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AUTHORITY

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Ionospheric Data Report — November 1963

IONOSPHERIC DATA: BANGKOK, THAILAND

Compiled by: VICHAI T. NIMIT

Prepared for:

U.S. ARMY ELECTRONICS LABORATORIES
FORT MONMOUTH, NEW JERSEY

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SUPREME COMMAND HEADQUARTERS
BANGKOK, THAILAND

STANFORD RESEARCH INSTITUTE
MENLO PARK, CALIFORNIA

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STANFORD RESEARCH INSTITUTE
MENLO PARK, CALIFORNIA

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BANGKOK, THAILAND

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CONTENTS

ILLUSTRATIONS

I INTRODUCTION

Ionospheric observations are being carried out at the Laboratory of the Military Research and Development Center at Bangkok, Thailand, a joint United States-Thailand organization. A Model C-2 vertical-incidence sounder supplied and operated by the United States Army Radio Propagation Agency has been installed there. Table I gives pertinent information about the site.

Table I

VERTICAL-INCIDENCE SOUNDER SITE
AT BANGKOK, THAILAND

Geographic		Geomagnetic	
Latitude	Longitude	Latitude	Longitude
13.73°N	100.57°E	2.5°N	169.83°E

Dip angle: 10°N

Distance from dip equator: 450 km

Equipment:

Instrument: Type C2 (automatic)

PRF: 60 pps

Frequency sweep time: 30 sec

Frequency sweep range: 1 to 25 Mc

Pulse duration: 50 μsec

Peak pulse power: approximately 10 kw.

The cooperation and participation of staff members of the Thailand Ministry of Defense and the support of the United States Advanced Research

Projects Agency, the United States Army Electronics Laboratories, and the United States Army Radio Propagation Agency made it possible for the data presented in this report to be accumulated.

II TERMINOLOGY AND SYMBOLS

The terminology and symbols used in this data report are in accordance with the conventions established by the World Wide Soundings Committee.[1]

A. TERMINOLOGY

f_oF_2, f_oF_1, f_oE	The ordinary wave critical frequency for the F_2 and F_1 layers and the E region, respectively.
f_oE_s	The ordinary wave top frequency corresponding to the highest frequency at which a mainly continuous E_s trace is observed.
f_bE_s	The blanketing frequency of an E_s layer, i.e., the lowest ordinary wave frequency at which the E_s layer begins to become transparent. (This is usually determined from the minimum frequency at which reflections from layers at greater heights are observed.)
f_{min}	The frequency below which no echoes are observed.
M(3000)F_2	The maximum usable frequency factor for a path of 3000 km for transmission by the F_2 layer.
h'F_2	The minimum virtual height of the ordinary wave trace for the highest stable stratification in the F region.
h'F	The most significant F-region virtual height parameter, that for the lowest F-region stratification. (Thus h'F is identical with the current h'F_2 when F-region stratification is absent, i.e., at night, and with current h'F_1 when F_1 stratification is present.)

[1] W. R. Piggott and K. Rawer, URSI Handbook of Ionogram Interpretation and Reduction of the World Wide Sounding Committee (Elsevier Publishing Company, Amsterdam, London, New York, 1961).

B. DESCRIPTIVE LETTERS

Certain effects observed on ionograms may make it difficult or impossible to obtain accurate numerical values. The descriptive letters listed below, when used alone indicate, in general, the presence of a phenomenon that may have influenced the measurement. Qualifying letters (Sec. C) indicate the nature of the uncertainty.

- A A lower thin layer present, e.g., E_s
- B Absorption in the vicinity of f_{min}
- C Any non-ionospheric reason
- D The upper limit of the normal frequency range
- E The lower limit of the normal frequency range
- F Spread echoes present
- G Ionization density of the layer too small for measurement
- H Stratification present
- L No sufficiently definite cusp between layers of the trace
- M Ordinary and extraordinary components indistinguishable
- N Conditions such that the measurement cannot be interpreted
- O Measurement referring to the ordinary component
- R Attenuation in the vicinity of a critical frequency
- S Interference or atmospherics
- T Value determined by a sequence of observations, the actual observation being inconsistent or doubtful
- V Forked trace
- W Echo lying outside the height range recorded
- X Measurement referring to the extraordinary component
- Y Intermittent trace
- Z Third magneto-ionic component present.

C. QUALIFYING LETTERS

- D Greater than. . .
- E Less than. . .

I An interpolated value

J Ordinary component characteristic deduced from the extraordinary component

O Extraordinary component characteristic deduced from the ordinary component

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

U Uncertain numerical value

Z Measurement deduced from the third magneto-ionic component.

D. DESCRIPTION OF STANDARD TYPES OF E_s

The eight standard types of E_s are identified by lower-case letters: f, l, c, h, q, r, a, and s. These letters suggest the corresponding names, flat, low, cusp, high, equatorial, retardation, auroral, and slant, respectively, but are not restrictive. The letter n is used to designate an E_s trace that does not correspond to one of the eight types. The classifications are:

f An E_s trace showing no appreciable increase of height with frequency, usually relatively solid at most latitudes. (This classification may be used only at night; it appears that flat E_s traces observed in the daytime are classified according to their virtual height: h or l.)

l A flat E_s trace at or below the normal E-region minimum virtual height in the day or below the E-region minimum virtual height at night.

c An E_s trace showing a relatively symmetrical cusp at or below f_0E. (This is usually continuous with the normal E trace, although when the deviative absorption is large, part or all of the cusp may be missing--usually a daytime type.)

h An E_s trace showing a discontinuity in height with the normal E-region trace at or above f_0E and an asymmetrical cusp. (The low-frequency end of the E_s trace lies clearly above the high-frequency end of the normal E trace--usually a daytime type.)

q An E_s trace that is diffuse and nonblanketing over a wide frequency range, the spread being most pronounced at the upper edge of the trace. (This type is common in daytime in the vicinity of the magnetic equator.)

r An E_s trace that is nonblanketing over part or all of its frequency range, showing an increase in virtual height at the high-frequency

end similar to group retardation. (This is distinguished from the usual group retardation—as in the case of an occulting thick E region—by the lack of group retardation in the F traces at corresponding frequencies and the lack of complete blanketing.)

a An E_s pattern having a well-defined flat or gradually rising lower edge with stratified and diffuse (spread) traces present above it. (These sometimes extend over several hundred kilometers of virtual height.)

s A diffuse E_s trace that rises steadily with frequency, usually emerging from another type of E_s trace. (The rising trace alone is classified as s; the horizontal trace is classified separately. At high latitudes, the slant trace usually starts to rise from a horizontal E_s trace, such as l or f, at frequencies that greatly exceed the E-region critical frequency, e.g., about 6 Mc; whereas at low latitudes it usually rises from equatorial-type E_s, q, c, or h, at frequencies near the regular E critical frequency. Type s is never used to determine $f_o E$ unless echoes clearly identifiable as E_s echoes are seen.)

n An E trace that cannot be classified as one of the standard types. (This must not be used for intermediate cases between any two classes. A choice should always be made wherever possible, even if it is doubtful.)

E. MULTIPLE REFLECTIONS FROM E_s

When the ionogram shows the presence of multiple reflections from E_s the number of traces seen will be recorded with the letter indicating the type.

Characteristic: fmin

IONOSPHER
Sweep: 1 Mc to 25
November

Observed at:
Bangkok, Thailand
Lat. 13.73°N, Long. 100.57°E
105°E Mean Time (GMT + 7 hours)

Hour / Date	00	01	02	03	04	05	06	07	08	09	10	11
1	018*	E016S	E012S	E013S	E015S	E015S	E018S	E027S	E029S	E032S	E025S	03
2	E018S	E014S	E016S	014	E013S	E018S	E016S	E027S	E028S	E027S	036	03
3	E017S	011	014	012	016	E016S	E018S	E027S	E030S	E026S	035	03
4	E016S	E012S	014	011	E012S	E016S	E023S	E018S	E027S	-	-	(
5	019	E019S	022	018	017	S	E019S	E019S	E026S	E024S	E027S	E02
6	E016S	E016S	011	E	E014S	B	E019S	E027S	E026S	E025S	E023S	E02
7	E016S	011	E	011	E013S	E016S	E017S	E025S	E026S	E030S	035	(
8	E016S	011	013	017	B	B	E017S	E017S	E027S	030	022	E02
9	023	020	018	019	017	018	E018S	E023S	E026S	030	035	03
10	030	017	018	015	017	016	E018S	021	026	E028S	035	03
11	018	018	017	018	020	017	E018S	E027S	029	029	035	0
12	-	-	-	-	-	-	-	-	-	-	-	
13	018	E011S	E012S	E	E013S	E016S	E016S	E027S	E028S	E032S	E023S	0
14	E016S	014	012	E	E014S	E015S	E017S	E018S	E018S	E030S	E024S	E0
15	E016S	E014S	E	E014S	E017S	S	E025S	S	E026S	E025S	E024S	E0
16	E016S	E014S	E013S	015	S	S	E024S	E025S	E030S	031	E027S	E0
17	016	E014S	E014S	E020S	E015S	E016S	E019S	E028S	E030S	E032S	E028S	E0
18	016	E014S	E014S	E020S	E015S	E016S	E025S	E027S	E030S	E032S	E027S	0
19	021	015	E	S	S	S	E019S	E019S	E027S	E028S	C	
20	E016S	E	E	E012S	E015S	E016S	E018S	E027S	E028S	E027S	E028S	E0
21	019	015	016	017	019	017	E018S	E027S	E019S	E024S	E025S	E0
22	E015S	E015S	E014S	E	E016S	E016S	E017S	E017S	E019S	E020S	034	E0
23	E016S	016	018	017	018	017	E018S	E027S	E027S	E028S	E025S	E0
24	017	020	019	017	E012S	018	E018S	E018S	E027S	E028S	E027S	E0
25	E015S	014	018	014	E016S	E017S	E020S	E015S	E025S	-	-	
26	C	C	C	C	C	C	C	C	C	C	C	
27	-	-	-	-	-	-	-	-	E027S	E028S	E028S	E0
28	-	-	-	-	-	C	-	-	-	026	E024S	0
29	E016S	E014S	E013S	012	E013S	E016S	019	E025S	E020S	E021S	E027S	E0
30	-	-	-	-	C	-	-	-	-	035	E027S	E0
31												
Median	016	014	014	015	015	016	018	025	027	028	027	0
Count	25	24	21	20	22	19	25	24	26	26	25	
UQ	018	016	018	017	017	017	019	027	028	030	035	0
LQ	016	013	012	012	013	016	018	019	026	026	025	0
QR	2	3	6	5	4	1	1	8	2	4	10	

* Tabulation of 018 = 1.8 Mc.

