Central Radio Propagation Laboratory

IONOSPHERIC PREDICTIONS

for

February

1965

TB 11-499-23/TO 31-3-28

U.S. DEPARTMENT of COMMERCE
National Bureau of Standards
Number 23/Issued November 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 February 1965

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

Number 23

Issued

November 1964

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 February 1965 being distributed in November 1964 and designated TB 11–499–(23), 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.

NOTE: The MUF(ZERO)F2 values of figures 1A through 12A were derived by adding one-half the gyrofrequency to the foF2 calculated by use of the predicted coefficients in table 1. The error introduced by this approximation is generally not important compared to other uncertainties in the predictions, and is significant only when the foF2 is near or below the gyrofrequency. If more precise values of predicted fxF2 are desired, the theoretical relationships should be applied to the foF2 values calculated by the coefficients in table 1.

Table A

Observed and Predicted Zurich Smoothed Relative Sunspot Numbers

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
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	23	21
	(31)	(28)	(26)	(25)	(25)	(25)	(23)	(21)	(20)	(18)	(18)	(17)
1964	19	17										
	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17.5)	(17.3)	(17.0)	(17.0)
1965												
	(15.0)	(16.0)*										
1966												

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.

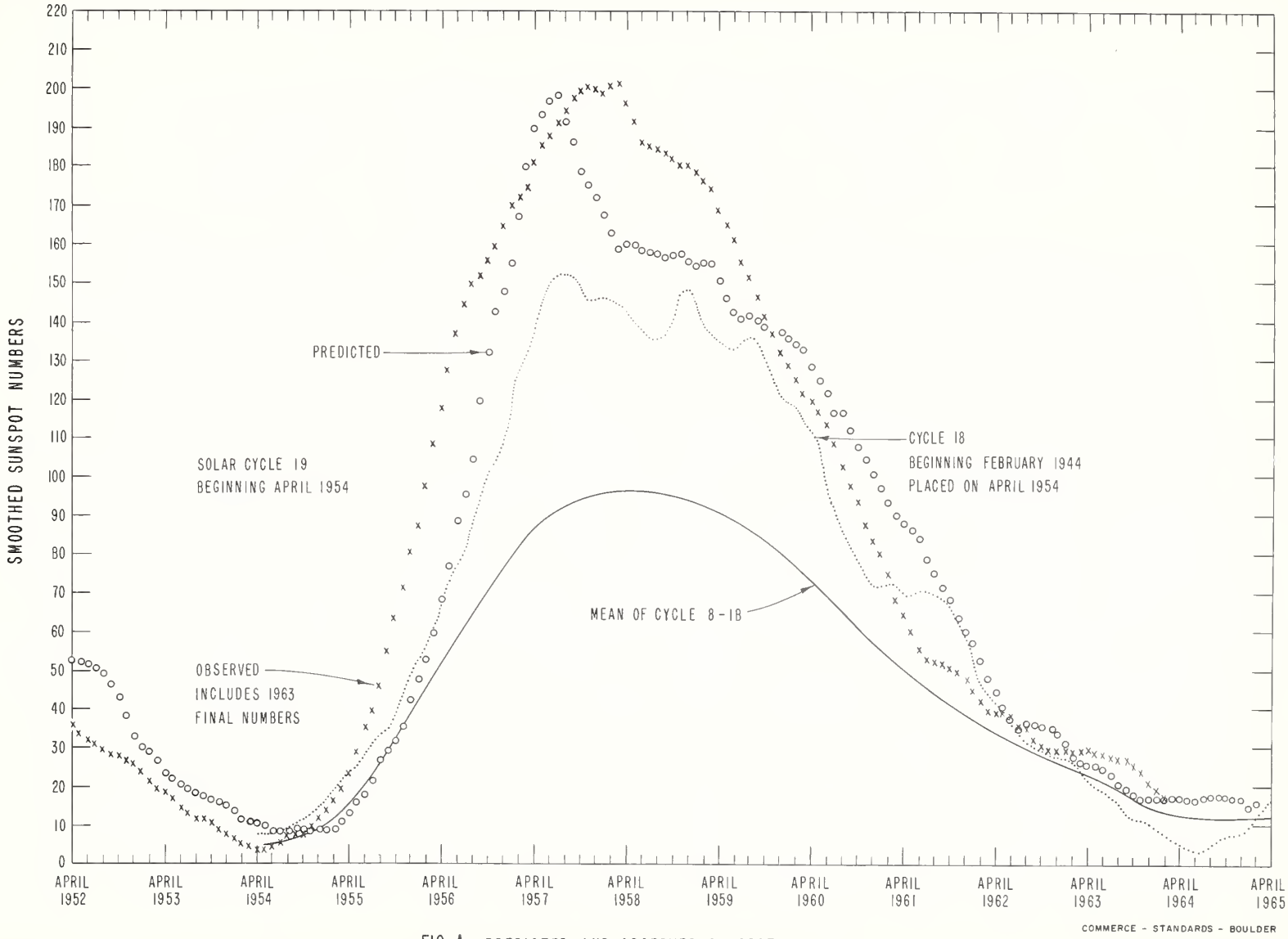

FIG. A. PREDICTED AND OBSERVED SUNSPOT NUMBERS

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	6.9625507E 00	2.2677000E 00	1.7363102E 00	-6.1848817E-01	3.5503092E-01	-2.5626514E-01	-5.3731774E-01	1.2717672E-01	-2.2288791E-01
	1	-1.9235179E 00	-9.4633720E-01	-4.6509184E-02	-2.6395174E-01	-9.3432982E-01	-1.4972546E 00	-6.9454316E-01	1.4453981E-01	-3.6912975E-01
	2	2.3391175E 00	5.2875081E-01	1.2378142E 01	7.6517987E 00	5.8853066E 00	-1.5588703E 00	2.3755076E 00	1.0765228E 00	1.6676306E 00
	3	1.6944435E 01	1.8427088E 01	2.5314072E 01	9.9952413E 00	1.7134259E 01	1.3970236E 01	5.9901596E 00	-3.7727467E 00	-9.9730388E-01
	4	-7.8588280E 01	-5.7267016E 01	-8.4322031E 01	-2.7272311E 01	-4.5088105E 01	1.6599445E 01	-9.9717708E 00	-1.0230551E 01	-1.0579824E 01
	5	-7.4019626E 01	-1.1068577E 02	-1.4416664E 02	-5.2630659E 01	-7.5479712E 01	-5.2511047E 01	-2.1038732E 01	1.8753023E 01	1.3851665E 01
	6	2.7725999E 02	2.1546566E 02	2.1286582E 02	2.7359417E 01	1.3871770E 02	-5.2576650E 01	3.4827562E 01	3.2819801E 01	3.6441962E 01
	7	1.5079583E 02	2.5850860E 02	3.1518987E 02	1.1200942E 02	1.4155016E 02	8.9115773E 01	3.4798291E 01	-4.1762297E 01	-3.7625247E 01
	8	-4.3229645E 02	-3.3440463E 02	-2.5797003E 02	2.2890514E 01	-2.1804538E 02	7.1532570E 01	-6.9640951E 01	-5.2864728E 01	-6.3541573E 01
	9	-1.4594213E 02	-2.5796996E 02	-2.9975279E 02	-1.0308858E 02	-1.1845543E 02	-6.9462089E 01	-2.7554773E 01	4.2234147E 01	3.9939571E 01
	10	3.1678346E 02	2.3824084E 02	1.5047570E 02	-5.3381207E 01	1.7348277E 02	-4.1347895E 01	6.7008868E 01	4.2386854E 01	5.3218512E 01
	11	5.3638707E 01	9.2689646E 01	1.0339680E 02	3.4023755E 01	3.6328225E 01	2.0432496E 01	8.5919547E 00	-1.5604771E 01	-1.4810615E 01
	12	-8.8807456E 01	-6.4571270E 01	-3.4767321E 01	2.3335916E 01	-5.5369573E 01	7.6293514E 00	-2.4065751E 01	-1.3307945E 01	-1.6987812E 01
II	13	1.0441525E-01	2.0242069E-02	1.7326897E-01	8.4657583E-02	1.3579314E-01	6.0331252E-02	4.9890718E-02	-1.0047684E-01	1.7435331E-02
	14	-2.3835750E-02	-3.3637700E-02	-7.2339575E-02	1.8971531E-02	6.0243639E-02	2.3627279E-01	1.7787258E-01	-5.5178903E-02	-2.8158362E-02
	15	3.3226688E-01	-1.2017456E 00	-8.7619686E-01	1.0324556E 00	3.7461797E-01	-5.1865712E-01	3.1101223E-01	2.6022701E-01	-1.9931119E-01
	16	-2.7697573E 00	-2.2989060E 00	-5.9349303E 00	-4.0486345E 00	-1.1937772E 00	-1.7137461E 00	-1.0453844E 00	3.6412089E-01	-7.7145908E-01
	17	-1.0849666E-01	-1.4501885E 00	-1.0849133E 01	-2.6353225E 00	-3.3049094E 00	-1.6322132E 00	-2.0599859E 00	4.2288775E 00	-8.2675089E-01
	18	8.6432087E 00	7.0704379E 00	-8.3613821E 00	-2.0416797E 00	-2.6177572E 00	-5.5007733E 00	-2.9735776E 00	4.0844686E 00	9.7274319E-01
	19	1.4968417E 01	1.8163670E 01	4.4024086E 00	-1.1543058E 01	4.0683333E 00	4.3877909E 00	-5.5915989E 00	-4.5467399E 00	5.0560814E 00
	20	8.9573151E 01	7.3651786E 01	9.1959016E 01	5.0214574E 01	1.4530122E 01	2.2036968E 01	1.2858264E 01	-1.9606591E 00	8.5642729E 00
	21	-7.3588244E 00	5.6490360E 01	7.5722462E 01	6.2100610E 00	2.1458857E-01	-6.1154935E 00	2.4709626E 01	-4.1929774E 01	1.2581944E 01
	22	-1.5183238E 02	-8.3188175E 01	1.2192132E 02	9.3233756E 00	1.8113760E 01	3.9067292E 01	2.1945743E 01	-4.0697370E 01	-1.3706432E 01
	23	-1.2688235E 02	-1.0263097E 02	-7.2765297E 00	4.6394213E 01	-3.8268960E 01	-1.3017874E 01	2.6486413E 01	2.2891993E 01	-2.7938828E 01
	24	-4.8830791E 02	-3.9478222E 02	-4.1086618E 02	-2.1189587E 02	-5.1740826E 01	-1.0152467E 02	-6.4398933E 01	7.5810702E 00	-3.6412657E 01
	25	4.4150253E 01	-3.6180055E 02	-2.0599229E 02	3.8435977E 01	7.0084510E 01	8.9331529E 01	-1.1392472E 02	1.6343666E 02	-6.4668682E 01
	26	7.0668484E 02	3.3523506E 02	-5.6507950E 02	-7.2490999E 00	-5.6236418E 01	-1.2613257E 02	-6.9201919E 01	1.6317920E 02	6.7199768E 01
	27	3.4859231E 02	2.5943045E 02	-9.0182362E 00	-9.1359991E 01	9.4891206E 01	1.2992122E 01	-4.8361781E 01	-5.0279354E 01	6.1143287E 01
	28	1.0895303E 03	8.2843519E 02	7.8275970E 02	4.0071709E 02	9.0984079E 01	2.1418396E 02	1.5999007E 02	-1.8920331E 01	7.1840119E 01
	29	-7.6726806E 01	9.0038443E 02	2.6924552E 02	-1.5848012E 02	-2.1046984E 02	-2.6548688E 02	2.3906640E 02	-2.9922375E 02	1.4338508E 02
	30	-1.4258066E 03	-6.3973753E 02	1.1168418E 03	-3.9463893E 01	8.1014636E 01	2.1131907E 02	1.1096415E 02	-3.1295387E 02	-1.4138772E 02
	31	-4.0707400E 02	-2.9478513E 02	3.0598187E 01	9.1718433E 01	-9.4981319E 01	1.8781867E 00	3.6746158E 01	5.2947017E 01	-5.9092312E 01
	32	-1.0787946E 03	-7.6391156E 02	-6.7409582E 02	-3.5052382E 02	-8.1778270E 01	-2.1177654E 02	-1.6588259E 02	2.1631233E 01	-6.6762818E 01
	33	4.6097588E 01	-9.7137964E 02	-1.7670106E 02	1.9368635E 02	2.3437870E 02	3.1036640E 02	-2.3087871E 02	2.6168373E 02	-1.4431101E 02
	34	1.3240441E 03	5.8898742E 02	-9.7913185E 02	8.5051764E 01	-5.1602387E 01	-1.8092859E 02	-9.2712783E 01	2.8384013E 02	1.3253498E 02
	35	1.7195179E 02	1.2257609E 02	-1.7749379E 01	-3.7127284E 01	3.3899050E 01	-6.2259962E 02	-9.0838984E 00	-2.1886564E 01	2.1154133E 01
	36	3.9148327E 02	2.5941787E 02	2.1587165E 02	1.1591312E 02	3.0167459E 01	7.9591643E 01	6.7199784E 01	-8.5055581E 00	2.3707467E 01
	37	-5.5219997E 00	3.8012795E 02	4.8638203E 01	-7.7569638E 01	-9.1586039E 01	-1.2771759E 02	8.3390501E 01	-8.8624388E 01	5.4264055E 01
	38	-4.6374446E 02	-2.0981992E 02	3.1393237E 02	-4.6168374E 01	1.2040520E 01	6.2734359E 01	3.2443214E 01	-9.7387180E 01	-4.5495136E 01
III	39	2.2686258E-01	1.1956597E-01	-1.9659080E-01	-1.3402455E-02	-3.0397159E-02	3.4699436E-03	4.5171382E-02	3.7940502E-03	-3.4252378E-02
	40	8.7809924E-02	9.5121300E-02	1.9184781E-03	-2.3402286E-02	-1.0479081E-02	1.4222988E-02	2.5341407E-02	6.3788109E-03	-1.7959089E-02
	41	1.0451126E 00	9.7265608E-01	-1.1340701E 00	-5.4348195E-01	1.0165904E-01	-6.0402528E-01	-9.0279404E-02	1.5950059E-01	-1.0449410E-01
	42	2.2754107E-01	1.4726780E-01	-4.7037448E-01	2.5101929E-01	-4.1718078E-02	-2.8228208E-02	-5.6338012E-02	-2.1844974E-02	3.1467114E-03
	43	-5.5958073E-01	-1.1421852E-01	3.4199112E 00	-2.8022356E-01	1.5284976E 00	4.2728018E-03	-1.2287377E-01	-4.3240026E-02	2.1860684E-02
	44	-6.4098728E-01	-5.6132864E-01	3.4013032E 00	-3.5782832E-02	1.1302225E 00	2.3416831E-02	-2.8238040E-02	2.5187619E-02	2.0899564E-02
	45	-1.8420244E 00	-1.9332107E 00	5.3990000E 00	2.4214071E 00	1.2996356E-01	3.0734038E 00	-1.6767189E-02	-3.9728059E-01	1.3548150E-01
	46	5.2675213E-03		3.4387172E 00	-3.9952469E-01	1.5563574E-01	1.6693555E-01	-3.4473920E-02	8.5773526E-03	-3.5794841E-03
	47	4.6299012E-01		-1.2471600E 01	4.3038274E-02	-3.2619024E 00	-3.8420731E-01	-6.7587525E-03	3.3841567E-01	
	48	-2.9312440E-03		-1.2408289E 01	2.7738538E-01	-4.1748672E 00	2.2214977E-03	1.6686656E-02	1.5867951E-02	
	49	-5.9398870E-02		-5.2617175E 00	-1.7422877E 00	-3.0247896E-01	-3.2982701E 00	1.3032919E-02	-2.7637016E-02	
	50	2.3968637E-02		-4.6799441E 00	-8.6555122E-02	2.1701429E-02	-5.0489748E-02	4.4864336E-02	-2.7474449E-02	
	51	-4.0550989E-01		1.1327228E 01		1.1758110E 00	-5.2678937E-02		-3.5988420E-01	
	52			1.1502148E 01		3.5021349E 00	-1.3436065E-01			

