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THUNDERSTORM PROBABILITY NOMOGRAM

Donald S. Foster and Ronald M. Reap

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Thunderstorm Probability Nomogram

by

Donald S. Foster and Ronald M. Reap

1. INTRODUCTION

Thunderstorm probability forecast equations have been developed and updated for each of the last several years to provide operational guidance for predicting thunderstorm activity 12-36 hours in advance (Reap and Foster, 1975, 1977). The major innovation for the 1977 thunderstorm equation was the development of an interactive predictor which takes into account the seasonal variation of thunderstorm occurrence but is properly responsive to the daily synoptic situation. This predictor was formed by multiplying the K stability index by the daily thunderstorm mean relative frequency. Local variations in thunderstorm occurrence were simulated by developing separate forecast equations, based on the interactive predictor, for each of the manually-digitized radar (MDR) grid blocks shown in figure 1. Although the interactive predictor is only one of several in the complete thunderstorm equation (National Weather Service, 1977), it tends to dominate the final probability forecast. By itself, it has a correlation coefficient of 0.54, corresponding to a reduction in variance of 0.29, as compared to 0.57 and 0.33, respectively, for the top eight predictors.

In a discussion with the Line Forecasters Technical Advisory Committee, it was agreed that these local forecast equations would be made available to field offices for guidance in preparing their own local thunderstorm probability forecasts. We have expanded on this idea by developing a nomogram that can be adapted locally to most MDR grid blocks.

2. THE INTERACTIVE PREDICTOR

The interactive predictor (KF) was formed by multiplying the K stability index (George, 1960) by the daily thunderstorm mean relative frequency. The K index is defined as:

$$K = (850 \text{ Temp} - 500 \text{ Temp}) + 850 \text{ Dew Pt} - (700 \text{ Temp} - 700 \text{ Dew Pt})$$

where the 850-mb and 700-mb temperatures and dew points are 24-hr forecasts obtained from TDL's trajectory model. The 500 mb-temperatures are 24-hr forecasts from NMC's six-layer primitive equation (PE) model. Thunderstorm mean relative frequencies were obtained from MDR data archived at TDL (Foster and Reap, 1973). An MDR code of 4 or greater was used to identify thunderstorms (Mogil, 1974).

Thunderstorm mean relative frequencies were used to simulate seasonal variations in thunderstorm occurrence. These variations are often related to subsynoptic-scale processes not adequately resolved by the large-scale model predictors, e.g., orographic, land-sea breeze, and diurnal heating effects.

The role of the K index is to force the climatology, as represented by the thunderstorm mean relative frequencies, to take into account the daily synoptic situation. For example, a cold frontal passage during summer in the southeastern United States will often sharply depress the K index. As a result, the contribution of the interactive predictor to the probability forecast will be minimized, even though the thunderstorm frequency may be quite high for that particular region and time of year.

To enhance the effect of the local variability in our thunderstorm probability forecasts, we developed statistical relationships between the interactive predictor (KF) and thunderstorm occurrence, as revealed by MDR data, for each of the grid blocks shown in figure 1. Probability estimates, $Y_{i,j}$, were obtained for each block by the linear regression equation

$$Y_{i,j} = A_{i,j} + B_{i,j} (KF)_{lin} \quad (1)$$

where i,j are the coordinates of the particular MDR block (see figure 1), $A_{i,j}$ and $B_{i,j}$ are regression constants for each block, and $(KF)_{lin}$ is a function of the interactive predictor (KF) and is linearly related to thunderstorm relative frequency. This function is more compatible with the linear regression relationships of equation 1 than the raw predictor (KF) which, as shown in figure 2, is highly nonlinear with respect to thunderstorm relative frequency. The linearization of KF was accomplished by a third order polynomial of the form

$$(KF)_{lin} = C_1 + C_2(KF) + C_3(KF)^2 + C_4(KF)^3 \quad (2)$$

where C_1 , C_2 , C_3 , and C_4 are polynomial coefficients.

Only one term $(KF)_{lin}$ was used in the probability estimates given by equation 1 because of the relatively small sample (517 cases) for each MDR grid block. From experimentation, we found that two or more terms introduced small-sample instabilities in the regression analysis resulting in erratic probability forecasts for certain blocks. In any case, additional terms did not give a significant increase in the reduction of variance.

