Central Radio Propagation Laboratory

IONOSPHERIC PREDICTIONS

for

October

1964

TB 11–499–19/TO 31–3–28

U. S. DEPARTMENT of COMMERCE
National Bureau of Standards
Number 19/Issued July 1964

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

NATIONAL BUREAU OF STANDARDS
A. V. Astin, Director

Central Radio Propagation Laboratory

Ionospheric Predictions

for October 1964

Number 19
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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 October 1964 being distributed in July 1964 and designated TB 11–499–(19), 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	26		
	(31)	(28)	(26)	(25)	(25)	(25)	(23)	(21)	(20)	(18)	(18)	(17)
1964												
	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17.5)	(17.3)*		

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.

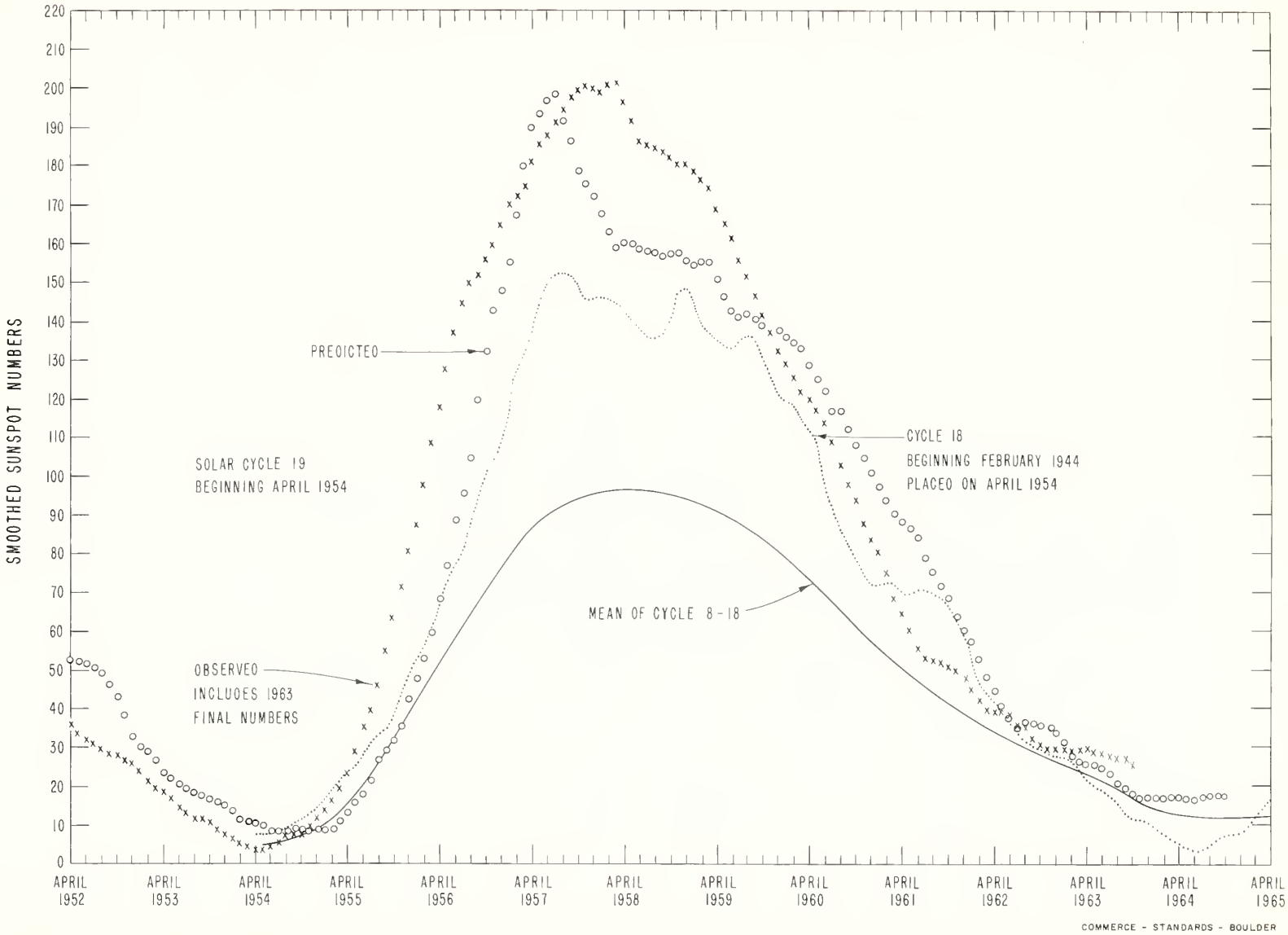

FIG. A. PREDICTED AND OBSERVED SUNSPOT NUMBERS

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	7.9390531E 00	2.4344055E 00	1.6580324E 00	-7.9432575E-01	1.6592077E-01	-1.3467477E-01	-6.1190234E-01	2.2399177E-01	-1.9521873E-01
	1	-1.8489508E-01	3.2996974E-01	-6.9314151E-01	1.4964543E-01	2.0183877E-01	-7.9963905E-01	-1.1649905E 00	4.0681481E-01	-2.7966493E-01
	2	-2.7391368E-01	-1.6894792E 00	1.7635531E 01	5.8867649E 00	5.0603764E 00	-2.0362648E 00	-1.9242965E-02	8.8109146E-01	2.2860670E 00
	3	4.5765495E 00	4.4289854F 00	4.1625913F 01	1.1355570E 01	4.4365414E 00	1.3121973E 01	7.0018815E 00	-4.6458184E 00	-2.5111494E 00
	4	-8.8889396E 01	-5.6757666E 01	-1.0768917E 02	1.0499147E 01	-3.5605540E 01	2.2888090E 01	2.4276348E 00	-1.4667748E 01	-8.8150092E 00
	5	-3.9761774E 01	-6.1031433E 01	-2.3809698E 02	-7.0221972E 01	-2.6226479E 01	-6.7359481E 01	-2.5240381E 01	1.2358738E 01	1.7636558E 01
	6	3.7093640E 02	2.5637616E 02	2.6853496F 02	-1.5562248E 02	1.0116466E 02	-9.1669662E 01	1.0296396F 01	5.3768159E 00	1.2757622E 01
	7	1.1236477E 02	1.8192738E 02	5.2325389E 02	1.5311460E 02	5.2683501E 01	1.4131053E 02	5.1726067E 01	-1.1100293E 01	-4.0004361E 01
	8	-6.6255840E 02	-4.6054758E 02	-3.4555313E 02	3.9258130E 02	-1.4402375E 02	1.6742204F 02	-4.5035547E 01	-8.4830477E 01	-1.3649575E 00
	9	-1.3172714E 02	-2.0444253E 02	-4.9907344E 02	-1.4244684E 02	-4.2909604E 01	-1.3122032E 02	-5.1210399E 01	1.1582038E 00	3.8965977E 01
	10	5.4872893E 02	3.7847040E 02	2.3150095E 02	-3.9092401E 02	1.0341342E 02	-1.4203728E 02	5.4215949E 01	6.1204666E 01	-1.1502997E 01
	11	5.4837220E 01	7.8837650E 01	1.7290515E 02	4.8191850E 01	1.1880881E 01	4.5041198E 01	1.8901828E 01	1.8238801E 00	-1.3847326E 01
	12	-1.7185268E 02	-1.1795495E 02	-6.5673065E 01	1.3860611E 02	-3.0303151E 01	4.5667964E 01	-2.1370578E 01	-1.6545451E 01	6.8504757E 00
II	13	8.4708698E-02	2.1812324E-01	6.1107275E-02	-4.1769270E-02	-1.3287550E-02	6.8217215E-02	1.6086774E-01	-5.2815427E-02	-1.3958139E-02
	14	5.1069969E-02	1.3129628E-01	-5.6308133E-02	5.8044220E-03	-1.3597361E-01	1.3346227E-01	2.8642415E-01	-7.2440521E-02	-1.3251219E-01
	15	-2.8020698E-01	-1.4627852E 00	-6.6195695E-02	2.4353815E-01	8.2776699E-01	1.8879745E-01	1.8314918E-01	1.9226915E-01	-2.3844995E-01
	16	-2.2062141E 00	-3.3878345E 00	-7.6824335E 00	-3.9752176E 00	-1.3020681E 00	-9.2189959E-01	-2.1035159E 00	7.7189454E-01	-1.1073250E 00
	17	-5.8336235E 00	-9.4891040E 00	-1.1052763E 01	2.5121874E 00	1.8564824E 00	-1.7392164E 00	-5.8141986E 00	1.9505344E 00	1.1039219E-01
	18	7.5799823E 00	2.1764098E 00	-1.0546801E 01	-1.8767736E 00	2.8820767F 00	-4.6466550E 00	-5.4920006E 00	5.4746965E 00	6.3170059E 00
	19	2.6362838E 01	2.8251445E 01	-7.9078079E 00	-1.1497568E 01	-1.1044196E 01	-3.6910206E 00	-3.3970206E 00	-5.7468545E 00	5.6589329E 00
	20	9.3269093E 01	9.5638131E 01	9.9460511E 01	4.9091583E 01	1.5007565E 01	1.2663216E 01	3.1305346F 01	-4.1464791E 00	1.3783889E 01
	21	7.8913488E 01	1.2821637E 02	1.1345905E 02	-2.5900109E 01	-4.3407128E 01	2.3771455E 00	5.0811769E 01	-1.3993223E 01	1.4685268E 00
	22	-1.5853235E 02	-5.4881136E 01	1.5458290E 02	2.8407625E 00	-1.9026859E 01	4.4739417E 01	4.5060478E 01	-5.3859012E 01	-5.4941596E 01
	23	-1.9620141E 02	-1.6143448E 02	3.4487096E 01	6.4661060E 01	4.9963325E 01	1.8879779E 01	1.7462217E 01	3.5427567E 01	-3.3849624E 01
	24	-5.1316842E 02	-5.2384320E 02	-3.8678660E 02	-2.0426586E 02	-6.3810968E 01	-6.1932067E 01	-1.6440636E 02	6.1051477E 00	-5.8196688E 01
	25	-3.5896625E 02	-6.0725840E 02	-4.2418863E 02	1.2904986E 02	2.3064691E 02	3.2520906E 01	-1.9046385E 02	4.2018206E 01	-1.0034211E 01
	26	8.2044272E 02	2.6678558E 02	-7.2317553E 02	4.6487283E 01	5.1825011E 01	-1.7931652E 02	-1.6559983E 02	2.1001289E 02	1.9597186E 02
	27	5.0696252E 02	3.8531675E 02	-4.4075619E 01	-1.5184820E 02	-1.0606191E 02	-4.4082583E 01	-3.5072972E 01	-8.5372583E 01	7.8857654E 01
	28	1.1256401E 03	1.1365010E 03	6.3697607E 02	3.7308081E 02	1.4053379E 02	1.3324674C 02	3.7539933E 02	-1.0457991E 00	1.0830416E 02
	29	7.5218003E 02	1.2976132E 03	7.4703193E 02	-2.9855016E 02	-4.9804832E 02	-1.2430252E 02	3.5081905F 02	-6.0896288E 01	2.5010457E 01
	30	-1.8127270E 03	-5.6139595E 02	1.4504463E 03	-1.8577087E 02	-6.9174391E 01	3.4386253E 02	2.9831652E 02	-3.9772480E 02	-3.4385336E 02
	31	-5.5951518E 02	-4.0558916E 02	4.1202934E 00	1.6757050E 02	1.0349514E 02	4.8428454E 01	2.9584296E 01	9.0388935E 01	-7.7961388E 01
	32	-1.0753989E 03	-1.0831525E 03	-4.6233339F 02	-3.1153597E 02	-1.4938081E 02	-1.3017567E 02	-3.8269525E 02	-2.3955871E 00	-9.1812565E 01
	33	-7.2728426E 02	-1.2811843E 03	-6.2962750E 02	3.0955192E 02	4.8072375E 02	1.5874960E 02	-3.1134125F 02	4.3579260E 01	-2.7949223E 01
	34	1.8156178E 03	5.4374285E 02	-1.3000192E 03	2.4612024E 02	4.3691953E 01	-3.1388233E 02	-2.5955864E 02	8.6238196E 02	2.9375826E 02
	35	2.2410164E 02	1.5605369E 02	1.4913066E 01	-7.1414881E 01	-3.7244781E 01	-2.0319891E 01	-8.4116399E 00	-3.5178981E 01	2.7392215E 01
	36	3.7100597E 02	3.7936878E 02	1.1964996E 02	9.7788184E 01	5.9977796E 01	4.7519703E 01	1.4286924E 02	5.5340487E-01	2.8873282E 01
	37	2.6195246E 02	4.7481877E 02	2.0426000E 02	-1.1758690E 02	-1.7226434E 02	-6.8397341E 01	1.0626287E 02	-1.2887639E 01	1.1529915E 01
	38	-6.7686548E 02	-2.0433894E 02	4.2887000E 02	-1.0847054E 02	-9.3249638E 00	1.0966982E 02	8.7250216E 01	-1.2667475E 02	-9.7480422E 01
III	39	2.3579883E-01	1.0063850E-01	-2.0844156E-01	3.2324687E-02	-4.6530302E-02	6.1040176E-03	-8.0522975E-03	1.6463146E-02	-1.0898872E-02
	40	1.0181511E-01	1.4178025E-01	-1.5157266E-01	-6.2094126E-02	-3.0949686E-02	3.7855541E-02	1.2598165E-01	3.1301146E-03	-5.8044087E-03
	41	1.2363044E 00	7.4680240E-01	-1.6770128E 00	-1.0746027E 00	1.3041538E-01	-4.3388941E-02	1.7980842E-02	2.4368135E-01	-8.6040980E-02
	42	2.0942453E-01	4.3877910E-02	8.0561006E-02	5.2944512E-01	1.0034458E-01	3.4559043E-02	-2.9401467E-01	6.3320806E-02	2.5436326E-03
	43	-8.8205076E-02	2.8355082E-01	3.0262454E 00	-9.2999769E-01	8.7991983E-01	-1.2690157E-01	1.9268344E-02	3.3181859E-02	-4.2533378E-02
	44	-7.7200738E-01	-7.3686549E-01	4.8938072E 00	-1.2134567E-01	-1.1353875E-01	1.2730630E-01	-4.0818654E-01	2.8363507E-02	2.3295589E-03
	45	-2.1233976E 00	-1.1817710E 00	7.7321376E 00	5.6036220E 00	-9.1527934E-02	1.5463139E-01	-3.6376931E-02	-1.4505616E 00	2.8901244E-02
	46	-1.3429160E-01	1.0363133E-01	1.6442139F 00	-9.4411821E-01	-3.3122893E-01	1.6328380E-02	5.5019771E-01	-1.1866641E-01	-1.6815757E-02
	47	-1.3307247E 00	-1.2549743E 00	-8.4755981E 00	1.6181059F 00	-1.5969769E 00	-2.9605044E-01	-7.7334840E-02	3.0554129E-02	1.5824916E-01
	48	5.5620166E-02	4.7230797E-02	-1.7241710E 01	7.7368240E-01	1.0768182E-01	-4.4426181E-01		-7.6047735E-02	1.6162785E-03
	49	2.8789471E-02	-2.8487343E-01	-7.3946956E 00	-5.4520255E 00		-1.7888793E-01		1.5707262E 00	-2.1250352E-02
	50	1.3467085E-01	-7.8754876E-02	-3.3778735E 00	9.0008036E-02		-1.3042052E-02			3.9536913E-02
	51	1.1117223E 00	1.1801681E 00	6.4719128E 00	-9.3529892E-01		1.7065420E-01			-1.5083944E-01
	52			1.5078671E 01			3.4900045E-01			