GEOGRAPHICAL VARIATION

Harmonic		5		6		7		8	
	K \ S	9	10	11	12	13	14	15	16
I	0	1.6072579E-01	1.7125064E-01	-1.0359468E-01	6.2002206E-02	-7.1844631E-02	-7.3432118E-02	5.2294317E-02	-6.5883641E-02
	1	1.9981179E-01	2.6928414E-02	5.9099619E-02	1.2897425E-01	-1.3048160E-01	2.4141181E-02	-4.7247040E-02	-8.7005200E-02
	2	-3.4138118E-01	-3.9266753E-01	3.3447102E-01	-5.2120314E-03	1.4009454E-01	2.4449336E-01	-2.1106803E-01	1.5517100E-01
	3	-1.9652740E-01	-5.0710470E-02	-5.4363318E-02	-1.3580170E-01	1.3834122E-01	-1.9623225E-02	3.9573935E-02	1.0357315E-01
	4	1.8454276E-01	2.1212338E-01	-2.3190630E-01	-6.7612554E-02	-6.3631712E-02	-1.7104319E-01	1.5858431E-01	-9.1775738E-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)

FEBRUARY 1965

TABLE 2

TABLE 2

TIME VARIATION

GEOGRAPHICAL VARIATION	Harmonic	0	1		2		3	
	K \ S	0	1	2	3	4	5	6
I	0	2.9986122E 00	-1.5410095E-01	-2.5841120E-01	9.8143325E-03	-8.9415206E-02	3.0722092E-02	-7.8002039E-02
	1	3.1214814E-01	-7.4422674E-03	-1.8151247E-01	2.2779464E-02	-5.9374158E-02	-1.4791825E-01	9.3306166E-02
	2	2.0707089E 00	1.4109289E 00	2.6534348E 00	4.2193835E-02	-3.6973253E-01	-8.1694521E-01	3.4207805E-01
	3	-5.7165673E-01	1.2113976E-01	1.6573172E 00	-1.4049520E-01	3.8983294E-01	6.0094771E-01	-4.6717830E-01
	4	-6.9649935E 00	-3.8117827E 00	-6.3280295E 00	-6.4251385E-01	1.5655961E 00	2.9800992E 00	-1.1639465E 00
	5	3.0555992E-01	-1.6211900E-01	-2.4465765E 00	2.6073648E-01	-4.3938416E-01	-9.1539804E-01	5.4228160E-01
	6	8.6192908E 00	4.5685491E 00	6.4739854E 00	1.0827790E 00	-1.8398945E 00	-3.9517477E 00	1.6314203E 00
	7	-3.1370413E-03	8.0100929E-02	1.0370030E 00	-1.3702107E-01	1.5210656E-01	4.4768330E-01	-1.6561355E-01
	8	-3.6066933E 00	-1.9998129E 00	-2.5049373E 00	-5.1241551E-01	7.3183763E-01	1.7726200E 00	-7.2764981E-01
II	9	-2.0646746E-02	-1.0386741E-02	4.8869696E-02	-1.9571973E-02	1.2259102E-02	5.0992921E-03	-3.9817996E-04
	10	-1.1102366E-01	-2.5561647E-02	-4.8851352E-04	-1.2516871E-02	1.0933038E-02	5.4398736E-02	-2.0489878E-02
	11	1.4457705E-01	-1.7848471E-01	9.1497059E-02	6.7140457E-02	1.1375167E-01	5.3410870E-02	-4.1519362E-03
	12	-4.4655030E-01	-5.0225319E-01	-9.9043825E-01	6.3414463E-02	-9.6221097E-03	2.1803250E-01	-4.1444803E-02
	13	9.7524898E-02	-2.6237438E-01	-5.4210612E-01	1.1074337E-01	-5.3397769E-02	1.7285431E-02	2.5929011E-01
	14	1.6631242E 00	7.4610705E-01	-5.2901913E-02	2.4674764E-01	-2.7069589E-01	-8.0884565E-01	6.1802704E-01
	15	-9.8039365E-01	1.1959149E 00	8.6487288E-02	-5.5366591E-01	-5.8661858E-01	-4.3000007E-01	-7.6704984E-02
	16	3.2277022E 00	3.0906564E 00	6.2583673E 00	-4.5041386E-01	-1.1543954E-01	-1.3534189E 00	6.9279619E-02
	17	3.8501634E-01	1.8270296E 00	1.2919937E 00	-4.7766530E-01	-3.1634520E-01	-5.6650003E-02	-1.2723207E 00
	18	-7.0778930E 00	-3.0342885E 00	2.7023537E-01	-1.5615396E 00	1.6731936E 00	3.3998104E 00	-2.5018970E 00
	19	2.3298356E 00	-2.5638945E 00	-7.4438545E-01	1.0923854E 00	9.6810157E-01	9.1998175E-01	3.1713758E-01
	20	-6.7220377E 00	-5.5574797E 00	-1.1048869E 01	1.0005540E 00	2.8237148E-01	2.3306587E 00	-4.3710651E-02
	21	-7.4740527E-01	-3.5703300E 00	-7.1472180E-01	8.5597652E-01	1.1589759E 00	-4.1485999E-02	2.0369974E 00
	22	1.0858074E 01	3.9490710E 00	-9.2226632E-01	3.0776586E 00	-3.2423585E 00	-4.9945084E 00	3.6316306E 00
	23	-1.6357653E 00	1.4674883E 00	6.0084275E-01	-6.5782087E-01	-4.6988339E-01	-5.1497281E-01	-2.0931314E-01
	24	4.2206675E 00	3.2008450E 00	6.2532346E 00	-6.4861527E-01	-1.7568407E-01	-1.2395082E 00	-2.5077875E-02
	25	2.5888007E-01	2.2750728E 00	-1.5644759E-02	-4.7723343E-01	-8.7527574E-01	2.7145281E-02	-1.0828786E 00
	26	-5.5072386E 00	-1.5835602E 00	6.5318507E-01	-1.8012360E 00	1.8906793E 00	2.3744182E 00	-1.7064808E 00
III	27		-2.0345204E-02	-9.9059356E-04	6.2706560E-03	5.0322983E-03	2.2987380E-02	2.5953127E-04
	28		-4.1288669E-03	-1.1470249E-02	4.0581255E-03	1.5820300E-02	1.4365699E-02	5.1591626E-04
	29		-1.6941795E-01	-1.3407655E-01	2.9072545E-02	-2.9146361E-02	1.0286115E-02	-6.6686194E-05
	30		-1.0444658E-02	-1.0062571E-01	7.4916596E-02	-8.0901034E-02	-9.6117206E-03	8.3823503E-05
	31		3.8282689E-02	-1.4287411E-01	-1.6412974E-02	-1.4358500E-02	-1.5696941E-01	-1.7988081E-03
	32		8.1265527E-02	-8.9634317E-02	-1.1723958E-02	-1.8753524E-02	-3.4274018E-02	
	33		3.7936291E-01	2.4186609E-01	-3.0900528E-02	4.7963506E-02	-1.1924507E-02	
	34			2.9600399E-01	-1.5635757E-01	1.4744361E-01	-6.7524889E-03	
	35			5.8742847E-01		-1.1705960E-02	1.9085293E-01	
	36							

GEOGRAPHICAL VARIATION	Harmonic	4		5		6	
	K \ S	7	8	9	10	11	12
I	0	2.9491654E-02	-3.3220869E-04	2.0243328E-02	2.9347649E-02	-1.8675685E-02	9.0735121E-03
	1	-7.8306548E-03	-5.8475531E-02	3.8535784E-02	-1.8219749E-03	6.1380888E-03	3.3650412E-02
	2	-2.8171654E-02	-8.9265223E-03	-2.3519906E-02	-3.5520358E-02	2.5737540E-02	-1.0195017E-02
	3	-1.3135193E-03	5.3119939E-02	-3.5156840E-02			-2.9323944E-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