ONOSPHERIC DATA
c to 25 Mc in 0.5 minute
November 1963

10	11	12	13	14	15	16	17	18	19	20	21	22	23
025S	032	E035S	E035S	036	025	029	E025S	E018S	E021S	E018S	E018S	E018S	E018S
036	036	036	040	043	034	025	E023S	E022S	E019S	E018S	E018S	E018S	E018S
035	036	035	038	031	029	E022S	020	020	E018S	E018S	E018S	E018S	E018S
-	C	-	-	034	029	023	E022S	021	020	019	020	019	020
027S	E028S	E023S	E026S	E027S	E021S	E023S	E022S	E018S	E019S	E017S	E018S	E018S	E018S
023S	E025S	E025S	E028S	E026S	020	E022S	E023S	E018S	E018S	E018S	020	E018S	E018S
035	C	052	039	046	035	E023S	E025S	E018S	E025S	E017S	E018S	E017S	020
022	E027S	040	E024S	037	018	040	034	024	025	022	021	022	035
035	039	035	038	034	045	E047S	035	027	038	025	027	023	022
035	036	052	047	056	055	050	035	024	032	024	E020S	032	022
035	036	036	045	060	047	036	033	028	025	027	021	024	025
-	-	-	-	-	-	-	-	-	-	-	-	-	-
023S	026	E029S	E025S	E026S	036	031	E023S	019	020	E018S	021	E024S	E019S
024S	E027S	041	030	035	034	033	E027S	E023S	E018S	S	E018S	020	E019S
024S	E028S	E028S	040	039	040	030	025	020	S	E017S	E018S	E023S	020
027S	E027S	E024S	E025S	027	028	029	E025S	E022S	E024S	020	014	022	020
028S	E027S	E030S	E030S	E029S	E023S	E028S	E023S	E019S	E018S	E019S	E025S	020	E018S
027S	027	E029S	E030S	E028S	E022S	E018S	E023S	E019S	E019S	E020S	E025S	E026S	019
C	S	029	E031S	E026S	E022S	E019S	025	E017S	E020S	E019S	E017S	E017S	E018S
028S	E029S	E035S	E029S	047	039	030	028	E022S	028	023	019	020	E018S
025S	E028S	E027S	S	E030S	E022S	E018S	E023S	E018S	E018S	E018S	E018S	E018S	E018S
034	E027S	034	E033S	042	038	033	E023S	E018S	020	019	019	018	019
025S	E025S	E028S	035	042	E022S	E021S	E020S	019	E021S	E018S	E018S	E018S	E017S
027S	E029S	038	038	034	023	024	021	E022S	E022S	021	021	E017S	020
-	-	-	-	-	C	-	-	-	-	-	-	-	-
C	C	C	C	C	C	C	C	C	C	C	C	C	C
028S	E027S	E029S	E028S	033	E022S	E018S	E025S	E019S	C	-	-	-	-
024S	032	E027S	030	E023S	E018S	E025S	029	E022S	E024S	E025S	020	E020S	E017S
027S	E027S	E027S	041	030	031	E027S	030	-	-	C	-	-	-
027S	E028S	034	029	023	025	034	026	027	E022S	019	E019S	021	E017S
027	028	032	031	024	027	027	025	020	020	019	019	020	019
25	24	26	25	27	27	27	27	26	24	24	25	25	25
035	032	036	038	042	033	033	028	022	025	022	021	023	020
025	027	028	029	027	022	023	023	018	019	018	018	018	018
10	5	8	9	15	11	10	5	4	6	4	3	5	2

Characteristic: f_0F_2

IONOSPHERI
Sweep: 1 Mc to 25 M
November,

Observed at:
Bangkok, Thailand
Lat. 13.73°N, Long. 100.57°E
105°E Mean Time (GMT + 7 hours)

Hour / Date	00	01	02	03	04	05	06	07	08	09	10	11
1	074*	072	075	055	027	019	037	070	084	D082S	090S	082
2	054	052	041	022	018	D020S	D031S	065	080	099	106	100
3	069	058	057	055	046	029	U036S	062	071	078	082	080
4	064	062	026	019	A	A	047	074	088	-	-	-
5	053	047	055	024	D020R	S	036	065	U075S	076	075	071
6	047	035	029	019	017	B	030	057	D067S	D065S	D070S	D070
7	050	050	035	026	021	017	U035S	065	J073S	065	075	C
8	048	044	038	D025R	B	B	027	056	076	082	085	076
9	07.	057	U062S	U060S	U045S	025	032	035	086	087	087	083
10	091	070	057	050	027	023	039	070	087	111	D100R	D095
11	060	065	062	046	031	023	046	U072S	087	095	D097?	092
12	-	-	-	-	-	-	-	-	-	-	-	-
13	049	058	D057S	031	021	019	D040S	D070S	D090S	101	D090S	D092
14	029	027	025	016	016	D019S	031	065	D087S	D092S	089	083
15	042	030	023	019	019	S	D029S	S	D043S	103	D100R	D085
16	U036S	U036S	032	021	S	S	032	069	080	D090S	085	081
17	065	D066S	044	D045S	031	D030S	D045S	D076S	D090S	090	072	071
18	065	066	044	D042S	031	D025S	D045S	D075S	D090S	090	077	072
19	050	037	024	S	S	S	J026S	D056S	075	082	C	S
20	051	047	041	033	021	018	D035S	063	079	087	080	073
21	060	060	046	024	021	D018R	030	060	075	080	069	D065
22	051	052	046	030	022	017	028	U061S	073	081	085	080
23	044	044	040	035	031	U025S	033	063	J077S	081	D073S	080
24	052	044	J040S	022	017	020	041	064	077	080	080	071
25	045	D037S	U040S	D031S	021	019	048	071	D090S	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-	D071S	D070S	D089S	100
28	-	-	-	-	-	-	-	-	-	076	077	075
29	D045S	041	037	031	024	019	030	064	D078S	082	082	080
30	-	-	-	-	-	-	-	-	-	D085S	D095S	090
31												
Median	051	050	041	031	021	019	035	065	079	082	085	080
Count	25	25	25	24	21	18	25	24	26	26	25	24
UQ	065	061	056	044	031	025	041	070	087	090	090	087
LQ	046	053	035	022	020	019	030	063	075	080	076	073
QR	19	22	21	22	11	6	11	7	12	10	14	14

* Tabulation of 074 = 7.4 Mc.

IONOSPHERIC DATA
Mc to [illegible] in 0.5 minute
November, 1963

10	11	12	13	14	15	16	17	18	19	20	21	22	23
090S	082	082	D090S	103	110	100	D090S	D095S	093	091	090	082	067
106	100	D095S	100	D100R	102	103	D106S	U100S	U100S	090	093	085	081
082	080	085	088	096	D110R	D110R	D110R	D095S	D090S	D090S	U085S	081	066
-	-	-	-	098	100	D104R	J100S	D100R	E095S	D093S	087	084	065
075	071	D061S	078	083	082	087	D090S	086	085	082	076	073	063
D070S	D070S	D067S	E090S	D091S	090	D095S	D088S	D095S	083	080	D067S	D065S	060
075	C	072	077	087	087	D087S	D100S	D092S	U080S	092	D087S	D095S	060
085	076	086	083	087	098	110	103	106	D067S	D019R	085	082	082
087	083	087	085	D080R	D080R	D090S	D100R	D104S	D095S	D090S	D091S	082	085
D100R	D095S	D093S	D096R	D085R	D065R	D080R	085	083	082	081	080	072	070
D097R	092	085	D080R	D075R	D080R	D075R	086	D087R	D077R	077	064	052	050
-	-	-	-	-	-	-	-	-	-	-	-	-	-
D090S	D092S	D090S	093	093	D090S	D092S	D100S	D102S	D093R	D096R	073	052	040
089	083	D080U	085	088	D090S	D089S	D090S	D088S	D087S	S	087	U085S	067
D100R	D085W	083	085	085	D090S	100	D090S	D093S	D	079	072	063	042
085	081	076	082	D087W	D090R	D095R	D090S	D082R	076	U070S	065	U057S	057
072	071	D070S	080	086	D090S	D088S	D090S	D090S	D090S	D087S	085	077	071
077	072	075	080	085	090	D090S	D090S	D091S	D090S	090	085	077	071
C	S	085	D089S	D100S	102	D110S	D106R	D087S	D090S	D080W	U070F	U057F	055
080	073	075	082	087	D090S	D096R	D092S	D092S	086	080	070	D070R	065
069	D065S	D080R	S	081	082	082	082	076	U065F	F	F	U052F	J051S
085	080	080	082	085	D081R	085	085	082	076	068	062	054	A
D073S	080	083	086	D090S	D095S	D092S	D092S	D100R	081	D069S	053	056	J063S
080	071	073	071	070	D075W	085	089	080	080	F	F	U060S	U060S
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
D089S	100	D090S	091	090	087	081	086	D091S	-	-	-	-	-
077	075	D075S	085	D097S	090	D089S	D093S	D090S	085	075	073	070	053
082	080	078	080	082	085	083	D082R	-	-	-	-	-	-
D095S	090	086	082	080	083	080	087	D090S	079	F	U072F	067	U047F
085	080	081	085	087	090	090	090	091	085	082	076	070	063
25	24	26	25	27	27	27	27	26	24	21	23	25	24
090	087	086	089	093	095	100	100	095	090	090	087	082	068
076	073	075	080	083	082	085	087	087	080	078	070	057	054
14	14	11	9	10	13	15	13	8	10	12	17	25	14

Characteristic: M(3000)F2

IONOSPHER

Sweep: 1 Mc to 25

November,

Observed at:
Bangkok, Thailand
Lat. 13.73°N, Long. 100.57°E
105°E Mean Time (GMT + 7 hours)