GEOGRAPHICAL VARIATION

Harmonic		5		6		7		8	
	K \ S	9	10	11	12	13	14	15	16
I	0	4.9911355E-02	2.5068945E-01	-1.3882298E-01	-2.9885675E-02	-7.1607071E-03	-1.1643702E-01	8.9914453E-02	1.0657596E-02
	1	4.3478608E-02	1.1476009E-01	-2.1436507E-02	8.7548840E-02	-8.9696283E-02	-9.7156962E-02	2.0486976E-02	-8.1789110E-02
	2	-4.4436955E-02	-4.2223831E-01	2.7346126E-01	1.6291521E-01	3.4484847E-03	2.1052867E-01	-2.2315087E-01	-7.9755341E-02
	3	-1.2890858E-02	-1.2596957E-01	1.6423459E-02	-7.2148191E-02	8.6333807E-02	1.0888497E-01	-1.3576329E-02	8.3580289E-02
	4		1.7295580E-01	-1.4379822E-01	-1.2035342E-01		-8.4841472E-02	1.3681026E-01	6.5828764E-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)

OCTOBER 1964

TIME VARIATION

TABLE 2

TIME VARIATION

GEOGRAPHICAL VARIATION

Harmonic		0	1		2		3	
	K \ S	0	1	2	3	4	5	6
I	0	2.9644630E 00	-1.7173462E-01	-2.6071648E-01	4.3593855E-02	-1.1668060E-01	7.5424817E-02	-5.7537350E-02
	1	1.3910853E-01	4.1710855E-02	-1.5776136E-01	2.7455399E-01	-8.1928724E-02	-1.6805256E-01	-3.9269858E-02
	2	2.1395361E 00	1.3383297E 00	2.6894044E 00	-2.5993594E-01	-1.4417405E-01	-1.1943281E 00	-1.6607084E-01
	3	1.4998359E-01	-2.4732541E-01	1.4290430E 00	-1.5752447E 00	1.5332629E-01	5.5186870E-01	7.7187663E-02
	4	-6.7017364E 00	-3.5888525E 00	-6.2668141E 00	2.2167727E-01	7.6596934E-01	4.1384272E 00	8.6261213E-01
	5	-6.7734883E-01	6.5197817E-01	-2.2908613E 00	2.5087736E 00	1.7008871E-01	-6.1869276E-01	-7.7328265E-02
	6	7.7320913E 00	4.2736856E 00	6.0829441E 00	9.3929653E-02	-9.5720927E-01	-5.2298172E 00	-1.1940737E 00
	7	3.9866574E-01	-4.3400370E-01	1.0835569E 00	-1.2218020E 00	-2.0001711E-01	2.2435581E-01	2.9378502E-02
	8	-3.0961596E 00	-1.8370157E 00	-2.1855692E 00	-1.1302149E-01	4.4393079E-01	2.2320397E 00	5.5412041E-01
II	9	-6.8463916E-03	-1.3828445E-02	1.6938207E-02	-2.5344359E-02	-8.4855452E-03	9.9221082E-03	4.1576045E-03
	10	-5.0147478E-02	-9.9900633E-03	1.6080304E-02	-3.7272381E-02	-2.9973027E-03	6.2773294E-02	-3.8500704E-03
	11	1.1797034E-01	-1.0182236E-01	1.3834136E-01	-6.9973642E-02	5.3948478E-02	1.6057111E-02	-2.0461649E-02
	12	-3.7004508E-01	-4.2366151E-01	-9.1559864E-01	2.4682239E-01	-7.7797821E-02	3.0927367E-01	6.0508627E-02
	13	2.1983795E-01	-2.7596778E-01	-4.0188776E-01	1.7560328E-01	-1.1503918E-02	-5.9256849E-02	4.8080433E-02
	14	7.5069703E-01	1.7011815E-01	-2.0964895E-01	6.8179846E-01	1.5887405E-02	-8.9424773E-01	8.5068038E-02
	15	-4.5806968E-01	5.2542861E-01	-4.1787930E-01	3.7286949E-01	-5.5595370E-02	-6.8358685E-02	8.0330405E-02
	16	2.6587591E 00	2.1786317E 00	5.5548468E 00	-1.7460200E 00	1.4585116E-01	-1.9410181E 00	-2.8505015E-01
	17	-7.8560093E-01	2.3335657E 00	1.4201610E 00	-6.6091760E-01	3.8424289E-02	9.0774269E-02	-6.6668419E-02
	18	-3.4197869E 00	-2.8885914E-01	1.1007104E 00	-2.9809540E 00	-3.2922482E-02	3.7343771E 00	-1.0028825E-01
	19	1.7090850E-01	-8.2554543E-01	3.5731492E-01	-4.6219867E-01	-1.8925484E-02	5.1644009E-02	-8.7147291E-03
	20	-4.7335666E 00	-3.7432837E 00	-9.4178224E 00	3.6169772E 00	-1.1792468E-01	3.5333691E 00	2.8589726E-01
	21	1.2412663E 00	-5.0377935E 00	-1.2840461E 00	9.6574486E-01	-6.7808278E-02	-1.1535602E-01	-4.3113685E-02
	22	5.8960798E 00	1.0957531E-01	-2.3746388E 00	4.6205567E 00	6.4741278E-02	-5.7230756E 00	7.5953057E-02
	23	1.5679422E-01	2.7699486E-01	-1.1061978E-01	1.1748446E-01	1.3555668E-02	4.5879115E-02	5.7196642E-03
	24	2.5169006E 00	2.1481904E 00	5.1508856E 00	-2.2321616E 00	7.1360339E-02	-1.9784297E 00	-4.1758844E-02
	25	-5.7886991E-01	3.2538764E 00	3.4853247E-01	-4.6064457E-01	3.3149557E-02	3.8660474E-02	2.3647552E-02
	26	-3.5350886E 00	5.9583199E-02	1.4586170E 00	-2.3028530E 00	-4.2457194E-02	2.8747625E 00	-4.6634423E-02
III	27	-2.6897385E-02	-2.1415435E-02	-8.9896080E-03	2.0336540E-03	4.9742481E-04	1.5565209E-02	3.2948838E-04
	28	-2.0193346E-02	-1.9626534E-02	6.2518052E-03	-1.2929174E-02	-8.0366715E-04	7.3594518E-03	8.6441709E-04
	29	-1.1453588E-01	-2.2122983E-02	-1.1414797E-01	6.8374121E-02	-6.8302378E-05	1.1398689E-02	-4.2746722E-05
	30	1.0278023E-01	-8.8515589E-04	-9.1694384E-02	7.0506154E-02	1.7762912E-04	-6.3544985E-03	-2.3366257E-04
	31	8.9029192E-02	5.4482022E-02	1.0638426E-01	-1.3444724E-02	-3.1602785E-03	-1.5978433E-01	-2.2238591E-03
	32	-2.8019066E-03	1.5682415E-01	-4.2118452E-02	-1.2742730E-02		-4.1114043E-02	
	33	3.1353790E-01	2.1974884E-02	2.6029781E-01	-1.3426625E-01		-4.3461900E-03	
	34	-3.0975570E-01	1.5112737E-02	2.4516636E-01	-1.2377385E-01		1.6135194E-02	
	35			3.3627010E-02			2.5363023E-01	
	36							

GEOGRAPHICAL VARIATION

Harmonic		4		5		6	
	K \ S	7	8	9	10	11	12
I	0	2.6932408E-02	1.9332570E-02	4.1659415E-03	3.2778603E-02	-2.1513175E-02	-6.7676818E-03
	1	2.7723908E-03	-3.8629165E-02	2.6347898E-02	2.1863254E-02	-1.3426648E-02	1.8585587E-02
	2	-1.4302455E-02	-2.1900360E-02	-9.8987924E-03	-3.2064465E-02	2.2752385E-02	7.9162116E-03
	3	-1.5618844E-03	2.9321977E-02	-2.1582606E-02	-2.0173967E-02	1.4884303E-02	-1.0309819E-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 M(3000)F2