3. THE THUNDERSTORM PROBABILITY NOMOGRAM

We have constructed a basic nomogram (figure 3) for use with all MDR blocks. To complete the nomogram for a specific grid block, the user must plot from table 1:

- (1) the specific location, i.e., MDR grid block coordinates or city name,
- (2) the thunderstorm relative frequency data, and
- (3) the labels for the forecast probability lines.

MDR grid row and column number refer to the grid shown in figure 1. If there is a city or Air Force Base with a weather station in a block, it is listed next.

The next 7 columns in table 1 list the mid-month values of thunderstorm mean relative frequencies from March through September averaged for the years 1974 through 1976. Plot these values on the left part of the nomogram as in figure 4. Daily values of the frequencies may be obtained by linear interpolation between the mid-month values.

The remaining 15 columns of figure 1 list the thunderstorm probabilities associated with KF values ranging from 125 to 3000. These KF values were used to construct the curves in figure 3, and were chosen to produce nomogram curves close enough together to permit reasonably accurate interpolation. In the construction, points were plotted representing the intersection of values of K and F whose products were equal to those chosen values. Thus, the 6 crosses on figure 3 are at the intersection of values of K and F whose product is 125. Similarly, the dots represent values of K and F whose product is 1000. The other curves were constructed in a similar manner.

The product curves may be relabeled in terms of thunderstorm probabilities for particular MDR blocks or locations by means of table 1. Thus, for Jacksonville, Fla. the KF values of 125, 250, ..., 3000 may be relabeled, respectively, as probability values of 15, 22, ..., 94 percent, as can be seen in figure 4. It should be noted that some probability values in table 1 have been truncated to 99.9 for convenience in listing.

To use the nomogram for any particular day, say June 1, start at the base of the frequency graph and move vertically upward until the frequency curve is intercepted, as shown in figure 4. From this point of interception move horizontally to the right until the vertical line along the forecast K index is intercepted. At this point read the forecast thunderstorm probability from the labels on the curves. Interpolation between lines by eye is perfectly acceptable and is within the accuracy of the final forecast value which is normally rounded to the nearest 5 or 10 percent.

A blank nomogram is attached at the end of this office note for your convenience in preparing a supply of blank forms.

4. LIMITATIONS

To insure good results with the nomogram there are certain limitations that must be considered. Since the probability forecast is for a thunderstorm (MDR code of 4 or greater) to occur anywhere within an MDR block area within the period ± 12 hours from the valid time of the K index, the user should be very careful about using the probabilities for a smaller area or different time period. A typical area might be a fairly large city and its suburbs, e.g., Washington, D. C. and vicinity. In addition, the probability

forecast is sensitive to thunderstorm relative frequency. In tabulating the frequencies, we averaged 3 years of data using a 9-point smoother. In spite of the smoothing, there were persistently low frequencies in blocks beyond an effective radar range of 140-150 km. Therefore, we limited the data in table 1 to those blocks whose centers were within 140-150 km of a WSR-57 radar site. These blocks are shown in figure 1. If there is a need to apply the nomogram to an MDR block that is beyond this range, we suggest experimenting with data from a nearby block that is within range. Finally, the derivation of the interactive predictor was based on 3 years of data for March 16 through September 15. Therefore, the nomogram should be used only during those months.

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TABLE 1. THUNDERSTORM RELATIVE FREQUENCY AVERAGES FOR MARCH THROUGH SEPTEMBER FOR THE YEARS 1974-1976 AND 12-36 HOUR FORECAST PROBABILITY LABELS FOR SELECTED CURVES OF FREQUENCY-K-INDEX PRODUCTS. PROBABILITIES ARE BASED ON SINGLE BLOCK EQUATIONS DERIVED BY LINEAR REGRESSION FOR THE SAME TIME PERIOD USING AS A PREDICTOR THE LINEARIZED PRODUCT OF THE K INDEX AND THE RELATIVE FREQUENCY.

