

CRPL-F 160 PART A

FOR OFFICIAL USE

PART A  
IONOSPHERIC DATA

ISSUED  
DECEMBER 1957

U. S. DEPARTMENT OF COMMERCE  
NATIONAL BUREAU OF STANDARDS  
CENTRAL RADIO PROPAGATION LABORATORY  
BOULDER, COLORADO



CRPL-F 160  
PART A

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## IONOSPHERIC DATA

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## SYMBOLS, TERMINOLOGY, CONVENTIONS

Beginning with data reported for January 1952, and continuing through December 1956, the symbols, terminology, and conventions for the determination of median values used in this report (CRPL-F series) conform as far as practicable to those adopted at the Sixth Meeting of the International Radio Consultative Committee (C.C.I.R.) in Geneva, 1951. Excerpts concerning symbols and terminology from Document No. 626-E of this Meeting are given on pages 2-7 of the report CRPL-F89, "Ionospheric Data," issued January 1952. Reprints of these pages are available upon request.

Beginning with data for January 1957, the symbols used are given in NBS Report 5033, "Summary of Changes in Ionospheric Vertical Soundings, Observing and Scaling Procedures - Effective 1 January 1957," which draws upon the First Report of the Special Committee on World-Wide Ionospheric Soundings (URSI/AGI), Brussels, Sept. 2, 1956. A list of these symbols is available upon request.

In the Second Report of the Special Committee on World-Wide Ionospheric Soundings of the URSI/AGI Committee, May 1957, a new descriptive letter was introduced:

M Measurement questionable because the ordinary and extraordinary components are not distinguishable.

There was an expansion in meaning of the following:

Z (1) (qualifying letter) Measurement deduced from the third magnetoionic component.  
(2) (descriptive letter) Third magnetoionic component present.

Beginning with data for January 1945, median values are published wherever possible. Where averages are reported, they are, at any hour, the average for all the days during the month for which numerical data exist.

The following conventions are used in determining the medians for hours when no measured values are given because of equipment limitations and ionospheric irregularities. Symbols used are those given above.

a. For all ionospheric characteristics:

Values missing because of A, C, F, H, L, N, R or S are omitted from the median count.

b. For critical frequencies and virtual heights:

Values of  $f_0F2$  (and  $f_0E$  near sunrise and sunset) missing because of E are counted as equal to or less than the lower limit of the recorder. Values of  $h'F$  (and  $h'E$  near sunrise and sunset) missing for this reason are counted usually as equal to or greater than the median. Other characteristics missing because of E are omitted from the median count.

Values missing because of G are counted:

1. For  $f_0F2$ , as equal to or less than  $f_0F1$ .
2. For  $h'F2$ , as equal to or greater than the median.

The symbol W is included in the median count only when it replaces a height characteristic; the descriptive symbol D, only when it replaces a frequency characteristic.

Values missing for any other reason are omitted from the median count.

c. For MUF factor (M-factors):

Values missing because of G or W are counted as equal to or less than the median.

Values missing for any other reason are omitted from the median count.

d. For sporadic E (Es):

Values of fEs missing because of E or G (and B when applied to the daytime E region only) are counted as equal to or less than the median  $f_0E$ , or equal to or less than the lower frequency limit of the recorder.

At night B for fEs is counted on the low side when there is a numerical value of  $f_0F2$ ; otherwise it is omitted from the median count.

Values of fEs missing for any other reason, and values of  $h'E$ s missing for any reason at all are omitted from the median count.

Beginning with data for November 1945, doubtful monthly median values for ionospheric observations at Washington, D. C., are indicated by parentheses, in accordance with the practice already in use for doubtful hourly values. The following are the conventions used to determine whether or not a median value is doubtful:

1. If the count is four or less, the data are considered insufficient and no median value is computed.
2. For the F2 layer, h'F or foEs, if the count is from five to nine, the median is considered doubtful. The E and F1 layers are so regular in their characteristics that, as long as the count is at least five, the median is not considered doubtful. A count of at least 5 is considered sufficient for an h'E's median.
3. For all layers, if more than half of the data used to compute the medians are doubtful (either doubtful or interpolated), the median is considered doubtful.

The same conventions are used by the CRPL in computing the medians from tabulations of daily and hourly data for stations other than Washington, beginning with the tables in IRPL-F18.

Ordinarily, a blank space in the fEs or foEs column of a table is the result of the fact that a majority of the readings for the month are below the lower limit of the recorder or less than the corresponding values of foE. Blank spaces at the beginning and end of columns of h'F2 or h'F1, foF1, h'E, and foE are usually the result of diurnal variation in these characteristics. Complete absence of medians of h'F1 and foF1 is usually the result of seasonal effects.

The dashed-line prediction curves of the graphs of ionospheric data are obtained from the predicted zero-muf contour charts of the CRPL-D series publications. The following points are worthy of note:

- a. Predictions for individual stations used to construct the charts may be more accurate than the values read from the charts since some smoothing of the contours is necessary to allow for the longitude effect within a zone. Thus, inasmuch as the predicted contours are for the center of each zone, part of the discrepancy between the predicted and observed values as given in the F series may be caused by the fact that the station is not centrally located within the zone.
- b. The final presentation of the predictions is dependent upon the latest available ionospheric and radio propagation data, as well as upon predicted sunspot number.
- c. There is no indication on the graphs of the relative reliability of the data; it is necessary to consult the tables for such information.
- d. The tables may contain median values of either foEs or fEs. The graph of median Es corresponds to the table. Percentage curves of fEs are estimated from values of foEs when necessary.

## PREDICTED AND OBSERVED SUNSPOT NUMBERS

The following predicted smoothed 12-month running-average Zürich sunspot numbers were used in constructing the contour charts:

Month	Predicted Sunspot Number										
	1958	1957	1956	1955	1954	1953	1952	1951	1950	1949	1948
December	150*	150	42	11	15	33	53	86	108	114	
November	150*	147	35	10	16	38	52	87	112	115	
October	150*	135	31	10	17	43	52	90	114	116	
September	150*	119	30	8	18	46	54	91	115	117	
August	150*	105	27	8	18	49	57	96	111	123	
July	150*	95	22	8	20	51	60	101	108	125	
June	150*	89	18	9	21	52	63	103	108	129	
May	150*	150*	77	16	10	22	52	68	102	108	130
April	150*	150*	68	13	10	24	52	74	101	109	133
March	150*	150*	60	14	11	27	52	78	103	111	133
February	150*	150*	53	14	12	29	51	82	103	113	133
January	150*	150*	48	12	14	30	53	85	105	112	130

\*This number is believed representative of solar activity at a maximum portion of the current sunspot cycle.

The latest available information follows concerning the corresponding observed Zürich numbers beginning with the minimum of April 1954. Final numbers are listed through June 1956.

### Observed Sunspot Number

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1954				3	4	4	5	7	8	8	9	12
1955	14	16	19	23	29	35	40	46	55	64	73	81
1956	89	98	109	119	127	137	145	148	149	154	157	162
1957	169	171	174	181	186							

## WORLD - WIDE SOURCES OF IONOSPHERIC DATA

The ionospheric data given here in tables 1 to 72 and figures 1 to 144 were assembled by the Central Radio Propagation Laboratory for analysis and correlation, incidental to CRPL prediction of radio propagation conditions. The data are median values unless otherwise indicated. The following are the sources of the data in this issue:

**Commonwealth of Australia, Ionospheric Prediction Service of the Commonwealth Observatory:**

Brisbane, Australia  
Canberra, Australia  
Townsville, Australia

**Australian Department of Supply and Shipping, Bureau of Mineral Resources, Geology and Geophysics:**

Watheroo, Western Australia

**University of Graz:**  
Graz, Austria

**Escola Politecnica, University of Sao Paulo:**  
Sao Paulo, Brazil

**British Department of Scientific and Industrial Research, Radio Research Board:**

Falkland Is.  
Ibadan, Nigeria (University College of Ibadan)  
Inverness, Scotland  
Singapore, British Malaya  
Slough, England

**Defence Research Board, Canada:**  
Baker Lake, Canada  
Churchill, Canada  
Ottawa, Canada

**Radio Wave Research Laboratories, National Taiwan University,  
Taipeh, Formosa, China:**  
Formosa, China

**General Direction of Posts and Telegraphs, Helsinki, Finland:**  
Nurmijarvi, Finland

**Heinrich Hertz Institute, German Academy of Sciences, Berlin:  
Juliusruh/Rügen, Germany**

**The Royal Netherlands Meteorological Institute:**  
De Bilt, Holland

Christchurch Geophysical Observatory, New Zealand Department of Scientific and Industrial Research:

Campbell I.  
Rarotonga, Cook Is.  
Scott Base

Norwegian Defence Research Establishment, Kjeller per Lillestrom, Norway:

Oslo, Norway  
Tromso, Norway

Institute of Terrestrial Magnetism, Ionosphere and Radio Propagation, Moscow, U.S.S.R.:

Ashkhabad  
Irkutsk  
Providenie Bay  
Rostov-on-Don  
Sverdlovsk

South African Council for Scientific and Industrial Research:

Capetown, Union of South Africa  
Johannesburg, Union of South Africa

Research Institute of National Defence, Stockholm, Sweden:

Kiruna, Sweden  
Lycksele, Sweden  
Upsala, Sweden

Royal Board of Swedish Telegraphs, Radio Department, Stockholm, Sweden:

Lulea, Sweden

Post, Telephone and Telegraph Administration, Berne, Switzerland:

Schwarzenburg, Switzerland

United States Army Signal Corps:

Ft. Monmouth, New Jersey  
Okinawa I.  
St. John's, Newfoundland  
Thule, Greenland  
White Sands, New Mexico

National Bureau of Standards (Central Radio Propagation Laboratory):

Anchorage, Alaska  
Panama Canal Zone  
Puerto Rico, W. I.  
Washington, D. C.

## INDEX OF IONOSPHERIC DATA PUBLISHED IN 1957

(CRPL-F149(A) THROUGH F160(A))

The following index of tables and graphs of ionospheric data published in the CRPL-F(A) series in 1957 is divided into two parts. Part I is an index of data observed in 1956 and 1957. Part II is an index of data observed prior to 1956.

In general, both table and graphs for a given station for a given month appear in the same issue.

Indexes of ionospheric data published prior to 1957 are in IRPL-F17, CRPL-F28, -F40, -F52, -F64, -F76, -F88, -F100, -F112, -F124, -F136(A), and -F148(A).

## PART II

Index of Tables and Graphs of Ionospheric Data Observed in 1956 and 1957

and Published in 1957 (CRPL-F149(A) through F160(A))

Station	1956										1957											
	J	F	M	A	M	J	Jy	A	S	O	N	O	J	F	M	A	M	J	Jy	A	S	N
Adak, Alaska																						
Ahmedabad, India	150	151		154	155		157	159	159	149	150	151	153	155	154	155	155	156	158	159	159	
Akita, Japan					149		149	150	151	153				155	155	157	157	158				
Alma-Ata, U.S.S.R.														155	157							
Anchorage, Alaska														152	152	155	155	156	158	159	160	
Ashkhabad, U.S.S.R.															155	160						
Baguio, P. I.															154	155	155	156	158	159		
Baker Lake, Canada						149		150	151	151	153	154		154	155	156	157	158	159	160		
Bombay, India	150	151		154	155		157	159	159													
Brisbane, Australia	150	151	153	154	154	153	152	152	153					156	158	158	158	159		160		
Budapest, Hungary				152	154	152				159	159							159				
Buenos Aires, Argentina						149		149	150	152	151	151	154	154	156	156	157					
Calcutta, India	150	151				154	158		158	159												
Canberra, Australia	150	151	153	154	154	153		152	152	153								159		160		
Capetown, Union of S.Africa						149		149	150	151	152	153	153	154	155	155	156	157	158	160		
Casablanca, Morocco				155	155	156	157	159														
Chita, U.S.S.R.																						
Christchurch, New Zealand	151					154	150		151	150	151	153	154	154	157	157	156	159	159	159		
Churchill, Canada							149		150	151	152	153	153	154	154	155	156	158	158	159	160	
De Bilt, Holland									149	150	150	152	153	153	154	154	155	156	156	159	160	
Deception I.										150	150	151	152	153								
Delhi, India	150	151			154	155		157	159	159												
Elisabethville, Belgian Congo						149		150	151	153	153	154	154	154	154	157	157	158	158	159	159	
Fairbanks, Alaska										150	151	151	151	151	152	153	155	156	157	157	159	
Falkland Is.						152	152		156	156	157	156	156	156	156	157	160	160	160			
Formosa, China															149	150	154	155	153	157	158	
Ft. Monmouth, New Jersey															149	150	152	154	155	155	160	
Godhavn, Greenland															150	157	158	158	158	158	160	
Grand Bahama I.																						
Graz, Austria															151	149	150	151	152	156	156	
Hobart, Tasmania	150	151	153	154	154	153		152	152	153					152	158	159	159	159			
Huancayo, Peru										150		153	153		155	155	157	157	158	158	159	
Ibadan, Nigeria	152	152	156	156	157	157		156	156	157	157	159	158		160							
Inverness, Scotland						152	152		152	159	158	156	156	156	156	156	160	160	160	160	160	
Irkutsk, U.S.S.R.															155	160						
Johannesburg, Union of S.Africa					149			149	150	151	152	153	153	154	154	155	157	157	158	160	160	
Juliusruh/Rügen, Germany									149	150	151	152	153	154	154	155	156	156	158	158	160	
Kiruna, Sweden										149	150	151	152	153	154	154	155	156	158	159	160	
Kodaikanal, India	150	151				154	155		157	159	159				155	155	157	157	158			
Leningrad, U.S.S.R.																						
Leopoldville, Belgian Congo						149			150	151	151	153	154	154	154	154	157	157	158	158		
Lindau/Harz, Germany						149			149	151	151	153	153	153	154	154	155	156	157	159	159	
Lulea, Sweden						154	153	154	155		157	158	160	160	153	153	154	155	155			
Lyckeby, Sweden																						
Madras, India	150	151			154	155		157	159	159						152	152	153	157	158	159	
Maui, Hawaii															149	150	152	152	154	155	156	
Monte Capellino, Italy									150	150	151				155	155	157	157	158	159	159	
Moscow, U.S.S.R.																155	156	157	157	158		
Nairobi, Kenya															149	151	151	152	153	155		
Narsarssuak, Greenland																						
Nurmijarvi, Finland																154 <sup>b</sup>	155 <sup>b</sup>	156 <sup>b</sup>	156 <sup>b</sup>			
Okinawa I.																150	151	152	153	154	155	160
Oslo, Norway																149	154	152	153	157	155	159
Ottawa, Canada																150	151	152	153	157	158	160
Panama Canal Zone																149	150	153	154	155	156	158

PART I (CONTINUED)

Station	1956							1957																	
	J	F	M	A	M	J	Jy	A	S	O	N	D	J	F	M	A	M	J	Jy	A	S	O	N		
Point Barrow, Alaska							150	150	150	150	150	150	152	152	154	155	156	158	159						
Poitiers, France	155	155	157	157	159								158	158 <sup>d</sup>											
Port Lockroy					152	152	152		156	159	156	157	157	157		160									
Providenie Bay, U.S.S.R.																									
Puerto Rico, W. I.												150	150												
Rarotonga I.	150	151	152	153	150	151	150	151	151	153	153	154		154	157	158	160								
Resolute Bay, Canada							149		150	151	151	153	153	149	155	155	158	158	159	159					
Reykjavik, Iceland																									
Rostov-on-Don, U.S.S.R.																									
St. John's, Newfoundland																									
San Francisco, California																									
Sao Paulo, Brazil																									
Schwarzenburg, Switzerland																									
Scott Base																									
Simferopol, U.S.S.R.																									
Singapore, British Malaya																									
Slough, England																									
Svalbard, Norway																									
Sverdlovsk, U.S.S.R.																									
Talara, Peru																									
Thule, Greenland																									
Tiruchi, India	150	151			154	155			157	159	159			152	153	155	155	157	158	160					
Tokyo, Japan										149				151	151	152	154	153							
Tomsk, U.S.S.R.																									
Townsville, Australia	150	151	153	154	154	153			152	152	153														
Tromso, Norway																									
Upsala, Sweden																									
Wakkanai, Japan																									
Washington, D. C.																									
Watheroo, W. Australia																									
White Sands, New Mexico																									
Winnipeg, Canada																									
Yakutsk, U.S.S.R.																									
Yamagawa, Japan																									
Yuzhno-Sakhalinsk, U.S.S.R.																									

<sup>a</sup>See erratum 2 in CRPL-F154(A), p. 8.  
<sup>b</sup>See erratum 1 in CRPL-F157(A), p. 8.  
<sup>c</sup>See erratum 1 in CRPL-F154(A), p. 8.

<sup>d</sup>See erratum 2 in CRPL-F159(A), p. 8.  
<sup>e</sup>See erratum 1 in CRPL-F153(A), p. 8.  
<sup>f</sup>See erratum 2 in CRPL-F153(A), p. 8.

<sup>g</sup>See erratum 1 in CRPL-F159(A), p. 8.  
<sup>h</sup>See erratum 1 in CRPL-F150(A), p. 10.  
<sup>i</sup>See erratum 1 in CRPL-F158(A), p. 8.

PART IIIndex of Tables and Graphs of Ionospheric Data Observed Prior to 1956 andPublished in 1957 (CRPL-F149(A) through F160(A))

Station	1955							1954																		
	J	F	M	A	M	J	Jy	A	S	O	N	D	J	F	M	A	M	J	Jy	A	S	O	N			
Ahmedabad, India													149	149												
Bombay, India													149	149												
Brisbane, Australia													149													
Calcutta, India													149	149												
Campbell I.	160	160	160	160	160																					
Canberra, Australia																										
Casablanca, Morocco																										
Delhi, India																										
Hobart, Tasmania																										
Kodaikanal, India																										
Madras, India																										
Poitiers, France																										
Rarotonga I.																										
Tananarive, Madagascar																										
Tiruchi, India																										
Townsville, Australia																										
	1953							1952																		
Campbell I.	152	152		150	150	151	152	160	160						151	152	152	151	151	152						
Leopoldville, Belgian Congo																156										
	1946																									
Tokyo, Japan																										

<sup>a</sup>See erratum 2 in CRPL-F150(A), p. 10.



### Radio Noise Data

The results of radio noise measurements are presented in the following graphs and tables. These are based on three parameters of the noise: (1) the mean power, (2) the mean envelope voltage, and (3) the mean logarithm of the envelope voltage. The mean power averaged over a period of several minutes is the basic parameter and is expressed as an effective antenna noise figure,  $F_a$ .  $F_a$  is defined as the noise power available from an equivalent lossless antenna in db above  $kT_b$  (the thermal noise power available from a passive resistance) where

$$k = \text{Boltzman's constant } (1.38 \times 10^{-23} \text{ joules per degree Kelvin})$$

$$t = \text{Absolute room temperature (taken as } 288^{\circ} \text{ K)}$$

$$b = \text{Bandwidth in cycles per second.}$$

The mean voltage and mean logarithm are expressed as deviations,  $V_d$  and  $L_d$ , respectively, in db below the mean power.

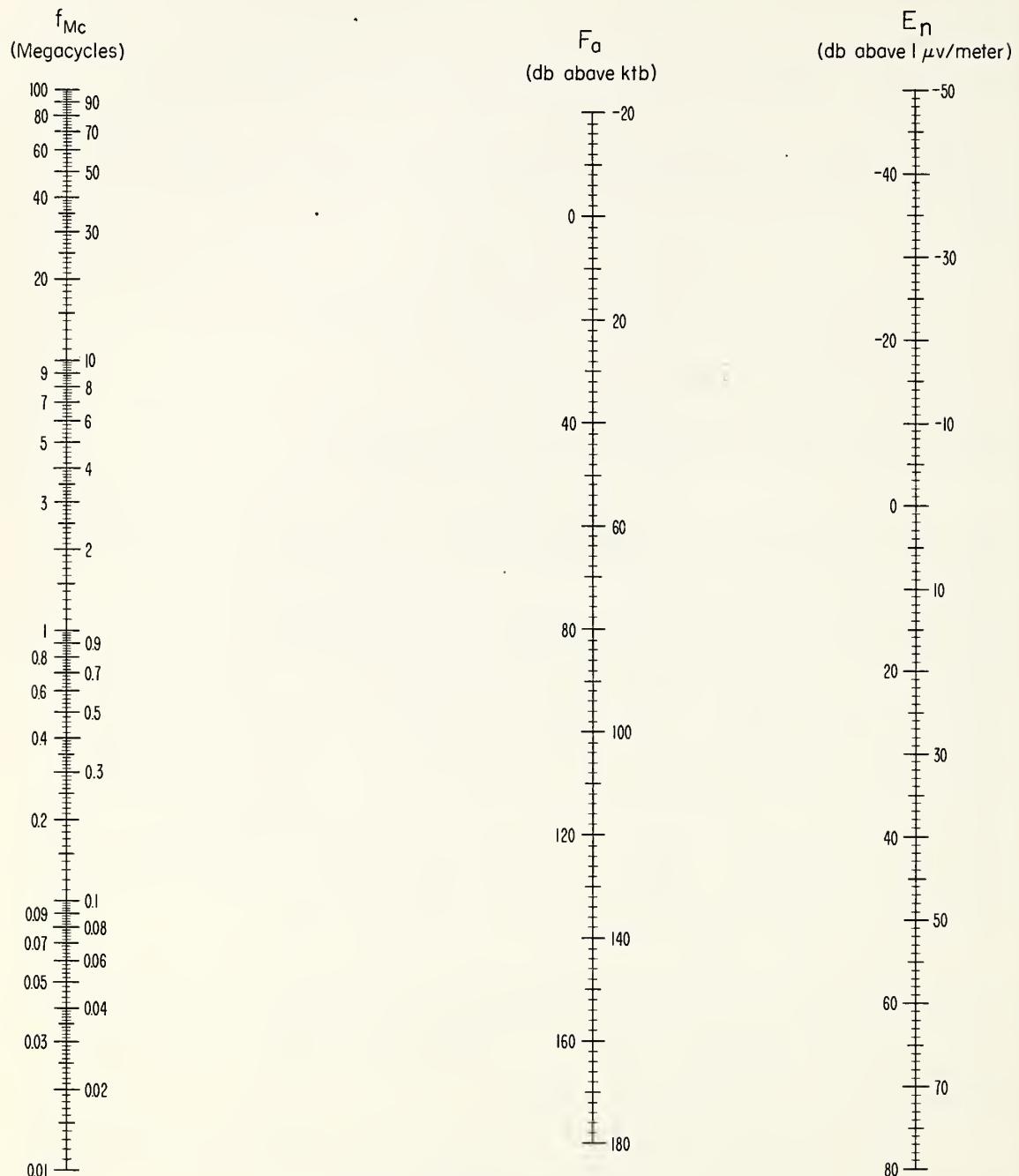
Measurements of these parameters were made with the National Bureau of Standards Radio Noise Recorder, Model ARN-2, which has an effective noise bandwidth of 280 cycles per second and uses a standard 21.75' vertical antenna. A 15-minute recording is made on each frequency each hour, and these 15-minute samples are taken as representing the noise conditions for the full hour. The month-hour medians,  $F_{am}$ ,  $V_{dm}$ , and  $L_{dm}$  are determined from these hourly values for each of the corresponding parameters and the resulting medians are plotted at the half-hour point on the curves. Normally from 25 to 30 observations of the mean power are obtained monthly for each hour of the day, and from 10 to 15 observations of the voltage and logarithm deviations. When there are fewer than 15 observations of the mean power, or 7 observations of the voltage and logarithm deviations, the tabulated values are identified by an asterisk (\*).

The upper and lower decile values of  $F_a$  are also reported in the following tabulation to give an indication of the extent of the variation of the noise power from day to day at a given time of day. These are expressed in db above and below the month-hour median,  $F_{am}$ , and designated by  $D_u$  and  $D_l$ , respectively.

To convert  $F_a$  to an r.m.s. noise field strength,  $E_n$ , the nomogram or the equation on the following page may be used.

Information on expected worldwide noise levels and their application to systems problems is presented in NBS Circular 557 (available from the Supt. of Documents, U. S. Govt. Printing Office, Washington 25, D. C.). More recent estimates of radio noise levels are given in CCIR Report No. 65, "Report on Revision of Atmospheric Radio Noise Data", Warsaw, 1956 (available from the International Telecommunication Union, Geneva).

NOMOGRAM FOR TRANSFORMING EFFECTIVE ANTENNA NOISE FIGURE  
TO NOISE FIELD STRENGTH AS A FUNCTION OF FREQUENCY



$$E_n = F_a + 20 \log_{10} f_{Mc} - 65.5$$

$F_a$  = Effective Antenna Noise Figure = External Noise Power Relative to ktb Available from an Equivalent Short, Lossless, Vertical Antenna in db Above ktb.

$E_n$  = Equivalent Vertically Polarized Ground Wave R.M.S. Noise Field Strength in db Above  $1\mu v/meter$  for a 1kc Bandwidth.

$f_{Mc}$  = Frequency in Megacycles.

## RADIO NOISE DATA

Station Bill, Wyoming Lat. 43.2° N Lang. 105.2° W Type Recorder ARN-2 Month October 1957

	Local Mean Time																							
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
51kc																								
F <sub>am</sub>	130	131	130	129	128	126	123	119	115	117	116	118	119	120	122	125	126	128	128	130	130	130	128	128
D <sub>u</sub>	7	7	8	7	6	8	9	11	13	10	14	12	13	9	8	7	7	8	7	6	8	9	9	9
D <sub>ℓ</sub>	8	8	8	7	6	8	8	9	7	14	14	12	15	14	15	16	15	5	10	9	9	8	6	6
V <sub>dm</sub>																								
L <sub>dm</sub>																								
113kc																								
F <sub>am</sub>	114	114	113	115	111	108	101	94	89	87	90	90	97	94	104	105	106	108	112	114	114	112	112	112
D <sub>u</sub>	8	8	7	5	7	8	10	14	16	19	18	18	13	16	8	17	8	9	9	6	8	9	10	10
D <sub>ℓ</sub>	9	8	11	12	13	13	12	14	13	11	10	12	19	16	25	11	17	13	9	11	10	10	8	8
V <sub>dm</sub>																								
L <sub>dm</sub>																								
246kc																								
F <sub>am</sub>	100	99	97	97	96	86	79	74	74	74	75	74	76	76	82	82	84	90	96	98	98	96	96	98
D <sub>u</sub>	6	6	9	7	8	15	9	12	10	10	7	8	12	12	9	20	20	11	10	8	11	11	12	11
D <sub>ℓ</sub>	13	10	11	13	17	10	9	3	2	2	3	2	4	4	10	10	10	10	9	13	10	6	9	9
V <sub>dm</sub>																								
L <sub>dm</sub>																								
545kc																								
F <sub>am</sub>	86	86	85	82	85	74	71	66	70	70	64	70	68	66	68	72	70	78	84	86	88	88	88	88
D <sub>u</sub>	6	4	5	8	5	9	4	1	2	2	11	4	10	6	6	14	15	10	9	6	9	7	7	8
D <sub>ℓ</sub>	7	6	8	9	8	10	3	2	4	4	2	4	4	4	4	3	4	9	6	7	10	9	9	8
V <sub>dm</sub>																								
L <sub>dm</sub>																								
2.5Mc																								
F <sub>am</sub>	56	56	58	56	58	56	40	32	26	27	24	26	26	28	26	27	36	46	54	58	56	59	57	57
D <sub>u</sub>	8	14	12	10	6	6	12	10	8	5	9	7	8	4	3	20	17	10	10	8	8	9	9	11
D <sub>ℓ</sub>	6	10	10	10	16	14	6	10	6	7	4	6	6	8	6	7	15	12	8	8	4	7	5	7
V <sub>dm</sub>																								
L <sub>dm</sub>																								
5Mc																								
F <sub>am</sub>	56	56	54	56	54	54	44	30	28	*26	26	26	24	24	28	30	38	46	52	53	54	54	54	55
D <sub>u</sub>	6	6	8	6	6	6	6	8	6		6	6	8	8	6	8	10	10	8	7	6	6	8	7
D <sub>ℓ</sub>	10	8	6	8	6	8	2	2	10		9	12	10	10	12	16	6	4	8	5	8	8	8	9
V <sub>dm</sub>																								
L <sub>dm</sub>																								
10Mc																								
F <sub>am</sub>	42	42	42	42	40	38	38	34	30	*26	24	25	25	26	32	36	40	42	43	44	44	44	44	44
D <sub>u</sub>	2	4	4	4	4	6	6	4	5		10	9	9	10	6	6	4	4	7	4	2	2	2	2
D <sub>ℓ</sub>	0	0	2	4	2	2	2	4	5		2	4	4	4	6	8	4	2	3	4	4	4	2	4
V <sub>dm</sub>																								
L <sub>dm</sub>																								
20Mc																								
F <sub>am</sub>	23	23	23	23	23	25	27	29	27	27	27	27	27	27	29	29	31	31	29	27	27	25	25	23
D <sub>u</sub>	2	2	2	2	2	2	4	2	4	2	4	18	12	6	4	2	2	4	6	4	2	2	0	2
D <sub>ℓ</sub>	2	2	2	2	2	2	4	4	2	4	4	4	2	4	2	2	2	2	0	2	2	2	2	0
V <sub>dm</sub>																								
L <sub>dm</sub>																								

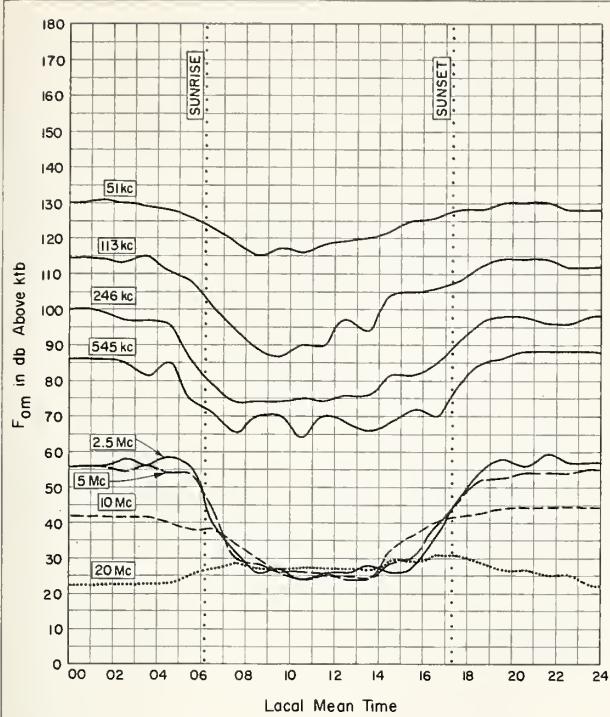
## RADIO NOISE DATA

Station Boulder, Colorado Lat. 40.1° N Long. 105.1° W Type Recorder ARN-2 Month October 19 57

	Local Mean Time																										
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
51 kc																											
F <sub>am</sub>	135	135	133	133	131	129	129	127	124	*	123	*	123	123	125	127	129	131	131	132	133	135	134	134	136		
D <sub>u</sub>	6	6	10	10	10	8	8	9						12	12	10	9	9	8	7	6	6	7	5	5	6	
D <sub>ℓ</sub>	6	8	6	6	6	8	10	14	12					10	12	16	14	15	14	15	10	8	5	5	9	8	
V <sub>dm</sub>	8.0	8.5	8.5	9.0	10.0	9.0	10.0	10.0	10.5	12.0	14.0	12.5	11.0	10.0	10.0	10.5	10.0	10.5	9.5	9.0	9.5	9.0	8.0	8.5			
L <sub>dm</sub>	15.0	16.0	16.0	17.0	17.5	17.0	18.0	19.0	19.5	19.0	22.5	21.0	19.0	17.5	18.0	17.5	17.5	18.0	16.0	16.0	16.0	16.0	16.5	16.5			
113 kc																											
F <sub>am</sub>	118	118	116	118	112	110	107	98	99	*	96	94	100	102	104	110	110	111	113	115	115	115	116	116	115		
D <sub>u</sub>	6	6	10	8	14	12	11	18	13			22	12	16	12	7	10	11	13	9	9	11	10	10	11		
D <sub>ℓ</sub>	10	8	8	10	10	14	19	22	19			16	20	24	24	26	26	21	17	9	9	7	8	6	7		
V <sub>dm</sub>	7.0	7.0	8.0	8.5	9.5	9.5	10.0	10.0	11.0	13.5	8.0	12.0	11.0	9.5	8.5	11.0	9.5	8.5	7.5	8.5	8.0	8.0	7.5	7.0			
L <sub>dm</sub>	15.0	15.0	14.0	16.5	17.0	18.5	19.0	18.0	21.5	24.0	14.0	21.0	21.0	19.0	17.0	19.5	15.0	16.0	15.0	16.0	15.5	15.5	14.0	14.0			
246 kc																											
F <sub>am</sub>	102	102	101	100	95	91	85	78	76	*	77	75	77	77	83	85	86	87	99	103	99	101	101	101	101		
D <sub>u</sub>	7	9	12	13	16	12	12	15	21			18	15	24	12	13	25	25	18	8	16	14	10	10	10		
D <sub>ℓ</sub>	11	9	8	9	12	14	12	7	5			4	6	6	10	12	13	10	19	16	10	10	8	12	6		
V <sub>dm</sub>	6.5	6.0	7.5	7.0	8.0	9.0	8.0	7.0	6.0	*	7.0	7.0	8.0	8.5	6.0	6.5	6.0	6.0	7.5	7.0	7.0	6.5	7.0	6.5	6.5		
L <sub>dm</sub>	13.5	12.5	13.5	15.0	16.0	15.0	17.0	11.0	9.5	13.0	12.0	11.5	13.0	12.0	12.5	15.0	13.5	14.5	14.0	13.5	14.5	14.0	13.5	13.0			
545 kc																											
F <sub>am</sub>	89	87	87	85	89	78	77	77	79	*	71	75	73	75	73	77	81	83	85	91	92	93	95	93	91		
D <sub>u</sub>	10	12	10	12	8	10	8	12	7			6	6	8	7	8	15	20	14	8	9	6	6	8	6		
D <sub>ℓ</sub>	8	6	6	8	12	7	6	9	9			6	4	4	6	7	7	12	12	8	7	6	10	6	6		
V <sub>dm</sub>	5.5	5.0	6.0	5.0	5.0	5.0	3.5	5.0	3.0			4.0	3.5	2.5	4.0	2.0	7.0	2.5	10.0	5.0	5.0	5.0	3.5	5.0	4.5	5.0	
L <sub>dm</sub>	11.0	12.0	12.0	12.5	12.0	6.0	8.0	4.5				7.5	8.5	4.0	7.5	4.5	13.5	5.0	18.0	10.0	10.5	10.0	8.0	9.0	8.5	10.0	
2.5 Mc																											
F <sub>am</sub>	60	60	62	60	60	58	48	44	40	*	44	*	46	46	46	46	46	47	50	60	62	62	62	62	61		
D <sub>u</sub>	10	8	6	9	6	10	13	5	8				2	4	2	2	6	9	11	7	8	7	6	6	9		
D <sub>ℓ</sub>	6	8	12	12	14	16	7	7	4				6	5	5	4	4	7	4	7	8	6	6	8	7		
V <sub>dm</sub>	4.0	4.5	4.5	4.0	6.0	5.0	2.5	2.0	2.0	1.0	1.5	1.5	2.0	1.5	1.5	1.5	2.5	2.5	3.5	3.0	5.0	4.0	4.0	5.0			
L <sub>dm</sub>	8.0	8.0	9.5	10.0	11.0	10.5	4.5	3.5	3.0	2.5	3.0	2.5	2.5	3.0	3.0	3.0	4.0	5.0	7.5	7.5	9.5	9.0	9.0	9.0			
5 Mc																											
F <sub>am</sub>	59	57	57	58	57	56	47	37	35	*	36	37	37	37	37	39	41	45	53	55	57	57	57	57	57		
D <sub>u</sub>	2	4	6	5	6	5	6	8	8			7	6	8	8	6	7	6	4	8	6	6	4	4	4		
D <sub>ℓ</sub>	10	8	6	7	8	9	4	6	8			6	6	4	4	5	7	6	8	6	8	8	10	8	10		
V <sub>dm</sub>	4.0	4.0	3.5	4.0	4.0	4.0	3.0	2.0	2.0	1.5	1.5	1.0	2.0	1.5	1.5	2.0	3.5	3.0	3.0	3.5	4.0	4.0	4.0	4.0			
L <sub>dm</sub>	8.0	8.0	8.0	8.0	7.5	8.0	7.0	3.5	3.5	3.0	3.5	3.5	3.5	3.0	3.0	3.0	5.5	6.0	7.0	7.5	8.5	8.0	8.0	8.0			
10 Mc																											
F <sub>am</sub>	44	44	44	44	42	40	40	34	28	*	27	25	25	26	28	34	38	42	46	46	46	44	44	44	44		
D <sub>u</sub>	3	2	4	2	4	4	4	6	10			12	10	10	12	4	6	4	2	4	3	4	4	4	4		
D <sub>ℓ</sub>	2	2	3	4	2	4	4	4	2			5	3	3	2	6	8	4	6	4	4	2	2	2			
V <sub>dm</sub>	3.0	3.0	3.0	2.5	3.0	3.0	3.0	3.0	3.5	2.0	3.0	3.0	3.0	3.0	3.0	3.0	2.5	3.0	3.0	3.0	3.5	3.0	3.0	3.0			
L <sub>dm</sub>	5.5	6.0	6.0	5.5	7.0	5.5	6.0	6.0	6.0	3.0	4.0	4.0	5.5	6.0	6.5	6.0	6.5	6.0	6.0	6.5	6.0	6.0	6.0	6.0			
20 Mc																											
F <sub>am</sub>	22	22	22	22	22	24	26	28	27	*	26	26	26	28	28	30	30	32	32	32	28	26	26	24	22		
D <sub>u</sub>	0	0	0	0	0	2	4	6	6			2	9	8	4	6	2	6	4	6	9	8	2	2	3		
D <sub>ℓ</sub>	0	2	2	2	0	2	2	2	1			2	2	2	2	4	2	2	3	6	2	2	2	2	0		
V <sub>dm</sub>	1.0	1.0	1.0	1.0	1.5	2.0	1.0	1.0	1.5	*	1.5	1.5	1.0	1.5	1.5	2.5	2.0	1.5	2.0	2.0	2.0	2.0	2.0	1.0			
L <sub>dm</sub>	2.0	2.0	2.0	2.5	2.5	2.5	4.0	3.0	3.0	4.0	3.0	4.0	4.0	3.5	4.0	4.0	3.5	3.5	2.5	4.0	4.5	4.0	4.0	3.0	2.5		

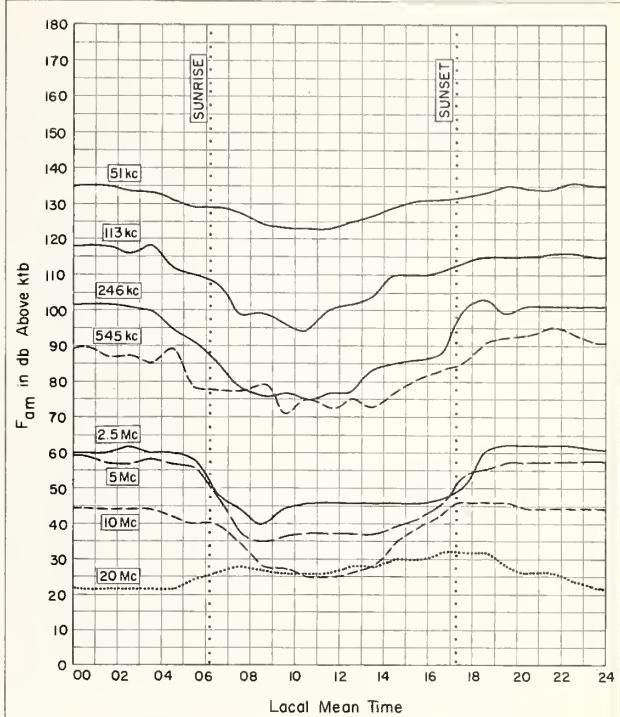
# GRAPHS OF RADIO NOISE DATA

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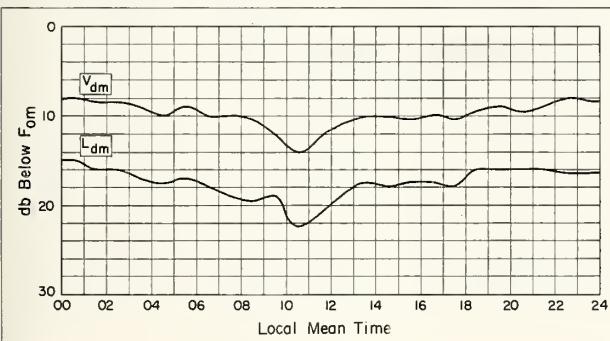
BILL, WYOMING

OCTOBER 1957



BOULDER, COLORADO

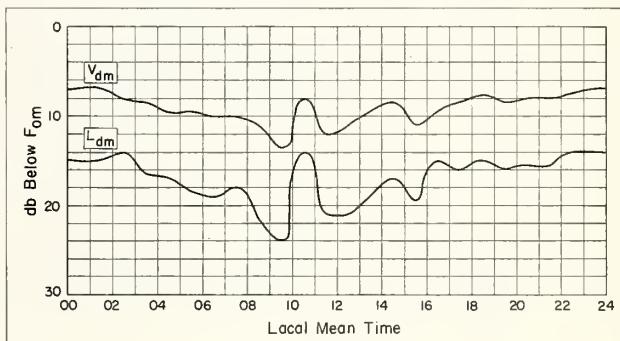
OCTOBER 1957



51 kc

BOULDER, COLORADO

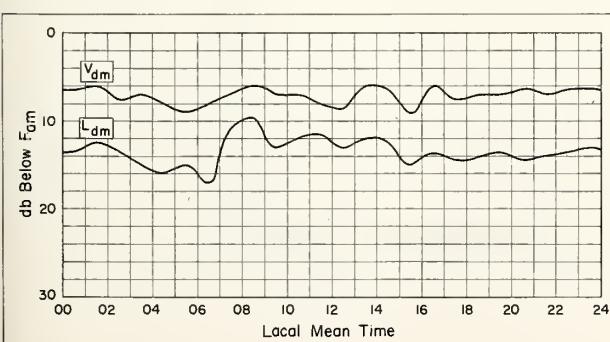
OCTOBER 1957



113 kc

BOULDER, COLORADO

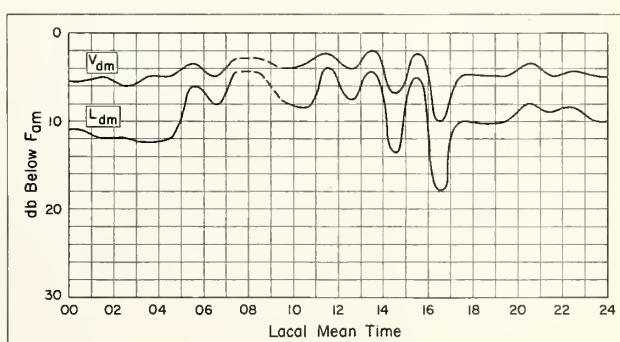
OCTOBER 1957



246 kc

BOULDER, COLORADO

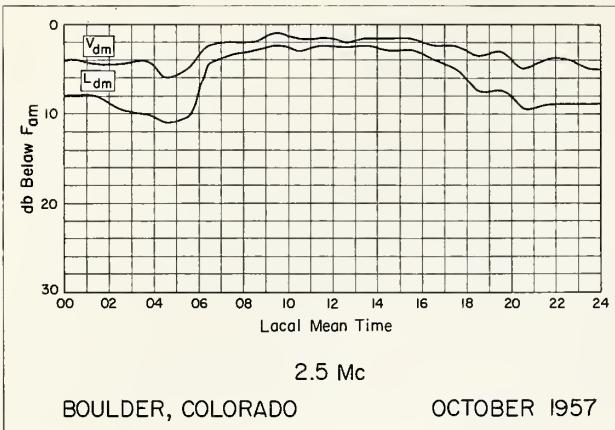
OCTOBER 1957



545 kc

BOULDER, COLORADO

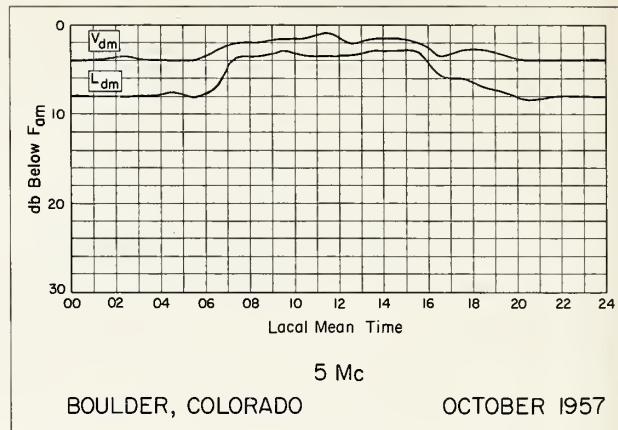
OCTOBER 1957



2.5 Mc

BOULDER, COLORADO

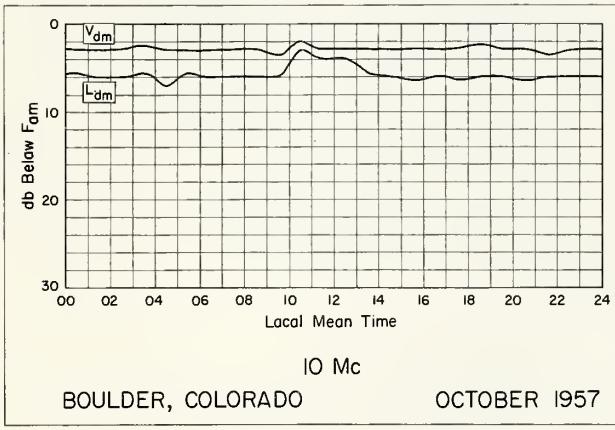
OCTOBER 1957



5 Mc

BOULDER, COLORADO

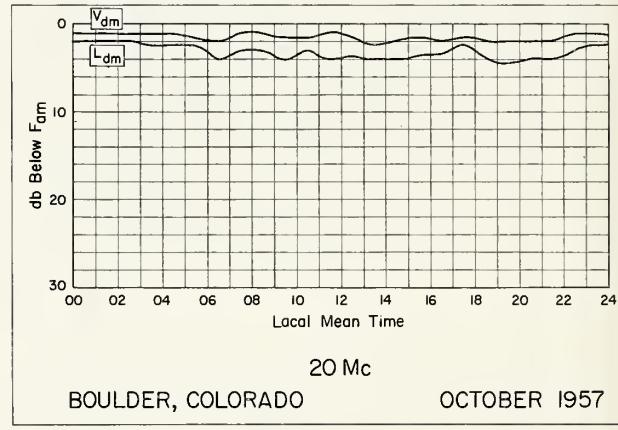
OCTOBER 1957



10 Mc

BOULDER, COLORADO

OCTOBER 1957



20 Mc

BOULDER, COLORADO

OCTOBER 1957

## EXAMPLE OF IONOSPHERIC VERTICAL SOUNDINGS

Okinawa; August 12, 1957  
 (Geomagnetic Latitude  $15^{\circ}\text{N}$ )

The following ionograms were obtained at the Sunsei Co., Okinawa vertical sounding station. They are typical of day and night conditions for August at this geomagnetic latitude. Ionospheric data are scaled directly from these records onto the daily f-plot, a graph of frequency characteristics vs. time. The f-plot for the day represented by these soundings is found on the following page. Medians as found in the Tables of Ionospheric Data are calculated using hourly values taken from the f-plot or directly from the ionogram.

