 | X 34 | X 33 | X 32 | X 34 |

**DEC.2021** fxI (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Kokubunji

**DEC.2021** foF2 (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | F | F | F | F | F | 30 | 29 | 58 | A | 59 | 91 | 86 | 86 | 68 | 64 | 71 | 73 | 45 | 36 | 32 | 36 | 36 | 31 | 32 |
| 2 | 33 | 34 | 41 | 34 | 27 | 23 | 27 | 58 | 74 | 74 | 97 | 77 | 70 | 72 | 70 | 66 | 62 | 39 | 32 | 34 | 38 | 30 | 31 | 31 |
| 3 | 31 | 32 | 33 | 33 | 33 | 18 | 23 | 54 | 60 | 65 | 67 | 76 | 72 | 81 | 72 | 70 | 59 | 33 | 24 | 26 | 28 | 30 | 30 | 30 |
| 4 | 30 | 29 | 30 | 29 | 28 | 28 | 29 | 50 | 60 | 72 | 84 | 93 | 74 | 72 | 68 | 64 | 50 | 33 | 33 | 35 | 30 | 31 | 23 | 26 |
| 5 | 28 | 29 | 30 | 32 | 41 | 23 | 25 | 51 | 56 | 61 | 74 | 84 | 76 | 66 | 66 | 67 | 55 | 34 | 30 | 26 | 26 | 28 | 28 | 28 |
| 6 | 29 | 29 | 30 | 30 | 32 | 24 | 28 | 47 | 52 | 67 | 68 | 83 | 62 | 62 | 62 | 58 | 50 | 41 | 31 | 26 | A | 24 | 25 | 26 |
| 7 | 27 | 28 | 28 | 29 | 30 | 27 | 28 | 50 | 53 | 60 | 73 | 77 | 76 | 60 | 64 | 59 | 50 | 38 | 23 | 29 | 36 | 24 | 26 | 26 |
| 8 | 27 | 28 | 28 | 29 | 29 | 22 | 23 | 46 | 60 | 58 | 61 | 64 | 64 | 70 | 67 | 54 | 54 | 33 | 27 | 26 | 29 | 28 | 26 | 27 |
| 9 | 29 | 31 | 31 | 31 | 34 | 27 | 24 | 42 | 51 | 51 | 56 | 74 | 58 | 57 | 59 | 55 | 49 | 32 | 25 | 31 | 29 | 28 | 28 | 29 |
| 10 | 30 | 31 | 30 | 29 | 30 | 27 | 25 | 52 | 50 | 48 | 60 | 73 | 68 | 60 | 58 | 50 | 54 | 39 | 24 | 24 | 31 | 27 | F | F |
| 11 | F | 30 | 27 | 28 | F | 25 | 21 | 42 | 50 | 56 | 58 | 60 | 63 | 62 | 64 | 61 | 56 | 36 | 32 | 26 | 26 | 25 | 27 | 28 |
| 12 | 30 | 30 | 31 | 32 | 30 | 23 | 23 | 46 | 56 | 56 | 68 | 68 | 64 | 58 | 60 | 64 | 51 | 39 | 29 | 26 | 28 | 30 | 29 | F |
| 13 | 29 | 29 | 30 | 30 | 30 | 32 | 25 | 50 | 54 | 52 | 60 | 80 | 66 | 60 | 52 | 59 | 52 | 32 | 29 | 32 | 28 | 22 | 26 | 26 |
| 14 | 30 | 30 | 30 | 30 | 34 | 28 | 25 | 43 | 56 | 56 | 59 | 58 | 66 | 59 | 54 | 63 | 56 | 34 | 26 | 23 | 28 | 30 | 26 | 26 |
| 15 | F | 29 | 29 | 27 | 29 | 23 | 23 | 44 | 53 | 58 | 60 | 62 | 71 | 66 | 68 | 60 | 52 | 36 | 31 | 32 | 34 | F | F | 31 |
| 16 | 31 | 31 | 31 | 32 | 32 | 32 | 39 | 50 | 55 | 60 | 69 | 73 | 87 | 61 | 60 | 60 | 60 | 41 | 31 | 32 | 33 | 32 | 26 | 32 |
| 17 | 32 | 34 | 36 | 32 | 32 | 31 | 34 | 57 | 58 | 70 | 69 | 76 | 82 | 68 | 84 | 66 | 67 | 40 | 36 | 34 | 28 | 28 | 26 | A |
| 18 | 28 | 29 | 30 | 31 | 31 | 31 | 31 | 52 | 61 | 60 | 71 | 64 | 70 | 74 | 67 | 72 | 60 | 39 | 32 | 30 | 30 | 30 | 30 | 28 |
| 19 | 32 | 32 | 31 | 32 | 40 | 25 | 25 | 48 | 59 | 66 | 73 | 74 | 76 | 71 | 83 | 72 | 68 | 51 | 31 | 34 | 40 | 32 | 26 | 26 |
| 20 | 29 | 30 | 30 | 28 | 27 | 27 | 31 | 54 | 59 | 84 | 89 | 74 | 64 | 79 | 73 | 89 | 72 | 47 | 44 | 32 | 38 | 41 | 42 | 42 |
| 21 | 44 | 45 | 46 | F | F | 52 | 51 | 59 | 63 | 81 | 109 | 94 | 80 | 69 | 69 | 70 | 66 | 44 | 36 | 39 | 37 | 31 | 31 | 31 |
| 22 | 33 | 37 | 41 | 37 | 40 | 34 | 34 | 53 | 78 | 78 | 89 | 70 | 82 | 70 | 76 | 76 | 61 | 39 | 38 | 28 | 29 | 31 | 32 | 33 |
| 23 | 34 | 36 | 38 | 36 | 39 | 38 | 32 | 50 | 63 | 89 | 80 | 85 | 76 | 73 | 79 | 67 | 74 | 44 | 35 | 30 | 28 | F | 31 | 31 |
| 24 | 34 | 34 | 36 | 35 | 32 | 34 | 32 | 52 | 60 | 66 | 69 | 83 | 96 | 76 | 70 | 61 | 72 | 48 | 33 | 33 | 37 | 32 | 33 | F |
| 25 | 37 | F | F | F | 42 | 39 | 34 | 52 | 57 | 73 | 73 | 83 | 66 | 64 | 71 | 72 | 67 | 49 | 32 | 32 | 34 | 31 | 32 | 32 |
| 26 | 32 | 36 | 38 | F | 32 | F | F | 56 | 63 | 66 | 83 | 96 | 78 | 74 | 73 | 72 | 67 | 51 | 41 | 32 | 35 | 24 | 28 | 30 |
| 27 | 35 | 32 | 33 | 36 | F | F | 39 | 54 | 61 | 69 | 72 | 83 | V 73 | 70 | 67 | 74 | 58 | 38 | 38 | 33 | 35 | 35 | 32 | 34 |
| 28 | 39 | 37 | 25 | 22 | 22 | 24 | 28 | 50 | 61 | 76 | 94 | 81 | 86 | 78 | 71 | 74 | 54 | 46 | 43 | 42 | 35 | 25 | 27 | 30 |
| 29 | 30 | 31 | 32 | 33 | 32 | 31 | 30 | 50 | 64 | 64 | 76 | 76 | 84 | 66 | 63 | 70 | 52 | 55 | 38 | 34 | 30 | 28 | 28 | 29 |
| 30 | 31 | 32 | 32 | 32 | 31 | 30 | 26 | 52 | 59 | 69 | 78 | 77 | 64 | 70 | 64 | 61 | V 56 | 54 | 36 | 32 | 31 | 28 | 30 | 33 |
| 31 | 33 | 28 | 32 | 32 | 26 | 28 | 26 | 46 | 68 | 63 | 72 | 66 | 74 | 66 | 68 | 61 | 52 | 40 | 32 | 34 | 25 | 26 | 26 | 29 |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 28 | 29 | 29 | 27 | 27 | 29 | 30 | 31 | 30 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 30 | 29 | 29 | 27 |
| MED | 31 | 31 | 31 | 32 | 32 | 28 | 28 | 50 | 59 | 65 | 72 | 76 | 73 | 68 | 67 | 66 | 56 | 39 | 32 | 32 | 30 | 30 | 28 | 30 |
| U Q | 33 | 34 | 34 | 33 | 34 | 32 | 32 | 54 | 61 | 72 | 83 | 83 | 80 | 72 | 71 | 72 | 67 | 46 | 36 | 34 | 35 | 31 | 31 | 32 |
| L Q | 29 | 29 | 30 | 29 | 29 | 24 | 25 | 47 | 55 | 58 | 67 | 70 | 66 | 62 | 63 | 60 | 52 | 36 | 29 | 26 | 28 | 26 | 26 | 27 |

**DEC.2021** foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Kokubunji

**DEC.2021** 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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | A | | L | L | L | | | | | | | | | | | |
| 2 | | | | | | | | | | | L | | L | L | L | | | | | | | | | |
| 3 | | | | | | | | | | | L | U L 452 | L | L | | | | | | | | | | |
| 4 | | | | | | | | | | L | L | L | L | L | | | | | | | | | | |
| 5 | | | | | | | | | | L | L | L | L | L | L | | | | | | | | | |
| 6 | | | | | | | | | | A | L | 380 | L | L | L | | | | | | A | | | |
| 7 | | | | | | | | | | L | 376 | L | L | L | L | | | | | | | | | |
| 8 | | | | | | | | | | L | 384 | L | L | L | | | | | | | | | | |
| 9 | | | | | | | | | L | A | L | | L | L | L | | | | | | | | | |
| 10 | | | | | | | | | | | L | L | A | L | L | | | | | | | | | |
| 11 | | | | | | | | | | L | L | L | 452 | | A | A | | | | | | | | |
| 12 | | | | | | | | | | | | A | L | | | | | | | | | | | |
| 13 | | | | | | | | | | | L | U L 404 | L | L | | | | | | | | | | |
| 14 | | | | | | | | | | | L | L | L | | | | | | | | | | | |
| 15 | | | | | | | | | | | | L | L | L | A | | | | | | | | | |
| 16 | | | | | | | | | L | L | L | L | L | L | | | | | | | | | | |
| 17 | | | | | | | | | | | L | | | L | L | | | | | | | | | |
| 18 | | | | | | | | | | | L | L | L | A | | | | | | | | | | |
| 19 | | | | | | | | | | | L | L | L | L | L | | | | | | | | | |
| 20 | | | | | | | | | | L | | L | | L | L | | | | | | | | | |
| 21 | | | | | | | | | | L | L | L | L | | L | | | | | | | | | |
| 22 | | | | | | | | | | | | L | L | | | | | | | | | | | |
| 23 | | | | | | | | | | | L | L | L | | L | | | | | | | | | |
| 24 | | | | | | | | | | | | U L 472 | | L | L | | | | | | | | | |
| 25 | | | | | | | | | | | L | | L | | L | | | | | | | | | |
| 26 | | | | | | | | | | | | | | L | L | L | | | | | | | | |
| 27 | | | | | | | | | | A | | L | L | | L | | | A | | | | | | |
| 28 | | | | | | | | | | L | | L | L | L | | | | | | | | | | |
| 29 | | | | | | | | | | L | L | L | | L | | | | | | | | | | |
| 30 | | | | | | | | | | L | L | L | L | L | L | | | | | | | | | |
| 31 | | | | | | | | | | L | L | | L | L | L | | | | | | | | | |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | | | | | | | | | | | 2 | 4 | 1 | | | | | | | | | | | |
| MED | | | | | | | | | | | 380 | U L 428 | 452 | | | | | | | | | | | |
| U Q | | | | | | | | | | | | U L 462 | | | | | | | | | | | | |
| L Q | | | | | | | | | | | | 392 | | | | | | | | | | | | |

**DEC.2021** foF1 (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Kokubunji

**DEC.2021** 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

| 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 | | | | | | | | BU R 196 | A | A | A | A | A | U 296 | U R 284 | 248 | 204 | B | | | | | | |
| 2 | | | | | | | | B B | A | A | A | A | A | A | A | A | A | B | | | | | | |
| 3 | | | | | | | | B A | U A 248 | U A 268 | U R 308 | M | U R 320 | A | A | A | U R 200 | B | | | | | | |
| 4 | | | | | | | | BU R 196 | U R 256 | U R 284 | U R 304 | A | U R 312 | U R 308 | U R 308 | U R 256 | B | B | | | | | | |
| 5 | | | | | | | | BU R 204 | 240 | A | A | U R 320 | U R 320 | U R 308 | A | | A | B | | | | | | |
| 6 | | | | | | | | BU R 184 | A | A | A | U R 308 | U R 312 | A | A | A | A | B | | | A | | | |
| 7 | | | | | | | | BU R 168 | U R 240 | U R 268 | 292 | A | U A 316 | U R 300 | U R 280 | U R 252 | U R 208 | | | | | | | |
| 8 | | | | | | | | B B | U A 232 | 292 | A | U R 304 | 304 | U R 288 | U R 280 | A | A | | | | | | | |
| 9 | | | | | | | | U R 200 | U R 232 | U A 272 | U R 316 | 316 | 316 | U R 296 | U R 280 | U R 256 | A | | | | | | | |
| 10 | | | | | | | | B B | U R 244 | U R 276 | U A 296 | U A 320 | A | A | U R 280 | R | A | | | | | | | |
| 11 | | | | | | | | B B | A | U R 292 | U A 300 | A | U R 316 | A | A | A | U R 208 | B | | | | | | |
| 12 | | | | | | | | BU R 180 | U R 248 | A | U R 308 | U A 316 | U R 316 | U R 296 | U R 284 | U R 256 | U R 208 | B | | | | | | |
| 13 | | | | | | | | BU R 184 | U R 236 | 284 | U A 308 | U R 332 | U R 332 | U R 296 | A | A | A | | | | | | | |
| 14 | | | | | | | | BU R 200 | U A 224 | U A 264 | U A 292 | A | U R 308 | U R 320 | U R 288 | U R 256 | U R 200 | B | | | | | | |
| 15 | | | | | | | | BU R 184 | U R 244 | U R 296 | U R 312 | A | A | U R 292 | 288 | A | A | B | | | | | | |
| 16 | | | | | | | | BU R 196 | U R 232 | U A 264 | U R 292 | U A 320 | 320 | U R 308 | A | U R 268 | U R 212 | B | | | | | | |
| 17 | | | | | | | | B B | U R 252 | U R 292 | U R 324 | A | U R 336 | A | U R 308 | A | A | B | | | | | | |
| 18 | | | | | | | | B B | U R 244 | U R 292 | A | A | A | 304 | U R 296 | U R 260 | U R 200 | B | | | | | | |
| 19 | | | | | | | | BU R 184 | U R 260 | U R 292 | U R 320 | U R 336 | 336 | U R 320 | U R 300 | U R 256 | 184 | B | | | | | | |
| 20 | | | | | | | | B B | 260 | 284 | A | U R 328 | U R 336 | U R 320 | U R 300 | U R 268 | B | B | | | | | | |
| 21 | | | | | | | | BU R 196 | U R 244 | 292 | U R 312 | U R 328 | 336 | 328 | U R 300 | U R 264 | U R 208 | B | | | | | | |
| 22 | | | | | | | | B B | U R 244 | A | U R 320 | U R 332 | U R 340 | R | U R 308 | A | A | B | | | | | | |
| 23 | | | | | | | | BU R 192 | U R 252 | 288 | U R 320 | U R 328 | U R 336 | U R 320 | U R 300 | U R 264 | U R 236 | B | | | | | | |
| 24 | | | | | | | | BU R 180 | U R 244 | U R 292 | A | U R 324 | U R 336 | U R 328 | U R 304 | U R 268 | U R 220 | B | | | | | | |
| 25 | | | | | | | | B | U R 256 | U R 292 | U R 316 | U R 340 | 340 | U R 328 | U R 308 | U R 272 | U R 220 | B | | | | | | |
| 26 | | | | | | | | B B | A | U R 288 | A | A | U R 340 | U R 316 | U R 304 | U R 268 | U R 224 | B | | | | | | |
| 27 | | | | | | | | B B | U R 232 | 288 | 300 | A | U R 332 | U R 312 | U R 296 | A | U A 244 | B | | | | | | |
| 28 | | | | | | | | B | A | A | U R 320 | U R 340 | U R 348 | U R 340 | 296 | 236 | A | | | | | | | |
| 29 | | | | | | | | B B | U R 252 | U R 280 | U A 304 | 316 | 316 | U A 300 | U R 280 | U R 252 | U A 188 | B | | | | | | |
| 30 | | | | | | | | B B | U R 228 | A | U R 312 | U R 328 | U R 328 | U R 304 | U R 296 | U R 260 | U R 216 | B | | | | | | |
| 31 | | | | | | | | B B | A | A | U R 320 | U R 324 | U R 336 | U R 320 | A | U R 264 | U R 228 | B | | | | | | |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | | | | | | | | 15 | 24 | 22 | 22 | 19 | 26 | 24 | 23 | 19 | 18 | | | | | | | |
| MED | | | | | | | | U R 192 | U R 244 | U R 288 | U R 310 | U R 324 | U R 330 | U R 308 | U R 296 | U R 260 | U R 208 | | | | | | | |
| U Q | | | | | | | | U R 196 | U R 252 | U R 292 | U R 320 | U R 332 | U R 336 | U R 320 | U R 304 | U R 268 | U R 220 | | | | | | | |
| L Q | | | | | | | | U R 184 | U R 234 | U A 276 | U 300 | U 316 | U 316 | U R 298 | U R 284 | U R 256 | U R 200 | | | | | | | |

**DEC.2021** foE (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Kokubunji

**DEC.2021** 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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 26 | J A 27 | J A 31 | J A 29 | J A 29 | J A 28 | 23 | G | J A 59 | J A 46 | J A 77 | J A 47 | J A 36 | G | G | G | G | J A 34 | 24 | 22 | 24 | E B 16 | E B 16 | E B 16 |
| 2 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 22 | J A 31 | J A 34 | J A 36 | 36 | J A 37 | J A 39 | J A 34 | J A 55 | J A 42 | J A 35 | J A 28 | E B 16 | 22 | E B 16 | 21 | 21 |
| 3 | E B 16 | J A 32 | 24 | 22 | J A 28 | 21 | 20 | 22 | 29 | 32 | G J A 36 | | G | J A 35 | J A 82 | J A 36 | G | 22 | 23 | E B 16 | 19 | 19 | E B 16 | J A 32 |
| 4 | E B 15 | E B 15 | E B 16 | E B 16 | 21 | E B 16 | E B 16 | G | G | G | G | J A 43 | G | G | G | G | E B 15 | J A 34 | E B 16 | E B 15 | E B 15 | E B 16 | E B 15 | E B 16 |
| 5 | E B 15 | E B 15 | E B 17 | E B 16 | E B 16 | E B 16 | E B 16 | G | 28 | 32 | J A 39 | G | G | G | J A 36 | J A 31 | J A 29 | J A 32 | J A 34 | J A 25 | 24 | 21 | 21 | 26 |
| 6 | J A 35 | J A 37 | J A 32 | 23 | 24 | 21 | E B 16 | G | J A 48 | J A 63 | J A 42 | G | G | J A 40 | J A 34 | J A 32 | J A 34 | 22 | J A 30 | J A 28 | J A 50 | J A 50 | J A 29 | J A 29 |
| 7 | E B 16 | 19 | 21 | 22 | 22 | 22 | E B 16 | G | G | G | 34 | 34 | 34 | G | G | G | G | J A 29 | J A 32 | 23 | 23 | 24 | J A 30 | J A 24 |
| 8 | 24 | 22 | E B 16 | 19 | E B 16 | E B 16 | E B 16 | E B 16 | 28 | G | J A 37 | G | G | G | G | 26 | J A 36 | J A 29 | 26 | 24 | J A 26 | J A 33 | 22 | J A 29 |
| 9 | J A 28 | 22 | J A 27 | 21 | 21 | E B 16 | E B 16 | G | G | 33 | G | 34 | G | G | G | G | 27 | J A 26 | 24 | E B 16 | E B 16 | E B 17 | 23 | E B 16 |
| 10 | E B 16 | 21 | 23 | 22 | 22 | 22 | 21 | 22 | G | G | 32 | 36 | J A 45 | J A 40 | G | G | J A 28 | J A 28 | 23 | E B 16 | E B 16 | E B 16 | 23 | E B 16 |
| 11 | E B 16 | E B 16 | E B 16 | 20 | 20 | E B 16 | E B 16 | 21 | 25 | G | 36 | 33 | 39 | 36 | 35 | 29 | G | E B 15 | E B 15 | E B 15 | E B 15 | E B 15 | E B 15 | E B 16 |
| 12 | E B 16 | E B 16 | 21 | E B 16 | E B 16 | 20 | E B 16 | G | G | J A 38 | G | 37 | G | G | G | G | G | E B 15 | E B 15 | E B 15 | E B 15 | E B 15 | E B 16 | E B 16 |
| 13 | E B 16 | 22 | E B 15 | E B 15 | E B 15 | 22 | E B 16 | G | G | 34 | 35 | G | G | G | 32 | J A 37 | J A 42 | J A 36 | J A 30 | E B 16 | 23 | J A 26 | E B 16 | E B 16 |
| 14 | E B 16 | J A 48 | J A 38 | 25 | 25 | E B 16 | E B 16 | G | 28 | 33 | 33 | J A 37 | G | G | G | G | G | 25 | 20 | J A 35 | J A 26 | J A E B 15 | J A 42 | E B 16 |
| 15 | 22 | E B 16 | 24 | 21 | 22 | 22 | E B 16 | G | G | G | G | J A 42 | J A 36 | G | 34 | J A 37 | J A 34 | E B 16 | 24 | E B 16 | J A 27 | E B 16 | E B 16 | E B 16 |
| 16 | J A 55 | J A 76 | J A 52 | J A 29 | E B 16 | 21 | 21 | 23 | G | G | G | 35 | 35 | G | 32 | G | G | E B 15 | E B 15 | J A 31 | E B 15 | J A 30 | J A 78 | J A 36 |
| 17 | J A 33 | J A 27 | 21 | J A 31 | 24 | 22 | E B 16 | E B 16 | G | G | G | 38 | G | 34 | G | J A 44 | J A 35 | J A 32 | J A 30 | J A 30 | E B 16 | J A 28 | J A 79 | J A 46 |
| 18 | J A 54 | J A 34 | J A 27 | J A 48 | J A 27 | 22 | E B 16 | J A 23 | G | G | J A 42 | 36 | 36 | 34 | G | G | G | J A 25 | 21 | 22 | 21 | J A 30 | 26 | 24 |
| 19 | J A 33 | 23 | 24 | 22 | 21 | E B 16 | E B 16 | G | G | G | G | G | G | G | G | G | 23 | 23 | J A 32 | J A 26 | 23 | 23 | E B 16 | E B 16 |
| 20 | E B 16 | E B 16 | 25 | E B 16 | E B 16 | 22 | E B 16 | E B 16 | G | 33 | J A 36 | G | G | G | G | G | E B 18 | E B 18 | 23 | 23 | E B 16 | E B 16 | E B 16 | 24 |
| 21 | J A 27 | J A 33 | 22 | 22 | E B 16 | E B 16 | E B 16 | G | G | G | G | G | G | G | G | G | G | 22 | E B 16 | 22 | 22 | 22 | 22 | 22 |
| 22 | J A 26 | J A 26 | 25 | 22 | E B 16 | E B 16 | E B 16 | E B 16 | G | 32 | G | G | G | G | G | J A 35 | 26 | 22 | 22 | J A 28 | 22 | E B 16 | E B 16 | E B 16 |
| 23 | E B 16 | E B 15 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | G | 34 | G | G | G | G | G | G | G | J A 26 | E B 16 | E B 16 | E B 16 | E B 16 | E B 15 | E B 15 |
| 24 | 21 | 25 | 24 | 23 | 20 | E B 16 | E B 16 | G | G | G | J A 44 | G | G | G | G | G | G | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 22 |
| 25 | 23 | 23 | 22 | E B 16 | E B 16 | J A 43 | E B 16 | E B 16 | G | G | G | G | G | G | G | G | G | E B 16 | J A 25 | 24 | 22 | 22 | E B 17 | E B 16 |
| 26 | 22 | 22 | E B 16 | 21 | 21 | 22 | 21 | E B 17 | J A 37 | G | J A 39 | J A 44 | G | G | G | G | G | E B 16 | 22 | E B 16 | E B 15 | E B 15 | E B 15 | 24 |
| 27 | 25 | E B 16 | J A 27 | J A 27 | E B 16 | J A 31 | E B 16 | E B 17 | G | 34 | 34 | 35 | G | G | G | J A 37 | 31 | J A 41 | J A 28 | 26 | E B 16 | E B 16 | E B 16 | E B 16 |
| 28 | J A 28 | E B 15 | E B 15 | E B 15 | 26 | 23 | 23 | J A 24 | J A 40 | J A 52 | G | G | G | G | 35 | 28 | J A 35 | 26 | 24 | 24 | E B 16 | E B 14 | E B 15 | E B 16 |
| 29 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | G | 35 | 35 | 36 | 34 | G | G | 23 | 22 | 23 | E B 16 | 22 | J A 41 | J A 35 | J A 35 |
| 30 | J A 30 | 24 | J A 26 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | J A 38 | G | G | G | G | G | G | G | 22 | E B 16 | E B 16 | E B 16 | E B 15 | E B 15 | E B 15 |
| 31 | E B 16 | J A 67 | J A 41 | J A 40 | J A 26 | J A 24 | 22 | E B 16 | 26 | 32 | G | G | G | G | J A 44 | G | G | J A 34 | E B 15 | 24 | E B 15 | 20 | 23 | E B 15 |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 |
| MED | 22 | 22 | 23 | 21 | 20 | 21 | E B 16 | G | G | 32 | 32 | 34 | G | G | G | G | G | 25 | 23 | 22 | 19 | E B 16 | E B 16 | E B 16 |
| U Q | J A 28 | J A 27 | J A 27 | J A 23 | 24 | 22 | 16 | G | J A 28 | J A 34 | J A 36 | J A 36 | 35 | 34 | J A 34 | J A 32 | J A 31 | J A 32 | J A 28 | J A 25 | 23 | J A 24 | J A 23 | J A 24 |
| L Q | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | G | G | G | G | G | G | G | G | E B 18 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |

**DEC.2021** foEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Kokubunji

**DEC.2021** fbEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | A A 59 | 39 | 34 | 31 | 31 | G | G | G | G | 22 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 2 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 20 | 24 | 29 | 30 | 33 | 30 | 32 | 30 | 33 | 28 | 22 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 3 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 21 | 28 | 28 | G | 31 | G | 32 | 45 | 26 | G | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 4 | E B 15 | E B 15 | E B 16 | E B 16 | E B 15 | E B 16 | E B 16 | G | G | G | G | 31 | G | G | G | G | E B 15 | E B 16 | E B 16 | E B 15 | E B 15 | E B 16 | E B 15 | E B 16 |
| 5 | E B 15 | E B 15 | E B 17 | E B 16 | E B 16 | E B 16 | E B 16 | G | 27 | 32 | 32 | G | G | G | 24 | 24 | 20 | 22 | 22 | 19 | E B 15 | E B 15 | E B 16 | E B 16 |
| 6 | E B 16 | 18 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | 41 | 35 | 28 | G | G | 30 | 28 | 25 | 25 | E B 16 | E B 16 | E B 16 | A A 50 | E B 16 | E B 16 | E B 16 |
| 7 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | G | G | 32 | 31 | 33 | G | G | G | G | 16 | E B 20 | E B 16 | E B 16 | E B 16 | 16 | E B 16 |
| 8 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 27 | G | 30 | G | G | G | G | 25 | 20 | 20 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 9 | E B 16 | E B 16 | E B 16 | E B 16 | E B 15 | E B 16 | E B 16 | G | G | 31 | G | 33 | G | G | G | G | 22 | 20 | 18 | E B 16 | E B 16 | E B 17 | E B 17 | E B 16 |
| 10 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | G | G 29 | 35 | 32 | 30 | G | G | 18 | 18 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 11 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 18 | 23 | G | 34 | 32 | 36 | 34 | 32 | 28 | G | E B 15 | E B 15 | E B 15 | E B 15 | E B 15 | E B 15 | E B 16 |
| 12 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | G | 27 | G | 35 | G | G | G | G | G | E B 15 | E B 15 | E B 15 | E B 15 | E B 15 | E B 16 | E B 16 |
| 13 | E B 16 | E B 15 | E B 15 | E B 15 | E B 15 | E B 16 | E B 16 | G | G | 30 | 34 | G | G | G | 30 | 24 | 24 | 21 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 14 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | 26 | 30 | 31 | 30 | G | G | G | G | G | E B 16 | E B 16 | E B 16 | 18 | E B 15 | E B 16 | E B 16 |
| 15 | E B 18 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | G | G | G | 32 | 32 | G | 32 | 29 | 21 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 16 | E B 16 | 20 | 21 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | G | G | 34 | 34 | G | 30 | G | G | E B 15 | E B 15 | E B 16 | E B 15 | E B 15 | E B 15 | E B 15 |
| 17 | E B 16 | E B 16 | E B 16 | 18 | E B 16 | E B 16 | E B 16 | E B 16 | G | G | G | 34 | G | 34 | G | 34 | 28 | 23 | 23 | 19 | E B 16 | E B 16 | E B 16 | A A 46 |
| 18 | E B 16 | 19 | E B 16 | 19 | E B 16 | E B 16 | E B 16 | E B 16 | G | G | 32 | 32 | 32 | 33 | G | G | G | E B 15 | E B 15 | E B 16 | 18 | E B 16 | E B 16 | E B 16 |
| 19 | 18 | E B 15 | E B 15 | E B 15 | E B 15 | E B 16 | E B 16 | G | G | G | G | G | G | G | G | G | 20 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 20 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | 31 | 31 | G | G | G | G | G | E B 18 | E B 18 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 21 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | G | G | G | G | G | G | G | G | G | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 22 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | 27 | G | G | G | G | G | 26 | 20 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 23 | E B 16 | E B 15 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | G | 32 | G | G | G | G | G | G | G | 21 | E B 16 | E B 16 | E B 16 | E B 16 | E B 15 | E B 15 |
| 24 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | G | G | 32 | G | G | G | G | G | G | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 25 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | G | G | G | G | G | G | G | G | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 17 | E B 16 |
| 26 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 17 | 24 | G | 32 | 33 | G | G | G | G | G | E B 16 | E B 16 | E B 16 | E B 15 | E B 15 | E B 15 | E B 16 |
| 27 | E B 15 | E B 16 | 18 | E B 16 | E B 16 | E B 16 | E B 16 | E B 17 | G | 33 | 33 | 33 | G | G | G | 25 | G 22 | 31 | 20 | 19 | E B 16 | E B 16 | E B 16 | E B 16 |
| 28 | E B 16 | E B 15 | E B 15 | E B 15 | E B 15 | E B 15 | E B 16 | E B 16 | 25 | 30 | G | G | G | G | 33 | 26 | 23 | 19 | E B 16 | E B 16 | E B 16 | E B 14 | E B 15 | E B 16 |
| 29 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | G | 32 | 33 | 36 | 32 | G | G | 21 | 21 | 18 | E B 16 | E B 16 | E B 16 | 20 | E B 16 |
| 30 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | 30 | G | G | G | G | G | G | G | E B 16 | E B 16 | E B 16 | E B 16 | E B 15 | E B 15 | E B 15 |
| 31 | E B 16 | E B 16 | 28 | 28 | 20 | E B 16 | E B 16 | E B 16 | 24 | 27 | G | G | G | G | 34 | G | G | 27 | E B 15 | E B 15 | E B 15 | E B 15 | E B 15 | E B 15 |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 |
| MED | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | G | 27 | G | 31 | G | G | G | G | G | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| U Q | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | 24 | 30 | 32 | 33 | 31 | 30 | 30 | 25 | G | 21 | 16 | 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| L Q | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | G | G | G | G | G | G | G | 21 | E B 16 | E B 16 | E B 16 | E B 16 | E B 15 | E B 15 | E B 16 |

**DEC.2021** fbEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Kokubunji

**DEC.2021** 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

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

# IONOSPHERIC DATA STATION Kokubunji

## DEC.2021 M(3000)F2 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | F | F | F | F | F | 317 | 335 | 377 | A | 324 | 357 | 379 | 357 | 389 | 342 | 354 | 366 | 358 | 348 | 326 | 319 | 327 | 332 | 296 |
| 2 | 279 | 291 | 361 | 368 | 364 | 302 | 317 | 372 | 382 | 362 | 368 | 384 | 360 | 353 | 378 | 357 | 387 | 371 | 325 | 319 | 339 | 325 | 333 | 289 |
| 3 | 302 | 305 | 305 | 311 | 343 | 362 | 334 | 368 | 379 | 386 | 380 | 350 | 350 | 342 | 362 | 378 | 346 | 355 | 339 | 347 | 297 | 320 | 293 | 318 |
| 4 | 315 | 320 | 335 | 322 | 289 | 305 | 315 | 372 | 381 | 363 | 351 | 358 | 352 | 344 | 346 | 364 | 364 | 363 | 332 | 383 | 310 | 349 | 286 | 290 |
| 5 | 314 | 311 | 311 | 313 | 366 | 398 | 325 | 368 | 391 | 369 | 335 | 372 | 360 | 361 | 354 | 380 | 376 | 381 | 370 | 332 | 295 | 319 | 312 | 304 |
| 6 | 292 | 303 | 295 | 304 | 356 | 316 | 341 | 382 | 393 | 352 | 349 | 375 | 370 | 371 | 371 | 381 | 375 | 365 | 375 | 355 | A | 343 | 292 | 315 |
| 7 | 303 | 305 | 299 | 306 | 311 | 353 | 364 | 393 | 380 | 362 | 388 | 344 | 349 | 353 | 376 | 377 | 373 | 390 | 322 | 335 | 402 | 321 | 302 | 280 |
| 8 | 289 | 297 | 334 | 355 | 374 | 365 | 373 | 363 | 382 | 383 | 355 | 381 | 329 | 358 | 335 | 331 | 387 | 372 | 368 | 329 | 346 | 362 | 317 | 308 |
| 9 | 313 | 310 | 300 | 310 | 346 | 389 | 349 | 382 | 392 | 374 | 371 | 388 | 378 | 370 | 374 | 353 | 357 | 367 | 337 | 374 | 371 | 327 | 327 | 318 |
| 10 | 312 | 313 | 311 | 304 | 328 | 321 | 389 | 367 | 384 | 397 | 377 | 381 | 378 | 373 | 377 | 354 | 377 | 362 | 342 | 326 | 314 | 318 |  | F | F |
| 11 | F | 289 | 288 | 276 | F | 367 | 353 | 384 | 380 | 383 | 363 | 377 | 325 | 334 | 365 | 373 | 384 | 359 | 367 | 349 | 320 | 323 | 317 | 314 |
| 12 | 311 | 315 | 333 | 338 | 370 | 374 | 313 | 368 | 365 | 366 | 388 | 385 | 362 | 374 | 364 | 342 | 375 | 378 | 357 | 359 | 329 | 313 | 305 | F |
| 13 | 306 | 306 | 302 | 317 | 331 | 396 | 316 | 363 | 382 | 380 | 364 | 380 | 380 | 379 | 391 | 374 | 368 | 370 | 338 | 357 | 389 | 326 | 294 | 284 |
| 14 | 312 | 321 | 331 | 331 | 363 | 379 | 334 | 377 | 379 | 374 | 381 | 383 | 365 | 375 | 390 | 376 | 382 | 384 | 376 | 349 | 328 | 357 | 336 | 284 |
| 15 | F | 306 | 292 | 329 | 344 | 361 | 334 | 376 | 410 | 391 | 375 | 364 | 370 | 353 | 383 | 368 | 383 | 364 | 343 | 324 | 319 |  | F | F | 324 |
| 16 | 310 | 311 | 311 | 299 | 295 | 343 | 367 | 383 | 366 | 362 | 337 | 355 | 371 | 370 | 375 | 356 | 374 | 370 | 349 | 341 | 366 | 322 | 275 | 280 |
| 17 | 330 | 330 | 321 | 322 | 358 | 332 | 357 | 378 | 370 | 371 | 371 | 338 | 383 | 353 | 361 | 357 | 378 | 357 | 340 | 386 | 322 | 331 | 302 |  | A |
| 18 | 294 | 305 | 311 | 310 | 324 | 346 | 358 | 383 | 405 | 372 | 374 | 397 | 336 | 382 | 380 | 386 | 359 | 384 | 323 | 344 | 329 | 329 | 329 | 304 |
| 19 | 302 | 309 | 297 | 332 | 375 | 307 | 321 | 375 | 375 | 382 | 373 | 371 | 366 | 358 | 370 | 378 | 374 | 336 | 329 | 313 | 364 | 373 | 311 | 266 |
| 20 | 304 | 296 | 296 | 333 | 301 | 302 | 385 | 371 | 378 | 315 | 358 | 381 | 334 | 328 | 338 | 339 | 390 | 365 | 367 | 305 | 298 | 312 | 320 | 298 |
| 21 | 283 | 281 | 271 | F | F | 303 | 373 | 373 | 361 | 352 | 370 | 361 | 352 | 361 | 344 | 371 | 362 | 359 | 322 | 349 | 365 | 337 | 274 | 286 |
| 22 | 298 | 282 | 297 | 326 | 342 | 325 | 310 | 358 | 363 | 351 | 372 | 370 | 357 | 371 | 351 | 373 | 375 | 346 | 358 | 389 | 314 | 304 | 312 | 313 |
| 23 | 299 | 283 | 329 | 293 | 298 | 314 | 319 | 372 | 343 | 385 | 348 | 359 | 357 | 334 | 348 | 331 | 371 | 345 | 345 | 331 | 292 | F | 272 | 313 |
| 24 | 313 | 314 | 300 | 310 | 290 | 317 | 303 | 360 | 369 | 377 | 350 | 363 | 366 | 350 | 344 | 339 | 358 | 355 | 328 | 336 | 341 | 293 | 269 |  | F |
| 25 | 282 | F | F | F | 315 | 338 | 358 | 367 | 376 | 363 | 335 | 378 | 383 | 359 | 335 | 355 | 360 | 355 | 320 | 326 | 329 | 294 | 308 | 301 |
| 26 | 318 | 290 | 312 | F | 292 | F | F | 366 | 372 | 360 | 351 | 374 | 362 | 355 | 346 | 345 | 365 | 337 | 361 | 328 | 370 | 288 | 285 | 289 |
| 27 | 343 | 344 | 337 | 326 | F | F | 329 | 371 | 365 | 359 | 377 | 336 | V 323 | 309 | 311 | 355 | 354 | 338 | 370 | 350 | 336 | 307 | 289 | 273 |
| 28 | 274 | 358 | 317 | 338 | 315 | 297 | 304 | 363 | 346 | 365 | 374 | 358 | 354 | 348 | 344 | 318 | 339 | 330 | 332 | 335 | 365 | 300 | 281 | 304 |
| 29 | 289 | 286 | 299 | 338 | 313 | 318 | 334 | 365 | 361 | 361 | 371 | 357 | 364 | 385 | 340 | 355 | 342 | 359 | 313 | 366 | 360 | 298 | 272 | 298 |
| 30 | 279 | 272 | 284 | 304 | 308 | 320 | 316 | 368 | 364 | 364 | 353 | 373 | 358 | 339 | 370 | 361 | V 314 | 361 | 323 | 350 | 284 | 270 | 288 | 303 |
| 31 | 347 | 298 | 320 | 330 | 312 | 290 | 301 | 342 | 372 | 382 | 358 | 342 | 371 | 369 | 361 | 339 | 355 | 370 | 334 | 335 | 342 | 312 | 293 | 295 |
|  | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 28 | 29 | 29 | 27 | 27 | 29 | 30 | 31 | 30 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 30 | 29 | 29 | 27 |
| MED | 304 | 305 | 311 | 322 | 328 | 325 | 334 | 371 | 377 | 366 | 368 | 372 | 360 | 358 | 361 | 357 | 371 | 362 | 340 | 341 | 329 | 321 | 302 | 298 |
| U Q | 313 | 314 | 325 | 332 | 358 | 364 | 358 | 377 | 382 | 382 | 374 | 381 | 370 | 371 | 375 | 374 | 377 | 370 | 361 | 355 | 364 | 330 | 317 | 313 |
| L Q | 290 | 290 | 297 | 306 | 308 | 310 | 316 | 366 | 365 | 361 | 351 | 358 | 352 | 348 | 344 | 345 | 358 | 355 | 328 | 328 | 314 | 306 | 286 | 286 |

DEC.2021 M(3000)F2 (0.01)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Kokubunji

**DEC.2021** 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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | A | | L | L | L | | | | | | | | | | | |
| 2 | | | | | | | | | | | L | | L | L | L | | | | | | | | | |
| 3 | | | | | | | | | | | L | U L 369 | L | L | | | | | | | | | | |
| 4 | | | | | | | | | | L | L | L | L | L | | | | | | | | | | |
| 5 | | | | | | | | | | L | L | L | L | L | L | | | | | | | | | |
| 6 | | | | | | | | | | A | L | 444 | L | L | L | | | | | | A | | | |
| 7 | | | | | | | | | | L | 434 | L | L | L | L | | | | | | | | | |
| 8 | | | | | | | | | | L | 442 | L | L | L | | | | | | | | | | |
| 9 | | | | | | | | | L | A | L | | L | L | L | | | | | | | | | |
| 10 | | | | | | | | | | | L | L | A | L | L | | | | | | | | | |
| 11 | | | | | | | | | | L | L | L | 383 | | A | A | | | | | | | | |
| 12 | | | | | | | | | | | | A | L | | | | | | | | | | | |
| 13 | | | | | | | | | | | L | U L 398 | L | L | | | | | | | | | | |
| 14 | | | | | | | | | | | L | L | L | | | | | | | | | | | |
| 15 | | | | | | | | | | | | L | L | L | A | | | | | | | | | |
| 16 | | | | | | | | | L | L | L | L | L | L | | | | | | | | | | |
| 17 | | | | | | | | | | | L | | | L | L | | | | | | | | | |
| 18 | | | | | | | | | | | L | L | L | A | | | | | | | | | | |
| 19 | | | | | | | | | | | L | L | L | L | L | | | | | | | | | |
| 20 | | | | | | | | | | L | | L | | L | L | | | | | | | | | |
| 21 | | | | | | | | | | L | L | L | L | | L | | | | | | | | | |
| 22 | | | | | | | | | | | | L | L | | | | | | | | | | | |
| 23 | | | | | | | | | | | L | L | L | | L | | | | | | | | | |
| 24 | | | | | | | | | | | | U L 363 | | L | L | | | | | | | | | |
| 25 | | | | | | | | | | | L | | L | | L | | | | | | | | | |
| 26 | | | | | | | | | | | | | | L | L | L | | | | | | | | |
| 27 | | | | | | | | | | A | | L | L | | L | | | A | | | | | | |
| 28 | | | | | | | | | | L | | L | L | L | | | | | | | | | | |
| 29 | | | | | | | | | | L | L | L | | L | | | | | | | | | | |
| 30 | | | | | | | | | | L | L | L | L | L | L | | | | | | | | | |
| 31 | | | | | | | | | | L | L | | L | L | L | | | | | | | | | |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | | | | | | | | | | | 2 | 4 | 1 | | | | | | | | | | | |
| MED | | | | | | | | | | | 438 | U L 384 | 383 | | | | | | | | | | | |
| U Q | | | | | | | | | | | | 421 | | | | | | | | | | | | |
| L Q | | | | | | | | | | | | U L 366 | | | | | | | | | | | | |

**DEC.2021** M(3000)F1 (0.01)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Kokubunji

**DEC.2021** h'F2 (KM) 135°E MEAN TIME (G.M.T. + 9 H)

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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | A | | 240 | 228 | 228 | | | | | | | | | | | |
| 2 | | | | | | | | | | | 228 | | 240 | 240 | 232 | | | | | | | | | |
| 3 | | | | | | | | | | | 232 | 242 | 242 | 242 | | | | | | | | | | |
| 4 | | | | | | | | | | 232 | 244 | 238 | 238 | 244 | | | | | | | | | | |
| 5 | | | | | | | | | | 232 | 252 | 228 | 228 | 232 | 246 | | | | | | | | | |
| 6 | | | | | | | | | | 246 | 264 | 232 | 232 | 232 | 232 | | | | | | A | | | |
| 7 | | | | | | | | | | 232 | 226 | 234 | 234 | 248 | 242 | | | | | | | | | |
| 8 | | | | | | | | | | 228 | 236 | 220 | 256 | 226 | | | | | | | | | | |
| 9 | | | | | | | | | 210 | 210 | 234 | | 220 | 234 | 234 | | | | | | | | | |
| 10 | | | | | | | | | | | 238 | 218 | 212 | 212 | 212 | | | | | | | | | |
| 11 | | | | | | | | | | 232 | 254 | 232 | 298 | | 228 | 228 | | | | | | | | |
| 12 | | | | | | | | | | | | 226 | 234 | | | | | | | | | | | |
| 13 | | | | | | | | | | | 234 | 222 | 222 | 228 | | | | | | | | | | |
| 14 | | | | | | | | | | | 228 | 228 | 234 | | | | | | | | | | | |
| 15 | | | | | | | | | | | | 234 | 226 | 234 | 218 | | | | | | | | | |
| 16 | | | | | | | | | 232 | 232 | 232 | 238 | 236 | 228 | | | | | | | | | | |
| 17 | | | | | | | | | | | 228 | | | 236 | 236 | | | | | | | | | |
| 18 | | | | | | | | | | | 230 | 212 | 252 | 208 | | | | | | | | | | |
| 19 | | | | | | | | | | | 220 | 232 | 232 | 232 | 232 | | | | | | | | | |
| 20 | | | | | | | | | | 264 | | 226 | | 262 | 248 | | | | | | | | | |
| 21 | | | | | | | | | | 248 | 240 | 218 | 230 | | 260 | | | | | | | | | |
| 22 | | | | | | | | | | | | 212 | 234 | | | | | | | | | | | |
| 23 | | | | | | | | | | | 234 | 222 | 232 | | 232 | | | | | | | | | |
| 24 | | | | | | | | | | | | 232 | | 246 | 250 | | | | | | | | | |
| 25 | | | | | | | | | | | 246 | | 216 | | 236 | | | | | | | | | |
| 26 | | | | | | | | | | | | | | 230 | 230 | 230 | | | | | | | | |
| 27 | | | | | | | | | | 210 | | 246 | 238 | | 284 | | | E A 296 | | | | | | |
| 28 | | | | | | | | | | 242 | | 230 | 224 | 232 | | | | | | | | | | |
| 29 | | | | | | | | | | 232 | 232 | 238 | | 224 | | | | | | | | | | |
| 30 | | | | | | | | | | 236 | 252 | 226 | 226 | 232 | 232 | | | | | | | | | |
| 31 | | | | | | | | | | 220 | 236 | | 228 | 228 | 242 | | | | | | | | | |
| | 00 | 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 | 15 | 23 | 25 | 26 | 22 | 19 | 2 | | 1 | | | | | | |
| MED | | | | | | | | | 221 | 232 | 234 | 228 | 232 | 232 | 234 | 229 | | E A 296 | | | | | | |
| U Q | | | | | | | | | | 242 | 244 | 234 | 238 | 240 | 246 | | | | | | | | | |
| L Q | | | | | | | | | | 228 | 230 | 222 | 226 | 228 | 232 | | | | | | | | | |

**DEC.2021** h'F2 (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Kokubunji

**DEC.2021** h'F (KM) 135°E MEAN TIME (G.M.T. + 9 H)

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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | E B 226 | E B 250 | E B 232 | E B 218 | E B 218 | E B 218 | 212 | 190 | A | 202 | 214 | 206 | 182 | 198 | 198 | 216 | 198 | 198 | E B 198 | E B 212 | E B 236 | E B 228 | E B 228 | E B 286 |
| 2 | E B 292 | E B 286 | E B 212 | E B 204 | E B 206 | E B 276 | E B 254 | 196 | 206 | 198 | 194 | 204 | 190 | 196 | 196 | 204 | 198 | 198 | E B 224 | E B 224 | E B 212 | E B 214 | E B 214 | E B 244 |
| 3 | E B 286 | E B 286 | E B 278 | 204 | E B 204 | E B 230 | 232 | 210 | 200 | 206 | 200 | 186 | 182 | 194 | 194 | 204 | 192 | 174 | 222 | 222 | E B 270 | E B 232 | E B 244 | E B 246 |
| 4 | E B 248 | E B 250 | E B 232 | E B 236 | E B 264 | E B 264 | E B 242 | 186 | 198 | 200 | 202 | 202 | 202 | 184 | 204 | 204 | 198 | 198 | E B 228 | E B 196 | E B 212 | E B 202 | E B 302 | E B 286 |
| 5 | E B 270 | E B 264 | E B 264 | E B 252 | 204 | 188 | E B 238 | 194 | 194 | 190 | 190 | 198 | 198 | 202 | 202 | 202 | 192 | 192 | 192 | E A 252 | E B 280 | E B 270 | E B 250 | E B 272 |
| 6 | E B 272 | E A 288 | E B 254 | E B 254 | E B 216 | 198 | 214 | 188 | 188 | A | 194 | 190 | 184 | 192 | 190 | 202 | 202 | 202 | 202 | 208 | A | 218 | E B 284 | E B 284 |
| 7 | E B 298 | E B 256 | E B 288 | E B 260 | E B 256 | E B 226 | 216 | 194 | 194 | 180 | 182 | 182 | 182 | 182 | 202 | 202 | 198 | 194 | E A 318 | E B 232 | 190 | E B 244 | E A 258 | E B 306 |
| 8 | E B 264 | E B 278 | E B 258 | E B 214 | 198 | E B 204 | 204 | 188 | 208 | 192 | 176 | 180 | 188 | 178 | 202 | 190 | 190 | 204 | E B 204 | 216 | 216 | 208 | E B 260 | E B 260 |
| 9 | E B 282 | E B 260 | E B 266 | E B 256 | E B 226 | 186 | E B 210 | 190 | 184 | A | 184 | 202 | 176 | 188 | 188 | 194 | 194 | 206 | E B 264 | 200 | E B 202 | E B 204 | 214 | E B 236 |
| 10 | E B 248 | E B 242 | E B 258 | E B 276 | E B 242 | E B 236 | 190 | 192 | 188 | 188 | 188 | 192 | A | 170 | 180 | 198 | 196 | 196 | E B 196 | E B 214 | E B 228 | E B 222 | E B 208 | E B 226 |
| 11 | E B 248 | E B 256 | E B 278 | E B 274 | 220 | 192 | E B 238 | 200 | 200 | 184 | 198 | 192 | 218 | 210 | A | A | 208 | 188 | E B 188 | E B 228 | E B 214 | E B 232 | E B 232 | E B 258 |
| 12 | E B 258 | E B 258 | E B 246 | 214 | E B 206 | 206 | E B 250 | 202 | 202 | 202 | 202 | A | 200 | 200 | 200 | 200 | 200 | 196 | E B 202 | E B 202 | E B 228 | E B 228 | E B 244 | E B 278 |
| 13 | E B 272 | E B 254 | E B 254 | E B 254 | E B 218 | 200 | E B 238 | 208 | 198 | 198 | 198 | 198 | 198 | 190 | 202 | 202 | 198 | 198 | E B 218 | 202 | E B 198 | E B 260 | E B 274 | E B 290 |
| 14 | E B 266 | E B 254 | E B 254 | E B 234 | 216 | E B 192 | 206 | 192 | 202 | 202 | 198 | 186 | 186 | 192 | 204 | 204 | 196 | 196 | E B 196 | E B 206 | E A 246 | E B 200 | E B 216 | E B 278 |
| 15 | E B 278 | E B 278 | E B 278 | E B 260 | E B 228 | 190 | 218 | 194 | 194 | 204 | 198 | 198 | 198 | 184 | A | 196 | 196 | 196 | E B 206 | E B 228 | E B 232 | E B 206 | 220 | E B 220 |
| 16 | E B 250 | E A 300 | E A 310 | E B 296 | E B 280 | E B 230 | 202 | 188 | 186 | 182 | 194 | 194 | 202 | 184 | 198 | 198 | 198 | 188 | E B 202 | E B 212 | E B 212 | E B 212 | 212 | E B 292 |
| 17 | E B 252 | E B 252 | E B 232 | E A 232 | E B 222 | E B 234 | 210 | 200 | 200 | 202 | 192 | 192 | 196 | 184 | 192 | 192 | 192 | 200 | E A 218 | 206 | E B 222 | E B 212 | E B 268 | A |
| 18 | E B 292 | E A 298 | E B 278 | E A 278 | E B 250 | 220 | 206 | 188 | 196 | 196 | 196 | 182 | 174 | A | 190 | 196 | 196 | 180 | E B 220 | E B 190 | E A 258 | E B 234 | E B 234 | E B 270 |
| 19 | E A 294 | E B 272 | E B 284 | E B 240 | 200 | 200 | 212 | 196 | 196 | 196 | 196 | 192 | 180 | 194 | 194 | 202 | 202 | 188 | 194 | E B 236 | 206 | 196 | E B 234 | E B 310 |
| 20 | E B 278 | E B 282 | E B 260 | E B 226 | E B 236 | E B 276 | 190 | 190 | 190 | 202 | 202 | 186 | 186 | 186 | 190 | 216 | 188 | 188 | 188 | E B 210 | E B 246 | E B 226 | E B 226 | E B 252 |
| 21 | E B 264 | E B 264 | E B 260 | E B 252 | E B 220 | E B 220 | 202 | 198 | 198 | 198 | 196 | 182 | 182 | 192 | 192 | 210 | 196 | 186 | E B 212 | E B 212 | E B 196 | E B 196 | E B 262 | E B 278 |
| 22 | E B 278 | E B 278 | E B 262 | E B 226 | E B 208 | E B 208 | E B 224 | 196 | 206 | 198 | 202 | 184 | 180 | 204 | 212 | 212 | 202 | 198 | 198 | E B 198 | E B 240 | E B 256 | E B 256 | E B 246 |
| 23 | E B 264 | E B 278 | E B 246 | E B 238 | E B 238 | E B 216 | 192 | 192 | 192 | 200 | 192 | 192 | 192 | 192 | 192 | 198 | 202 | 192 | E B 200 | E B 218 | E B 218 | E B 250 | E B 294 | E B 248 |
| 24 | E B 240 | E B 240 | E B 246 | E B 246 | E B 246 | E B 246 | E B 212 | 204 | 198 | 198 | 198 | 176 | 210 | 210 | 202 | 192 | 210 | 186 | E B 198 | E B 198 | E B 204 | E B 228 | E B 310 | E B 300 |
| 25 | E B 280 | E B 276 | E B 268 | E B 268 | E B 234 | E B 220 | 202 | 184 | 184 | 204 | 186 | 202 | 178 | 184 | 184 | 206 | 202 | 196 | E B 254 | 202 | E B 216 | E B 232 | E B 258 | E B 262 |
| 26 | E B 262 | E B 280 | E B 230 | 230 | E B 230 | E B 230 | 214 | 196 | 194 | 194 | 194 | 210 | 210 | 194 | 186 | 186 | 198 | 202 | 202 | E B 210 | E B 206 | E B 280 | E B 292 | E B 304 |
| 27 | E B 228 | E B 228 | E B 230 | E A 230 | E B 274 | E B 266 | 206 | 190 | 196 | A | 196 | 186 | 186 | 186 | 184 | 200 | 200 | A | 200 | E A 226 | E B 226 | E B 238 | E B 264 | E B 300 |
| 28 | E B 274 | E B 200 | E B 208 | E B 208 | E B 286 | E B 286 | E B 264 | 196 | 196 | 204 | 204 | 186 | 186 | 194 | 198 | 210 | 204 | 204 | 204 | 218 | E B 204 | E B 260 | E B 290 | E B 272 |
| 29 | E B 272 | E B 296 | E B 274 | E B 234 | E B 256 | E B 230 | 216 | 208 | 206 | 174 | 206 | 196 | 218 | 192 | 202 | 194 | 194 | 194 | E B 252 | 200 | E B 218 | E B 264 | E A 372 | E B 296 |
| 30 | E B 284 | E B 284 | E B 272 | E B 252 | E B 240 | E B 240 | 258 | 208 | 200 | 192 | 192 | 192 | 190 | 186 | 190 | 190 | 202 | 202 | E B 218 | E B 210 | E B 198 | E B 288 | E B 306 | E B 270 |
| 31 | E B 208 | E B 276 | E A 326 | E A 292 | E A 278 | E B 278 | E B 278 | 216 | 216 | 186 | 194 | 194 | 188 | 188 | 198 | 198 | 198 | 204 | E B 212 | E B 212 | E B 210 | E B 266 | E B 318 | E B 282 |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 30 | 28 | 31 | 30 | 30 | 30 | 29 | 30 | 31 | 30 | 31 | 31 | 30 | 31 | 31 | 30 |
| MED | E B 270 | E B 272 | E B 260 | E B 240 | E B 228 | E B 220 | 209 | 194 | 197 | 198 | 196 | 192 | 188 | 192 | 196 | 201 | 198 | 196 | E B 204 | E B 212 | E B 216 | E B 228 | E B 258 | E B 275 |
| U Q | E B 280 | E B 282 | E B 278 | E B 260 | E B 250 | E B 240 | E B 238 | 200 | 200 | 202 | 200 | 198 | 198 | 194 | 202 | 204 | 202 | 200 | E B 220 | E B 222 | E B 232 | E B 256 | E B 290 | E B 290 |
| L Q | E B 250 | E B 254 | E B 246 | E B 226 | E B 216 | 200 | 206 | 190 | 194 | 191 | 192 | 186 | 182 | 184 | 190 | 196 | 196 | 188 | E B 198 | E B 202 | E B 206 | E B 212 | E B 228 | E B 252 |

**DEC.2021** h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Kokubunji

**DEC.2021** 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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | B | 118 | A | A | A | A | A | 108 | 108 | 108 | 118 | B | | | | | | |
| 2 | | | | | | | B | B | A | A | A | A | A | A | A | A | A | B | | | | | | |
| 3 | | | | | | | B | 130 | 118 | 114 | 114 | A | 114 | A | A | A | 114 | B | | | | | | |
| 4 | | | | | | | B | 122 | 122 | 118 | 118 | A | 118 | 118 | 118 | 118 | B | B | | | | | | |
| 5 | | | | | | | B | 134 | 126 | 114 | A | 114 | 112 | 112 | A | | A | B | | | | | | |
| 6 | | | | | | | B | 112 | A | A | A | 112 | 112 | A | A | A | A | B | | | A | | | |
| 7 | | | | | | | B | 132 | 124 | 112 | 112 | 112 | 112 | 112 | 112 | 112 | 112 | | | | | | | |
| 8 | | | | | | | B | B | 112 | 112 | A | 112 | 112 | 112 | 112 | 112 | A | | | | | | | |
| 9 | | | | | | | | 122 | 122 | 118 | 116 | 116 | 108 | 108 | 108 | 108 | A | | | | | | | |
| 10 | | | | | | | B | B | 114 | 114 | 114 | 114 | A | A | 114 | 114 | A | | | | | | | |
| 11 | | | | | | | B | B | 114 | 114 | 114 | 114 | 112 | 112 | 114 | 114 | 114 | B | | | | | | |
| 12 | | | | | | | B | 136 | 112 | A | 112 | 112 | 112 | 112 | 112 | 112 | 112 | B | | | | | | |
| 13 | | | | | | | B | 128 | 116 | 112 | 112 | 112 | 112 | 112 | 112 | A | A | | | | | | | |
| 14 | | | | | | | B | 116 | 116 | 110 | 108 | A | 108 | 108 | 108 | 108 | 120 | B | | | | | | |
| 15 | | | | | | | B | 114 | 114 | 114 | 108 | A | A | 108 | 108 | A | A | B | | | | | | |
| 16 | | | | | | | B | E 140 | 112 | 112 | 112 | 112 | 112 | 112 | 112 | 112 | 112 | B | | | | | | |
| 17 | | | | | | | B | B | 112 | 112 | 112 | A | 112 | 112 | 112 | A | A | B | | | | | | |
| 18 | | | | | | | B | B | 112 | 112 | A | A | A | 112 | 110 | 110 | 108 | B | | | | | | |
| 19 | | | | | | | B | 122 | 118 | 118 | 118 | 118 | 112 | 112 | 112 | 112 | 112 | B | | | | | | |
| 20 | | | | | | | B | B | 112 | 112 | A | 112 | 112 | 110 | 110 | 110 | B | B | | | | | | |
| 21 | | | | | | | B | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 110 | B | | | | | | |
| 22 | | | | | | | B | B | 110 | A | 110 | 110 | 110 | 110 | 110 | A | A | B | | | | | | |
| 23 | | | | | | | B | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 112 | B | | | | | | |
| 24 | | | | | | | B | 112 | 112 | 112 | A | 112 | 112 | 112 | 112 | 110 | 110 | B | | | | | | |
| 25 | | | | | | | B | | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 110 | B | | | | | | |
| 26 | | | | | | | B | B | A | 110 | A | A | 110 | 110 | 110 | 110 | 110 | B | | | | | | |
| 27 | | | | | | | B | B | 108 | 108 | 108 | 108 | 108 | 108 | 108 | A | 108 | B | | | | | | |
| 28 | | | | | | | | B | A | A | 108 | 108 | 108 | 108 | 108 | 108 | A | | | | | | | |
| 29 | | | | | | | B | B | 108 | 108 | 108 | 108 | 108 | 108 | 108 | 108 | 108 | B | | | | | | |
| 30 | | | | | | | B | B | 108 | 108 | 108 | 108 | 108 | 108 | 108 | 108 | 108 | B | | | | | | |
| 31 | | | | | | | B | B | 108 | A | 108 | 108 | 108 | 108 | A | 108 | 108 | 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 | 26 | 24 | 22 | 22 | 26 | 27 | 26 | 22 | 18 | | | | | | | |
| MED | | | | | | | | 121 | 112 | 112 | 111 | 112 | 112 | 110 | 110 | 110 | 111 | | | | | | | |
| U Q | | | | | | | | 131 | 116 | 114 | 114 | 112 | 112 | 112 | 112 | 112 | 112 | | | | | | | |
| L Q | | | | | | | | 113 | 110 | 110 | 108 | 110 | 108 | 108 | 108 | 108 | 108 | | | | | | | |

**DEC.2021** h'E (KM)

# IONOSPHERIC DATA STATION Kokubunji

**DEC.2021** h'Es (KM) 135°E MEAN TIME (G.M.T. + 9 H)

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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 92 | 92 | 98 | 98 | 98 | 98 | 92 | G | 94 | 94 | 94 | 86 | 86 | G | G | G | G | 80 | 80 | 80 | 80 | B | B | B |
| 2 | B | B | B | B | B | B | B | 124 | 102 | 96 | 96 | 92 | 80 | 86 | 86 | 84 | 84 | 84 | 84 | B | 84 | B | 84 | 84 |
| 3 | B | 88 | 88 | 84 | 84 | 84 | 82 | 130 | 118 | 114 | G | 98 | G | 90 | 88 | 84 | G | 80 | 82 | B | 120 | 120 | B | 94 |
| 4 | B | B | B | B | 90 | B | B | G | G | G | G | 90 | G | G | G | G | B | 90 | B | B | B | B | B | B |
| 5 | B | B | B | B | B | B | B | G | 150 | 122 | 104 | G | G | G | 92 | 92 | 92 | 92 | 90 | 84 | 84 | 84 | 84 | 98 |
| 6 | 98 | 90 | 90 | 90 | 90 | 90 | B | G | 90 | 90 | 90 | G | G | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 92 | 92 |
| 7 | B | 92 | 100 | 94 | 94 | 94 | B | G | G | G | 144 | 114 | 152 | G | G | G | G | 88 | 88 | 88 | 88 | 88 | 88 | 88 |
| 8 | 88 | 88 | B | 92 | B | B | B | B | 134 | G | 98 | G | G | G | G | 116 | 72 | 84 | 84 | 84 | 84 | 84 | 84 | 84 |
| 9 | 84 | 84 | 84 | 84 | 84 | B | B | G | G | 146 | G | 146 | G | G | G | G | 76 | 76 | 76 | B | B | B | 76 | B |
| 10 | B | 76 | 74 | 74 | 78 | 86 | 86 | 86 | G | G | 152 | 166 | 90 | 90 | G | G | 80 | 80 | 80 | B | B | B | 90 | B |
| 11 | B | B | B | 90 | 90 | B | B | 90 | 112 | G | 142 | 136 | 158 | 110 | 122 | 124 | G | B | B | B | B | B | B | B |
| 12 | B | B | 82 | B | B | 82 | B | G | G | 92 | G | 158 | G | G | G | G | G | B | B | B | B | B | B | B |
| 13 | B | 96 | B | B | B | 96 | B | G | G | 132 | 154 | G | G | G | 108 | 84 | 84 | 84 | 84 | B | 84 | 84 | B | B |
| 14 | B | 84 | 84 | 92 | 92 | B | B | G | 146 | 134 | 134 | 88 | G | G | G | G | G | 82 | 82 | 82 | 86 | B | 86 | B |
| 15 | 86 | B | 86 | 86 | 86 | 86 | B | G | G | G | G | 92 | 92 | G | 156 | 80 | 86 | B | 86 | B | 86 | B | B | B |
| 16 | 96 | 84 | 84 | 86 | B | 86 | 86 | 100 | G | G | G | 124 | 124 | G | 124 | G | G | B | B | 96 | B | 96 | 96 | 96 |
| 17 | 96 | 96 | 96 | 96 | 96 | 96 | B | B | G | G | G | 96 | G | 108 | G | 80 | 80 | 80 | 80 | 80 | B | 92 | 92 | 90 |
| 18 | 90 | 86 | 86 | 86 | 86 | 94 | B | 84 | G | G | 98 | 98 | 98 | 146 | G | G | G | 88 | 88 | 88 | 88 | 92 | 92 | 90 |
| 19 | 90 | 90 | 90 | 90 | 90 | B | B | G | G | G | G | G | G | G | G | G | 136 | 100 | 100 | 100 | 100 | 100 | B | B |
| 20 | B | B | 94 | B | B | 78 | B | B | G | 148 | 102 | G | G | G | G | G | B | B | 94 | 94 | B | B | B | 94 |
| 21 | 94 | 86 | 86 | 86 | B | B | B | G | G | G | G | G | G | G | G | G | G | 86 | B | 86 | 86 | 86 | 86 | 86 |
| 22 | 86 | 86 | 80 | 80 | B | B | B | B | G | 96 | G | G | G | G | G | 96 | 96 | 104 | 102 | 100 | 100 | B | B | B |
| 23 | B | B | B | B | B | B | B | G | G | 140 | G | G | G | G | G | G | G | 78 | B | B | B | B | B | B |
| 24 | 84 | 84 | 84 | 84 | 84 | B | B | G | G | G | 90 | G | G | G | G | G | G | B | B | B | B | B | B | 90 |
| 25 | 90 | 90 | 90 | B | B | 90 | B | B | G | G | G | G | G | G | G | G | G | B | 90 | 90 | 90 | 90 | B | B |
| 26 | 90 | 90 | B | 90 | 90 | 90 | 86 | B | 98 | G | 98 | 98 | G | G | G | G | G | B | 98 | B | B | B | B | 88 |
| 27 | 80 | B | 80 | 88 | B | 88 | B | B | G | 156 | 152 | 116 | G | G | G | 84 | 128 | 80 | 80 | 80 | B | B | B | B |
| 28 | 80 | B | B | B | 80 | 92 | 92 | 92 | 102 | 100 | G | G | G | G | 176 | 162 | 80 | 80 | 80 | 80 | B | B | B | B |
| 29 | B | B | B | B | B | B | B | B | G | G | 140 | 140 | 168 | 146 | G | G | 146 | 92 | 92 | B | 92 | 92 | 92 | 90 |
| 30 | 90 | 90 | 90 | B | B | B | B | B | G | 116 | G | G | G | G | G | G | G | 94 | B | B | B | B | B | B |
| 31 | B | 80 | 80 | 80 | 80 | 80 | 80 | B | 114 | 102 | G | G | G | G | 86 | G | G | 82 | B | 90 | B | 90 | 90 | B |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 17 | 20 | 21 | 20 | 17 | 17 | 7 | 7 | 11 | 16 | 16 | 17 | 9 | 8 | 10 | 12 | 14 | 23 | 22 | 17 | 16 | 14 | 14 | 14 |
| MED | 90 | 88 | 86 | 87 | 90 | 90 | 86 | 92 | 112 | 115 | 103 | 98 | 98 | 99 | 100 | 86 | 85 | 84 | 85 | 88 | 87 | 90 | 89 | 90 |
| U Q | 93 | 90 | 90 | 91 | 91 | 94 | 92 | 124 | 134 | 137 | 143 | 138 | 155 | 128 | 124 | 106 | 96 | 90 | 90 | 92 | 91 | 92 | 92 | 94 |
| L Q | 85 | 84 | 83 | 84 | 84 | 85 | 82 | 86 | 98 | 96 | 97 | 92 | 88 | 89 | 88 | 84 | 80 | 80 | 80 | 81 | 84 | 86 | 84 | 88 |

# IONOSPHERIC DATA STATION Kokubunji

**DEC.2021** TYPES OF Es 135°E MEAN TIME (G.M.T. + 9 H)

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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | F1 | F1 | F2 | F2 | F2 | F2 | L1 | | L6 | L3 | L2 | L3 | L3 | | | | | L5 | F2 | F1 | F2 | | | |
| 2 | | | | | | | | C2 | L3 | L2 | L2 | L2 | L2 | L1 | L2 | L3 | L2 | L3 | F2 | | F1 | | F1 | F1 |
| 3 | | F2 | F2 | F1 | F2 | F1 | L1 | C1 | C1 | C2 | | C2 | | L3 | L5 | L4 | | L1 | F1 | | F1 | F2 | | F1 |
| 4 | | | | | F1 | | | | | | | L2 | | | | | | L2 | | | | | | |
| 5 | | | | | | | | | H1 | C2 | L3 | | | | L4 | L2 | L2 | L5 | F5 | F3 | F2 | F2 | F2 | F2 |
| 6 | F2 | F4 | F2 | F2 | F2 | F1 | | | L4 | L2 | L3 | | | L2 | L3 | L3 | L2 | L1 | F2 | F4 | F5 | F4 | F2 | F3 |
| 7 | | F1 | F2 | F1 | F1 | F1 | | | | | H2 | C2 | H1 | | | | | L2 | F2 | F1 | F1 | F2 | F2 | F2 |
| 8 | F2 | F1 | | F1 | | | | | H2 | | L2 | | | | | C1 | L2 | L1 | F2 | F1 | F2 | F2 | F2 | F2 |
| 9 | F2 | F1 | F1 | F2 | F2 | | | | | H2 | | H1 | | | | | L1 | L2 | F2 | | | | F1 | |
| 10 | | F1 | F1 | F3 | F1 | F1 | L1 | L1 | | | H1 L2 | H1 | L2 | L2 | | | L2 | L2 | F2 | | | | F2 | |
| 11 | | | | F1 | F1 | | | L1 | C1 | | H1 | H2 | H1 | C1 | C1 | C2 | | | | | | | | |
| 12 | | | F1 | | | F1 | | | | L2 | | H1 | | | | | | | | | | | | |
| 13 | | F1 | | | | F3 | | | | H1 | H1 | | | | C1 | L3 | L2 | L3 | F2 | | F1 | F1 | | |
| 14 | | F2 | F2 | F1 | F1 | | | | H1 | H2 | H1 | L2 | | | | | | L2 | F1 | F2 | F3 | | F2 | |
| 15 | F1 | | F2 | F2 | F2 | F1 | | | | | | L2 | L2 | | H1 | L2 | L2 | | F1 | | F2 | | | |
| 16 | F2 | F3 | F4 | F2 | | F3 | L1 | L1 | | | | C1 | C1 | | C1 | | | | | F2 | | F2 | F5 | F5 |
| 17 | F2 | F5 | F3 | F4 | F1 | F2 | | | | | | L2 | | C1 | | L6 | L4 | L4 | L6 | F3 | | F1 | F3 | F5 |
| 18 | F3 | F3 | F2 | F2 | F2 | F1 | | L1 | | | L1 | L2 | L2 | H1 | | | | L3 | F1 | F1 | F4 | F2 | F3 | F2 |
| 19 | F2 | F2 | F2 | F2 | F1 | | | | | | | | | | | | H1 | L1 | F2 | F2 | F2 | F1 | | |
| 20 | | | F1 | | | F1 | | | | H1 | L2 | | | | | | | | F1 | F1 | | | | F2 |
| 21 | F2 | F2 | F1 | F1 | | | | | | | | | | | | | | L1 | | F1 | F1 | F1 | F1 | F2 |
| 22 | F2 | F3 | F2 | F2 | | | | | | L1 | | | | | | L1 | L1 | L1 | F1 | F2 | F1 | | | |
| 23 | | | | | | | | | | H1 | | | | | | | | L3 | | | | | | |
| 24 | F2 | F2 | F1 | F1 | F1 | | | | | | L2 | | | | | | | | | | | | | F1 |
| 25 | F1 | F2 | F1 | | | F1 | | | | | | | | | | | | | F2 | F1 | F1 | F1 | | |
| 26 | F1 | F1 | | F1 | F2 | F2 | L1 | | L2 | | L1 | L1 | | | | | | | F1 | | | | | F1 |
| 27 | F1 | | F2 | F2 | | F2 | | | | H1 | H1 | C1 | | | | L2 | C1 | L4 | F4 | F2 | | | | |
| 28 | F1 | | | | F1 | F1 | F2 | L1 | L2 | L2 | | | | | H1 | H1 | L3 | L2 | F1 | F1 | | | | |
| 29 | | | | | | | | | | | H2 | H1 | H1 | H1 | | | H1 | L2 | F2 | | F2 | F2 | F3 | F2 |
| 30 | F1 | F1 | F2 | | | | | | | C1 | | | | | | | | L1 | | | | | | |
| 31 | | L5 | F4 | F4 | F4 | F3 | L1 | | C2 | L1 | | | | | L3 | | | L2 | | 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.2021** TYPES OF Es

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Yamagawa

**DEC.2021** fxI (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | X 39 | X 37 | X 39 | X 41 | X 39 | X 38 | | | | | | | | | | | | | X 53 | X 39 | X 42 | X 39 | X 39 | X 37 |
| 2 | X 37 | X 38 | X 48 | X 44 | X 35 | 33 | X 28 | X 50 | | | | | | | | | | | X 45 | X 42 | X 45 | X 40 | X 36 | X 34 |
| 3 | X 35 | X 37 | X 35 | X 37 | X 44 | X 26 | | | | | | | | | | | | | X 42 | X 32 | X 32 | X 35 | X 35 | X 35 |
| 4 | X 36 | X 33 | X 37 | X 34 | X 34 | X 32 | X 30 | X 48 | | | | | | | | | | | X 47 | X 48 | X 36 | X 35 | X 28 | X 30 |
| 5 | X 32 | X 34 | X 35 | X 37 | X 41 | X 38 | | | | | | | | | | | | | X 40 | X 34 | A | X 34 | X 35 | X 32 |
| 6 | X 36 | X 36 | X 36 | X 36 | X 38 | X 34 | | X 50 | | | | | | | | | | | X 38 | X 33 | X 32 | X 33 | A | X 31 |
| 7 | X 33 | X 35 | X 35 | X 35 | X 36 | X 36 | X 32 | | | | | | | | | | | | X 42 | X 30 | X 36 | X 32 | 35 | X 32 |
| 8 | X 33 | X 34 | X 34 | X 37 | X 40 | X 32 | | | | | | | | | | | | | X 36 | X 30 | X 35 | X 35 | X 33 | X 33 |
| 9 | X 33 | X 35 | X 35 | X 36 | X 38 | X 42 | | | | | | | | | | | | | X 41 | X 36 | X 40 | X 34 | X 30 | X 30 |
| 10 | X 32 | X 34 | X 34 | X 34 | X 34 | X 34 | | X 39 | | | | | | | | | | | X 47 | A | X 34 | X 32 | X 32 | X 32 |
| 11 | X 31 | X 34 | X 34 | X 32 | X 35 | X 38 | X 30 | X 38 | | | | | | | | | | | X 39 | X 35 | X 32 | X 32 | X 36 | X 36 |
| 12 | X 34 | X 36 | X 36 | X 36 | X 36 | X 36 | | | | | | | | | | | | | X 38 | X A | A | A | X 33 | X 33 |
| 13 | X 33 | X 34 | X 36 | X 36 | X 38 | X 35 | | X 41 | | | | | | | | | | | A | X 39 | X 40 | X 30 | X 31 | X 33 |
| 14 | X 36 | X 36 | X 37 | X 37 | X 37 | X 35 | | | | | | | | | | | | | X 50 | X 35 | X 31 | X 37 | X 37 | X 32 |
| 15 | X 33 | X 35 | X 36 | X 37 | X 39 | X 34 | | | | | | | | | | | | | X 46 | X 38 | X 36 | X 42 | X 34 | X 32 |
| 16 | X 31 | X 34 | X 35 | X 35 | X 34 | X 37 | X 41 | X 42 | | | | | | | | | | | X 45 | X 39 | X 38 | X 36 | X 37 | X 37 |
| 17 | X 37 | X 39 | X 40 | X 38 | X 44 | X 34 | | | | | | | | | | | | | | X 51 | X 41 | X 39 | X 35 | X 33 |
| 18 | X 34 | X 36 | X 36 | X 36 | X 39 | X 39 | | | | | | | | | | | | | X 46 | X 41 | X 48 | X 41 | X 38 | X 32 |
| 19 | X 32 | X 34 | X 34 | X 38 | X 38 | X 34 | | X 44 | | | | | | | | | | | X 59 | A | X 43 | X 52 | X 44 | X 31 |
| 20 | X 34 | X 35 | X 35 | X 36 | X 38 | X 34 | | | | | | | | | | | | | X 45 | X 46 | X 46 | X 51 | X 51 | X 35 |
| 21 | X 37 | X 38 | X 38 | X 42 | X 44 | X 40 | | | | | | | | | | | | | | X 49 | X 49 | X 41 | X 31 | X 32 |
| 22 | X 35 | X 38 | X 40 | X 42 | X 44 | X 33 | X 33 | X 49 | | | | | | | | | | | X 55 | X 45 | X 45 | X 41 | X 38 | X 36 |
| 23 | X 38 | X 39 | X 43 | X 41 | X 36 | X 36 | | | | | | | | | | | | | X 51 | X 44 | X 37 | X 35 | X 35 | 39 |
| 24 | 40 | X 38 | X 40 | X 40 | X 41 | X 32 | | | | | | | | | | | | | X 64 | X 45 | X 47 | X 42 | X 34 | X 36 |
| 25 | 40 | 46 | X 42 | X 44 | X 50 | 49 | | | | | | | | | | | | | X 53 | X 43 | X 50 | X 47 | X 44 | 42 |
| 26 | 40 | X 39 | X 40 | X 40 | X 40 | X 39 | | | | | | | | | | | | | X 59 | X 55 | X 45 | X 43 | X 38 | X 38 |
| 27 | X 38 | X 38 | X 38 | 45 | 45 | X 40 | 46 | | | | | | | | | | | | X 50 | X 45 | X 48 | X 50 | X 49 | X 42 |
| 28 | X 42 | X 46 | X 34 | X 30 | X 31 | X 31 | X 31 | X 43 | | | | | | | | | | | X 61 | X 52 | X 59 | X 51 | X 33 | X 34 |
| 29 | X 36 | X 34 | X 36 | X 39 | X 39 | X 38 | X 30 | X 42 | | | | | | | | | | | X 62 | X 52 | X 47 | X 40 | X 35 | X 33 |
| 30 | X 35 | X 36 | X 37 | X 40 | X 40 | X 34 | | X 40 | | | | | | | | | | | X 71 | X 56 | X 48 | X 40 | X 40 | X 41 |
| 31 | X 41 | X 37 | X 37 | X 43 | X 35 | A | | X 36 | | | | | | | | | | | X 50 | X 38 | X 40 | X 35 | X 34 | X 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 | 31 | 31 | 31 | 31 | 31 | 30 | 9 | 13 | | | | | | | | | | | 28 | 28 | 29 | 30 | 30 | 31 |
| MED | X 35 | X 36 | X 36 | X 37 | X 38 | X 35 | X 31 | X 42 | | | | | | | | | | | X 47 | X 42 | X 41 | X 39 | X 35 | X 33 |
| U Q | X 38 | X 38 | X 39 | X 41 | X 41 | X 38 | X 37 | X 48 | | | | | | | | | | | X 54 | X 47 | X 47 | X 42 | X 38 | X 36 |
| L Q | X 33 | X 34 | X 35 | X 36 | X 36 | X 34 | X 30 | X 40 | | | | | | | | | | | X 42 | X 36 | X 36 | X 35 | X 33 | X 32 |

# IONOSPHERIC DATA STATION Yamagawa

**DEC.2021** foF2 (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 33 | 31 | 33 | 35 | 33 | 32 | 27 | 41 | 59 | 55 | 69 | 100 | 82 | 71 | 66 | 74 | 88 | 71 | 47 | 33 | 36 | 33 | 33 | 31 |
| 2 | 31 | 32 | 42 | 38 | 29 | F | 22 | 44 | 67 | 78 | 84 | 85 | 75 | 69 | 79 | 67 | 74 | 59 | 39 | 36 | 39 | 34 | 30 | 28 |
| 3 | 29 | 31 | 29 | 31 | 38 | 20 | 22 | 36 | 58 | 66 | 74 | 80 | 76 | 70 | 83 | 68 | 64 | 54 | 36 | 26 | 26 | 29 | 29 | 29 |
| 4 | 30 | 27 | 31 | 28 | 28 | 26 | 24 | 42 | 60 | 71 | 83 | 111 | 92 | 78 | 71 | 75 | 64 | 48 | 41 | 42 | 30 | 29 | 22 | 24 |
| 5 | 26 | 28 | 29 | 31 | 35 | 32 | 21 | 37 | 58 | 60 | 66 | 82 | 71 | 67 | 73 | 64 | 64 | 51 | 34 | 28 | A | 28 | 30 | 26 |
| 6 | 30 | 30 | 30 | 30 | 32 | 28 | 27 | 44 | 54 | 52 | 71 | 74 | 70 | 68 | 63 | 60 | 63 | 55 | 32 | 28 | 26 | 27 | A | 25 |
| 7 | 27 | 29 | 29 | 29 | 30 | 30 | 26 | 37 | 60 | 60 | 71 | 76 | 73 | 70 | 73 | 66 | 58 | 55 | 36 | 24 | 30 | 26 | F | 26 |
| 8 | 27 | 28 | 28 | 31 | 34 | 26 | 21 | 35 | 60 | 56 | 59 | 68 | 76 | 95 | 94 | R 83 | 66 | 47 | 30 | 24 | 29 | 29 | 27 | 27 |
| 9 | 27 | 29 | 29 | 30 | 32 | 36 | 26 | 32 | 50 | 58 | 56 | 67 | 62 | 59 | 59 | 61 | 61 | 53 | 35 | 30 | 34 | 28 | 24 | 24 |
| 10 | 26 | 28 | 28 | 28 | 28 | 28 | 29 | 33 | 48 | 50 | 52 | 58 | 64 | 65 | 61 | 55 | 55 | 57 | 41 | A | 28 | 26 | 26 | 26 |
| 11 | 25 | 28 | 26 | 26 | 29 | 32 | 24 | 32 | 50 | 54 | 54 | 62 | 57 | 59 | 61 | 57 | 60 | 65 | 33 | 29 | 26 | 26 | 30 | 30 |
| 12 | 28 | 30 | 30 | 30 | 30 | 30 | 23 | 35 | 54 | 60 | 62 | 60 | 64 | 65 | 61 | 54 | 58 | 62 | 32 | A | A | A | 27 | 27 |
| 13 | 27 | 28 | 30 | 30 | 32 | 29 | 28 | 35 | 50 | 59 | 62 | 72 | 66 | 66 | 62 | 55 | 54 | 59 | A | 33 | 34 | 24 | 25 | 27 |
| 14 | 30 | 30 | 31 | 31 | 31 | 29 | 24 | 33 | 56 | 61 | 67 | 60 | 71 | 71 | 55 | 61 | 68 | 56 | 44 | 29 | 25 | 31 | 31 | 26 |
| 15 | 27 | 29 | 30 | 31 | 33 | 28 | 23 | 34 | 58 | 59 | 60 | 62 | 66 | 71 | 66 | 66 | 64 | 50 | 40 | 32 | 30 | 36 | 28 | 26 |
| 16 | 25 | 28 | 29 | 29 | 28 | 31 | 35 | 36 | 59 | 61 | 70 | 77 | 81 | 62 | 71 | 56 | 66 | 64 | 39 | 33 | 32 | 30 | 31 | 31 |
| 17 | 31 | 33 | 34 | 32 | 38 | 28 | 28 | 39 | 60 | 66 | 65 | 74 | 97 | 70 | 87 | 89 | 72 | 56 | 41 | 45 | 35 | 33 | 29 | 27 |
| 18 | 28 | 30 | 30 | 30 | 33 | 33 | 28 | 38 | 60 | 62 | 65 | 69 | 67 | 76 | 74 | 74 | 74 | 58 | 40 | 35 | 42 | 35 | 31 | 26 |
| 19 | 26 | 28 | 28 | 32 | 32 | 28 | 24 | 38 | 62 | 69 | 75 | 72 | 69 | 77 | 72 | 90 | 61 | 66 | 53 | A | 36 | 46 | 38 | 25 |
| 20 | 28 | 29 | 29 | 30 | 32 | 28 | 32 | 43 | 52 | 65 | 101 | 94 | 70 | 80 | 75 | 100 | 86 | 68 | 39 | 40 | 40 | 45 | 45 | 29 |
| 21 | 31 | 32 | 34 | 36 | 38 | 34 | 38 | 48 | 66 | 72 | 90 | 100 | 88 | 83 | 73 | 79 | 72 | 66 | 49 | 43 | 43 | 35 | 25 | 26 |
| 22 | 29 | 32 | 34 | 36 | 38 | 27 | 27 | 43 | 69 | 74 | 81 | 95 | 93 | 85 | 84 | 84 | 86 | 62 | 49 | 39 | 39 | 35 | 32 | 30 |
| 23 | 32 | 33 | 37 | 35 | 30 | 31 | 36 | 41 | 62 | 80 | 80 | 81 | 81 | 94 | 85 | 76 | 82 | 66 | 45 | 38 | 31 | 29 | 29 | F |
| 24 | F | 32 | 34 | 34 | 35 | 26 | 28 | 36 | 56 | 60 | 64 | 75 | 93 | 100 | 86 | 70 | 94 | 72 | 58 | 39 | 41 | 36 | 28 | 30 |
| 25 | F | F | 36 | 38 | 44 | F | 32 | 40 | 58 | 70 | 80 | 86 | 83 | 78 | 81 | 69 | 84 | 74 | 47 | 37 | 44 | 41 | 38 | F |
| 26 | F | 33 | 34 | 34 | 34 | 33 | 35 | 44 | 69 | 72 | 75 | 93 | 93 | 96 | 82 | 90 | 82 | 76 | 53 | 48 | 39 | 37 | 32 | 32 |
| 27 | 32 | 32 | 32 | F | F | 34 | F | 52 | 65 | 62 | 66 | 81 | 85 | 87 | 74 | 84 | 84 | 72 | 44 | 39 | 42 | 44 | 43 | 36 |
| 28 | 36 | 40 | 28 | 24 | 25 | 25 | 25 | 37 | 60 | 76 | 83 | 83 | 100 | R 123 | 120 | 108 | 100 | 69 | 55 | 46 | 52 | 45 | 27 | 28 |
| 29 | 30 | 28 | 30 | 33 | 33 | 32 | 24 | 36 | 59 | 68 | 68 | 71 | 101 | 87 | 77 | 77 | 77 | 72 | 56 | 46 | 41 | 34 | 29 | 27 |
| 30 | 29 | 31 | 31 | 34 | 34 | 28 | 27 | 34 | 65 | 82 | 80 | 73 | 80 | 87 | 83 | 80 | 62 | 72 | 65 | 50 | 42 | 34 | 34 | 35 |
| 31 | 35 | 31 | 31 | 37 | 29 | A | 24 | 29 | 60 | 70 | 72 | 66 | 80 | 75 | 66 | 58 | 62 | 57 | 44 | 32 | 34 | 29 | 28 | 28 |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 28 | 30 | 31 | 30 | 30 | 28 | 30 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 30 | 28 | 29 | 30 | 29 | 29 |
| MED | 29 | 30 | 30 | 31 | 32 | 29 | 26 | 37 | 59 | 62 | 70 | 75 | 76 | 75 | 73 | 70 | 66 | 62 | 41 | 36 | 35 | 33 | 29 | 27 |
| U Q | 31 | 32 | 34 | 34 | 34 | 32 | 28 | 42 | 62 | 71 | 80 | 85 | 88 | 87 | 83 | 83 | 82 | 69 | 49 | 41 | 41 | 36 | 32 | 30 |
| L Q | 27 | 28 | 29 | 30 | 30 | 28 | 24 | 35 | 56 | 59 | 64 | 68 | 69 | 68 | 66 | 61 | 62 | 55 | 36 | 30 | 30 | 29 | 27 | 26 |