ROW	GRD COL	WEATHER STATION	3-YR AVG TSTM RELATIVE FREQ			12-36 HR TSTM FST PROBABILITY FOR SELECTED FREQUENCY-K-INDEX PRODUCTS																		
			MAR	APR	MAY	JUN	JUL	AUG	SEP	125	250	375	500	625	750	1000	1250	1500	1750	2000	2250	2500	2750	3000
2	12	ABERDEEN, S DAK	1	9	15	25	28	24	7	11.3	18.9	26.0	32.6	38.8	44.6	55.1	64.0	71.5	77.9	83.1	87.3	90.7	93.3	95.3
2	13		1	9	15	26	28	24	8	11.7	19.2	26.2	32.8	38.9	44.7	55.0	63.9	71.3	77.6	82.8	87.0	90.3	92.9	94.9
2	14		1	8	13	24	25	22	7	10.3	18.4	26.1	33.2	39.9	46.2	57.4	67.0	75.2	82.0	87.6	92.2	95.3	98.6	99.9
2	15		1	10	13	26	27	27	12	12.4	21.6	30.2	38.2	45.7	52.8	65.4	76.2	85.3	93.0	99.3	99.9	99.9	99.9	99.9
2	16	ST CLOUD, MINN	1	7	11	22	25	23	10	12.2	23.7	34.5	44.7	54.1	63.0	78.8	92.4	99.9	99.9	99.9	99.9	99.9	99.9	99.9
3	11		0	8	15	23	27	23	8	9.4	16.8	23.8	30.3	36.4	42.1	52.4	61.2	68.6	74.8	79.9	84.1	87.4	90.0	91.9
3	12		1	11	17	26	27	26	10	9.9	15.8	21.3	26.4	31.2	35.7	43.7	50.6	56.4	61.3	65.3	68.6	71.2	73.2	74.7
3	13		1	12	18	26	28	28	11	11.6	19.9	27.7	35.0	41.8	48.1	59.5	69.3	77.6	84.5	90.2	94.9	98.5	99.9	99.9
3	14	HURON, S DAK	1	10	16	24	26	26	12	11.6	19.9	27.7	35.0	41.8	48.1	59.5	69.3	77.6	84.5	90.2	94.9	98.5	99.9	99.9
3	15		2	12	18	29	27	29	15	14.3	21.9	29.1	35.8	42.1	48.0	58.5	67.5	75.2	81.6	86.8	91.1	94.5	97.2	99.2
3	16		3	15	19	32	30	31	17	13.5	20.5	27.1	33.3	39.0	44.4	54.0	62.3	69.3	75.2	80.0	83.9	87.0	89.4	91.3
3	17		3	12	16	28	29	28	14	13.7	20.6	27.2	33.3	39.0	44.4	53.9	62.1	69.1	74.9	79.7	83.6	86.7	89.1	91.0
4	12	MINNEAPOLIS, MINN	1	11	18	24	27	27	12	9.6	16.3	22.6	28.4	33.9	39.0	48.2	56.1	62.8	68.4	72.9	76.7	79.6	81.9	83.7
4	13		1	12	18	22	25	28	12	10.8	17.9	24.6	30.9	36.7	42.2	52.0	60.4	67.5	73.5	78.4	82.4	85.5	88.0	89.9
4	14		4	12	20	27	27	28	14	14.7	22.2	29.3	35.9	42.1	47.9	58.2	67.1	74.7	81.0	86.2	90.4	93.7	96.3	98.3
4	15		5	16	23	31	29	30	16	17.1	24.1	31.6	38.6	45.1	51.2	62.2	71.5	79.5	86.2	91.6	96.1	99.6	99.9	99.9
4	16	BANGOR, ME	5	12	19	28	27	28	14	17.3	25.6	33.4	40.8	47.6	54.0	65.5	75.3	83.6	90.6	96.3	99.9	99.9	99.9	99.9
4	17		2	7	10	20	19	26	8	11.3	20.1	28.4	36.2	43.4	50.2	62.3	72.7	81.6	88.9	95.0	99.9	99.9	99.9	99.9
4	18		2	7	9	20	19	27	8	13.0	23.0	32.4	41.2	49.4	57.1	70.8	82.6	92.6	99.9	99.9	99.9	99.9	99.9	99.9
4	19		1	5	8	18	16	24	9	12.7	23.8	34.2	44.0	53.1	61.7	77.0	90.1	99.9	99.9	99.9	99.9	99.9	99.9	99.9
4	20	ROCHESTER, MINN	1	1	6	17	29	19	8	10.3	19.9	29.0	37.5	45.4	52.8	66.0	77.4	87.1	95.1	99.9	99.9	99.9	99.9	99.9
4	21		1	1	5	13	24	16	6	11.7	21.7	31.1	39.9	48.1	55.8	69.6	81.4	91.4	99.8	99.9	99.9	99.9	99.9	99.9
4	22		7	17	23	32	28	32	14	10.6	17.8	24.5	30.8	36.7	42.2	52.0	60.5	67.6	73.6	78.6	82.6	85.7	88.2	90.1
4	23		6	13	18	27	26	30	10	12.9	20.2	27.1	33.5	39.5	45.1	55.2	63.8	71.1	77.2	82.3	86.3	89.6	92.1	94.0
5	20	GREEN BAY, WIS	3	9	12	22	20	29	6	13.8	23.7	33.1	41.8	50.0	57.6	71.3	83.0	92.9	99.9	99.9	99.9	99.9	99.9	99.9