Hour / Date	00	01	02	03	04	05	06	07	08	09	10	11
1	310*	330	360	380	380	350	330	3.0	340	S	S	28
2	340	340	370	370	350	S	S	330	330	320	295	27
3	355	340	340	355	355	375	U330S	315	280	270	255	27
4	350	355	360	365	A	A	350	350	325	-	-	-
5	340	315	355	360	R	S	330	340	S	260	260	30
6	365	360	355	365	370	B	325	330	S	S	S	S
7	350	380	355	340	350	330	U330S	335	S	295	275	C
8	350	355	370	R	B	B	290	305	270	305	265	30
9	335	345	U330S	U360S	U345S	345	305	315	285	300	295	29
10	355	345	345	360	350	315	380	340	340	325	R	S
11	350	350	375	340	340	350	340	U345S	335	330	R	26
12	-	-	-	-	-	-	-	-	-	-	-	-
13	340	345	S	340	310	330	S	S	S	315	S	S
14	365	340	375	340	325	S	320	320	S	S	265	27
15	360	350	350	360	325	S	S	S	S	335	R	W
16	U340S	U350S	360	385	S	S	315	335	320	S	275	24
17	310	S	325	S	250	S	S	S	S	260	260	25
18	315	335	320	S	250	S	S	S	S	265	265	25
19	350	350	355	S	S	S	S	C	300	255	C	S
20	330	350	345	350	365	340	S	330	295	275	265	27
21	340	370	380	360	305	R	320	330	305	270	285	S
22	340	355	370	390	350	355	320	U355S	340	310	260	26
23	350	365	355	360	330	U310S	330	340	J290S	270	S	26
24	360	350	J365S	345	345	310	325	325	285	280	265	2[illegible]
25	335	S	U325S	S	360	265	355	350	S	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-	S	S	S	33
28	-	-	-	-	-	-	-	-	-	290	295	27
29	S	355	355	365	355	355	345	340	S	305	260	29
30	-	-	-	-	-	-	-	-	-	S	S	30
31												
Median	345	350	355	360	348	340	330	335	305	292	265	27
Count	24	23	24	20	20	13	18	20	15	20	16	1
UQ	352	355	367	365	355	352	340	343	335	312	280	29
LQ	338	340	345	348	325	313	320	328	285	270	260	26
QR	14	15	22	17	30	39	20	15	50	42	20	3

* Tabulation of 310 = 3.1.

IONOSPHERIC DATA
Mc to 25 Mc in 0.5 minute
November, 1963

10	11	12	13	14	15	16	17	18	19	20	21	22	23
S	280	275	S	300	300	315	S	S	275	315	330	350	350
295	270	S	300	R	310	310	S	U310S	U290S	305	300	330	350
255	270	275	275	330	R	R	R	S	S	S	U390S	340	345
-	-	-	-	285	295	R	S	R	S	S	315	350	355
260	305	S	270	270	280	285	S	295	300	305	315	360	365
S	S	S	S	S	285	S	S	S	315	310	S	S	355
275	C	300	300	305	295	S	S	S	U285S	270	S	S	355
265	300	275	255	265	305	325	320	325	S	R	325	335	335
295	295	265	255	R	R	S	R	S	S	S	S	325	330
R	S	S	R	R	R	R	290	315	305	315	320	325	335
R	260	265	R	R	R	R	305	R	R	335	335	325	325
-	-	-	-	-	-	-	-	-	-	-	-	-	-
S	S	S	300	285	S	S	S	S	S	R	325	360	355
265	270	W	275	285	S	S	S	S	S	S	325	U335S	355
R	W	260	265	290	S	290	S	S	S	315	335	340	345
275	245	255	255	W	R	R	S	R	275	U290S	305	U330S	340
260	255	S	255	265	S	S	S	S	S	S	300	325	355
265	250	245	255	265	275	S	S	S	S	285	290	325	355
C	S	265	S	S	300	S	R	S	S	W	U290F	U325F	320
265	270	260	265	300	S	R	S	S	305	300	315	R	345
285	S	R	S	280	270	270	280	295	F	F	F	U340F	J340S
260	265	275	280	280	R	280	290	305	335	335	325	345	A
S	260	260	270	S	S	S	S	R	325	S	300	315	J360S
265	295	270	275	295	W	300	310	315	310	F	F	U335S	U345S
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
S	330	S	280	270	275	295	295	S	-	-	-	-	-
295	270	S	295	S	290	S	S	S	300	310	330	350	365
260	295	285	285	280	285	300	R	-	-	-	-	-	-
S	300	300	285	290	275	290	325	S	300	F	F	355	S
265	270	268	275	285	287	295	300	310	300	310	320	335	350
16	19	16	20	18	14	11	8	7	13	13	19	22	23
280	295	275	285	295	300	310	315	315	312	315	330	350	355
260	260	260	260	270	275	285	290	295	288	295	300	325	340
20	35	15	25	25	25	25	25	20	24	20	30	25	15

Characteristic: $h'F_2$

IONOSPHERI
Sweep: 1 Mc to 25 M
November

Observed at:
Bangkok, Thailand
Lat. 13.73°N, Long. 100.57°E
105°E Mean Time (GMT + 7 hours)

Hour / Date	00	01	02	03	04	05	06	07	08	09	10	11
1	-	-	-	-	-	-	-	-	-	-	285*	26
2	-	-	-	-	-	-	-	-	-	280	-	32
3	-	-	-	-	-	-	-	-	-	305	320	-
4	-	-	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	330	335	35
6	-	-	-	-	-	-	-	-	-	-	340	35
7	-	-	-	-	-	-	-	-	-	-	330	C
8	-	-	-	-	-	-	-	-	-	300	295	30
9	-	-	-	-	-	-	-	-	-	-	300	28
10	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	31
12	-	-	-	-	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-	-	-	325	30
14	-	-	-	-	-	-	-	-	-	300	315	29
15	-	-	-	-	-	-	-	-	-	-	295	32
16	-	-	-	-	-	-	-	-	-	-	320	34
17	-	-	-	-	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-	-	-	330	-	-
20	-	-	-	-	-	-	-	-	-	315	320	33
21	-	-	-	-	-	-	-	-	-	310	350	34
22	-	-	-	-	-	-	-	-	-	-	300	33
23	-	-	-	-	-	-	-	-	-	300	300	33
24	-	-	-	-	-	-	-	-	-	290	325	31
25	-	-	-	-	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-	250	-	-	28
28	-	-	-	-	-	-	-	-	-	300	290	30
29	-	-	-	-	-	-	-	-	-	305	300	32
30	-	-	-	-	-	-	-	-	-	280	285	30
31												
Median	-	-	-	-	-	-	-	-	-	300	315	32
Count	-	-	-	-	-	-	-	-	1	13	19	2
UQ	-	-	-	-	-	-	-	-	-	312	325	33
LQ	-	-	-	-	-	-	-	-	-	295	295	30
QR	-	-	-	-	-	-	-	-	-	17	30	3

* Tabulation of 285 = 285 km.

IONOSPHERIC DATA
1 Mc to 25 Mc in 0.5 minute
November 1963

10	11	12	13	14	15	16	17	18	19	20	21	22	23
285*	265	305	300	-	-	-	-	-	-	-	-	-	-
-	325	300	280	-	-	-	-	-	-	-	-	-	-
320	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
335	350	350	335	290	-	-	-	-	-	-	-	-	-
340	355	345	300	290	-	-	-	-	-	-	-	-	-
330	C	-	321	273	-	-	-	-	-	-	-	-	-
295	300	315	-	275	-	-	-	-	-	-	-	-	-
300	285	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	300	280	-	-	-	-	-	-	-	-	-
-	315	310	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
325	300	300	280	265	-	-	-	-	-	-	-	-	-
315	295	290	305	-	-	-	-	-	-	-	-	-	-
295	325	330	315	-	-	-	-	-	-	-	-	-	-
320	340	360	325	-	-	-	-	-	-	-	-	-	-
-	-	-	-	305	-	-	-	-	-	-	-	-	-
-	-	335	350	305	-	-	-	-	-	-	-	-	-
-	-	315	305	300	-	-	-	-	-	-	-	-	-
320	330	340	315	330	280	-	-	-	-	-	-	-	-
350	340	350	-	300	290	-	-	-	-	-	-	-	-
300	330	310	310	300	-	-	-	-	-	-	-	-	-
300	330	310	-	-	-	-	-	-	-	-	-	-	-
325	315	315	U300L	280	250	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	280	330	320	305	-	-	-	-	-	-	-	-	-
290	300	310	305	290	-	-	-	-	-	-	-	-	-
300	325	310	310	320	285	-	-	-	-	-	-	-	-
285	300	300	300	300	-	-	-	-	-	-	-	-	-
315	320	315	305	300	283	-	-	-	-	-	-	-	-
19	20	21	19	17	4	-	-	-	-	-	-	-	-
325	330	337	320	305	288	-	-	-	-	-	-	-	-
295	300	308	300	280	265	-	-	-	-	-	-	-	-
30	30	29	20	25	23	-	-	-	-	-	-	-	-

1

Characteristic: h'F

IONOSPHERIC
Sweep: 1 Mc to 25 Mc
November 19

Observed at:
Bangkok, Thailand
Lat. 13.73°N, Long. 100.57°E
105°E Mean Time (GMT + 7 hours)