# IONOSPHERIC DATA STATION Yamagawa

**DEC.2021** foF1 (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

| 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 | | | | | | | | | | L | L | L | L | A | U L 432 | L | L | | | | | | | |
| 2 | | | | | | | | | | L | L | L | L | | L | L | | | | | | | | |
| 3 | | | | | | | | | | L | L | L | L | L | L | L | | | | | | | | |
| 4 | | | | | | | | | | L | L | 444 | 444 | L | L | L | | | | | | | | |
| 5 | | | | | | | | | | | L | L | A | A | L | A | | | | | | | | |
| 6 | | | | | | | | | | | A | L | L | L | L | | | | | | | | | |
| 7 | | | | | | | | | | 332 | L | | 436 | L | L | L | A | | | | | | | |
| 8 | | | | | | | | | 260 | | 392 | A | L | 424 | L | | | | | | | | | |
| 9 | | | | | | | | | | | A | U L 408 | L | L | L | L | | | | | | | | |
| 10 | | | | | | | | | | A | | A | L | U L 444 | L | A | A | | | | | | | |
| 11 | | | | | | | | | | | L | L | | A | L | L | | | | | | | | |
| 12 | | | | | | | | | | | L | L | L | A | L | | | | | | | | | |
| 13 | | | | | | | | | | | L | L | L | L | L | L | | | | | | | | |
| 14 | | | | | | | | | | | | | L | | L | | | | | | | | | |
| 15 | | | | | | | | | | | L | L | U L 448 | | L | | | | | | | | | |
| 16 | | | | | | | | | | L | L | L | A | L | L | | | | | | | | | |
| 17 | | | | | | | | | | A | | L | | L | L | L | | | | | | | | |
| 18 | | | | | | | | | | | L | L | L | L | L | L | | | | | | | | |
| 19 | | | | | | | | | | | L | L | L | L | L | L | | | | | | | | |
| 20 | | | | | | | | | | | L | L | L | L | | L | | | | | | | | |
| 21 | | | | | | | | | | | L | L | L | L | L | L | | | | | | | | |
| 22 | | | | | | | | | | | | L | L | L | L | L | | | | | | | | |
| 23 | | | | | | | | | | | L | L | L | L | L | L | | | | | | | | |
| 24 | | | | | | | | | | L | | A | U L 468 | L | L | | | | | | | | | |
| 25 | | | | | | | | | | | L | L | L | L | L | | | | | | | | | |
| 26 | | | | | | | | | | | L | 472 | L | L | L | L | L | | | | | | | |
| 27 | | | | | | | | | | | A | L | L | L | | A | A | | | | | | | |
| 28 | | | | | | | | | | L | L | L | 476 | A | L | L | | | | | | | | |
| 29 | | | | | | | | | | L | L | L | | L | L | L | | | | | | | | |
| 30 | | | | | | | | | | | | L | L | L | L | L | | A | | | | | | |
| 31 | | | | | | | | | | | L | L | L | L | L | A | 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 | 1 | 1 | 3 | 5 | 2 | 1 | | | | | | | | | |
| MED | | | | | | | | | 260 | 332 | 392 | 444 | 448 | 434 | U L 432 | | | | | | | | | |
| U Q | | | | | | | | | | | | 472 | 472 | | | | | | | | | | | |
| L Q | | | | | | | | | | | | U L 408 | 440 | | | | | | | | | | | |

**DEC.2021** foF1 (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Yamagawa

**DEC.2021** foE (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | B | B | U R 240 | U A 272 | 308 | 320 | 328 | A | A | U R 292 | A | B | | | | | | |
| 2 | | | | | | | | | U A 244 | U R 280 | A | A | A | A | A | A | A | B | | | | | | |
| 3 | | | | | | | B | B | U R 248 | A | A | A | U A 324 | U R 324 | A | U R 280 | U R 256 | B | | | | | | |
| 4 | | | | | | | | | U R 236 | U R 272 | A | A | U R 320 | U A 308 | A | A | U R 236 | B | | | | | | |
| 5 | | | | | | | B | B | U R 232 | A | A | A | A | A | A | A | A | B | | | | | | |
| 6 | | | | | | | B | | A | A | A | A | A | U R 316 | U R 304 | A | A | B | | | | | | |
| 7 | | | | | | | | B | U R 252 | U R 268 | U R 300 | U A 308 | A | U R 312 | U R 296 | U A 264 | A | B | | | | | | |
| 8 | | | | | | | B | B | 212 | U R 280 | U R 304 | U A 300 | U R 328 | 304 | U R 292 | A | A | B | | | | | | |
| 9 | | | | | | | B | B | 208 | 268 | U A 300 | A | U A 320 | 308 | U A 288 | U R 276 | U A 224 | B | | | | | | |
| 10 | | | | | | | B | | 196 | U A 248 | U A 288 | U A 300 | U A 304 | U A 304 | A 288 | U A 264 | A | B | | | | | | |
| 11 | | | | | | | | | U A 192 | 248 | 284 | A | 312 | 296 | A | U R 288 | A | B | | | | | | |
| 12 | | | | | | | B | B | 212 | U R 280 | U A 292 | U A 320 | U R 304 | 300 | U A 288 | U A 272 | A | B | | | | | | |
| 13 | | | | | | | B | | 200 | 256 | U A 296 | A | A | A | A | U R 280 | A | A | | | | | | |
| 14 | | | | | | | B | B | 204 | 260 | U A 292 | U R 312 | U R 340 | 316 | A | U R 280 | U R 252 | B | | | | | | |
| 15 | | | | | | | B | B | U R 236 | 268 | U R 304 | A | A | 316 | U R 308 | U R 288 | U R 256 | B | | | | | | |
| 16 | | | | | | | | | U R 220 | A | 300 | U R 316 | U R 332 | U R 316 | U R 316 | U A 280 | A | U R 196 | | | | | | |
| 17 | | | | | | | B | B | 196 | U R 288 | U A 316 | A | A | A | A | A | A | A | A | | | | | | |
| 18 | | | | | | | B | B | U R 228 | A | A | A | A | U R 332 | 344 | A | A | B | | | | | | |
| 19 | | | | | | | B | | 204 | U R 304 | A | A | A | U R 320 | A | U R 284 | U R 260 | U R 192 | | | | | | |
| 20 | | | | | | | B | B | U A 204 | 276 | A | A | A | U R 340 | U R 320 | U R 300 | U R 248 | B | | | | | | |
| 21 | | | | | | | B | B | U R 204 | U R 284 | U R 304 | R 348 | 348 | U R 336 | U R 320 | U R 292 | U R 268 | U R 200 | B | | | | | |
| 22 | | | | | | | | | U R 220 | 284 | 312 | U R 332 | U R 344 | U R 340 | 332 | U R 308 | U R 264 | A | | | | | | |
| 23 | | | | | | | B | B | U A 208 | U R 272 | A | U R 332 | U R 348 | U R 336 | U R 324 | U R 296 | 260 | B | | | | | | |
| 24 | | | | | | | B | B | U R 224 | U R 264 | U R 296 | U A 320 | 336 | U R 336 | U R 320 | U R 296 | U R 244 | A | | | | | | |
| 25 | | | | | | | B | B | A | U R 276 | A | A | U R 356 | A | A | A | U R 260 | B | | | | | | |
| 26 | | | | | | | B | B | U R 216 | A | U A 312 | A | A | A | U R 324 | U R 300 | U R 264 | B | | | | | | |
| 27 | | | | | | | B | B | U R 216 | 264 | U A 316 | A | A | U R 336 | A | 288 | U A 252 | U R 208 | | | | | | |
| 28 | | | | | | | | | A | R | A | A | U R 348 | A | A | U R 288 | U R 268 | B | | | | | | |
| 29 | | | | | | | | | 192 | U R 272 | A | U A 312 | 340 | U A 320 | U R 312 | U R 296 | 260 | B | | | | | | |
| 30 | | | | | | | B | | U R 208 | U A 264 | U R 312 | U R 340 | U R 340 | U R 332 | U R 308 | U R 292 | U A 264 | A | | | | | | |
| 31 | | | | | | | B | | 208 | U A 264 | A | A | A | U R 328 | A | A | U R 276 | U R 188 | | | | | | |
| | 00 | 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 | 24 | 18 | 13 | 18 | 23 | 17 | 22 | 18 | 5 | | | | | | |
| MED | | | | | | | | | U 212 | U 272 | U 302 | U 320 | U R 334 | U R 320 | U R 312 | U R 288 | U R 260 | U R 196 | | | | | | |
| U Q | | | | | | | | | U R 230 | U R 280 | U A 312 | U R 332 | U R 344 | U R 336 | U R 322 | U R 296 | U R 264 | U R 204 | | | | | | |
| L Q | | | | | | | | | 204 | 264 | U A 296 | U A 310 | U 320 | 308 | U 294 | U A 280 | U R 252 | U R 190 | | | | | | |

**DEC.2021** foE (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Yamagawa

**DEC.2021** 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

| 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 | JA 39 | EB 16 | EB 16 | EB 16 | EB 16 | EB 16 | EB 16 | EB 16 | G | 35 | 36 | 36 | 35 | JA 62 | JA 74 | JA 45 | JA 56 | EB 16 | JA 30 | EB 16 | JA 27 | 21 | 21 | EB 16 |
| 2 | 26 | 23 | 23 | EB 16 | EB 16 | EB 16 | 19 | 19 | 28 | GJ 44 | JA 72 | JA 70 | JA 79 | JA 65 | JA 62 | JA 40 | JA 28 | 25 | JA 25 | 27 | JA 24 | JA 27 | 22 | |
| 3 | 22 | JA 31 | JA 29 | 22 | JA 24 | EB 15 | 22 | 25 | G | 30 | 34 | JA 48 | 35 | G | JA 41 | G | GJ 33 | JA 33 | 24 | 23 | 21 | EB 15 | 21 | |
| 4 | EB 16 | EB 16 | EB 15 | EB 15 | JA 21 | 24 | 23 | EB 16 | G | GJ 39 | JA 49 | G | 35 | JA 38 | JA 33 | JA 56 | JA 53 | JA 33 | 26 | 26 | 22 | JA 26 | 20 | |
| 5 | 22 | 22 | 22 | EB 16 | EB 16 | EB 16 | 19 | 22 | GJ 36 | JA 43 | JA 90 | JA 99 | JA 60 | JA 45 | JA 60 | JA 44 | JA 50 | JA 42 | JA 28 | 36 | 26 | 22 | 22 | |
| 6 | 24 | JA 34 | 22 | JA 33 | 25 | 25 | JA 28 | 23 | JA 41 | JA 38 | JA 50 | JA 62 | JA 61 | G | G | JA 73 | JA 53 | JA 37 | JA 27 | 25 | JA 44 | JA 33 | JA 49 | JA 78 |
| 7 | JA 38 | JA 32 | JA 35 | 23 | 24 | 21 | JA 25 | 21 | G | G | 34 | 37 | JA 43 | JA 53 | G | 32 | JA 50 | JA 35 | JA 29 | JA 34 | JA 29 | 26 | 26 | JA 27 |
| 8 | 25 | JA 42 | JA 32 | EB 16 | EB 15 | EB 15 | 22 | EB 16 | G | G | 35 | 36 | G | 34 | G | 30 | JA 42 | JA 28 | EB 16 | EB 16 | JA 28 | EB 16 | EB 16 | 21 |
| 9 | 23 | JA 22 | JA 22 | 23 | EB 16 | EB 16 | EB 16 | 22 | 26 | 30 | 37 | JA 43 | 38 | 35 | 34 | G | 26 | JA 27 | EB 15 | JA 29 | 22 | 22 | EB 16 | JA 28 |
| 10 | 22 | 19 | 20 | JA 26 | JA 42 | EB 16 | EB 16 | EB 16 | 25 | 33 | 35 | 40 | 38 | 34 | 32 | 32 | 31 | 21 | 23 | JA 34 | 23 | EB 15 | EB 15 | EB 15 |
| 11 | EB 16 | EB 16 | EB 16 | EB 16 | EB 16 | 20 | EB 16 | JA 24 | 27 | 32 | 32 | 35 | 38 | 40 | 35 | JA 40 | JA 28 | 20 | 22 | JA 28 | JA 33 | 22 | EB 16 | EB 16 |
| 12 | 20 | 22 | JA 30 | EB 16 | EB 16 | 23 | EB 15 | EB 15 | 26 | G | 33 | 37 | G | 37 | 33 | 33 | 26 | JA 32 | JA 39 | JA 53 | JA 40 | JA 40 | JA 28 | JA 23 |
| 13 | JA 30 | JA 32 | JA 27 | 24 | 23 | 20 | JA 28 | JA 23 | G | 30 | 35 | JA 43 | JA 42 | JA 43 | JA 49 | G | JA 43 | JA 54 | JA 47 | JA 22 | 21 | EB 16 | JA 31 | JA 32 |
| 14 | EB 16 | JA 22 | JA 26 | 26 | JA 26 | 24 | JA 74 | JA 48 | 26 | 29 | 33 | 34 | G | 37 | JA 42 | G | G | JA 42 | JA 32 | JA 34 | EB 15 | JA 31 | EB 16 | EB 16 |
| 15 | 22 | 22 | EB 16 | EB 16 | EB 16 | 22 | 22 | 21 | G | 30 | GJ 44 | JA 40 | 36 | G | G | G | GJ 24 | JA 25 | 26 | 24 | EB 16 | EB 16 | 24 | |
| 16 | EB 16 | EB 16 | BJ 27 | AJ 35 | 26 | JA 35 | AJ 27 | AJ 26 | GJ A 35 | 34 | G | 39 | G | G | 36 | JA 33 | G | 25 | 25 | 24 | EB 16 | 22 | JA 30 | |
| 17 | JA 27 | EB 16 | 25 | 21 | 24 | JA 64 | EB 16 | 24 | 25 | G | 38 | 38 | JA 44 | JA 55 | JA 44 | JA 52 | JA 48 | JA 54 | JA 58 | JA 28 | 22 | 23 | EB 16 | EB 16 |
| 18 | EB 16 | 23 | JA 34 | JA 34 | 26 | JA 29 | 25 | 24 | G | 30 | 34 | JA 42 | JA 55 | G | J 38 | JA 50 | JA 34 | JA 34 | JA 30 | JA 26 | JA 22 | JA 26 | 24 | 25 |
| 19 | 24 | JA 62 | JA 31 | JA 26 | 20 | 22 | JA 21 | EB 16 | 27 | GJ 38 | JA 42 | JA 45 | G | 36 | G | GJ 36 | JA 24 | 20 | JA 26 | 20 | EB 16 | 22 | | |
| 20 | JA 32 | JA 33 | JA 26 | EB 16 | BJ 25 | AE 16 | EB 16 | EB 15 | 24 | 34 | 35 | JA 53 | JA 43 | G | G | G | GE B 14 | 22 | 22 | 22 | 20 | 22 | 20 | |
| 21 | 22 | 24 | 24 | 24 | 22 | 24 | 20 | EB 16 | G | G | G | G | G | G | G | G | G | G | JA 23 | 25 | 24 | 20 | 20 | JA 53 |
| 22 | JA 29 | 26 | 22 | JA 28 | JA 28 | 24 | EB 16 | JA 33 | G | 33 | 36 | G | G | G | 36 | G | GJ 34 | JA 33 | JA 30 | JA 26 | JA 26 | 25 | 25 | |
| 23 | 22 | EB 16 | BJ 29 | AE 16 | EB 16 | EB 16 | EB 16 | EB 16 | 24 | GJ 42 | JA G | G | G | G | G | G | GJ 36 | JA 24 | 20 | JA 26 | 20 | EB 16 | 22 | |
| 24 | JA 28 | 23 | 25 | 22 | 22 | EB 16 | 22 | 20 | G | G | G | 38 | 38 | G | G | G | 30 | JA 34 | JA 24 | 24 | EB 16 | 23 | EB 16 | EB 16 |
| 25 | EB 16 | EB 16 | BJ 28 | A 22 | EB 16 | EB 16 | EB 16 | BJ 32 | AJ 27 | GJ 43 | JA 44 | GJ 43 | JA 44 | JA 34 | GJ 40 | JA 42 | 24 | JA 25 | AJ 25 | 22 | 22 | | | |
| 26 | 22 | 20 | 20 | EB 16 | 24 | 21 | 21 | 20 | GJ 42 | JA 42 | JA 53 | JA 75 | JA 53 | G | G | GJ 27 | EB 21 | 16 | 21 | 22 | 22 | 22 | | |
| 27 | 22 | JA 26 | 20 | EB 16 | EB 16 | 20 | 22 | 21 | G | 30 | 40 | JA 37 | JA 55 | G | JA 48 | 33 | 28 | G | JA 31 | AJ 28 | EB 16 | EB 16 | EB 16 | EB 16 |
| 28 | EB 16 | 21 | EB 16 | EB 16 | EB 16 | 21 | 21 | EB 15 | 27 | GJ 43 | JA 44 | GJ 68 | JA 56 | G | JA 47 | 30 | JA 25 | 23 | 23 | EB 16 | EB 16 | EB 16 | EB 16 | |
| 29 | EB 16 | EB 16 | 23 | EB 16 | 19 | EB 16 | EB 16 | BJ 28 | 22 | GJ 36 | 36 | 38 | 35 | G | G | 28 | 21 | JA 30 | 26 | 23 | EB 16 | EB 16 | EB 16 | |
| 30 | JA 28 | JA 29 | JA 50 | JA 38 | AJ 35 | A 22 | 22 | 22 | G | 30 | G | G | G | G | G | G | 30 | JA 36 | JA 36 | AJ 27 | 26 | 24 | EB 16 | EB 16 |
| 31 | EB 16 | EB 16 | EB 16 | BJ 34 | AJ 34 | AJ 28 | 23 | 23 | 23 | 30 | 35 | JA 43 | 36 | G | GJ 64 | JA 47 | G | G | 22 | JA 28 | JA 36 | 23 | 23 | 23 |
| | 00 | 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 | 22 | 22 | 24 | 22 | 22 | 21 | 21 | 21 | G | 30 | 35 | JA 40 | 38 | 35 | 35 | 30 | 28 | JA 30 | AJ 29 | AJ 26 | 24 | 22 | 21 | 22 |
| U Q | JA 27 | JA 29 | JA 29 | AJ 26 | AJ 25 | 24 | JA 23 | JA 24 | 26 | 33 | J 40 | AJ 44 | AJ 44 | AJ 43 | AJ 44 | AJ 40 | AJ 43 | JA 36 | AJ 33 | AJ 28 | AJ 28 | AJ 26 | AJ 25 | AJ 25 |
| L Q | EB 16 | EB 16 | E 20 | EB 16 | EB 16 | EB 16 | EB 16 | EB 16 | G | G | 34 | G 36 | G | G | G | G | G | G 20 | 23 | 24 | 22 | EB 16 | EB 16 | EB 16 |

**DEC.2021** foEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Yamagawa

**DEC.2021** 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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | 30 | 34 | 34 | 34 | 36 | 33 | G 23 | 24 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 2 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 26 | G | 30 | 34 | 34 | 34 | 31 | 28 | 25 | E B 16 | E B 16 | E B 16 | 19 | 19 | E B 16 | E B 16 |
| 3 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 15 | E B 16 | E B 16 | G | 28 | 31 | 32 | 33 | G | 32 | G | G | E B 15 | E B 15 | E B 15 | E B 15 | E B 15 | E B 15 | E B 15 |
| 4 | E B 16 | E B 16 | E B 15 | E B 15 | E B 15 | E B 16 | E B 16 | E B 16 | G | G | 29 | 31 | G | 34 | 34 | 29 | G 19 | 25 | 16 | 18 | 16 | E B 15 | 18 | E B 16 |
| 5 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 15 | G | 24 | 32 | 33 | 41 | 36 | 32 | 29 | 25 | 25 | 20 | E B 16 | A A 36 | 18 | E B 16 | E B 16 |
| 6 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 22 | 32 | 36 | 33 | 32 | G | G | 28 | 24 | 32 | E B 16 | E B 16 | E B 16 | 20 | A A 49 | E B 16 |
| 7 | 20 | 20 | 20 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | G | 32 | 35 | 33 | G 26 | G | 30 | 30 | 28 | 18 | 20 | E B 16 | E B 16 | E B 16 | E B 16 |
| 8 | E B 16 | E B 16 | E B 16 | E B 16 | E B 15 | E B 15 | E B 15 | E B 16 | G | G | 32 | 34 | G | 32 | G | 29 | 26 | 21 | E B 16 | E B 16 | 18 | E B 16 | E B 16 | E B 16 |
| 9 | E B 17 | E B 17 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 26 | 30 | 34 | 32 | 33 | 34 | 32 | G | 26 | 20 | E B 15 | 18 | E B 16 | E B 16 | E B 16 | E B 16 |
| 10 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 23 | 29 | 33 | 37 | 36 | 34 | 31 | 31 | 28 | 18 | E B 16 | A A 34 | E B 16 | E B 15 | E B 15 | E B 15 |
| 11 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 26 | 30 | 32 | 34 | 34 | 38 | 33 | G 21 | 23 | 17 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 12 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 15 | E B 15 | 24 | G | 32 | 32 | G | 36 | 30 | 30 | 24 | 18 | 25 | A A 53 | A A 40 | A A 40 | 24 | E B 16 |
| 13 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | 30 | 34 | 32 | 32 | 32 | 32 | G | 26 | 28 | A A 47 | 18 | E B 16 | E B 16 | E B 16 | E B 16 |
| 14 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 16 | 24 | 28 | 31 | 33 | G | 36 | 32 | G | G | 22 | E B 16 | E B 16 | E B 15 | E B 15 | E B 16 | E B 16 |
| 15 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 16 | G | 29 | G | 34 | 34 | 35 | G | G | G | 20 | E B 15 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 17 | 17 | E B 16 | G | 26 | 32 | G | 38 | G | G | 32 | 24 | G | E B 17 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 17 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 25 | G | 32 | 34 | 34 | 34 | 34 | 30 | 33 | 37 | 26 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 18 | E B 16 | E B 16 | 20 | E B 16 | E B 16 | E B 16 | E B 16 | 20 | G | 28 | 32 | 34 | 34 | G | G 34 | 34 | 26 | 21 | 21 | 18 | E B 16 | E B 16 | E B 16 | 17 |
| 19 | E B 17 | 20 | 18 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 26 | G | 29 | 34 | 33 | G | 33 | G | G | G | 18 | A A 39 | 21 | 18 | E B 16 | E B 16 |
| 20 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 15 | 22 | 30 | 32 | 34 | 34 | G | G | G | G | E B 14 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 21 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | G | G | G | G | G | G | G | G | G | E B 16 | 17 | E B 16 | E B 16 | E B 16 | E B 16 |
| 22 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | 32 | 34 | G | G | G | 34 | G | G | 19 | 18 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 23 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 22 | G | 33 | G | G | G | G | G | G | 20 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 24 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | G | G | 38 | 35 | G | G | G | 28 | 20 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 25 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 20 | G | 30 | 34 | G | 34 | 32 | 27 | G | 20 | 31 | E B 16 | 20 | E B 16 | E B 16 | E B 16 |
| 26 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | 29 | 32 | 36 | 36 | 34 | G | G | G | 20 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 27 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | 30 | 37 | 33 | 34 | G | 37 | 32 | 27 | G | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 28 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 15 | 22 | G | 30 | 34 | G | 40 | 32 | G | G 22 | 22 | 19 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 29 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 21 | G | 30 | 34 | 36 | 34 | G | G | 27 | 20 | 20 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 30 | E B 16 | E B 16 | E B 16 | E B 16 | 21 | E B 16 | E B 16 | E B 16 | G | 30 | G | G | G | G | G | G | 27 | 26 | 19 | 20 | E B 16 | E B 16 | E B 16 | E B 16 |
| 31 | E B 16 | E B 16 | E B 16 | 18 | 20 | A A 28 | E B 16 | E B 16 | 22 | 28 | 34 | 35 | 35 | G | 32 | 35 | G | G | E B 15 | E B 16 | 17 | E B 16 | E B 16 | 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 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 |
| MED | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | 28 | 32 | 34 | 33 | 32 | G | G | 24 | 20 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| U Q | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 16 | 23 | 30 | 33 | 34 | 34 | 34 | G | 30 | 26 | 22 | 19 | 18 | 16 | 16 | E B 16 | E B 16 |
| L Q | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | G | 30 | G 32 | G | G | 32 | G | G | G | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |

**DEC.2021** fbEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Yamagawa

**DEC.2021** fmin (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

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

# IONOSPHERIC DATA STATION Yamagawa

**DEC.2021** M(3000)F2 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 334 | 301 | 306 | 319 | 334 | 378 | 339 | 388 | 394 | 370 | 330 | 373 | 354 | 379 | 346 | 344 | 352 | 368 | 364 | 334 | 325 | 348 | 318 | 288 |
| 2 | 289 | 285 | 343 | 355 | 355 | F | 307 | 370 | 374 | 378 | 379 | 367 | 365 | 347 | 358 | 349 | 369 | 370 | 320 | 348 | 363 | 333 | 341 | 330 |
| 3 | 294 | 325 | 315 | 292 | 369 | 428 | 320 | 352 | 382 | 360 | 370 | 365 | 386 | 348 | 355 | 372 | 369 | 359 | 399 | 363 | 344 | 289 | 340 | 318 |
| 4 | 314 | 307 | 328 | 334 | 335 | 285 | 321 | 341 | 366 | 349 | 341 | 349 | 363 | 371 | 362 | 364 | 379 | 370 | 339 | 359 | 336 | 351 | 335 | 309 |
| 5 | 302 | 307 | 325 | 307 | 349 | 397 | 324 | 314 | 374 | 374 | 354 | 352 | 340 | 345 | 359 | 347 | 362 | 380 | 374 | 381 | A | 307 | 308 | 313 |
| 6 | 318 | 322 | 326 | 334 | 329 | 316 | 325 | 357 | 376 | 370 | 358 | 373 | 355 | 377 | 386 | 344 | 378 | 385 | 400 | 359 | 314 | 328 | A | 307 |
| 7 | 301 | 315 | 304 | 304 | 330 | 361 | 356 | 362 | 371 | 372 | 383 | 386 | 350 | 357 | 351 | 349 | 379 | 381 | 398 | 336 | 322 | 308 | F | 283 |
| 8 | 304 | 300 | 320 | 329 | 380 | 367 | 341 | 372 | 375 | 371 | 341 | 366 | 361 | 363 | 346 | R 285 | 342 | 358 | 369 | 324 | 331 | 344 | 353 | 292 |
| 9 | 293 | 307 | 307 | 305 | 340 | 376 | 439 | 368 | 370 | 378 | 370 | 380 | 380 | 373 | 372 | 361 | 366 | 373 | 373 | 355 | 404 | 361 | 344 | 313 |
| 10 | 301 | 328 | 329 | 316 | 318 | 323 | 373 | 382 | 398 | 386 | 361 | 357 | 359 | 371 | 373 | 354 | 355 | 392 | 412 | A | 328 | 331 | 337 | 349 |
| 11 | 323 | 316 | 317 | 317 | 326 | 399 | 362 | 359 | 396 | 384 | 381 | 382 | 336 | 360 | 354 | 403 | 357 | 385 | 367 | 364 | 328 | 332 | 333 | 334 |
| 12 | 322 | 311 | 341 | 341 | 341 | 358 | 366 | 353 | 390 | 382 | 374 | 392 | 363 | 379 | 384 | 373 | 372 | 382 | 392 | A | A | A | 326 | 326 |
| 13 | 293 | 310 | 320 | 321 | 356 | 375 | 358 | 342 | 379 | 369 | 373 | 364 | 351 | 352 | 377 | 357 | 360 | 380 | A | 333 | 355 | 347 | 302 | 310 |
| 14 | 310 | 310 | 306 | 311 | 343 | 372 | 358 | 375 | 380 | 361 | 395 | 356 | 380 | 391 | 379 | 340 | 365 | 391 | 381 | 357 | 286 | 321 | 350 | 321 |
| 15 | 290 | 288 | 304 | 307 | 318 | 378 | 354 | 354 | 355 | 350 | 367 | 384 | 362 | 380 | 331 | 350 | 369 | 384 | 361 | 330 | 298 | 348 | 372 | 350 |
| 16 | 274 | 297 | 302 | 303 | 287 | 308 | 401 | 336 | 354 | 356 | 354 | 366 | 371 | 364 | 361 | 357 | 369 | 381 | 367 | 344 | 329 | 289 | 296 | 296 |
| 17 | 293 | 309 | 321 | 327 | 353 | 368 | 331 | 366 | 374 | 375 | 355 | 318 | 377 | 340 | 336 | 358 | 377 | 356 | 359 | 347 | 308 | 331 | 343 | 290 |
| 18 | 292 | 306 | 302 | 311 | 330 | 345 | 327 | 361 | 381 | 365 | 380 | 372 | 343 | 337 | 345 | 345 | 368 | 375 | 347 | 303 | 316 | 316 | 343 | 360 |
| 19 | 299 | 298 | 310 | 333 | 338 | 358 | 326 | 335 | 372 | 355 | 379 | 352 | 338 | 346 | 314 | 361 | 342 | 362 | 362 | A | 300 | 313 | 347 | 323 |
| 20 | 291 | 313 | 311 | 314 | 338 | 274 | 357 | 357 | 377 | 311 | 350 | 383 | 344 | 323 | 311 | 330 | 357 | 370 | 326 | 329 | 305 | 323 | 346 | 364 |
| 21 | 275 | 278 | 270 | 309 | 314 | 302 | 321 | 332 | 381 | 350 | 348 | 364 | 340 | 361 | 337 | 347 | 366 | 360 | 369 | 331 | 334 | 371 | 345 | 280 |
| 22 | 282 | 280 | 322 | 335 | 358 | 317 | 302 | 340 | 407 | 373 | 350 | 354 | 341 | 358 | 356 | 351 | 374 | 375 | 378 | 324 | 312 | 317 | 341 | 292 |
| 23 | 284 | 283 | 304 | 350 | 318 | 278 | 345 | 355 | 357 | 371 | 332 | 357 | 325 | 342 | 332 | 327 | 355 | 365 | 378 | 363 | 296 | 321 | 292 | F |
| 24 | F | 300 | 330 | 321 | 354 | 291 | 354 | 349 | 376 | 378 | 351 | 327 | 343 | 345 | 358 | 328 | 347 | 351 | 349 | 307 | 351 | 331 | 302 | 290 |
| 25 | F | F | 264 | 267 | 317 | F | 299 | 363 | 368 | 365 | 355 | 352 | 368 | 345 | 348 | 315 | 347 | 374 | 359 | 296 | 320 | 320 | 323 | F |
| 26 | F | 281 | 311 | 295 | 305 | 301 | 316 | 333 | 369 | 364 | 359 | 344 | 344 | 364 | 316 | 341 | 341 | 347 | 344 | 348 | 328 | 308 | 278 | 289 |
| 27 | 321 | 322 | 333 | F | F | 318 | F | 359 | 385 | 369 | 359 | 347 | 355 | 360 | 301 | 327 | 360 | 367 | 351 | 301 | 319 | 327 | 325 | 282 |
| 28 | 299 | 330 | 356 | 321 | 321 | 293 | 294 | 356 | 380 | 365 | 378 | 343 | 330 | R 302 | 295 | 315 | 312 | 341 | 353 | 299 | 320 | 333 | 327 | 288 |
| 29 | 315 | 286 | 302 | 315 | 315 | 379 | 296 | 320 | 357 | 372 | 361 | 331 | 351 | 347 | 341 | 337 | 347 | 310 | 339 | 323 | 350 | 339 | 331 | 292 |
| 30 | 280 | 292 | 306 | 329 | 329 | 366 | 298 | 314 | 359 | 362 | 354 | 343 | 355 | 354 | 368 | 365 | 359 | 344 | 359 | 331 | 332 | 282 | 290 | 323 |
| 31 | 337 | 289 | 307 | 365 | 370 | A | 292 | 314 | 355 | 379 | 385 | 342 | 357 | 350 | 376 | 356 | 365 | 364 | 378 | 319 | 345 | 315 | 308 | 296 |
| | 00 | 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 | 30 | 31 | 30 | 30 | 28 | 30 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 30 | 28 | 29 | 30 | 29 | 29 |
| MED | 299 | 306 | 311 | 318 | 334 | 358 | 329 | 355 | 375 | 370 | 359 | 357 | 355 | 357 | 354 | 349 | 362 | 370 | 366 | 334 | 328 | 328 | 333 | 309 |
| U Q | 314 | 313 | 326 | 333 | 353 | 376 | 357 | 363 | 381 | 375 | 378 | 373 | 363 | 371 | 368 | 358 | 369 | 381 | 378 | 356 | 340 | 339 | 344 | 324 |
| L Q | 290 | 289 | 304 | 307 | 318 | 305 | 316 | 336 | 368 | 361 | 351 | 347 | 343 | 345 | 336 | 337 | 352 | 359 | 351 | 324 | 313 | 315 | 308 | 290 |

# IONOSPHERIC DATA STATION Yamagawa

**DEC.2021** 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

| 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 | | | | | | | | | | L | L | L | L | A | U L 396 | L | L | | | | | | | |
| 2 | | | | | | | | | | L | L | L | L | | L | L | | | | | | | | |
| 3 | | | | | | | | | | L | L | L | L | L | L | L | | | | | | | | |
| 4 | | | | | | | | | | L | L | 385 | 408 | L | L | L | | | | | | | | |
| 5 | | | | | | | | | | | L | L | A | A | L | A | | | | | | | | |
| 6 | | | | | | | | | | | A | L | L | L | L | | | | | | | | | |
| 7 | | | | | | | | | | 425 | L | | 390 | L | L | L | A | | | | | | | |
| 8 | | | | | | | | | 429 | | 440 | A | L | 410 | L | | | | | | | | | |
| 9 | | | | | | | | | | | A | U L 425 | L | L | L | L | | | | | | | | |
| 10 | | | | | | | | | | A | | A | L | U L 390 | L | A | A | | | | | | | |
| 11 | | | | | | | | | | | L | L | | A | L | L | | | | | | | | |
| 12 | | | | | | | | | | | L | L | L | A | L | | | | | | | | | |
| 13 | | | | | | | | | | | L | L | L | L | L | L | | | | | | | | |
| 14 | | | | | | | | | | | | | L | | L | | | | | | | | | |
| 15 | | | | | | | | | | | L | L | U L 399 | | L | | | | | | | | | |
| 16 | | | | | | | | | | L | L | L | A | L | L | | | | | | | | | |
| 17 | | | | | | | | | | A | | L | | L | L | L | | | | | | | | |
| 18 | | | | | | | | | | | L | L | L | L | L | L | | | | | | | | |
| 19 | | | | | | | | | | | L | L | L | L | L | L | | | | | | | | |
| 20 | | | | | | | | | | | L | L | L | L | | L | | | | | | | | |
| 21 | | | | | | | | | | | L | L | L | L | L | L | | | | | | | | |
| 22 | | | | | | | | | | | | L | L | L | L | L | | | | | | | | |
| 23 | | | | | | | | | | | L | L | L | L | L | L | | | | | | | | |
| 24 | | | | | | | | | | L | | A | U L 393 | L | L | | | | | | | | | |
| 25 | | | | | | | | | | | L | L | L | L | L | | | | | | | | | |
| 26 | | | | | | | | | | | L | 390 | L | L | L | L | L | | | | | | | |
| 27 | | | | | | | | | | | A | L | L | L | | A | A | | | | | | | |
| 28 | | | | | | | | | | L | L | L | 405 | A | L | L | | | | | | | | |
| 29 | | | | | | | | | | L | L | L | | L | L | L | | | | | | | | |
| 30 | | | | | | | | | | | | L | L | L | L | L | | A | | | | | | |
| 31 | | | | | | | | | | | L | L | L | L | L | A | 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 | 1 | 1 | 3 | 5 | 2 | 1 | | | | | | | | | |
| MED | | | | | | | | | 429 | 425 | 440 | 390 | 399 | 400 | U L 396 | | | | | | | | | |
| U Q | | | | | | | | | | | | U L 425 | 406 | | | | | | | | | | | |
| L Q | | | | | | | | | | | | 385 | 392 | | | | | | | | | | | |

**DEC.2021** M(3000)F1 (0.01)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Yamagawa

**DEC.2021** h'F2 (KM) 135°E MEAN TIME (G.M.T. + 9 H)

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

| 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 | | | | | | | | | | 224 | 268 | 220 | 240 | 216 | 250 | 252 | 244 | | | | | | | |
| 2 | | | | | | | | | | 232 | 232 | 232 | 244 | | 228 | 228 | | | | | | | | |
| 3 | | | | | | | | | | 246 | 232 | 232 | 232 | 242 | 242 | 230 | | | | | | | | |
| 4 | | | | | | | | | | 238 | 252 | 226 | 212 | 232 | 248 | 248 | | | | | | | | |
| 5 | | | | | | | | | | | 250 | 236 | 236 | 238 | 248 | 236 | | | | | | | | |
| 6 | | | | | | | | | | | 244 | 226 | 232 | 230 | 230 | | | | | | | | | |
| 7 | | | | | | | | | | 230 | 230 | | 240 | 240 | 252 | 236 | 210 | | | | | | | |
| 8 | | | | | | | | | 226 | | 250 | 226 | 226 | 226 | 226 | | | | | | | | | |
| 9 | | | | | | | | | | | 226 | 226 | 226 | 238 | 238 | 250 | | | | | | | | |
| 10 | | | | | | | | | | 214 | | 222 | 228 | 228 | 248 | 236 | 220 | | | | | | | |
| 11 | | | | | | | | | | | 236 | 220 | | 242 | 236 | 218 | | | | | | | | |
| 12 | | | | | | | | | | | 224 | 214 | 226 | 226 | 226 | | | | | | | | | |
| 13 | | | | | | | | | | | 242 | 242 | 242 | 242 | 232 | 232 | | | | | | | | |
| 14 | | | | | | | | | | | | | 232 | | 232 | | | | | | | | | |
| 15 | | | | | | | | | | | 232 | 230 | 242 | | 260 | | | | | | | | | |
| 16 | | | | | | | | | | 246 | 246 | 228 | 228 | 228 | 240 | | | | | | | | | |
| 17 | | | | | | | | | | 212 | | 278 | | 256 | 248 | 214 | | | | | | | | |
| 18 | | | | | | | | | | | 222 | 222 | 256 | 256 | 248 | 256 | | | | | | | | |
| 19 | | | | | | | | | | | 230 | 236 | 250 | 250 | 290 | 240 | | | | | | | | |
| 20 | | | | | | | | | | | 240 | 224 | 264 | 264 | | 252 | | | | | | | | |
| 21 | | | | | | | | | | | 236 | 228 | 236 | 236 | 246 | 246 | | | | | | | | |
| 22 | | | | | | | | | | | | 236 | 236 | 222 | 238 | 244 | | | | | | | | |
| 23 | | | | | | | | | | | 266 | 240 | 240 | 240 | 240 | 240 | | | | | | | | |
| 24 | | | | | | | | | | 220 | | 238 | 238 | 238 | 230 | | | | | | | | | |
| 25 | | | | | | | | | | | 242 | 242 | 222 | 236 | 236 | | | | | | | | | |
| 26 | | | | | | | | | | | 236 | 258 | 258 | 232 | 248 | 248 | 240 | | | | | | | |
| 27 | | | | | | | | | | | 228 | 228 | 228 | 232 | | 232 | 226 | | | | | | | |
| 28 | | | | | | | | | | 226 | 226 | 234 | 244 | 226 | 226 | 246 | | | | | | | | |
| 29 | | | | | | | | | | 224 | 236 | 236 | | 236 | 242 | 244 | | | | | | | | |
| 30 | | | | | | | | | | | | 234 | 228 | 222 | 222 | 222 | | 232 | | | | | | |
| 31 | | | | | | | | | | | 232 | 232 | 232 | 240 | 240 | 226 | 238 | | | | | | | |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | | | | | | | | | 1 | 11 | 25 | 29 | 28 | 28 | 29 | 23 | 6 | 1 | | | | | | |
| MED | | | | | | | | | 226 | 226 | 236 | 232 | 236 | 236 | 240 | 240 | 232 | 232 | | | | | | |
| U Q | | | | | | | | | | 238 | 245 | 236 | 242 | 241 | 248 | 248 | 240 | | | | | | | |
| L Q | | | | | | | | | | 220 | 230 | 226 | 228 | 228 | 231 | 230 | 220 | | | | | | | |

# IONOSPHERIC DATA STATION Yamagawa

**DEC.2021** h'F (KM) 135°E MEAN TIME (G.M.T. + 9 H)

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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | E B 224 | E B 254 | E B 254 | E B 210 | E B 210 | E B 186 | 212 | 194 | 194 | 176 | 198 | 198 | 198 | A | 182 | 190 | 214 | 192 | 190 | E B 192 | E B 222 | E B 222 | E B 222 | E B 240 |
| 2 | E B 284 | E B 258 | 228 | E B 208 | E B 208 | E B 274 | E B 296 | 212 | 212 | 202 | 202 | 202 | 194 | 202 | 190 | 190 | 206 | 192 | E B 192 | E B 192 | E A 206 | 206 | E B 218 | E B 228 |
| 3 | E B 282 | E B 242 | E B 242 | E B 258 | 208 | E B 204 | E B 258 | 210 | 192 | 202 | 202 | 190 | 190 | 184 | 202 | 194 | 200 | 192 | E B 178 | E B 206 | E B 216 | E B 246 | E B 218 | E B 250 |
| 4 | E B 230 | E B 262 | E B 234 | E B 234 | E B 234 | E B 296 | E B 296 | 218 | 202 | 202 | 192 | 192 | 182 | 200 | 200 | 208 | 208 | 206 | 206 | 206 | E B 202 | E B 202 | E A 276 | E B 288 |
| 5 | E B 288 | E B 258 | E B 246 | E B 260 | E B 234 | 190 | E B 254 | 190 | 206 | 206 | 206 | 206 | A | A | 206 | A | 206 | 196 | 196 | 196 | A | E A 288 | E B 236 | E B 238 |
| 6 | E B 256 | E B 256 | E B 240 | E B 230 | E B 230 | E B 244 | E B 248 | 200 | 198 | 198 | A | 198 | 186 | 186 | 186 | 200 | 200 | 198 | 184 | E B 198 | E B 242 | E A 258 | A | E B 276 |
| 7 | E A 318 | E A 296 | E A 296 | E B 288 | E B 250 | E B 210 | E B 210 | 204 | 204 | 174 | 200 | 200 | 190 | 182 | 196 | 194 | A | 204 | 186 | E A 320 | E B 236 | E B 236 | E B 230 | E B 286 |
| 8 | E B 286 | E B 286 | E B 266 | E B 238 | E B 200 | E B 200 | 228 | 200 | 184 | 200 | 194 | A | 194 | 194 | 188 | 196 | 196 | 192 | E B 192 | E B 198 | E A 246 | E B 216 | E B 216 | E B 286 |
| 9 | E B 286 | E B 286 | E B 276 | E B 276 | E B 228 | E B 196 | 180 | 198 | 198 | 208 | A | 186 | 184 | 196 | 196 | 196 | 206 | 204 | E B 192 | 226 | E B 196 | E B 196 | E B 220 | E B 270 |
| 10 | E B 270 | E B 242 | E B 242 | E B 268 | E B 260 | 198 | 188 | 186 | 186 | A | 194 | A | 194 | 194 | 194 | A | A | 192 | E B 178 | A | E B 208 | E B 216 | E B 216 | E B 216 |
| 11 | E B 252 | E B 250 | E B 256 | E B 262 | E B 244 | 200 | E B 200 | E B 200 | 198 | 198 | 190 | 190 | 190 | A | 190 | 190 | 206 | 192 | 184 | 220 | E B 220 | E B 234 | E B 234 | E B 234 |
| 12 | E B 262 | E B 256 | E B 224 | E B 224 | E B 236 | E B 212 | 218 | 204 | 192 | 200 | 196 | 190 | 186 | A | 186 | 200 | 200 | 200 | 200 | A | A | A | E A 296 | E B 246 |
| 13 | E B 264 | E B 280 | E B 268 | E B 244 | 230 | 198 | 202 | E B 202 | 180 | 204 | 204 | 192 | 192 | 184 | 200 | 190 | 198 | 198 | A | 206 | E B 206 | E B 244 | E B 276 | E B 274 |
| 14 | E B 268 | E B 268 | E B 268 | E B 242 | E B 218 | 196 | 210 | 204 | 204 | 208 | 208 | 198 | 198 | 202 | 192 | 192 | 206 | 198 | 190 | E B 192 | E B 270 | E B 246 | E B 214 | E B 218 |
| 15 | E B 278 | E B 288 | E B 268 | E B 246 | E B 246 | 186 | 206 | 206 | 206 | 194 | 194 | 194 | 182 | 208 | 202 | 202 | 202 | 200 | E B 198 | 202 | E B 246 | E B 216 | E B 194 | E B 204 |
| 16 | E B 264 | E B 298 | E B 278 | E B 292 | E B 314 | E A 250 | 196 | E B 208 | 212 | 194 | 194 | 184 | A | 184 | 206 | 206 | 206 | 206 | 196 | E B 208 | E B 208 | E B 250 | E B 240 | E B 260 |
| 17 | E B 272 | E B 256 | E B 248 | E B 212 | E B 214 | E B 210 | 222 | 196 | 196 | A | 196 | 196 | 202 | 188 | 198 | 198 | 198 | 198 | 212 | E B 200 | E B 200 | E B 208 | E B 216 | E B 252 |
| 18 | E B 288 | E B 288 | E A 298 | E B 260 | E B 246 | E B 210 | 204 | 194 | 202 | 200 | 190 | 178 | 178 | 176 | 190 | 190 | 196 | 196 | 196 | E A 210 | E B 202 | E B 232 | E B 224 | E A 224 |
| 19 | E B 284 | E A 332 | E A 294 | E B 228 | E B 210 | E B 208 | E B 226 | E B 206 | 206 | 210 | 202 | 192 | 188 | 188 | 188 | 188 | 194 | 194 | 194 | A | E A 264 | E A 238 | E B 210 | E B 210 |
| 20 | E B 306 | E B 296 | E B 260 | E B 246 | E B 232 | E B 336 | E B 216 | 202 | 196 | 204 | 204 | 192 | 188 | 190 | 196 | 196 | 200 | 192 | E B 182 | E B 200 | E B 234 | E B 232 | 218 | E B 204 |
| 21 | E B 296 | E B 304 | E B 304 | E B 280 | E B 224 | E B 224 | 208 | 216 | 202 | 202 | 200 | 186 | 182 | 188 | 188 | 188 | 200 | 200 | 182 | 206 | E B 204 | E B 192 | E B 208 | E B 314 |
| 22 | E B 310 | E B 294 | E B 258 | 220 | E B 214 | E B 214 | E B 274 | 222 | 184 | 198 | 198 | 188 | 178 | 196 | 196 | 196 | 200 | 184 | 196 | E B 208 | E B 208 | E B 208 | E B 218 | E B 270 |
| 23 | E B 288 | E B 288 | E B 254 | 204 | E B 218 | E B 266 | 202 | 196 | 196 | 208 | 208 | 194 | 194 | 190 | 190 | 190 | 216 | 202 | 182 | E B 190 | 220 | E B 220 | E B 250 | E B 320 |
| 24 | E B 314 | 226 | E B 226 | E B 240 | 208 | E B 294 | 228 | 208 | 194 | 198 | 198 | A | 182 | 194 | 194 | 192 | 218 | 198 | 188 | E B 212 | E B 212 | E B 212 | E B 234 | E B 278 |
| 25 | E B 308 | E B 260 | E B 282 | E B 282 | E B 246 | E B 202 | 224 | 212 | 196 | 204 | 198 | 196 | 190 | 182 | 182 | 198 | 214 | 202 | 202 | E B 218 | 218 | E B 222 | E B 222 | E B 270 |
| 26 | E B 288 | E B 288 | E B 244 | E B 276 | E B 248 | E B 264 | 228 | 228 | 204 | 204 | 200 | 188 | 184 | 182 | 178 | 188 | 188 | 198 | 190 | 186 | E B 196 | E B 202 | E B 264 | E B 264 |
| 27 | E B 228 | E B 228 | E B 228 | E B 262 | E B 238 | E B 236 | 236 | 214 | 206 | 200 | A | 184 | 190 | 182 | 194 | A | A | 204 | E B 200 | E B 216 | E B 226 | E B 226 | E B 226 | E B 282 |
| 28 | E B 268 | 218 | E B 218 | E B 226 | E B 240 | E B 294 | E B 294 | 210 | 210 | 202 | 192 | 192 | 188 | A | 188 | 180 | 202 | 196 | 186 | E B 202 | E B 212 | E B 198 | E B 212 | E B 290 |
| 29 | E B 270 | E B 270 | E B 270 | E B 270 | E B 240 | E B 188 | E B 284 | E B 238 | 202 | 192 | 184 | 184 | 222 | 198 | 188 | 188 | 212 | 196 | 200 | E B 200 | E B 200 | E B 200 | E B 230 | E B 288 |
| 30 | E B 318 | E B 288 | E B 272 | E B 236 | E A 264 | 224 | 292 | E B 248 | 214 | 214 | 206 | 192 | 186 | 190 | 186 | 198 | 198 | A | 188 | E B 198 | E B 220 | E B 240 | E B 256 | E B 256 |
| 31 | E B 214 | E B 272 | E B 272 | E A 214 | E A 214 | A | E B 296 | E B 262 | 210 | 210 | 202 | 190 | 190 | 190 | 188 | A | 192 | 198 | 198 | E B 212 | 222 | E B 234 | E B 260 | E B 276 |
| | 00 | 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 | 31 | 31 | 31 | 29 | 28 | 28 | 29 | 26 | 31 | 27 | 28 | 30 | 30 | 28 | 29 | 30 | 30 | 31 |
| MED | E B 282 | E B 270 | E B 258 | E B 244 | E B 232 | E B 210 | U 213 | 204 | 202 | 202 | 198 | 192 | 190 | 190 | 190 | 194 | 201 | 198 | 191 | E B 204 | E B 216 | E B 222 | E B 223 | E B 264 |
| U Q | E B 288 | E B 288 | E B 272 | E B 268 | E B 246 | E B 250 | E B 258 | 214 | 206 | 205 | 202 | 196 | 194 | 196 | 196 | 198 | 206 | 200 | 198 | E 211 | E B 230 | E B 238 | E B 240 | E B 282 |
| L Q | E B 264 | E B 256 | E B 242 | E B 226 | E B 214 | 198 | 206 | 200 | 194 | 198 | 194 | 188 | 184 | 184 | 188 | 190 | 198 | 192 | 186 | E B 198 | E B 205 | E B 208 | E B 216 | E B 234 |

**DEC.2021** h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Yamagawa

DEC.2021 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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | B | B | 108 | 108 | 108 | 108 | 108 | A | A | 108 | A | B | | | | | | |
| 2 | | | | | | | | | 108 | 108 | A | A | A | A | A | A | A | B | | | | | | |
| 3 | | | | | | | B | B | 116 | 116 | 116 | A | 116 | 110 | A | 110 | 110 | B | | | | | | |
| 4 | | | | | | | | | 110 | 110 | A | A | 110 | 110 | A | A | 110 | B | | | | | | |
| 5 | | | | | | | B | B | 110 | A | A | A | A | A | A | A | A | B | | | | | | |
| 6 | | | | | | | B | | A | A | A | A | A | 108 | 108 | A | A | B | | | | | | |
| 7 | | | | | | | | B | 116 | 116 | 116 | 116 | A | 116 | 116 | 116 | A | B | | | | | | |
| 8 | | | | | | | B | B | 116 | 116 | 116 | 116 | 114 | 114 | 114 | 114 | A | B | | | | | | |
| 9 | | | | | | | B | B | 114 | 114 | 114 | A | 114 | 114 | 114 | 114 | 114 | B | | | | | | |
| 10 | | | | | | | B | | 114 | 114 | 114 | 112 | 110 | 110 | 110 | 110 | 110 | B | | | | | | |
| 11 | | | | | | | | | 110 | 108 | 108 | 108 | 108 | 108 | 108 | 108 | A | B | | | | | | |
| 12 | | | | | | | B | B | 108 | 108 | 108 | 108 | 108 | 108 | 112 | 112 | 112 | B | | | | | | |
| 13 | | | | | | | B | | 110 | 110 | 110 | A | A | A | A | 110 | A | A | | | | | | |
| 14 | | | | | | | B | B | 110 | 110 | 112 | 112 | 112 | 112 | A | 112 | 110 | B | | | | | | |
| 15 | | | | | | | B | B | 110 | 110 | 110 | A | A | 110 | 110 | 110 | 110 | B | | | | | | |
| 16 | | | | | | | | | 118 | A | 118 | 110 | 110 | 110 | 110 | 110 | A | 110 | | | | | | |
| 17 | | | | | | | B | B | 110 | 110 | 110 | 110 | A | A | A | A | A | A | A | | | | | |
| 18 | | | | | | | B | B | 110 | 110 | 110 | A | A | 110 | 106 | A | A | B | | | | | | |
| 19 | | | | | | | B | | 114 | 114 | A | A | A | 114 | 114 | 114 | 114 | 114 | | | | | | |
| 20 | | | | | | | B | B | 114 | 114 | 114 | A | A | 114 | 108 | 108 | 108 | B | | | | | | |
| 21 | | | | | | | B | B | 108 | 108 | 108 | 108 | 108 | 108 | 108 | 108 | 108 | 108 | B | | | | | |
| 22 | | | | | | | | | 108 | 108 | 108 | 108 | 108 | 108 | 108 | 108 | 108 | A | | | | | | |
| 23 | | | | | | | B | B | 108 | 108 | A | 108 | 108 | 108 | 108 | 108 | 108 | B | | | | | | |
| 24 | | | | | | | B | B | 108 | 108 | 108 | 108 | 108 | 108 | 108 | 108 | 108 | A | | | | | | |
| 25 | | | | | | | B | B | A | 108 | A | A | 108 | A | A | A | 108 | B | | | | | | |
| 26 | | | | | | | B | B | 108 | A | 108 | A | A | A | 108 | 108 | 108 | B | | | | | | |
| 27 | | | | | | | B | B | 108 | 114 | 114 | A | A | 114 | A | 114 | 114 | 114 | | | | | | |
| 28 | | | | | | | | | 114 | 114 | A | A | 114 | A | A | 114 | 114 | B | | | | | | |
| 29 | | | | | | | | | 114 | 112 | A | 110 | 110 | 110 | 110 | 110 | 110 | B | | | | | | |
| 30 | | | | | | | B | | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 112 | 112 | A | | | | | | |
| 31 | | | | | | | B | | 112 | 112 | A | A | A | 112 | A | A | 112 | 112 | | | | | | |
| | 00 | 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 | 27 | 21 | 15 | 18 | 23 | 19 | 23 | 20 | 5 | | | | | | |
| MED | | | | | | | | | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 112 | | | | | | |
| U Q | | | | | | | | | 114 | 114 | 114 | 112 | 112 | 114 | 112 | 114 | 112 | 114 | | | | | | |
| L Q | | | | | | | | | 108 | 108 | 108 | 108 | 108 | 108 | 108 | 108 | 108 | 109 | | | | | | |

DEC.2021 h'E (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Yamagawa

**DEC.2021** h'Es (KM) 135°E MEAN TIME (G.M.T. + 9 H)

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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 90 | B | B | B | B | B | B | B | G | 116 | 166 | 158 | 158 | 78 | 78 | 78 | 78 | B | 80 | B | 80 | 80 | 80 | B |
| 2 | 80 | 80 | 80 | B | B | B | 80 | 88 | 150 | G | 94 | 94 | 92 | 86 | 94 | 94 | 90 | 90 | 90 | 90 | 86 | 86 | 86 | 86 |
| 3 | 86 | 96 | 96 | 96 | 96 | B | 94 | 92 | G | 108 | 108 | 104 | 114 | G | 86 | G | G | 86 | 86 | 86 | 86 | 86 | B | 86 |
| 4 | B | B | B | B | 86 | 86 | 86 | B | G | G | 88 | 90 | G | 152 | 98 | 96 | 96 | 94 | 94 | 94 | 94 | 94 | 86 | 84 |
| 5 | 84 | 84 | 84 | B | B | B | 156 | 102 | G | 102 | 102 | 90 | 86 | 86 | 86 | 86 | 86 | 82 | 82 | 82 | 82 | 82 | 82 | 82 |
| 6 | 82 | 82 | 86 | 86 | 86 | 86 | 96 | 96 | 96 | 96 | 92 | 92 | 90 | G | G | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| 7 | 84 | 82 | 82 | 82 | 90 | 90 | 90 | 90 | G | G | 142 | 136 | 96 | 92 | G | 114 | 82 | 82 | 82 | 82 | 82 | 82 | 90 | 90 |
| 8 | 90 | 90 | 90 | B | B | B | 90 | B | G | G | 110 | 130 | G | 150 | G | 132 | 90 | 90 | B | B | 90 | B | B | 90 |
| 9 | 90 | 90 | 90 | 90 | B | B | B | 88 | 148 | 146 | 134 | 102 | 118 | 152 | 116 | G | 148 | 86 | B | 86 | 84 | 82 | B | 82 |
| 10 | 82 | 82 | 82 | 112 | 94 | B | B | B | 148 | 148 | 140 | 120 | 120 | 120 | 126 | 144 | 124 | 124 | 86 | 94 | 94 | B | B | B |
| 11 | B | B | B | B | B | 94 | B | 94 | 142 | 142 | 148 | 110 | 132 | 126 | 118 | 90 | 104 | 102 | 98 | 96 | 96 | 96 | B | B |
| 12 | 96 | 96 | 88 | B | B | 88 | B | B | 152 | G | 146 | 138 | G | 130 | 130 | 130 | 124 | 102 | 100 | 100 | 94 | 88 | 88 | 88 |
| 13 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | G | 150 | 140 | 100 | 96 | 96 | 84 | G | 84 | 84 | 84 | 84 | 84 | B | 102 | 84 |
| 14 | B | 84 | 94 | 94 | 94 | 94 | 74 | 92 | 152 | 152 | 146 | 146 | G | 146 | 88 | G | G | 82 | 82 | 82 | B | 82 | B | B |
| 15 | 84 | 84 | B | B | B | 84 | 84 | 84 | G | 140 | G | 98 | 98 | 140 | G | G | G | 112 | 96 | 96 | 96 | B | B | 88 |
| 16 | B | B | 88 | 88 | 90 | 90 | 88 | 88 | G | 98 | 144 | G | 154 | G | G | 122 | 102 | G | 102 | 100 | 98 | B | 98 | 98 |
| 17 | 98 | B | 92 | 92 | 92 | 92 | B | 92 | 152 | G | 140 | 130 | 106 | 106 | 100 | 94 | 94 | 86 | 86 | 86 | 86 | 86 | B | B |
| 18 | B | 86 | 86 | 86 | 86 | 92 | 92 | 90 | G | 112 | 118 | 106 | 94 | G | 94 | 94 | 94 | 92 | 90 | 90 | 90 | 90 | 90 | 90 |
| 19 | 90 | 90 | 86 | 86 | 86 | 90 | 90 | B | 152 | G | 100 | 98 | 98 | G | 112 | G | G | G | 104 | 92 | 86 | 86 | 86 | 116 |
| 20 | 102 | 96 | 96 | B | 90 | B | B | B | 138 | 144 | 122 | 90 | 96 | G | G | G | G | B | 90 | 92 | 92 | 92 | 92 | 92 |
| 21 | 92 | 92 | 92 | 92 | 88 | 88 | 88 | B | G | G | G | G | G | G | G | G | G | G | 88 | 88 | 88 | 88 | 88 | 88 |
| 22 | 88 | 88 | 88 | 88 | 88 | 88 | B | 94 | G | 160 | 160 | G | G | G | 160 | G | G | 86 | 86 | 86 | 86 | 86 | 86 | 86 |
| 23 | 86 | B | 86 | B | B | B | B | B | 142 | G | 100 | G | G | G | G | G | G | 84 | 84 | 84 | 84 | 84 | B | 92 |
| 24 | 92 | 92 | 92 | 92 | 86 | B | 86 | 86 | G | G | G | 144 | 144 | G | G | G | 144 | 86 | 86 | 86 | B | 86 | B | B |
| 25 | B | B | 86 | 86 | B | B | B | 104 | 104 | G | 102 | 102 | G | 102 | 102 | 102 | G | 98 | 90 | 90 | 84 | 84 | 86 | 86 |
| 26 | 86 | 86 | 86 | B | 90 | 90 | 96 | 96 | G | 100 | 114 | 102 | 102 | 94 | G | G | G | 94 | 94 | B | 94 | 94 | 94 | 94 |
| 27 | 80 | 80 | 80 | B | B | 80 | 82 | 90 | G | 148 | 156 | 92 | 92 | G | 86 | 148 | 154 | G | 86 | 86 | B | B | B | B |
| 28 | B | 86 | B | B | B | 86 | 86 | B | 110 | G | 100 | 96 | G | 84 | 84 | G | 84 | 82 | 82 | 82 | 82 | B | B | B |
| 29 | B | B | 82 | B | 96 | B | B | 96 | 146 | G | 104 | 132 | 146 | 154 | G | G | 154 | 132 | 84 | 84 | 84 | B | B | B |
| 30 | 96 | 96 | 96 | 96 | 82 | 82 | 82 | 88 | G | 158 | G | G | G | G | G | G | 146 | 84 | 84 | 84 | 84 | 84 | B | B |
| 31 | B | B | B | 84 | 84 | 84 | 84 | 84 | 168 | 124 | 102 | 92 | 92 | G | 92 | 84 | G | G | 88 | 98 | 98 | 88 | 88 | 88 |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 22 | 22 | 25 | 17 | 19 | 19 | 20 | 21 | 15 | 18 | 27 | 26 | 21 | 18 | 19 | 16 | 20 | 24 | 29 | 28 | 28 | 23 | 17 | 21 |
| MED | 88 | 87 | 88 | 88 | 88 | 88 | 88 | 90 | 148 | 141 | 118 | 102 | 98 | 113 | 94 | 95 | 95 | 88 | 86 | 87 | 86 | 86 | 88 | 88 |
| U Q | 92 | 92 | 92 | 93 | 92 | 90 | 91 | 95 | 152 | 148 | 144 | 130 | 126 | 146 | 116 | 126 | 134 | 96 | 92 | 93 | 94 | 90 | 91 | 91 |
| L Q | 84 | 84 | 85 | 86 | 86 | 86 | 84 | 88 | 138 | 108 | 102 | 94 | 93 | 92 | 86 | 90 | 88 | 84 | 84 | 84 | 84 | 84 | 86 | 86 |

**DEC.2021** h'Es (KM)

# IONOSPHERIC DATA STATION Yamagawa

**DEC.2021** 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 | F3 | | | | | | | | | C2 | H1 | H1 | H1 | L3 | L3 | L2 | L2 | | F1 | | F2 | F2 | F1 | |
| 2 | F2 | F2 | F1 | | | | F2 | F1 | H1 | | L2 | L3 | L3 | L5 | L2 | L2 | L2 | L1 | F1 | F3 | F3 | F3 | F2 | F1 |
| 3 | F1 | F2 | F2 | F1 | F2 | | L1 | L2 | | C2 | C2 | L2 | C2 | | L4 | | | L2 | F1 | F4 | F2 | F1 | | F1 |
| 4 | | | | | F1 | F1 | F1 | | | | L3 | L2 | | HL22 | L2 | L2 | L2 | L3 | F2 | F1 | F3 | F2 | F5 | F1 |
| 5 | F3 | F2 | F2 | | | | H1 | L1 | | L2 | L2 | L3 | L4 | L3 | L3 | L4 | L2 | L5 | F4 | F3 | F6 | F6 | F4 | F2 |
| 6 | F2 | F3 | F2 | F2 | F2 | F1 | L2 | L2 | L2 | L3 | L3 | L2 | L2 | | | L3 | L3 | L3 | F3 | F1 | F4 | F2 | F8 | F5 |
| 7 | F6 | F2 | F2 | F1 | F1 | F1 | F1 | L1 | | | H2 | H2 | L2 | L2 | | C2 | L3 | L4 | F5 | F3 | F3 | F2 | F1 | F2 |
| 8 | F2 | F2 | F3 | | | | L1 | | | | C2 | C2 | | H1 | | C1 | L2 | L2 | | | F6 | | | F1 |
| 9 | F1 | F1 | F1 | F1 | | | | L2 | H2 | HL23 | H2 | L2 | C1 | H1 | C2 | | H2 | L3 | | L4 | F1 | F1 | | F2 |
| 10 | F2 | F2 | F1 | F1 | F1 | | | | H2 | H2 | H2 | C2 | C2 | C1 | C1 | HL12 | C2 | C3 | F3 | F7 | F1 | | | |
| 11 | | | | | | F1 | | L2 | H3 | H2 | H1 | C2 | H2 | C2 | CL22 | L2 | L1 | L1 | F1 | F3 | F3 | F1 | | |
| 12 | F2 | F2 | F3 | | | F3 | | | H2 | | H2 | H2 | | H2 | HL12 | HL12 | C1 | L2 | L5 | F5 | F6 | F9 | F8 | F4 |
| 13 | F1 | F4 | F2 | F2 | F2 | F1 | L2 | L1 | | H2 | H2 | L2 | L2 | L2 | L4 | | L4 | L5 | F5 | F2 | F1 | | F1 | F1 |
| 14 | | F1 | F1 | F2 | F2 | F1 | L1 | L1 | H2 | H2 | H2 | H1 | | H1 | L3 | | | L4 | F1 | F1 | | F1 | | |
| 15 | F1 | F1 | | | | F1 | F2 | L1 | | H1 | | L3 | L2 | HL12 | | | | L1 | F3 | F3 | F1 | | | F1 |
| 16 | | | F1 | F3 | F2 | F4 | F3 | F2 | | L2 | H2 | | H2 | | | C2 | L3 | | F1 | F3 | F3 | | F1 | F2 |
| 17 | F2 | | F1 | F2 | F2 | F1 | | L1 | H2 | | H2 | H2 | L2 | L2 | L3 | L3 | L5 | L4 | F8 | F2 | F1 | F3 | | |
| 18 | | F2 | F2 | F1 | F2 | F1 | L3 | L3 | | C2 | C2 | L1 | L2 | | L2 | L3 | L3 | L3 | F7 | F3 | F3 | F3 | F1 | F3 |
| 19 | F1 | F3 | F2 | F3 | F1 | F1 | L1 | | H2 | | L1 | L2 | L2 | | C1 | | | | F2 | F7 | F6 | F3 | F1 | F1 |
| 20 | F1 | F2 | F1 | | F1 | | | | H2 | H2 | C2 | L4 | L2 | | | | | | F1 | F2 | F2 | F2 | F2 | F1 |
| 21 | F2 | F1 | F2 | F2 | F4 | F2 | L1 | | | | | | | | | | | | F1 | F4 | F1 | F1 | F2 | F4 |
| 22 | F2 | F1 | F1 | F2 | F2 | F1 | | F1 | | H2 | H1 | | | | H1 | | | L1 | F1 | F1 | F1 | F2 | F1 | F1 |
| 23 | F2 | | F1 | | | | | | H2 | | L2 | | | | | | | L3 | F1 | F1 | F4 | F2 | | F1 |
| 24 | F2 | F2 | F1 | F2 | F1 | | L1 | L2 | | | | H2 | H1 | | | | H1 | L2 | F1 | F1 | | F1 | | |
| 25 | | | F2 | F1 | | | | L1 | L3 | | L2 | L2 | | L2 | L2 | L2 | | L3 | L6 | F2 | F3 | F3 | F1 | F2 |
| 26 | F3 | F2 | F1 | | F1 | F2 | L1 | L1 | | L2 | C2 | L2 | L2 | L4 | | | | L2 | F1 | | F1 | F2 | F2 | F1 |
| 27 | F1 | F1 | F1 | | | F1 | L2 | L2 | | H2 | H2 | L2 | L3 | | L2 | H1 | H1 | | F2 | F1 | | | | |
| 28 | | F1 | | | | F1 | F1 | | C1 | | L2 | L2 | | L3 | L2 | | L1 | L3 | F1 | F1 | F1 | | | |
| 29 | | | F2 | | F1 | | | F1 | H1 | | L2 | C2 | H1 | H1 | | | H1 | C1 | F4 | F2 | F1 | | | |
| 30 | F2 | F2 | F2 | F3 | F5 | F1 | L1 | L1 | | H2 | | | | | | | H1 | L4 | F3 | F4 | F2 | F2 | | |
| 31 | | | | F4 | F5 | F6 | L2 | L1 | H1 | C2 | L1 | L2 | L2 | | L2 | L5 | | | F1 | F2 | F4 | F2 | F2 | 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.2021** TYPES OF Es

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Okinawa

**DEC.2021** fxI (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | X 39 | X 34 | X 36 | X 35 | X 38 | X 32 | X 27 | | | | | | | | | | | | | X 48 | X 53 | X 50 | X 42 | X 36 |
| 2 | X 36 | X 36 | X 41 | X 36 | X 30 | X 26 | X 25 | | | | | | | | | | | | | X 57 | X 54 | X 55 | X 43 | X 37 |
| 3 | X 34 | X 36 | X 36 | X 34 | X 40 | X 28 | X 27 | | | | | | | | | | | | | X 42 | X 39 | X 32 | X 32 | X 33 |
| 4 | X 34 | X 34 | X 36 | X 34 | X 31 | X 30 | X 26 | | | | | | | | | | | | | X 64 | X 51 | X 37 | X 32 | X 30 |
| 5 | X 30 | X 33 | X 34 | X 37 | X 40 | X 34 | X 27 | | | | | | | | | | | | | X 41 | X 40 | X 38 | X 37 | X 37 |
| 6 | X 34 | X 38 | X 39 | X 36 | X 37 | X 31 | X 29 | | | | | | | | | | | | | X 39 | X 36 | X 38 | X 39 | X 38 |
| 7 | X 34 | X 35 | X 38 | X 36 | X 41 | X 50 | X 29 | | | | | | | | | | | | | X 37 | X 36 | X 32 | X 34 | X 35 |
| 8 | X 36 | X 38 | X 40 | X 40 | X 45 | A | A | | | | | | | | | | | | | X 41 | X 35 | A | A | X 36 |
| 9 | X 35 | X 37 | X 37 | X 38 | X 41 | X 47 | X 28 | | | | | | | | | | | | | A | X 40 | A | X 32 | X 31 |
| 10 | X 32 | X 36 | X 37 | X 36 | X 36 | X 42 | X 38 | | | | | | | | | | | | | X 44 | X 36 | X 35 | X 36 | X 36 |
| 11 | X 34 | X 34 | X 35 | X 35 | X 40 | X 38 | X 32 | | | | | | | | | | | | | X 38 | X 33 | X 33 | X 37 | 46 |
| 12 | X 38 | X 37 | X 39 | X 34 | X 34 | X 32 | X 32 | | | | | | | | | | | | | X 36 | X 38 | X 34 | X 34 | X 36 |
| 13 | X 35 | X 34 | X 39 | X 39 | X 41 | X 41 | X 37 | | | | | | | | | | | | | X 58 | X 49 | X 44 | X 40 | X 40 |
| 14 | X 38 | X 39 | X 40 | X 40 | X 41 | X 38 | X 30 | | | | | | | | | | | | | X 45 | X 37 | X 37 | X 41 | X 34 |
| 15 | X 34 | X 34 | X 36 | X 37 | X 42 | X 32 | X 32 | | | | | | | | | | | | | X 48 | X 44 | X 45 | X 46 | X 29 |
| 16 | X 28 | X 32 | X 34 | X 36 | X 35 | X 40 | X 34 | | | | | | | | | | | | | X 45 | X 45 | X 40 | X 40 | X 37 |
| 17 | X 36 | X 36 | X 38 | X 41 | X 43 | X 25 | X 28 | | | | | | | | | | | | | X 73 | X 69 | X 59 | X 51 | X 46 |
| 18 | X 42 | X 43 | X 40 | X 39 | X 44 | X 44 | X 30 | | | | | | | | | | | | | X 57 | X 60 | X 56 | X 46 | X 41 |
| 19 | X 36 | X 34 | X 37 | X 35 | X 39 | X 32 | X 29 | | | | | | | | | | | | | X 70 | X 63 | X 65 | X 66 | X 47 |
| 20 | X 38 | X 36 | X 37 | X 37 | X 35 | X 33 | X 34 | | | | | | | | | | | | | X 52 | X 58 | X 68 | X 60 | X 34 |
| 21 | X 32 | X 33 | X 35 | X 36 | X 45 | X 34 | X 30 | | | | | | | | | | | | | X 58 | X 67 | X 64 | X 41 | X 34 |
| 22 | X 34 | X 36 | X 39 | X 38 | X 44 | X 26 | X 27 | | | | | | | | | | | | | X 59 | X 64 | X 63 | X 52 | X 39 |
| 23 | X 38 | X 40 | X 42 | X 48 | X 32 | X 28 | X 33 | | | | | | | | | | | | | X 65 | X 56 | X 48 | X 41 | X 36 |
| 24 | X 36 | X 40 | X 38 | X 40 | X 38 | X 28 | X 27 | | | | | | | | | | | | | X 69 | X 59 | X 58 | X 44 | X 40 |
| 25 | X 39 | X 38 | X 44 | X 47 | X 60 | X 54 | X 43 | | | | | | | | | | | | | X 61 | X 69 | X 68 | X 61 | X 48 |
| 26 | X 45 | X 47 | X 45 | X 42 | X 42 | X 35 | X 37 | | | | | | | | | | | | | X 89 | X 80 | X 78 | X 64 | X 55 |
| 27 | X 56 | X 53 | X 41 | X 40 | X 36 | X 35 | X 35 | | | | | | | | | | | | | X 71 | X 78 | X 76 | X 64 | X 50 |
| 28 | X 47 | X 51 | X 38 | X 33 | X 34 | X 27 | X 27 | | | | | | | | | | | | | X 72 | X 78 | X 86 | X 56 | X 42 |
| 29 | X 39 | X 39 | X 37 | X 40 | X 42 | X 39 | X 34 | | | | | | | | | | | | | X 78 | X 72 | X 71 | X 47 | X 38 |
| 30 | X 36 | X 39 | X 40 | X 44 | X 45 | X 34 | X 32 | | | | | | | | | | | | | X 94 | X 80 | X 60 | X 52 | X 53 |
| 31 | X 35 | X 36 | X 37 | X 40 | X 36 | X 27 | X 27 | | | | | | | | | | | | | X 47 | X 46 | X 44 | X 42 | X 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 | 31 | 31 | 31 | 31 | 31 | 30 | 30 | | | | | | | | | | | | | 30 | 31 | 29 | 30 | 31 |
| MED | X 36 | X 36 | X 38 | X 37 | X 40 | X 34 | X 30 | | | | | | | | | | | | | X 57 | X 53 | X 50 | X 42 | X 37 |
| U Q | X 38 | X 39 | X 40 | X 40 | X 42 | X 39 | X 34 | | | | | | | | | | | | | X 69 | X 67 | X 64 | X 52 | X 42 |
| L Q | X 34 | X 34 | X 36 | X 36 | X 36 | X 28 | X 27 | | | | | | | | | | | | | X 44 | X 39 | X 38 | X 37 | X 35 |

# IONOSPHERIC DATA STATION Okinawa

**DEC.2021** foF2 (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 33 | 28 | 30 | 29 | 32 | 26 | 21 | 38 | 53 | 60 | 71 | 94 | 90 | 85 | 74 | 83 | 98 | 92 | 78 | 42 | 47 | 44 | 36 | 30 |
| 2 | 30 | 30 | 35 | 30 | 24 | 20 | 19 | 43 | 64 | 93 | 77 | 82 | 91 | 72 | 72 | 78 | 75 | 68 | 57 | 51 | 48 | 49 | 37 | 31 |
| 3 | 28 | 30 | 30 | 28 | 34 | 22 | 21 | 38 | 54 | 64 | 83 | 86 | 82 | 84 | 92 | 93 | 61 | 68 | 54 | 36 | 33 | 26 | 26 | 27 |
| 4 | 28 | 28 | 30 | 28 | 25 | 24 | 20 | 40 | 58 | 72 | 87 | 112 | 124 | 101 | 96 | 104 | 89 | 69 | 64 | 58 | 45 | 31 | 26 | 23 |
| 5 | 24 | 27 | 28 | 31 | 34 | 28 | 21 | 35 | 56 | 70 | 68 | 80 | 90 | 83 | 90 | 73 | 74 | 70 | 49 | 35 | 34 | 32 | 31 | 31 |
| 6 | 28 | R 32 | 33 | 30 | 31 | 25 | 23 | 38 | 59 | 61 | 59 | 84 | 90 | 94 | H 72 | 66 | 76 | 66 | 46 | 33 | 30 | 32 | 33 | 32 |
| 7 | 28 | 29 | 32 | 30 | 35 | 44 | 23 | 34 | 57 | 73 | 80 | 77 | 73 | 92 | 102 | 100 | J R 90 | 81 | 44 | 31 | 30 | 26 | 28 | 29 |
| 8 | 30 | 32 | 34 | 34 | 39 | A | A | 34 | 49 | 70 | 74 | 65 | 93 | 135 | 147 | 119 | H 86 | H 74 | 52 | 35 | 29 | A | A | 30 |
| 9 | 29 | 31 | 31 | 32 | 35 | 41 | 22 | 31 | 47 | 58 | 59 | 67 | 60 | 66 | 79 | 68 | 67 | 62 | 59 | A | 34 | A | 26 | 25 |
| 10 | 26 | 30 | 31 | 30 | 30 | 36 | 32 | 31 | 46 | 58 | 62 | 57 | 59 | 81 | 76 | 104 | V 83 | 84 | 59 | 38 | 30 | 29 | 30 | 30 |
| 11 | 28 | 28 | 29 | 29 | 34 | 32 | 26 | 33 | 47 | 59 | 60 | 61 | 64 | 71 | 81 | 71 | 59 | 67 | 57 | 32 | 27 | 27 | 31 | F 38 |
| 12 | 32 | 31 | 33 | 28 | 28 | 26 | 26 | 33 | 51 | 58 | 62 | 67 | 60 | H 84 | 74 | 66 | 61 | 62 | 56 | 30 | 32 | 28 | 28 | 30 |
| 13 | 29 | 28 | 33 | 33 | 35 | 35 | 31 | 39 | 49 | 58 | 85 | 80 | 76 | 108 | 98 | J R 88 | 66 | 62 | 58 | 52 | 43 | 38 | 34 | 34 |
| 14 | 32 | 33 | 34 | 34 | 35 | 32 | 24 | 35 | 50 | 69 | 72 | 76 | 71 | 83 | 88 | 81 | R 81 | 66 | 62 | 39 | 31 | 31 | 35 | 28 |
| 15 | 28 | 28 | 30 | 31 | 36 | 26 | 26 | 36 | 51 | 56 | 63 | 66 | 65 | 75 | 72 | 71 | 82 | 62 | 54 | 42 | 38 | 39 | 40 | 23 |
| 16 | 22 | 26 | 28 | 30 | 29 | 34 | 28 | 35 | 62 | 89 | 92 | 89 | 74 | 92 | 95 | 84 | 73 | 72 | 67 | 39 | 39 | 34 | 34 | 31 |
| 17 | 30 | 30 | 32 | 35 | 37 | 19 | 22 | 38 | 58 | 66 | 71 | 79 | 105 | 97 | 96 | 114 | H 95 | 73 | 72 | 67 | 63 | 53 | 44 | 40 |
| 18 | 36 | 37 | 34 | 33 | 38 | 38 | 24 | 34 | 65 | 70 | 72 | 68 | 74 | 90 | 97 | 85 | 87 | 89 | H 68 | 51 | 54 | 50 | 40 | 35 |
| 19 | 29 | 28 | 31 | 29 | 33 | 26 | 23 | 38 | 62 | 70 | 78 | 77 | 84 | 92 | 94 | 98 | H 108 | 92 | 90 | 64 | 57 | 59 | 60 | 41 |
| 20 | 32 | 30 | 31 | 31 | 29 | 27 | 28 | 43 | 55 | 62 | 94 | 90 | 85 | 87 | H 104 | 107 | 104 | 87 | 62 | 46 | 52 | 62 | 54 | 28 |
| 21 | 26 | 27 | 29 | 30 | 39 | 28 | 24 | 38 | 67 | 80 | 89 | 96 | 102 | 106 | 92 | 94 | 85 | 84 | 77 | 52 | 61 | 58 | 35 | 28 |
| 22 | 28 | 30 | 33 | 32 | 38 | 20 | 21 | 38 | 76 | 75 | 82 | 112 | 132 | 142 | 127 | 130 | 111 | 86 | 74 | 53 | 58 | 57 | 46 | 33 |
| 23 | 32 | 34 | 36 | 42 | 26 | 22 | 27 | 43 | 63 | 76 | 79 | 79 | 90 | 102 | 112 | 97 | 103 | 104 | J R 88 | H 59 | 50 | 42 | 35 | 29 |
| 24 | 30 | 34 | 32 | 34 | 32 | 22 | 21 | 34 | 60 | 65 | 70 | 70 | 94 | 118 | 142 | 134 | 137 | 136 | 109 | 63 | 53 | 52 | 38 | 34 |
| 25 | 33 | 34 | 38 | 41 | 54 | 48 | 37 | 43 | 65 | 74 | 85 | 89 | 99 | 101 | H 102 | 108 | H 108 | 108 | 96 | H 55 | 63 | 62 | 55 | 42 |
| 26 | 39 | 40 | 38 | 36 | 36 | 29 | 31 | 41 | 67 | 80 | 84 | 83 | 95 | 112 | 142 | 146 | 145 | 139 | 126 | 83 | 74 | 72 | 58 | 49 |
| 27 | 50 | 47 | 35 | 34 | 30 | 29 | 29 | 39 | 69 | 72 | 73 | 77 | 88 | 110 | 120 | 115 | 124 | 121 | 90 | 65 | 72 | 70 | 58 | 44 |
| 28 | 41 | 45 | 32 | 27 | 28 | 21 | 21 | 38 | 70 | 79 | 100 | 79 | 120 | 152 | 136 | 122 | 133 | 101 | 82 | 66 | 72 | 80 | 50 | 36 |
| 29 | 33 | 33 | 31 | 34 | 36 | 33 | 28 | 36 | 70 | 80 | 84 | 70 | 102 | 133 | 144 | 113 | 112 | 111 | 104 | 72 | 66 | 65 | 41 | 32 |
| 30 | 30 | 33 | 34 | 38 | 39 | 28 | 26 | 33 | 62 | 89 | 109 | 86 | 98 | 108 | 109 | 116 | 106 | 102 | 116 | 88 | 74 | 54 | 46 | 47 |
| 31 | 29 | 30 | 31 | 34 | 30 | 21 | 21 | 26 | 63 | 73 | 74 | 74 | 76 | 86 | 88 | 74 | 68 | 64 | 53 | 41 | 40 | 38 | 36 | 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 | 31 | 31 | 31 | 31 | 31 | 30 | 30 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 30 | 31 | 29 | 30 | 31 |
| MED | 30 | 30 | 32 | 31 | 34 | 28 | 24 | 38 | 59 | 70 | 77 | 79 | 90 | 92 | 96 | 97 | 87 | 81 | 64 | 51 | 47 | 44 | 36 | 31 |
| U Q | 32 | 33 | 34 | 34 | 36 | 33 | 28 | 39 | 65 | 76 | 85 | 86 | 98 | 108 | 112 | 114 | 108 | 101 | 88 | 63 | 61 | 58 | 46 | 36 |
| L Q | 28 | 28 | 30 | 30 | 30 | 22 | 21 | 34 | 51 | 61 | 70 | 70 | 74 | 84 | 81 | 78 | 74 | 67 | 56 | 38 | 33 | 32 | 31 | 29 |

# IONOSPHERIC DATA STATION Okinawa

**DEC.2021** 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

| 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 | | | | | | | | | | L | L | L | L | L | L | L | A | | | | | | | |
| | | | | | | | | | | | | 444 | 468 | 448 | | | | | | | | | | |
| 2 | | | | | | | | | | 376 | L | A | 452 | 456 | 440 | L | L | | | | | | | |
| | | | | | | | | | | | 436 | | | | | 420 | | | | | | | | |
| 3 | | | | | | | | | | | L | L | 452 | 460 | 436 | 408 | L | | | | | | | |
| | | | | | | | | | | | 440 | 448 | | | | | | | | | | | | |
| 4 | | | | | | | | | | L | L | 452 | 468 | 468 | L | L | A | 244 | | | | | | |
| | | | | | | | | | | | 468 | | | | | 376 | | | | | | | | |
| 5 | | | | | | | | | | L | L | L | L | L | U L | L | L | | | | | | | |
| | | | | | | | | | | | 420 | 456 | 452 | 460 | 444 | | | | | | | | | |
| 6 | | | | | | | | | | | L | L | 460 | 452 | 420 | A | A | A | | | | | | |
| 7 | | | | | | | | | | L | | | 444 | 428 | 428 | 400 | | | | | | | | |
| | | | | | | | | | | | 420 | 432 | | | | | | | | | | | | |
| 8 | | | | | | | | | | | L | | 448 | 428 | 432 | | L | | | | | | | |
| | | | | | | | | | | | 416 | 432 | | | | | | | | | | | | |
| 9 | | | | | | | | | | | L | | 424 | L | 436 | L | A | A | | | | | | |
| | | | | | | | | | | | 412 | 420 | | 460 | | | | | | | | | | |
| 10 | | | | | | | | | | | | U L | U L | | L | | U L | | | | | | | |
| | | | | | | | | | | | 412 | 396 | 444 | 448 | 440 | 400 | 348 | | | | | | | |
| 11 | | | | | | | | | | L | L | | 428 | 436 | 424 | L | L | | | | | | | |
| | | | | | | | | | | | | 424 | | | | | | | | | | | | |
| 12 | | | | | | | | | | 320 | L | | U L | L | | L | U L | | | | | | | |
| | | | | | | | | | | | | 436 | 448 | 436 | 436 | | 320 | | | | | | | |
| 13 | | | | | | | | | 260 | | 424 | 428 | 456 | 448 | 428 | L | A | | | | | | | |
| | | | | | | | | | | | | | | | | 404 | | | | | | | | |
| 14 | | | | | | | | | | L | L | | U L | | | L | | | | | | | | |
| | | | | | | | | | | | 424 | 432 | 444 | 444 | 440 | | | | | | | | | |
| 15 | | | | | | | | | | L | L | L | | | | L | L | | | | | | | |
| | | | | | | | | | | | | 440 | 452 | 452 | 440 | 408 | | | | | | | | |
| 16 | | | | | | | | | | A | L | | | | | L | | | | | | | | |
| | | | | | | | | | | | | 448 | 456 | 460 | 460 | | | | | | | | | |
| 17 | | | | | | | | | | | L | L | L | | L | L | L | | | | | | | |
| | | | | | | | | | | | | 464 | 472 | 480 | 484 | | | | | | | | | |
| 18 | | | | | | | | | | L | L | | U L | L | | L | | | | | | | | |
| | | | | | | | | | | | | 448 | 512 | 480 | 468 | 424 | | | | | | | | |
| 19 | | | | | | | | | | | L | L | | L | L | U L | | | | | | | | |
| | | | | | | | | | | | | 460 | 484 | 480 | 460 | 460 | | | | | | | | |
| 20 | | | | | | | | | | U L | L | L | | L | L | L | | | | | | | | |
| | | | | | | | | | | 492 | 436 | 480 | 484 | 492 | 484 | 456 | | | | | | | | |
| 21 | | | | | | | | | | L | L | | L | L | L | L | L | | | | | | | |
| | | | | | | | | | | | | 512 | | 472 | | | | | | | | | | |
| 22 | | | | | | | | | | L | U L | L | 484 | 476 | L | L | | | | | | | | |
| | | | | | | | | | | | 468 | 488 | | | 484 | | | | | | | | | |
| 23 | | | | | | | | | | | L | L | L | L | | U L | L | | | | | | | |
| | | | | | | | | | | | | | 512 | 504 | 480 | 448 | | | | | | | | |
| 24 | | | | | | | | | | | L | U L | U L | L | L | L | L | | | | | | | |
| | | | | | | | | | | | | 376 | 480 | 508 | 480 | | | | | | | | | |
| 25 | | | | | | | | | | U L | L | L | L | | U L | L | U L | | | | | | | |
| | | | | | | | | | | 356 | | 464 | 484 | 496 | 460 | | 372 | | | | | | | |
| 26 | | | | | | | | | | L | L | L | L | L | L | L | L | | | | | | | |
| | | | | | | | | | | | 440 | | 476 | 524 | 484 | 444 | | | | | | | | |
| 27 | | | | | | | | | | L | U L | | U L | L | L | L | | | | | | | | |
| | | | | | | | | | | 360 | 444 | 480 | 608 | 496 | 484 | | | | | | | | | |
| 28 | | | | | | | | | | L | L | | L | L | L | U L | | | | | | | | |
| | | | | | | | | | | | 456 | 468 | 460 | 500 | 448 | 444 | | | | | | | | |
| 29 | | | | | | | | | | L | L | U L | | | A | | | | | | | | | |
| | | | | | | | | | | | | 460 | 436 | 496 | | 420 | | | | | | | | |
| 30 | | | | | | | | | L | L | L | L | | L | | | | | | | | | | |
| | | | | | | | | | | | | 452 | 480 | 468 | 452 | 440 | | | | | | | | |
| 31 | | | | | | | | | | L | L | | | | | L | U L | | | | | | | |
| | | | | | | | | | | | 440 | 456 | 460 | 472 | 452 | | 360 | | | | | | | |
| | 00 | 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 | 16 | 27 | 30 | 31 | 27 | 15 | 4 | 1 | | | | | | |
| MED | | | | | | | | | 260 | 360 | L 436 | L 448 | 460 | 468 | 448 | L 420 | U L 354 | 244 | | | | | | |
| U Q | | | | | | | | | | 434 | L 442 | L 464 | L 480 | L 492 | L 480 | U L 444 | U L 366 | | | | | | | |
| L Q | | | | | | | | | | 338 | L 420 | 432 | 448 | 448 | 436 | 404 | U L 334 | | | | | | | |

