Central Radio Propagation Laboratory

IONOSPHERIC PREDICTIONS

for

September

1964

TB 11-499-18/TO 31-3-28

U. S. DEPARTMENT of COMMERCE
National Bureau of Standards
Number 18/Issued June 1964

U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, Secretary

NATIONAL BUREAU OF STANDARDS
A. V. Astin, Director

Central Radio Propagation Laboratory

Ionospheric Predictions

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[Formerly "Basic Radio Propagation Predictions," CRPL Series D.]

The CRPL Ionospheric Predictions are issued monthly as an aid in determining the best sky-wave frequencies over any transmission path, at any time of day, for average conditions for the month. Issued three months in advance, each issue provides tables of numerical coefficients that define the functions describing the predicted worldwide distribution of foF2 and M(3000)F2 and maps for each even hour of universal time of MUF(Zero)F2 and MUF(4000)F2.

NOTE: Department of Defense personnel see back cover.

Use of funds for printing this publication approved by the Director of the Bureau of the Budget (June 19, 1961).

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National Bureau of Standards

The functions of the National Bureau of Standards are set forth in an Act of Congress, March 3, 1901, as amended. These include the development and maintenance of the national standards of measurement and the provision of means and methods for making measurements consistent with these standards; the determination of physical constants and properties of materials; the development of methods and instruments for testing materials, devices, and structures; advisory services to government agencies on scientific and technical problems; invention and development of devices to serve special needs of the Government; and the development of standard practices, codes, and specifications. The work includes basic and applied research, development, engineering, instrumentation, testing, evaluation, calibration services, and various consultation and information services. The Bureau also serves as the Federal technical research center in a number of specialized fields.

Central Radio Propagation Laboratory

The Central Radio Propagation Laboratory at Boulder, Colorado, is the central agency of the Federal Government for the collection, analysis, and dissemination of information on propagation of radio waves at all frequencies along the surface of the earth, in the atmosphere, and in space, and performs scientific studies looking toward new techniques for the efficient use and conservation of the radio spectrum. To carry out this responsibility, the CRPL—

1. Acts as the central agency for the conduct of basic research on the nature of radio waves, the pertinent properties of the media through which radio waves are transmitted, the interaction of radio waves with those media, and on the nature of radio noise and interference effects. This includes compilation of reports by other foreign and domestic agencies conducting research in this field and furnishing advice to government and nongovernment groups conducting propagation research.

2. Performs studies of specific radio propagation mechanisms and performs scientific studies looking toward the development of techniques for efficient use and conservation of the radiofrequency spectrum as part of its regular program or as requested by other government agencies. In an advisory capacity, coordinates studies in this area undertaken by other government agencies.

3. Furnishes advisory and consultative service on radio wave propagation, on radiofrequency utilization, and on radio systems problems to other organizations within the United States, public and private.

4. Prepares and issues predictions of radio wave propagation and noise conditions and warnings of disturbances in these conditions.

5. Acts as a central repository for data, reports, and information in the field of radio wave propagation.

6. Performs scientific liaison and exchanges data and information with other countries to advance knowledge of radio wave propagation and interference phenomena and spectrum conservation techniques, including that liaison required by international responsibilities and agreements.

Introduction

The "Central Radio Propagation Laboratory Ionospheric Predictions" is the successor to the former "Basic Radio Propagation Predictions," CRPL Series D. To make effective use of these predictions, National Bureau of Standards Handbook 90, "Handbook for CRPL Ionospheric Predictions Based on Numerical Methods of Mapping," should be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402, price 40 cents. This Handbook includes required additional data, nomographs and graphical aids, as well as methods for the use of the predictions. The Handbook supersedes the obsolete NBS Circular 465.

The basic prediction appears in tables 1 and 2, presenting predicted coefficients for foF2 and M(3000)F2 defining the numerical map functions describing the predicted worldwide variation of these characteristics. With additional auxiliary information, these coefficients may be used as input data for electronic computer programs solving specific high frequency propagation problems. The basic equations, their interpretation, and methods of using the numerical maps are described in two papers by W. B. Jones and R. M. Gallet, "The Representation of Diurnal and Geographic Variations of Ionospheric Data by Numerical Methods," Volume 66D, Number 4, July–August 1962, pages 419–438, and "Methods for Applying Numerical Maps of Ionospheric Characteristics," Volume 66D, Number 6, November–December 1962, pages 649–662, both in the Journal of Research of the National Bureau of Standards, Section D. Radio Propagation. The predicted numerical map coefficients of tables 1 and 2 may be purchased in the form of a tested set of punched cards. Write to the Prediction Services Section, Central Radio Propagation Laboratory, National Bureau of Standards, Boulder, Colorado, to arrange for the purchase of the set of punched cards and for further information and assistance in the application of computer methods and numerical prediction maps to specific propagation problems.

The graphical prediction maps, derived from the basic prediction, are provided for those unable to make use of an electronic computer. Figures 1 to 12 present world maps of MUF (Zero) F2 and MUF(4000)F2 for each even hour of universal time. Figures 13 to 16 present the same predictions for hours 00 and 12 universal time for the North and South Polar areas. Predicted polar maps for each even hour of universal time may be obtained by special arrangements with the Central Radio Propagation Laboratory. Handbook 90 describes methods for including regular E–F1 propagation. Figure A is a graph of predicted and observed Zürich sunspot numbers which shows the recent trend of solar activity. Table A lists observed and predicted Zürich smoothed relative sunspot numbers and includes the sunpot number used for the current prediction.

Members of the U.S. Army, Navy, or Air Force desiring the Handbook and the Ionospheric Predictions should send requests to the proper service address; for the Navy: The Director, Naval Communications, Department of the Navy, Washington, D.C., 20350; for the Air Force: Directorate of Command Control and Communications, Headquarters, United States Air Force, Washington, D.C., 20330. Attention: AFOCCAA. Army personnel should refer to the Handbook as TM-11–499 and to the monthly predictions as TB 11–499–( ), predictions for the month of September 1964 being distributed in June 1964 and designated TB 11–499–(18), and should requisition these through normal publication channels.

Information concerning the theory of radio wave propagation and such important problems as absorption, field intensity, lowest useful high frequencies, etc., is given in National Bureau of Standards Circular 462, "Ionospheric Radio Propagation." A revised work is in preparation which will be announced in the Ionospheric Prediction series when available. Additional information about radio noise may be found in C.C.I.R. Report Number 65, "Revision of Atmospheric Noise Data," International Telecommunication Union, Geneva, 1957.

Reports to this Laboratory of experience with these predictions would be appreciated. Correspondence should be addressed to the Prediction Services Section, Central Radio Propagation Laboratory, National Bureau of Standards, Boulder, Colorado.

Table A

Observed and Predicted Zurich Smoothed Relative Sunspot Numbers

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1952	43	42	39	36	34	32	31	29	28	28	27	26
	(53)	(51)	(52)	(52)	(52)	(52)	(51)	(49)	(46)	(43)	(38)	(33)
1953	24	22	20	19	17	15	13	12	11	10	9	7
	(30)	(29)	(27)	(24)	(22)	(21)	(20)	(18)	(18)	(17)	(16)	(15)
1954	6	6	4	3	4	4	5	7	8	8	10	12
	(14)	(12)	(11)	(10)	(10)	(9)	(8)	(8)	(8)	(10)	(10)	(11)
1955	14	16	20	23	29	35	40	46	55	64	73	81
	(12)	(14)	(14)	(13)	(16)	(18)	(22)	(27)	(30)	(31)	(35)	(42)
1956	89	98	109	119	127	137	146	150	151	156	160	164
	(48)	(53)	(60)	(68)	(77)	(89)	(95)	(105)	(119)	(135)	(147)	(150)
1957	170	172	174	181	186	188	191	194	197	200	201	200
	(150)	(150)	(150)	(150)	(150)	(150)	(150)	(150)	(150)	(150)	(150)	(150)
1958	199	201	201	197	191	187	185	185	184	182	181	180
	(150)	(150)	(150)	(150)	(150)	(150)	(150)	(150)	(150)	(150)	(150)	(150)
1959	179	177	174	169	165	161	156	151	146	141	137	132
	(150)	(150)	(150)	(150)	(146)	(143)	(141)	(142)	(141)	(139)	(137)	(137)
1960	129	125	122	120	117	114	109	102	98	93	88	84
	(136)	(135)	(133)	(130)	(125)	(120)	(118)	(115)	(110)	(108)	(105)	(100)
1961	80	75	69	64	60	56	53	52	52	51	50	49
	(100)	(90)	(90)	(90)	(85)	(85)	(80)	(75)	(70)	(70)	(65)	(60)
1962	45	42	40	39	39	38	37	35	33	31	30	30
	(60)	(50)	(48)	(45)	(42)	(37)	(34)	(31)	(29)	(28)	(27)	(34)
1963	29	30	30	29	29	28	28	27	27			
	(31)	(28)	(26)	(25)	(25)	(25)	(23)	(21)	(20)	(18)	(18)	(17)
1964												
	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17.5)*			

Note: Final numbers are listed through June 1963, the succeeding values being based on provisional data. The predicted numbers are in parentheses.

* Number used for predictions in this issue.