Hour / Date	00	01	02	03	04	05	06	07	08	09	10	11
1	249*	232	220	200	215	E255S	E250S	220	209	205	195	180
2	E200S	219	195	219	E260S	E300S	E250S	E230S	225	211	E215A	E215A
3	220	235	235	229	E219B	223	E255S	E225S	220	E210A	E225A	E275A
4	230	225	205	215	A	A	239	225	E239A	-	-	-
5	227	E250S	227	E240B	E260B	S	E240S	E220S	205	E215A	E219A	E255A
6	215	221	219	230	230	B	E255S	E230S	215	200	185	E200A
7	225	225	205	215	E220S	E330S	E250S	E230S	212	E200S	200	C
8	E235B	225	235	E210B	B	B	E280S	E240A	220	235	205	205
9	240	225	230	220	E215S	E245A	E265S	E240S	E225A	E229A	E235A	225
10	240	200	200	200	210	255	240	240	E250A	E230A	E295A	E235A
11	E215S	229	205	205	225	E250S	245	230	220	225	E300A	E220A
12	-	-	-	-	-	-	-	-	-	-	-	-
13	235	E225S	225	225	E260S	E300S	E250S	225	2 5	215	E200A	E200A
14	230	E240A	215	265	E310S	E370S	E265S	230	225	215	200	200
15	215	230	235	E240S	E300S	S	E300S	S	E220S	215	200	190
16	230	220	215	E200S	S	S	E300S	E235S	225	E225A	210	E200A
17	235	235	E235S	E320S	E365S	E315S	E250S	E240S	225	215	205	200
18	230	230	E235S	E330S	E375S	E320S	E275S	E230S	230	215	210	E200A
19	220	230	E240A	S	S	S	E290S	240	220	220	C	S
20	230	225	205	215	E220S	E315S	260	E230S	211	210	205	E230A
21	230	230	220	E200S	E315S	E350B	E270S	E240S	230	210	200	180
22	230	220	215	200	E240S	E270S	E260S	220	210	E225A	E225A	E250A
23	E230A	220	230	225	250	300	260	230	205	200	190	170
24	210	225	215	250	250	E325S	240	220	210	200	185	185
25	225	240	225	215	E235S	E400S	235	E225S	E215A	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-	210	200	E260A	190
28	-	-	-	-	-	-	-	-	-	200	190	200
29	210	210	210	210	210	E230S	250	E220S	210	200	195	185
30	-	-	-	-	-	-	-	-	-	E215B	200	190
31												
Median	230	225	220	217	240	300	255	230	220	215	205	200
Count	25	25	25	24	21	18	25	24	26	26	25	24
UQ	232	231	232	235	280	325	267	237	225	220	219	222
LQ	218	221	208	208	220	255	248	225	210	200	198	190
QR	14	10	24	27	60	70	19	12	15	20	21	32

* Tabulation of 240 = 249 km.

IONOSPHERIC DATA
Mc to 25 Mc in 0.5 minute
November 1963

10	11	12	13	14	15	16	17	18	19	20	21	22	23
195	*180*	E200S	E200S	195	205	220	229	240	E250S	E210S	219	219	211
E215A	E215A	E240A	E220A	E210B	E185B	E250A	E240S	245	E265S	E240S	225	227	E219S
E225A	E275A	E315A	E290A	E270A	E260A	E240A	235	269	255	211	200	223	223
-	-	-	-	E275A	E300A	E285A	E265A	250	E270A	E280A	230	230	225
E219A	E255A	E215A	E230A	185	E220A	E240A	240	240	240	223	228	225	225
185	E200A	200	180	210	E215A	E240A	E235S	235	239	E250A	E260A	225	E225A
200	C	-	200	215	E215A	215	E240S	265	E295S	255	229	215	225
205	205	200	E200A	195	E230S	E232B	240	250	255	245	E240A	235	240
E235A	225	310	310	E280A	E225B	E230B	250	245	265	255	230	240	250
E295A	E235A	200	E225B	E230B	E330B	E250B	E230S	230	240	230	220	230	225
E300A	E220A	E215A	E275B	E335B	300	E255B	255	255	249	230	230	239	E255B
-	-	-	-	-	-	-	-	-	-	-	-	-	-
E200A	E200A	E200A	E185A	200	E220B	E240B	240	245	E235A	220	E230A	230	E225S
200	200	E200B	185	200	E220B	E250B	240	245	250	S	220	250	220
200	190	200	E220B	-	200	E200A	E235S	240	S	E230S	225	E230S	E225S
210	E200A	E200A	E210A	190	E215A	E220A	E240S	250	E240S	E240S	E270A	240	240
205	200	E210A	E200A	E200A	195	E200S	240	245	260	245	240	230	215
210	E200A	210	E200A	E200A	195	220	245	240	255	250	250	230	220
C	S	E200B	200	195	221	E215A	240	250	240	230	240	230	230
205	E230B	190	E200B	180	165	E230A	240	250	240	240	260	230	225
200	180	210	S	E190A	E170A	E190A	E230S	240	230	230	250	220	230
E225A	E250A	170	E170S	185	E185B	E200B	E220S	230	215	210	225	220	A
190	170	190	175	E200A	E200A	205	215	215	210	E 20A	E280A	265	225
185	185	180	170	200	165	220	235	240	240	250	240	215	220
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
E260A	190	180	E190A	E175B	185	210	E220S	230	-	-	-	-	-
190	200	190	E190A	E190A	180	E215A	240	10	220	225	220	210	210
195	185	190	180	180	165	205	215		-	-	-	-	-
200	190	E200A	E250A	170	E250A	215	230	215	260	240	220	205	220
205	200	200	200	200	215	220	240	243	245	235	230	230	225
25	24	25	25	26	27	27	27	26	24	24	25	25	24
219	222	210	222	210	225	240	240	250	257	247	240	232	227
198	190	190	185	190	185	210	230	240	240	223	220	220	220
21	32	20	37	20	40	30	10	10	17	24	20	12	7

2

Characteristic: foF1

IONOSPHERIC
Sweep: 1 Mc to 25 Mc
November 19

Observed at:
Bangkok, Thailand
Lat. 13.73°N, Long. 100.57°E
105°E Mean Time (GMT + 7 hours)

Hour / Date	00	01	02	03	04	05	06	07	08	09	10	11
1	-	-	-	-	-	-	-	-	L	L	050*	L
2	-	-	-	-	-	-	-	-	L	U046L	L	047
3	-	-	-	-	-	-	-	-	L	046	046	L
4	-	-	-	-	-	-	-	L	L	-	-	-
5	-	-	-	-	-	-	-	L	L	045	045	047
6	-	-	-	-	-	-	-	L	L	L	046	047
7	-	-	-	-	-	-	-	-	L	L	045	G
8	-	-	-	-	-	-	-	-	L	U046L	045	046
9	-	-	-	-	-	-	-	-	L	L	047	047
10	-	-	-	-	-	-	-	-	L	L	A	050
11	-	-	-	-	-	-	-	S	L	L	L	047
12	-	-	-	-	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-	L	L	041	046
14	-	-	-	-	-	-	-	L	L	042	046	044
15	-	-	-	-	-	-	-	-	-	L	U045L	047
16	-	-	-	-	-	-	-	-	L	L	047	047
17	-	-	-	-	-	-	-	-	L	L	L	L
18	-	-	-	-	-	-	-	-	L	L	L	L
19	-	-	-	-	-	-	-	L	L	048	C	S
20	-	-	-	-	-	-	-	-	L	043	045	U046
21	-	-	-	-	-	-	-	-	L	044H	045	045
22	-	-	-	-	-	-	-	L	L	L	U045L	U046
23	-	-	-	-	-	-	-	-	L	045	U045L	046
24	-	-	-	-	-	-	-	L	L	045	045	045
25	-	-	-	-	-	-	-	L	L	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-	041	L	L	046
28	-	-	-	-	-	-	-	-	-	043	043	046
29	-	-	-	-	-	-	-	-	L	045	045	045
30	-	-	-	-	-	-	-	-	-	042	045	045
31												
Median	-	-	-	-	-	-	-	-	-	045	045	046
Count	-	-	-	-	-	-	-	-	1	13	19	20
UQ	-	-	-	-	-	-	-	-	-	046	046	047
LQ	-	-	-	-	-	-	-	-	-	043	045	046
QR	-	-	-	-	-	-	-	-	-	3	1	1

* Tabulation of 050 = 5.0 Mc.

IONOSPHERIC DATA
e to 25 Mc in 0.5 minute
November 1963

10	11	13	14	15	16	17	18	19	20	21	22	23
050*	L	U035S	L	L	L	L	-	-	-	-	-	-
L	047	046	L	L	L	L	-	-	-	-	-	-
046	L	A	L	L	L	-	-	-	-	-	-	-
-	-	-	L	A	A	-	-	-	-	-	-	-
045	047	045	043	L	L	-	-	-	-	-	-	-
046	047	044	U045L	L	L	-	-	-	-	-	-	-
045	G	047	045	L	L	-	-	-	-	-	-	-
045	046	L	U042L	L	L	-	-	-	-	-	-	-
047	047	-	A	L	B	B	-	-	-	-	-	-
A	050	045	045	B	B	L	-	-	-	-	-	-
L	047	L	L	L	L	L	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
047	046	045	043	L	L	-	-	-	-	-	-	-
046	044	046	L	L	L	-	-	-	-	-	-	-
U045L	047	046	044	L	L	L	-	-	-	-	-	-
047	047	045	L	L	L	L	-	-	-	-	-	-
L	L	L	U046L	L	L	-	-	-	-	-	-	-
L	L	U048L	046	L	L	-	-	-	-	-	-	-
C	S	045	046	L	L	-	-	-	-	-	-	-
045	U048L	047	047	045	L	-	-	-	-	-	-	-
045	045	S	046	U044L	L	-	-	-	-	-	-	-
U045L	U046S	045	047	L	L	L	-	-	-	-	-	-
U045L	046	L	L	L	L	-	-	-	-	-	-	-
045	045	U043L	043	036	L	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
L	046	043	044	L	L	L	-	-	-	-	-	-
043	046	046	042	L	-	-	-	-	-	-	-	-
045	045	045	046	U043L	L	-	-	-	-	-	-	-
045	045	044	045	L	-	-	-	-	-	-	-	-
045	046	045	045	044	-	-	-	-	-	-	-	-
19	20	19	18	4	-	-	-	-	-	-	-	-
046	047	046	046	045	-	-	-	-	-	-	-	-
045	046	044	043	042	-	-	-	-	-	-	-	-
1	1	2	3	3	-	-	-	-	-	-	-	-

2

Characteristic: M(3000)F1

IONOSPHERI
Sweep: 1 Mc to 25 M
November

Observed at:
Bangkok, Thailand
Lat. 13.73°N, Long. 100.57°E
105°E Mean Time (GMT + 7 hours)