**DEC.2021** foF1 (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Okinawa

**DEC.2021** 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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | B | A | A | 304 | A | A | A | 312 | 280 | A | A | B | | | | | |
| 2 | | | | | | | | B | 208 | 268 | 292 | 312 | 320 | A | 320 | 300 | 260 | A | B | | | | | |
| 3 | | | | | | | | B | 220 | 272 | 304 | 316 | 320 | 308 | 284 | 276 | 248 | A | A | | | | | |
| 4 | | | | | | | | B | 196 | 244 | 272 | A | 304 | A | A | 280 | A | A | A | | | | | |
| 5 | | | | | | | | A | 220 | 280 | 300 | A | A | A | A | A | A | A | A | | | | | |
| 6 | | | | | | | | B | A | 264 | A | U A 288 | A | A | A | A | A | A | B | | | | | |
| 7 | | | | | | | | B | A | A | A | A | A | A | A | A | A | A | A | | | | | |
| 8 | | | | | | | | B | A | 252 | A | A | A | A | 304 | 280 | 244 | A | A | | | | | |
| 9 | | | | | | | | A | 200 | 252 | 288 | 284 | A | A | 284 | 280 | 244 | A | A | | | | | |
| 10 | | | | | | | | B | 200 | 256 | 284 | 308 | 312 | 308 | A | 272 | A | 180 | A | | | | | |
| 11 | | | | | | | | B | 184 | 248 | 280 | 296 | 308 | 312 | 296 | 284 | 244 | A | B | | | | | |
| 12 | | | | | | | | B | A | A | 300 | A | A | A | A | A | A | A | B | | | | | |
| 13 | | | | | | | | B | 204 | 252 | 288 | 308 | A | A | A | A | A | A | A | | | | | |
| 14 | | | | | | | | B | 208 | 256 | 292 | 308 | 324 | 320 | 308 | 296 | A | A | A | | | | | |
| 15 | | | | | | | | B | 172 | 244 | 276 | 320 | 324 | 336 | A | 312 | 268 | 196 | B | | | | | |
| 16 | | | | | | | | B | 200 | 248 | 272 | 316 | 332 | 332 | A | 304 | A | A | B | | | | | |
| 17 | | | | | | | | B | 192 | 260 | 304 | 328 | 336 | 328 | U A 308 | A | A | A | A | | | | | |
| 18 | | | | | | | | B | 192 | 240 | 296 | 312 | 332 | 320 | U A 308 | A | A | A | B | | | | | |
| 19 | | | | | | | | B | 204 | 268 | 312 | 320 | 328 | 312 | 308 | A | A | A | B | | | | | |
| 20 | | | | | | | | B | 204 | 256 | 300 | A | A | 344 | 336 | 308 | 264 | 188 | B | | | | | |
| 21 | | | | | | | | B | 204 | 240 | 272 | A | 344 | 344 | 332 | 316 | 280 | 200 | B | | | | | |
| 22 | | | | | | | | B | 208 | 268 | A | A | 348 | 352 | 340 | 316 | A | A | B | | | | | |
| 23 | | | | | | | | B | 204 | 272 | 308 | A | A | A | A | 316 | 272 | A | B | | | | | |
| 24 | | | | | | | | B | 196 | 260 | 308 | U A 304 | 344 | A | 336 | 316 | A | A | B | | | | | |
| 25 | | | | | | | | B | A | A | A | A | A | A | A | A | U A 256 | A | B | | | | | |
| 26 | | | | | | | | B | 204 | 268 | 308 | A | A | A | A | A | 276 | 200 | B | | | | | |
| 27 | | | | | | | | B | 188 | 252 | U A 296 | 324 | A | 336 | 328 | 304 | 272 | 196 | B | | | | | |
| 28 | | | | | | | | B | 204 | U A 260 | A | A | A | 356 | A | A | A | A | A | | | | | |
| 29 | | | | | | | | B | 188 | 260 | 304 | 304 | U A 308 | 336 | A | A | A | 204 | A | | | | | |
| 30 | | | | | | | | B | 184 | 256 | 284 | A | A | 332 | 332 | A | A | A | A | | | | | |
| 31 | | | | | | | | B | 176 | 252 | 288 | 316 | 320 | A | 324 | 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 | | | | | | | | | 25 | 27 | 25 | 17 | 16 | 16 | 17 | 17 | 12 | 7 | | | | | | |
| MED | | | | | | | | | 200 | 256 | 296 | 312 | 324 | 332 | 312 | 300 | 262 | 196 | | | | | | |
| U Q | | | | | | | | | 204 | 268 | 304 | 318 | 334 | 340 | 332 | 314 | 272 | 200 | | | | | | |
| L Q | | | | | | | | | 190 | 252 | 284 | 304 | 316 | 316 | 306 | 280 | 246 | 188 | | | | | | |

**DEC.2021** foE (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Okinawa

**DEC.2021** 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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 20 | J A 18 | E B 16 | J A 26 | J A 22 | J A 32 | J A 29 | E B 16 | 26 | 32 | 36 | 36 | 35 | J A 42 | G 28 | J A 45 | J A 50 | J A 54 | J A 22 | J A 22 | J A 21 | E B 16 | E B 16 | E B 16 |
| 2 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | J A 17 | 25 | 31 | 39 | J A 46 | 36 | J A 60 | G | G | G | J A 29 | J A 23 | J A 28 | J A 23 | 20 | E B 16 | J A 19 |
| 3 | J A 18 | J A 16 | E B 16 | J A 32 | J A 19 | E B 16 | E B 16 | E B 16 | 25 | 31 | 34 | 37 | 39 | 39 | 35 | J A 36 | G | J A 33 | J A 32 | J A 23 | J A 15 | 18 | 18 | E B 16 |
| 4 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | E B 16 | J A 20 | 23 | 28 | 33 | 36 | 37 | 35 | 34 | 36 | 31 | J A 28 | J A 38 | J A 40 | J A 22 | 19 | 18 | J A 18 |
| 5 | 20 | E B 16 | 18 | E B 16 | E B 16 | 19 | E B 16 | 18 | 28 | 33 | J A 42 | 40 | J A 45 | J A 46 | J A 50 | J A 48 | J A 30 | J A 33 | J A 34 | J A 52 | J A 25 | J A 18 | J A 18 | 19 |
| 6 | E B 16 | E B 16 | 20 | J A 17 | J A 20 | 19 | J A 23 | J A 20 | 25 | 34 | J A 40 | 36 | J A 55 | J A 52 | J A 54 | J A 78 | J A 61 | J A 32 | J A 20 | 20 | J A 19 | J A 21 | J A 24 | J A 26 |
| 7 | J A 32 | J A 16 | J A 36 | J A 40 | J A 29 | 20 | J A 16 | J A 21 | J A 29 | J A 34 | J A 35 | 36 | J A 70 | J A 102 | 39 | J A 42 | J A 30 | J A 33 | J A 49 | J A 28 | J A 50 | J A 33 | J A 23 | J A 16 |
| 8 | J A 22 | J A 17 | J A 20 | J A E B 16 | 51 | J A 20 | J A 20 | J A 22 | 24 | 30 | 33 | J A 37 | J A 64 | J A 40 | 33 | 32 | 28 | J A 39 | J A 28 | J A 28 | J A 33 | J A 43 | J A 35 | J A 34 |
| 9 | D D 37 | J A 29 | J A 22 | J A 21 | J A 20 | J A 19 | J A 20 | 20 | 27 | 32 | 35 | J A 43 | J A 45 | J A 42 | J A 40 | 38 | 41 | J A 38 | J A 38 | J A 44 | J A 21 | J A 37 | J A 38 | J A 20 |
| 10 | J A 20 | 18 | 19 | 18 | J A 26 | E B 16 | E B 16 | E B 16 | 27 | 35 | 38 | 37 | 41 | 39 | J A 49 | J A 52 | J A 50 | 29 | J A 27 | J A 74 | J A 49 | J A 22 | J A 48 | J A 32 |
| 11 | J A 20 | E B 16 | 19 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 26 | 31 | 34 | 34 | 42 | 41 | 34 | 31 | 28 | J A 35 | E B 16 | E B 16 | E B 16 | E B 16 | 18 | E B 16 |
| 12 | E B 16 | J A 20 | J A 18 | J A 17 | J A 104 | E B 16 | E B 16 | E B 16 | 25 | 32 | 38 | 38 | J A 42 | 38 | J A 36 | J A 36 | J A 31 | J A 26 | J A 18 | E B 16 | 18 | J A 25 | 19 | E B 16 |
| 13 | E B 16 | 19 | J A 49 | J A 20 | J A 21 | J A 24 | J A E B 16 | 19 | G | 33 | 36 | 34 | J A 46 | J A 54 | J A 34 | J A 34 | J A 43 | J A 36 | J A 34 | J A 37 | J A 23 | J A 21 | J A 18 | J A 18 |
| 14 | 18 | E B 16 | E B 16 | J A 21 | J A 18 | 20 | 18 | E B 16 | 26 | 31 | 35 | 36 | 36 | 38 | 36 | J A 54 | J A 33 | J A 28 | J A 27 | J A 22 | 19 | E B 16 | E B 16 | E B 16 |
| 15 | E B 16 | E B 16 | E B 16 | 19 | J A 20 | J A 25 | 20 | E B 16 | 22 | 29 | 35 | 36 | 37 | 37 | J A 54 | G | 31 | 26 | J A 19 | J A 24 | E B 16 | J A 25 | J A 16 | E B 16 |
| 16 | J A 16 | J A 29 | 20 | J A 18 | J A 18 | J A 29 | J A 22 | J A 17 | 26 | 31 | 34 | 36 | G | 36 | 38 | 35 | 30 | J A 42 | J A 21 | J A 21 | E B 16 | J A 32 | J A 17 | E B 16 |
| 17 | E B 16 | J A 16 | J A 29 | J A 20 | J A 19 | J A 31 | J A 20 | J A 16 | 26 | 31 | 35 | J A 42 | J A 46 | J A 52 | J A 57 | J A 38 | J A 53 | J A 50 | J A 27 | J A 48 | J A 18 | 18 | E B 16 | E B 16 |
| 18 | E B 16 | E B 16 | E B 16 | E B 16 | B J 28 | A J 26 | A J 17 | A 19 | G | 29 | 35 | J A 43 | J A 40 | J A 36 | J A 48 | J A 62 | J A 38 | J A 29 | J A 25 | J A 17 | J A 17 | J A 16 | J A 23 | 20 |
| 19 | E B 16 | E B 16 | E B 16 | J A 40 | A J 27 | A J 23 | A J 18 | E B 16 | 25 | 33 | 38 | 38 | 40 | J A 45 | J A 37 | J A 48 | J A 39 | J A 33 | J A 29 | J A E B 28 | E B 16 | E B 16 | 20 | J A 20 |
| 20 | E B 16 | E B 16 | E B 16 | J A 25 | A J 25 | A E B 16 | E B 16 | E B 16 | 24 | 32 | 34 | J A 45 | J A 56 | G | G | G | G | G | E B 16 | J A 20 | A J 18 | A J 17 | A J 16 | E B 16 |
| 21 | J A 18 | J A 22 | J A 18 | J A 22 | A J 17 | A J 15 | E B 16 | 17 | G | G | 33 | 40 | 39 | G | G | 35 | 31 | 24 | J A 18 | J A 23 | J A 42 | J A 38 | J A 26 | E B 16 |
| 22 | J A 24 | 20 | E B 16 | J A 22 | A J 23 | A E B 16 | E B 16 | E B 16 | 24 | J A 35 | J A 41 | J A 40 | G | G | G | J A 50 | J A 43 | J A 37 | J A 32 | J A 26 | J A 36 | 20 | J A 20 | E B 16 |
| 23 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 24 | G | 34 | J A 48 | J A 43 | J A 44 | J A 36 | G 25 | 30 | 22 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 24 | 20 | E B 16 | J A 34 | 19 | J A 20 | 19 | J A E B 14 | 16 | 24 | 31 | G | J A 36 | 38 | 40 | 36 | J A 29 | 32 | 26 | J A 40 | J A E B 25 | E B 16 | J A E B 16 | E B 16 | E B 16 |
| 25 | E B 16 | E B 16 | E B 16 | J A 22 | A J 16 | A E B 16 | E B 16 | J A 63 | J A 37 | J A 41 | J A 41 | J A 39 | J A 41 | J A 43 | J A 40 | J A 40 | J A 33 | 23 | J A 26 | J A 29 | J A 26 | J A 29 | J A 24 | J A 22 |
| 26 | J A 20 | J A 18 | 18 | 18 | J A 27 | A J 23 | A J 29 | A J 26 | 24 | 30 | 37 | J A 60 | J A 64 | J A 56 | J A 84 | J A 48 | G | 22 | J A 15 | J A 18 | J A 26 | J A 34 | J A 22 | J A 22 |
| 27 | J A 30 | J A 26 | E B 17 | E B E B 16 | B E 16 | B 19 | 18 | E B 16 | 23 | 28 | J A 38 | G | J A 49 | G | G | 33 | 30 | 24 | E B 16 | J A 21 | E B 16 | J A 27 | 20 | E B 16 |
| 28 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 23 | J A 41 | J A 38 | J A 60 | J A 38 | 42 | J A 53 | J A 58 | J A 70 | J A 52 | J A 34 | J A 18 | J A 24 | J A 21 | E B 16 | J A 20 |
| 29 | E B 16 | E B 16 | E B 16 | J A 17 | J A 15 | A J 16 | A J 18 | E B 16 | 23 | G | G | 35 | J A 43 | J A 32 | J A 75 | J A 52 | 34 | 28 | J A 22 | J A 20 | E B 16 | E B 16 | E B 16 | E B 16 |
| 30 | J A 20 | E B 16 | E B 16 | J A 20 | E B 16 | J A 19 | J A 21 | J A 20 | 24 | 32 | J A 37 | J A 34 | J A 36 | G | G | J A 48 | J A 41 | J A 53 | J A 26 | E B 16 | J A 21 | E B 16 | J A 41 | J A 16 |
| 31 | 18 | J A 19 | E B 16 | E B 16 | B J 22 | A E 16 | B J 21 | A J 20 | 24 | 30 | 36 | 40 | 39 | J A 44 | J A 80 | J A 52 | J A 32 | J A 35 | J A 26 | E B 16 | E B 16 | E B 16 | E B 16 | 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 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 |
| MED | 18 | E B 16 | E B 16 | J A 18 | J A 20 | 19 | 16 | 16 | 24 | 31 | 35 | 37 | J A 41 | 40 | J A 36 | J A 38 | J A 32 | J A 32 | J A 26 | J A 23 | J A 19 | J A 20 | J A 18 | E B 16 |
| U Q | J A 20 | A J 19 | A J 20 | A J 22 | A J 25 | A J 23 | A J 20 | A J 20 | 26 | 33 | J A 38 | J A 42 | J A 46 | A J 45 | A J 50 | A J 50 | J A 41 | J A 37 | J A 32 | J A 28 | J A 25 | J A 27 | J A 23 | J A 20 |
| L Q | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 23 | 30 | 34 | 36 | 37 | G 36 | G 33 | 33 | 30 | 26 | 19 | E B 18 | E B 16 | E B 16 | E B 16 | E B 16 |

**DEC.2021** foEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Okinawa

**DEC.2021** fbEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 17 | E B 16 | E B 16 | 26 | 31 | 34 | 34 | 35 | 33 | G 18 | G 18 | 27 | 21 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 2 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 25 | 29 | 34 | 42 | 35 | 35 | G | G | G | 22 | E B 16 | 20 | 18 | E B 16 | E B 16 | E B 16 |
| 3 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 24 | 30 | 32 | 35 | 37 | 36 | 32 | G 21 | G | 21 | 20 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 4 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | E B 16 | E B 16 | 22 | 28 | 32 | 34 | 37 | 33 | 32 | 34 | 29 | 21 | 24 | 20 | 18 | E B 16 | E B 16 | E B 16 |
| 5 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 16 | 26 | 30 | 34 | 38 | 40 | 37 | 36 | 32 | 26 | 28 | 20 | 23 | E B 16 | E B 16 | E B 16 | E B 16 |
| 6 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 24 | 34 | 34 | 35 | 36 | 35 | 34 | 40 | 33 | 28 | E B 16 | E B 16 | E B 16 | E B 16 | 19 | 20 |
| 7 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 24 | 30 | 33 | 36 | 38 | 34 | 34 | 31 | 27 | 22 | 18 | 23 | 20 | 18 | E B 16 | E B 16 |
| 8 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | A A 20 | A A 20 | E B 16 | 24 | 30 | 33 | 35 | 34 | 32 | 32 | 32 | 26 | 33 | 18 | 20 | 18 | A A 43 | A A 35 | 22 |
| 9 | E B 16 | E B 16 | E B 16 | 19 | E B 16 | E B 16 | E B 16 | 18 | 26 | 32 | 33 | 36 | 35 | 33 | 35 | 37 | 40 | 29 | 20 | A A 44 | 19 | A A 37 | E B 16 | E B 16 |
| 10 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 27 | 34 | 34 | 36 | 38 | 37 | 37 | 32 | 30 | 28 | 26 | 27 | E B 16 | 20 | E B 16 | E B 16 |
| 11 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 26 | 31 | 33 | 34 | 38 | 40 | 33 | 30 | 28 | 32 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 12 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 25 | 29 | 35 | 34 | 35 | 38 | 33 | 32 | 29 | 22 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 13 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | 32 | 35 | 34 | 33 | 33 | 32 | 31 | 31 | 32 | 27 | E B 16 | E B 16 | 18 | E B 16 | E B 16 |
| 14 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 26 | 30 | 34 | 34 | 34 | 38 | 36 | G 23 | 28 | 22 | 19 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 15 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 22 | 28 | 33 | 35 | 35 | 37 | 35 | G | 30 | 24 | E B 16 | 18 | E B 16 | E B 16 | E B 16 | E B 16 |
| 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 25 | 30 | 32 | 35 | G | 36 | 37 | 34 | 30 | 22 | E B 16 | E B 16 | E B 16 | 22 | E B 16 | E B 16 |
| 17 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 26 | 30 | 34 | 37 | 38 | 40 | 40 | 33 | 32 | 40 | 19 | 25 | E B 16 | E B 16 | E B 16 | E B 16 |
| 18 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | 28 | 34 | 40 | 36 | 35 | 39 | 36 | 30 | 22 | E B 16 | E B 16 | E B 16 | E B 16 | 18 | E B 16 |
| 19 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 25 | 32 | 36 | 37 | 38 | 36 | 34 | 32 | 27 | 22 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 20 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 24 | 31 | 34 | 39 | 36 | G | G | G | G | G | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 21 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | G | G | 32 | 34 | 39 | G | G | 34 | 31 | 24 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 22 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 23 | 29 | 36 | 35 | G | G | G | 35 | 28 | 23 | E B 16 | E B 16 | 25 | E B 16 | E B 16 | E B 16 |
| 23 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 24 | G | 33 | 35 | 36 | 35 | 34 | G 23 | 30 | 22 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 24 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 24 | 30 | G | 34 | 38 | 39 | 36 | G 22 | 32 | 25 | E B 16 | 21 | E B 16 | E B 16 | E B 16 | E B 16 |
| 25 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 25 | 30 | 33 | 34 | 36 | 36 | 36 | 36 | 31 | 23 | E B 16 | E B 16 | 19 | 22 | 18 | E B 16 |
| 26 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 24 | 29 | 34 | 37 | 36 | 37 | 40 | 31 | G | 22 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 27 | E B 16 | E B 16 | E B 17 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 23 | 27 | 32 | G | 38 | G | G | 33 | 28 | 23 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 28 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 23 | 30 | 36 | 34 | 35 | 41 | 34 | 32 | 32 | 33 | 18 | E B 16 | 21 | E B 16 | E B 16 | E B 16 |
| 29 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 22 | G | G | 34 | 36 | G 26 | 53 | 37 | 33 | 27 | 18 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 30 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 23 | 31 | 32 | 33 | 35 | G | G | 37 | 30 | 33 | 23 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| 31 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 24 | 30 | 35 | 38 | 36 | 34 | G 26 | 32 | 30 | 30 | 20 | E B 16 | E B 16 | E B 16 | E B 16 | 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 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 |
| MED | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 24 | 30 | 34 | 35 | 36 | 35 | 34 | 32 | 30 | 23 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |
| U Q | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 25 | 31 | 34 | 37 | 38 | 37 | 36 | 34 | 31 | 29 | 20 | 20 | 18 | 16 | 16 | E B 16 |
| L Q | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | 23 | 29 | 32 | 34 | 35 | G 33 | G | G | 27 | 22 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 | E B 16 |

**DEC.2021** fbEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Okinawa

**DEC.2021** fmin (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

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

# IONOSPHERIC DATA STATION Okinawa

**DEC.2021** M(3000)F2 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

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

| D \ 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 | 350 | 303 | 310 | 329 | 353 | 381 | 351 | 347 | 358 | 380 | 340 | 342 | 360 | 361 | 325 | 317 | 335 | 351 | 349 | 316 | 314 | 321 | 326 | 311 |
| 2 | 305 | 289 | 314 | 384 | 384 | 283 | 281 | 350 | 364 | 368 | 373 | 375 | 366 | 330 | 340 | 357 | 354 | 381 | 332 | 305 | 325 | 354 | 374 | 312 |
| 3 | 325 | 333 | 348 | 309 | 332 | 381 | 290 | 347 | 365 | 351 | 353 | 351 | 345 | 326 | 337 | 375 | 361 | 380 | 346 | 364 | 387 | 318 | 336 | 279 |
| 4 | 309 | 312 | 320 | 342 | 335 | 291 | 273 | 331 | 364 | 340 | 317 | 353 | 357 | 344 | 293 | 337 | 358 | 326 | 327 | 347 | 369 | 331 | 296 | 281 |
| 5 | 301 | 309 | 315 | 314 | 335 | 395 | 331 | 349 | 352 | 354 | 347 | 336 | 326 | 331 | 347 | 357 | 367 | 386 | 359 | 353 | 300 | 303 | 307 | 326 |
| 6 | 289 | 313R | 352 | 308 | 327 | 348 | 307 | 342 | 377 | 359 | 333 | 359 | 353 | 342 | 335H | 349 | 365 | 379 | 363 | 382 | 298 | 326 | 349 | 264 |
| 7 | 306 | 299 | 296 | 292 | 323 | 369 | 363 | 341 | 351 | 355 | 372 | 369 | 348 | 331 | 334 | 340 | 282JR | 392 | 383 | 378 | 316 | 316 | 302 | 276 |
| 8 | 296 | 295 | 318 | 356 | 390 | A | A | 358 | 367 | 389 | 361 | 343 | 327 | 344 | 341 | 342 | 352H | 370H | 373 | 379 | 308 | A | A | 306 |
| 9 | 297 | 301 | 318 | 320 | 337 | 402 | 359 | 355 | 375 | 367 | 374 | 393 | 348 | 347 | 352 | 308 | 340 | 348 | 385 | A | 367 | A | 329 | 274 |
| 10 | 313 | 313 | 320 | 315 | 327 | 369 | 417 | 361 | 373 | 386 | 394 | 383 | 325 | 323 | 327 | 322 | 323V | 345 | 374 | 328 | 319 | 315 | 335 | 344 |
| 11 | 313 | 309 | 331 | 311 | 321 | 360 | 392 | 349 | 371 | 368 | 366 | 377 | 360 | 348 | 339 | 359 | 367 | 371 | 378 | 337 | 327 | 285 | 314 | 353F |
| 12 | 322 | 296 | 313 | 320 | 331 | 362 | 371 | 358 | 380 | 359 | 350 | 376 | 326 | 328H | 349 | 353 | 343 | 361 | 406 | 369 | 306 | 364 | 333 | 323 |
| 13 | 280 | 302 | 311 | 321 | 363 | 360 | 387 | 365 | 385 | 331 | 363 | 381 | 322 | 344 | 312 | 293JR | 330 | 359 | 371 | 328 | 330 | 356 | 278 | 323 |
| 14 | 295 | 311 | 332 | 315 | 343 | 378 | 347 | 357 | 366 | 358 | 359 | 391 | 337 | 359 | 343 | 303 | 338R | 368 | 378 | 350 | 316 | 300 | 353 | 353 |
| 15 | 320 | 308 | 308 | 317 | 359 | 359 | 352 | 349 | 390 | 369 | 363 | 368 | 345 | 359 | 346 | 336 | 370 | 371 | 380 | 358 | 295 | 314 | 364 | 388 |
| 16 | 298 | 286 | 304 | 310 | 297 | 349 | 395 | 332 | 343 | 372 | 367 | 361 | 358 | 335 | 340 | 324 | 357 | 348 | 398 | 333 | 326 | 310 | 349 | 318 |
| 17 | 283 | 305 | 313 | 347 | 382 | 356 | 308 | 345 | 370 | 370 | 345 | 362 | 338 | 352 | 323 | 345 | 347H | 366 | 345 | 348 | 335 | 303 | 338 | 307 |
| 18 | 283 | 291 | 304 | 321 | 341 | 393 | 373 | 332 | 373 | 366 | 368 | 364 | 328 | 327 | 344 | 334 | 350 | 344 | 349H | 332 | 327 | 321 | 296 | 346 |
| 19 | 307 | 287 | 314 | 320 | 379 | 339 | 301 | 312 | 358 | 367 | 359 | 363 | 347 | 330 | 306 | 326 | 331H | 327 | 379 | 348 | 310 | 314 | 342 | 297 |
| 20 | 257 | 290 | 315 | 328 | 338 | 273 | 319 | 343 | 377 | 303 | 360 | 324 | 341 | 305 | 296H | 315 | 343 | 349 | 366 | 291 | 293 | 324 | 354 | 332 |
| 21 | 274 | 277 | 286 | 285 | 350 | 385 | 299 | 329 | 358 | 336 | 344 | 340 | 329 | 335 | 319 | 339 | 349 | 350 | 341 | 307 | 326 | 354 | 341 | 286 |
| 22 | 277 | 287 | 307 | 320 | 390 | 270 | 288 | 323 | 364 | 370 | 325 | 346 | 328 | 330 | 306 | 332 | 358 | 356 | 339 | 300 | 326 | 315 | 311 | 292 |
| 23 | 281 | 287 | 320 | 355 | 346 | 301 | 299 | 358 | 349 | 344 | 369 | 339 | 332 | 327 | 346 | 320 | 318 | 342 | 296JR | 308H | 312 | 313 | 297 | 306 |
| 24 | 284 | 307 | 337 | 343 | 356 | 286 | 319 | 330 | 364 | 376 | 367 | 313 | 320 | 321 | 348 | 306 | 321 | 340 | 348 | 338 | 303 | 361 | 309 | 322 |
| 25 | 297 | 280 | 282 | 283 | 320 | 366 | 309 | 319 | 362 | 358 | 354 | 345 | 339 | 330 | 289H | 316 | 313H | 332 | 360 | 292H | 288 | 317 | 331 | 297 |
| 26 | 261 | 271 | 296 | 303 | 331 | 290 | 321 | 323 | 361 | 357 | 375 | 331 | 325 | 308 | 330 | 313 | 320 | 336 | 349 | 311 | 315 | 316 | 311 | 303 |
| 27 | 306 | 302 | 308 | 313 | 316 | 300 | 311 | 342 | 383 | 374 | 355 | 343 | 300 | 329 | 297 | 292 | 321 | 331 | 355 | 352 | 313 | 332 | 344 | 311 |
| 28 | 294 | 315 | 314 | 314 | 352 | 272 | 288 | 329 | 377 | 344 | 370 | 327 | 315 | 317 | 320 | 309 | 346 | 346 | 330 | 299 | 309 | 357 | 344 | 256 |
| 29 | 298 | 310 | 284 | 286 | 321 | 329 | 283 | 295 | 354 | 344 | 365 | 327 | 321 | 327 | 331 | 302 | 317 | 342 | 344 | 340 | 324 | 346 | 323 | 302 |
| 30 | 277 | 280 | 293 | 340 | 334 | 350 | 287 | 304 | 332 | 338 | 363 | 356 | 336 | 318 | 306 | 325 | 302 | 310 | 357 | 339 | 328 | 290 | 294 | 330 |
| 31 | 313 | 275 | 300 | 339 | 360 | 296 | 283 | 299 | 350 | 357 | 378 | 367 | 335 | 326 | 340 | 344 | 343 | 366 | 352 | 346 | 314 | 320 | 305 | 311 |
| | 00 | 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 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 30 | 31 | 29 | 30 | 31 |
| MED | 297 | 301 | 313 | 320 | 338 | 353 | 315 | 342 | 364 | 359 | 363 | 356 | 336 | 330 | 334 | 326 | 343 | 350 | 357 | 338 | 316 | 318 | 330 | 311 |
| U Q | 309 | 309 | 320 | 339 | 359 | 369 | 359 | 350 | 375 | 370 | 369 | 369 | 348 | 344 | 343 | 344 | 357 | 370 | 378 | 352 | 327 | 339 | 344 | 326 |
| L Q | 283 | 287 | 304 | 310 | 327 | 296 | 290 | 329 | 358 | 344 | 350 | 340 | 326 | 326 | 312 | 313 | 321 | 342 | 345 | 311 | 308 | 314 | 307 | 292 |

# IONOSPHERIC DATA STATION Okinawa

**DEC.2021** M(3000)F1 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

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

| 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 | | | | | | | | | | L | L | L | L | L | L | L | A | | | | | | | |
| | | | | | | | | | | | | 397 | 387 | 394 | | | | | | | | | | |
| 2 | | | | | | | | | | 401 | L | A | 394 | 392 | 397 | L | L | | | | | | | |
| | | | | | | | | | | | 396 | | | | | 393 | | | | | | | | |
| 3 | | | | | | | | | | | L | L | 393 | 385 | 386 | 387 | L | | | | | | | |
| | | | | | | | | | | | 386 | 379 | | | | | | | | | | | | |
| 4 | | | | | | | | | | L | L | 387 | 380 | 394 | L | A | A | 438 | | | | | | |
| | | | | | | | | | | | 370 | | | | | | | | | | | | | |
| 5 | | | | | | | | | | L | L | L | L | L | A | L | L | | | | | | | |
| | | | | | | | | | | | 401 | 373 | 383 | 383 | | | | | | | | | | |
| 6 | | | | | | | | | | | L | L | 373 | 383 | 398 | A | A | A | | | | | | |
| 7 | | | | | | | | | | L | 394 | 393 | 389 | 410 | 377 | 401 | | | | | | | | |
| 8 | | | | | | | | | | | L | | 383 | 382 | 398 | | L | | | | | | | |
| | | | | | | | | | | | 397 | 424 | | | | | | | | | | | | |
| 9 | | | | | | | | | | | L | | 414 | L | 377 | L | A | A | | | | | | |
| | | | | | | | | | | | 397 | 407 | | 388 | | | | | | | | | | |
| 10 | | | | | | | | | | | | U L | U L | | L | | U L | | | | | | | |
| | | | | | | | | | | | 400 | 442 | 399 | 375 | 394 | 382 | 404 | | | | | | | |
| 11 | | | | | | | | | | L | L | | | A | | L | L | | | | | | | |
| | | | | | | | | | | | | 409 | 390 | | 384 | | | | | | | | | |
| 12 | | | | | | | | | | | L | | U L | L | | L | U L | | | | | | | |
| | | | | | | | | | | 438 | | 408 | 408 | 391 | 398 | | 435 | | | | | | | |
| 13 | | | | | | | | | | | | | | | | L | A | | | | | | | |
| | | | | | | | | | 453 | | 380 | 391 | 391 | 381 | 397 | 395 | | | | | | | | |
| 14 | | | | | | | | | | L | L | | U L | | | L | | | | | | | | |
| | | | | | | | | | | | 397 | 401 | 405 | 382 | 372 | | | | | | | | | |
| 15 | | | | | | | | | | L | L | L | | | | L | L | | | | | | | |
| | | | | | | | | | | | | 389 | 388 | 386 | 389 | 389 | | | | | | | | |
| 16 | | | | | | | | | | A | L | | | | | L | | | | | | | | |
| | | | | | | | | | | | | 408 | 399 | 391 | 380 | | | | | | | | | |
| 17 | | | | | | | | | | | L | L | L | L | L | L | L | | | | | | | |
| | | | | | | | | | | | | 382 | 376 | 392 | 368 | | | | | | | | | |
| 18 | | | | | | | | | | L | L | | U L | L | | L | | | | | | | | |
| | | | | | | | | | | | | 418 | 389 | 390 | 381 | 401 | | | | | | | | |
| 19 | | | | | | | | | | | L | L | | L | L | U L | | | | | | | | |
| | | | | | | | | | | | | 396 | 387 | 374 | 399 | 395 | | | | | | | | |
| 20 | | | | | | | | | | U L | L | L | | L | L | L | | | | | | | | |
| | | | | | | | | | | 354 | 408 | 407 | 383 | 373 | 380 | 365 | | | | | | | | |
| 21 | | | | | | | | | | L | L | | L | L | L | L | L | | | | | | | |
| | | | | | | | | | | | | 386 | | 396 | | | | | | | | | | |
| 22 | | | | | | | | | | L | U L | L | | L | L | | | | | | | | | |
| | | | | | | | | | | | 401 | 385 | 384 | 395 | 397 | | | | | | | | | |
| 23 | | | | | | | | | | | L | L | L | L | | U L | L | | | | | | | |
| | | | | | | | | | | | | | 375 | 366 | 370 | 399 | | | | | | | | |
| 24 | | | | | | | | | | | L | U L | U L | L | L | L | L | | | | | | | |
| | | | | | | | | | | | | 462 | 388 | 364 | 378 | | | | | | | | | |
| 25 | | | | | | | | | | U L | L | L | L | | U L | L | U L | | | | | | | |
| | | | | | | | | | | 410 | | 397 | 381 | 371 | 409 | | 397 | | | | | | | |
| 26 | | | | | | | | | | L | L | L | L | L | L | | L | | | | | | | |
| | | | | | | | | | | | 400 | | 386 | 363 | 369 | 391 | | | | | | | | |
| 27 | | | | | | | | | | L | U L | | U L | L | L | L | | | | | | | | |
| | | | | | | | | | | 414 | 402 | 393 | 362 | 374 | 371 | | | | | | | | | |
| 28 | | | | | | | | | | L | L | | L | L | L | U L | | | | | | | | |
| | | | | | | | | | | | 384 | 397 | 397 | 367 | 389 | 393 | | | | | | | | |
| 29 | | | | | | | | | | L | L | U L | | | A | | | | | | | | | |
| | | | | | | | | | | | | 410 | 430 | 363 | | 420 | | | | | | | | |
| 30 | | | | | | | | | L | L | L | L | | L | | | | | | | | | | |
| | | | | | | | | | | | | 397 | 375 | 395 | 392 | 364 | | | | | | | | |
| 31 | | | | | | | | | | L | L | | | | | L | U L | | | | | | | |
| | | | | | | | | | | | 397 | 393 | 411 | 401 | 397 | | 405 | | | | | | | |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | | | | | | | | | 1 | 5 | 16 | 27 | 30 | 30 | 26 | 14 | 4 | 1 | | | | | | |
| MED | | | | | | | | | 453 | 410 | L 397 | L 397 | 388 | 384 | 388 | L 393 | U L 404 | 438 | | | | | | |
| U Q | | | | | | | | | | 426 | L 400 | 408 | 397 | 392 | 397 | 399 | U L 420 | | | | | | | |
| L Q | | | | | | | | | | 378 | L 390 | L 389 | 383 | L 374 | 377 | 387 | U L 400 | | | | | | | |

**DEC.2021** M(3000)F1 (0.01)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Okinawa

**DEC.2021** h'F2 (KM) 135°E MEAN TIME (G.M.T. + 9 H)

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

| 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 | | | | | | | | | | 224 | 260 | 250 | 230 | 216 | 262 | 272 | 224 | | | | | | | |
| 2 | | | | | | | | | | 240 | 234 | 226 | 236 | 248 | 232 | 238 | 230 | | | | | | | |
| 3 | | | | | | | | | | | 246 | 244 | 250 | 246 | 266 | 222 | 218 | | | | | | | |
| 4 | | | | | | | | | | 262 | 280 | 234 | 236 | 218 | 250 | 246 | 222 | 202 | | | | | | |
| 5 | | | | | | | | | | 246 | 236 | 276 | 252 | 266 | 248 | 230 | 226 | | | | | | | |
| 6 | | | | | | | | | | | 228 | 254 | 242 | 238 | 234 | 250 | 232 | 204 | | | | | | |
| 7 | | | | | | | | | | 234 | 220 | 226 | 246 | 256 | 238 | 226 | | | | | | | | |
| 8 | | | | | | | | | | | 218 | 270 | 274 | 230 | 238 | | 208 | | | | | | | |
| 9 | | | | | | | | | | | 234 | 216 | 240 | 262 | 248 | 264 | 236 | 228 | | | | | | |
| 10 | | | | | | | | | | | 220 | 224 | 268 | 252 | 240 | 226 | 246 | | | | | | | |
| 11 | | | | | | | | | | 236 | 240 | 226 | 250 | 248 | 240 | 220 | 224 | | | | | | | |
| 12 | | | | | | | | | | 216 | 236 | 214 | 288 | 240 | 228 | 218 | 234 | | | | | | | |
| 13 | | | | | | | | | 194 | | 236 | 216 | 274 | 238 | 236 | 226 | 224 | | | | | | | |
| 14 | | | | | | | | | | 242 | 236 | 214 | 248 | 240 | 246 | 242 | | | | | | | | |
| 15 | | | | | | | | | | 216 | 234 | 248 | 268 | 244 | 240 | 252 | 232 | | | | | | | |
| 16 | | | | | | | | | | 220 | 226 | 220 | 232 | 250 | 256 | 224 | | | | | | | | |
| 17 | | | | | | | | | | | 248 | 238 | 260 | 220 | 268 | 230 | 200 | | | | | | | |
| 18 | | | | | | | | | | 222 | 232 | 222 | 254 | 246 | 244 | 234 | | | | | | | | |
| 19 | | | | | | | | | | | 240 | 232 | 232 | 240 | 250 | 252 | | | | | | | | |
| 20 | | | | | | | | | | 332 | 232 | 240 | 250 | 278 | 250 | 266 | | | | | | | | |
| 21 | | | | | | | | | | 226 | 238 | 244 | 264 | 234 | 244 | 240 | 238 | | | | | | | |
| 22 | | | | | | | | | | 218 | 248 | 242 | 238 | 224 | 240 | 234 | | | | | | | | |
| 23 | | | | | | | | | | | 232 | 258 | 264 | 264 | 240 | 248 | 242 | | | | | | | |
| 24 | | | | | | | | | | | 228 | 200 | 270 | 278 | 222 | 238 | 246 | | | | | | | |
| 25 | | | | | | | | | | 228 | 238 | 238 | 246 | 248 | 240 | 230 | 240 | | | | | | | |
| 26 | | | | | | | | | | 234 | 220 | 250 | 248 | 290 | 244 | 236 | 232 | | | | | | | |
| 27 | | | | | | | | | | 222 | 242 | 246 | 292 | 258 | 256 | 238 | | | | | | | | |
| 28 | | | | | | | | | | 246 | 228 | 248 | 258 | 262 | 232 | 258 | | | | | | | | |
| 29 | | | | | | | | | | 240 | 218 | 244 | 282 | 260 | 220 | 224 | | | | | | | | |
| 30 | | | | | | | | | 230 | 254 | 226 | 228 | 258 | 254 | 228 | 256 | | | | | | | | |
| 31 | | | | | | | | | | 234 | 218 | 234 | 268 | 264 | 244 | 236 | 236 | | | | | | | |
| | 00 | 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 | 31 | 31 | 31 | 31 | 31 | 30 | 20 | 3 | | | | | | |
| MED | | | | | | | | | 212 | 234 | 234 | 238 | 252 | 248 | 240 | 237 | 232 | 204 | | | | | | |
| U Q | | | | | | | | | | 244 | 240 | 248 | 268 | 262 | 250 | 250 | 237 | 228 | | | | | | |
| L Q | | | | | | | | | | 222 | 226 | 224 | 242 | 238 | 236 | 226 | 224 | 202 | | | | | | |

**DEC.2021** h'F2 (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Okinawa

**DEC.2021** h'F (KM) 135°E MEAN TIME (G.M.T. + 9 H)

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

| D \ 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 | 210 | 276 | 266 | 236 | 226 | 196 | 236 | 192 | 208 | 214 | 226 | 202 | 200 | 202 | 190 | 198 | A | 222 | 192 | 192 | 230 | 214 | 216 | 212 |
| 2 | 270 | 280 | 236 | 188 | 208 | 320 | 366 | 218 | 220 | 208 | 218 | A | 206 | 198 | 192 | 178 | 202 | 210 | 196 | 212 | 208 | 200 | 194 | 264 |
| 3 | 246 | 252 | 226 | 240 | 244 | 190 | 316 | 226 | 220 | 220 | 212 | 208 | 200 | 204 | 200 | 206 | 190 | 220 | 194 | 178 | 194 | 234 | 234 | 304 |
| 4 | 258 | 266 | 254 | 214 | 226 | 304 | 352 | 238 | 214 | 198 | 206 | 206 | 220 | 200 | 204 | A | A | 192 | 206 | 212 | 194 | 188 | 220 | 300 |
| 5 | 290 | 268 | 260 | 252 | 224 | 190 | 242 | 208 | 222 | 218 | 212 | 254 | E A 238 | 212 | A | 216 | 212 | 202 | 198 | 202 | 218 | 268 | 248 | 248 |
| 6 | 296 | 252 | 222 | 244 | 244 | 216 | 284 | 230 | 214 | 230 | 210 | 180 | 222 | 212 | 210 | A | A | A | 186 | 184 | 214 | 242 | 232 | E A 318 |
| 7 | 294 | 286 | 276 | 300 | 260 | 200 | 198 | 210 | 230 | 224 | 208 | 212 | E A 226 | 180 | 212 | 218 | 212 | 208 | 180 | E A 196 | E A 274 | E A 274 | 268 | 274 |
| 8 | 284 | 300 | 252 | 228 | 198 | A | A | 216 | 198 | 222 | 198 | 184 | 188 | 188 | 188 | 202 | 202 | 204 | 194 | 190 | E A 268 | A | A | E A 302 |
| 9 | 282 | 288 | 274 | 268 | 244 | 192 | 214 | 218 | 210 | 228 | 218 | 210 | 180 | 180 | 234 | E A 220 | A | A | 196 | A | 206 | A | 244 | 264 |
| 10 | 284 | 264 | 256 | 256 | 250 | 212 | 176 | 160 | 206 | 224 | 214 | 190 | 198 | 224 | 220 | 220 | 210 | 208 | 194 | E A 224 | 248 | E A 244 | 220 | 210 |
| 11 | 242 | 274 | 254 | 258 | 230 | 198 | 180 | 200 | 202 | 218 | 214 | 200 | E A 226 | A | 190 | 206 | 212 | 214 | 190 | 178 | 214 | 278 | Q 270 | Q 220 |
| 12 | 226 | 268 | 234 | 246 | 234 | 208 | 218 | 196 | 196 | 200 | 226 | 196 | 180 | 212 | 210 | 206 | 188 | 220 | 188 | 168 | 226 | 204 | 226 | 242 |
| 13 | 286 | 286 | 262 | 244 | 214 | 214 | 196 | 206 | 174 | 232 | 226 | 208 | 188 | 176 | 188 | 196 | A | 222 | 204 | 190 | 184 | 202 | 266 | 224 |
| 14 | 276 | 258 | 230 | 238 | 226 | 192 | 224 | 210 | 206 | 228 | 212 | 210 | 202 | 232 | 206 | 206 | 218 | 206 | 194 | 174 | 200 | 266 | 216 | 220 |
| 15 | 254 | 274 | 274 | 244 | 226 | 202 | 222 | 212 | 204 | 198 | 196 | 188 | 194 | 212 | 214 | 202 | 228 | 204 | 190 | 196 | 214 | 240 | 198 | 198 |
| 16 | 238 | 324 | 294 | 274 | 294 | 234 | 192 | 240 | 230 | A | 212 | 204 | 186 | 182 | 218 | 214 | 228 | 218 | 192 | 182 | 208 | E A 258 | 234 | 242 |
| 17 | 278 | 284 | 262 | 232 | 196 | 272 | 274 | 224 | 210 | 220 | 212 | 218 | 194 | 214 | 232 | 222 | A | 202 | 192 | 198 | 192 | 192 | 218 | 228 |
| 18 | 276 | 276 | 262 | 250 | 234 | 200 | 222 | 240 | 218 | 206 | 200 | 198 | 184 | 180 | 222 | 206 | 232 | 200 | 184 | 184 | 216 | 212 | 212 | 226 |
| 19 | 250 | 302 | 254 | 236 | 214 | 224 | 240 | 228 | 216 | 228 | 218 | 204 | 210 | 212 | 188 | 188 | 214 | 216 | 192 | 184 | 186 | 226 | 204 | 218 |
| 20 | 306 | 290 | 254 | 242 | 232 | 336 | 224 | 208 | 208 | 200 | 204 | 200 | 204 | 194 | 202 | 196 | 222 | 210 | 182 | 218 | 240 | 232 | 200 | 222 |
| 21 | 324 | 334 | 300 | 308 | 230 | 202 | 272 | 226 | 222 | 208 | 206 | 184 | 218 | 192 | 202 | 212 | 226 | 214 | 192 | 198 | 206 | 206 | 186 | 284 |
| 22 | 334 | 308 | 260 | 242 | 204 | 382 | 332 | 252 | 222 | 202 | 198 | 176 | 176 | 194 | 196 | 224 | 220 | 200 | 190 | 182 | 228 | 210 | 214 | 234 |
| 23 | 306 | 292 | 264 | 214 | 204 | 274 | 262 | 210 | 212 | 216 | 206 | 188 | 182 | 198 | 198 | 192 | 220 | 214 | 192 | 186 | 200 | 218 | 222 | 266 |
| 24 | 302 | 266 | 226 | 226 | 206 | 330 | 264 | 224 | 212 | 220 | 204 | 174 | 186 | 214 | 202 | 196 | 230 | 210 | 194 | 190 | 208 | 200 | 244 | 218 |
| 25 | 264 | 298 | 296 | 310 | 228 | 208 | 218 | 234 | 212 | 192 | 194 | 180 | 192 | 178 | 196 | 214 | 204 | 222 | 200 | 186 | 228 | 216 | 224 | 224 |
| 26 | 302 | 286 | 262 | 258 | 240 | 262 | 256 | 242 | 212 | 218 | 208 | 216 | 188 | 184 | E A 224 | 198 | 222 | 220 | 192 | 184 | 202 | 222 | 204 | 242 |
| 27 | 238 | 234 | 234 | 254 | 252 | 270 | 272 | 216 | 210 | 204 | 200 | 180 | H 192 | 176 | 182 | 206 | 228 | 220 | 188 | 212 | 202 | 216 | 200 | 230 |
| 28 | 258 | 226 | 202 | 244 | 218 | 376 | 344 | 250 | 218 | 216 | 214 | 176 | 180 | 242 | 198 | 194 | 238 | 210 | 202 | 204 | 232 | 200 | 198 | 288 |
| 29 | 276 | 270 | 294 | 294 | 254 | 210 | 270 | 258 | 230 | 196 | 206 | 186 | 184 | 194 | A | 202 | 234 | 216 | 198 | 182 | 196 | 208 | 216 | 212 |
| 30 | 308 | 298 | 278 | 230 | 228 | 200 | 294 | 262 | 212 | 222 | 208 | 184 | 192 | 182 | 170 | E A 236 | 208 | 240 | 210 | 186 | 198 | 208 | 242 | 220 |
| 31 | 226 | 306 | 282 | 228 | 212 | 304 | 372 | 270 | 234 | 216 | 208 | 202 | 186 | 166 | 162 | 208 | 204 | 212 | 202 | 188 | 224 | 196 | 244 | 260 |
| | 00 | 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 | 30 | 31 | 30 | 31 | 30 | 29 | 29 | 25 | 29 | 31 | 30 | 31 | 29 | 30 | 31 |
| MED | 276 | 280 | 260 | 244 | 228 | 213 | 249 | 224 | 212 | 217 | 208 | 199 | 190 | 196 | 201 | 206 | 218 | 212 | 192 | 188 | 208 | 213 | 220 | 231 |
| U Q | 296 | 298 | 274 | 258 | 244 | 274 | 284 | 240 | 220 | 222 | 214 | 208 | 206 | 212 | 213 | 215 | 228 | 220 | 198 | 198 | 228 | 241 | 242 | 266 |
| L Q | 250 | 266 | 236 | 232 | 214 | 200 | 218 | 210 | 208 | 204 | 204 | 184 | 186 | 182 | 190 | 197 | 206 | 205 | 190 | 184 | 200 | 203 | 204 | 220 |

**DEC.2021** h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Okinawa

**DEC.2021** 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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | B | A | A | 104 | A | A | A | 102 | 102 | A | A | B | | | | | |
| 2 | | | | | | | | B | 100 | 102 | 102 | 102 | 102 | A | 104 | 104 | 104 | A | B | | | | | |
| 3 | | | | | | | | B | 106 | 106 | 106 | 106 | 106 | 102 | 98 | 100 | 106 | A | A | | | | | |
| 4 | | | | | | | | B | 106 | 102 | 102 | A | 102 | A | A | 102 | A | A | A | | | | | |
| 5 | | | | | | | | A | 106 | 106 | 106 | A | A | A | A | A | A | A | A | | | | | |
| 6 | | | | | | | | B | A | 104 | A | 102 | A | A | A | A | A | A | B | | | | | |
| 7 | | | | | | | | B | A | A | A | A | A | A | A | A | A | A | A | | | | | |
| 8 | | | | | | | | B | A | 102 | A | A | A | A | 102 | 102 | 110 | A | A | | | | | |
| 9 | | | | | | | | A | 108 | 102 | 102 | 102 | A | A | 102 | 102 | 102 | A | A | | | | | |
| 10 | | | | | | | | B | 110 | 104 | 104 | 104 | 104 | 102 | A | 102 | A | 112 | A | | | | | |
| 11 | | | | | | | | B | 104 | 104 | 102 | 102 | 102 | 102 | 102 | 102 | 106 | A | B | | | | | |
| 12 | | | | | | | | B | A | A | 106 | A | A | A | A | A | A | A | B | | | | | |
| 13 | | | | | | | | B | 104 | 104 | 104 | 104 | A | A | A | A | A | A | A | | | | | |
| 14 | | | | | | | | B | 110 | 104 | 104 | 104 | 104 | 104 | 104 | 106 | A | A | A | | | | | |
| 15 | | | | | | | | B | 104 | 104 | 104 | 102 | 102 | 104 | A | 104 | 106 | 106 | B | | | | | |
| 16 | | | | | | | | B | 106 | 102 | 102 | 102 | 102 | 102 | A | 102 | A | A | B | | | | | |
| 17 | | | | | | | | B | 106 | 102 | 102 | 104 | 104 | 104 | 102 | A | A | A | A | | | | | |
| 18 | | | | | | | | B | 102 | 102 | 102 | 102 | 102 | 102 | 102 | A | A | A | B | | | | | |
| 19 | | | | | | | | B | 102 | 102 | 102 | 102 | 102 | 102 | 102 | A | A | A | B | | | | | |
| 20 | | | | | | | | B | 106 | 102 | 100 | A | A | 104 | 104 | 104 | 104 | 108 | B | | | | | |
| 21 | | | | | | | | B | 102 | 102 | 102 | A | 102 | 102 | 102 | 102 | 106 | 106 | B | | | | | |
| 22 | | | | | | | | B | 104 | 104 | A | A | 104 | 106 | 104 | 104 | A | A | B | | | | | |
| 23 | | | | | | | | B | 104 | 104 | 104 | A | A | A | A | 104 | 104 | A | B | | | | | |
| 24 | | | | | | | | B | 112 | 104 | 104 | 104 | 104 | A | 104 | 102 | A | A | B | | | | | |
| 25 | | | | | | | | B | A | A | A | A | A | A | A | A | 102 | A | B | | | | | |
| 26 | | | | | | | | B | 104 | 104 | 104 | A | A | A | A | A | 104 | 108 | B | | | | | |
| 27 | | | | | | | | B | 104 | 102 | 100 | 100 | A | 102 | 102 | 102 | 106 | 112 | B | | | | | |
| 28 | | | | | | | | B | 104 | 104 | A | A | A | 104 | A | A | A | A | A | | | | | |
| 29 | | | | | | | | B | 102 | 102 | 102 | 102 | 102 | 108 | A | A | A | 108 | A | | | | | |
| 30 | | | | | | | | B | 108 | 102 | 102 | A | A | 102 | 102 | A | A | A | A | | | | | |
| 31 | | | | | | | | B | 104 | 102 | 102 | 102 | 102 | A | 104 | 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 | | | | | | | | | 25 | 27 | 25 | 17 | 16 | 16 | 17 | 17 | 12 | 7 | | | | | | |
| MED | | | | | | | | | 104 | 102 | 102 | 102 | 102 | 102 | 102 | 102 | 105 | 108 | | | | | | |
| U Q | | | | | | | | | 106 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 106 | 112 | | | | | | |
| L Q | | | | | | | | | 104 | 102 | 102 | 102 | 102 | 102 | 102 | 102 | 104 | 106 | | | | | | |

**DEC.2021** h'E (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION Okinawa

**DEC.2021** 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

| 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 | 86 | 94 | B | 94 | 98 | 98 | 98 | B | 160 | 128 | 138 | 156 | 94 | 94 | 94 | 90 | 88 | 86 | 86 | 86 | 86 | B | B | B |
| 2 | B | B | B | B | B | B | B | 156 | 154 | 132 | 122 | 112 | 136 | 112 | G | G | G | 92 | 92 | 92 | 88 | 88 | B | 86 |
| 3 | 92 | 104 | B | 94 | 94 | B | B | B | 164 | 148 | 122 | 108 | 108 | 106 | 104 | 88 | G | 90 | 90 | 88 | 90 | 90 | 116 | B |
| 4 | B | B | B | B | B | G | B | 92 | 146 | 134 | 110 | 112 | 170 | 104 | 102 | 166 | 152 | 96 | 96 | 96 | 92 | 92 | 88 | 108 |
| 5 | 108 | B | 96 | B | B | 90 | B | 148 | 152 | 114 | 104 | 160 | 98 | 94 | 90 | 94 | 92 | 92 | 92 | 92 | 92 | 114 | 88 | 88 |
| 6 | B | B | 104 | 104 | 96 | 96 | 96 | 94 | 188 | 174 | 114 | 100 | 104 | 104 | 104 | 102 | 102 | 102 | 100 | 100 | 96 | 104 | 88 | 84 |
| 7 | 102 | 86 | 96 | 100 | 94 | 94 | 94 | 88 | 90 | 98 | 102 | 148 | 104 | 96 | 144 | 98 | 98 | 96 | 98 | 96 | 94 | 94 | 84 | 84 |
| 8 | 106 | 88 | 94 | B | 92 | 90 | 90 | 100 | 162 | 176 | 158 | 102 | 100 | 100 | 154 | 166 | 138 | 120 | 92 | 92 | 90 | 86 | 86 | 88 |
| 9 | 92 | 102 | 98 | 90 | 88 | 88 | 88 | 166 | 154 | 166 | 140 | 104 | 104 | 104 | 110 | 126 | 134 | 96 | 90 | 100 | 106 | 96 | 94 | 102 |
| 10 | 94 | 92 | 94 | 106 | 96 | B | B | B | 162 | 148 | 132 | 146 | 142 | 162 | 96 | 106 | 94 | 118 | 112 | 106 | 102 | 98 | 94 | 94 |
| 11 | 108 | B | 88 | B | B | B | B | B | 160 | 166 | 158 | 156 | 116 | 130 | 140 | 128 | 114 | 108 | B | B | B | B | 130 | B |
| 12 | B | 90 | 92 | 92 | 92 | B | B | B | 168 | 156 | 138 | 130 | 104 | 160 | 94 | 102 | 112 | 132 | 126 | B | 100 | 96 | 92 | B |
| 13 | B | 94 | 94 | 90 | 100 | 88 | B | 88 | G | 166 | 136 | 174 | 110 | 108 | 106 | 108 | 90 | 120 | 122 | 122 | 110 | 94 | 94 | 90 |
| 14 | 84 | B | B | 96 | 96 | 96 | 100 | B | 168 | 162 | 136 | 138 | 154 | 174 | 140 | 94 | 94 | 88 | 86 | 86 | 88 | B | B | B |
| 15 | B | B | B | 86 | 94 | 88 | 92 | B | 130 | 140 | 124 | 124 | 118 | 166 | 102 | G | 152 | 136 | 100 | 92 | B | 90 | 86 | B |
| 16 | 96 | 96 | 94 | 94 | 94 | 92 | 92 | 92 | 174 | 180 | 172 | 148 | G | 114 | 144 | 130 | 188 | 100 | 100 | 94 | B | 86 | 96 | B |
| 17 | B | 116 | 94 | 90 | 88 | 88 | 88 | 90 | 162 | 174 | 156 | 116 | 108 | 100 | 102 | 106 | 102 | 94 | 94 | 90 | 92 | 86 | B | B |
| 18 | B | B | B | B | 88 | 88 | 86 | 92 | G | 132 | 122 | 104 | 108 | 110 | 108 | 102 | 98 | 98 | 94 | 96 | 94 | 94 | 90 | 90 |
| 19 | B | B | B | 88 | 92 | 86 | 92 | B | 160 | 164 | 140 | 114 | 106 | 102 | 108 | 102 | 106 | 100 | 96 | 94 | B | B | 88 | 88 |
| 20 | B | B | B | 90 | 86 | B | B | B | 176 | 182 | 106 | 102 | 100 | G | G | G | G | G | B | 98 | 90 | 92 | 88 | B |
| 21 | 92 | 90 | 92 | 88 | 92 | 88 | B | 88 | G | G | 106 | 110 | 186 | G | G | 176 | 190 | 196 | 96 | 94 | 94 | 88 | 84 | B |
| 22 | 94 | 94 | B | 90 | 92 | B | B | B | 178 | 106 | 106 | 102 | G | G | G | 106 | 90 | 92 | 108 | 100 | 86 | 96 | 82 | B |
| 23 | B | B | B | B | B | B | B | B | 158 | G | 108 | 104 | 100 | 102 | 106 | 92 | 180 | 154 | B | B | B | B | B | B |
| 24 | 88 | B | 88 | 92 | 92 | 92 | 90 | B | 160 | 178 | G | 106 | 154 | 174 | 162 | 94 | 178 | 124 | 96 | 92 | B | 88 | B | B |
| 25 | B | B | B | 92 | 92 | B | B | 86 | 104 | 114 | 108 | 108 | 110 | 106 | 106 | 102 | 106 | 118 | 104 | 100 | 98 | 90 | 90 | 92 |
| 26 | 92 | 92 | 94 | 96 | 94 | 94 | 94 | 94 | 156 | 178 | 126 | 104 | 94 | 96 | 90 | 92 | G | 188 | 92 | 102 | 96 | 94 | 90 | 86 |
| 27 | 88 | 92 | B | B | B | 90 | 90 | B | 172 | 126 | 104 | G | 96 | G | G | 168 | 166 | 142 | B | 90 | B | 90 | 92 | B |
| 28 | B | B | B | B | B | B | B | B | 178 | 112 | 106 | 102 | 108 | 170 | 92 | 96 | 88 | 88 | 88 | 82 | 106 | 94 | B | 102 |
| 29 | B | B | B | 92 | 92 | 92 | 88 | B | 170 | G | G | 104 | 102 | 98 | 90 | 88 | 162 | 136 | 86 | 112 | B | B | B | B |
| 30 | 84 | B | B | 94 | B | 92 | 90 | 88 | 174 | 156 | 116 | 108 | 102 | G | G | 90 | 90 | 88 | 86 | B | 96 | B | 96 | 94 |
| 31 | 98 | 116 | B | B | 92 | B | 86 | 92 | 156 | 152 | 116 | 108 | 104 | 100 | 96 | 106 | 106 | 100 | 98 | B | B | B | B | B |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 17 | 15 | 14 | 21 | 23 | 19 | 17 | 16 | 28 | 28 | 29 | 30 | 29 | 26 | 25 | 28 | 27 | 30 | 27 | 26 | 22 | 23 | 22 | 15 |
| MED | 92 | 94 | 94 | 92 | 92 | 90 | 90 | 92 | 161 | 154 | 122 | 109 | 106 | 105 | 104 | 102 | 106 | 100 | 96 | 94 | 94 | 92 | 90 | 90 |
| U Q | 100 | 102 | 96 | 95 | 94 | 94 | 94 | 97 | 171 | 170 | 138 | 138 | 117 | 130 | 125 | 117 | 152 | 124 | 100 | 100 | 98 | 96 | 94 | 94 |
| L Q | 88 | 90 | 92 | 90 | 92 | 88 | 88 | 88 | 155 | 130 | 107 | 104 | 101 | 100 | 95 | 94 | 94 | 92 | 90 | 92 | 90 | 88 | 88 | 86 |

**DEC.2021** h'Es (KM)

# IONOSPHERIC DATA STATION Okinawa

**DEC.2021** 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 | F1 | F1 | | F2 | F1 | F5 | F3 | | HC21 | CH11 | HC11 | HL11 | L2 | L1 | L1 | L1 | L2 | L1 | L1 | F1 | F1 | | | |
| 2 | | | | | | | | H1 | H1 | H1 | C1 | C1 | H1 | C1 | | | | L2 | L3 | F6 | F4 | F1 | | F1 |
| 3 | F1 | F1 | | F3 | F1 | | | | H1 | HC11 | C1 | C1 | C1 | C1 | C1 | L2 | | LH11 | L2 | F1 | F1 | F1 | F1 | |
| 4 | | | | | | | | L1 | H1 | H1 | C2 | C1 | HC11 | C1 | C1 | HC11 | HC11 | LH11 | L4 | F3 | F5 | F1 | F1 | F1 |
| 5 | F1 | | F1 | | | F1 | | HL11 | HC22 | C1 | C1 | HC11 | L2 | L2 | L2 | LC32 | L2 | L2 | L4 | F6 | F2 | FF11 | F1 | F1 |
| 6 | | | F1 | F1 | F1 | F1 | F2 | L1 | H2 | HC21 | CH11 | C2 | C2 | CQ11 | CQ21 | C3 | C4 | C2 | C2 | F1 | F3 | F2 | F2 | F6 |
| 7 | FF12 | F1 | F2 | F2 | F2 | F1 | F1 | L3 | L3 | LH31 | CH21 | HC11 | C3 | L3 | HL11 | LQ11 | L2 | L3 | L3 | F6 | F3 | F2 | F3 | F2 |
| 8 | F1 | F1 | F1 | | F1 | F1 | F2 | C1 | HC11 | H1 | HC11 | CH11 | C2 | C1 | H1 | H1 | H1 | C4 | L3 | F4 | F5 | F7 | F6 | F3 |
| 9 | FF33 | F1 | F1 | F1 | F2 | F1 | F1 | HL11 | H1 | H1 | H1 | C2 | C1 | C1 | CH11 | C2 | H2 | LH32 | L3 | FF43 | FF41 | FF52 | F4 | F1 |
| 10 | F2 | F1 | F1 | F1 | F1 | | | | H1 | H2 | H1 | H1 | H2 | H1 | LH31 | CHL21 | LH31 | C5 | C8 | FF51 | F3 | F3 | F5 | F3 |
| 11 | F1 | | F1 | | | | | | H2 | H2 | H1 | H1 | CH11 | H1 | H1 | C1 | C2 | C3 | | | | | F1 | |
| 12 | | F1 | F1 | F2 | F1 | | | | HC12 | HC11 | HC11 | HC11 | CH11 | HL11 | L2 | CHL11 | CL12 | HCL11 | C1 | | F1 | F3 | F1 | |
| 13 | | F1 | F2 | F2 | F1 | F2 | | L1 | | H2 | H1 | HC11 | C1 | C1 | C1 | C1 | LH31 | CL42 | CL52 | FF32 | F1 | F3 | F1 | F1 |
| 14 | F1 | | | F1 | F1 | F1 | F1 | | H2 | H1 | H1 | H1 | H1 | HL11 | HL11 | L2 | L2 | L3 | L3 | F1 | F1 | | | |
| 15 | | | | F1 | F1 | F1 | F1 | | H1 | H1 | C1 | C1 | C1 | H1 | C2 | | H1 | HC31 | C1 | F3 | | F1 | F1 | |
| 16 | F1 | F2 | F1 | F1 | F1 | F5 | F3 | L2 | H1 | HC11 | HC11 | H1 | | C1 | HC22 | HC21 | HC21 | L3 | L5 | F4 | | F4 | F1 | |
| 17 | | F1 | F2 | F1 | F1 | F3 | F3 | L2 | H3 | H1 | H1 | C2 | C1 | C3 | C3 | C2 | C2 | L4 | L5 | F3 | F2 | F1 | | |
| 18 | | | | | F4 | F2 | F1 | L1 | | H1 | C1 | C2 | C1 | C1 | C2 | C3 | L3 | LC21 | L4 | F1 | F1 | F1 | F3 | F1 |
| 19 | | | | F2 | F2 | F2 | F1 | | H2 | H1 | H1 | C1 | C2 | C2 | C1 | C2 | C2 | C2 | L3 | F3 | | | F1 | F1 |
| 20 | | | | F1 | F1 | | | | H1 | H1 | C2 | C3 | C2 | | | | | | | F1 | F1 | F4 | F1 | |
| 21 | F2 | F2 | F1 | F2 | F1 | F1 | | L1 | | | C2 | C1 | H1 | | | H1 | H1 | H1 | L1 | F1 | F3 | F3 | F3 | |
| 22 | F2 | F1 | | F1 | F1 | | | | H1 | C2 | C2 | C2 | | | | CH11 | L2 | L2 | C3 | F3 | F5 | F1 | F1 | |
| 23 | | | | | | | | | H1 | | C1 | C2 | C2 | C1 | C1 | L1 | H1 | HC11 | | | | | | |
| 24 | F2 | | F3 | F1 | F1 | F1 | F1 | | H1 | H1 | | C1 | HC11 | H1 | H1 | L2 | H1 | C1 | L3 | F5 | | F1 | | |
| 25 | | | | F1 | F1 | | | L1 | CH31 | CH21 | C1 | C1 | C1 | C2 | C1 | C2 | C2 | C1 | C1 | F3 | F2 | F5 | F3 | F3 |
| 26 | F3 | F1 | F1 | F1 | F2 | F3 | F5 | L3 | H1 | H1 | C1 | C2 | L3 | L2 | L4 | L3 | | H1 | L1 | F1 | F3 | F3 | F2 | F1 |
| 27 | F2 | F3 | | | | F1 | F1 | | H1 | C1 | C1 | | LH21 | | | H1 | H1 | H1 | | F1 | | F3 | F1 | |
| 28 | | | | | | | | | H1 | C1 | CH11 | C1 | C1 | H1 | L1 | L2 | L2 | L5 | L2 | F2 | F2 | F1 | | F1 |
| 29 | | | | F1 | F1 | F1 | F2 | | H1 | | | C1 | C2 | L1 | L4 | L3 | HC11 | HL21 | L2 | F1 | | | | |
| 30 | F3 | | | F2 | | F1 | F1 | L2 | H1 | H1 | C1 | C1 | C1 | | | L4 | L3 | L5 | L3 | | F3 | | F3 | F2 |
| 31 | F1 | F1 | | | F1 | | F2 | L1 | H1 | H1 | C1 | C1 | C1 | C2 | L2 | C2 | C2 | C4 | L7 | | | | | |
| | 00 | 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.2021** TYPES OF Es

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# f-PLOTS OF IONOSPHERIC DATA

| KEY OF f-PLOT | |
|---|---|
|  | SPREAD |
|  | foF2,foF1,foE |
|  | fxF2 |
|  | DOUBTFUL foF2,foF1,foE |
|  | fbEs |
|  | ESTIMATED foF1 |
|  | fmin |
|  | GREATER THAN |
|  | LESS THAN |

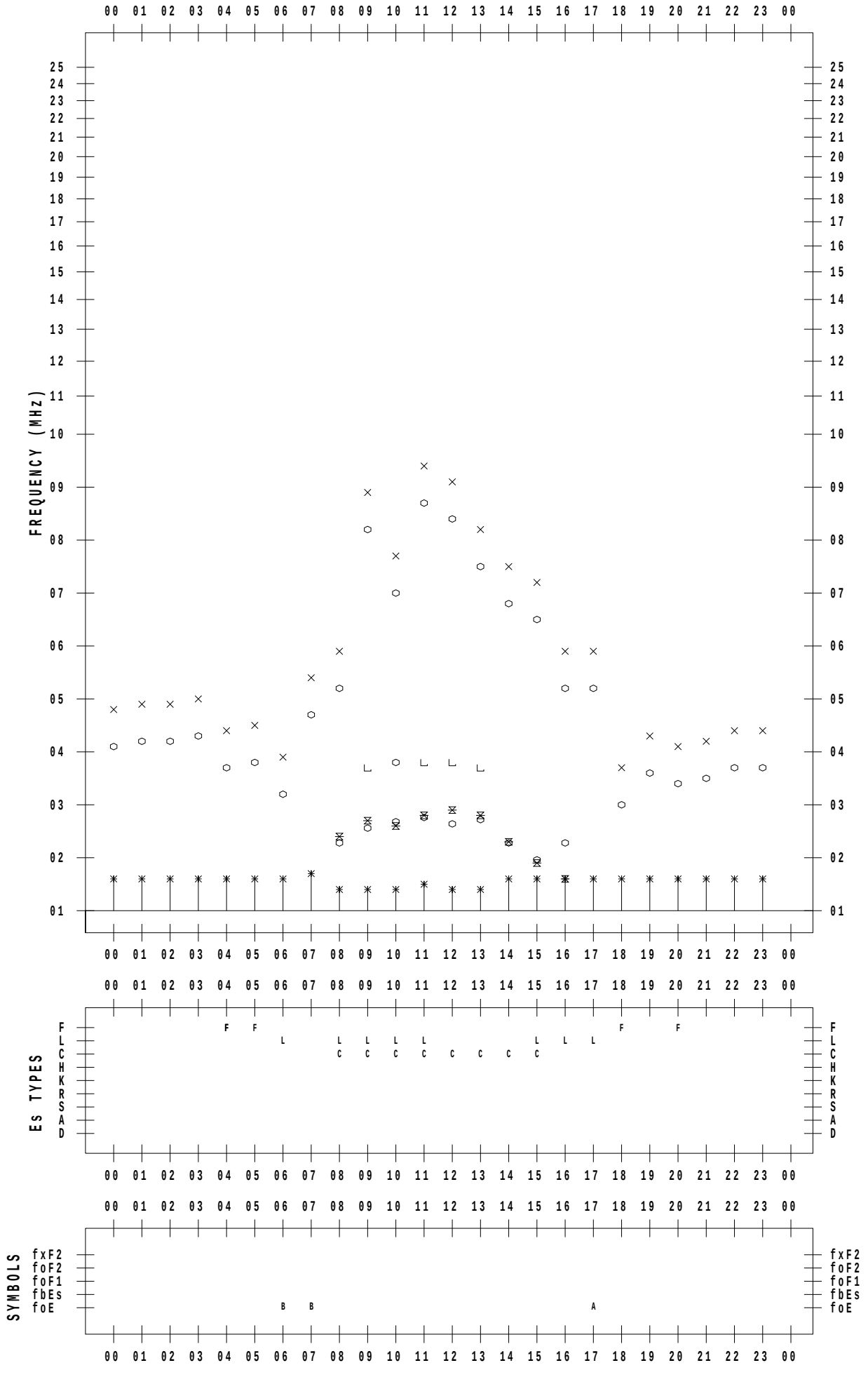
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/ 1

135 °E MEAN TIME



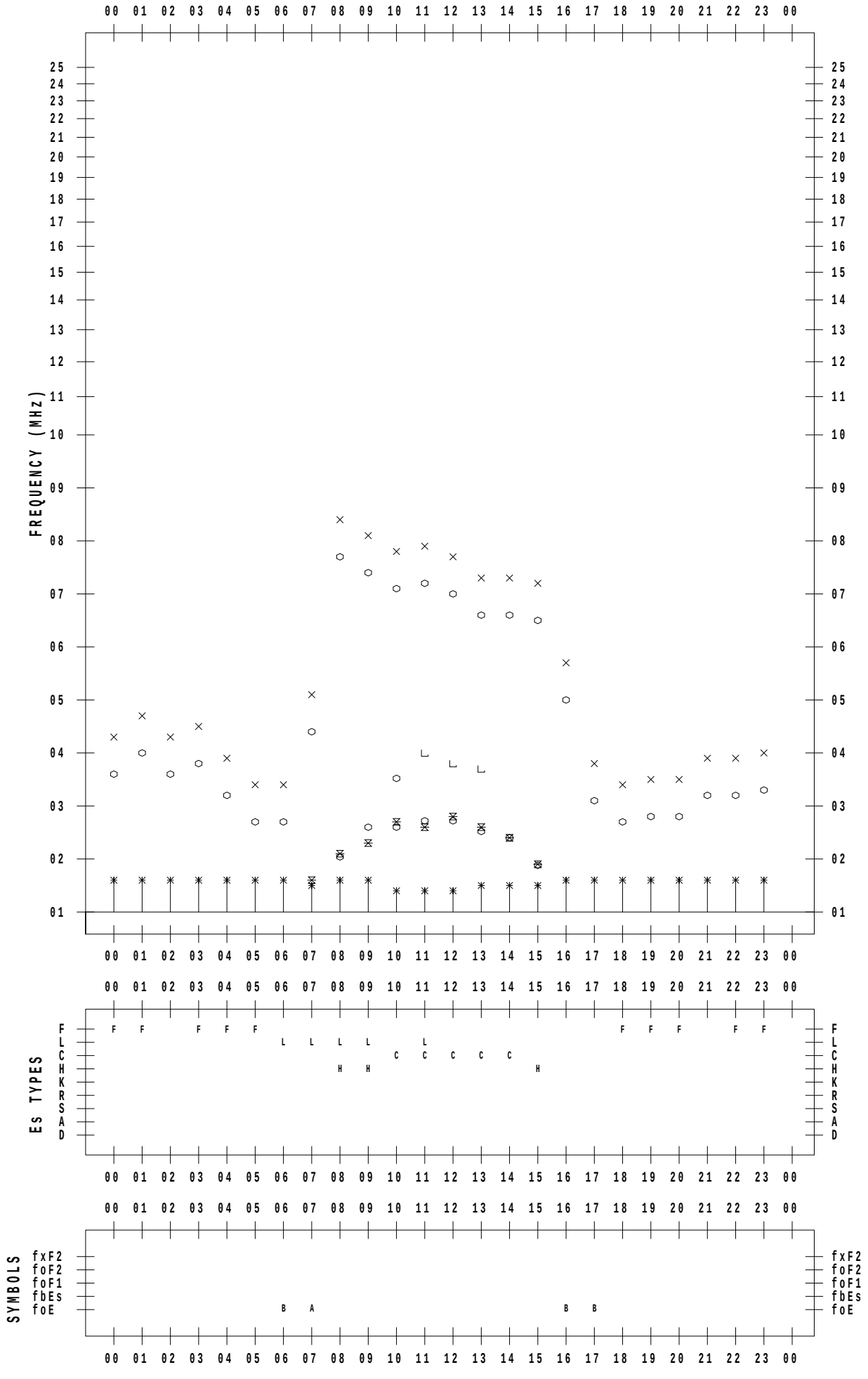
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/ 2

135 °E MEAN TIME



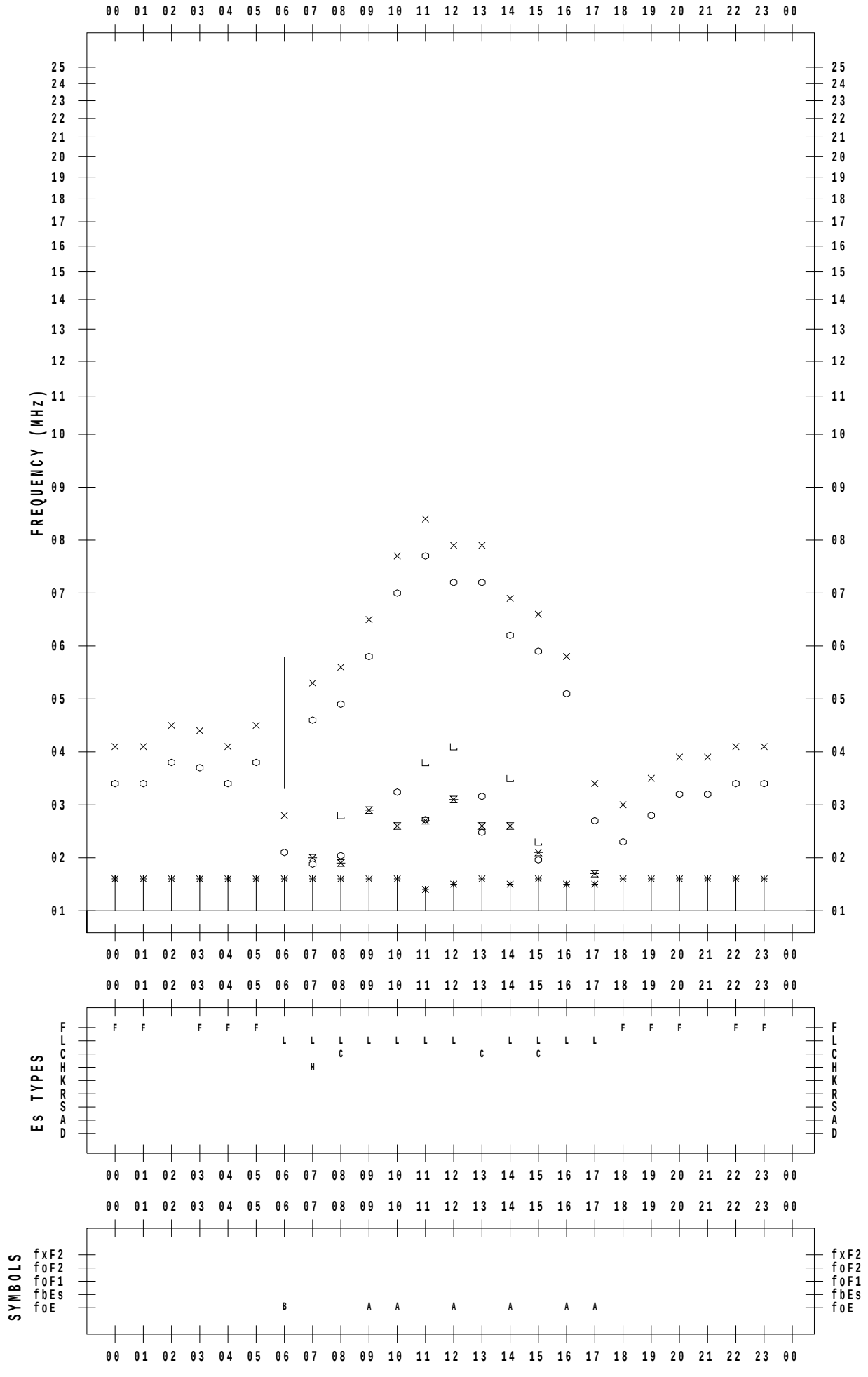
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/ 3

135 °E MEAN TIME



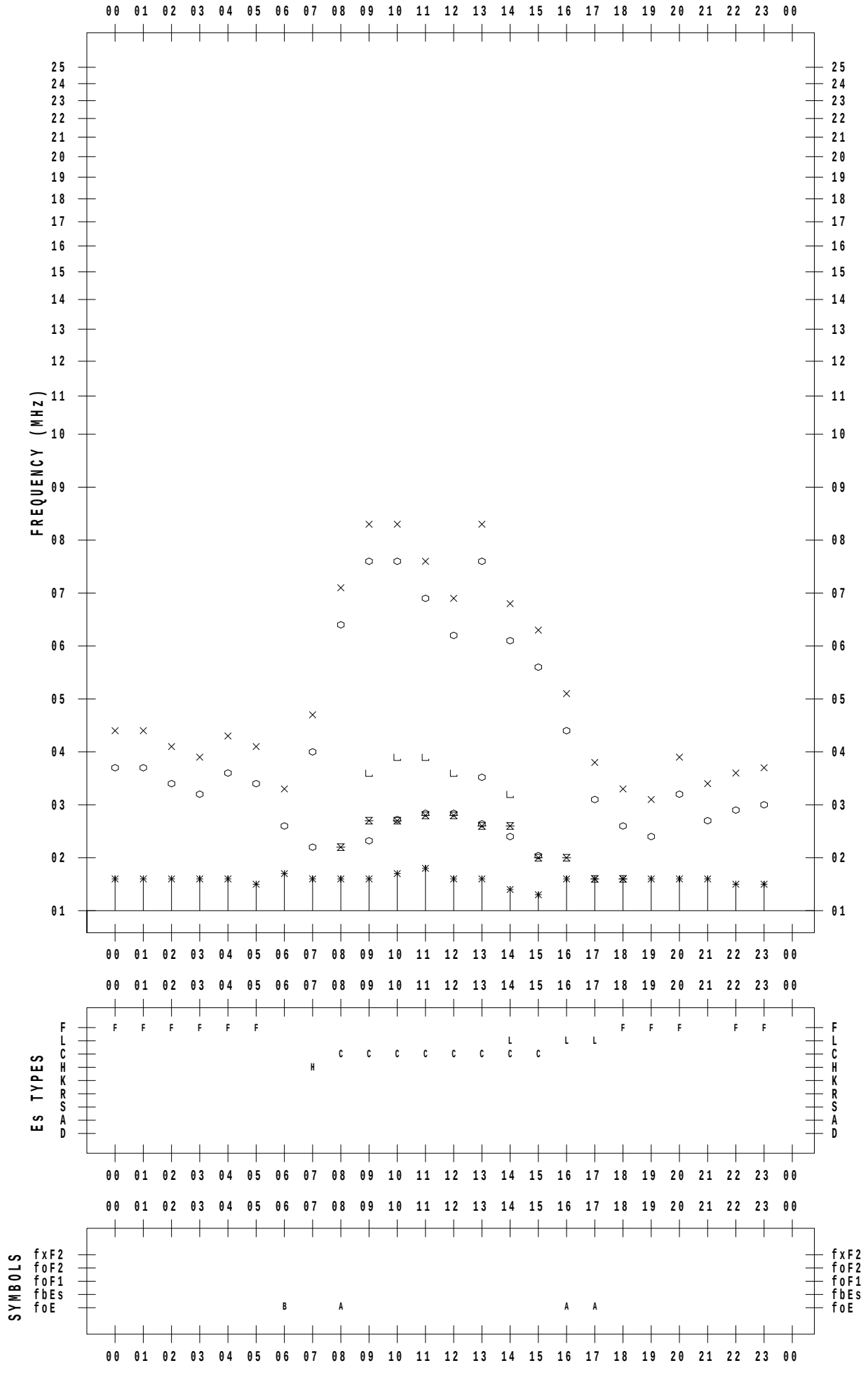
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/ 4

135 °E MEAN TIME



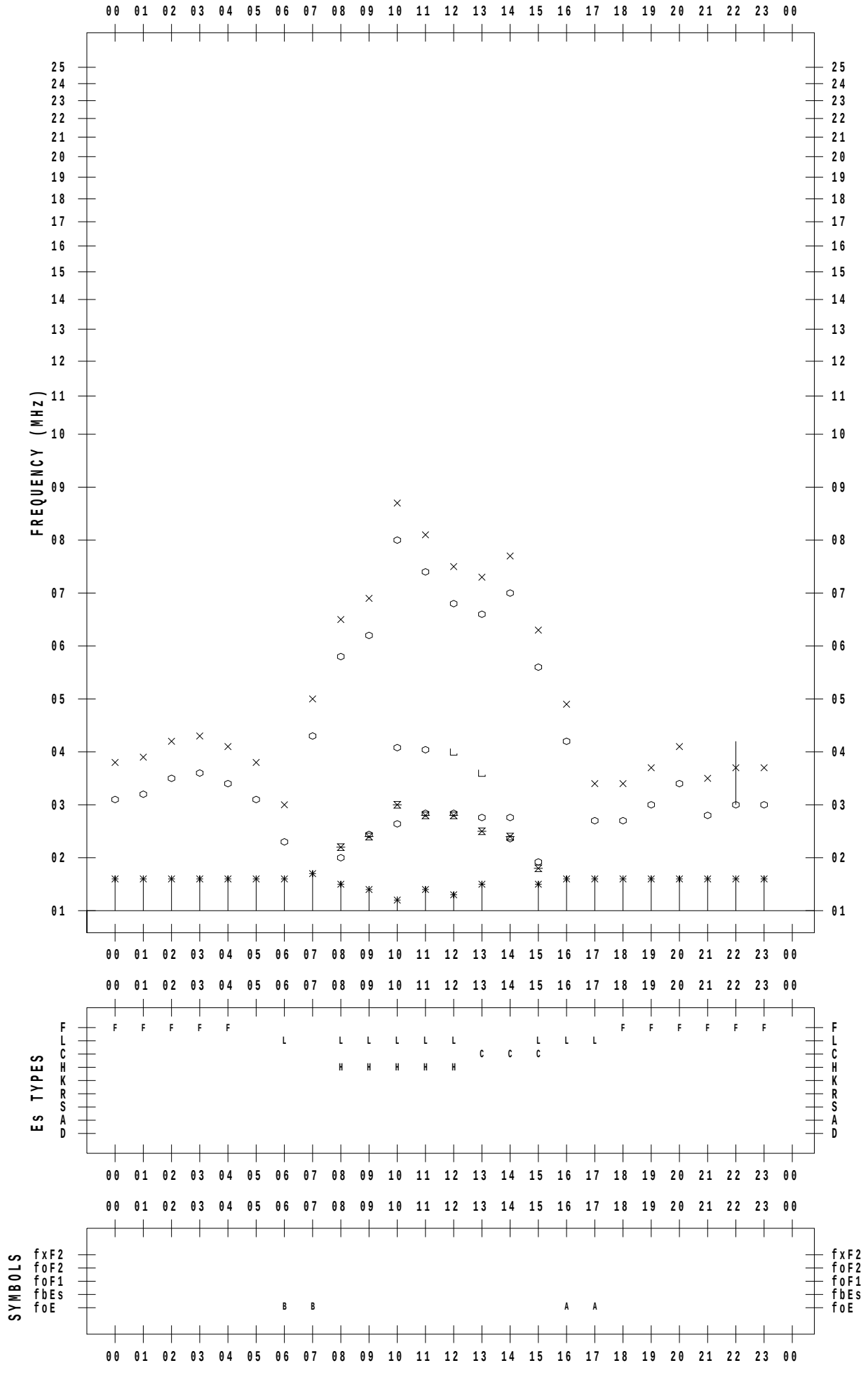
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/ 5

