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NORTH ATLANTIC RADIO PROPAGATION DISTURBANCESOCTOBER 1943 THROUGH OCTOBER 1945.

This report is in part a revision of IRPL-R13, "Ionospheric and Radio Propagation Disturbances October 1943 through February 1945." As suggested in R13, with the accumulation of more data it has become advisable to revise the conversion scales used in converting the received data to the IRPL radio propagation forecast scale, i.e.:

1 - Useless	4 - Poor to fair	7 - Good
2 - Very poor	5 - Fair	8 - Very good
3 - Poor	6 - Fair to good	9 - Excellent

Only North Atlantic paths were considered in this report; later revision of the North Pacific radio propagation quality figures is also planned. In the rest of this report all of the discussion pertains to North Atlantic paths only.

In the report IRPL-R13 the conversion scales for each report received were based on approximately the same percentage of cases for each below the storm threshold level. In the present report a master distribution curve was used to convert each report to the forecast scale. For each report the disturbance threshold was thus set at the same percentage of cases and the same percentage of cases in each report were converted into each of the individual forecast ratings as well.

The following reports were used in determining the master distribution curve of the forecast scale ratings as they occurred in actual conditions: Army Air Forces, Army Airways Communication System in the North Atlantic Area, average rating of about twenty stations; British Broadcasting Company average of reception of British stations at Portland, Oregon, Phoenix, Arizona, St. Louis, Mo., Cincinnati, Ohio, Indianapolis, Ind., and New York, N. Y.; Churchill, Canada, reception of WWV, Washington, D.C. on 5 Mc and 10 Mc; Mackay Radio Company reception at New York of European stations; Royal Canadian Air Force reception between Ottawa, Halifax, St. John's and Goose; and the Royal Air Force reception at Dorval, Canada, of Goose, Iceland, and the United Kingdom. All of these reports were made on the 1-9 forecast scale. Frequency distributions of the data as reported through July or August 1945 were made in each case. To give approximately equal weighting to each of the reports, since they covered varying periods of time, the percentage of cases of each forecast value were computed from the number of cases falling into each class. Then by averaging these percentages for each value of the forecast scale a master

(over)

frequency distribution of the forecast scale as reported in actual radio propagation conditions was obtained. This master scale was then used to form conversion scales for all reports including those used in computing the master. In this way for each report the same percentage of cases fell into each of the forecast scale values.

The conversion scales were computed by first forming cumulative percentage curves of the master and of each of the frequency distributions of the individual reports, starting with disturbed values and ending with the quiet ones. Fig. 1 shows the master frequency distribution and cumulative percentage curves. It will be noted that the frequency distribution was not a normal one since there were more cases on the quiet side of the ratings than on the disturbed side as would be logically expected. Also as was logical, the highest percentage of cases fell at "5" or fair ratings. About 28% of the cases fell below the storm threshold. This agreed rather well with the percentage of geomagnetic disturbance during the same period. Since these two phenomena are associated with the same probable causes the disturbed percentages should be approximately the same.

There were two reports received on the forecast scale ratings which were not included in forming the master scale. One, a rating of reception on the Ottawa to England path, was determined to be erroneously low due to the improper judgment of the operators in rating reception. The other was the series of reports from the RCAC, Inc., in which the number of "8" ratings predominated in the frequency distribution, indicating that on the quiet side of the scale there was not enough variation in the quality reported. The frequency distribution was of the J-type rather than approximating a normal distribution so had it been included in the average with the other reports received on the forecast scale, the master distribution would have had an illogical bump on the quiet side with more "8" than "7" ratings reported. Thus these two reports were not used in forming the master scale but were converted by it and were of great value in forming the radio propagation quality figures for the individual days.

Fig. 2 is a sample of the conversion scales developed for each report. All of the conversion scales used in this study are presented in Table 1. The conversion scale was formed by equating percentages under the master cumulative percentage curve and the cumulative percentage curve of the reported data. By reading on the conversion scale at the reported value across to the forecast scale the quality figure to use in place of the original report value was determined. The conversion values were read to the nearest tenth. The converted values were then averaged for each day and the result rounded off into the nearest whole quality figure dropping the five tenths to the lower value in order to represent the more disturbed rather than the quiet conditions. Half-days whose quality was "4" or lower were considered disturbed and those whose quality was "5" or better quiet.

Tables 2-13 present the North Atlantic radio propagation quality figures for October 1943 through October 1945 by the above method comparing them with the IRPL daily warnings, the ISIB daily warnings, the IRPL A-zone forecasts, and the geomagnetic  $K_A$  figures. In the score columns H (hit)



represents a quality of "4" or lower on a half or whole day for which a warning was given or for which the forecast was "4" or lower; M (miss) represents a quality of "4" or lower on a half or whole day for which no warning was given or for which the forecast was "5" or higher; G (good) represents a quality of "5" or higher on day for which no warning was given or for which the forecast was "5" or higher; (S) (superfluous) represents a quality of "5" or fair on half or whole day for which a warning was given or for which the forecast was "4" or lower; and S (superfluous) represents a quality of "6" or higher on day for which warning was given or for which the forecast was "4" or lower. The  $X_A$  figures were considered disturbed if "3" or higher.

Table 14 summarizes the scores for the total period. It will be noted that the IRPL hit a much higher percentage of the disturbed days than did the ISIB for the daily warnings; 70.4% for the former vs. 47.4% for the latter. It is true that the ISIB forecasted correctly a considerably higher percentage of the quiet days than did the IRPL; 96.8% vs. 75.6% for the latter. The IRPL tended to issue more superfluous warnings but of these 80.6% were for days whose conditions were no better than fair. As to the percentage of all days correctly forecast the IRPL hit 73.0% and the ISIB 72.1%. Thus if the user was interested in hitting a higher percentage of the disturbed days by the warnings issued the IRPL has had the better average.

For the IRPL A-zone forecasts it will be noted as discussed in IRPL-R13 that the scores are much poorer since May 1944 than before. Table 15, showing the 27-day recurrence pattern of the disturbed quality figures in this report, clearly illustrates the lack of the 27-day recurrence tendency since May 1944 to serve as a backbone in forecasting radio propagation disturbance from four to seven days in advance. This plus the apparent change in statistical-solar relationships with the beginning of the present sunspot cycle with sunspots and floccular regions at the higher solar latitudes, has made the problem of correct forecasting extremely difficult. In observing the tables for the individual months it will be noted in many cases that the forecasts for disturbed conditions are displaced by only two to three days from the time of the actual disturbed conditions. As stated in IRPL-R13, through this present period the semi-weekly forecasts should be used only as rough guides with the daily warning revising them as is found necessary. Actually in the total period of this report 51.4% of the disturbed days, 70.3% of the quiet, or 60.8% of all days were correctly forecast. The change in level of radio propagation conditions is also illustrated by Table 15 by the fact that from October 1943 through May 1944 there were 150 disturbances and in the much longer period from June 1944 through October 1945 there were only 130 disturbances. The contrast in recurrence is evident in the fact that for the first period 78% of the disturbances recurred in 27 days and for the latter only 32%.

Fig. 3 shows the frequency distribution and cumulative percentage curves of the quality figures for the total period. This distribution differed from the master one in that on the quiet side there were almost equal numbers of

"5" and "6" reported rather than more of the "5" than "6" ratings. The original reports gave less variation in reporting quiet conditions than disturbed so that the conversion scales, as will be noted in Table 1, tended to be overbalanced on the higher ratings used for reporting quiet conditions. As with the master scale, 28% of the days in the total period were disturbed.

Fig. 4 shows the relative occurrence of disturbed days in each month. It too indicates that conditions have been quieter on the whole since May 1944. Except for the months of December 1944 and January 1945, when there was an unusual amount of solar activity, disturbance has been more prevalent during the equinoctial months than during the winter or summer months.

The relationship between the level of the horizontal intensity trace of the magnetograms of the Cheltenham, Md., station of the U.S. Coast and Geodetic Survey, and the North Atlantic radio propagation quality figures of this report, is shown in Table 16. The traces have been divided as to whether the minimum for the day was less than 18,145 gammas called L or low days, was between 18,145 and 18,165 gammas called B or borderline days, or was above 18,165 gammas called H or high days. The radio propagation conditions are shown as X for disturbed, F for fair, or blank for quiet. The summary of Table 16 indicates as did IRPL-R18 "Comparison of Geomagnetic Records and North Atlantic Radio Propagation Quality Figures October 1943 through May 1945," based on the quality figures of IRPL-R13, that radio propagation disturbances are associated with low-level magnetic traces and quiet radio conditions with high traces. Since the usual pattern of a geomagnetic disturbance is for the horizontal intensity trace to become irregular and drop to a low intensity, this means that the radio propagation disturbances usually begin with the geomagnetic disturbances. After the geomagnetic trace is quiet, as long as it remains at a low level, radio disturbance continues. In studying Table 16 it will be noted that few radio disturbances began until the magnetic trace was low but the radio disturbance patterns did extend into the B or H days of the magnetic trace.