FEBRUARY 1965

FEBRUARY 1965 UT=00

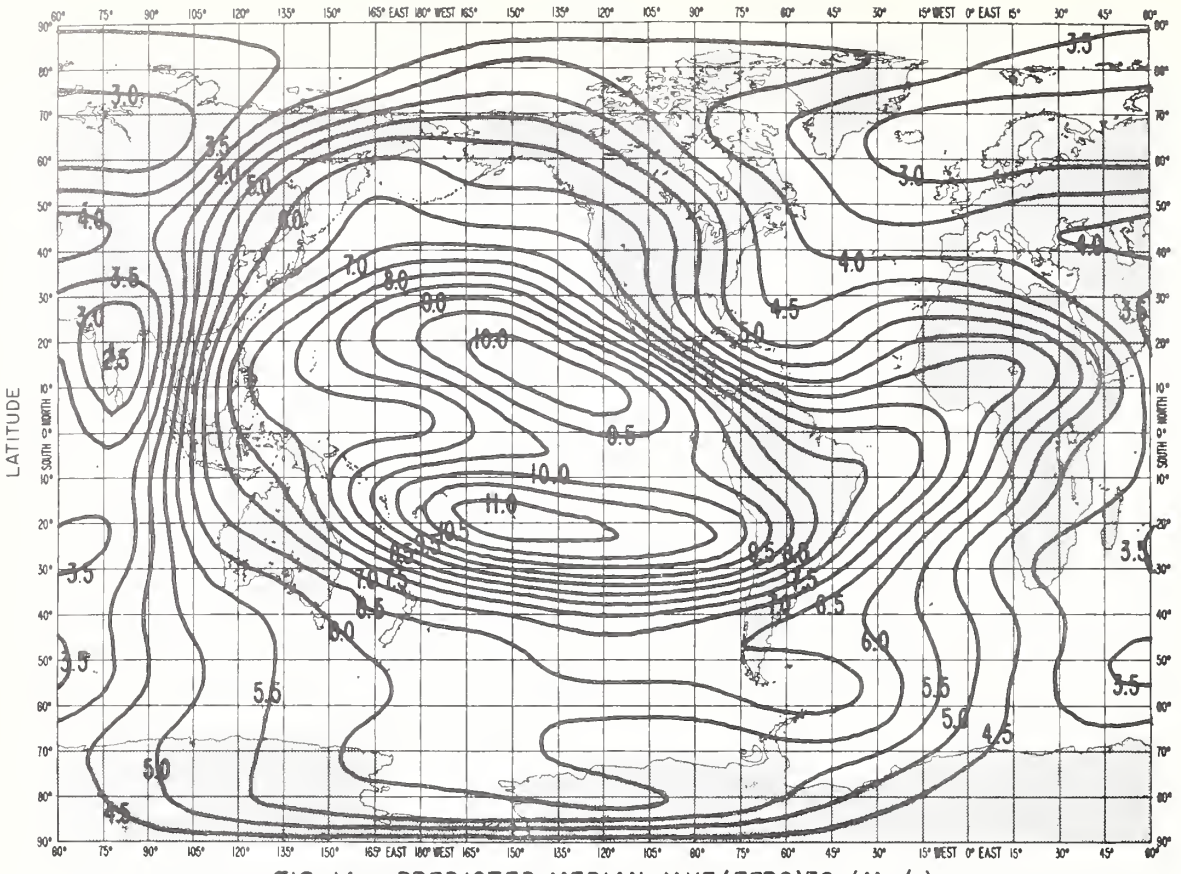

FIG. 1A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

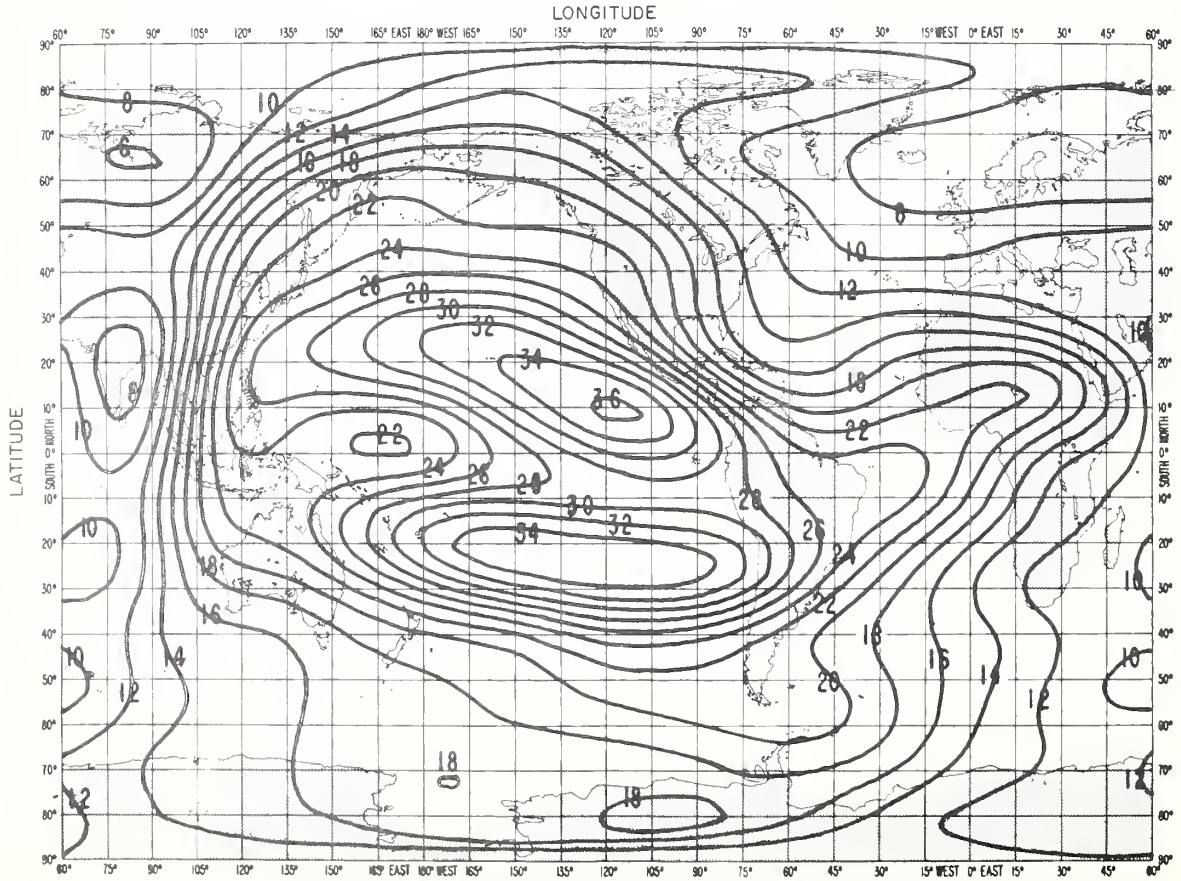

FIG. 1B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

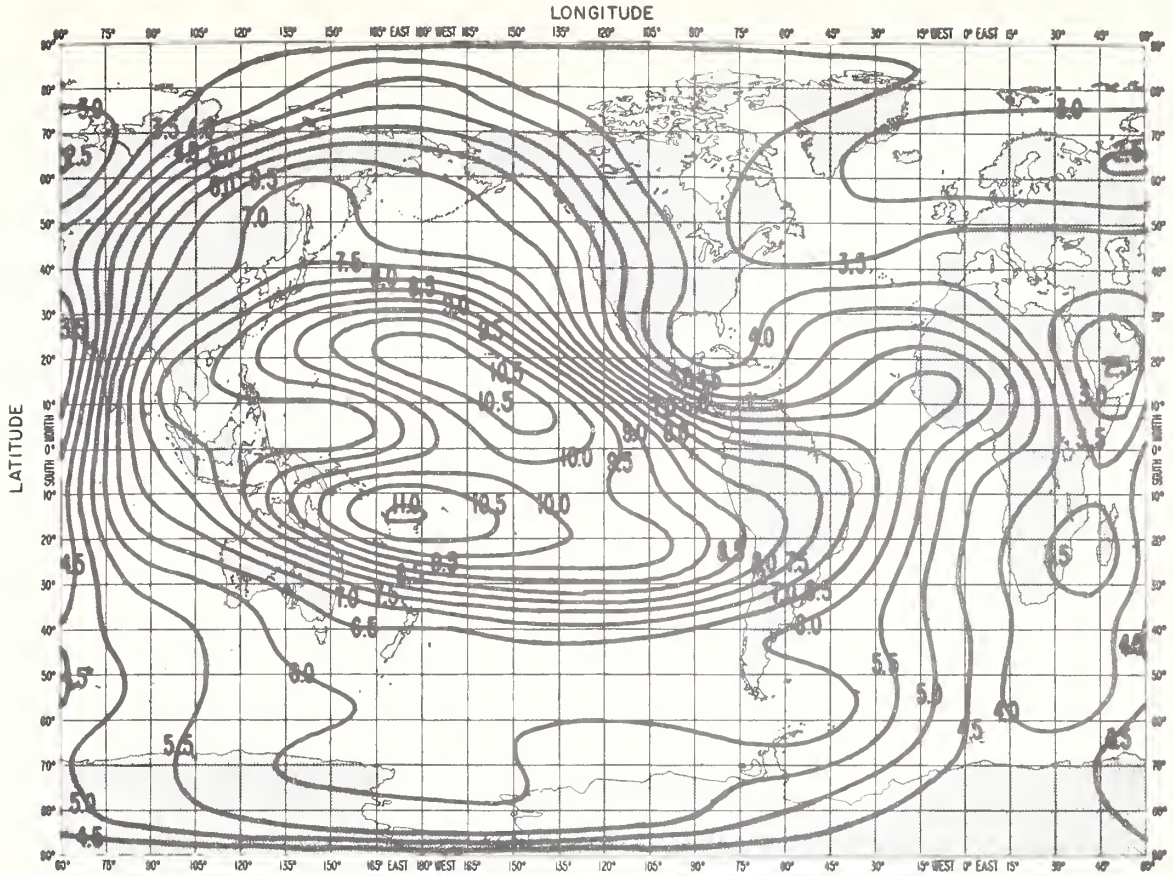

FIG. 2A. PREDICTED MEDIAN MUF (ZERO)F2 (Mc/s)