Hour / Date	00	01	02	03	04	05	06	07	08	09	10	11
1	-	-	-	-	-	-	-	-	L	L	360*	L
2	-	-	-	-	-	-	-	-	L	L	L	39
3	-	-	-	-	-	-	-	-	L	380	400	L
4	-	-	-	-	-	-	-	L	L	-	-	-
5	-	-	-	-	-	-	-	L	L	375	390	4
6	-	-	-	-	-	-	-	L	L	L	390	39
7	-	-	-	-	-	-	-	-	L	L	390	C
8	-	-	-	-	-	-	-	-	L	U390L	380	38
9	-	-	-	-	-	-	-	-	L	L	380	38
10	-	-	-	-	-	-	-	-	L	L	A	36
11	-	-	-	-	-	-	-	S	L	L	L	37
12	-	-	-	-	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-	L	L	380	39
14	-	-	-	-	-	-	-	L	L	380	380	40
15	-	-	-	-	-	-	-	-	-	L	U400L	40
16	-	-	-	-	-	-	-	-	L	L	370	3
17	-	-	-	-	-	-	-	-	L	L	L	L
18	-	-	-	-	-	-	-	-	L	L	L	L
19	-	-	-	-	-	-	-	L	L	355	C	3
20	-	-	-	-	-	-	-	-	L	375	370	U3
21	-	-	-	-	-	-	-	-	L	365H	405	3
22	-	-	-	-	-	-	-	L	L	L	U390L	U3
23	-	-	-	-	-	-	-	-	L	380	U400L	3
24	-	-	-	-	-	-	-	L	L	380	410	4
25	-	-	-	-	-	-	-	L	L	-	-	
26	-	-	-	-	-	-	-	-	-	-	-	
27	-	-	-	-	-	-	-	-	400	L	L	4
28	-	-	-	-	-	-	-	-	-	380	405	4
29	-	-	-	-	-	-	-	-	L	385	395	4
30	-	-	-	-	-	-	-	-	-	395	395	4
31												
Median	-	-	-	-	-	-	-	-	-	380	390	3
Count	-	-	-	-	-	-	-	-	1	12	19	
UQ	-	-	-	-	-	-	-	-	-	380	400	4
LQ	-	-	-	-	-	-	-		-	375	380	3
QR	-	-	-	-	-	-	-	-	-	5	20	

* Tabulation of 360 = factor of 3.6.

NOSPHERIC DATA
to 25 Mc in 0.5 minute
November 1963

10	11	12	13	14	15	16	17	18	19	20	21	22	23
360*	L	380	U390S	L	L	L	L	-	-	-	-	-	-
L	390	A	400	L	L	L	L	-	-	-	-	-	-
400	L	A	A	L	L	L	-	-	-	-	-	-	-
-	-	-	-	L	A	A	-	-	-	-	-	-	-
390	440	400	400	405	L	L	-	-	-	-	-	-	-
390	390	400	420	U390L	L	L	-	-	-	-	-	-	-
390	C	395	380	390	L	L	-	-	-	-	-	-	-
380	380	380	L	U400L	L	L	-	-	-	-	-	-	-
380	380	A	-	A	L	B	B	-	-	-	-	-	-
A	360	B	380	390	B	B	L	-	-	-	-	-	-
L	375	410	L	L	L	L	L	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
380	39[illegible]	390	395	395	L	L	-	-	-	-	-	-	-
380	405	410	375	L	L	L	-	-	-	-	-	-	-
400L	400	U390L	380	385	L	L	L	-	-	-	-	-	-
370	370	385	390	L	L	L	L	-	-	-	-	-	-
L	L	L	L	U380L	L	L	-	-	-	-	-	-	-
L	L	U365S	U360L	370	L	L	-	-	-	-	-	-	-
C	S	380	405	375	L	L	-	-	-	-	-	-	-
370	U360L	380	380	365	380	L	-	-	-	-	-	-	-
405	390	405	S	390	U370L	L	-	-	-	-	-	-	-
390L	U365S	U400L	390	380	L	L	L	-	-	-	-	-	-
400L	380	420	L	L	L	L	-	-	-	-	-	-	-
410	410	430	U420L	395	430	L	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
L	400	U400S	425	400	L	L	L	-	-	-	-	-	-
405	410	400	400	425	L	-	-	-	-	-	-	-	-
395	400	405	410	380	L	L	-	-	-	-	-	-	-
395	410	405	400	390	L	-	-	-	-	-	-	-	-
390	390	400	395	390	-	-	-	-	-	-	-	-	-
19	20	21	19	18	3	-	-	-	-	-	-	-	-
400	403	405	405	395	-	-	-	-	-	-	-	-	-
380	378	380	380	380	-	-	-	-	-	-	-	-	-
20	25	25	25	15	-	-	-	-	-	-	-	-	-

2

Characteristic: f_oE

IONOSPHERI
Sweep: 1 Mc to 25 M
November

Observed at:
Bangkok, Thailand
Lat. 13.73°N, Long. 100.57°E
105°E Mean Time (GMT + 7 hours)

Hour / Date	00	01	02	03	04	05	06	07	08	09	10	11
1	-	-	-	-	-	-	-	-	S	S	D320R	S
2	-	-	-	-	-	-	-	-	S	U310R	B	B
3	-	-	-	-	-	-	-	-	S	A	B	B
4	-	-	-	-	-	-	-	D280A	D280A	-	-	-
5	-	-	-	-	-	-	-	S	A	D290A	D310A	A
6	-	-	-	-	-	-	-	S	280*	D300R	A	A
7	-	-	-	-	-	-	-	-	S	S	B	C
8	-	-	-	-	-	-	-	-	S	A	A	A
9	-	-	-	-	-	-	-	-	A	A	A	A
10	-	-	-	-	-	-	-	-	A	A	A	A
11	-	-	-	-	-	-	-	S	A	A	A	A
12	-	-	-	-	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-	300	D290S	D300A	A
14	-	-	-	-	-	-	-	D210S	A	300	D290R	A
15	-	-	-	-	-	-	-	-	-	D280R	D290R	D31
16	-	-	-	-	-	-	-	-	S	A	A	A
17	-	-	-	-	-	-	-	-	S	S	D310R	A
18	-	-	-	-	-	-	-	-	S	S	R	A
19	-	-	-	-	-	-	-	S	S	A	C	S
20	-	-	-	-	-	-	-	-	S	295	345	A
21	-	-	-	-	-	-	-	-	S	295	310	33
22	-	-	-	-	-	-	-	S	A	D260A	A	A
23	-	-	-	-	-	-	-	-	S	D290R	315	34
24	-	-	-	-	-	-	-	D210S	285	300	A	A
25	-	-	-	-	-	-	-	S	D280A	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-	A	A	A	A
28	-	-	-	-	-	-	-	-	-	A	320	B
29	-	-	-	-	-	-	-	-	S	D290R	D320R	U32
30	-	-	-	-	-	-	-	-	-	B	D300S	D29
31												
Median	-	-	-	-	-	-	-	-	280	292	310	32
Count	-	-	-	-	-	-	-	3	5	12	12	5
UQ	-	-	-	-	-	-	-	-	292	300	320	33
LQ	-	-	-	-	-	-	-	-	280	290	300	30
QR	-	-	-	-	-	-	-	-	12	10	20	3

* Tabulation of 280 = 2.8 Mc.

IONOSPHERIC DATA
Mc to 25 Mc in 0.5 minute
November 1963

10	11	12	13	14	15	16	17	18	19	20	21	22	23
D320R	S	S	S	B	D280R	B	S	-	-	-	-	-	-
B	B	B	B	B	B	A	S	-	-	-	-	-	-
B	B	B	B	B	B	B	-	-	-	-	-	-	-
-	-	-	-	B	A	A	A	-	-	-	-	-	-
D310A	A	A	A	A	A	D250A	-	-	-	-	-	-	-
A	A	A	A	A	U300R	A	-	-	-	-	-	-	-
B	C	B	B	B	R	D240A	-	-	-	-	-	-	-
A	A	B	A	B	A	B	-	-	-	-	-	-	-
A	A	A	-	A	B	B	B	-	-	-	-	-	-
A	A	B	B	B	B	B	B	-	-	-	-	-	-
A	A	A	B	B	B	B	B	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
D300A	A	A	D270A	D300R	B	B	-	-	-	-	-	-	-
D290R	A	B	B	B	B	B	-	-	-	-	-	-	-
D280R	D310A	D300A	B	B	B	B	-	-	-	-	-	-	-
A	A	A	A	A	A	B	S	-	-	-	-	-	-
D310R	A	A	A	D310A	U280R	S	-	-	-	-	-	-	-
R	A	A	A	A	R	280	-	-	-	-	-	-	-
C	S	R	S	A	A	A	-	-	-	-	-	-	-
345	A	S	B	B	300	B	-	-	-	-	-	-	-
310	330	A	S	A	D300A	A	-	-	-	-	-	-	-
A	A	B	S	B	B	B	S	-	-	-	-	-	-
315	340	330	B	B	A	R	-	-	-	-	-	-	-
A	A	R	R	350	270	A	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
A	A	A	A	B	R	275	-	-	-	-	-	-	-
320	B	A	A	A	A	A	-	-	-	-	-	-	-
D320R	U325S	D305R	B	B	300	-	-	-	-	-	-	-	-
D300S	D290R	A	D310A	D290A	B	B	-	-	-	-	-	-	-
310	325	305	290	305	300	263	-	-	-	-	-	-	-
12	5	3	2	4	7	4	-	-	-	-	-	-	-
320	335	318	310	330	300	275	-	-	-	-	-	-	-
300	300	303	270	295	280	245	-	-	-	-	-	-	-
20	35	15	40	35	20	30	-	-	-	-	-	-	-

2

Characteristic: h'E

IONOSPHERIC

Sweep: 1 Mc to 25 Mc

November 19

Observed at:
Bangkok, Thailand
Lat. 13.73°N, Long. 100.57°E
105°E Mean Time (GMT + 7 hours)