135 °E MEAN TIME



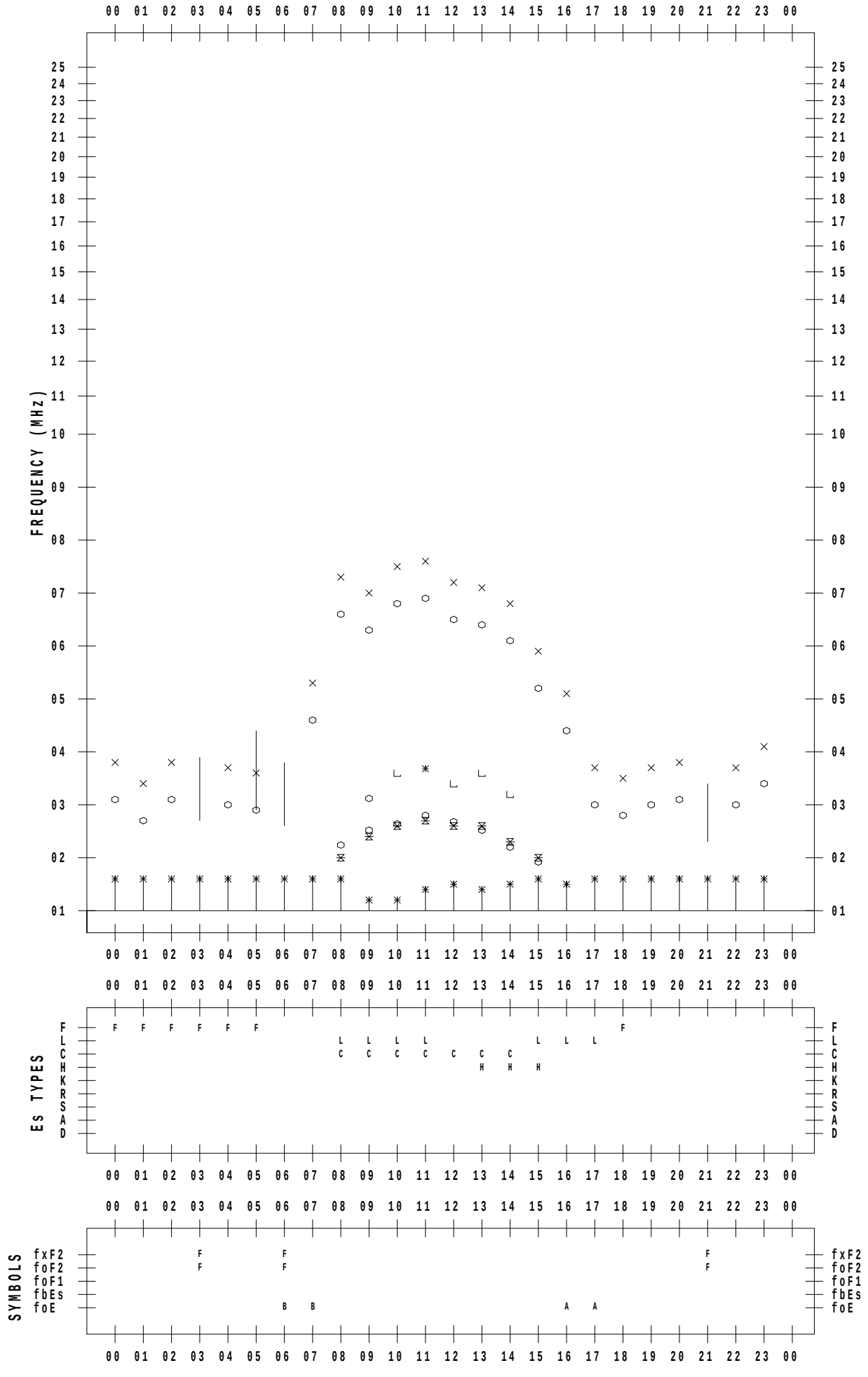
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/ 6

135 °E MEAN TIME



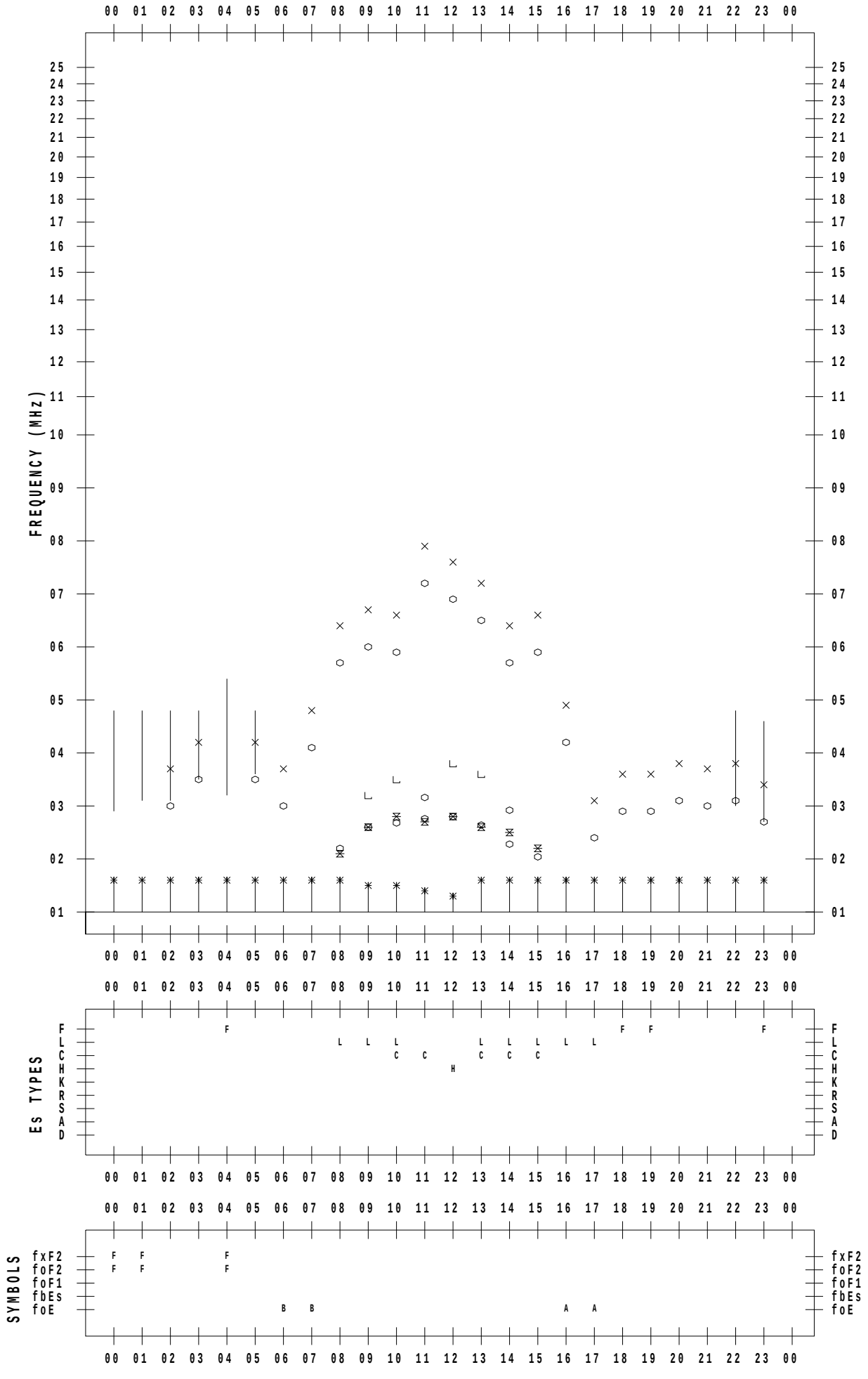
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/ 7

135 °E MEAN TIME



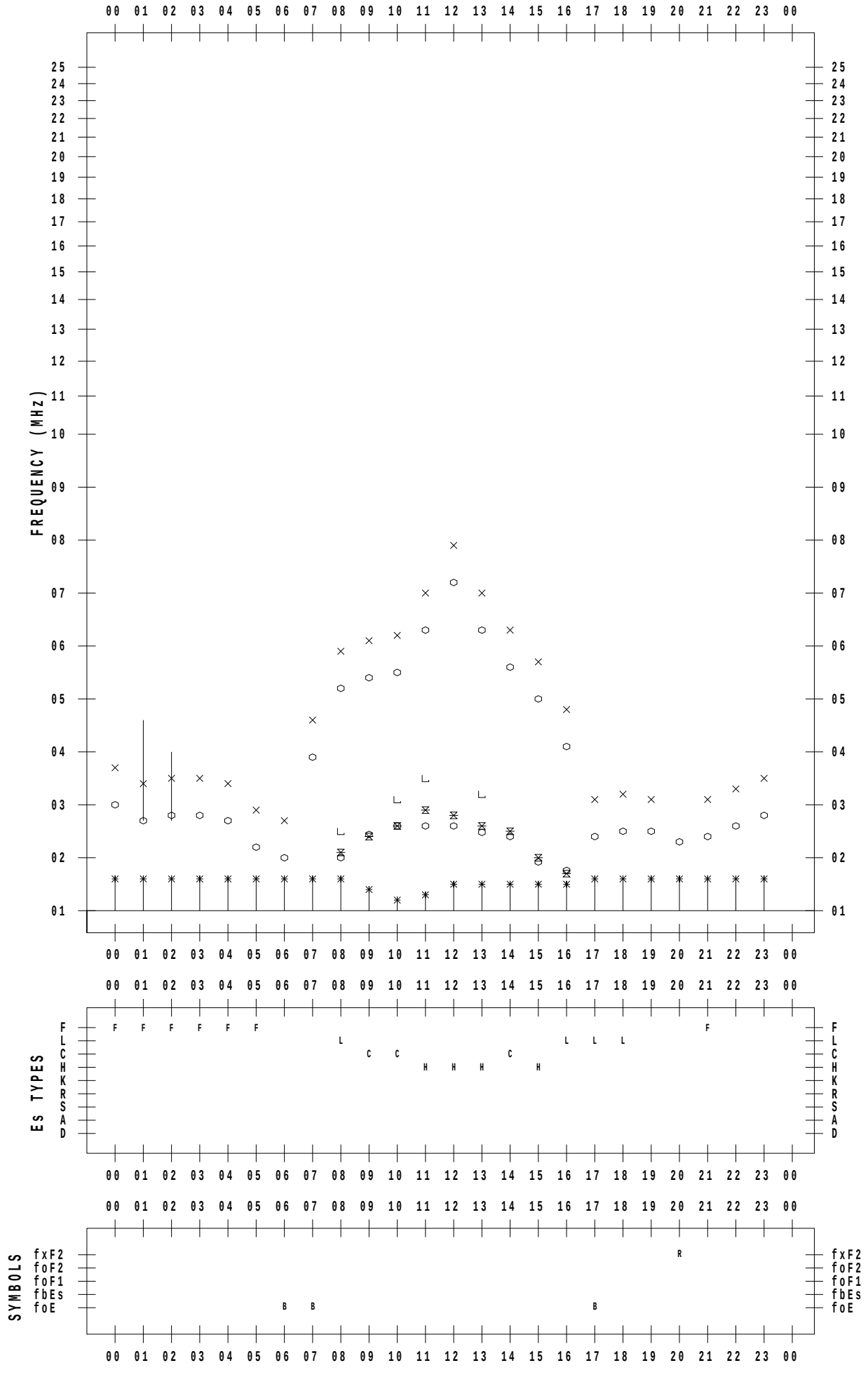
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/ 8

135 °E MEAN TIME



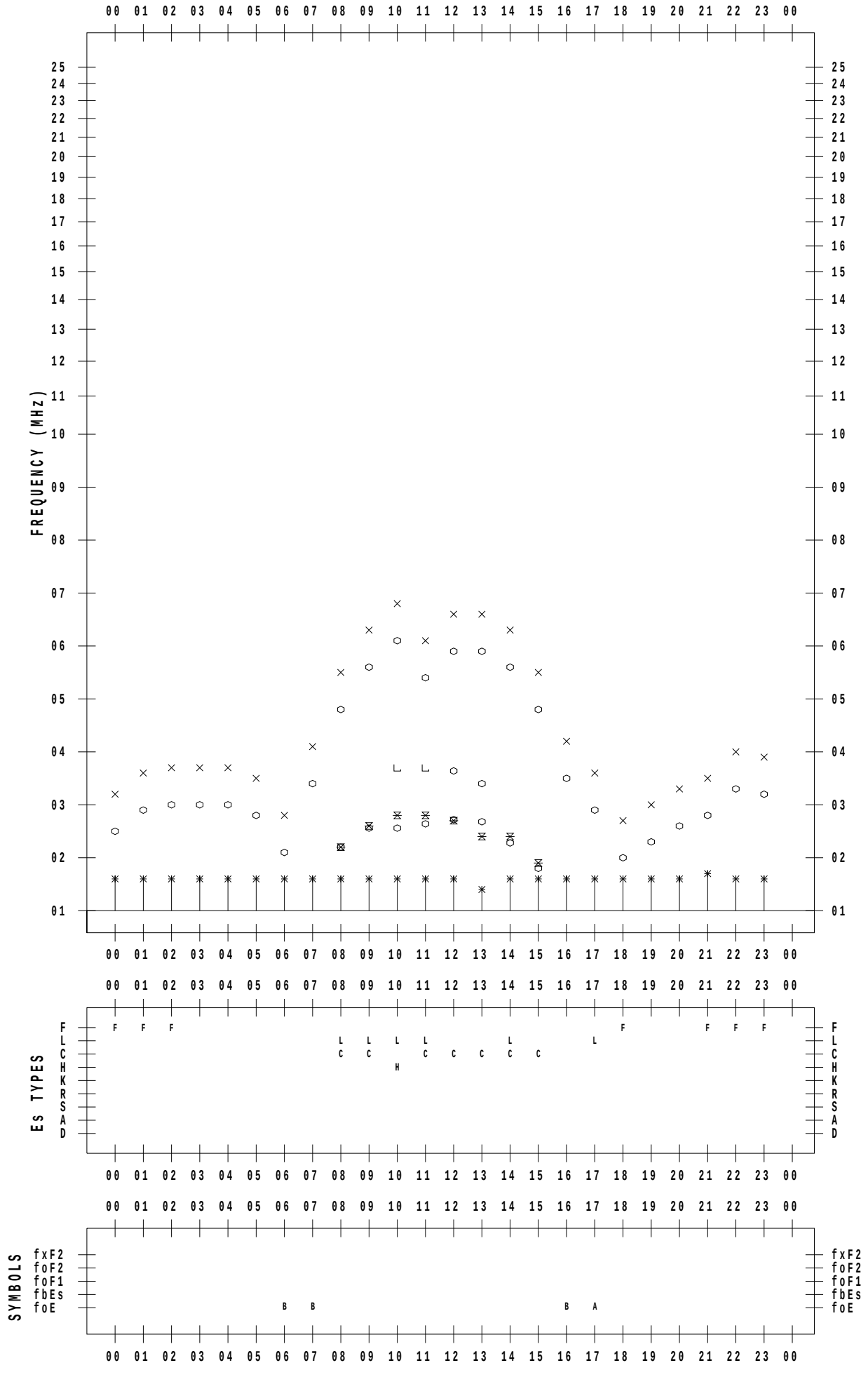
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/ 9

135 °E MEAN TIME



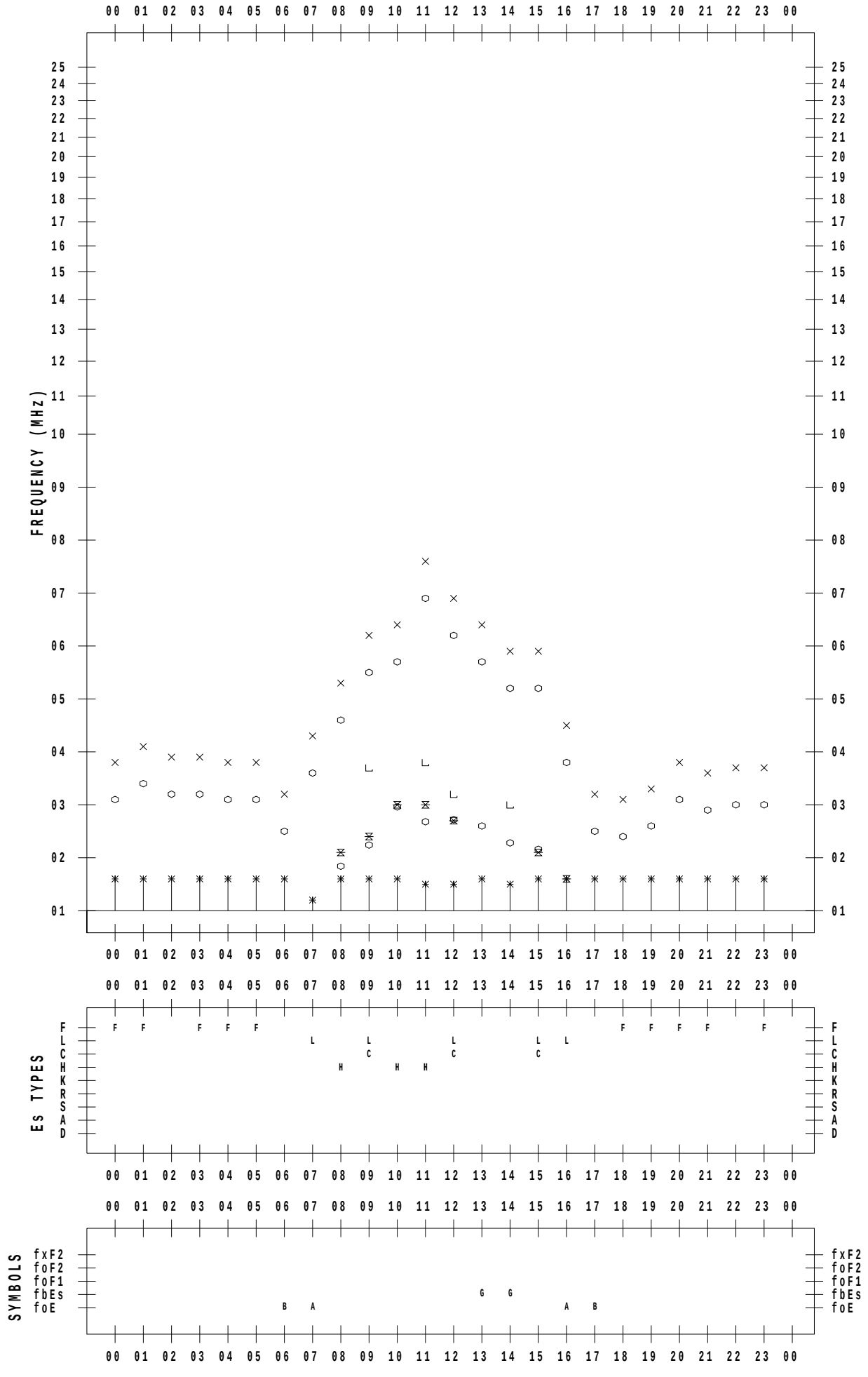
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/10

135 °E MEAN TIME



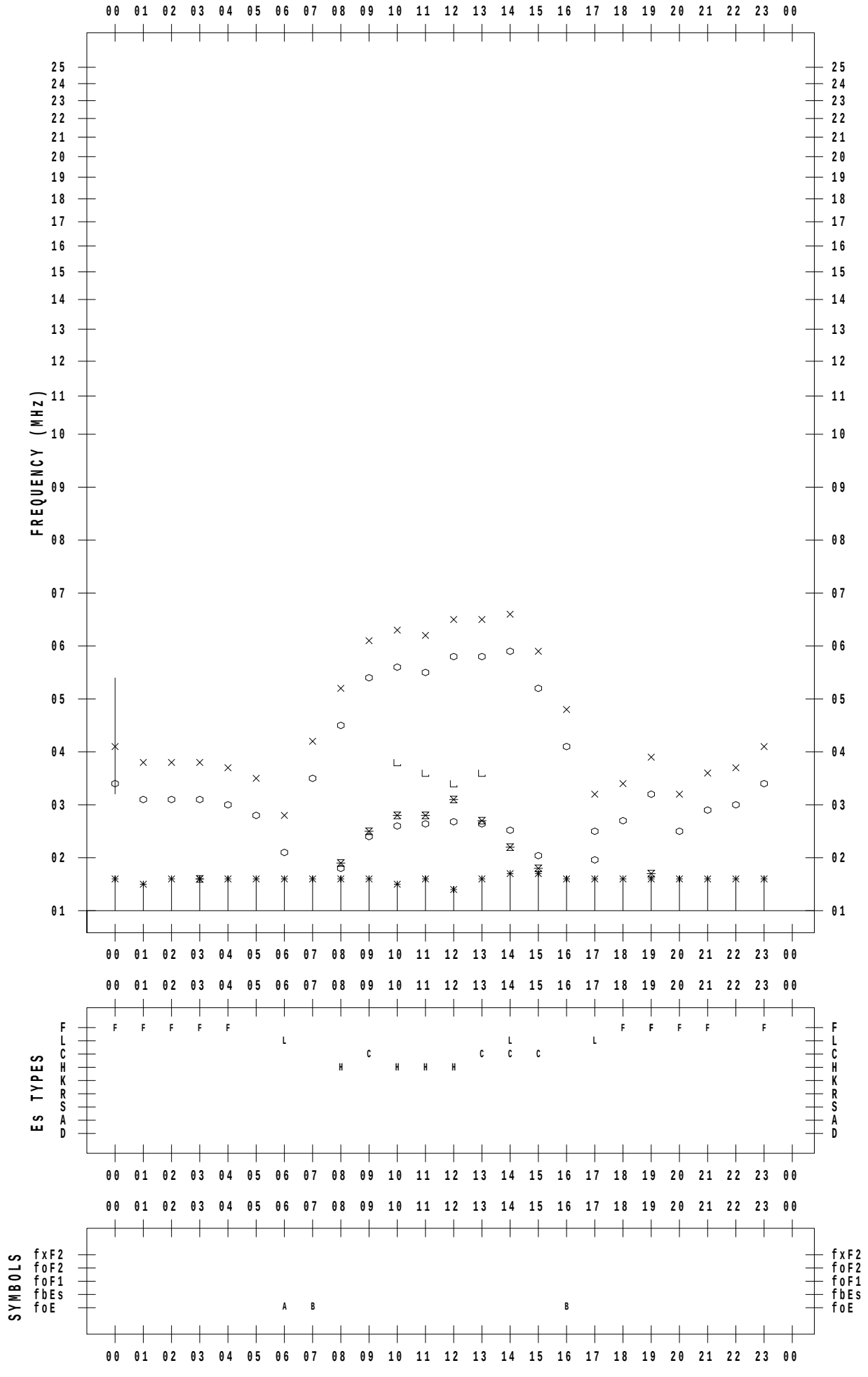
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/11

135 °E MEAN TIME



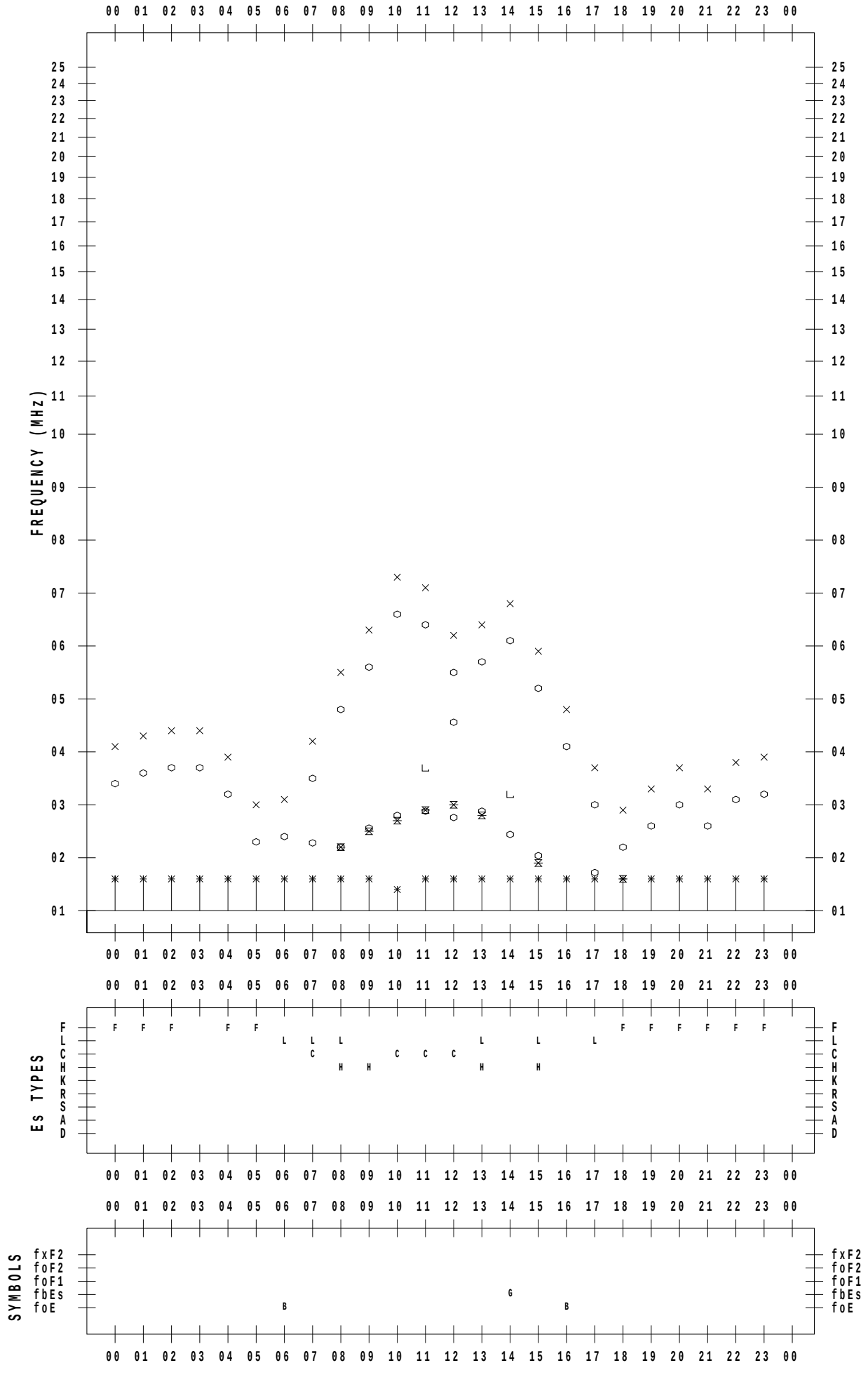
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/12

135 °E MEAN TIME



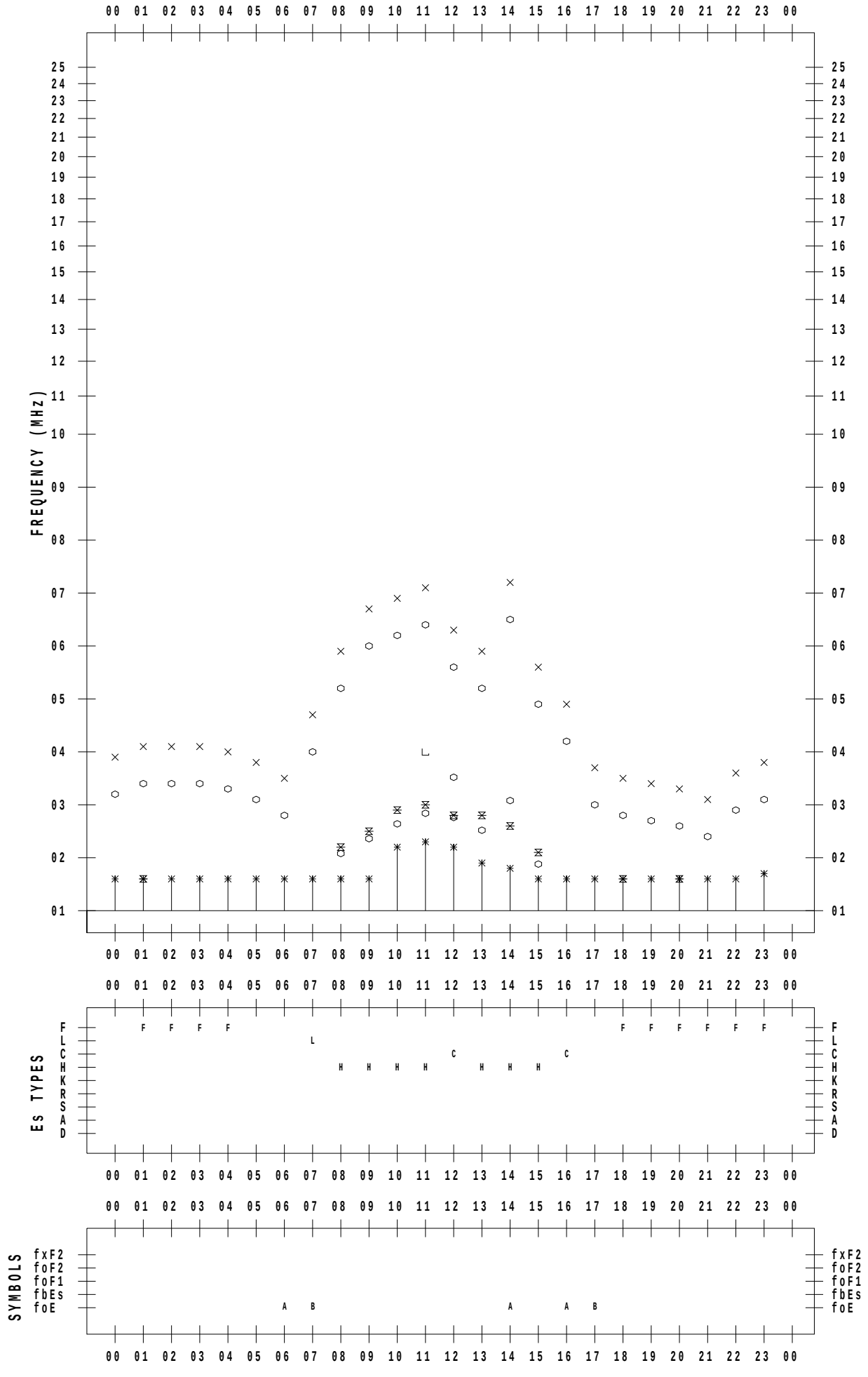
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/13

135 °E MEAN TIME



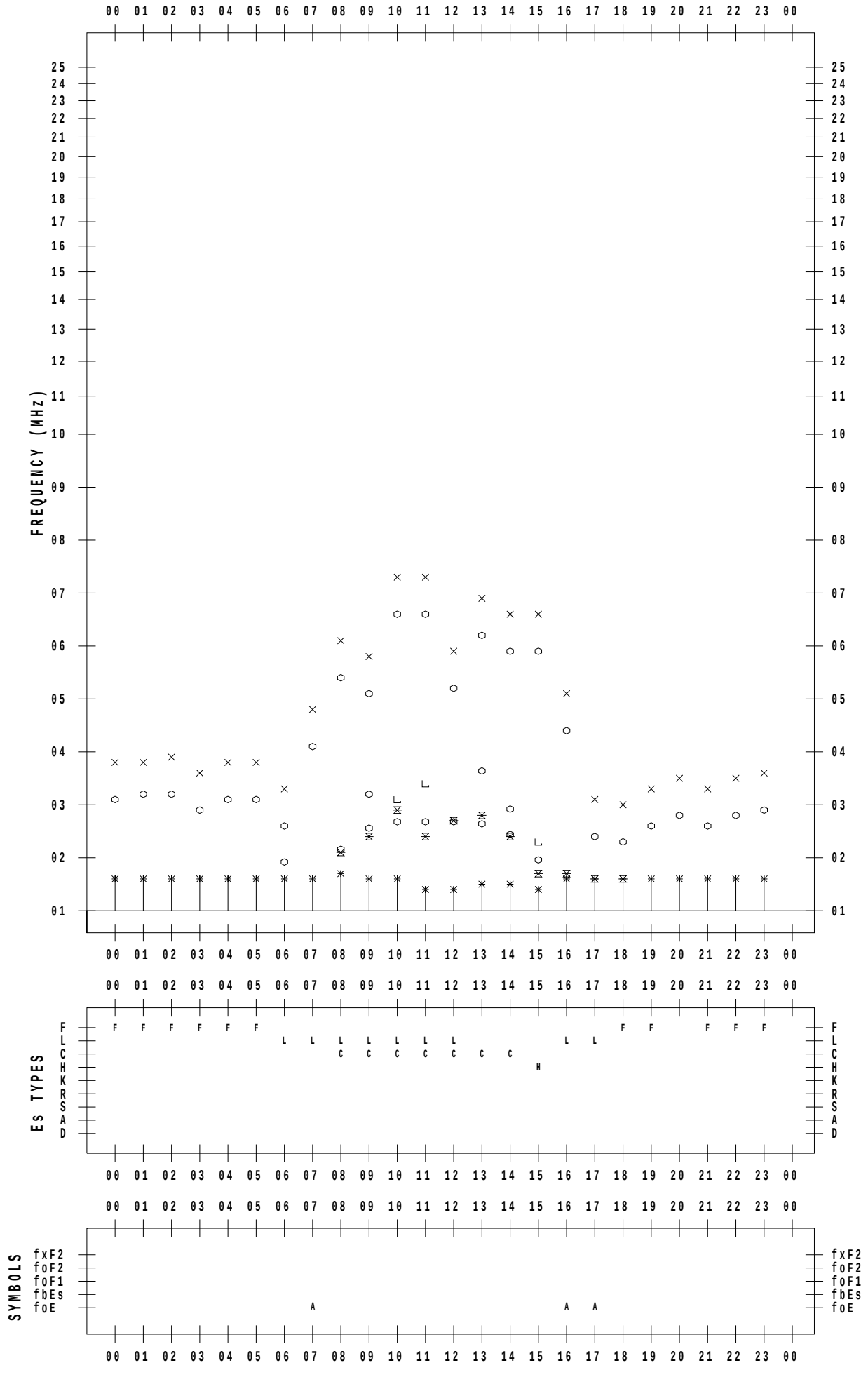
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/14

135 °E MEAN TIME



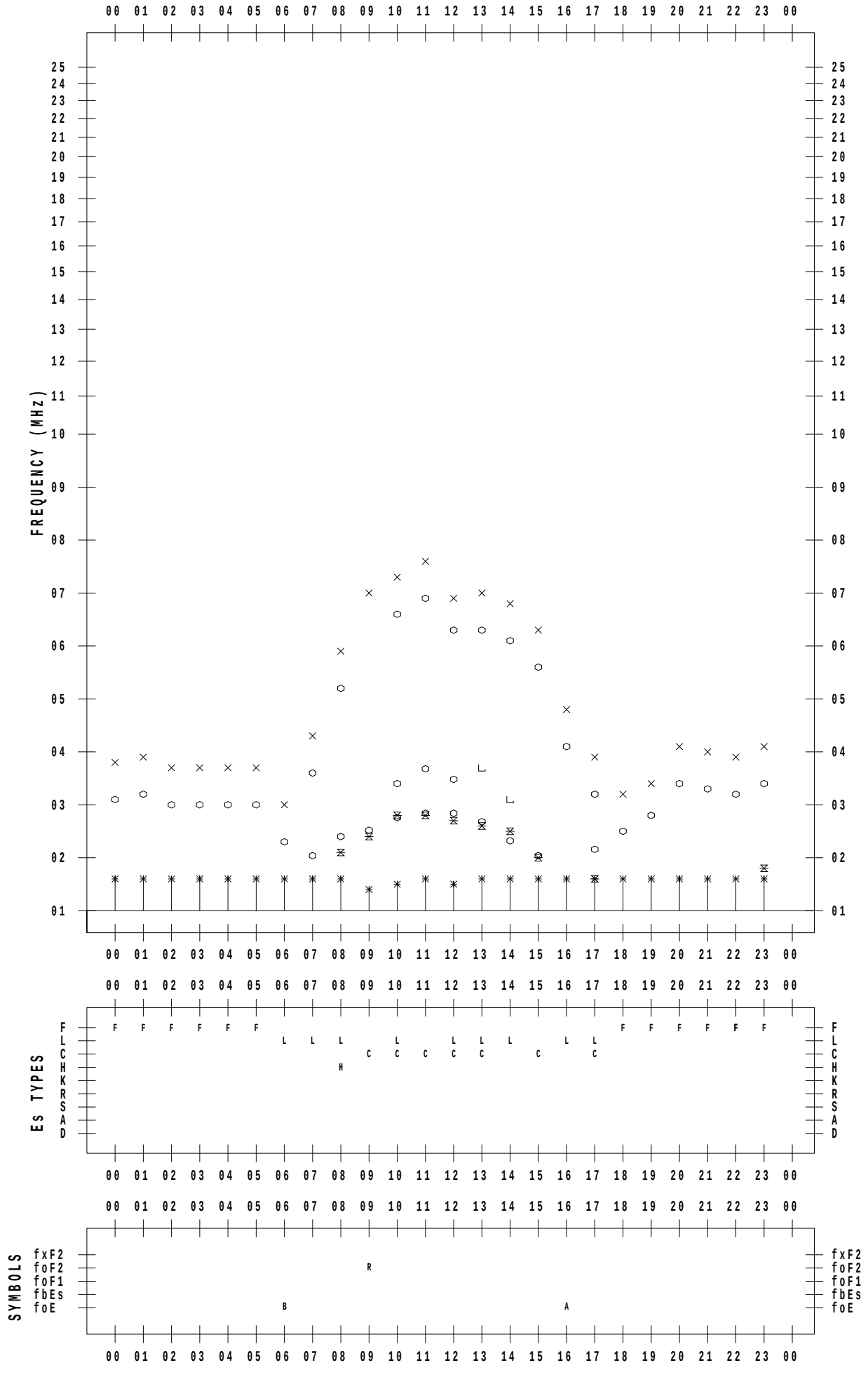
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/15

135 °E MEAN TIME



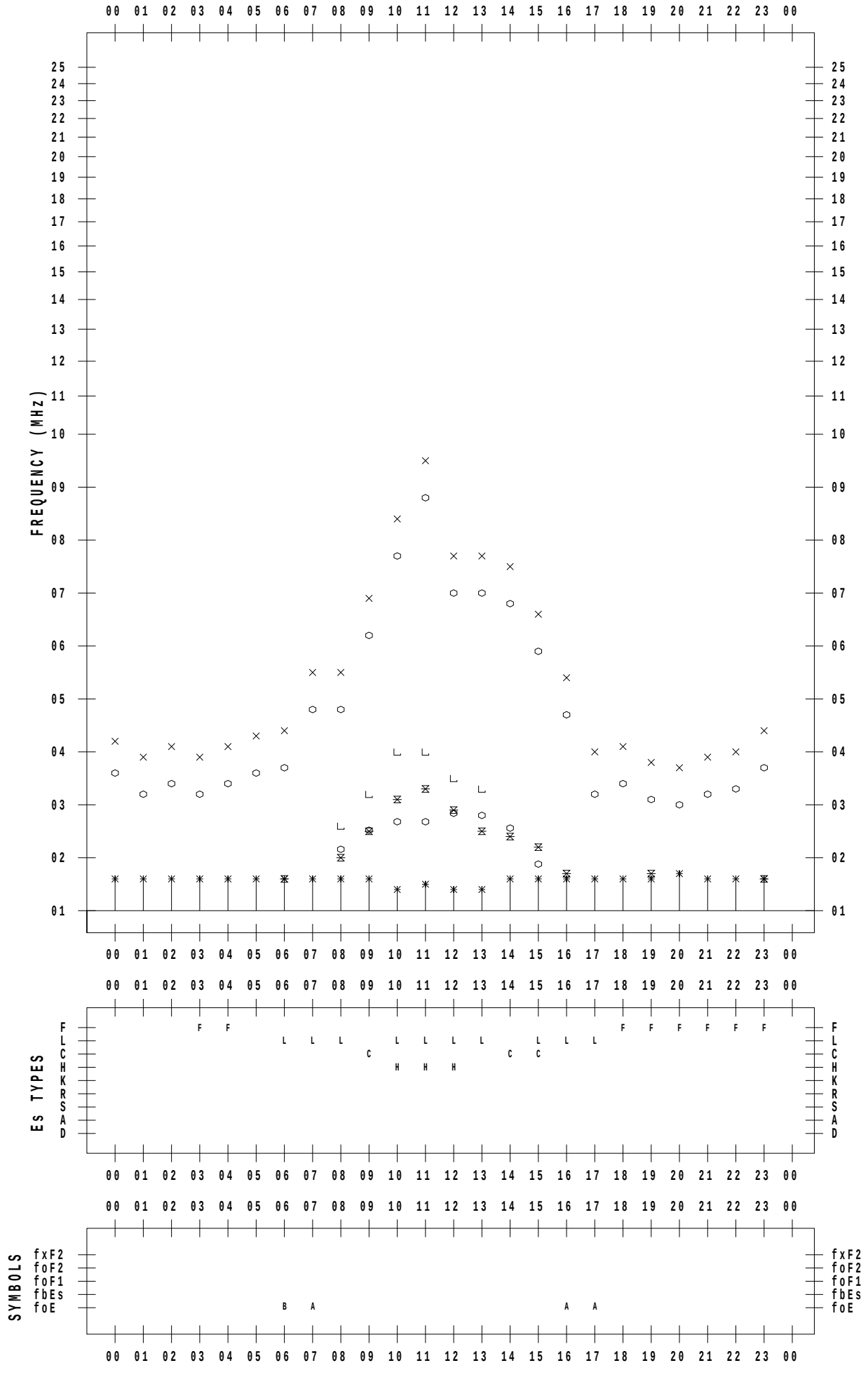
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/16

135 °E MEAN TIME



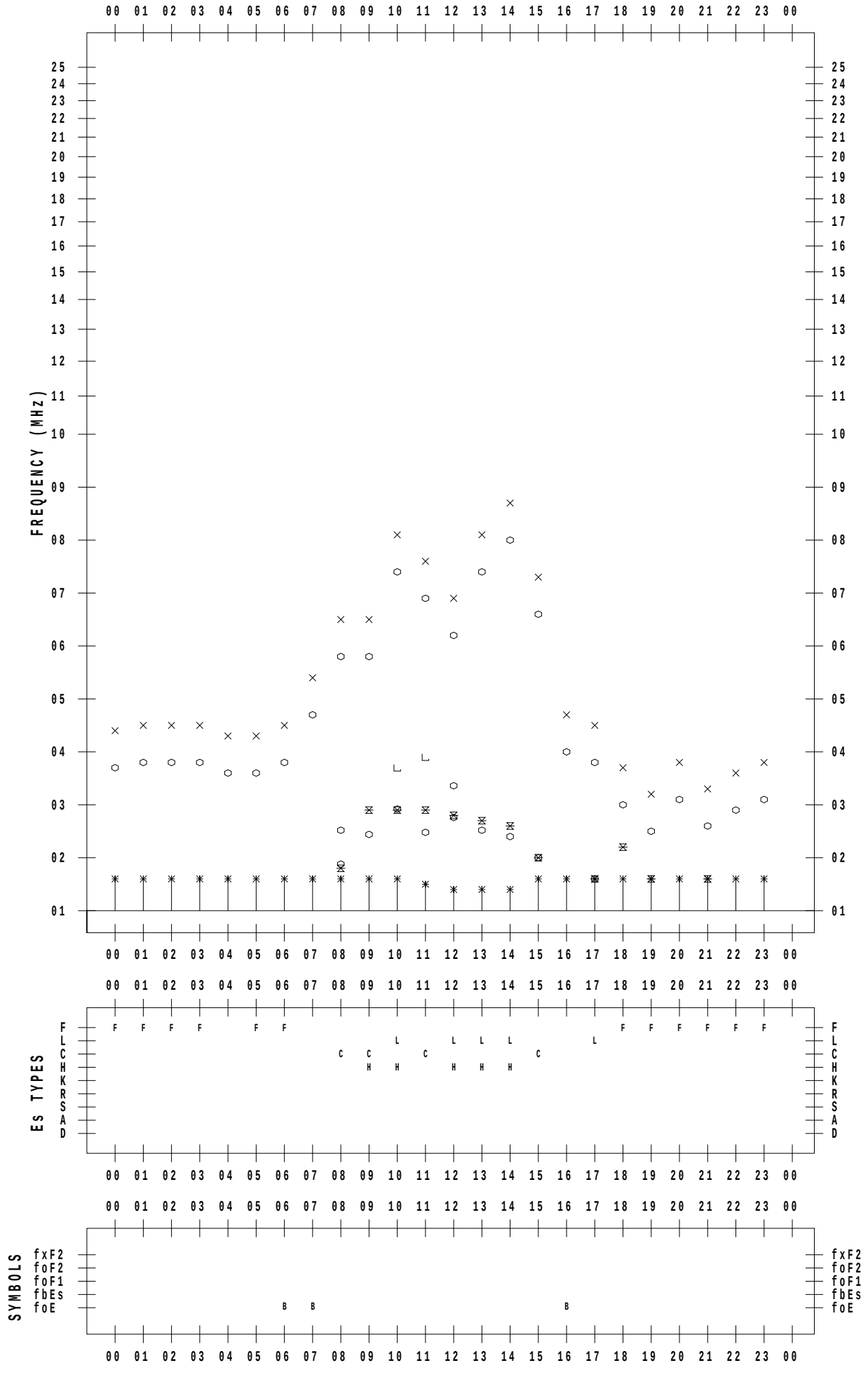
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/17

135 °E MEAN TIME



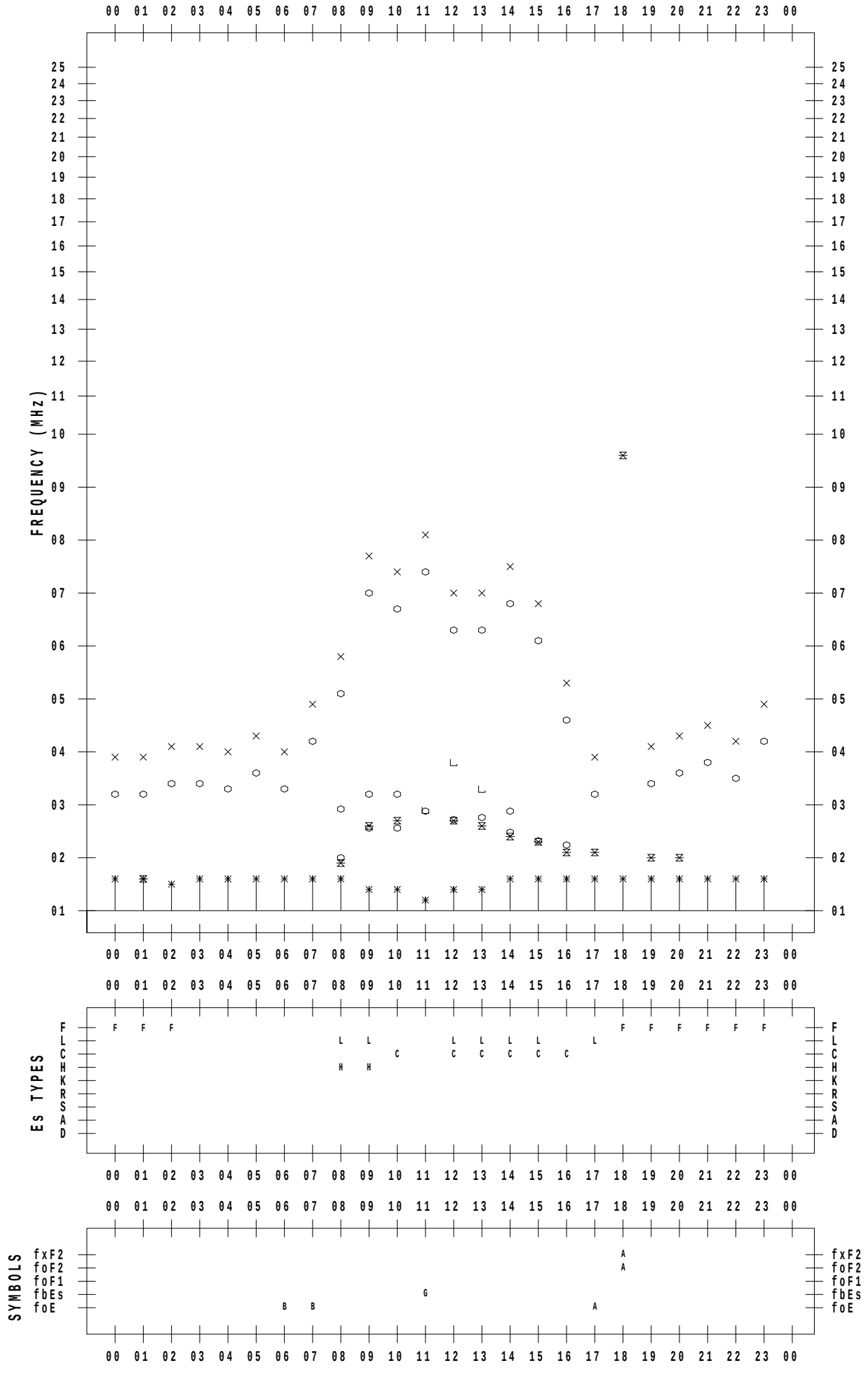
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/18

135 °E MEAN TIME



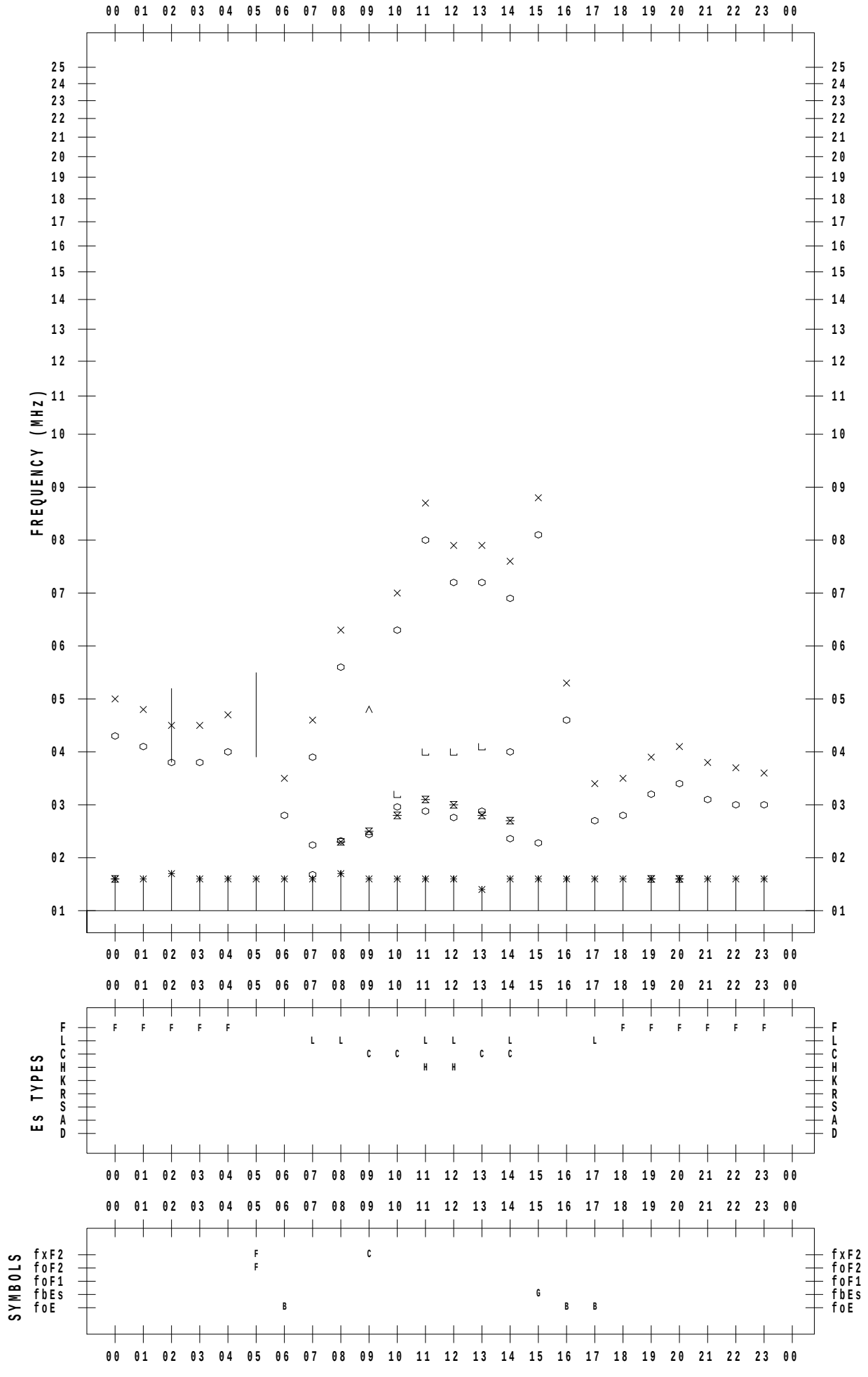
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/19

135 °E MEAN TIME



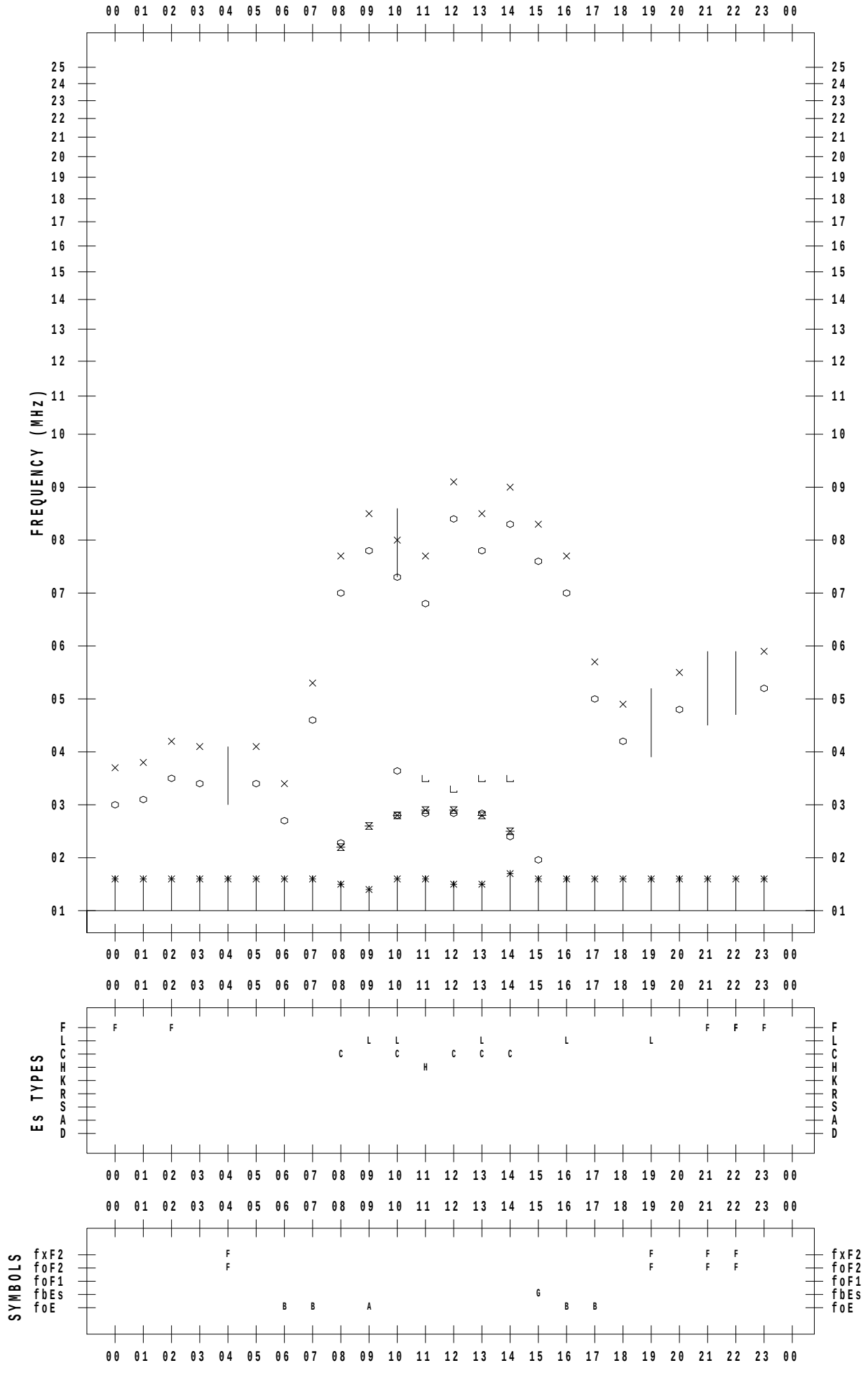
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/20

135 °E MEAN TIME



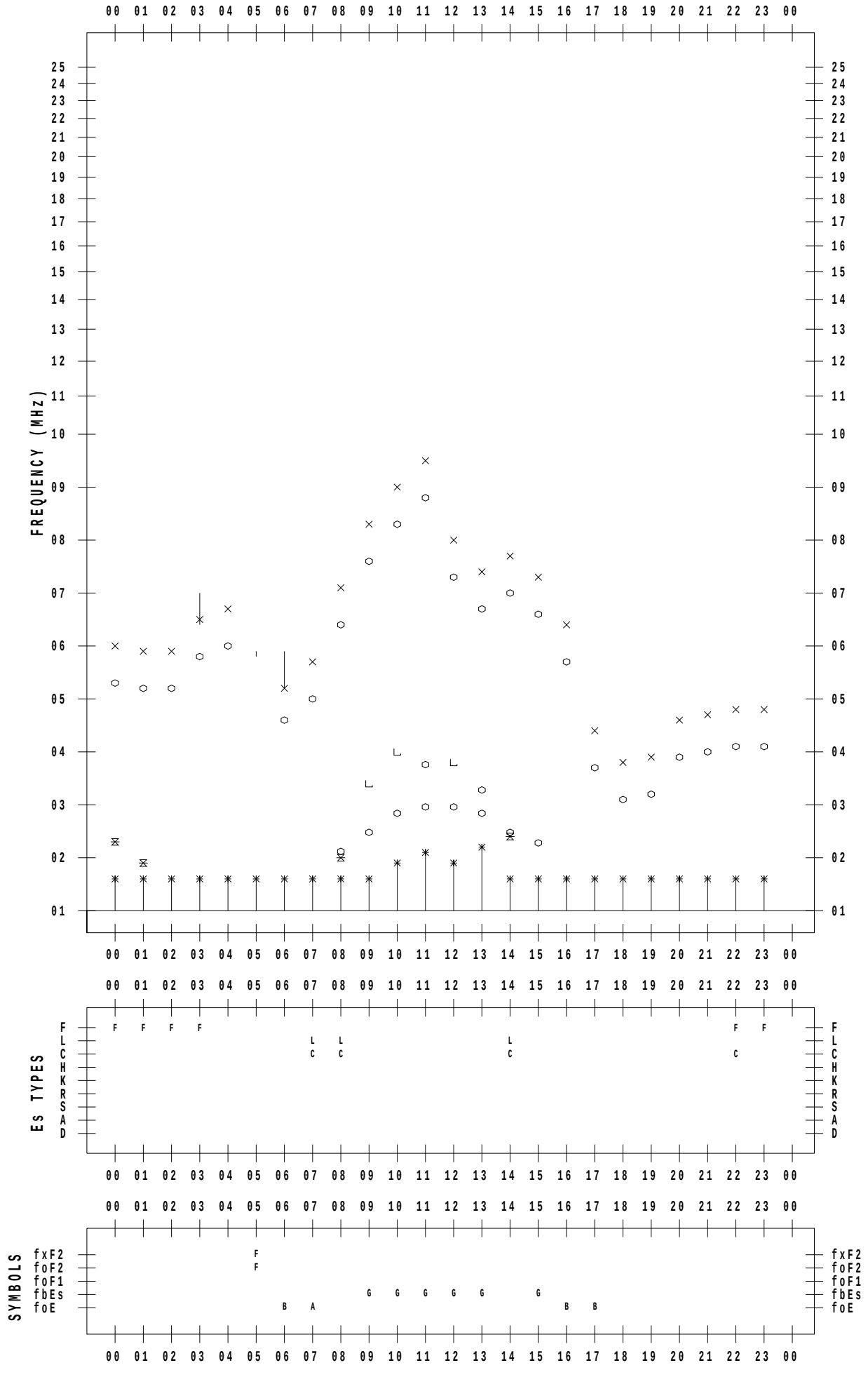
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/21

135 °E MEAN TIME



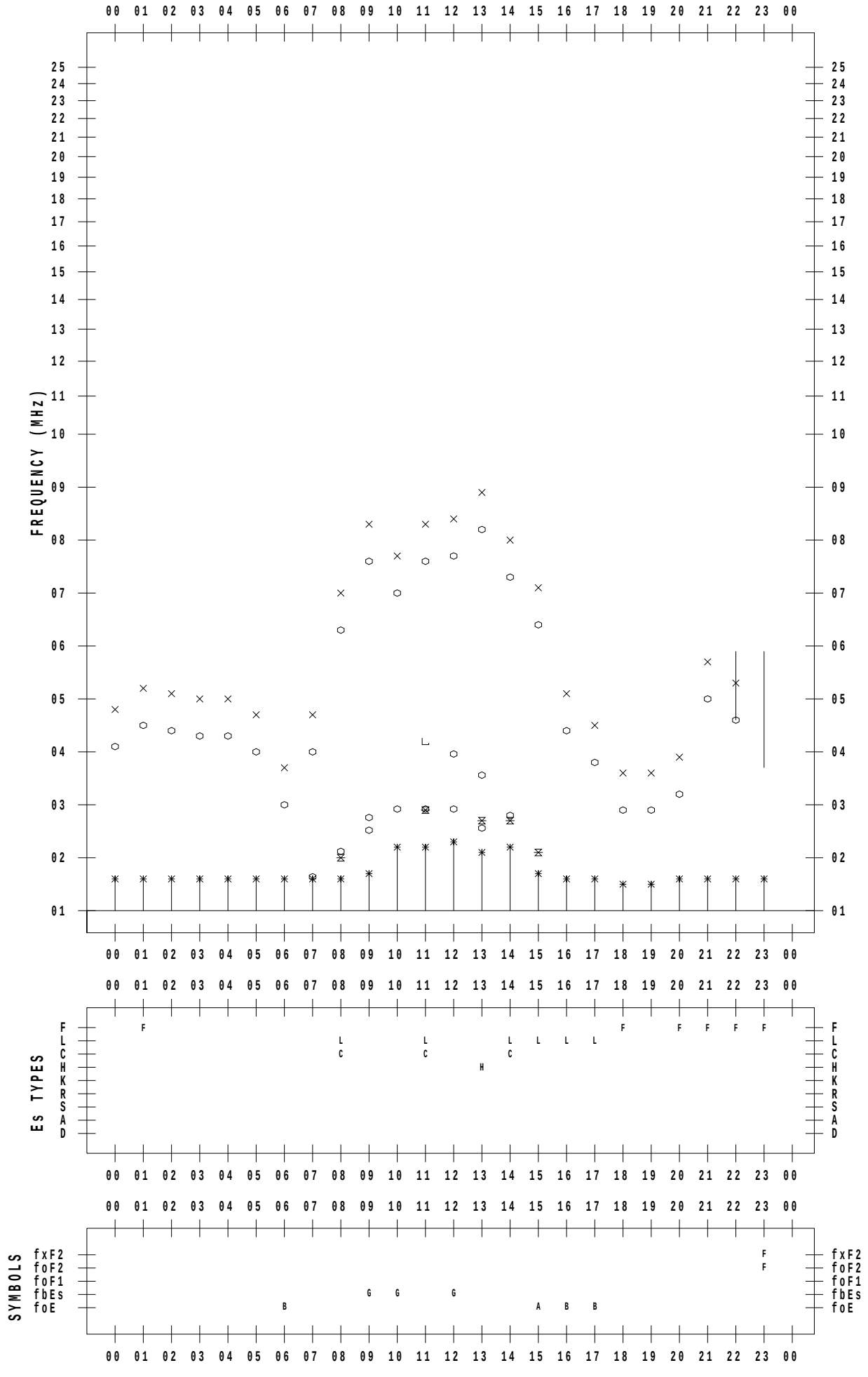
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/22

135 °E MEAN TIME



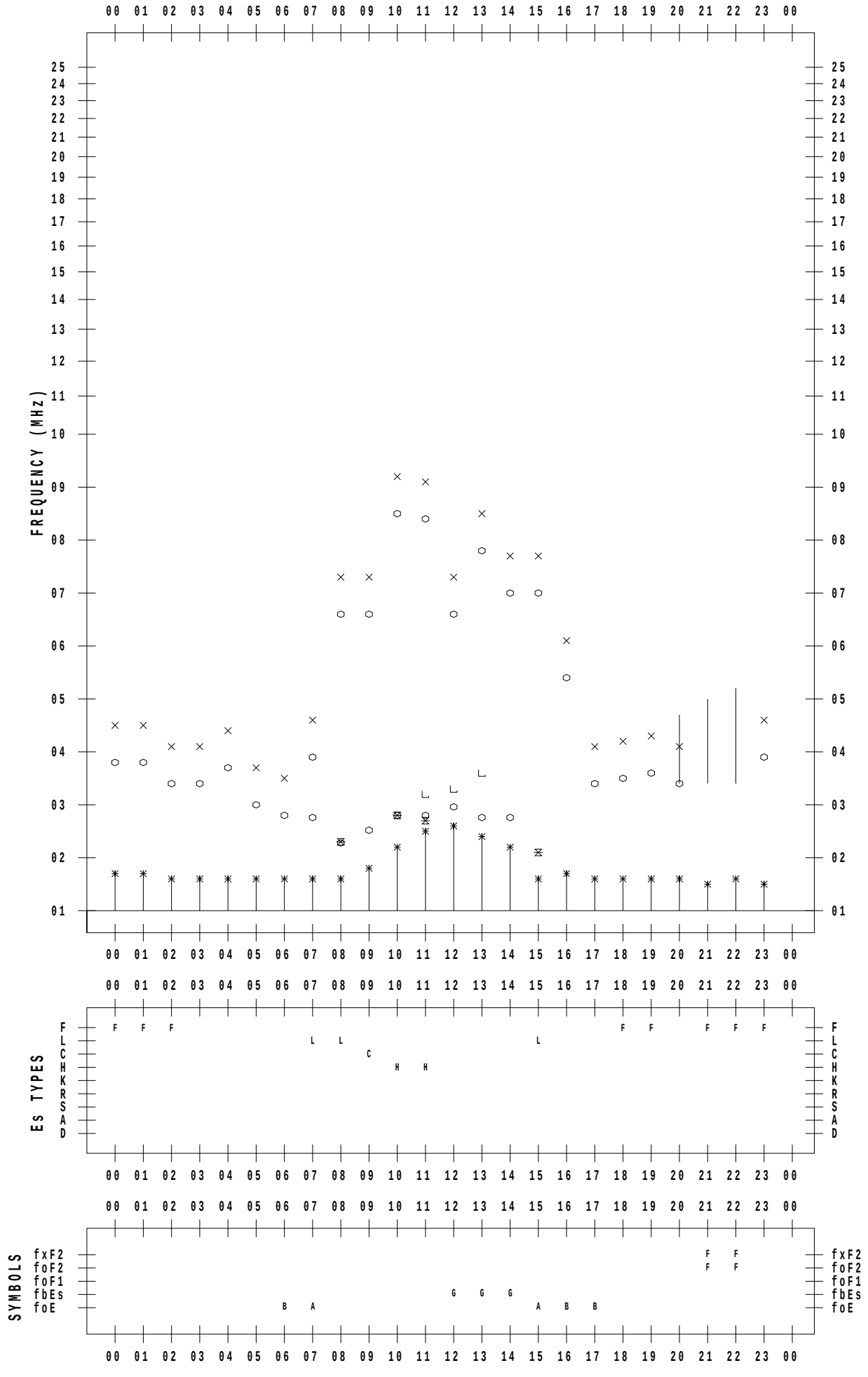
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/23

135 °E MEAN TIME



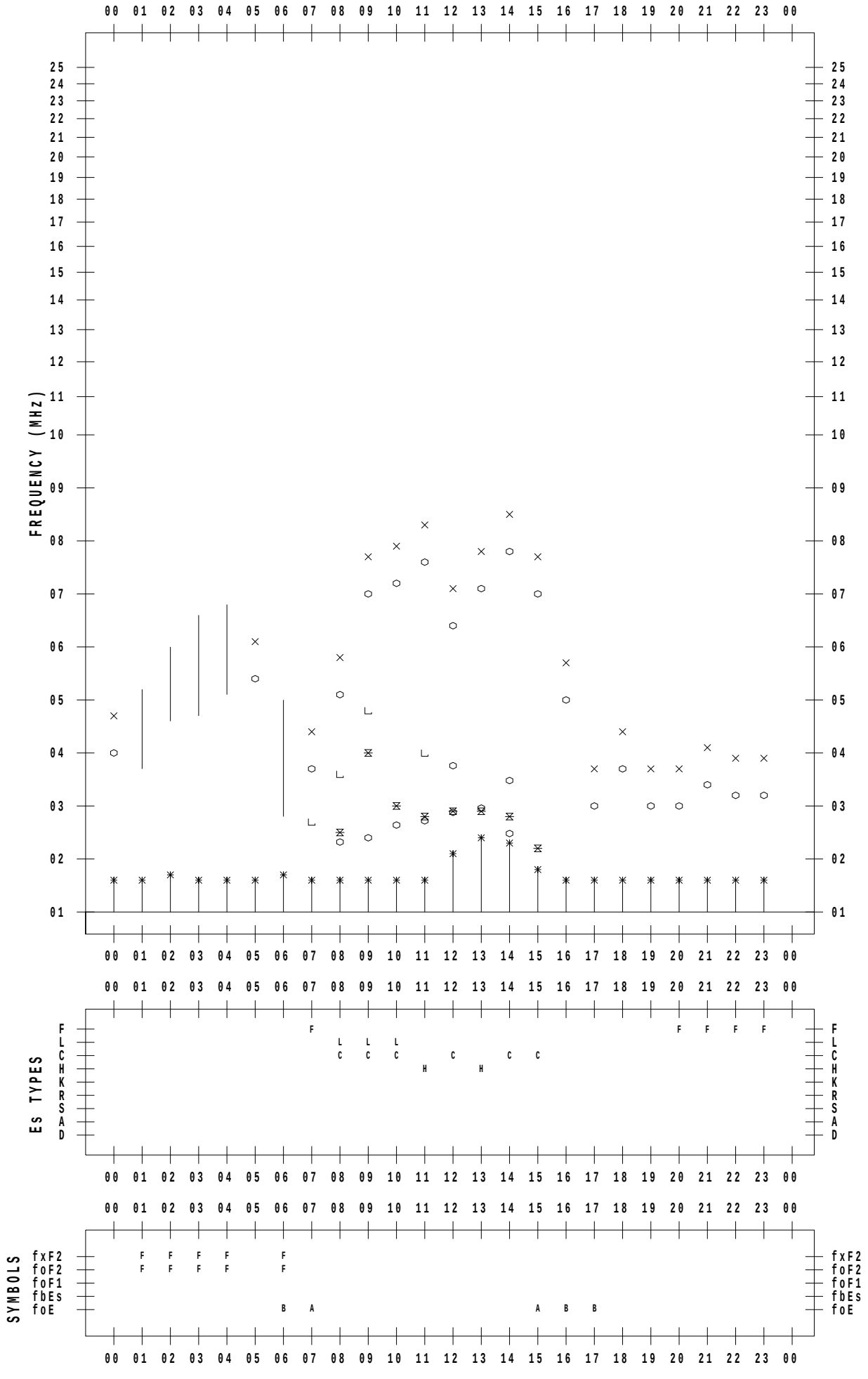
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/24

135 °E MEAN TIME



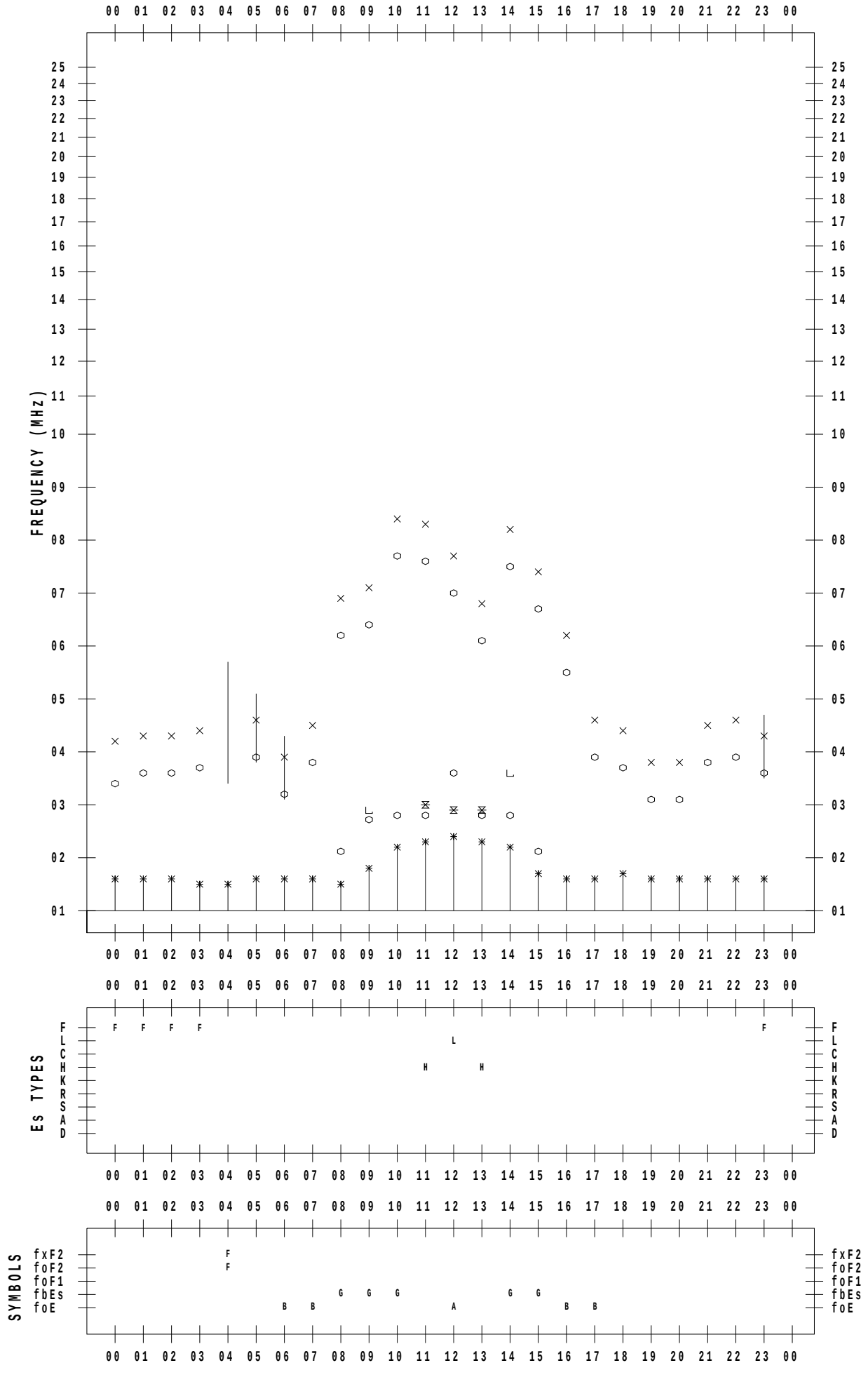
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/25

135 °E MEAN TIME



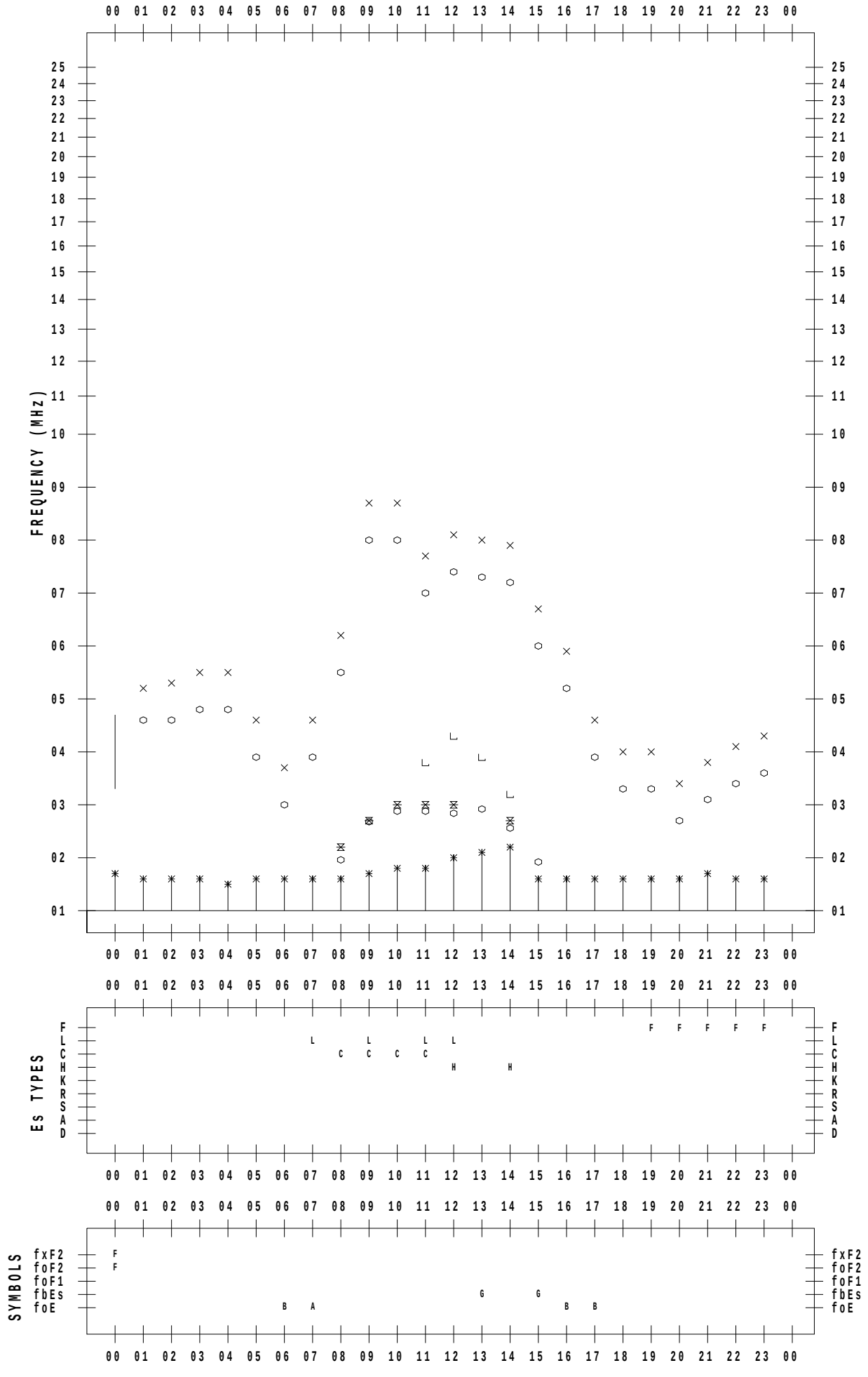
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/26

135 °E MEAN TIME



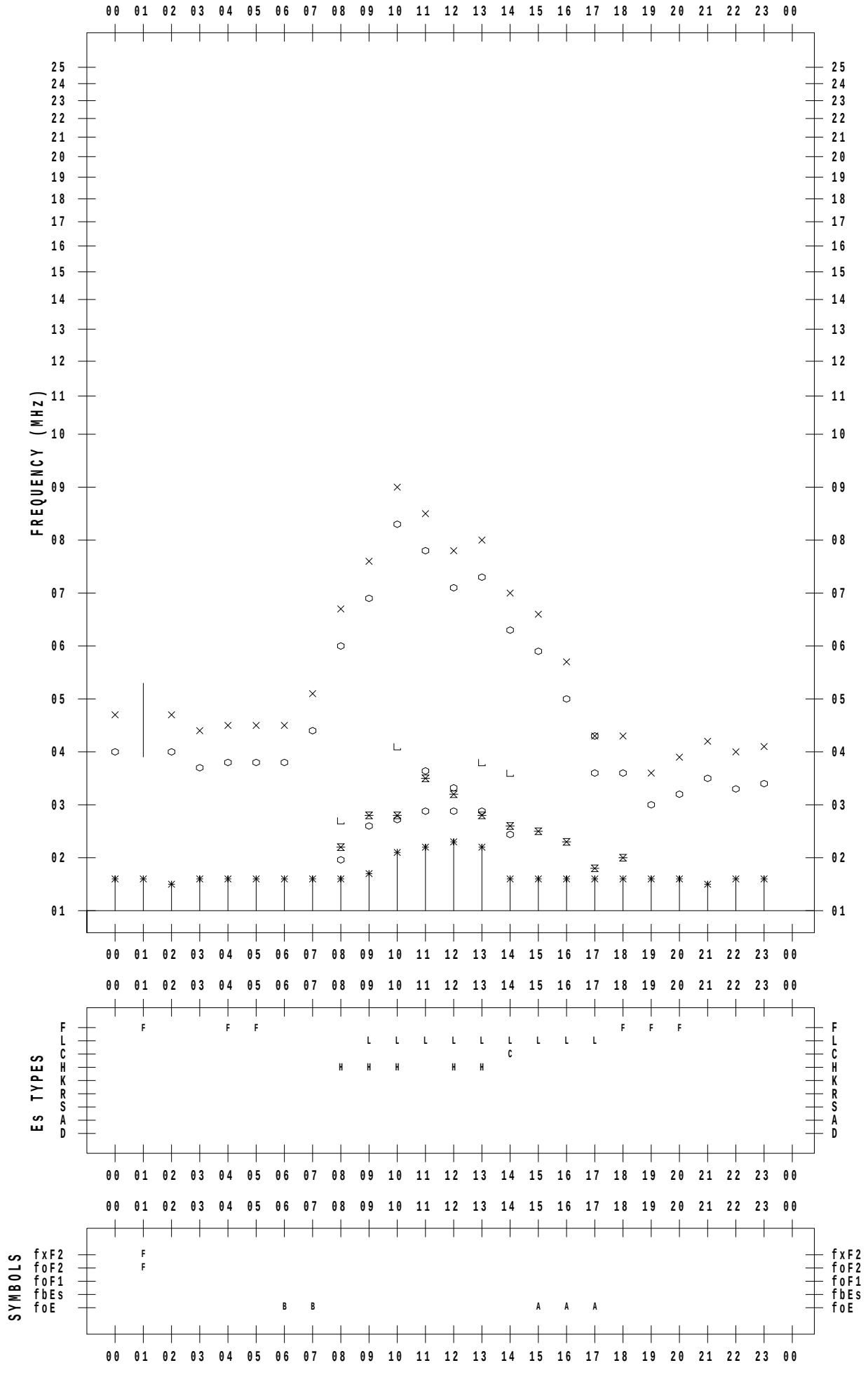
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/27

135 °E MEAN TIME



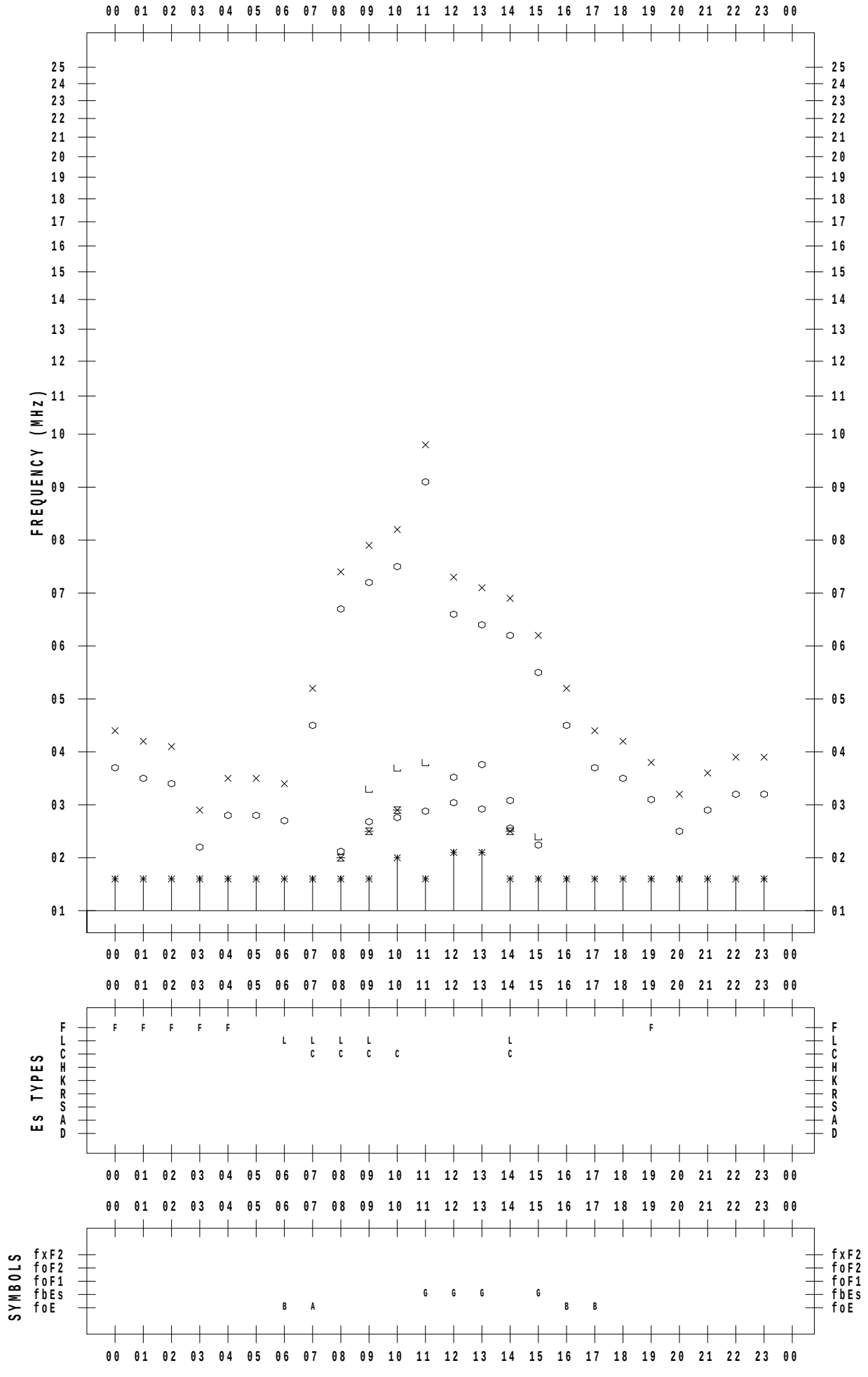
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/28

135 °E MEAN TIME



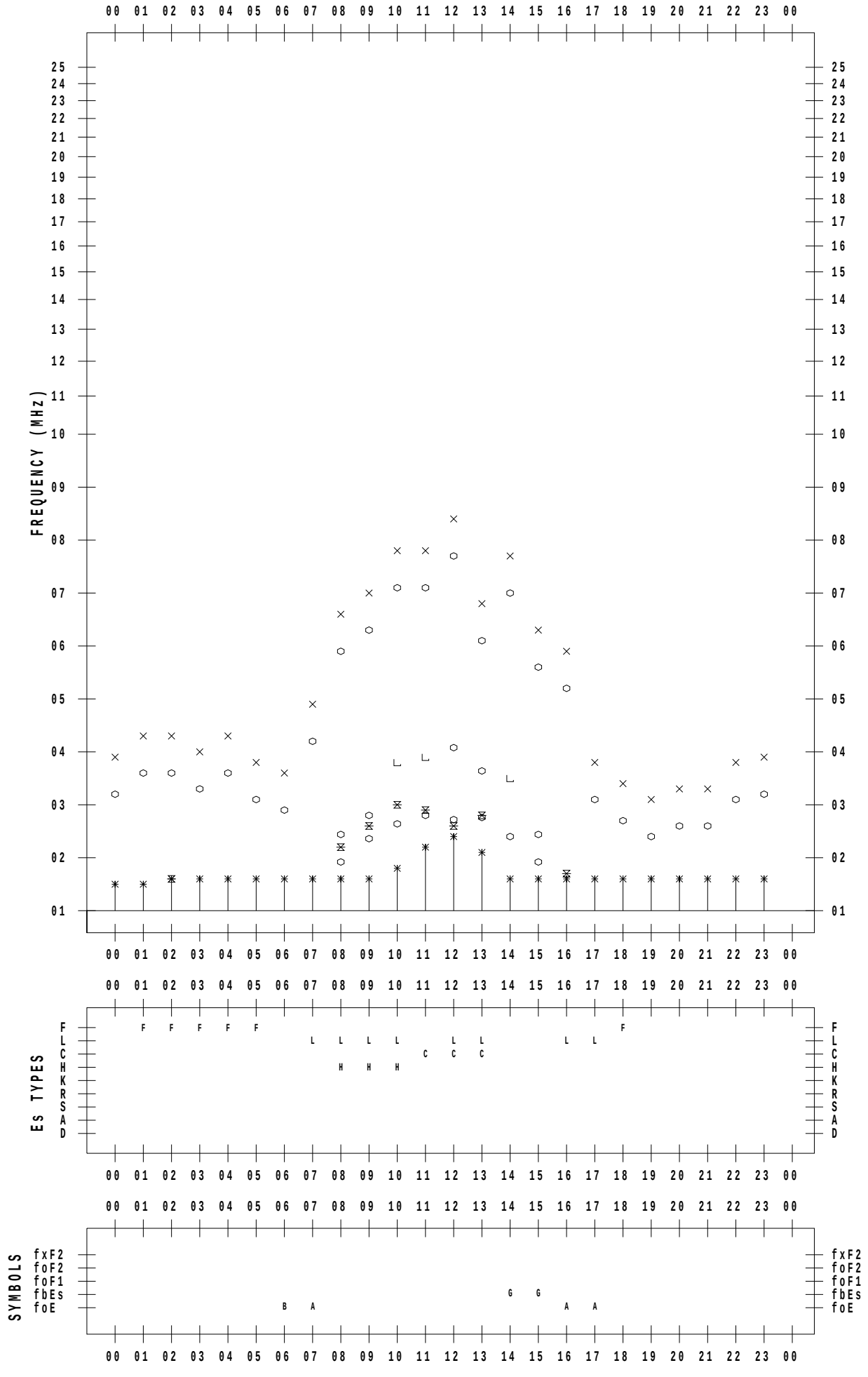
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/29