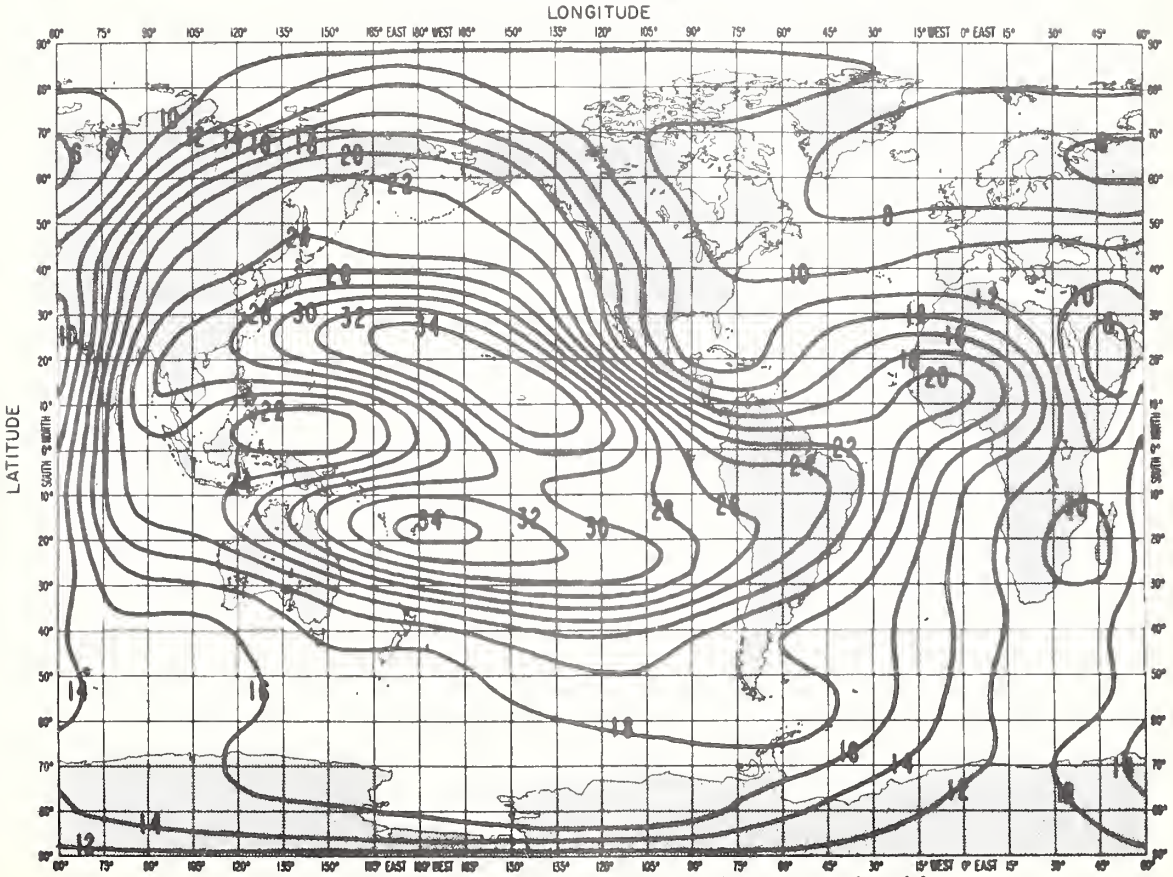

FIG. 2B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

FEBRUARY 1965 UT=04

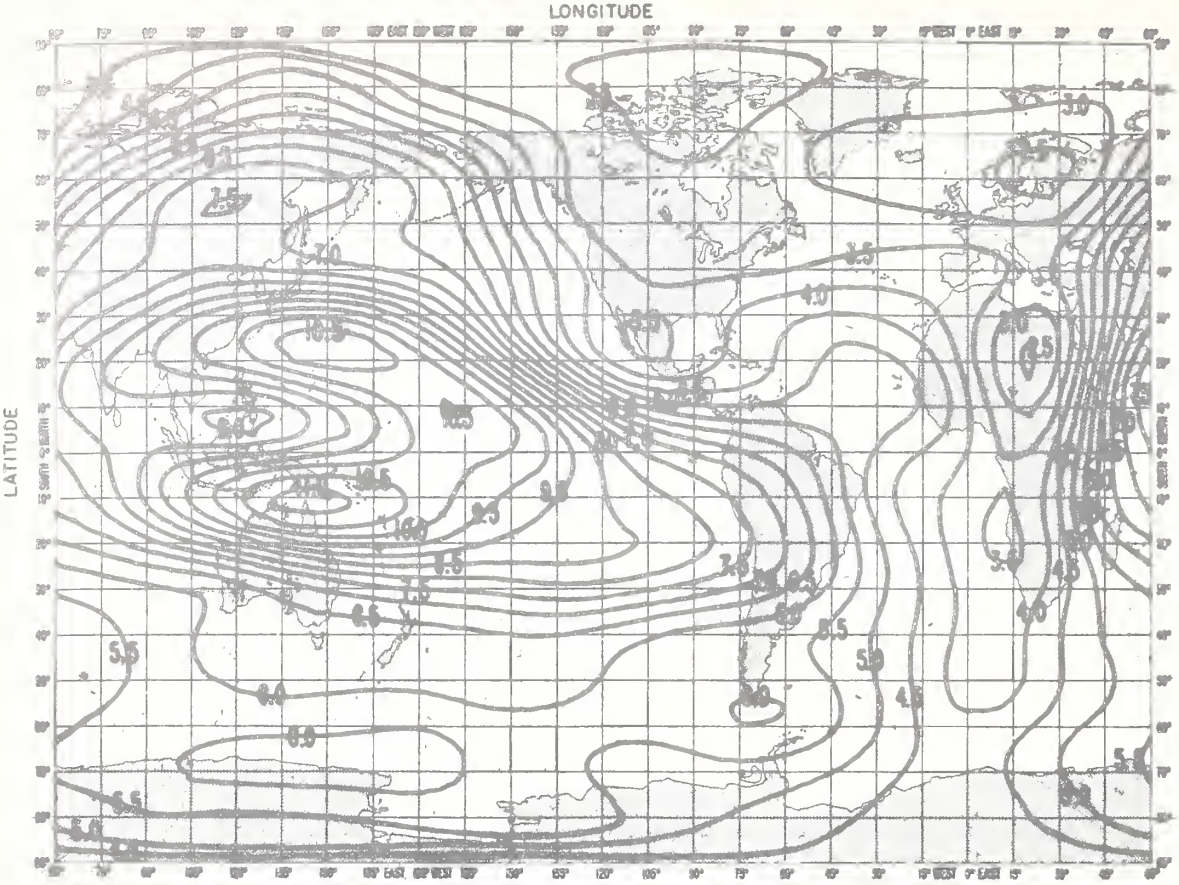

FIG. 3A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

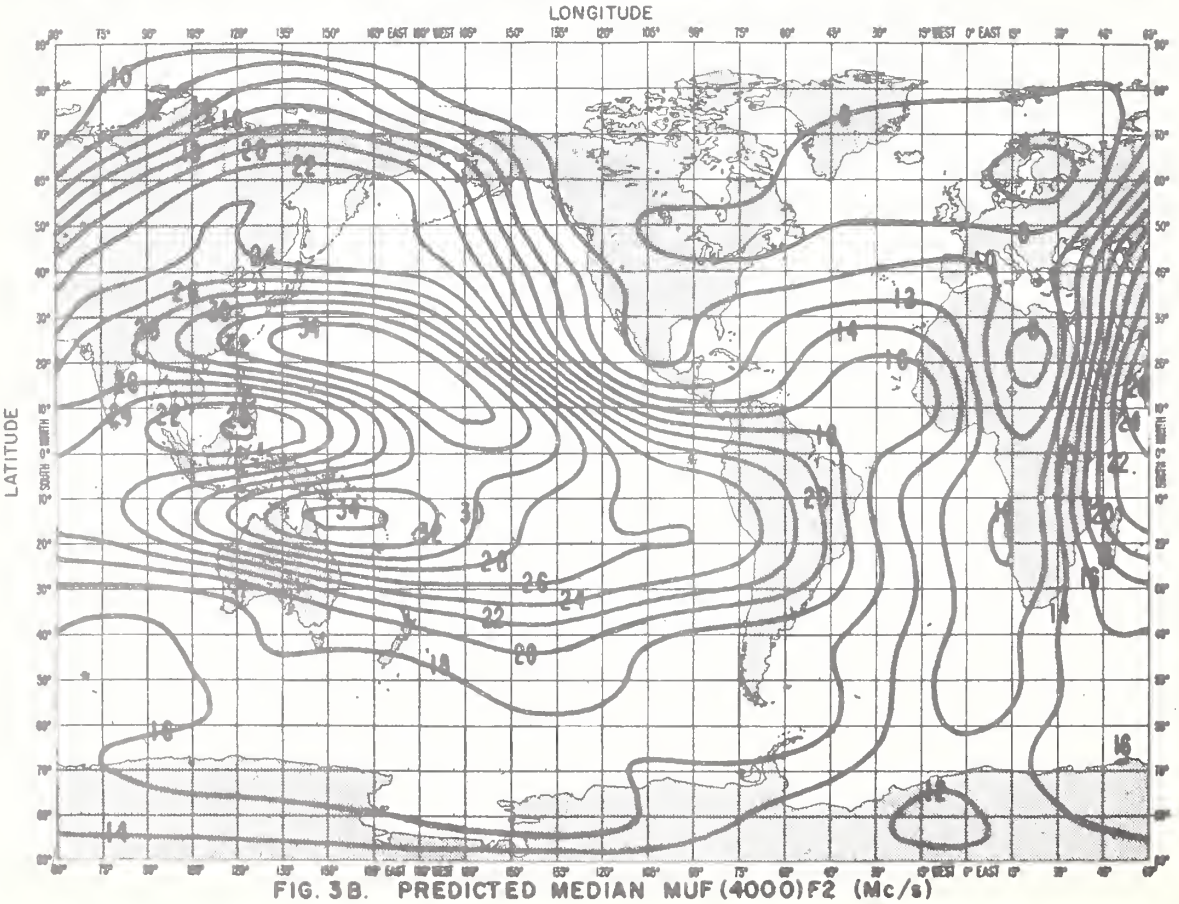

FIG. 3B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

FEBRUARY 1965 UT=06

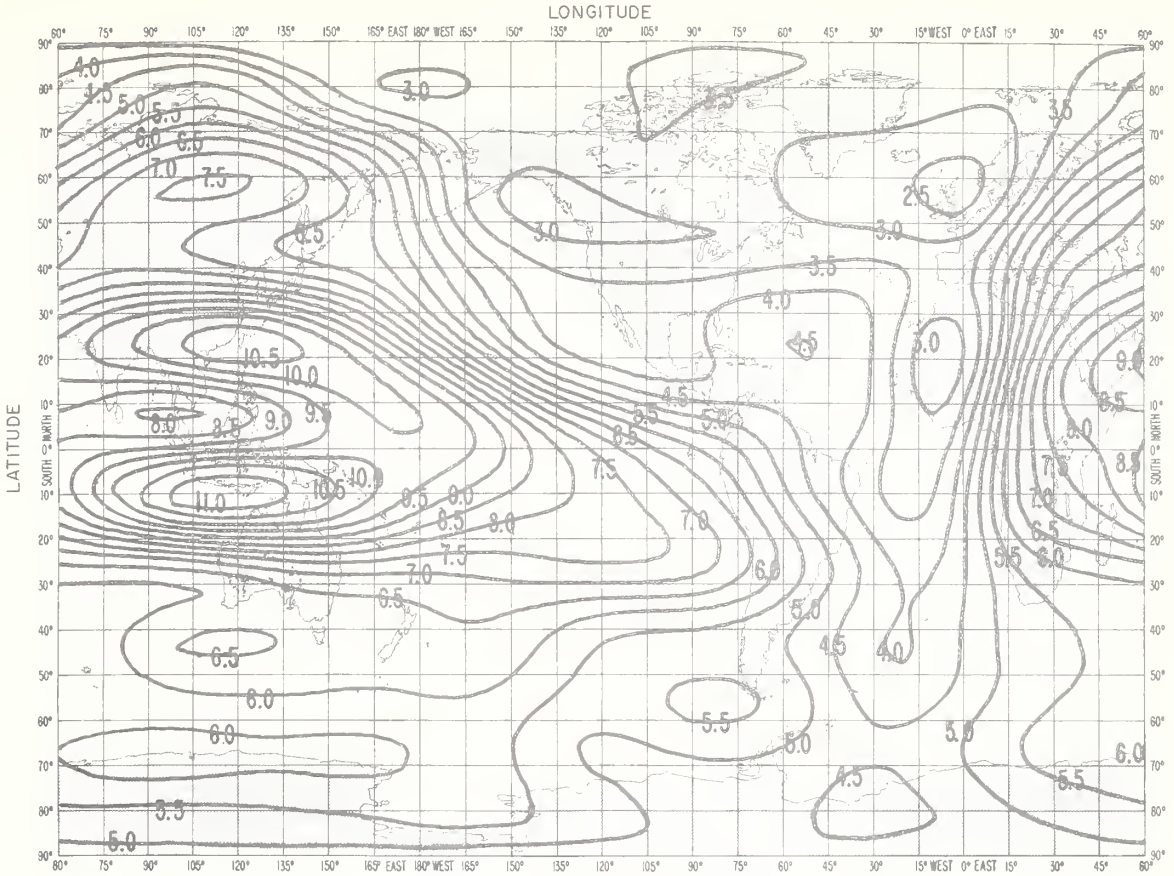

FIG. 4A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

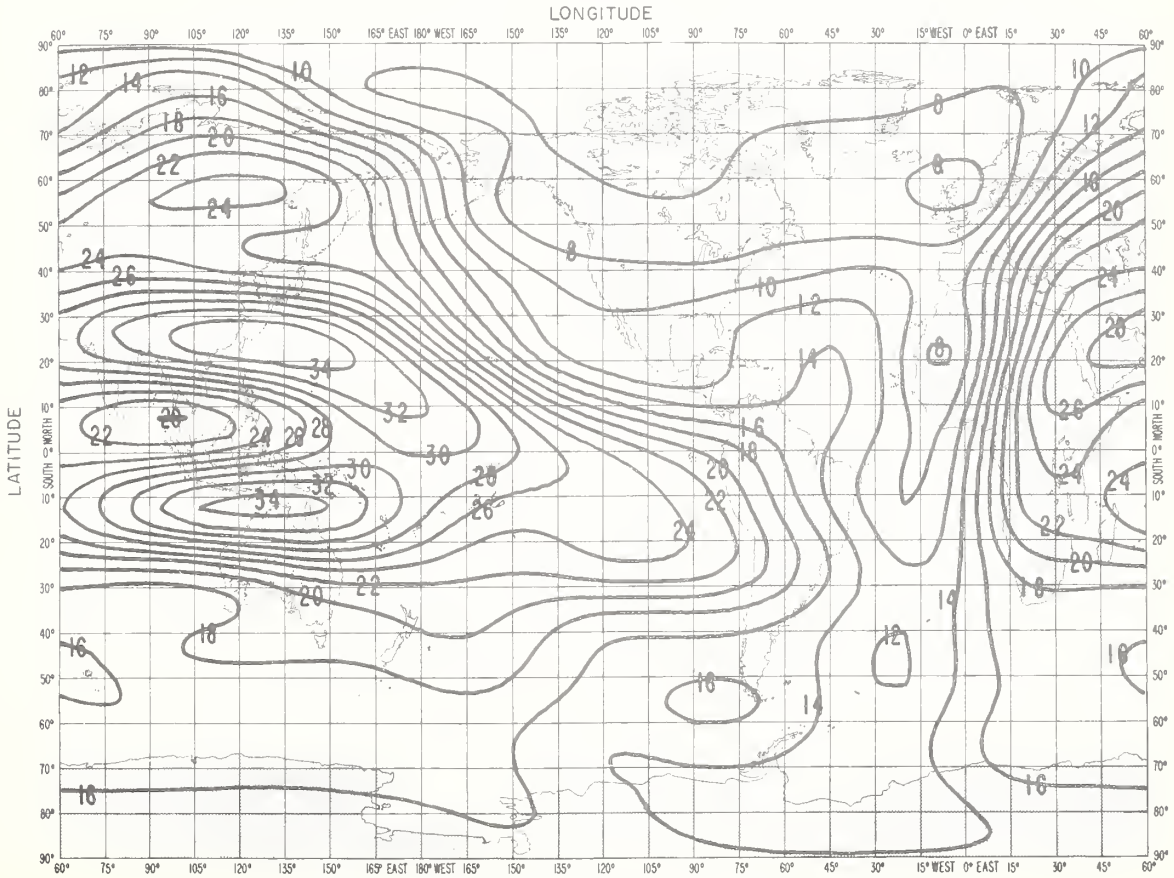

FIG. 4B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

FEBRUARY 1965 UT= 08