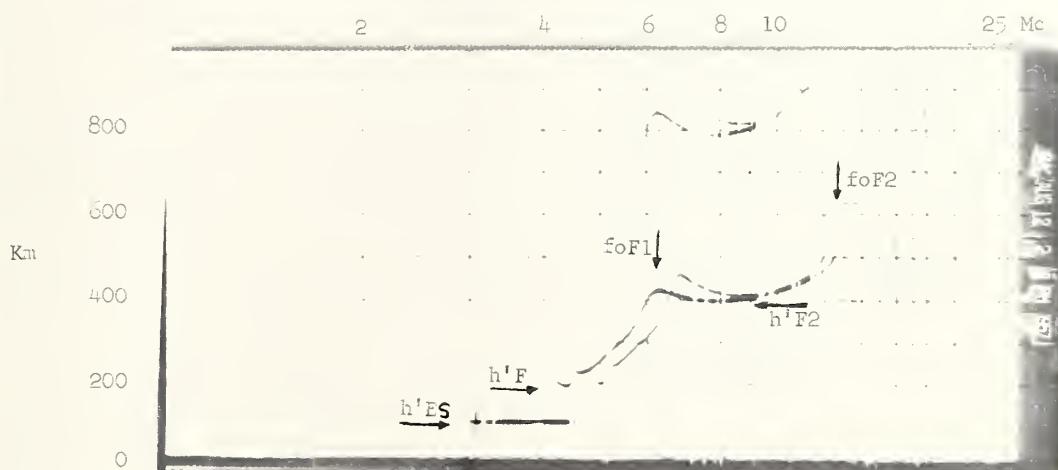


Fig. A. Okinawa, August 12, 1957, 1420 hours,  $135^{\circ}\text{E}$  time.

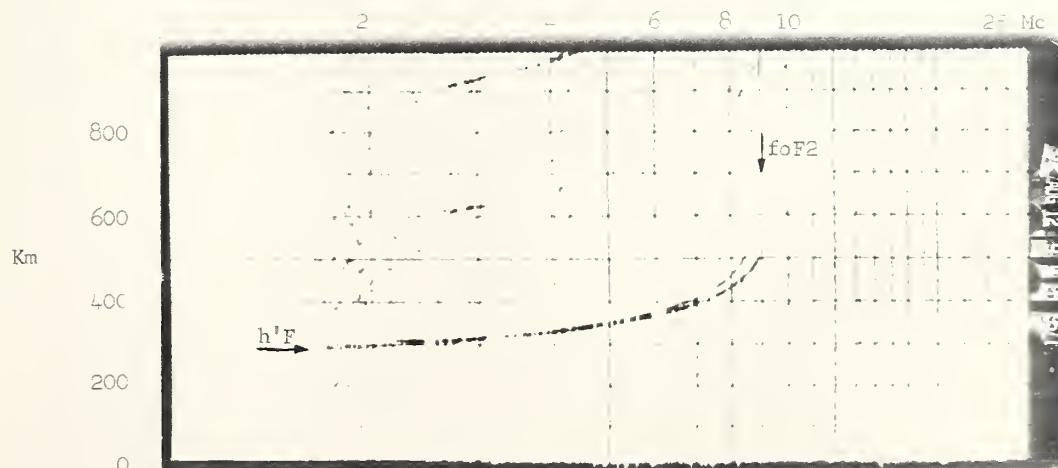


Fig. B. Okinawa, August 12, 1957, 2100 hours,  $135^{\circ}\text{E}$  time.

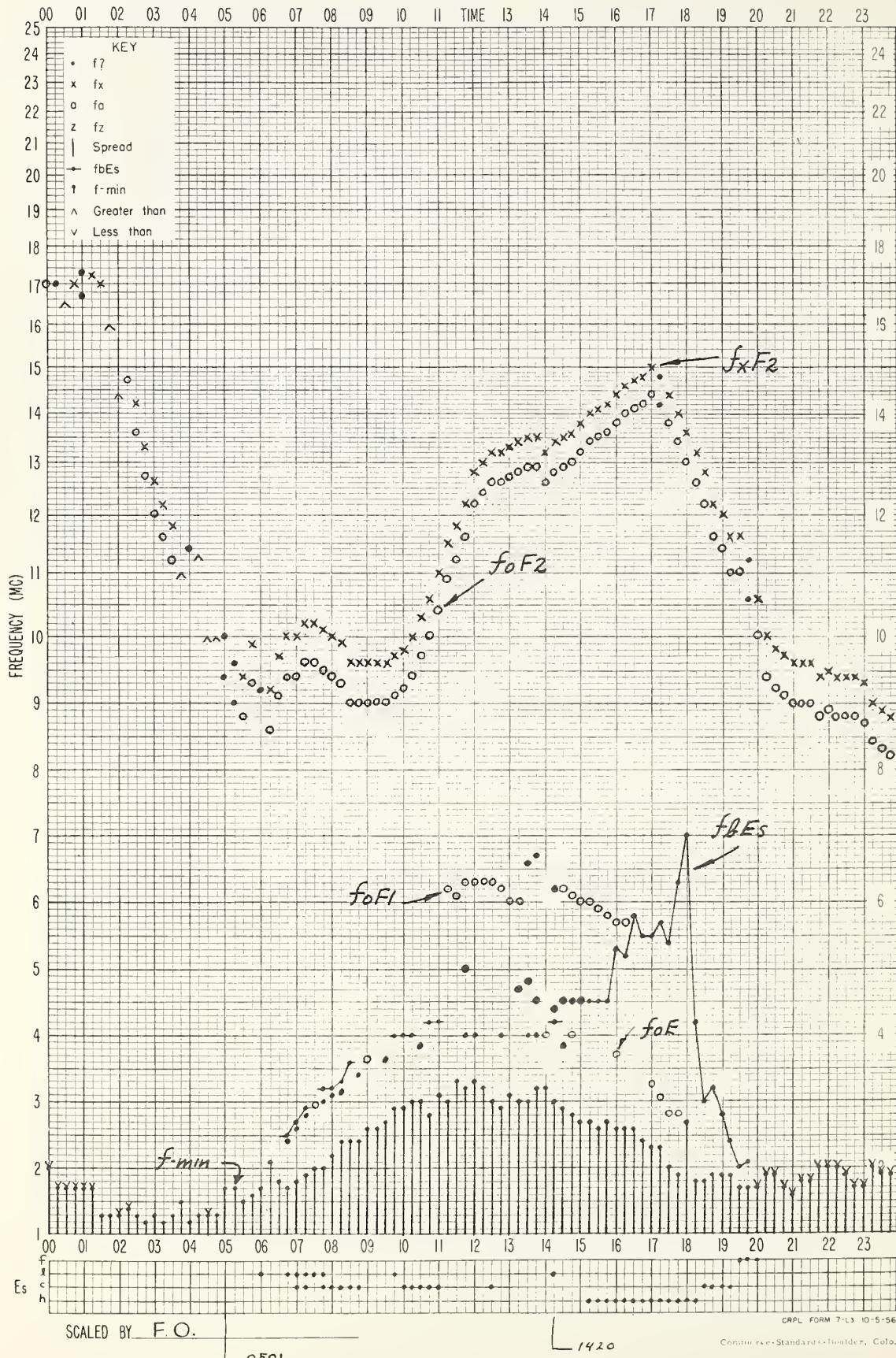
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OKINAWA I.

STATION TONOK

## f - PLOT OF IONOSPHERIC DATA

DATE 12 AUG 1957



## TABLES OF IONOSPHERIC DATA

Table 1

October 1957

Time	h'F2	foF2	h'F	foF1	h'E	foE	fEs	(M3000)F2
00	6.3	365			3.0	2.4		
01	6.1	350			2.4	2.4		
02	6.0	330			2.3	2.5		
03	6.1	320			2.3	2.5		
04	6.2	280			2.0	2.5		
05	5.5	270			E	2.0	2.6	
06	6.2	250			---		2.7	
07	7.8	255			120	1.75	1.9	
08	10.0	240			110	2.20	2.9	
09	11.1	235			105	2.50	3.0	
10	12.3	230			105	2.80	3.0	
11	12.6	230			105	2.90	3.0	
12	13.0	225			105	2.90	2.95	
13	12.6	230			105	2.85	3.0	
14	13.0	230			105	2.60	3.0	
15	12.7	230			105	2.30	3.0	
16	12.0	230			125	1.95	2.0	
17	11.4	230			E		2.9	
18	9.5	230			E		2.8	
19	7.6	250					2.8	
20	6.2	285					2.2	2.6
21	6.1	320					2.6	2.5
22	6.7	320					3.4	2.5
23	6.2	350					3.0	2.4

Time: 15.0°E.

Sweep: 1.4 Mc to 17.0 Mc in 6 minutes, automatic operation.

Table 2

October 1957

Time	h'F2	foF2	h'F	foF1	h'E	foE	fEs	(M3000)F2
00			14.9	240				2.90
01			13.2	230				2.85
02			10.4	230				2.90
03			8.4	220				2.95
04			6.9	230				2.70
05			6.3	<260				2.60
06			9.0	290				2.70
07			12.9	240				2.95
08			14.1	230				2.90
09			15.2	230				2.75
10			15.1	230				2.65
11			15.6	230				2.50
12			16.2	220	(7.6)			2.45
13			(440)	16.2	230			2.40
14			430	16.5	230	(7.4)		2.45
15			(420)	16.4	240	---		2.45
16			---	16.1	240			2.55
17			16.2	260				2.50
18			(16.6)	290				2.55
19			(17.9)	320				2.50
20			19.1	300				2.60
21			18.6	260				2.65
22			18.0	240				2.1
23			(17.6)	240				(2.80)

Time: 120.0°E.

Sweep: 1.1 Mc to 19.5 Mc in 15 minutes, manual operation.

Table 3

September 1957

Time	h'F2	foF2	h'F	foF1	h'E	foE	fEs	(M3000)F2
00	5.6	360			(3.7)	2.5		
01	5.2	345			(3.8)	2.4		
02	5.0	350			(3.3)	2.5		
03	5.0	330			2.2	2.5		
04	5.0	315			(2.6)	2.55		
05	5.0	290			1.8	2.0	2.65	
06	5.8	265			2.1	2.7		
07	6.5	260			120	2.5	2.7	
08	7.0	250			110	2.8	2.7	
09	8.0	245	4.7	110	3.0	2.7		
10	8.5	240	5.0	110	3.0	2.7		
11	8.7	240	4.9	110	3.1	2.6		
12	8.5	240	5.0	110	3.1	2.6		
13	(385)	8.6	240	4.7	110	3.0	2.7	
14	8.2	245	4.2	110	2.9	2.7		
15	7.4	250	---	115	2.8	2.8		
16	7.4	250	---	---	2.7	2.8		
17	7.6	255	---	---	2.0	2.8		
18	6.5	280	---	1.8	2.8	2.8		
19	6.8	290			3.0	2.7		
20	5.9	290			(3.2)	2.65		
21	5.6	320			(3.9)	2.6		
22	5.2	345			(3.8)	2.5		
23	5.9	350			(3.6)	(2.6)		

Time: 15.0°E.

Sweep: 0.8 Mc to 14.0 Mc in 30 seconds.

Table 4

September 1957

Time	h'F2	foF2	h'F	foF1	h'E	foE	fEs	(M3000)F2
00			5.2	310				2.5
01			5.0	320				2.5
02			4.8	315				2.5
03			4.4	310				2.5
04			4.6	290				2.7
05			(300)	5.0	275	3.20	---	E
06				330	6.3	260	3.90	120
07				(260)	6.9	245	4.00	110
08				(330)	7.6	240	4.50	105
09				(280)	8.4	240	4.70	105
10				330	8.7	230	4.90	105
11				315	9.0	230	5.05	105
12				370	8.6	230	5.10	105
13				380	8.6	230	5.00	105
14				(420)	8.4	230	4.75	105
15				(350)	8.4	235	4.35	105
16				(375)	8.7	240	4.10	110
17				(340)	8.8	240	----	115
18				---	8.4	245	----	130
19				---	7.8	250	----	E
20				6.4	255	----	----	2.0
21				5.5	270	----	----	2.1
22				5.2	305	----	----	2.0
23				5.0	315	----	----	2.1

Time: 15.0°E.

Sweep: 1.4 Mc to 17.0 Mc in 6 minutes, automatic operation.

Table 6

September 1957

Time	h'F2	foF2	h'F	foF1	h'E	foE	fEs	(M3000)F2
00			5.2	305				2.5
01			5.4	315				2.5
02			4.6	300				2.5
03			4.2	310				2.45
04			4.1	310				2.5
05			4.5	290	----	----	E	3.0
06			5.5	260	----	120	2.10	3.6
07			(530)	6.2	250	4.00	110	2.60
08				360	7.2	240	4.60	110
09				330	8.0	240	5.00	110
10				325	8.4	240	5.10	105
11				440	9.3	230	5.20	105
12				305	9.3	240	5.30	105
13				320	9.0	240	5.30	105
14				295	9.4	240	5.20	105
15				300	8.8	240	(5.20)	105
16				(420)	9.5	245	4.55	110
17				---	9.3	250	(4.10)	120
18				18	9.4	245	----	1.60
19				8.8	245	----	E	3.0
20				7.1	245	----	----	3.2
21				6.5	255	----	----	3.5
22				6.3	280	----	----	3.2
23				6.2	290	----	----	2.5

Time: 30.0°E.

Sweep: 1.0 Mc to 25.0 Mc in 1 minute.

Graz, Austria (47.1°N, 15.5°E)		Table 7						
Time	h°F2	foF2	h°F	foF1	h°E	foE	fEs	(M3000)F2
00		7.0	340					
01		6.4	350					
02		6.4	345					
03		(5.8)	340					
04		(5.4)	340					
05		>4.9	325					
06		7.0	260					
07		8.6	260					
08		>9.4	250					
09		>9.8	250					
10		>9.5	250					
11	310	>9.6	250					
12	320	>9.4	250					
13	350	>9.5	250	(6.6)				
14	345	>9.5	250	(6.3)				
15		>9.5	250					
16		>10.0	260					
17		9.6	260					
18		>9.3	260					
19		9.4	270					
20		(8.4)	280					
21		(7.6)	290					
22		(7.3)	300					
23		>7.0	330					

Time: 15.0°E.

Sweep: 2.5 Mc to 11.5 Mc in 2 minutes.

Formosa, China (25.0°N, 121.5°E)		Table 9						
Time	h°F2	foF2	h°F	foF1	h°E	foE	fEs	(M3000)F2
00		14.4	260					
01		13.7	250					
02		11.0	240					
03		8.7	230					
04		7.4	240					
05		6.3	250					
06		9.0	260	(2.1)				
07		11.5	240					
08		11.9	230					
09		12.8	230					
10		13.9	230					
11	---	15.1	230	---				
12	---	16.1	(230)	---				
13	(400)	16.9	(230)	---				
14	(400)	17.5	230	---				
15	(380)	17.3	240	---				
16	---	17.0	240					
17	---	17.0	260					
18		17.1	260	---				
19		>17.0	280					
20		17.2	280					
21		16.3	270					
22		16.4	290					
23		15.0	270					

Time: 120.0°E.

Sweep: 1.1 Mc to 19.5 Mc in 15 minutes, manual operation.

Schwarzenburg, Switzerland (46.8°N, 7.3°E)		Table 8						
Time	h°F2	foF2	h°F	foF1	h°E	foE	fEs	(M3000)F2
00		280	6.7					
01		290	6.6					
02		290	6.1					
03		290	6.0					
04		290	5.0					
05		300	4.6					
06		260	5.0					
07	230	7.2	---	---	---	---	---	3.3
08	220	8.8	220	4.6	100	3.0		3.5
09	220	9.5	200	5.2	100	3.2		3.4
10	230	9.7	200	5.4	100	3.5		3.3
11	220	10.2	200	6.0	100	3.7		3.25
12	270	10.6	210	6.3	100	3.7		3.1
13	290	10.5	220	6.5	100	3.7		3.0
14	280	10.2	210	6.3	100	3.6		3.0
15	270	10.2	220	5.9	100	3.4		3.05
16	260	9.2	220	5.5	100	3.2		3.2
17	240	8.9	230	4.8	100	2.8		3.2
18	240	8.4	---	---	100	2.3	3.0	(3.2)
19	230	8.6						3.2
20	240	8.3						3.2
21	260	7.8						3.2
22	240	7.5						3.1
23	270	6.6						3.0

Time: 15.0°E.

Sweep: 1.0 Mc to 25.0 Mc in 30 seconds.

Anchorage, Alaska (61.2°N, 149.9°W)		Table 11						
Time	h°F2	foF2	h°F	foF1	h°E	foE	fEs	(M3000)F2
00		4.4						
01		(4.4)						
02		4.3						
03		4.3						
04		4.6						
05		5.2						
06		5.8	3.4	125	(2.15)			
07		6.1	4.5	116	2.85			
08		6.3	4.6	111	3.05			
09		6.5	4.9	109	(3.20)			
10		6.8	5.0	107	3.40			
11		6.6	5.1	109	(3.50)			
12		6.8	5.2	109	(3.50)			
13		7.0	5.0	109	(3.50)			
14		6.8	5.2	108	(3.40)			
15		6.8	(4.8)	109	3.30			
16		6.8	4.8	109	(3.05)			
17		7.0	4.6	109	(2.85)			
18		6.8		111	2.45			
19		6.8		<131	2.20			
20		6.6						
21		6.0						
22		5.5						
23		4.9						

Time: 150.0°W.

Sweep: 1.0 Mc to 25.0 Mc in 13.5 seconds.

Oslo, Norway (60.0°N, 11.1°E)		Table 12						
Time	h°F2	foF2	h°F	foF1	h°E	foE	fEs	(M3000)F2
00		6.0	300					2.50
01		6.2	300					(2.60)
02		5.3	300					2.55
03		4.6	300					2.55
04		4.5	290					2.55
05		5.3	270					2.70
06	---	5.9	250	---	100	2.40	3.0	2.75
07	---	6.7	240	---	100	2.75	3.4	2.75
08	(480)	7.0	245	4.60	100	3.10	3.5	2.75
09	(440)	7.6	240	5.10	100	3.30	4.0	2.70
10	(450)	7.6	230	5.10	100	3.60	4.2	2.70
11	440	7.6	220	5.15	100	3.65	3.9	2.75
12	460	8.0	215	5.15	100	3.65	3.9	2.70
13	(490)	7.9	215	5.20	100	3.70		2.70
14	(475)	7.7	215	5.20	100	3.65	3.7	2.70
15	---	7.7	225	---	100	3.55	3.6	2.70
16	---	7.8	240	---	100	3.30	3.5	2.70
17	---	7.8	250	---	100	3.05		2.75
18		7.7	250		105	2.65	3.0	2.80
19		7.7	255			2.25	2.8	2.80
20		7.5	260			---	2.6	2.80
21		7.0	260				2.9	2.70
22		>6.8	280				2.9	2.60
23		6.3	300				3.0	2.55

Time: 15.0°E.

Sweep: 0.7 Mc to 25.0 Mc in 5 minutes, automatic operation.

Table 13

De Bilt, Holland (52.1°N, 5.2°E)							August 1957	
Time	h'F2	foF2	h'F1	foF1	h'E	foE	fEs	(M3000)F2
00	300	6.2				2.2	2.65	
01	300	6.0				2.2	2.65	
02	300	5.5				2.70		
03	290	5.1				2.75		
04	280	5.0				2.80		
05	250	5.6	245	---	120	2.0	2.5	3.00
06	(300)	6.6	230	4.2	105	2.6	3.5	3.10
07	370	7.2	220	4.7	105	3.0	4.0	3.00
09	335	7.8	220	5.0	105	3.3	4.2	2.95
09	310	8.4	210	5.1	105	3.5	4.8	2.95
10	310	8.7	205	5.5	105	3.6	4.2	2.95
11	345	8.4	205	5.5	105	3.8	4.0	2.90
12	355	8.3	205	5.5	105	3.9		
13	350	8.1	205	5.6	105	4.0		
14	375	8.0	215	5.5	105	3.8		
15	340	8.0	215	5.2	105	3.6		
16	(350)	8.0	225	5.0	105	3.3	3.4	
17	---	8.0	230	---	105	2.9	3.6	3.00
18	250	8.1	240	---	115	2.4	3.5	3.00
19	250	8.0				3.5		
20	250	7.9						
21	250	7.3						
22	270	6.9						
23	300	6.5						

Time: 0.0°.

Sweep: 1.4 Mc to 16.0 Mc in 40 seconds.

Table 15

Ottawa, Canada (45.4°N, 75.9°W)							August 1957	
Time	h'F2	foF2	h'F	foF1	h'E	foE	fEs	(M3000)F2
00	5.4	290				<1.7	2.6	
01	4.8	300				<1.7	2.6	
02	4.5	300				<1.7	2.6	
03	4.0	300				<1.7	2.6	
04	3.8	300				<1.7	2.6	
05	4.2	290				1.8	2.8	
06	(280)	5.3	250	---	115	2.5	3.0	
07	330	6.1	240	4.4	110	3.0	3.0	
08	340	6.4	220	4.8	105	3.3	2.8	
09	360	7.0	220	5.0	105	3.6	2.8	
10	400	6.9	220	5.2	105	3.9	2.7	
11	440	7.0	200	5.3	105	4.0	2.6	
12	420	7.0	210	5.4	105	4.0	2.7	
13	420	7.3	220	5.3	105	4.0	2.6	
14	400	7.1	220	5.5	105	3.9	2.6	
15	400	7.2	220	5.2	105	3.8	2.6	
16	380	7.2	230	5.0	105	3.5	2.6	
17	340	7.4	240	4.9	110	3.0	2.7	
18	300	7.4	250	4.0	120	2.6	2.7	
19	---	7.3	270		120	1.9	2.8	
20	7.2	260			<1.7	2.6		
21	7.0	270			<1.6	2.7		
22	6.3	280			<1.7	2.7		
23	5.9	290			<1.7	2.7		

Time: 75.0°W.

Sweep: 1.0 Mc to 16.0 Mc in 16 seconds.

Table 17

White Sands, New Mexico (32.3°N, 106.5°W)							August 1957	
Time	h'F2	foF2	h'F	foF1	h'E	foE	fEs	(M3000)F2
00	6.0	<300				3.2	2.60	
01	6.1	300				3.4	2.60	
02	5.8	290				2.7	2.65	
03	5.7	280				2.9	2.70	
04	5.6	<280				2.7	2.70	
05	5.3	<280				3.0	2.80	
06	6.4	255			119	2.10	2.4	3.00
07	(385)	7.6	240	---	111	(2.90)	3.1	2.95
08	---	8.4	220	5.3	109	(3.30)	3.9	2.85
09	355	9.1	210	5.8	109	(3.70)	4.1	2.70
10	370	9.6	210	5.8	108	(3.90)	4.2	2.65
11	370	9.8	210	5.9	107	(3.95)	4.1	2.60
12	380	10.1	210	5.9	109	(4.05)	4.5	2.60
13	380	10.3	220	5.8	109	(4.00)	4.1	2.60
14	370	10.3	220	5.8	109	(3.95)	4.2	2.65
15	355	10.0	225	5.7	109	(3.80)	4.0	2.65
16	360	9.7	230	5.2	109	(3.50)	3.8	2.70
17	---	9.2	240	---	111	3.10	3.4	2.80
18	8.9	<260			117	2.60	2.8	2.85
19	8.6	250				2.9	2.90	
20	7.7	245				3.2	2.75	
21	7.0	250				3.1	2.75	
22	6.4	<275				3.4	2.65	
23	6.1	<280				3.2	2.60	

Time: 105.0°W.

Sweep: 1.0 Mc to 25.0 Mc in 13.5 seconds.

Table 14

St. John's, Newfoundland (47.6°N, 52.7°W)							August 1957	
Time	h'F2	foF2	h'F	foF1	h'E	foE	fEs	(M3000)F2
00					5.7	300		
01					5.0	300		
02					5.0	300		
03					4.0	290		
04					4.0	290		
05					5.0	260		
06	(390)	5.9	230	4.2	111	2.10		
07	(380)	6.4	230	4.5	109	3.10		
08	430	6.6	220	4.9	109	3.40		
09	440	6.7	220	5.0	107	3.50		
10	430	6.9	210	5.3	105	3.75		
11	450	7.0	210	5.4	105	3.95		
12	425	7.0	210	5.5	105	4.00		
13	450	7.1	220	5.4	103	3.90		
14	425	7.2	220	5.4	105	3.60		
15	415	7.4	220	5.2	105	3.50		
16	(385)	7.6	230	4.9	109	3.15		
17	---	7.8	240	111	2.70			
18	7.6	260	119	2.50				
19	7.3	270	119	2.50				
20	7.5	270	119	2.50				
21	6.9	290	119	2.50				
22	6.7	280	119	2.50				
23	6.1	300	119	2.50				

Time: 60.0°W.

Sweep: 1.0 Mc to 25.0 Mc in 13.5 seconds.

Table 15

Washington, D. C. (38.7°N, 77.1°W)							August 1957	
Time	h'F2	foF2	h'F	foF1	h'E	foE	fEs	(M3000)F2
00					6.0	285		
01					5.8	285		
02					5.4	290		
03					5.1	280		
04					4.8	260		
05					4.5	260		
06					5.8	255		
07	290	6.5	240	---	111	2.80	3.0	
08	290	6.7	230	4.7	109	3.20	3.6	
09	375	7.0	220	5.3	105	(3.50)	3.7	
10	415	7.7	205	5.4	105	(3.80)	3.8	
11	410	7.5	200	5.4	105	(3.95)	2.70	
12	420	7.8	210	5.6	105	4.00	2.65	
13	400	7.6	210	5.6	105	4.00	2.65	
14	405	7.8	220	5.5	105	3.90	2.65	
15	385	7.7	220	5.4	105	3.75	2.70	
16	360	7.6	225	5.0	108	3.45	2.70	
17	350	7.6	235	---	109	3.00	3.1	
18	280	7.7	250	119	2.50			
19	7.6	260	119	2.50				
20	7.4	250	119	2.50				
21	7.2	270	119	2.50				
22	6.8	280	119	2.50				
23	6.5	<280	119	2.50				

Time: 135.0°E.

Sweep: 1.0 Mc to 25.0 Mc in 13.5 seconds.

Table 19

Time	August 1957						
	h'F2	foF2	h'F	foF1	h'E	foE	foEs (M3000)F2
00		8.9	290			(2.9)	2.75
01		8.6	275			(3.1)	2.85
02		8.0	250			3.6	2.90
03		7.2	250			(3.2)	2.75
04		6.9	270			(3.0)	2.80
05		6.4	260			(2.8)	2.90
06		6.8	270				2.90
07	---	7.6	245		115	(2.40)	3.10
08	---	8.8	230	---	109	3.15	3.3
09	(280)	9.1	220	---	109	(3.60)	3.9
10	340	10.0	220	5.8	109	(3.85)	4.2
11	360	10.9	215	5.8	109	(4.00)	4.4
12	360	11.5	215	5.8	109	(4.15)	4.5
13	350	11.5	220	5.7	109	(4.20)	4.4
14	350	11.4	220	5.8	109	(4.10)	4.4
15	360	11.1	220	5.5	111	3.95	4.4
16	350	11.1	230	5.6	111	3.65	4.2
17	325	10.8	240	5.0	115	3.20	3.8
18	(290)	10.1	255		117	(2.45)	3.2
19		9.6	260			2.7	2.80
20		9.3	(260)			3.0	2.70
21		9.2	280			3.1	2.65
22		8.9	295			(2.8)	2.60
23		8.8	300			(3.7)	2.65

Time: 60.0°W.

Sweep: 1.0 Mc to 25.0 Mc in 13.5 seconds.

Table 21

Time	July 1957						
	h'F2	foF2	h'F	foF1	h'E	foE	fEs (M3000)F2
00	(430)	5.8	240	---	109	2.30	2.80
01	(500)	5.6	240	3.5	109	2.30	2.80
02	---	5.6	240	---	106	(2.40)	2.70
03	G	5.6	240	3.9	103	(2.50)	2.85
04	(460)	5.9	230	4.1	101	2.70	2.70
05	460	5.5	225	4.2	101	(2.60)	2.60
06	540	5.5	225	4.3	101	3.00	2.65
07	450	(5.8)	215	4.5	101	3.10	2.60
08	450	5.6	215	4.7	101	3.20	2.50
09	460	5.8	215	4.7	101	(3.30)	2.65
10	470	6.0	210	4.6	101	3.35	2.50
11	460	5.9	210	4.8	101	3.40	2.50
12	480	6.0	210	4.7	101	3.40	2.35
13	480	6.0	210	4.8	101	(3.40)	2.60
14	460	5.9	210	4.8	101	3.30	2.60
15	460	6.0	215	4.7	101	3.20	2.50
16	440	5.9	215	4.6	101	3.10	2.55
17	460	5.8	220	4.4	101	3.00	2.55
18	470	5.8	225	4.4	101	2.95	2.60
19	410	6.0	230	(4.2)	101	(2.80)	2.70
20	(380)	6.0	230	---	107	2.60	2.75
21	(470)	5.9	235	---	109	2.50	2.65
22	---	5.9	245	---	109	(2.30)	2.80
23	(430)	5.8	240	3.5	109	2.30	2.70

Time: 75.0°W.

Sweep: 1.0 Mc to 25.0 Mc in 13.5 seconds.

Table 23

Time	July 1957						
	h'F2	foF2	h'F	foF1	h'E	foE	fEs (M3000)F2
00		6.5	310				2.50
01		6.5	310	---	---	2.4	2.45
02		6.3	315	---	---	2.8	2.40
03	---	5.8	300	---	---	2.6	2.55
04	---	6.0	275	---	---	2.00	2.4
05	---	6.5	250	---	100	2.35	2.55
06	(500)	6.5	250	4.40	100	2.80	3.2
07	(500)	6.5	240	4.45	100	3.10	3.0
08	460	6.0	240	5.00	100	3.30	4.0
09	460	7.0	240	5.10	100	3.60	4.0
10	445	7.3	215	5.20	100	3.65	4.2
11	440	7.3	215	5.35	100	3.80	4.4
12	470	7.4	215	5.50	100	3.80	4.0
13	500	7.4	215	5.35	100	3.80	3.8
14	460	7.4	215	5.40	100	3.80	3.8
15	470	7.2	215	5.20	100	3.70	2.55
16	(465)	7.2	215	5.15	100	3.60	2.55
17	(500)	7.3	245	4.85	105	3.30	2.70
18	---	7.5	250	---	105	3.00	3.2
19		7.2	250	---		2.65	3.0
20		7.0	265	---		2.30	2.6
21		6.9	270	---		2.00	2.70
22		6.9	295	---		1.4	2.70
23		6.9	300	---			2.55

Time: 15.0°E.

Sweep: 0.7 Mc to 25.0 Mc in 5 minutes, automatic operation.

Table 20

Time	August 1957						
	h'F2	foF2	h'F	foF1	h'E	foE	fEs (M3000)F2
00			(5.1)	<250			(3.25)
01			(5.1)	<250			(3.05)
02			>4.8	<250			(3.25)
03			4.8	240			3.30
04			(4.3)	<225			(3.10)
05			3.7	<250			3.20
06			3.7	<245			3.25
07			6.7	230	110	1.85	3.60
08			8.5	225	105	2.80	3.60
09			10.2	220	105	3.20	3.45
10			11.0	230	105	3.50	3.40
11			(250)	11.1	225	5.0	100
12			250	11.0	225	5.2	100
13			(250)	11.0	230	5.1	110
14			(300)	10.6	240	5.9	110
15			10.6	235	110	3.45	3.20
16			10.5	220	110	3.15	3.20
17			>9.6	230	110	2.60	(3.35)
18				225	150	1.65	(3.25)
19			>7.1	215			(3.35)
20				7.0	220		<3.35
21				6.5	230		3.25
22				5.8	235		3.20
23				(5.2)	250		(3.25)

Time: 120.0°E.

Sweep: 1.0 Mc to 16.0 Mc in 1 minute 45 seconds.

Table 22

Time	July 1957						
	h'F2	foF2	h'F	foF1	h'E	foE	fEs (M3000)F2
00			5.9	290	130	1.5	4.2
01			5.4	280	130	1.5	5.0
02			5.4	290	120	1.5	3.8
03			5.3	290	110	1.8	3.4
04			5.3	270	110	2.1	4.0
05		400	5.3	260	110	2.4	4.0
06		360	5.6	240	110	2.8	5.0
07	470	5.7	220	4.5	105	3.1	5.0
08	500	5.6	220	4.7	100	3.4	4.1
09	470	5.8	210	4.8	100	3.6	5.0
10	520	5.9	220	4.9	100	3.8	5.0
11	500	6.2	220	5.0	100	3.9	5.5
12	480	6.4	210	5.0	100	3.8	5.0
13	470	6.7	210	5.0	100	3.8	2.6
14	440	6.5	220	4.9	100	3.5	2.6
15	490	6.2	230	5.0	100	3.8	3.8
16	500	6.0	250	4.9	100	3.8	2.6
17	520	6.2	220	5.1	100	3.8	2.4
18	480	6.4	220	5.2	100	3.9	2.5
19	490	6.5	210	5.2	100	3.9	2.5
20	500	6.5	210	5.2	100	3.9	2.5
21	470	6.6	230	5.0	100	3.6	2.5
22	480	6.6	230	5.0	100	3.6	2.5
23	500	6.5	210	5.2	100	3.9	2.5

Time: 90.0°W.

Sweep: 1.0 Mc to 17.0 Mc in 16 seconds.

Table 25

Ottawa, Canada (45.4°N, 75.9°W)								July 1957
Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2
00	5.9	290			<1.7	2.6		
01	5.3	300			<1.7	2.6		
02	4.9	300			<1.7	2.6		
03	4.4	290			<1.7	2.6		
04	4.2	300			<1.7	2.7		
05	---	270			120	2.0		2.6
06	340	5.7	250	4.2	110	2.7		2.8
07	350	6.0	230	4.8	105	3.1		2.7
08	410	6.4	220	5.0	105	3.5		2.6
09	420	6.4	210	5.2	105	3.8		2.6
10	460	6.4	210	5.2	105	3.9		2.4
11	480	6.6	210	5.4	105	4.0		2.6
12	500	6.4	210	5.4	105	4.0		2.5
13	500	6.6	210	5.4	105	4.0		2.5
14	470	6.8	220	5.4	105	4.0		2.5
15	460	6.9	220	5.3	105	3.9		2.5
16	450	6.9	230	5.2	105	3.8		2.55
17	400	7.1	240	4.9	110	3.4		2.6
18	350	7.2	250	4.3	110	2.9		2.6
19	(300)	7.2	270		120	2.3		2.7
20		7.2	270		---	1.8	<2.1	2.7
21		7.2	280			<1.7		2.7
22		6.9	280			2.4		2.7
23		6.4	290			<1.7		2.65

Time: 75.0°W.

Sweep: 1.0 Mc to 16.0 Mc in 16 seconds.

Table 27

Okinawa I., (26.3°N, 127.0°E)								July 1957
Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2
00	>11.1	310				3.2	2.60	
01	11.2	285				3.1	2.70	
02	10.1	260				3.2	2.80	
03	9.5	255				3.1	2.80	
04	8.3	260				4.1	2.80	
05	7.3	260				3.8	2.75	
06	7.9	255	(129)	2,00		3.00		
07	8.4	240	111	(2,85)	3.3	3.00		
08	---	230	109	(3,35)	4.7	2.95		
09	---	220	---	109	(3,70)	5.6	2.80	
10	(420)	9.2	220	6.3	109	(4,00)	5.2	2.55
11	410	10.1	215	6.2	109	(4,15)	4.9	2.50
12	400	10.9	215	6.1	109	(4,30)	5.1	2.55
13	400	11.3	210	6.2	109	4.25	5.2	2.55
14	400	11.9	220	6.1	110	(4,15)	5.0	2.55
15	390	12.4	225	5.9	109	4.00	5.2	2.60
16	360	12.8	230	5.7	109	3.75	5.2	2.65
17	330	12.6	235	---	109	3.40	4.5	2.70
18	(310)	12.2	250		111	2.85	4.7	2.70
19	11.6	270	(121)	----		4.4	2.70	
20	10.7	300				4.2	2.55	
21	(10.7)	325				3.1	2.45	
22	10.8	330				3.1	2.45	
23	11.2	320				3.0	2.50	

Time: 135.0°E.

Sweep: 1.0 Mc to 25.0 Mc in 13.5 seconds.

Table 29

Townsville, Australia (19.3°S, 146.7°E)								July 1957
Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2
00	>5.7	240					3.05	
01	4.6	245					2.95	
02	4.2	250					2.95	
03	3.9	250					3.05	
04	3.6	260					2.75	
05	3.7	260					2.90	
06	4.0	250					3.00	
07	>7.0	250	150	2,05	2.1	(3,20)		
08	(10.8)	240	100	2,90		(3,30)		
09	(240)	11.8	230	100	3.25			
10	250	12.6	220	100	3.55			
11	(250)	12.0	220	---	100	3.75	4.0	
12	(250)	11.5	210	---	100	3.75	4.0	
13	(320)	11.2	210	6.2	100	3.75	4.0	
14	280	11.2	220	6.1	100	3.70	4.0	
15	(290)	11.0	230	---	100	3.50	3.8	
16	---	>11.0	230	---	100	3.15	3.6	(2,95)
17	>10.0	250	100	2,60		3.8		
18	>8.0	230	---	---		3.7		
19	7.7	230				3.2	3.10	
20	7.0	240				2.1	2.90	
21	(7.2)	250				(3,00)		
22	>6.5	250				3.10		
23	>6.0	240				3.00		

Time: 150.0°E.

Sweep: 1.0 Mc to 16.0 Mc in 1 minute 55 seconds.

Table 26

Ft. Monmouth, New Jersey (40.3°N, 74.1°W)								July 1957
Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2
00			6.6	<270				4.2
01			6.2	270				4.0
02			5.6	(260)				2.65
03			5.3	<270				3.1
04			5.0	270				3.1
05			5.4	265				2.90
06	(420)	6.2	250	---	115	(1,95)	2,2	2.90
07	380	6.6	230	4.4	107	(3,15)	3.5	2.90
08	365	6.8	220	5.2	105	(3,50)	3.8	2.80
09	420	6.8	205	5.4	105	(3,65)	4.4	2.70
10	440	7.0	205	5.4	105	(3,90)	4.3	2.65
11	465	7.2	200	5.6	105	(4,00)	4.2	2.60
12	455	7.0	200	5.5	105	(4,00)	4.2	2.60
13	480	7.0	200	5.6	105	4.05	4.2	2.50
14	450	7.2	210	5.5	105	3.90	4.1	2.60
15	430	7.2	215	5.4	106	3.85		2.65
16	390	7.4	225	5.2	105	3.60		2.65
17	380	7.6	230	4.8	107	(2,70)	3.4	2.75
18	---	7.7	245	---	111	(2,05)	3.0	2.80
19		7.6	270			<125		
20		7.7	250					
21		7.4	<255					
22		7.2	<270					
23		7.0	275					

Time: 75.0°W.

Sweep: 1.0 Mc to 25.0 Mc in 13.5 seconds.

Table 28

Panama Canal Zone (9.4°N, 79.9°W)								July 1957
Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2
00			9.7	260				(2,2)
01			8.6	240				2.85
02			8.0	250				2.85
03			7.8	245				2.05
04			7.3	245				2.85
05			6.5	245				(3,0)
06			6.2	280				2.05
07			7.4	240				3.00
08			8.1	230				2.75
09			9.4	220				2.60
10	(410)	10.2	215	5.9	107	(4,00)	4.1	2.35
11	420	10.9	210	6.0	107	(4,20)	4.2	2.40
12	440	11.5	210	6.0	109	4.20		2.40
13	420	12.0	210	6.0	107	(4,20)	4.4	2.50
14	410	12.5	215	6.0	108	(4,10)	4.4	2.50
15	390	12.7	220	5.6	107	(4,00)	4.2	2.55
16	365	12.2	220	5.5	109	3.65	4.0	2.60
17	350	11.7	235	---	109	3.20	3.6	2.60
18	---	11.0	250		115	(2,50)	2.7	2.60
19	9.0	230					3.1	2.60
20	9.6	295					2.3	2.55
21	9.6	300						2.60
22	9.7	280						(2,6)
23	9.8	270						2.75

Time: 75.0°W.

Sweep: 1.0 Mc to 25.0 Mc in 13.5 seconds.

Table 30

Johannesburg, Union of S. Africa (26.2°S, 20.0°E)								July 1957
Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2
00			3.0	<295				<1.7
01			3.0	<305				<1.8
02			3.0	<270				<1.6
03			3.0	<250				<1.6
04			3.0	(250)				2.85
05			2.7	<280				<1.6
06			2.9	<270				<1.7
07			6.1	240				3.10
08			9.0	230				3.25
09			(240)	10.3	225			3.20
10			250	11.4	225			3.15
11								

Table 31

Brisbane, Australia (27.5°S, 152.9°E)								July 1957	
Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2	
00		4.9	260					2.65	
01		4.8	268					2.70	
02		4.7	260					2.75	
03		4.7	250					2.75	
04		4.4	240					2.75	
05		4.0	250					2.70	
06		4.3	258	---	E			2.80	
07		8.0	230	140	2.20			3.15	
08		10.7	230	110	2.08			3.15	
09		12.8	230	110	3.38			3.15	
10		12.8	238	118	3.50			3.15	
11		11.8	220	118	3.65	3.8		3.00	
12		11.8	220	118	3.78	4.8		2.90	
13		11.0	226	115	3.70	4.0		2.85	
14		11.8	238	115	3.55	4.0		2.80	
15		10.8	230	120	3.30	3.4		2.85	
16		10.2	240	120	2.70	3.2		2.85	
17		9.6	240	120	1.95	3.7		2.95	
18		8.5	238	---	E	3.2		2.85	
19		7.2	230	---	---	2.2		2.75	
20		6.6	258					2.75	
21		6.8	250					2.75	
22		5.6	250					2.68	
23		5.2	240					2.80	

Time: 150.0°E.

Sweep: 1.8 Mc to 16.0 Mc in 1 minute 55 seconds.

Table 33

Scott Base (77.0°S, 166.0°E)								July 1957	
Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2	
00		(4.9)	250					----	
01		3.7	280					(3.10)	
02		(3.8)	258			<1.1		----	
03		(3.8)	270			<1.2		----	
04		(3.4)	250					----	
05		(3.4)	250			<1.5		(3.38)	
06		(3.4)	250					(3.08)	
07		(3.5)	240			<1.2		(3.30)	
08		4.0	258			<1.3		----	
09		4.2	258			<1.3		(3.20)	
10		4.8	240			2.4		(3.30)	
11		5.3	258			<1.9		(3.30)	
12		6.0	240			3.0		(3.20)	
13		7.0	250			5.3		(3.30)	
14		6.6	258			<3.4		(3.20)	
15		7.2	250			5.0		(3.28)	
16		7.8	258			<1.4		(3.10)	
17		7.0	258					(3.20)	
18		7.3	258					(3.20)	
19		7.5	250					(3.20)	
20		6.6	250			----			
21		6.9	250					2.70	
22		5.9	250			----			
23		(5.7)	250			----			

Time: 165.0°E.

Table 35

Juliusruh/Rügen, Germany (54.6°N, 13.4°E)								June 1957	
Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2	
00			7.7					2.40	
01		7.4			E	1.3		2.45	
02		7.2			E	1.2		2.45	
03		6.8			1.25	1.8		2.45	
04		6.8		---	1.60	2.2		2.50	
05		7.1	4.0		2.35	2.7		2.50	
06		7.2	4.6		2.05	3.6		2.55	
07		7.4	4.0		3.20	3.7		2.50	
08		7.6	5.4		3.40	3.9		2.45	
09		7.9	5.5		3.78	5.1		2.50	
10		7.8	5.6		3.78	4.5		2.50	
11		7.6	5.6		3.80	4.5		2.50	
12		7.6	5.6		3.80	5.1		2.50	
13		7.5	5.8	(3.65)				2.45	
14		7.6	5.6		3.65	5.6		2.55	
15		7.4	5.5		3.55	4.1		2.55	
16		7.4	5.4		3.50	3.8		2.55	
17		7.5	5.0		3.35	4.7		2.60	
18		7.5			2.95	4.4		2.65	
19		7.6			2.45	4.6		2.65	
20		7.6			1.80	3.0		2.70	
21		7.6			---	2.0		2.60	
22		7.8				2.3		2.45	
23		7.6				2.45			

Time: 15.0°E.

Sweep: 0.5 Mc to 20.0 Mc in 28 seconds.

Table 32

Canberra, Australia (35.3°S, 149.0°E)								July 1957	
Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2	
00			4.5		250				2.00
01			4.4	288					2.75
02			4.4	278					2.80
03			4.4	275					2.00
04			4.6	255					2.95
05			4.0	<248					1.0
06			3.9	<250					2.85
07			5.6	240					2.90
08			8.7	225					3.48
09			10.8	235					3.30
10			245	>11.2	230	(4.5)	110	3.38	3.4
11			(245)	11.6	220	(5.8)	118	3.58	3.5
12			(250)	11.2	220	(4.6)	110	3.50	3.0
13			258	>11.1	220	(4.5)	118	3.50	3.0
14			(258)	11.1	220	(4.6)	118	3.40	2.95
15			(250)	11.0	235	---	110	3.10	3.00
16			10.7	240					3.00
17			10.1	230					3.10
18			0.6	220					2.18
19			7.5	<248					3.00
20			6.6	<240					3.80
21			6.0	<250					2.90
22			5.2	<240					2.85
23			5.0	<260					2.80

Time: 150.0°E.

Sweep: 1.0 Mc to 16.0 Mc in 1 minute 55 seconds.