Hour / Date	00	01	02	03	04	05	06	07	08	09	10	11
1	-	-	-	-	-	-	-	-	S	S	111*	S
2	-	-	-	-	-	-	-	-	S	E120S	B	B
3	-	-	-	-	-	-	-	-	S	A	B	B
4	-	-	-	-	-	-	-	120	135	-	-	-
5	-	-	-	-	-	-	-	115	125	111	125	A
6	-	-	-	-	-	-	-	115	115	105	103	A
7	-	-	-	-	-	-	-	-	S	S	B	C
8	-	-	-	-	-	-	-	-	S	B	A	A
9	-	-	-	-	-	-	-	-	S	B	B	B
10	-	-	-	-	-	-	-	-	S	120	B	B
11	-	-	-	-	-	-	-	S	S	S	B	B
12	-	-	-	-	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-	S	110	100	A
14	-	-	-	-	-	-	-	120	A	110	105	110
15	-	-	-	-	-	-	-	-	-	115	111	111
16	-	-	-	-	-	-	-	-	S	S	125	A
17	-	-	-	-	-	-	-	-	S	S	115	115
18	-	-	-	-	-	-	-	-	S	S	115	115
19	-	-	-	-	-	-	-	120	S	120	C	S
20	-	-	-	-	-	-	-	-	S	E120S	115	120
21	-	-	-	-	-	-	-	-	115	115	105	100
22	-	-	-	-	-	-	-	E125S	105	100	B	110
23	-	-	-	-	-	-	-	-	S	110	105	105
24	-	-	-	-	-	-	-	-	E200S	110	A	105
25	-	-	-	-	-	-	-		110	-	-	-
26	-	-	-	-	-	-	-		-	-	-	-
27	-	-	-	-	-	-	-	-	S	S	S	100
28	-	-	-	-	-	-	-	-	-	110	105	B
29	-	-	-	-	-	-	-	-	110	105	110	110
30	-	-	-	-	-	-	-	-	-	B	100	-
31												
Median	-	-	-	-	-	-	-	118	115	110	110	110
Count	-	-	-	-	-	-	-	8	8	15	15	11
UQ	-	-	-	-	-	-	-	120	130	120	115	115
LQ	-	-	-	-	-	-	-	113	110	110	105	105
QR	-	-	-	-	-	-	-	7	20	10	10	10

* Tabulation of 111 = 111 km.

IONOSPHERIC DATA

Mc to 25 Mc in 0.5 minute

November, 1963

10	11	12	13	14	15	16	17	18	19	20	21	22	23
111*	S	S	S	B	109	B	S	-	-	-	-	-	-
B	B	B	B	B	B	A	S	-	-	-	-	-	-
B	B	B	B	B	B	B	-	-	-	-	-	-	-
-	-	-	-	B	A	A	A	-	-	-	-	-	-
125	A	A	A	A	A	115	-	-	-	-	-	-	-
103	A	A	109	110	110	117	-	-	-	-	-	-	-
B	C	B	B	B	115	120	-	-	-	-	-	-	-
A	A	B	A	B	A	B	-	-	-	-	-	-	-
B	B	B	-	B	B	B	B	-	-	-	-	-	-
B	B	B	B	B	B	B	B	-	-	-	-	-	-
B	B	B	B	B	B	B	B	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
100	A	A	100	110	B	B	-	-	-	-	-	-	-
105	110	B	115	B	B	B	-	-	-	-	-	-	-
111	111	110	B	B	B	B	-	-	-	-	-	-	-
125	A	A	A	A	A	B	S	-	-	-	-	-	-
115	115	A	115	125	E111S	S	-	-	-	-	-	-	-
115	115	S	115	125	115	109	-	-	-	-	-	-	-
C	S	115	115	117	115	A	-	-	-	-	-	-	-
115	120	S	A	B	115	B	-	-	-	-	-	-	-
105	100	110	S	105	108	110	-	-	-	-	-	-	-
B	110	B	S	B	B	B	S	-	-	-	-	-	-
105	105	105	B	B	A	110	-	-	-	-	-	-	-
A	105	100	100	E170B	110	S	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
S	100	110	A	B	111	115	-	-	-	-	-	-	-
105	B	100	105	A	A	A	-	-	-	-	-	-	-
110	110	100	B	B	115	-	-	-	-	-	-	-	-
100	-	B	120	115	B	B	-	-	-	-	-	-	-
110	110	102	115	116	111	115	-	-	-	-	-	-	-
15	11	8	9	8	11	7	-	-	-	-	-	-	-
115	115	110	115	125	115	117	-	-	-	-	-	-	-
105	105	100	103	110	110	110	-	-	-	-	-	-	-
10	10	10	12	15	5	7	-	-	-	-	-	-	-

Characteristic: f_{bEs}

IONOSPHERIC
Sweep: 1 Mc to 25 Mc
November, 1

Observed at:
Bangkok, Thailand
Lat. 13.73°N, Long. 100.57°E
105°E Mean Time (GMT + 7 hours)

Hour / Date	00	01	02	03	04	05	06	07	08	09	10	11
1	B	S	S	S	S	S	S	S	S	S	G	S
2	-	S	S	B	S	S	S	S	S	S	039	041
3	-	B	B	B	B	S	S	S	S	037	042	045
4	S	S	B	B	-	M	-	029	036	-	-	-
5	B	S	B	B	B	S	S	S	-	031	035	04
6	S	S	B	014	S	B	-	-	G	G	035	03
7	018	B	G	B	S	S	S	S	028M	S	B	G
8	-	-	-	B	B	B	M	022	028M	034	-	03
9	B	B	B	B	B	021	S	S	033M	037	040M	04
10	B	B	B	B	B	-	S	026	-	039M	055	05
11	B	B	B	B	B	B	S	S	032	035	054	04
12	-	-	-	-	-	-	-	-	-	-	-	-
13	B	S	S	B	S	S	S	S	S	S	034	03
14	-	017M	B	-	S	S	019	S	028M	S	G	03
15	S	S	011	S	S	S	S	S	S	033	G	04
16	S	S	M	S	S	S	S	S	S	034	G 6	03
17	B	S	S	-	-	-	S	S	031	S	G	M
18	B	S	S	M	M	M	S	S	-	S	G	03
19	B	016	015M	S	S	S	S	S	S	031M	C	S
20	S	G	G	S	S	M	S	S	S	-	M	G
21	-	B	B	B	B	B	S	S	S	S	033	S
22	-	M	S	G	S	S	S	S	029	035	041	04
23	025M	025M	B	B	B	-	S	S	S	S	S	03
24	B	B	B	B	S	B	M	S	S	S	034M	03
25	S	B	B	-	M	S	S	S	032	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-	032	033	042M	03
28	-	-	-	-	-	-	-	-	-	033	G	03
29	S	S	S	015	S	M	B	S	S	G	G	G
30	-	-	-	-	-	-	-	-	-	B	S	G
31												
Median	-	-	-	-	-	-	-	-	032	034	039	03
Count	2	3	2	2	-	1	1	3	10	12	13	1
UQ	-	-	-	-	-	-	-	028	032	036	042	04
LQ	-	-	-	-	-	-	-	024	029	033	035	03
QR	-	-	-	-	-	-	-	4	3	3	7	6

* Tabulation of 023 = 2.3 Mc.

IONOSPHERIC DATA
Mc to 25 Mc in 0.5 minute
November, 1963

10	11	12	13	14	15	16	17	18	19	20	21	22	23
G	S	S	S	B	G	B	S	S	S	S	023*	025	020
039	040	044	B	B	B	036	S	S	S	S	021	M	M
042	045M	053M	050	043M	042M	028	023	025	S	M	M	023	S
-	-	-	-	043	050M	065M	062M	036	046M	055M	030	025	B
035	044M	037	040M	032M	033	031	025M	023	M	S	S	S	S
035	039	032	034	033	035	035	-	S	-	034	045	M	023M
B	G	B	B	B	B	-	S	021	S	-	-	S	B
-	036	B	045	B	033M	B	B	B	-	031M	035	026	B
040M	047	044	052	047	B	B	B	028	B	B	B	030	036M
055	050	B	B	B	B	B	B	B	B	B	S	B	B
054	040	042M	B	B	B	B	B	B	B	B	B	B	B
-	-	-	-	-	-	-	-	-	-	-	-	-	-
034	036	035	034	B	B	B	S	026M	030M	022M	043M	S	B
G	037	B	G	B	B	B	S	S	035	S	029M	036	M
G	040	037	B	B	B	B	B	B	S	S	02[illegible]	S	B
036	036	036	039M	039	035	B	S	S	S	S	034M	B	B
G	M	M	036	035	S	S	S	S	S	S	S	B	S
G	035	039M	036	034	S	S	S	S	S	S	S	S	B
C	S	G	036	034M	031M	027M	B	S	-	S	M	S	S
M	G	S	040	B	G	032	-	029M	B	-	025	025	M
033	S	035	S	035M	031	027M	S	S	S	S	-	-	M
041	041	B	S	B	B	B	S	S	B	021M	023	-	-
S	033	035	B	B	030	S	S	B	S	024	027	021	S
034M	035M	B	B	B	B	-	B	S	S	B	B	S	022
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
042M	033	034	039M	B	G	S	S	S	-	-	-	-	-
G	035	033	036	035	031	029M	B	S	S	S	B	S	S
G	G	G	B	B	B	S	D	-	-	-	-	-	-
S	G	037	040	032	039	E	B	B	S	B	S	B	-
039	038	037	039	035	033	031	-	026	-	028	028	025	023
13	18	15	14	12	11	9	3	7	3	6	12	8	4
042	041	042	040	041	039	035	-	029	-	034	034	028	030
035	035	035	036	034	031	027	-	023	-	022	024	024	021
7	6	7	4	7	8	8	-	6	-	12	10	4	9

2

Characteristic: foEs

IONOSPHERIC

Sweep: 1 Mc to 25 Mc

November 196

Observed at:
Bangkok, Thailand
Lat. 13.72°N, Long. 100.57°E
105°E Mean Time (GMT + 7 hours)