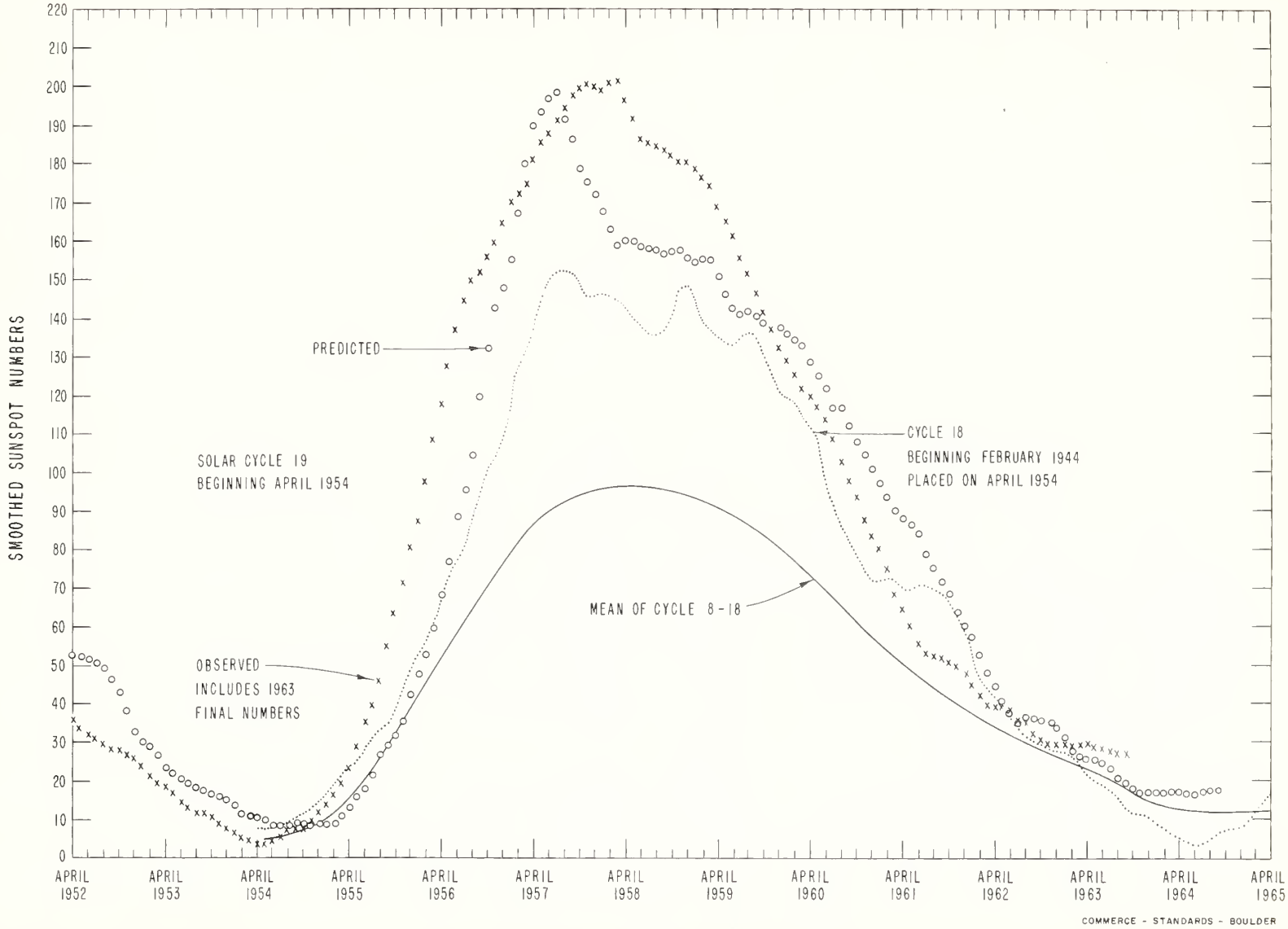

FIG. A. PREDICTED AND OBSERVED SUNSPOT NUMBERS

TABLE I

TIME VARIATION

GEOGRAPHICAL VARIATION

Harmonic		0	1		2		3		4	
	K \ S	0	1	2	3	4	5	6	7	8
I	0	7.0558494E 00	2.2420290E 00	1.9083390E 00	-7.6096166E-01	1.0201752E-01	-2.6301577E-01	-4.7314443E-01	2.3222861E-01	-1.6963128E-01
	1	1.9350802E-02	1.1986793E 00	-9.0247571E-01	2.0595817E 00	-3.8494745E-01	-8.3318590E-03	-1.1721442E 00	4.0911810E-02	1.9380480E-01
	2	-7.1249992E 00	-2.7814189E 00	1.6571355E 01	8.7865472E 00	2.2092691E 00	-5.2177278E-01	-2.7279873E 00	-1.4189662E 00	3.4789906E 00
	3	1.6618901E 01	8.8723409E 00	3.3116980E 01	-4.8750901E 00	-8.3922160E-01	2.2026000F 00	1.0104228F 01	-1.6112952E-01	2.8097706E 00
	4	-9.6670513E 00	-3.8658957E 01	-1.4243503E 02	-2.5620242E 01	-6.9690996E 00	1.2054022E 01	2.7867088E 01	1.0599004E 01	-1.8818676E 01
	5	-1.0657071E 02	-9.9314028E 01	-2.0571927E 02	-2.5614811E 01	1.0648166E 01	-1.7150616E 01	-3.6202405E 01	1.6761329E 00	-2.2414271E 01
	6	6.7362710E 01	1.9010335E 02	4.6334031E 02	-8.4312274E 00	-1.2196910E 01	-5.8088509E 01	-8.3169541E 01	-3.4196163E 01	4.4462594E 01
	7	2.5238002E 02	2.7392169E 02	4.7376828E 02	9.8067083E 01	-3.0615157E 01	4.3711527E 01	6.8854848E 01	-4.2440100E 00	5.3092059E 01
	8	-1.2668288E 02	-3.5655034E 02	-7.4802642E 02	1.2015225E 02	6.5282732E 01	1.1922886E 02	1.1590926E 02	5.2035586E 01	-5.2941628E 01
	9	-2.6071259E 02	-2.9843117E 02	-4.6520129E 02	-1.1292729E 02	3.5656992E 01	-4.5134212E 01	-6.5754190E 01	3.9132585E 00	-5.1493147E 01
	10	1.0385566E 02	3.0434214E 02	5.9747539E 02	-1.5530717E 02	-7.8366514E 01	-1.1005557E 02	-7.8591723E 01	-3.7789264E 01	3.1739574E 01
	11	9.8762335E 01	1.1376980E 02	1.6466801E 02	4.3347273E 01	-1.4426137E 01	1.6419263E 01	2.4328789E 01	-1.2543832E 00	1.7803306E 01
	12	-3.0985384E 01	-9.8475543E 01	-1.8839732E 02	6.1333362E 01	2.9881182E 01	3.7640915E 01	2.1140514F 01	1.0535208E 01	-7.7747215E 00
II	13	1.7653597E-01	1.6078341E-01	1.3544865E-01	-8.7268362E-02	-1.2533807E-01	5.2131138E-02	1.3961095E-01	3.2884259E-03	-6.2714990E-02
	14	1.6714853E-01	1.4871578E-01	2.7861801E-01	-3.3792787E-01	-1.2427737E-01	-1.0981197E-02	2.2171023E-01	7.6521929E-02	-1.1204114E-01
	15	-8.1997421E-01	-1.1680759E 00	5.7654235E-01	-2.6207768E-01	2.0710887E-01	3.3751033E-02	-4.0665790E-01	3.6347294E-02	-8.0932910E-02
	16	-2.3935034E 00	-2.2840473E 00	-7.5839790E 00	-4.6342402E 00	-1.7611104E 00	-5.8272600E-01	-1.1913105E 00	4.1146978E-01	-1.1231153E 00
	17	-1.2103626E 01	-5.2046381E 00	-5.5511856E 00	6.5255451E 00	1.9168580E 00	-1.1491370E 00	-6.0526322E 00	-1.4441122E-01	4.6539708E 00
	18	-9.2102598E 00	-7.4585443E 00	-7.2954813E 00	2.6478896E 00	-1.4207986E-01	-7.8180016E-01	-6.4568344E 00	-4.6622083E-01	2.8007014E 00
	19	3.0441843E 01	2.3246811E 01	-1.2965610E 01	-1.7247769E 00	-7.0964612E 00	-2.7879054E 00	3.6246800E 00	-8.5147401E-02	1.1025251E 00
	20	8.3447092E 01	7.1952816E 01	1.2206362E 02	5.7081239E 01	2.6745441E 01	6.4868846E 00	2.0446826E 01	-8.3071772E-01	1.2587934E 01
	21	1.4187136E 02	7.1158550E 01	4.3836030E 01	-6.7008289E 01	-1.8246800E 01	6.0088200E 00	6.4633011E 01	2.0740319E 00	-4.9282886E 01
	22	5.9558061E 01	5.6040605E 01	4.4204646E 01	-6.5462742E 00	2.1277570E 01	7.9649143E 00	6.1869069E 01	1.6549369E 00	-1.8250948E 01
	23	-2.0379336E 02	-1.3780043E 02	5.0189826E 01	1.0316357E 01	4.7205004E 01	1.9180587E 01	-5.4404450E 00	-1.0093757E-01	-9.8803777E 00
	24	-4.6510763E 02	-4.0755098E 02	-5.7153456E 02	-2.5009543E 02	-1.3332040E 02	-3.0969229E 01	-1.1496069E 02	-1.8930043E 00	-4.4975265E 01
	25	-6.1109533E 02	-3.4214473E 02	-1.1067323E 02	2.8632646E 02	8.0937715E 01	-1.4072542E 01	-2.7609519E 02	-7.9393061E 00	2.0150045E 02
	26	-1.5957139E 02	-1.8997753E 02	-1.2515931E 02	2.7632279E 01	-1.4309251E 02	-2.3495722E 01	-2.4744380E 02	-6.2153736E 00	6.0019129E 01
	27	5.2055648E 02	3.4301652E 02	-6.9749810E 01	-2.3877276E 01	-1.2276525E 02	-5.1757317E 01	-7.0585736E 00	8.5028855E-01	3.1759115E 01
	28	1.0501149E 03	9.0533500E 02	1.1377084E 03	4.9499915E 02	3.0701173E 02	6.6333067E 01	2.7153473E 02	5.5907063E 00	6.6090605E 01
	29	1.2269071E 03	7.4302967E 02	1.0194233E 02	-5.8226900E 02	-1.6890817E 02	1.3999833E 01	5.5126036E 02	1.2764598E 01	-3.8221079E 02
	30	1.9383649E 02	3.2057261E 02	1.6674490E 02	-9.6945013E 01	3.5755640E 02	2.8466932E 01	4.7181895E 02	1.3388605E 01	-1.1148599E 02
	31	-5.8303979E 02	-3.7582245E 02	2.8165406E 01	3.2947601E 01	1.3627969E 02	6.0580287E 01	1.9072171E 01	-9.7843012E-01	-4.0146056E 01
	32	-1.0442039E 03	-8.8238705E 02	-1.0155489E 03	-4.5632616E 02	-3.3323215E 02	-6.3482537E 01	-2.8158337E 02	-4.4407343E 00	-3.9173090E 01
	33	-1.1496001E 03	-7.4517485E 02	-1.5620055E 01	5.5210916E 02	1.6569245E 02	-3.2226257E 00	-5.1296303E 02	-9.0253738E 00	3.3779371E 02
	34	-9.7575290E 01	-2.6101974E 02	-9.8023846E 01	1.3550154E 02	-3.8476215E 02	-1.1742896E 01	-4.2565374E 02	-1.3187572E 01	1.0649001E 02
	35	2.3958195E 02	1.4991935E 02	4.7166976E 00	-1.9754385E 01	-5.4009019E 01	-2.5446579E 01	-9.7523152E 00	3.5563032E-01	1.7252630E 01
	36	3.7907893E 02	3.1661628E 02	3.3521166E 02	1.5955528E 02	1.3387294E 02	2.2003082E 01	1.0598254E 02	1.3110571E 00	6.4077427E 00
	37	4.0554075E 02	2.8008842E 02	-1.3098538E 01	-1.9542999E 02	-6.1563475E 01	-2.0124369E 00	1.7934074E 02	2.1996240E 00	-1.1224397E 02
	38	1.1747211E 01	8.1660788E 01	2.0075988E 01	-6.2414564E 01	1.5043538E 02	-4.6458948E-01	1.4597651E 02	4.7905055E 00	-3.9674439E 01
III	39	1.1206583E-01	2.1450996E-02	-4.3098330E-03	-8.3386176E-02	-4.1399175E-02	-5.2975981E-02	6.2056760E-02	-2.6771897E-03	-3.3367072E-02
	40	1.1536325E-01	1.2954261E-01	-2.4288901E-02	-8.7321688E-02	-1.3334604E-02	2.1014135E-04	1.2855208E-01	9.0655439E-04	-3.1192308E-02
	41	7.6819415E-01	6.2167106E-01	1.3926441E-02	1.8849176E-01	5.2975602E-03	-3.1309471E-02	7.6276214E-02	-6.4106191E-03	4.9961528E-02
	42	2.2060540E-01	6.6075068E-02	2.0996844E-02	5.9836091E-01	2.2006004E-01	-1.9924617E-02	-2.6745682E-01	1.1287200E-04	-8.9376211E-02
	43	-1.4713674E-01	5.2380654E-01	2.9424080E-02	-1.7782359E-01	-7.5379516E-02	3.8345428E-02	-1.7934477E 00	5.7792016E-02	9.3188018E-01
	44	-4.2556157E-01	-5.2982127E-01	2.3496883E-01	3.0489258E-01	-5.4819217E-02	8.6486164E-02	-1.5746041E 00	-1.8105998E-02	-6.4053028E-03
	45	-1.3877320E 00	-4.8254399E-01	-4.0855989E-01	-2.6769958E-01	-1.2422730F-01	1.5655150E-01	-6.0039186E-01	2.4553551E-02	-3.1004334E-01
	46	-3.7553814E-02	7.0167605E-02	-7.7205612E-02	-1.2489729E 00	7.9456458E-03	7.0613795E-02	6.7670393E-01	3.2285842E-02	9.0761515E-02
	47	-1.6081931E-01	-1.2828200E 00	-6.2486314E-02	8.4996790E-01	4.8221111E-01	-5.3894058E-02	6.3551559E 00	-2.1520537E-01	-3.1416365E 00
	48	2.5736609E-01	-3.9341202E-02	-1.6719638E-01	2.7795266E-01	7.2338355E-02	-3.5230385E-01	4.4040313E 00	3.2694635E-02	2.1262466E-01
	49	-5.2929683E-01	-6.8263794E-01	5.8125249E-01	5.1909057E-02	7.0577326E-02	-1.4817721E-01	9.4901919E-01	-2.0251153E-02	4.6890595E-01
	50		-9.6807780E-02		-2.9104920E-02	-3.0747668E-02	-8.2316326E-02	-1.1276562E-01	-5.8550170E-02	3.4849722E-02
	51		1.2481840E 00		-6.9884112E-01	-5.8384740E-01	-1.9508255E-02	-5.4202061E 00	2.0737269E-01	2.4860076E 00
	52						3.2127342E-01	-3.5513932E 00		-1.6639671E-01

GEOGRAPHICAL VARIATION

Harmonic		5		6		7		8	
	K \ S	9	10	11	12	13	14	15	16
I	0	6.9727819E-02	2.2387582E-01	-1.0710011E-01	1.8023373E-03	-3.2549208E-02	-8.9313114E-02	9.6087178E-02	-6.0919874E-03
	1	-2.5212474E-02	6.3670849E-02	-2.7015002E-02	-1.4120126E-02	2.4598055E-02	1.5041382E-03	8.3956267E-03	3.0072879E-02
	2	-7.6139493E-02	-4.2099127E-01	1.0233147E-01	-4.5029162E-03	9.9743632E-02	9.3440706E-02	-1.7814338E-01	9.3032124E-03
	3	6.2802215E-03	-9.4316323E-02	3.9702653E-02	8.4784678E-04	-1.7842308E-02		-1.8446872E-02	-3.1515330E-02
	4		2.2773211E-01		9.1210955E-03	-7.4468893E-02		8.7283471E-02	

I - Main latitudinal variation. Mixed latitudinal and longitudinal variation: II - First order in longitude, III - Second order in longitude

Notation: For each entry the number given by the first eight digits and sign is multiplied by the power of ten defined by the last two digits and sign.

PREDICTED COEFFICIENTS D_{SK} DEFINING THE FUNCTION $\Gamma(\lambda,\theta,t)$ FOR MONTHLY MEDIAN f_o F2 (Mc/s)

SEPTEMBER 1964

TABLE 2

TIME VARIATION

GEOGRAPHICAL VARIATION	Harmonic	0	1		2		3	
	K \ S	0	1	2	3	4	5	6
I	0	2.9941944E 00	-1.3509222E-01	-2.7117133E-01	1.0528094E-02	-1.0638839E-01	4.7632760E-02	-3.0081837E-02
	1	-1.8268112E-01	1.7897833E-02	-2.3603703E-01	3.5195062E-01	-5.2033029E-01	-7.8309771E-02	2.1484927E-03
	2	1.9896327E 00	9.5553194E-01	2.9293363E 00	1.1021904E-01	-2.3500025E-01	-1.0849273E 00	-5.1310919E-01
	3	9.4334295E-01	-2.2156227E-01	1.3080158E 00	-2.1966376E 00	2.3422350E 00	3.2628722E-01	1.3772036E-01
	4	-6.2878744E 00	-2.3712823E 00	-7.6017348E 00	-1.1737166E 00	1.3949787E 00	4.2868222E 00	1.9877819E 00
	5	-1.6751406E 00	6.9371398E-01	-2.1834126E 00	3.7578866E 00	-3.3592656E 00	-3.5503060E-01	-2.4594483E-01
	6	7.1472167E 00	2.6825546E 00	8.0616746E 00	2.1472498E 00	-2.1222953E 00	-5.8502953E 00	-2.6926764E 00
	7	8.8526043E-01	-4.7322934E-01	1.0639105E 00	-1.9193244E 00	1.5266247E 00	1.0426367E-01	1.2383500E-01
	8	-2.7973331E 00	-1.1274667E 00	-3.1014537E 00	-1.0973535E 00	1.0345975E 00	2.6167841E 00	1.2244218E 00
II	9	4.3155032E-03	-7.9621706E-03	3.3477415E-02	-3.4452845E-02	8.7238871E-04	1.0103472E-02	7.8988228E-04
	10	3.1848858E-02	2.3770627E-02	3.9749439E-02	-8.8732433E-02	5.0937815E-02	2.5403475E-02	1.4031434E-03
	11	1.4795734E-01	-1.3029428E-01	1.0930083E-01	-8.9701421E-02	5.2925544E-02	-2.4345502E-02	-3.2009412E-02
	12	-4.6297359E-01	-3.0699432E-01	-1.0562600E 00	1.5748990E-01	-8.7767775E-02	2.6160291E-01	2.1635646E-01
	13	-9.9782263E-03	-4.0257099E-01	-7.8031817E-01	2.1946705E-01	-5.6059158E-01	1.1639477E-01	3.6272019E-02
	14	-2.5530278E-01	-4.0715123E-01	6.1196777E-02	1.8276538E 00	-8.7724323E-01	-5.1830048E-01	-2.8023829E-02
	15	-8.3373845E-01	9.7567416E-01	2.6414866E-02	5.2435197E-01	1.2906309E-01	1.3540035E-01	2.3067270E-01
	16	3.4166420E 00	1.4447880E 00	6.5820873E 00	-1.2807860E 00	4.5575080E-01	-2.0108555E 00	-1.4410678E 00
	17	4.1837286E-01	3.0200749E 00	3.4067872E 00	-3.6052120E-01	3.0186590E 00	-8.9568510E-01	-1.5728024E-01
	18	-1.6204652E-01	2.5937110E 00	-1.5239944E 00	-8.4505194E 00	3.8636094E 00	2.3986304E 00	8.1407738E-02
	19	9.7942299E-01	-2.0906109E 00	-1.2278515E 00	-8.5939769E-01	-8.0098120E-01	-1.4908920E-01	-3.4911249E-01
	20	-5.9043990E 00	-2.3210589E 00	-1.1153750E 01	2.8488186E 00	-7.7245951E-01	4.0327392E 00	2.8070041E 00
	21	-4.1898530E-01	-6.2480620E 00	-4.6862302E 00	-3.6335943E-01	-5.1824463E 00	1.7949961E 00	4.9608296E-01
	22	1.9623222E 00	-4.8299573E 00	3.3742194E 00	1.3469958E 01	-5.8473726E 00	-3.7614787E 00	-1.9799235E-01
	23	-2.5524043E-01	1.1316366E 00	1.4153412E 00	3.5409795E-01	7.4865901E-01	6.9337828E-02	1.9110868E-01
	24	3.0265875E 00	1.3668314E 00	5.9672973E 00	-1.8133480E 00	4.5653620E-01	-2.3464999E 00	-1.6754963E 00
	25	2.1921328E-01	3.9006373E 00	2.2435430E 00	5.8396090E-01	2.7943445E 00	-1.0504710E 00	-4.6792511E-01
	26	-1.9057497E 00	2.6845182E 00	-2.0800106E 00	-6.8594105E 00	2.9356140E 00	1.8763349E 00	1.6440518E-01
III	27	-9.6279137E-03	-2.2846974E-02	9.1279192E-03	-7.9588460E-03	6.8173463E-03	1.8592939E-04	4.3081362E-03
	28	-7.7256216E-03	-1.7864867E-02	9.1260612E-03	-8.8171933E-03	1.3740424E-02	5.6211814E-04	2.1601987E-03
	29	-1.1957697E-01	-1.8473463E-02	-1.0938889E-01	6.7196189E-03	2.4905398E-03	-1.0003064E-03	1.4552496E-02
	30	8.1554897E-02	9.2912718E-03	-1.2457633E-01	5.3944290E-02	1.1987728E-03	-1.1628699E-03	1.7112996E-03
	31	7.8769019E-03	7.7518308E-02	3.4124970E-02	-3.1289704E-03	3.4300666E-04		-1.4936011E-02
	32	-1.6750356E-02	2.0553272E-01	-9.3633273E-02	-5.2044936E-03	1.4997249E-04		-4.7640861E-02
	33	3.0276268E-01	1.9088318E-02	2.4861630E-01		-6.1444198E-03		
	34	-3.0595762E-01	1.1338027E-02	3.1321167E-01				
	35			3.6985808E-02				
	36							

GEOGRAPHICAL VARIATION	Harmonic	4		5		6	
	K \ S	7	8	9	10	11	12
I	0	3.6596845E-02	1.5527298E-02	3.2403426E-03	3.5205624E-02	-1.6039596E-02	-4.5256134E-03
	1	3.1396765E-02	7.2569495E-03	-6.6049689E-03	-1.4110385E-03	-1.0294765E-03	-1.3351908E-03
	2	-2.9906809E-02	-7.3860642E-03	-6.3655980E-03	-2.8781987E-02	1.5196940E-02	-2.3138008E-03
	3	-4.5033327E-02	-7.8486844E-04		-1.4828214E-03	8.8439529E-04	

I - Main latitudinal variation. Mixed latitudinal and longitudinal variation: II - First order in longitude, III - Second order in longitude.

Notation: For each entry the number given by the first eight digits and sign is multiplied by the power of ten defined by the last two digits and sign.