Of the radio propagation disturbances from October 1943 through October 1945, 56% of them occurred on L days and 33% on B days. Of the quiet radio propagation condition days, 64% were on H days and 29% on B days. Of the L magnetic days, 83% were accompanied by radio propagation disturbance and 15% of the remaining 17% were days of only fair radio conditions; of the B magnetic days, 40% were accompanied by radio disturbance and 47% were days of only fair radio conditions; of the H days, 44% were days of better than fair radio conditions and 46% were days of at least fair conditions. Thus, as stated before in the conclusion of IRPL-R18, it is evident that use of a visual magnetograph, in addition to direction-finder observations, radio traffic, ionospheric, solar and auroral data, is of value in issuing warnings of radio propagation disturbance to follow.

North Atlantic radio propagation quality figures based on the conversion scales of this report rather than those of IRPL-R13 will be issued on a current basis in future IRPL-F series reports. It is hoped that they will prove useful in analyzing radio propagation conditions as affected by geomagnetic and ionospheric disturbances and solar activity.

Table 1

**Conversion Scales from Master Distribution Curve**  
(1st column as reported, 2nd column as converted)

A.A.F. A.A.C.S. North Atlantic Area	B.E.C. Ratings	Churchill Hours of F2	Churchill Reception of WWV 5 Mc	Churchill Reception of WWV 10 Mc	College, Alaska Hours of GSD below Minimum Reliable Value	College, Alaska Hours of WWV 10 Mc below Minimum Re- liable Value	GLH at Riverhead % of Hours below Median
6.1	9.0	24	9.0	9.0	0	0	0
6.0	8.9	23	8.5	8.5	1	1	5
5.9	8.5	22	8.0	7.5	2	2	10
5.8	8.0	21	7.5	7.0	3	3	15
5.7	7.8	20	7.0	6.5	4	4	20
5.6	7.5	19	6.5	6.0	5	5	25
5.5	7.3	18	6.0	5.5	6	6	30
5.4	7.0	17	5.5	5.0	7	7	35
5.3	6.5	16	5.0	4.5	8	8	40
5.2	6.0	15	4.5	4.0	9	9	45
5.1	5.7	14	4.0	3.5	10	10	50
5.0	5.2	13	3.5	3.0	11	11	55
4.9	4.8	12	3.0	2.5	12	12	60
4.8	4.5	11	2.5	2.0	13	13	65
4.7	4.3	10	2.0	1.5	14	14	70
4.6	4.1	9	1.5	1.0	15	15	75
4.5	3.9	8	1.0	0.5	16	16	80
4.4	3.6	7	0.5	0.0	17	17	85
4.3	3.4	6	0.0	0.0	18	18	90
4.2	3.2	5	0.0	0.0	19	19	95
4.1	3.0	4	0.0	0.0	20	20	100
4.0	2.8	3	0.0	0.0	21	21	
3.9	2.5	2	0.0	0.0	22	22	
3.8	2.1	1	0.0	0.0	23	23	
3.7	1.8	0	0.0	0.0	24	24	



Table 1 (continued)

Conversion Scales from Master Distribution Curve  
(1st column as reported, 2nd column as converted)

A.A.F. A.A.C.S. North Atlantic Area	B.B.C. Ratings	Churchill Hours of F2	Churchill Reception of WWV 5 Mc	Churchill Reception of WWV 10 Mc	College, Alaska Hours of GSD below Minimum Reliable Value	College, Alaska Hours of WWV 10 Mc below Minimum Re- liable Value	GLH at Riverhead % of Hours below Median
3.6	1.5						
3.5	1.4						
3.4	1.3						
3.3	1.3						
3.2	1.2						
3.1	1.2						
3.0	1.1						
2.9	1.0						
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Ottawa to Southern England	Moscow to F.O.M.	N.Y. R.A.F. to U.K., land and Ice- Goose	R.A.F. Dorval to Moscow and Stockholm to New York	RCAC London and Berne to New York	RCAC Naples, Lisbon and Cairo to New York	RCAC North Atlantic Disturbance Ratings	RCAF Ratings St. John's, Halifax, Goose, Ottawa
7.0	9.0	9.0	8.0	7.0-9.0	8.0	6.0-9.0	9.0
6.5	8.6	8.4	7.5	6.1	7.5	4.7	8.5
6.0	8.0	8.1	7.0	5.7	7.0	4.2	8.0
5.5	7.4	7.33	6.5	5.2	6.5	3.7	7.5
5.0	6.6	7.00	6.0	4.8	6.0	3.3	7.0
4.5	5.8	6.67	5.5	4.6	5.5	2.8	6.5
4.0	4.8	6.50	5.0	4.4	5.0	2.5	6.0
3.5	4.1	6.33	4.5	4.0	4.5	2.0	5.5
3.0	3.5	6.00	4.0	3.9	4.0	1.6	5.0
2.5	2.6	5.67	3.5	3.2	3.5		4.5
2.0	2.0	5.50	3.0	3.1	3.0		4.1
1.5	1.4	5.33	2.5	2.4	2.5		3.7
1.0	1.0	5.00	2.0	2.2	2.0		3.5
							3.0



Table 1 (continued)  
Conversion Scales from Master Distribution Curve  
(1st column as reported, 2nd column as converted)

Kodiak Hours of WWV 2.5 Mc 01-12 GCT	Kodiak Hours of WWV 5 Mc 01-12 GCT	Kodiak Hours of WWV 10 Mc 01-12 GCT	Kodiak Hours of WWV 10 Mc 13-24 GCT	Kodiak Hours of WWV 15 Mc 13-24 GCT	Mackay N.Y. Reception of Moscow, Kaboul, Bombay	Mackay N.Y. Reception of S.F., Great Britain and France	Marconi Montreal to United Kingdom
12 9.0	12 8.0-9.0	12 8.0-9.0	12 9.0	12 9.0	9.0	9.0	1.0 6.0-9.0
11 8.7	11 6.7	11 7.5	11 8.5	11 7.9	8.5	8.5	1.5 4.9
10 8.1	10 6.1	10 6.6	10 8.0	10 7.0	8.0	8.0	2.0 4.1
9 7.2	9 5.4	9 6.2	9 7.5	9 6.6	7.5	7.5	2.5 3.8
8 6.4	8 4.6	8 5.8	8 6.9	8 6.0	7.0	7.0	3.0 3.2
7 6.0	7 3.9	7 5.6	7 6.6	7 5.5	6.5	6.5	3.5 2.7
6 5.3	6 3.5	6 5.3	6 6.0	6 4.8	6.0	6.0	4.0 2.1
5 4.7	5 2.9	5 5.1	5 5.4	5 4.1	5.5	5.5	4.5 1.3
4 4.2	4 2.6	4 4.8	4 4.5	4 3.6	5.0	5.0	5.0 1.0
3 3.8	3 1.7	3 4.6	3 3.3	3 3.3	4.5	4.5	
2 3.4	2 1.5	2 4.0	2 2.9	2 2.9	4.0	4.0	
1 2.9	1 1.2	1 3.2	1 3.5	1 2.7	3.5	3.5	
0 2.6	0 1.1	0 2.8	0 3.0	0 2.4	3.0	3.0	
					2.5	2.5	
					2.0	2.0	
					1.5	1.5	
					1.0	1.0	



Table 1 (continued)

Conversion Scales from Master Distribution Curve  
(1st column as reported, 2nd column as converted)

Reykjavik		T.D.Average	
Hours of WWV		Daily Field	
10 Mc below		Deviation from	
Minimum Re-		31-Day Running	
liable Value		Median	
0	9.0	20	9.0
1	7.7	19	8.9
2	7.4	18	8.9
3	7.0	17	8.7
4	6.6	16	8.5
5	6.0	15	8.4
6	5.7	14	8.2
7	5.3	13	8.1
8	4.9	12	8.0
9	4.7	11	7.8
10	4.5	10	7.6
11	4.2	9	7.4
12	4.0	8	7.3
13	3.9	7	7.0
14	3.6	6	6.8
15	3.3	5	6.4
16	3.1	4	6.2
17	2.9	3	5.9
18	2.6	2	5.6
19	2.0	1	5.3
20	1.8	0	5.0
21	1.5	- 1	4.6
22	1.4	- 2	4.4
23	1.1	- 3	4.2
24	1.0	- 4	4.0
		- 5	3.9
		- 6	3.7
		- 7	3.6
		- 8	3.4
		- 9	3.2
		-10	3.0
		-11	2.9
		-12	2.7
		-13	2.6
		-14	2.4
		-15	2.3
		-16	2.2
		-17	2.1
		-18	1.9
		-19	1.8
		-20	1.7

Table 1 (continued)

Conversion Scales from Master Distribution Curve  
(1st column as reported, 2nd column as converted)

<hr/>	
T. D. Average	
Daily Field	
Deviation from	
31-Day Running	
Median	
<hr/>	
-21	1.6
-22	1.5
-23	1.4
-24	1.3
-25	1.3
-26	1.2
-27	1.2
-28	1.1
-29	1.1
-30	1.1
-31	1.0
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Table 2

North Atlantic Radio Propagation Quality Figures  
Compared with IRPL A-zone Forecasts.