OCTOBER 1964

OCTOBER 1964 UT=00

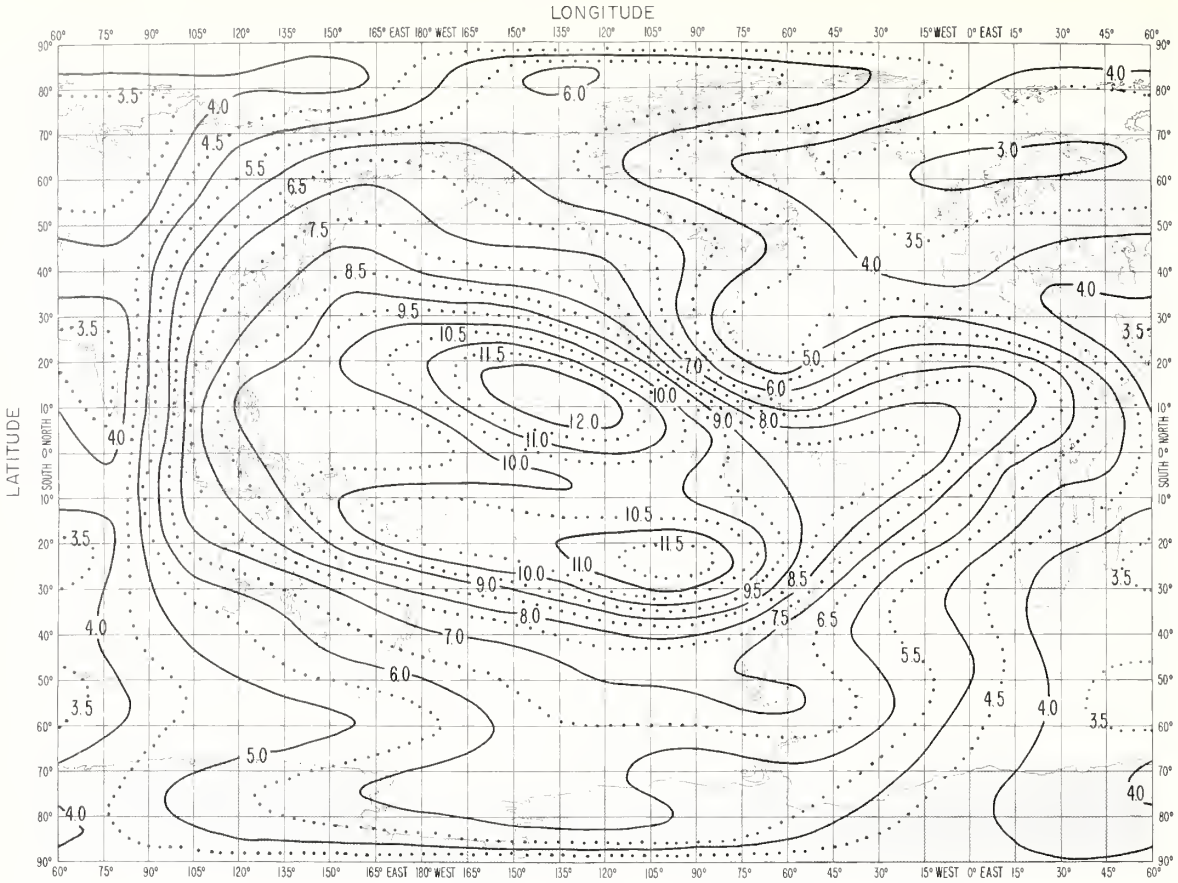

FIG. 1A PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

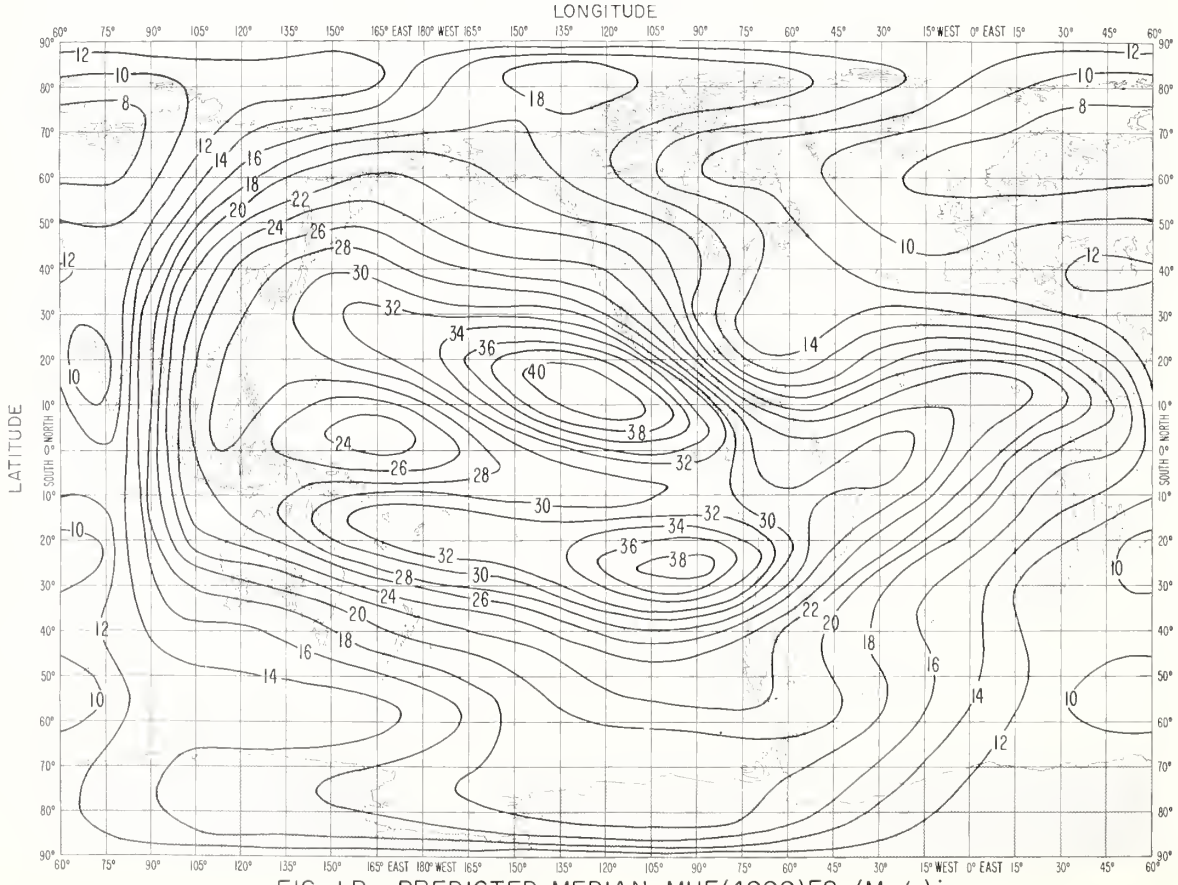

FIG. 1B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

OCTOBER 1964 UT=02

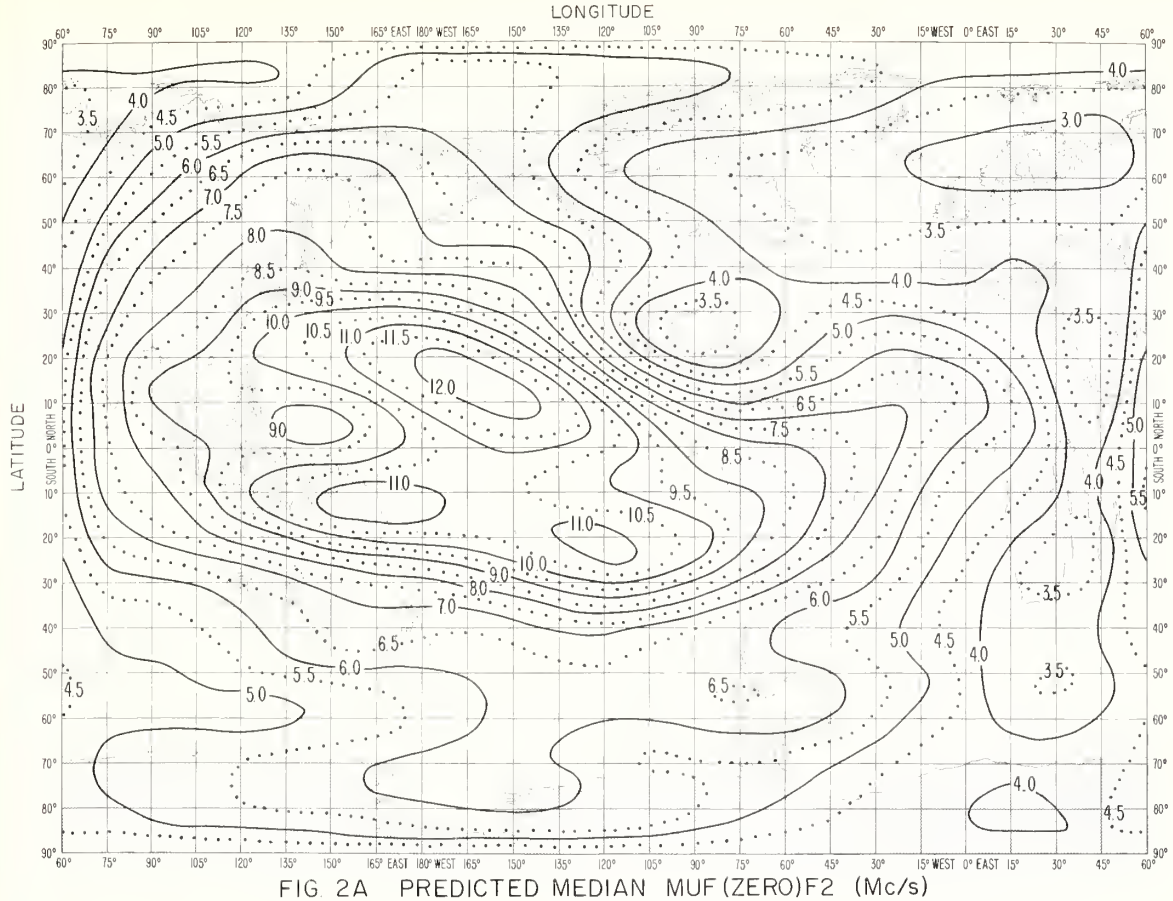

FIG. 2A PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

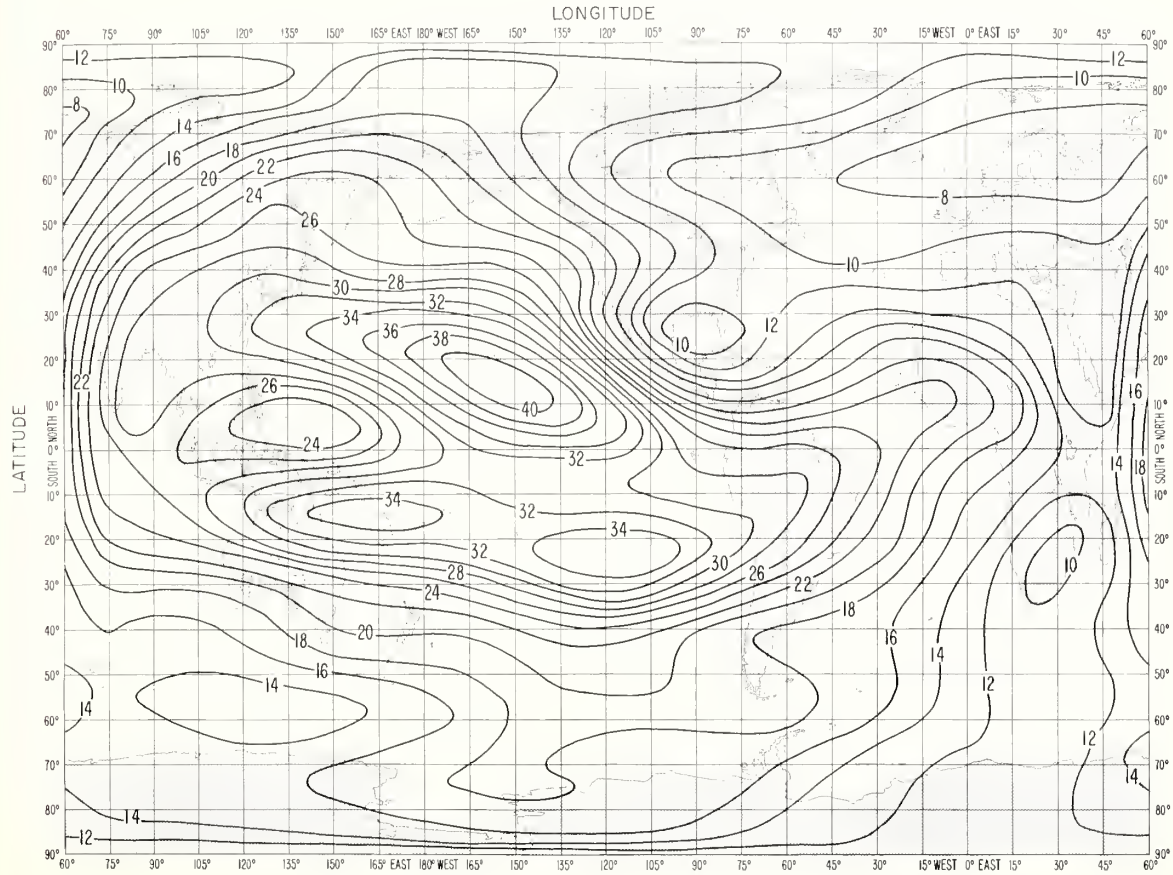

FIG. 2B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

OCTOBER 1964 UT=04

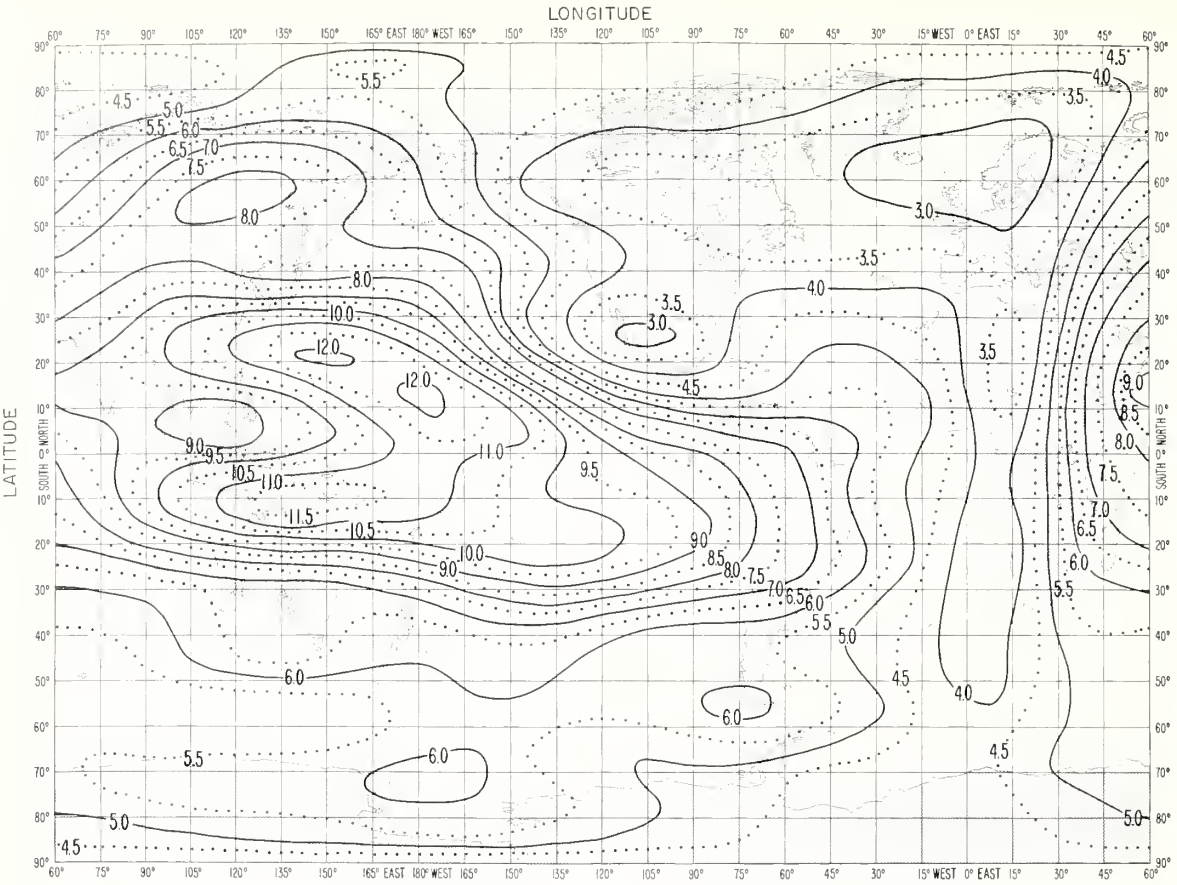