PREDICTED COEFFICIENTS D_{SK} DEFINING THE FUNCTION $\Gamma(\lambda,\theta,t)$ FOR MONTHLY MEDIAN M(3000)F2

SEPTEMBER 1964

SEPTEMBER 1964 UT = 00

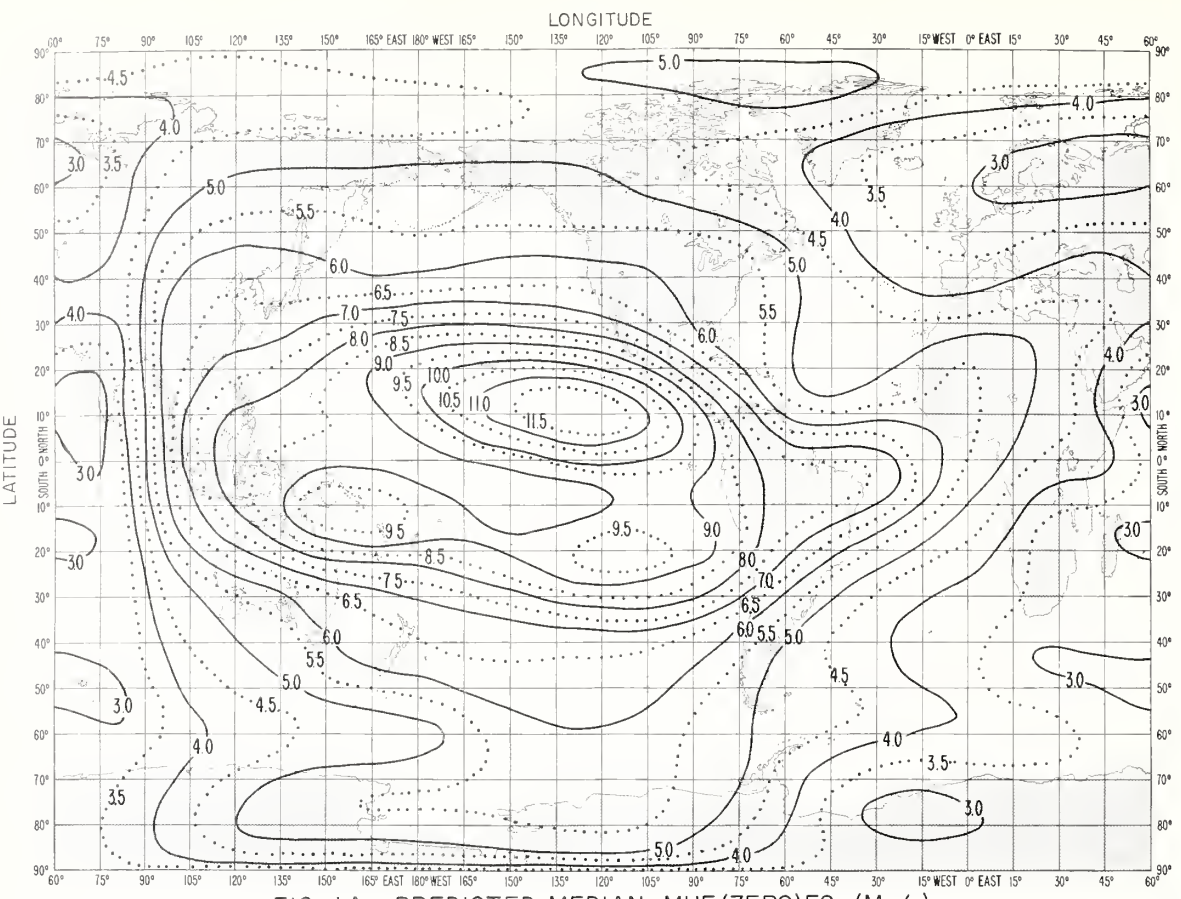

FIG. 1A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

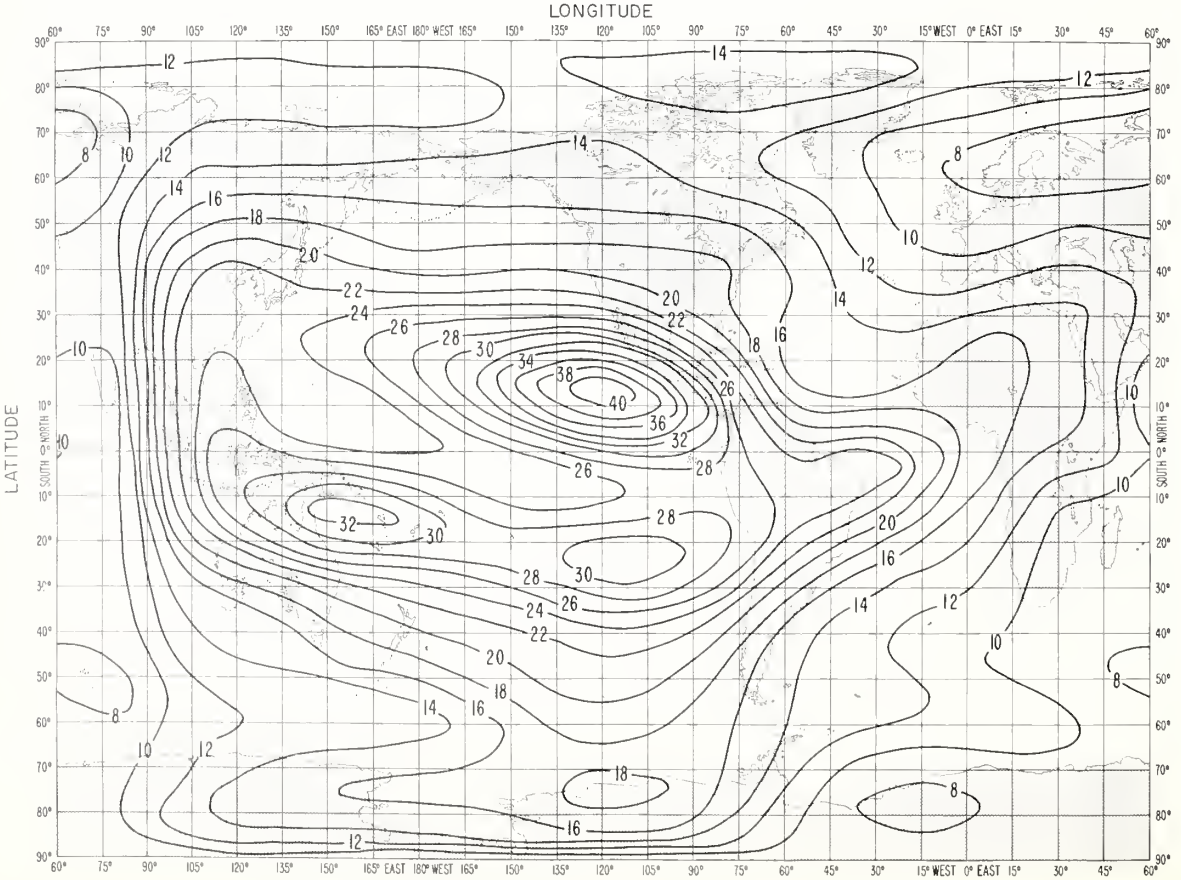

FIG. 1B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

SEPTEMBER 1964 UT = 02

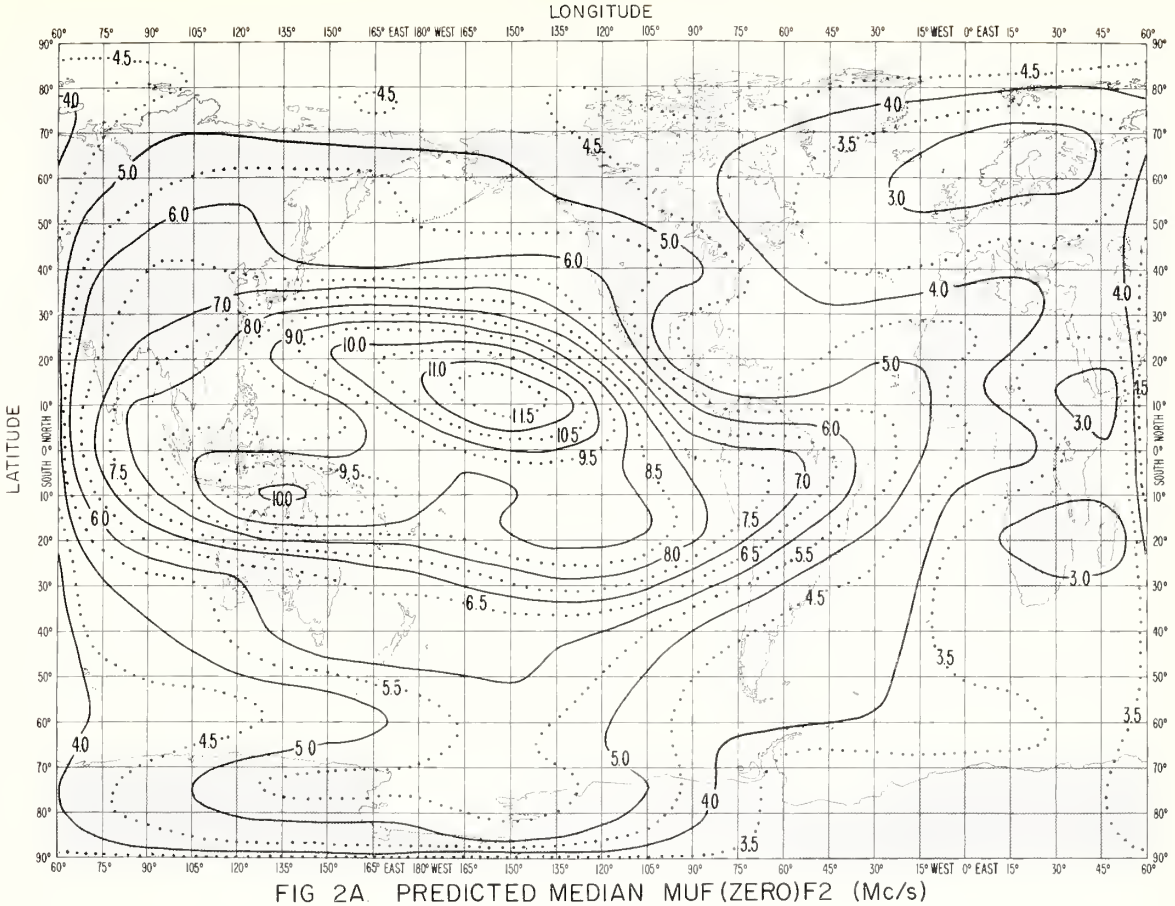

FIG 2A. PREDICTED MEDIAN MUF (ZERO) F2 (Mc/s)

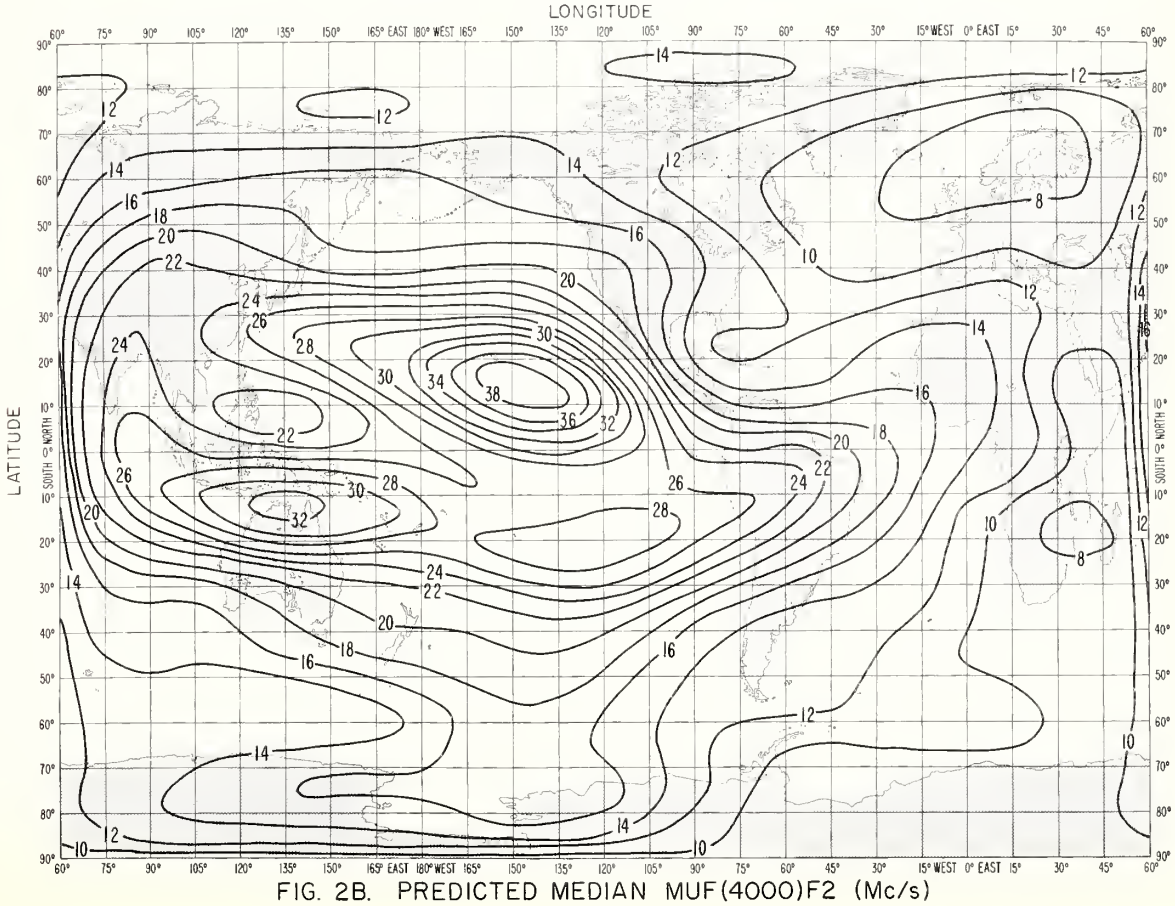

FIG. 2B. PREDICTED MEDIAN MUF (4000) F2 (Mc/s)