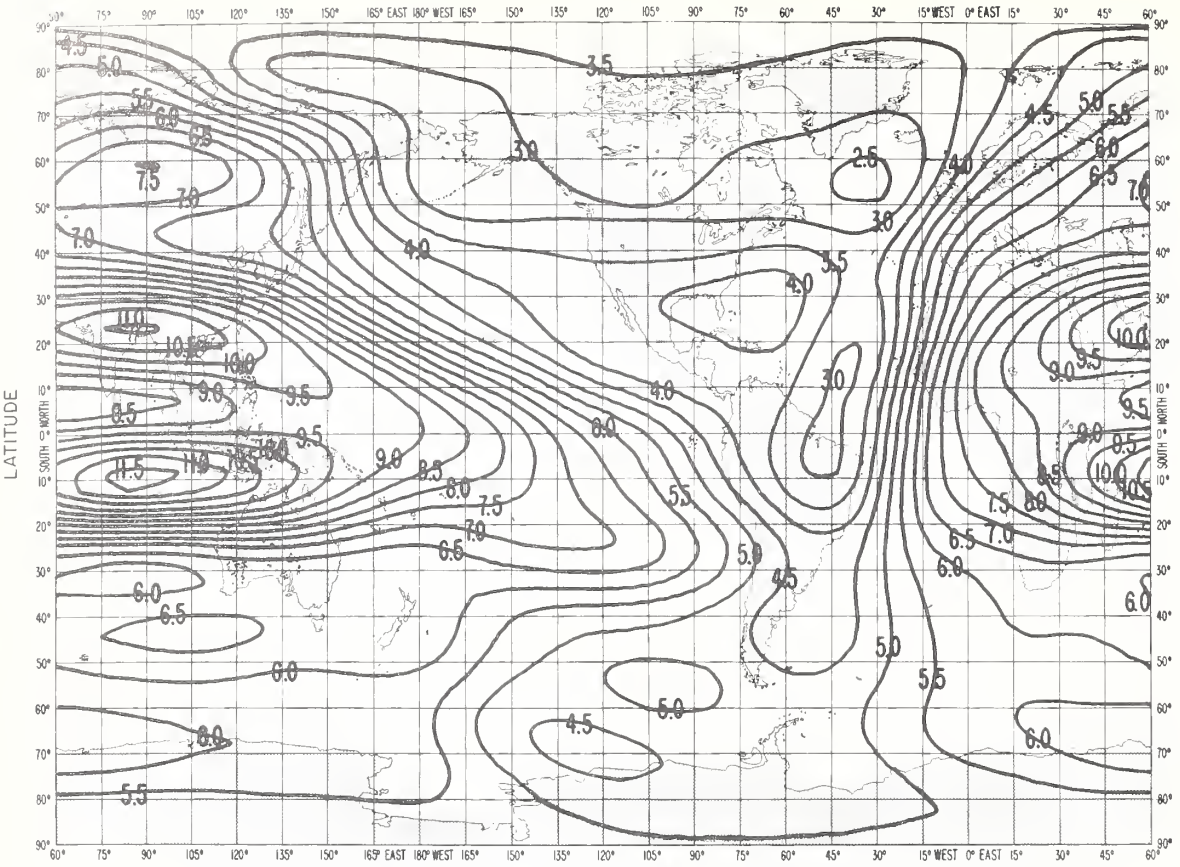

FIG. 5A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

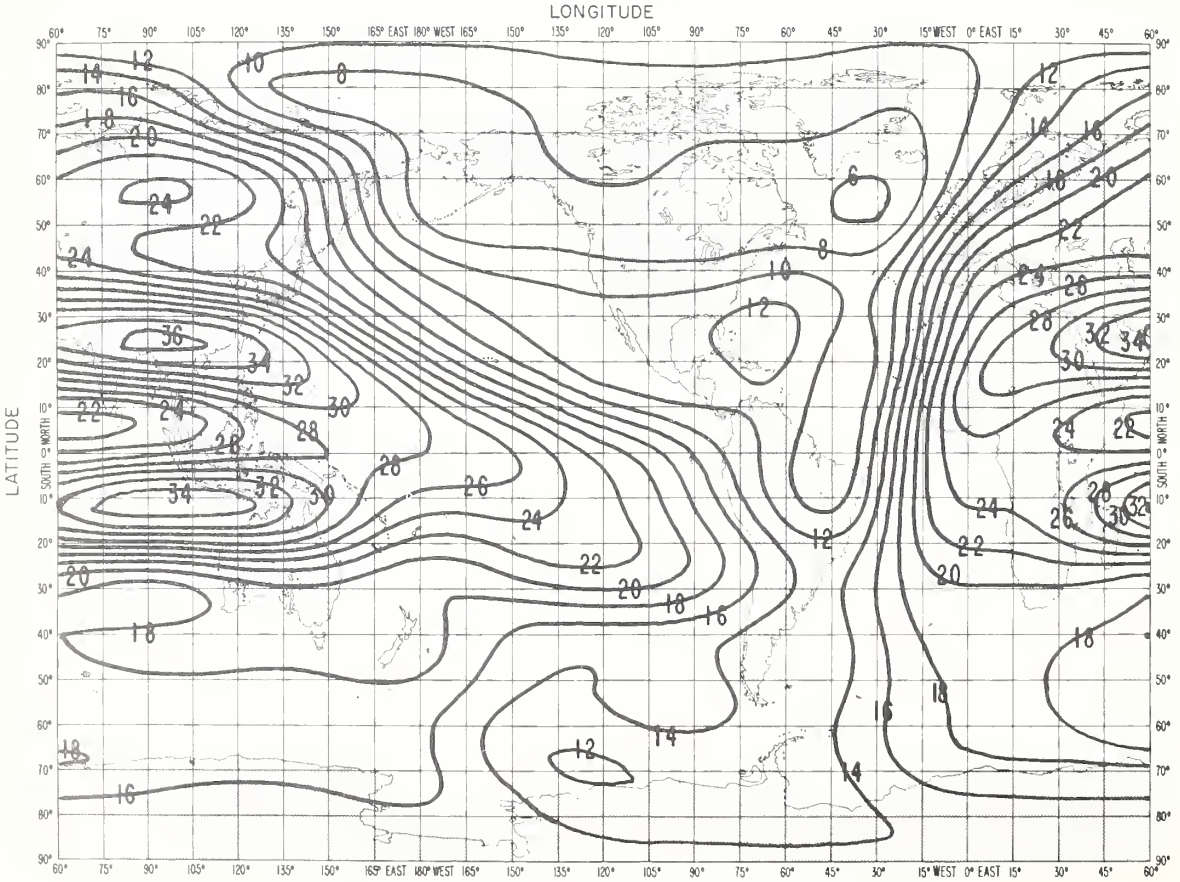

FIG. 5B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

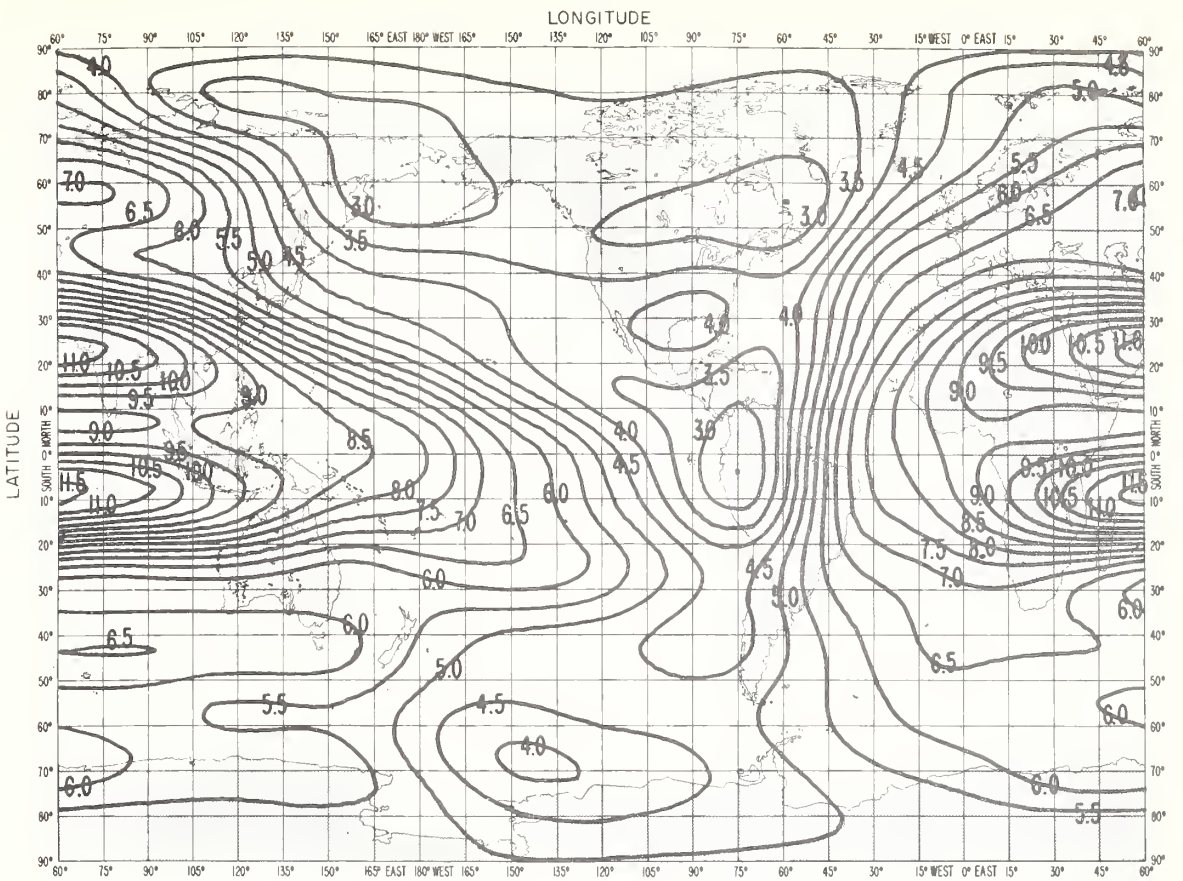

FIG. 6A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

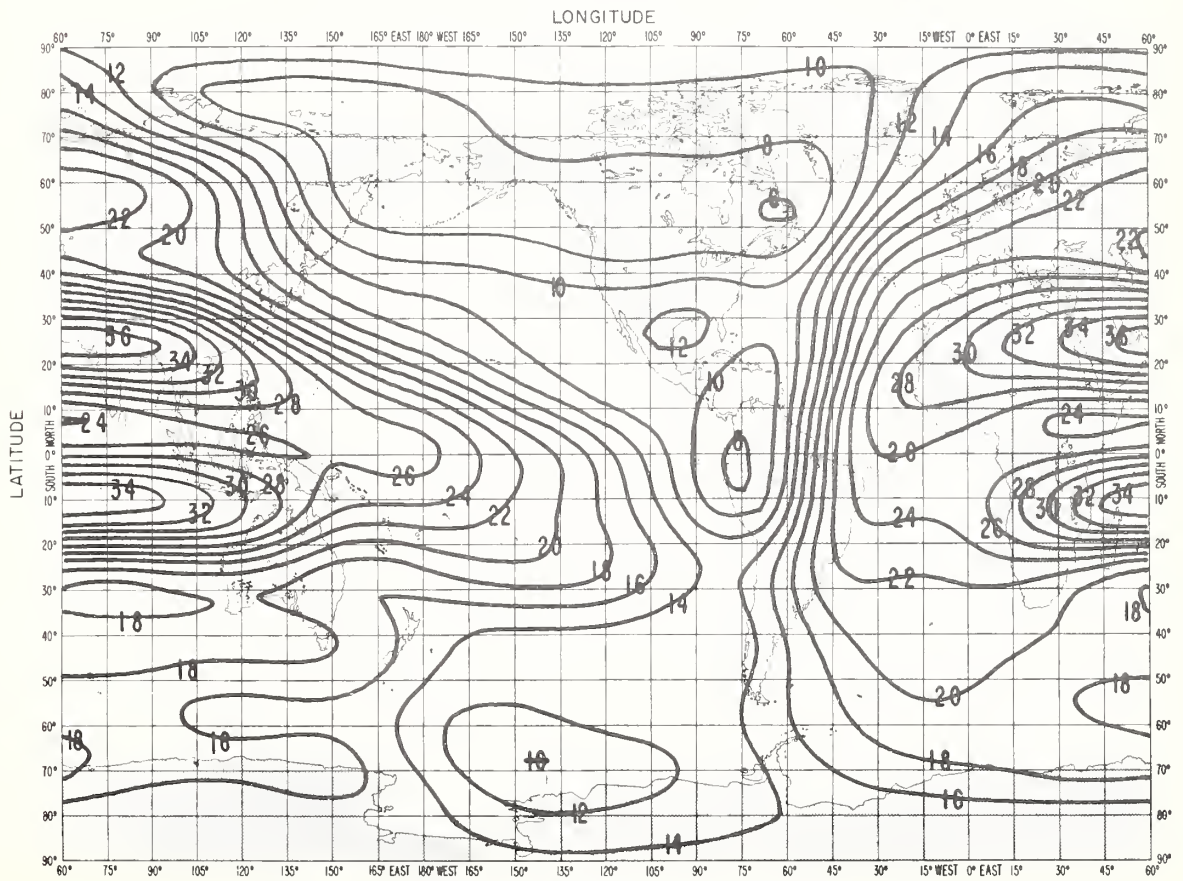

FIG. 6B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

FEBRUARY 1965 UT=12

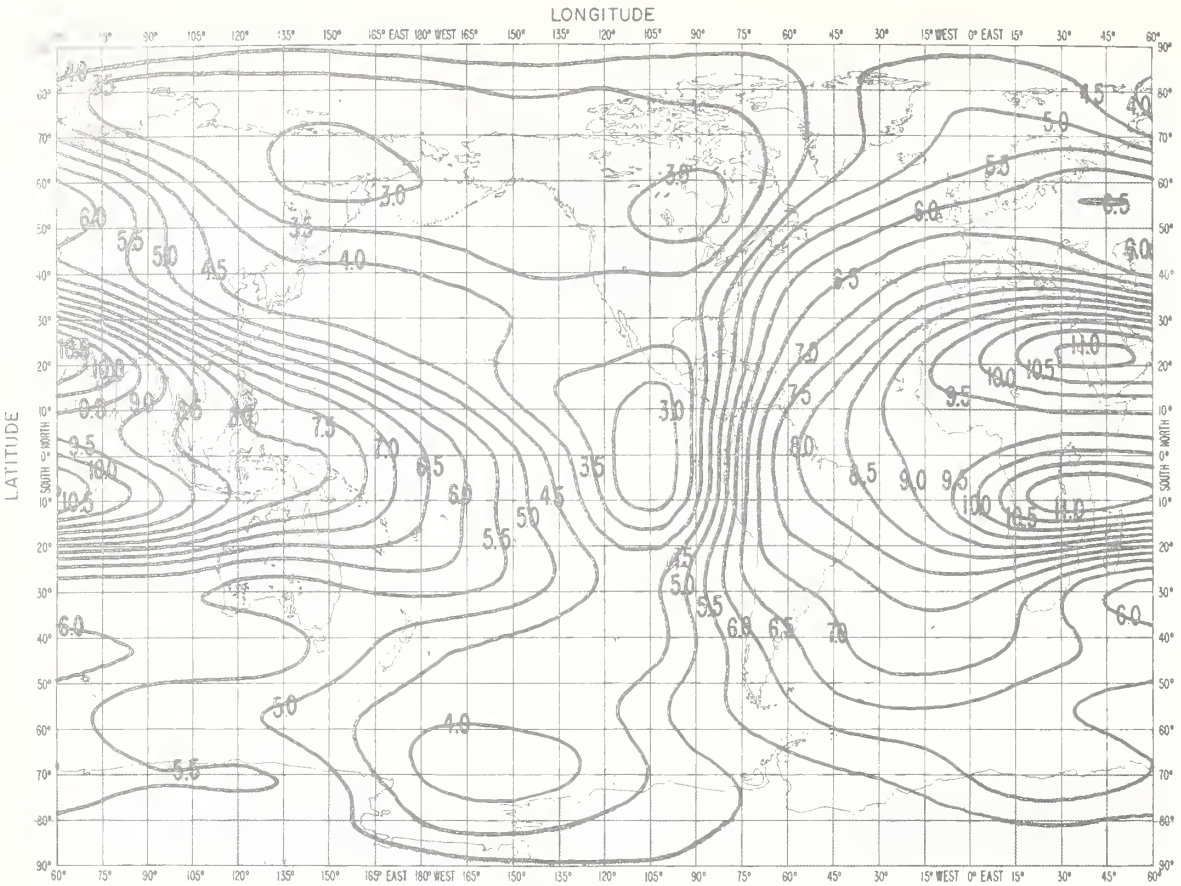

FIG. 7A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

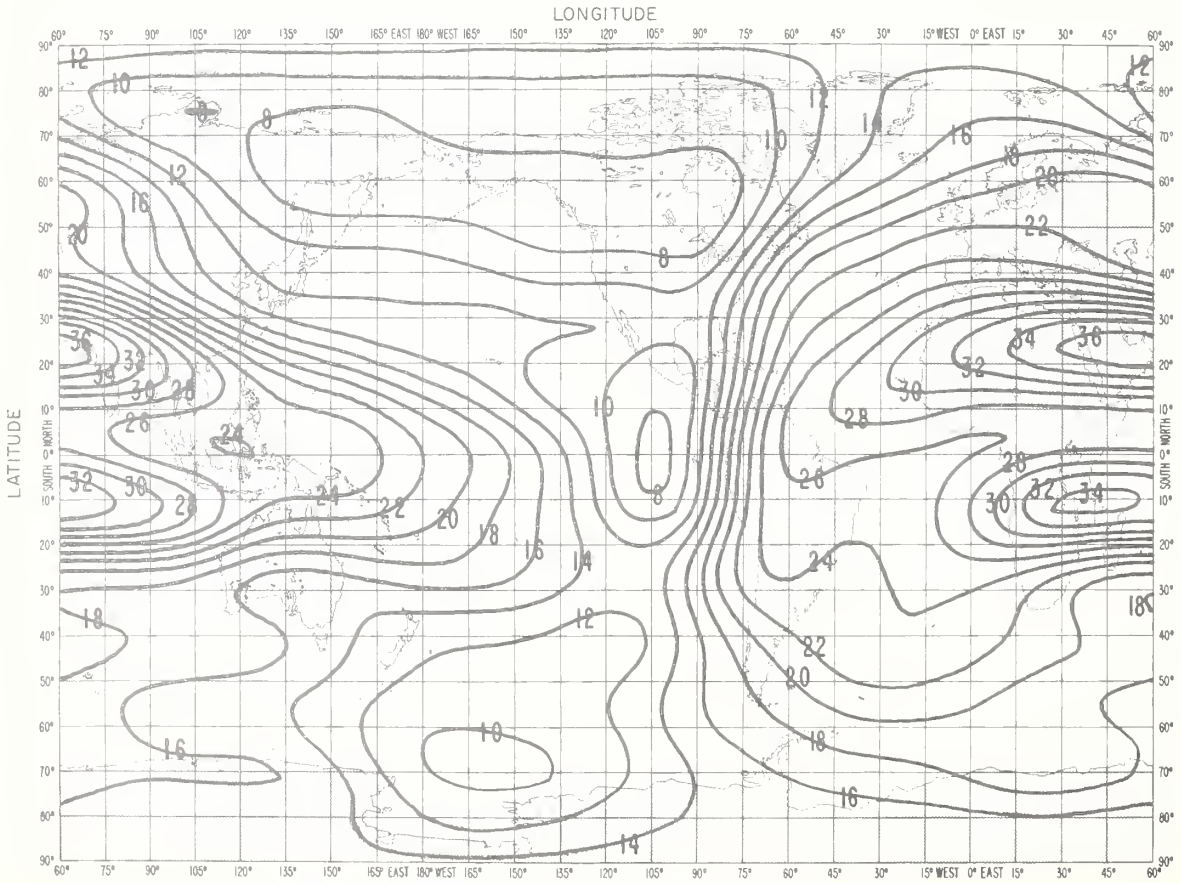