5	21		3	11	12	23	20	30	9	8.4	14.8	20.8	26.4	31.7	36.6	45.4	52.9	59.3	64.6	69.0	72.6	75.4	77.7	79.3
5	22		2	9	10	21	19	26	10	11.9	19.9	27.5	34.5	41.1	47.3	58.4	67.8	75.9	82.6	88.1	92.6	96.2	99.0	99.9
5	23		1	1	7	18	31	19	9	11.2	20.8	29.8	38.3	46.1	53.5	66.7	78.0	87.6	95.6	99.9	99.9	99.9	99.9	99.9
5	24	DENVER, COLO	2	2	8	19	32	22	11	11.7	20.4	28.6	36.3	43.4	50.1	62.1	72.3	81.0	88.3	94.3	99.2	99.9	99.9	99.9
5	25		1	2	4	10	19	14	5	6.2	12.2	17.8	23.1	28.1	32.7	40.9	48.0	54.0	59.0	63.2	66.5	69.2	71.3	72.9
5	26		0	2	11	20	35	23	10	12.0	21.6	30.7	39.2	47.2	54.6	67.9	79.3	89.0	97.0	99.9	99.9	99.9	99.9	99.9
5	27		1	4	16	22	36	26	10	12.7	21.0	28.8	36.1	42.9	49.3	60.8	70.6	78.9	85.8	91.6	96.2	99.9	99.9	99.9
6	6	NORFOLK, NEBR	1	4	17	19	31	23	9	13.1	20.8	28.0	34.7	41.0	46.9	57.4	66.5	74.1	80.6	85.8	90.1	93.5	96.2	98.2
6	7		2	18	25	32	33	28	15	18.2	24.1	29.7	34.9	39.8	44.4	52.6	59.6	65.6	70.5	74.6	78.0	80.6	82.7	84.2
6	8		3	22	27	34	32	30	19	17.6	23.2	28.4	33.3	37.9	42.2	49.9	56.5	62.0	66.7	70.5	73.7	76.1	78.1	79.5
6	9		3	21	26	32	29	30	19	15.9	21.7	27.1	32.2	36.9	41.3	49.3	56.1	61.9	66.7	70.7	73.9	76.5	78.4	80.0
6	10	MADISON, WIS	7	17	25	33	26	34	15	12.5	21.8	30.6	38.8	46.5	53.7	66.5	77.5	86.9	94.7	99.9	99.9	99.9	99.9	99.9
6	11		4	10	15	23	20	29	4	13.0	21.1	28.6	35.8	42.4	48.6	59.7	69.3	77.3	84.1	89.7	94.2	97.3	99.9	99.9
6	12		5	12	14	23	21	27	6	13.8	20.3	26.4	32.1	37.5	42.4	51.4	59.0	65.5	71.0	75.4	79.0	81.9	84.2	85.9
6	13		3	9	11	19	17	22	6	13.8	21.7	29.1	36.1	42.6	48.6	59.5	68.6	76.7	83.3	88.8	93.2	96.7	99.4	99.9
6	14	CONCORD, N H	3	9	11	19	17	22	6	13.8	21.7	29.1	36.1	42.6	48.6	59.5	68.6	76.7	83.3	88.8	93.2	96.7	99.4	99.9
6	15		1	6	6	23	17	14	3	9.2	17.2	24.6	31.6	38.2	44.3	55.2	64.6	72.6	79.2	84.7	89.2	92.7	95.3	97.6
6	16		1	5	5	20	17	9	3	7.7	14.0	19.8	25.3	30.5	35.3	43.9	51.3	57.5	62.8	67.1	70.6	73.3	75.5	77.2
6	17		2	3	8	17	28	19	10	12.2	21.8	30.8	39.2	47.1	54.4	67.6	78.9	88.5	96.5	99.9	99.9	99.9	99.9	99.9
6	18	PORTLAND, ME	3	4	9	16	29	23	13	11.6	21.3	30.3	38.8	46.8	54.2	67.5	78.9	88.5	96.6	99.9	99.9	99.9	99.9	99.9
6	19		3	15	23	37	26	12	14.8	25.3	35.1	44.3	52.9	61.0	75.4	87.7	98.2	99.9	99.9	99.9	99.9	99.9	99.9	99.9
6	20		1	3	15	23	37	26	12	14.8	25.3	35.1	44.3	52.9	61.0	75.4	87.7	98.2	99.9	99.9	99.9	99.9	99.9	99.9
6	21		3	15	23	37	26	12	14.8	25.3	35.1	44.3	52.9	61.0	75.4	87.7	98.2	99.9	99.9	99.9	99.9	99.9	99.9	99.9
6	22	COLORADO SPGS, COL	1	3	15	23	37	26	12	14.8	25.3	35.1	44.3	52.9	61.0	75.4	87.7	98.2	99.9	99.9	99.9	99.9	99.9	99.9
6	23		1	3	15	23	37	26	12	14.8	25.3	35.1	44.3	52.9	61.0	75.4	87.7	98.2	99.9	99.9	99.9	99.9	99.9	99.9
6	24		1	3	15	23	37	26	12	14.8	25.3	35.1	44.3	52.9	61.0	75.4	87.7	98.2	99.9	99.9	99.9	99.9	99.9	99.9
6	25		1	3	15	23	37	26	12	14.8	25.3	35.1	44.3	52.9	61.0	75.4	87.7	98.2	99.9	99.9	99.9	99.9	99.9	99.9