SEPTEMBER 1964 UT = 04

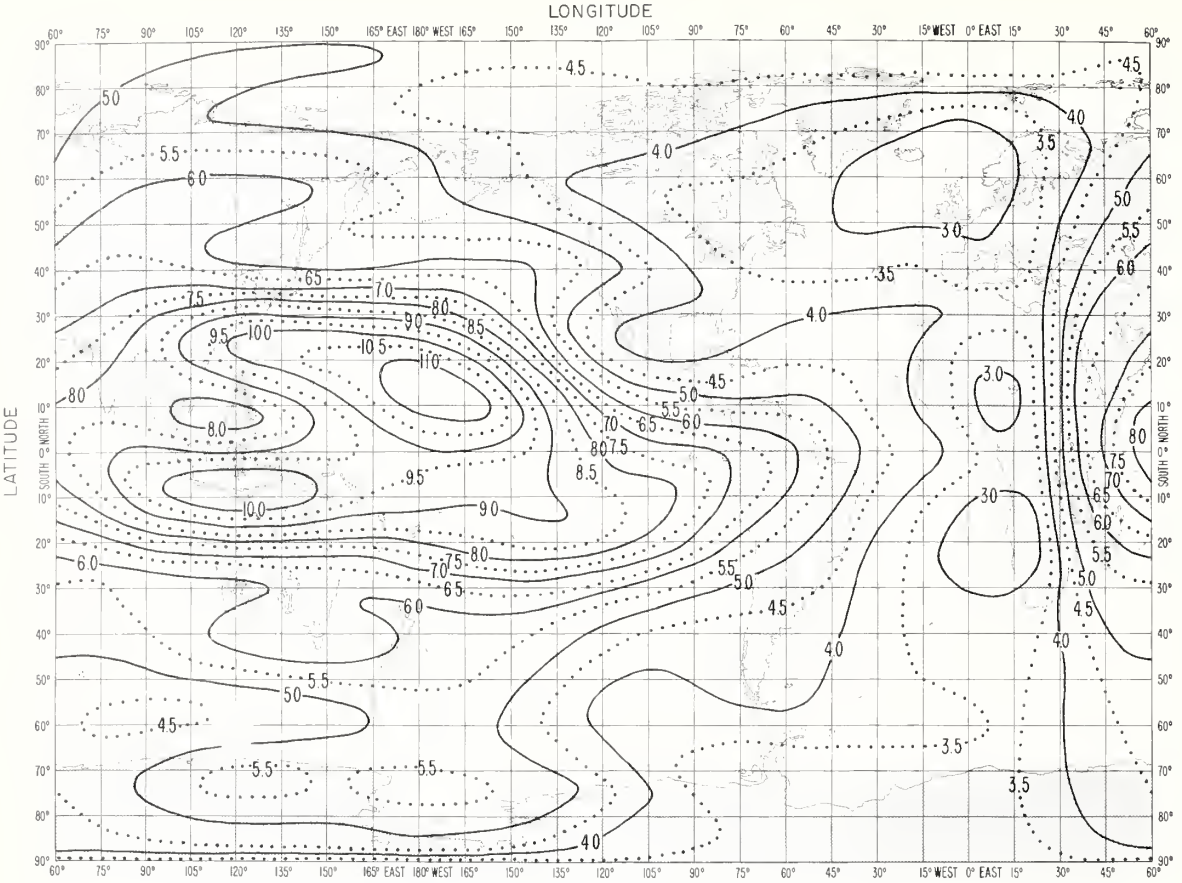

FIG. 3A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

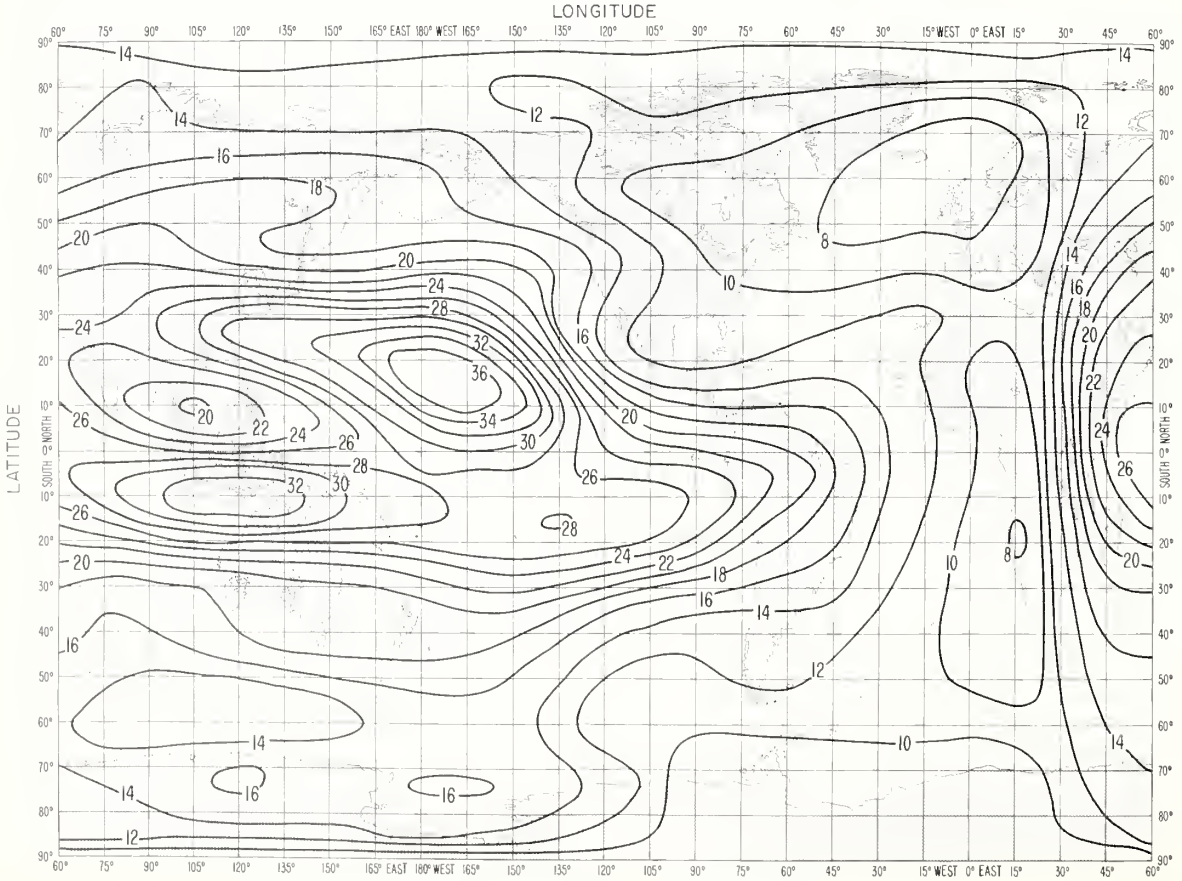

FIG. 3B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

SEPTEMBER 1964 UT=06

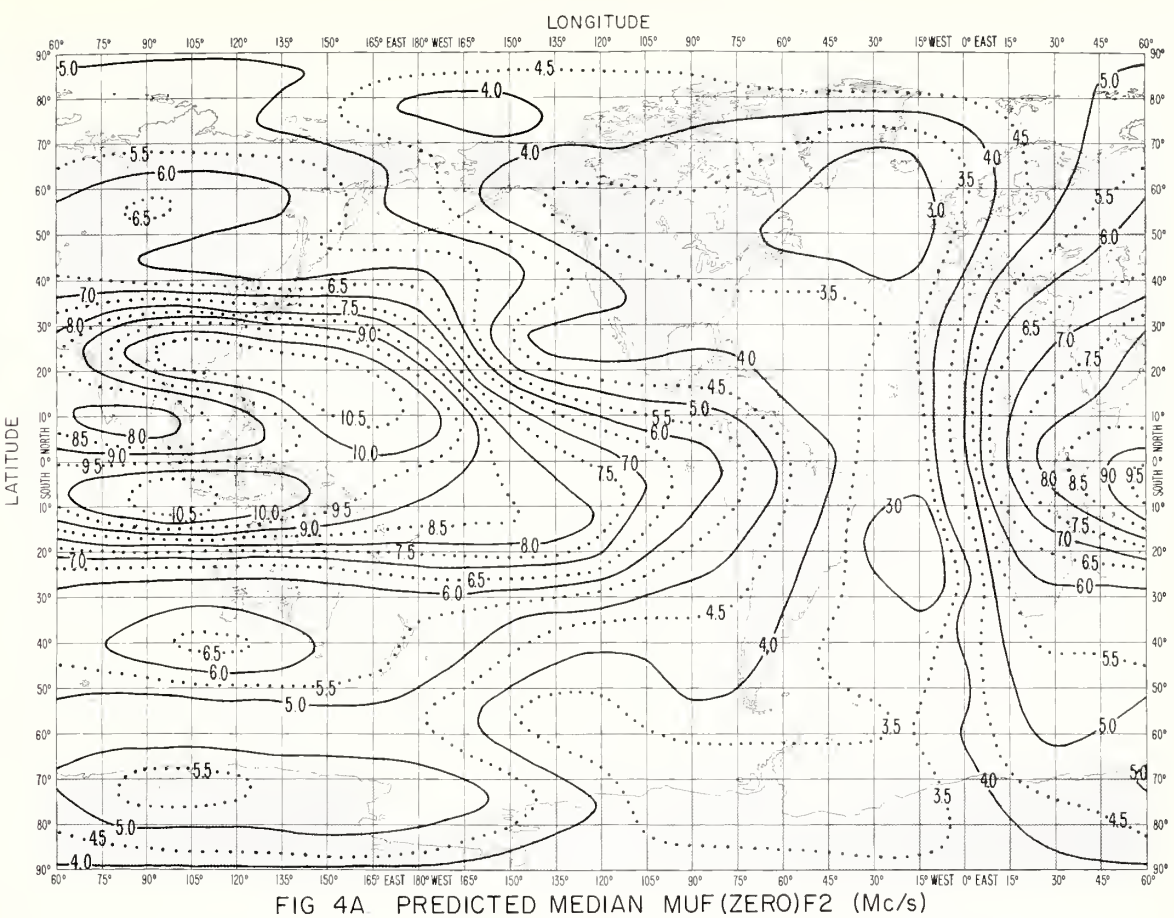

FIG 4A PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

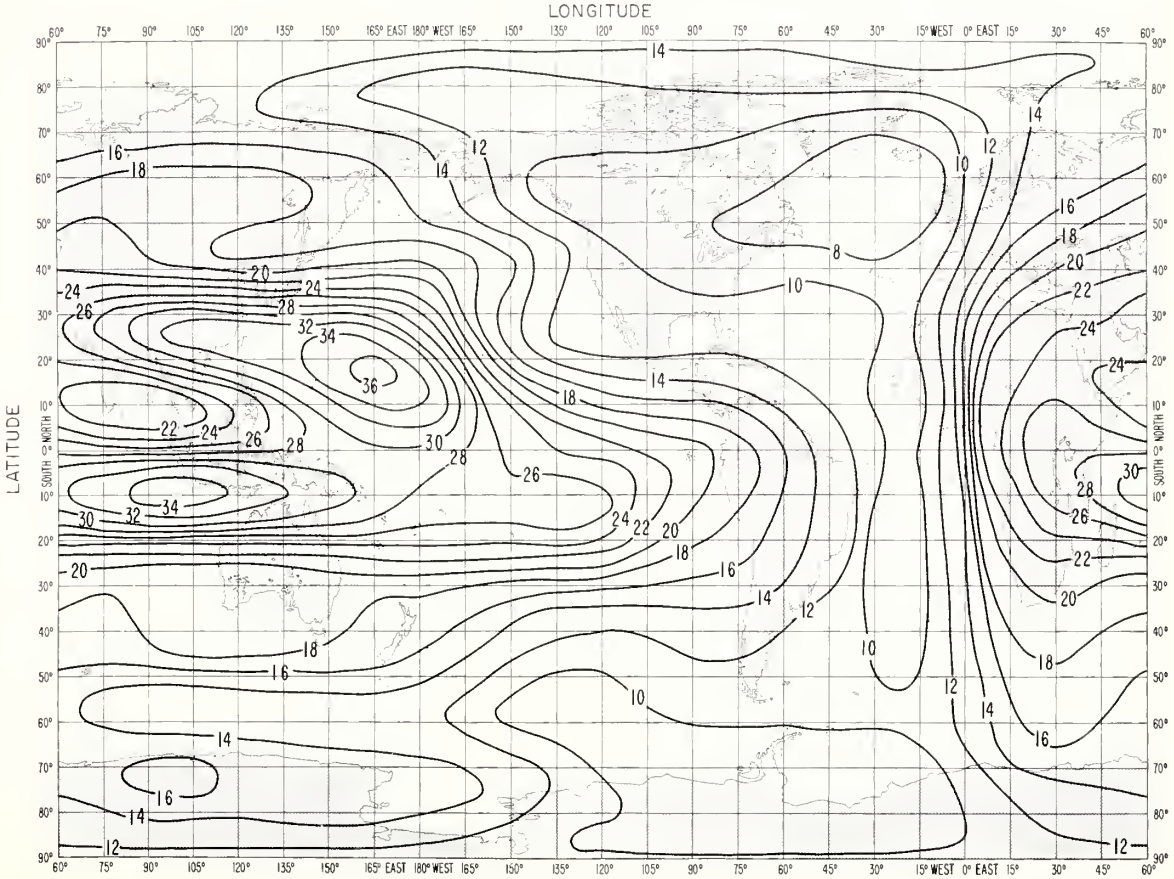

FIG. 4B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

SEPTEMBER 1964 UT=08

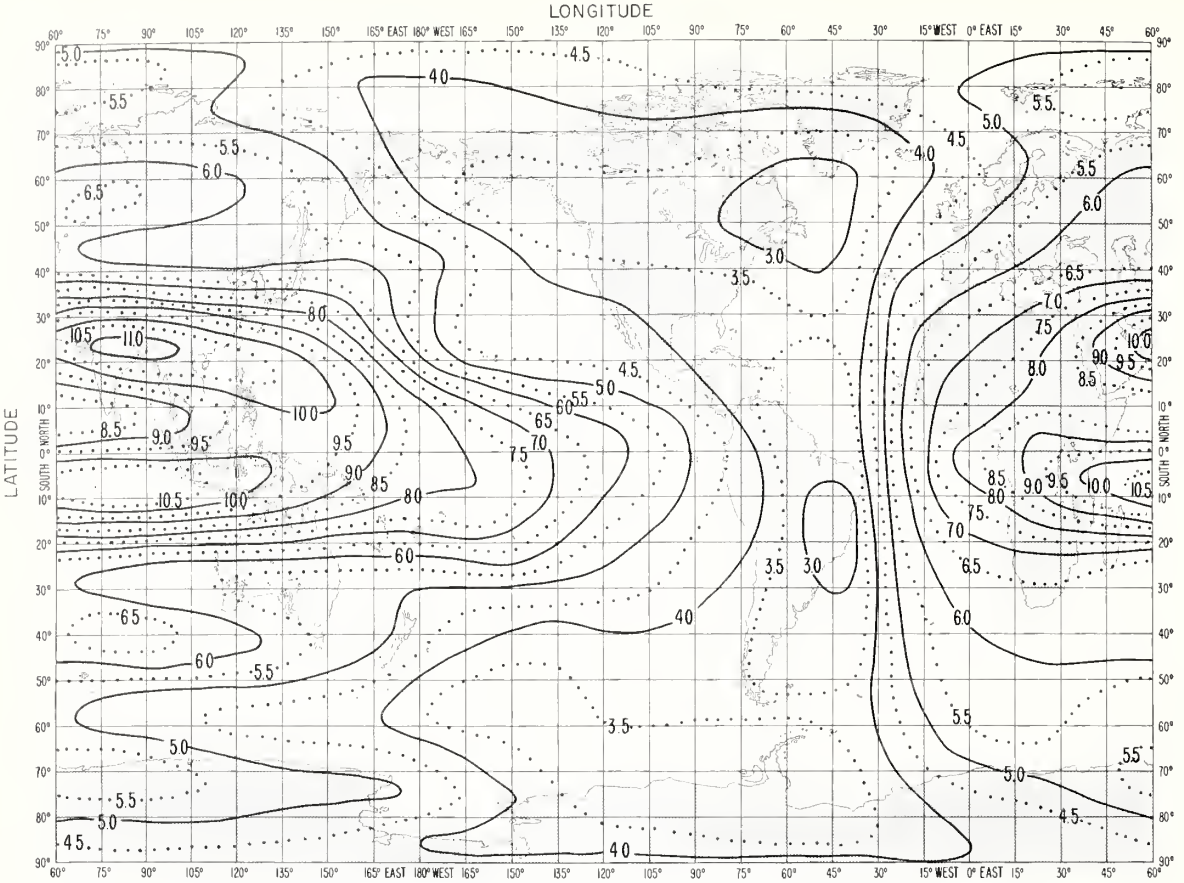

FIG. 5A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

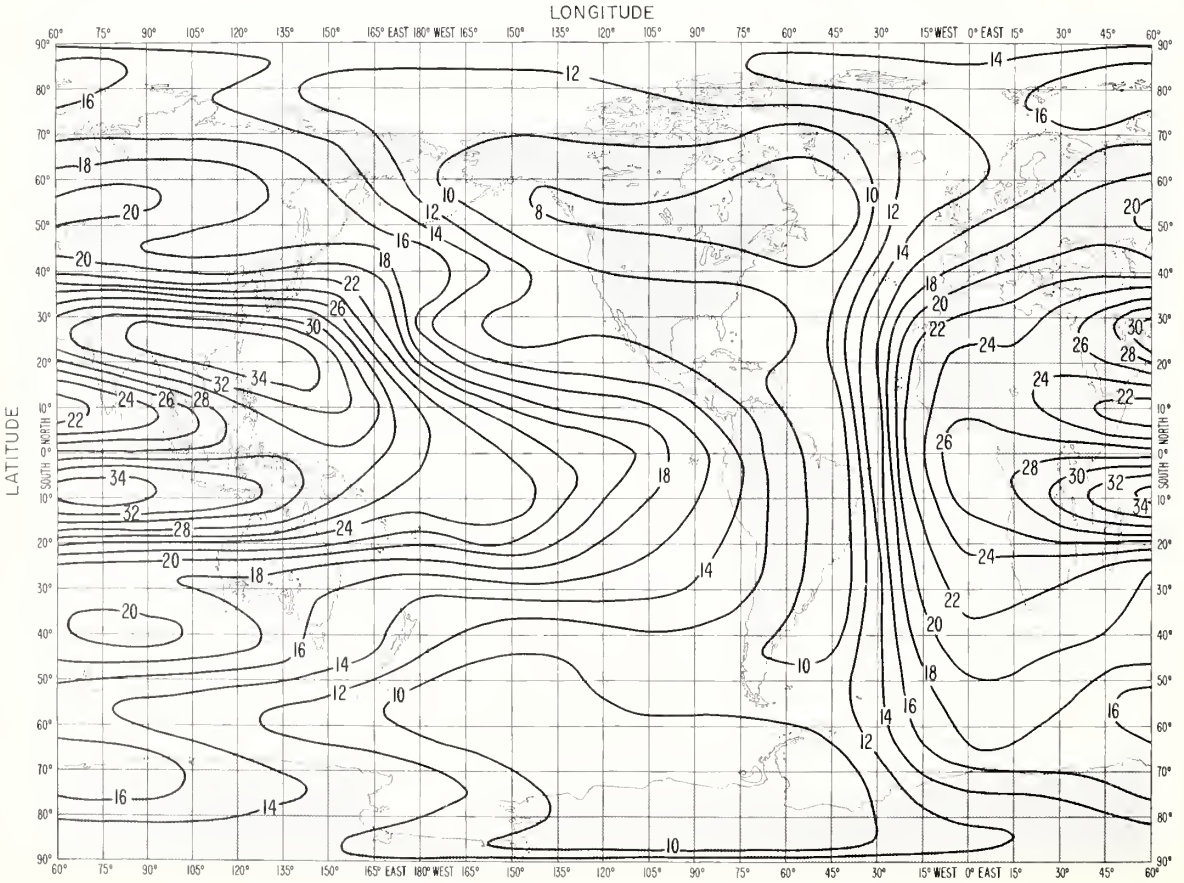