Day	October 1943			November 1943			December 1943		
	Quality Figure	A-zone Forecast	Geo-magnetic $K_A$	Quality Figure	A-zone Forecast	Geo-magnetic $K_A$	Quality Figure	A-zone Forecast	Geo-magnetic $K_A$
	01-12 GCT 13-24 GCT		01-12 GCT 13-24 GCT	01-12 GCT 13-24 GCT		01-12 GCT 13-24 GCT	01-12 GCT 13-24 GCT		01-12 GCT 13-24 GCT
1	(2)	(2)	(4)	(2)	(3)	(4)	(3)	(4)	5
2	(2)	(2)	(4)	(3)	(4)	5	(4)	(4)	(4)
3	(2)	(3)	6	(4)	(4)	(4)	(4)	(4)	(3)
4	(2)	(4)	6	(4)	6	(2)	(4)	(3)	2
5	(3)	(4)	5	(4)	5	(3)	(4)	(4)	(3)
6	(3)	5	(4)	(4)	(4)	(3)	(4)	5	(4)
7	(4)	5	5	(4)	5	(4)	5	5	5
8	(3)	(4)	(3)	(4)	5	(3)	5	5	6
9	(2)	(3)	(3)	(4)	(4)	6	(3)	2	6
10	(3)	(4)	(3)	5	5	6	1	2	6
11	(3)	(4)	(4)	5	5	6	1	1	(4)
12	(4)	5	(4)	5	6	6	1	1	(3)
13	(4)	6	5	6	6	5	0	1	(3)
14	5	6	(4)	6	6	(4)	1	1	5
15	(4)	6	5	5	6	(4)	1	2	(3)
16	6	7	(4)	5	6	(4)	2	(3)	(2)
17	5	6	5	6	7	5	1	1	(4)
18	5	6	(3)	5	6	(4)	2	2	(3)
19	5	6	(4)	(4)	(4)	5	(4)	(4)	(4)
20	5	6	5	(4)	(4)	(3)	(5)	(3)	(4)
21	5	6	5	(3)	(3)	(2)	(4)	(3)	2
22	5	5	(3)	(3)	(3)	(3)	(3)	(4)	(1)
23	(4)	5	(3)	(3)	(3)	(3)	(4)	(4)	(3)
24	(4)	(4)	(3)	(2)	(3)	(3)	(4)	(4)	2
25	(3)	(3)	(2)	(2)	(3)	(3)	(4)	(4)	(2)
26	(2)	(2)	(2)	(3)	(3)	(3)	(3)	(4)	(2)
27	(3)	(3)	(2)	(2)	(2)	(3)	(5)	(3)	(3)
28	(2)	(2)	(3)	(3)	(3)	(3)	(4)	2	5
29	(2)	(2)	(3)	(2)	(3)	(4)	(4)	2	(4)
30	(2)	(3)	(2)	(3)	(3)	5	2	1	(3)
31	(3)	(3)	(4)	(4)	(4)	(4)	(4)	5	(3)

Score:

H	17	16	17
M	6	5	1
G	3	5	6
(s)	4	3	6
S	1	1	1



Table 3

North Atlantic Radio Propagation Quality Figures Compared with  
IRPL and ISIB Warnings and IRPL A-Zone Forecasts

Day	January 1944									February 1944								
	Quality Figure		IRPL Warning		ISIB Warning		A-zone Forecast		Geo-magnetic K <sub>A</sub>	Quality Figure		IRPL Warning		ISIB Warning		A-zone Forecast		Geo-magnetic K <sub>A</sub>
	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT		GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT
	01-12	13-24	01-12	13-24	01-12	13-24		01-12	13-24	01-12	13-24	01-12	13-24	01-12	13-24		01-12	13-24
1	(3)	(4)					(3)	2	(3)	5	5					(4)	1	1
2	(4)	5					6	1	2	5	5			X	X	5	2	1
3	5	5					6	1	1	5	6					6	1	1
4	5	6					5	1	2	5	5					6	1	2
5	(3)	(4)					(4)	(3)	2	5	6					6	1	1
6	5	5					(4)	0	2	5	6					5	1	1
7	5	5					6	1	1	(4)	(4)	X	X			(4)	(3)	(4)
8	5	5					7	2	1	(3)	(4)	X	X			(2)	(3)	(3)
9	5	6					6	1	2	(3)	(3)	X	X			(2)	(3)	(3)
10	5	5					6	1	(3)	(3)	(4)	X	X	X	X	(2)	(3)	2
11	(3)	(3)					(4)	(3)	(3)	(3)	(4)	X	X	X	X	(3)	(3)	2
12	(2)	(4)					(3)	(3)	(3)	(3)	(4)	X	X	X	X	(3)	(3)	2
13	(3)	(4)					(2)	(4)	(3)	(4)	(4)	X	X	X	X	(3)	2	2
14	(4)	(4)					(3)	(3)	(4)	(2)	(3)	X	X	X	X	(3)	(5)	(3)
15	(3)	(4)					(3)	(3)	(3)	(3)	(3)	X	X	X	X	(4)	(3)	(3)
16	(3)	(3)					(4)	(3)	(3)	(3)	(4)	X	X	X	X	(4)	2	2
17	(3)	(3)					(3)	(3)	(3)	(4)	5	X	X	X	X	5	1	1
18	(3)	(3)					(4)	(3)	(3)	(4)	5	X	X			5	0	0
19	(3)	(4)					(4)	2	2	5	5					6	1	1
20	(4)	(4)					(4)	2	2	(4)	5					6	2	(3)
21	(4)	5					(4)	1	1	(4)	5			X	X	5	2	2
22	(4)	5					(3)	1	1	(4)	5					(4)	2	1
23	(4)	5					5	1	1	(4)	5					(3)	1	1
24	(4)	(4)					5	1	2	5	6	X	X			(4)	1	1
25	(4)	(4)					5	1	2	6	6					6	0	0
26	(4)	5					(4)	1	(3)	5	6					6	1	0
27	(4)	(4)					(4)	(3)	2	6	6					5	1	1
28	(4)	5					(3)	2	1	5	6					(4)	1	1
29	(4)	5					(4)	2	1	5	6					5	2	2
30	5	5					5	1	1									
31	5	6					5	1	2									

Score:

H	18	12	9	12
M	4	4	7	4
G	8	12	12	10
(S)	1	1	1	3
S				

Table 4

North Atlantic Radio Propagation Quality Figures Compared with  
IRPL and ISIB Warnings and IRPL A-Zone Forecasts.

Day	March 1944						April 1944					
	Quality	IRPL	ISIB	A-Zone	Geo-	mag- netic K <sub>A</sub>	Quality	IRPL	ISIB	2-Zone	Geo-	mag- netic K <sub>A</sub>
	Figure	Warning	Warning	Forecast			Figure	Warning	Warning	Forecast		
	01-12	GCT	01-12	GCT	01-12	GCT	01-12	GCT	01-12	GCT	01-12	GCT
	13-24	GCT	13-24	GCT	13-24	GCT	13-24	GCT	13-24	GCT	13-24	GCT
1	6	6				6	(4)	5	X	X		(4)
2	5	5				2	(2)	(3)	X	X		(4)
3	5	6	X	X		5	(3)	5	X	X	X	(6)
4	(4)	(4)			X	(4)	(3)	(3)	X	X	X	(3)
5	(4)	5	X	X	X	(2)	(3)	(3)	X	X	X	(3)
6	(3)	(4)	X	X	X	(2)	(3)	(3)	X	X	X	(2)
7	(2)	(4)	X	X	X	(3)	(3)	(4)	X	X	X	(4)
8	(3)	(4)	X	X	X	(3)	(3)	(3)	X	X	X	(3)
9	(3)	(3)	X	X	X	(4)	(4)	(3)	X	X	X	2
10	(3)	(3)	X	X	X	5	(3)	(4)	X	X	X	1
11	(3)	(4)	X	X	X	(4)	(3)	(4)	X	X	X	(3)
12	(3)	(4)	X	X	X	(3)	(3)	5	X	X	X	2
13	(3)	(3)	X	X	X	(3)	(3)	7	X	X		1
14	(3)	(4)	X	X	X	(4)	(3)	7				0
15	(4)	5	X	X	X	5	5	6				1
16	(4)	5		X	X	6	(3)	(3)		X		(3)
17	5	6	X	X		6	(4)	6		X		2
18	5	6	X	X		(3)	5	6				1
19	(3)	(4)			X	(3)	6	7				1
20	(4)	5	X	X	X	(4)	5	7	X	X		1
21	5	6		X	X	5	5	6	X	X		1
22	5	5				(3)	5	6	X	X		0
23	5	6				6	5	7	X	X		1
24	(4)	6	X	X		6	5	6	X	X		2
25	5	6	X	X		5	5	6	X	X		2
26	(3)	5				5	5	6	X	X		2
27	(2)	(3)			X	(4)	(4)	5				5
28	(3)	(4)	X	X	X	(4)	(4)	5	X	X	X	(3)
29	(2)	(3)		X	X	5	(4)	5	X	X	X	(3)
30	(3)	(4)	X	X	X	5	(3)	5	X	X	X	(4)
31	(4)	5	X	X	X	(4)						(3)

Score:

H	16	16	15	15	16	12
M	6	6	7	3	2	6
G	5	8	8	4	12	4
(S)	4	1	1	8	0	8
S						

Table 5

North Atlantic Radio Propagation Quality Figures Compared with  
IRPL and ISIB Warnings and IRPL A-Zone Forecasts.