Hour / Date	00	01	02	03	04	05	06	07	08	09	10	11
1	B	S	S	S	S	S	S	S	S	S	G	S
2	023	S	S	B	S	S	S	S	S	037	039	040
3	020	B	B	B	B	S	S	S	S	037	042	050M
4	S	S	B	B	026	029M	028	036	037	-	-	-
5	B	S	B	B	B	S	S	S	028	031	035	052M
6	S	S	B	014	S	B	-	032	G	G	035	037
7	018	B	G	B	S	S	S	S	033M	S	B	C
8	018	012	018	B	B	B	035M	033	034M	032	027	036
9	B	B	B	B	B	026	S	S	030M	042	045M	047
10	B	B	B	B	B	019	S	032	050	045M	060	050
11	B	B	B	B	B	B	S	S	032	035	054	040
12	-	-	-	-	-	-	-	-	-	-	-	-
13	B	S	S	B	S	S	S	S	S	S	034	036
14	021	023M	B	-	S	S	029	S	055M	S	G	037
15	S	S	018	S	S	S	S	S	S	033	G	040
16	S	S	070M	S	S	S	S	S	S	034	036	036
17	B	S	S	-	026	020	S	S	032	S	G	035M
18	B	S	S	035M	027M	020M	S	S	032	S	G	035
19	B	029	023M	S	S	S	S	S	S	031M	C	S
20	S	G	G	S	S	020M	S	S	S	035	037M	G
21	021	B	B	B	B	B	S	S	S	S	033	S
22	031	032M	S	G	S	S	S	S	030	035	041	050
23	030M	028M	B	B	B	019	S	S	S	S	S	035
24	B	B	B	B	S	B	043M	S	S	S	060M	036M
25	S	B	B	028	022M	S	S	S	048	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-	033	034	048M	040
28	-	-	-	-	-	-	-	-	-	034	G	035
29	S	S	S	024	S	020M	B	S	S	G	G	G
30	-	-	-	-	-	-	-	-	-	B	S	G
31												
Median	021	028	021	026	026	020	032	032	033	034	039	037
Count	8	5	4	4	4	8	4	4	13	13	15	1
UQ	027	031	046	031	027	023	039	035	043	036	048	047
LQ	019	017	018	019	024	020	029	032	032	033	035	036
QR	8	14	28	12	3	3	10	3	11	3	13	1

* Tabulation of 029 = 2.9 Mc.

IONOSPHERIC DATA

Mc to 25 Mc in 0,5 minute

November 1963

10	11	12	13	14	15	16	17	18	19	20	21	22	23
G	S	S	S	B	G	B	S	S	S	S	029*	032	035
039	040	050	B	B	B	052	S	S	S	S	031	037M	035M
043	050M	060M	057	052M	050M	034	030	028	S	046M	047M	032	S
-	-	-	-	049	090M	088M	067M	045	075M	075M	038	025	B
035	052M	051	066M	034M	054	032	041M	037	028M	S	S	S	S
035	037	032	034	037	039	035	045	S	030	045	065	045M	031M
B	C	B	B	B	B	027	S	029	S	028	025	S	B
027	036	B	061	B	033M	B	B	B	027	052M	068	042	B
045M	047	055	060	056	B	B	B	041	B	B	B	047	040M
060	050	B	B	B	B	B	B	B	B	B	S	B	B
054	040	045M	B	B	B	B	B	B	B	B	B	B	B
-	-	-	-	-	-	-	-	-	-	-	-	-	-
034	036	035	034	B	B	B	S	040M	048M	043M	080M	S	B
G	037	B	G	3	B	B	B	S	036	S	085M	085	032M
G	040	037	B	B	B	B	B	B	S	S	033M	S	B
036	036	038	067M	045	035	B	S	S	S	S	055M	B	B
G	035M	058M	036	035	S	S	S	S	S	S	S	B	S
G	035	056M	036	034	S	S	S	S	S	S	S	S	B
C	S	G	040	041M	037M	039M	B	S	037	S	035M	S	S
037M	G	S	040	B	G	034	028	052M	B	-	029	029	035M
033	S	035	S	043M	033	034M	S	S	S	S	030	043	031M
041	050	B	S	B	B	B	S	S	B	027M	028	022	080
S	033	036	B	B	040	S	S	B	S	034	049	043	S
060M	036M	B	B	B	B	026	B	S	S	B	B	S	030
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
048M	040	042	047M	B	G	S	S	S	-	-	-	-	-
G	035	039	037	036	045	056M	B	S	S	S	B	S	S
G	G	G	B	B	B	S	B	-	-	-	-	-	-
S	G	039	040	032	047	B	B	B	S	B	S	B	030
039	037	041	040	039	039	034	041	040	036	044	037	040	034
15	19	16	14	12	11	11	5	7	7	8	16	12	10
048	047	053	060	047	047	052	056	045	048	049	060	044	035
035	036	037	036	035	034	032	029	029	028	031	029	031	031
13	11	16	24	12	13	20	27	6	20	18	31	13	4

2

Characteristic: h'Es

IONOSPHERI

Sweep: 1 Mc to 25 M
November,

Observed at:
Bangkok, Thailand
Lat. 13.73°N, Long. 100.57°E
105°E Mean Time (GMT + 7 hours)

Hour / Date	00	01	02	03	04	05	06	07	08	09	10	11
1	B	S	S	S	S	S	S	S	S	S	G	S
2	117	S	S	B	S	S	S	S	S	S	115	122
3	100	B	B	B	B	S	S	S	S	131	128	121
4	S	S	B	B	121	121	120	120	119	-	-	C
5	B	S	B	B	B	S	S	S	120	111	125	111
6	S	S	B	120	S	B	-	125	G	G	103	100
7	099	B	G	B	S	S	S	S	121	S	B	C
8	129	129	135	B	B	B	103	100	120	135	100	099
9	B	B	B	B	B	099	S	S	125	126	125	119
10	B	B	B	B	B	125	S	135	119	123	125	125
11	B	B	B	B	B	B	S	S	139	135	120	125
12	-	-	-	-	-	-	-	-	-	-	-	-
13	B	S	S	B	S	S	S	S	S	S	100	100
14	125	120	B	-	S	S	100	S	100	S	G	110
15	S	S	125	S	S	S	S	S	S	160	G	115
16	S	S	129	S	S	S	S	S	S	135	135	110
17	B	S	S	-	119	115	S	S	119	S	G	109
18	B	S	S	120	120	111	S	S	119	S	G	110
19	B	130	115	S	S	S	S	S	S	125	C	S
20	S	G	G	S	S	100	S	S	S	120	115	G
21	105	B	B	B	B	B	S	S	S	S	140	S
22	100	120	S	G	S	S	S	S	150	129	115	110
23	105	103	B	B	B	103	S	S	S	S	S	100
24	B	B	B	B	S	B	105	S	S	S	100	105
25	S	B	B	120	100	S	S	S	105	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-	125	130	120	100
28	-	-	-	-	-	-	-	-	-	100	G	150
29	S	S	S	100	S	105	B	S	S	G	G	G
30	-	-	-	-	-		-	-	-	B	S	G
31												
Median	105	120	127	120	120	108	104	123	120	129	115	110
Count	8	5	4	4	4	8	4	4	13	13	15	13
UQ	121	127	132	120	121	118	113	130	125	135	125	121
LQ	100	110	120	110	109	102	102	110	119	124	103	100
QR	21	17	12	10	12	16	11	20	6	11	22	21

* Tabulation of 129 = 129 km.

IONOSPHERIC DATA

1 Mc to 25 Mc in 0.5 minute

November, 1963

10	11	12	13	14	15	16	17	18	19	20	21	22	23
G	S	S	S	B	G	B	S	S	S	S	129*	121	100
115	122	119	B	B	B	112	S	S	S	S	129	121	100
128	121	115	115	115	112	115	115	099	S	129	100	100	S
-	C	-	-	113	101	099	119	101	100	100	100	100	B
125	111	100	100	100	100	111	100	099	113	S	S	S	S
103	100	102	109	110	135	125	127	S	110	112	115	115	100
B	C	B	B	B	B	130	S	100	S	101	099	S	B
100	099	B	095	B	099	B	B	B	126	110	100	105	B
125	119	115	110	105	B	B	B	100	B	B	B	100	100
115	125	B	B	B	B	B	B	B	B	B	B	B	B
120	125	115	B	B	B	B	B	B	B	B	B	B	B
-	-	-	-	-	-	-	-	-	-	-	-	-	-
100	100	102	100	G	B	B	S	115	115	115	110	S	B
G	110	B	G	B	B	B	S	S	110	S	100	103	100
G	115	115	B	B	B	B	B	B	S	S	105	S	B
135	110	103	100	100	100	B	S	S	S	S	115	B	B
G	109	105	105	115	S	S	S	S	S	S	S	B	S
G	110	105	105	115	S	S	S	S	S	S	S	S	B
C	S	G	120	125	120	110	B	S	130	S	160	S	S
115	G	S	100	B	G	150	135	120	B	-	110	105	105
140	S	100	S	105	107	110	S	S	S	S	100	105	105
115	110	B	S	B	B	B	S	S	B	125	120	115	110
S	100	120	B	B	105	S	S	B	S	108	100	100	S
100	105	B	B	B	B	150	B	S	S	B	B	S	100
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
120	100	115	100	B	G	S	S	S	-	-	-	-	-
G	150	100	115	090	090	105	B	S	S	S	B	S	S
G	G	G	B	B	B	S	B	-	-	-	-	-	-
S	G	120	115	115	100	D	B	B	S	B	S	B	110
115	110	110	105	112	101	112	119	100	113	111	110	105	100
15	19	16	14	12	11	11	5	7	7	8	16	12	10
125	121	115	115	115	112	130	131	115	126	120	117	115	105
103	100	103	100	103	100	110	108	099	110	105	100	100	100
22	21	12	15	12	12	20	23	16	16	15	17	15	5

2

Characteristic: Type of f_s

IONOSPHER
Sweep: 1 Mc to 25
November

Observed at:
Bangkok, Thailand
Lat. 13.73°N, Long. 100.57°E
105°E Mean Time (GMT + 7 hours)