FIG. 5B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

SEPTEMBER 1964 UT = 10

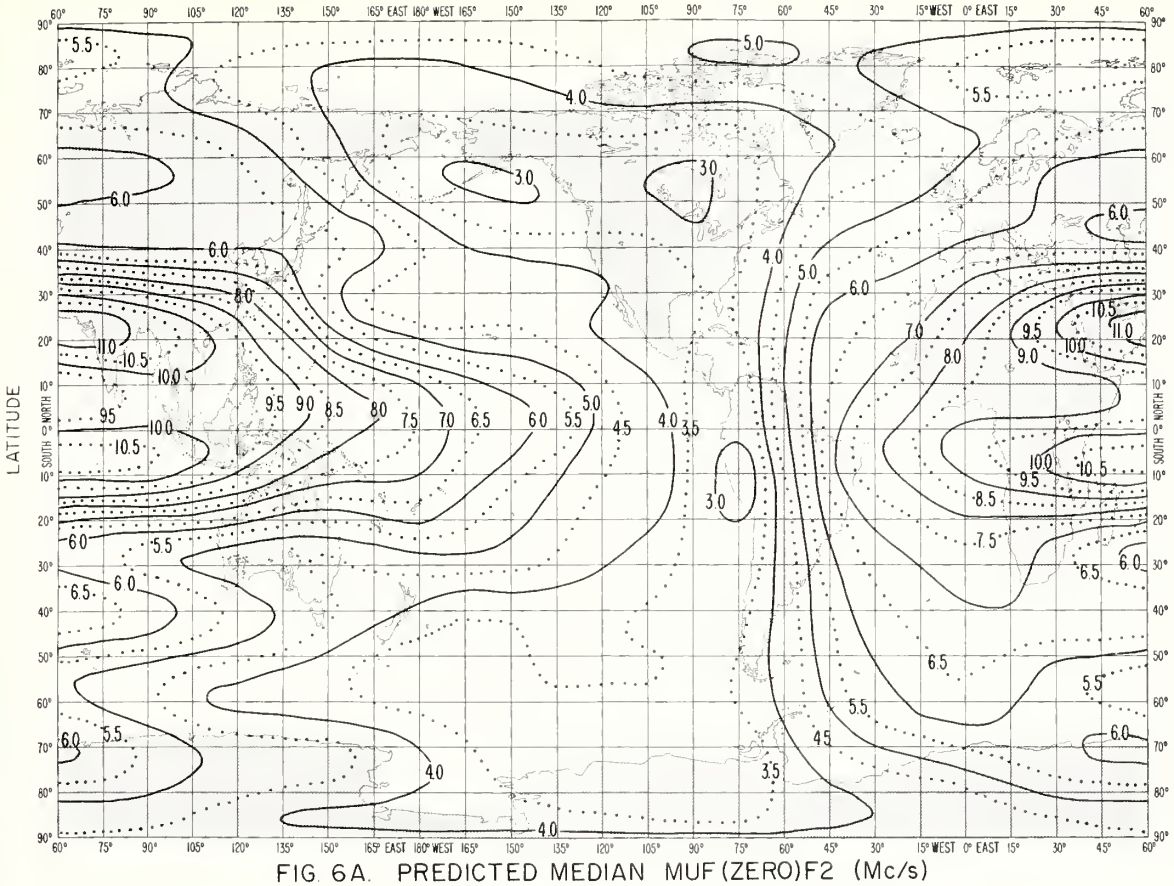

FIG. 6A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

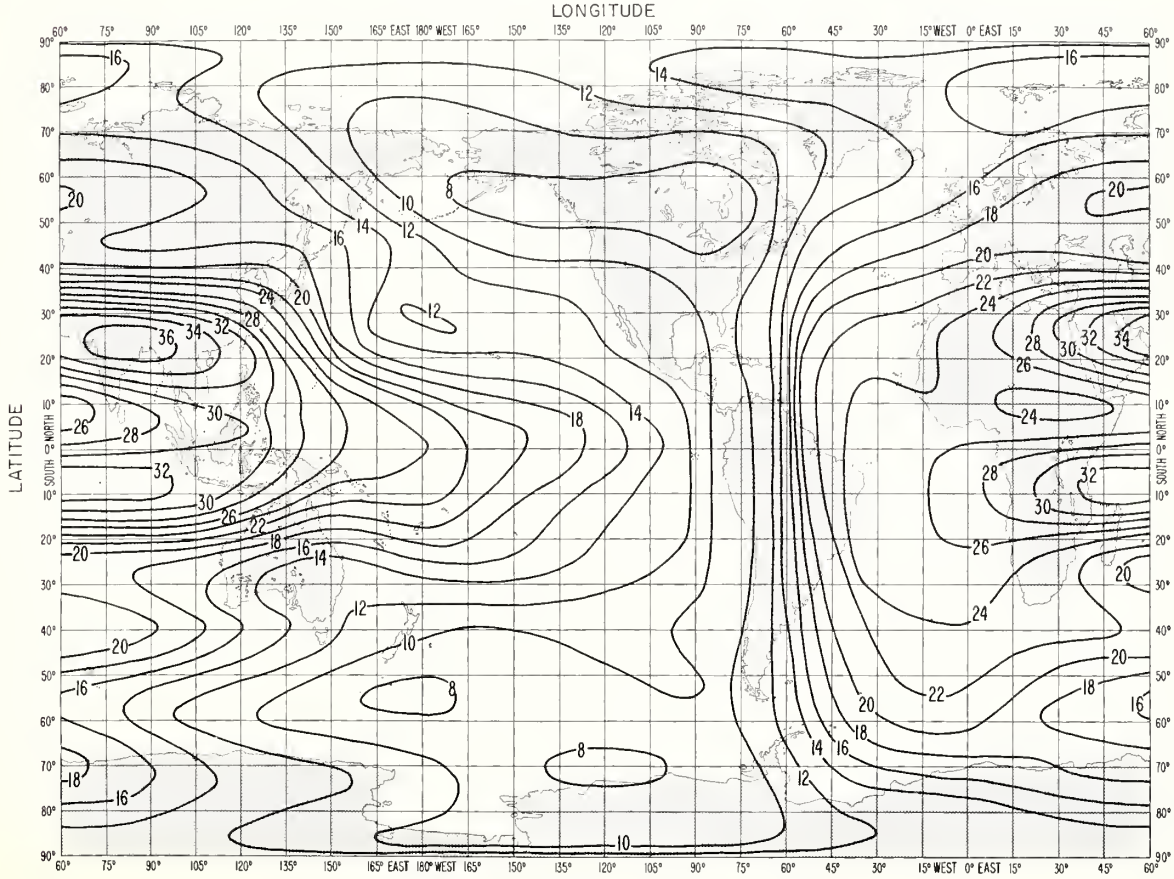

FIG. 6B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

SEPTEMBER 1964 UT=12

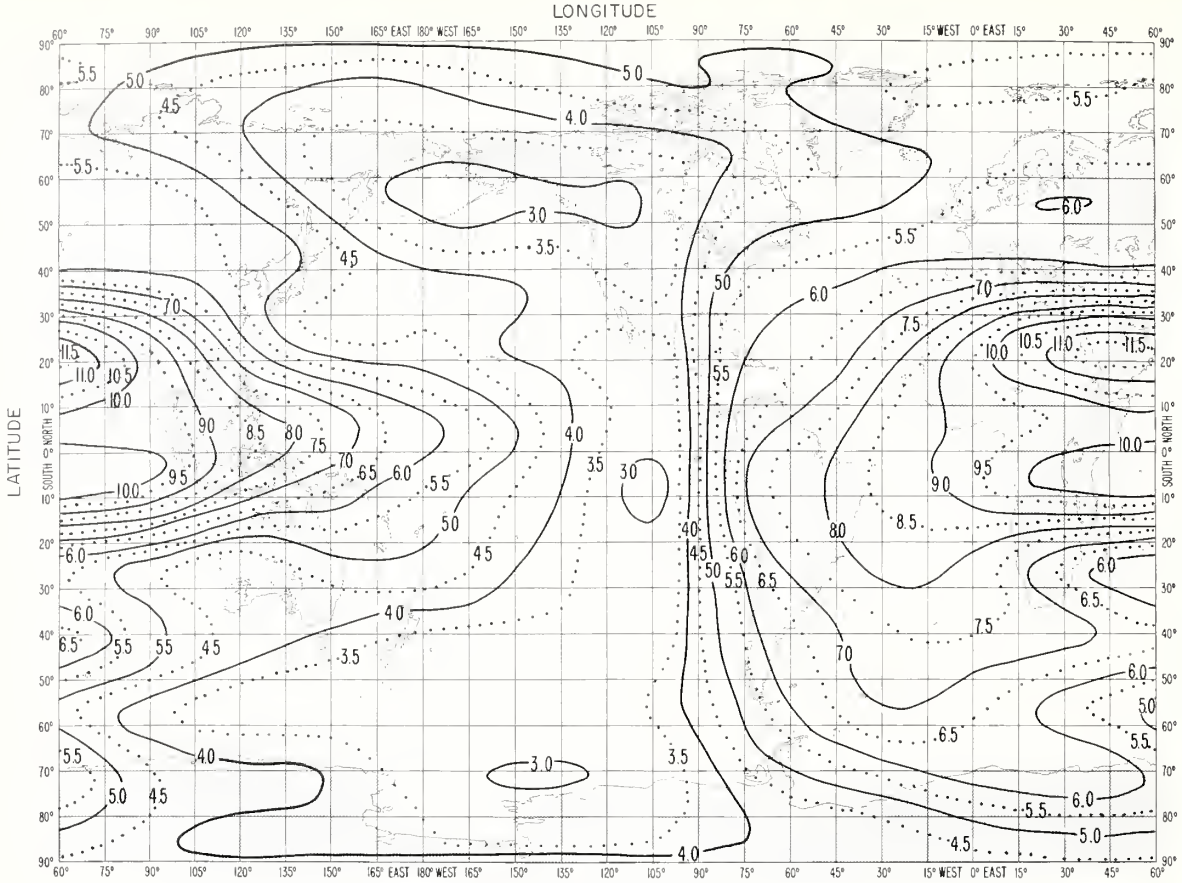

FIG. 7A PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

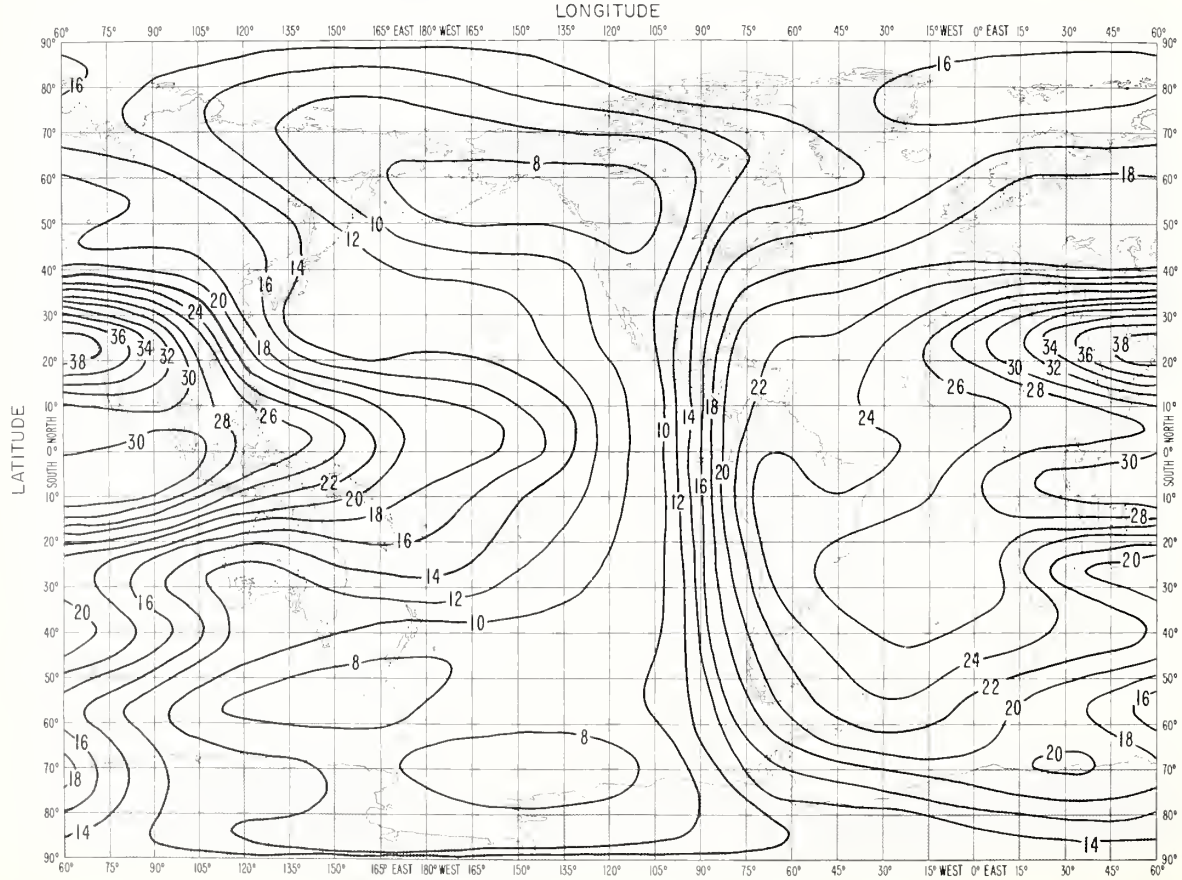

FIG. 7B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

SEPTEMBER 1964 UT= 14

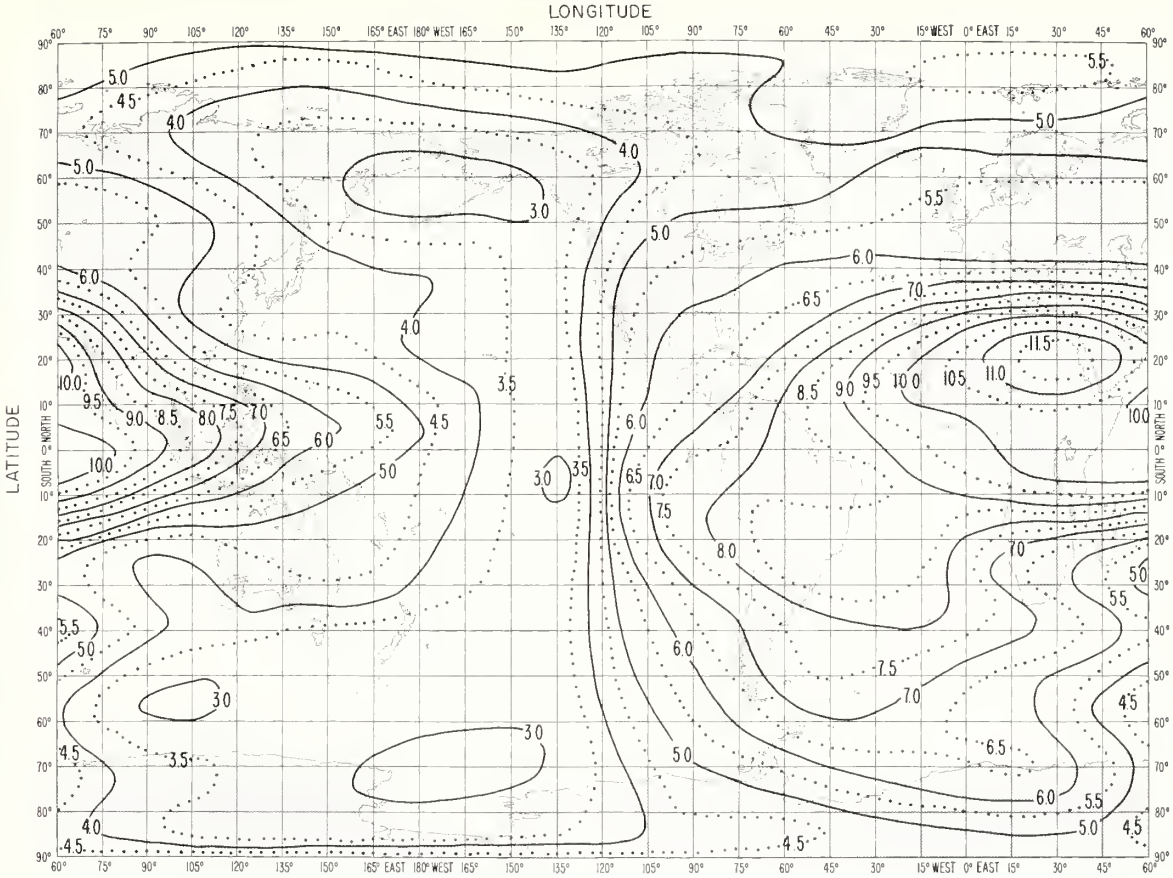

FIG. 8A PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