135 °E MEAN TIME



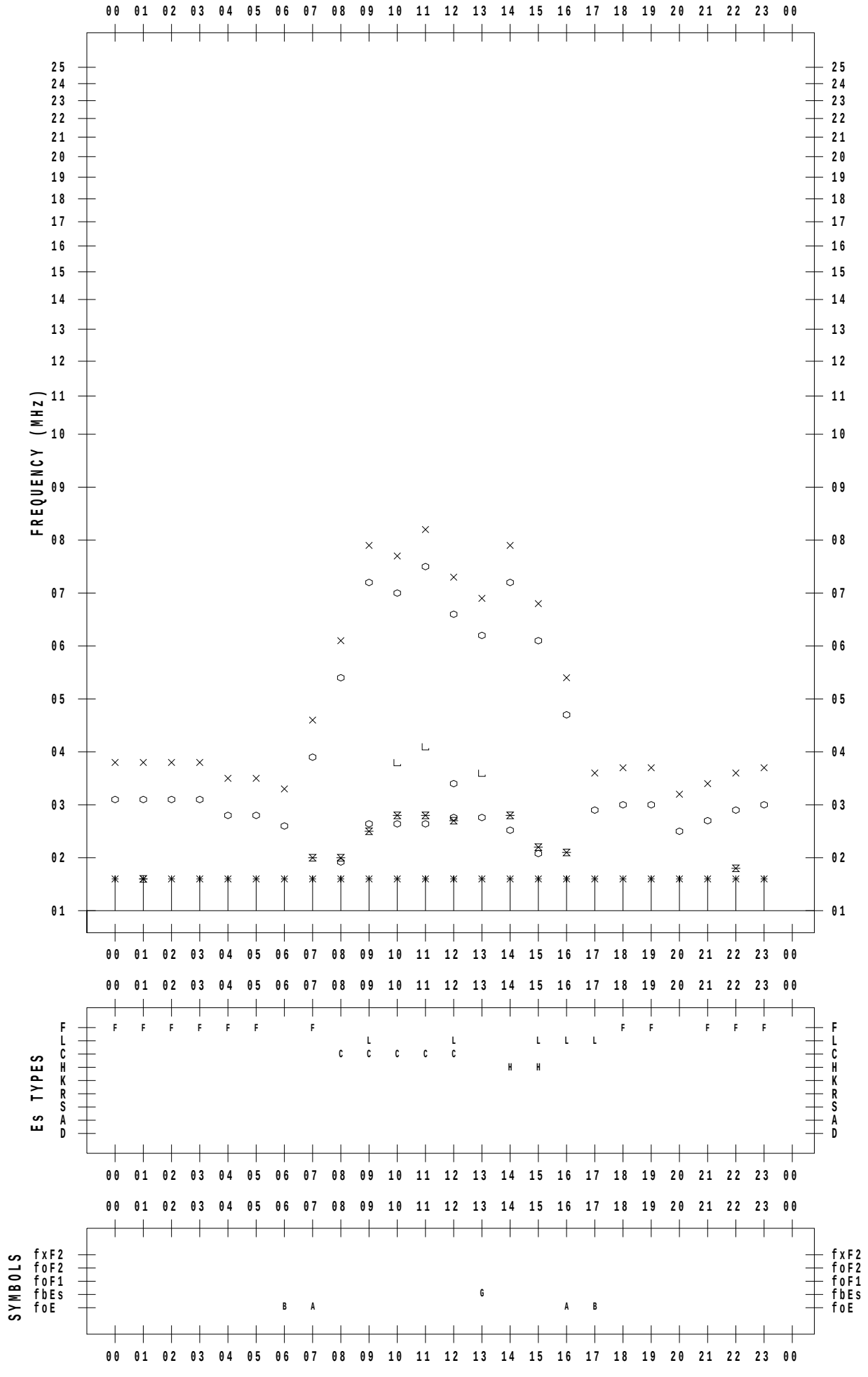
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/30

135 °E MEAN TIME



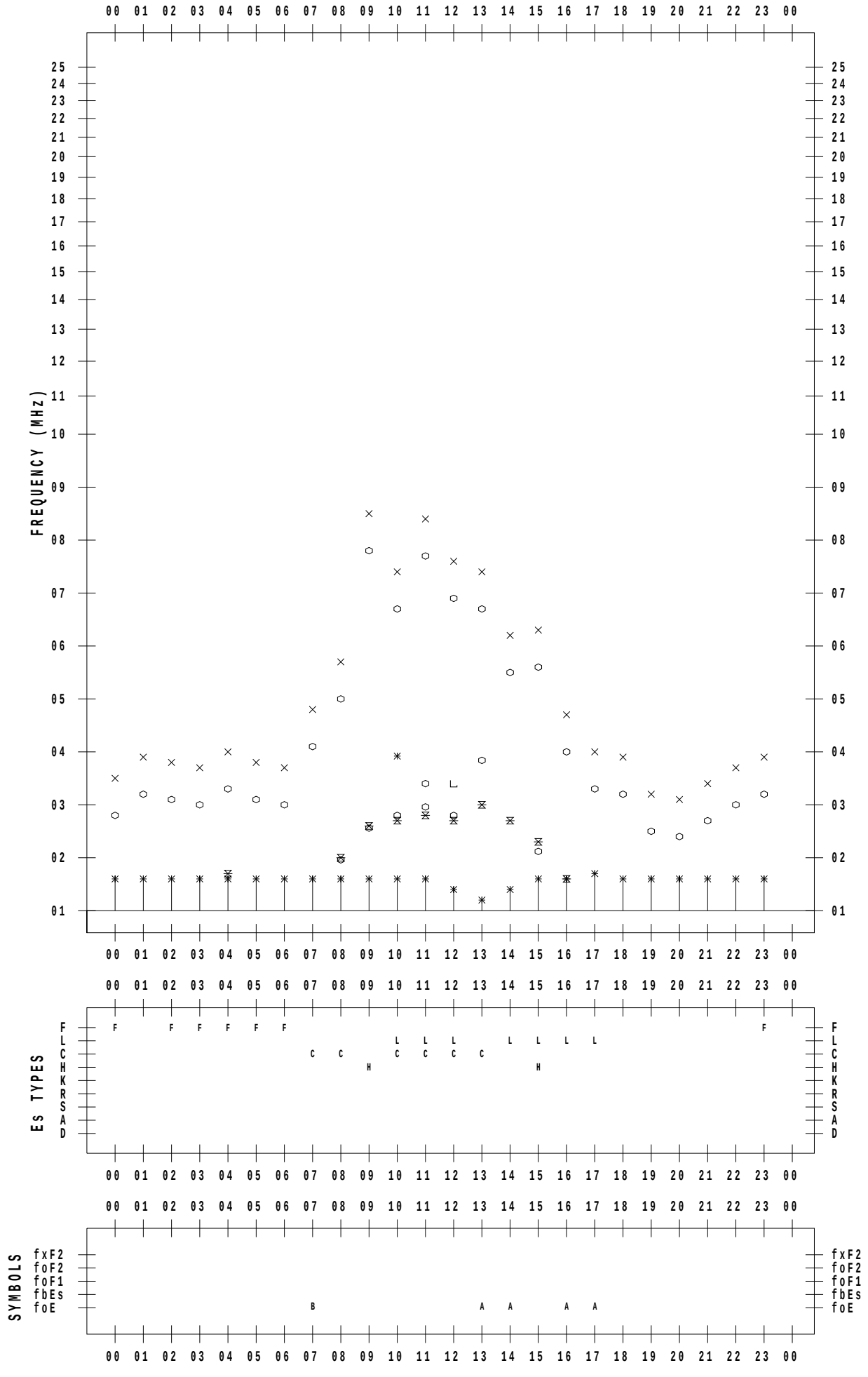
# f-PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2021/12/31

135 °E MEAN TIME



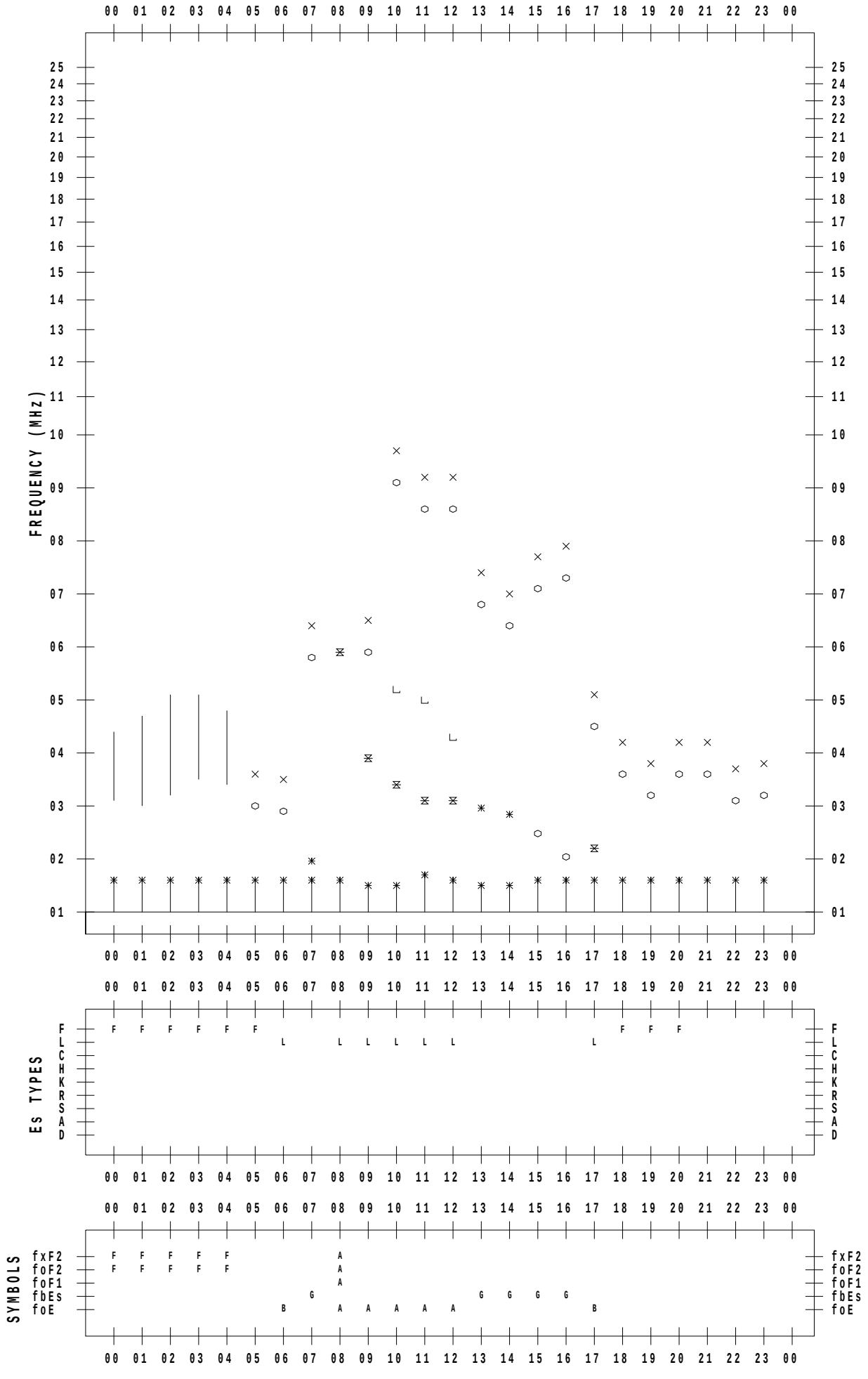
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/ 1

135 °E MEAN TIME



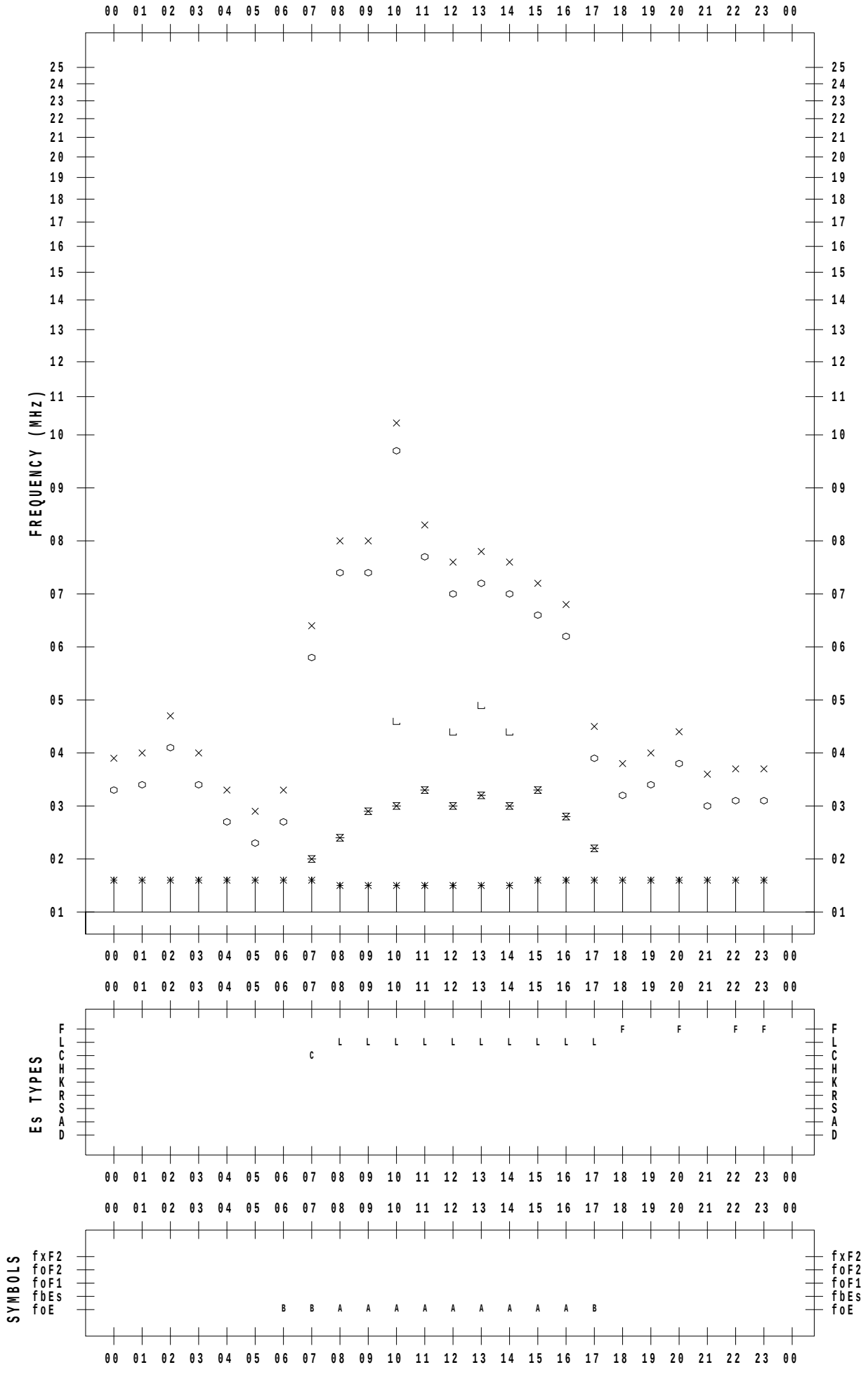
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/ 2

135 °E MEAN TIME



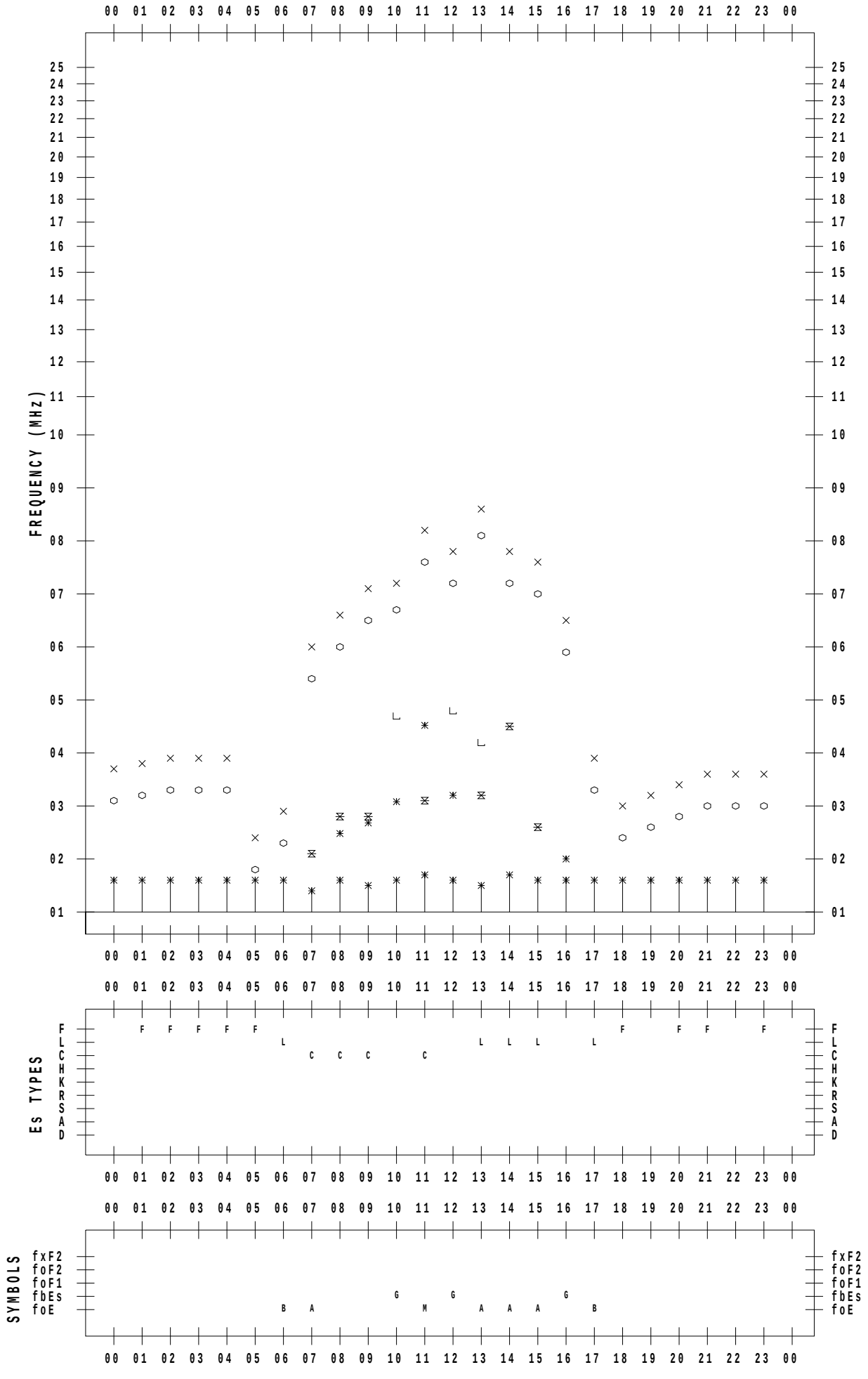
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/ 3

135 °E MEAN TIME



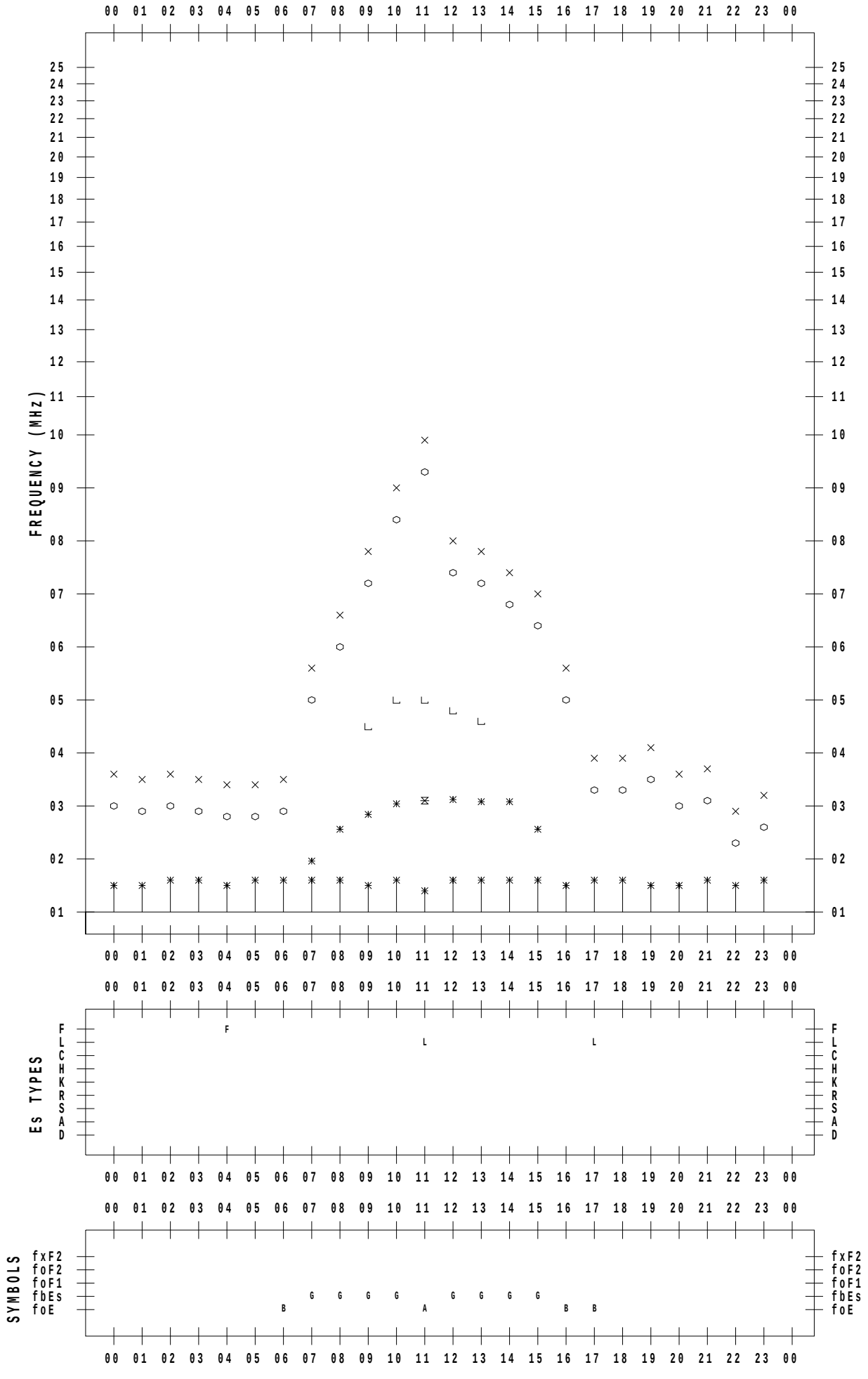
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/ 4

135 °E MEAN TIME



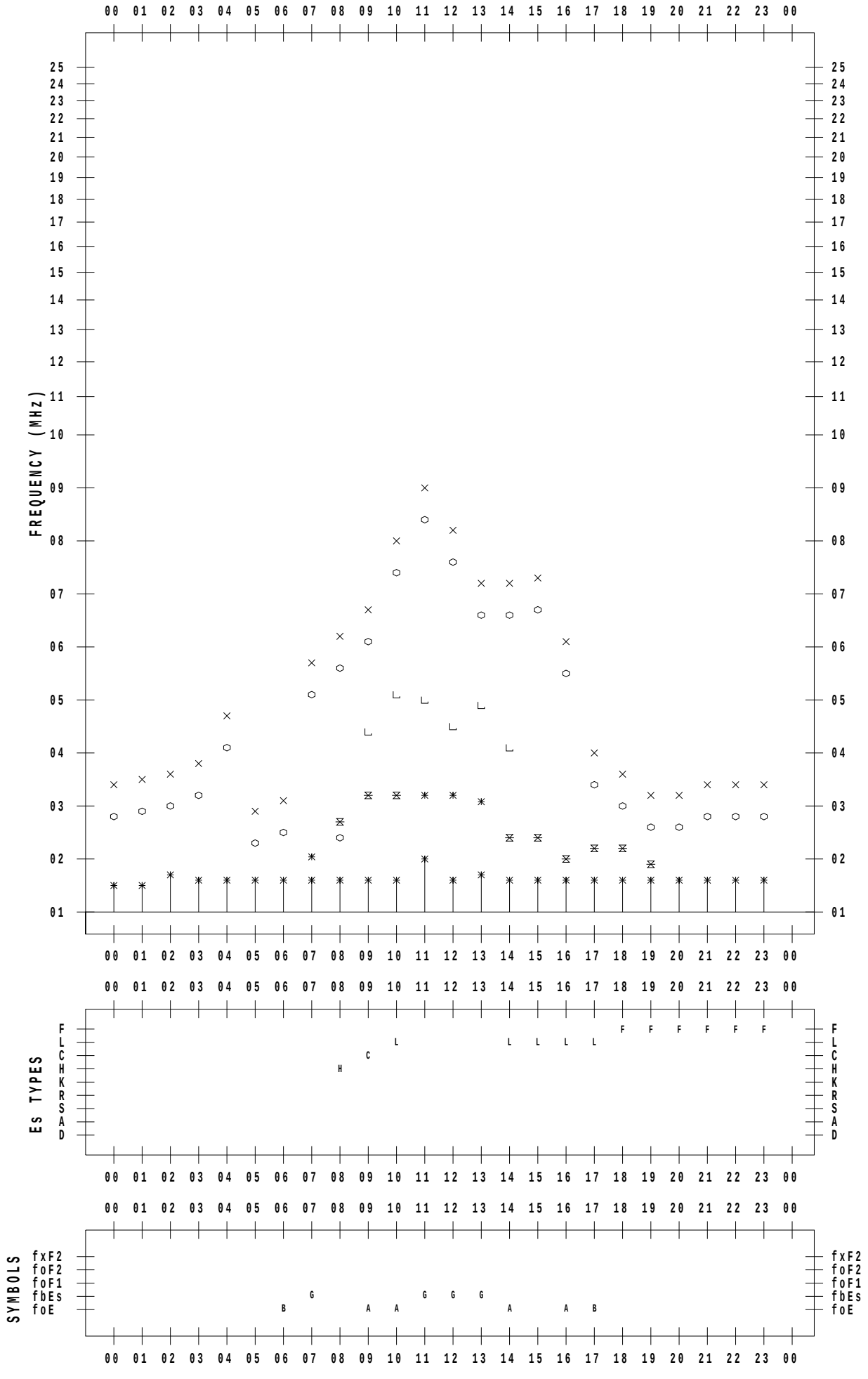
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/ 5

135 °E MEAN TIME



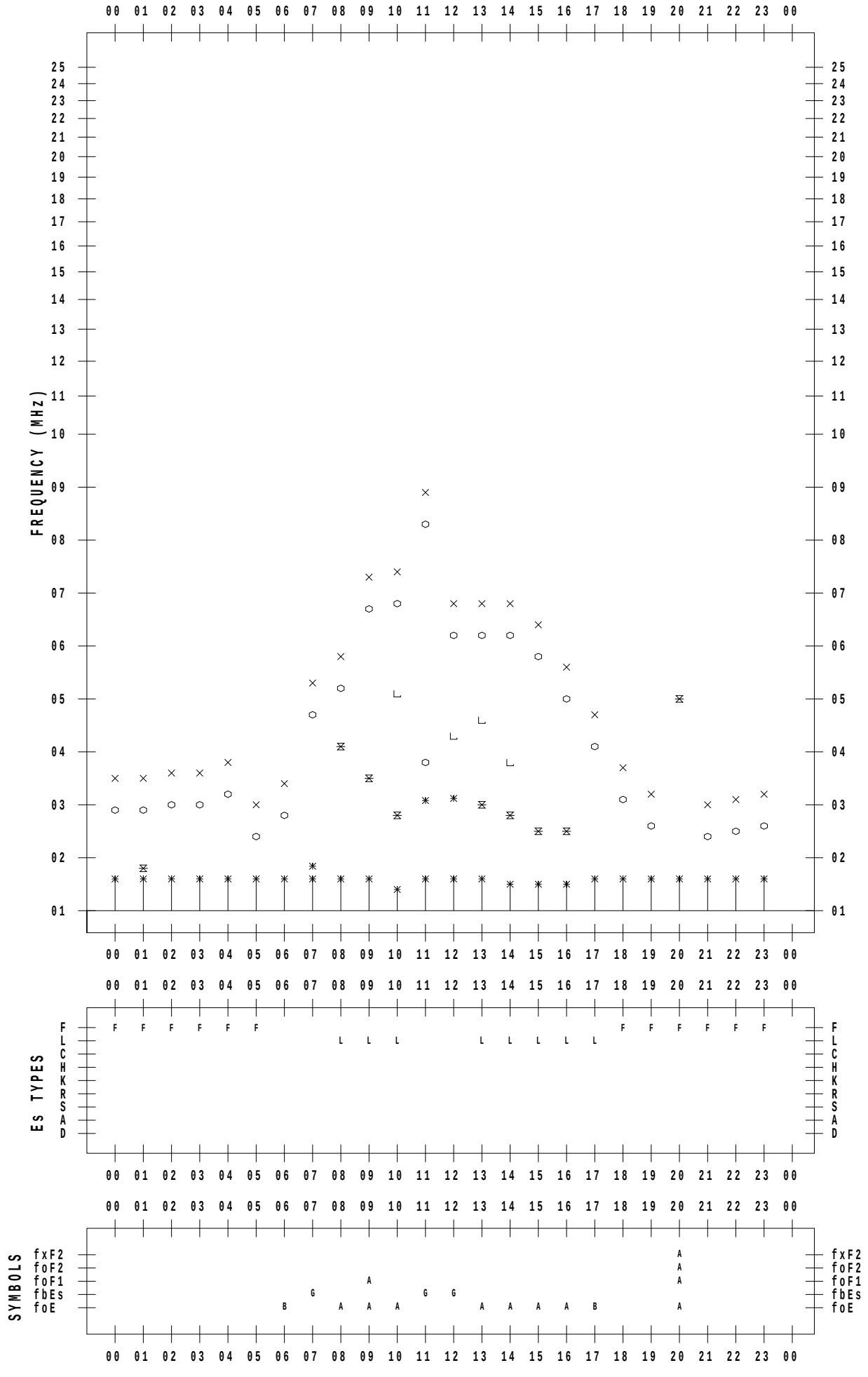
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/ 6

135 °E MEAN TIME



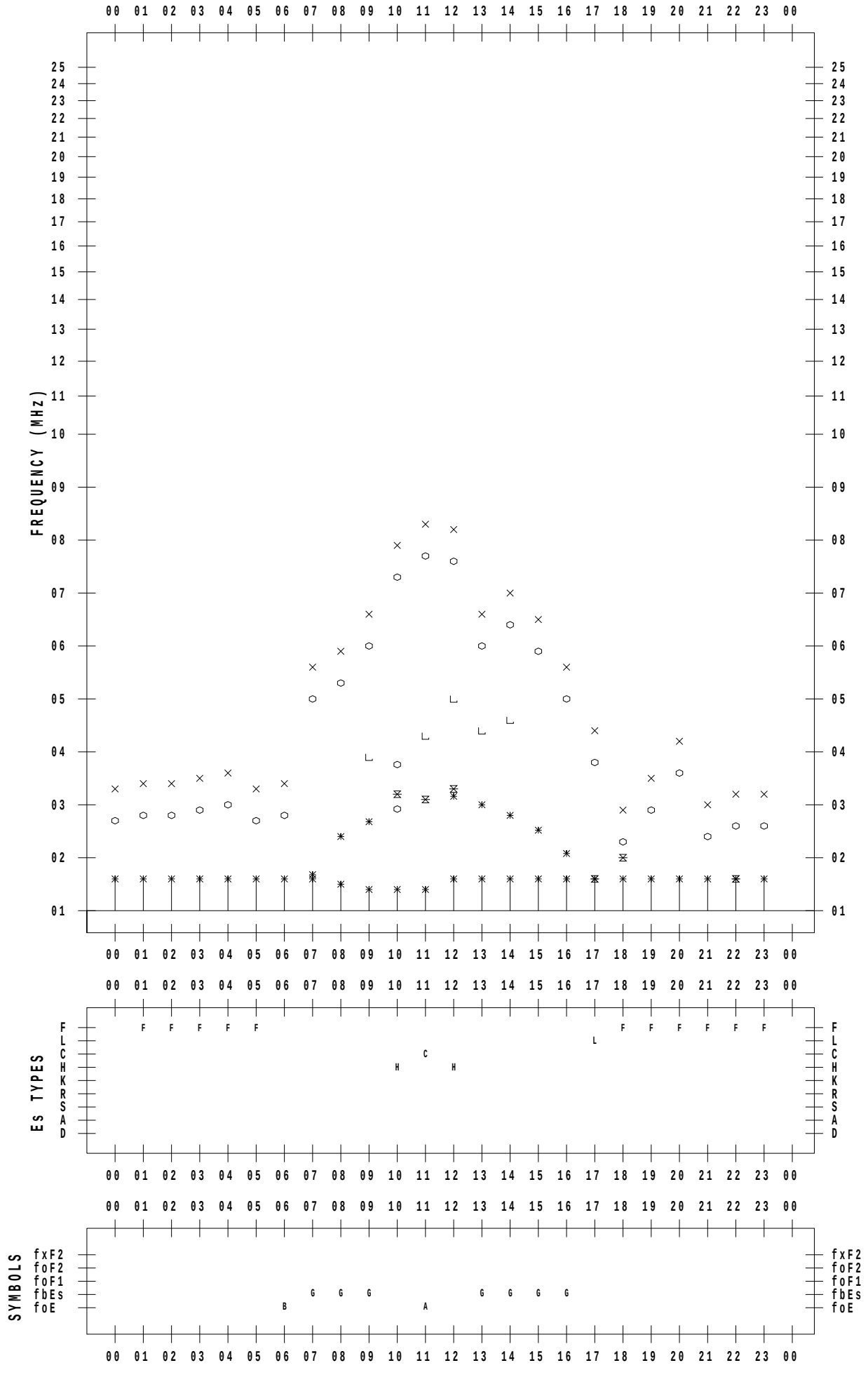
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/ 7

135 °E MEAN TIME



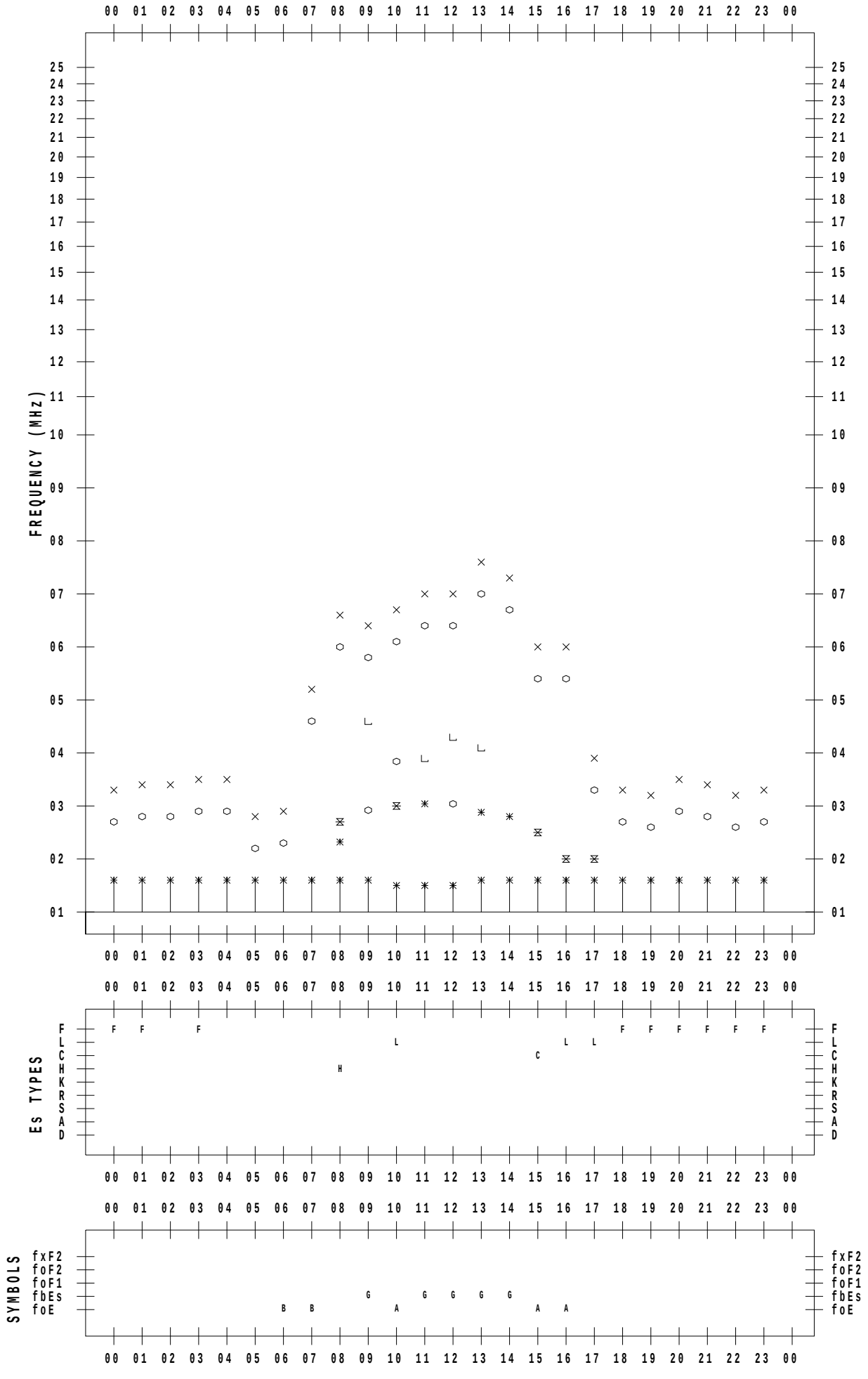
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/ 8

135 °E MEAN TIME



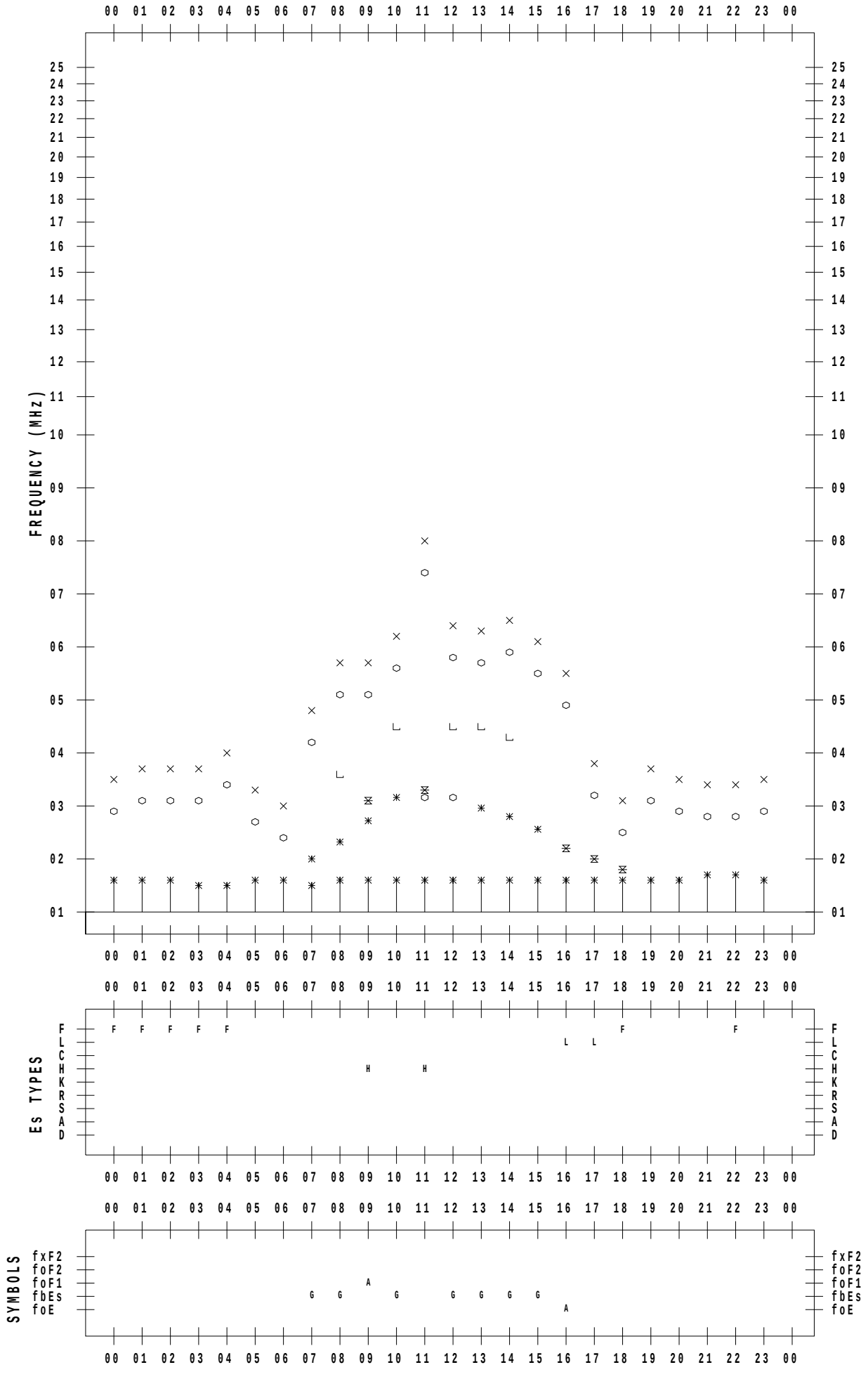
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/ 9

135 °E MEAN TIME



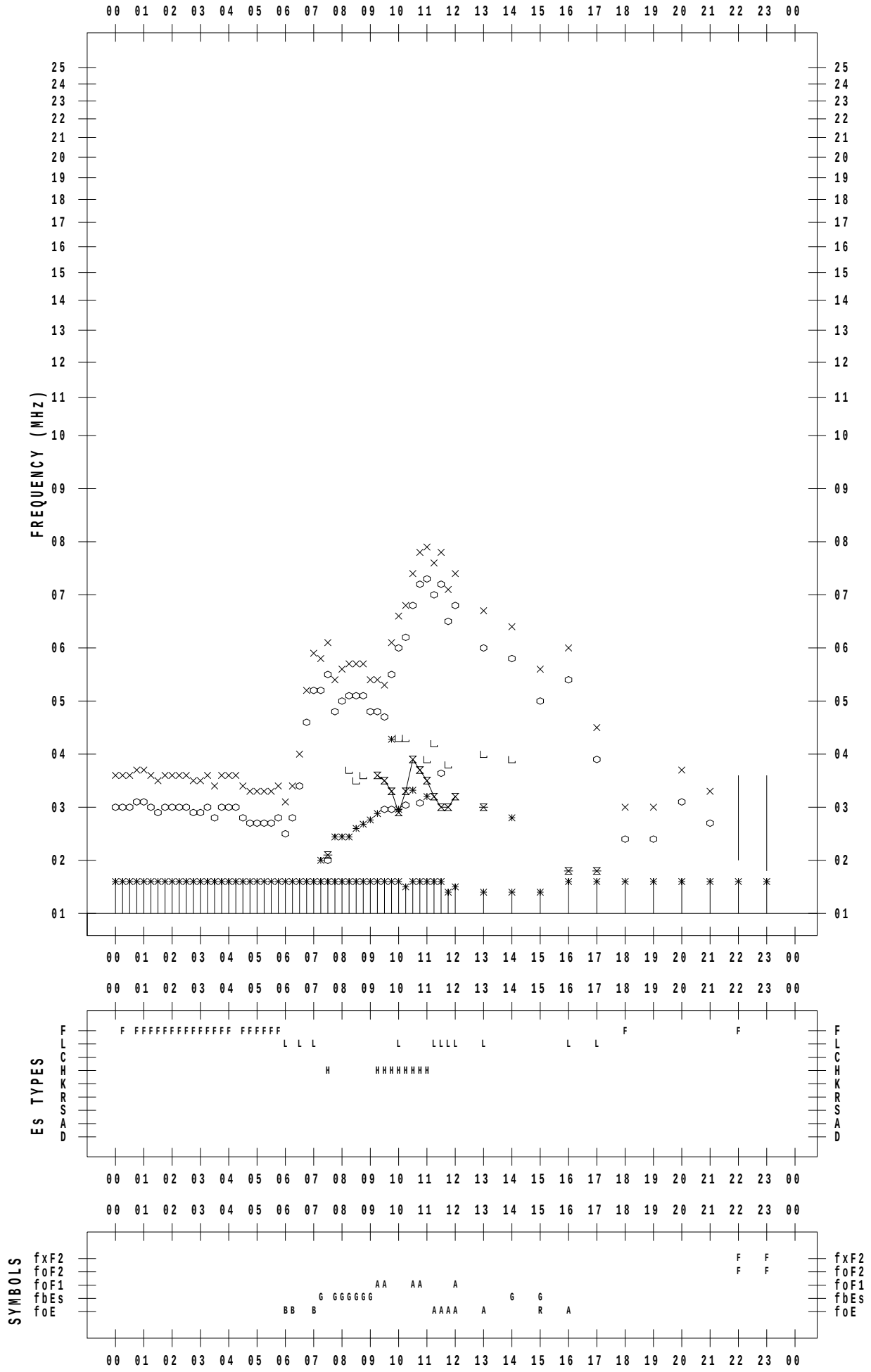
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/10

135 °E MEAN TIME



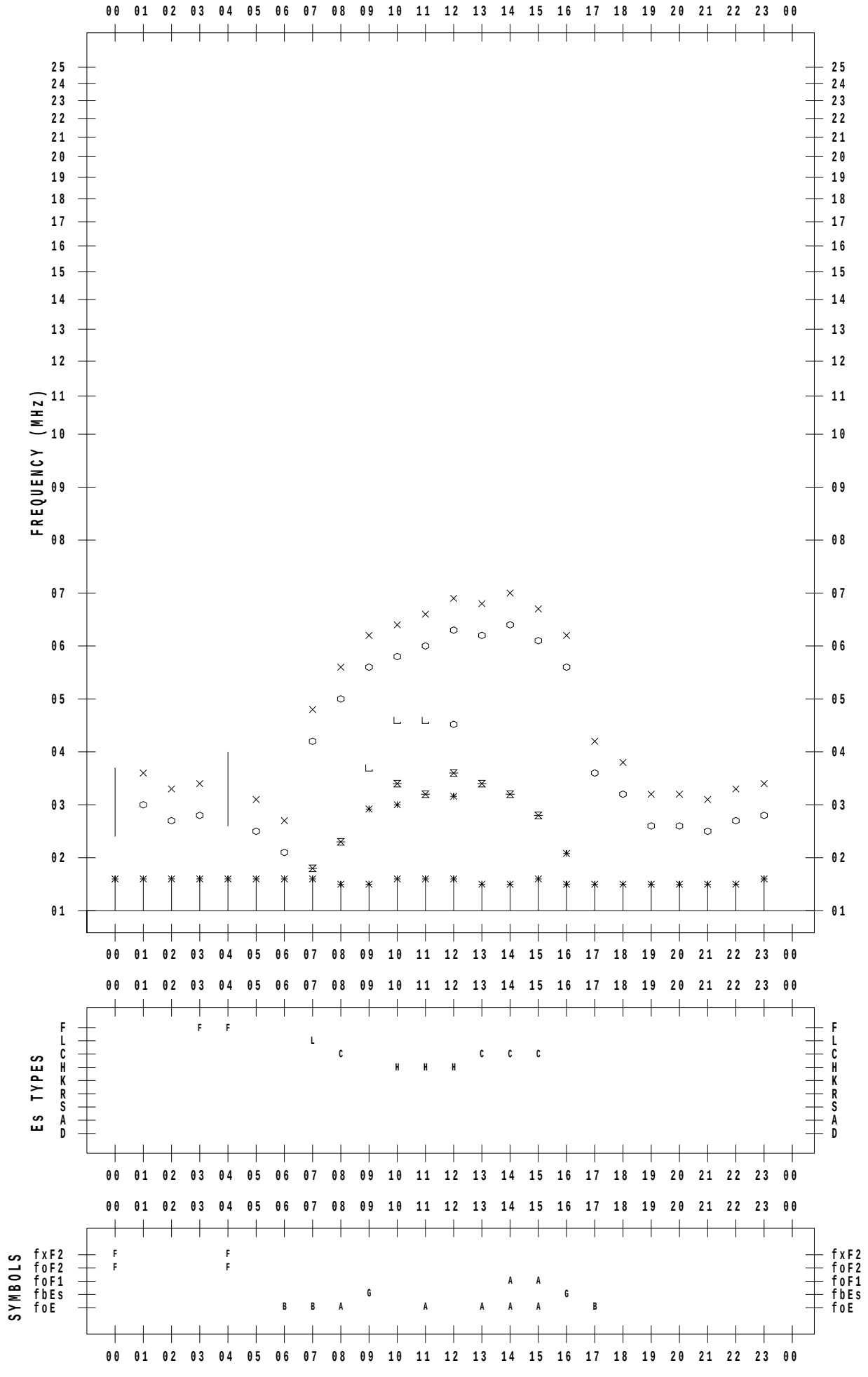
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/11

135 °E MEAN TIME



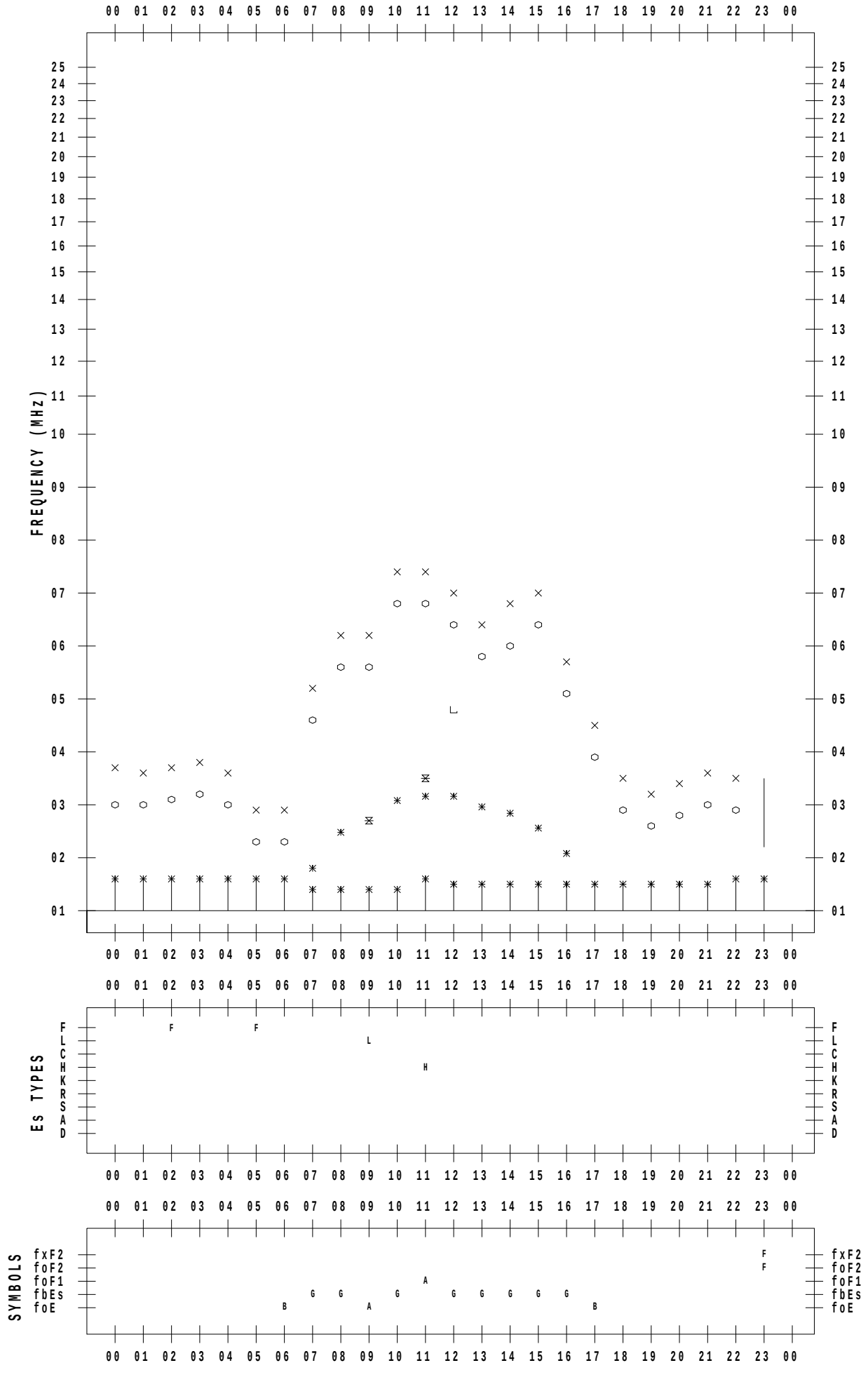
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/12

135 °E MEAN TIME



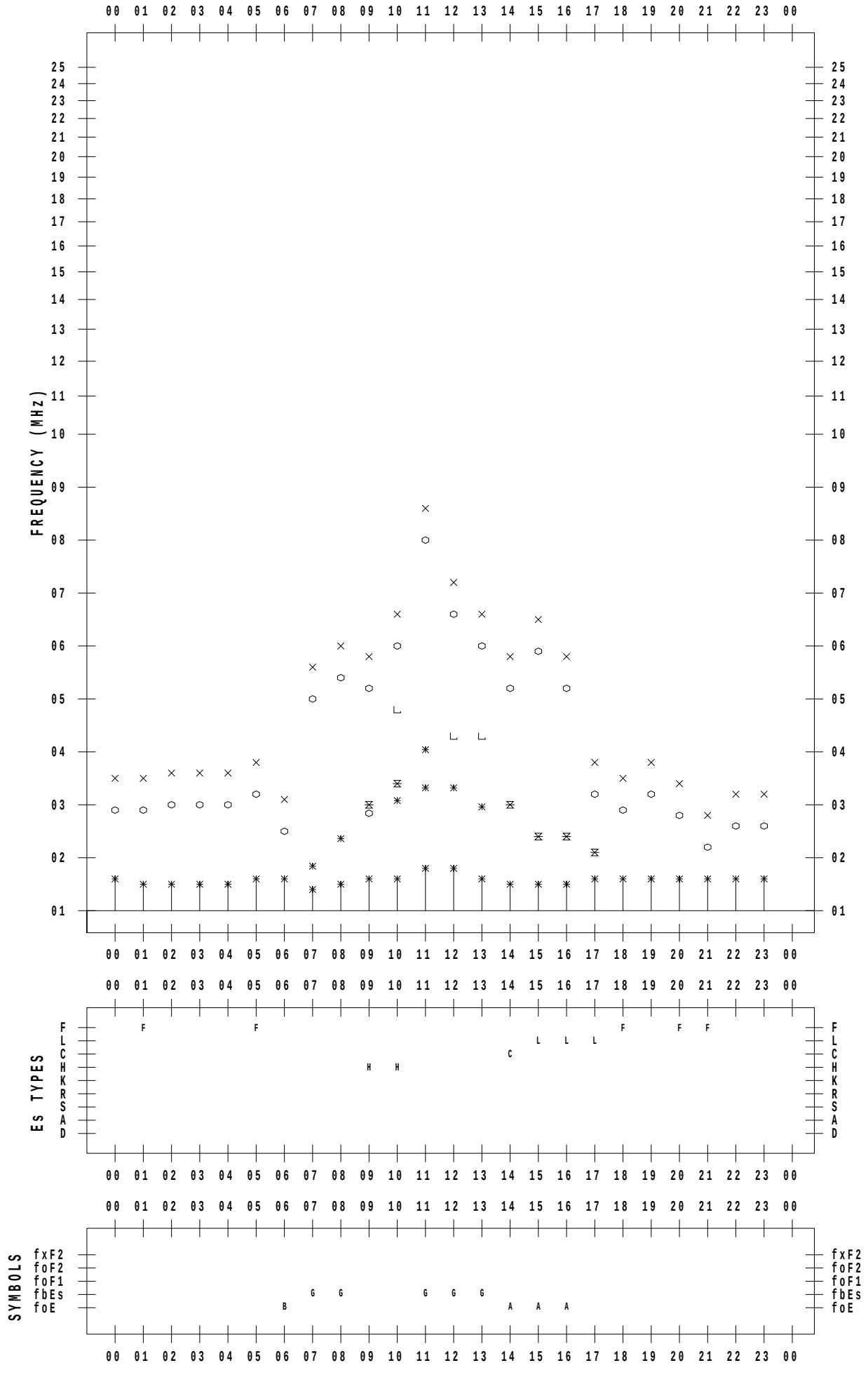
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/13

135 °E MEAN TIME



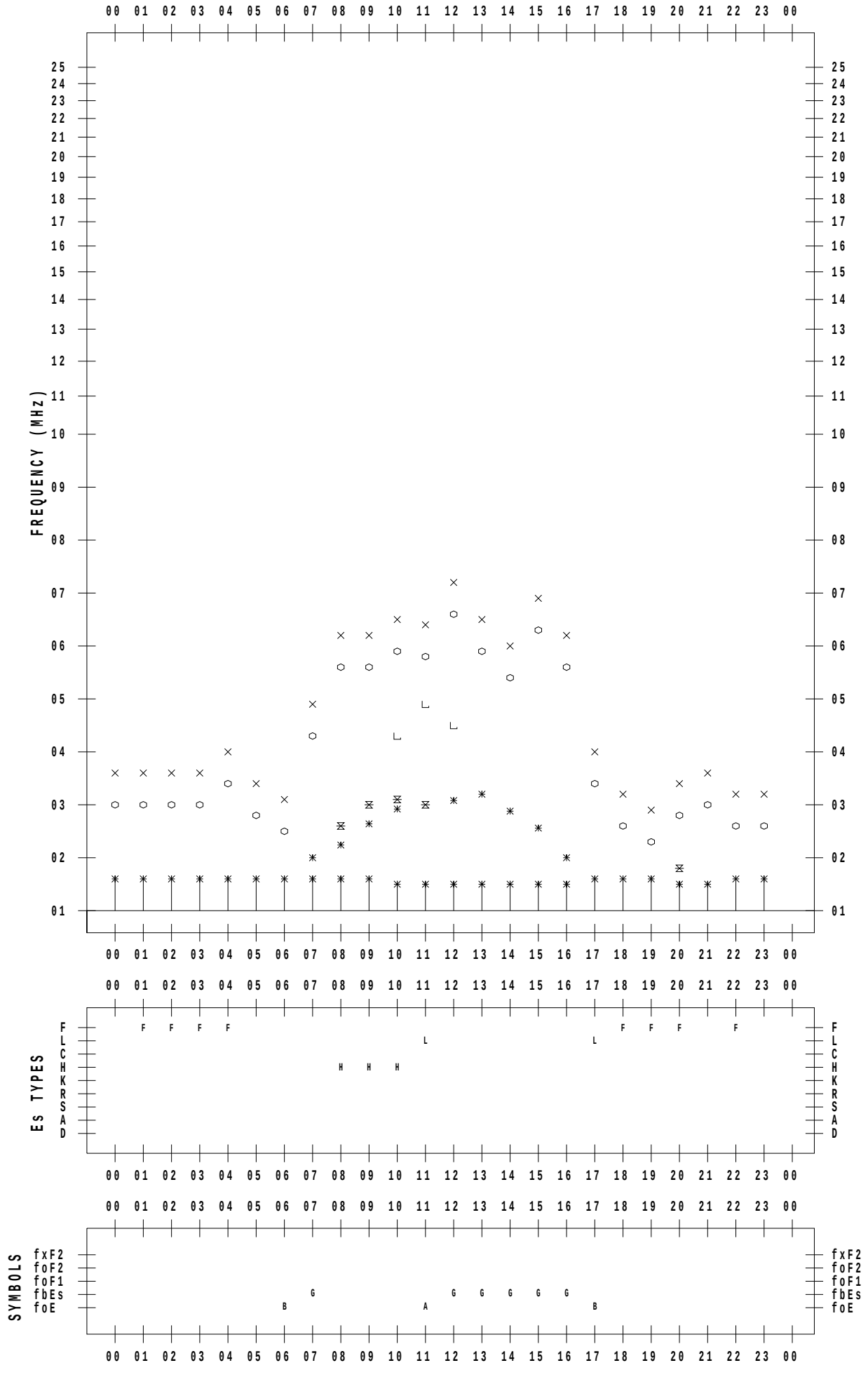
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/14

135 °E MEAN TIME



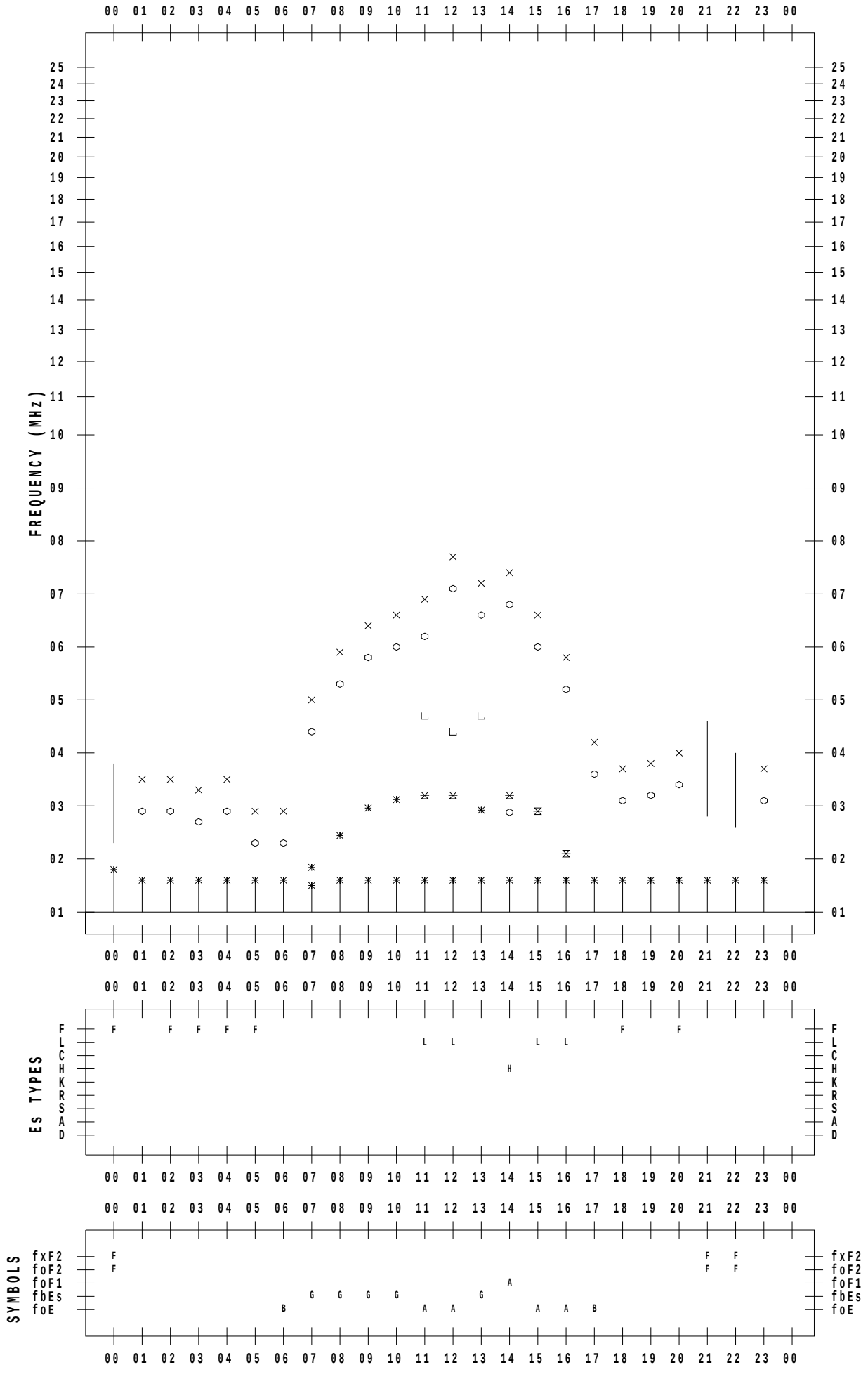
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/15

135 °E MEAN TIME



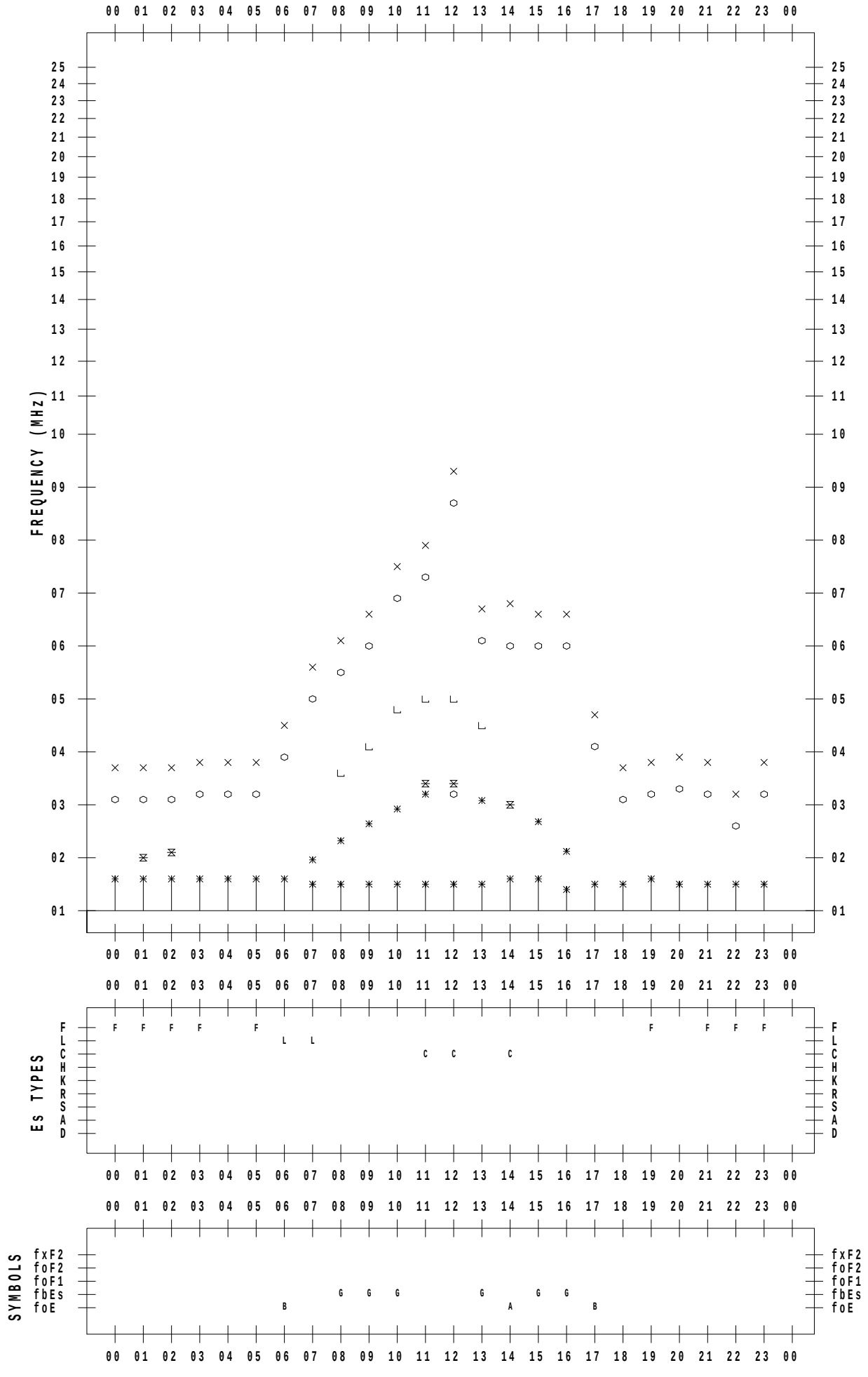
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/16

135 °E MEAN TIME



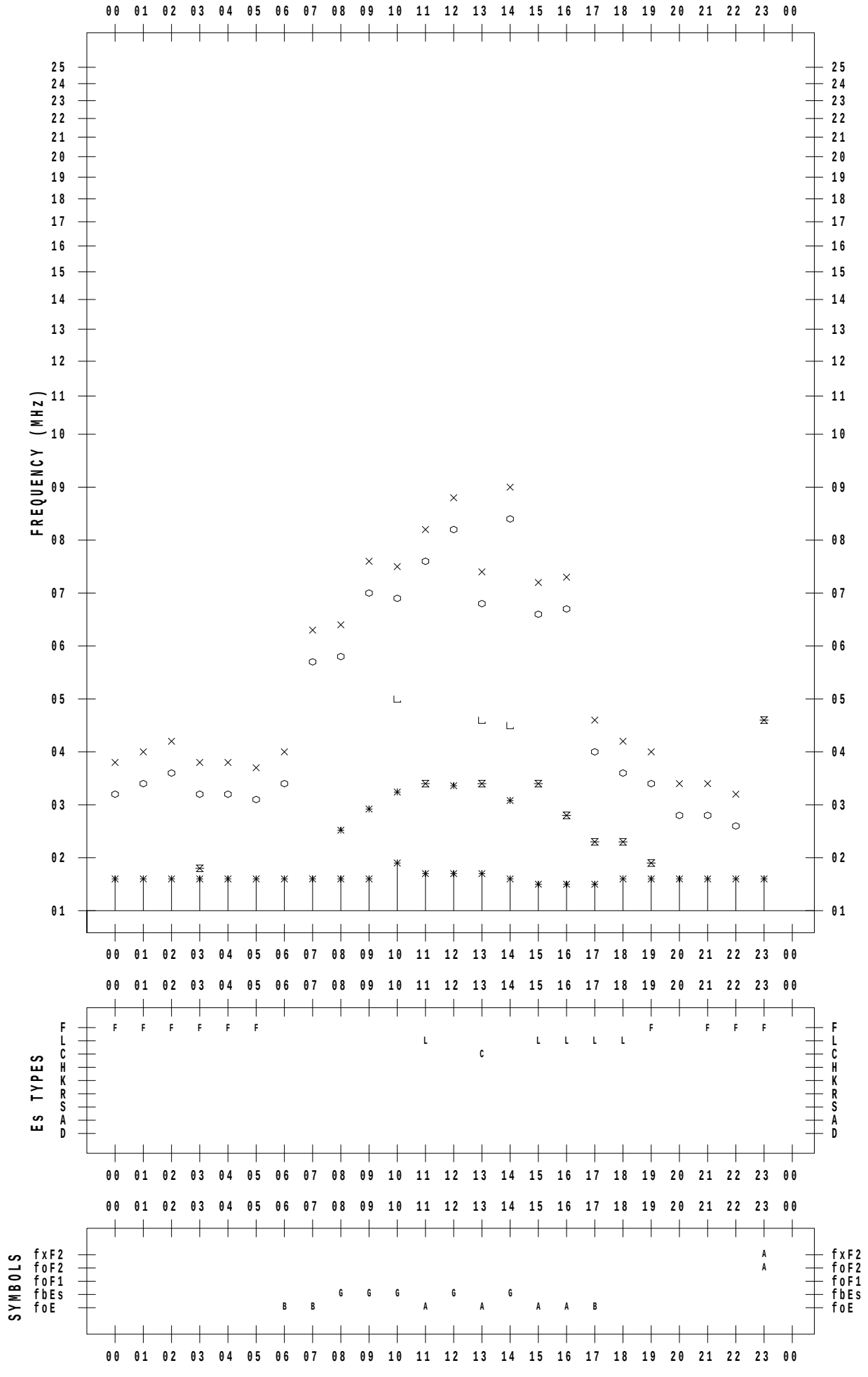
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/17

135 °E MEAN TIME



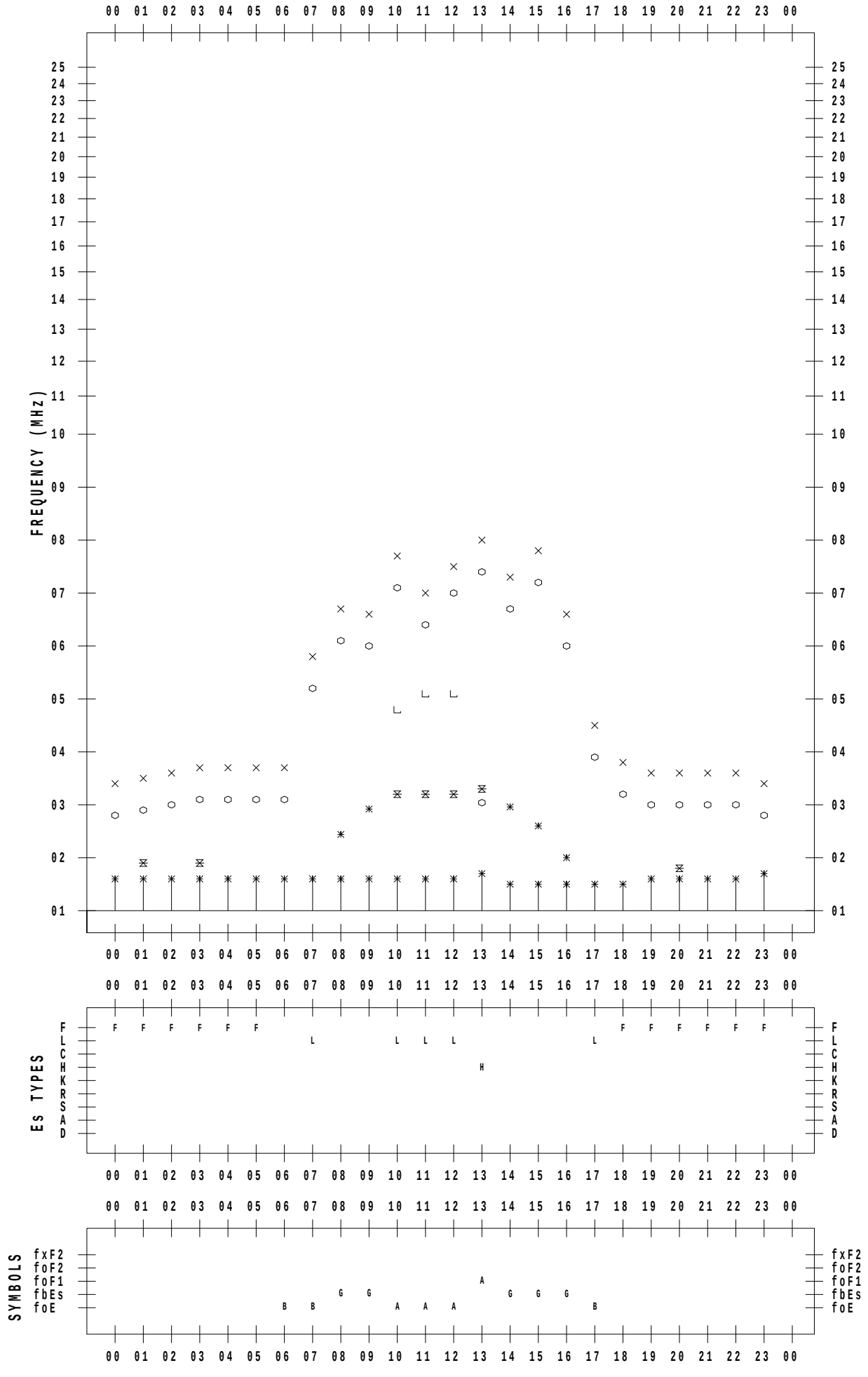
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/18

135 °E MEAN TIME



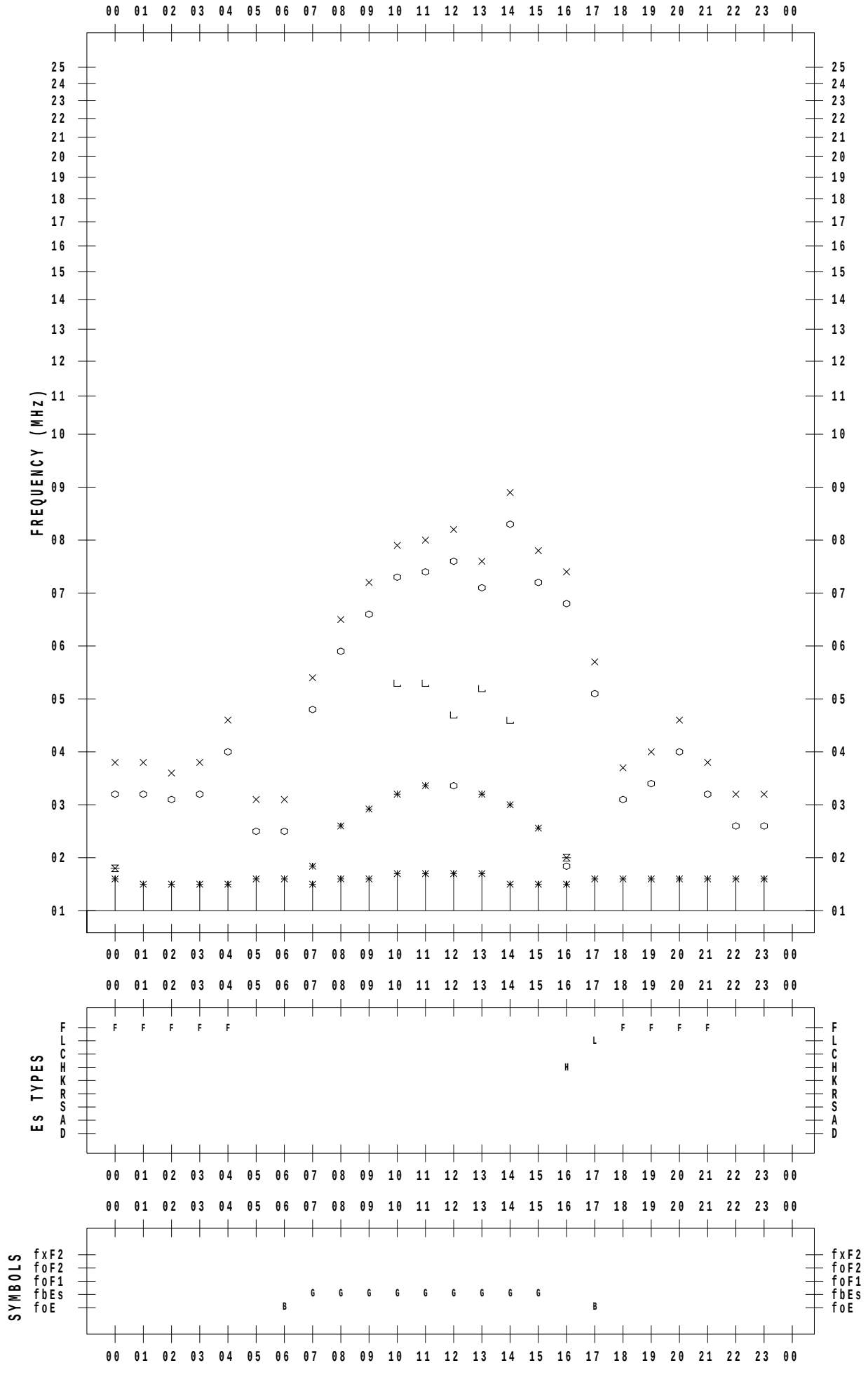
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/19

135 °E MEAN TIME



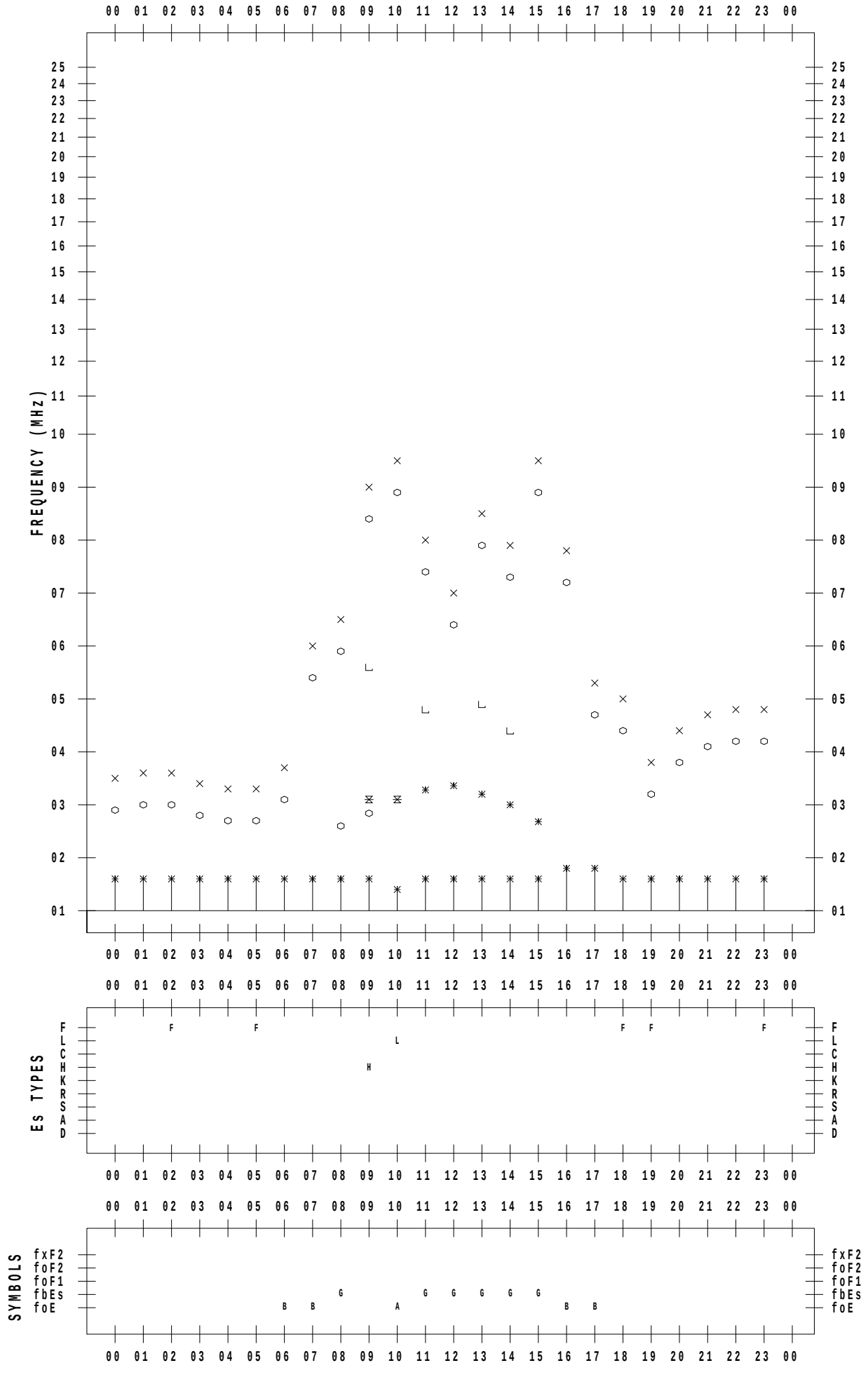
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/20

135 °E MEAN TIME



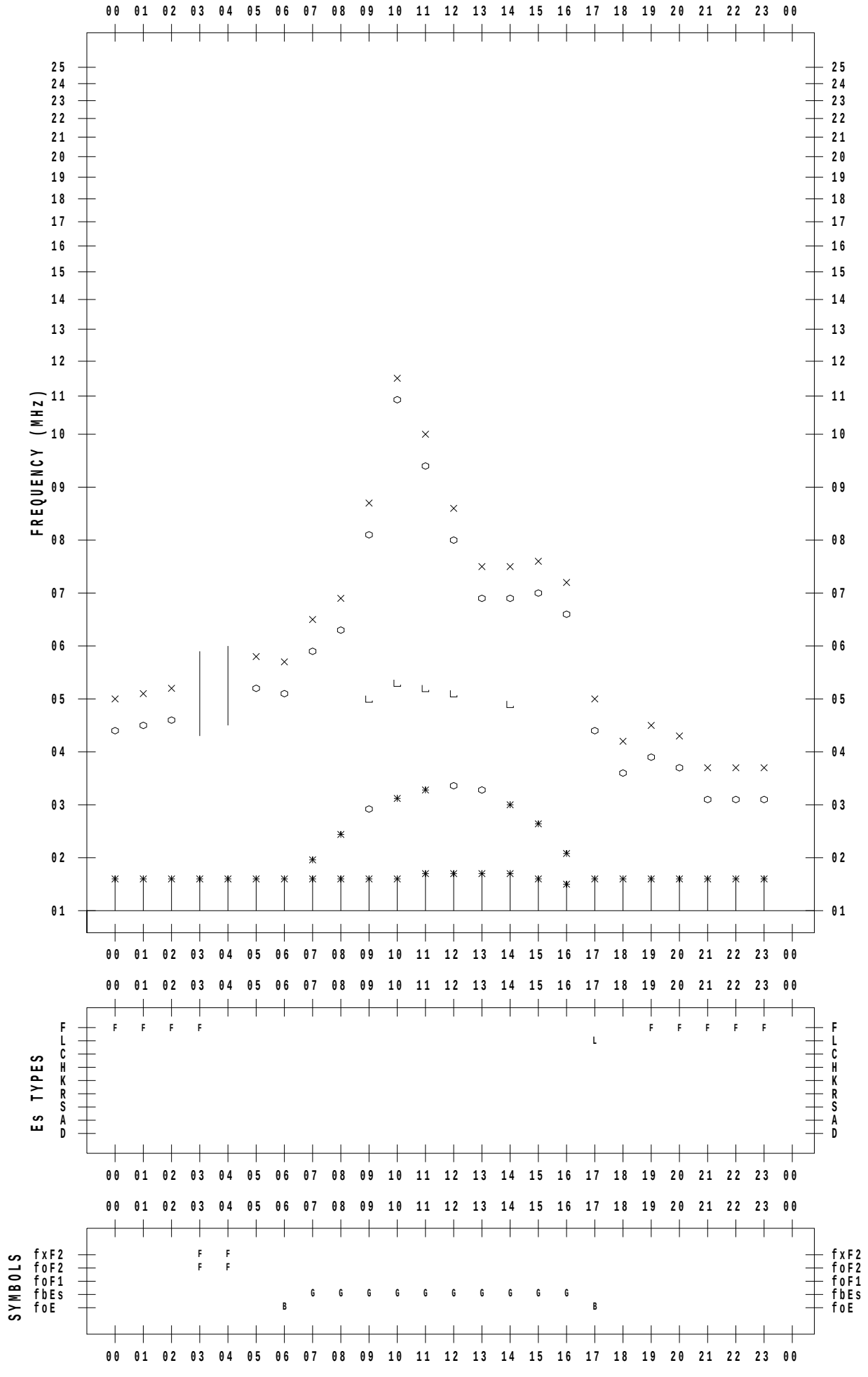
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/21