Day	May 1944									June 1944								
	Quality	IRPL	ISIB		A-Zone		Geo-		mag-	Quality	IRPL	ISIB		A-Zone		Geo-		mag-
	Figure	Warning	Warning	Warning	Forecast	Forecast	mag-	netic		Figure	Warning	Warning	Warning	Forecast	Forecast	mag-	netic	
	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT		GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT	
	01-12	13-24	01-12	13-24	01-12	13-24		01-12	13-24	01-12	13-24	01-12	13-24	01-12	13-24		01-12	13-24
1	(3)	(3)	X	X	X	X	(4)	(3)	(4)	6	6	X	X			(4)	2	1
2	(3)	(3)	X	X	X	X	(4)	(4)	(3)	5	6	X	X			(4)	1	1
3	(4)	(4)	X	X	X	X	(4)	2	1	5	6					(4)	1	1
4	(4)	(4)	X	X	X	X	(4)	2	(4)	6	7					(4)	1	2
5	(3)	(4)	X	X	X	X	(4)	(3)	(3)	6	6	X	X			5	2	2
6	(3)	(4)	X	X	X	X	(4)	(3)	(3)	7	6	X	X			5	1	1
7	(4)	(4)	X	X	X	X	(4)	(3)	(3)	6	7					6	1	1
8	(4)	5	X	X			(4)	(3)	1	6	7					6	1	1
9	5	6	X	X			5	1	1	7	7					6	2	2
10	5	6					6	1	1	7	7					5	1	1
11	6	7					6	1	1	7	7					5	1	2
12	6	7					5	1	1	7	7					5	1	1
13	5	6	X	X			(3)	1	1	6	7					5	1	1
14	6	7					5	1	1	6	6					6	1	2
15	6	7					5	2	1	5	(4)					5	2	2
16	7	7					5	1	1	5	5					5	(3)	(3)
17	6	7					6	1	1	5	5	X	X			5	2	2
18	5	7					5	1	1	6	6					6	2	2
19	7	7					5	1	1	6	6					6	2	1
20	7	7					6	0	0	6	6					5	2	1
21	7	7					6	1	1	6	6					5	2	2
22	7	7					6	1	1	(4)	5					5	(3)	(3)
23	6	7					5	2	2	(4)	(4)	X	X	X	X	5	(3)	(3)
24	5	5					5	(3)	2	5	5	X	X	X	X	5	2	2
25	5	6					5	2	2	5	6	X	X	X	X	(4)	2	1
26	6	6	X	X			(4)	2	2	5	5	X	X			(4)	1	2
27	5	5	X	X			(4)	2	2	5	5					(4)	2	(3)
28	6	6	X	X			(3)	2	2	6	6					(4)	2	2
29	(4)	(4)	X	X			(3)	(3)	(3)	5	5					5	2	1
30	(3)	(4)	X	X	X	X	(4)	(3)	2	5	5					(4)	2	1
31	5	5	X	X			5	2	2	6	5					(4)	2	2

Score:

H	10	8	10	1	1	0
M	0	2	0	2	2	3
G	15	21	17	19	26	18
(S)	4	0	2	4	1	6
S	2	0	2	4	0	3



Table 6

North Atlantic Radio Propagation Quality Figures Compared with  
IRPL and ISIB Warnings and IRPL A-Zone Forecasts.

Day	July 1944								August 1944							
	Quality		IRPL		ISIB		A-Zone		Quality		IRPL		ISIB		A-Zone	
	Figure		Warning		Warning		Forecast		Figure		Warning		Warning		Forecast	
	Geo- mag- netic K <sub>A</sub>								Geo- mag- netic K <sub>A</sub>							
	01-12	GCT	01-12	GCT	01-12	GCT	01-12	GCT	01-12	GCT	01-12	GCT	01-12	GCT	01-12	GCT
	13-24	GCT	13-24	GCT	13-24	GCT	13-24	GCT	13-24	GCT	13-24	GCT	13-24	GCT	13-24	GCT
1	6	6	X	X			(4)	1	2	6	6				6	2
2	6	6	X	X			(4)	2	2	5	5				6	2
3	7	6					(4)	1	2	(2)	(3)				6	(3)
4	6	7					5	1	1	(4)	5	X	X		6	2
5	6	6					5	1	1	5	5	X	X		(4)	1
6	7	7					6	1	1	5	6				5	2
7	7	6					6	2	2	5	6				6	1
8	7	7					5	1	1	6	6				5	2
9	5	5					6	(3)	2	6	7				6	1
10	6	6					5	1	2	6	6	X	X		6	(3)
11	5	6	X	X			5	2	1	6	6	X	X		5	2
12	6	7					(4)	1	1	5	5	X	X	X	6	(3)
13	7	7	X	X			(4)	2	1	6	6				5	2
14	7	7					5	2	2	6	7				6	1
15	5	5					6	2	2	6	6				(4)	2
16	6	5					6	1	2	5	6	X	X		(4)	1
17	5	6					5	2	2	7	6				(4)	1
18	6	6					(4)	1	1	(4)	5				6	(3)
19	6	5					(4)	2	2	(4)	5	X	X		6	2
20	6	6					(4)	(3)	1	(4)	6				6	1
21	6	6					5	2	2	5	6	X	X		5	1
22	6	6					5	2	2	6	7				5	1
23	6	6					(4)	2	1	(4)	5	X	X		5	(3)
24	7	7					(4)	1	1	(4)	5	X	X		6	(3)
25	7	6					6	1	1	5	6	X	X		6	0
26	6	7					6	1	1	6	7				6	0
27	7	7					6	0	1	6	7				6	2
28	6	7					6	0	1	5	5				6	(3)
29	7	7					5	1	2	5	7				(4)	1
30	6	7					5	2	2	5	6				(4)	2
31	5	6					6	2	2	5	5				(4)	(3)

Score:

H	0	0	0	4	0	0
M	0	0	0	3	7	7
G	27	31	21	13	23	17
(S)	1	0	1	9	1	5
S	3	0	9	2	0	2

Table 7

North Atlantic Radio Propagation Quality Figures Compared with  
IRPL and ISIB Warnings and IRPL A-Zone Forecasts.

Day	September 1944								October 1944									
	Quality	IRPL	ISIB	A-Zone	Geo-		mag-	netic	Quality	IRPL	ISIB	A-Zone	Geo-		mag-	netic		
	Figure	Warning	Warning	Forecast	Figure				Warning	Warning	Forecast	Figure						
	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT		
	01-12	13-24	01-12	13-24	01-12	13-24	01-12	13-24	01-12	13-24	01-12	13-24	01-12	13-24	01-12	13-24		
1	5	5	X	X			5	(3)	2	(4)	5	X	X	X	X	(4)	(3)	(3)
2	(3)	(4)					(4)	(4)	(3)	5	6	X	X			(4)	1	2
3	(4)	6	X	X			5	2	1	5	5					5	(3)	(3)
4	5	6					6	1	2	5	6					6	1	1
5	5	6					5	2	1	5	6					5	1	1
6	6	7					(4)	1	2	5	7					6	2	2
7	5	6					5	2	1	5	6	X	X			(4)	1	1
8	5	5					5	2	2	5	6					5	0	1
9	5	6					6	2	1	5	7					5	1	0
10	5	6					6	2	2	5	6	X	X			5	1	2
11	6	6	X	X			5	2	2	(4)	5					5	(3)	(4)
12	5	6	X	X			6	(3)	2	(4)	6	X	X	X	X	6	1	2
13	5	6	X	X			5	1	2	5	6	X	X			6	1	2
14	5	6	X	X			(4)	2	2	(4)	5					6	2	(3)
15	5	6	X	X			(4)	2	0	(3)	(4)	X	X	X	X	6	(4)	(3)
16	5	6	X	X			(2)	1	1	(4)	5	X	X	X	X	5	2	2
17	5	6	X	X			(3)	1	2	(4)	5	X	X			(4)	2	2
18	5	6					(4)	2	2	(4)	5					(4)	2	1
19	5	6	X	X			(4)	1	1	(4)	6					5	1	0
20	5	6					(4)	1	(3)	5	6					(4)	0	1
21	(4)	5					5	(3)	2	5	6	X	X			(4)	1	1
22	5	6	X	X			5	2	2	5	6					(4)	2	1
23	(4)	5	X	X			6	2	2	6	6	X	X			(4)	2	(3)
24	(4)	(4)	X	X			(4)	(4)	(3)	5	5	X	X			(4)	(3)	(3)
25	(4)	5	X	X			5	2	2	5	6	X	X			5	1	2
26	5	5					5	2	2	(4)	5					5	(3)	1
27	5	5					(4)	2	2	5	6					(4)	1	2
28	5	6	X	X			(4)	2	1	5	6					(4)	2	2
29	6	6					(4)	2	1	5	6					(4)	1	1
30	6	5					(4)	2	(4)	5	6	X	X			(4)	2	1
31										5	6					5	(3)	2