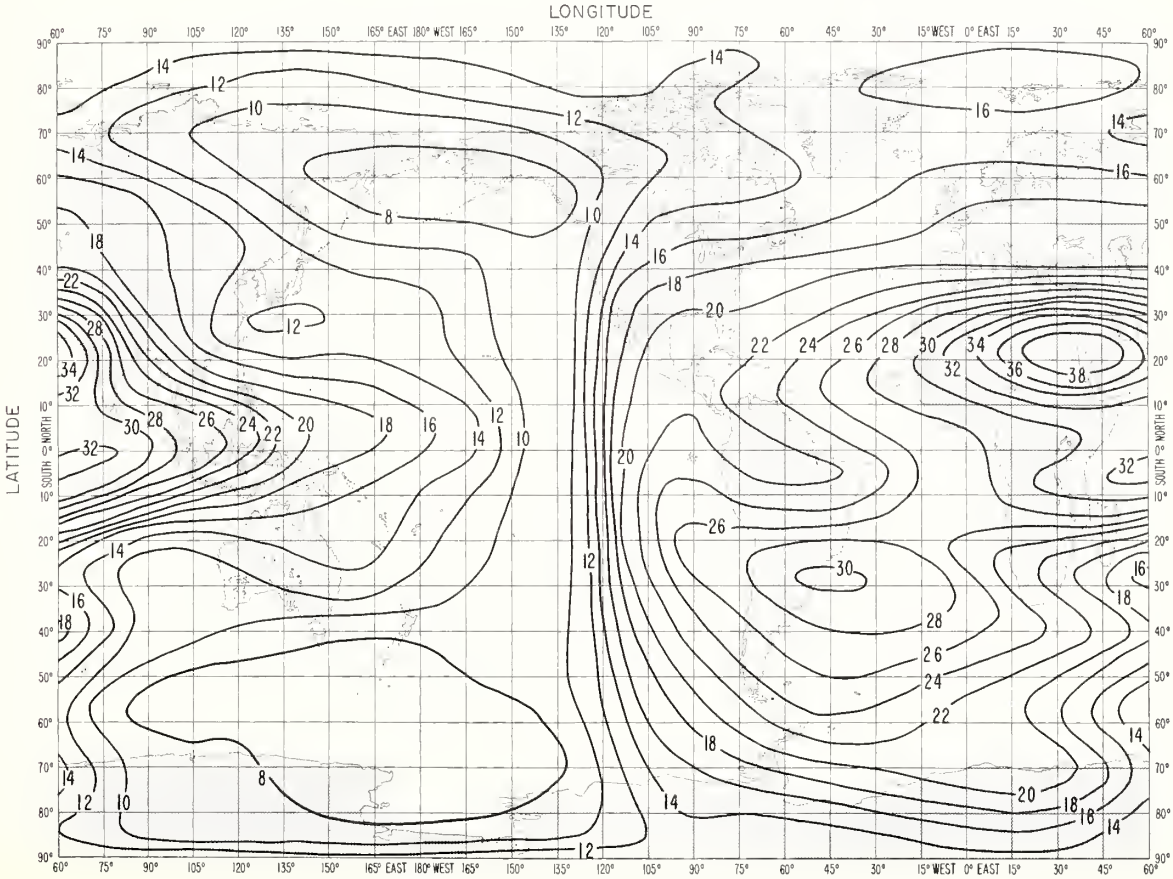

FIG. 8B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

SEPTEMBER 1964 UT=16

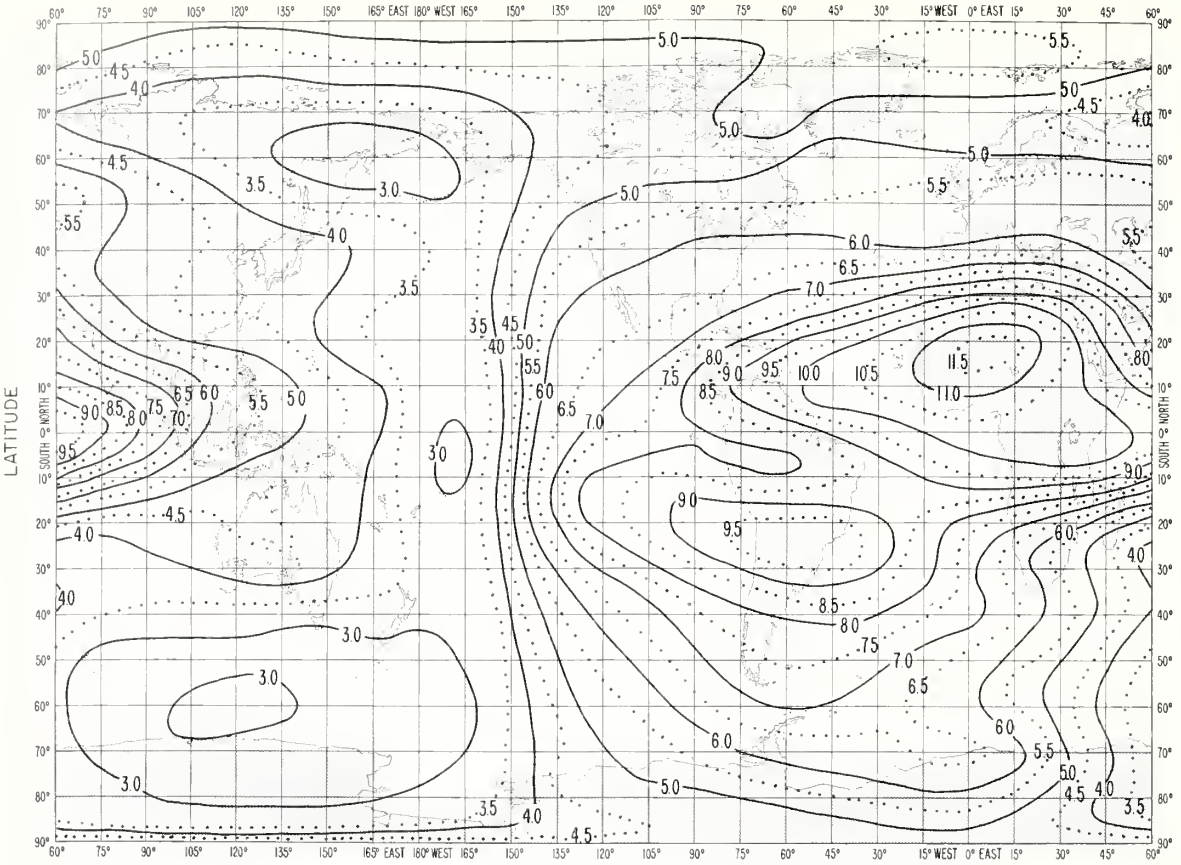

FIG. 9A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

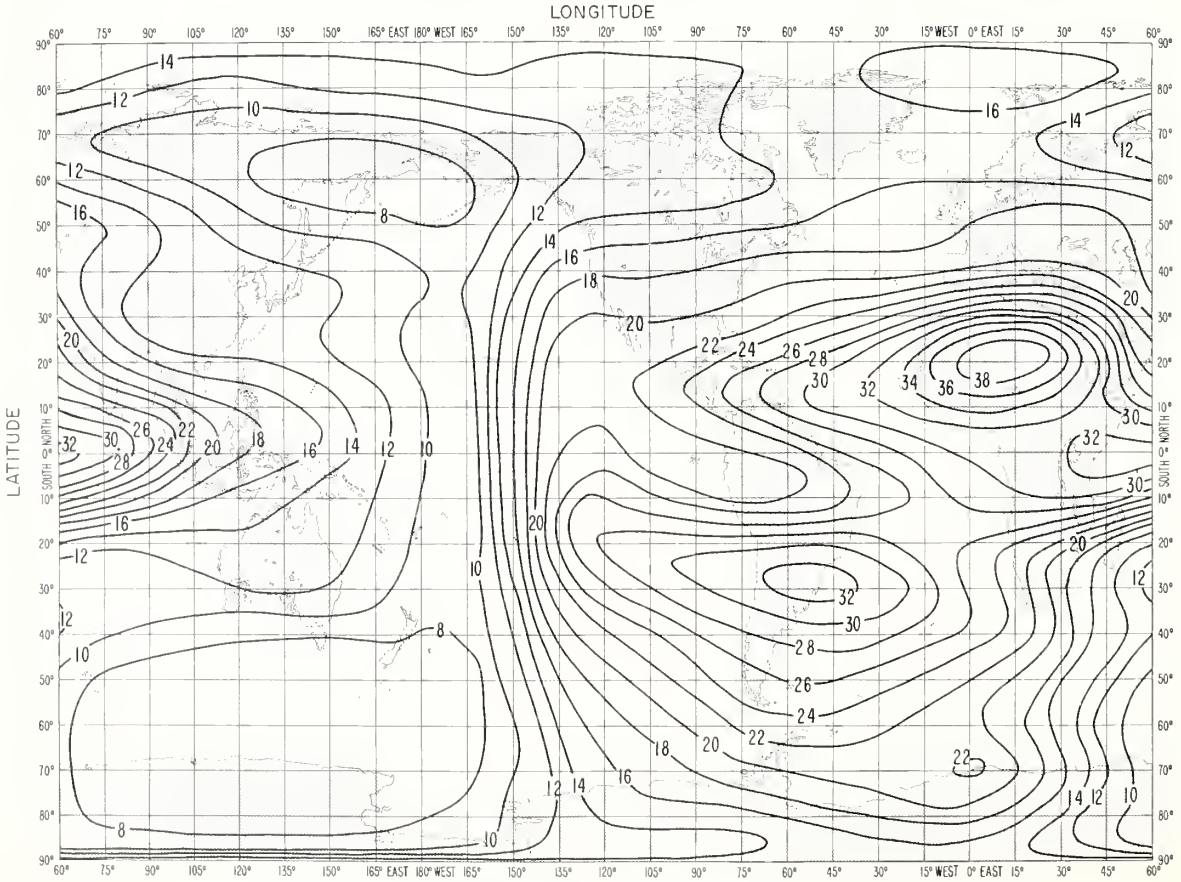

FIG. 9B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

SEPTEMBER 1964 UT= 18

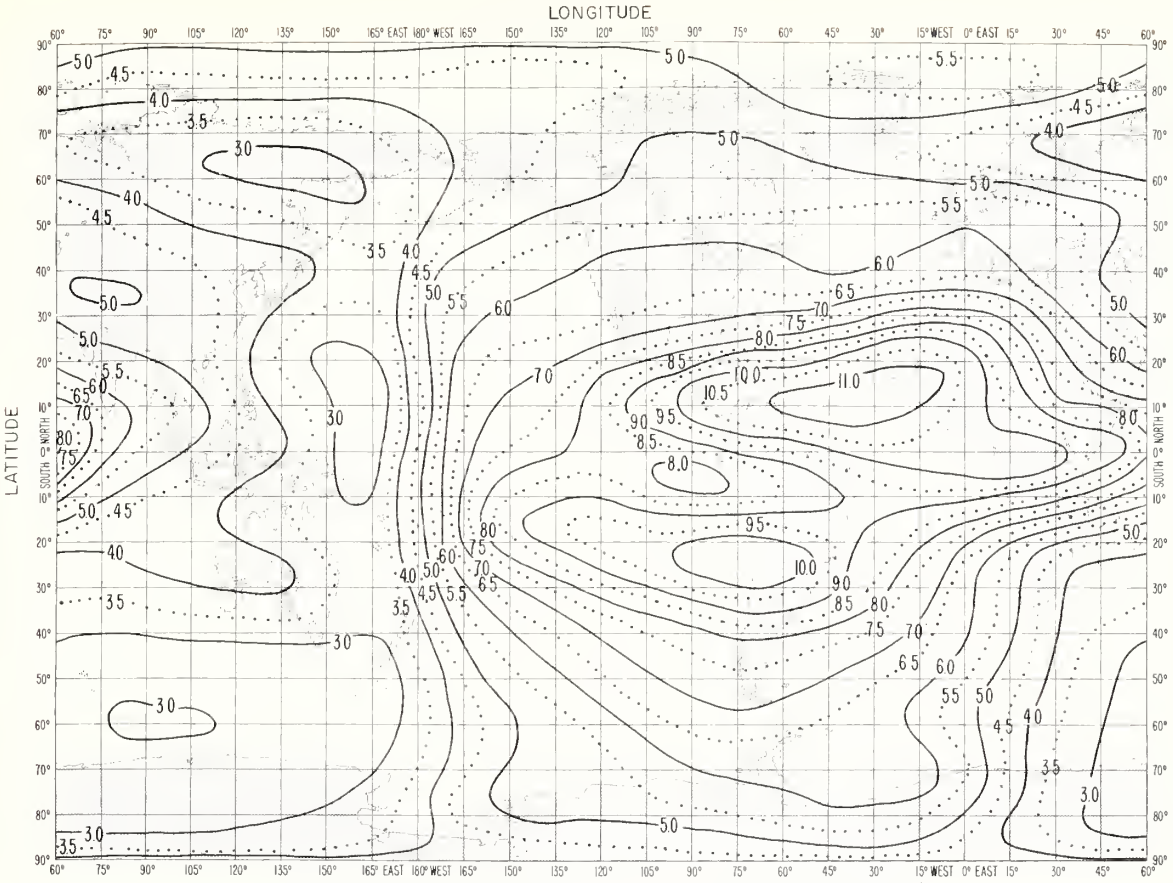

FIG 10A. PREDICTED MEDIAN MUF (ZERO) F2 (Mc/s)

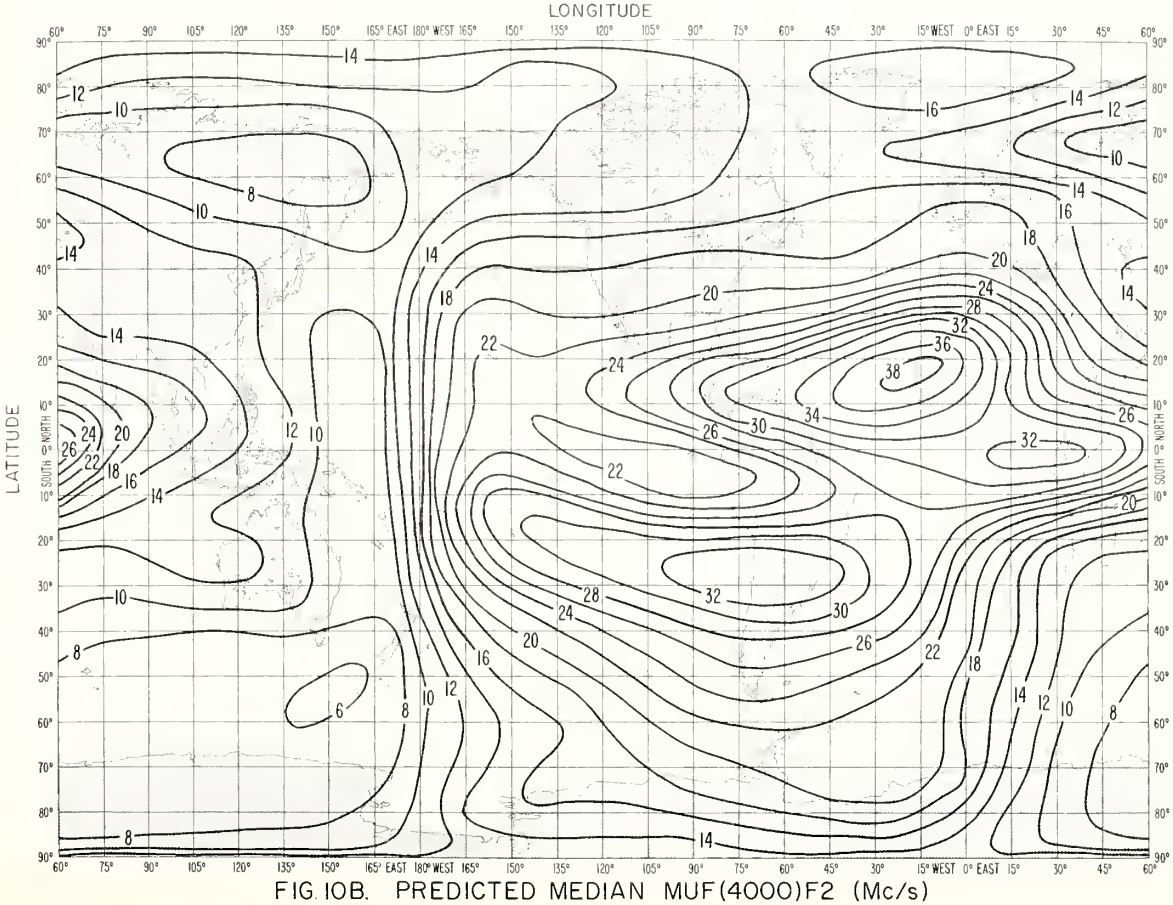

FIG 10B. PREDICTED MEDIAN MUF (4000) F2 (Mc/s)

SEPTEMBER 1964 UT = 20

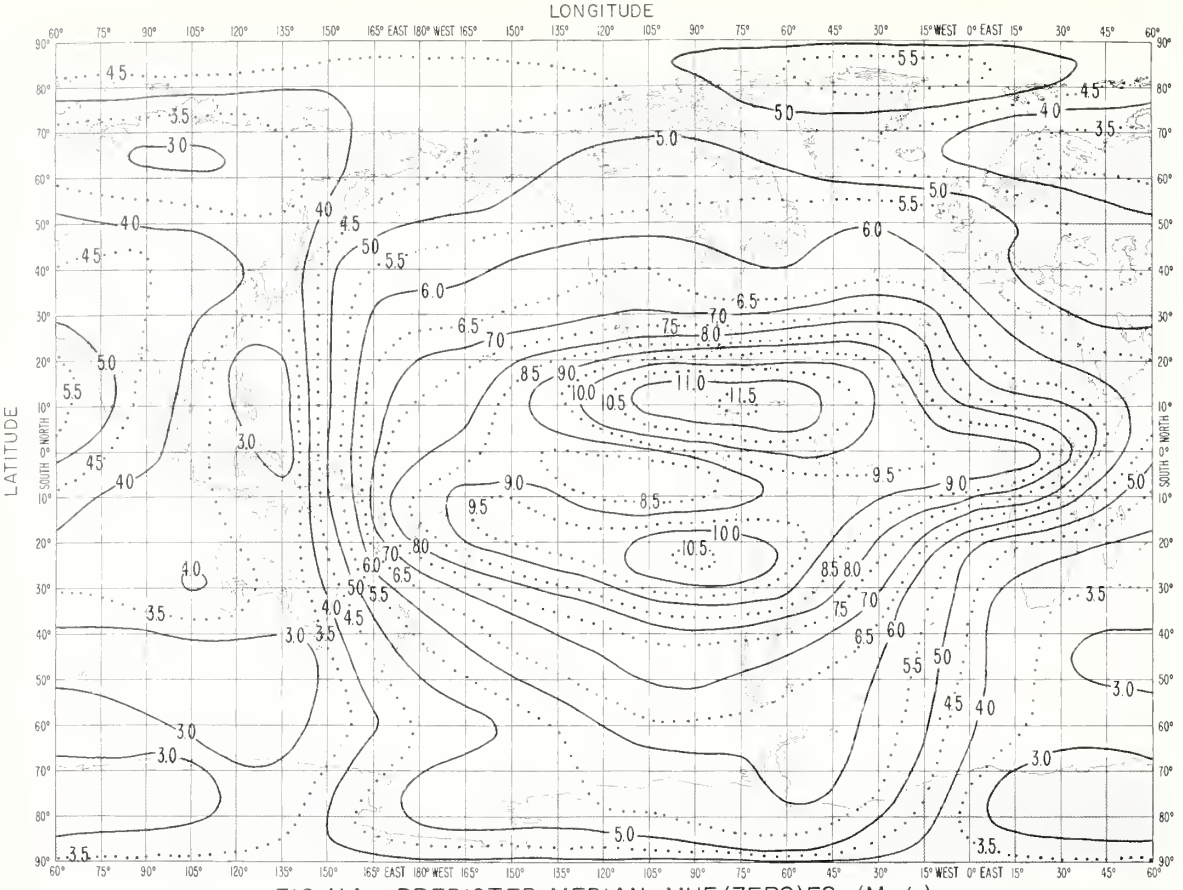

FIG. IIA. PREDICTED MEDIAN MUF (ZERO) F2 (Mc/s)