135 °E MEAN TIME



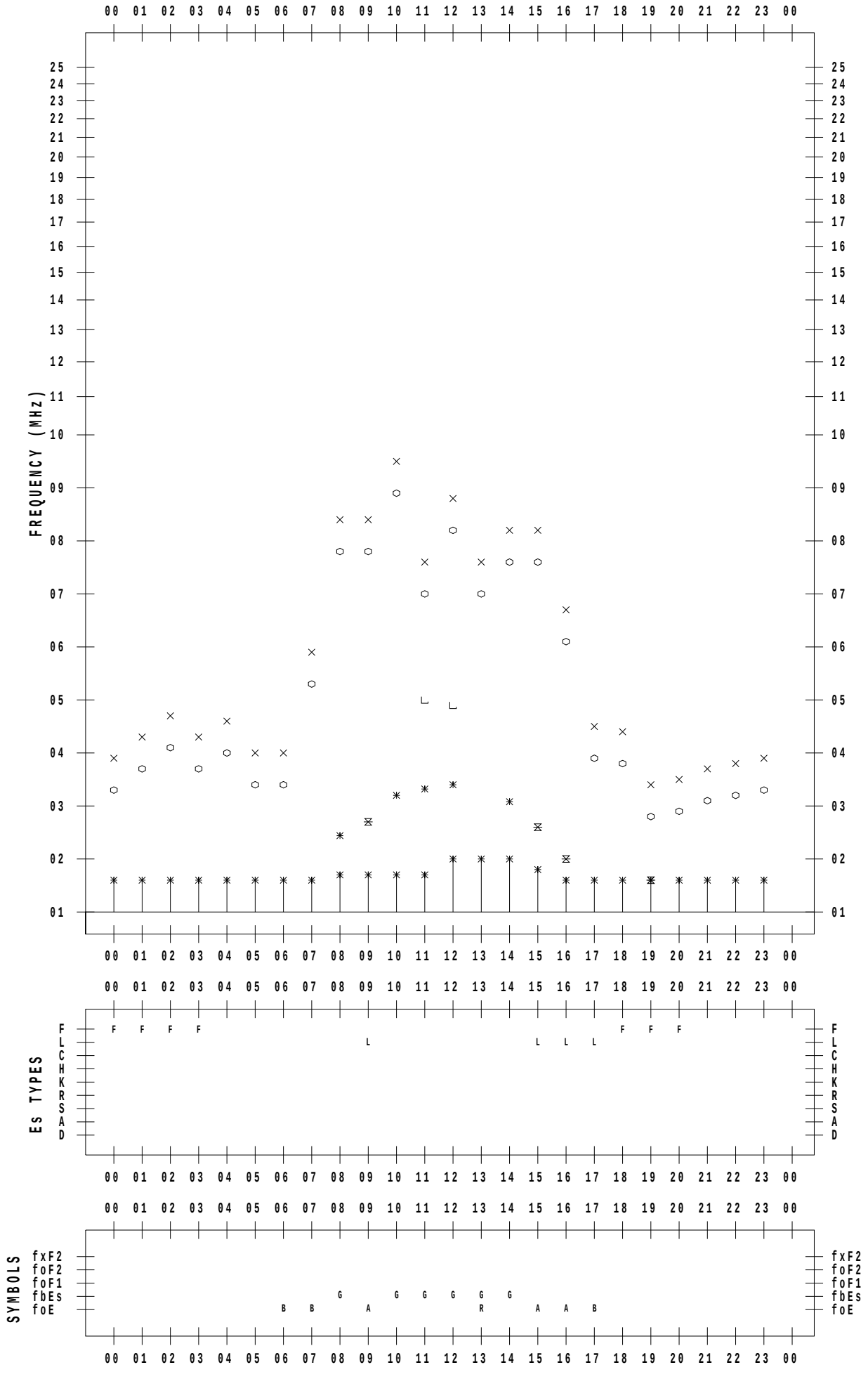
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/22

135 °E MEAN TIME



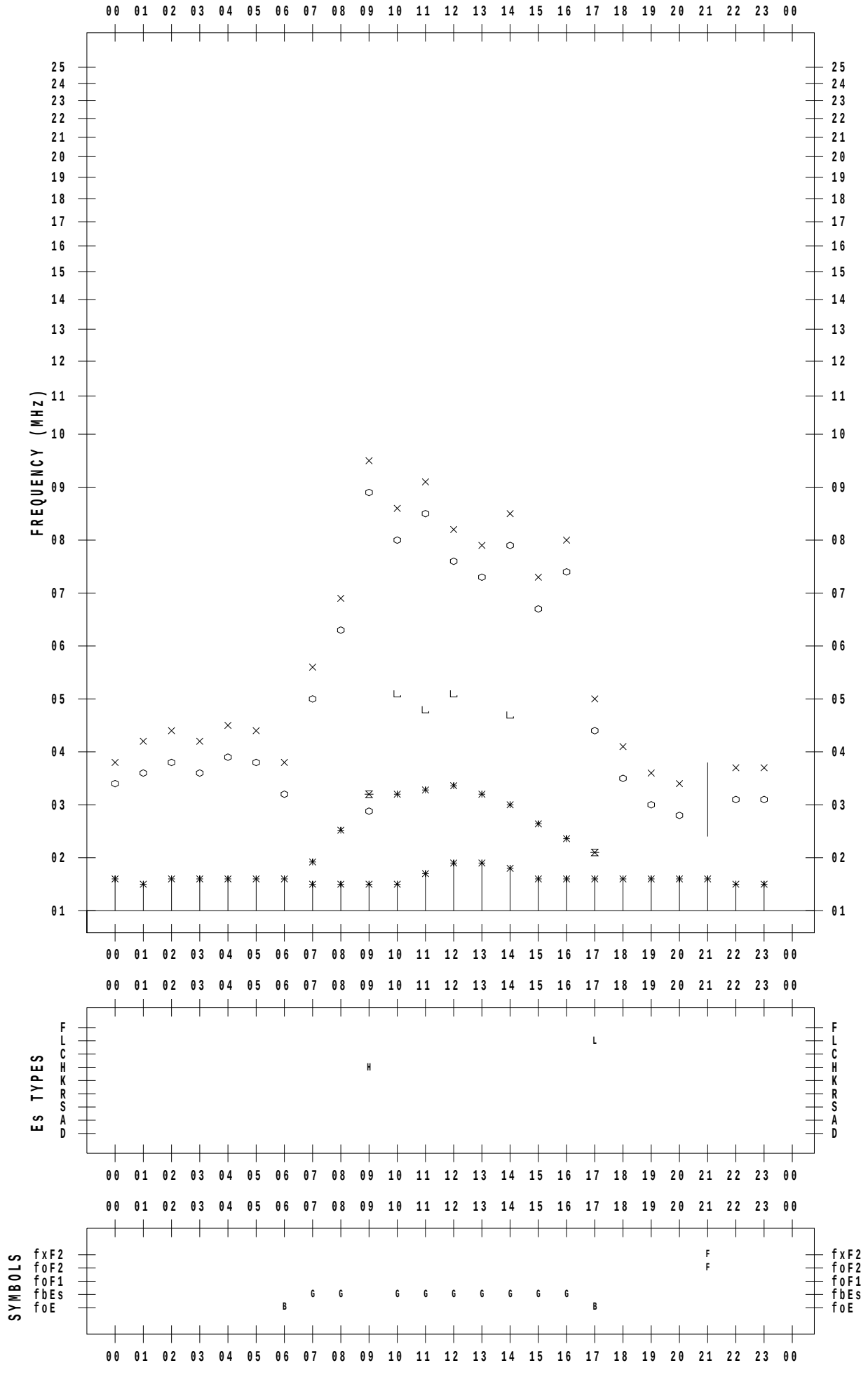
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/23

135 °E MEAN TIME



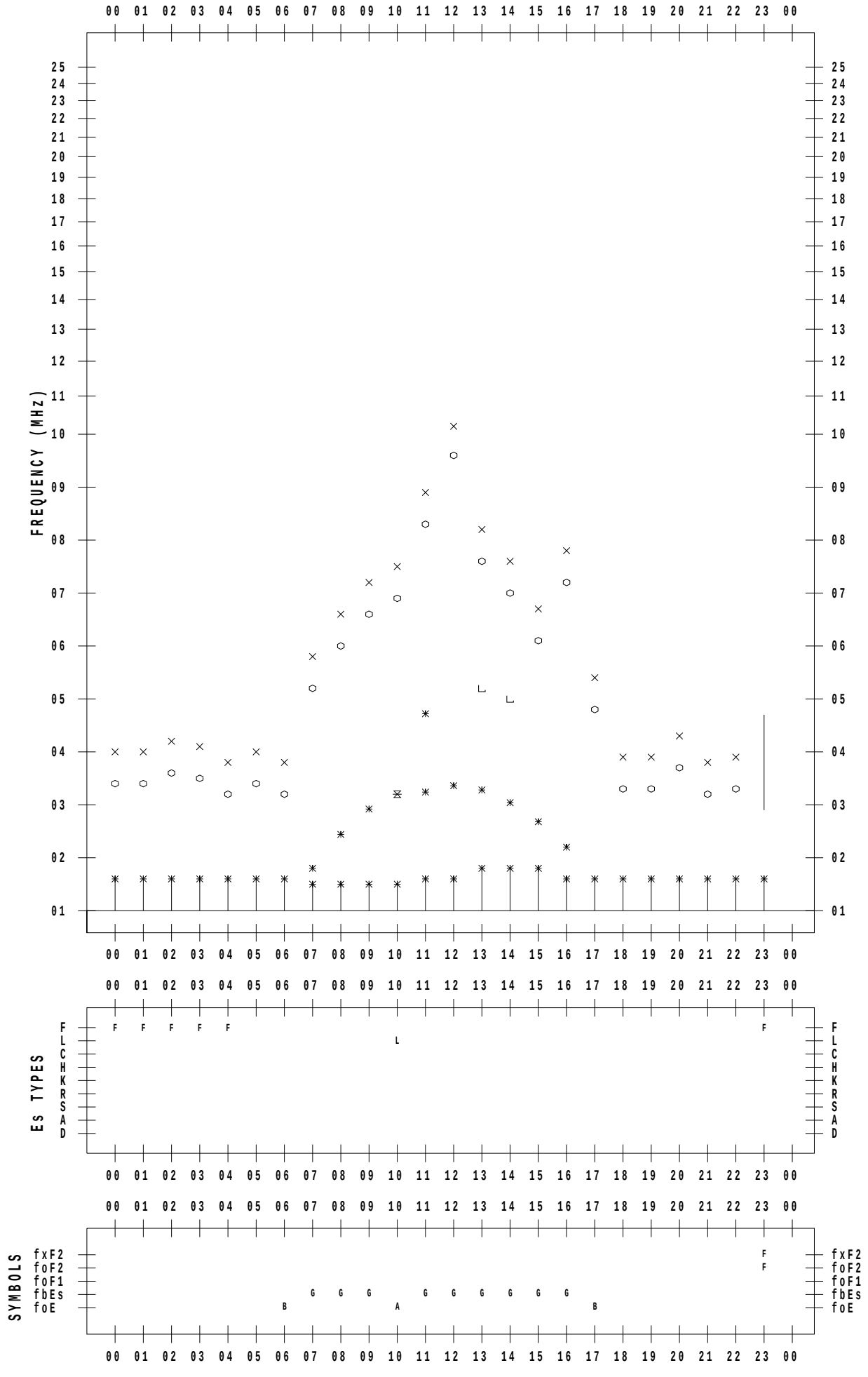
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/24

135 °E MEAN TIME



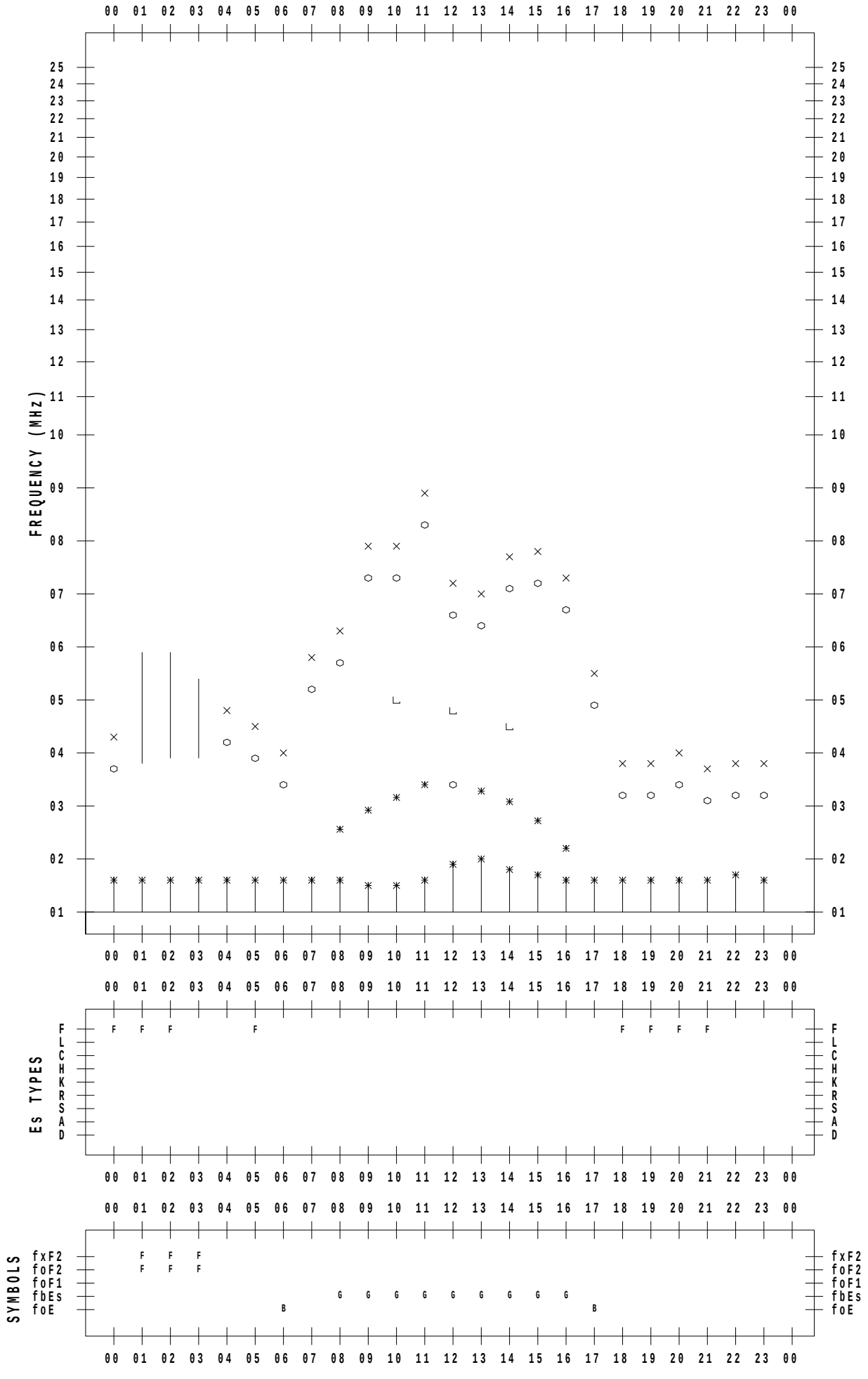
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/25

135 °E MEAN TIME



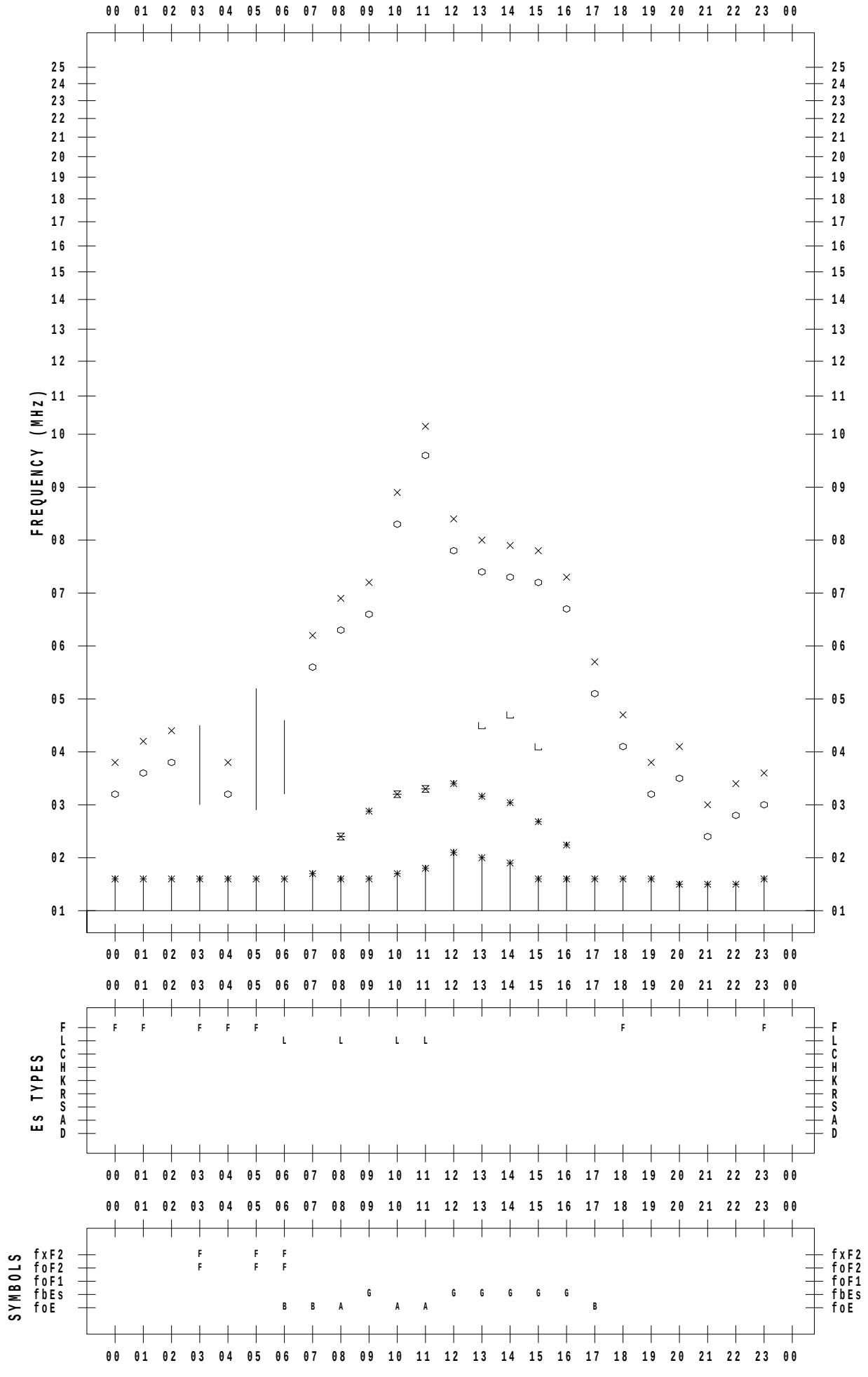
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/26

135 °E MEAN TIME



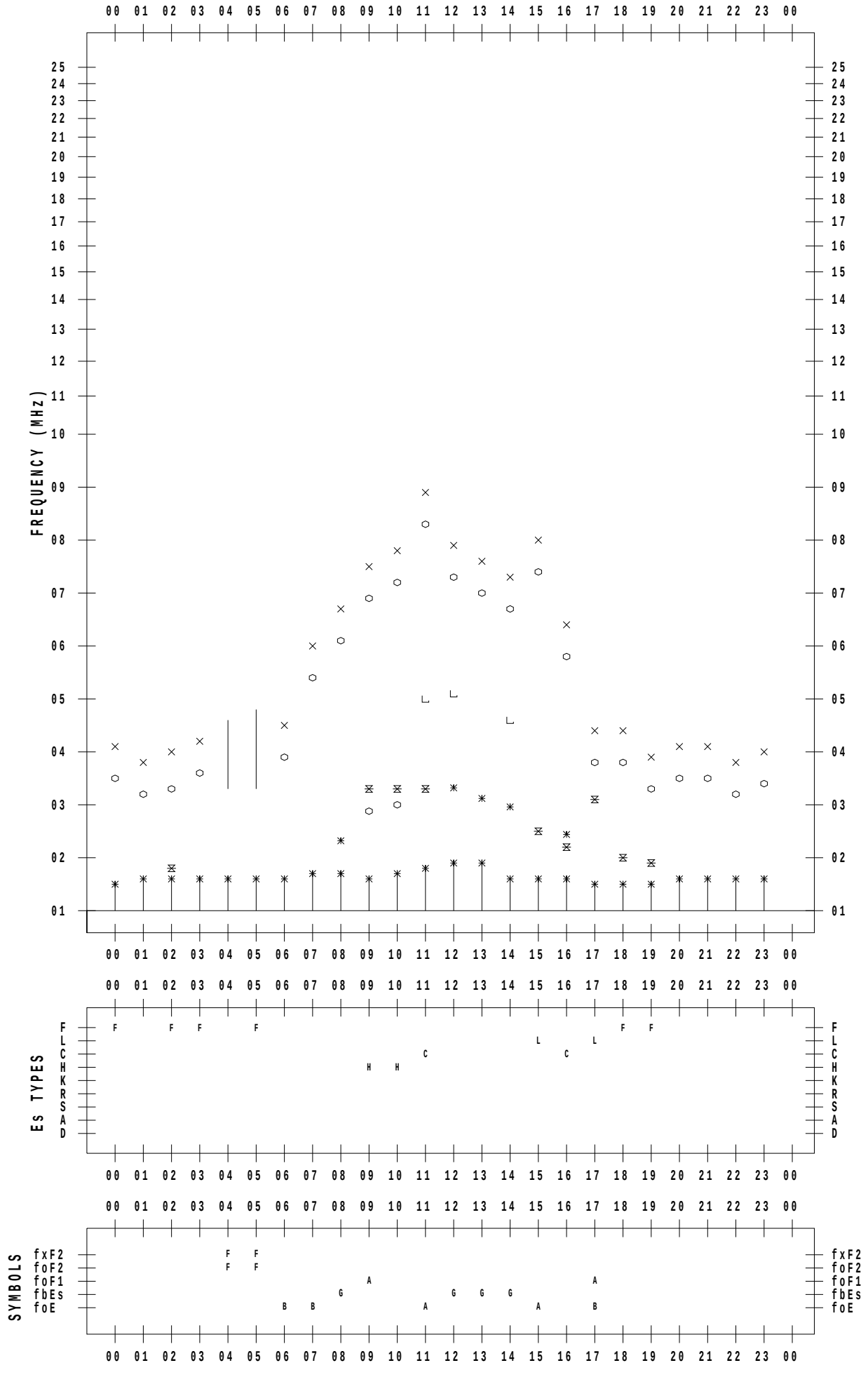
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/27

135 °E MEAN TIME



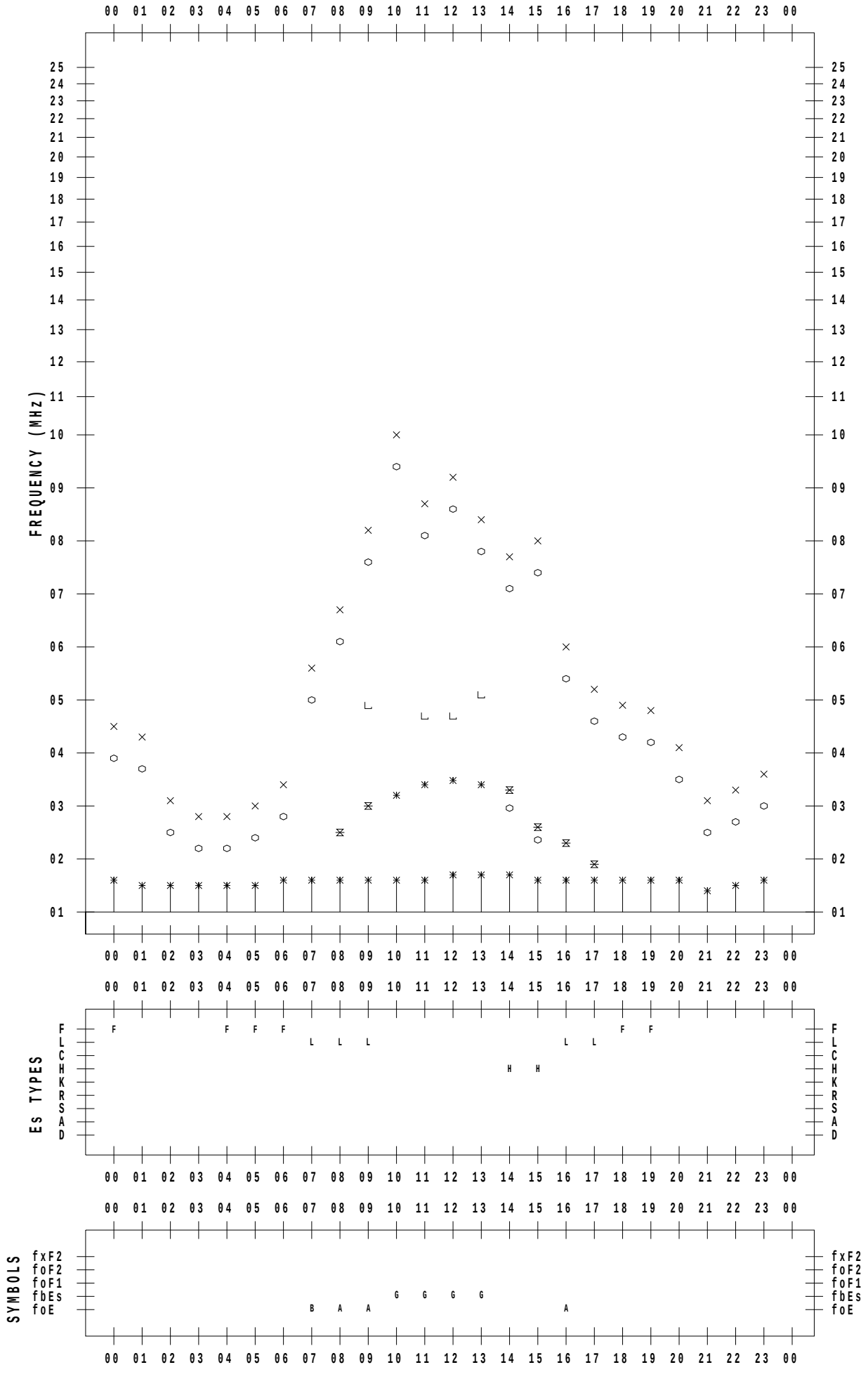
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/28

135 °E MEAN TIME



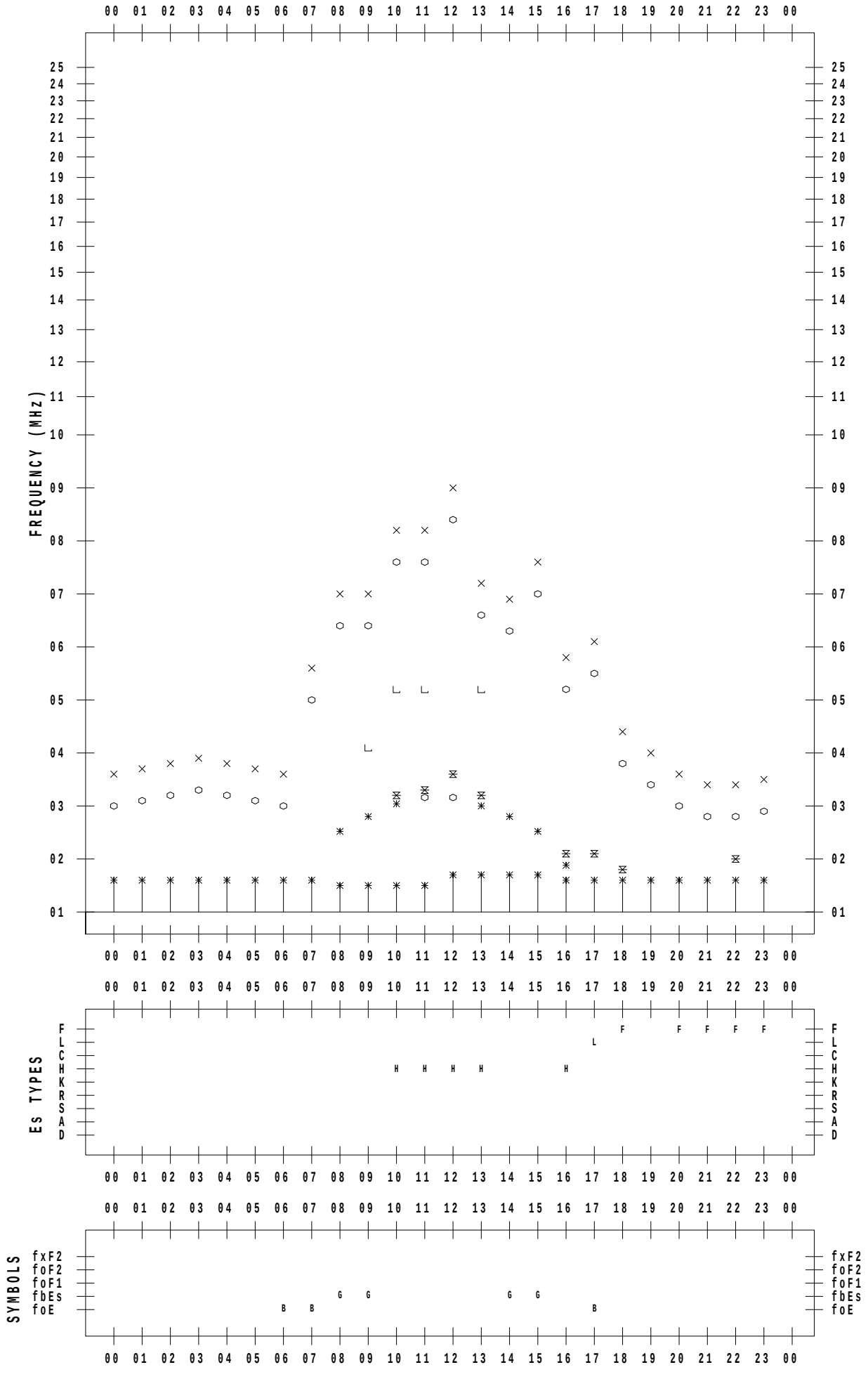
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/29

135 °E MEAN TIME



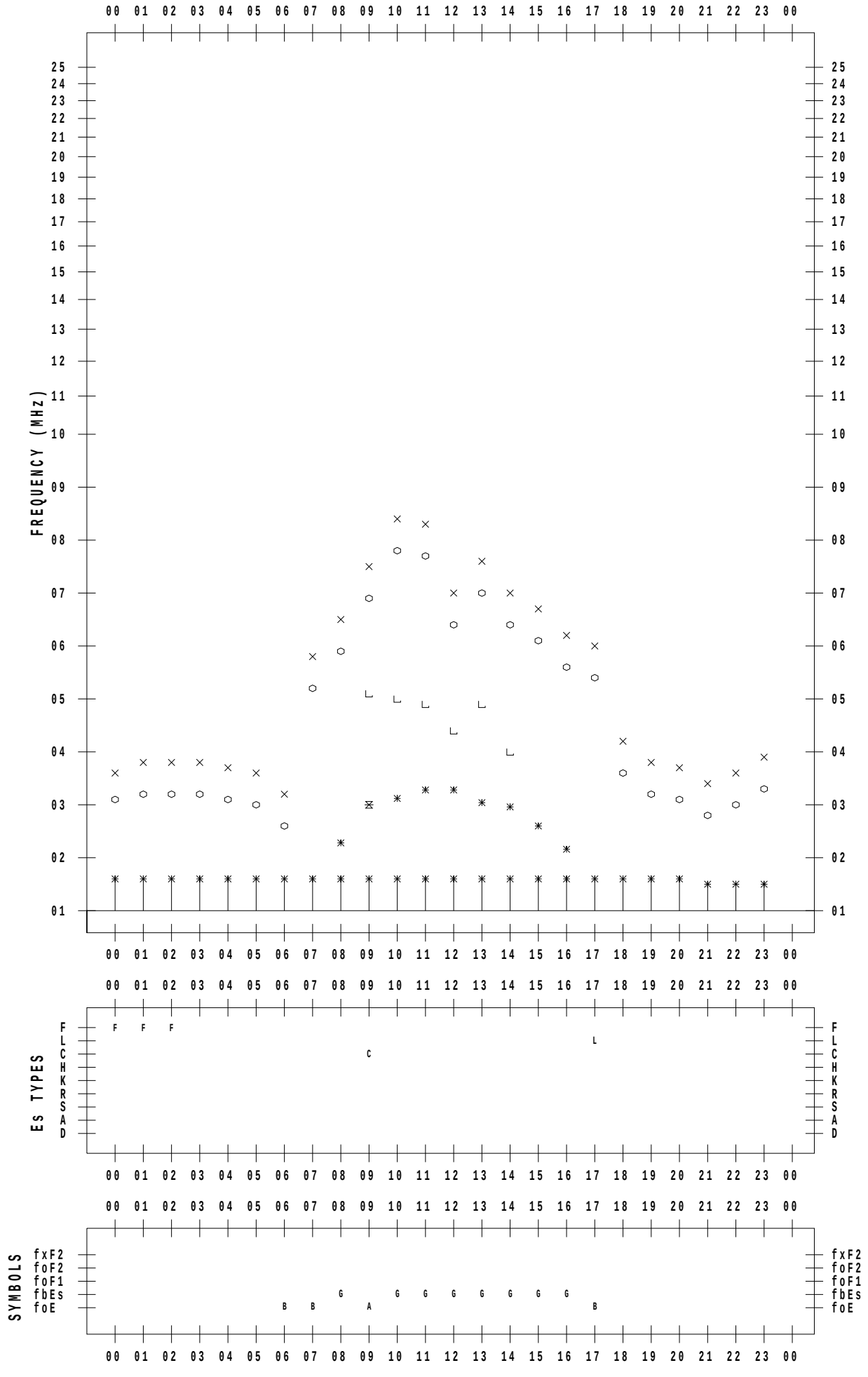
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/30

135 °E MEAN TIME



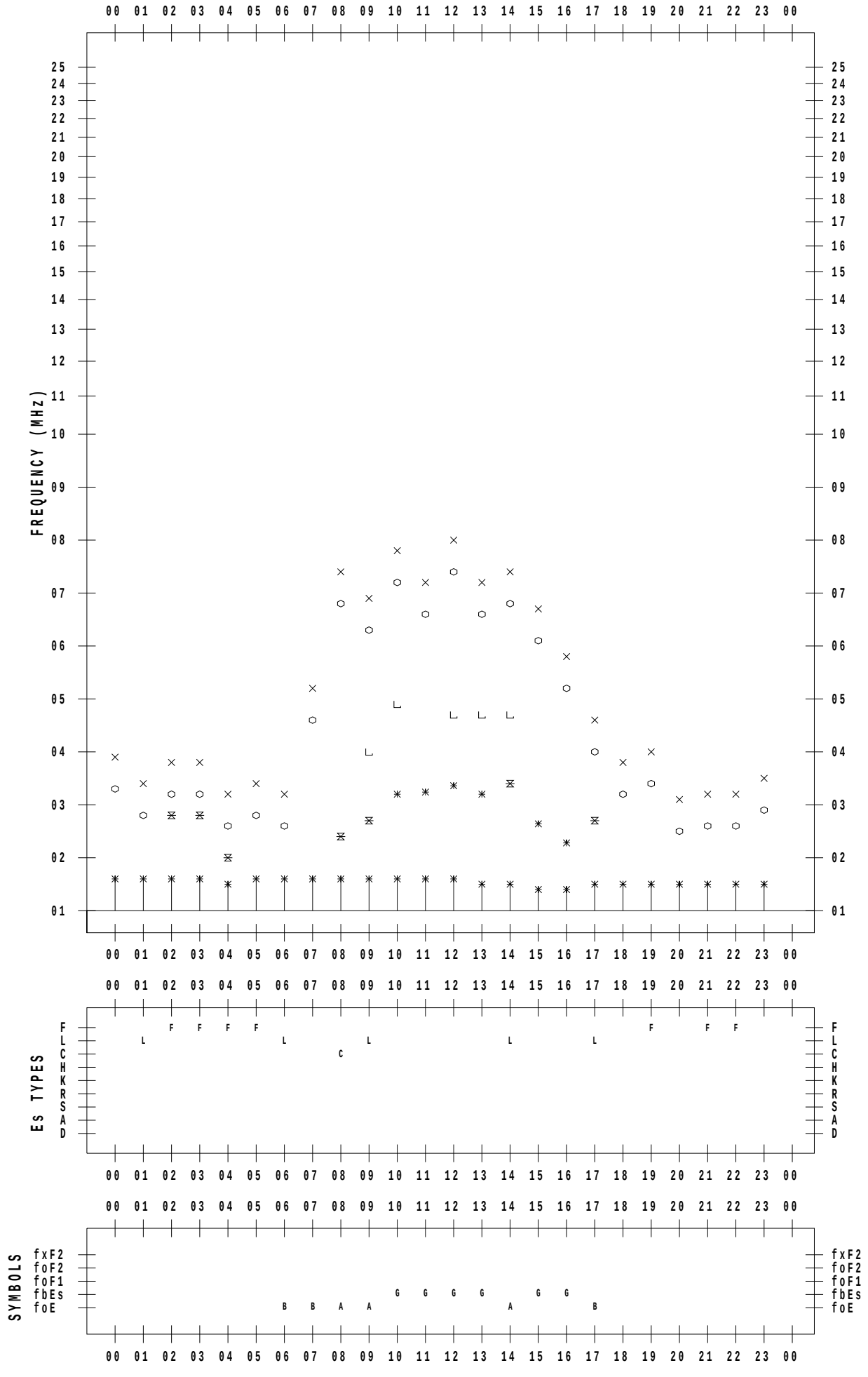
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2021/12/31

135 °E MEAN TIME



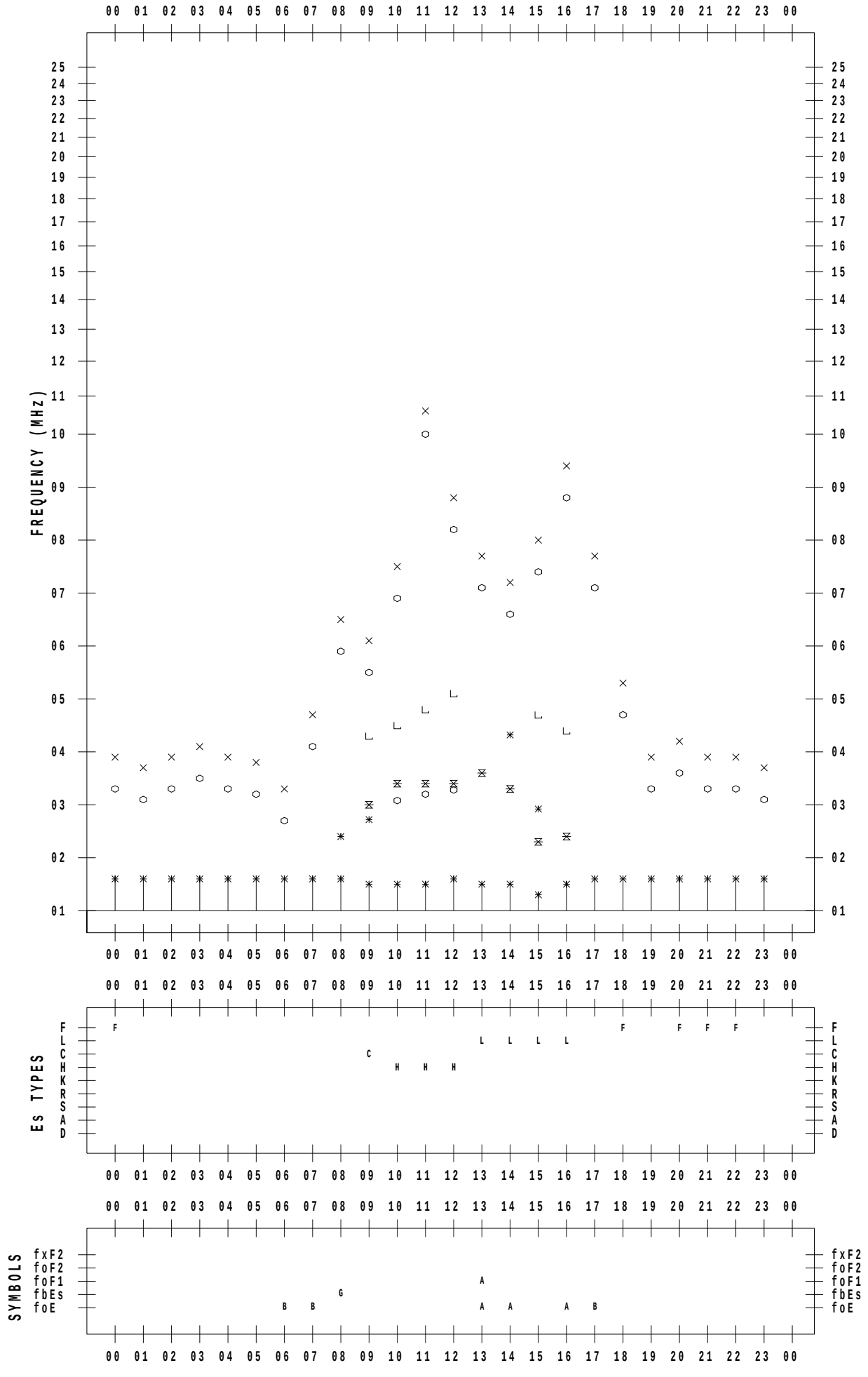
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/ 1

135 °E MEAN TIME



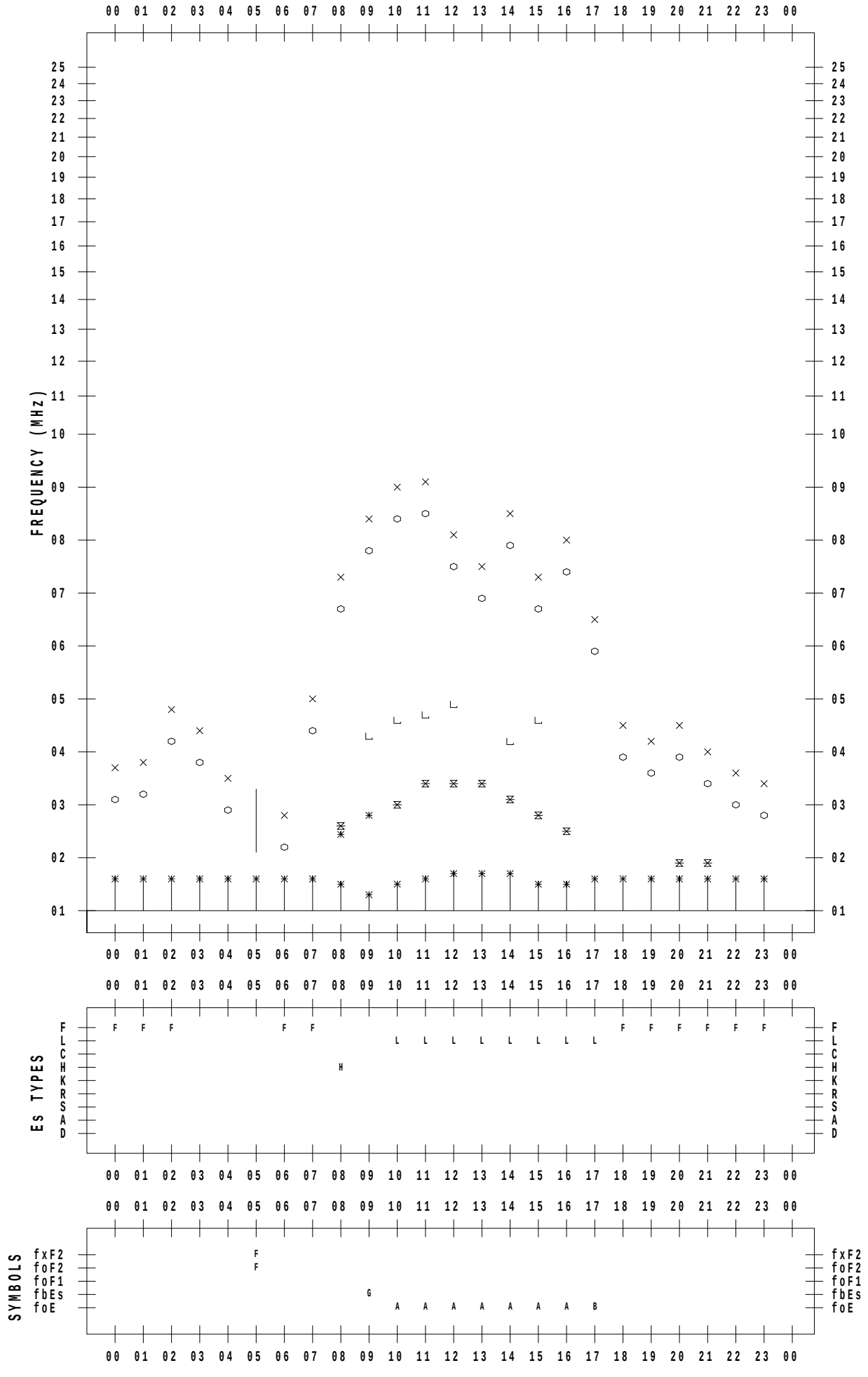
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/ 2

135 °E MEAN TIME



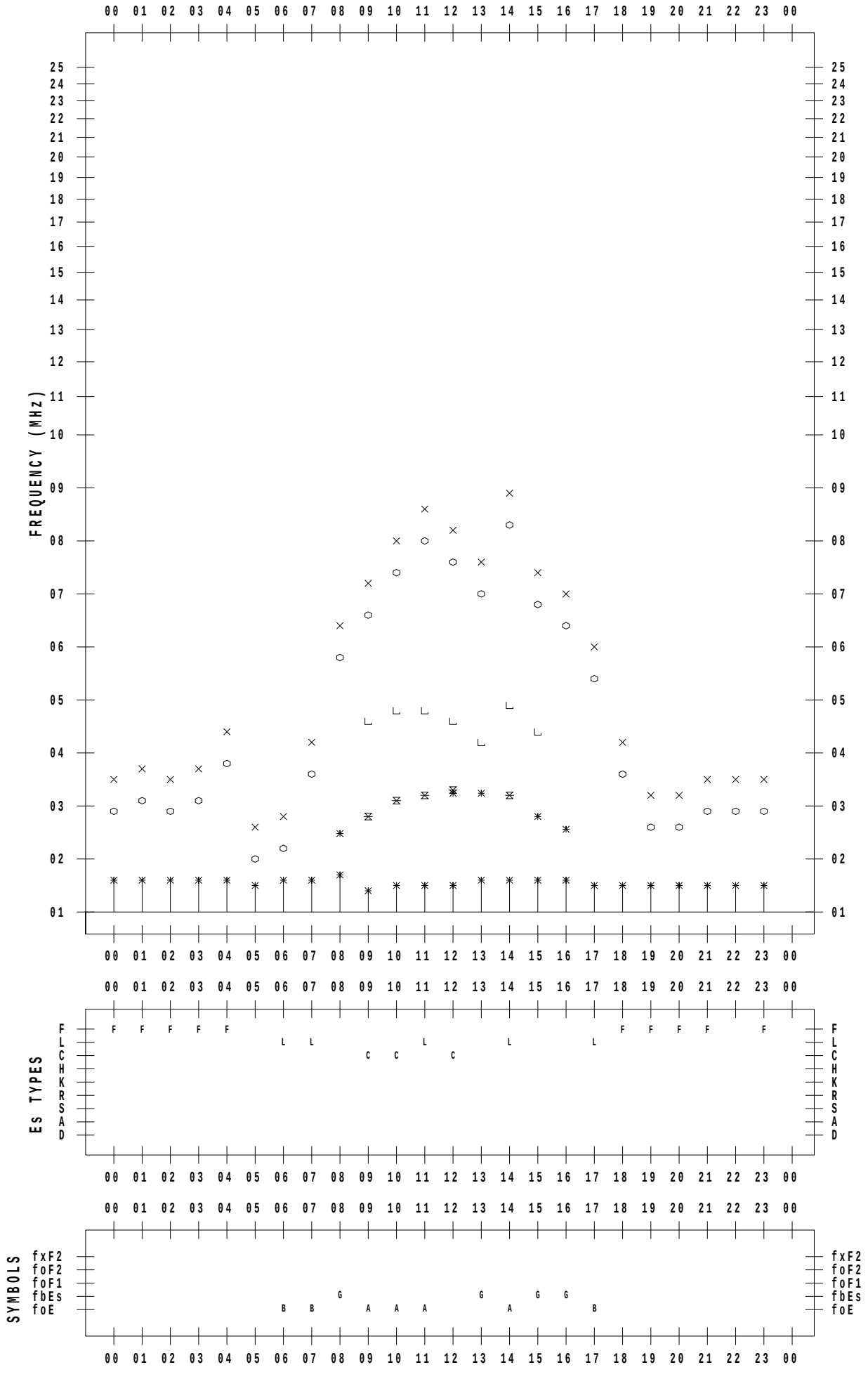
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/ 3

135 °E MEAN TIME



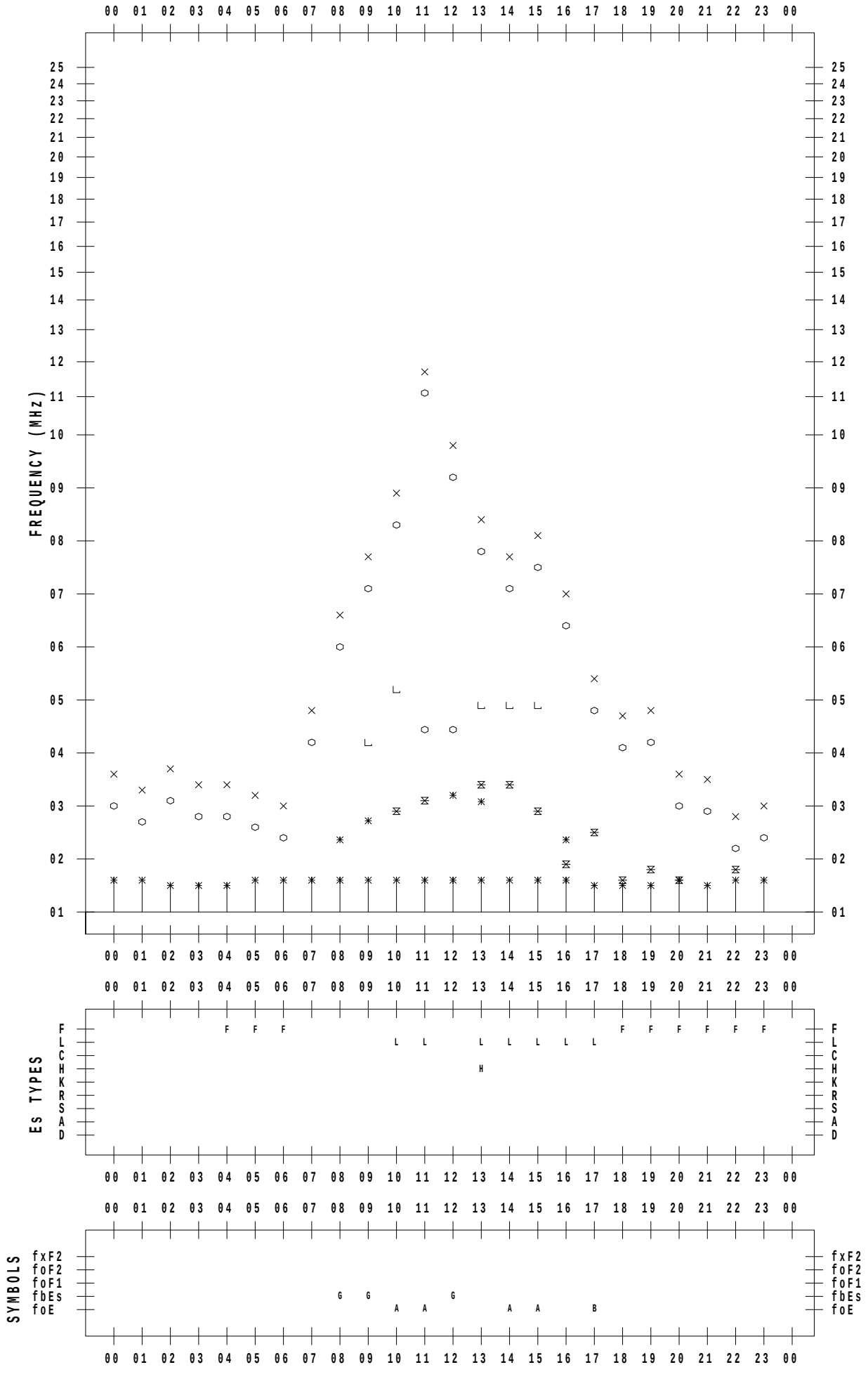
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/ 4

135 °E MEAN TIME



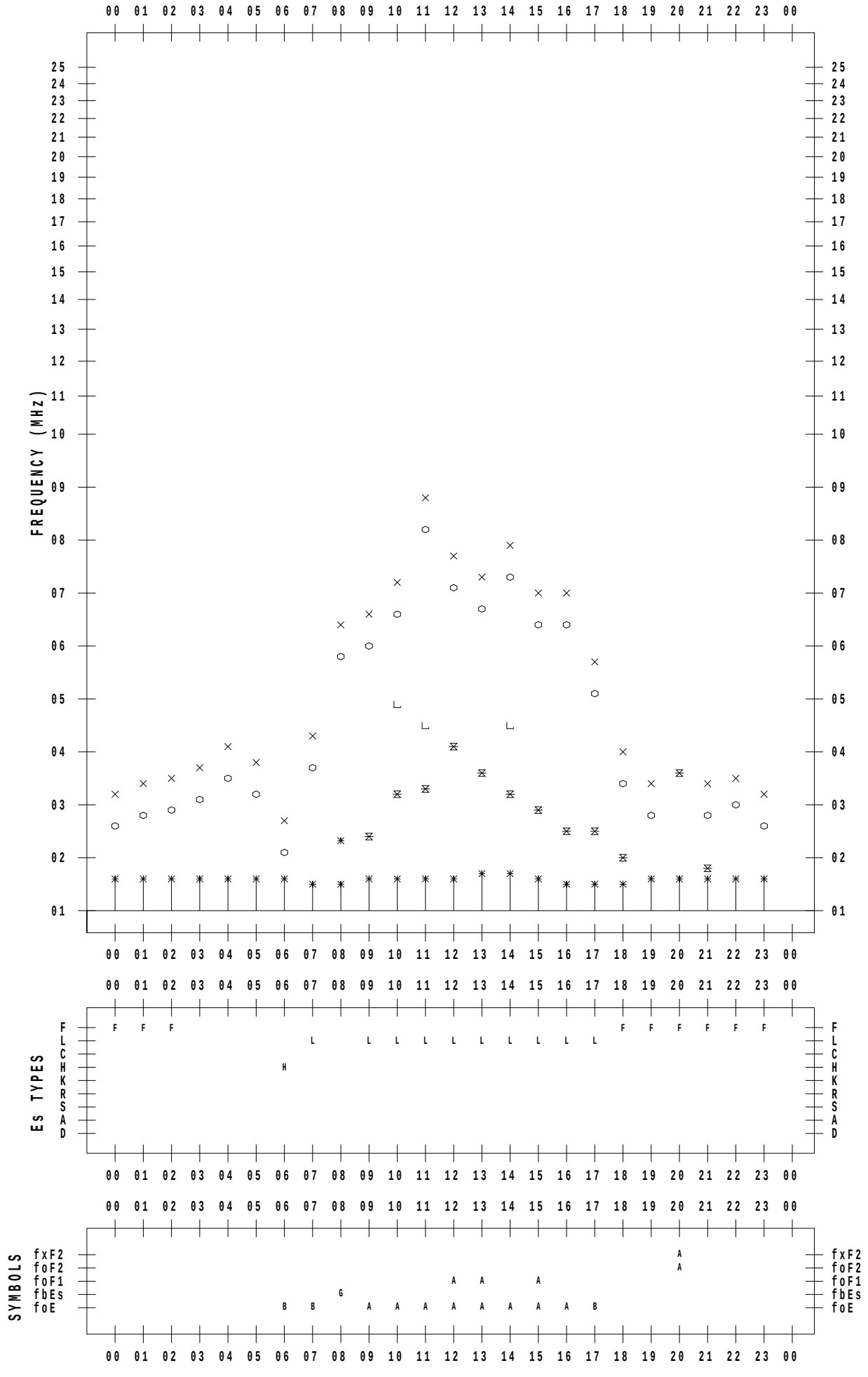
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/ 5

135 °E MEAN TIME



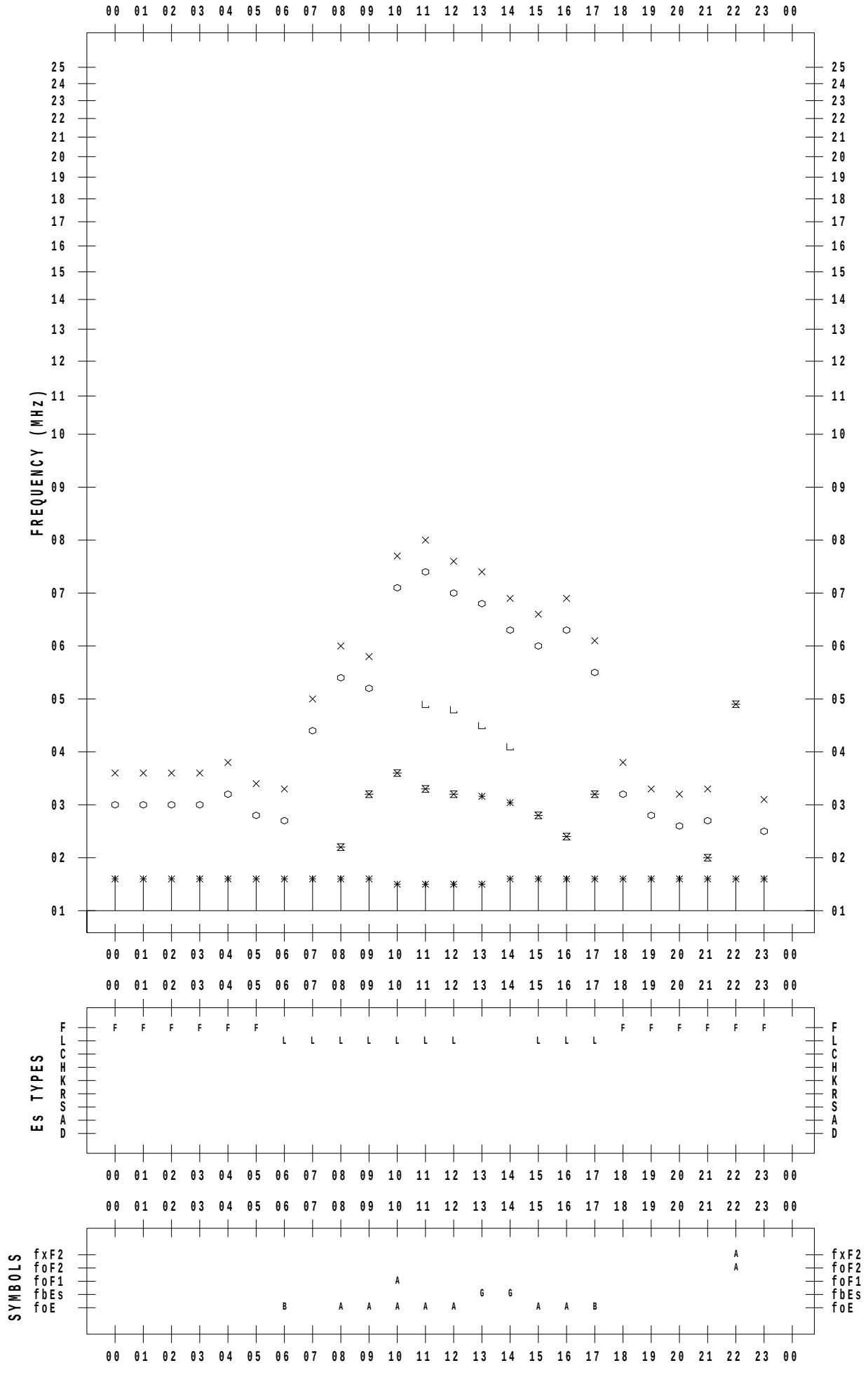
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/ 6

135 °E MEAN TIME



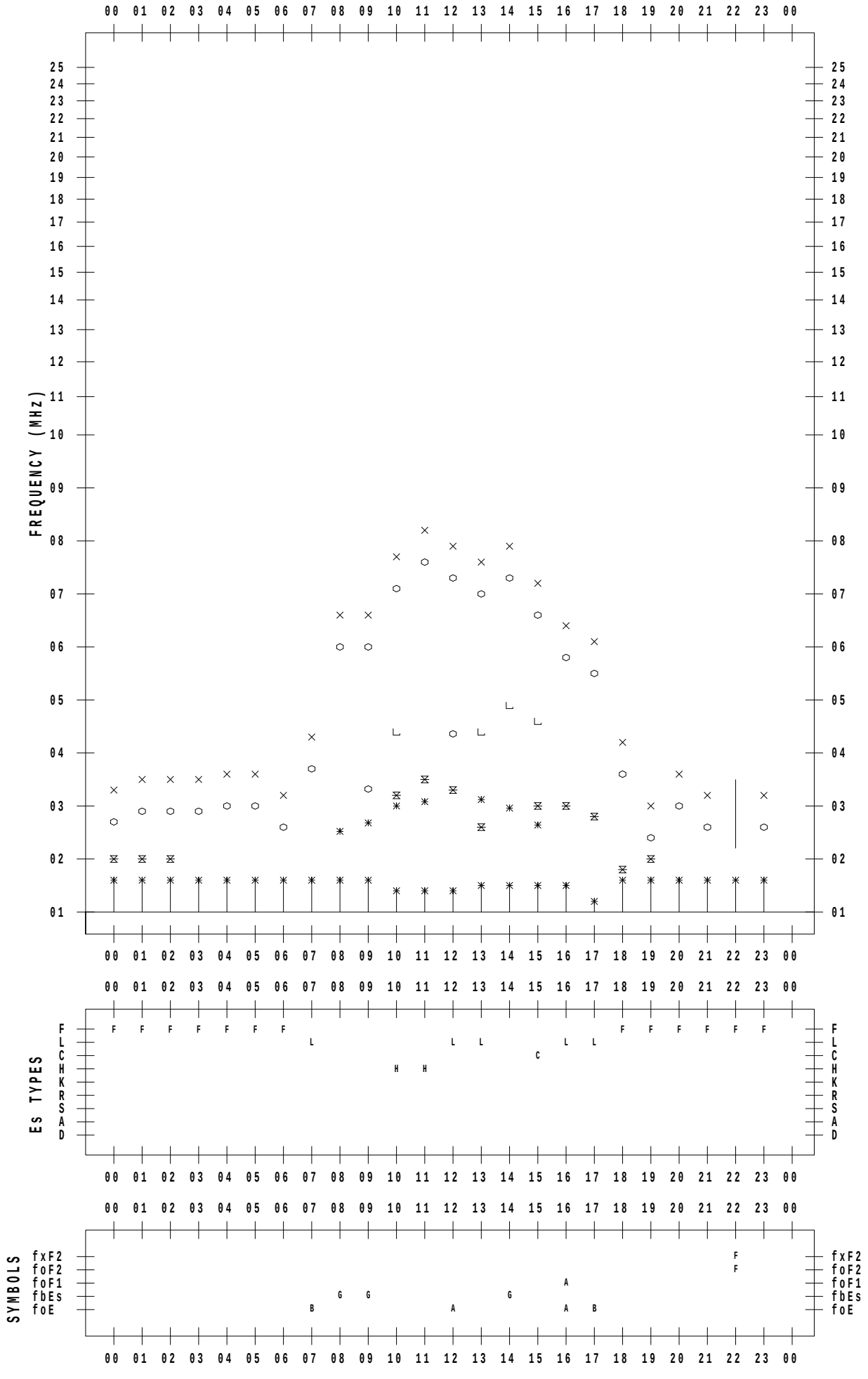
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/ 7

135 °E MEAN TIME



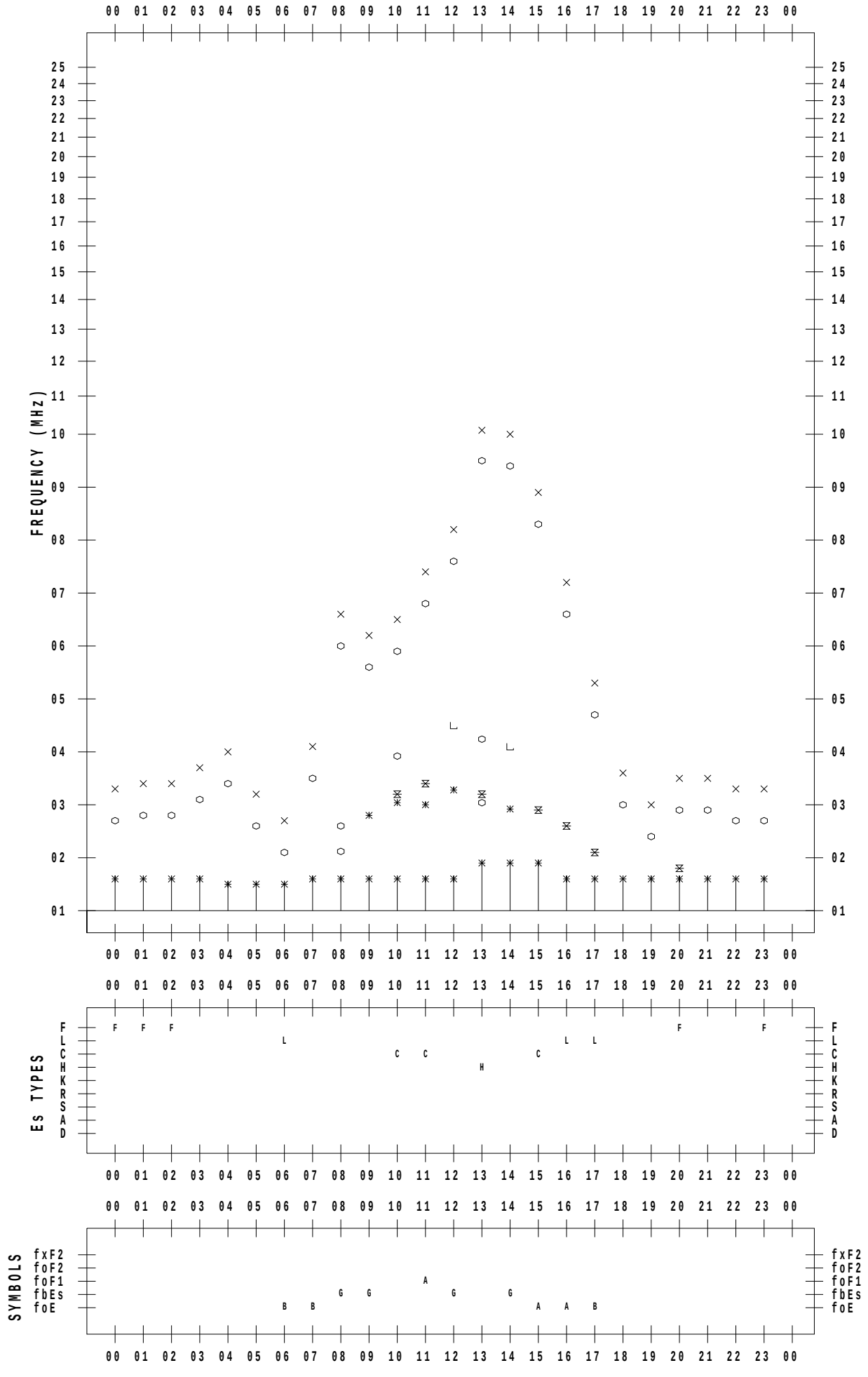
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/ 8

135 °E MEAN TIME



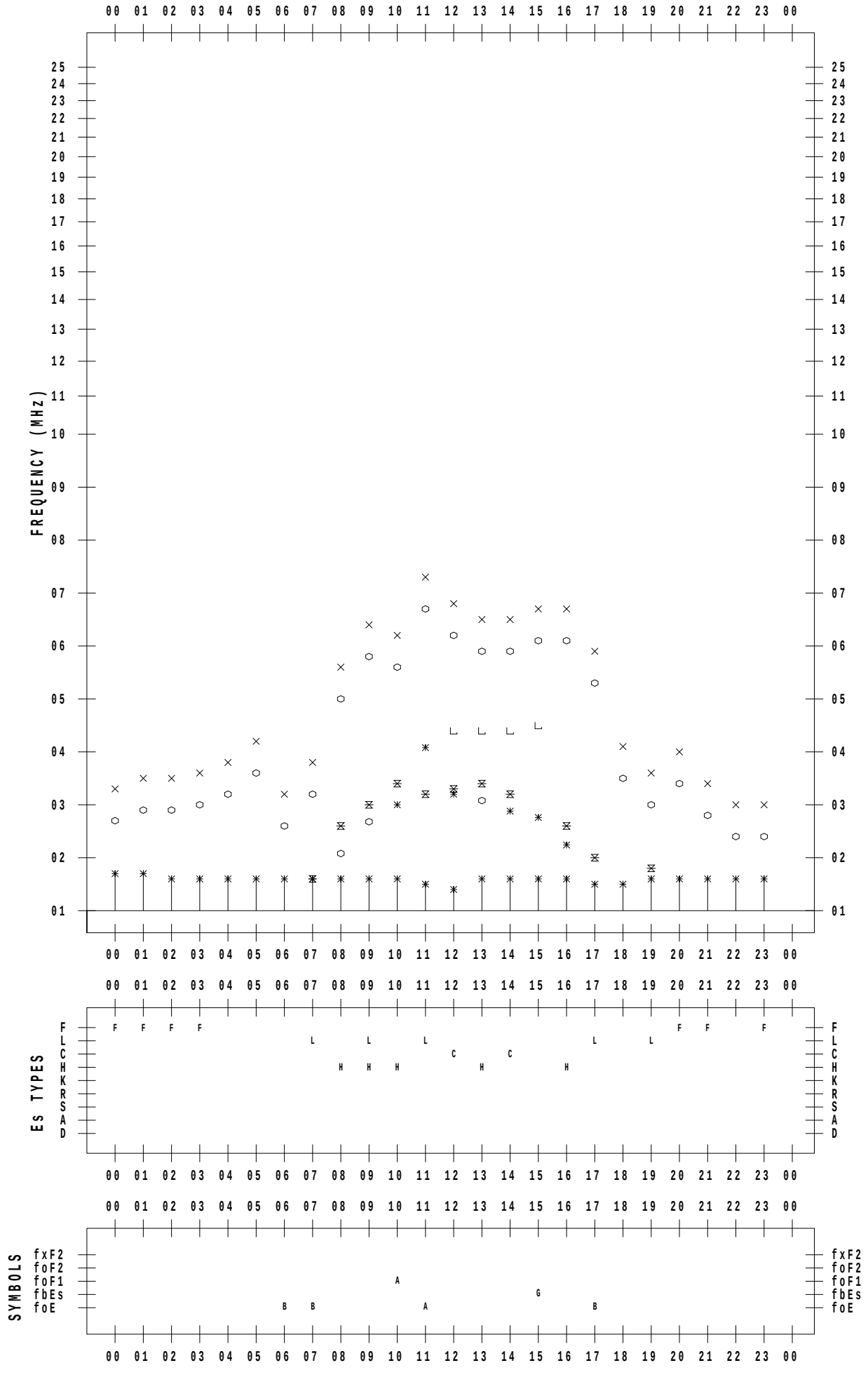
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/ 9

135 °E MEAN TIME



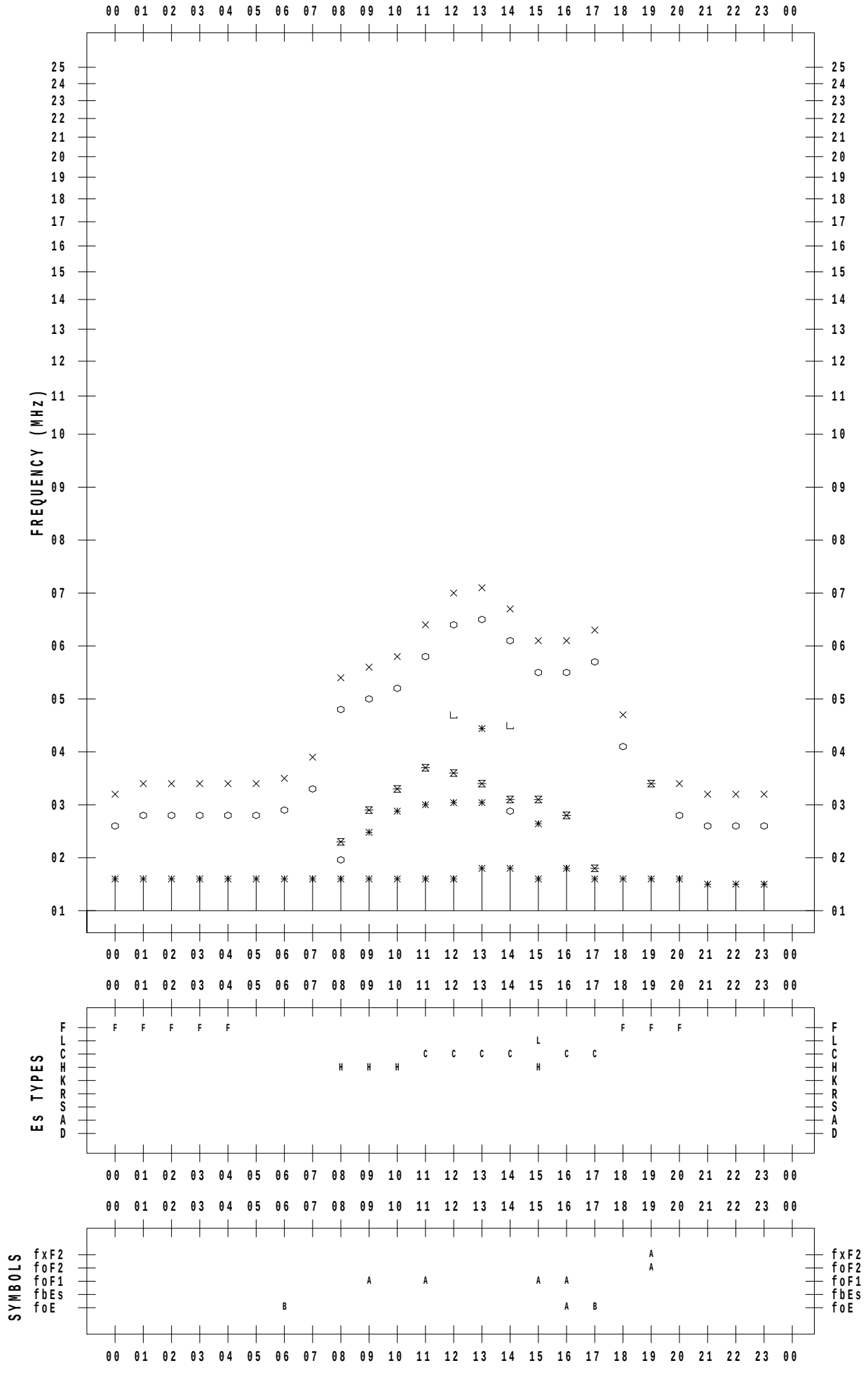
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/10

135 °E MEAN TIME



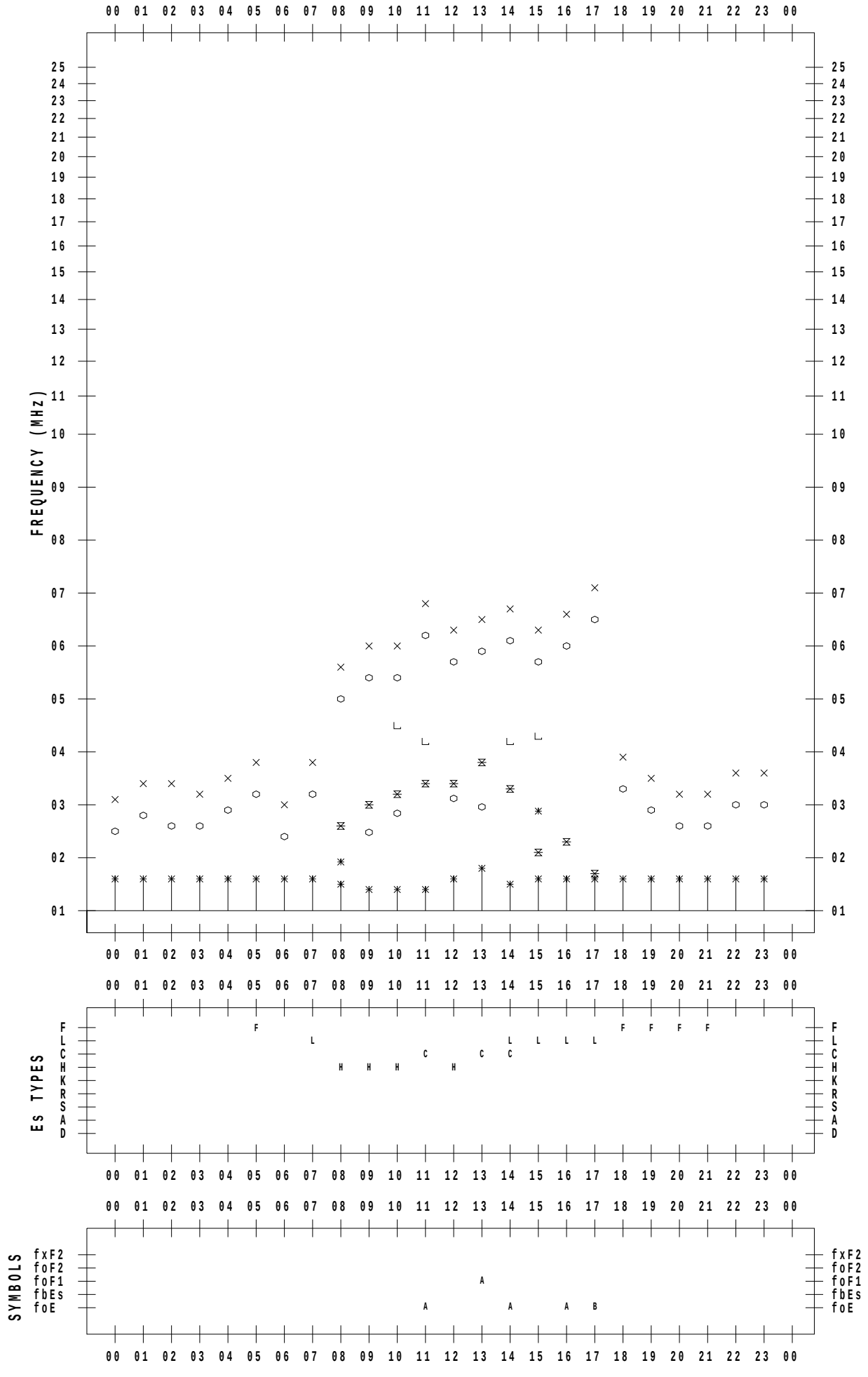
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/11

135 °E MEAN TIME



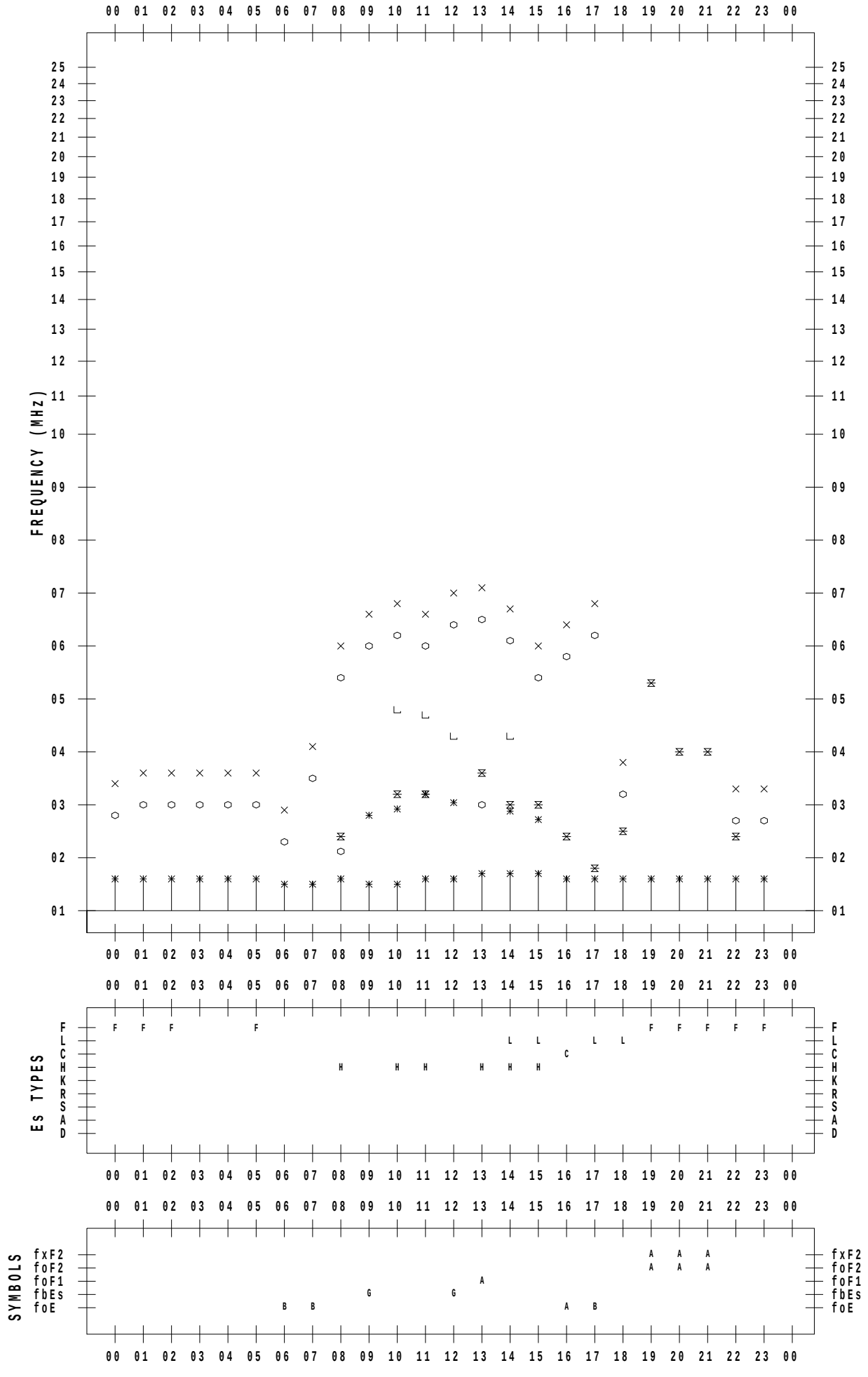
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/12

135 °E MEAN TIME



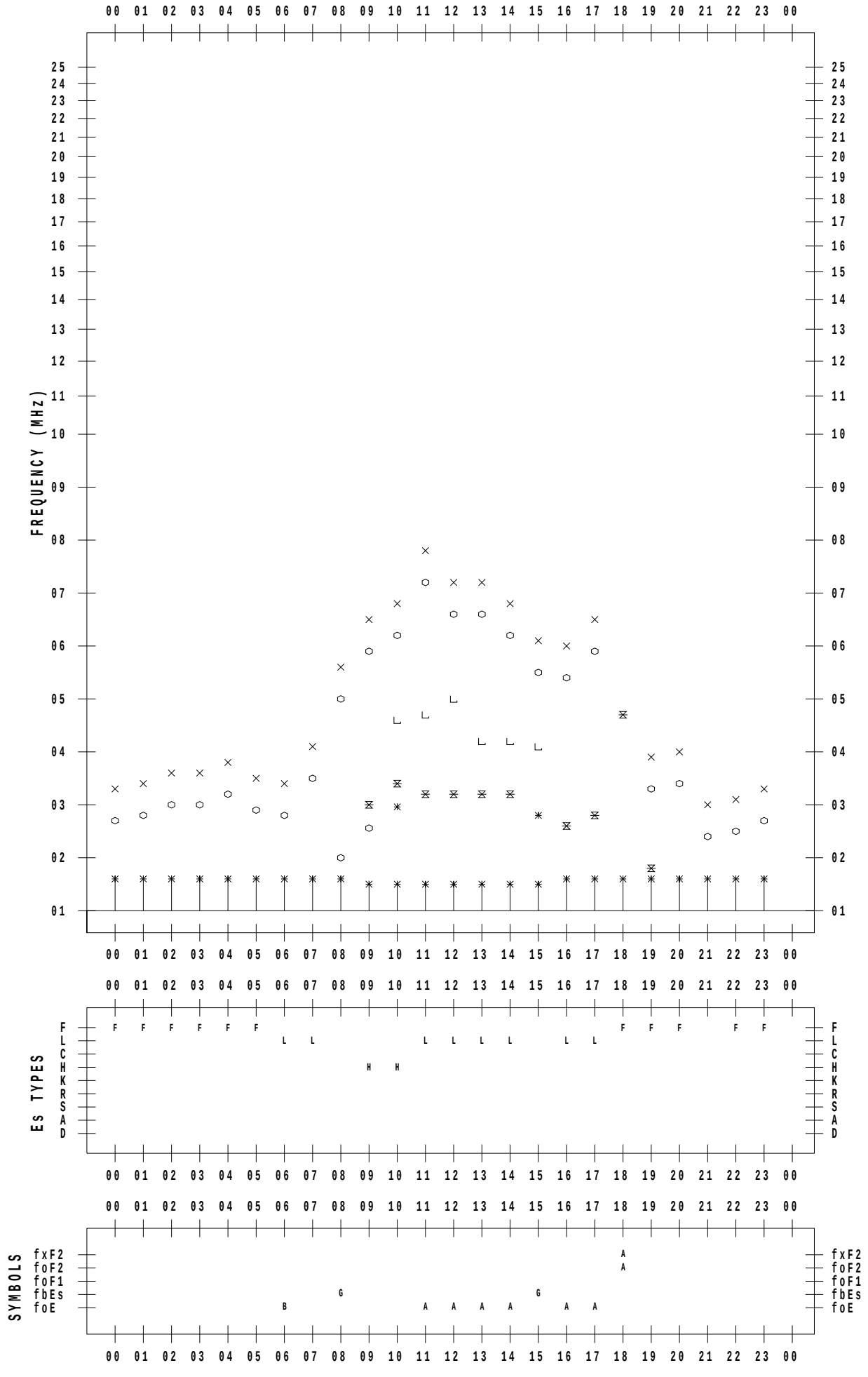
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/13

135 °E MEAN TIME



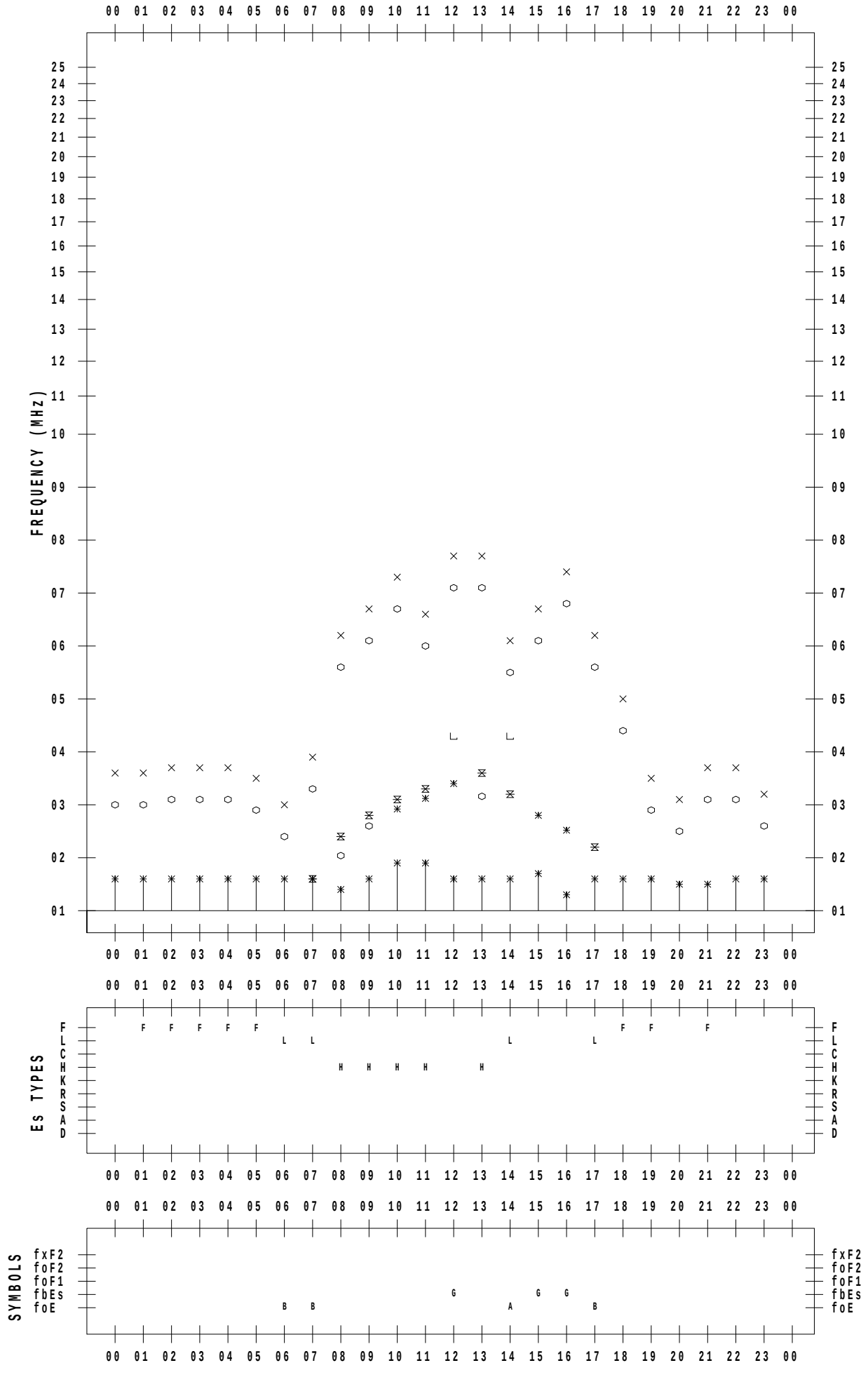
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/14