Table 33

Inverness, Scotland (57.4°N, 4.2°W)								June 1957	
Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2	
00			7.0		315				2.27
01			7.0		320				2.27
02			6.9		335				2.25
03			6.3		330	(135)			2.3
04			6.3	300		(3.9)	115	2.45	2.4
05			(450)	6.3	298	(4.9)	115	2.45	2.5
06			430	6.4	255	4.6	118	2.98	2.55
07			455	6.9	245	5.0	105	3.35	3.4
08			475	7.1	240	5.5	105	3.58	3.9
09			458	7.3	245	5.5	105	3.65	4.2
10			465	7.8	220	5.5	100	3.80	2.5
11			485	7.1	235	5.6	100	4.05	4.2
12			505	7.2	238	5.6	100	4.00	2.40
13			505	7.1	240	5.6	100	3.95	2.35
14			485	7.3	230	5.6	100	3.90	2.35
15			475	7.2	270	5.5	100	3.75	2.4
16			465	7.8	245	5.4	105	3.65	2.45
17			475	7.9	238	5.8	105	3.9	4.8
18			465	8.1	235	5.8	105	4.8	4.6
19			470	8.2	235	5.7	105	3.9	4.8
20			460	0.0	235	5.6	110	3.8	4.6
21			435	0.0	240	5.5	110	3.6	4.3
22			410	8.0	250	(5.3)	110	3.3	4.6
23			8.2	260					2.60
			8.2	275					2.68
			7.8	285					2.65
			8.4	300					3.3
			8.4	300					2.50
			8.5	315					2.3
			7.9	325					2.4

Time: 0.0°E.

Sweep: 0.67 Mc to 25.0 Mc in 5 minutes, automatic operation.

\*Average values except foF2 and foEs, which are median values.

Table 37

Townsville, Australia (19.3°S, 146.7°E)							June 1957	
Time	h'F2	foF2	h'F	foFl	h'E	foE	foEs	(M3000)F2
00	>5.8	240				2.90		
01	>5.0	240				(2.05)		
02	4.4	250				2.95		
03	4.0	240				3.00		
04	3.6	250				2.00		
05	3.6	265				2.00		
06	3.7	250				3.00		
07	7.4	240			2.10	(3.20)		
08	>11.0	230				2.90	(3.30)	
09	(240)	>12.0	230			3.35		
10	-- (12.7)	225				3.60	3.7	(3.15)
11	-- >12.0	220				3.75	4.0	3.00
12	(300)	11.7	220	--		3.80	4.2	2.95
13	-- >11.5	210	--			3.75	4.2	2.85
14	-- 11.8	220	--			3.70	4.3	2.00
15	-- 11.5	230	--			3.50	4.0	2.80
16	>11.0	240				3.15	4.2	(2.00)
17	>10.0	240				2.60	4.6	
18	>8.0	250				--	4.1	
19	>7.5	230					4.0	--
20	>7.2	240					3.1	(2.90)
21	>7.2	250					2.8	(2.80)
22	>7.0	250						(2.95)
23	>6.3	235						(3.10)

Time: 150.0°E.

Sweep: 1.0 Mc to 16.0 Mc in 1 minute 55 seconds.

Table 39

Cape Town, Union of S. Africa (34.1°S, 10.3°E)							June 1957	
Time	h'F2	foF2	h'F	foFl	h'E	foE	foEs	(M3000)F2
00	2.6	<330						2.60
01	2.8	<315						2.65
02	2.0	<300						2.70
03	2.8	<285						2.80
04	2.0	<290						2.80
05	2.8	<300						2.80
06	2.6	<290						2.75
07	2.9	<275						2.70
08	6.8	240			2.0			3.10
09	-- >9.6	235	--			3.25		
10	240	11.0	235	--		3.2		
11	(245)	12.0	230	--		3.4		
12	240	12.4	230	--		3.6		
13	(250)	>12.2	230	--		3.7	4.0	2.85
14	(250)	12.4	240	--		3.5	3.8	2.85
15	(250)	12.3	240	--		3.3	3.6	2.80
16	(255)	12.3	240			3.0	3.4	2.85
17	11.7	235				2.4	2.6	2.90
18	>10.4	220				--		3.05
19	0.0	220						3.00
20	6.3	230						3.15
21	4.2	230						3.25
22	2.7	<230						3.15
23	2.4	<310						2.75

Time: 30.0°E.

Sweep: 1.0 Mc to 15.0 Mc in 7 seconds.

Table 11\*

Slough, England (51.5°N, 0.6°W)							May 1957	
Time	h'F2	foF2	h'F	foFl	h'E	foE	foEs	(M3000)F2
00	7.4	400						2.40
01	7.1	320						2.40
02	7.0	320						2.35
03	6.5	315						2.40
04	6.7	305			130	1.6	3.2	2.50
05	7.1	270			115	2.1	3.2	2.60
06	7.2	250			115	2.6	3.4	2.65
07	(360)	0.0	245	(5.3)	110	3.0	4.0	2.65
08	375	8.5	235	4.8	105	3.4	4.5	2.55
09	385	0.5	245	5.7	105	3.7	4.7	2.55
10	405	8.7	225	5.9	105	3.8	4.8	2.50
11	425	8.8	225	5.9	105	3.8	4.7	2.50
12	430	9.0	215	6.0	105	3.8	5.1	2.45
13	375	9.1	230	6.0	105	3.9	4.8	2.50
14	395	9.0	235	5.8	105	3.8	4.5	2.50
15	395	8.0	235	5.7	105	3.7	4.3	2.55
16	(400)	0.8	240	(5.6)	105	3.5	4.2	2.55
17	(380)	0.6	245	(5.4)	110	3.3	3.0	2.60
18	0.5	255			115	2.0	3.6	2.60
19	8.7	270			125	2.1	3.5	2.65
20	8.6	270						2.60
21	8.4	285						2.50
22	0.2	285						2.45
23	7.9	305						2.45

Time: 0.0°.

Sweep: 0.67 Mc to 25.0 Mc in 5 minutes, automatic operation.

\*Average values except foF2 and foEs, which are median values.

Table 38

Johannesburg, Union of S. Africa (26.2°S, 28.0°E)							June 1957	
Time	h'F2	foF2	h'F	foFl	h'E	foE	foEs	(M3000)F2
00								2.70
01								2.75
02								2.80
03								2.90
04								2.90
05								2.80
06								2.85
07								3.10
08								3.10
09								3.15
10								3.10
11								3.10
12								3.10
13								3.10
14								3.15
15								3.10
16								2.80
17								2.80
18								2.80
19								2.80
20								2.80
21								2.80
22								2.80
23								2.80

Time: 30.0°E.

Sweep: 1.0 Mc to 16.0 Mc in 7 seconds.

Table 40\*

Inverness, Scotland (57.4°N, 4.2°W)							May 1957	
Time	h'F2	foF2	h'F	foFl	h'E	foE	foEs	(M3000)F2
00								2.3
01								2.3
02								2.3
03								2.35
04								2.35
05								2.6
06								2.7
07								2.7
08								2.6
09								2.5
10								2.3
11								2.5
12								2.5
13								2.5
14								2.5
15								2.7
16								2.7
17								2.7
18								2.7
19								2.7
20								2.7
21								2.7
22								2.7
23								2.7

Time: 0.0°.

Sweep: 1.5 Mc to 20.0 Mc in 5 minutes, manual operation.

Table 42

Rarotonga I. (21.2°S, 159.0°W)							May 1957	
Time	h'F2	foF2	h'F	foFl	h'E	foE	foEs	(M3000)F2
00								2.90
01								2.90
02								2.90
03								2.90
04								2.90
05								2.90
06								2.90
07								2.90
08								2.90
09								2.90
10								2.90
11								2.90
12								2.90
13								2.90
14								2.90
15								2.90
16								2.90
17								2.90
18								2.90
19								2.90
20								2.90
21								2.90
22								2.90
23								2.90

Time: 165.0°W.

Sweep: 1.5 Mc to 20.0 Mc in 5 minutes, manual operation.

\*Average values except foF2 and foEs, which are median values.

Table 43\*

Inverness, Scotland (57.4°N, 4.2°W)							April 1957	
Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2
00		5.8	350					2.30
01		5.5	365					2.30
02		5.2	360					2.10
03		4.9	315					2.20
04		4.9	325					2.40
05		5.4	290	130	1.7			2.50
06		5.6	265	125	2.2			2.60
07		6.3	255	110	2.65			2.65
00		7.2	250	110	3.05			2.70
09	(410)	7.8	240	(5.3)	105	3.40		2.60
10	395	0.2	235	(5.5)	105	3.55		2.60
11	415	8.6	230	(5.6)	105	3.70		2.50
12	420	9.0	230	(5.9)	105	3.75		2.50
13	420	9.0	235	(5.6)	105	3.75		2.50
14	415	0.8	240	(5.7)	105	3.65		2.50
15	390	8.9	240	(5.0)	105	3.55		2.60
16		9.4	245		110	3.30		2.60
17		9.4	250		110	2.95		2.65
18		9.5	255		115	2.55		2.75
19		8.7	260		140	2.05		2.75
20		8.1	260			(1.6)		2.65
21		7.2	260					2.45
22		6.7	305					2.35
23		6.4	340					2.30

Time: 0.0°.

Sweep: 0.67 Mc to 25.0 Mc in 5 minutes, automatic operation.

\*Average values except foF2 and fEs, which are median values.

Table 45\*

Slough, England (51.5°N, 0.6°W)							April 1957	
Time	h'F2	foF2	h'F1	foF1	h'E	foE	foEs	(M3000)F2
00	340	6.6						2.35
01	345	6.3						2.30
02	340	5.9						2.35
03	330	5.0						2.4
04	315	5.4						2.35
05	205	5.3			145	1.0	3.2	2.55
06	265	6.4			130	2.2	3.5	2.70
07	255	7.1	(255)		115	2.0	3.0	2.70
00	290	7.0	240	5.4	120	3.2	4.3	2.65
09	330	8.8	235	5.7	115	3.5	4.4	2.60
10	380	9.3	235	6.1	110	3.7	4.4	2.55
11	380	10.1	235	6.1	110	3.0	4.6	2.60
12	360	10.4	230	6.3	110	3.0	4.6	2.55
13	365	10.4	230	6.4	110	3.8	4.4	2.55
14	330	10.2	225	6.0	110	3.7	3.9	2.55
15	325	10.0	240	6.0	110	3.6	3.8	2.60
16	265	10.1	(245)	(5.6)	115	3.3	4.0	2.60
17	250	(10.4)			115	2.9	3.4	2.65
10	260	(10.1)			130	2.3	3.1	2.70
19	260	(9.6)			(150)	(2.0)	2.9	2.70
20	260	0.5						2.60
21	275	7.9						2.50
22	300	7.2						2.40
23	330	6.9						2.40

Time: 0.0°.

Sweep: 0.67 Mc to 25.0 Mc in 5 minutes, automatic operation.

\*Average values except foF2 and fEs, which are median values.

Table 47

Providenie Bay, U.S.S.R. (64.4°N, 106.6°E)							March 1957	
Time	h'F2	foF2	h'F1	foF1	h'E	foE	fEs	(M3000)F2
00	400	4.8						2.2
01	360	5.2						2.2
02	330	5.2						2.3
03	380	5.6						2.2
04	350	5.4						2.3
05	350	5.7						2.3
06	300	5.0						2.5
07	270	6.3						2.5
08	260	7.0						2.7
09	260	7.3						2.7
10	250	8.2						2.7
11	250	0.4						2.9
12	250	8.5						2.9
13	250	0.6						2.8
14	250	0.6						2.8
15	250	0.0						2.0
16	250	8.8						2.9
17	250	0.7						2.0
18	250	0.7						2.7
19	260	0.0						2.6
20	270	6.2						2.6
21	290	5.3						2.4
22	330	4.8						2.3
23	350	4.5						2.2

Time: 180.0°E.

Sweep: 1.0 Mc to 10.0 Mc in 10 minutes, semiautomatic operation.

Table 48\*

\*Average values except foF2 and fEs, which are median values.

Table 43\*

Juliusruh/Rügen, Germany (54.6°N, 13.4°E)

Juliusruh/Rügen, Germany (54.6°N, 13.4°E)							April 1957	
Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2
00								2.50
01								(2.60)
02								(2.60)
03								(2.55)
04								(2.65)
05								(2.95)
06								(2.90)
07								(2.70)
08								(2.65)
09								(2.65)
10								(2.70)
11								(2.70)
12								(2.75)
13								(2.85)
14								(2.90)
15								(2.70)
16								(2.75)
17								(2.75)
18								(2.85)
19								(2.90)
20								(2.75)
21								(2.65)
22								(2.50)
23								2.35

Time: 15.0°E.

Sweep: 0.5 Mc to 20.0 Mc in 20 seconds.

Table 45\*

Singapore, British Malaya (1.3°N, 103.8°E)

Singapore, British Malaya (1.3°N, 103.8°E)							April 1957	
Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2
00								2.00
01								2.60
02								2.70
03								2.80
04								(1.1)
05								2.95
06								3.10
07								2.85
08								2.85
09								2.50
10								2.15
11								1.95
12								1.95
13								1.95
14								1.95
15								2.00
16								2.05
17								2.05
18								2.05
19								2.05
20								2.05
21								1.2
22								1.4
23								(2.50)

Time: 105.0°E.

Sweep: 0.67 Mc to 25.0 Mc in 5 minutes, automatic operation.

\*Average values except foF2 and fEs, which are median values.

Table 47

Inverness, Scotland (57.4°N, 4.2°W)

Inverness, Scotland (57.4°N, 4.2°W)							March 1957	
Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2
00								2.35
01								2.35
02								2.30
03								2.25
04								2.20
05								2.35
06								2.50
07								2.85
08								2.85
09								2.85
10								2.70
11								2.70
12								2.70
13								2.65
14								2.65
15								2.70
16								2.70
17								2.70
18								2.70
19								2.70
20								2.70
21								2.45
22								2.35
23								2.30

Time: 0.0°.

Sweep: 0.67 Mc to 25.0 Mc in 5 minutes, automatic operation.

\*Average values except foF2 and fEs, which are median values.

Table 49

Sverdlovsk, U.S.S.R. (56.7°N, 61.1°E)							March 1957	
Time	h'F2	foF2	h'F1	foF1	h'E	foE	fEs	(M3000)F2
00	350	5.2				2.4		
01	370	5.0				2.4		
02	350	4.9				2.4		
03	340	4.5				2.4		
04	340	4.3				2.4		
05	330	4.2				2.5		
06	290	5.1				2.7		
07	270	6.8			---	1.8		
08	260	8.6	260	4.2	120	2.7		
09	250	10.8	250	4.3	120	3.0		
10	250	12.1	250	4.6	120	3.2		
11	250	12.6	240	4.9	120	3.3		
12	250	12.6	240	4.8	120	3.3		
13	250	13.0	240	4.5	120	3.3		
14	250	12.7	250	4.8	120	3.2		
15	250	12.5	250	4.3	120	3.1		
16	250	12.2			130	2.8		
17	260	11.2			140	2.3		
18	260	10.7			150	1.8		
19	270	9.6						
20	270	8.2						
21	270	6.9						
22	300	6.0						
23	300	5.6						

Time: 60.0°E.

Sweep: 1.5 Mc to 18.0 Mc in 10 minutes, manual operation.

Table 51

Rostov-on-Don, U.S.S.R. (47.2°N, 39.7°E)							March 1957	
Time	h'F2	foF2	h'F1	foF1	h'E	foE	fEs	(M3000)F2
00	320	6.8				2.4		
01	320	6.4				2.4		
02	320	6.0				2.5		
03	330	6.0				2.3		
04	320	5.4				2.4		
05	330	5.1				2.4		
06	300	5.3				2.7		
07	250	7.0				2.8		
08	240	9.0			120	2.7		
09	240	9.2			120	3.2		
10	240	9.5			120	3.4		
11	240	9.8			120	3.6		
12	240	9.4			120	3.7		
13	240	9.6			120	3.7		
14	240	9.6			120	3.6		
15	240	9.4			120	3.5		
16	240	9.3			120	3.2		
17	240	9.4			120	2.8		
18	250	9.4				2.3		
19	250	9.0						
20	240	8.1						
21	250	7.6						
22	270	7.2						
23	310	7.0						

Time: 45.0°E.

Sweep: 1.6 Mc to 10.0 Mc in 5 to 10 minutes, manual operation.

Table 53\*

Singapore, British Malaya (1.3°N, 103.8°E)							March 1957	
Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2
00	11.7	220				2.65		
01	10.7	250				2.60		
02	10.2	255				2.65		
03	10.4	255				2.60		
04	9.6	230				2.95		
05	8.1	235			1.0	3.00		
06	6.3	255			1.4	2.80		
07	9.9	250	130	2.6	2.7	2.90		
08	11.6	245	120	3.3	3.4	2.60		
09	12.8	230	110	3.8	3.9	2.25		
10	13.5	215	110	4.1		2.10		
11	13.2	210	110	4.2		1.90		
12	13.0	210	110	4.3		2.00		
13	13.1	210	110	4.3		1.95		
14	13.3	210	110	4.1		2.00		
15	13.6	220	110	3.9		2.00		
16	13.7	240	115	3.5		2.00		
17	13.9	250	115	2.9		2.05		
18	13.7	290	(150)	1.95		2.05		
19	13.4	380				2.00		
20	>13.6	380			(2.05)			
21	>14.0	300		1.2	----			
22	13.5	250			(2.55)			
23	13.2	230			2.65			

Time: 105.0°E.

Sweep: 0.67 Mc to 25.0 Mc in 5 minutes, automatic operation.

\*Average values except foF2 and foEs, which are median values.

Table 50

Irkutsk, U.S.S.R. (52.5°N, 104.0°E)							March 1957	
Time	h'F2	foF2	h'F1	foF1	h'E	foE	foEs	(M3000)F2
00	230		(6.0)					(2.8)
01	300		(5.8)					(2.7)
02	290		(5.3)					(2.7)
03	300		(4.9)					(2.6)
04	300		(4.8)					(2.7)
05	290		(5.0)					(2.7)
06	260		(5.2)					(2.9)
07	230		(8.2)					(2.9)
08	230		9.8	220	(4.3)	110	2.8	3.1
09	230		11.2	210	(4.2)	110	3.1	3.0
10	230		12.4	220	(4.4)	110	3.3	2.9
11	240		(13.2)	200	(4.4)	110	3.4	2.9
12	240		13.4	210	(4.4)	110	3.5	2.9
13	240		13.2	210	(4.5)	110	3.5	2.8
14	250		12.8	210	(4.4)	110	3.4	2.8
15	230		12.7	220	(4.2)	110	3.2	2.8
16	240		12.2			110	2.9	2.9
17	230		(12.0)			110	2.4	2.9
18	230		11.2			130	1.9	2.9
19	230		10.4					2.9
20	230		9.2					2.9
21	240		(6.3)					2.8
22	250		(7.6)					2.8
23	260		7.1					2.8

Time: 105.0°E.

Sweep: 1.8 Mc to 16.0 Mc in 1 minute.

Table 52

Ashkhabad, U.S.S.R. (37.9°N, 58.3°E)							March 1957	
Time	h'F2	foF2	h'F1	foF1	h'E	foE	foEs	(M3000)F2
00	300		6.8					2.5
01	320		6.7					2.6
02	310		6.5					2.5
03	300		6.3					2.6
04	290		6.1					2.6
05	290		5.8					2.6
06	290		6.1					2.7
07	250		6.6					3.0
08	240		10.8					3.0
09	240		12.6					2.8
10	250		13.6	230	4.9	100	3.5	2.9
11	240		14.0	220	5.0	100	3.7	2.8
12	250		14.0	220	6.5	100	3.9	2.7
13	260		13.8	230	6.8	100	3.9	2.6
14	250		13.2	230	7.0	100	3.8	2.6
15	280		13.0	230	6.5	100	3.6	2.7
16	250		12.6	250	6.2	100	3.3	2.7
17	250		12.4			110	2.8	2.8
18	250		12.2			120	2.3	2.9
19	230		10.6					2.9
20	240		6.8					2.7
21	250		8.3					2.7
22	270		7.9					2.6
23	280		7.4					2.6

Table 54\*

Falkland Is. (51.7°S, 57.8°W)							March 1957	
Time	h'F2	foF2	h'F1	foF1	h'E	foE	foEs	(M3000)F2
00			6.9	345				(2.6)
01			6.0	340				(2.3)
02			6.4	340				(2.3)
03			6.1	335				2.2
04			5.7	365				2.2
05			5.4	370				2.2
06			6.5	280				2.5
07			8.7	250				2.8
08			10.6	245				2.8
09			12.2	240				2.8
10			13.0	240				2.8
11			13.4	225				2.7
12			13.8	230				2.7
13			13.5	230				2.7
14			12.9	235				2.8
15			11.7	240				2.8
16			11.1	245				2.8
17			10.5	250				2.9
18			10.4	250				2.9
19			9.4	250				2.8
20			8.0	255				2.7
21			7.3	275				2.5
22			6.9	315				

Table 55\*

Inverness, Scotland (57.4°N, 4.2°W)							February 1957		
Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2	
00		3.8	325				(2.45)		
01		4.4	345				(2.50)		
02		3.9	340				(2.50)		
03		>3.6	335				(2.50)		
04		(3.2)	330				(2.40)		
05		(3.1)	315				(2.50)		
06		(3.6)	290				---		
07		3.9	270	---	---		2.70		
00		6.2	255	145	1.90		3.00		
09		6.5	245	130	2.35		3.00		
10		10.5	240	120	2.65		3.00		
11		11.8	240	115	2.90		3.00		
12		12.2	235	115	3.00		3.00		
13		12.4	235	120	3.00		2.90		
14		12.4	235	120	2.90		2.95		
15		12.1	240	125	2.65		2.90		
16		12.0	240	135	2.40		3.00		
17		10.8	235	140	1.95		3.00		
18		8.6	235	---	---		2.90		
19		7.2	245				2.75		
20		6.2	275				2.70		
21		5.1	295				2.65		
22		4.6	315				2.50		
23		4.6	320				2.45		

Time: 0.0°.

Sweep: 0.67 Mc to 25.0 Mc in 5 minutes, automatic operation.

\*Average values except foF2 and foEs, which are median values.

Table 57\*

Falkland Is. (51.7°S, 57.8°W)							February 1957		
Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2	
00		0.4	315				(2.2)	2.4	
01		8.1	315				(1.8)	2.4	
02		7.8	320				(1.9)	2.4	
03		7.4	330				2.3		
04		6.0	365				2.3		
05		7.4	300	155	1.8		2.3		
06		0.5	255	130	2.3	2.6	2.4		
07		9.8	250	110	2.9	3.6	2.5		
00		10.5	245	105	3.3	(4.3)	2.6		
09		10.8	245	100	3.5	(4.9)	2.5		
10		11.5	(235)	100	3.7	(5.3)	2.6		
11		12.0	(225)	100	3.8	(5.7)	2.6		
12		11.9	225	100	3.8	(5.3)	2.6		
13		11.6	230	100	3.7	(4.6)	2.7		
14		11.2	225	100	3.8	(4.2)	2.7		
15		10.2	230	100	3.6		2.7		
16		9.2	240	100	3.4	(3.7)	2.8		
17		8.8	245	105	3.0		2.8		
18		0.5	255	125	2.5	(3.0)	2.8		
19		8.3	265	(135)	(1.8)	(3.0)	2.7		
20		8.4	290			(3.2)	2.6		
21		8.2	300			(3.3)	2.4		
22		8.4	325			(2.7)	2.3		
23		8.4	325			(2.6)	2.4		

Time: 60.0°W.

Sweep: 0.67 Mc to 25.0 Mc in 5 minutes, automatic.

\*Average values except foF2 and foEs, which are median values.

Table 59

Lulea, Sweden (65.6°N, 22.1°E)							October 1956		
Time	h'F2	foF2	h'F1	foF1	h'E	foE	foEs	(M3000)F2	
00	320	---					1.7		
01	320	---					2.0		
02	310	---					2.3		
03	310	---					2.6		
04	310	---					2.3		
05	280	---					2.0		
06	270	---	---	---	---		1.7		
07	250	7.0	---	---	---		2.0		
08	250	>8.0	---	---	120	2.3			
09	(240)	>8.5	---	---	125	2.5			
10	240	>9.0	---	---	120	2.5			
11	240	>9.0	---	---	120	2.6			
12	240	>9.0	---	---	115	2.6			
13	240	>9.5	---	---	110	2.5			
14	235	>9.0	---	---	130	2.4			
15	230	>9.3	---	---	125	2.3			
16	230	>8.0	---	---	---	2.0			
17	240	>8.0	---	---	---				
18	240	>7.0	---	---	---				
19	240	>7.0	---	---	---				
20	250	>7.0				2.0			
21	250	---				2.5			
22	(270)	---				2.5			
23	(260)	---				2.0			

Time: 15.0°E.

Sweep: 1.5 Mc to 10.0 Mc in 9 minutes, automatic operation.

Table 55\*

Inverness, Scotland (57.4°N, 4.2°W)							February 1957		
Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2	
00		3.8	325				(2.45)		
01		4.4	345				(2.50)		
02		3.9	340				(2.50)		
03		>3.6	335				(2.50)		
04		(3.2)	330				(2.40)		
05		(3.1)	315				(2.50)		
06		(3.6)	290				---		
07		3.9	270	---	---		2.70		
00		6.2	255	145	1.90		3.00		
09		6.5	245	130	2.35		3.00		
10		10.5	240	120	2.65		3.00		
11		11.8	240	115	2.90		3.00		
12		12.2	235	115	3.00		3.00		
13		12.4	235	120	3.00		2.90		
14		12.4	235	120	2.90		2.95		
15		12.1	240	125	2.65		2.90		
16		12.0	240	135	2.40		3.00		
17		10.8	235	140	1.95		3.00		
18		8.6	235	---	---		2.90		
19		7.2	245				2.75		
20		6.2	275				2.70		
21		5.1	295				2.65		
22		4.6	315				2.50		
23		4.6	320				2.45		

Time: 0.0°.

Sweep: 0.67 Mc to 25.0 Mc in 5 minutes, automatic operation.

\*Average values except foF2 and foEs, which are median values.

Table 56\*

Ibadan, Nigeria (7.4°N, 3.9°E)							February 1957		
Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2	
00					<9.8	265		1.0	
01					>10.1	250		---	
02					10.7	240		2.80	
03					10.0	235		---	
04					0.1	225		---	
05					5.5	220		1.6	
06					(6.0)	255		3.35	
07					9.7	240		3.2	
00					11.8	230		3.10	
09					12.8	220		3.20	
10					12.3	210		2.20	
11					12.2	210		10.8	
12					12.4	200		13.5	
13					12.6	200		2.15	
14					13.0	210		7.4	
15					13.4	225		2.25	
16					13.3	240		2.20	
17					13.3	240		1.6	
18					(12.2)	300		5.7	
19					(10.3)	400		---	
20					10.3	375		---	
21					(10.0)	335		---	
22					(9.8)	295		---	
23					<9.5	265		---	

Time: 0.0°.

Sweep: 0.67 Mc to 25.0 Mc in 5 minutes, automatic operation.

\*Average values except foF2 and foEs, which are median values.

Table 58

Tromso, Norway (69.7°N, 19.0°E)							November 1956		
Time	h'F2	foF2	h'F1	foF1	h'E	foE	foEs	(M3000)F2	
00								3.2	
01		(345)						4.0	
02		(350)						3.2	
03		(290)	(5.70)					3.2	
04		(300)	(7.10)					2.6	
05		285	5.90					2.50	
06		260	4.80					2.55	
07		250	5.10					2.50	
08		255	5.95					2.70	
09		255	8.00					2.70	
10		250	9.20					2.70	
11		245	11.50	250				1.8	
12		245	12.05	250				2.30	
13		240	11.75	---				2.00	
14		240	11.75	---				1.90	
15		245	10.60	---				2.90	
16		240	9.20	---				2.80	
17		250	5.90	---				2.7	
18		(250)	5.20	---				2.6	
19		(280)	(4.80)	---				2.9	
20									

Table 61

Lulea, Sweden (65.6°N, 22.1°E)

(M3000)F2

September 1956

Time	h'F2	foF2	h'F1	foF1	h'E	foE	fEs	(M3000)F2
00	330	---				2.5		
01	350	---				2.5		
02	320	---				2.5		
03	300	---				2.4		
04	310	---				1.9		
05	275	---				1.7		
06	250 (6.0)	260	---		130	2.3		
07	(240) (6.9)	260	---		120	2.5		
08	(240) 7.0	230	---		110	3.2		
09	(240) 7.2	245	5.0		110	3.4		
10	7.5	---			110	---		
11	---	>8.3	230	5.0	110	---		
12	---	>9.0	---		110	---		
13	---	>8.8	---		110	---		
14	---	>9.0	---		110	---		
15	(240) >8.6	---			110	2.7		
16	250 >8.0	---			110	2.5		
17	250 >8.5	---			130	2.3		
18	240 >7.9	---			---	1.8	2.4	
19	250	---			---	---		
20	250	---						
21	260	---						
22	270	---				2.5		
23	300	---				2.5		

Time: 15.0°E.

Sweep: 1.5 Mc to 10.0 Mc in 9 minutes, automatic operation.

Table 63\*

Campbell I. (52.5°S, 169.2°E)

(M3000)F2

May 1955

Time	h'F2	foF2	h'F1	foF1	h'E	foE	fEs	(M3000)F2
00								
01								
02								
03								
04								
05	---	E				---		
06	---	E				---		
07	270	2.7	---	---	---	---	3.1	
08	250	4.3	230	2.0	---	---	3.3	
09	250	4.8	230	3.2	130	2.3	3.3	
10	260	5.0	240	3.6	125	2.7	3.3	
11	280	5.4	240	3.8	130	2.8	3.2	
12	260	5.5	240	3.8	130	2.8	3.2	
13	270	5.3	230	3.7	120	2.6	3.35	
14	270	5.3	240	3.5	---	---	3.2	
15	260	5.5	240	---	---	---	3.2	
16	250	5.2	240	---	---	---	3.1	
17	260	4.7	240	---			3.1	
18	260	4.0					3.1	
19	280	3.5					3.0	
20	290	2.7					3.0	
21	340	2.1					2.9	
22	390	2.0					2.9	
23	---	E					(2.9)	

Time: 165.0°E.

Sweep: 1.0 Mc to 15.0 Mc in 5 minutes, manual operation.

\*Observations taken on a 19-hour working schedule.

Table 65\*

Campbell I. (52.5°S, 169.2°E)

(M3000)F2

March 1955

Time	h'F2	foF2	h'F1	foF1	h'E	foE	fEs	(M3000)F2
00								
01								
02								
03								
04								
05	280	2.8		---			3.0	
06	290	3.5	250	---			3.1	
07	(350) 4.1	250	3.8	130			3.0	
08	300	4.6	240	4.0	130		3.1	
09	340	4.8	230	4.0	130		3.1	
10	330	5.2	230	4.2	120		3.2	
11	320	5.3	230	4.2	120		3.2	
12	330	5.4	230	4.3	120		3.1	
13	320	5.4	240	4.2	125		3.1	
14	320	5.3	240	4.2	130		3.1	
15	320	5.3	240	3.9	125		3.1	
16	300	5.3	240	3.9	130		3.2	
17	300	5.2	250	3.8	130		3.1	
18	280	5.3	250	---			3.1	
19	270	5.0	250	---			3.0	
20	270	4.4					3.0	
21	280	3.6					3.0	
22	320	2.9					2.9	
23	(300)	2.6					2.9	

Time: 165.0°E.

Sweep: 1.0 Mc to 15.0 Mc in 5 minutes, manual operation.

\*Observations taken on a 19-hour schedule.

Table 62

Sao Paulo, Brazil (23.5°S, 46.5°W)

(M3000)F2

September 1956

Time	h'F2	foF2	h'F1	foF1	h'E	foE	fEs	(M3000)F2
00	230	>14.0						<2.6
01	230	>14.0						<2.5
02	220	12.5						<2.6
03	220	9.2						3.0
04	260	8.2						<2.5
05	260	6.6						2.8
06	280	7.4						<2.5
07	250	9.9						2.9
08	250	11.6						3.1
09	---	13.2	240	---	120	3.5		2.8
10	---	13.8	230	---	120	3.6		2.8
11	(260)	14.0	230	---	120	---		2.7
12	(270)	14.2	220	5.3	120	---		2.6
13	(260)	14.2	220	4.9	120	---		2.6
14	(260)	14.4	220	(4.8)	120	3.7		2.6
15	---	14.4	240	---	130	3.6		2.6
16	(250)	14.4	250	---	130	3.3	3.9	2.6
17	260	14.6	---	---	2.7			2.7
18	280	(14.8)	---	---	2.6	(2.8)		
19	300	(14.4)	---	---	2.6	(2.7)		
20	280	(14.1)	---	---	2.5	(2.75)		
21	260	(14.6)	---	---	2.5	(2.8)		
22	250	15.0	---	---	2.6	3.0		
23	240	(14.8)	---	---	2.5	(3.1)		

Time: 45.0°W.

Sweep: 1.75 Mc to 20.0 Mc in 2 minutes 30 seconds.

Table 64\*

Campbell I. (52.5°S, 169.2°E)

(M3000)F2

April 1955

Time	h'F2	foF2	h'F1	foF1	h'E	foE	fEs	(M3000)F2
00								
01								
02								
03								
04								
05	270	3.4	---	---	120	2.6		3.1
06	(300)	4.1	250	3.6	120	2.6		3.1
07	310	4.5	240	3.9	120	2.8		3.1
08	350	5.0	230	4.2	120	2.8		3.0
09	350	5.3	230	4.3	120	3.0		3.0
10	330	5.4	220	4.4	120	3.0	3.3	3.1
11	350	5.5	220	4.5	120	3.1	3.6	3.0
12	350	5.6	220	4.4	120	3.1	3.3	3.05
13	330	5.6	230	4.4	120	3.1	3.2	3.1
14	330	5.6	230	4.4	120	3.1		3.1
15	340	5.5	230	4.3	120	3.1		3.0
16	340	5.4	240	4.1	120	2.8		3.1
17	310	5.4	250	3.8	120	2.8		3.1
18	300	5.3	250	3.5	---	---		3.05
19	270	5.5	260	---	---	---		3.0
20	270	5.5						3.0
21	270	4.8						2.9
22	290	4.1						2.85
23	300	3.8						2.9

Time: 165.0°E.

Sweep: 1.0 Mc to 15.0 Mc in 5 minutes, manual operation.

\*Observations taken on a 19-hour working schedule.

Table 67\*

Campbell I. (52.5°S, 169.2°E)								January 1955	
Time	h'F2	foF2	h'F1	foF1	h'E	foE	fEs	(M3000)F2	
00									
01									
02									
03									
04									
05	(250)	4.0	220	---	140	2.3		3.1	
06	300	4.4	240	3.9	130	2.5		3.0	
07	340	4.8	240	4.0	125	2.6		3.0	
08	380	5.1	240	4.2	125	2.8		3.0	
09	350	5.2	230	4.4	120	3.0		3.0	
10	350	5.5	230	4.4	120	2.8	2.8	3.0	
11	370	5.3	230	4.5	120	2.9	3.6	3.0	
12	350	5.4	220	4.4	120	3.1	3.5	3.0	
13	350	5.6	220	4.4	120	3.0	3.4	3.0	
14	350	5.4	230	4.4	120	3.1		3.0	
15	350	5.4	230	4.3	120	2.0	3.0	3.0	
16	340	5.5	240	4.1	125	2.8		3.0	
17	320	5.6	240	4.0	130	2.6		3.0	
18	300	5.5	240	3.6	130	2.3		3.0	
19	270	5.2	240	---	---	---		3.0	
20	260	5.4						3.0	
21	260	5.1						3.0	
22	260	4.8						3.0	
23	280	4.0					2.2	3.0	

Time: 165.0°E.

Sweep: 1.0 Mc to 15.0 Mc in 5 minutes, manual operation.

\*Observations taken on a 19-hour working schedule.

Table 69\*

Campbell I. (52.5°S, 169.2°E)								April 1954	
Time	h'F2	foF2	h'F1	foF1	h'E	foE	fEs	(M3000)F2	
00									
01									
02									
03									
04									
05	---	E						---	
06	---	2.2						2.95	
07	240	3.2	---	---	---	1.6		3.3	
08	(250)	4.1	230	3.1	110	2.2		3.3	
09	290	4.5	230	3.7	110	2.6		3.2	
10	300	4.7	230	3.8	110	2.6		3.3	
11	300	4.9	220	3.9	110	2.8		3.2	
12	300	5.1	220	3.9	110	2.8		3.2	
13	290	5.1	230	3.9	110	2.6		3.3	
14	280	5.0	230	3.7	110	2.6		3.3	
15	280	5.0	230	3.6	110	2.4		3.2	
16	250	5.0	240	2.6	---	2.0		3.2	
17	240	5.0	---	---	---	1.7		3.2	
18	240	4.5						3.1	
19	260	3.8						3.0	
20	---	2.9						2.8	
21	---	2.5						2.9	
22	---	2.0						2.6	
23	---	E					3.0	---	

Time: 165.0°E.

Sweep: 1.0 Mc to 15.0 Mc in 5 minutes, manual operation.

\*Observations taken on a 19-hour working schedule.

Table 71\*

Campbell I. (52.5°S, 169.2°E)								December 1953	
Time	h'F2	foF2	h'F1	foF1	h'E	foE	fEs	(M3000)F2	
00									
01									
02									
03									
04									
05	250	4.0	240	3.2	110	2.2		3.2	
06	300	4.4	230	3.6	110	2.5		3.1	
07	350	4.8	230	3.9	110	2.8		3.0	
08	340	5.0	220	4.0	110	3.0		3.1	
09	340	5.3	220	4.1	110	3.1		3.1	
10	340	5.4	220	4.2	110	3.2		3.1	
11	340	5.5	220	4.2	110	3.2		3.1	
12	330	5.5	210	4.2	110	3.2		3.1	
13	320	5.5	210	4.2	110	3.2		3.1	
14	330	5.4	220	4.2	110	3.2		3.1	
15	330	5.4	220	4.1	110	3.0		3.1	
16	320	5.4	220	3.9	110	2.9		3.05	
17	310	5.5	240	3.7	110	2.6		3.1	
18	280	5.6	240	3.4	120	2.3		3.1	
19	260	5.5	240	2.9	---	1.0		3.1	
20	250	5.6	---	---	1.6			3.1	
21	240	5.5					2.0	3.1	
22	250	5.0						3.0	
23	260	4.5						3.0	

Time: 165.0°E.

Sweep: 1.0 Mc to 15.0 Mc in 5 minutes, manual operation.

\*Observations taken on a 19-hour working schedule.

Table 72\*

Table 68\*

Campbell I. (52.5°S, 169.2°E)								May 1954	
Time	h'F2	foF2	h'F1	foF1	h'E	foE	fEs	(M3000)F2	
00									
01									
02									
03									
04									
05									
06									
07									
08									
09									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									

Time: 165.0°E.

Sweep: 1.0 Mc to 15.0 Mc in 5 minutes, manual operation.

\*Observations taken on a 19-hour working schedule.

Time: 165.0°E.

Sweep: 1.0 Mc to 15.0 Mc in 5 minutes, manual operation.

\*Observations taken on a 19-hour working schedule.

Time: 165.0°E.

Sweep: 1.0 Mc to 15.0 Mc in 5 minutes, manual operation.

\*Observations taken on a 19-hour working schedule.

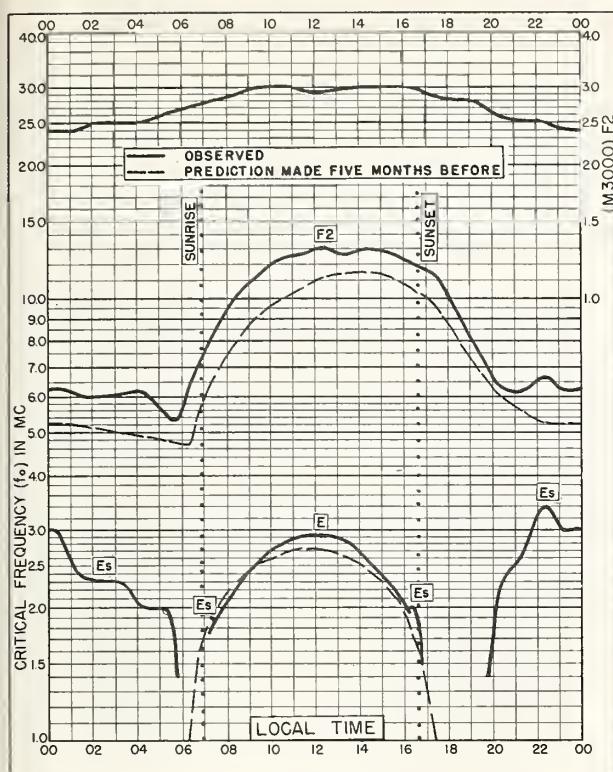


Fig. 1. LYCKSELE, SWEDEN  
64.6°N, 18.8°E OCTOBER 1957

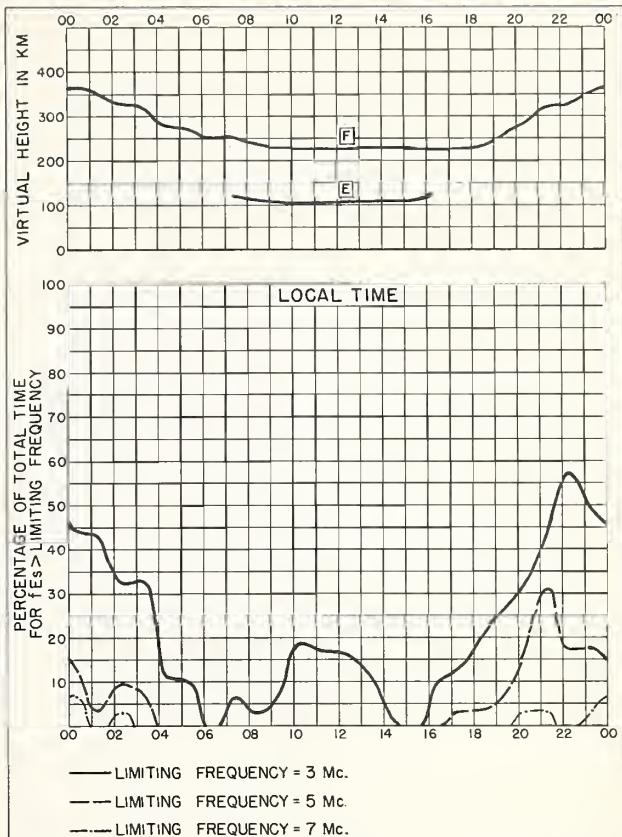


Fig. 2. LYCKSELE, SWEDEN OCTOBER 1957

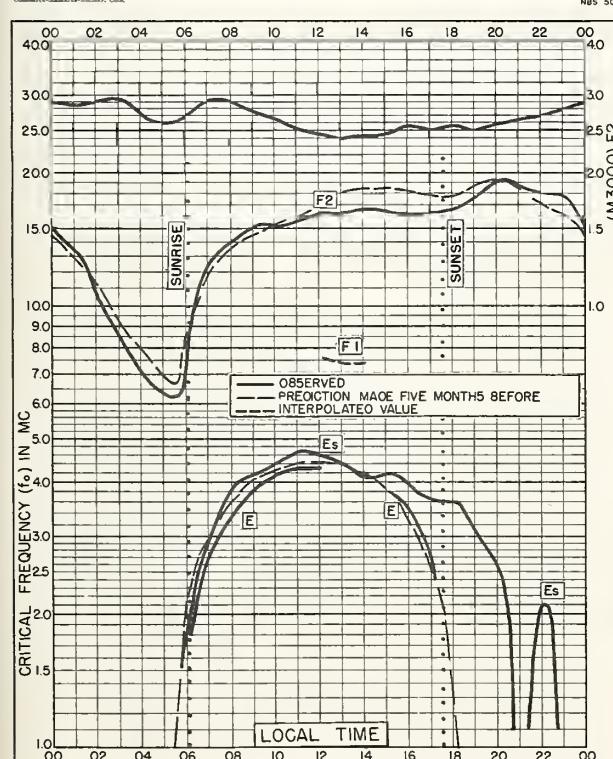


Fig. 3. FORMOSA, CHINA  
25.0°N, 121.5°E OCTOBER 1957

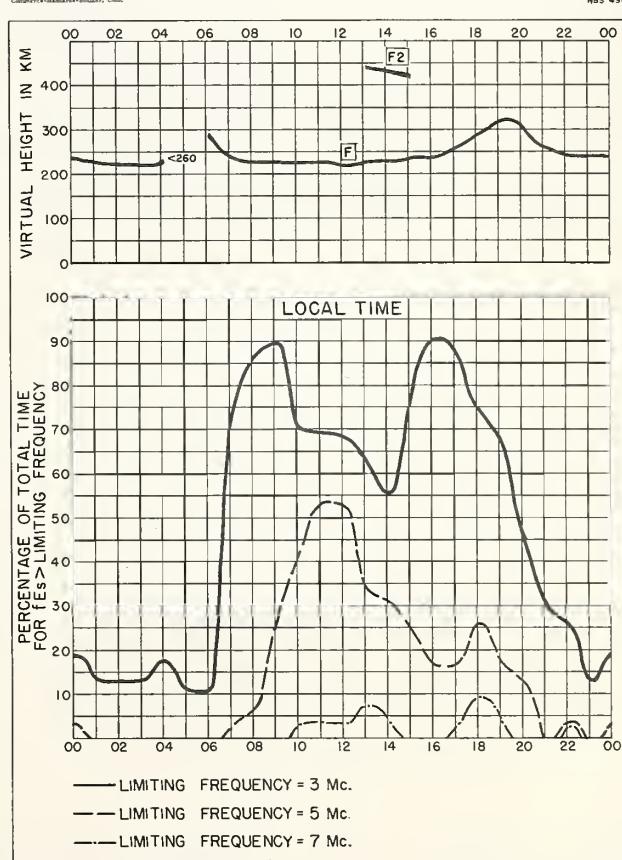
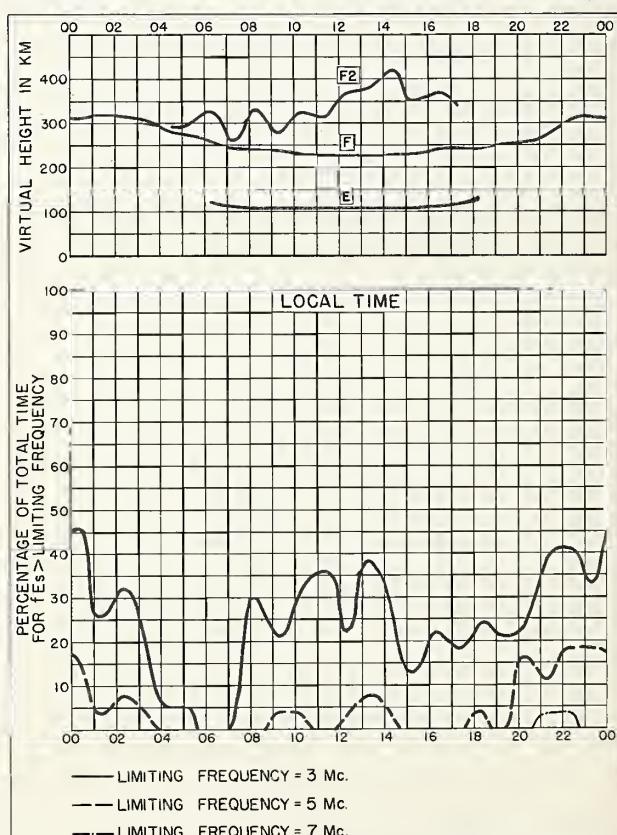
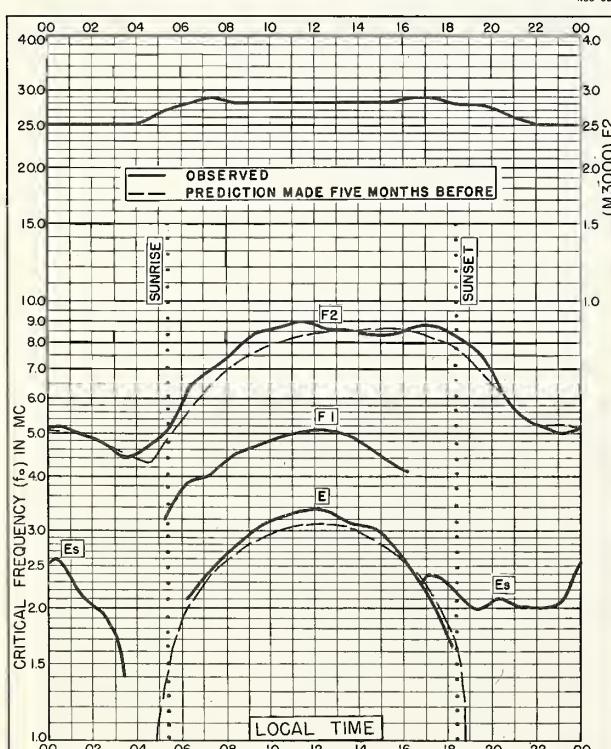
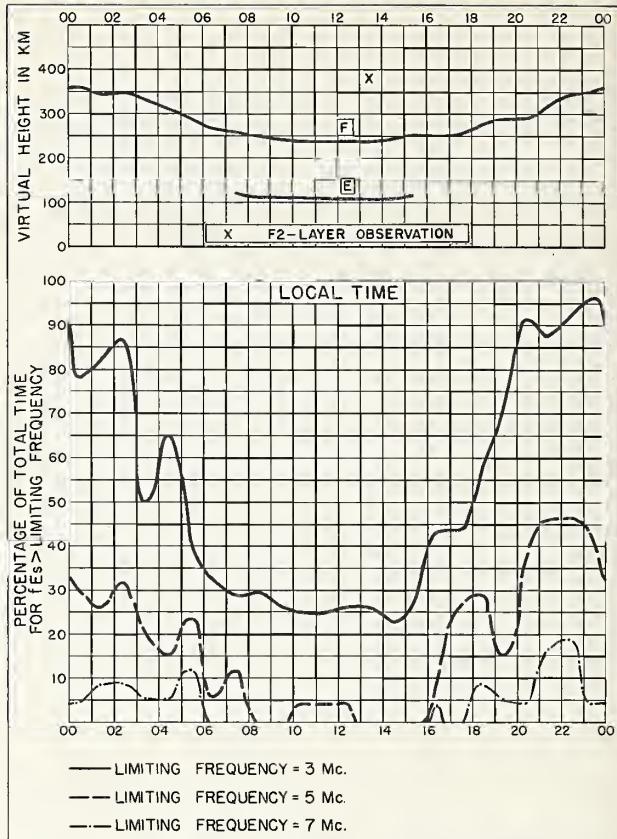
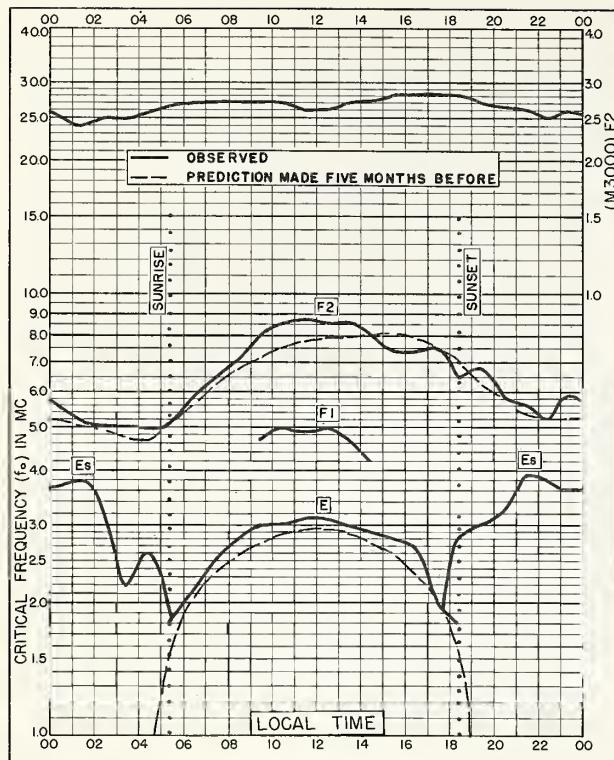