FIG. 3A PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

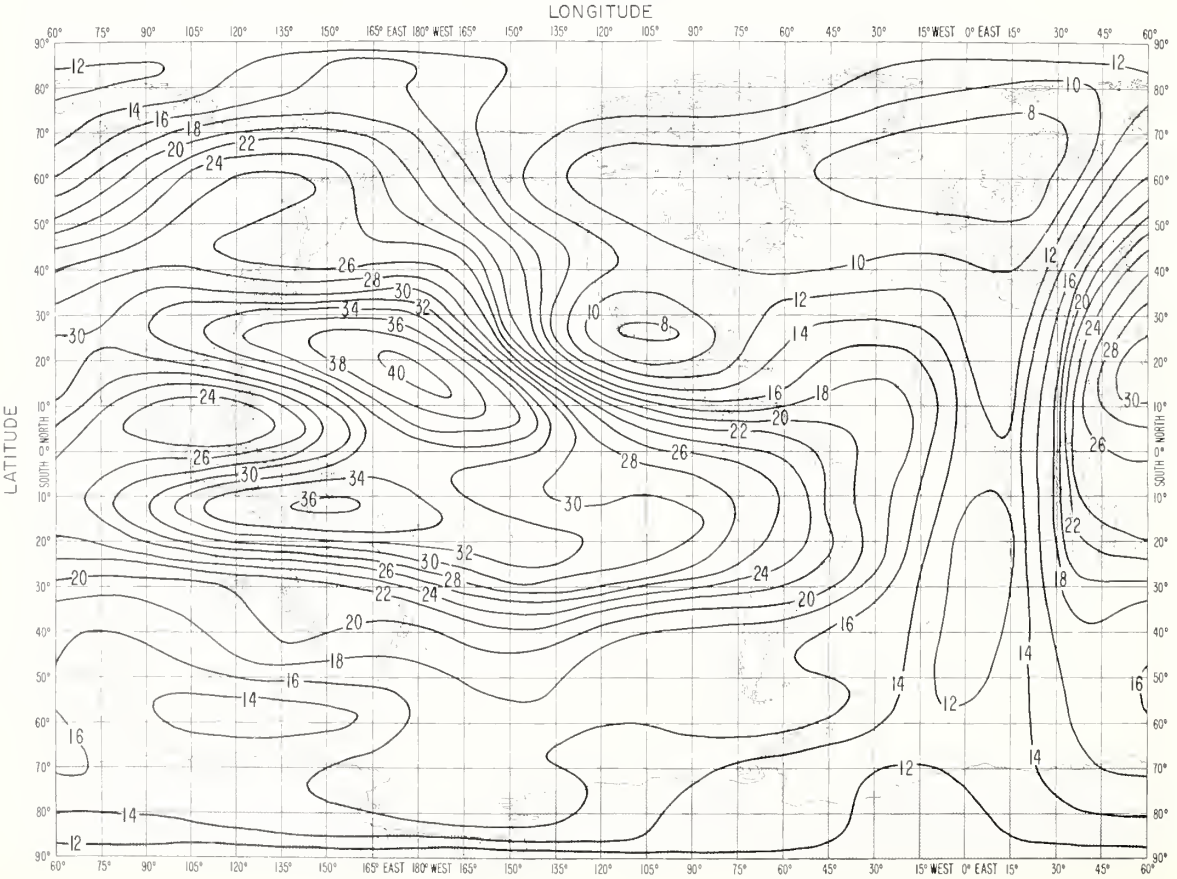

FIG. 3B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

OCTOBER 1964 UT=06

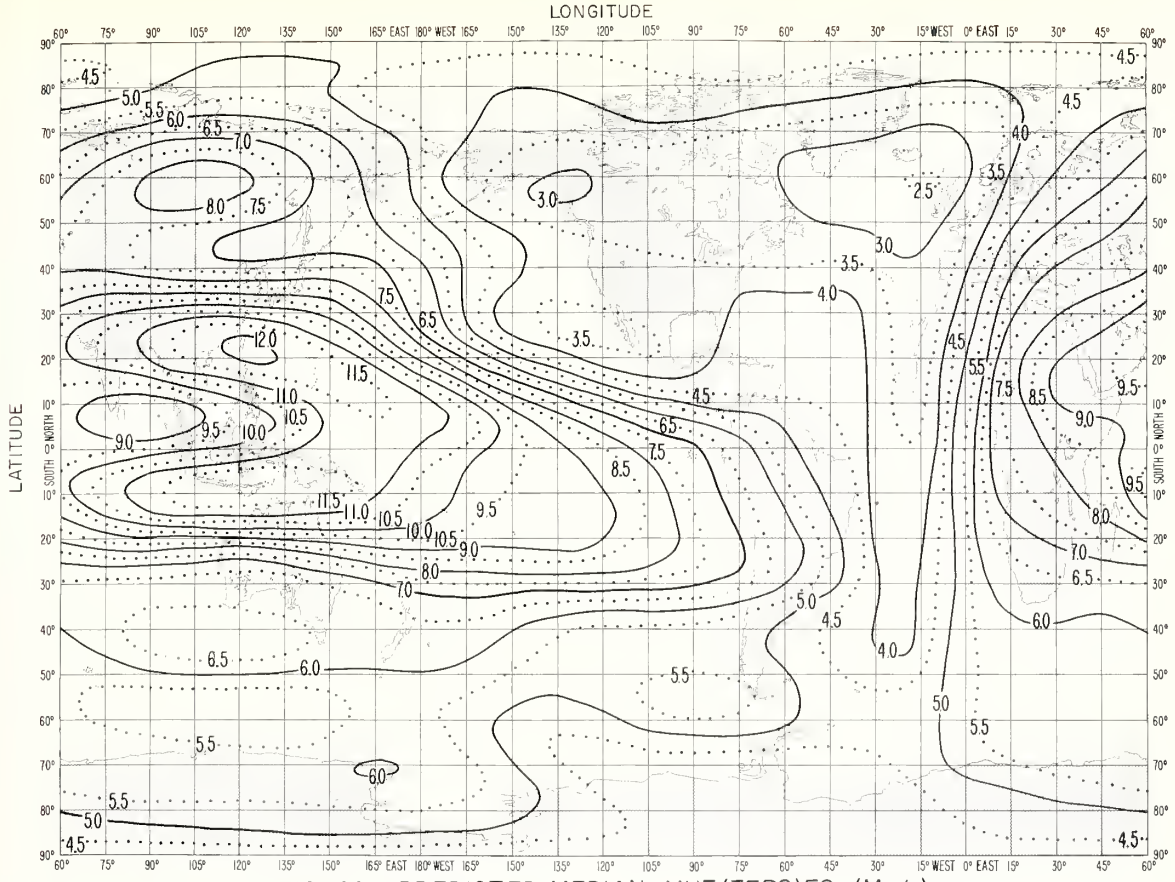

FIG. 4A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

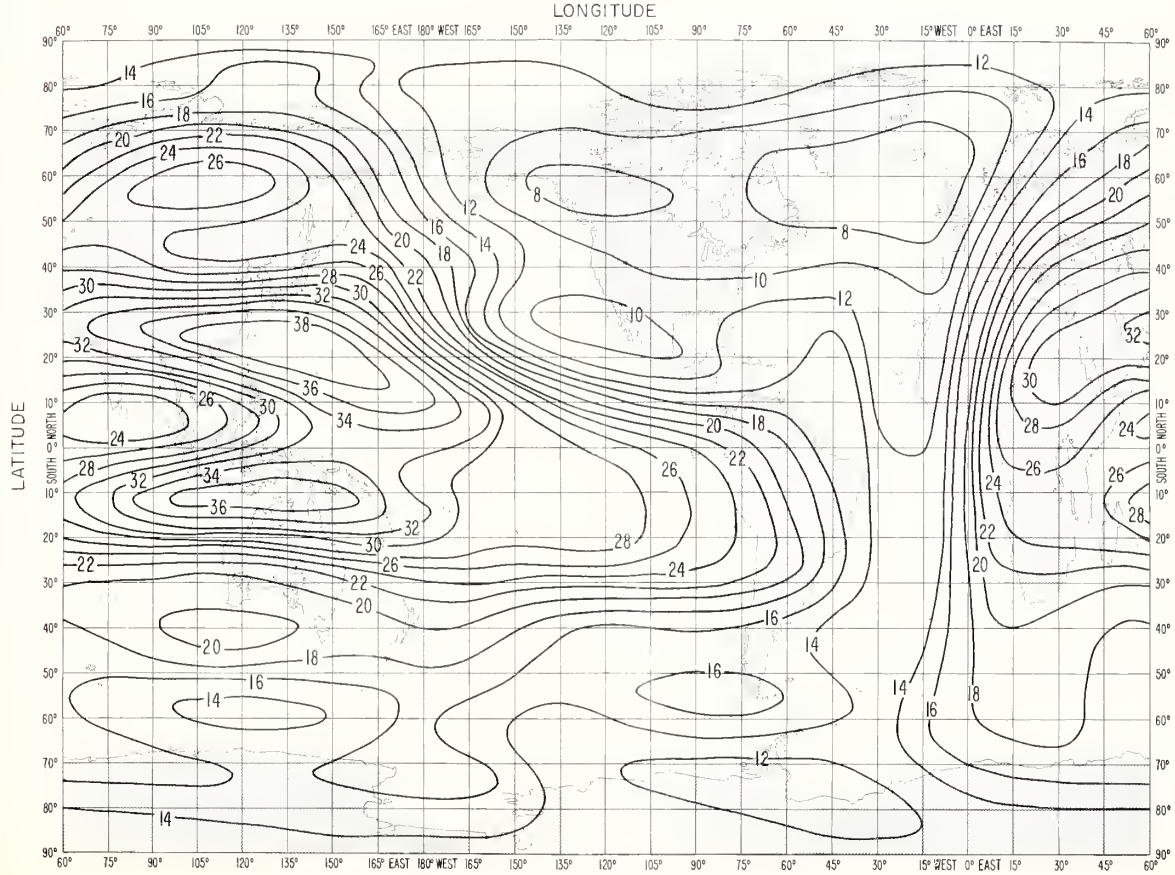

FIG. 4B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

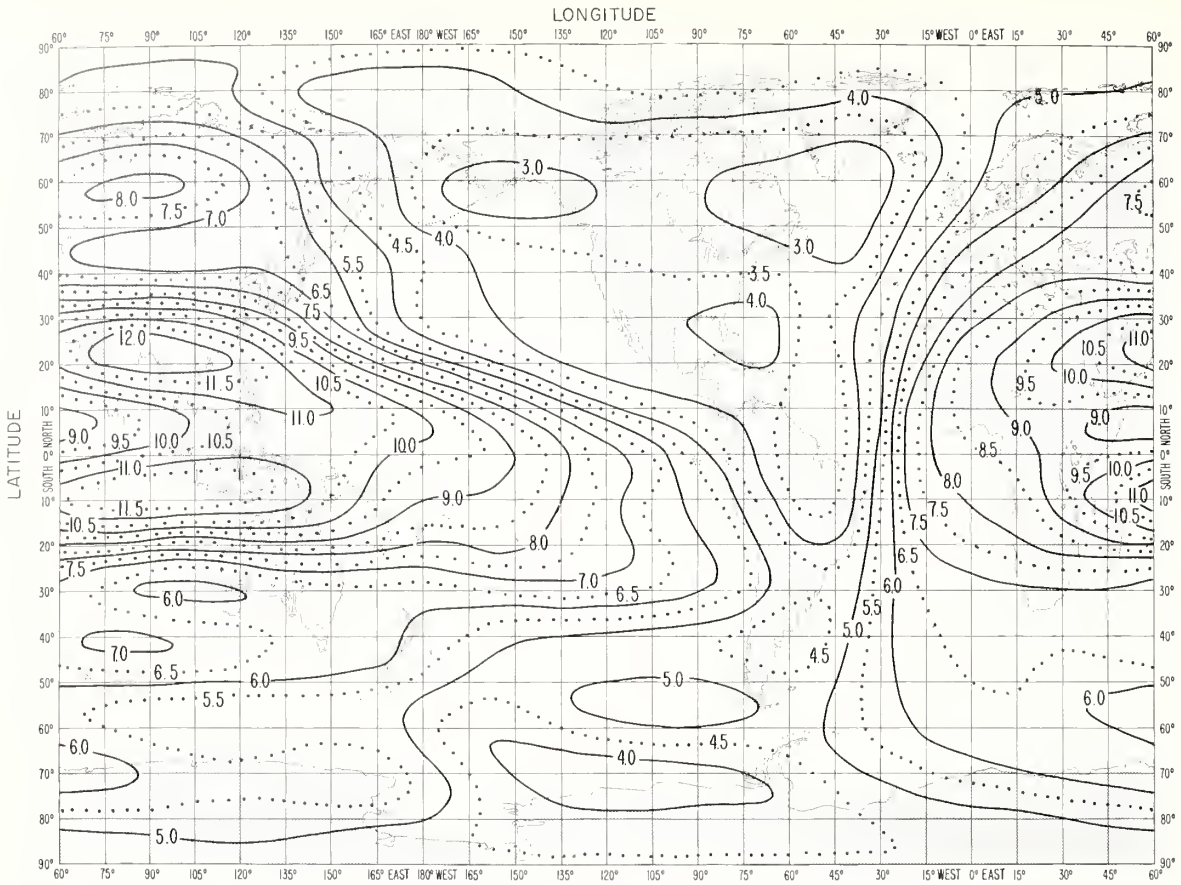

FIG. 5A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

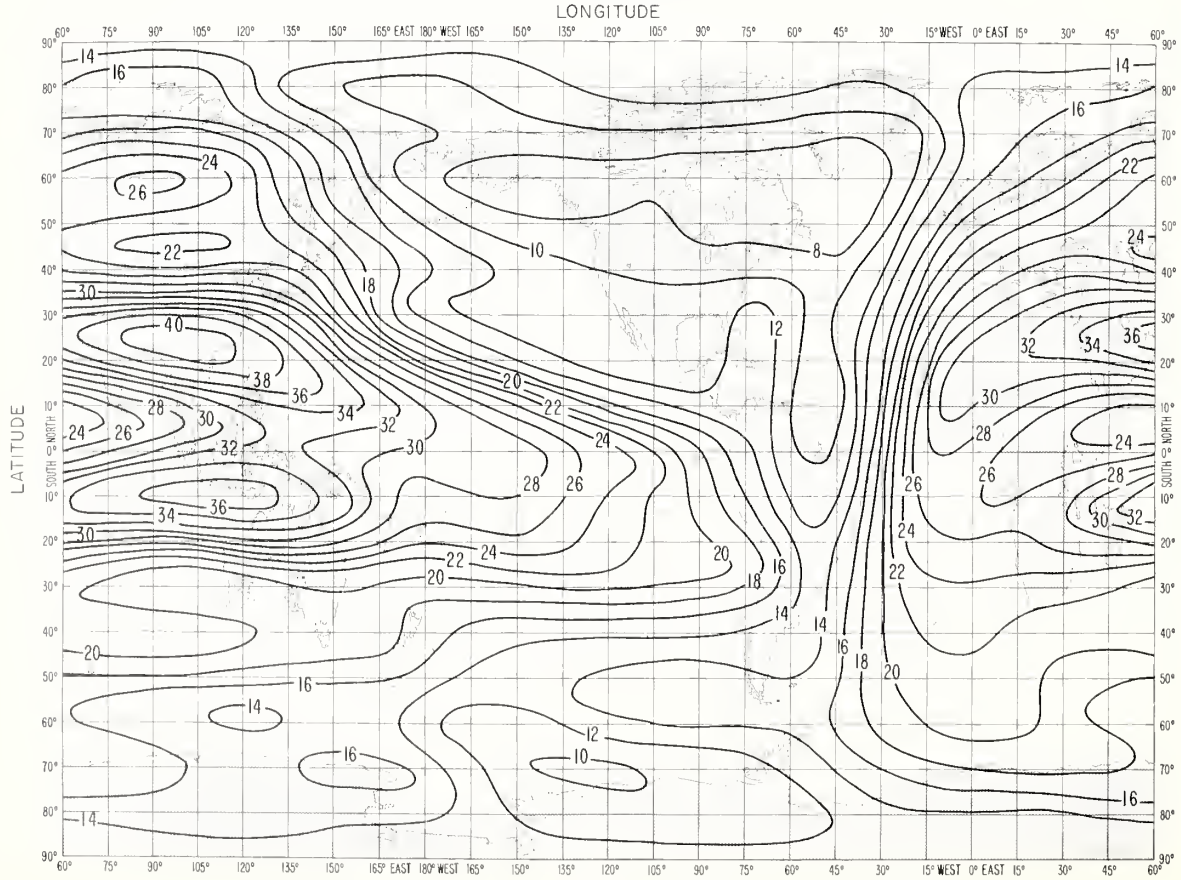