135 °E MEAN TIME



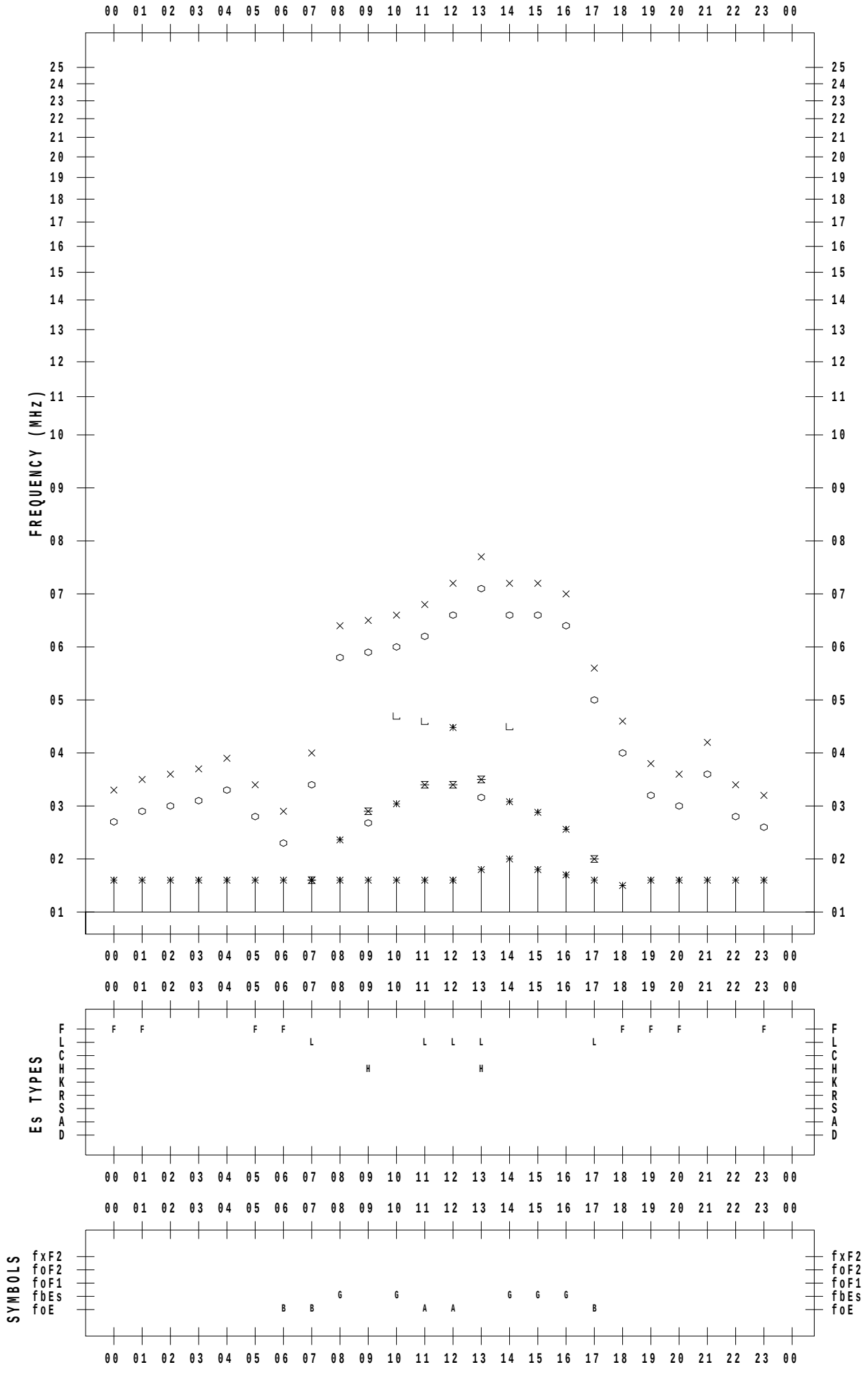
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/15

135 °E MEAN TIME



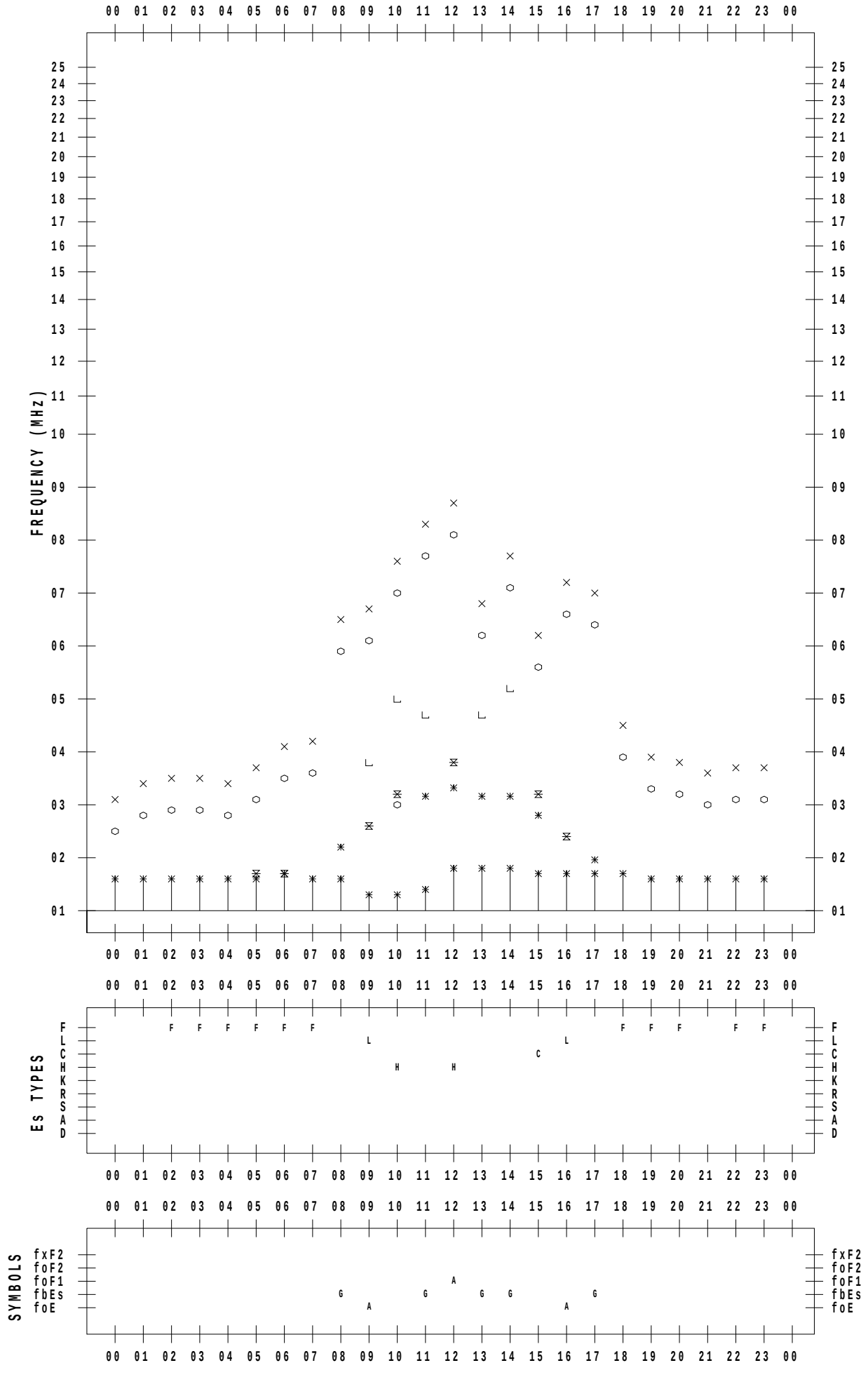
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/16

135 °E MEAN TIME



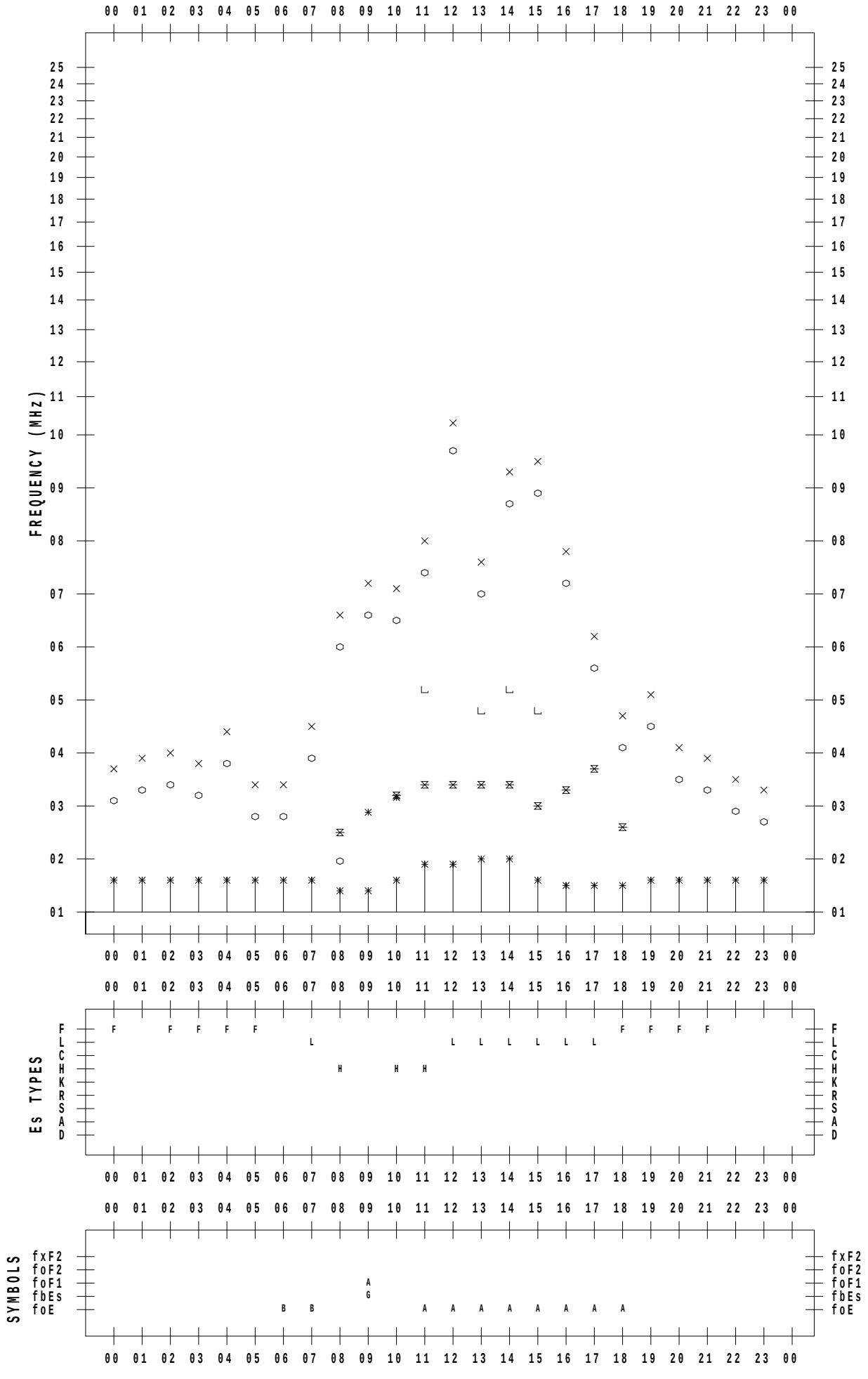
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/17

135 °E MEAN TIME



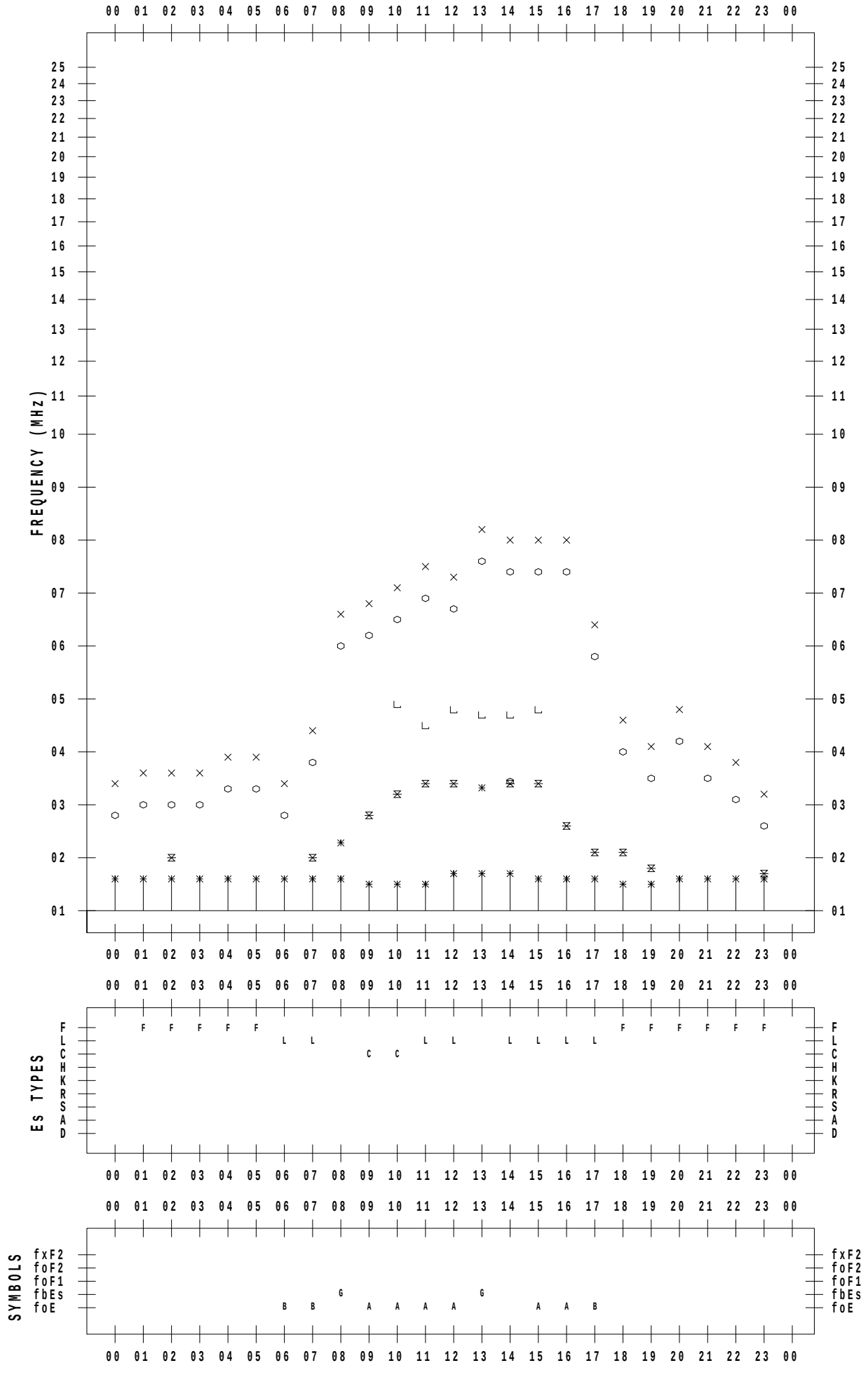
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/18

135 °E MEAN TIME



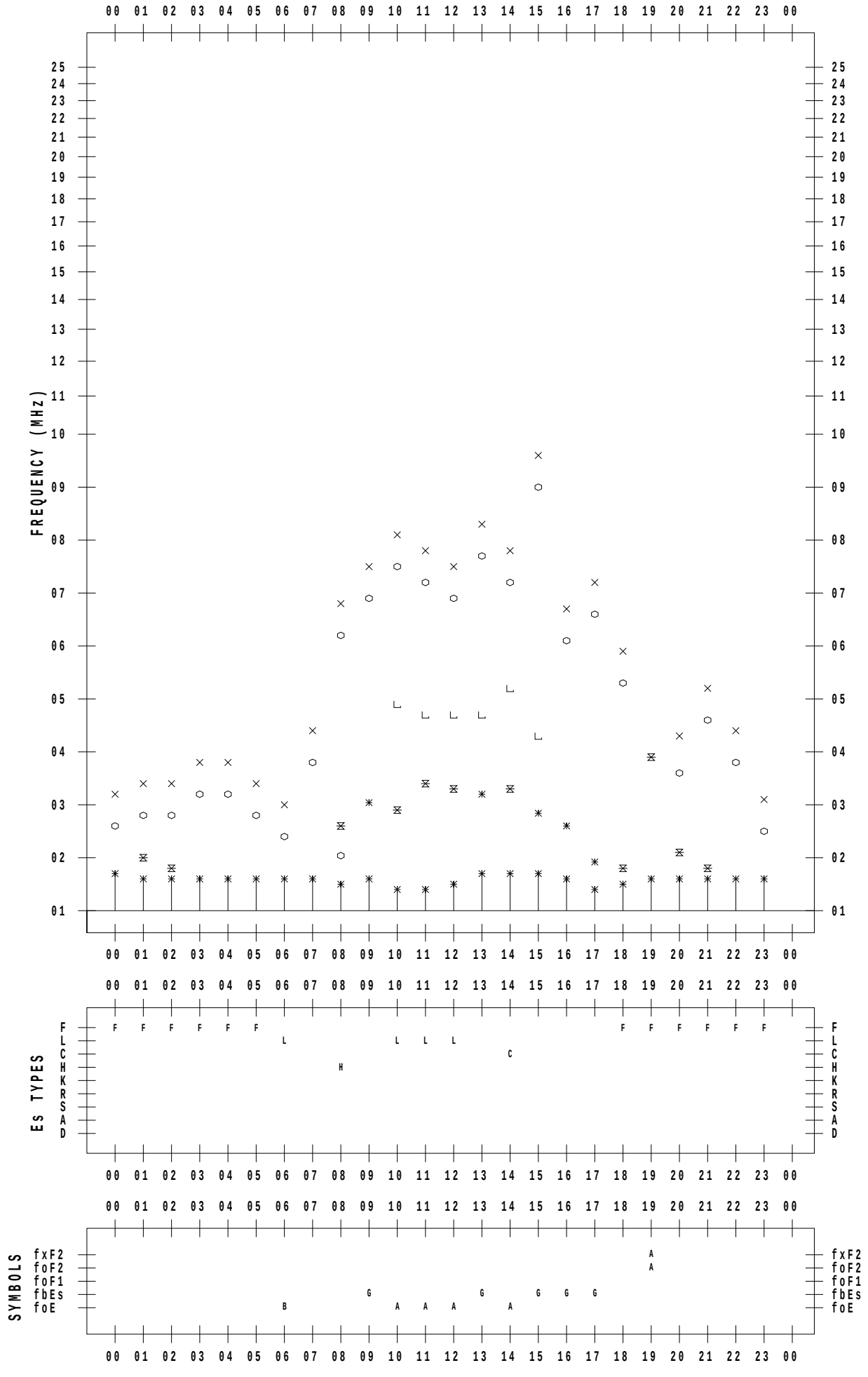
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/19

135 °E MEAN TIME



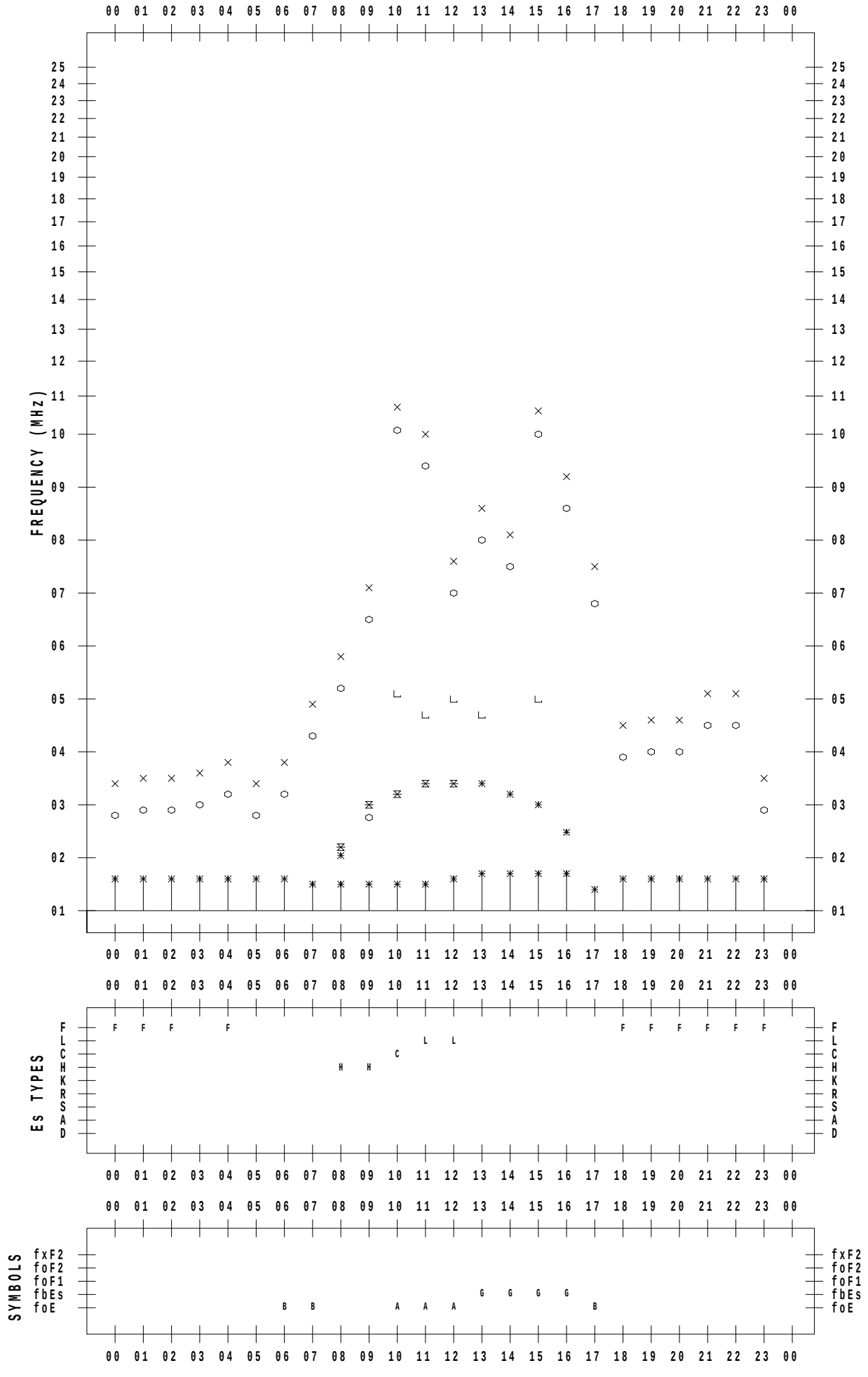
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/20

135 °E MEAN TIME



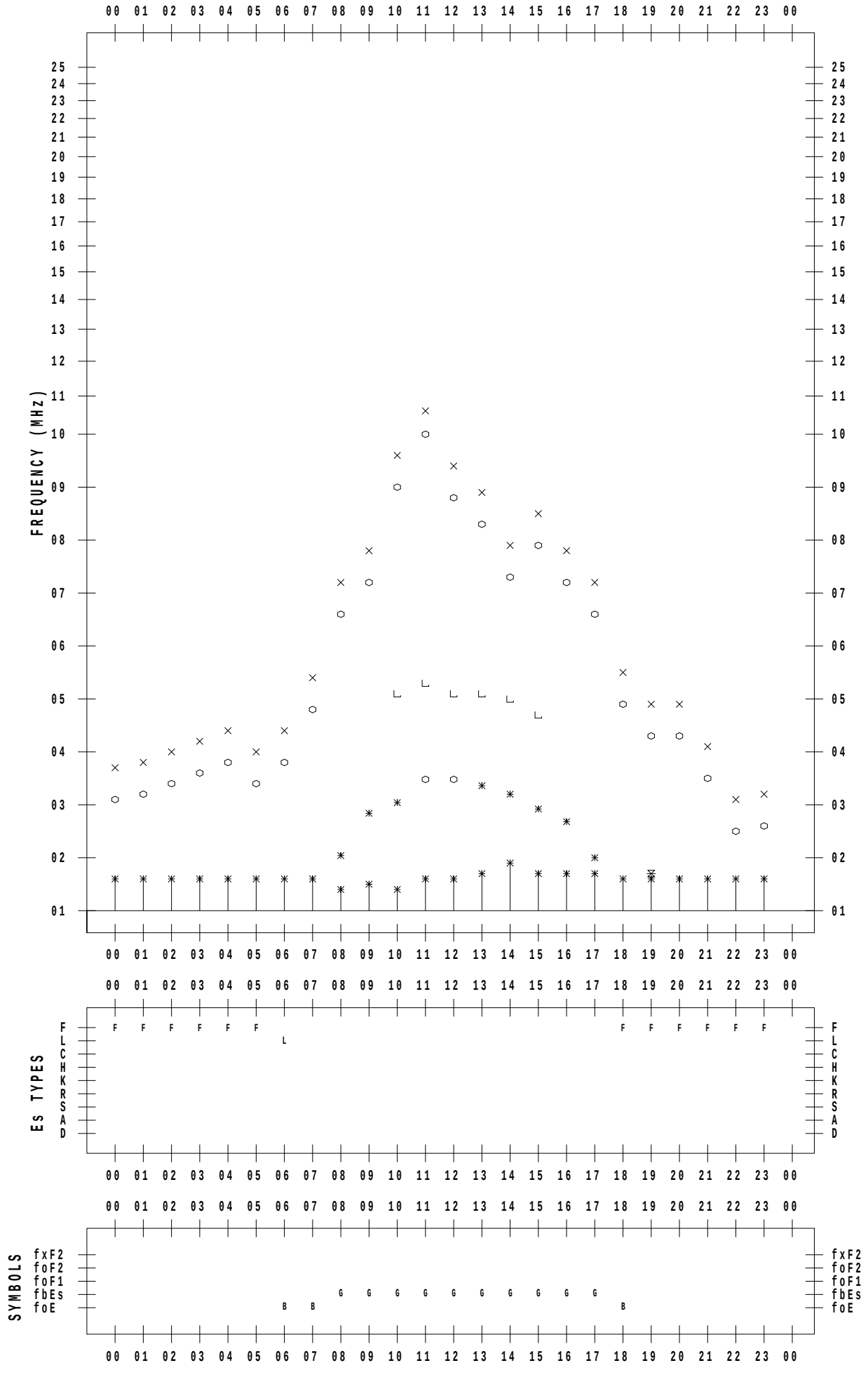
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/21

135 °E MEAN TIME



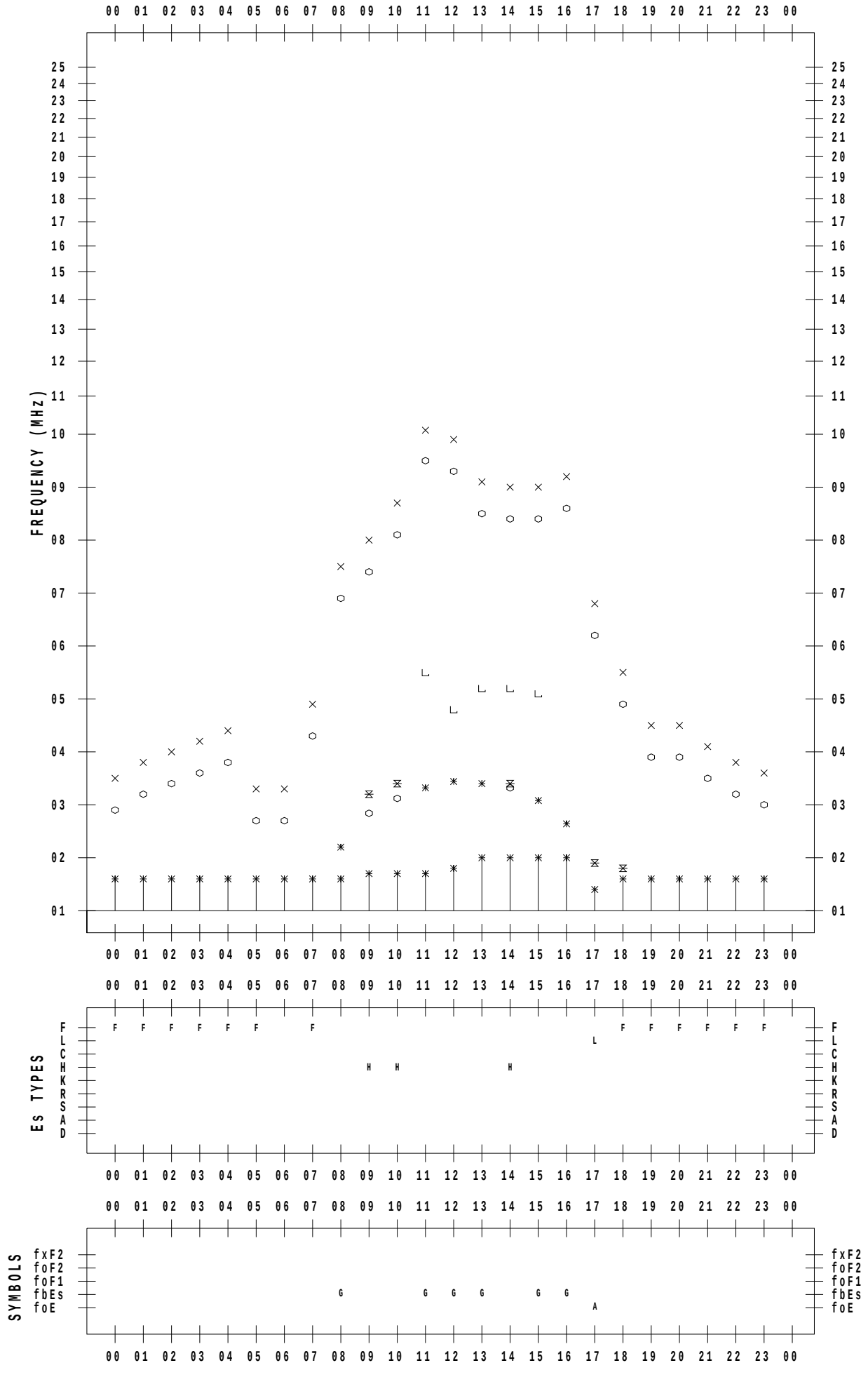
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/22

135 °E MEAN TIME



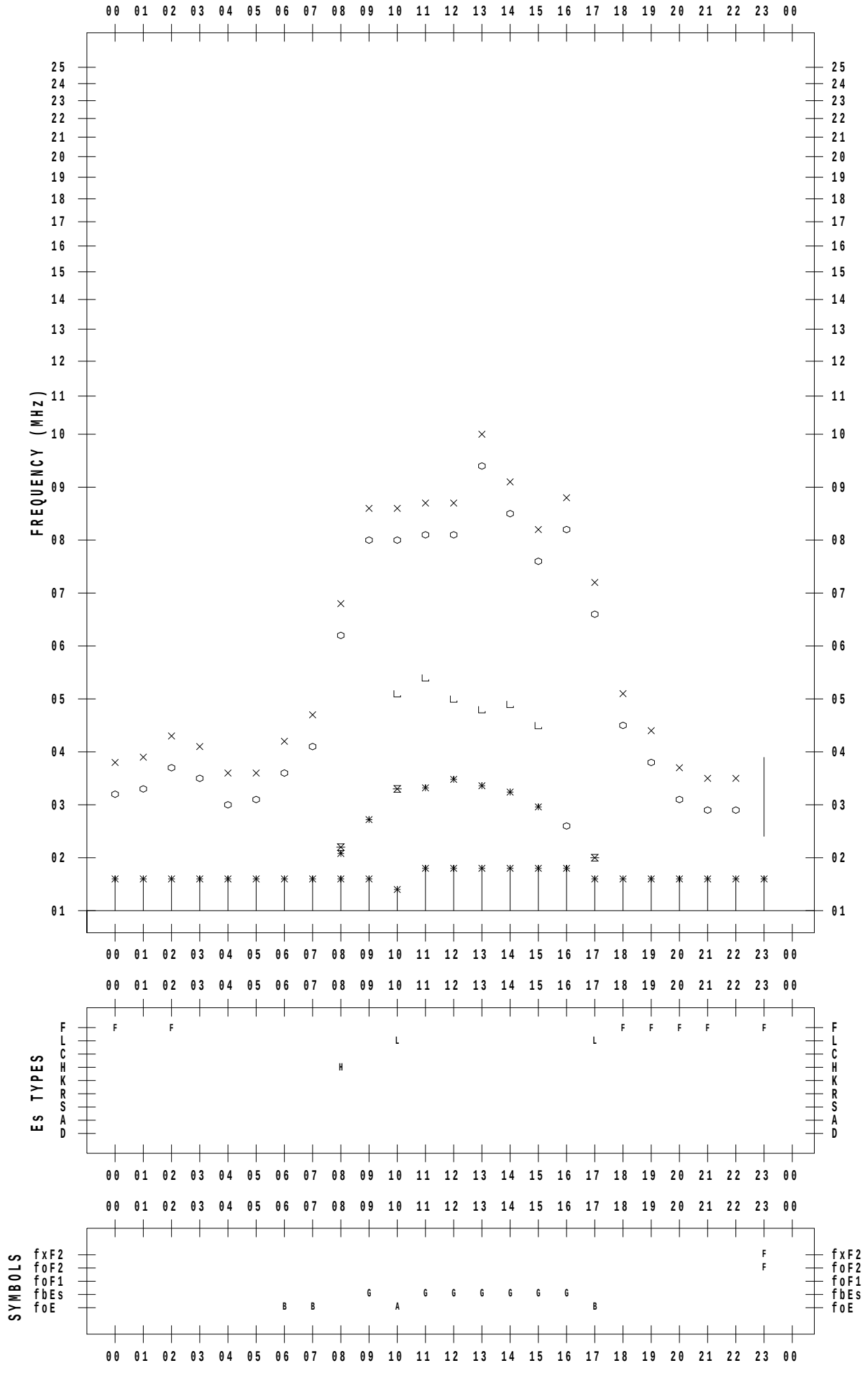
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/23

135 °E MEAN TIME



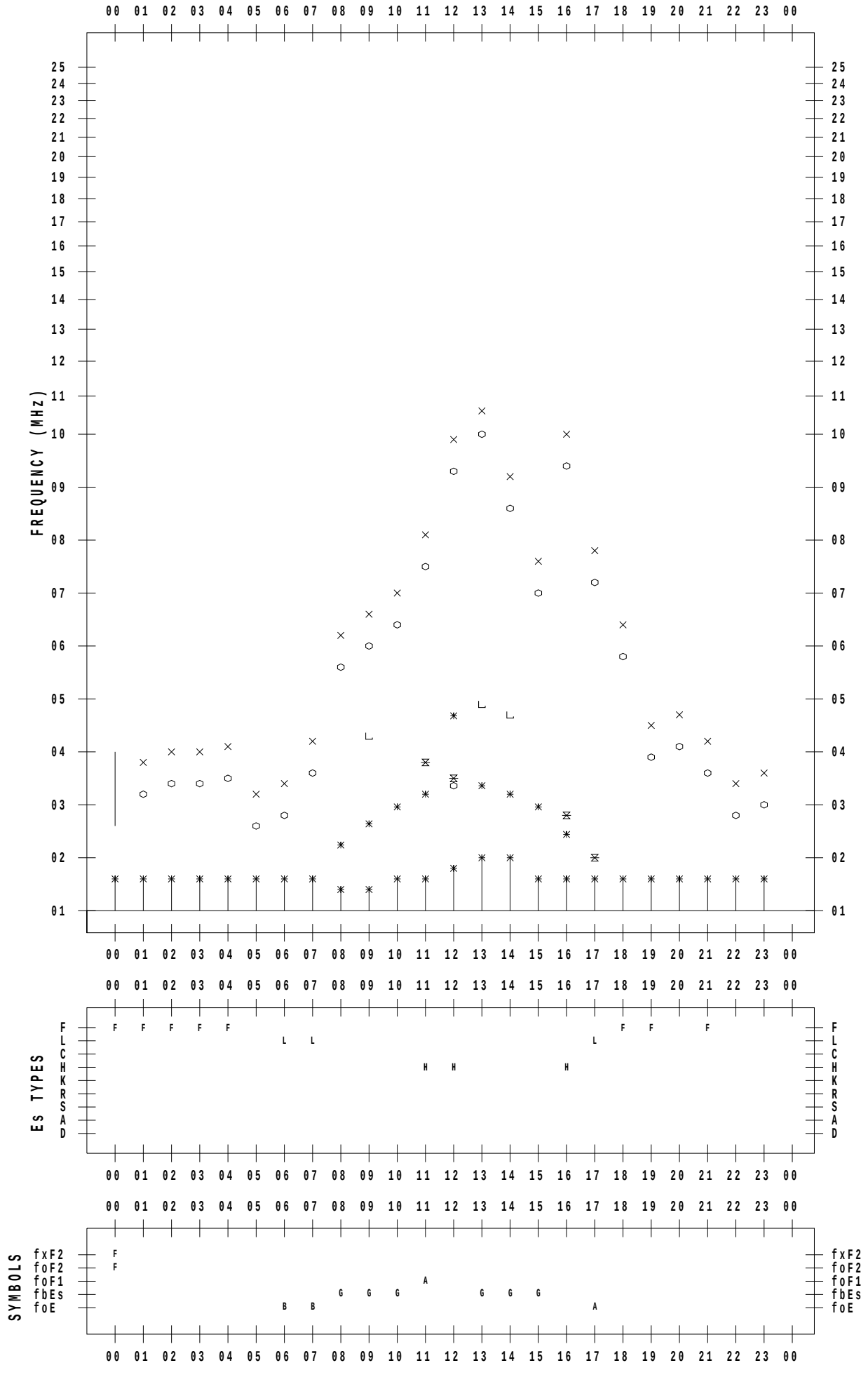
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/24

135 °E MEAN TIME



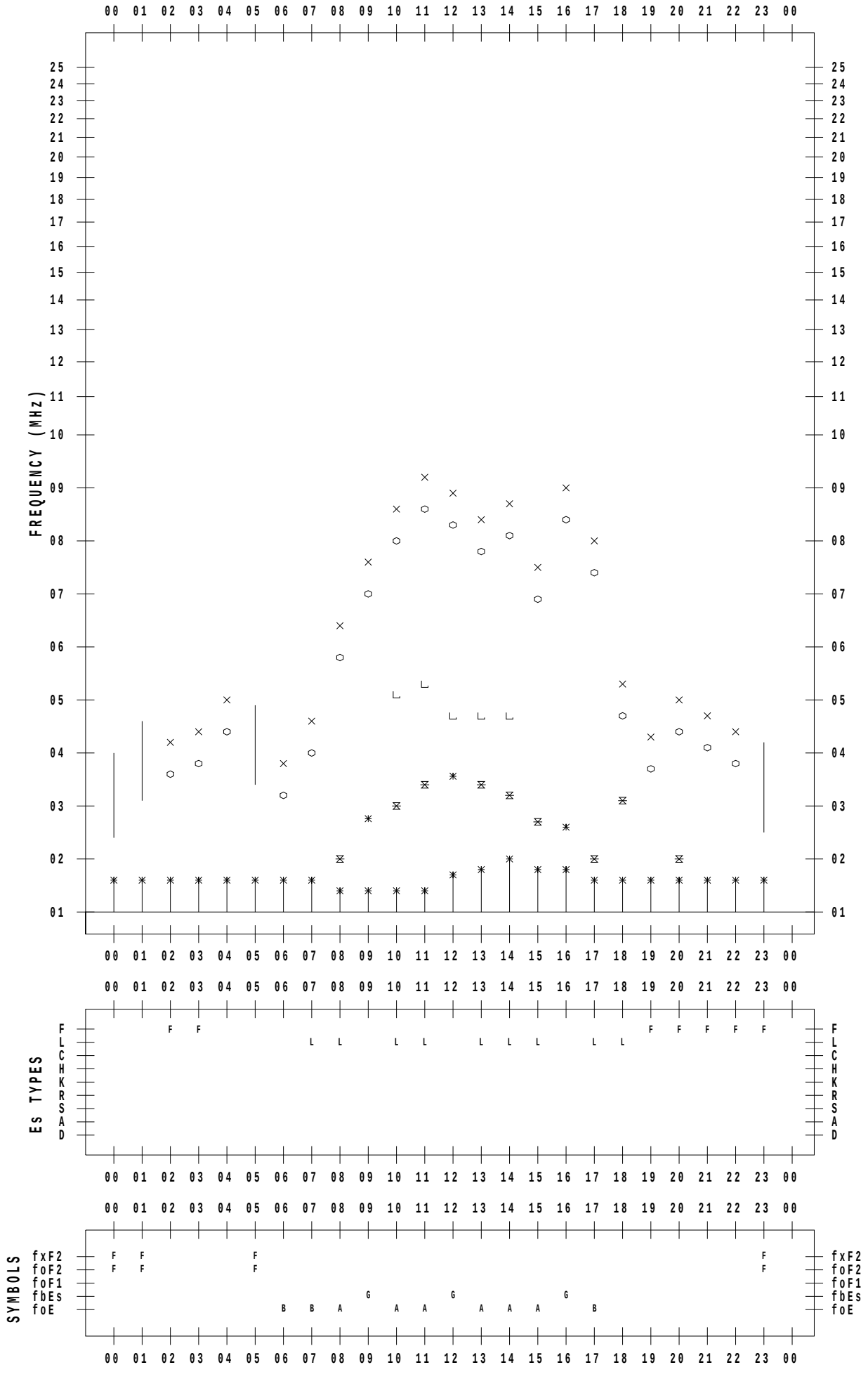
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/25

135 °E MEAN TIME



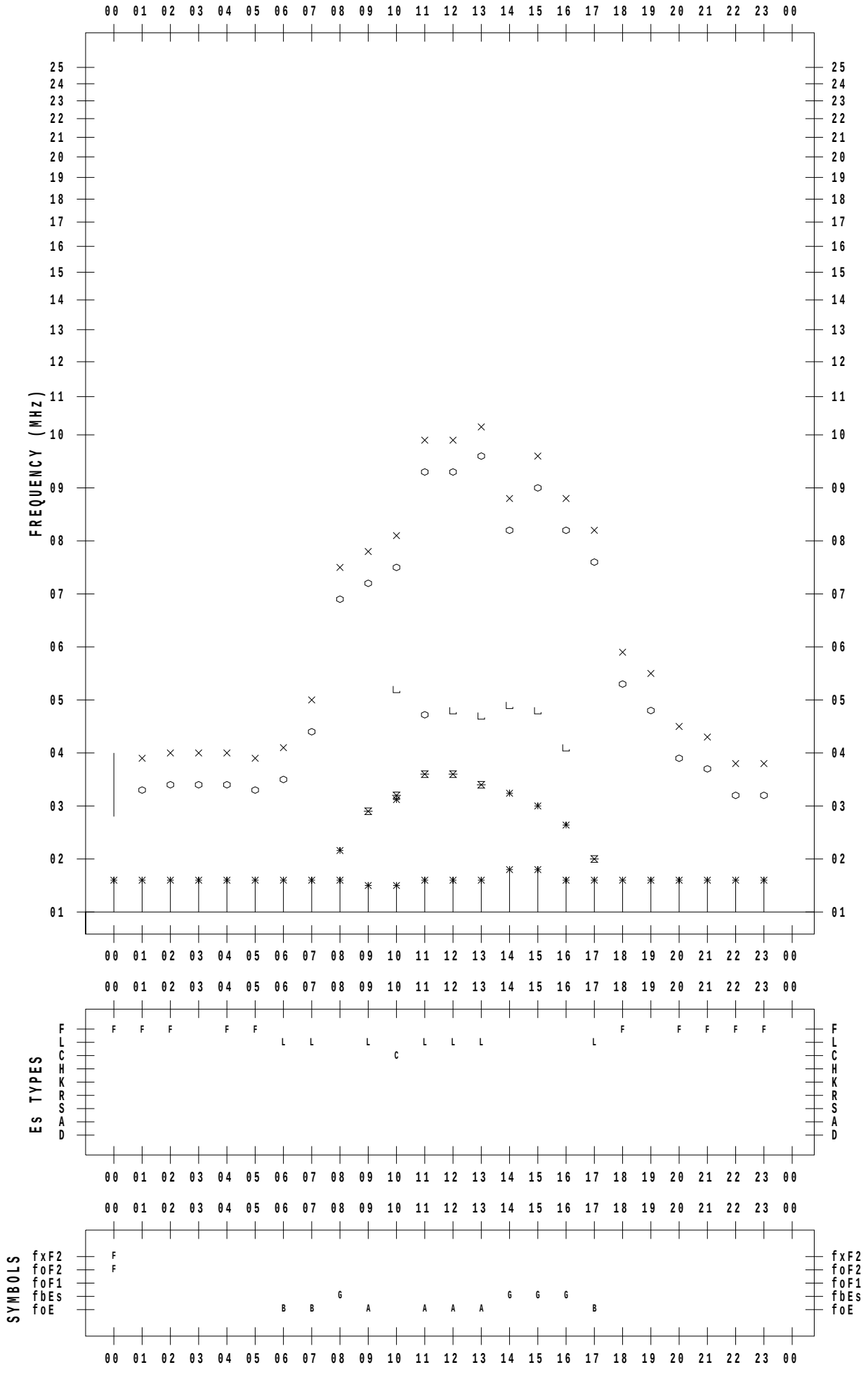
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/26

135 °E MEAN TIME



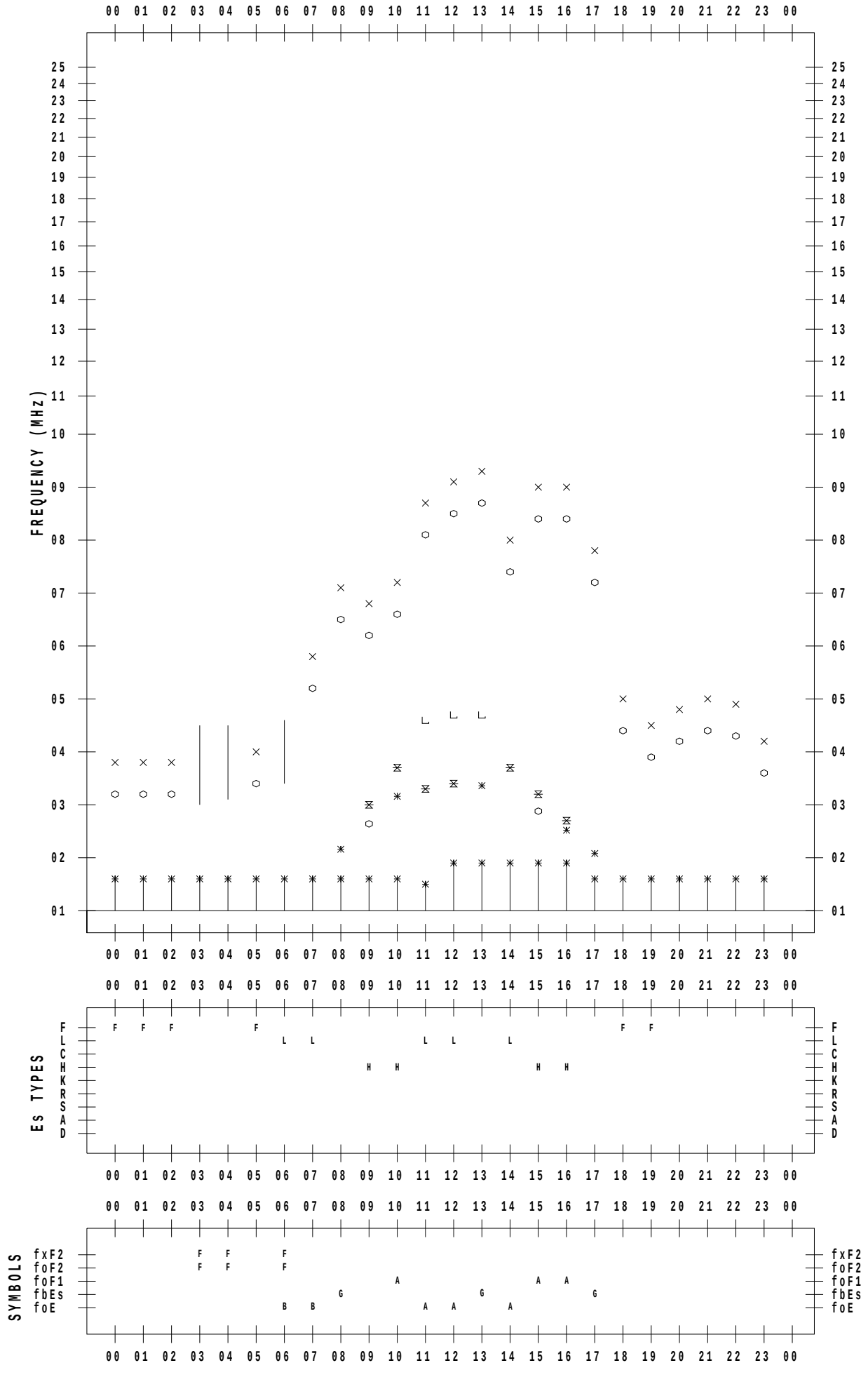
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/27

135 °E MEAN TIME



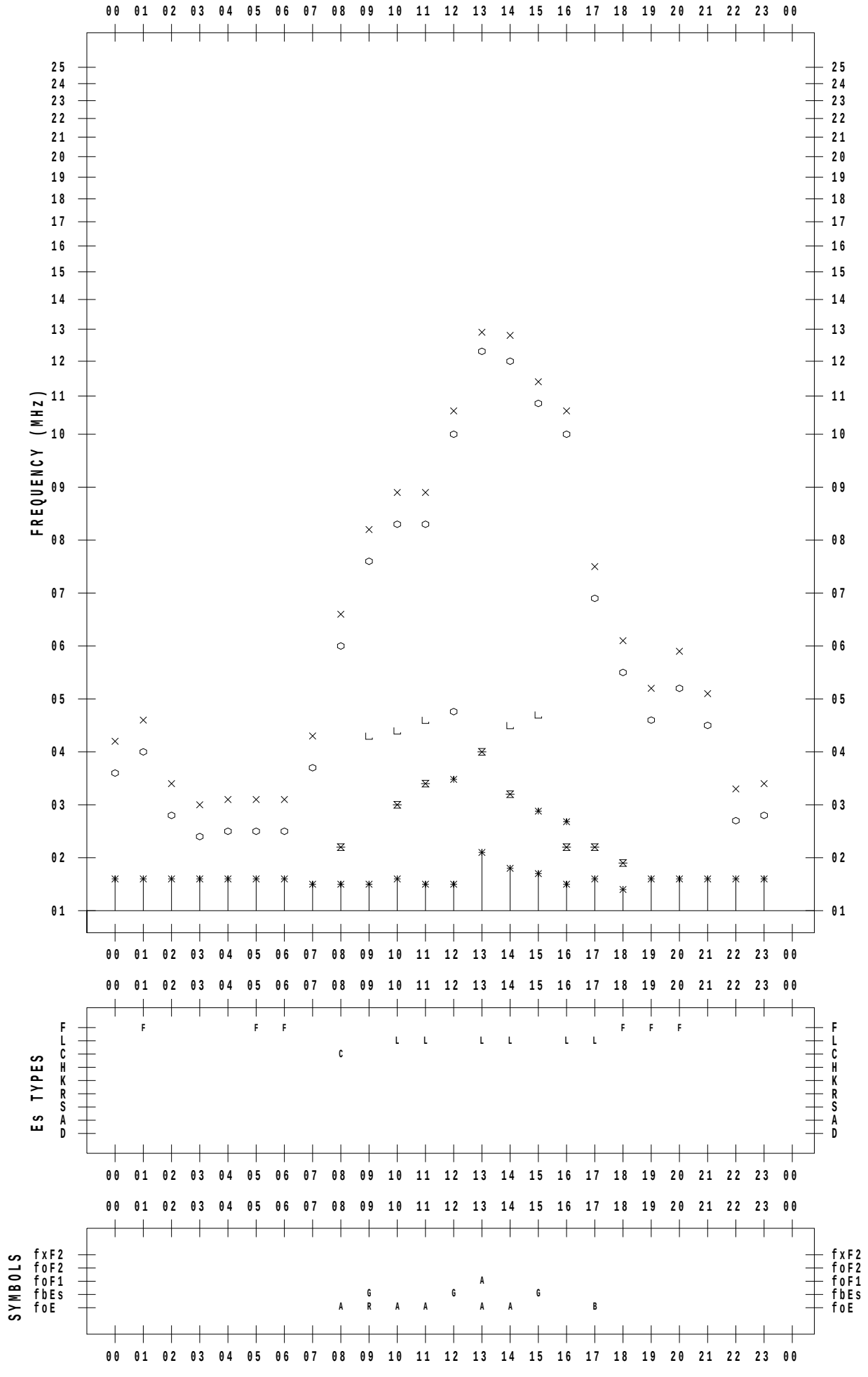
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/28

135 °E MEAN TIME



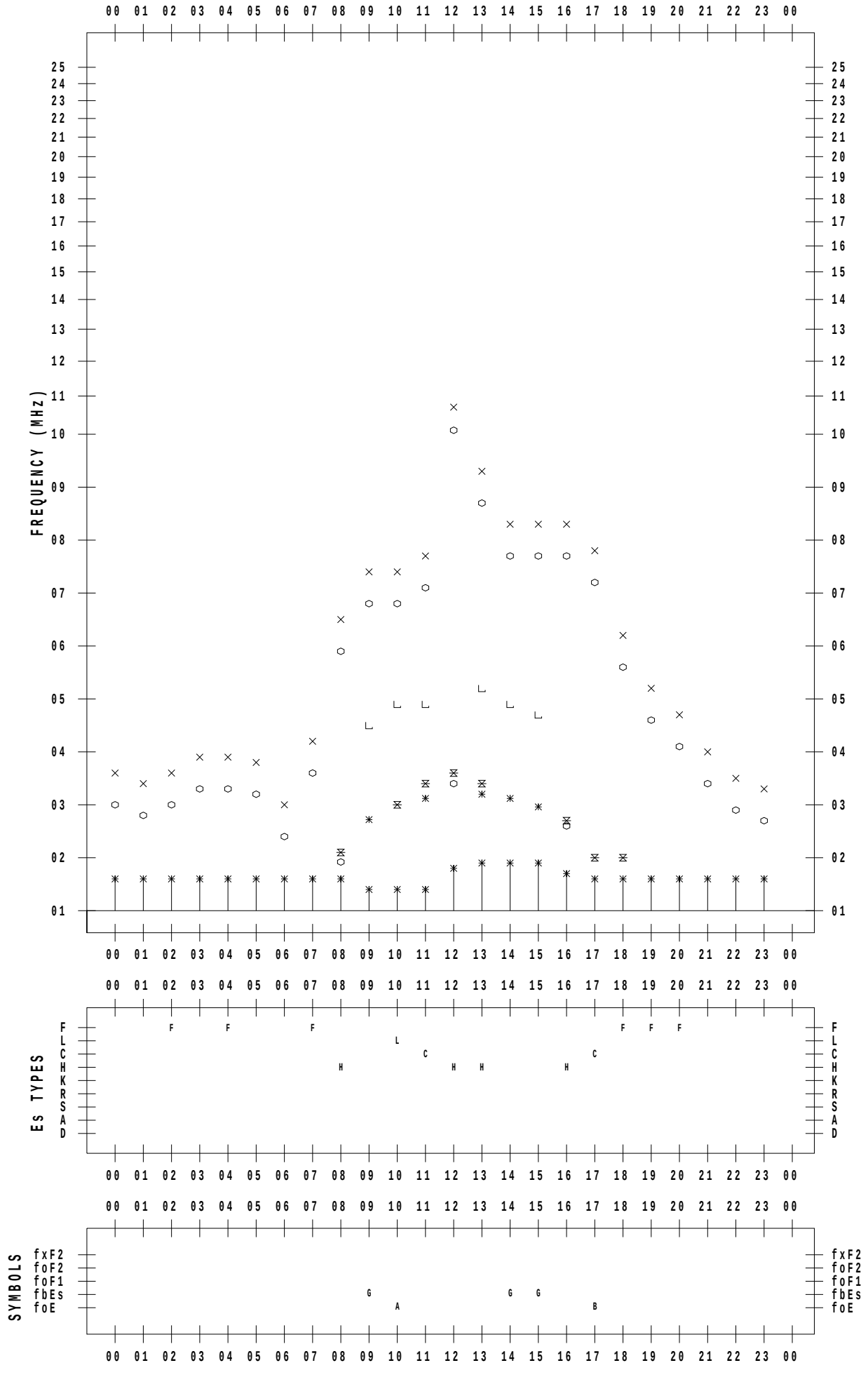
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/29

135 °E MEAN TIME



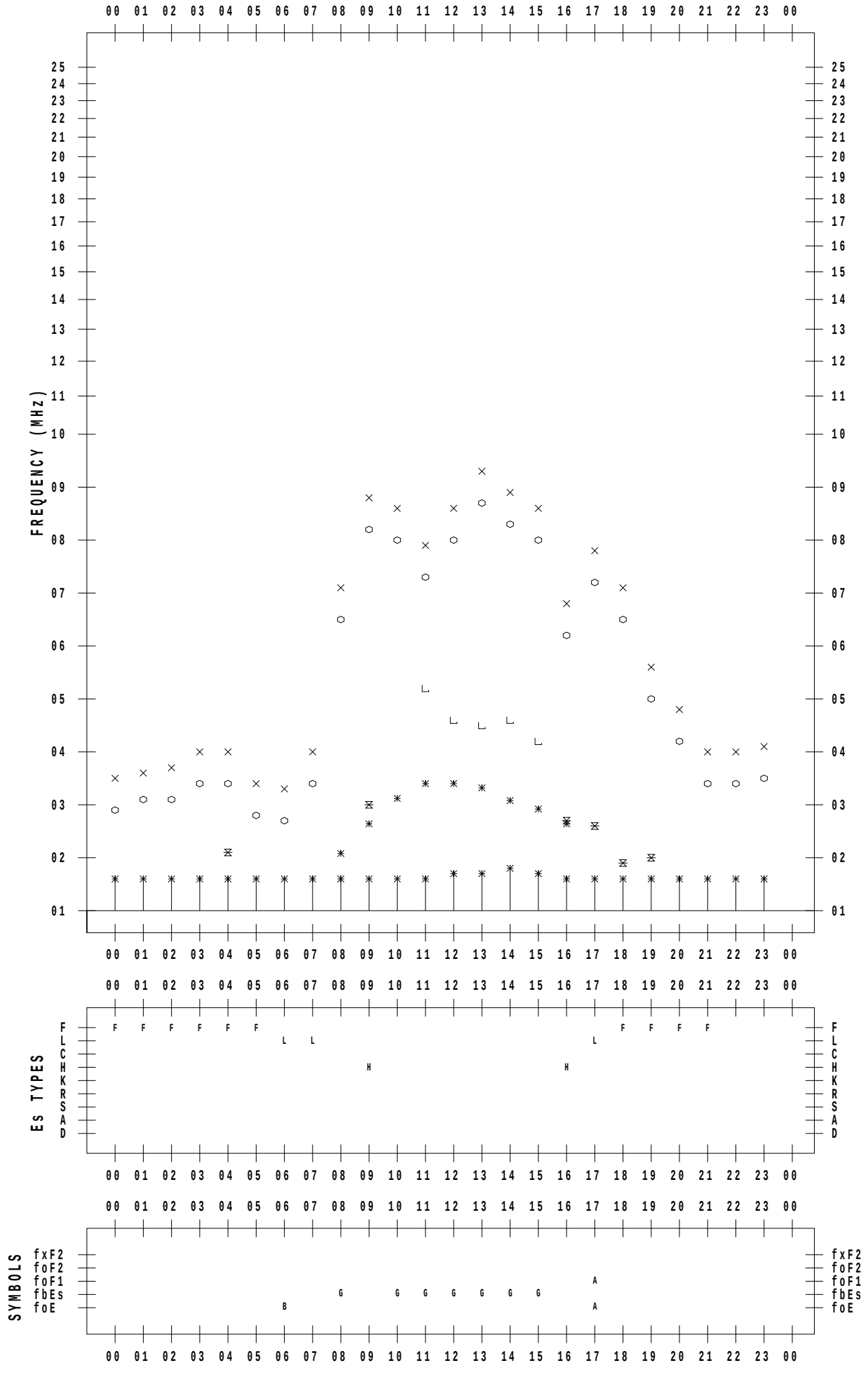
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/30

135 °E MEAN TIME



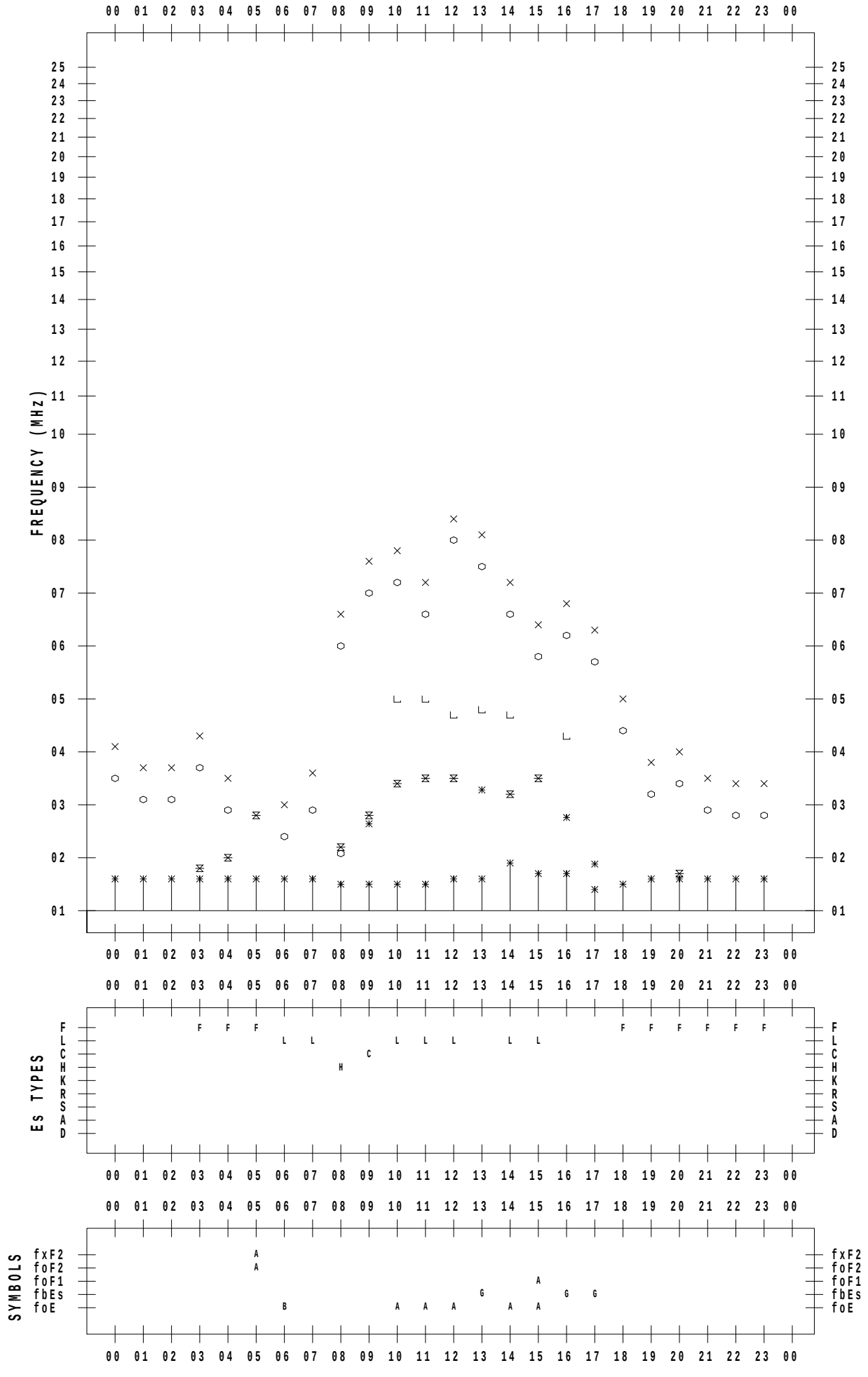
# f-PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2021/12/31

135 °E MEAN TIME



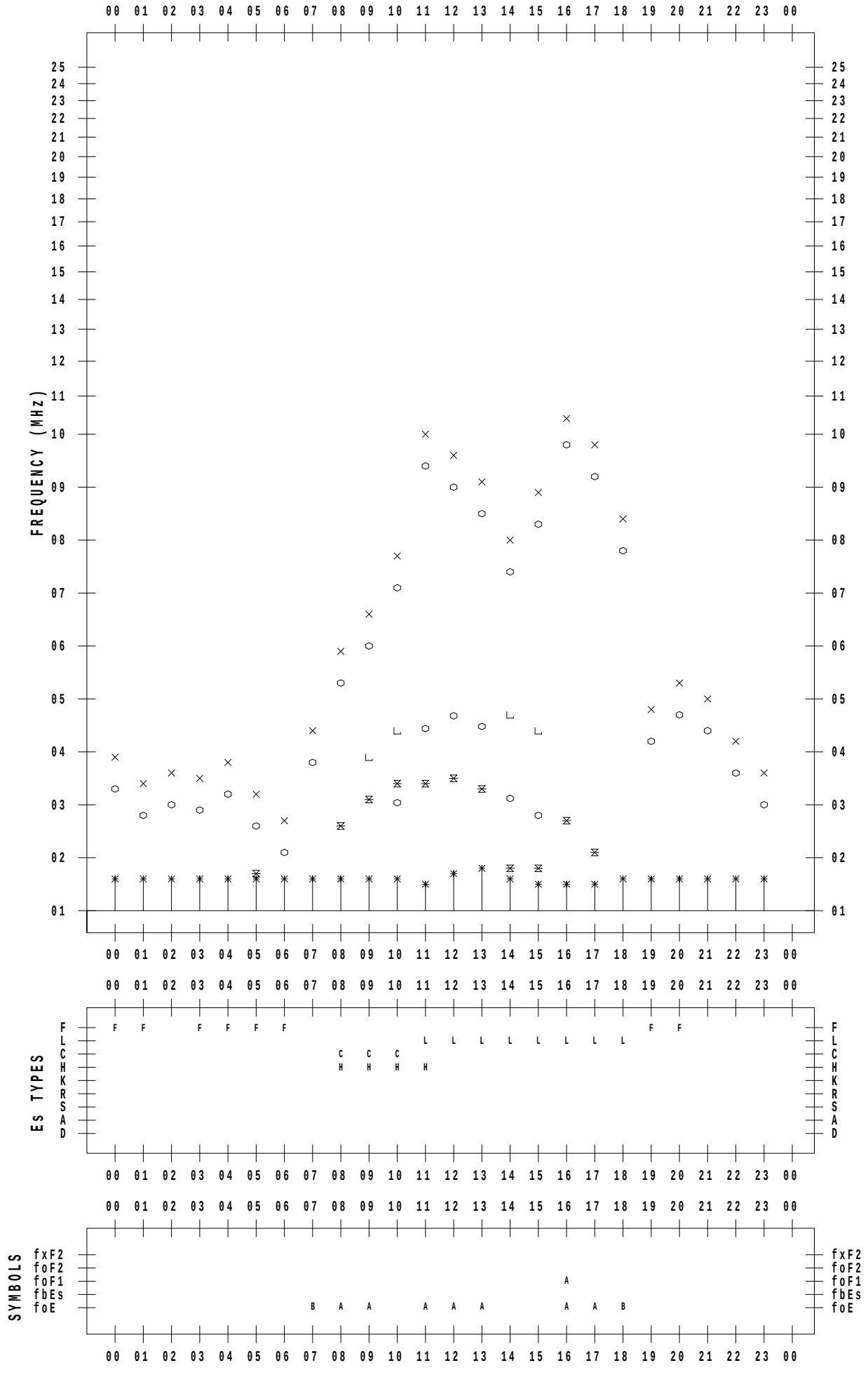
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/ 1

135 °E MEAN TIME



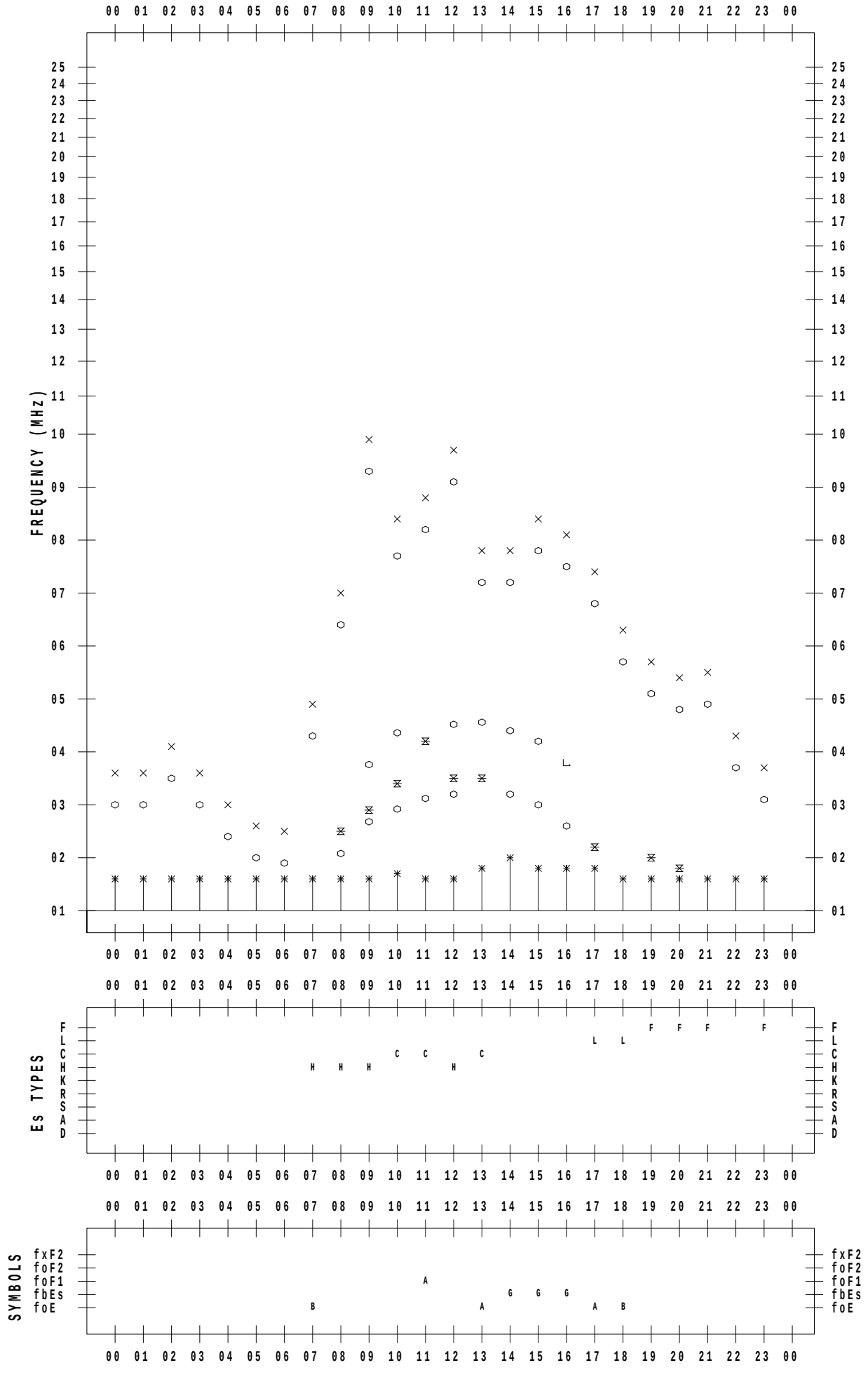
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/ 2

135 °E MEAN TIME



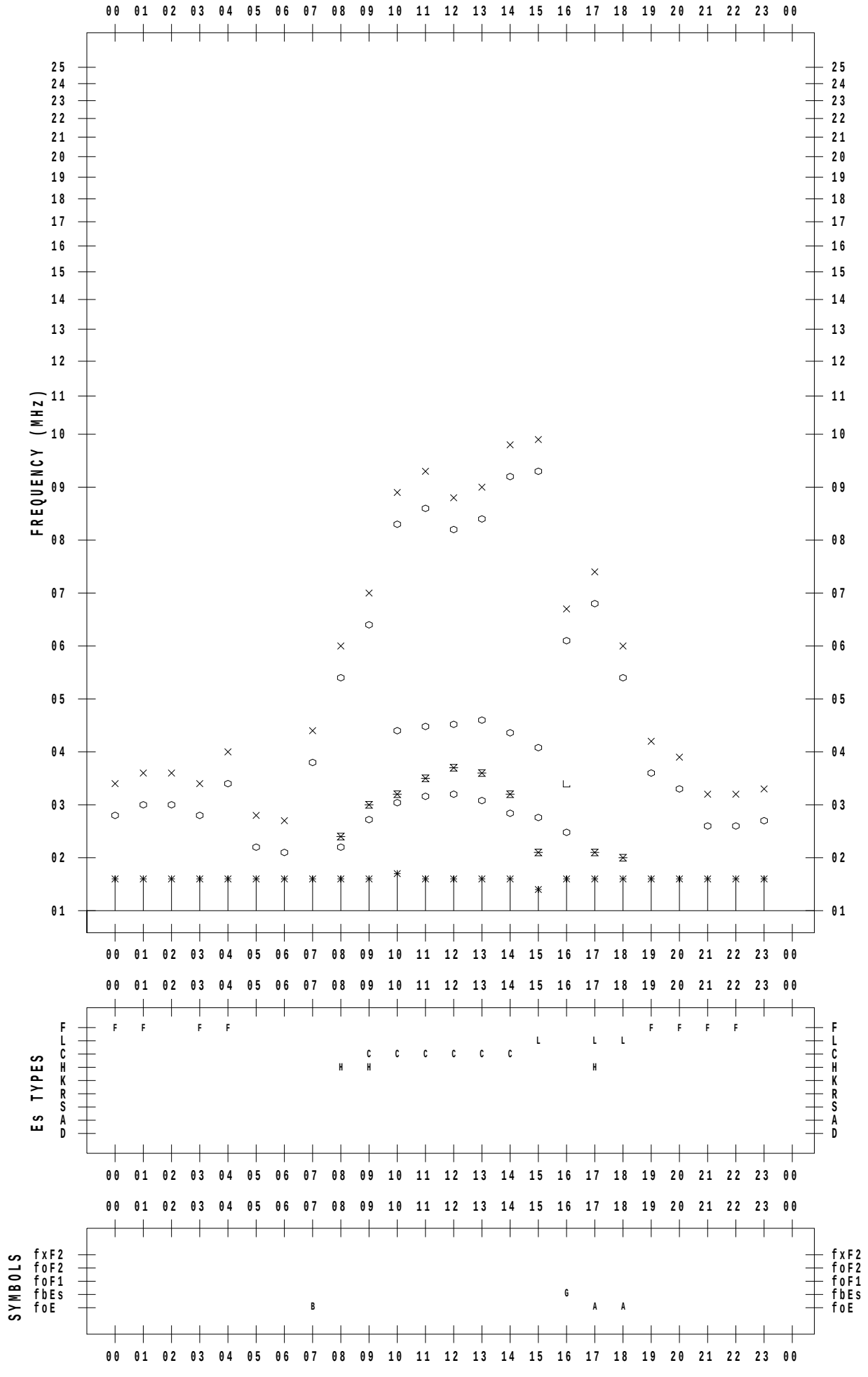
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/ 3

135 °E MEAN TIME



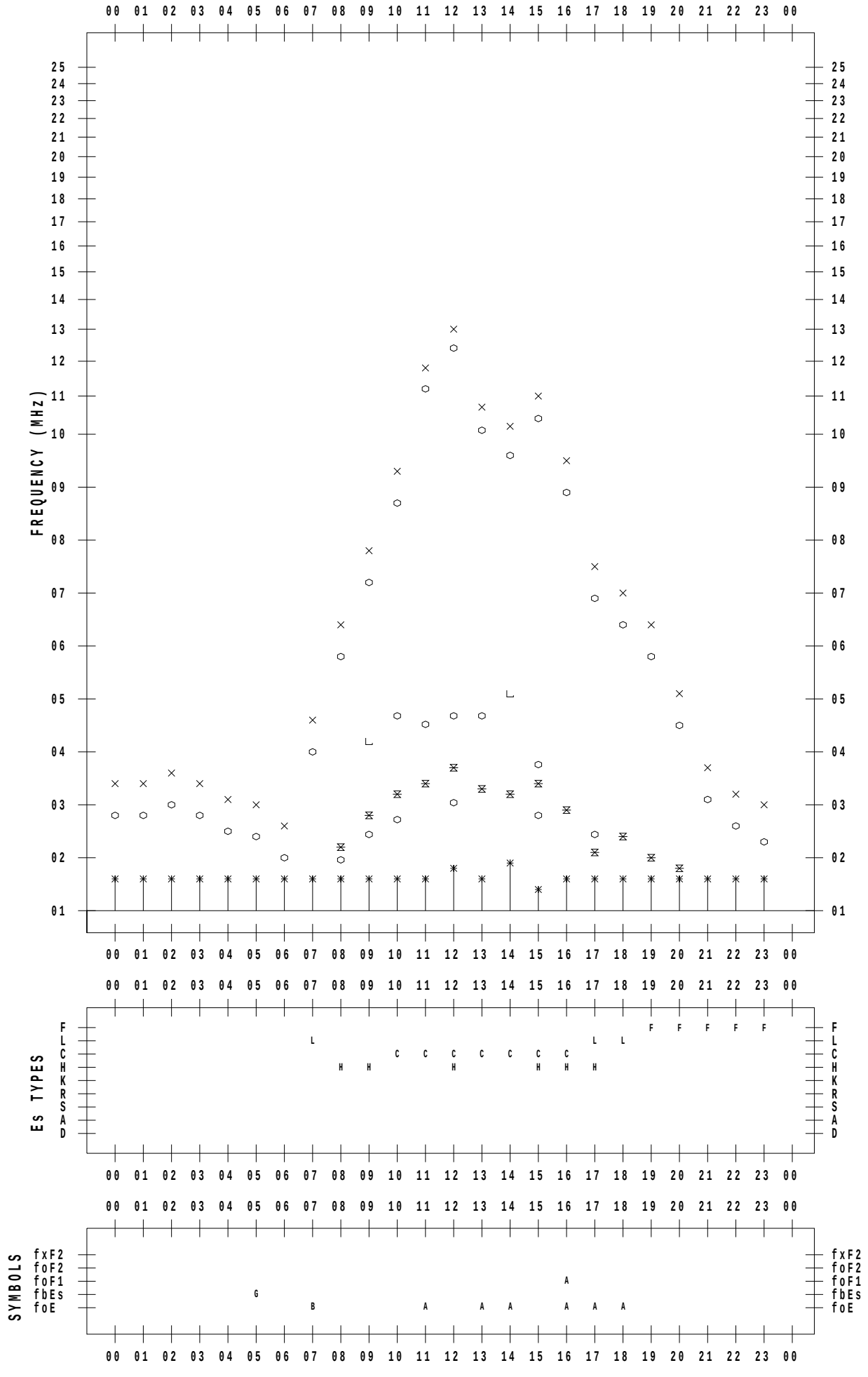
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/ 4

135 °E MEAN TIME



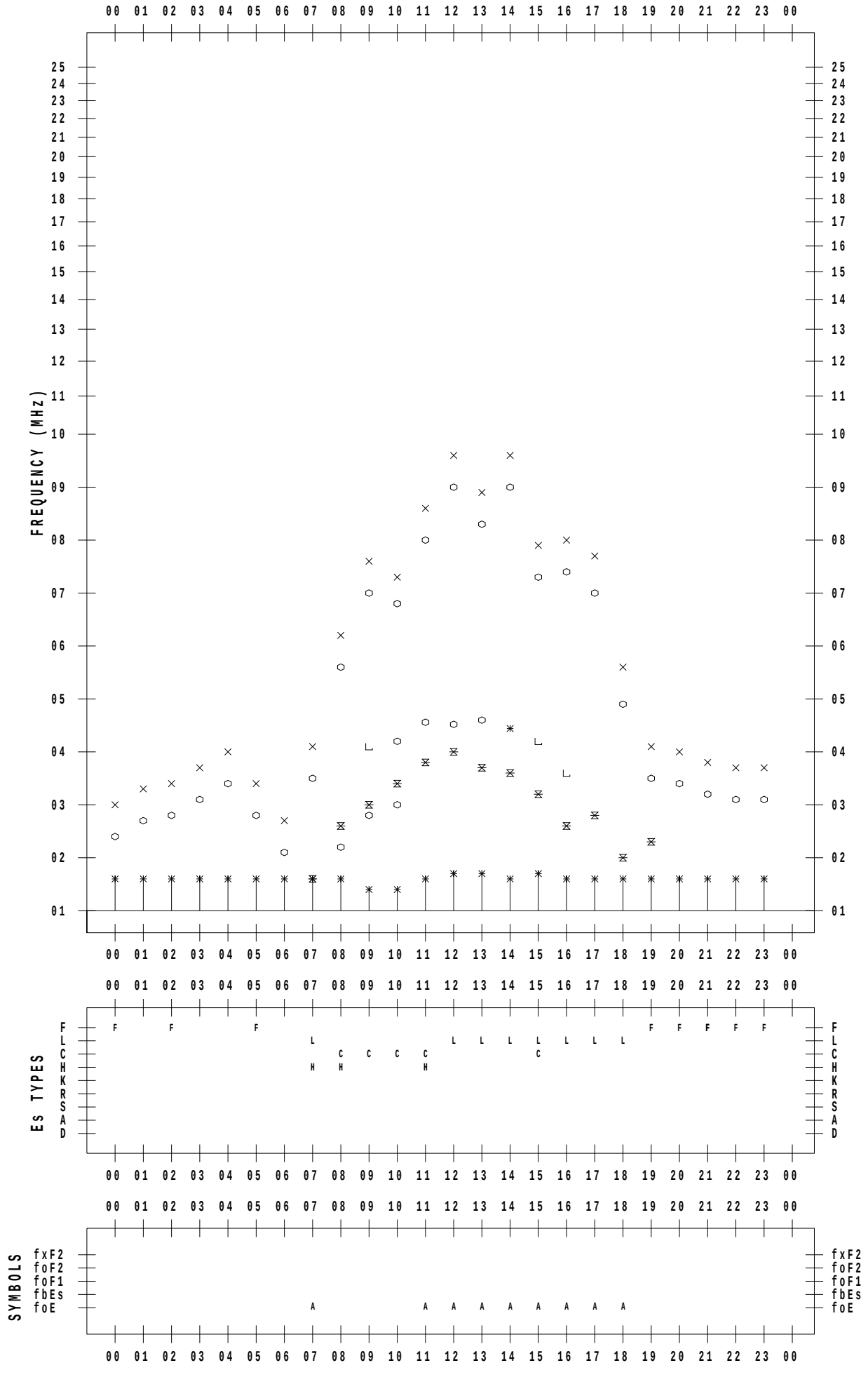
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/ 5

135 °E MEAN TIME



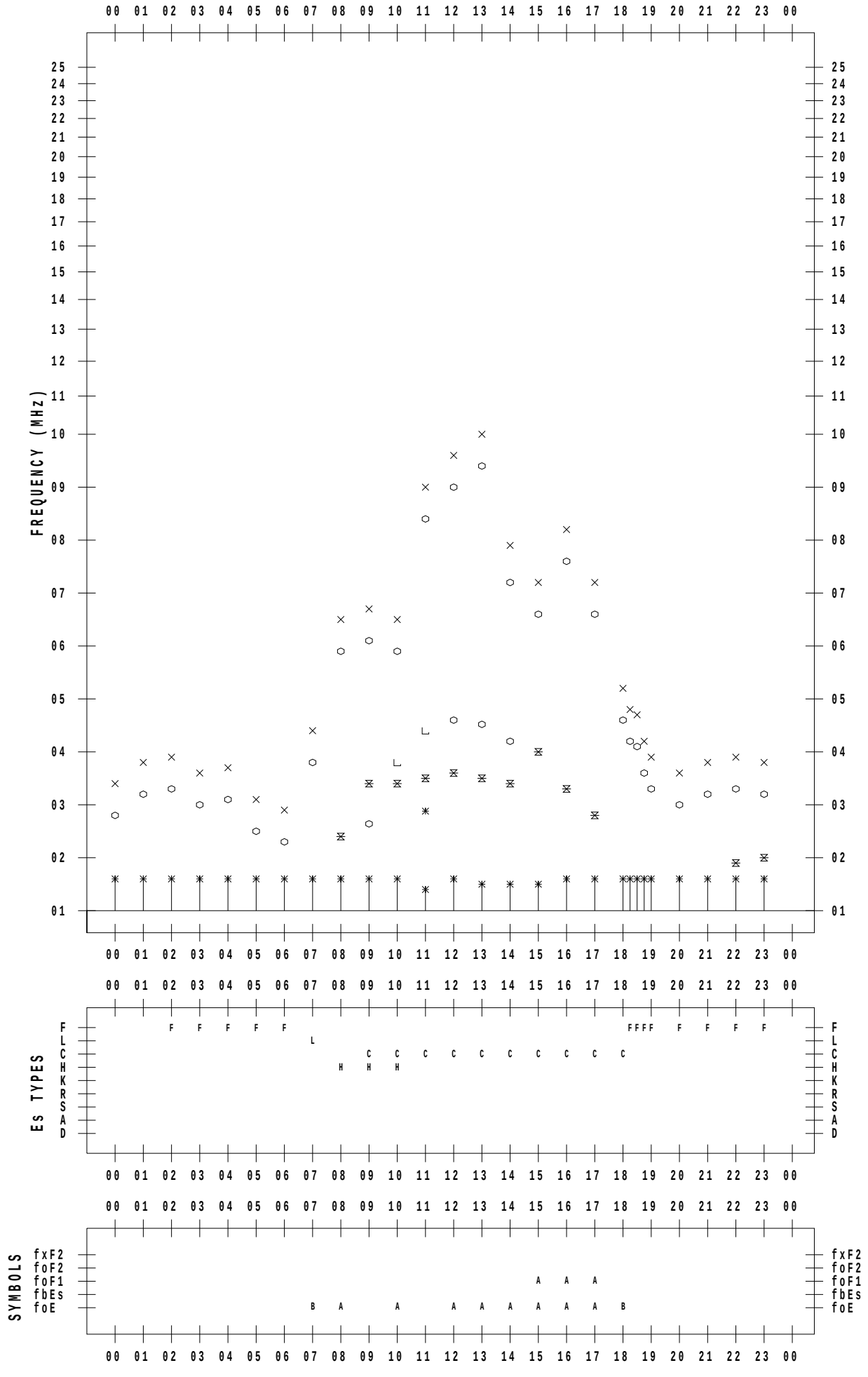
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/ 6