Fig. 4. FORMOSA, CHINA OCTOBER 1957



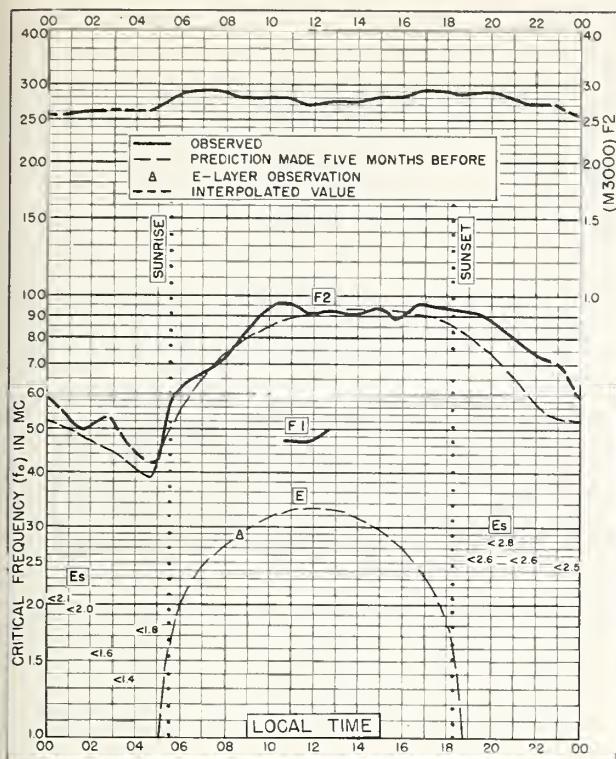


Fig. 9. NURMIJARVI, FINLAND  
60.5°N, 24.6°E SEPTEMBER 1957

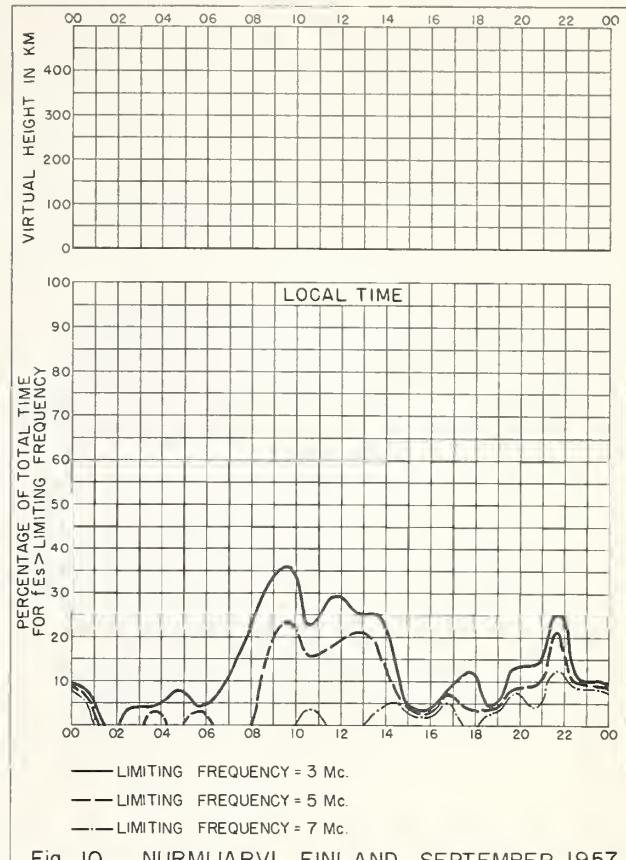


Fig. 10. NURMIJARVI, FINLAND SEPTEMBER 1957

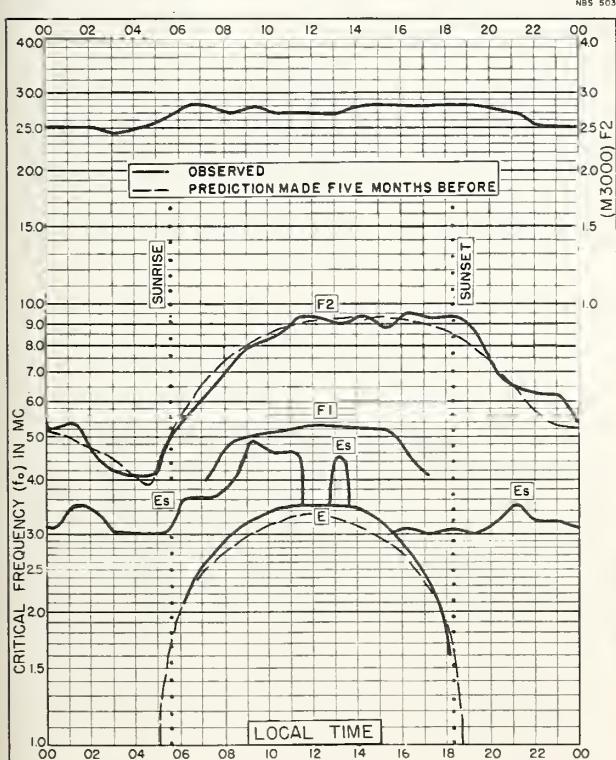


Fig. 11. UPSALA, SWEDEN  
59.8°N, 17.6°E SEPTEMBER 1957

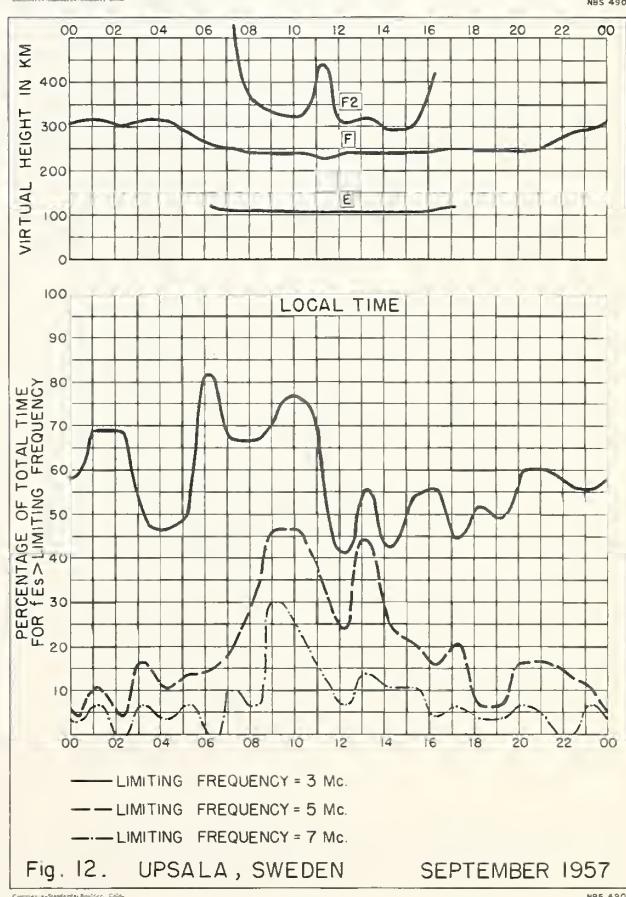


Fig. 12. UPSALA, SWEDEN SEPTEMBER 1957

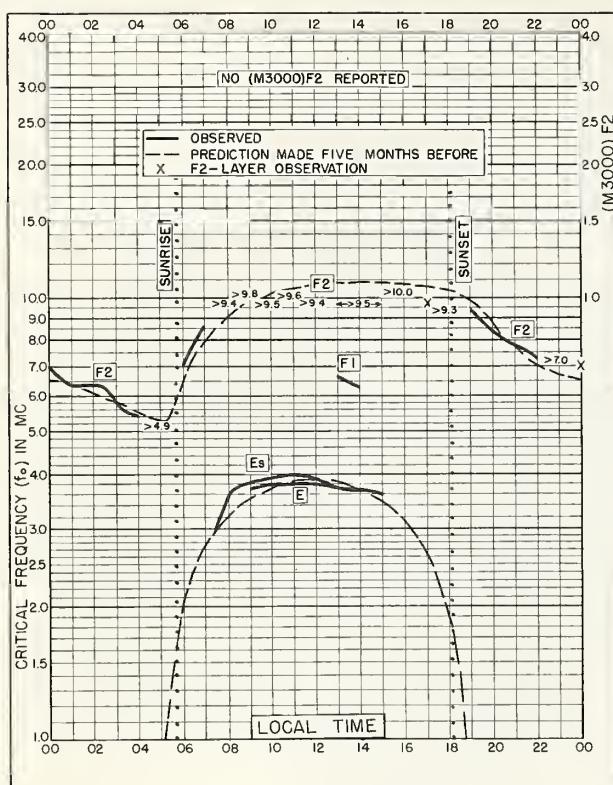


Fig. 13. GRAZ, AUSTRIA  
47.1°N, 15.5°E SEPTEMBER 1957

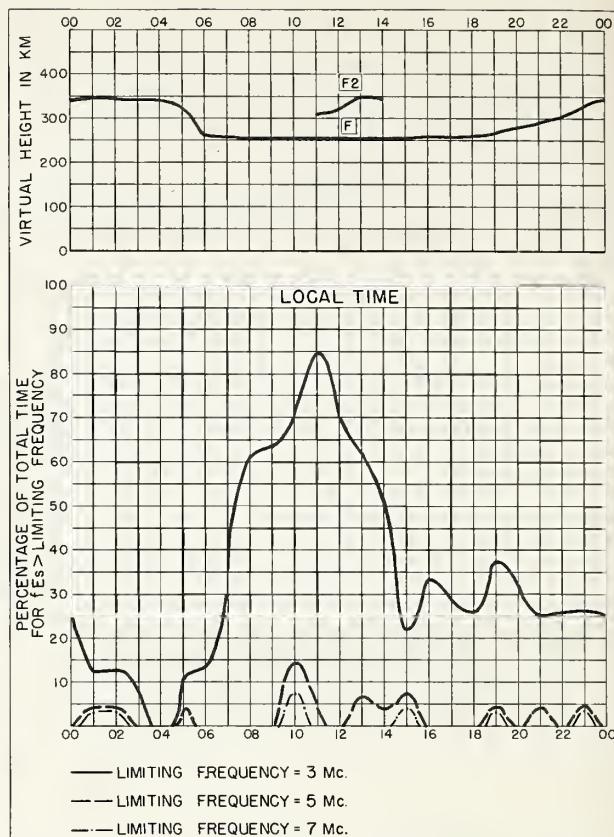


Fig. 14. GRAZ, AUSTRIA SEPTEMBER 1957

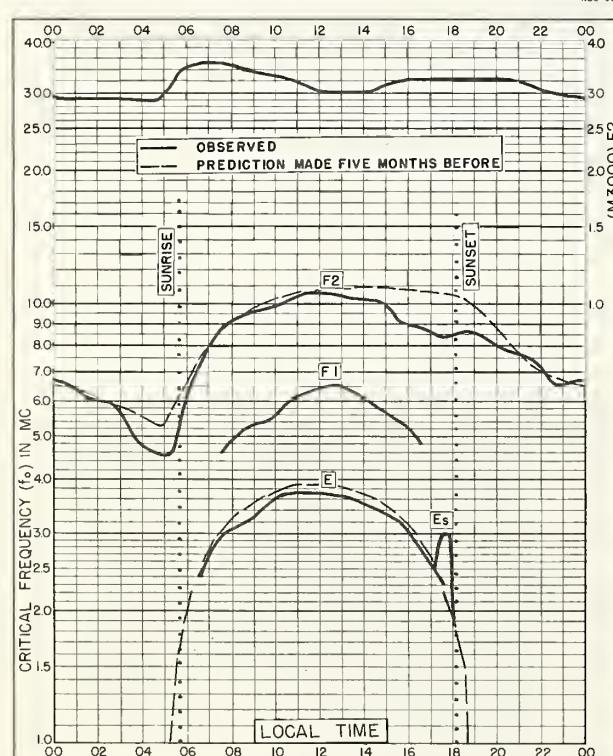


Fig. 15. SCHWARZENBURG, SWITZERLAND  
46.8°N, 7.3°E SEPTEMBER 1957

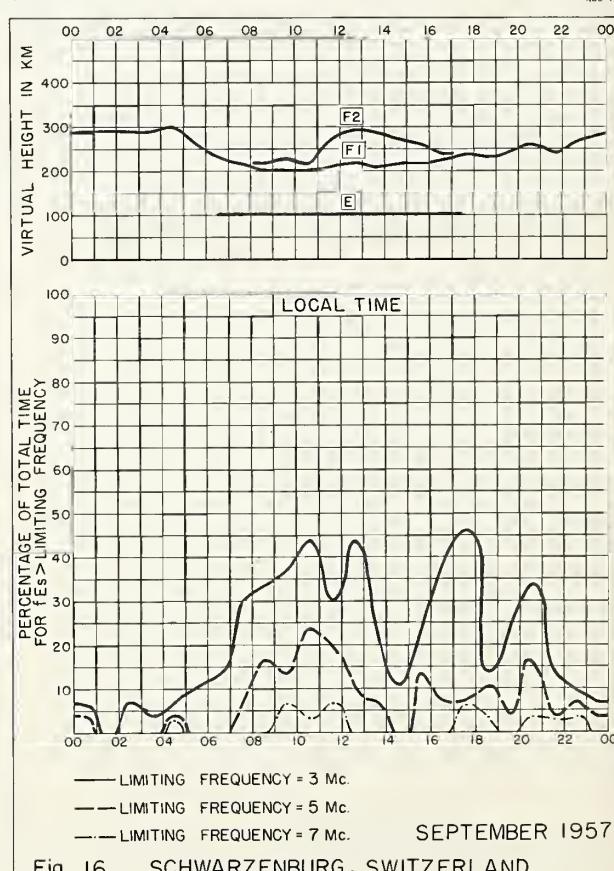


Fig. 16. SCHWARZENBURG, SWITZERLAND

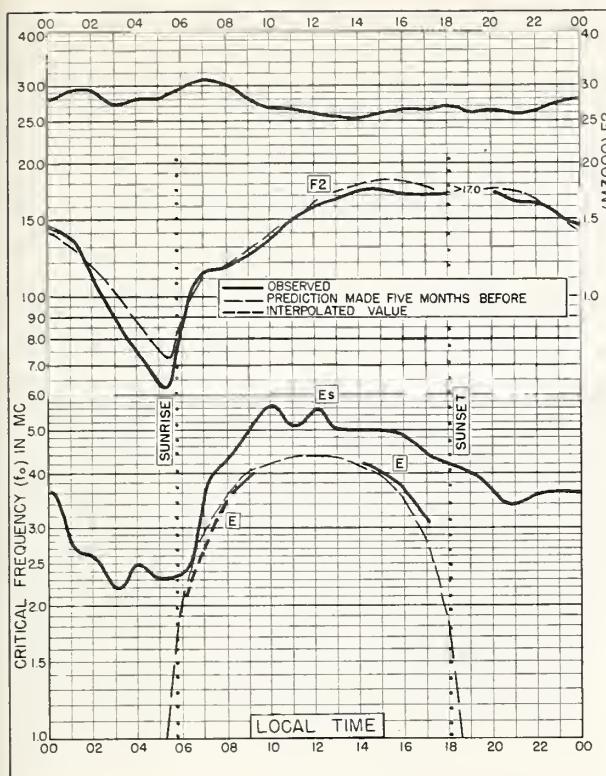


Fig. 17. FORMOSA, CHINA  
25.0°N, 121.5°E      SEPTEMBER 1957

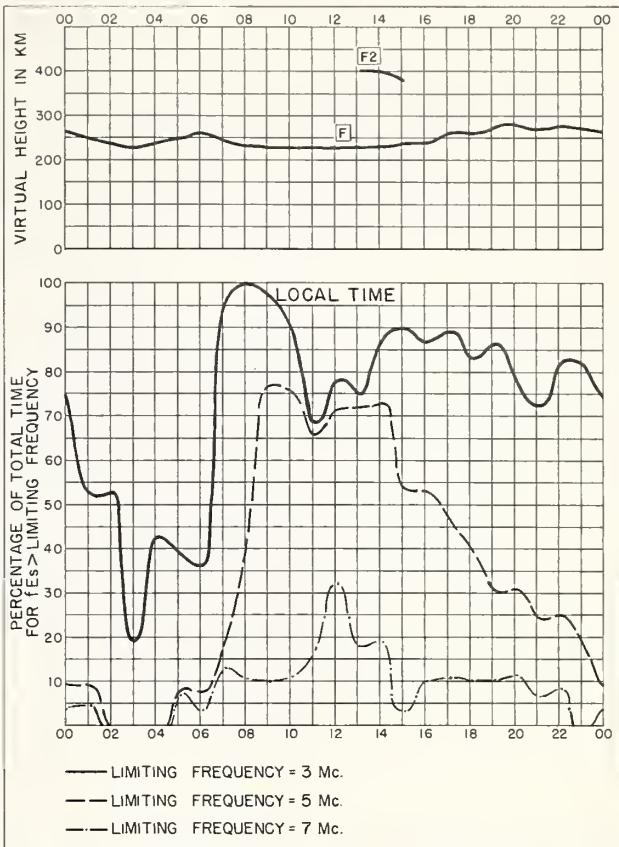


Fig. 18. FORMOSA, CHINA      SEPTEMBER 1957

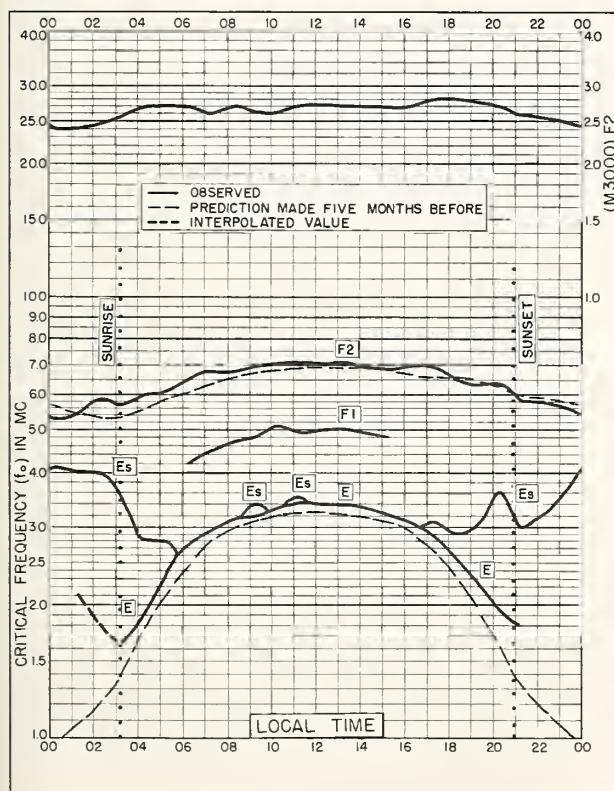


Fig. 19. TROMSO, NORWAY  
69.7°N, 19.0°E      AUGUST 1957

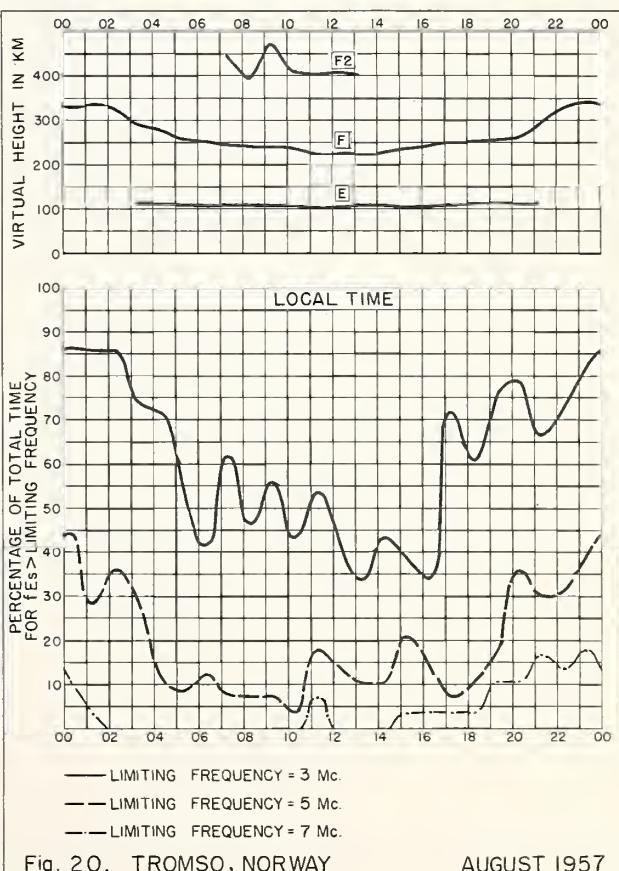


Fig. 20. TROMSO, NORWAY      AUGUST 1957

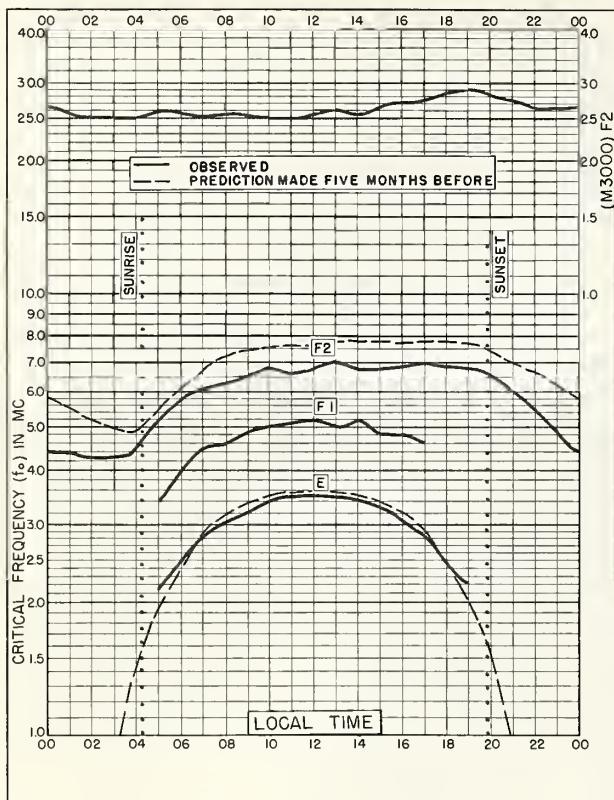


Fig. 21. ANCHORAGE , ALASKA  
61.2°N, 149.9°W AUGUST 1957

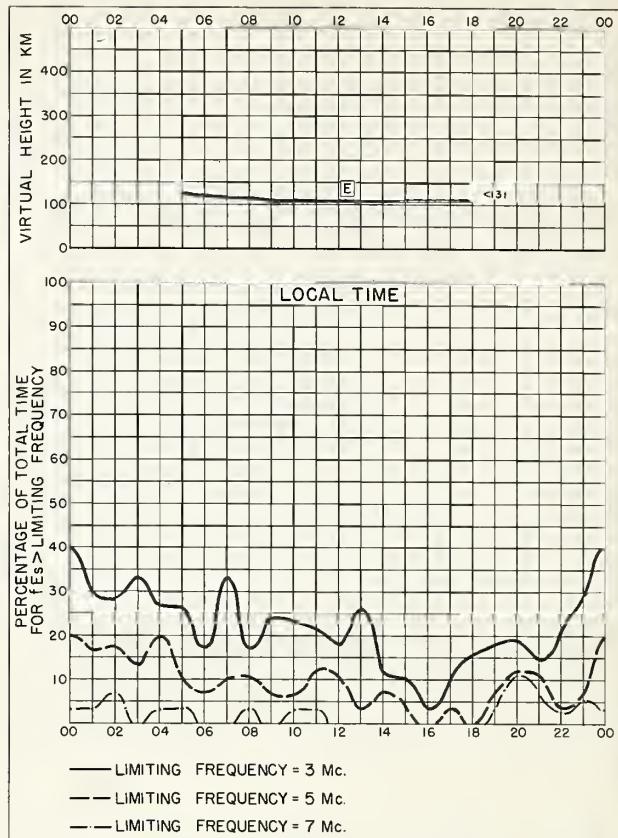


Fig. 22. ANCHORAGE , ALASKA AUGUST 1957

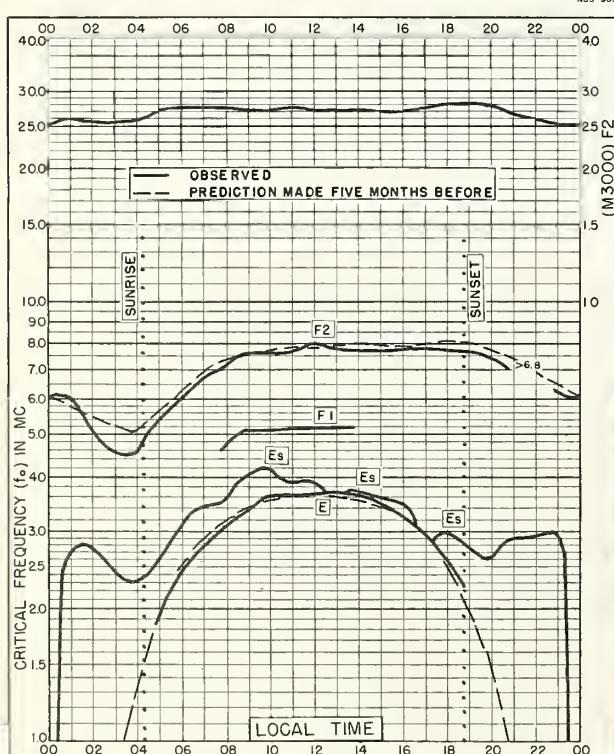


Fig. 23. OSLO , NORWAY  
60.0°N, 11.1°E AUGUST 1957

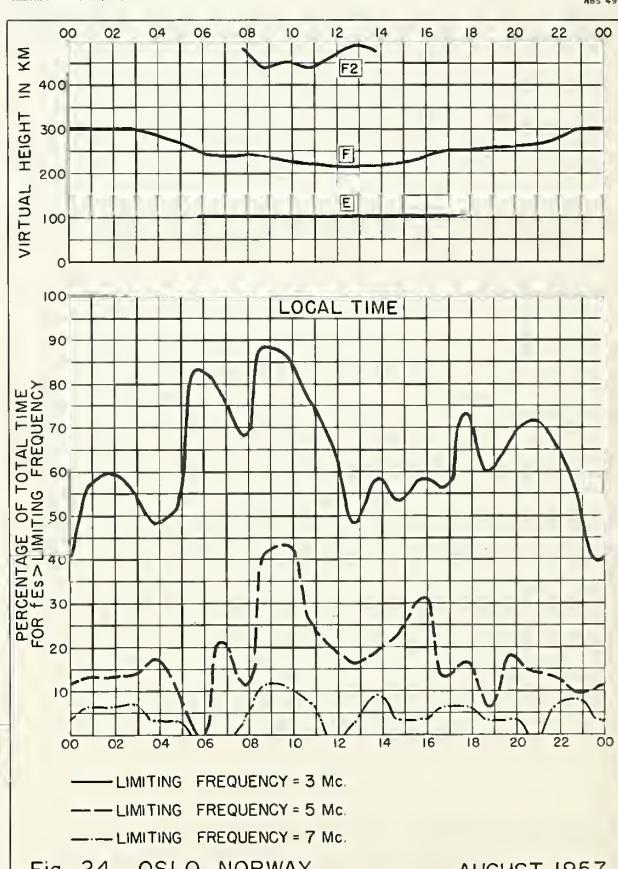


Fig. 24. OSLO, NORWAY AUGUST 1957

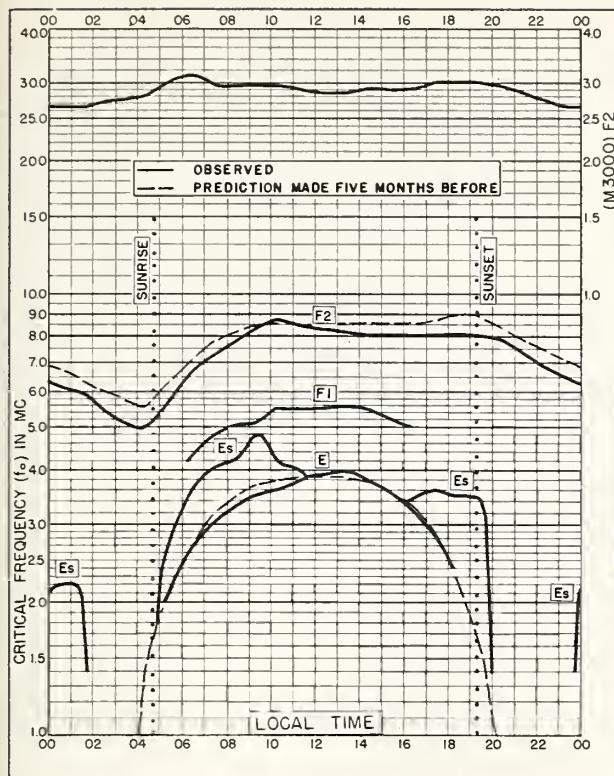


Fig. 25. De BILT, HOLLAND  
52.1°N, 5.2°E AUGUST 1957

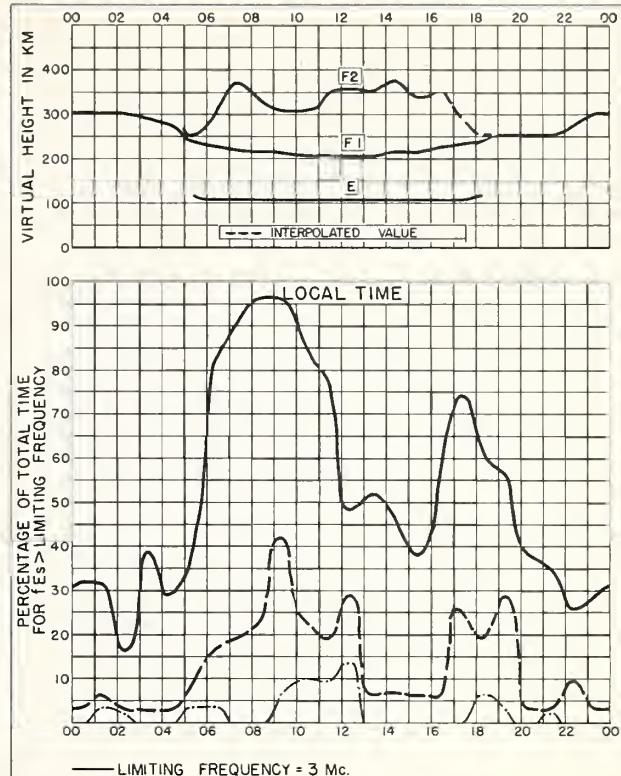


Fig. 26. De BILT, HOLLAND AUGUST 1957

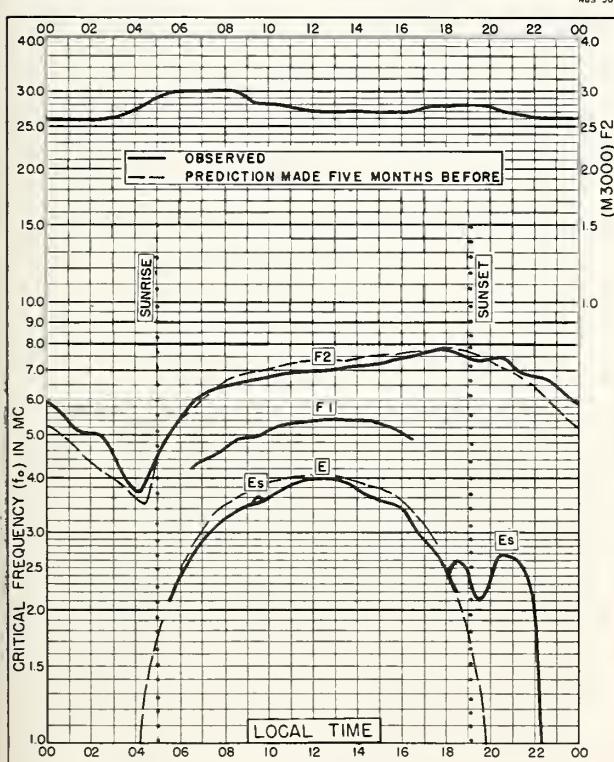


Fig. 27. ST. JOHN'S, NEWFOUNDLAND  
47.6°N, 52.7°W AUGUST 1957

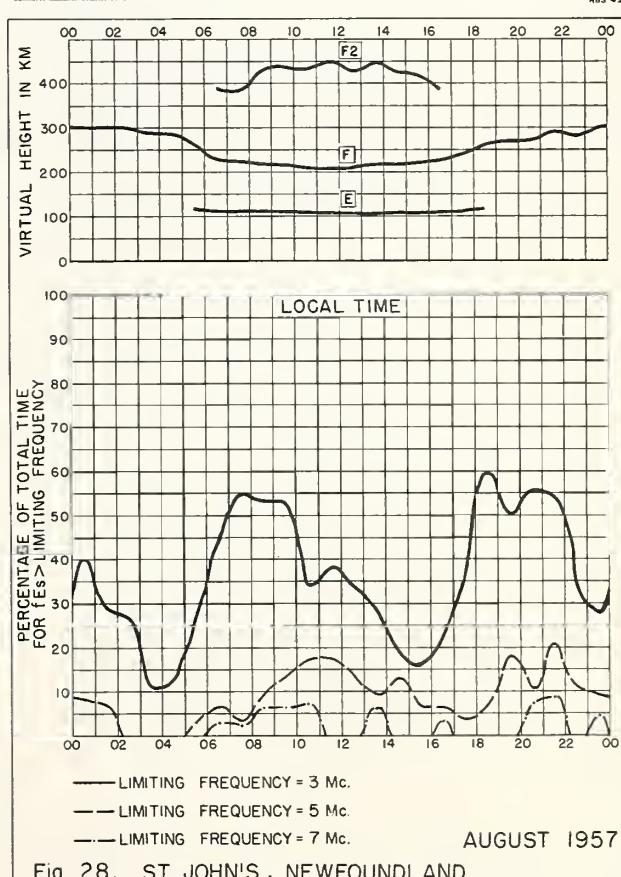


Fig. 28. ST. JOHN'S, NEWFOUNDLAND AUGUST 1957

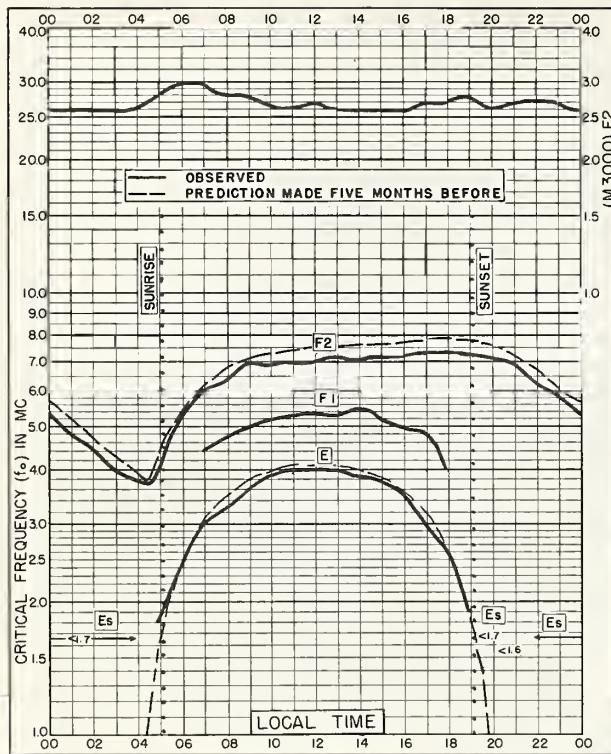


Fig. 29. OTTAWA, CANADA  
45.4°N, 75.9°W AUGUST 1957

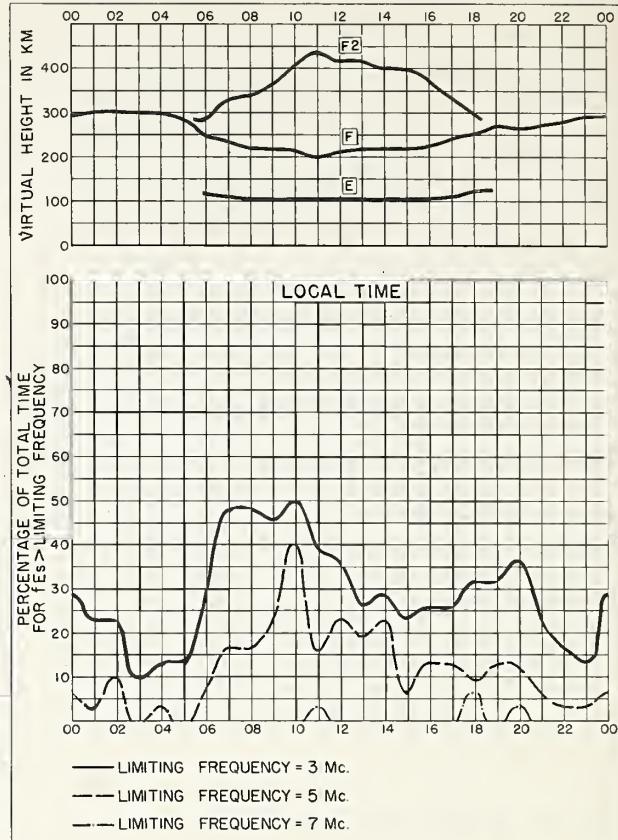