FIG. 7B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

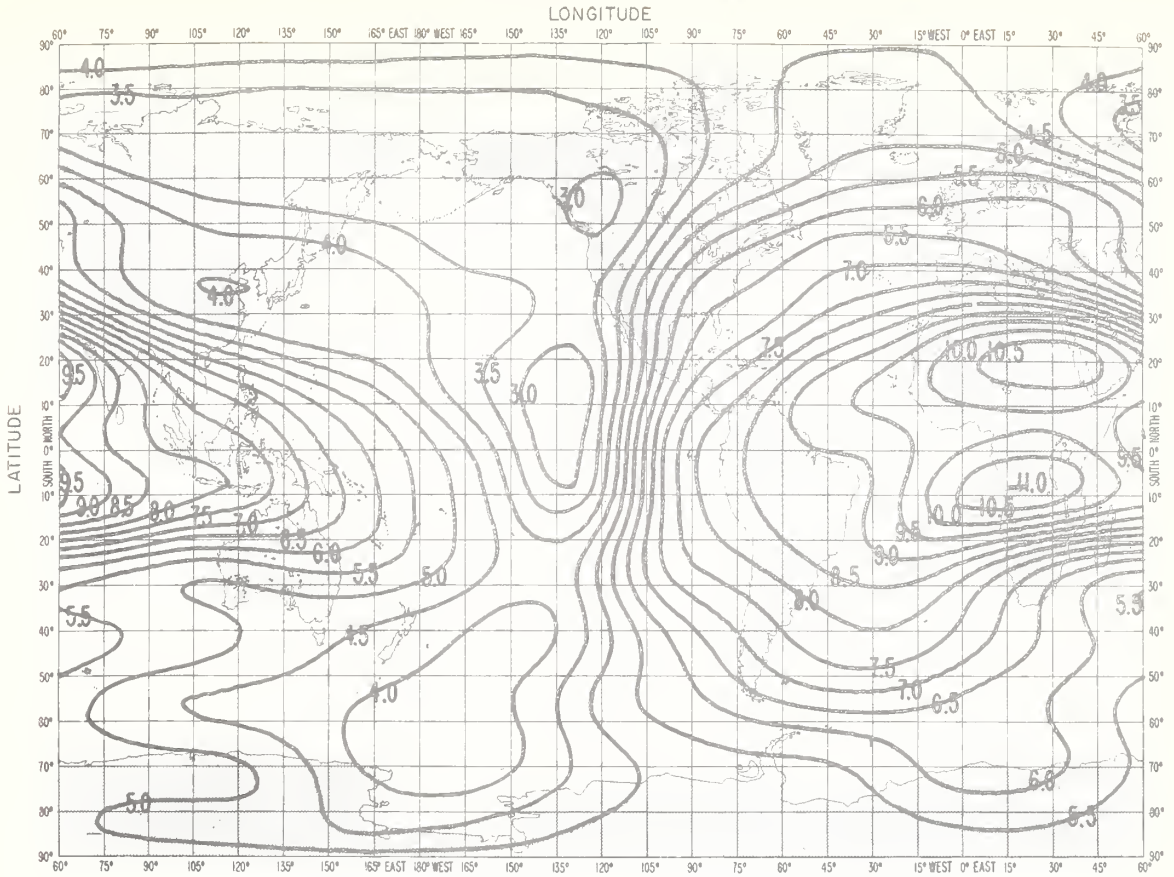

FIG. 8A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

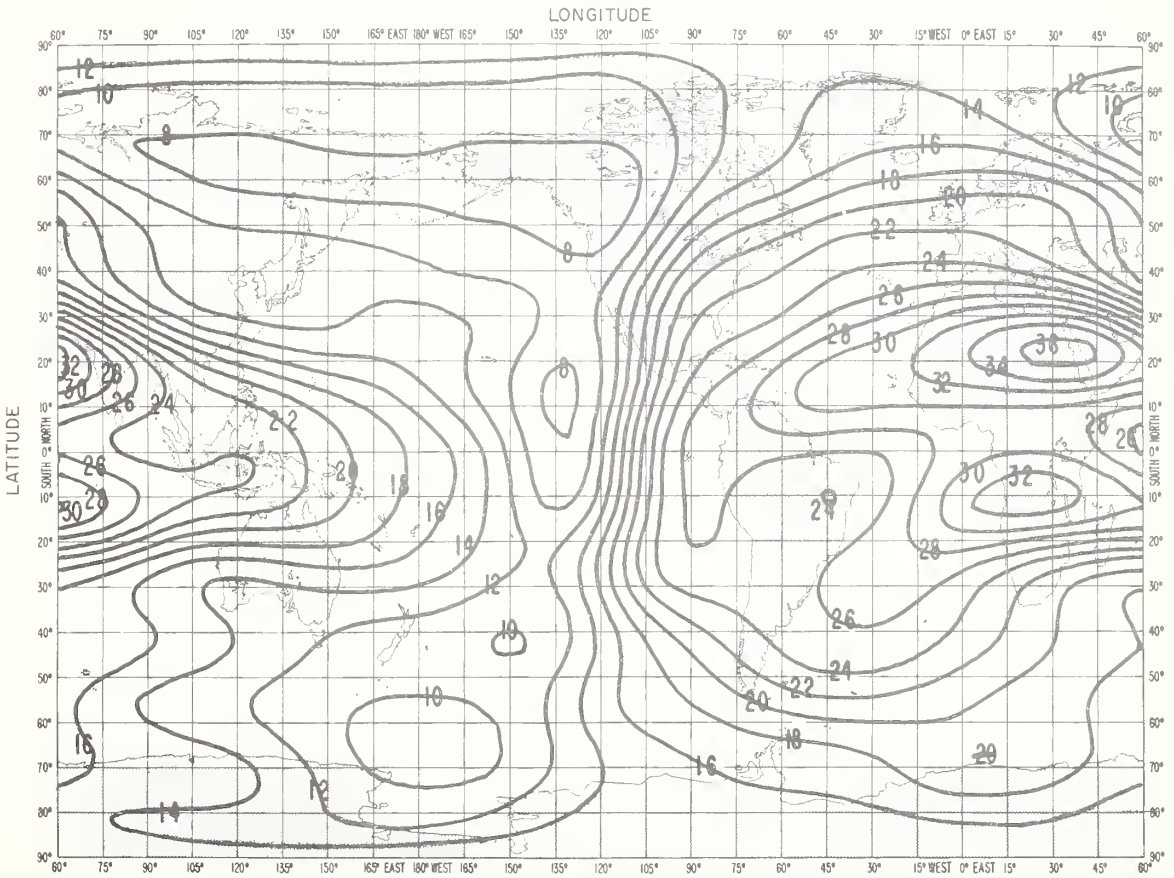

FIG. 8B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

FEBRUARY 1965 UT= 16

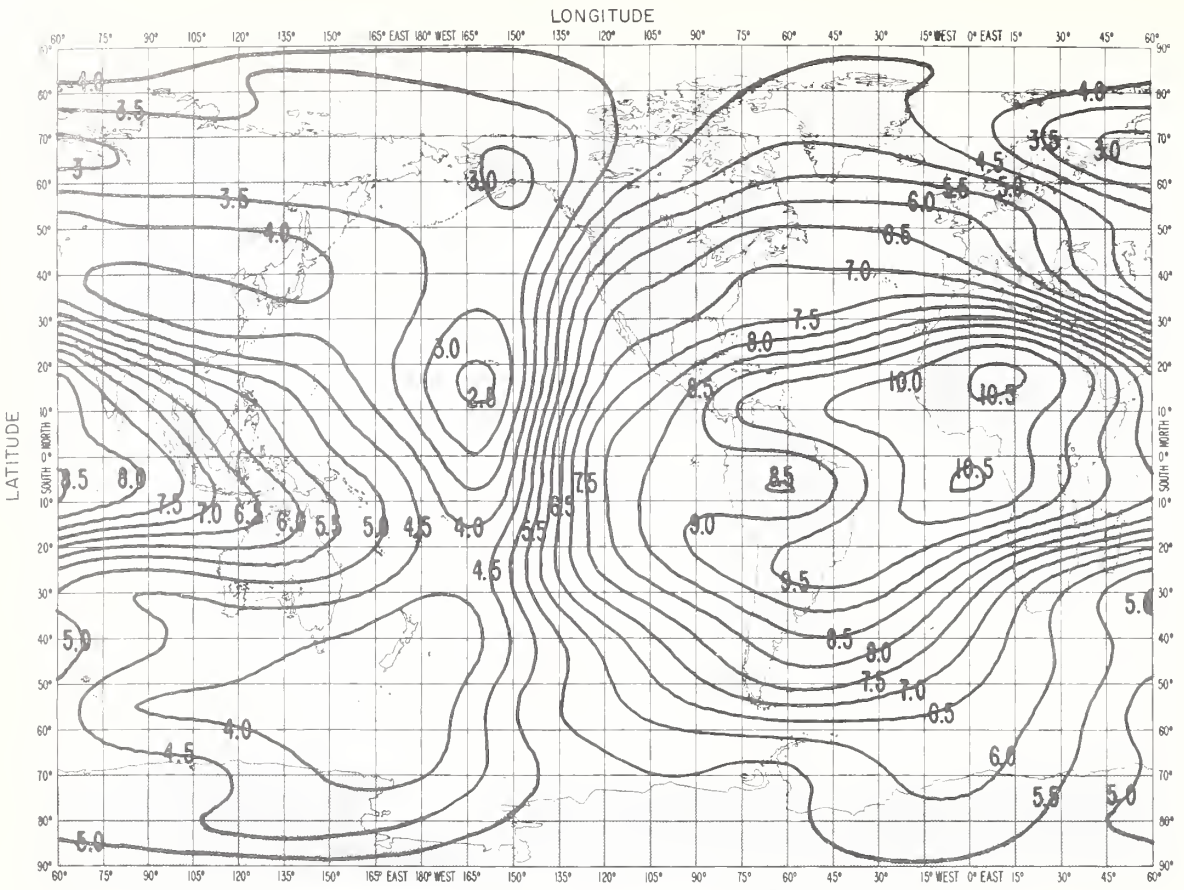

FIG. 9A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

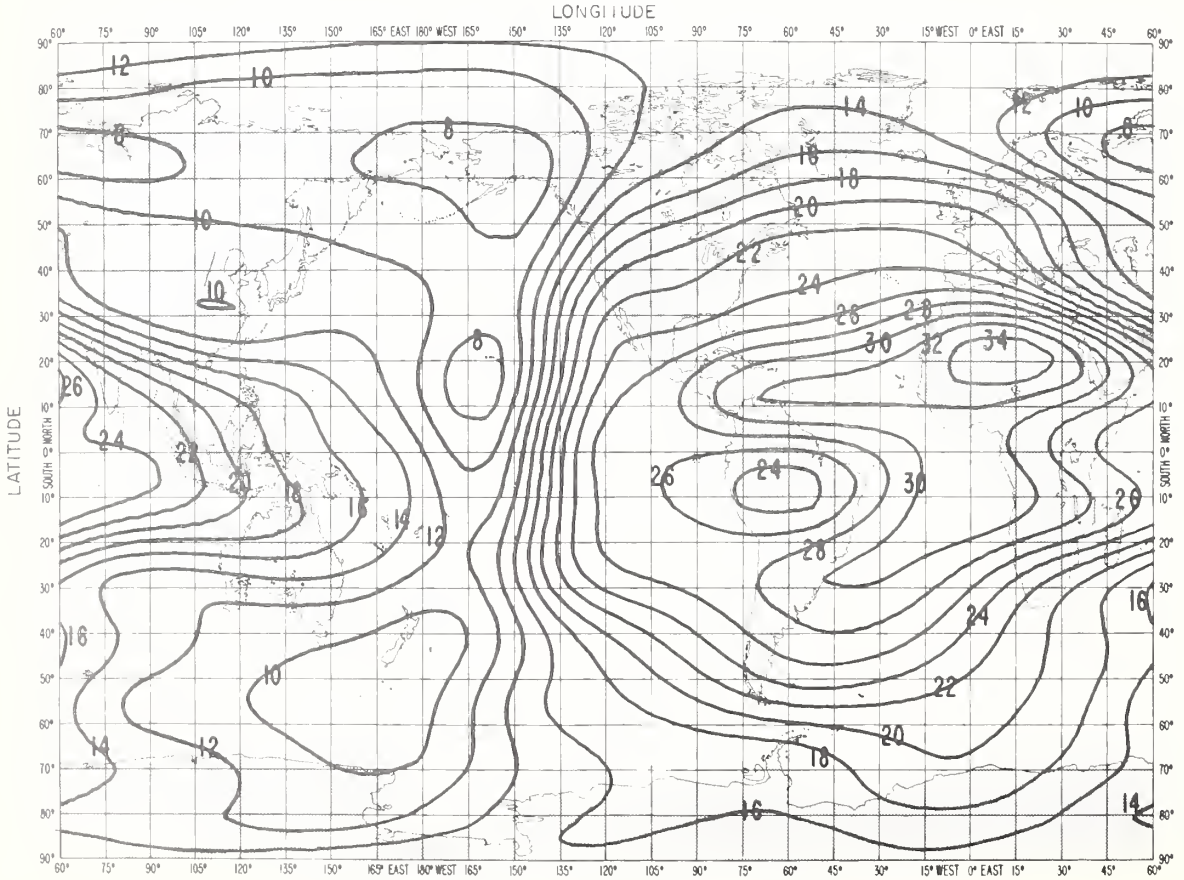

FIG. 9B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

FEBRUARY 1965 UT=18

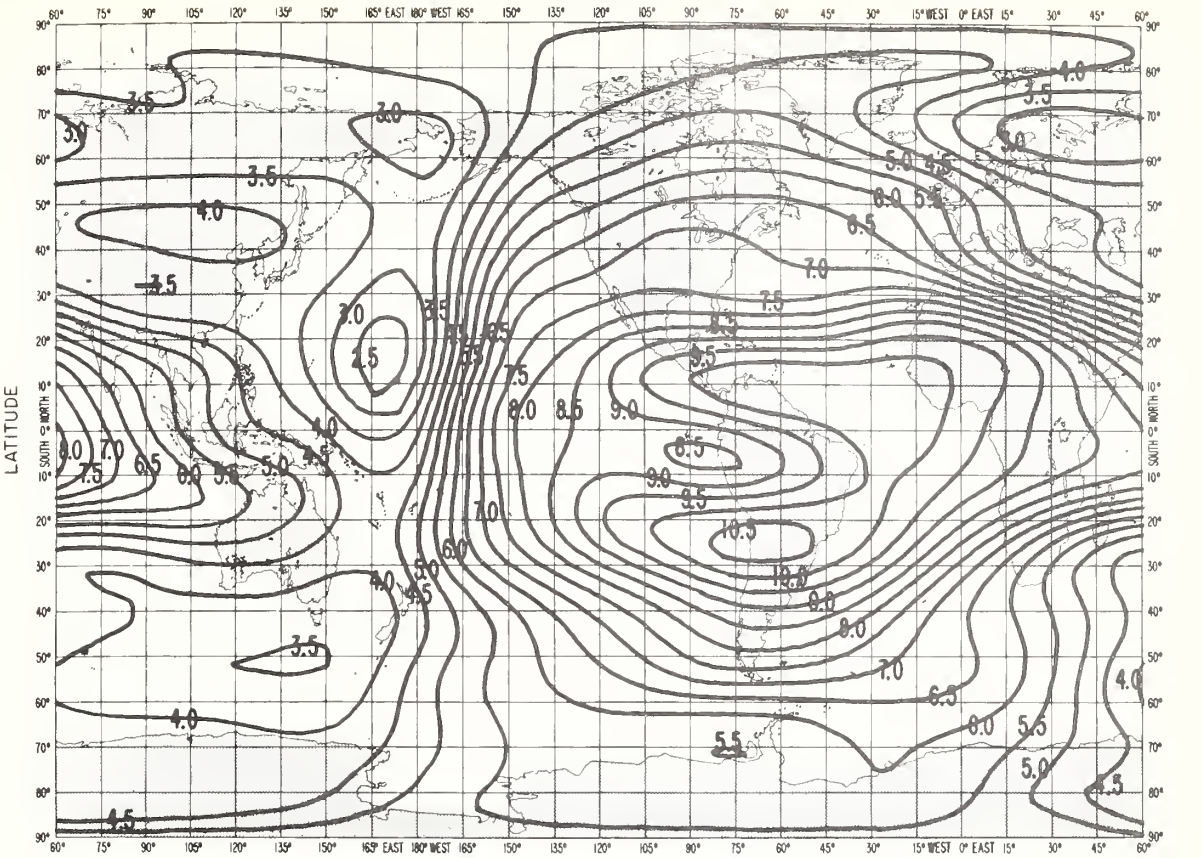

FIG. 10A PREDICTED MEDIAN MUF (ZERO)F2 (Mc/s)