Score:

H	4	0	2	5	4	3
M	2	6	4	5	6	7
G	13	24	12	12	21	10
(S)	10	0	10	8	0	10
S	1	0	2	1	0	1

Table 8

North Atlantic Radio Propagation Quality Figures Compared with  
IRPL and ISIB Warnings and IRPL A-Zone Forecasts

Day	November 1944								December 1944							
	Quality	IRPL	ISIB	A-Zone	Geo-	mag- netic K <sub>A</sub>			Quality	IRPL	ISIB	A-Zone	Geo-	mag- netic K <sub>A</sub>		
	Figure	Warning	Warning	Forecast					Figure	Warning	Warning	Forecast				
	01-12	01-12	01-12	01-12	01-12	01-12	01-12		01-12	01-12	01-12	01-12	01-12	01-12	01-12	
	01-12	13-24	01-12	13-24	01-12	13-24	01-12		01-12	13-24	01-12	13-24	01-12	13-24	01-12	
1	5	6	X	X			5	0	1	6	6				5	1
2	6	6					5	1	0	3	5				(4)	(3)
3	3	6					6	1	2	(4)	5				(4)	(3)
4	6	6		X			5	(3)	2	5	6	X	X		5	2
5	3	3	X	X			5	(3)	(3)	5	6				5	1
6	(3)	3	X	X	X	X	5	(3)	1	5	5				6	2
7	3	3	X	X			(4)	1	2	5	6				6	1
8	(4)	5	X	X			(4)	2	0	5	6				5	1
9	5	6					5	2	1	6	7				6	2
10	5	6					(4)	1	2	6	6				6	1
11	5	6					(4)	1	1	6	7	X	X		5	1
12	5	6					(4)	1	0	6	7				5	1
13	6	6					5	0	0	5	5	X	X		6	2
14	5	6					(4)	1	1	(4)	5	X	X		6	(3)
15	5	6					(4)	1	0	(4)	5	X	X		5	1
16	6	6					5	2	1	(4)	(4)			X	(4)	(6)
17	6	6					5	0	1	(3)	(3)	X	X	X	(4)	(5)
18	5	5	X	X			5	2	2	(3)	(3)	X	X	X	5	(4)
19	5	6	X	X			(4)	(3)	1	(3)	(4)	X	X	X	5	2
20	3	(4)		X			(4)	(3)	(3)	(4)	5	X	X	X	5	2
21	(4)	5	X	X	X	X	5	1	0	5	5			X	6	2
22	5	5					5	0	1	5	5				6	1
23	5	5					5	1	1	5	6				6	1
24	6	7					(4)	1	0	6	6				6	1
25	6	6					5	0	1	6	6				5	0
26	5	6					(4)	2	1	6	6	X	X		5	1
27	6	6	X	X			(4)	1	1	5	(3)			X	5	(4)
28	6	6					5	1	1	(3)	(4)	X	X	X	5	(3)
29	6	6					6	1	1	(4)	(4)			X	(4)	2
30	6	6					6	1	2	(4)	5	X	X		(4)	(3)
31										(4)	5	X	X		5	1

Score:

H	4	2	2	12	7	5
M	0	2	2	1	6	8
G	19	26	16	14	17	17
(S)	5	0	8	2	1	1
S	2	0	2	2	0	0



Table 9

North Atlantic Radio Propagation Quality Figures Compared with  
IRPL and ISIB Warnings and IRPL A-Zone Forecasts

Day	January 1945									February 1945								
	Quality Figure	IRPL	ISIB	A-Zone	Geo-magnetic		K <sub>A</sub>			Quality Figure	IRPL	ISIB	A-Zone	Geo-magnetic		K <sub>A</sub>		
	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT
	01-12	13-24	01-12	13-24	01-12	13-24	01-12	13-24		01-12	13-24	01-12	13-24	01-12	13-24	01-12	13-24	
1	5	5	X	X			5	2	2	5	6					6	1	1
2	(4)	(4)					6	2	2	5	5					6	1	2
3	(4)	5					6	2	2	5	5	X	X			6	2	1
4	(4)	5					5	1	2	5	6					6	1	1
5	(4)	5	X	X			(4)	2	1	5	5	X	X			5	(3)	1
6	5	6					(4)	2	1	(4)	5	X	X			5	(3)	2
7	6	6					5	2	1	5	6					5	1	1
8	6	6					5	1	1	(4)	5					5	(3)	2
9	5	5					5	1	(3)	(4)	5					5	(3)	2
10	(3)	5	X	X		X	5	(4)	2	(4)	6					5	2	2
11	5	5	X	X	X	X	(4)	0	0	5	5					(4)	2	1
12	5	6			X	X	(4)	1	2	5	6	X	X	X	X	(4)	2	1
13	5	6			X		(4)	2	0	6	6					5	1	0
14	5	6					5	1	1	5	6					5	0	2
15	(4)	(3)		X			5	(3)	(4)	5	5					(4)	(4)	(3)
16	(3)	(4)	X	X			5	(3)	2	(4)	(4)	X	X			5	2	2
17	(3)	(3)	X	X			5	(3)	2	(4)	5	X	X			5	2	2
18	(4)	5	X	X	X	X	5	0	2	5	6		X	X		6	2	1
19	(4)	5					5	2	2	5	6					(4)	1	1
20	(4)	(4)			X	X	5	2	2	6	7					(4)	1	1
21	5	6					6	2	1	6	6					6	1	0
22	5	6	X	X			6	1	1	6	7					6	1	2
23	5	6					5	1	0	6	7					6	1	2
24	6	6	X	X			(4)	0	0	6	7					5	2	2
25	6	6					(4)	0	0	5	6					(4)	(3)	2
26	5	6					(4)	1	2	5	6					(4)	2	(3)
27	6	6					5	1	2	5	5	X	X	X	X	5	2	2
28	6	6					6	1	(3)	(4)	6	X	X	X	X	6	2	1
29	(3)	(3)	X	X	X	X	6	(4)	(3)									
30	(3)	(4)	X	X	X	X	5	(3)	2									
31	(4)	5	X	X			5	1	1									

Score:

H	9	5	1	4	2	0
M	5	9	13	3	5	7
G	13	14	10	16	19	14
(S)	3	3	5	5	2	6
S	1	0	2	0	0	1

Table 10

North Atlantic Radio Propagation Quality Figures Compared with  
IRPL and ISIB Warnings and IRPL A-Zone Forecasts

Day	March 1945						April 1945							
	Quality	IRPL	ISIB	A-Zone	Geo-	mag- netic K <sub>A</sub>	Quality	IRPL	ISIB	A-Zone	Geo-			
	Figure	Warning	Warning	Forecast			Figure	Warning	Warning	Forecast				
	GCT	GCT	GCT	GCT	GCT		GCT	GCT	GCT	GCT	GCT	GCT		
	01-12	13-24	01-12	13-24	01-12	13-24	01-12	13-24	01-12	13-24	01-12	13-24		
1	5	6			5	2	1	(4)	(4)			(4)	(4)	
2	5	6			6	1	2	(3)	5	X	X	X	(4)	(3)
3	5	6			6	(3)	1	(4)	6				5	2
4	6	6			6	1	1	5	5	X	X		5	1
5	5	5			(4)	1	(4)	(4)	5	X	X		5	1
6	5	5	X	X	(4)	2	(3)	(3)	(4)	X	X		5	(3)
7	5	6	X	X	5	2	2	(4)	5	X	X		(4)	(3)
8	5	5		X	5	(3)	2	(4)	5	X	X		(4)	(3)
9	5	6	X	X	(3)	1	1	6	6				(4)	1
10	5	5	X	X	(4)	1	1	5	6				5	1
11	(4)	(4)	X	X	5	(4)	(3)	5	5		X	X	5	(3)
12	(3)	(3)	X	X	5	(3)	(5)	(4)	(4)	X	X		(4)	(4)
13	(2)	(3)	X	X	5	(3)	1	(4)	5	X	X		5	(3)
14	(4)	(4)	X	X	5	2	2	(4)	5	X	X		6	(3)
15	(3)	(4)	X	X	(4)	(4)	(4)	(4)	5				6	(3)
16	(3)	(4)	X	X	5	(3)	(3)	5	5				6	2
17	(4)	(4)	X	X	5	2	1	5	6				6	1
18	(4)	(4)			6	2	2	6	7				6	1
19	5	5	X	X	5	1	1	6	6				6	2
20	5	5			6	2	(3)	5	5	X	X		5	(3)
21	(4)	5			6	2	2	(4)	6	X	X		5	1
22	5	6	X	X	6	1	0	5	6				(4)	1
23	6	6			5	1	1	5	6				(4)	2
24	5	7			(4)	2	2	5	5	X	X		(4)	(3)
25	5	6			(4)	1	(3)	(4)	5				5	2
26	(4)	(4)	X	X	5	(4)	(4)	6	6				5	0
27	(3)	(4)	X	X	5	(3)	(3)	6	6				5	1
28	(3)	(3)	X	X	(4)	(5)	(3)	5	6				(4)	0
29	(3)	(4)	X	X	(4)	(3)	2	6	7	X	X		(4)	1
30	5	6	X	X	(4)	1	1	5	6	X	X		(4)	2
31	5	6			(4)	0	1							
Score:														
H			11		7		3			10		2		5
M			2		6		10			3		11		8
G			10		18		10			11		16		10
(S)			8		0		8			5		1		5
S			0		0		0			1		0		2

Table 11

North Atlantic Radio Propagation Quality Figures Compared with  
IRPL and ISIB Warnings and IRPL A-Zone Forecasts.