Fig. 30. OTTAWA, CANADA AUGUST 1957

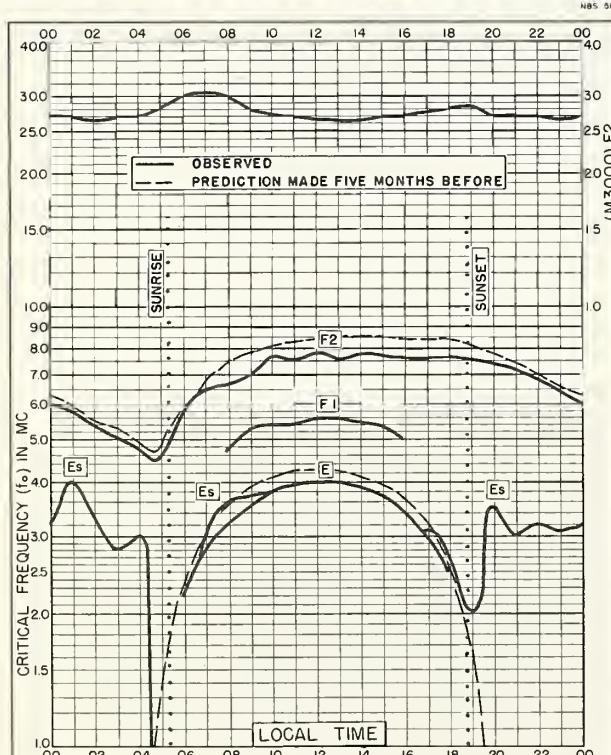


Fig. 31. WASHINGTON, D.C.  
38.7°N, 77.1°W AUGUST 1957

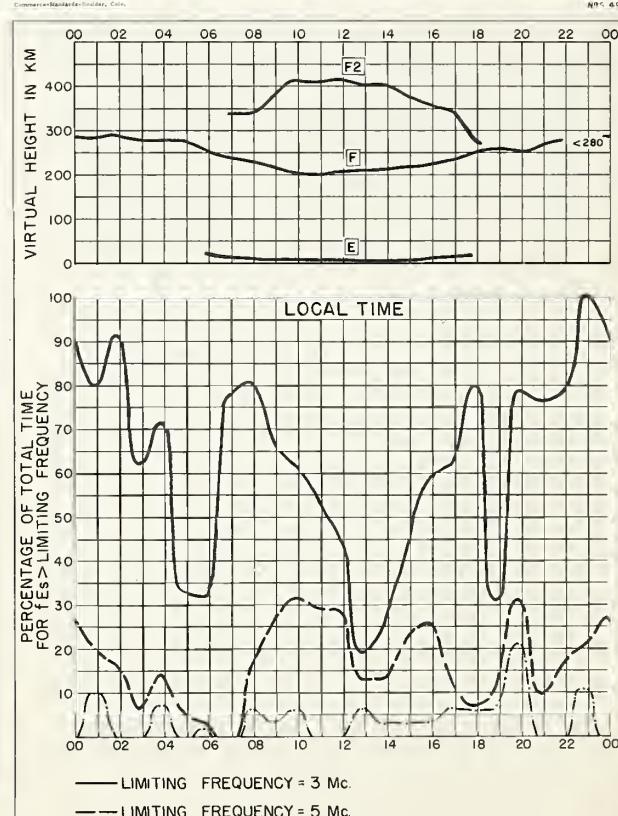


Fig. 32. WASHINGTON, D.C. AUGUST 1957

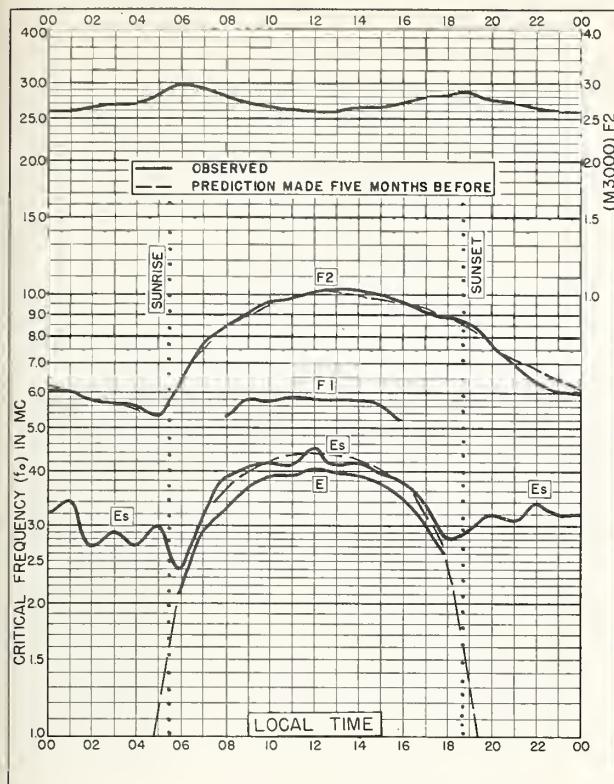


Fig. 33. WHITE SANDS, NEW MEXICO  
32.3°N, 106.5°W AUGUST 1957

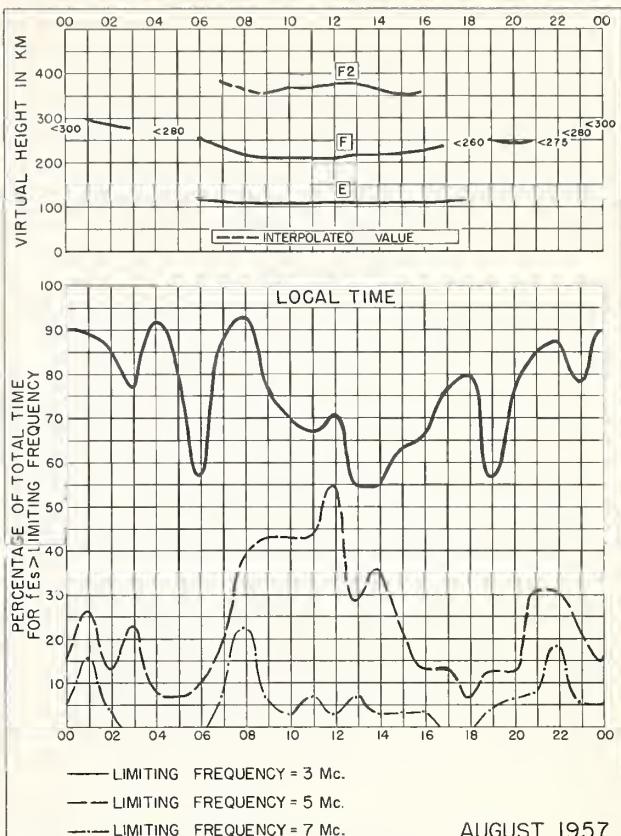


Fig. 34. WHITE SANDS, NEW MEXICO

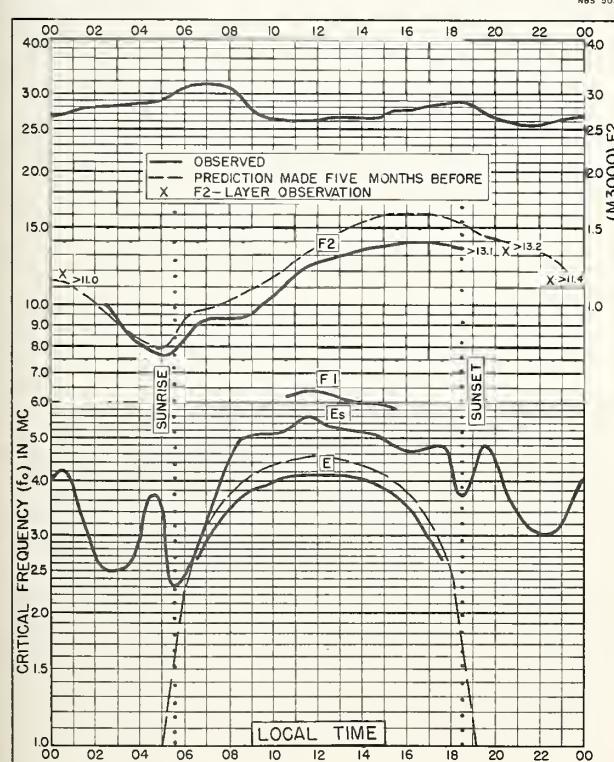


Fig. 35. OKINAWA I.  
26.3°N, 127.8°E AUGUST 1957

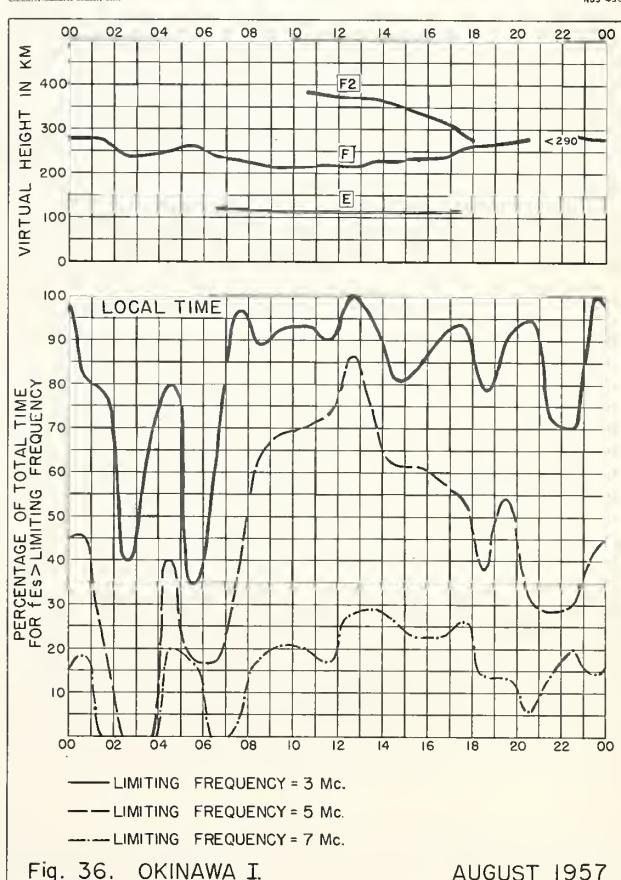


Fig. 36. OKINAWA I. AUGUST 1957

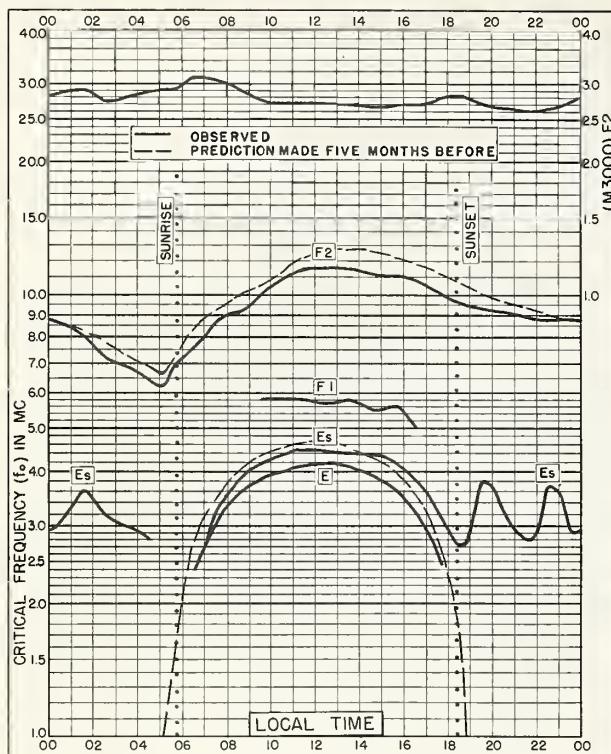


Fig. 37. PUERTO RICO, W.I.  
18.5°N, 67.2°W AUGUST 1957

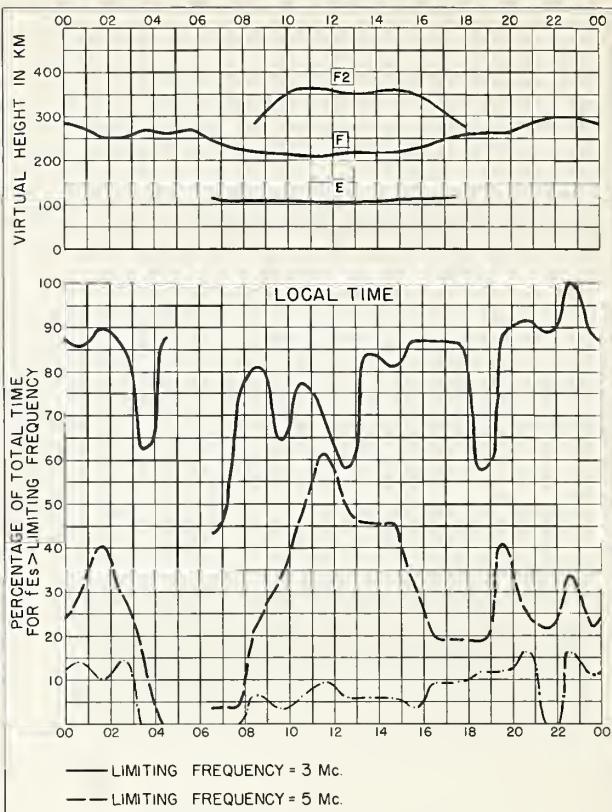


Fig. 38. PUERTO RICO, W.I. AUGUST 1957

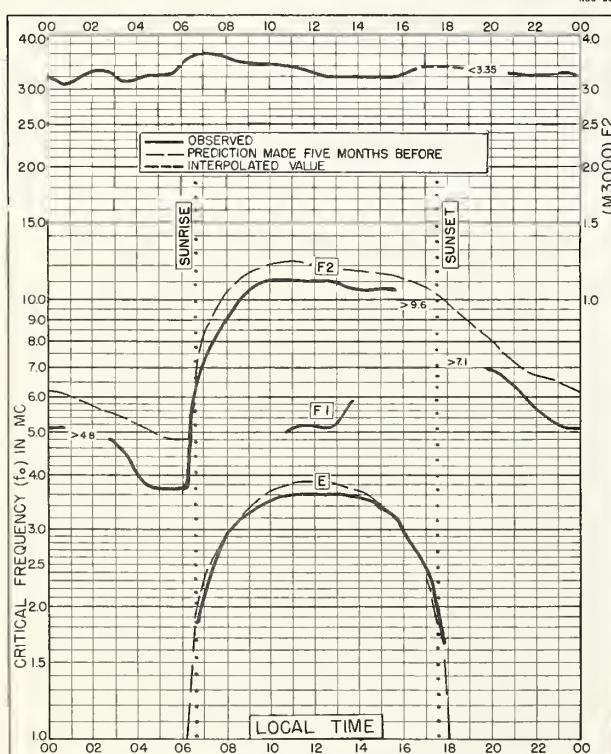
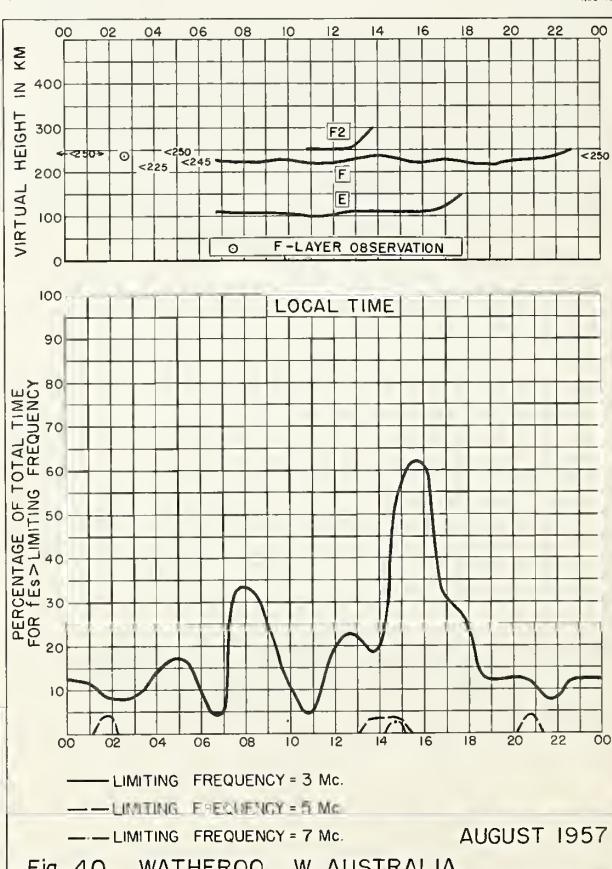


Fig. 39. WATHEROO, W. AUSTRALIA  
30.3°S, 115.9°E AUGUST 1957



AUGUST 1957  
Fig. 40. WATHEROO, W. AUSTRALIA

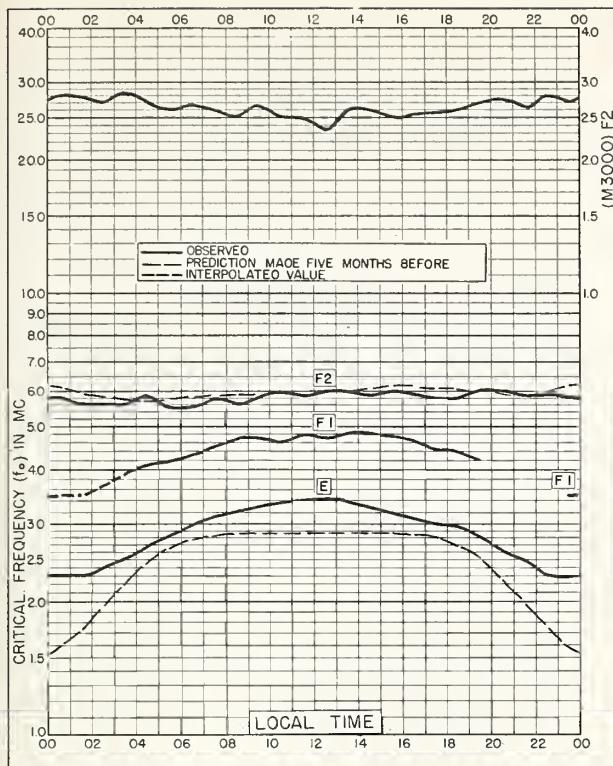


Fig. 41. THULE , GREENLAND  
76.6°N, 68.7°W JULY 1957

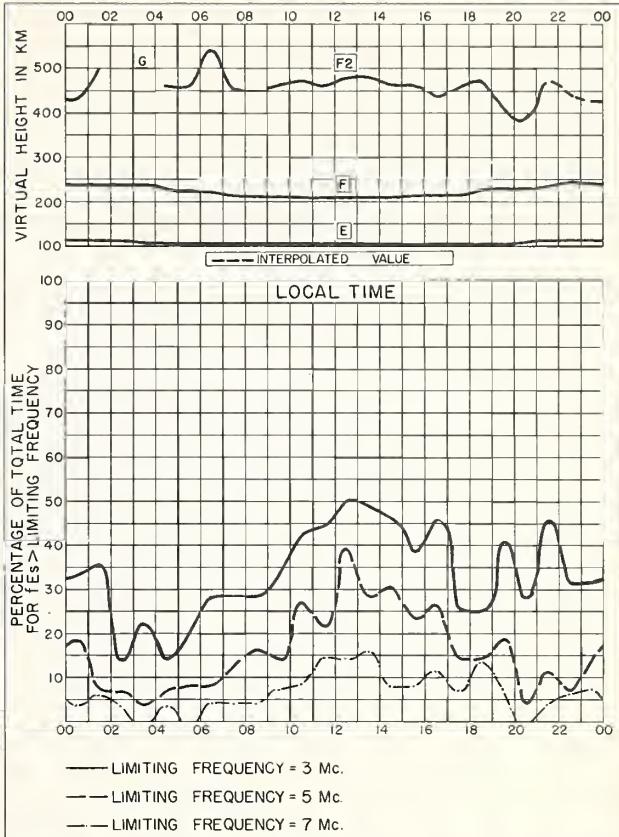


Fig. 42. THULE , GREENLAND JULY 1957

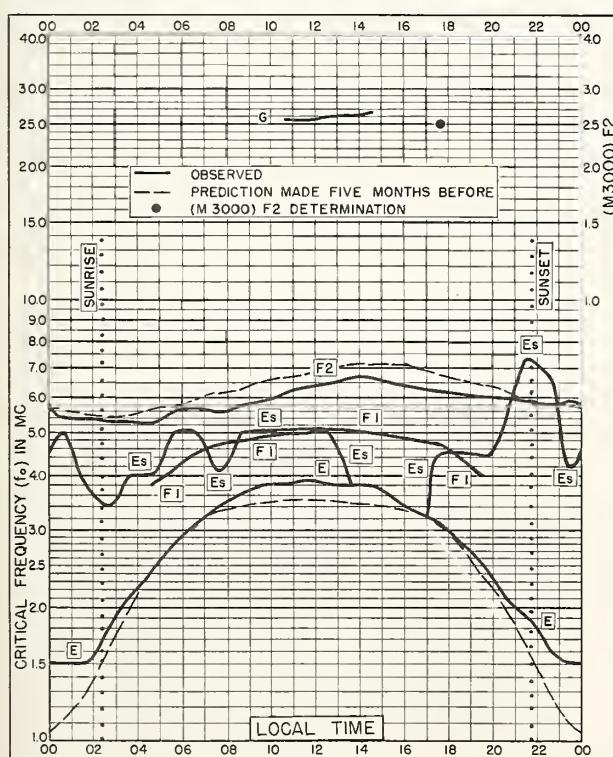


Fig. 43. BAKER LAKE , CANADA  
64.3°N, 96.0°W JULY 1957

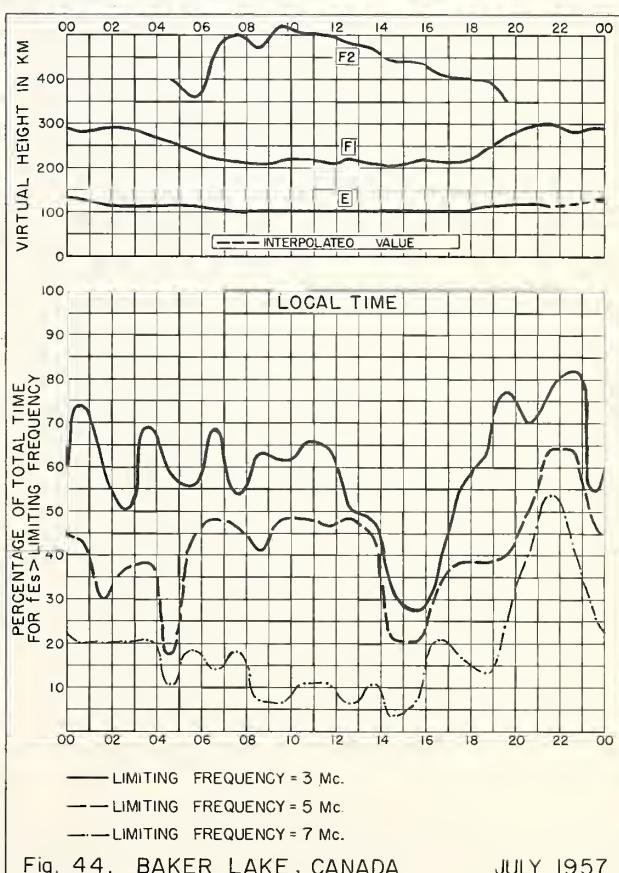
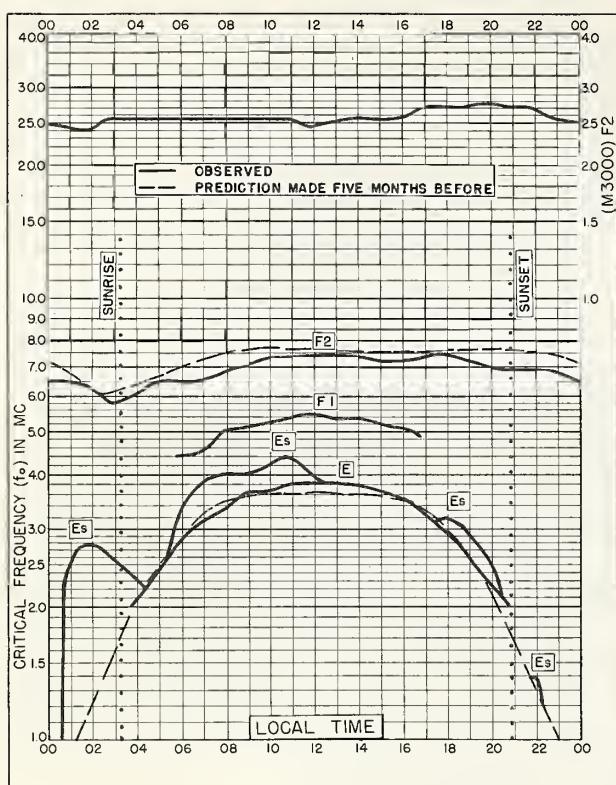


Fig. 44. BAKER LAKE , CANADA JULY 1957

Fig. 45. OSLO, NORWAY  
60.0°N, 11.1°E

JULY 1957

NBS 503

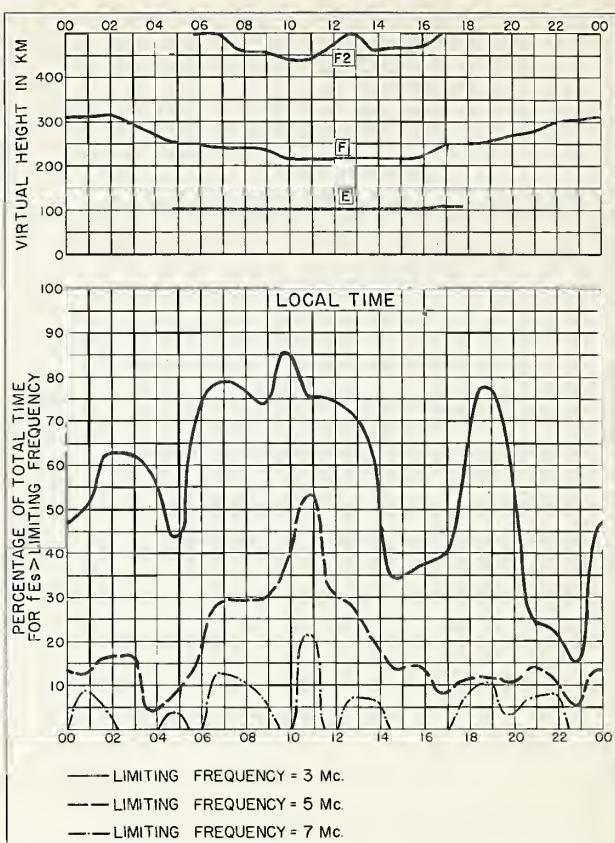
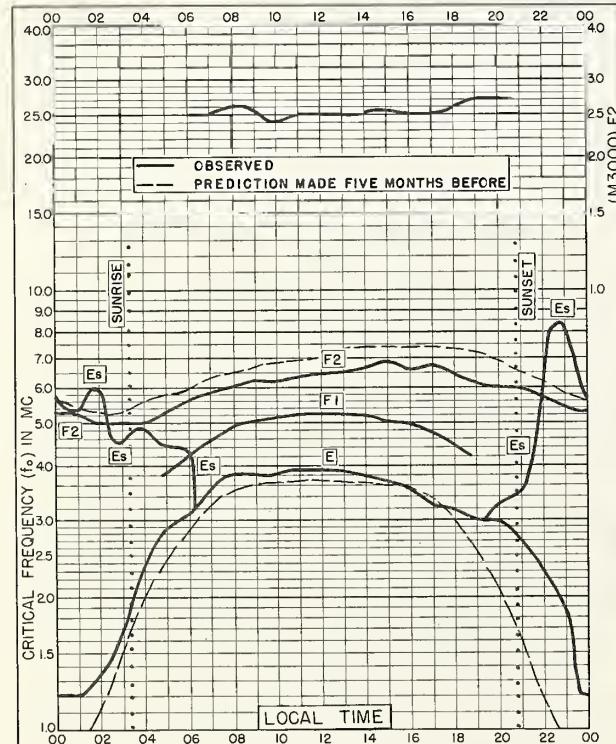


Fig. 46. OSLO, NORWAY

JULY 1957

NBS 490

Fig. 47. CHURCHILL, CANADA  
58.8°N, 94.2°W

JULY 1957

NBS 503

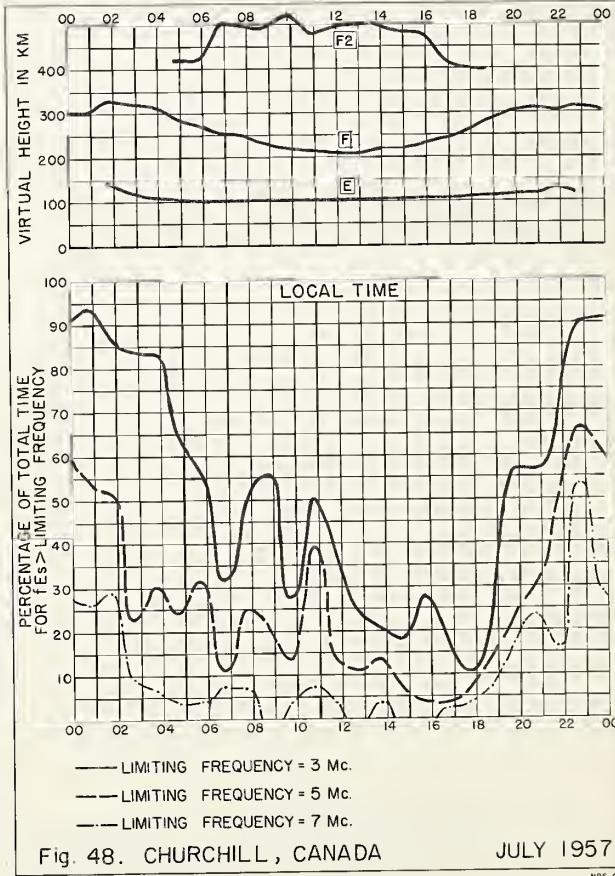
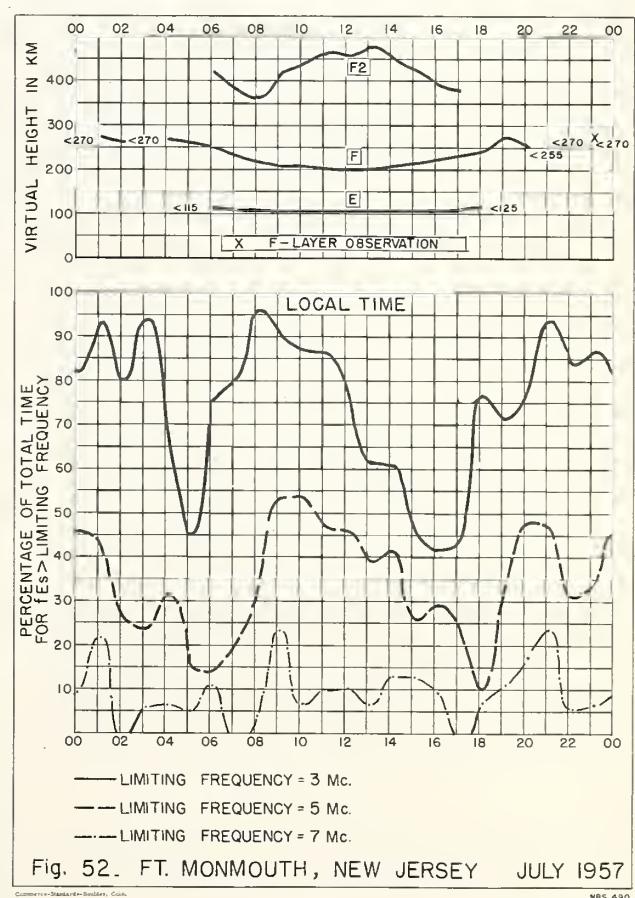
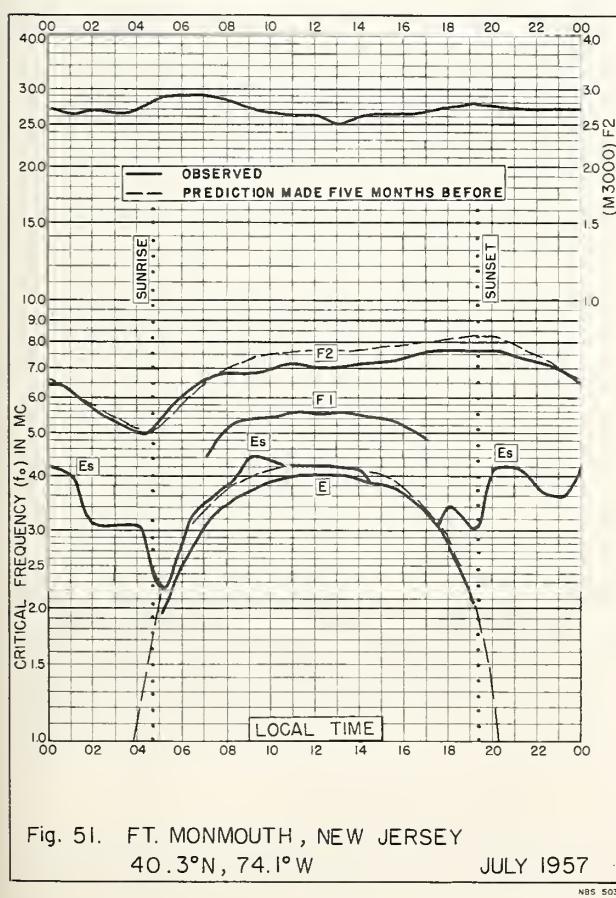
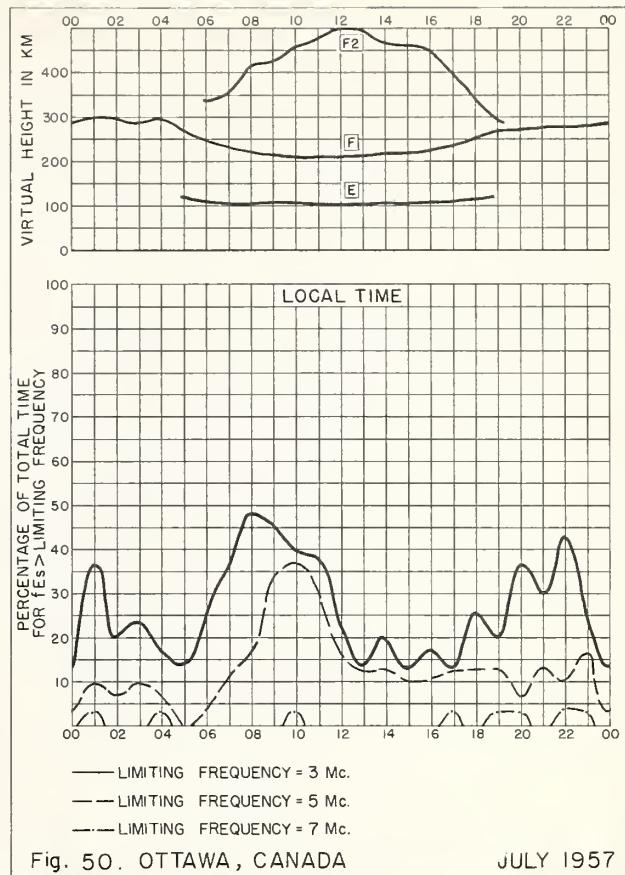
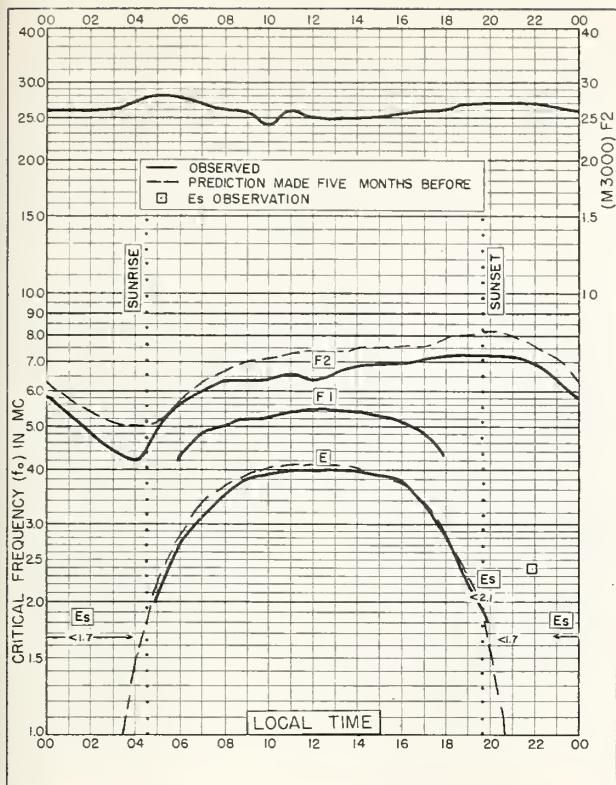


Fig. 48. CHURCHILL, CANADA

JULY 1957

NBS 490

Commerce-Department-Bulletin, C-60.



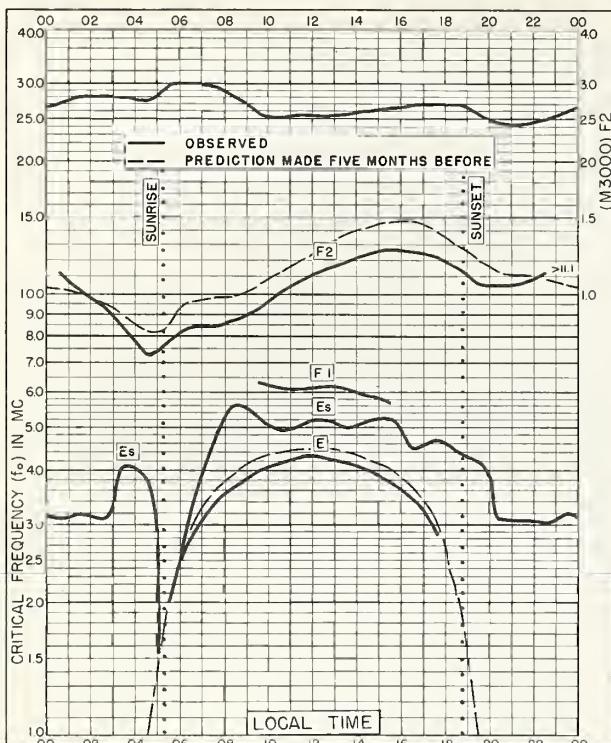


Fig. 53. OKINAWA I.

26.3°N, 127.8°E

JULY 1957

NBS 503

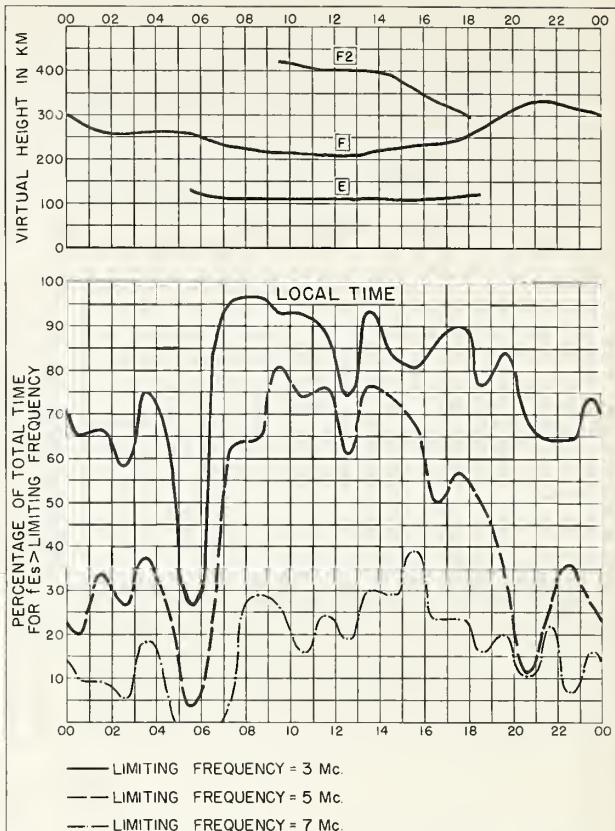


Fig. 54. OKINAWA I.