FIG. 5B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

OCTOBER 1964 UT= 10

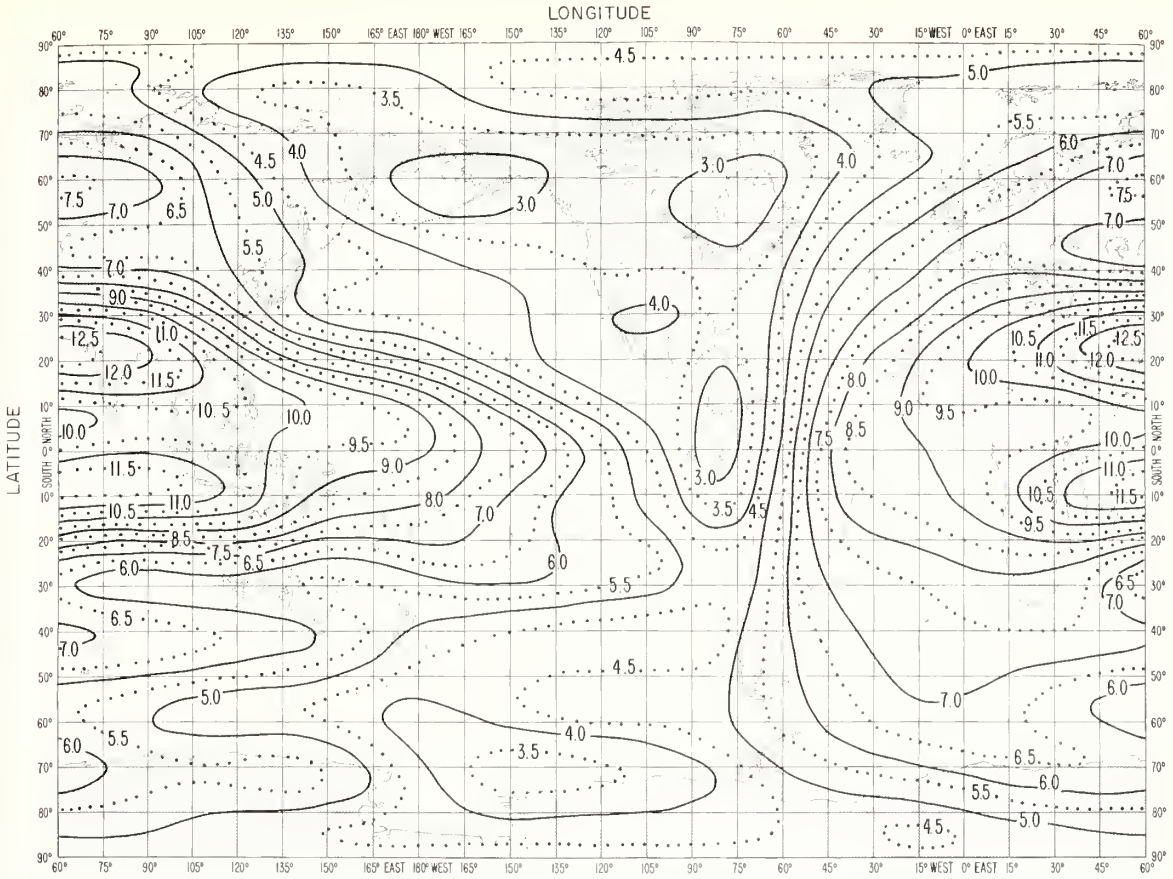

FIG 6A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

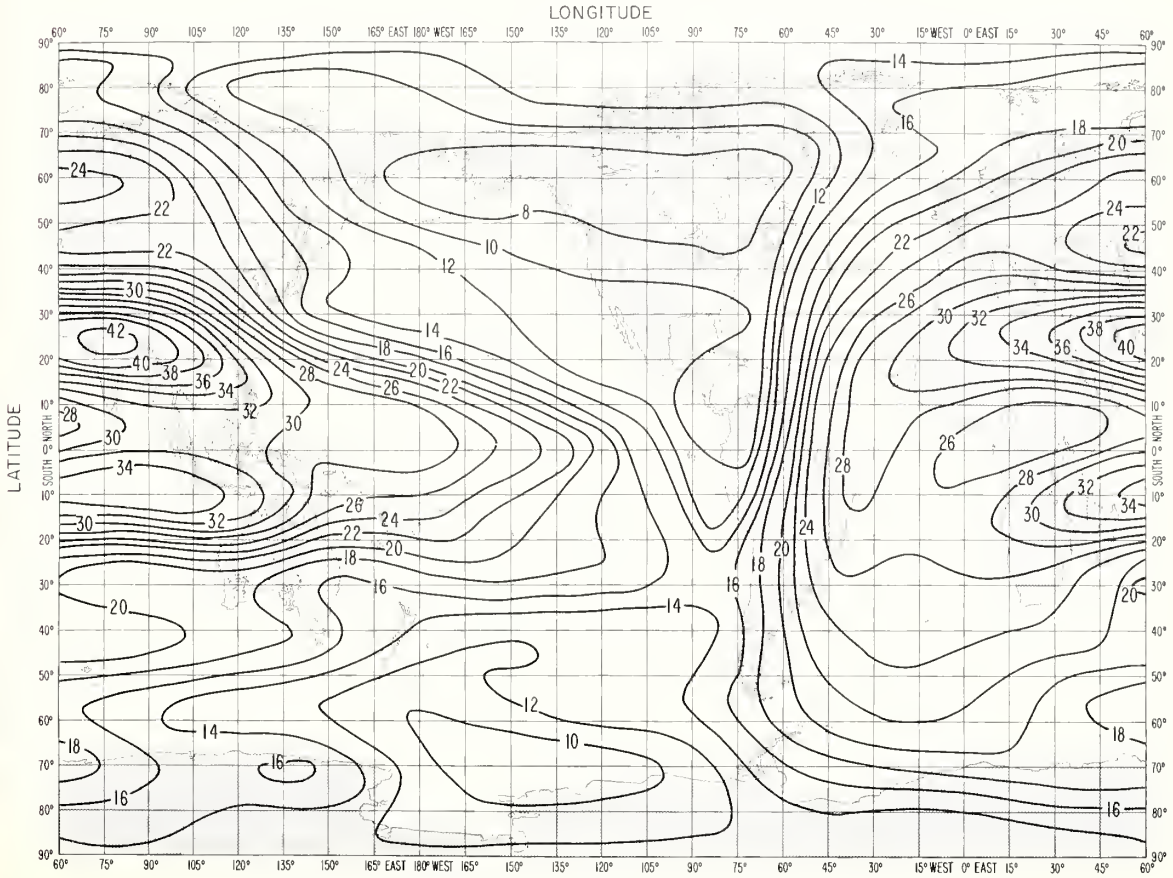

FIG. 6B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

OCTOBER 1964 UT= 12

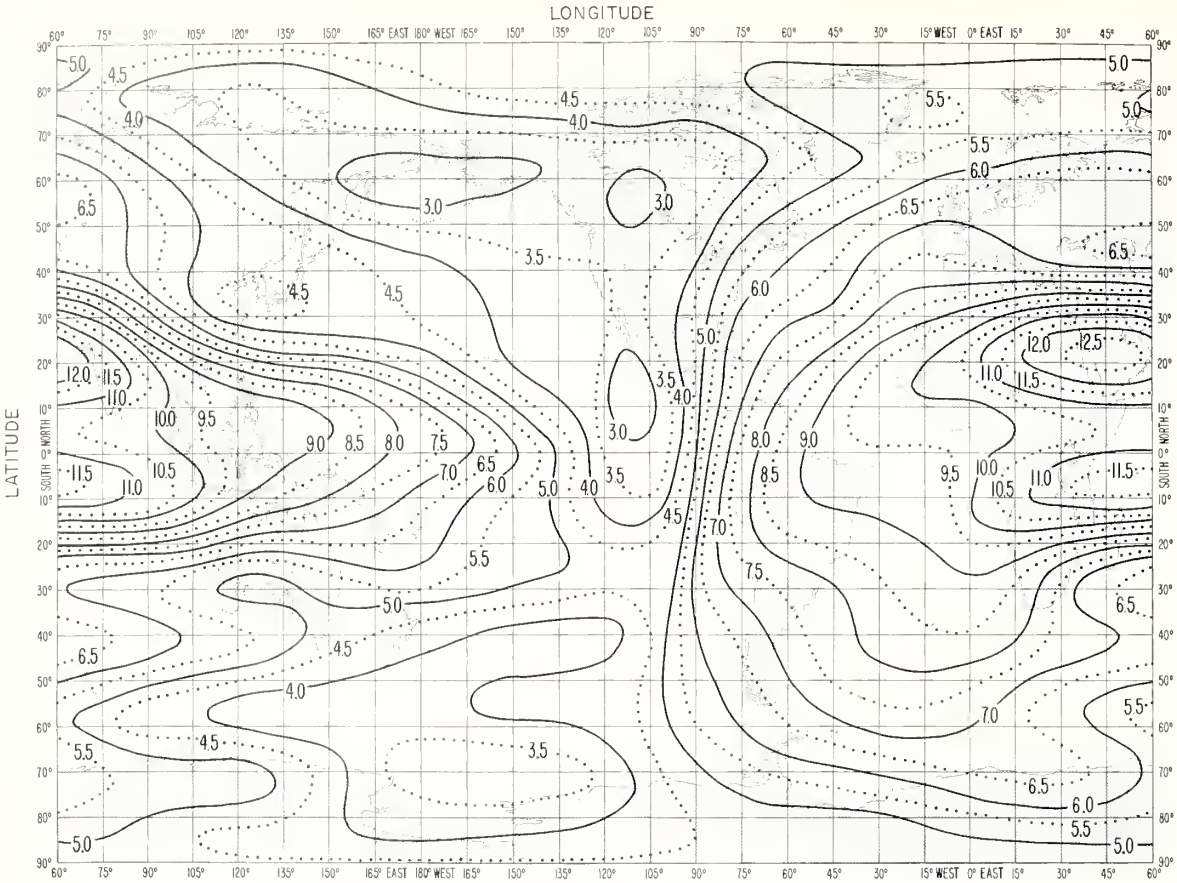

FIG 7A PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

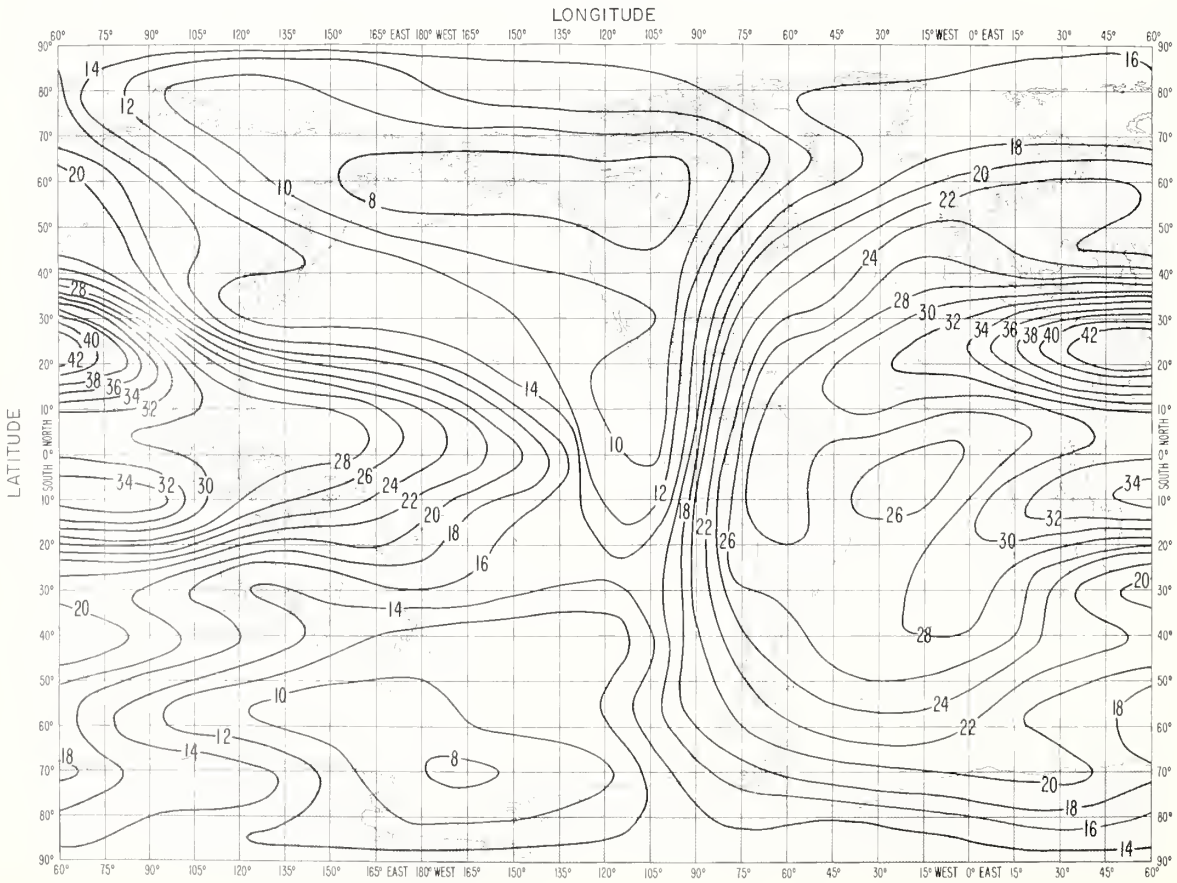

FIG 7B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

OCTOBER 1964 UT= 14