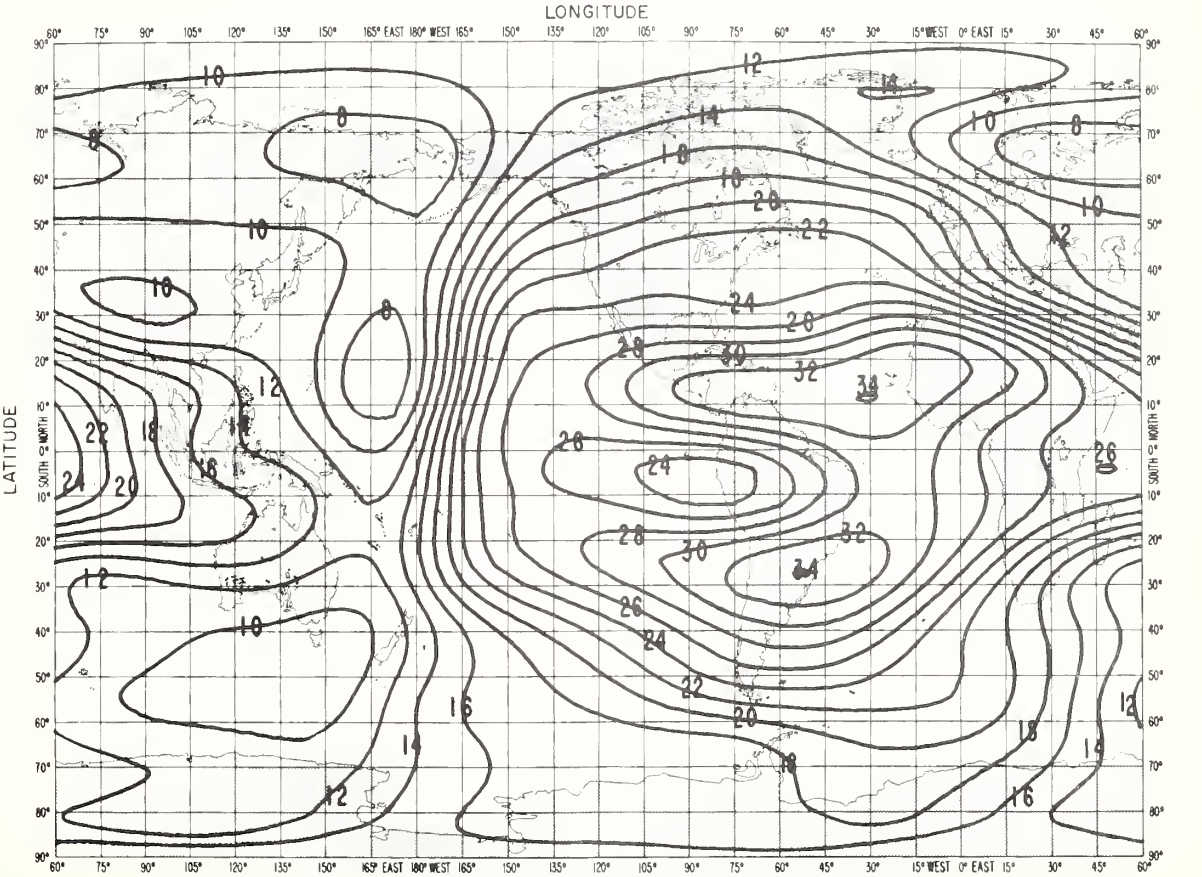

FIG. 10B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

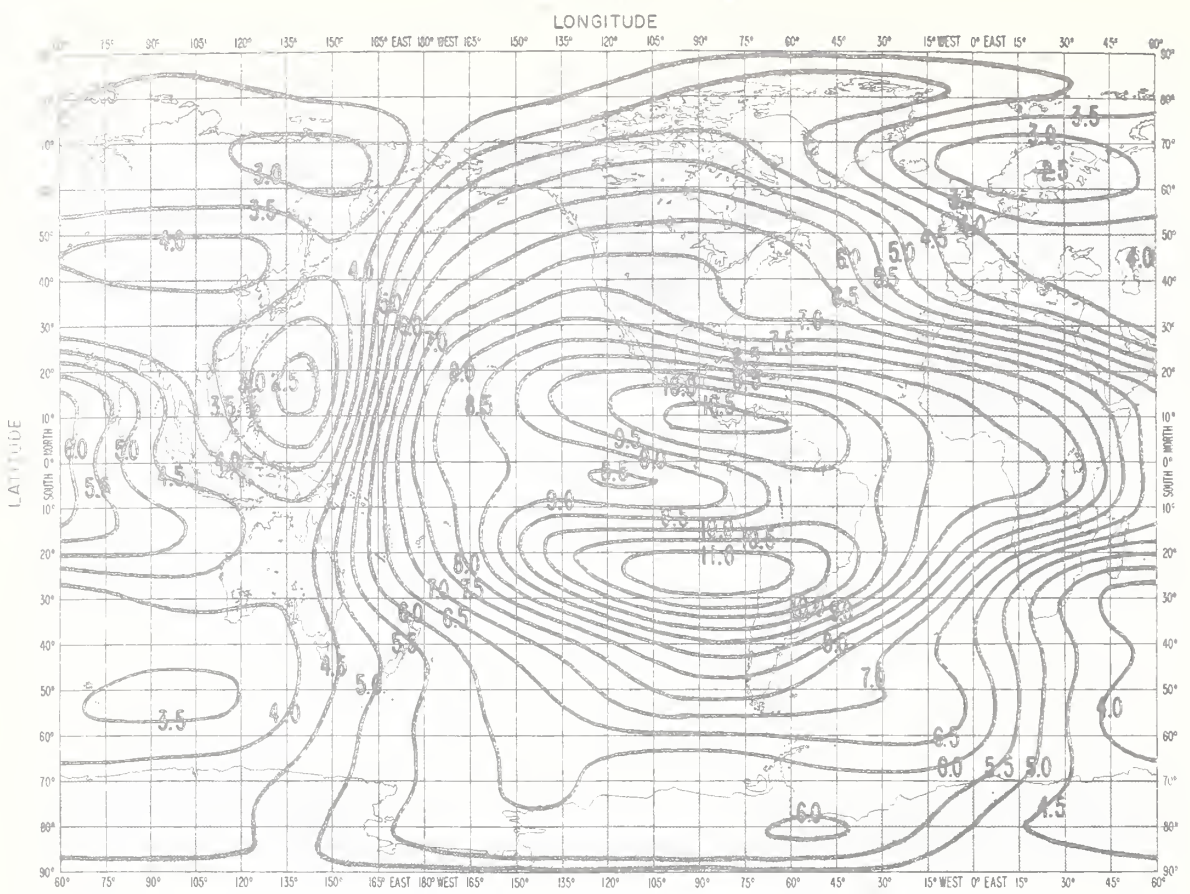

FIG. IIA. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

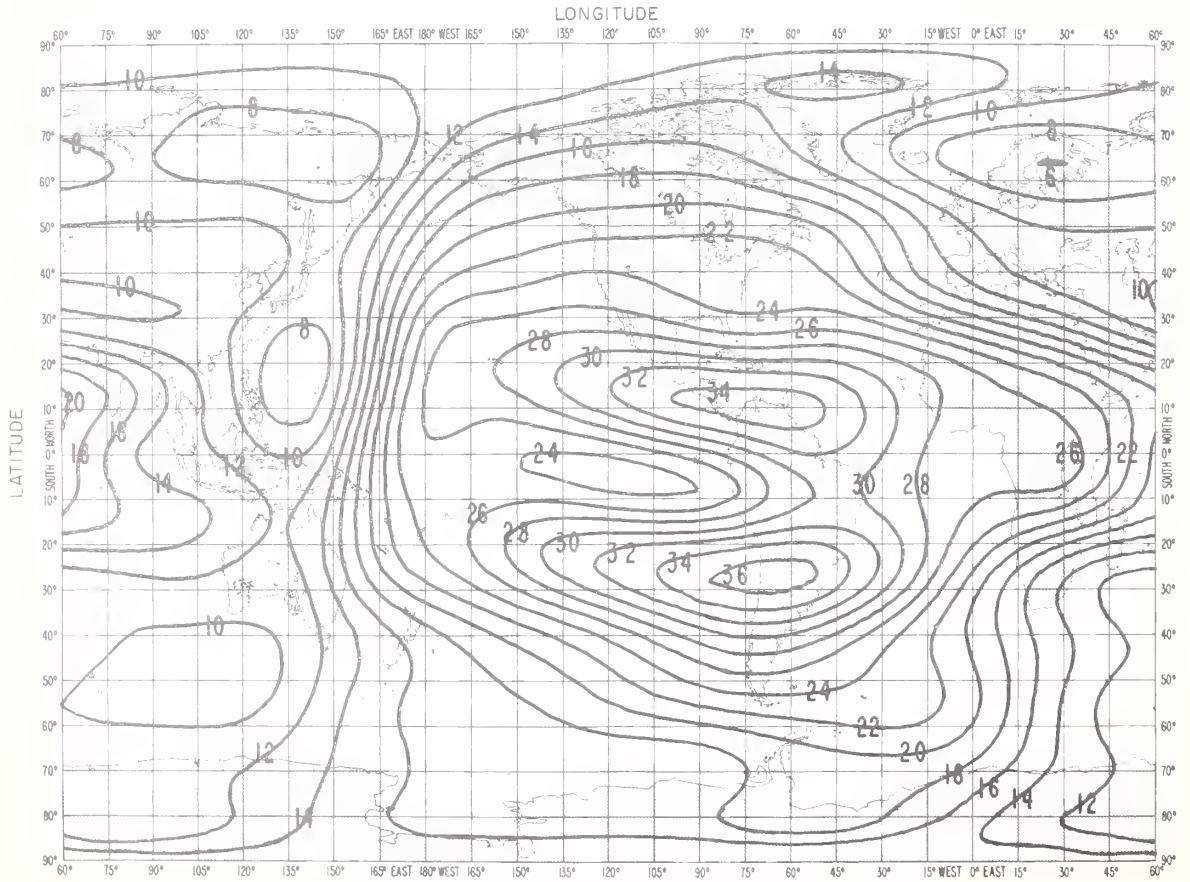

FIG. IIB. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

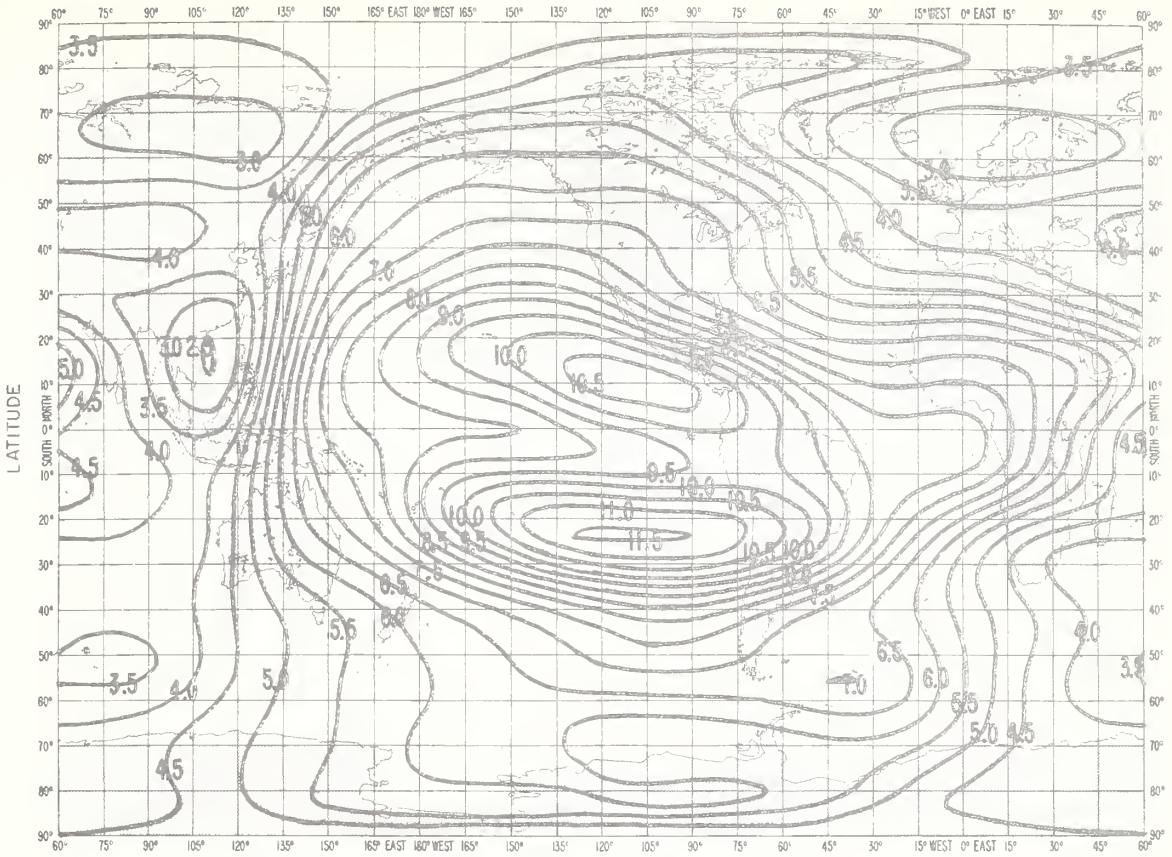

FIG. 12A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

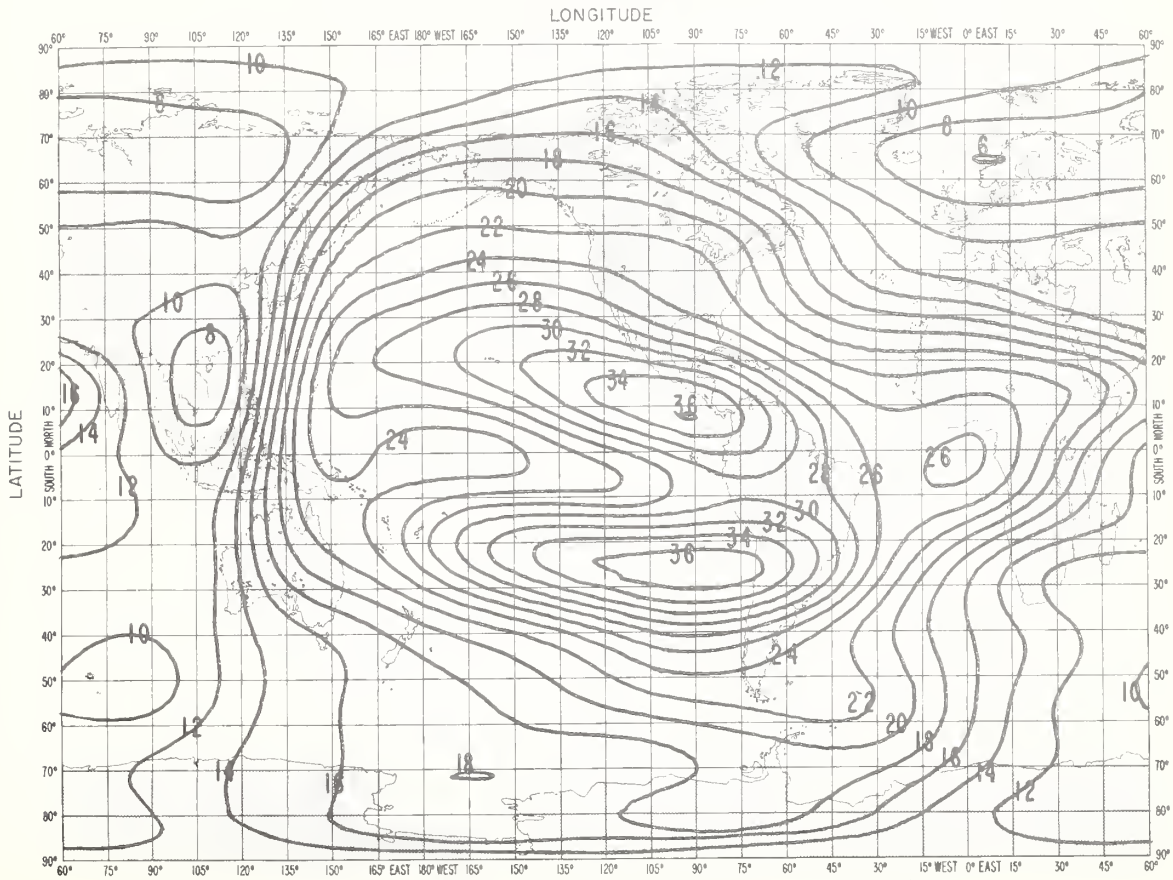

FIG. 12B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

NORTH POLAR AREA
FEBRUARY 1965 UT=00

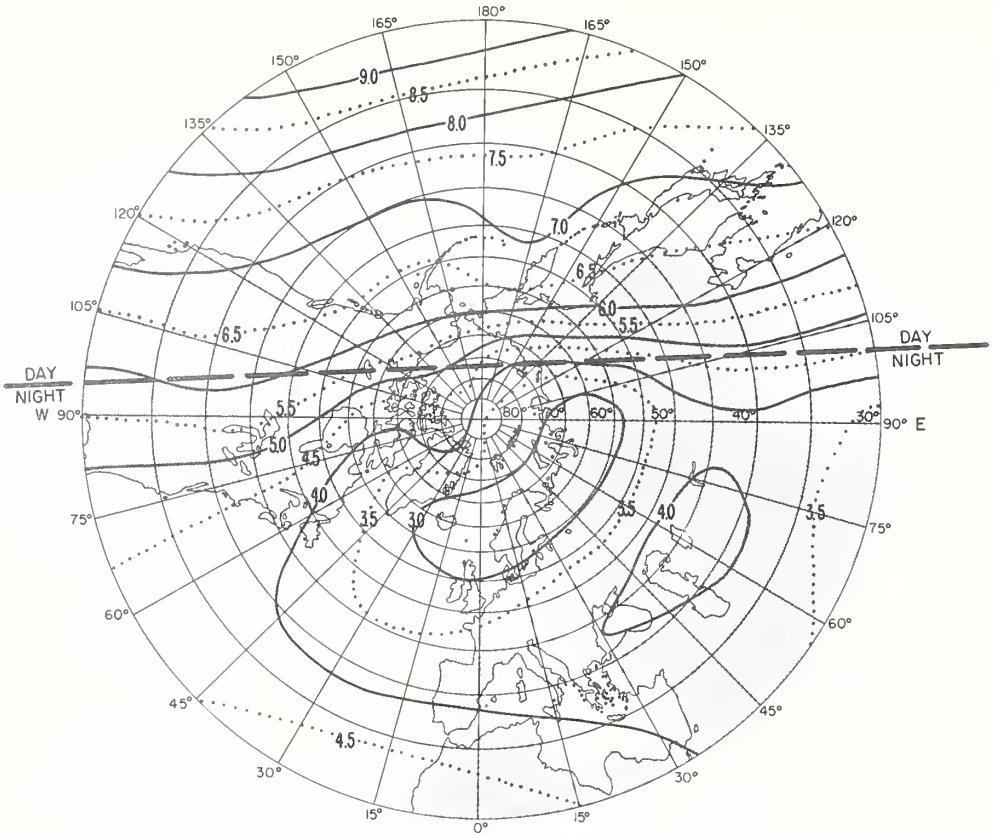

FIG. 13A. PREDICTED MEDIAN MUF (ZERO) F2 (Mc/s)

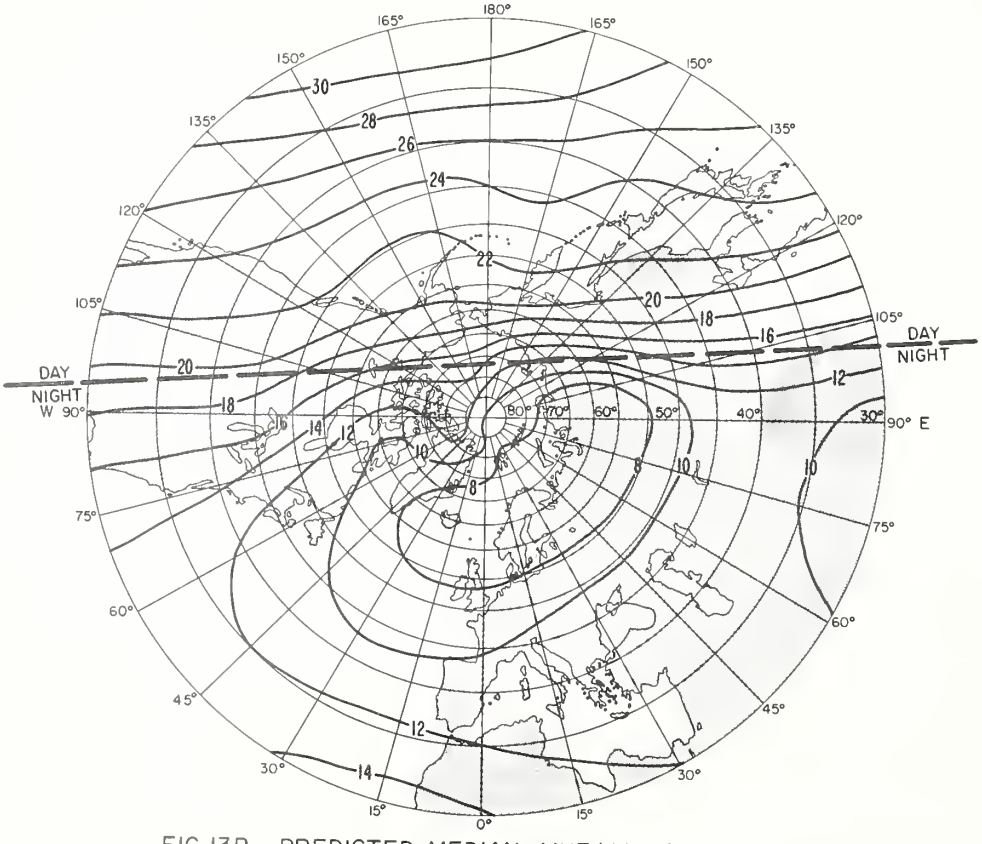

FIG. 13B. PREDICTED MEDIAN MUF (4000) F2 (Mc/s)