135 °E MEAN TIME



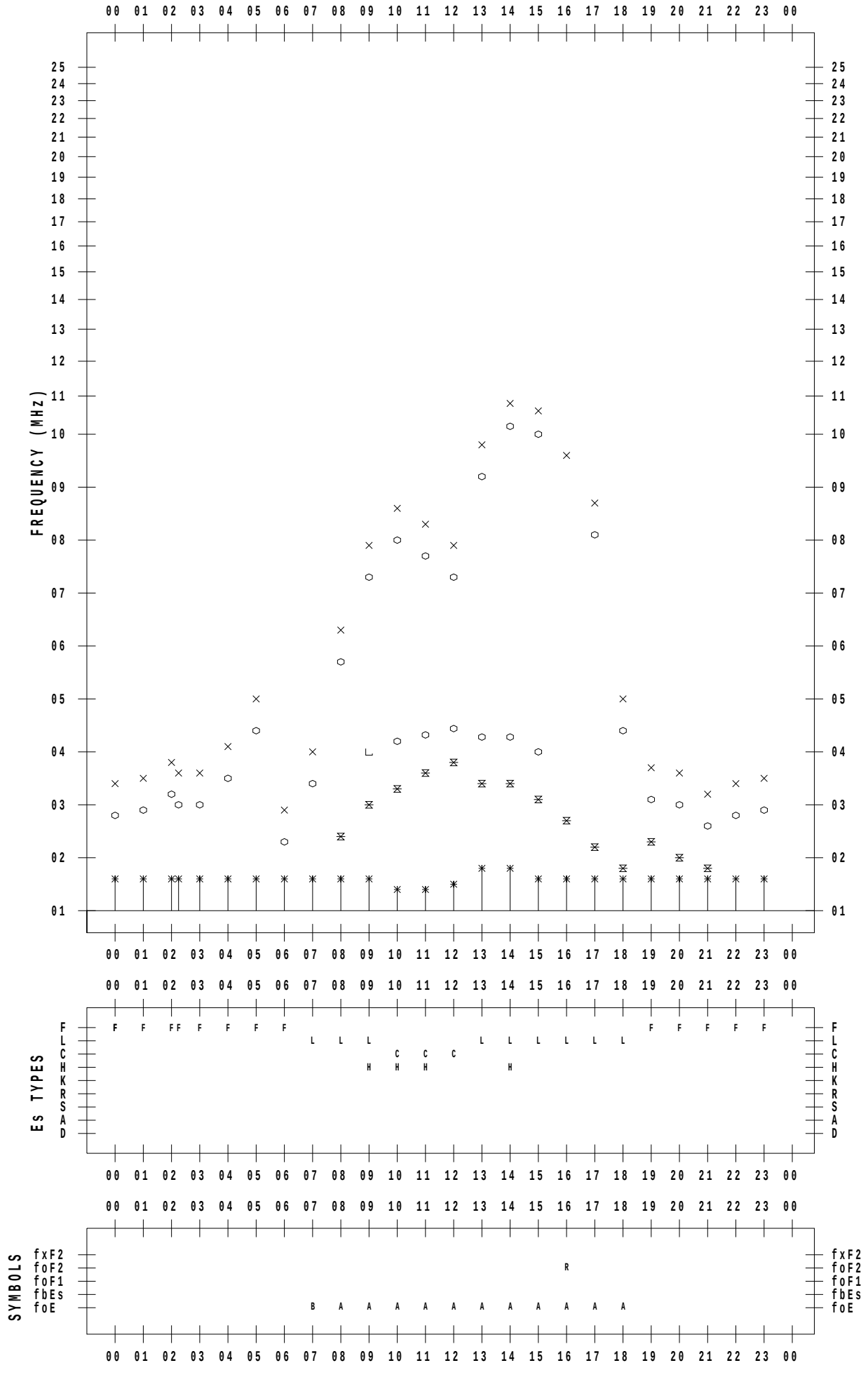
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/ 7

135 °E MEAN TIME



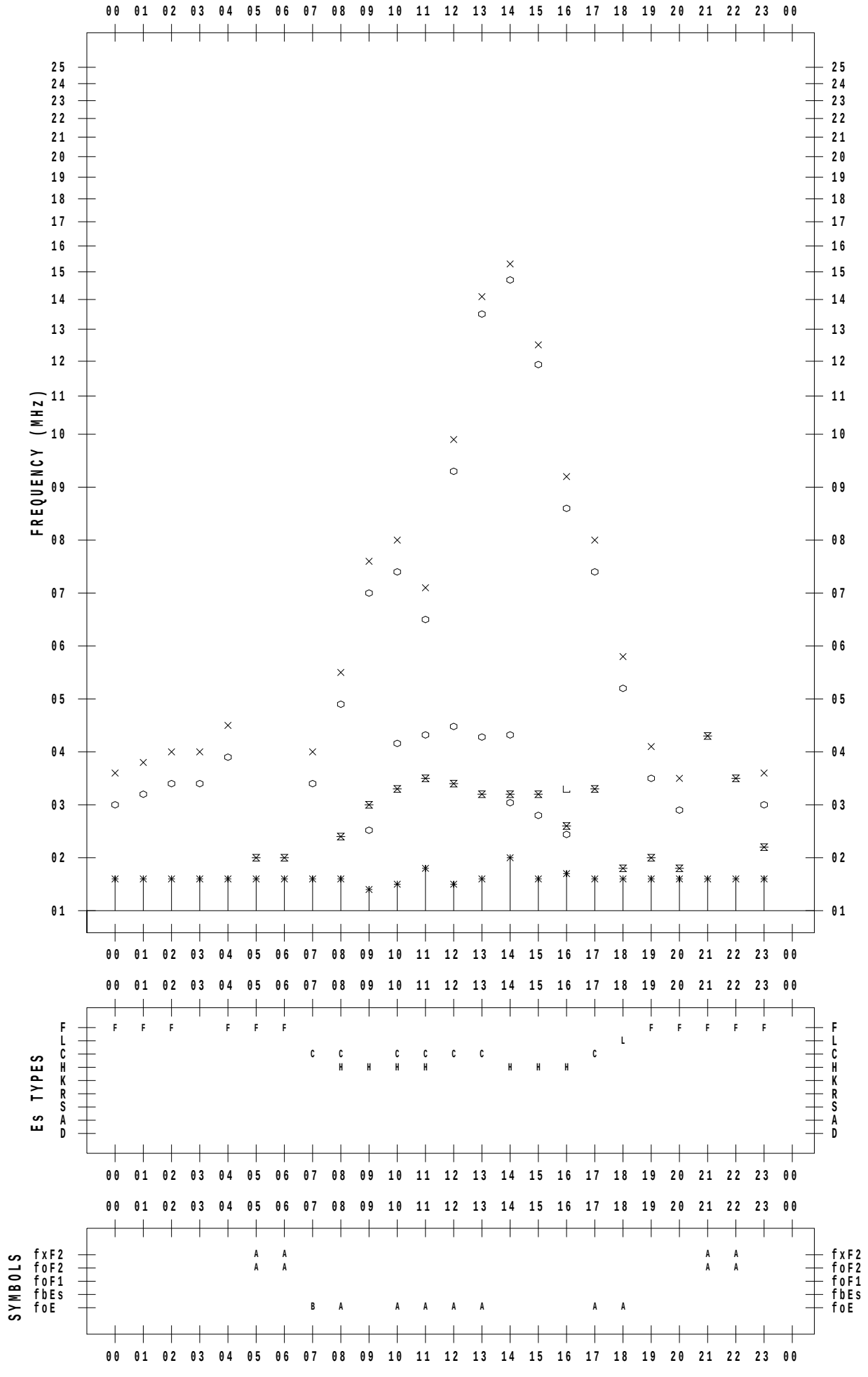
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/ 8

135 °E MEAN TIME



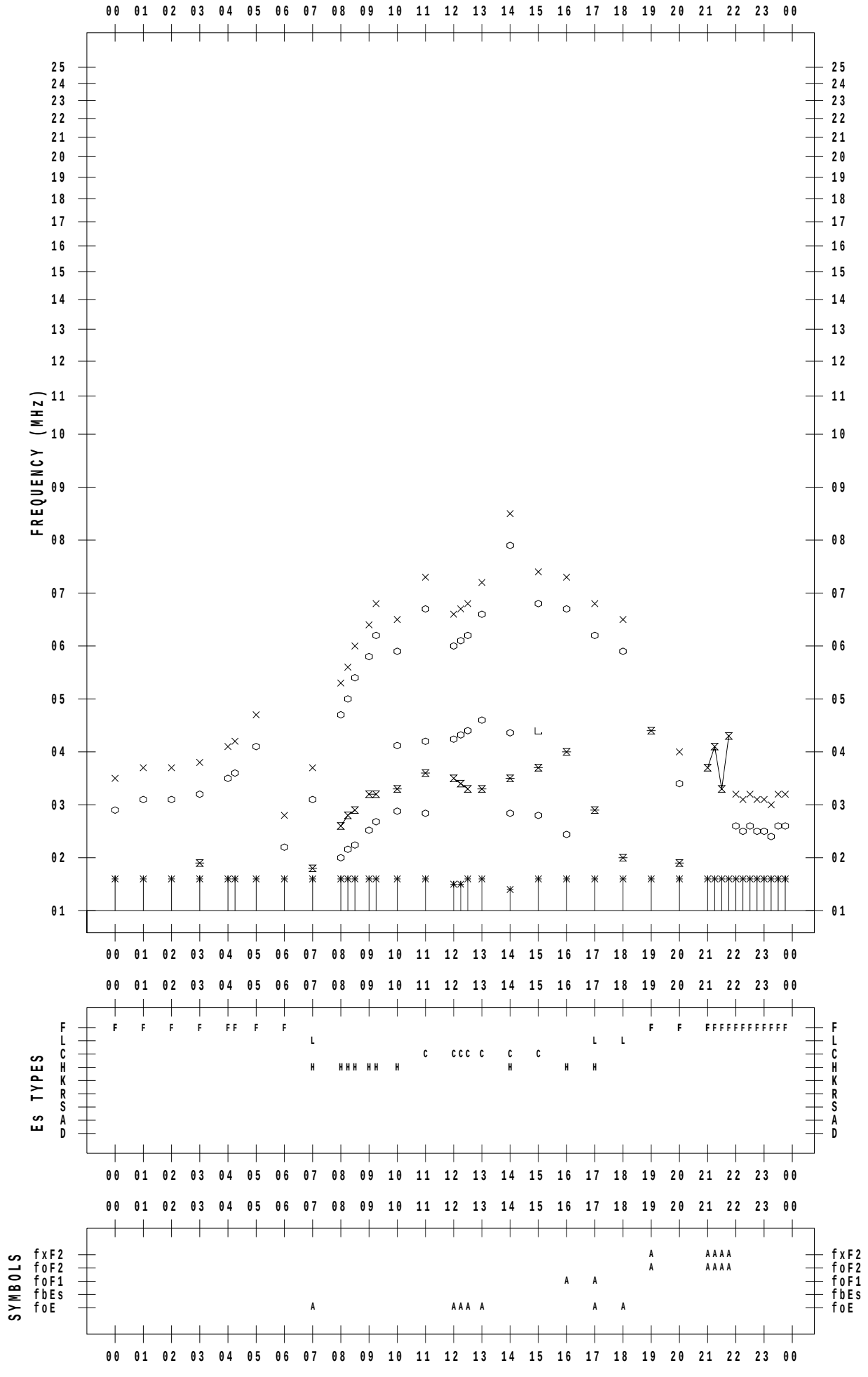
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/ 9

135 °E MEAN TIME



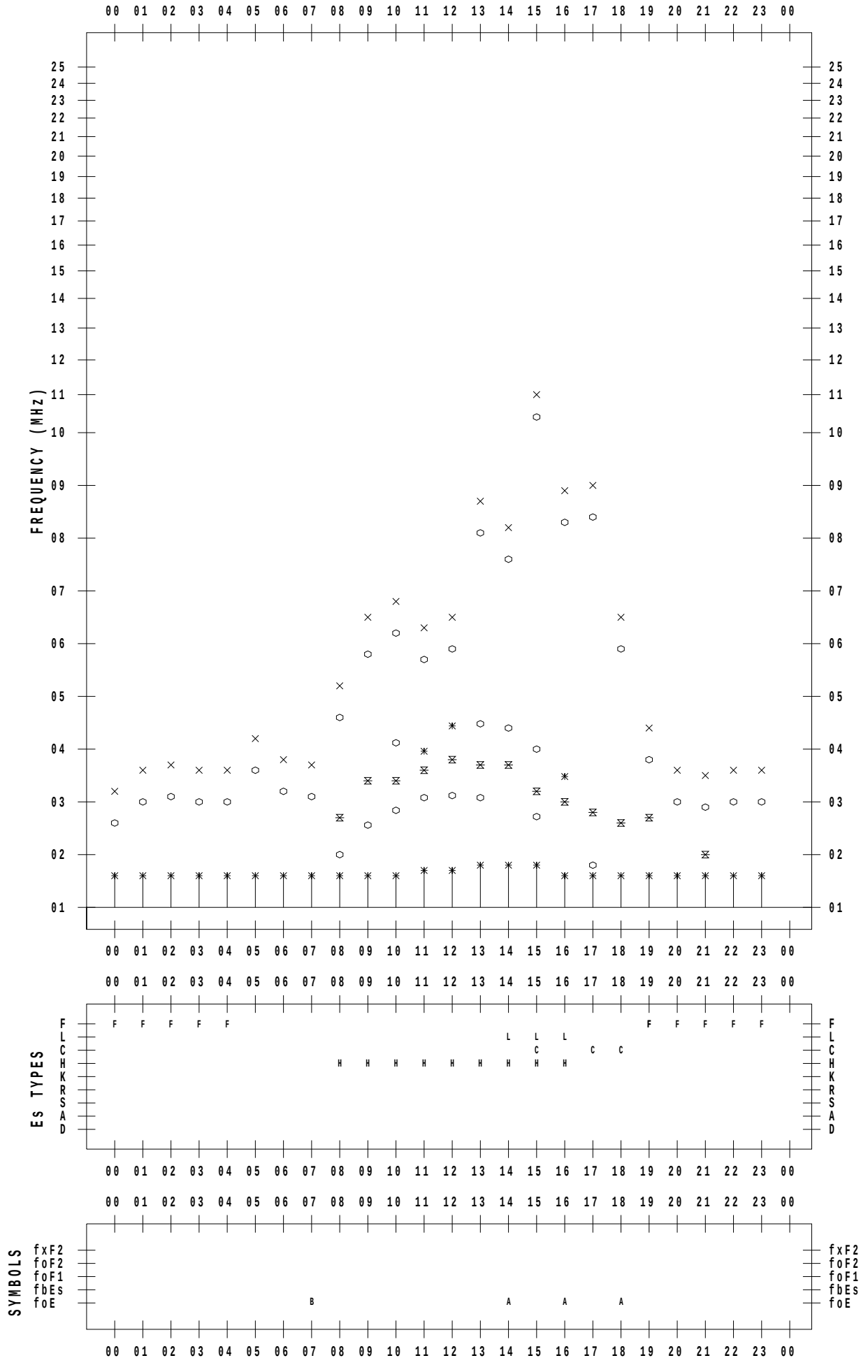
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/10

135 °E MEAN TIME



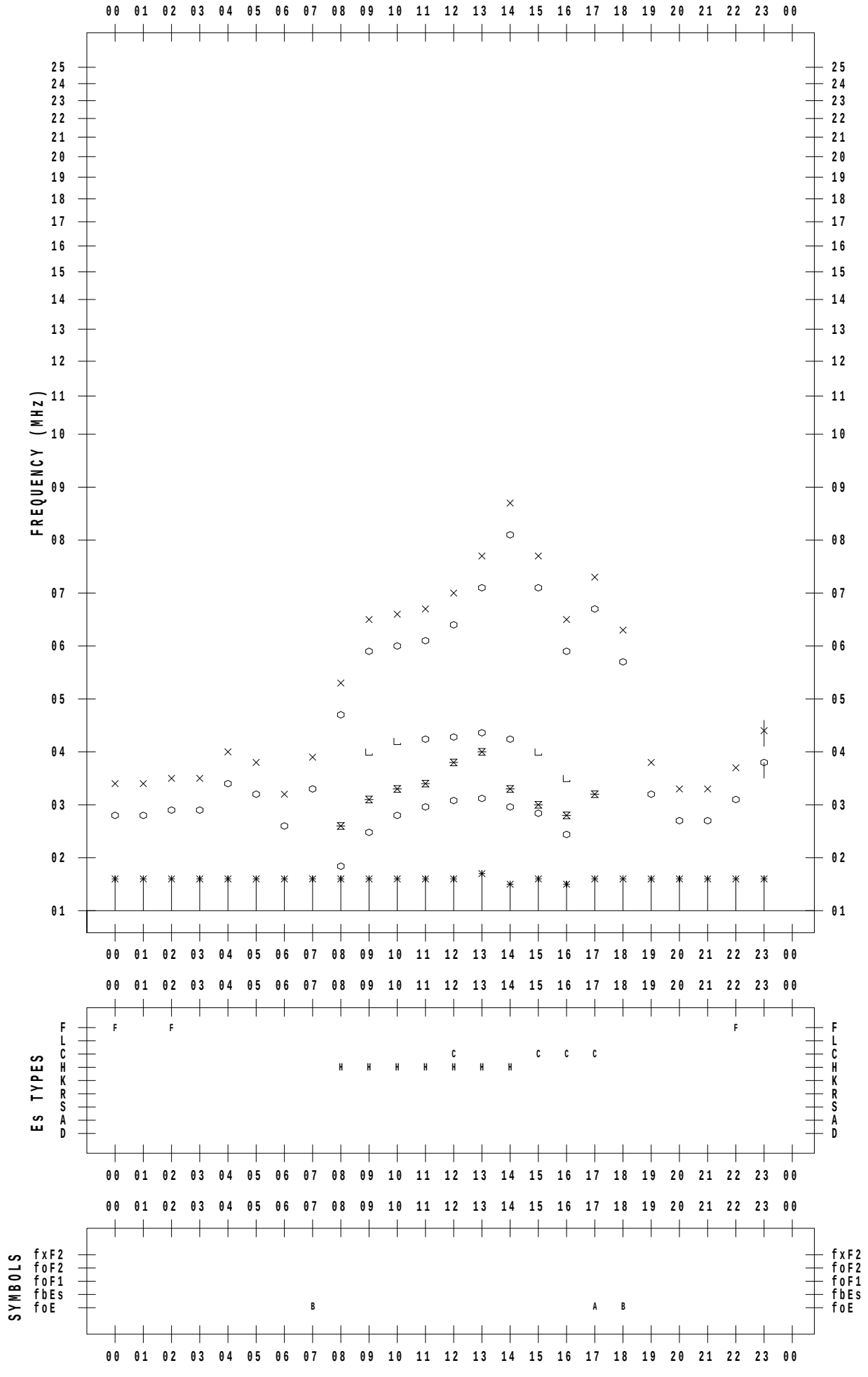
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/11

135 °E MEAN TIME



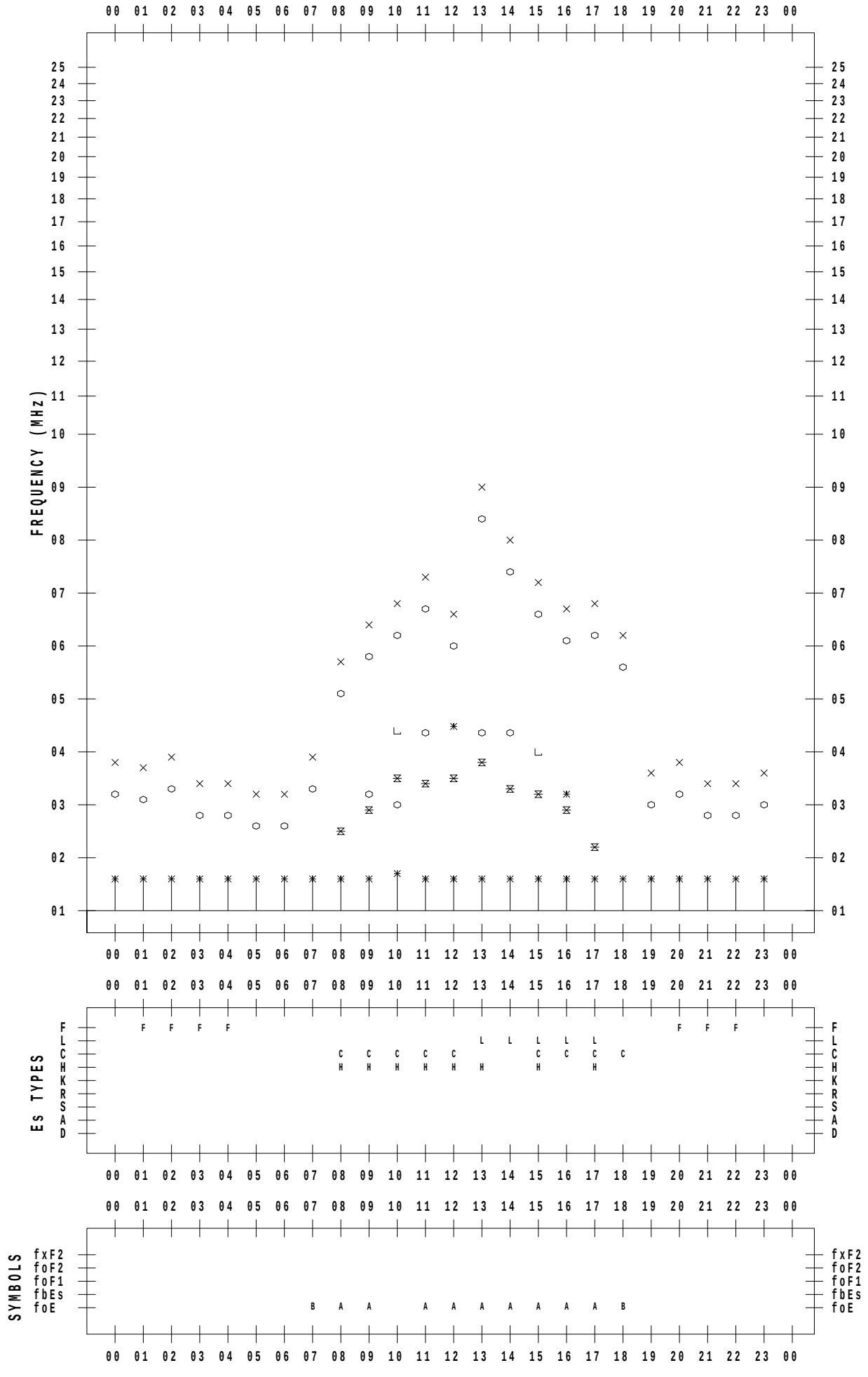
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/12

135 °E MEAN TIME



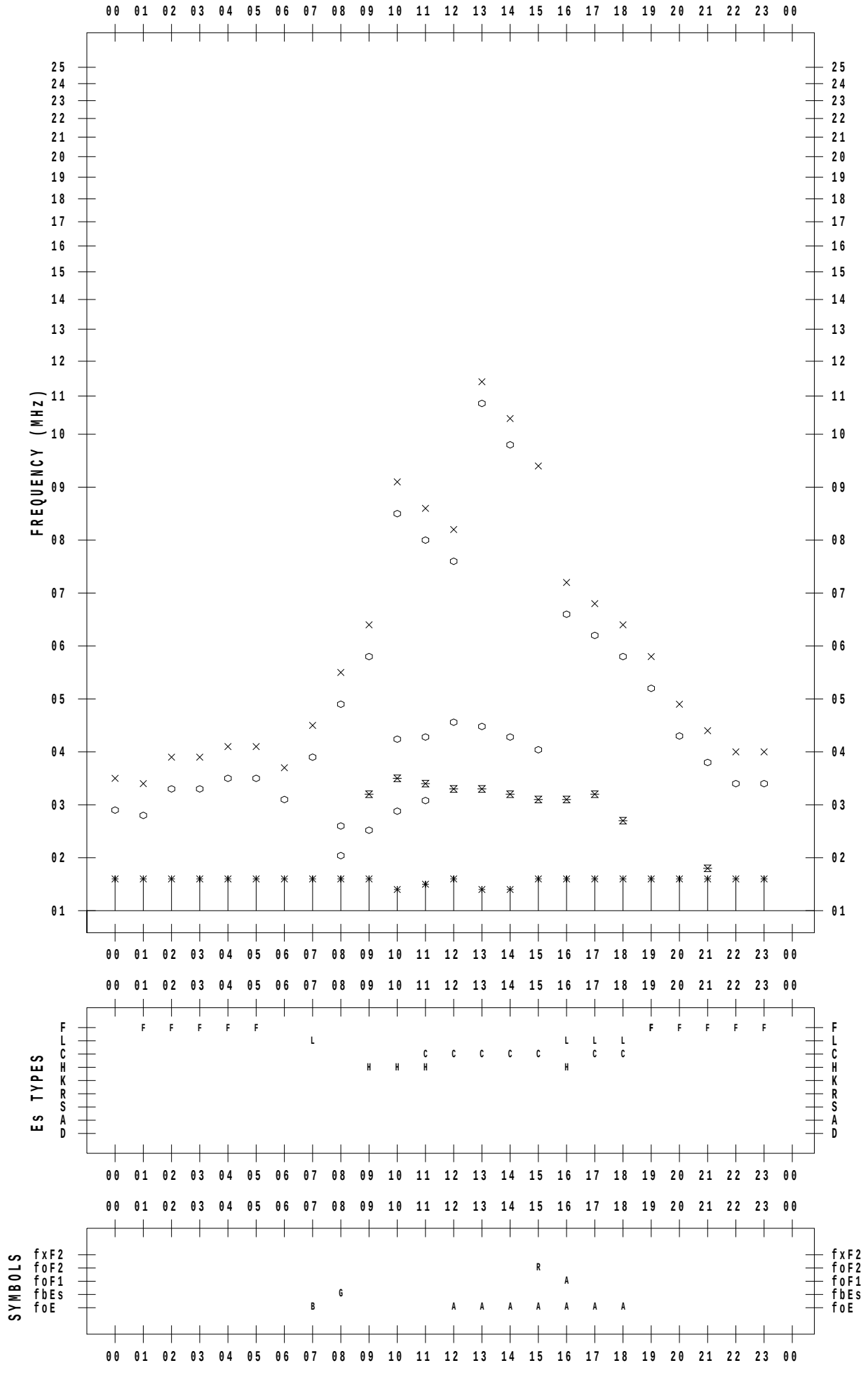
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/13

135 °E MEAN TIME



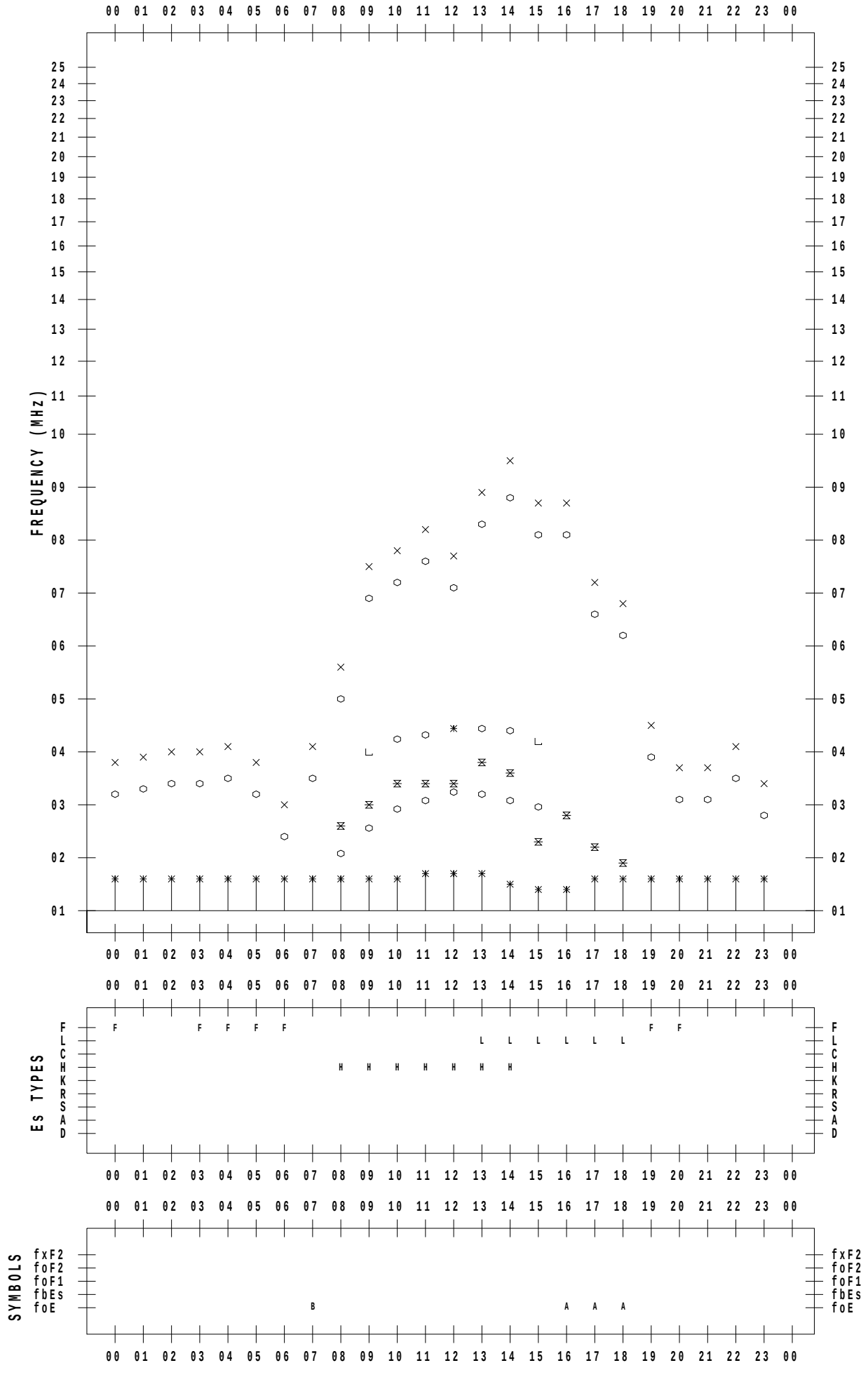
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/14

135 °E MEAN TIME



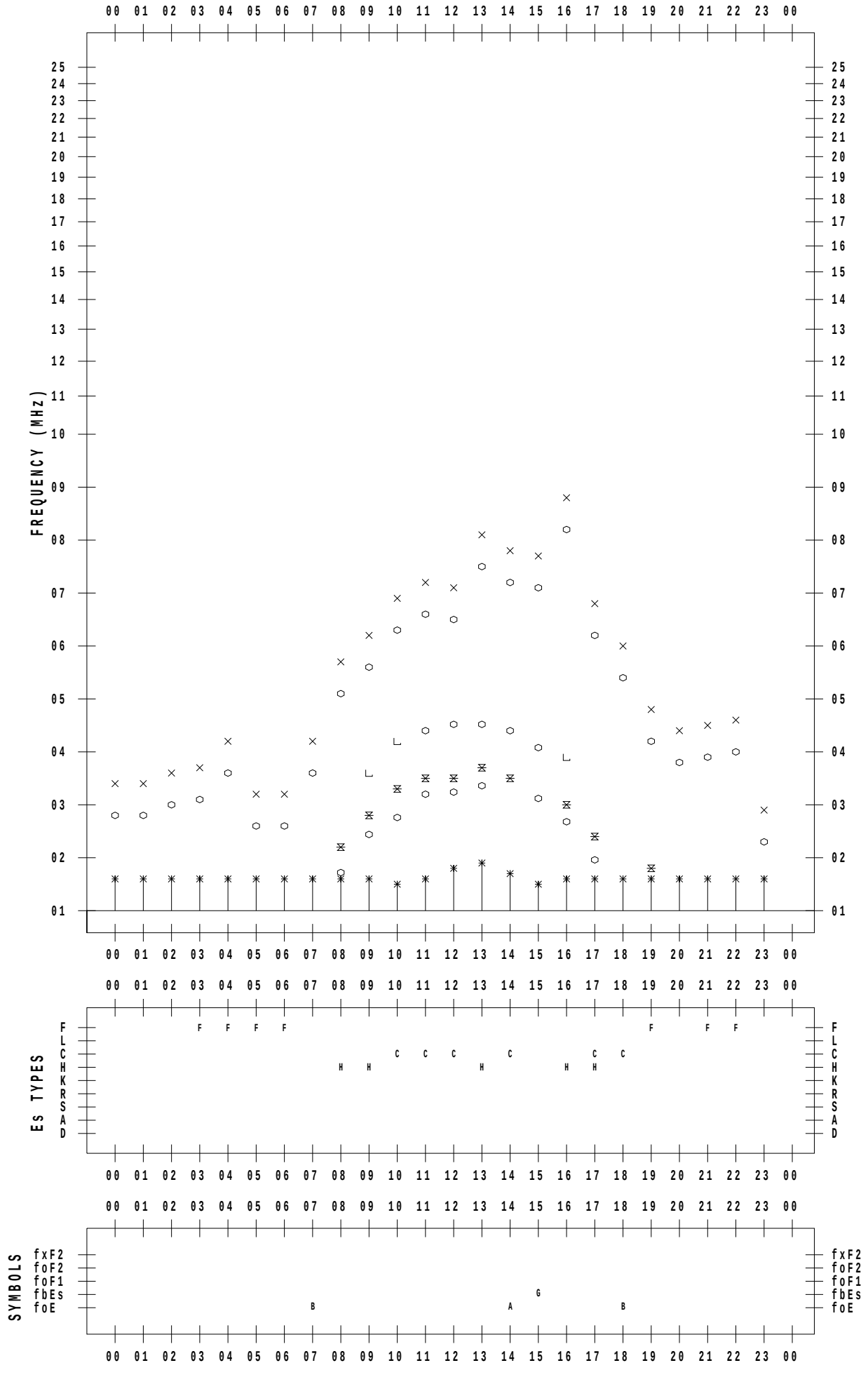
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/15

135 °E MEAN TIME



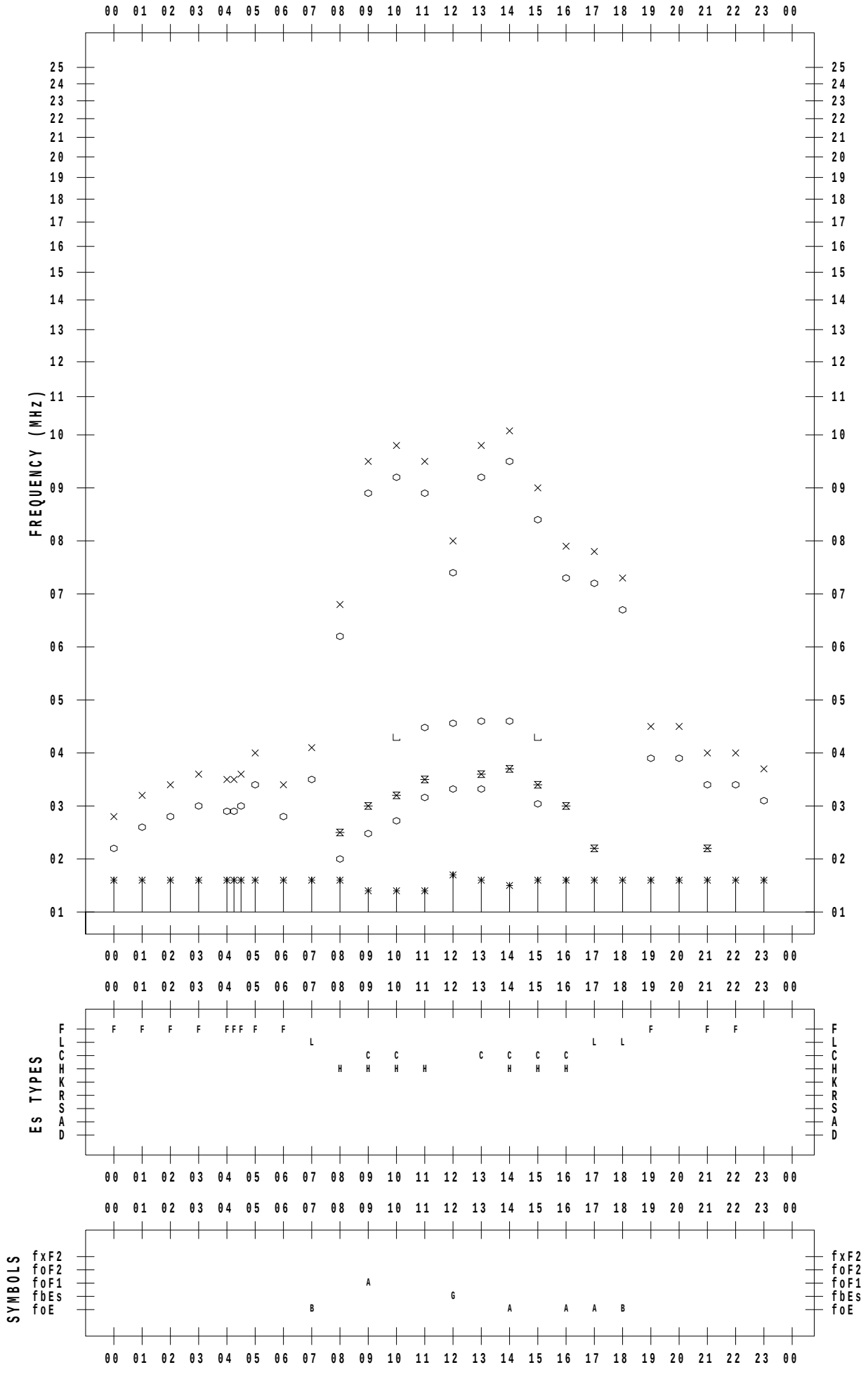
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/16

135 °E MEAN TIME



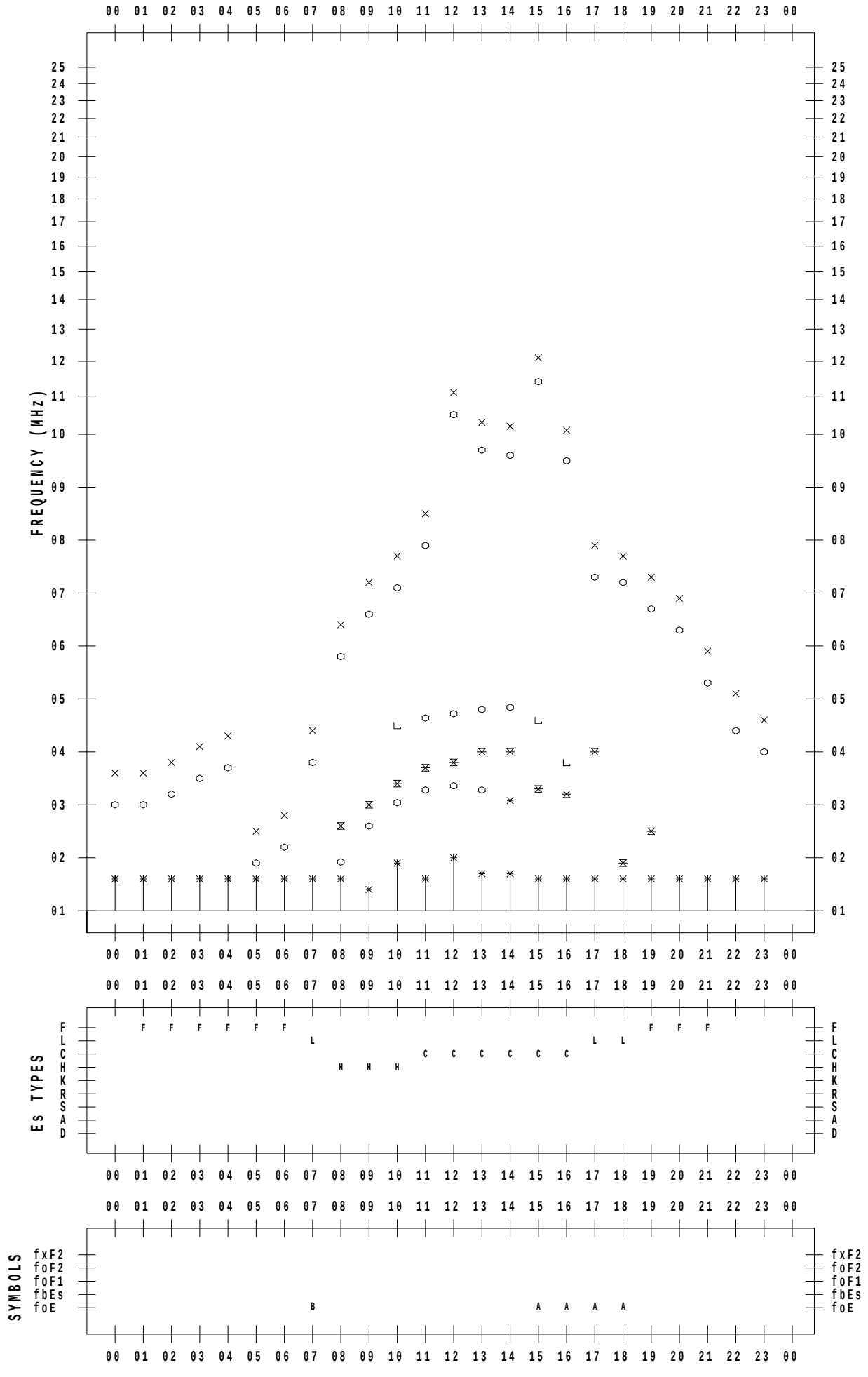
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/17

135 °E MEAN TIME



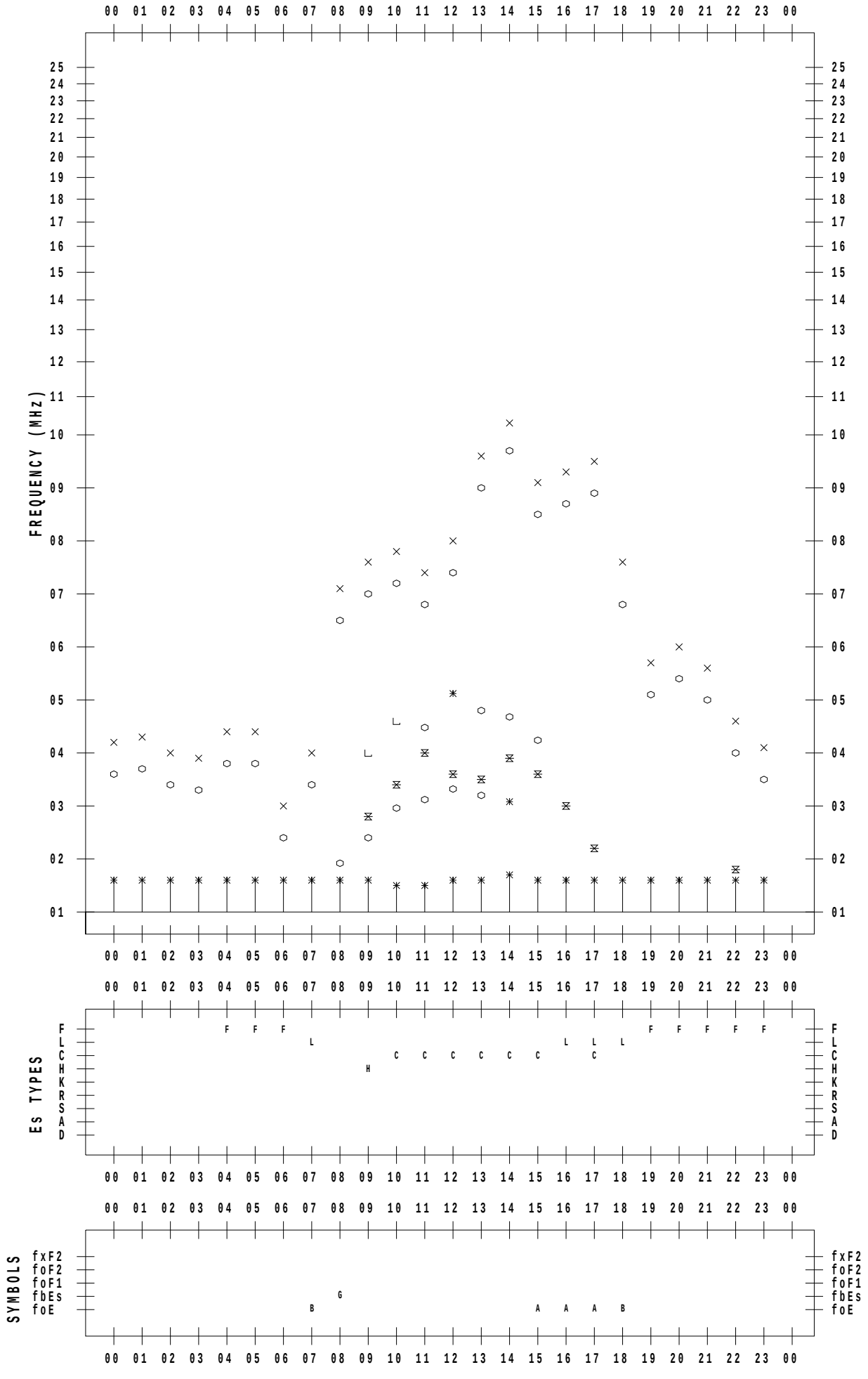
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/18

135 °E MEAN TIME



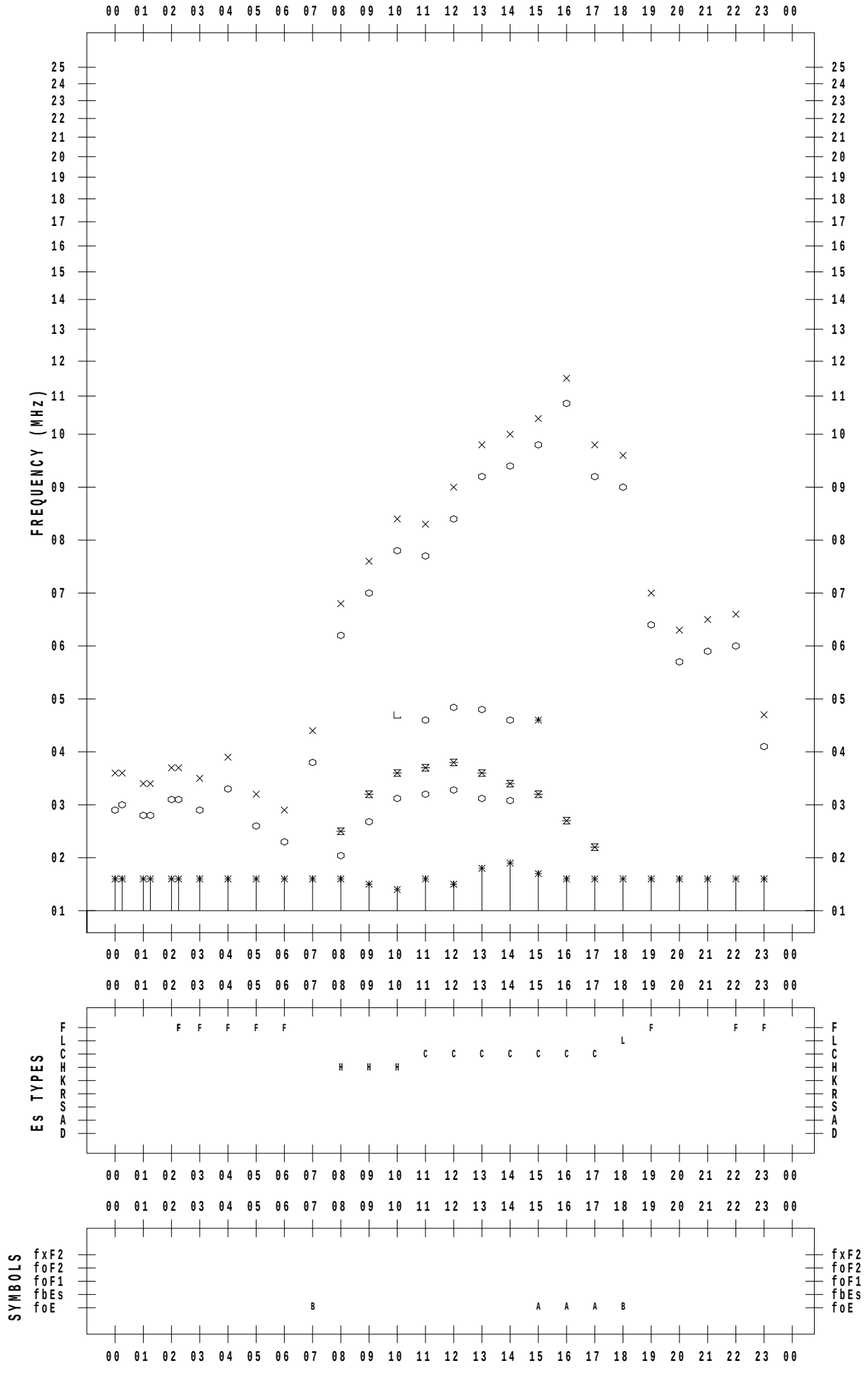
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/19

135 °E MEAN TIME



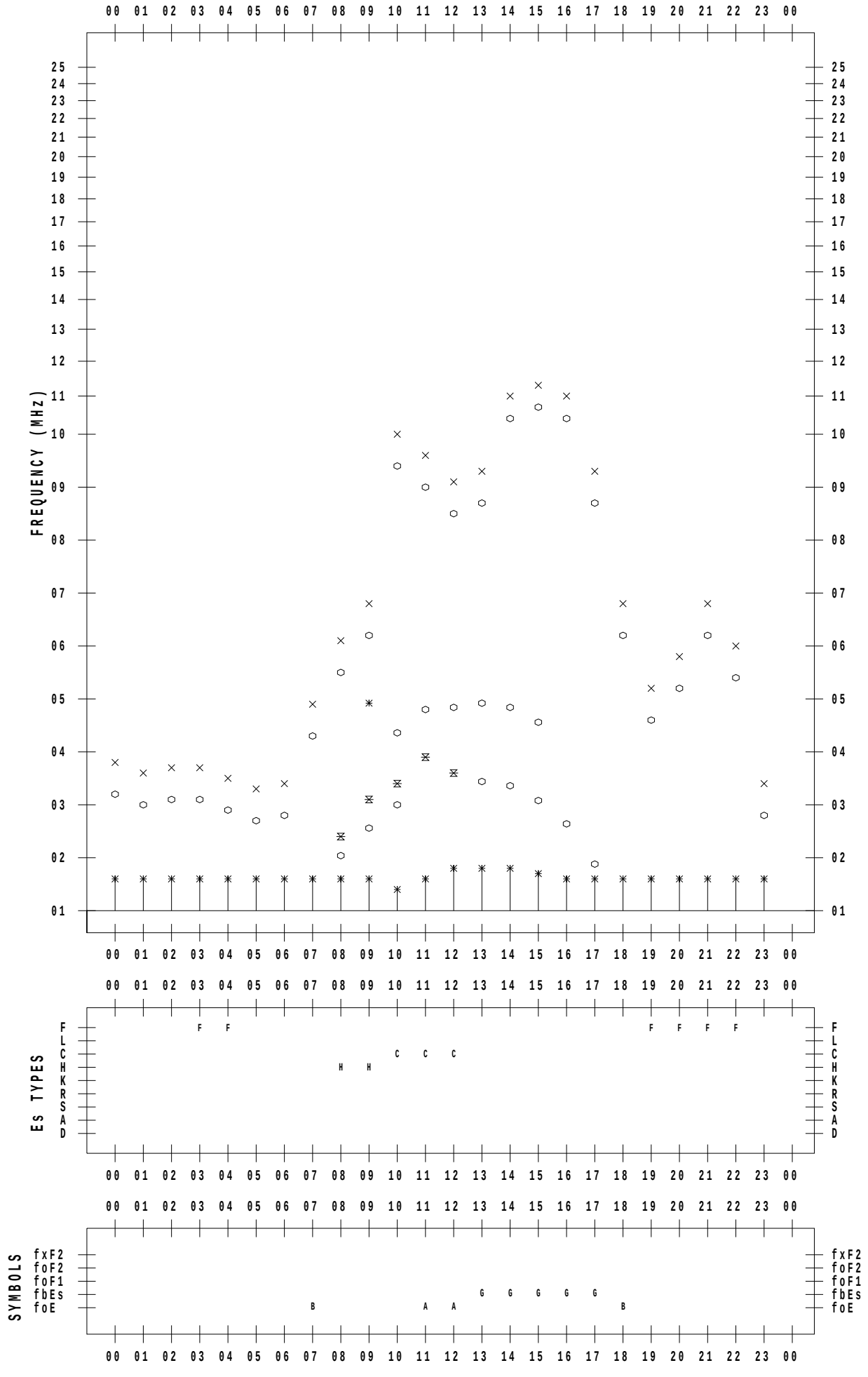
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/20

135 °E MEAN TIME



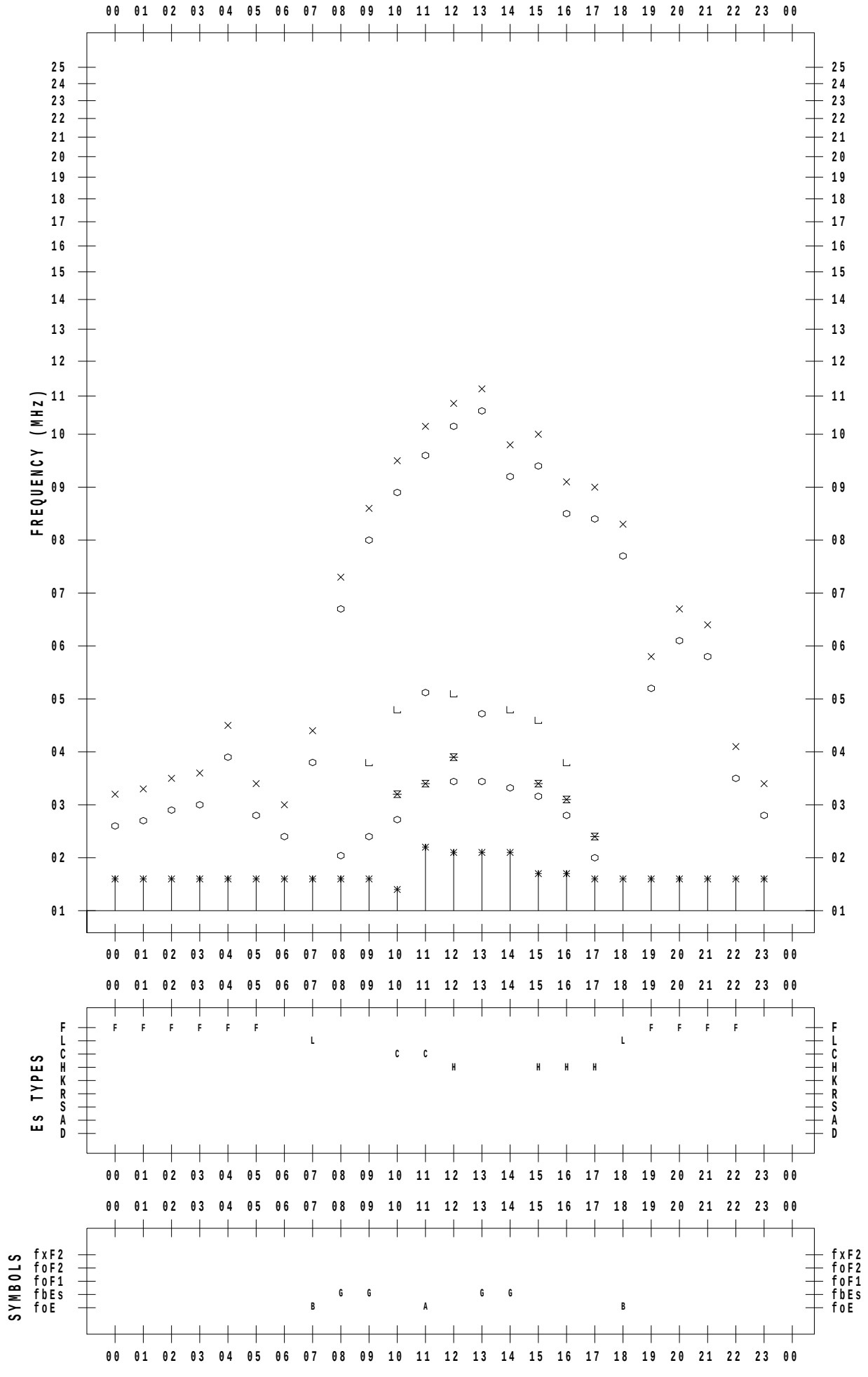
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/21

135 °E MEAN TIME



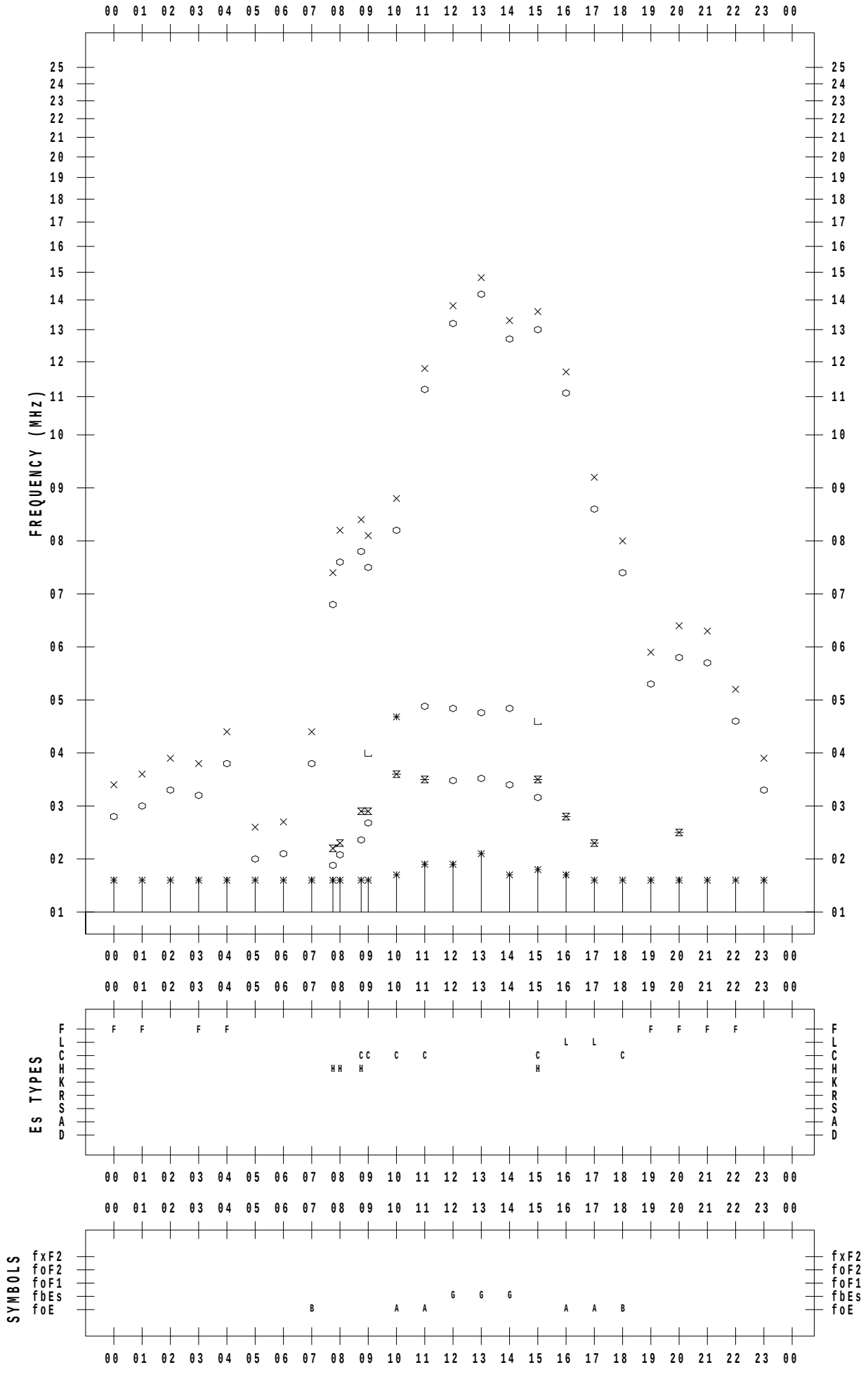
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/22

135 °E MEAN TIME



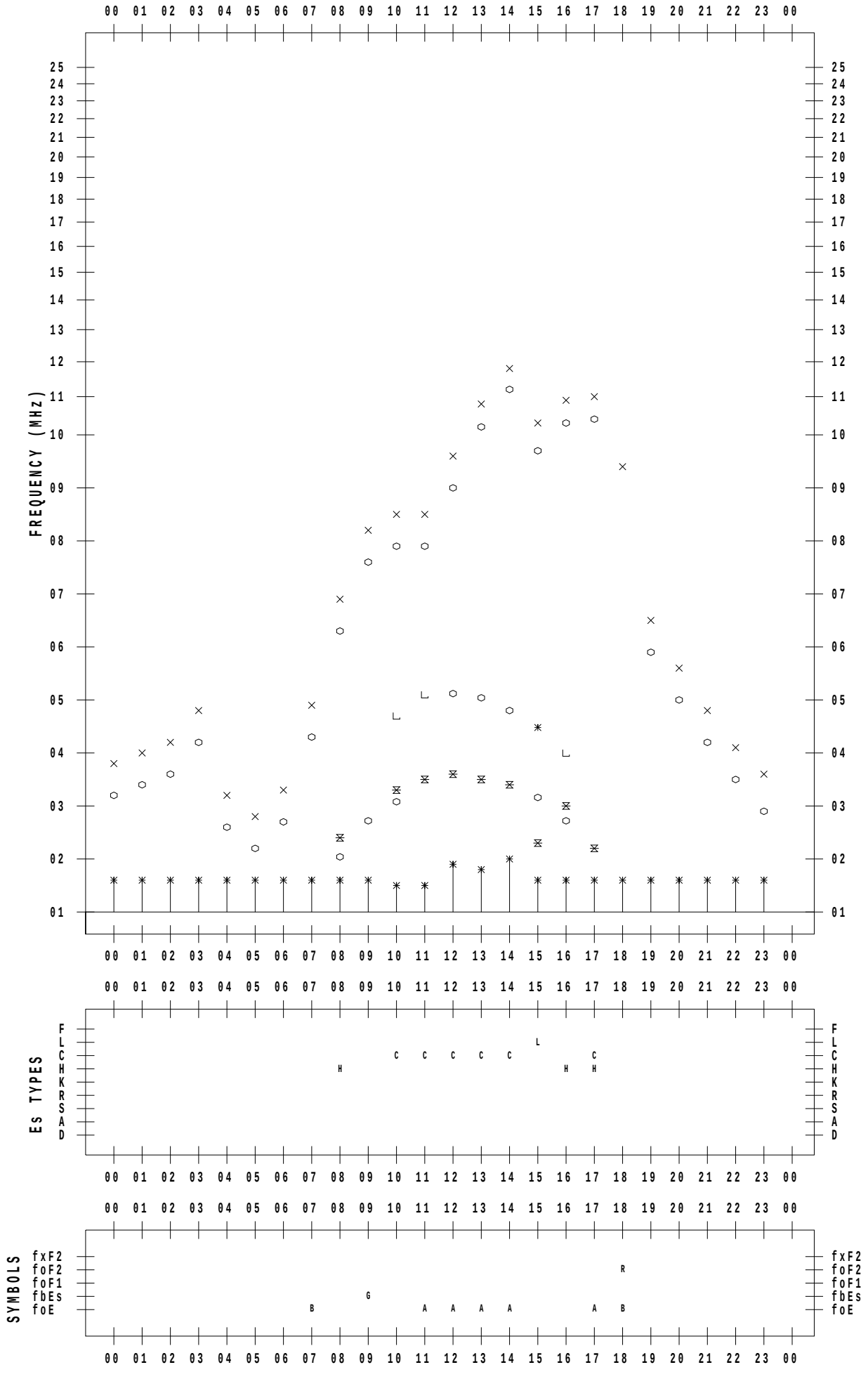
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/23

135 °E MEAN TIME



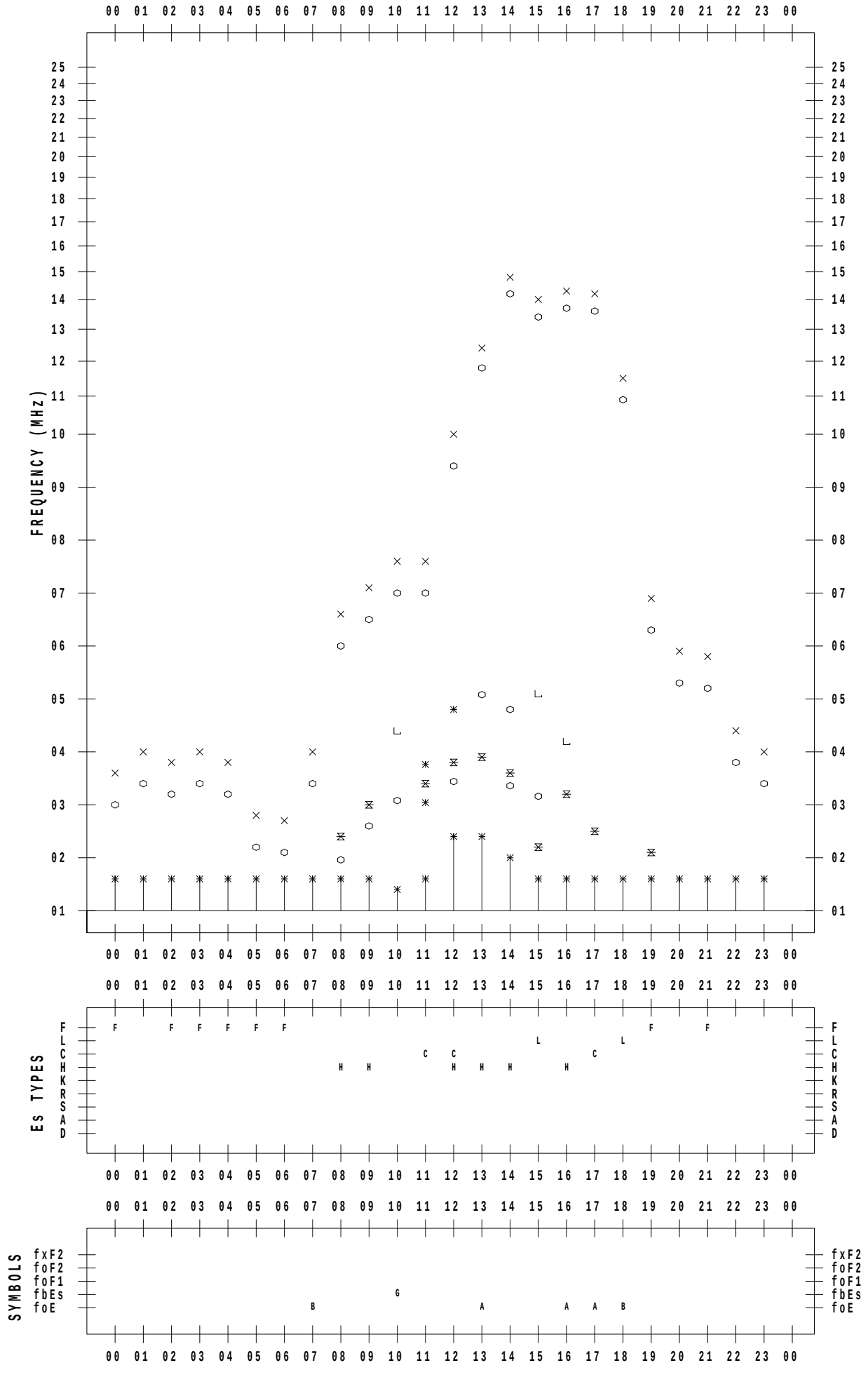
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/24

135 °E MEAN TIME



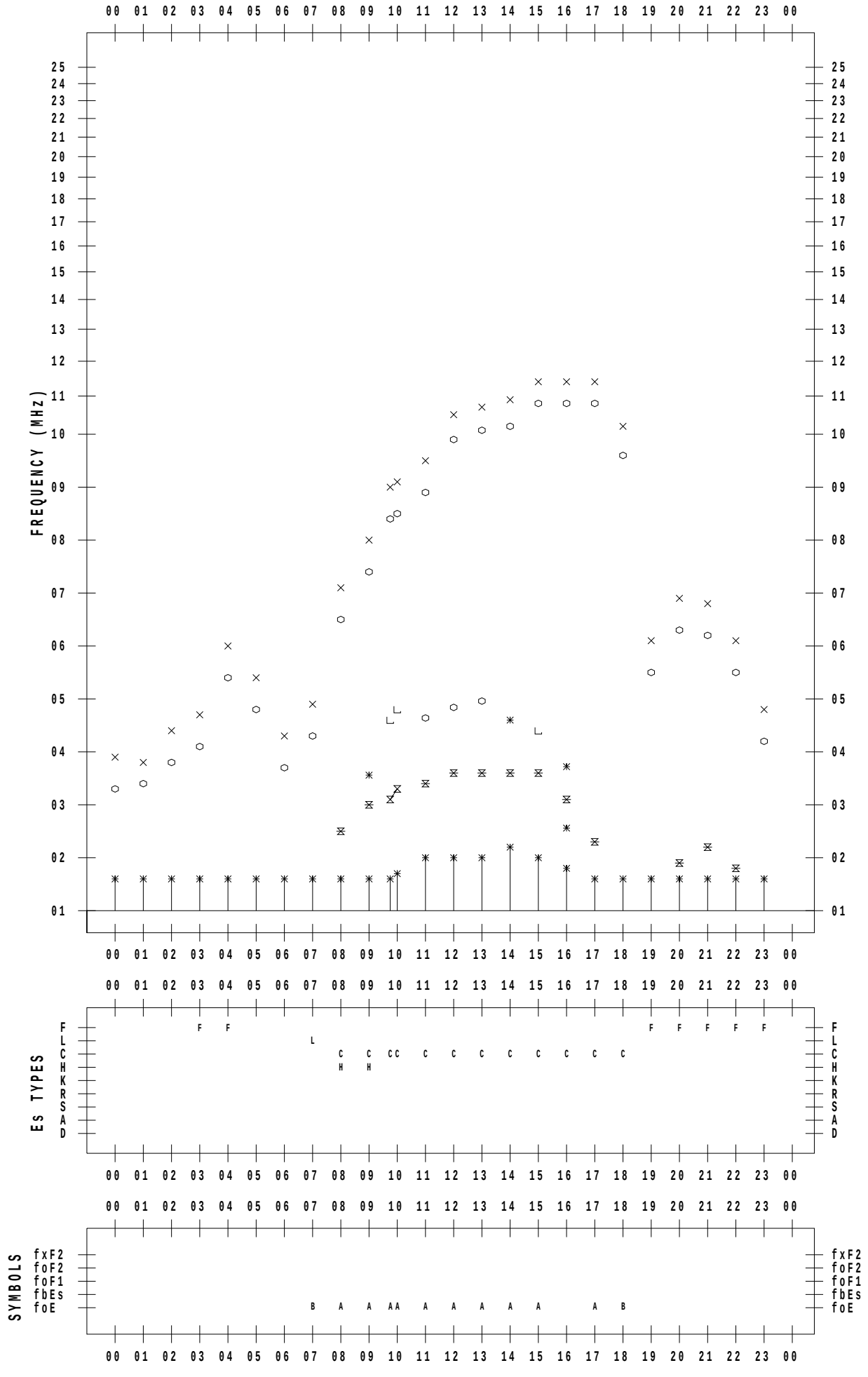
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/25

135 °E MEAN TIME



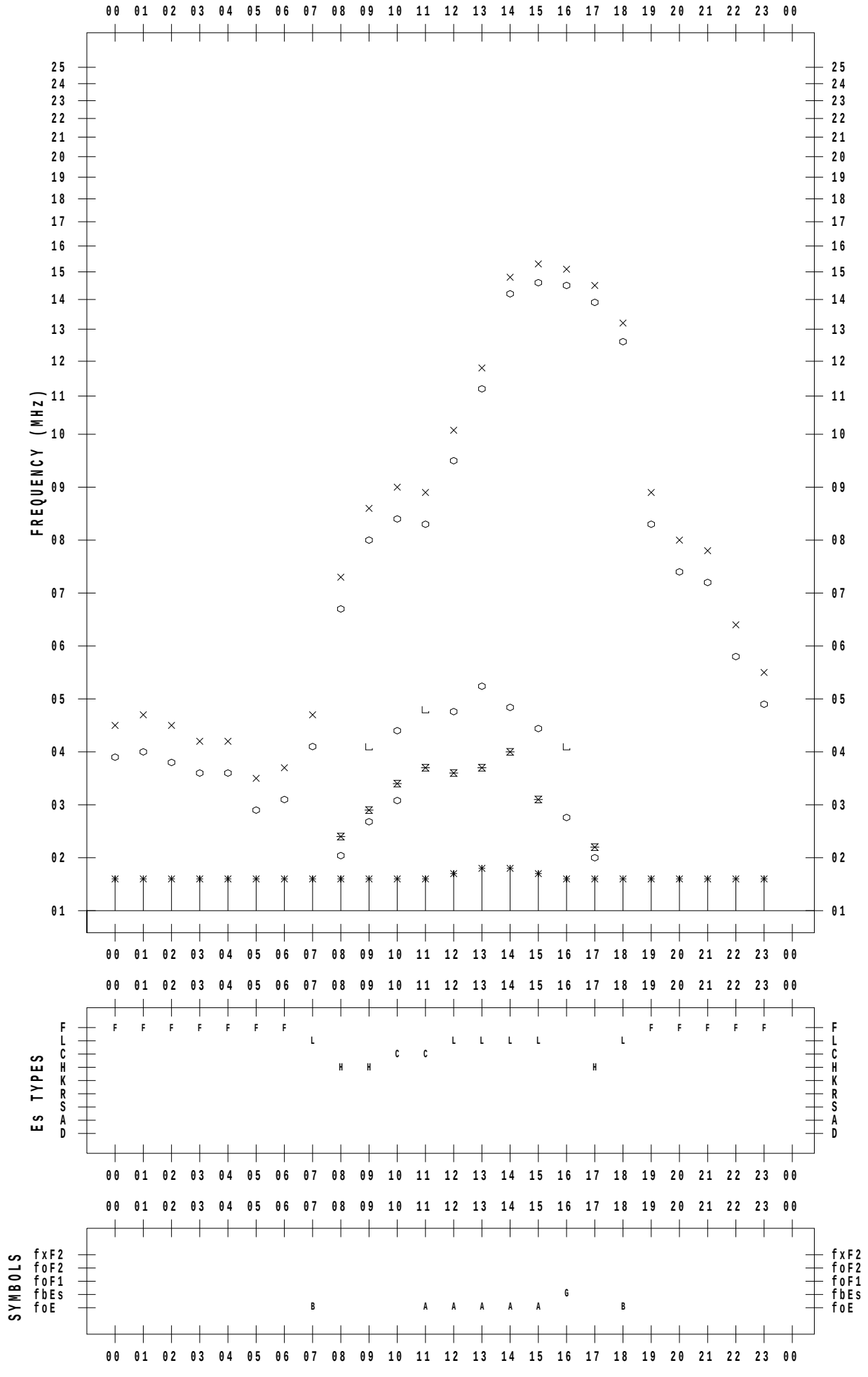
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/26

135 °E MEAN TIME



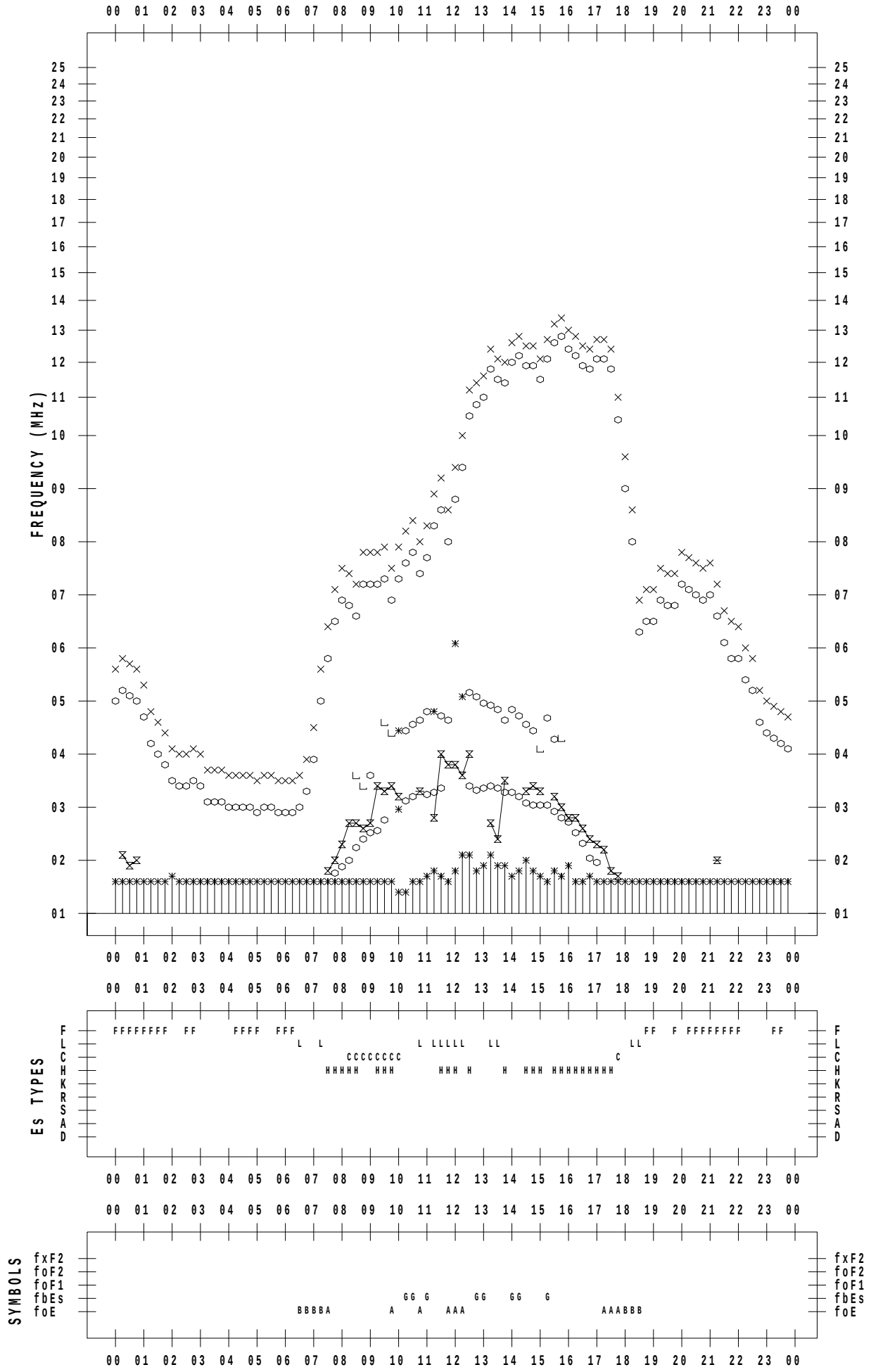
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/27

135 °E MEAN TIME



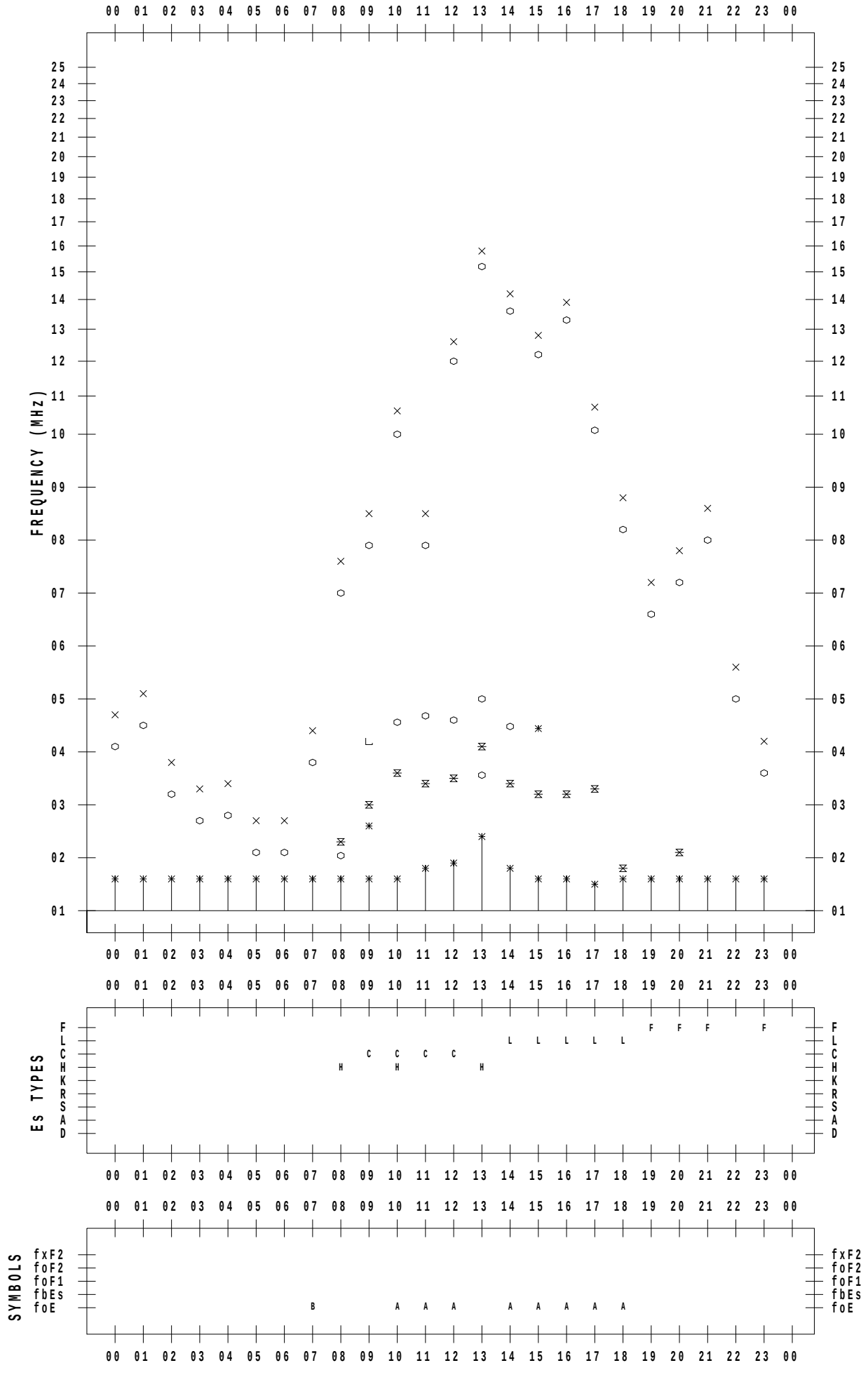
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/28

135 °E MEAN TIME



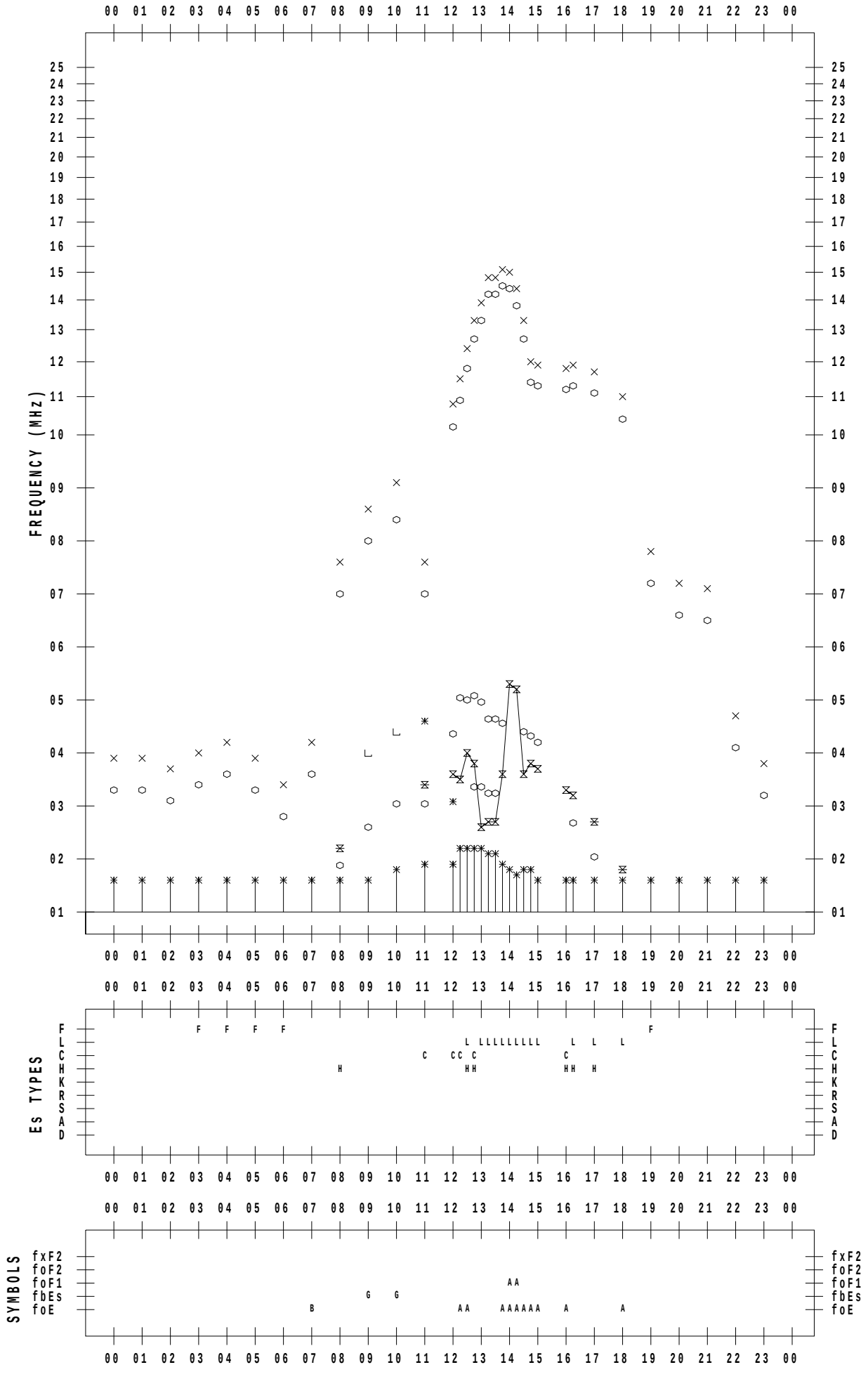
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/29

135 °E MEAN TIME



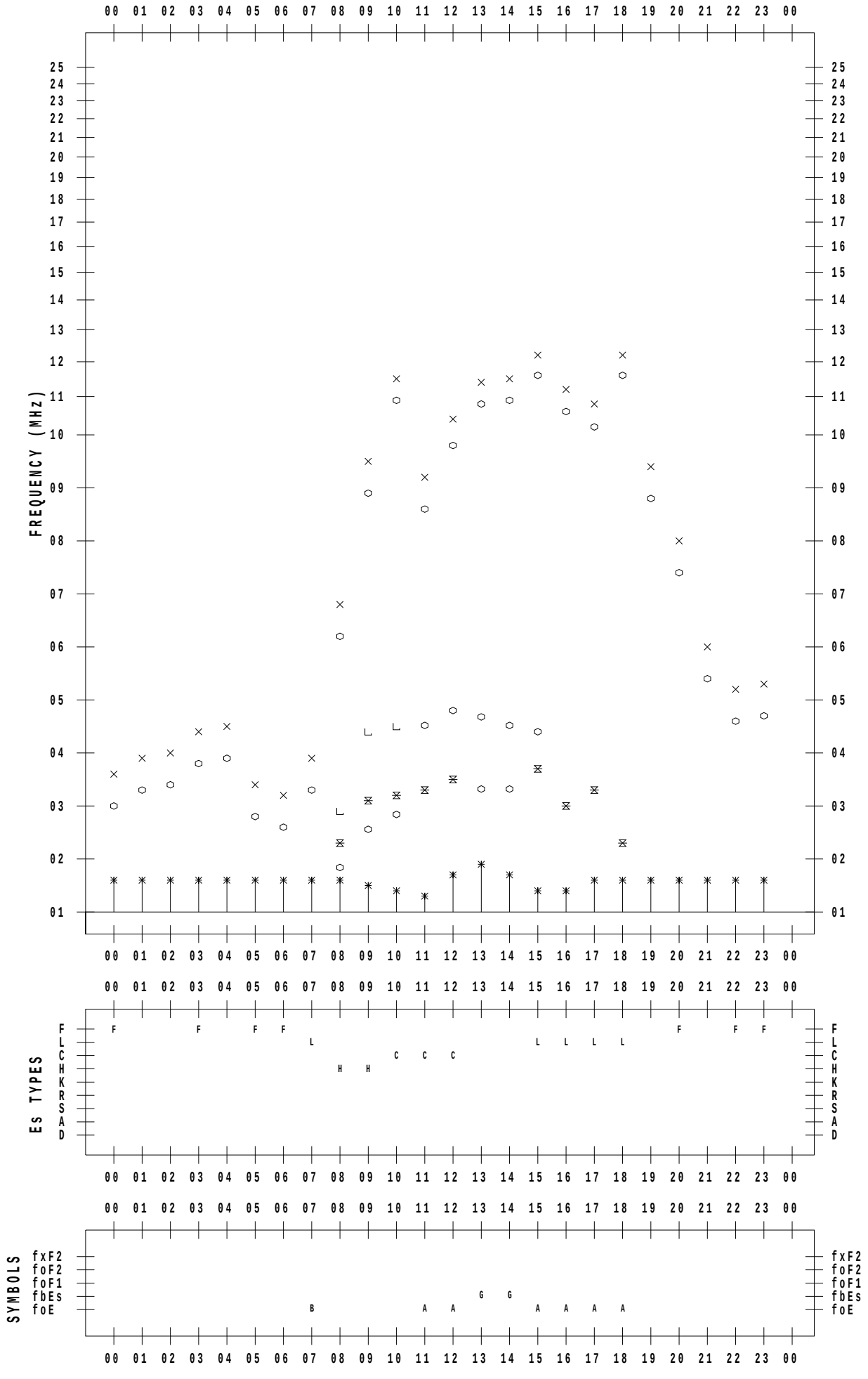
# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/30

135 °E MEAN TIME



# f-PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2021/12/31

135 °E MEAN TIME