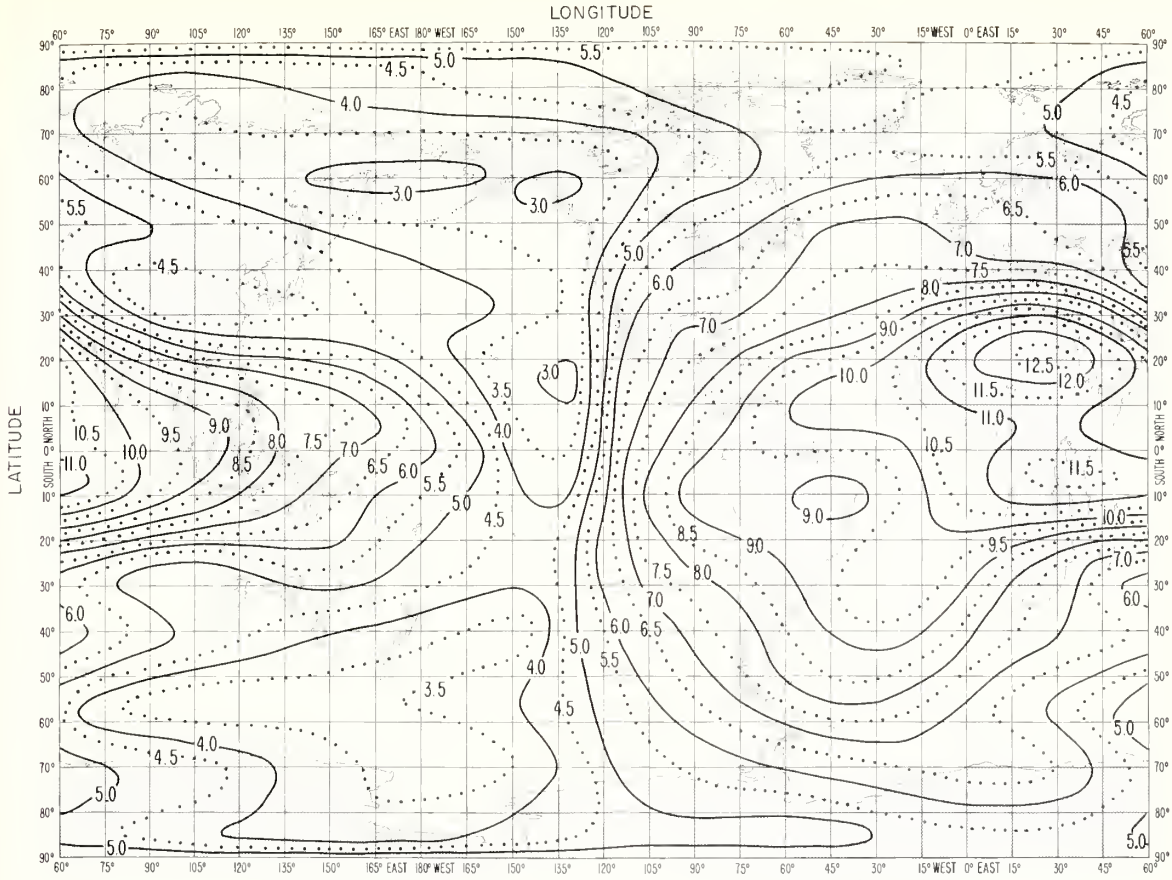

FIG 8A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

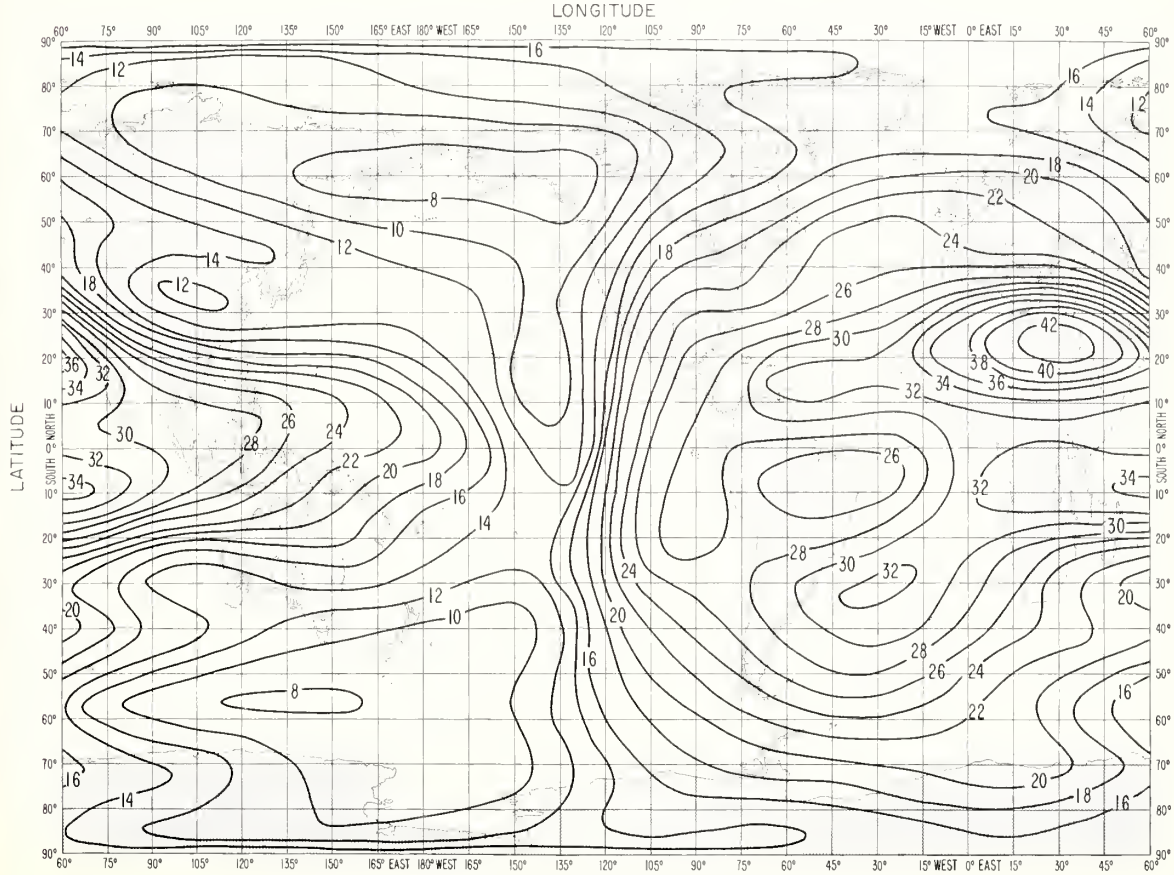

FIG. 8B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

OCTOBER 1964 UT= 16

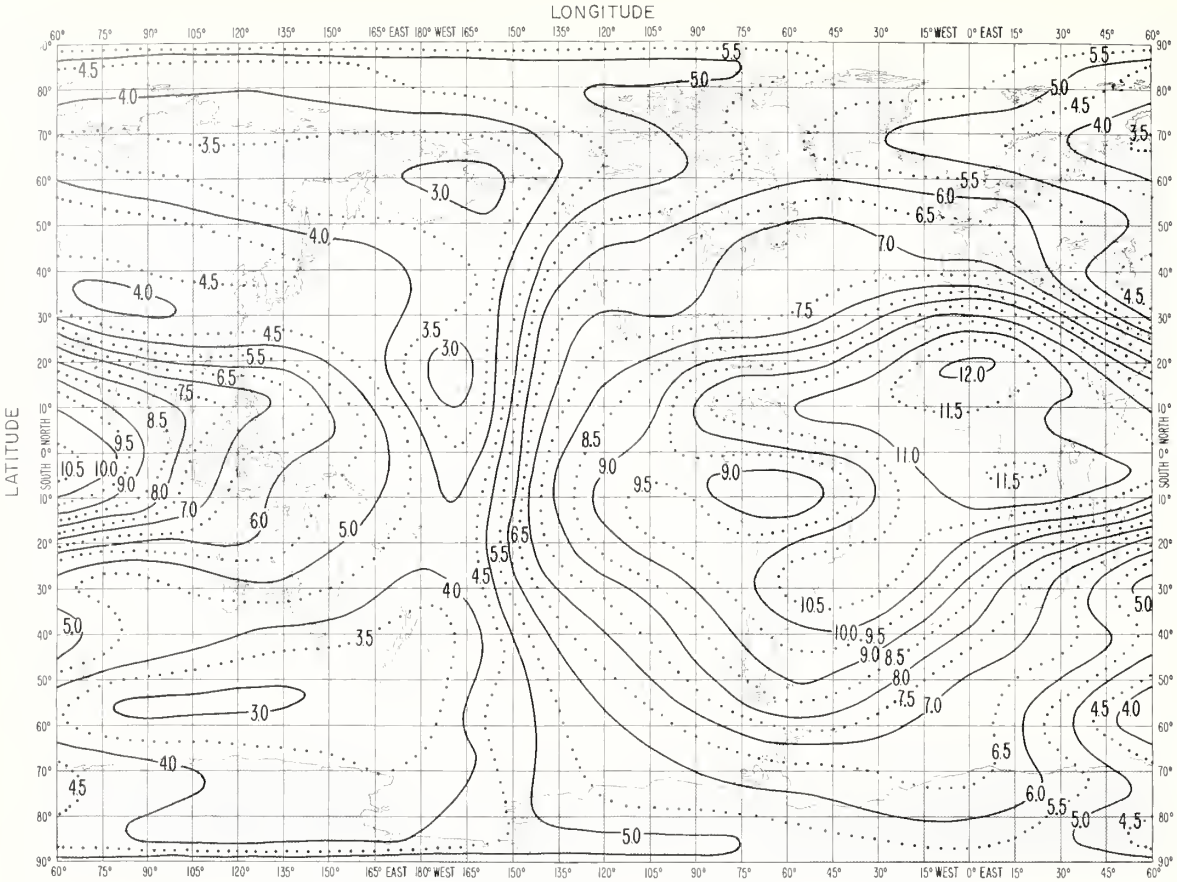

FIG 9A PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

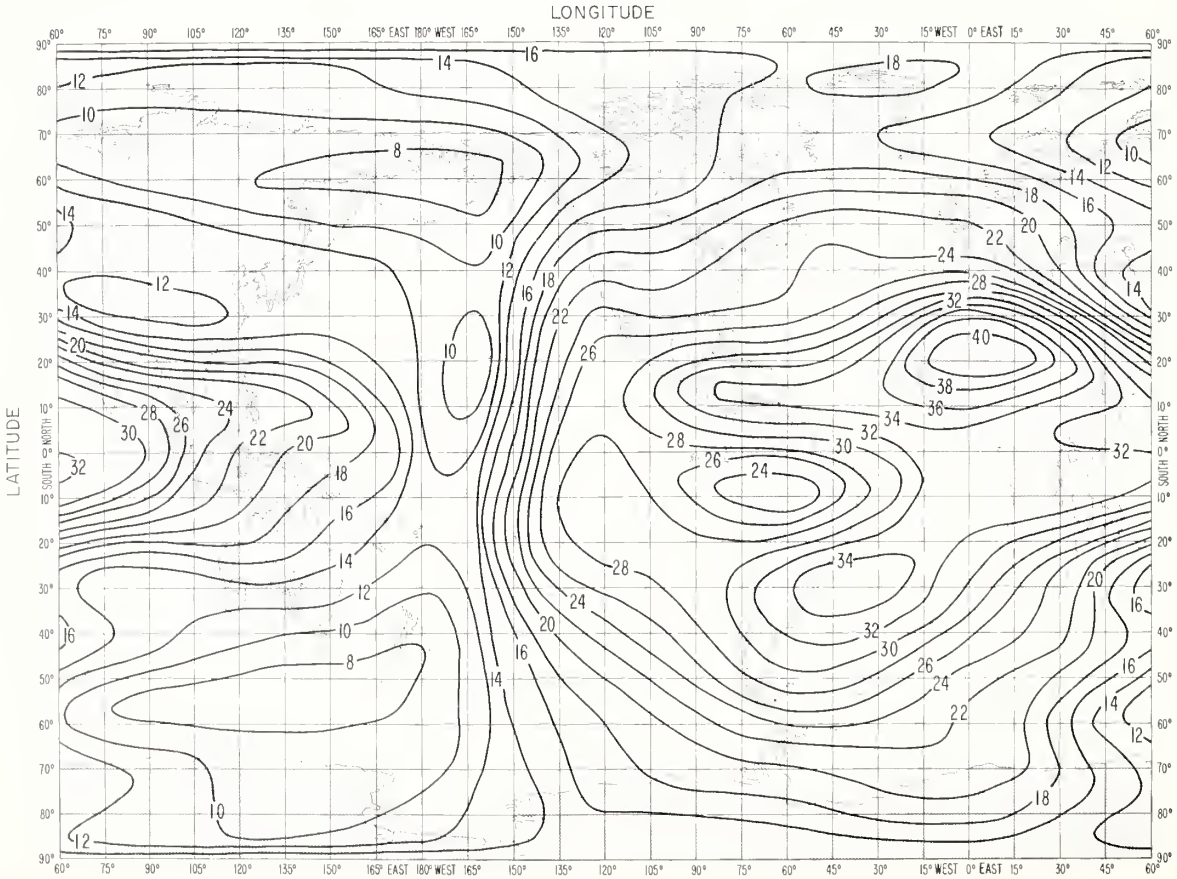

FIG 9B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

OCTOBER 1964 UT= 18

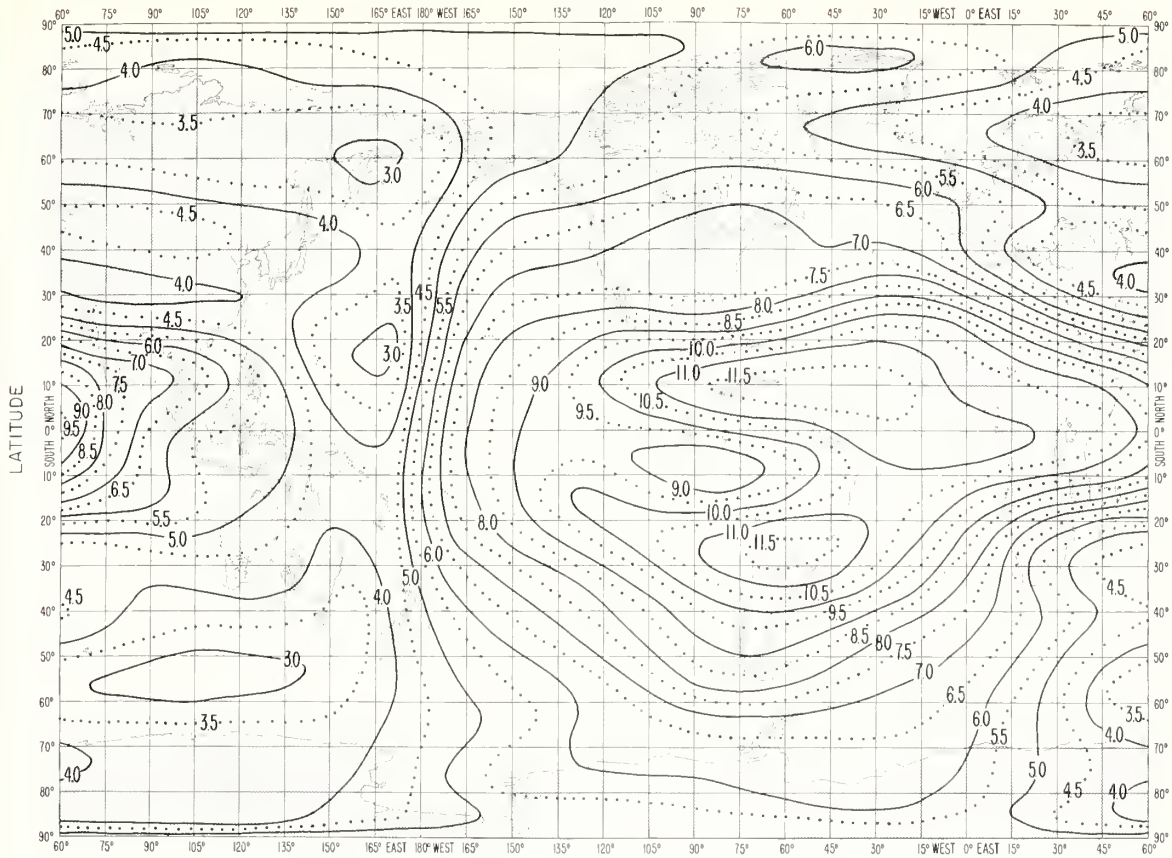

FIG.10A PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