Day	May 1945								June 1945							
	Quality	IRPL	ISIB		A-Zone	Geo-	mag-	netic	Quality	IRPL	ISIB		A-Zone	Geo-	mag-	netic
	Figure	Warning	Warning	Forecast		Figure			Warning	Warning	Forecast					
	GCT	GCT	GCT	GCT	GCT	GCT			GCT	GCT	GCT	GCT	GCT	GCT		
	01-12	13-24	01-12	13-24	01-12	13-24			01-12	13-24	01-12	13-24	01-12	13-24		
1	5	6	X	X			(4)	2	2	6	7			6	1	1
2	5	5					(3)	(3)	2	6	6			6	0	1
3	5	6					(3)	2	2	6	7			5	1	1
4	5	6					(4)	2	1	6	7			5	0	1
5	5	6					5	2	1	6	7			6	1	2
6	5	6					5	1	2	5	5			5	(3)	(3)
7	6	6					5	0	1	(4)	5	X	X	(4)	2	(3)
8	6	7					5	2	1	(4)	5		X	(4)	(3)	(3)
9	6	7					5	1	(3)	5	5			5	(3)	2
10	5	6					5	2	2	(4)	5			6	(3)	2
11	(4)	(4)	X	X			5	(3)	(3)	5	5			6	2	2
12	(4)	5	X	X	X	X	5	2	2	5	6			6	1	1
13	5	5					6	2	2	6	6			6	1	1
14	6	6					6	1	2	6	6			6	1	1
15	5	6					6	1	1	6	6			5	1	1
16	6	6					5	1	2	6	6			(4)	1	1
17	6	6					5	2	2	6	6			(4)	2	2
18	5	6					6	1	(3)	6	6			(4)	1	1
19	6	6					6	2	2	6	7			(4)	1	1
20	5	6	X	X			5	2	1	6	6			5	2	1
21	6	6					(4)	1	2	6	6			5	1	1
22	6	6					5	1	1	6	7			6	0	1
23	6	6					6	2	1	6	7			7	2	1
24	5	6					5	2	2	6	6			7	1	1
25	5	5					6	(3)	2	6	6			6	2	1
26	6	7					5	2	2	6	7			6	1	1
27	6	6					5	1	2	5	6			6	(3)	2
28	6	7					5	1	2	5	6			7	2	1
29	6	6					5	2	2	6	6			7	1	0
30	6	7					5	2	(3)	5	6			7	2	(3)
31	5	5					6	2	2							

Score:

H		2	1	0		2	0	2
M		0	1	2		1	3	1
G		27	29	24		27	27	23
(S)		2	0	4		0	0	0
S		0	0	1		0	0	4



Table 12

North Atlantic Radio Propagation Quality Figures Compared with  
IRPL and ISIB Warnings and IRPL A-Zone Forecasts.

Day	July 1945								August 1945							
	Quality	IRPL	ISIB		A-Zone		Geo-		Quality	IRPL	ISIB		A-Zone		Geo-	
	Figure	Warning	Warning	Warning	Forecast	Forecast	mag-	netic	Figure	Warning	Warning	Warning	Forecast	Forecast	mag-	netic
	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT	GCT
	01-12	13-24	01-12	13-24	01-12	13-24	01-12	13-24	01-12	13-24	01-12	13-24	01-12	13-24	01-12	13-24
1	(3)	(4)	X	X		X	7	(4)	(3)	5	5			5	1	2
2	(1)	5	X	X	X		7	2	2	(4)	5	X	X	(4)	(3)	2
3	(4)	6	X	X			6	2	1	5	6	X	X	5	2	2
4	(4)	6					6	2	(3)	5	6			5	2	1
5	(4)	5					6	(3)	2	5	6			6	2	2
6	(3)	(4)		X		X	5	(4)	2	5	6			6	2	1
7	(4)	5	X	X	X		6	2	2	6	7			7	1	1
8	(4)	5					6	(3)	2	6	7			7	1	2
9	5	6					5	2	2	6	7			6	1	1
10	5	6					6	1	1	6	7			7	1	1
11	5	6					6	1	1	6	7			7	1	2
12	6	6					6	1	1	6	7			6	2	1
13	5	6					5	1	0	5	5			5	2	2
14	6	6					(4)	1	1	(4)	5		X	5	(3)	2
15	6	6					(4)	1	1	5	6	X	X	6	2	2
16	6	6					(4)	1	2	6	6			6	2	1
17	6	6					(4)	2	(3)	5	6			6	1	1
18	(4)	5	X	X			5	2	1	5	6			6	1	1
19	5	6					6	2	1	5	6			5	1	1
20	6	7					6	1	1	5	6			5	1	1
21	6	7					6	1	1	6	7			6	2	2
22	6	7					6	1	1	6	6			6	1	(3)
23	6	6					6	1	(3)	(4)	5			6	(3)	1
24	5	6					5	2	1	5	6	X	X	5	1	0
25	6	7					6	1	1	6	6			5	1	0
26	5	6		X			6	1	1	6	6			5	1	1
27	5	7					6	0	1	5	6			5	1	2
28	5	6					(4)	(3)	(3)	(4)	5	X	X	(4)	(4)	2
29	5	6					(4)	2	(3)	5	6	X	X	(4)	2	1
30	(4)	5					5	(4)	(3)	6	6	X	X	5	0	1
31	5	6	X	X	X	X	6	2	1	5	7			6	1	1

Score:

H	6	4	0	2	0	2
M	4	6	10	2	11	2
G	19	20	15	22	27	26
(S)	1	1	2	4	0	1
S	1	0	4	1	0	0

Table 13

North Atlantic Radio Propagation Quality Figures Compared with  
IRPL and ISIB Warnings and IRPL A-Zone Forecasts.

Day	September 1945								October 1945								
	Quality	IRPL	ISIB		A-Zone	Geo- mag- netic K <sub>A</sub>	Quality	IRPL	ISIB		A-Zone	Geo- mag- netic K <sub>A</sub>					
	Figure	Warning	Warning	Forecast	Figure		Warning	Warning	Forecast								
	GCT	GCT	GCT	GCT	GCT		GCT	GCT	GCT	GCT	GCT		GCT	GCT			
	01-12	13-24	01-12	13-24	01-12	13-24	01-12	13-24	01-12	13-24	01-12	13-24	01-12	13-24			
1	5	6					6	1	2	(4)	6	X	X		5	1	1
2	5	6					6	2	1	5	6	X	X		5	1	1
3	6	7					6	1	1	5	7				5	1	1
4	5	6					7	(3)	2	6	7				5	0	1
5	5	6					7	2	2	6	6				(4)	2	2
6	5	6					6	2	1	5	7				5	0	1
7	5	7					5	2	1	5	6				5	1	2
8	6	6					5	0	2	(4)	5				5	2	2
9	5	6					5	1	0	5	6				5	2	1
10	5	6					(4)	1	1	5	7				6	0	0
11	6	6					5	1	(3)	5	6				6	0	0
12	(4)	6					5	(3)	1	5	5		X		6	2	(4)
13	5	6					6	2	2	(4)	5	X	X	X	5	(3)	1
14	5	6					6	1	1	(4)	5	X	X		(4)	1	2
15	5	6					7	1	1	(4)	5			X	(4)	2	2
16	5	6					7	1	2	(4)	5				5	2	2
17	(3)	(4)	X	X		X	6	(4)	(4)	(4)	5				5	1	2
18	(3)	(4)	X	X	X	X	6	(3)	(4)	(4)	6				5	2	2
19	(3)	5	X	X	X		5	(3)	1	5	6				5	1	2
20	(3)	5			X	X	6	2	1	5	6				6	1	2
21	(4)	6					6	1	2	6	6				5	0	1
22	(4)	6					6	1	1	5	6				(4)	1	2
23	5	6					5	0	0	5	6				(4)	1	2
24	5	7					(4)	0	1	(4)	5				5	(4)	5
25	5	6					5	2	2	(3)	(4)	X	X	X	6	(4)	(3)
26	(4)	6					6	1	2	(3)	5	X	X	X	6	1	0
27	(4)	6					6	2	2	5	5				6	1	(3)
28	5	6					6	2	1	(4)	5	X	X	X	7	(3)	(3)
29	5	6					6	1	1	5	5	X	X	X	7	2	2
30	5	6					6	(3)	2	5	5				6	1	2
31										6	6				5	1	1