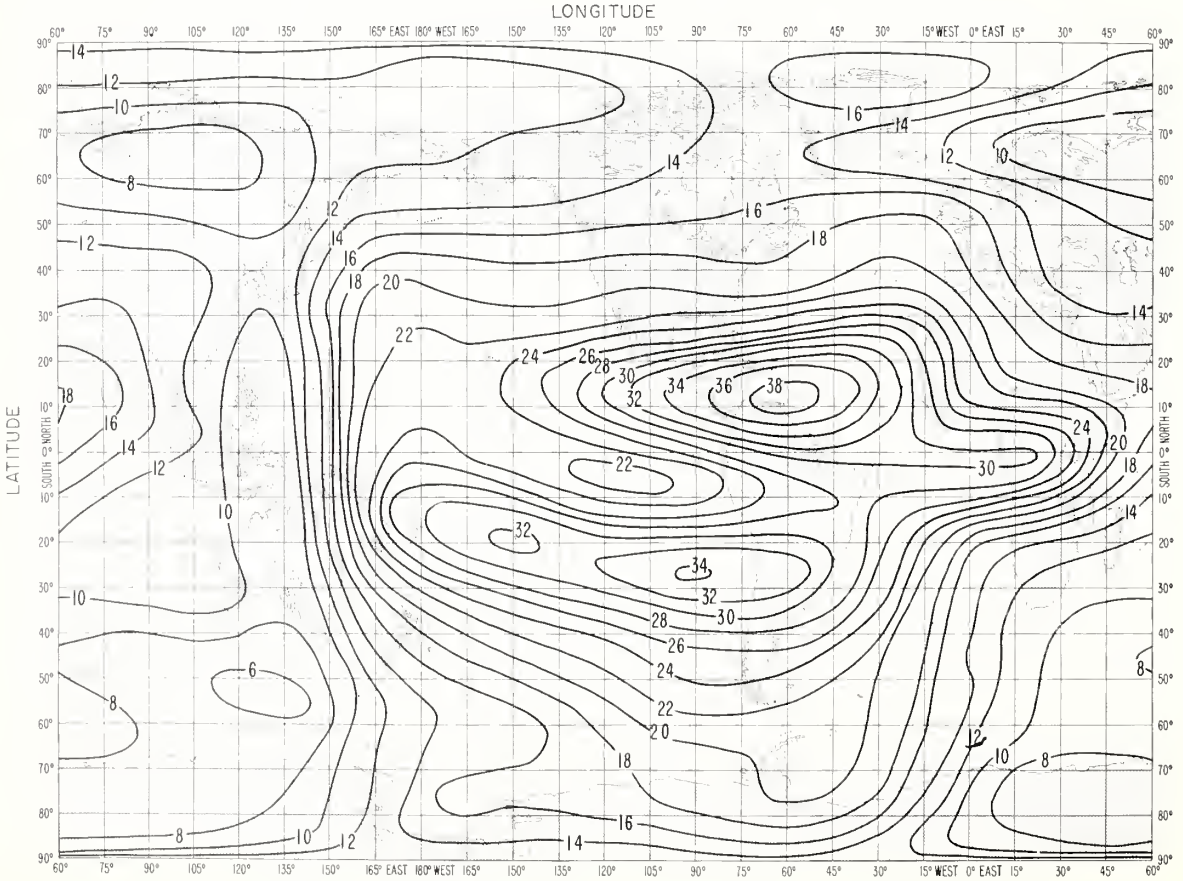

FIG IIB. PREDICTED MEDIAN MUF (4000) F2 (Mc/s)

SEPTEMBER 1964 UT= 22

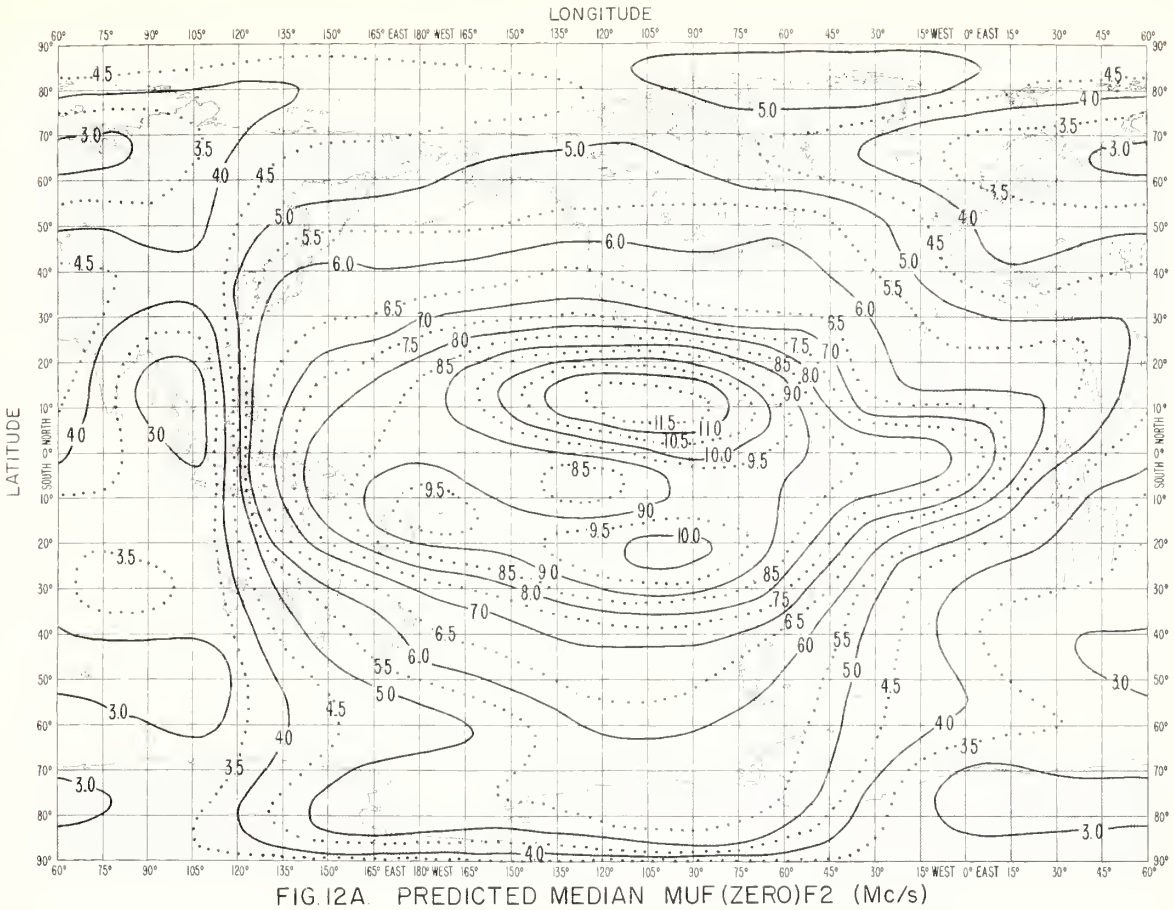

FIG. 12A PREDICTED MEDIAN MUF (ZERO) F2 (Mc/s)

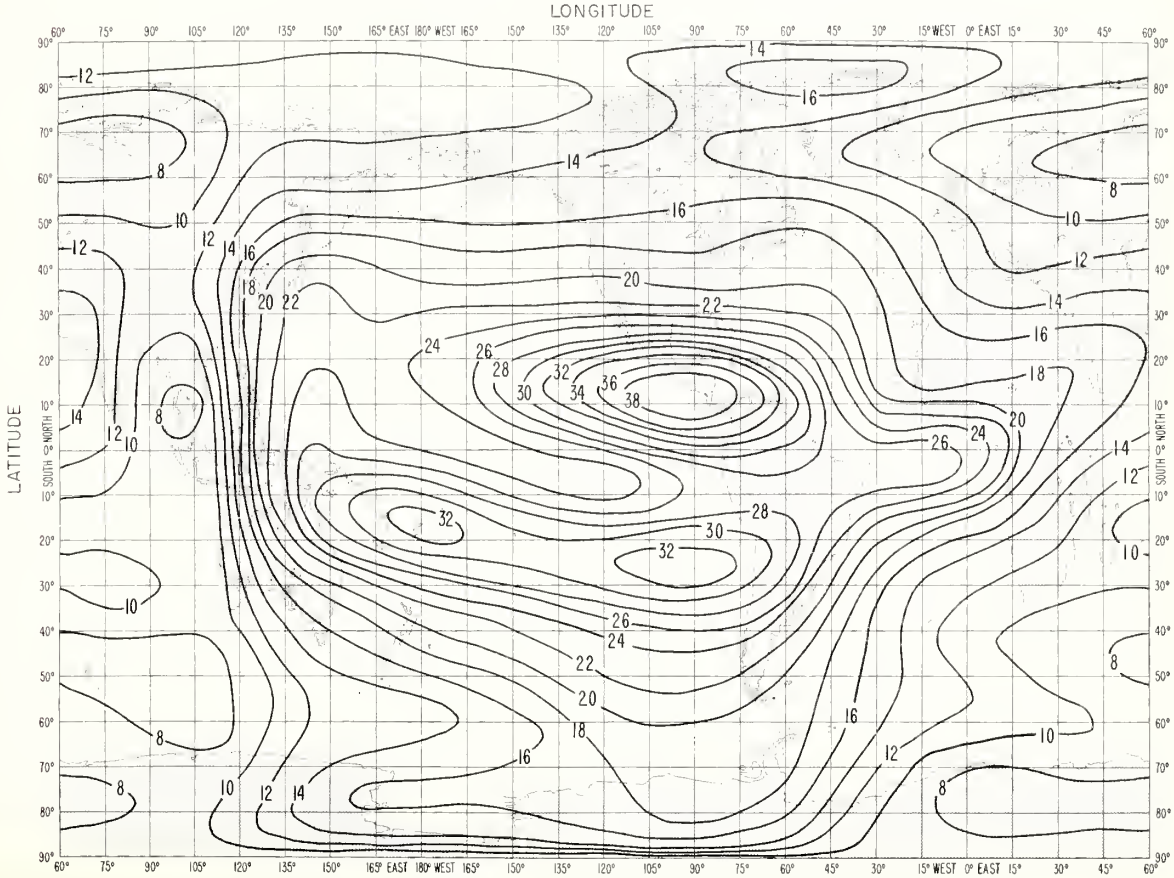

FIG. 12B. PREDICTED MEDIAN MUF (4000) F2 (Mc/s)