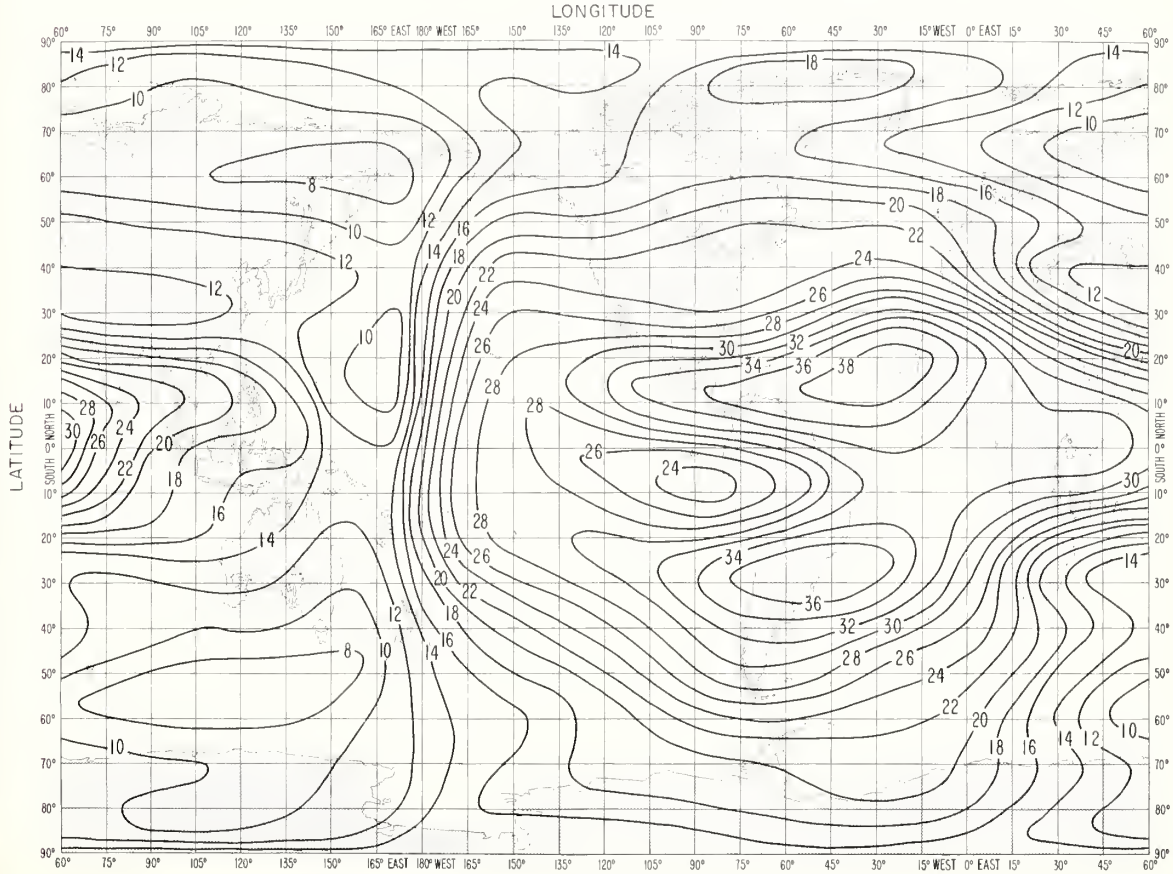

FIG.10B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

OCTOBER 1964 UT= 20

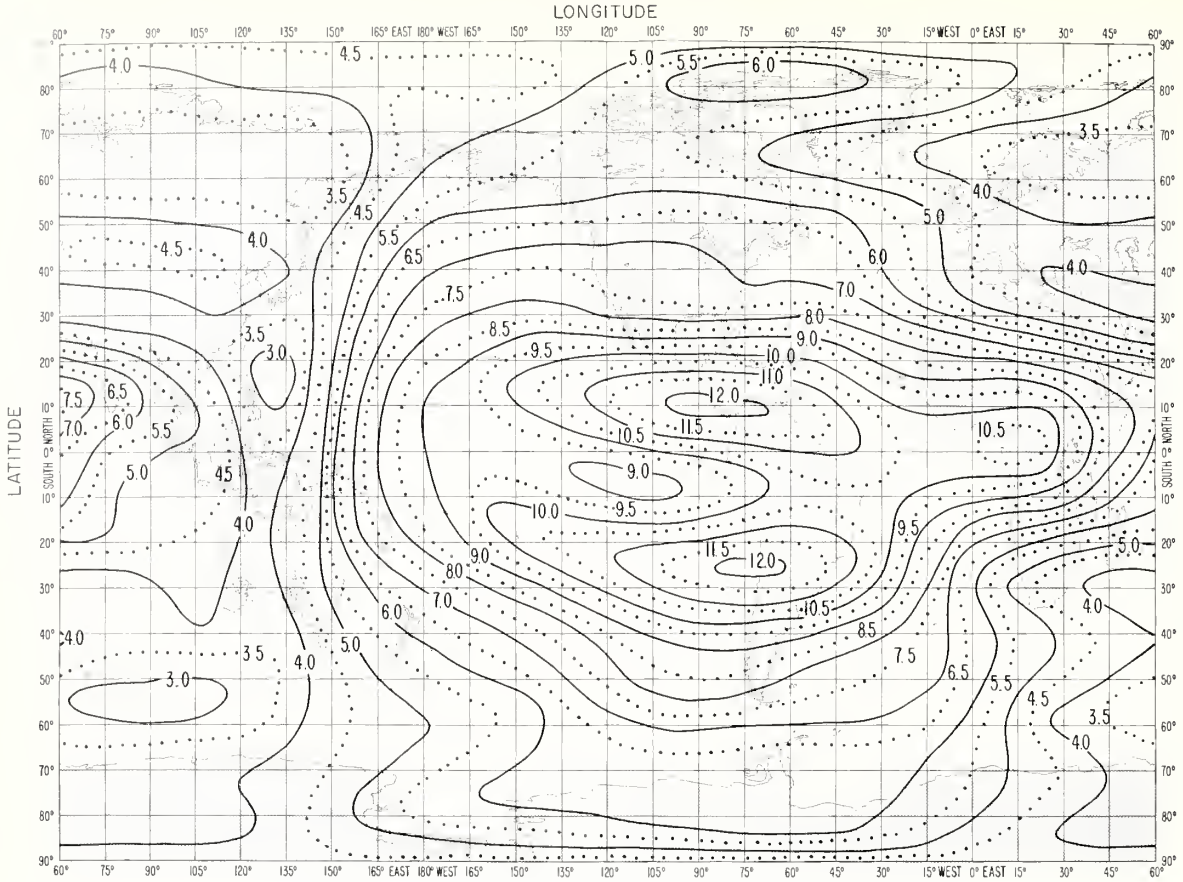

FIG 11A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

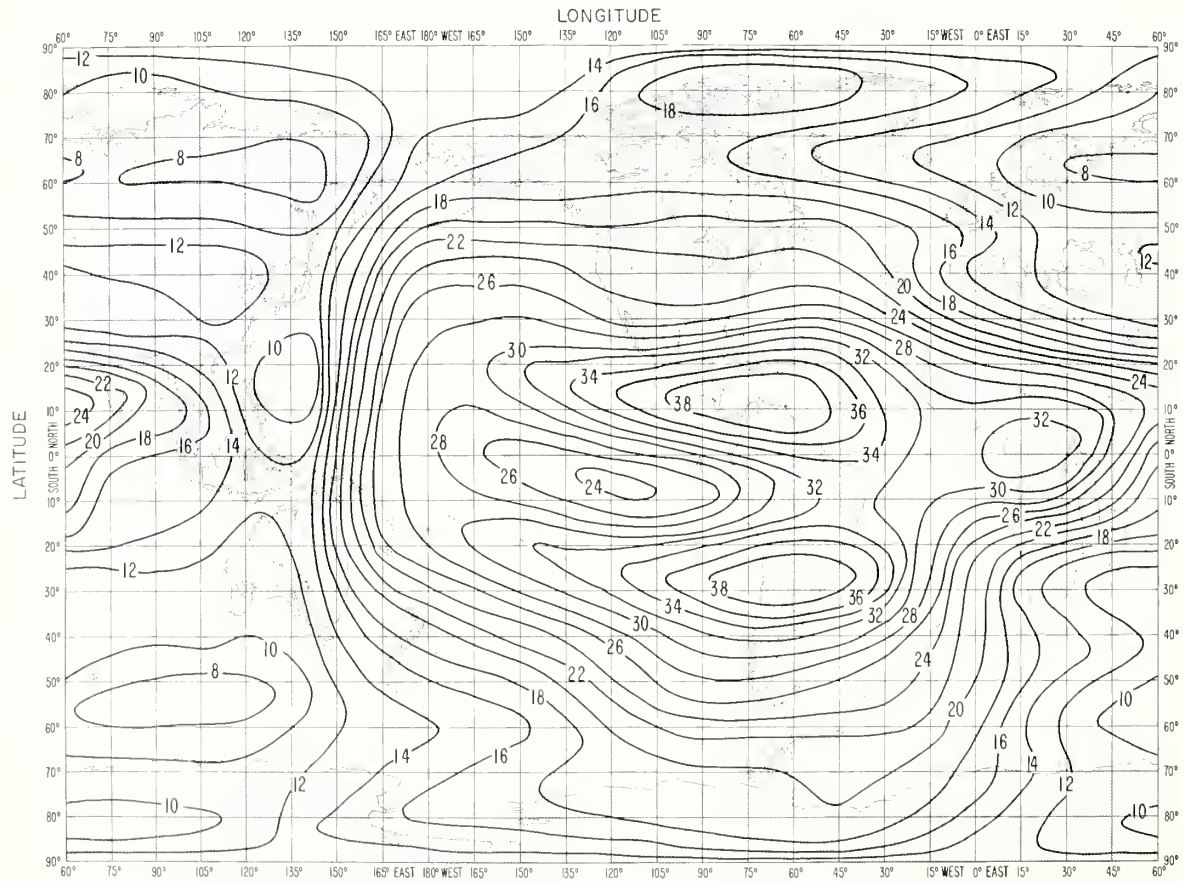

FIG. 11B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

OCTOBER 1964 UT=22

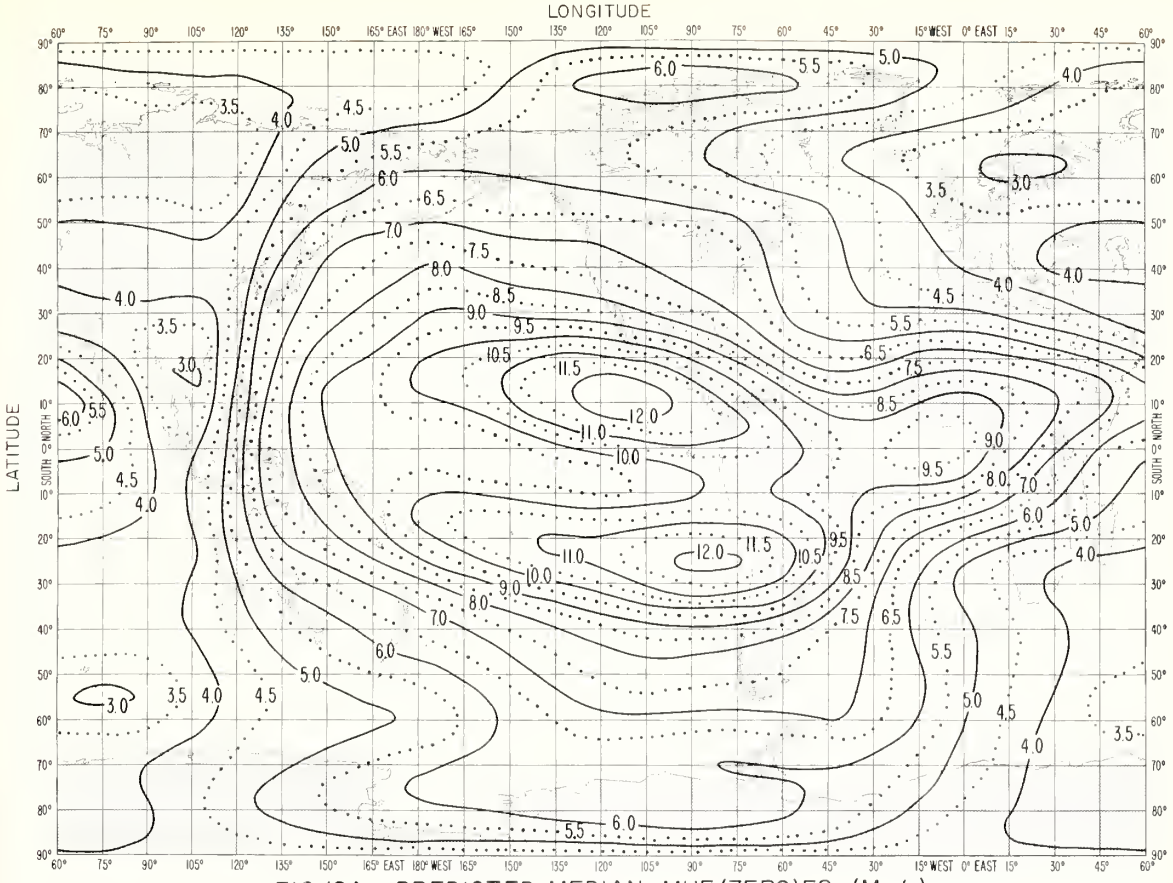

FIG. 12A PREDICTED MEDIAN MUF (ZERO) F2 (Mc/s)

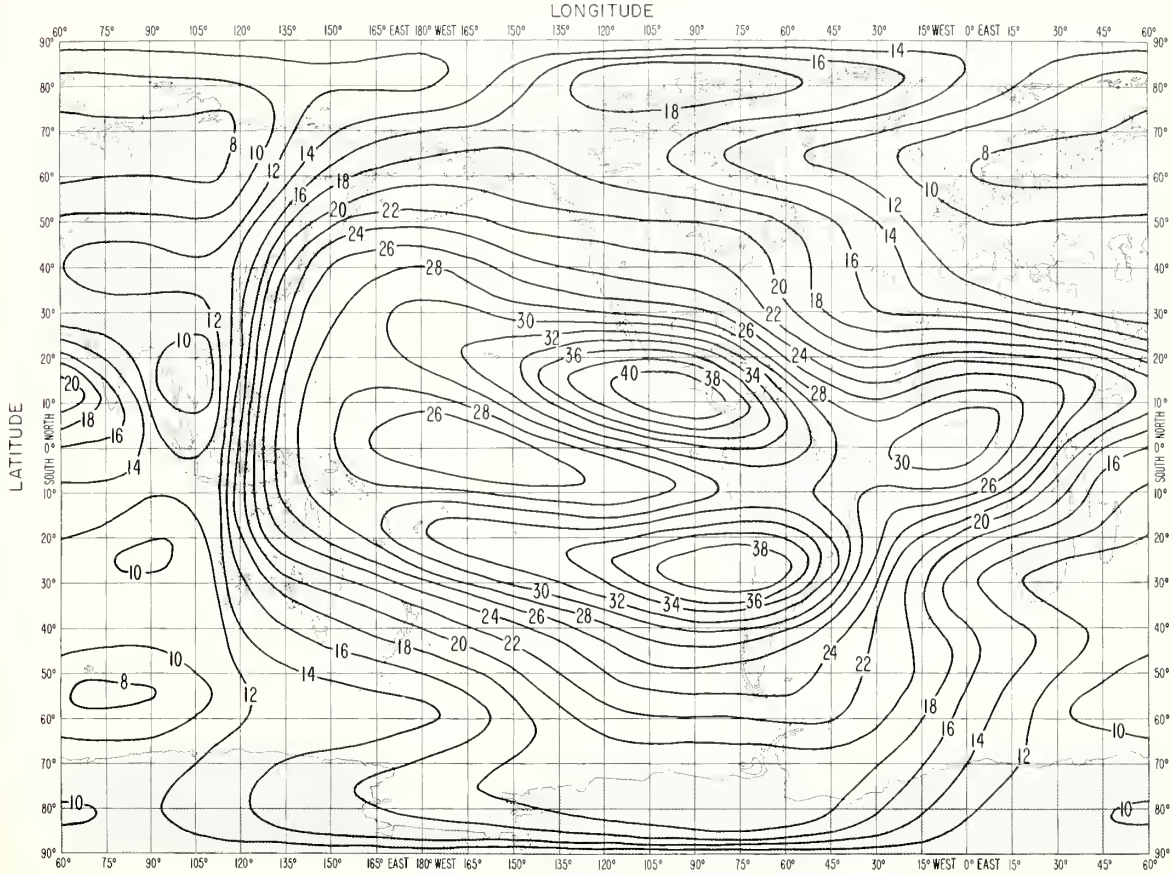

FIG. 12B. PREDICTED MEDIAN MUF (4000) F2 (Mc/s)