Score:

H		3	4	0		6	5	2
M		6	5	9		6	7	10
G		21	21	19		16	17	16
(s)		0	0	2		3	2	2
s		0	0	0		0	0	1

# Summary Comparison North Atlantic Radio Propagation Quality Figures and IRPL Warnings, ISIB Warnings and IRPL A-Zone Forecasts

		1943												1944												1945													
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Totals												
H M G (S) S		12	16	15	10	1	0	4	4	5	4	12	9	4	11	10	2	2	2	6	2	3	3	6	138														
		4	6	3	0	2	0	3	2	5	0	1	5	3	2	3	0	1	4	4	2	6	6	58															
		12	5	4	15	19	27	13	13	12	19	14	13	16	10	11	27	27	19	22	21	16	335																
		1	4	8	4	4	1	9	10	8	5	2	3	5	8	5	2	0	1	4	0	3	87																
		0	0	0	2	4	3	2	1	1	2	2	1	0	0	1	0	0	1	1	1	0	0	21															
		IRPL Warnings												ISIB Warnings																									
H M G (S) S		9	16	16	8	1	0	0	4	2	7	5	2	2	7	2	1	0	4	4	0	4	5	93															
		7	6	2	2	2	0	7	6	2	6	9	5	5	6	11	1	3	6	4	4	5	7	103															
		12	8	12	21	26	31	23	24	21	26	17	14	19	18	16	29	27	20	27	21	17	429																
		1	1	0	0	1	0	1	0	0	1	3	2	2	0	1	0	0	1	0	0	2	14																
			IRPL A-Zone Forecasts												ISIB A-Zone Forecasts																								
H M G (S) S		17	16	17	18	12	15	12	10	0	0	2	3	2	5	1	0	0	2	2	0	2	2	144															
		6	5	1	4	7	6	7	4	3	7	8	13	7	10	8	2	1	10	2	9	10	136																
		3	5	6	8	10	8	17	18	21	17	12	10	16	17	10	10	24	23	15	26	19	16	339															
		4	3	6	1	3	1	5	10	10	8	1	5	6	8	5	4	0	2	1	2	2	104																
		1	1	1	0	0	0	2	2	1	2	0	2	1	0	2	1	4	4	0	0	1	39																
		IRPL Warnings												ISIB Warnings																									
		70.4%												47.4%																									
		75.6												96.8																									
		73.0												72.1																									
		80.6												100.1																									
		Percentage of storm days forecast correctly.												Percentage of storm days forecast correctly.																									
		Percentage of quiet days forecast correctly.												Percentage of quiet days forecast correctly.																									
		Percentage of all days forecast correctly.												Percentage of all days forecast correctly.																									
		Percentage of superfluous warnings on fair days.												Percentage of superfluous warnings on fair days.																									

Percentage of storm days forecast correctly.  
Percentage of quiet days forecast correctly.  
Percentage of all days forecast correctly.  
Percentage of superfluous warnings on fair days.

Table 15

Radio Disturbance Based on North Atlantic Radio Propagation Quality Figures  
(Disturbed if Half or Whole Day  $\leq 4$ )  
27-Day Recurrence Table

	1944												1945																
	6 Sept	13 Oct	17 Nov	14 Dec	10 Jan	9 Feb	4 Mar	11 Mar	18 Mar	24 Apr	20 June	17 July	13 Aug	9 Sept	9 Oct	2 Nov	29 Nov	26 Dec	22 Jan	18 Feb	17 Mar	13 Apr	10 May	9 June	3 July	30 July	26 Aug	22 Sept	19 Oct
1																													
2																													
3																													
4																													
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24																													
25																													
26																													
27																													

October 1943 through May 1944

June 1944 through October 1945



Comparison of low, borderline, and high horizontal intensity minima on Cheltenham magnetograms vs. radio propagation disturbance as shown by North Atlantic radio propagation quality figures.

-	Magnetic trace minimum less than 18145 gammas.
L	Magnetic trace minimum between 18145 and 18165 gammas.
B	Magnetic trace minimum greater than 18165 gammas.
H	Half or whole day radio quality 4 or less (disturbed).
X	Half or whole day radio quality 5 (fair).
F	Radio quality 6 or better (quiet).
Blank	

[illegible]

Table 16 Cont'd.

Day	Oct. 1943	Nov.	Dec.	Jan. 1944	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.
20	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX
21	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX
22	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX
23	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX
24	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX
25	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX
26	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX
27	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX
28	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX
29	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX
30	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX
31	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX	LX
LX	17	15	16	15	15	15	10	3	1	0	2	2	3
LF	3	0	1	2	0	0	0	0	0	0	0	0	0
L	0	0	1	0	0	0	0	0	0	0	0	0	0
BX	5	5	2	7	2	7	9	5	2	3	1	5	6
BF	2	2	9	9	1	6	6	1	2	1	7	5	9
B	0	0	1	0	1	1	1	1	1	1	7	1	1
BX	1	2	0	0	9	2	7	2	4	5	1	2	7
BF	2	1	0	1	7	3	0	1	1	9	1	12	8
H	1	1	0	0	12	0	0	12	16	19	11	2	3

Summary of Table 16

---

LX	156
LF	29
L	2
BX	92
BF	110
B	31
HX	32
HF	159
H	151

56% of the radio propagation disturbances hit by L's.  
 33% of the radio propagation disturbances are on B days.  
 64% of the quiet days are on H days.  
 29% of the quiet days are on B days.

83% of L days accompanied by radio propagation disturbance.  
 15% of L days " " fair radio propagation conditions.  
 40% of B days " " radio propagation disturbance.  
 47% of B days " " fair radio propagation conditions.  
 46% of H days " " " " " "  
 44% of H days " " better than fair radio propagation conditions.