JULY 1957

NBS 490

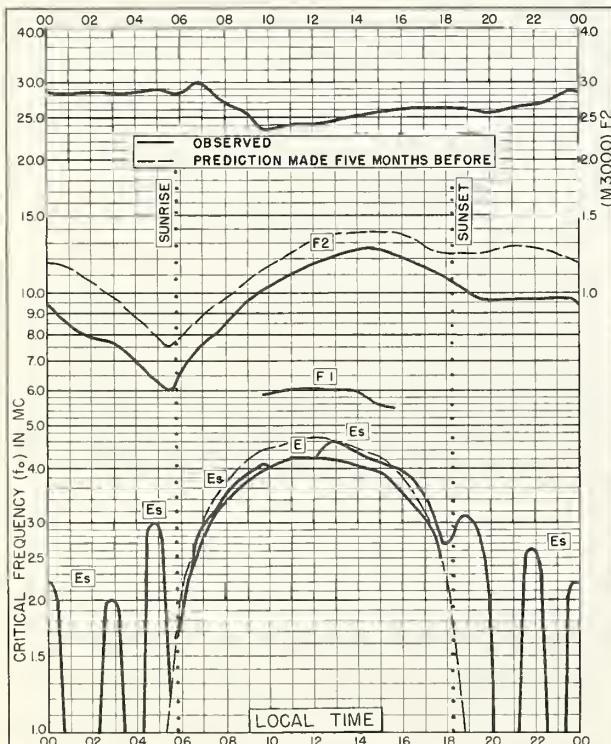


Fig. 55. PANAMA CANAL ZONE

9.4°N, 79.9°W

JULY 1957

NBS 503

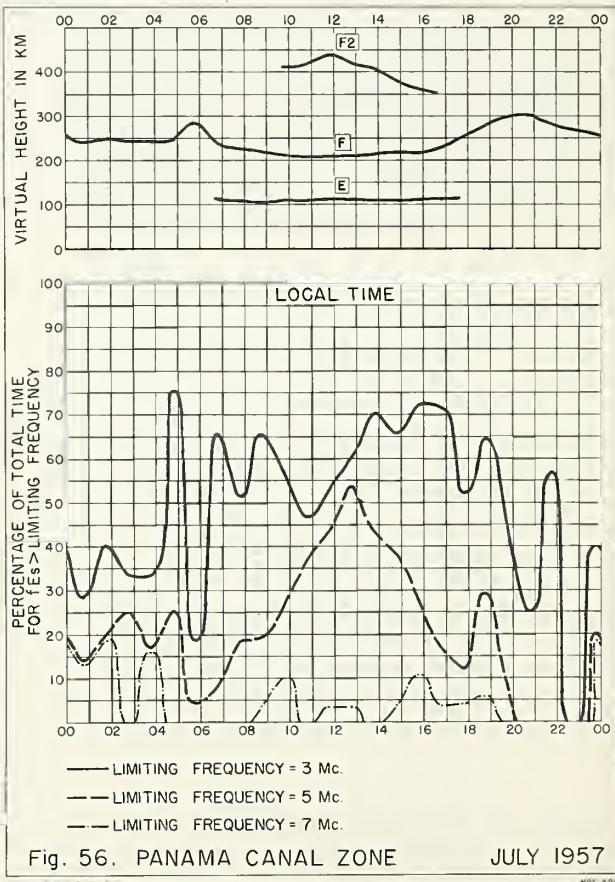


Fig. 56. PANAMA CANAL ZONE

JULY 1957

NBS 490

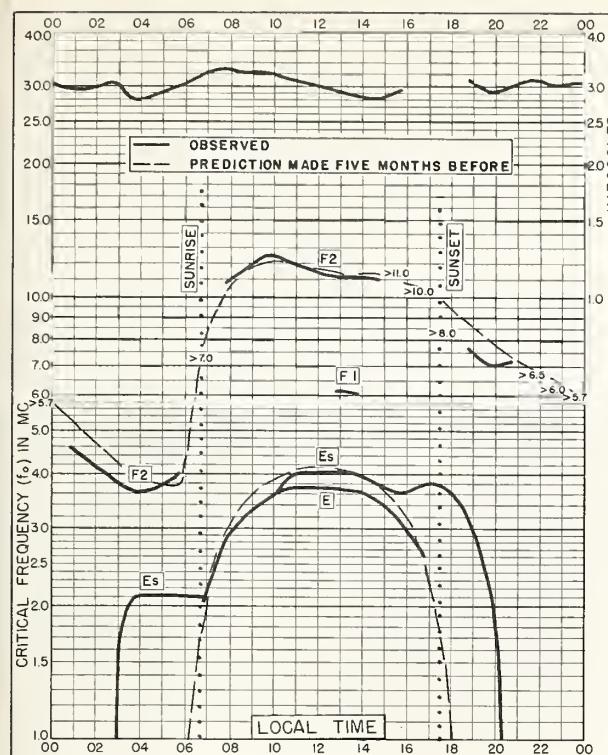


Fig. 57. TOWNSVILLE, AUSTRALIA  
19.3°S, 146.7°E JULY 1957

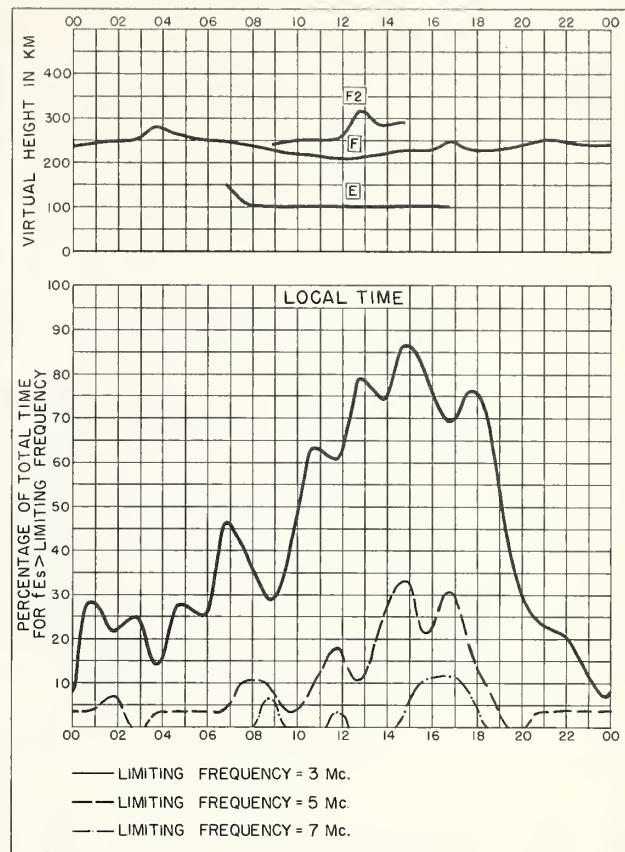


Fig. 58. TOWNSVILLE, AUSTRALIA JULY 1957

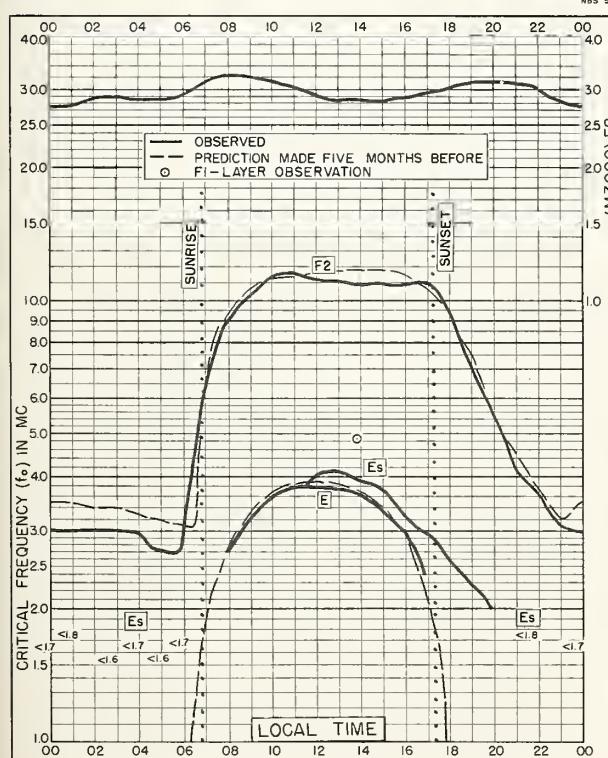


Fig. 59. JOHANNESBURG, UNION OF S. AFRICA  
26.2°S, 28.0°E JULY 1957

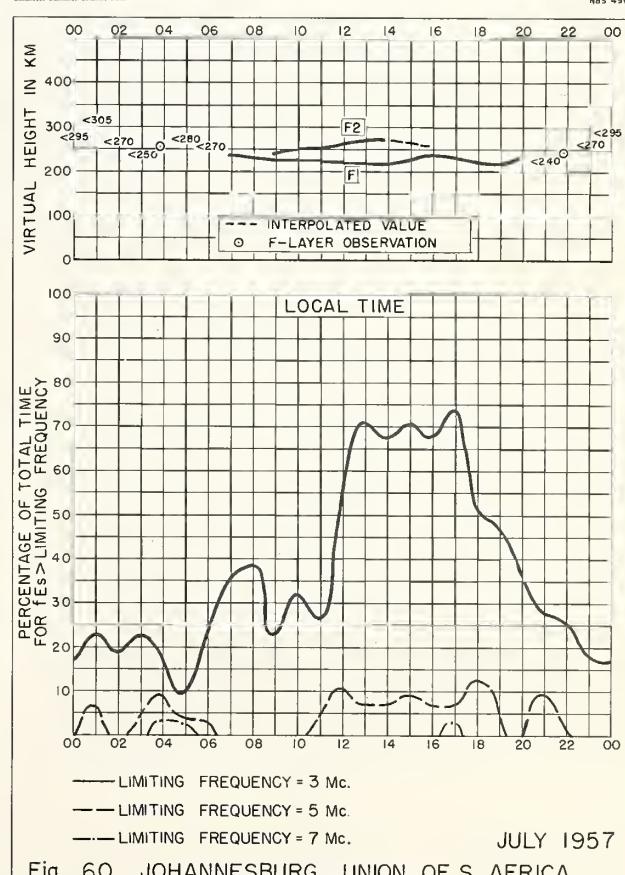


Fig. 60. JOHANNESBURG, UNION OF S. AFRICA JULY 1957

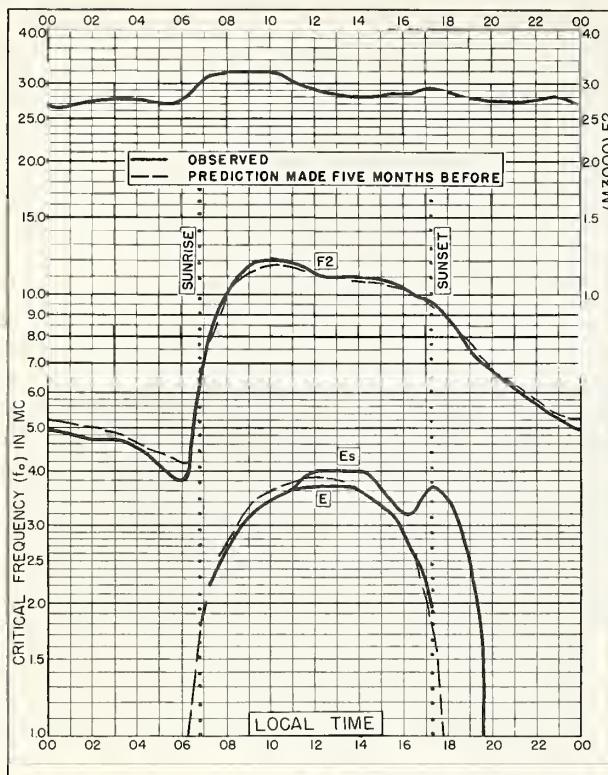


Fig. 61. BRISBANE, AUSTRALIA  
27.5°S, 152.9°E JULY 1957

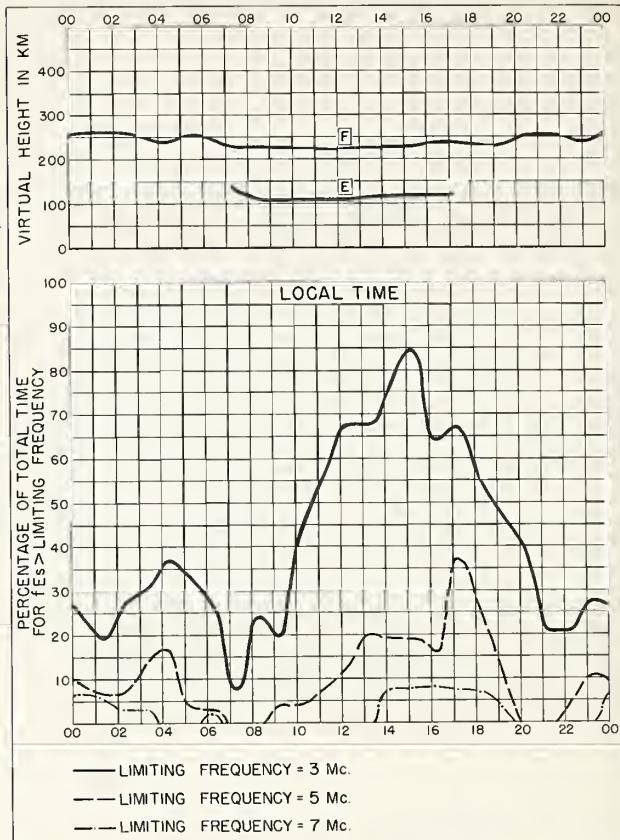


Fig. 62. BRISBANE, AUSTRALIA JULY 1957

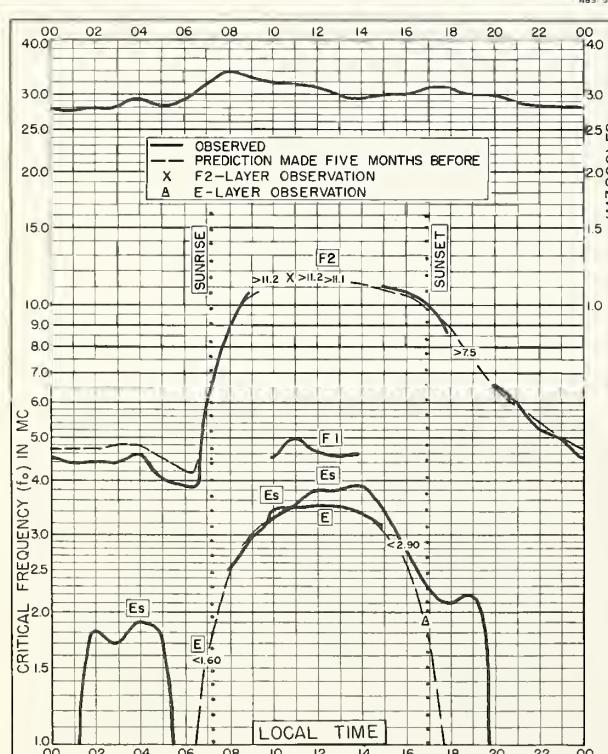


Fig. 63. CANBERRA, AUSTRALIA  
35.3°S, 149.0°E JULY 1957

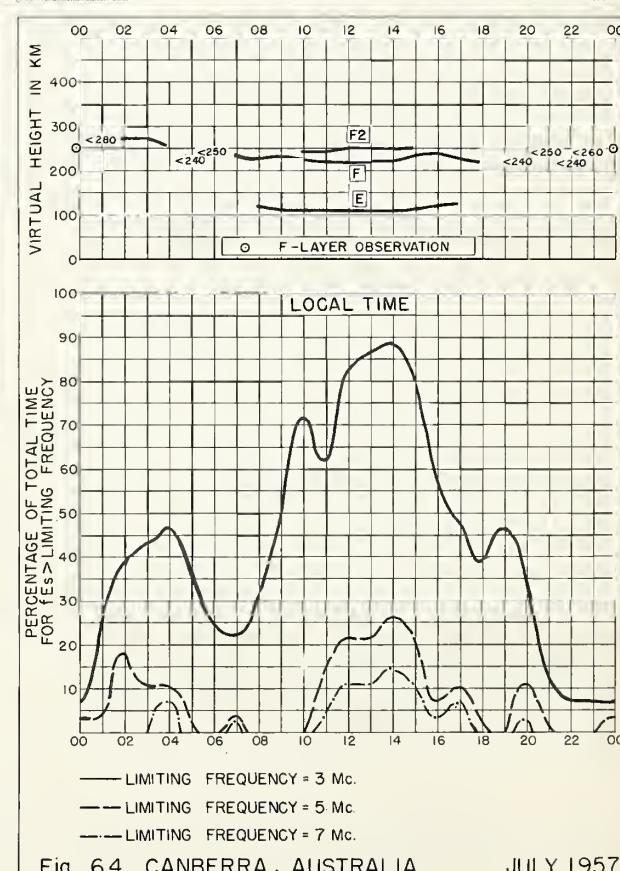
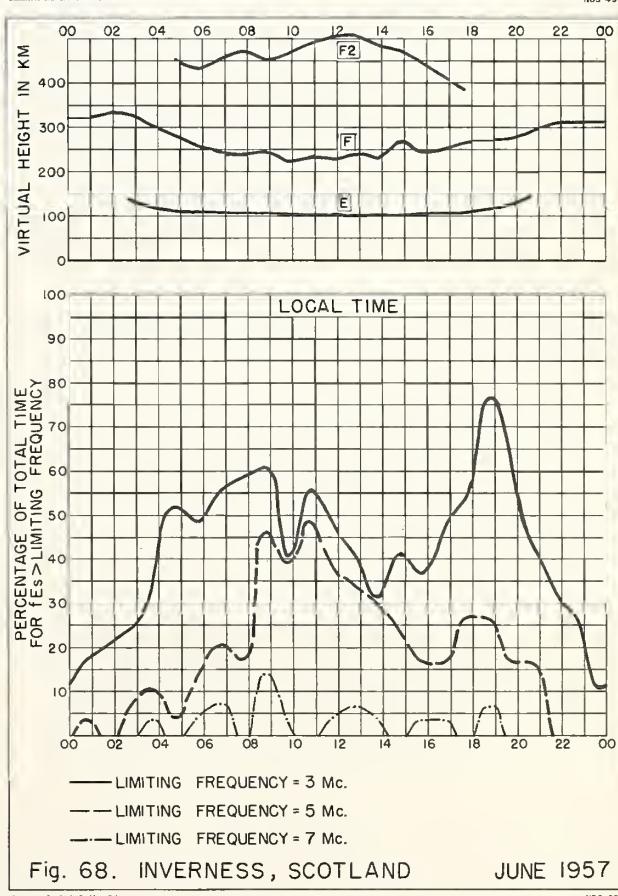
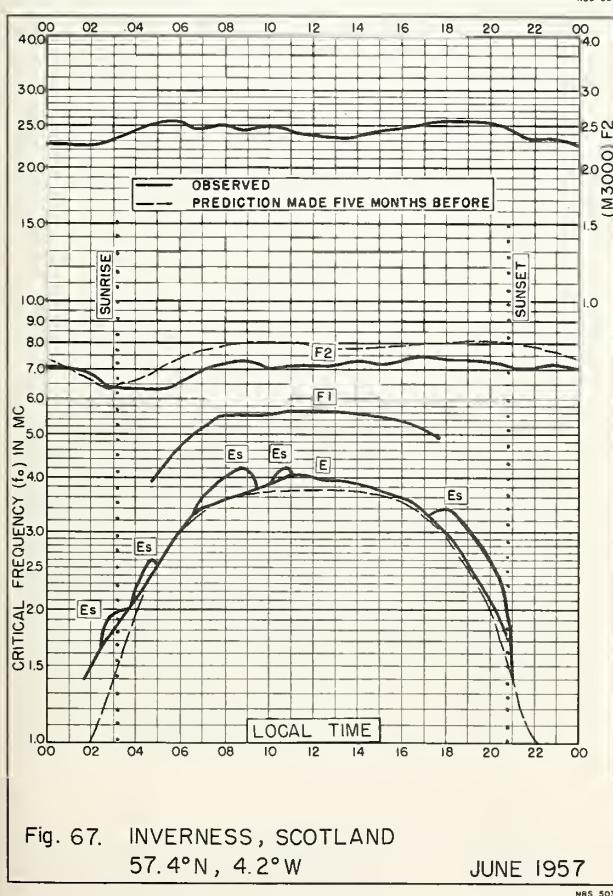
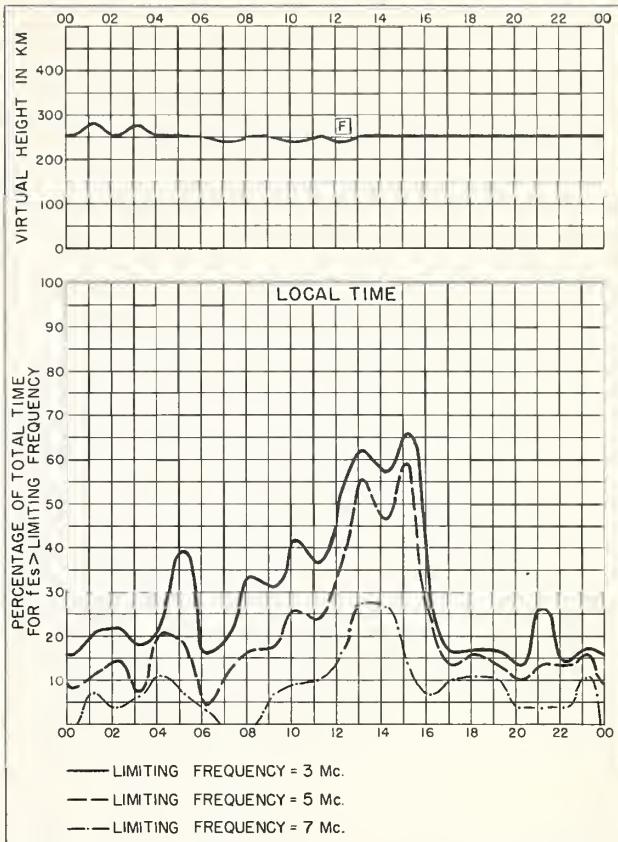
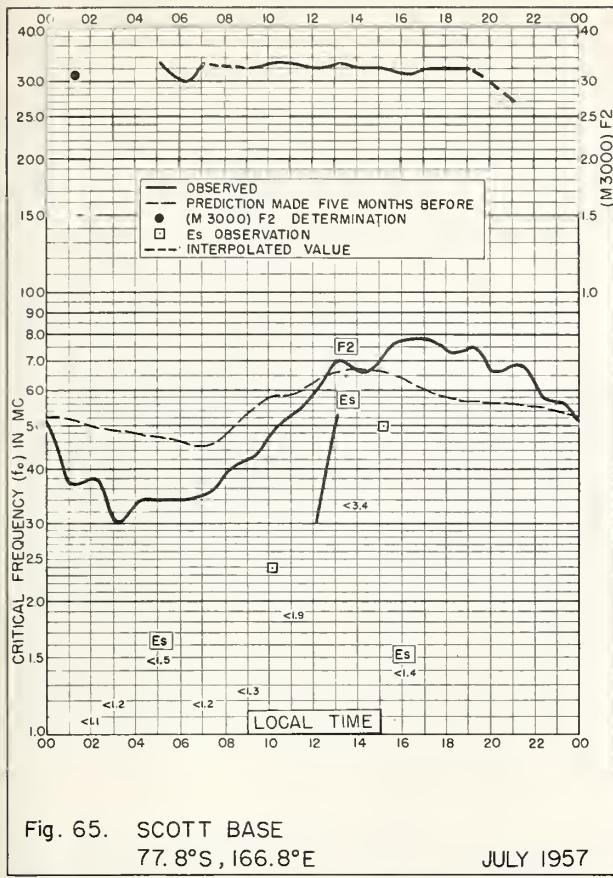
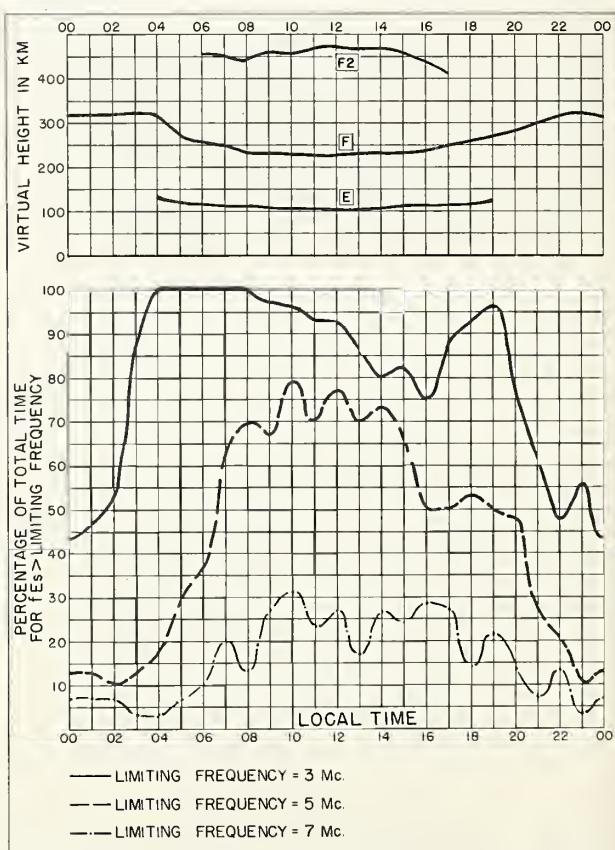
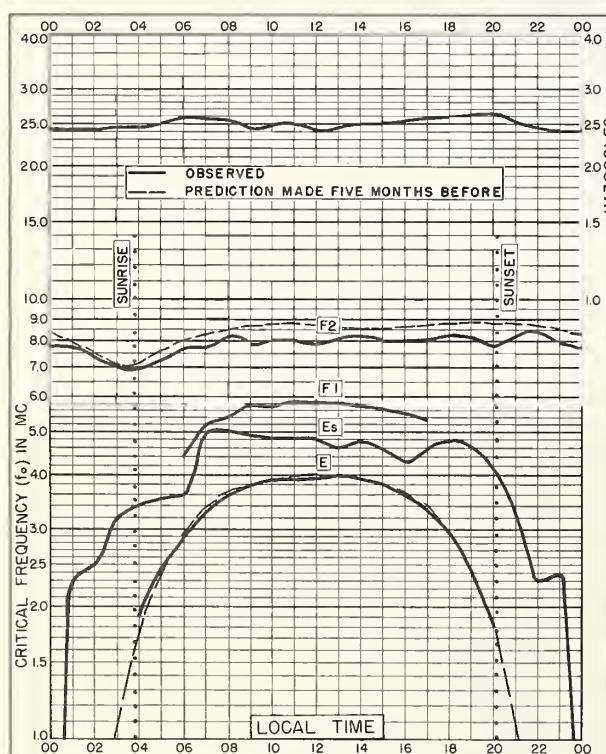
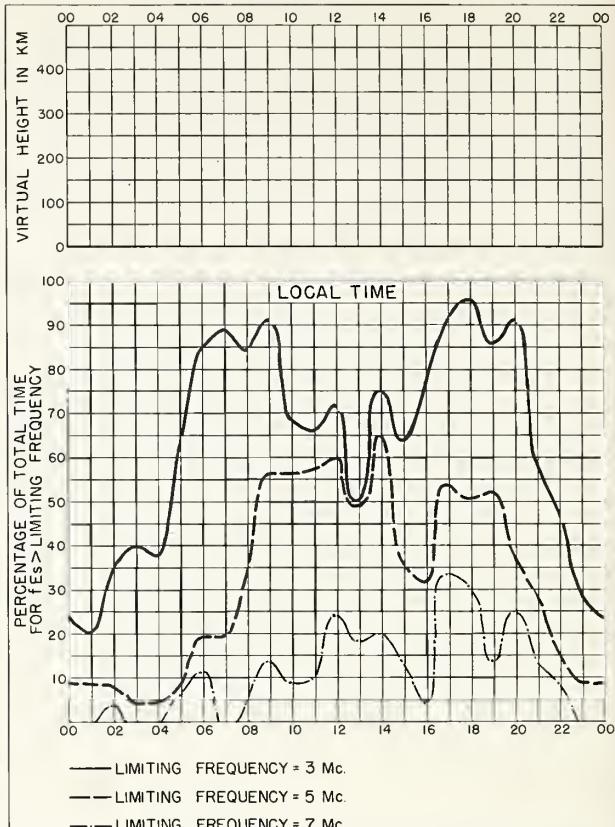
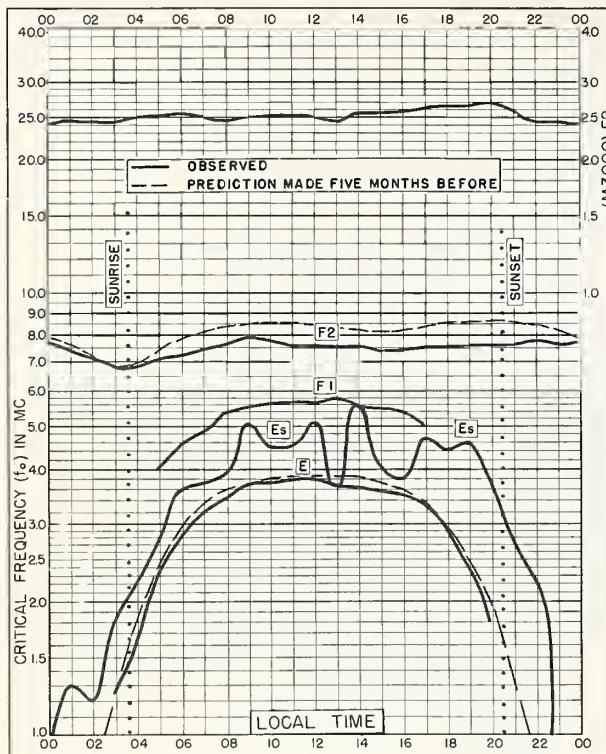


Fig. 64. CANBERRA, AUSTRALIA JULY 1957





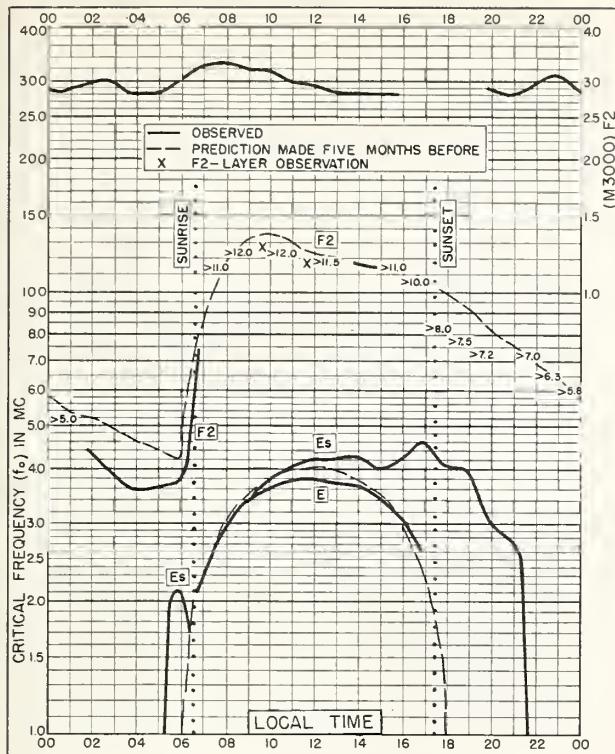


Fig. 73. TOWNSVILLE, AUSTRALIA  
19.3°S, 146.7°E JUNE 1957

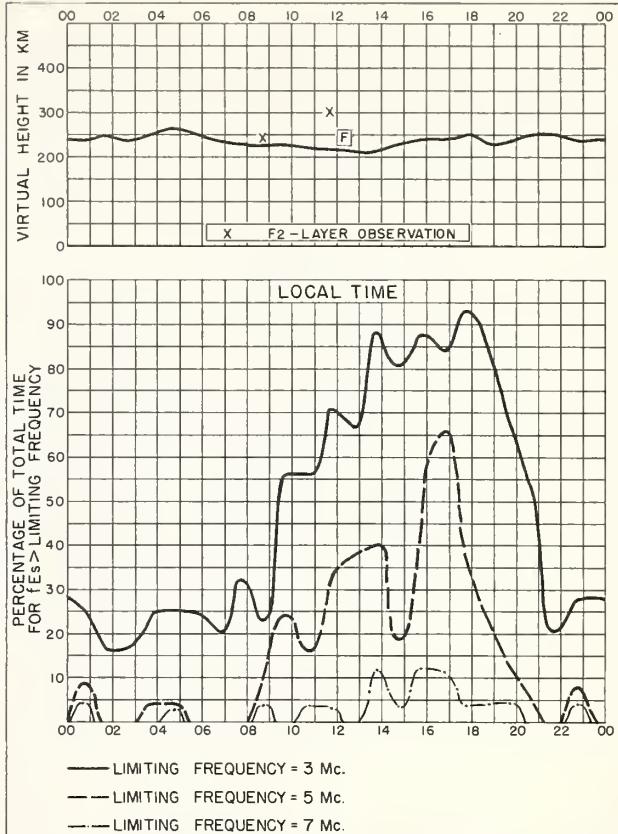


Fig. 74. TOWNSVILLE, AUSTRALIA JUNE 1957

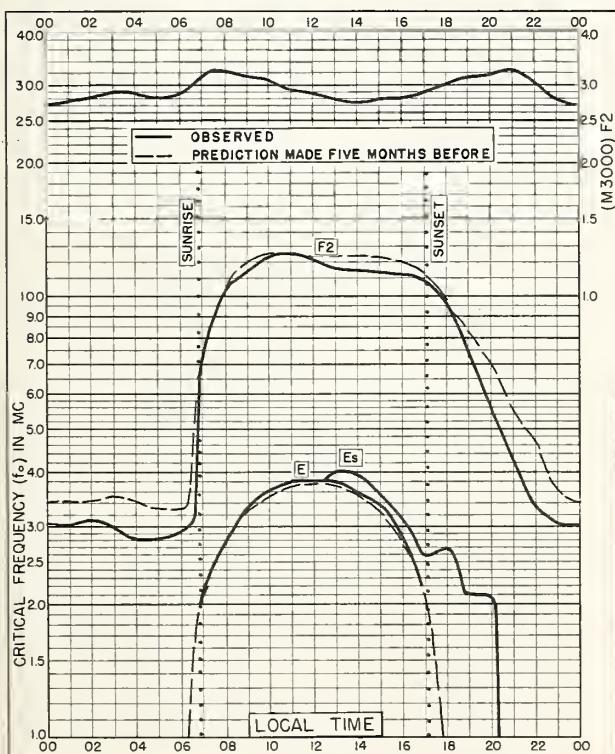


Fig. 75. JOHANNESBURG, UNION OF S. AFRICA  
26.2°S, 28.0°E JUNE 1957

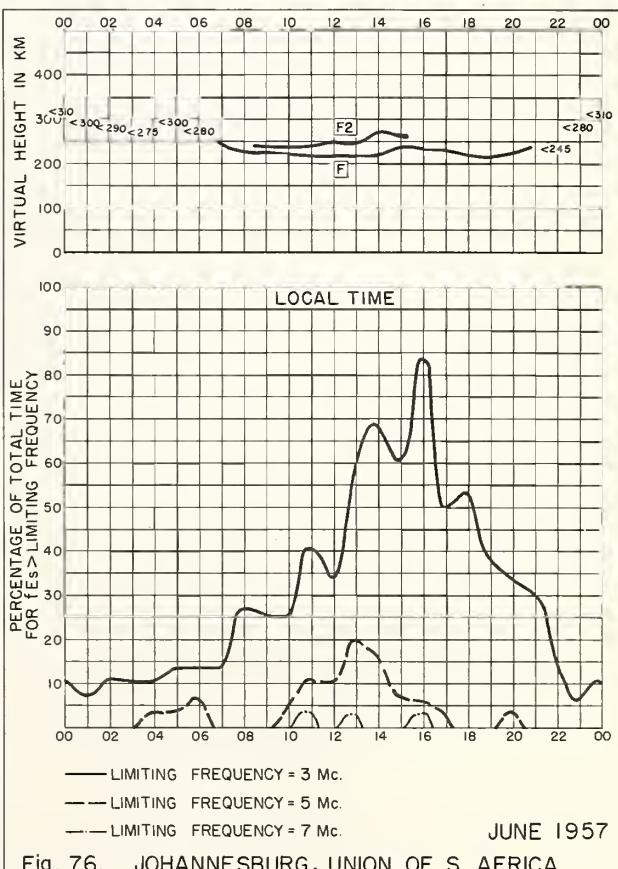


Fig. 76. JOHANNESBURG, UNION OF S. AFRICA JUNE 1957

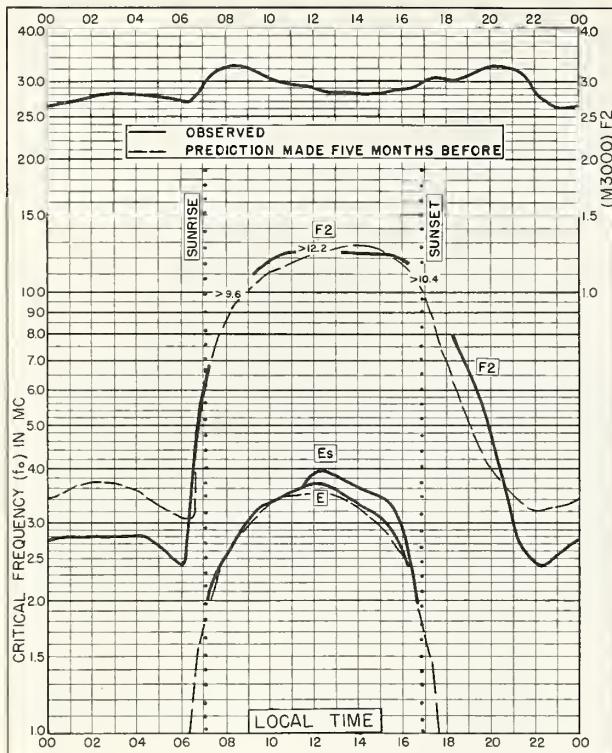
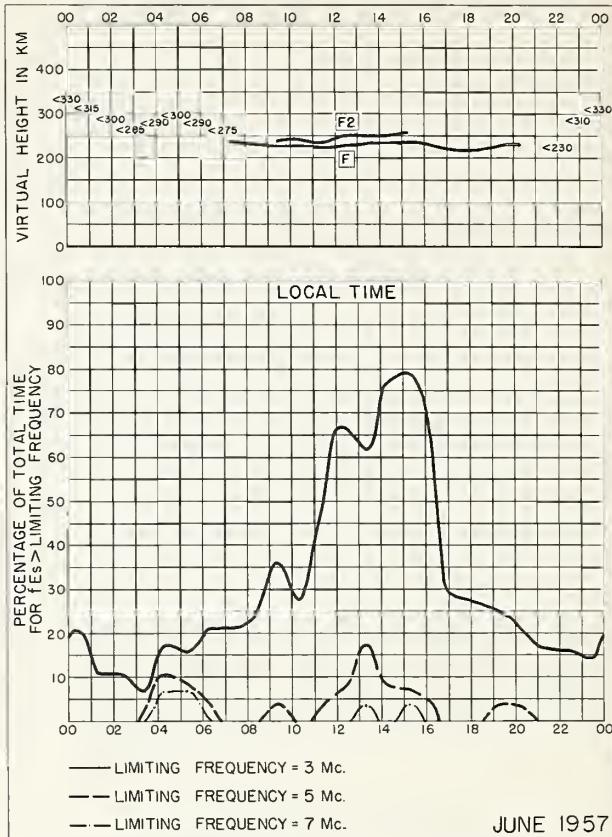


Fig. 77. CAPETOWN, UNION OF S. AFRICA  
34.1°S, 18.3°E JUNE 1957



JUNE 1957

Commerce-Boulder Boulder, Colo.

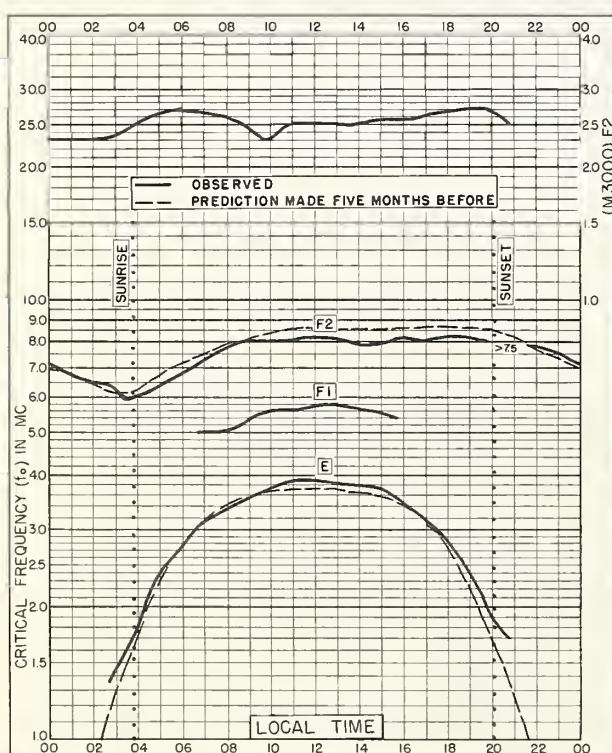
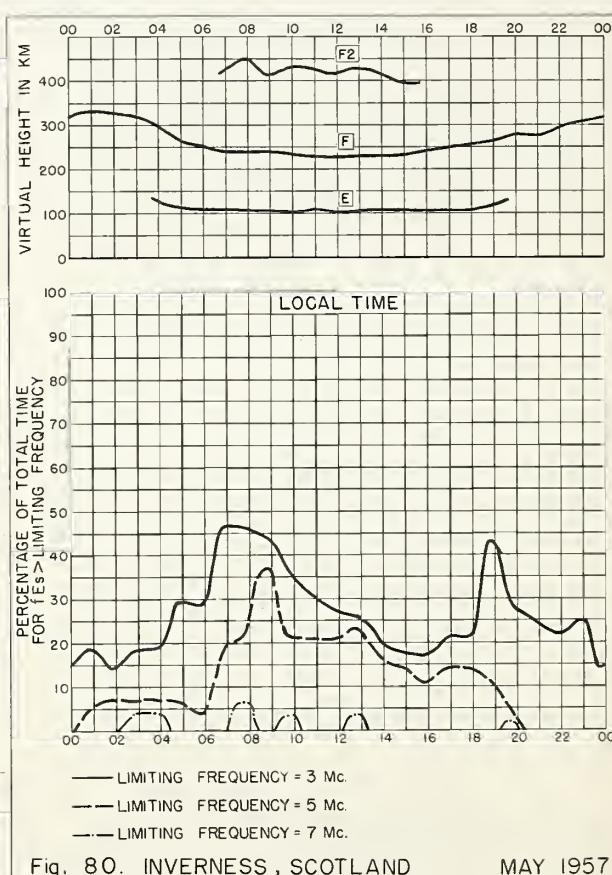
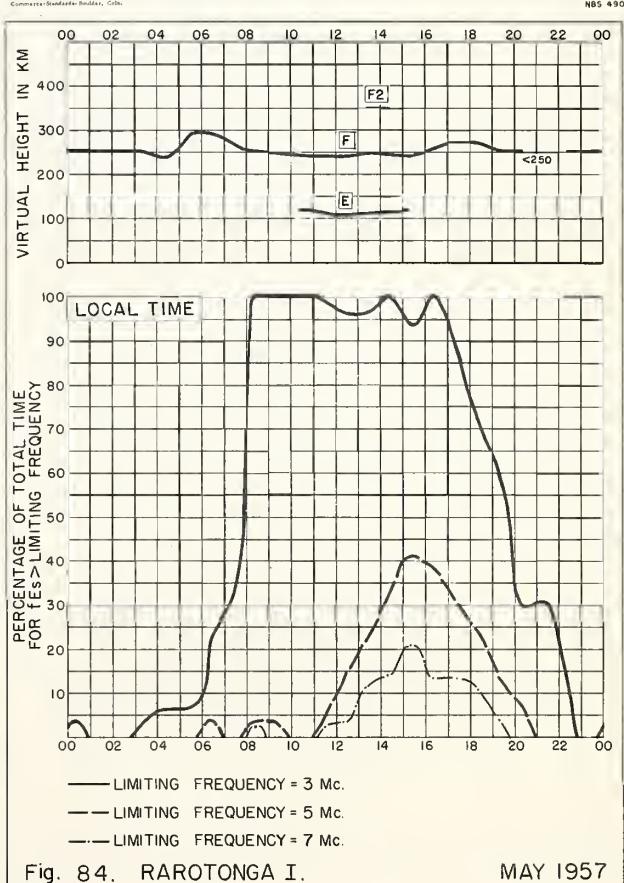
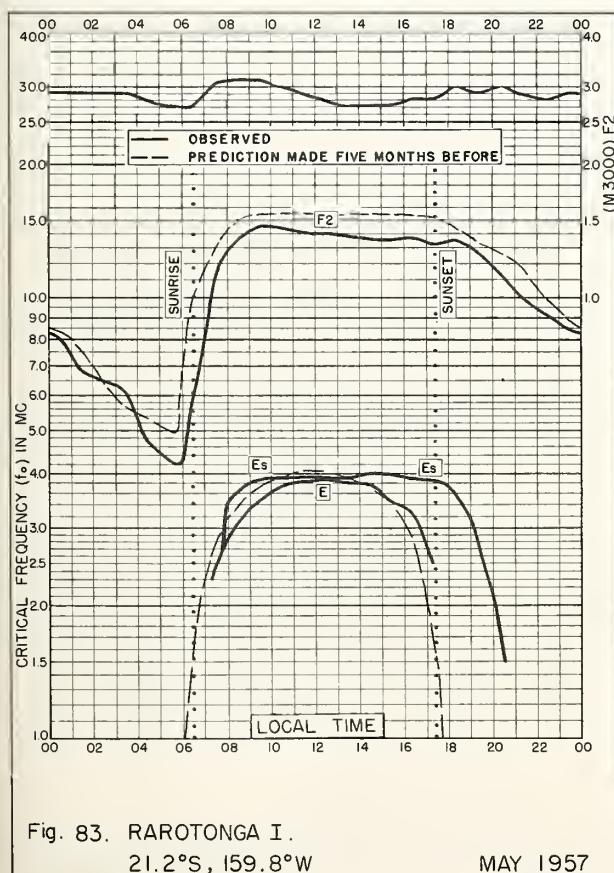
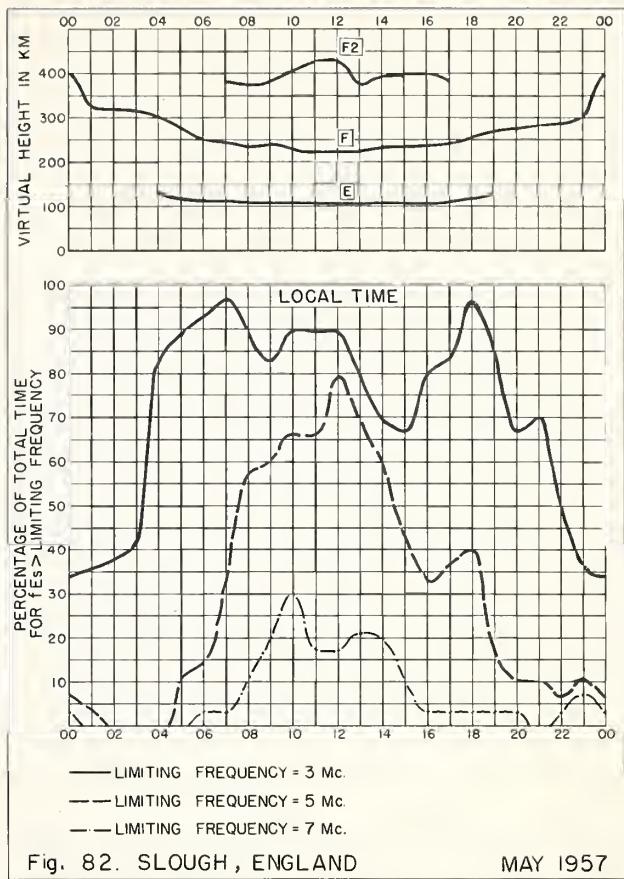
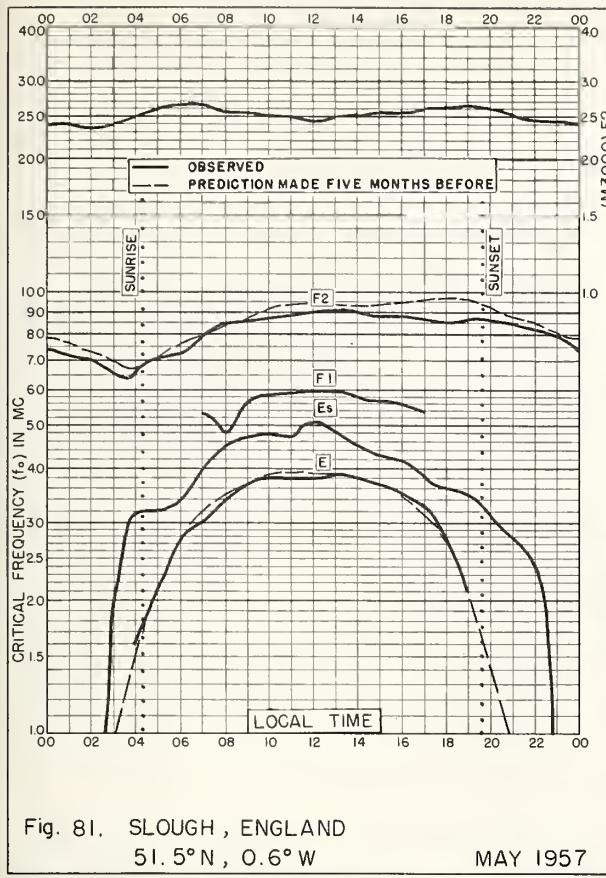


Fig. 79. INVERNESS, SCOTLAND  
57.4°N, 4.2°W MAY 1957



MAY 1957

Commerce-Boulder Boulder, Colo.