NORTH POLAR AREA
SEPTEMBER 1964 UT = 00

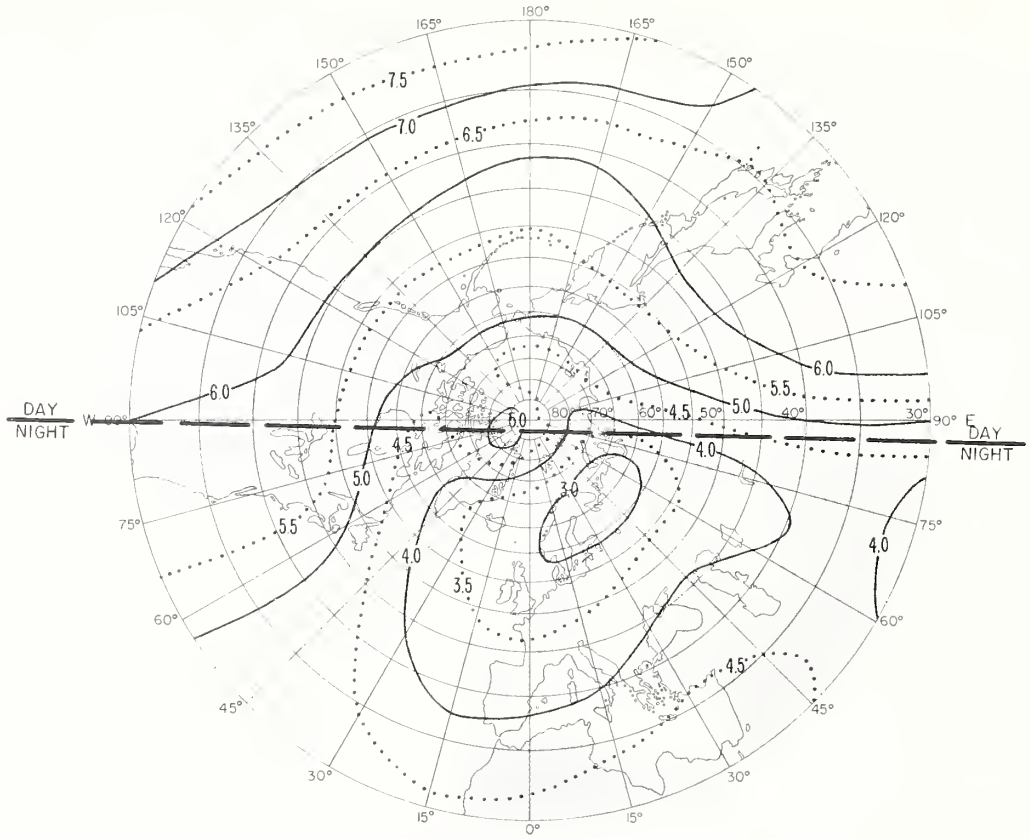

FIG. 13A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

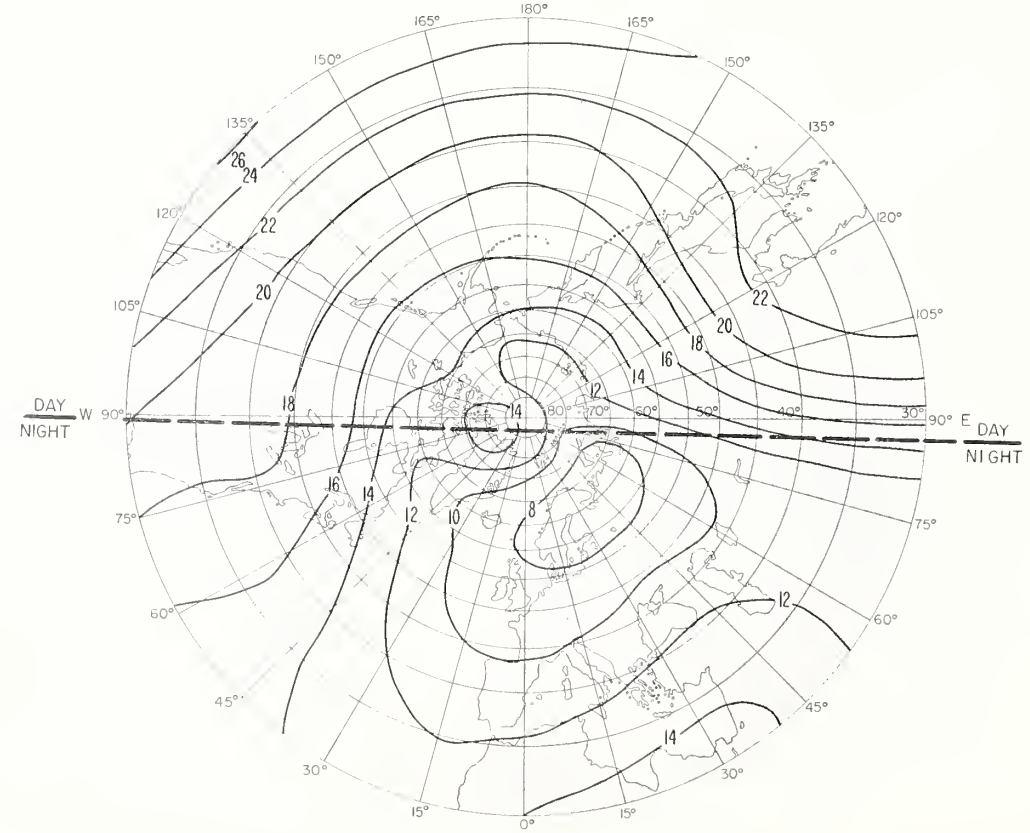

FIG. 13B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

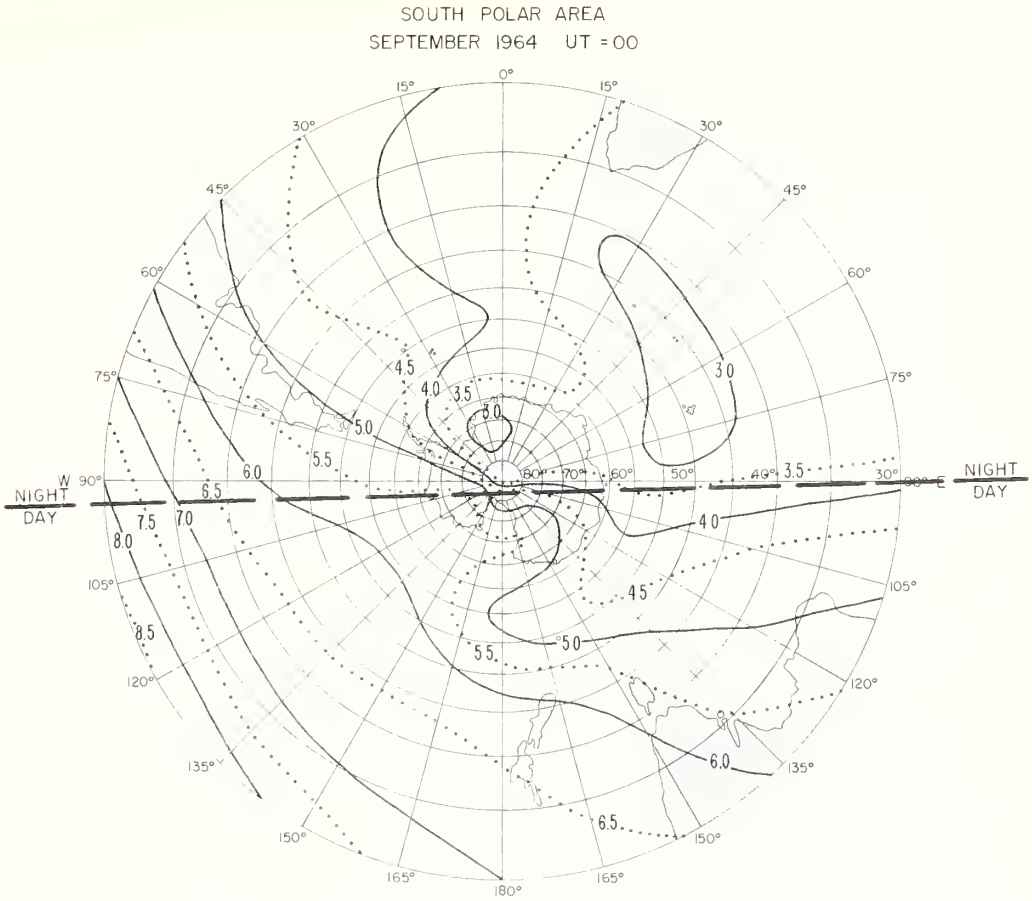

FIG. 14A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

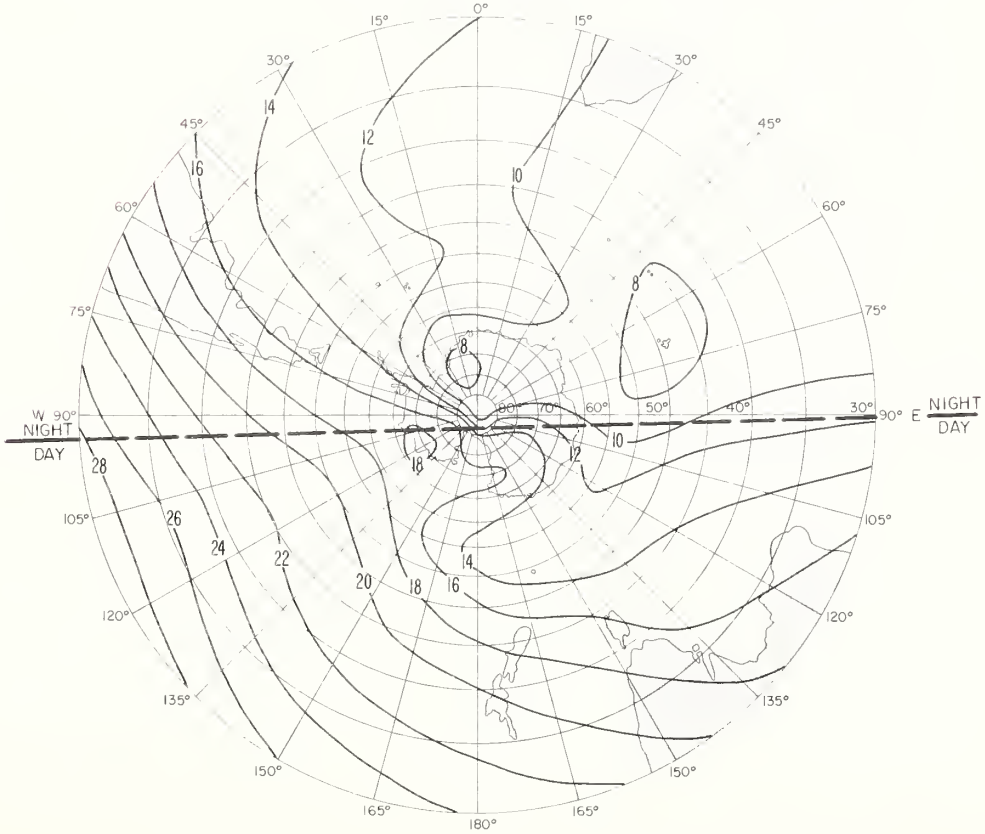

FIG. 14B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

NORTH POLAR AREA
SEPTEMBER 1964 UT = 12

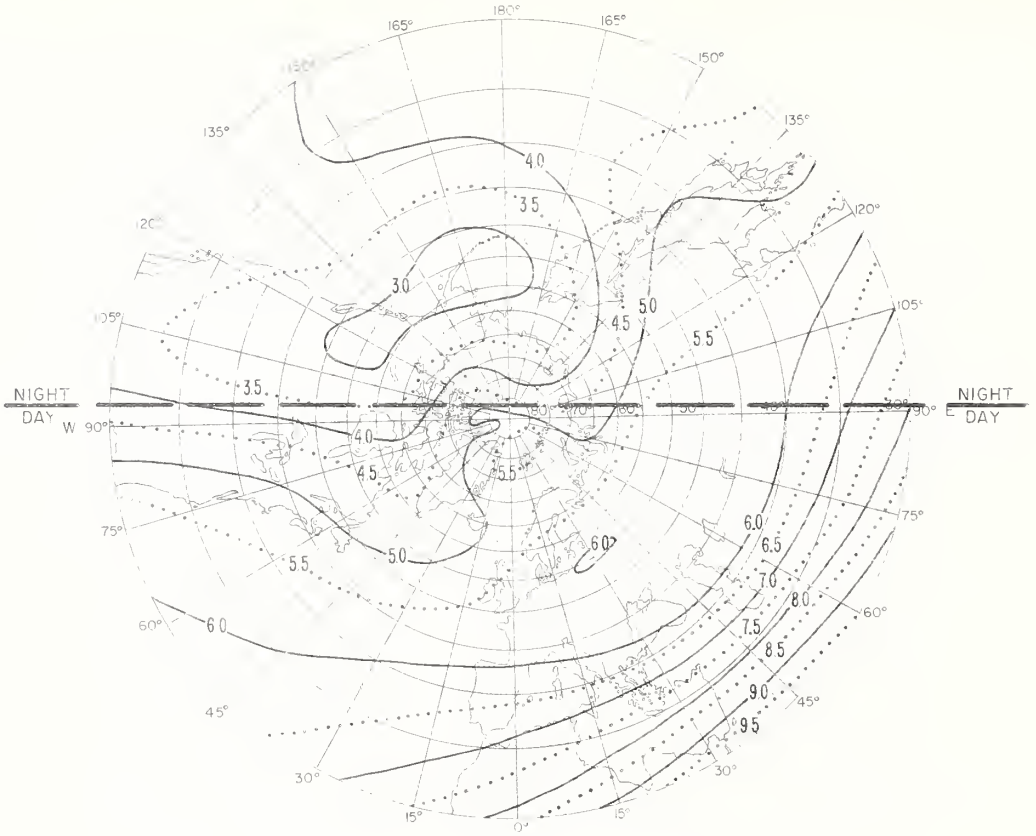

FIG. 15A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

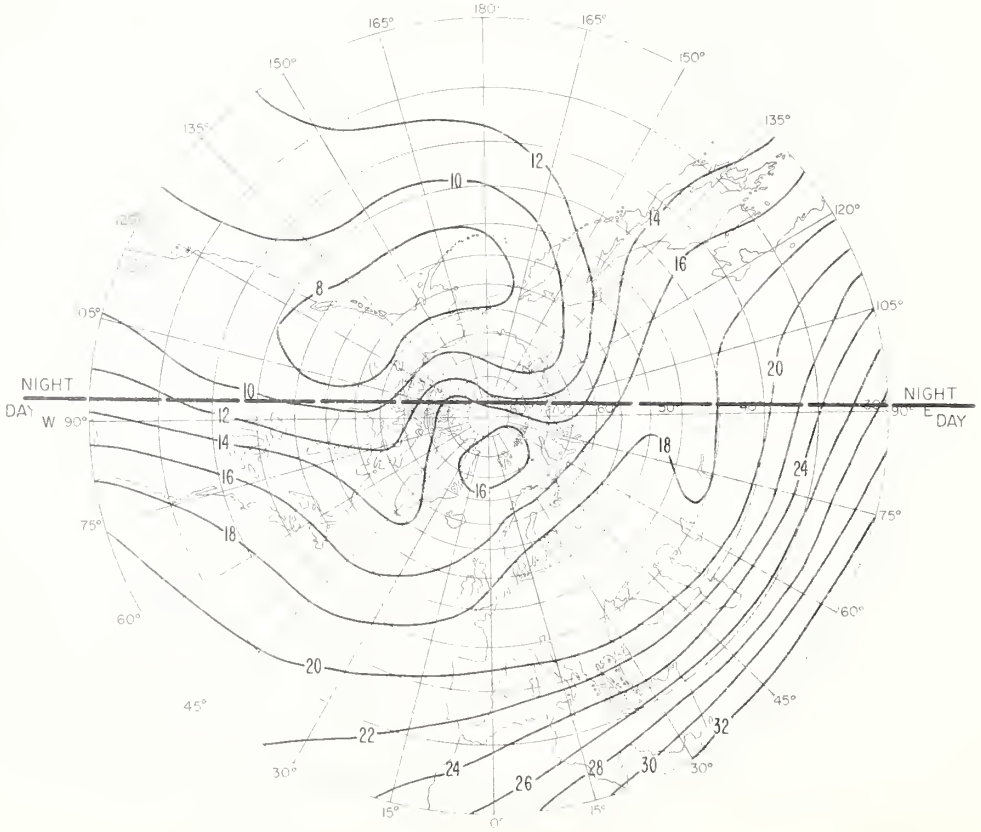

FIG. 15B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

SOUTH POLAR AREA
SEPTEMBER 1964 UT = 12

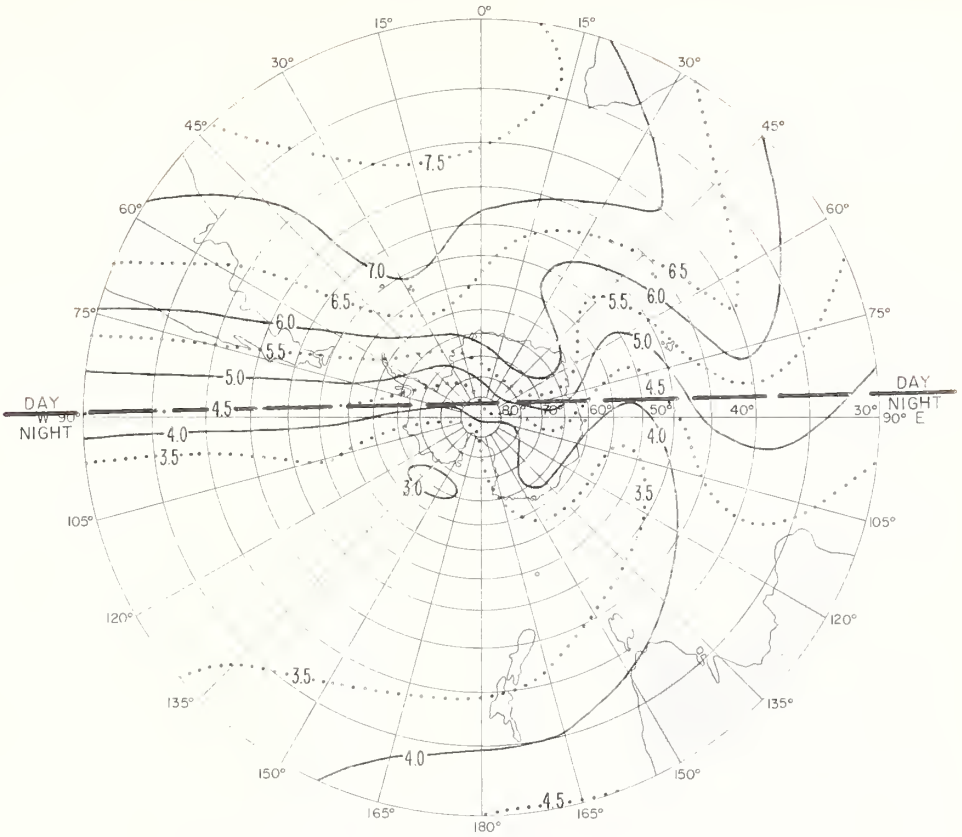

FIG. 16A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

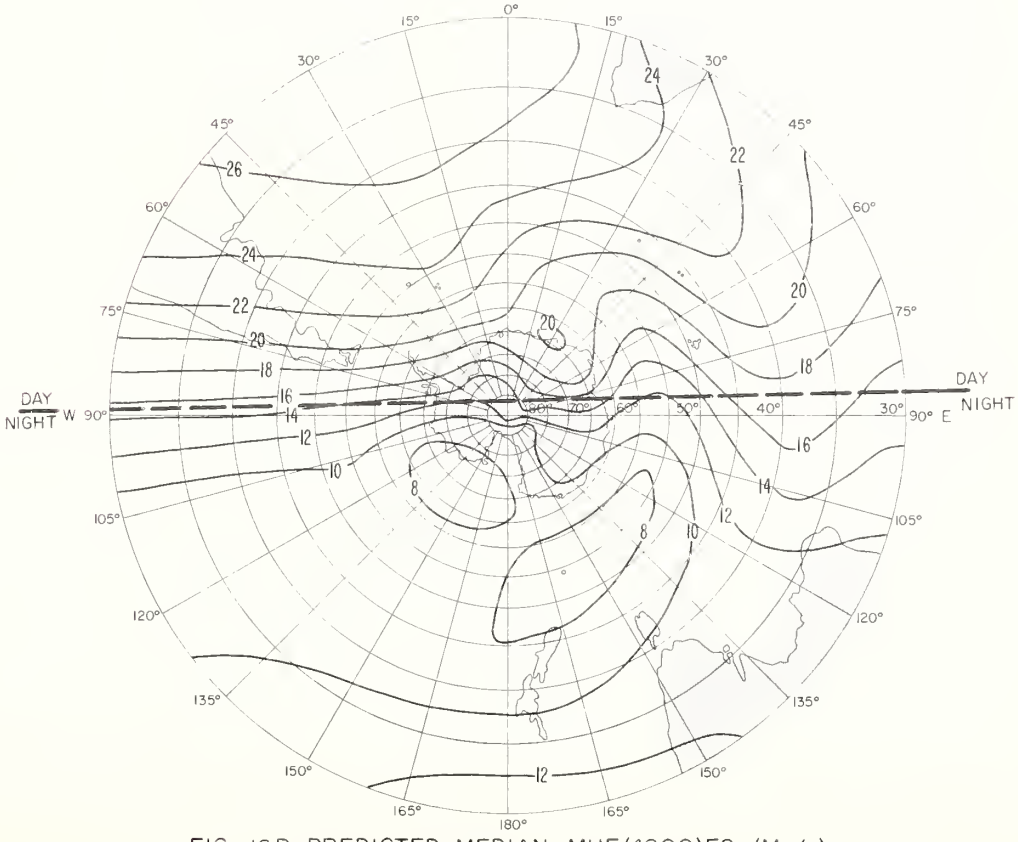

FIG. 16B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

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NG: None.
USAR: None.
For explanation of abbreviations used, see AR 320-50.

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