Hour / Date	00	01	02	03	04	05	06	07	08	09	10	11
1	–	–	–	–	–	–	–	–	–	–	–	
2	f	–	–	–	–	–	–	–	–	–	c	c
3	f	–	–	–	–	–	–	–	–	fc	c	c
4	–	–	–	f	f	f	f	fc	c	–	–	
5	–	–	–	–	–	–	–	–	c	c	c	ci
6	–	–	–	f	–	–	–	c	–	–	–	i
7	f	–	–	–	–	–	–	–	s	–	–	
8	f	f	f	–	–	–	f	f	r	c	i	i
9	f	–	–	–	–	f	–	–	c	c	c	c
10	f	–	f	f	f	f	–	n	c	c	c	c
11	–	–	–	–	–	f	–	–	h	h	c	c
12	–	–	–	–	–	–	–	–	–	–	–	–
13	–	–	–	–	–	–	–	–	–	–	i	i
14	f	f	–	–	–	–	f	–	i	i	–	c
15	–	–	f	–	–	–	–	–	–	h	–	i
16	–	–	f	–	–	–	–	–	–	h	h	i
17	–	–	–	–	f	f	–	–	s	–	–	i
18	–	–	–	f	f	f	–	–	c	–	–	i
19	–	–	f	f	–	–	–	–	–	s	–	–
20	–	–	–	–	–	f	–	–	–	n	i	–
21	f	f	–	–	–	–	–	–	–	h	–	–
22	f	f	–	–	–	–	–	–	h	h	c	c
23	f	f	–	–	–	f	–	–	–	–	–	i
24	–	–	f	–	–	–	f	–	–	–	i	c
25	–	–	f	f	f	–	–	–	c	–	–	–
26	–	–	–	–	–	–	–	–	–	–	–	–
27	–	–	–	–	–	–	–	–	hc	c	c	c
28	–	–	–	–	–	–	–	–	–	c	–	ch
29	–	–	–	f	–	f	–	–	–	–	–	–
30	–	–	–	–	–	–	–	–	–		–	–
31												
Median	–	–	–	–	–	–	–	–	–	–	–	
Count	–	–	–	–	–	–	–	–	–	–	–	
UQ	–	–	–	–	–	–	–	–	–	–	–	
LQ	–	–	–	–	–	–	–	–	–	–	–	
QR	–	–	–	–	–	–	–	–	–	–	–	

IONOSPHERIC DATA
Mc to 25 Mc in 0.5 minute
November 1963

10	11	12	13	14	15	16	17	18	19	20	21	22	23
–	–	–	–	–	–	–	–	–	–	–	f	f	f
c	c	c	c	–	–	–	–	–	–	–	f	f	f
c	c	c	c	c	c	c	f	f	–	f	f	f	–
–	–	–	–	c	c	f4	f2	f	f2	f3	f	f	–
c	–	–	–	–	–	c	f	f3	f	–	–	–	–
–	–	–	c	–	h	c	–	–	f	f4	f	f	f
–	–	–	–	–	h	ch	–	f	–	f	f	–	–
–	–	–	–	–	–	–	–	–	f	f	f	f	–
c	c	c	c	–	–	–	–	f	f	f	f	f	f
c	c	–	–	–	–	–	–	–	–	–	–	f	–
c	c	c	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	f	f	f	f	–	–
–	–	–	–	–	–	–	–	–	f	–	f	f	f
–	–	–	–	–	s	s	–	–	–	–	f	–	–
h	–	–	–	–	–	–	–	–	–	–	f	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	c	–	c	–	–	–	–	–	–	–	–	–
–	–	–	–	c	c	r	–	–	f	–	f	–	–
–	–	–	–	–	–	h	h	1	–	f	f	f	f
h	–	–	–	–	c	c	–	–	–	–	f	f	f
c	c	–	–	–	–	–	–	–	–	f	f	f	f
–	–	h	–	h	–	–	–	–	–	f2	f2	f	–
–	c	–	–	–	–	h	–	–	–	–	f	–	f
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
c	c	c	c	–	–	–	–	–	–	–	–	–	
–	ch	h	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	c	–	h	c	–	–	–	–	–	f	–	f
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–

MEDIAN VALUES NOVEMBER 1963

Hour Local	fmin (Mc)	foF2 (Mc)	M(3000)F2	h'F2 (km)	h'' (km)	foF1 (Mc)	M(3000)F1	foE (Mc)	h'E (km)	ftEs (Mc)	foEs (Mc)	h'Es (km)
00	1.6	5.1	3.45	-	230	-	-	-	-	-	2.1	105
01	1.4	5.0	3.50	-	225	-	-	-	-	-	2.8	120
02	1.4	4.1	3.55	-	220	-	-	-	-	-	2.1	127
03	1.5	3.1	3.60	-	217	-	-	-	-	-	2.6	120
04	1.5	2.1	3.48	-	240	-	-	-	-	-	2.6	120
05	1.6	1.9	3.40	-	300	-	-	-	-	-	2.0	108
06	1.8	3.5	3.30	-	255	-	-	-	-	-	3.2	104
07	2.5	6.5	3.35	-	230	-	-	-	118	-	3.2	123
08	2.7	7.9	3.05	-	220	-	-	2.80	115	3.2	3.3	120
09	2.8	8.2	2.92	300	215	4.5	3.80	2.92	110	3.4	3.4	129
10	2.7	8.5	2.65	315	205	4.5	3.90	3.10	110	3.9	3.9	115
11	2.8	8.0	2.70	320	200	4.6	3.90	3.25	110	3.8	3.7	110
12	3.2	8.1	2.68	315	200	4.6	4.00	3.05*	102	3.7	4.1	110
13	3.1	8.5	2.75	305	200	4.5	3.95	2.90*	115	3.9	4.0	105
14	3.4	8.7	2.85	300	200	4.5	3.90	3.05	116	3.5	3.9	112
15	2.7	9.0	2.87	283	215	4.4	-	3.00	111	3.3	3.9	101
16	2.7	9.0	2.95	-	220	-	-	2.63	115	3.1	3.4	112
17	2.5	9.0	3.00	-	240	-	-	-	-	-	4.1	119
18	2.0	9.1	3.10	-	243	-	-	-	-	2.6	4.0	100
19	2.0	8.5	3.00	-	245	-	-	-	-	-	3.6	113
20	1.9	8.2	3.10	-	235	-	-	-	-	2.8	4.4	111
21	1.9	7.6	3.20	-	230	-	-	-	-	2.8	3.7	110
22	2.0	7.0	3.35	-	230	-	-	-	-	2.5	4.0	105
23	1.9	6.3	3.50	-	225	-	-	-	-	2.3	3.4	100

* Insufficient data for reliable median.

IONOSPHERIC DATA
MONTHLY MEDIAN CHARACTERISTICS
BANGKOK, THAILAND
NOVEMBER 1963

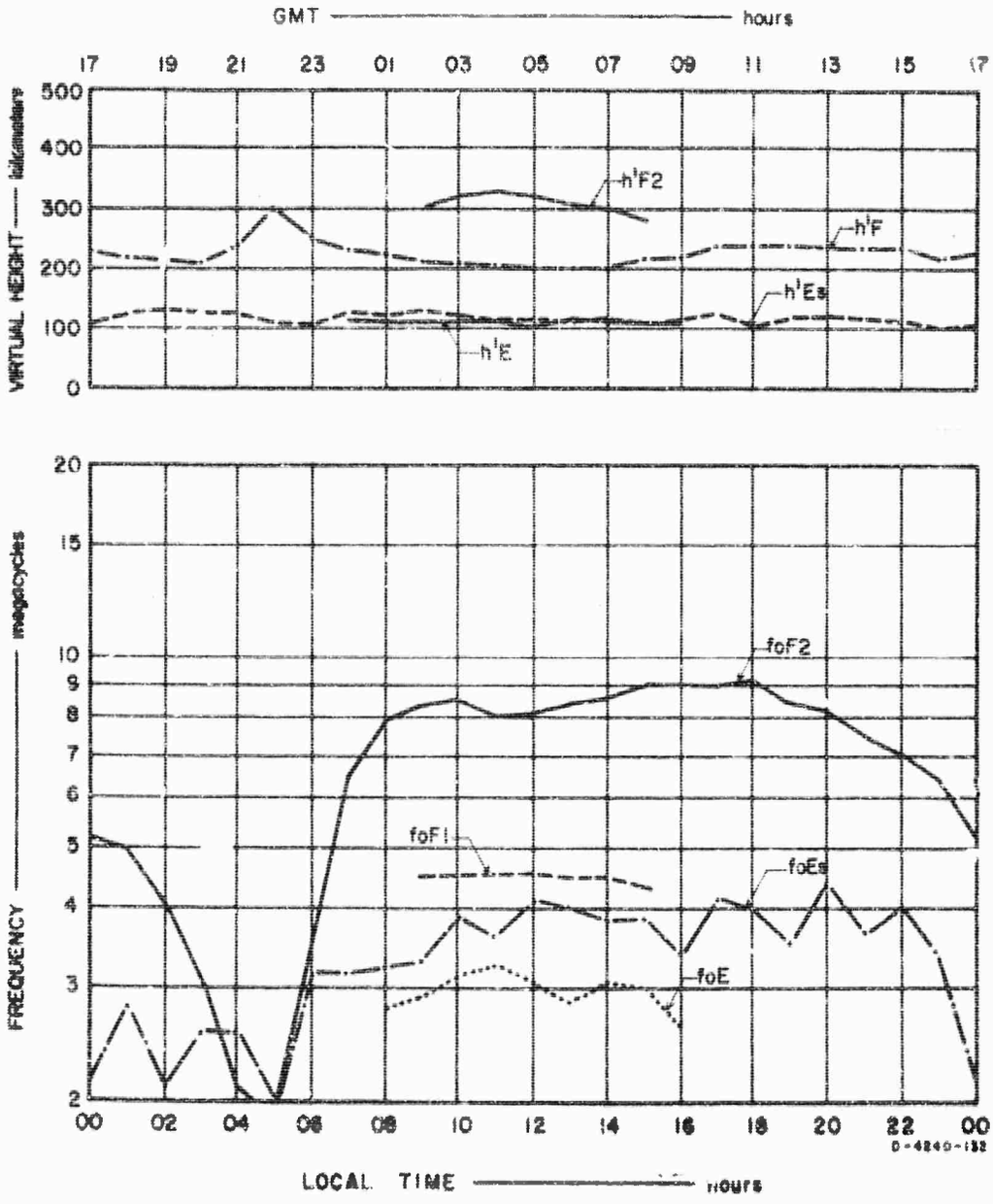

FIG. 1 SUMMARY GRAPHS

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