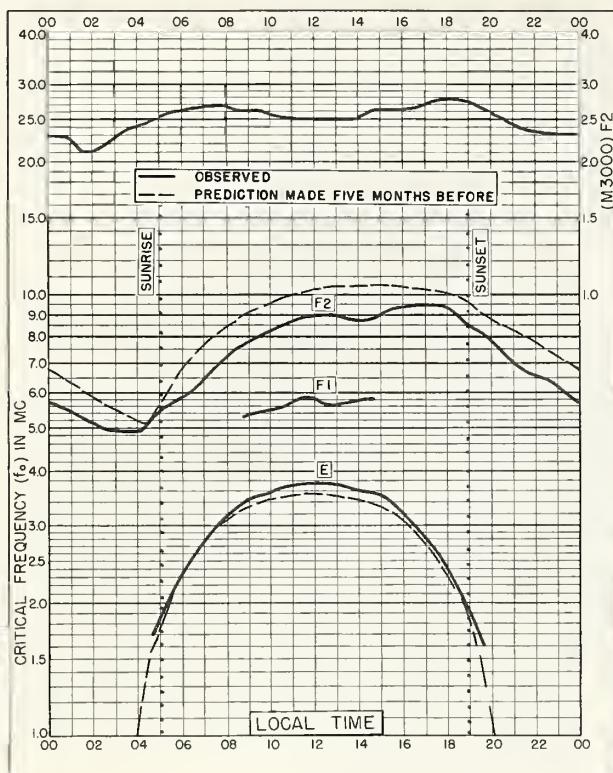


Fig. 85. INVERNESS, SCOTLAND  
57.4°N, 4.2°W APRIL 1957

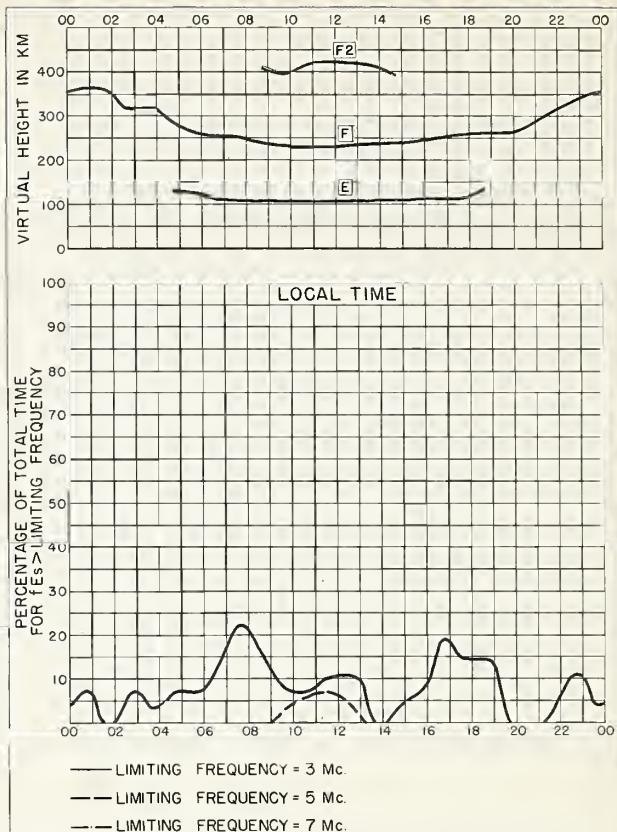


Fig. 86. INVERNESS, SCOTLAND APRIL 1957

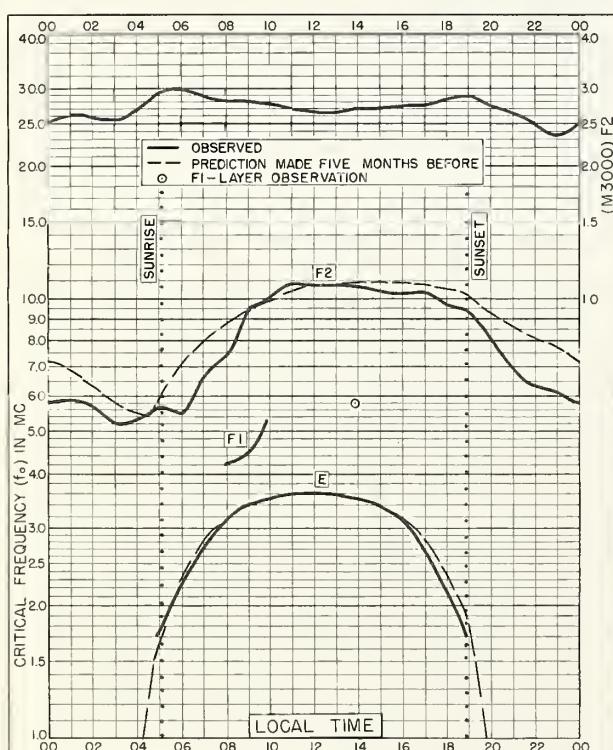


Fig. 87. JULIUSRUH/RÜGEN, GERMANY  
54.6°N, 13.4°E APRIL 1957

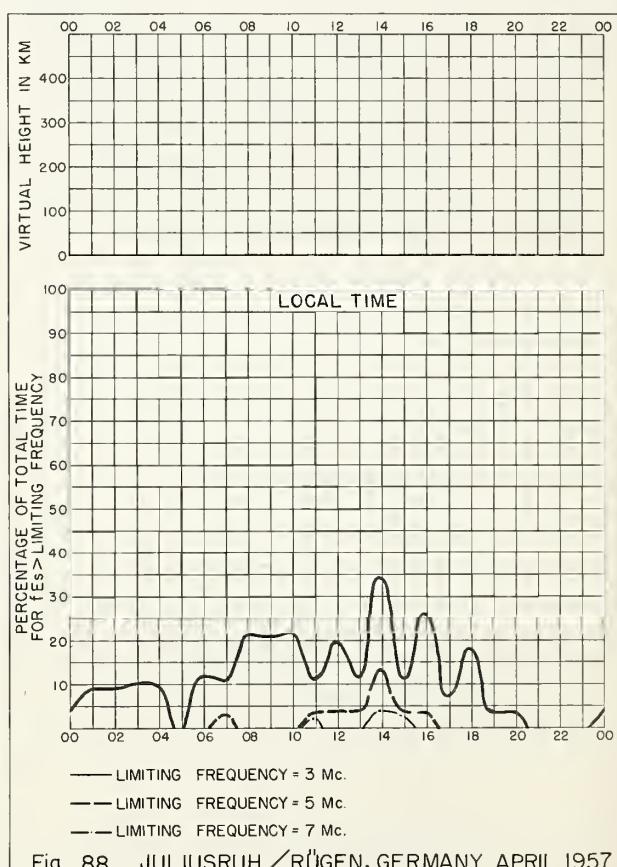


Fig. 88. JULIUSRUH/RÜGEN, GERMANY APRIL 1957

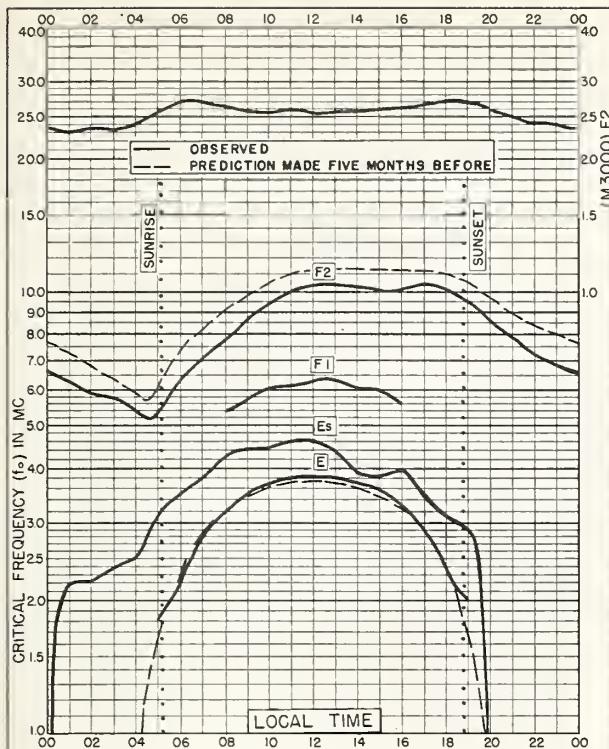


Fig. 89. SLOUGH, ENGLAND  
51.5°N, 0.6°W  
APRIL 1957

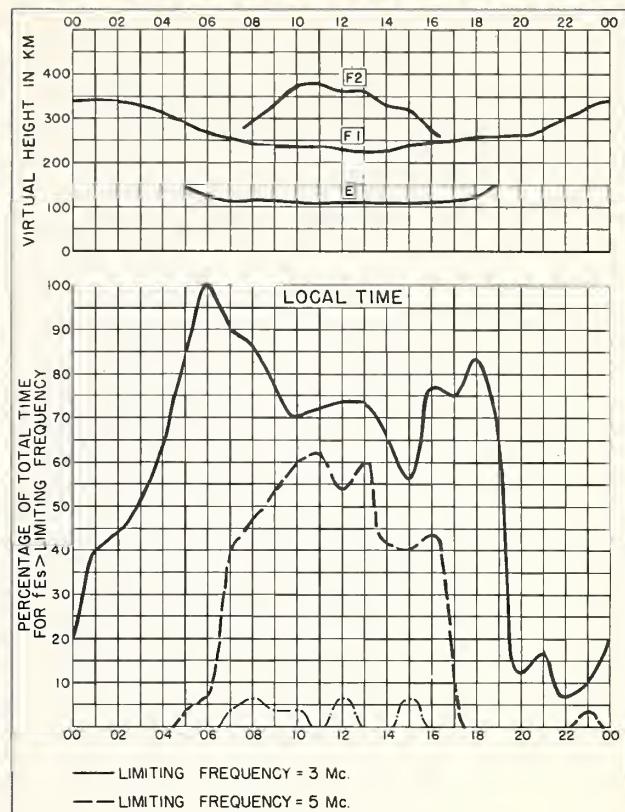


Fig. 90. SLOUGH, ENGLAND  
APRIL 1957

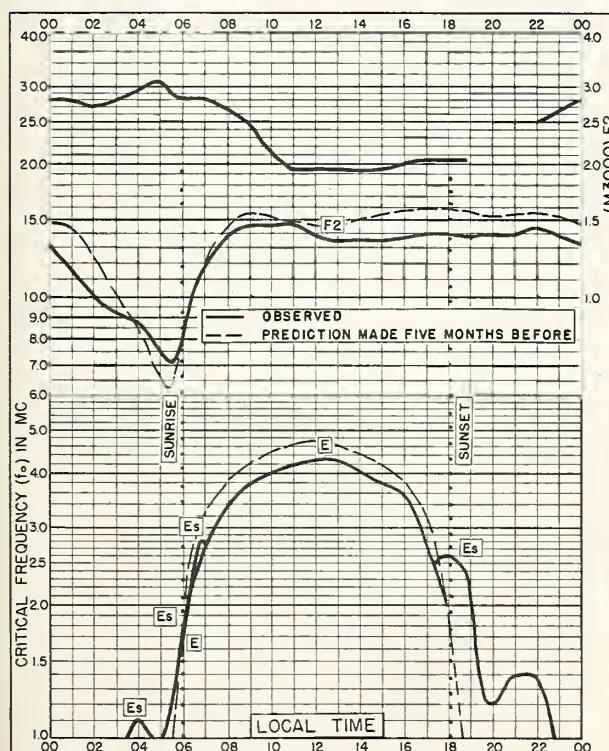


Fig. 91. SINGAPORE, BRITISH MALAYA  
1.3°N, 103.8°E  
APRIL 1957

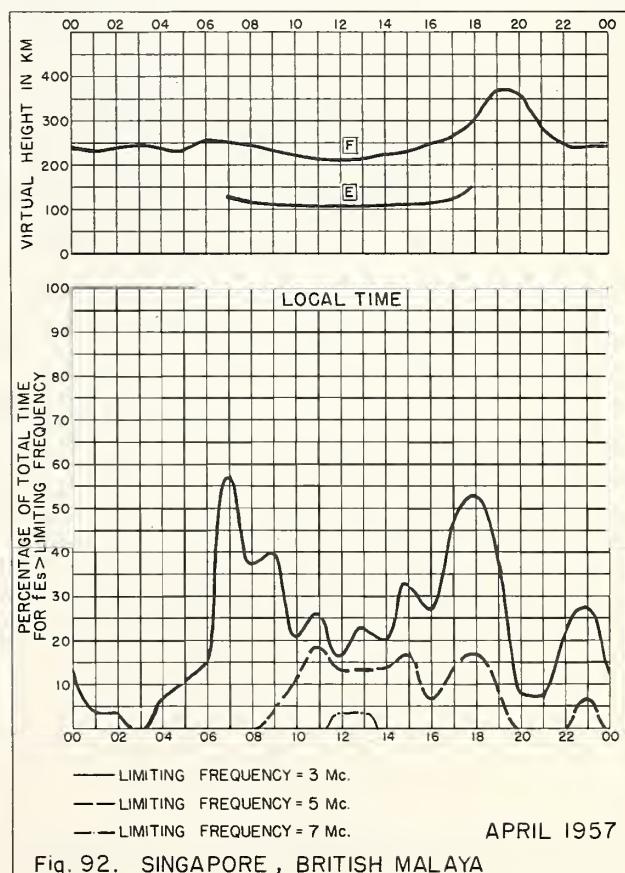


Fig. 92. SINGAPORE, BRITISH MALAYA  
APRIL 1957

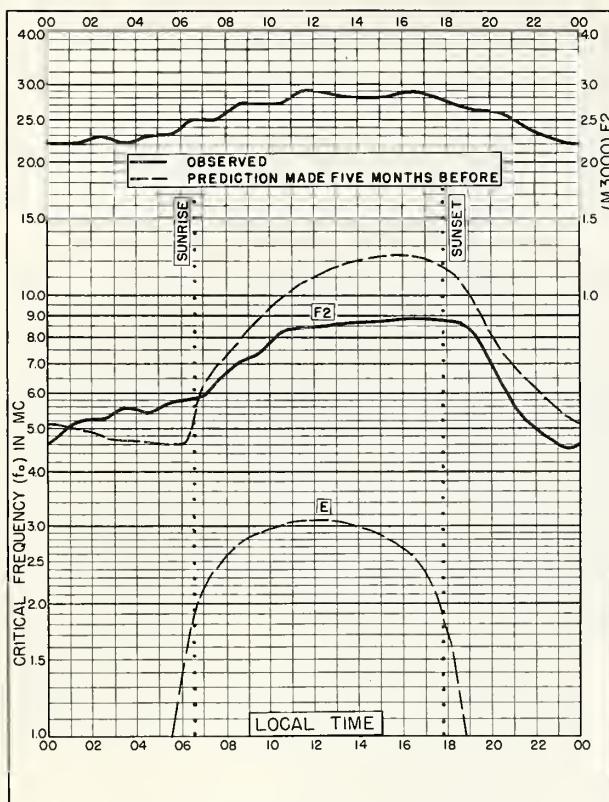


Fig. 93. PROVIDENIE BAY, U.S.S.R.  
64.4°N, 186.6°E MARCH 1957

NBS 503

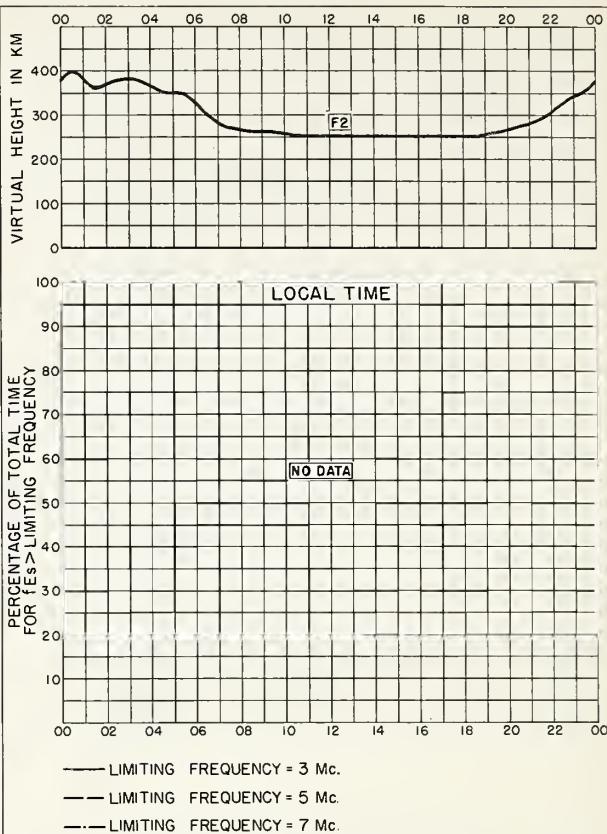


Fig. 94. PROVIDENIE BAY, U.S.S.R. MARCH 1957

Commerce Standard Boulder, Colo.

NBS 490

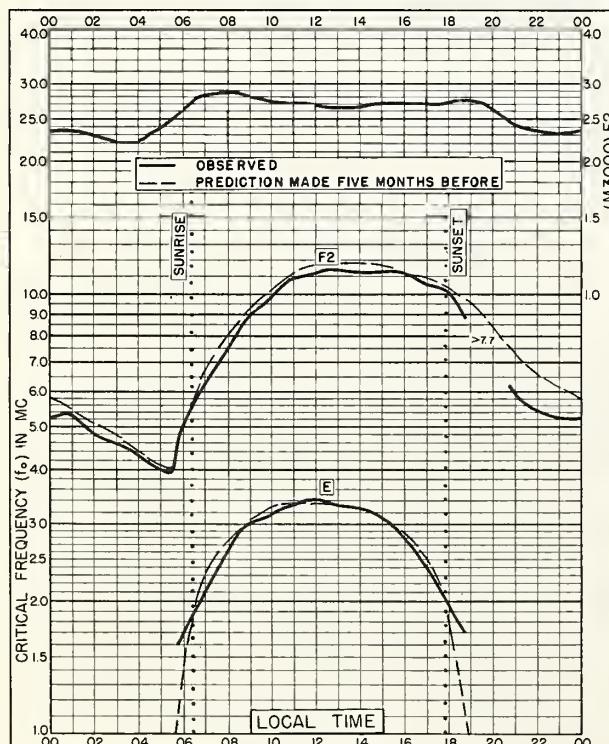


Fig. 95. INVERNESS, SCOTLAND  
57.4°N, 4.2°W MARCH 1957

NBS 503

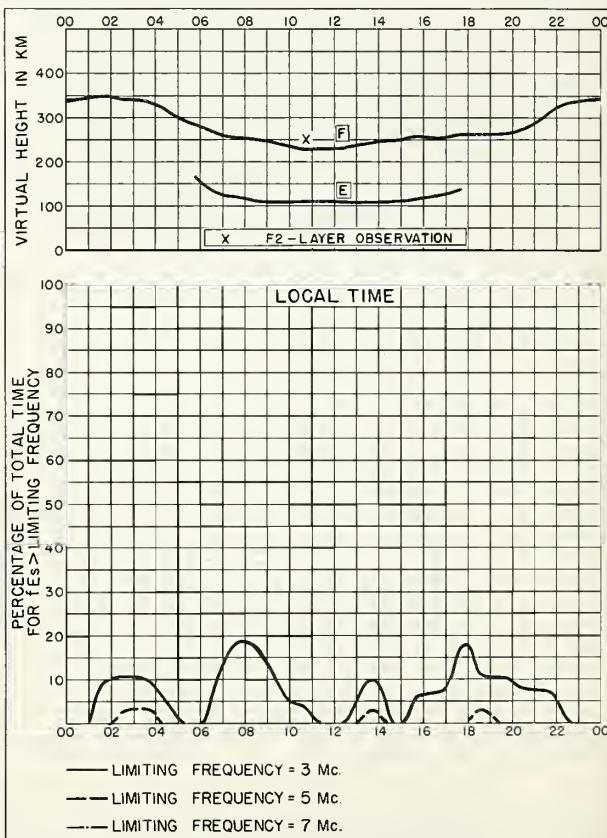


Fig. 96. INVERNESS, SCOTLAND MARCH 1957

NBS 490

Commerce Standard Boulder, Colo.

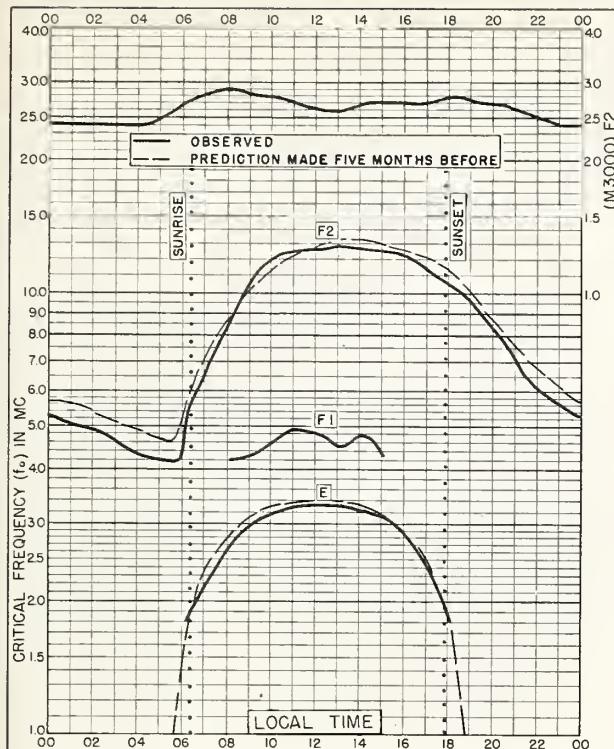


Fig. 97. SVERDLOVSK, U.S.S.R.  
56.7°N, 61.1°E MARCH 1957

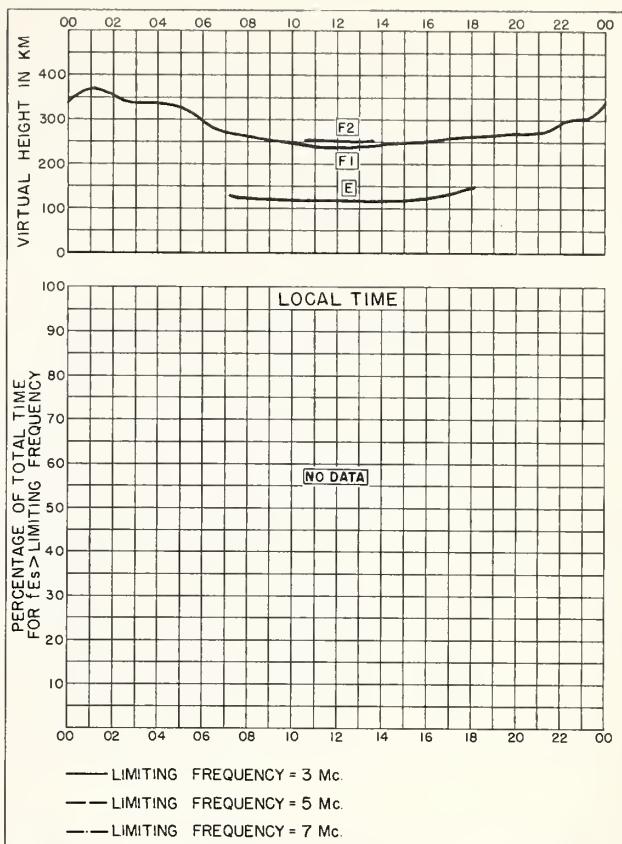


Fig. 98. SVERDLOVSK, U.S.S.R. MARCH 1957

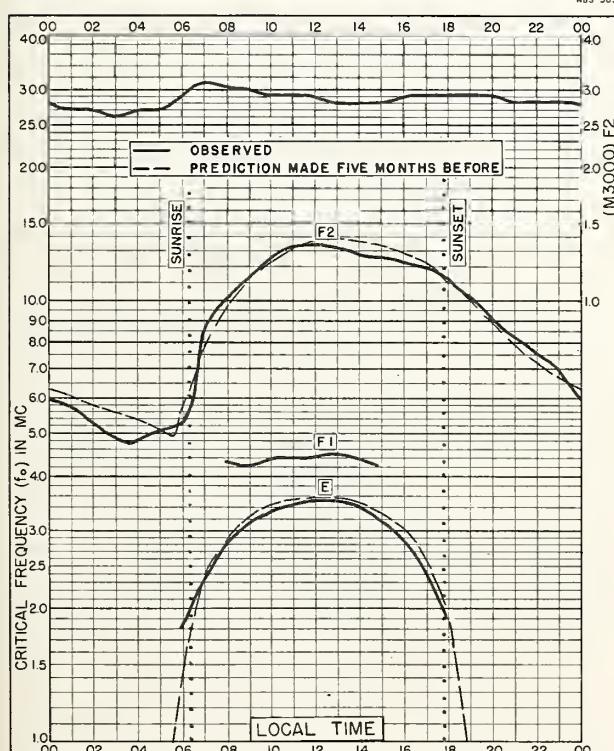


Fig. 99. IRKUTSK, U.S.S.R.  
52.5°N, 104.0°E MARCH 1957

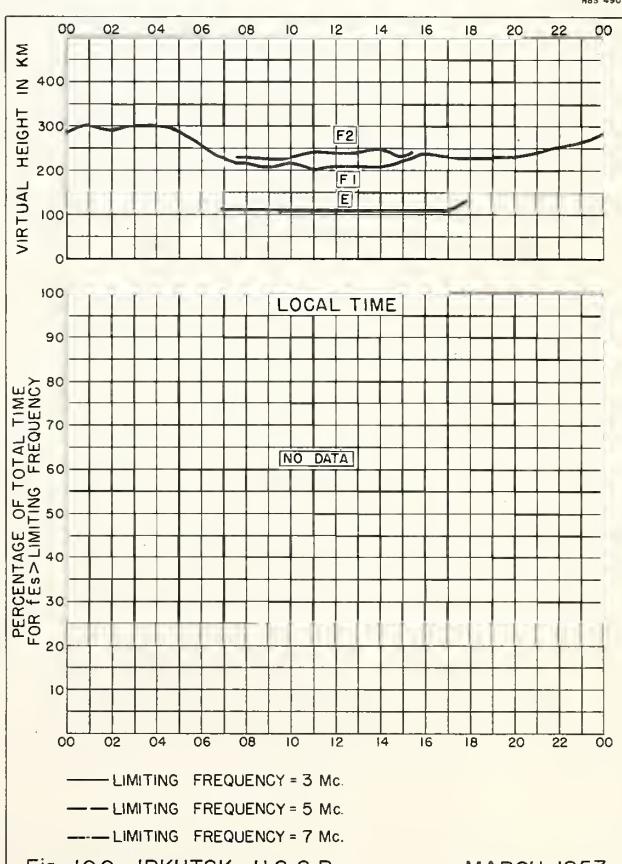
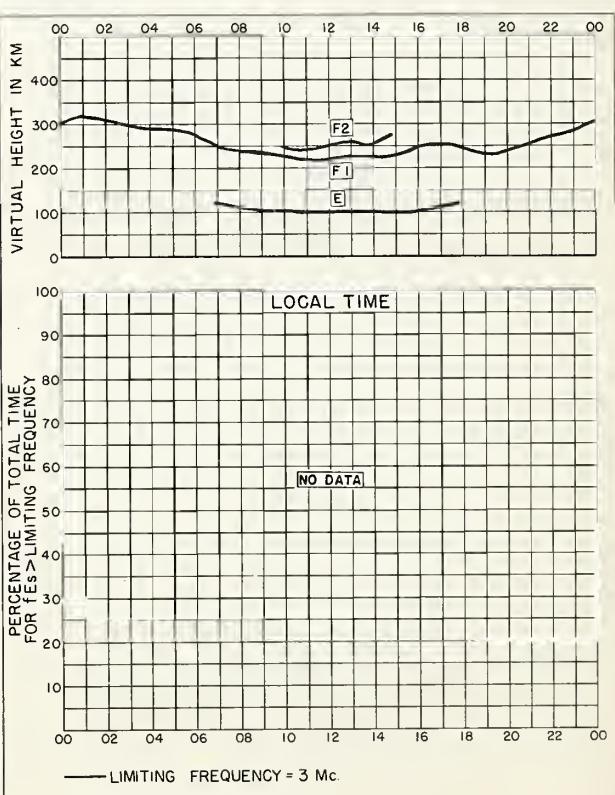
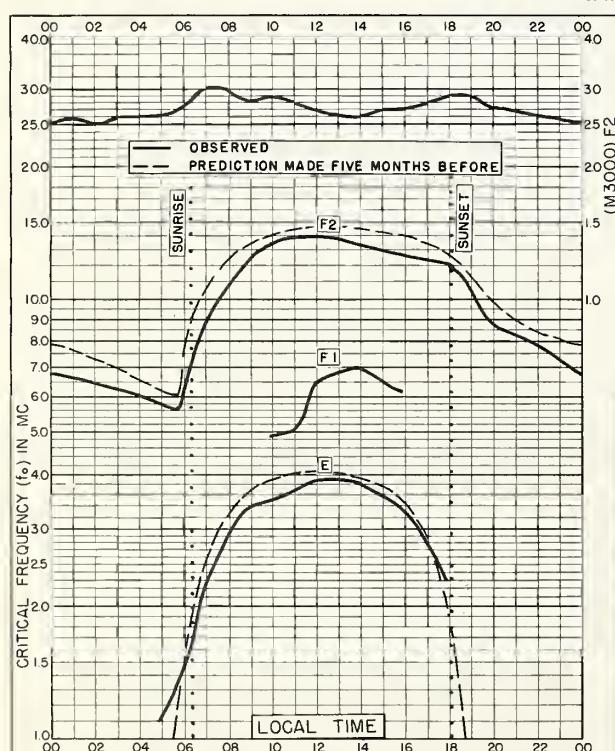
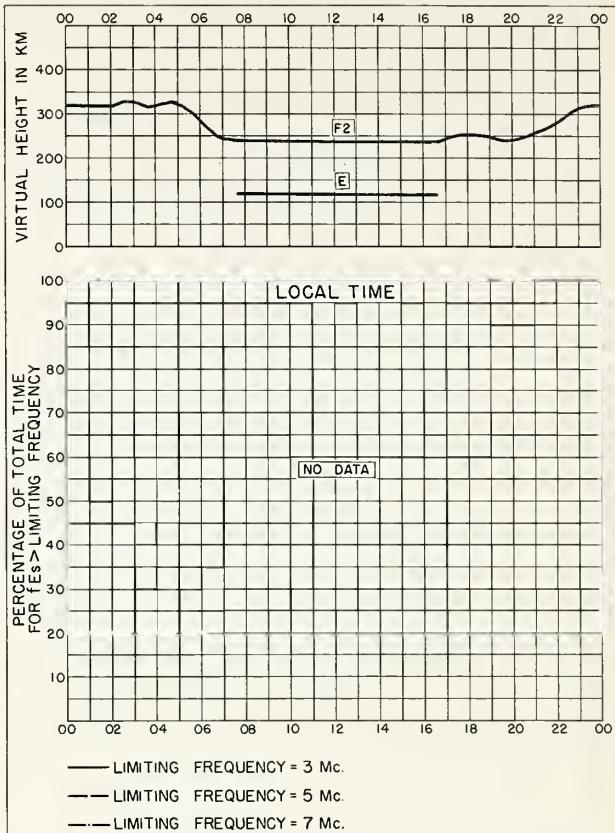
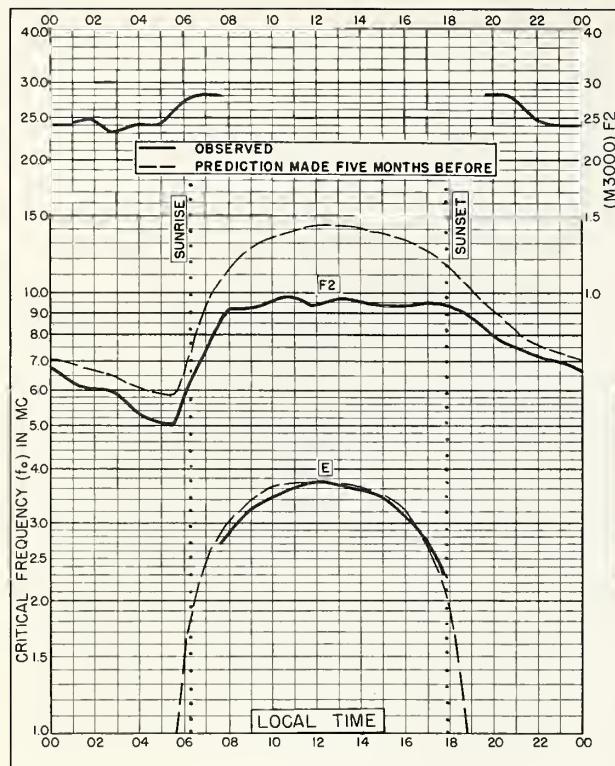
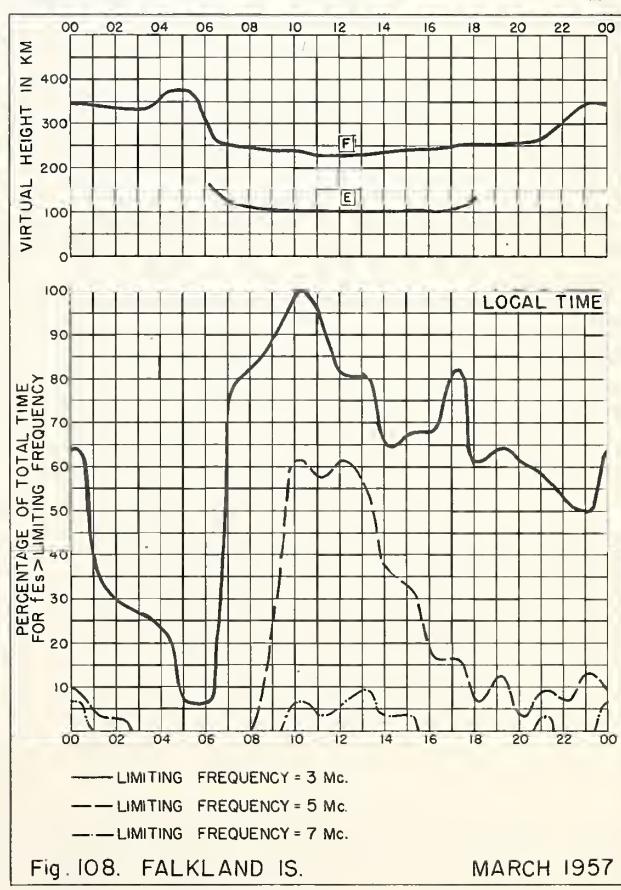
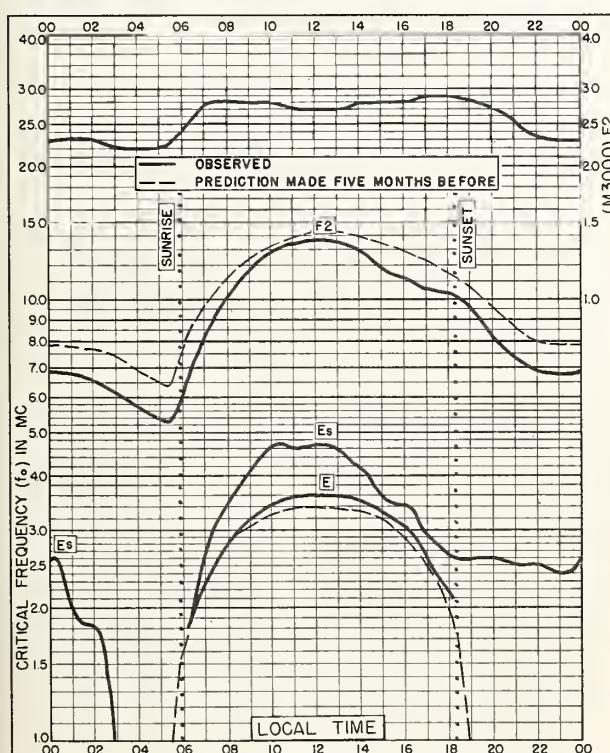
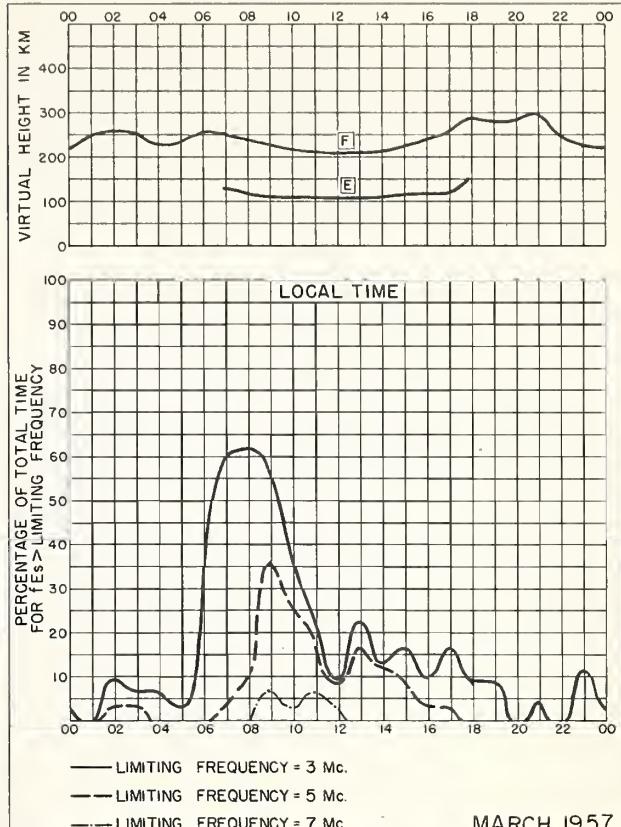
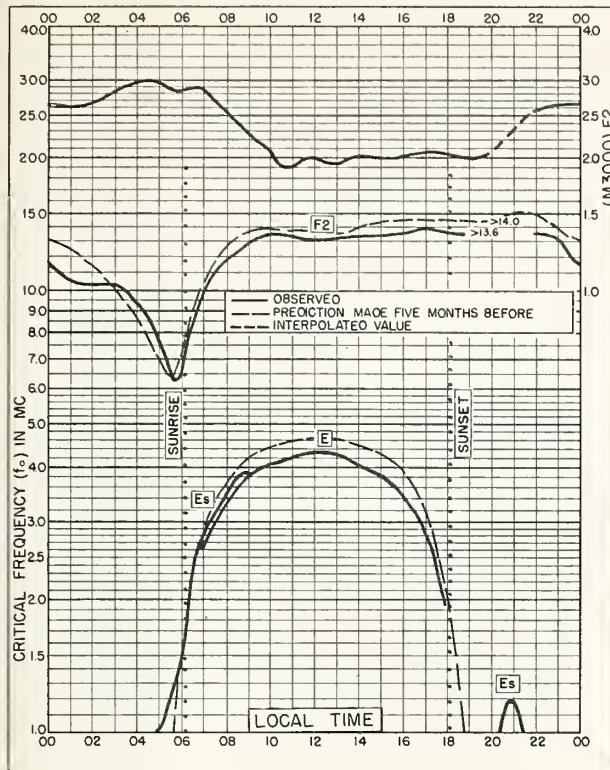
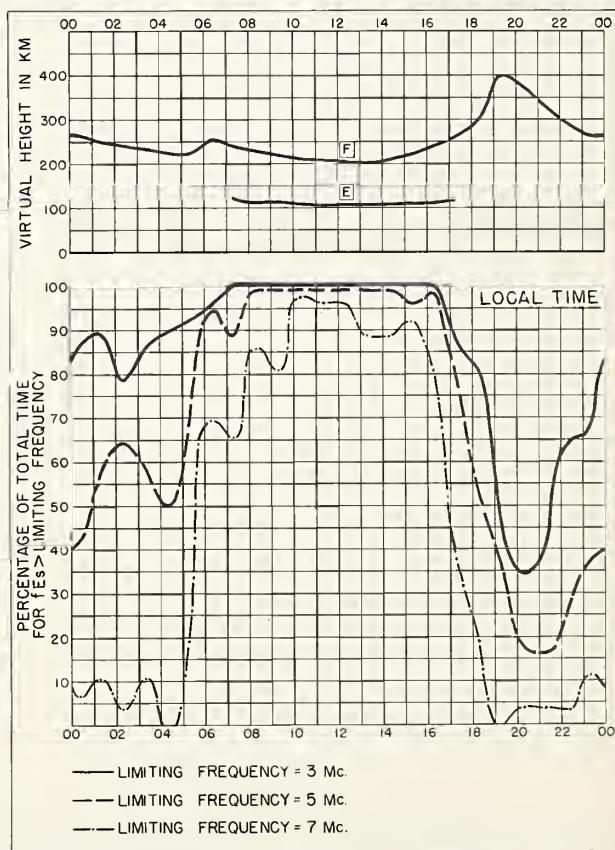
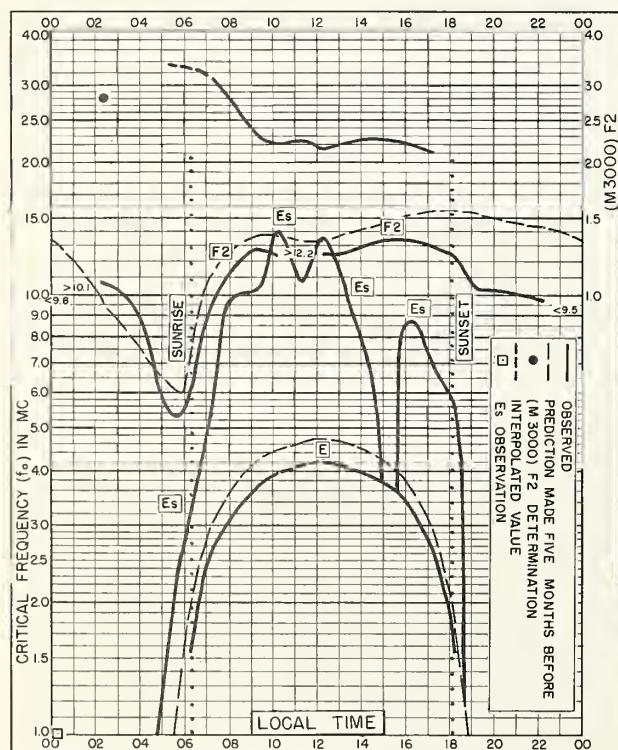
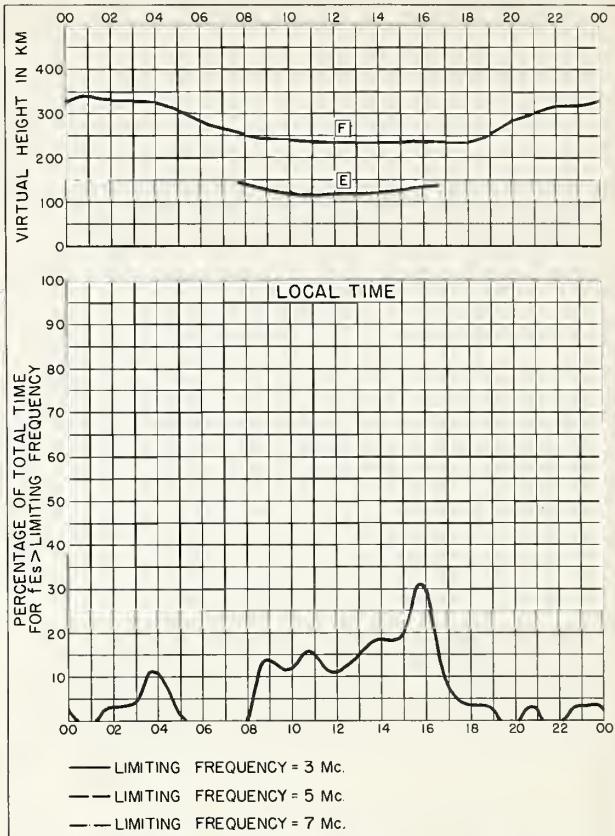
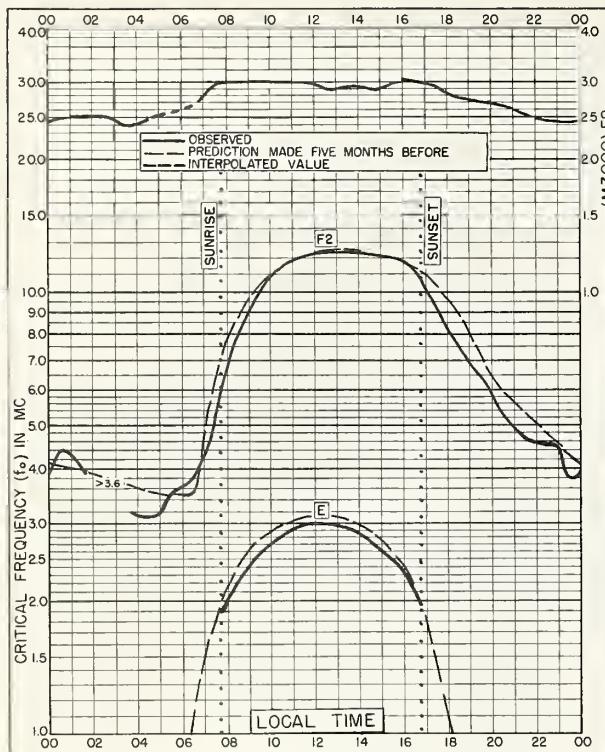


Fig. 100. IRKUTSK, U.S.S.R. MARCH 1957







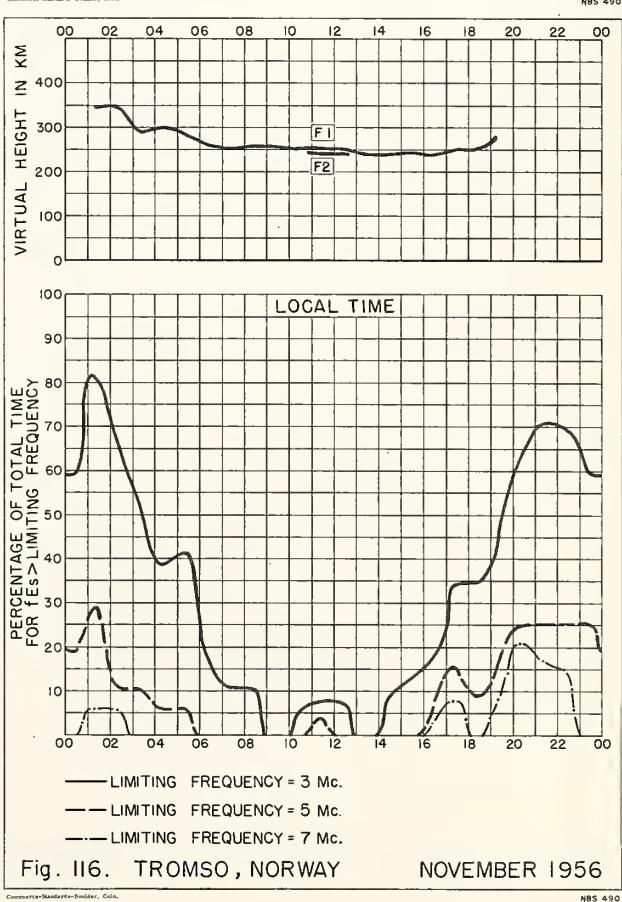
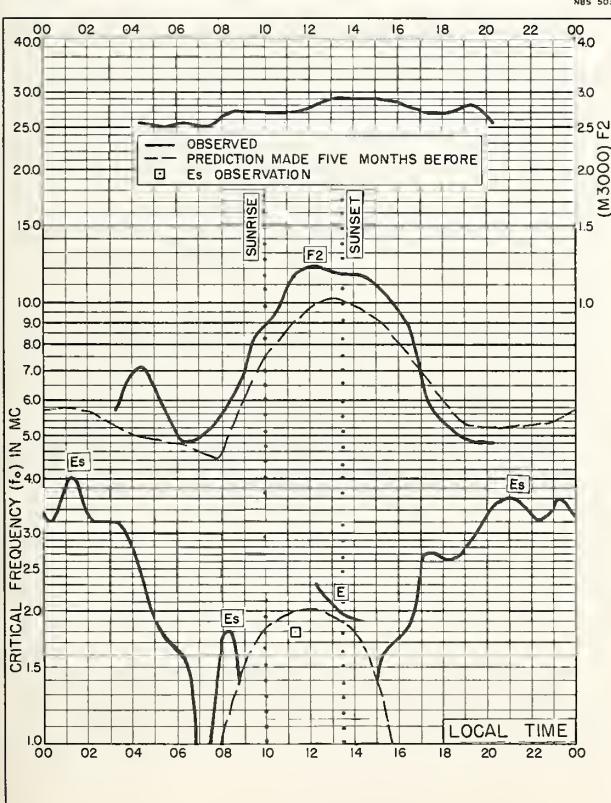
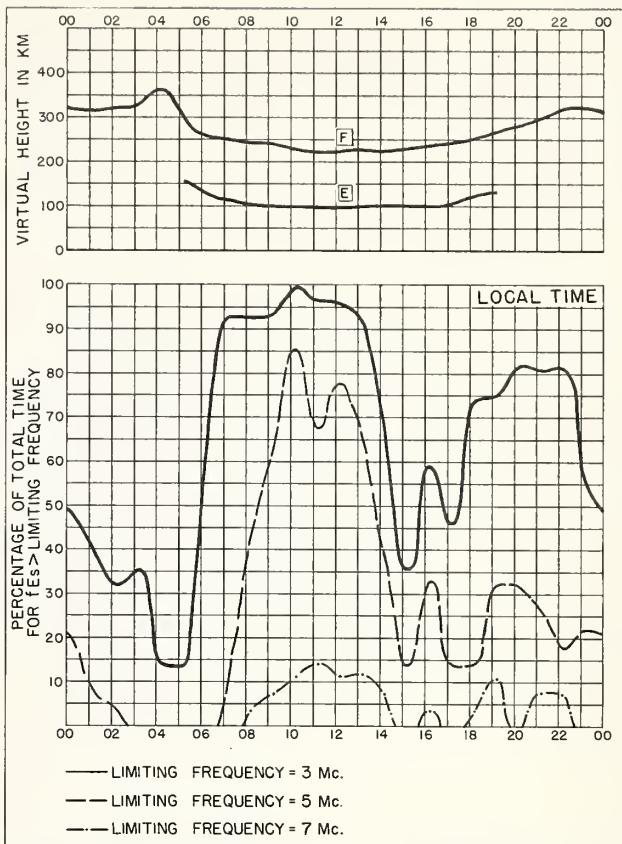
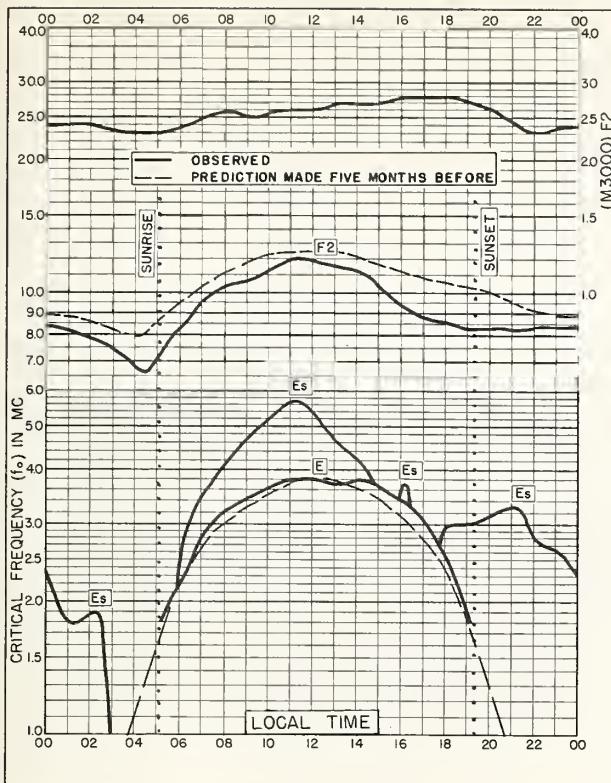