---





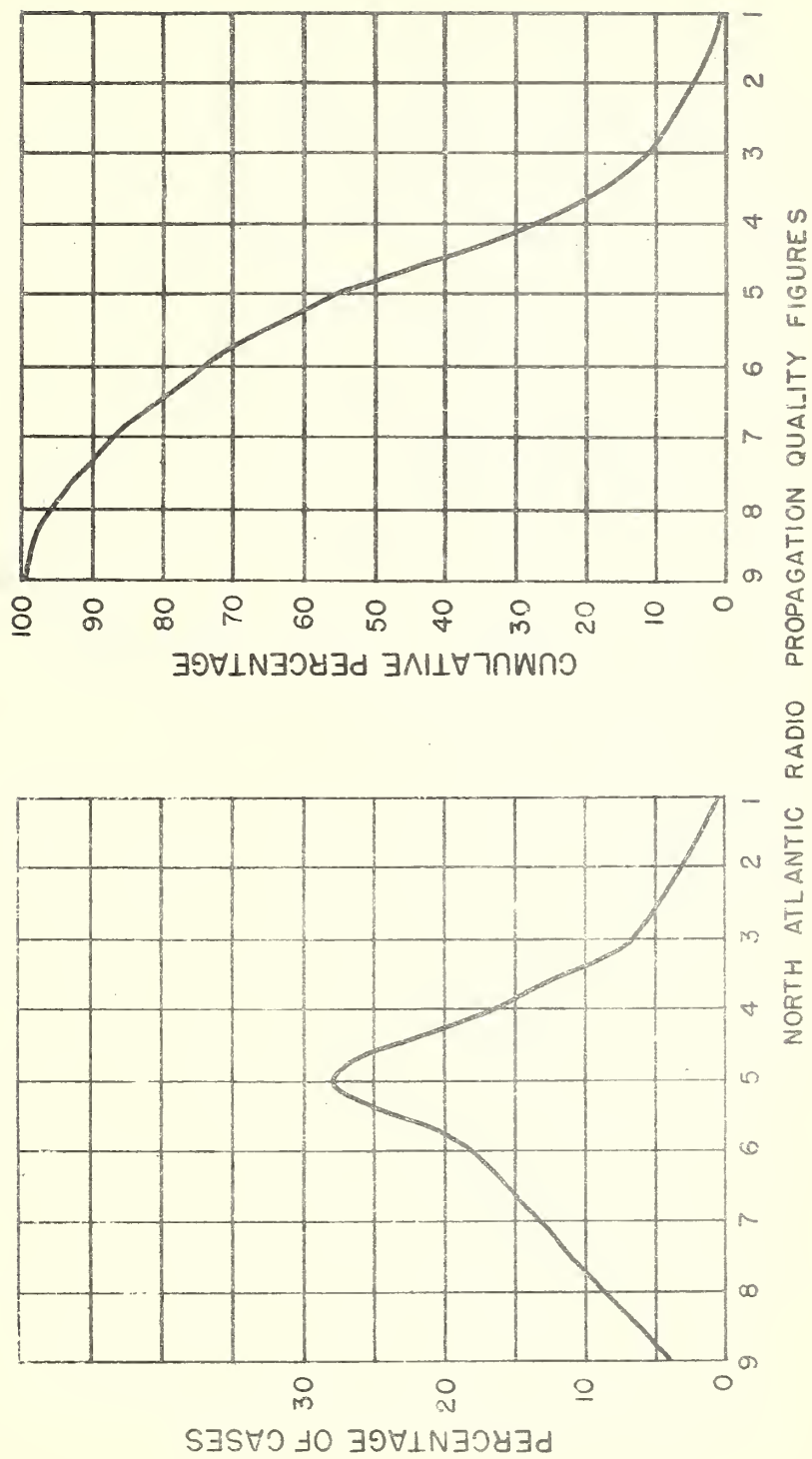


FIG.1.1. AVERAGE FREQUENCY DISTRIBUTION AND CUMULATIVE PERCENTAGE CURVES USED FOR MASTER CONVERSION SCALE



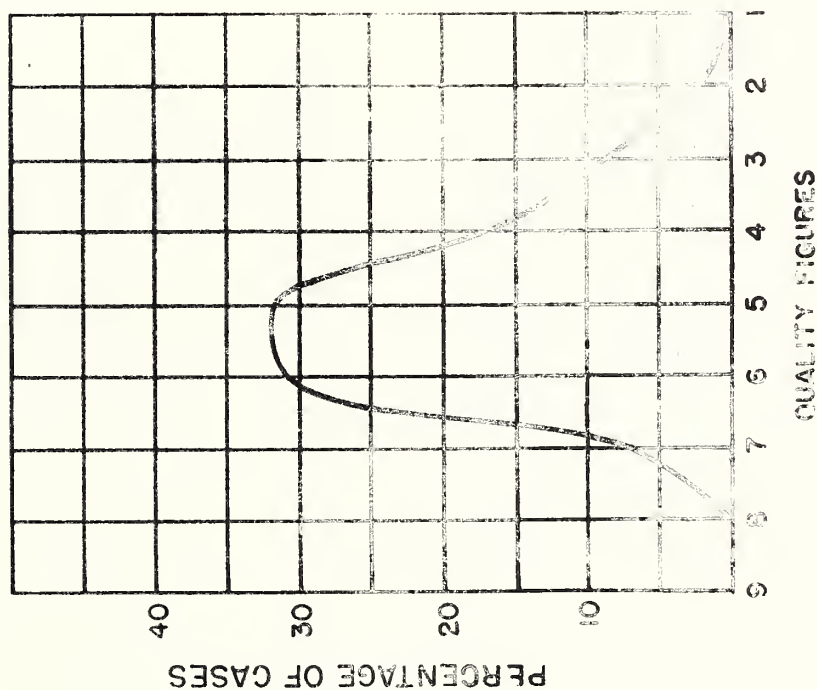
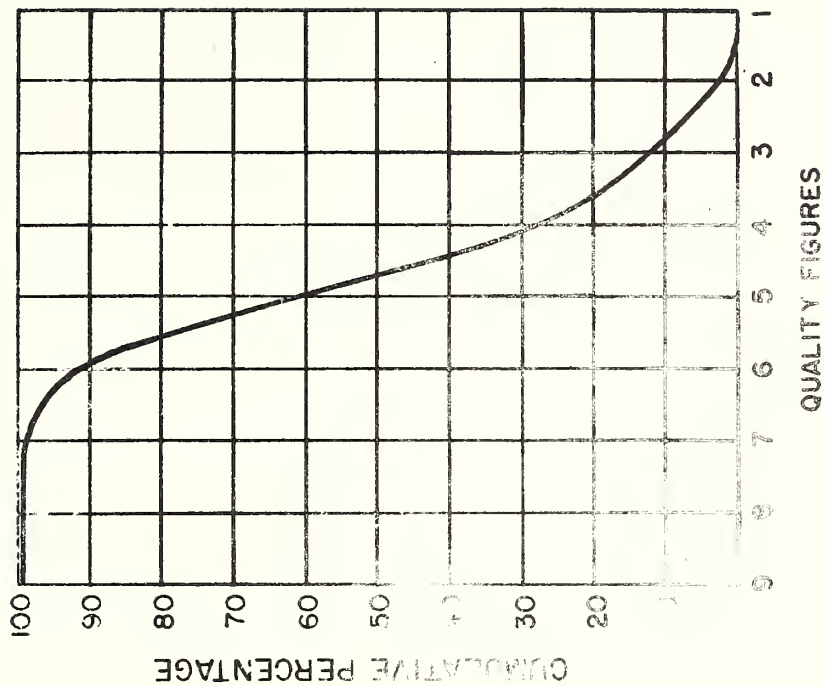


Fig. 3. FREQUENCY DISTRIBUTION AND CUMULATIVE PERCENTAGE CURVES FOR  
NORTH ATLANTIC RADIO PROPAGATION QUALITY FIGURES  
OCTOBER 1943 THROUGH OCTOBER 1945

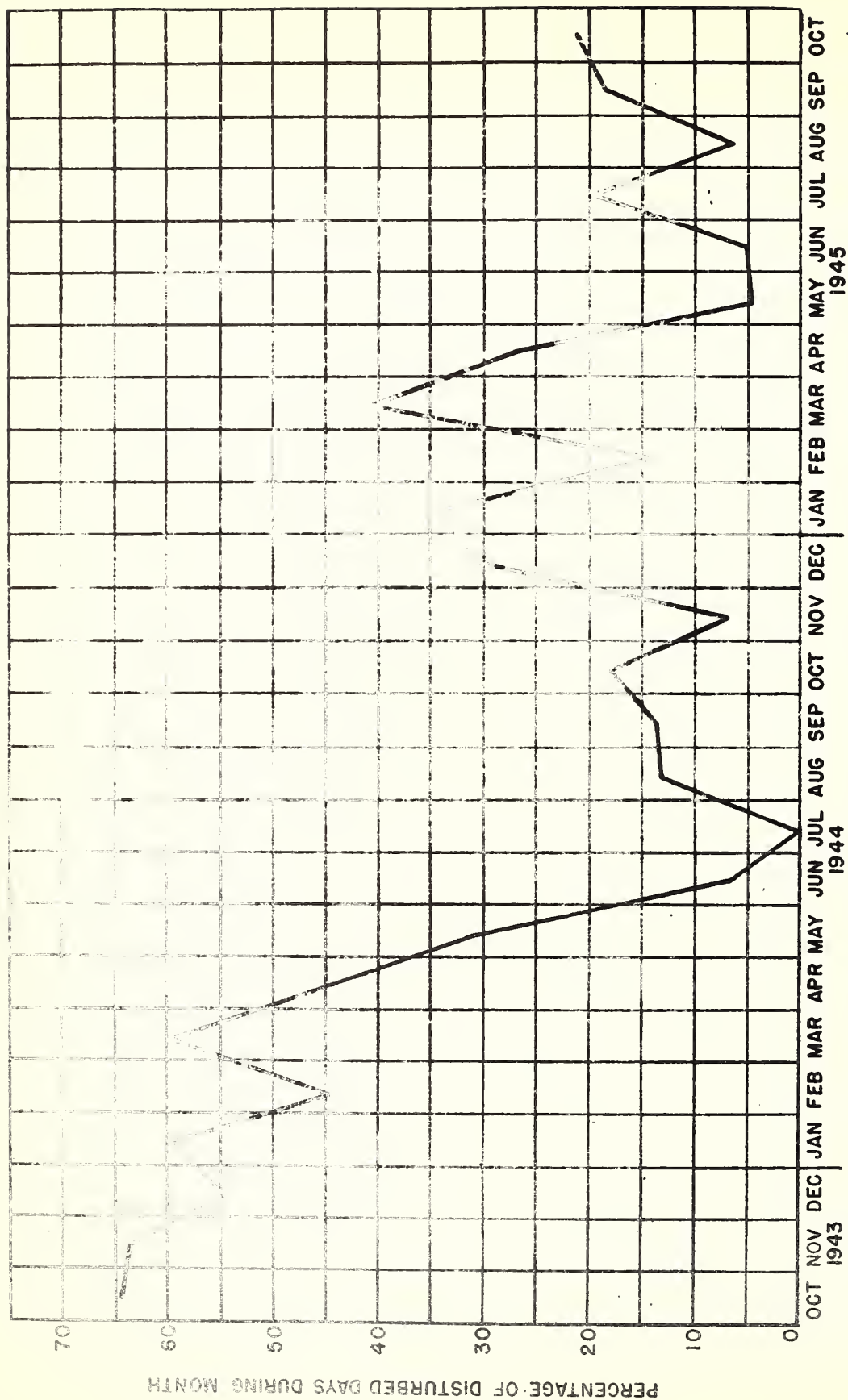


Fig. 4. \_ RELATIVE FREQUENCY OF OCCURRENCE OF RADIO PROPAGATION DISTURBANCE