SOUTH POLAR AREA
FEBRUARY 1965 UT=00

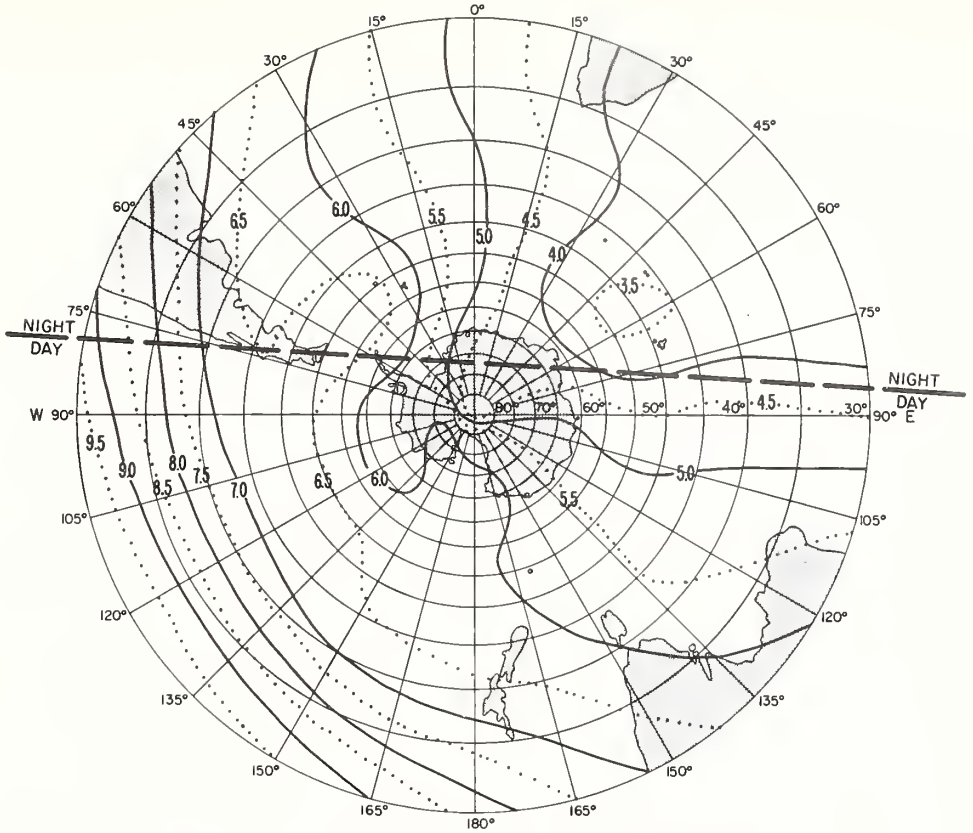

FIG. 14A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

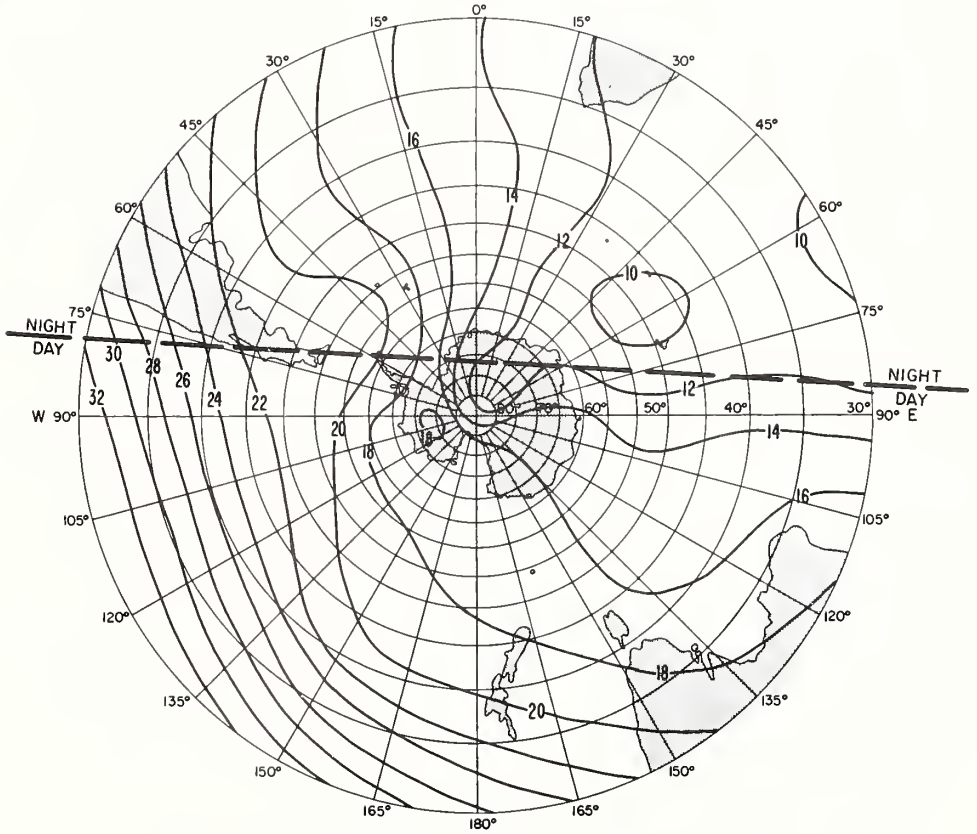

FIG. 14B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

NORTH POLAR AREA
FEBRUARY 1965 UT= 12

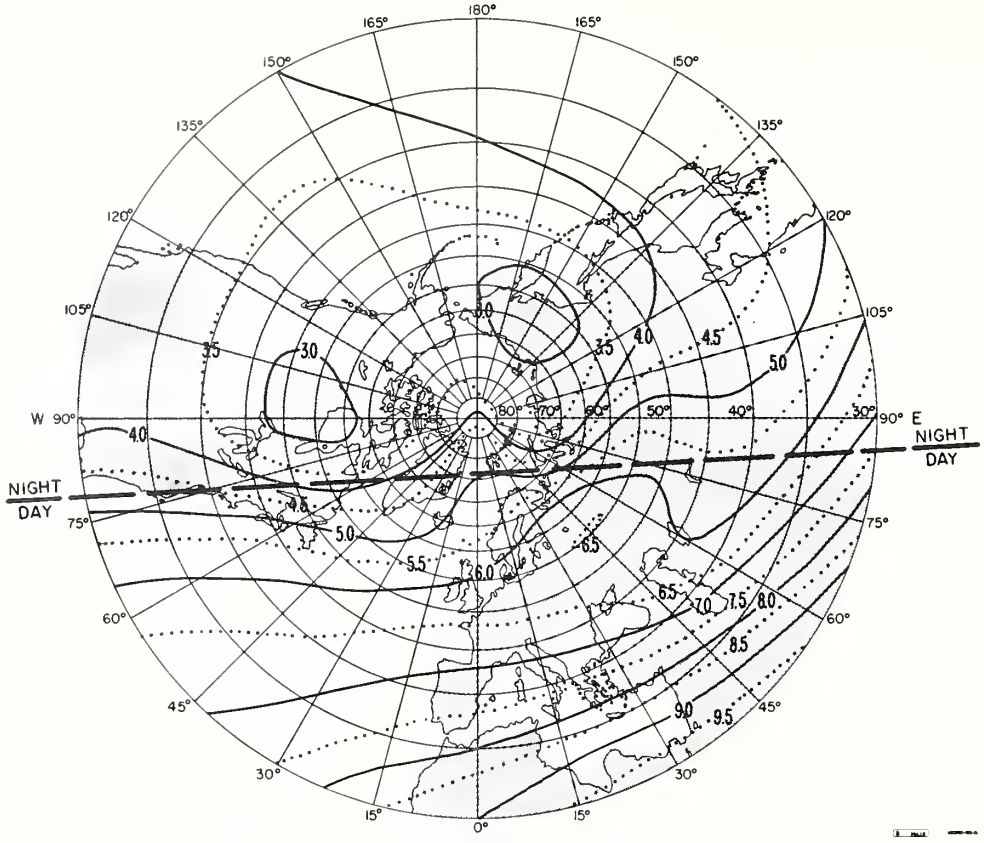

FIG. 15A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

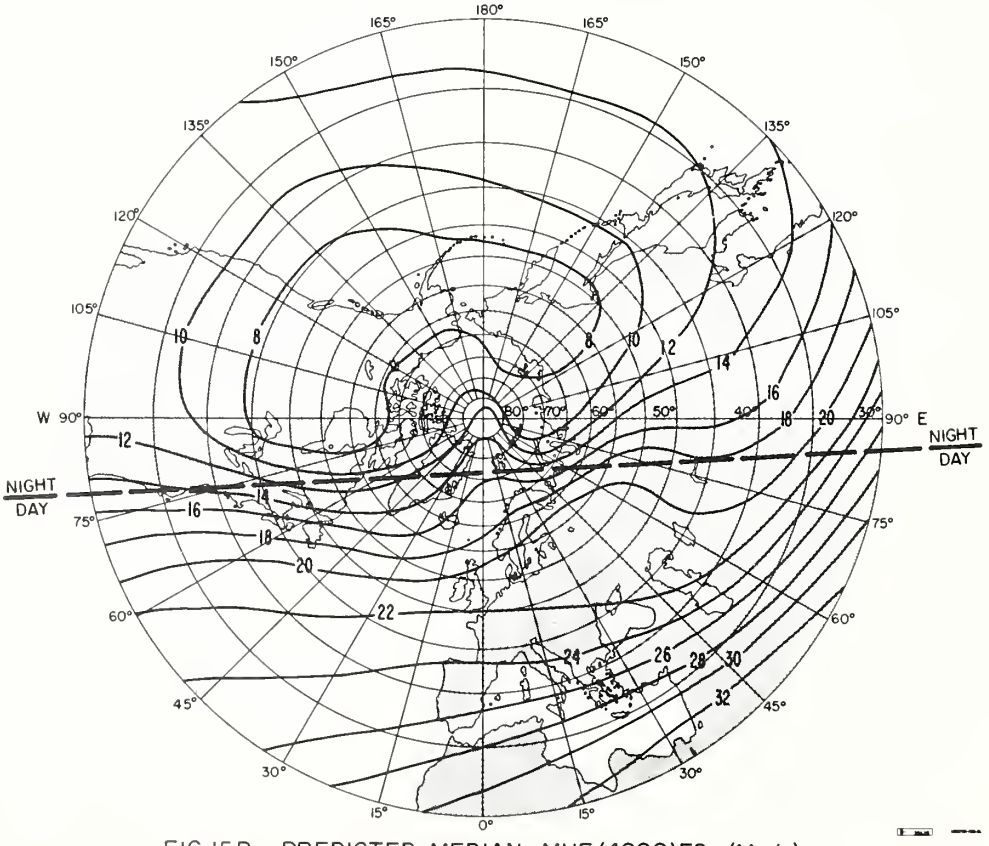

FIG. 15B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

SOUTH POLAR AREA
FEBRUARY 1965 UT= 12

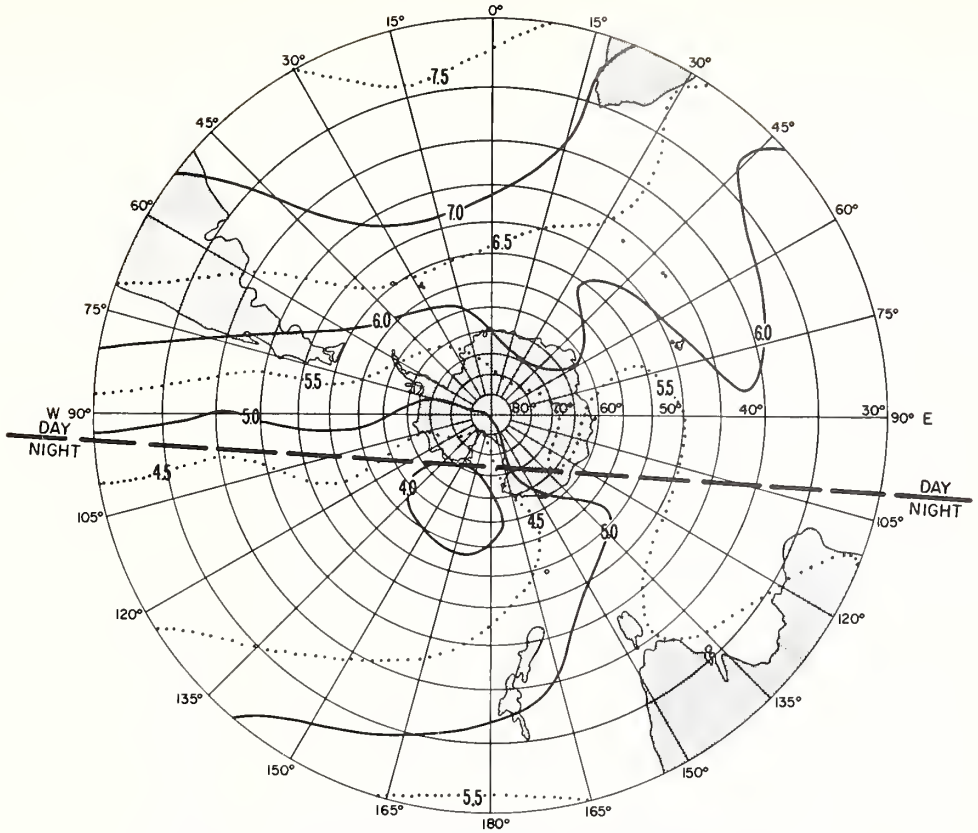

FIG. 16A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

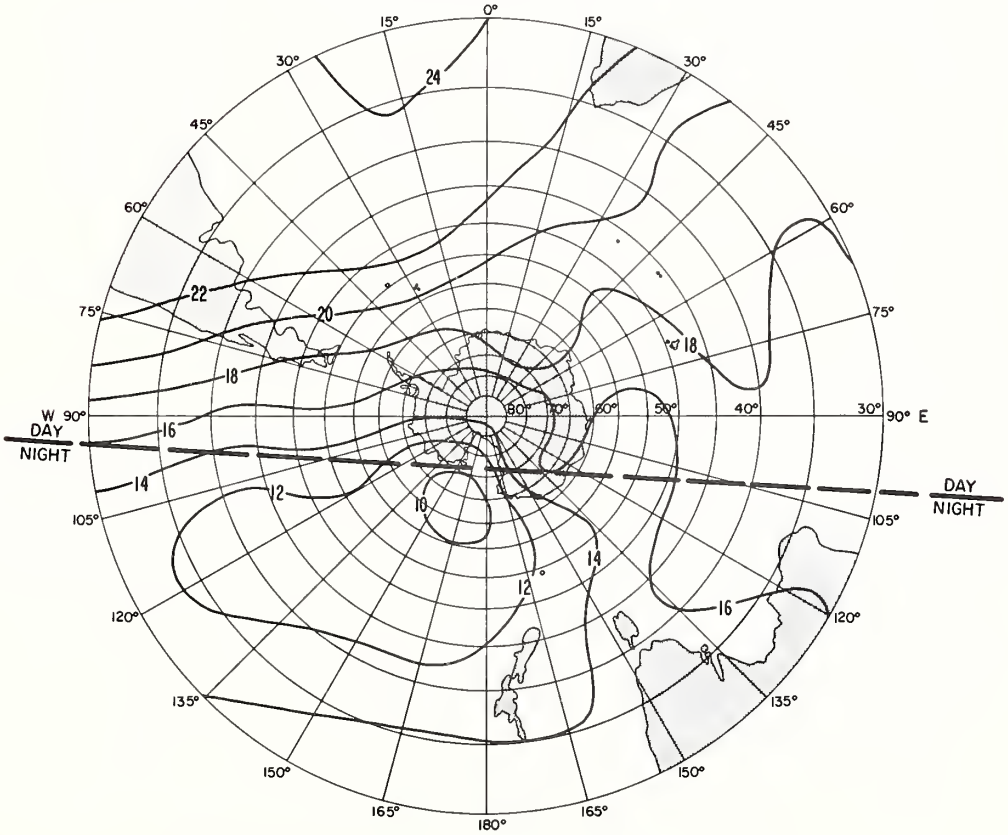

FIG. 16B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

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