Fig. II15. TROMSO, NORWAY  
69.7°N, 19.0°E      NOVEMBER 1956

Fig. II16. TROMSO, NORWAY      NOVEMBER 1956

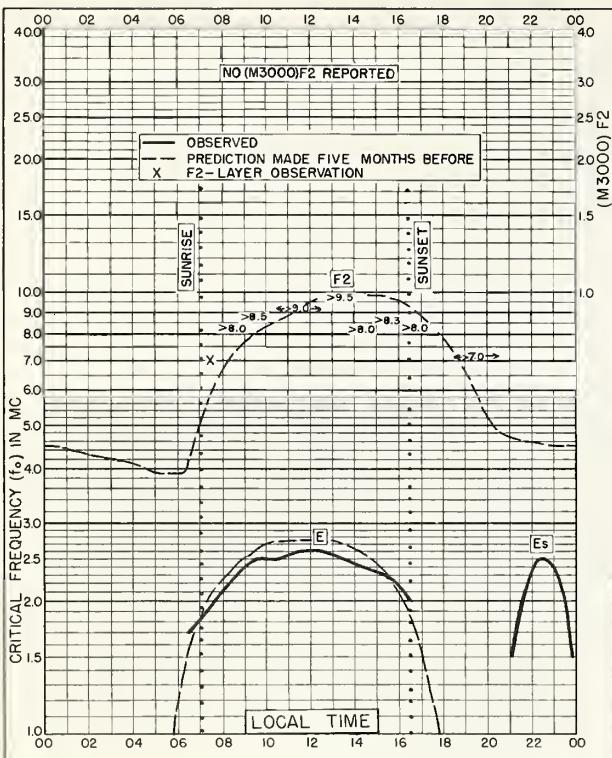


Fig. 117. LULEA, SWEDEN  
65.6°N, 22.1°E OCTOBER 1956

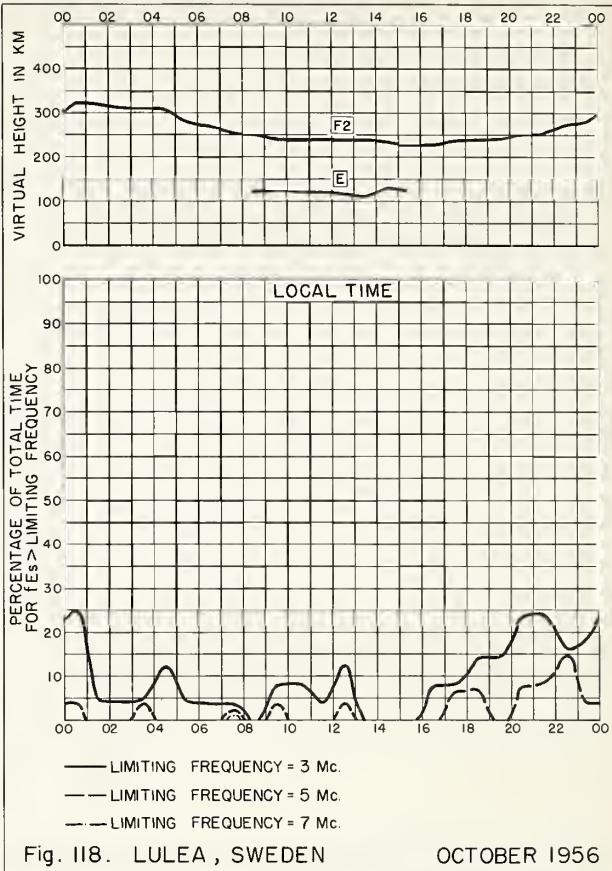


Fig. 118. LULEA, SWEDEN OCTOBER 1956

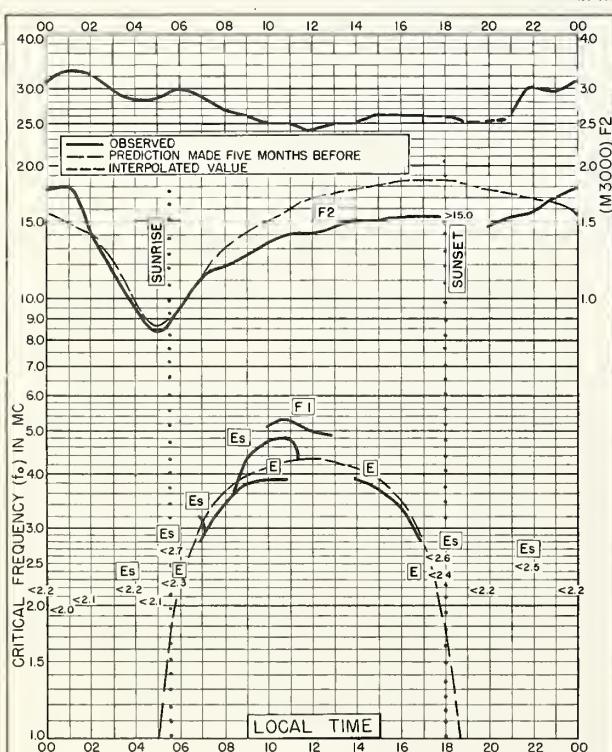


Fig. 119. SAO PAULO, BRAZIL  
23.5°S, 46.5°W OCTOBER 1956

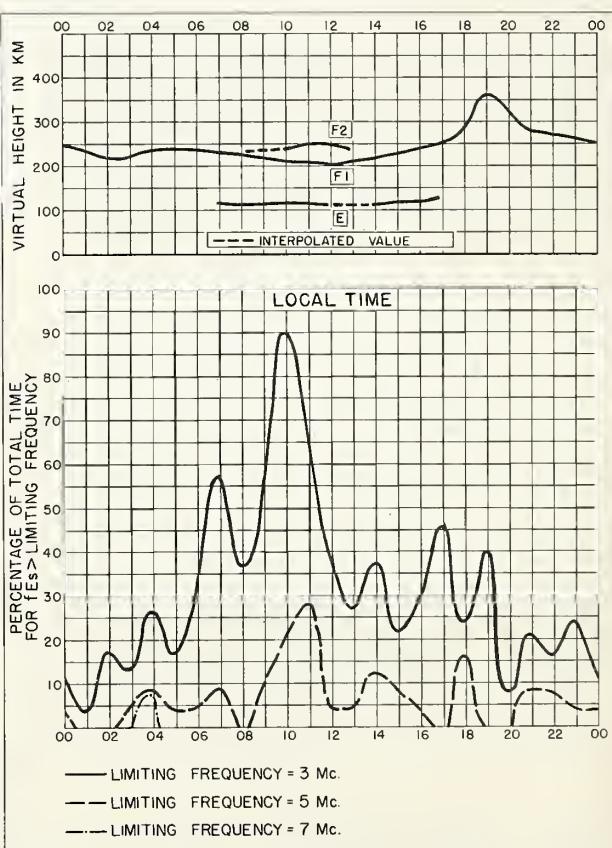
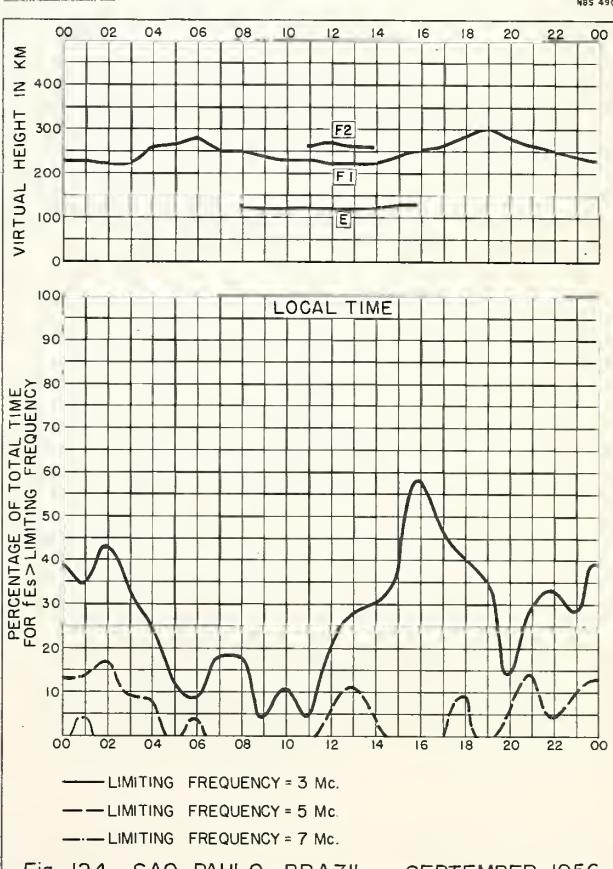
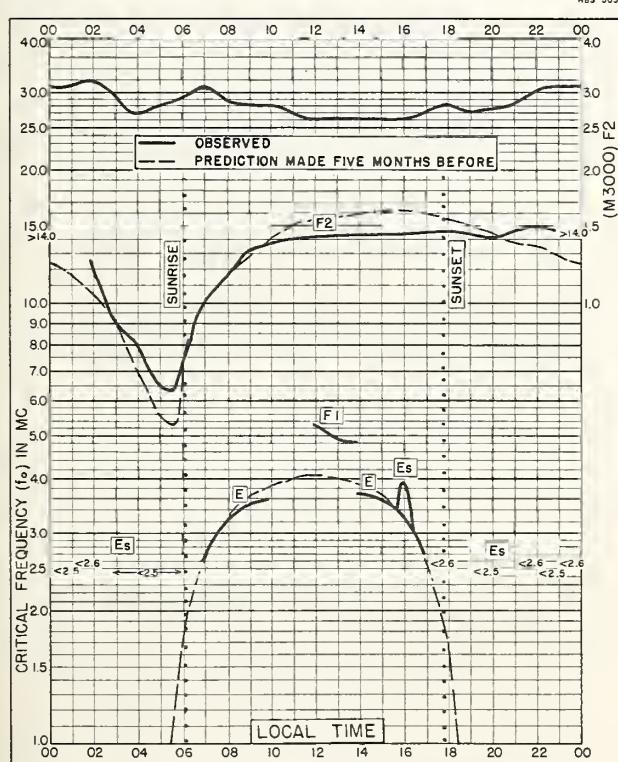
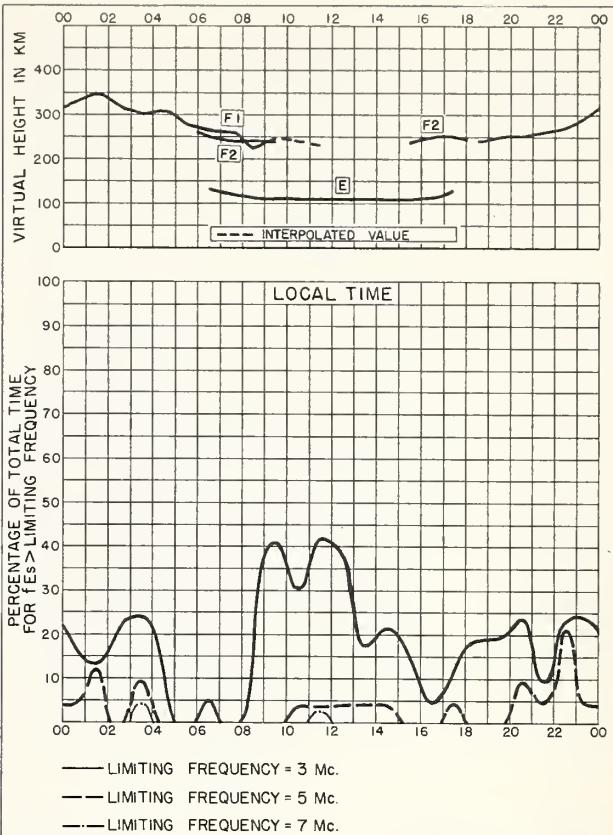
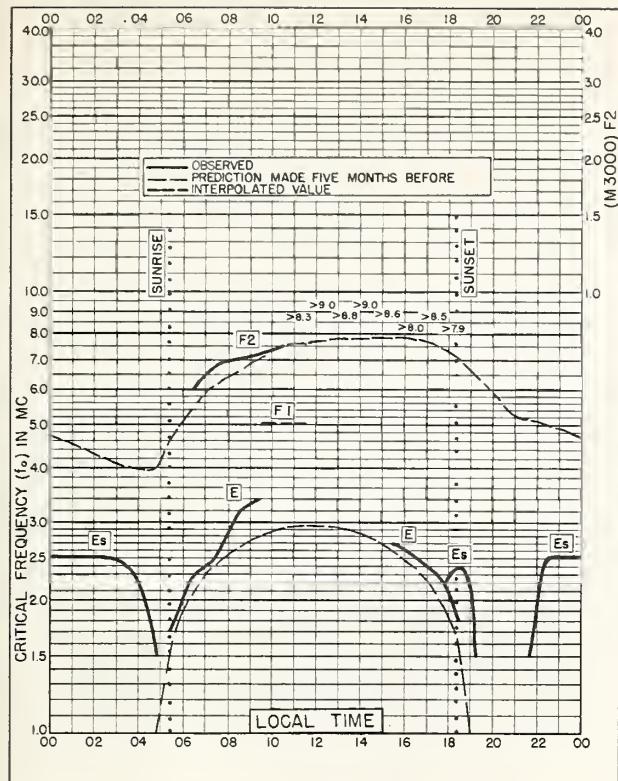
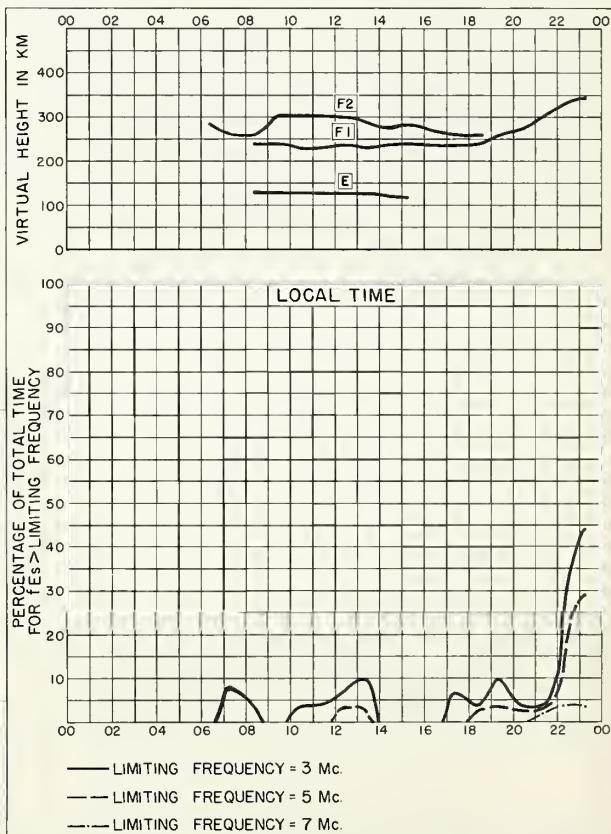
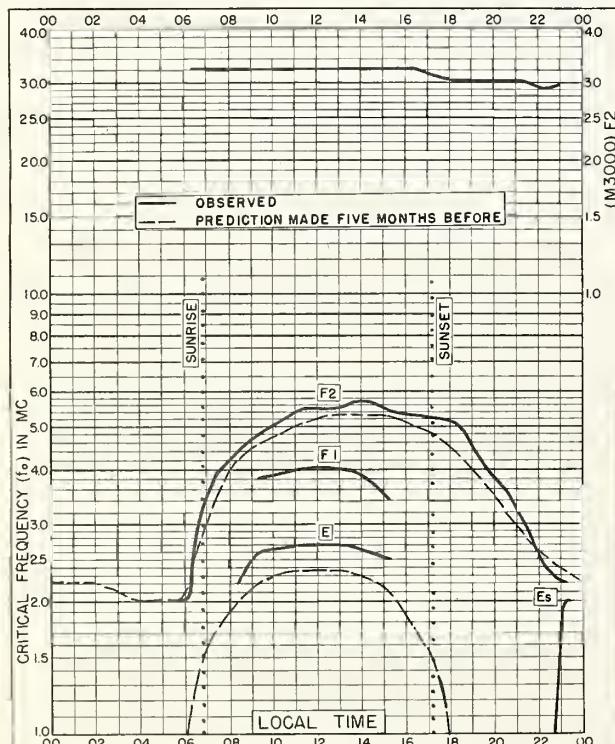
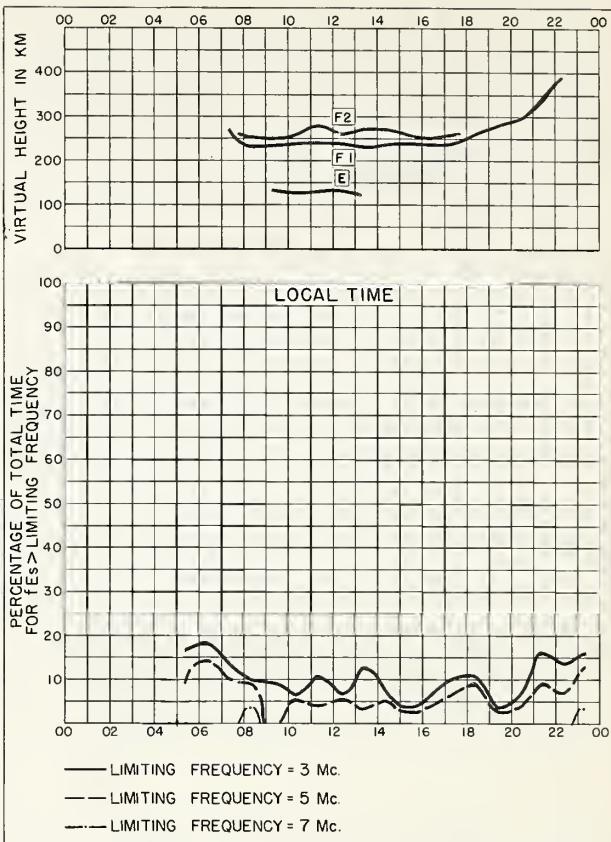
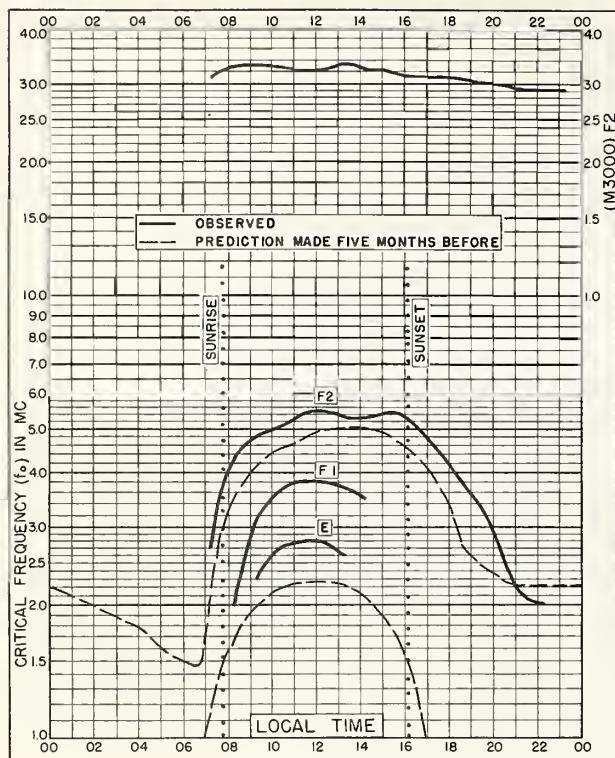


Fig. 120. SAO PAULO, BRAZIL OCTOBER 1956





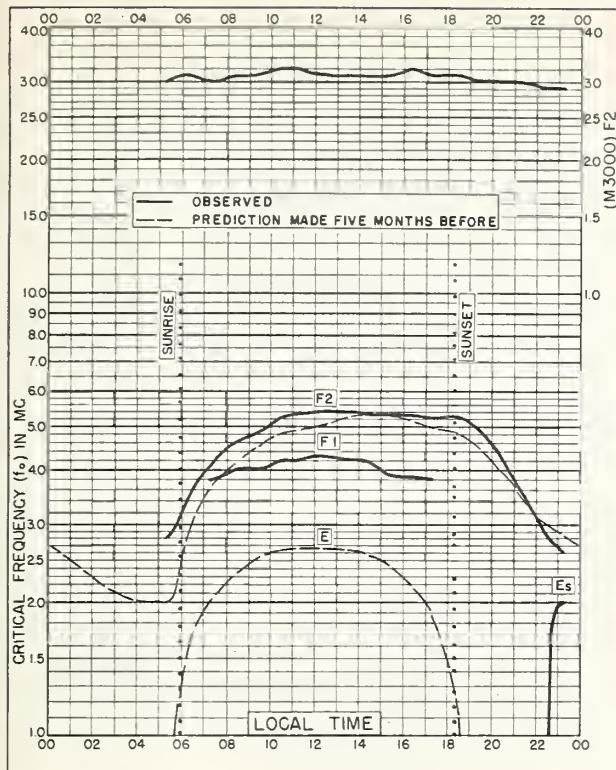


Fig. 129. CAMPBELL I.  
52.5°S, 169.2°E      MARCH 1955

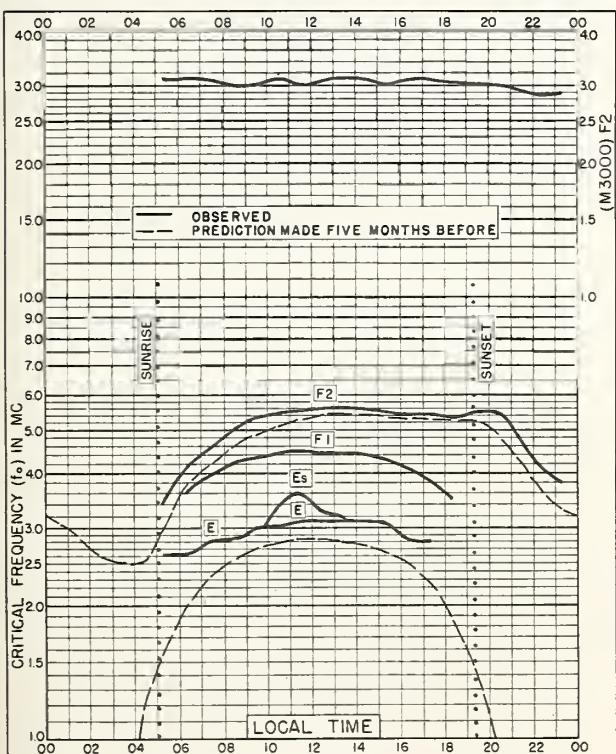
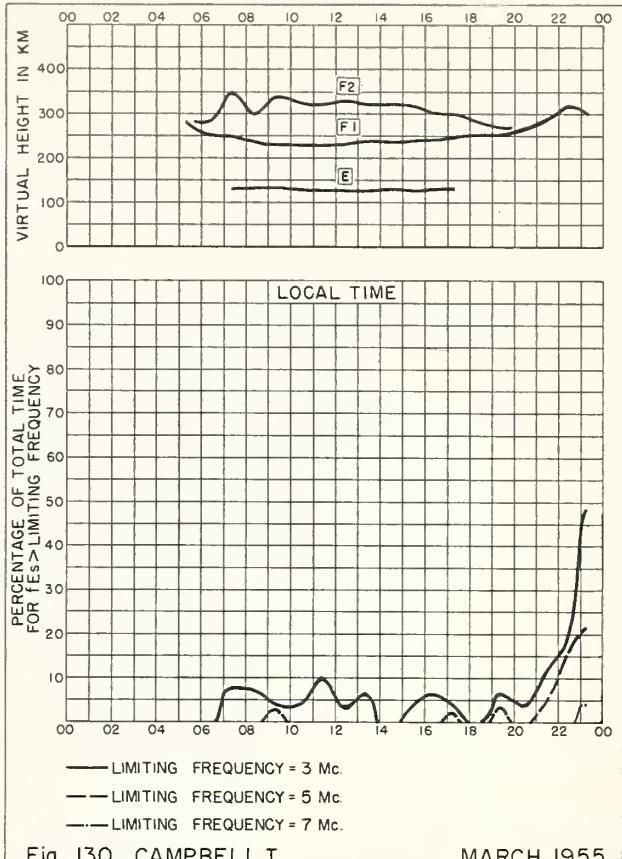
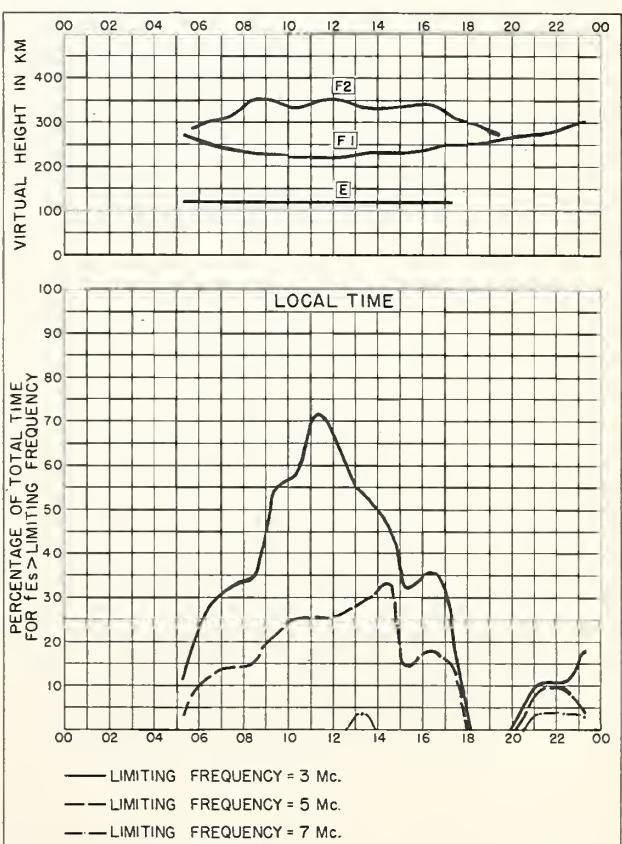


Fig. 131. CAMPBELL I.  
52.5°S, 169.2°E      FEBRUARY 1955



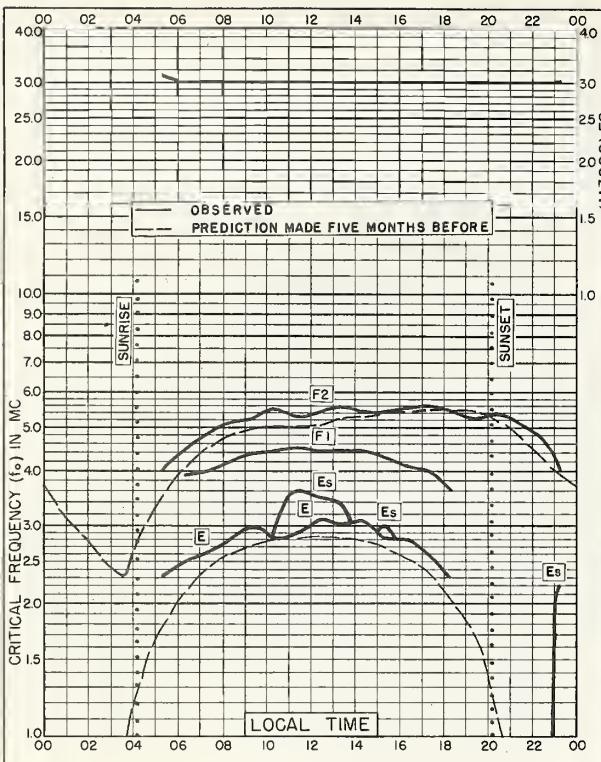


Fig. 133. CAMPBELL I.  
52.5°S, 169.2°E      JANUARY 1955

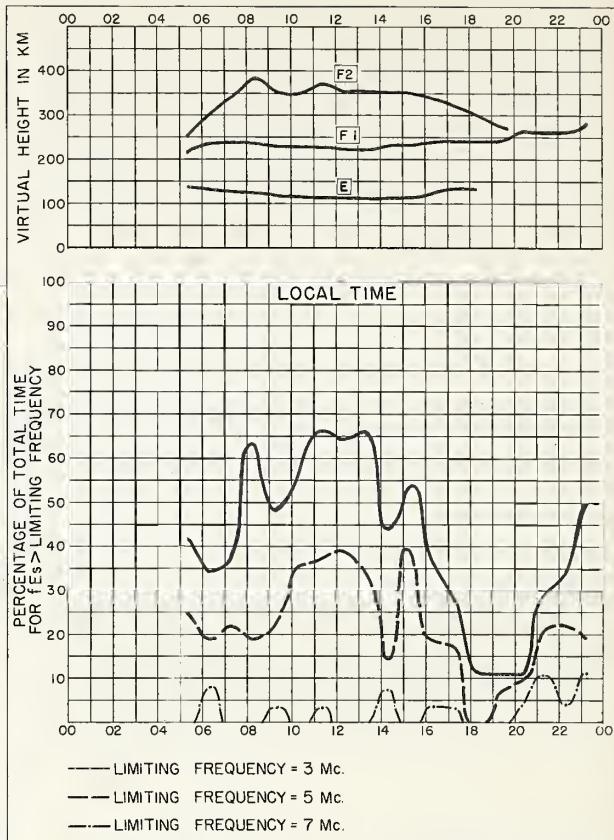


Fig. 134. CAMPBELL I.      JANUARY 1955

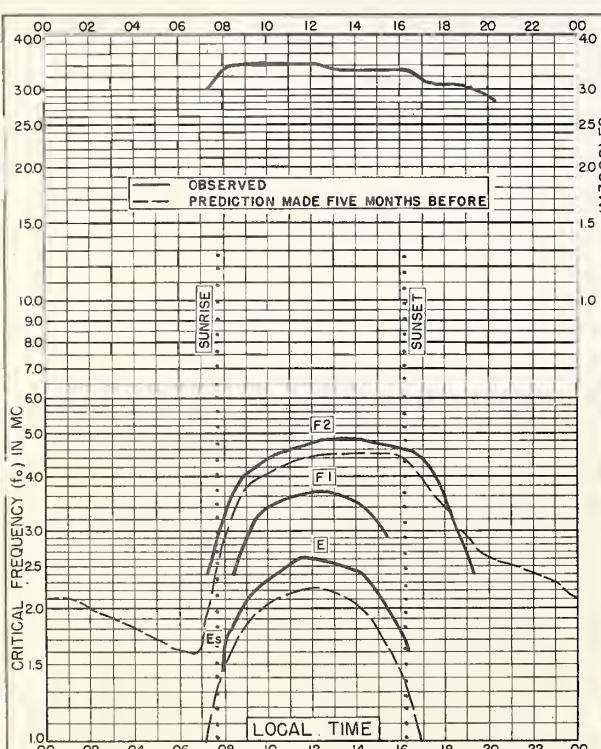


Fig. 135. CAMPBELL I.  
52.5°S, 169.2°E      MAY 1954

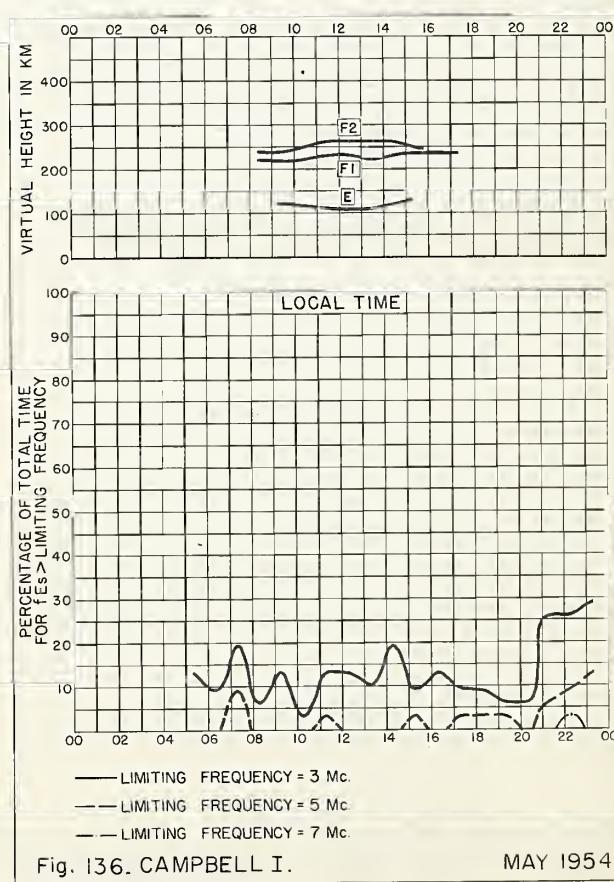


Fig. 136. CAMPBELL I.      MAY 1954

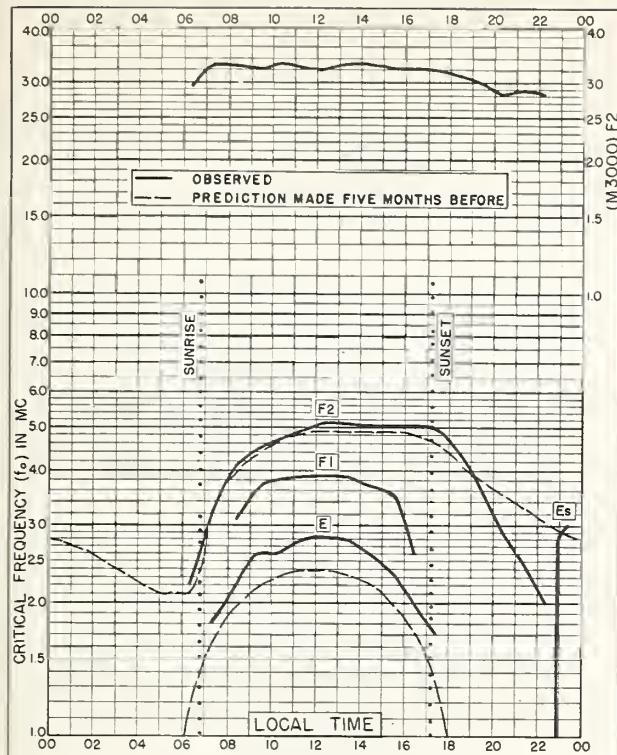


Fig. 137. CAMPBELL I.  
52.5°S, 169.2°E      APRIL 1954

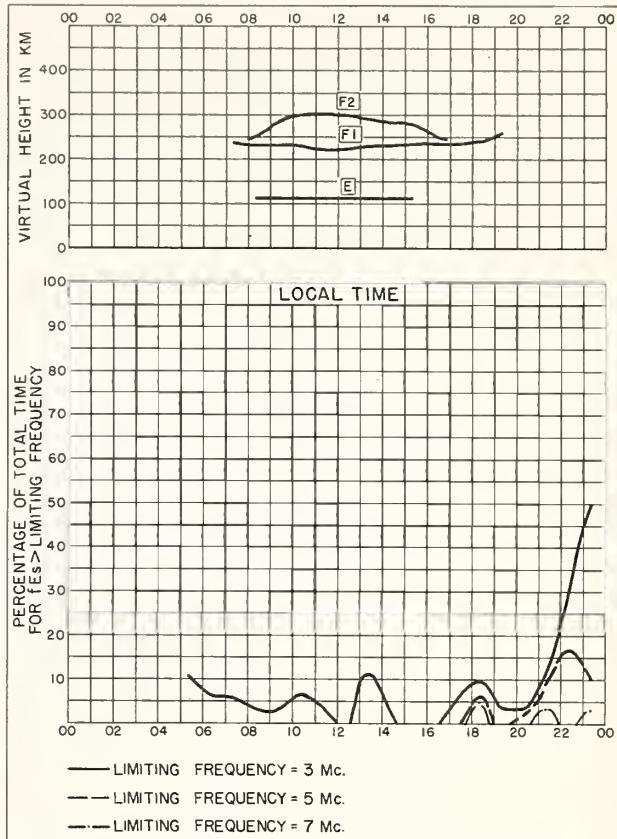


Fig. 138. CAMPBELL I.      APRIL 1954

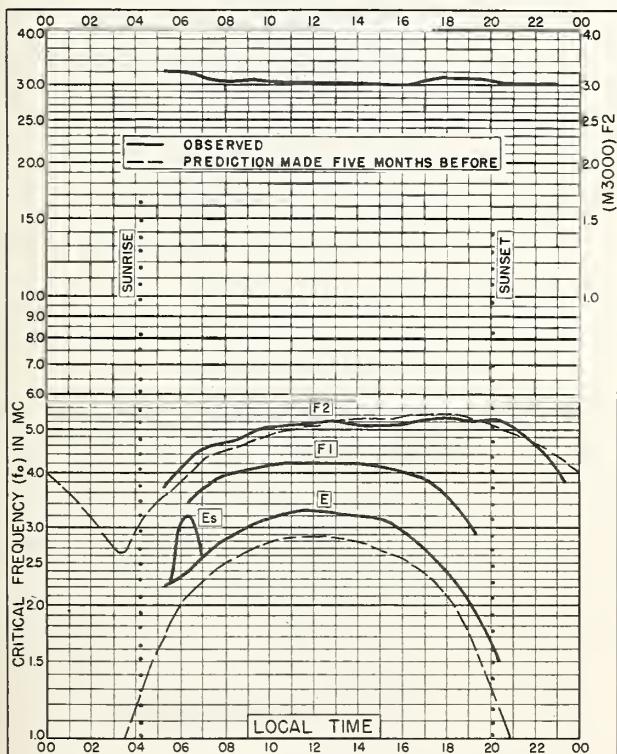


Fig. 139. CAMPBELL I.  
52.5°S, 169.2°E      JANUARY 1954

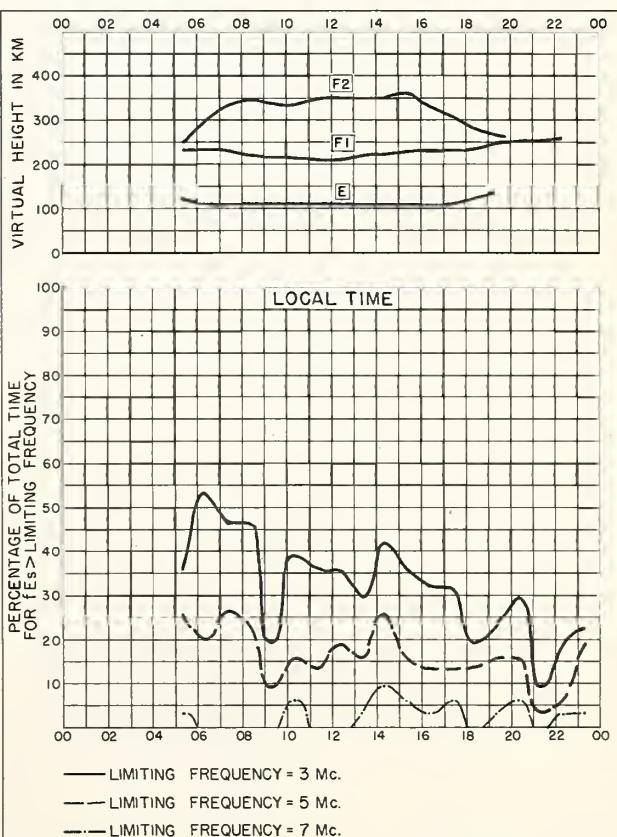


Fig. 140. CAMPBELL I.      JANUARY 1954

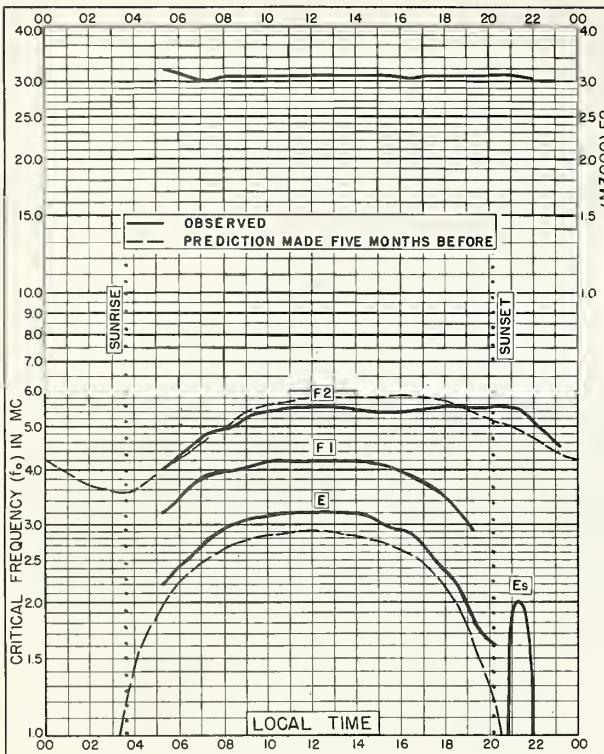


Fig. 141. CAMPBELL I.  
52.5°S, 169.2°E DECEMBER 1953

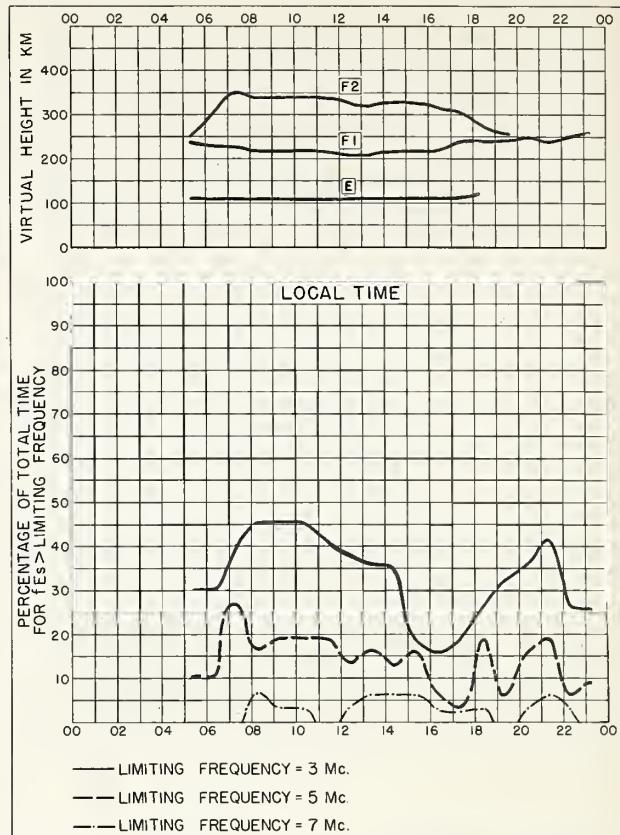


Fig. 142. CAMPBELL I. DECEMBER 1953

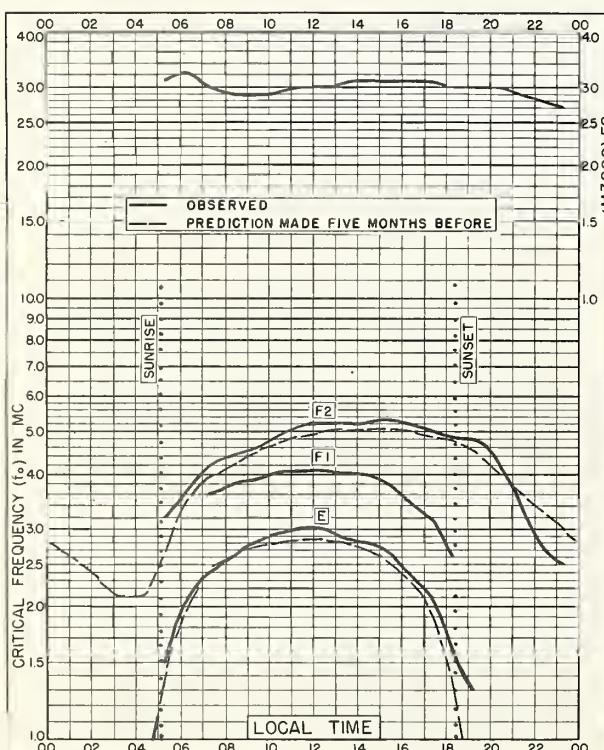


Fig. 143. CAMPBELL I.  
52.5°S, 169.2°E OCTOBER 1953

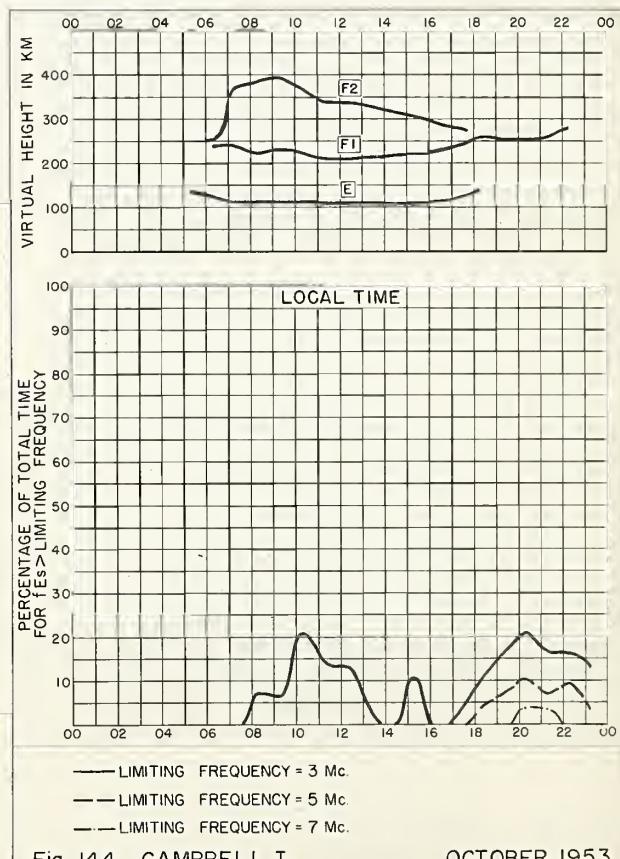


Fig. 144. CAMPBELL I. OCTOBER 1953

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<b>Townsville, Australia</b>		
July 1957. . . . .	23	45
June 1957. . . . .	25	49
<b>Tromso, Norway</b>		
August 1957. . . . .	20	35
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<b>Upsala, Sweden</b>		
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August 1957. . . . .	22	40
<b>White Sands, New Mexico</b>		
August 1957. . . . .	21	39

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## CRPL Reports

[A detailed list of CRPL publications is available from the Central Radio Propagation Laboratory upon request]

*Daily:*

Radio disturbance forecasts, every half hour from broadcast stations WWV and WWVH of the National Bureau of Standards.

Telephoned and telegraphed reports of ionospheric, solar, geomagnetic, and radio propagation data.

*Semiweekly:*

CRPL—J. North Atlantic Radio Propagation Forecast (of days most likely to be disturbed during following month).

CRPL—Jp. North Pacific Radio Propagation Forecast (of days most likely to be disturbed during following month).

*Semimonthly:*

CRPL—Ja. Semimonthly Frequency Revision Factors For CRPL Basic Radio Propagation Prediction Reports.

*Monthly:*

CRPL—D. Basic Radio Propagation Predictions—Three months in advance. (Dept. of the Army, TB 11-499-, monthly supplements to TM 11-499; Dept. of the Air Force, TO 31-3-28 series). On sale by Superintendent of Documents.\* Members of the Armed Forces should address cognizant military office.

CRPL—F. (Part A). Ionospheric Data.

(Part B). Solar-Geophysical Data.

Limited distribution. These publications are in general disseminated only to those individuals or scientific organizations which collaborate in the exchange of ionospheric, solar, geomagnetic or other radio propagation data or in exchange for copies of publications on radio, physics, and geophysics for the CRPL library.

The publications listed above may be obtained without charge from the Central Radio Propagation Laboratory, National Bureau of Standards, Boulder Laboratories, Boulder, Colorado, unless otherwise indicated. Please note that the F series is not generally available.

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*Circulars of the National Bureau of Standards pertaining to Radio Sky Wave Transmission:*

NBS Circular 462. Ionospheric Radio Propagation. \$1.25.

NBS Circular 465. Instructions for the Use of Basic Radio Propagation Predictions. 30 cents.

NBS Circular 557. Worldwide Radio Noise Levels Expected in the Frequency Band 10 Kilocycles to 100 Megacycles. 30 cents.

NBS Circular 582. Worldwide Occurrence of Sporadic E. \$3.25.

These Circulars are on sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Members of the Armed Forces should address the respective military office having cognizance of radio wave propagation.

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\* For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D. C. Price 10 cents (single copy). Subscription Price: \$1.00 a year; 25 cents additional for foreign mailing.