NORTH POLAR AREA
OCTOBER 1964 UT=00

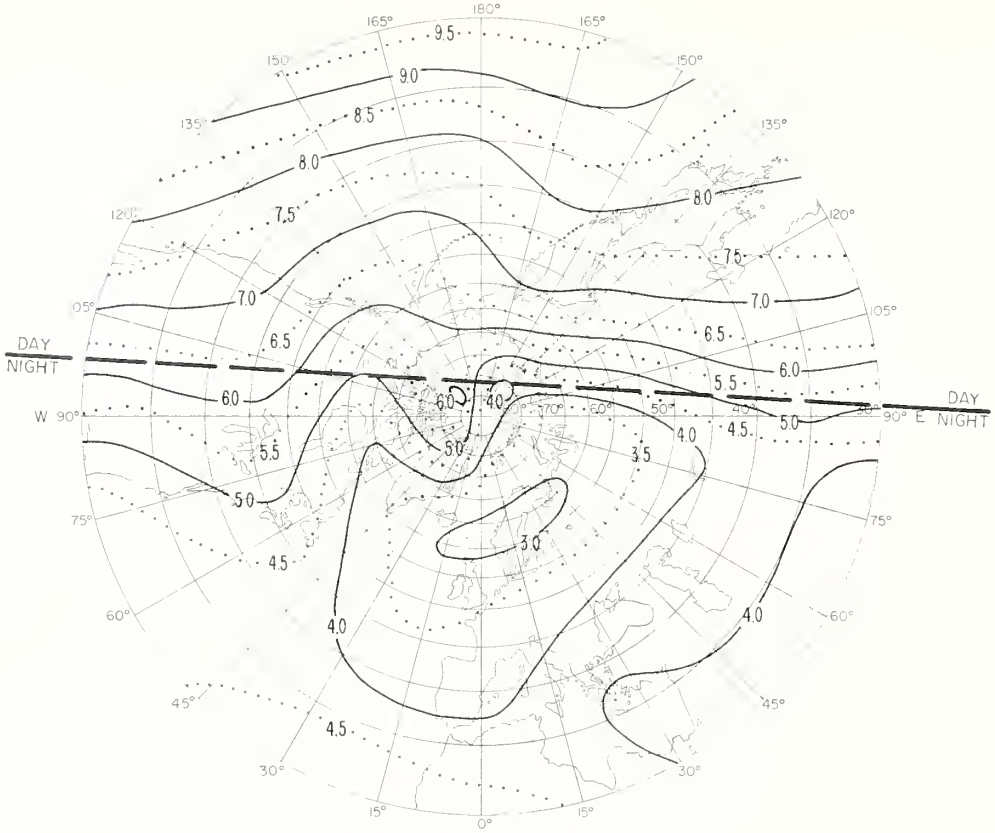

FIG. 13A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

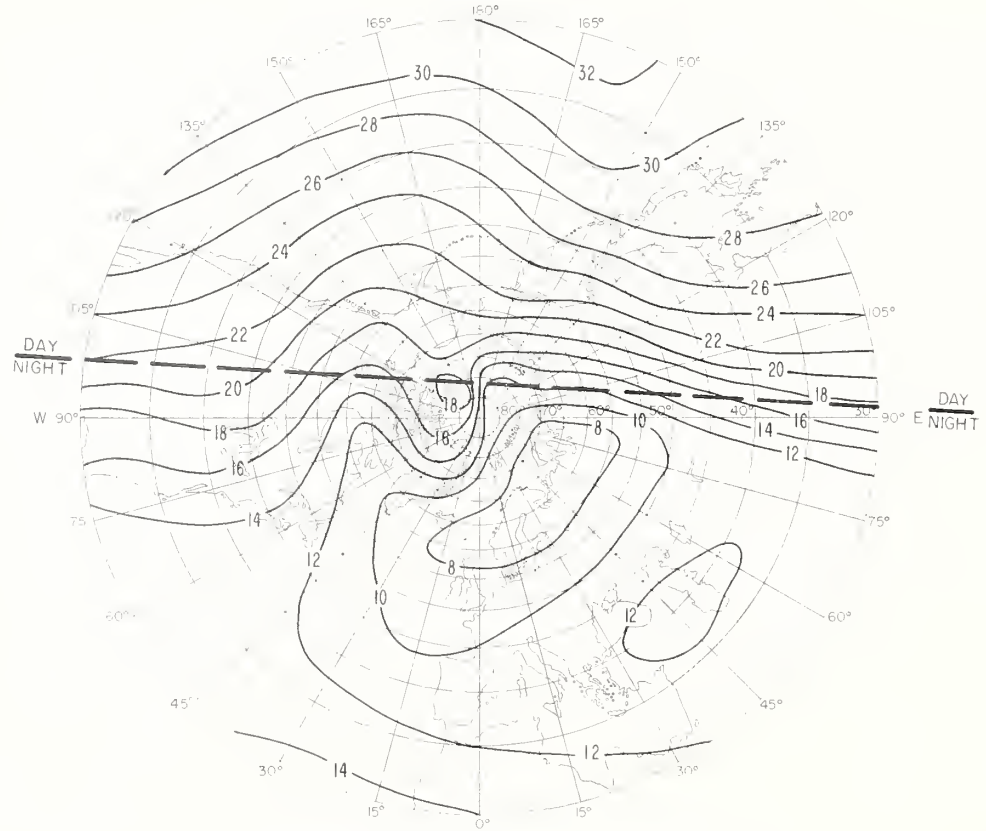

FIG. 13B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

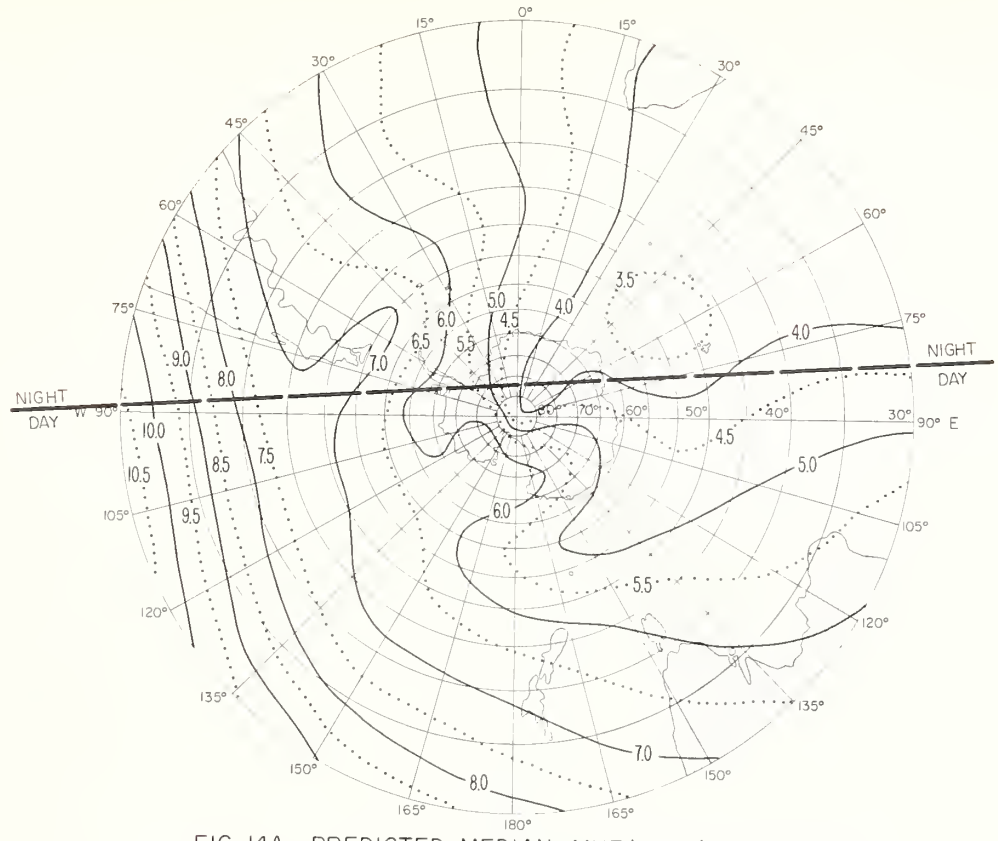

FIG. 14A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

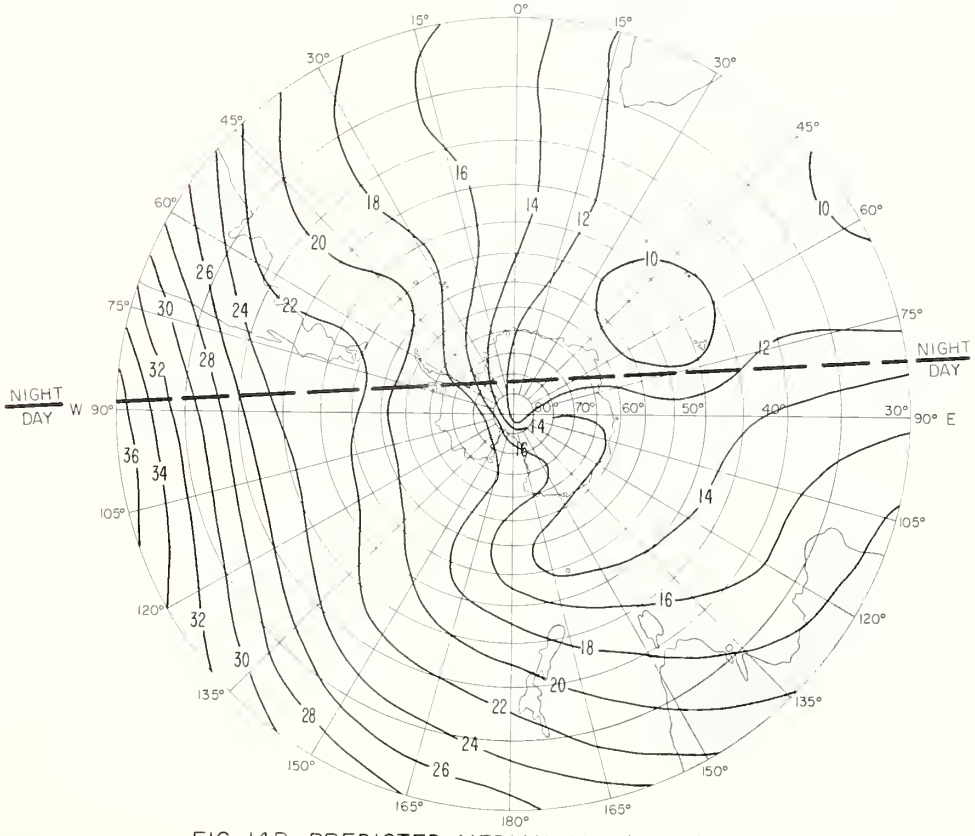

FIG. 14B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

NORTH POLAR AREA
OCTOBER 1964 UT=12

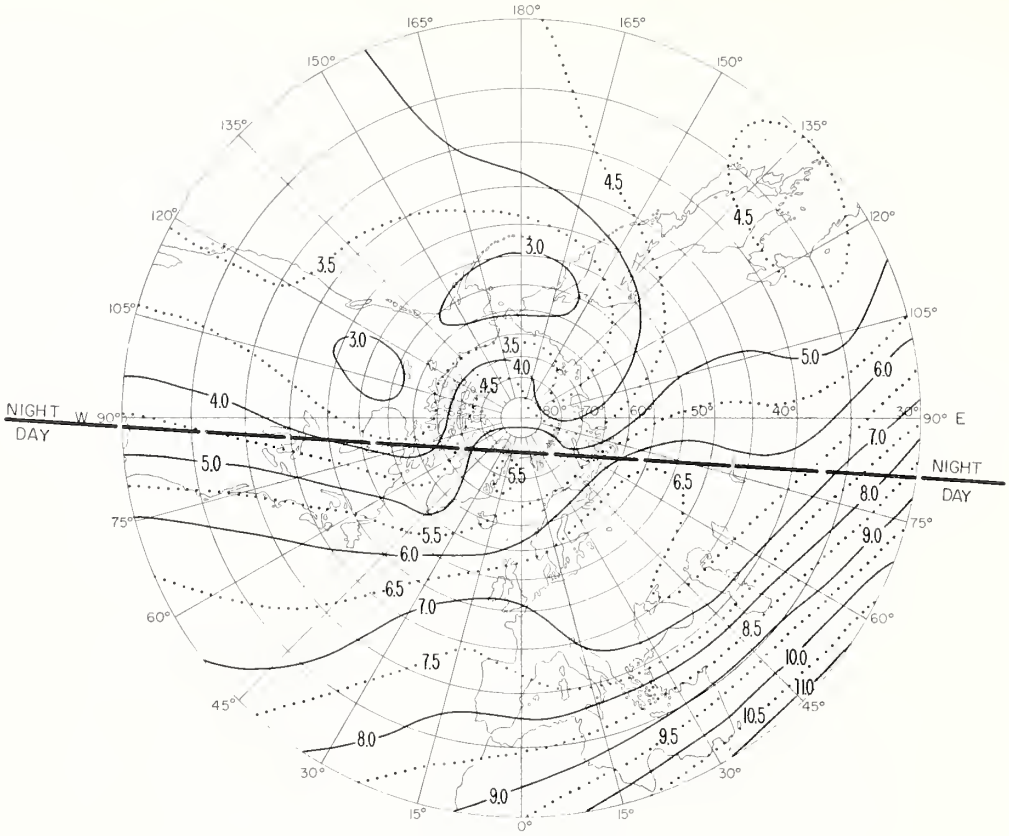

FIG. 15A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

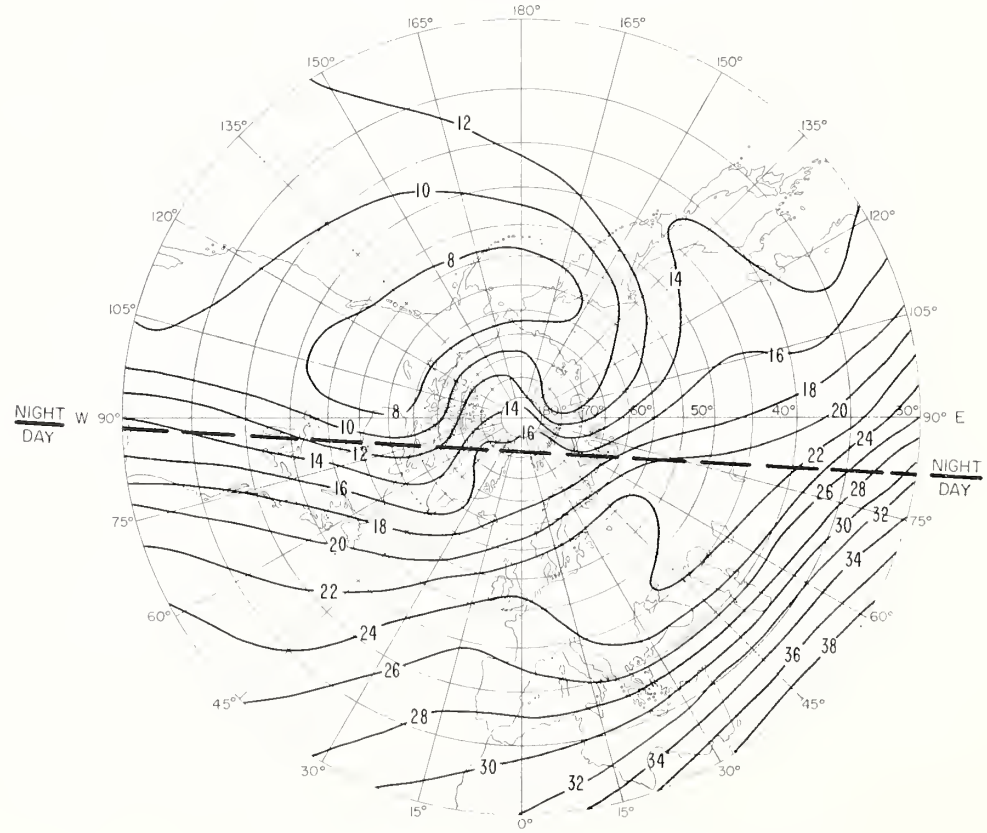

FIG. 15B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

SOUTH POLAR AREA
OCTOBER 1964 UT=12

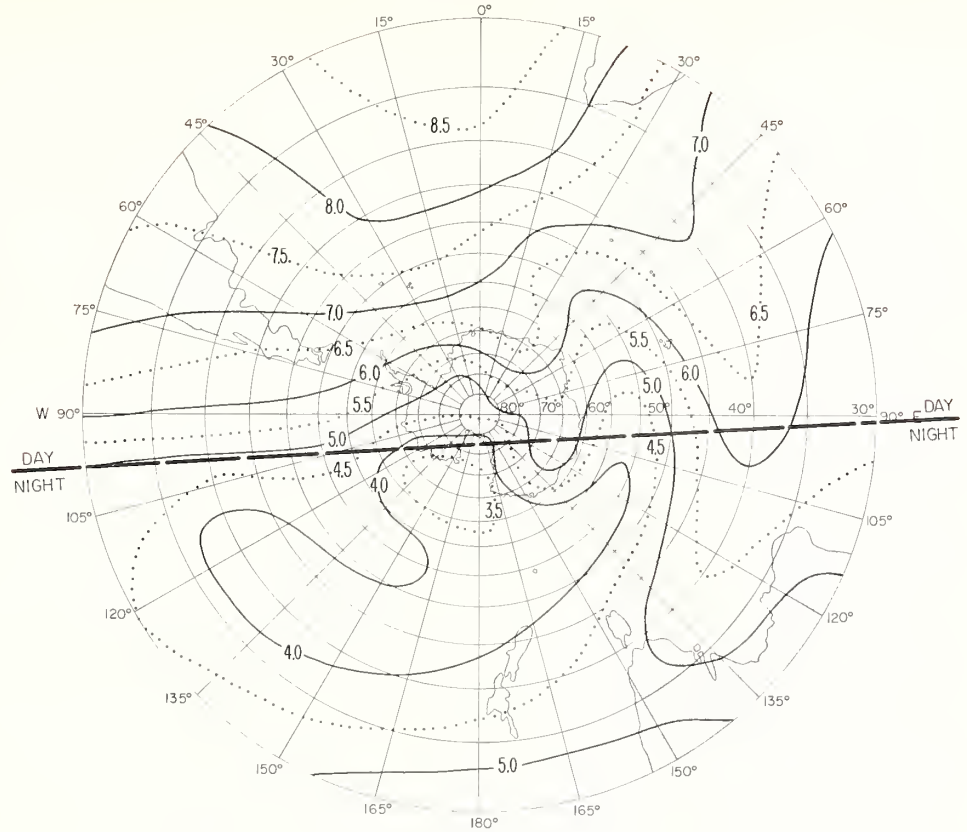

FIG. 16A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

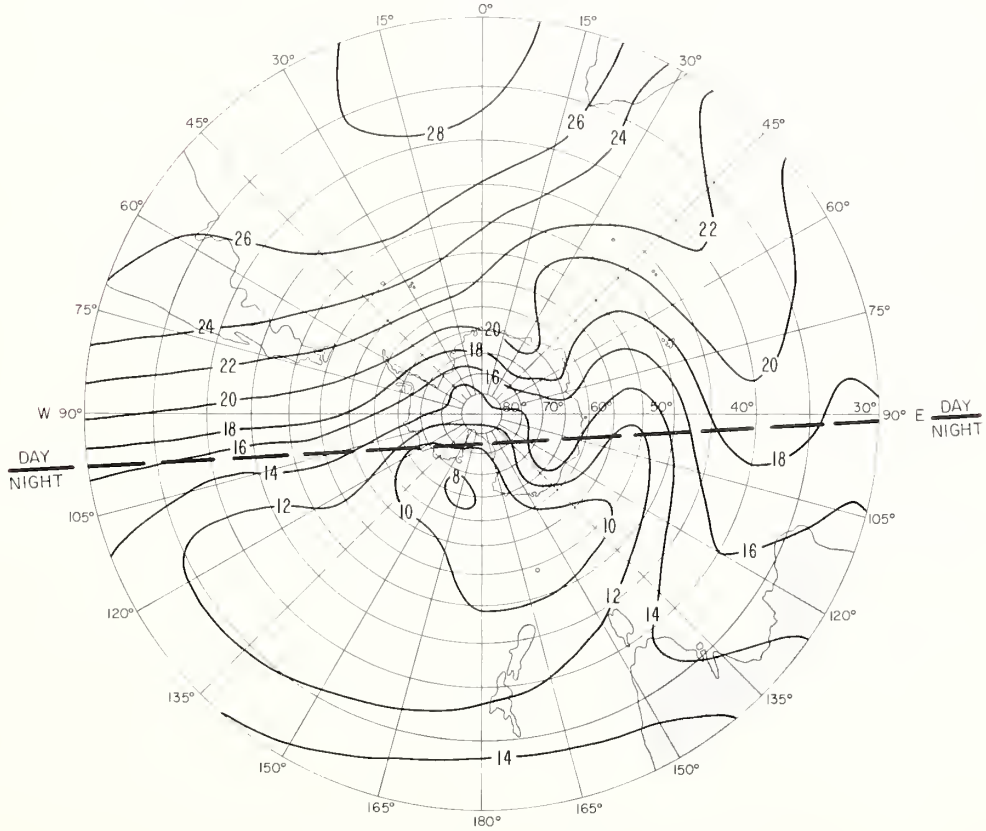

FIG. 16B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

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

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