TABLE 1. CONTINUED

MCR GRO ROW COL	WEATHER STATION	3-YR AVG TSTM RELATIVE FREQ MAR APR MAY JUN JUL AUG SEP	12-36 HR TSTM FCST PROBABILITY FOR SELECTED FREQUENCY-K-INDEX PRODUCTS 125 250 375 500 625 750 1000 1250 1500 1750 2000 2250 2500 2750 3000
7 5	GRAND ISLAND, NEBR	2 6 22 28 42 32 13	15.0 21.6 27.9 33.7 39.2 44.2 53.4 61.2 67.9 73.4 78.0 81.7 84.6 86.9 88.7
7 6		2 6 21 24 36 28 12	14.6 21.5 27.9 33.9 39.5 44.8 54.2 62.3 69.2 74.9 79.6 83.4 86.5 88.8 90.7
7 7		2 23 27 33 31 30 20	18.0 22.9 27.5 31.9 35.9 39.7 46.5 52.3 57.2 61.3 64.7 67.5 69.7 71.4 72.7
7 10		4 29 31 36 31 31 22	15.6 20.1 24.4 28.4 32.2 41.9 47.3 51.9 55.7 58.8 61.4 63.4 65.0 66.2
7 11		5 29 32 35 28 31 21	18.8 24.2 29.2 33.9 38.3 42.4 49.8 56.1 61.5 66.0 69.7 72.7 75.1 76.9 78.3
7 12		10 22 31 40 27 38 20	14.7 22.4 29.7 36.5 42.8 48.7 59.4 68.5 76.2 82.6 88.0 92.3 95.7 98.4 99.9
7 15		11 22 30 40 28 37 18	11.3 19.7 27.6 35.0 41.9 48.4 60.0 69.9 78.3 85.4 91.2 95.9 99.6 99.9 99.9
7 16		11 22 27 37 27 36 13	15.7 23.6 31.1 38.1 44.7 50.8 61.8 71.2 79.2 85.9 91.4 95.8 99.4 99.9 99.9
7 17		11 22 27 37 27 36 13	15.7 23.6 31.1 38.1 44.7 50.8 61.8 71.2 79.2 85.9 91.4 95.8 99.4 99.9 99.9
7 25		11 13 13 36 31 27 12	18.5 27.0 35.0 42.4 49.4 58.9 67.6 77.6 86.1 93.2 99.0 99.9 99.9 99.9 99.9
7 26	WATERLOO, IOWA	13 14 15 37 37 28 13	17.6 26.6 35.0 42.9 50.3 57.2 69.0 80.2 89.1 96.7 99.9 99.9 99.9 99.9 99.9
7 27		13 14 15 37 37 28 13	16.5 26.5 35.9 44.7 53.0 60.7 74.5 86.3 96.4 99.9 99.9 99.9 99.9 99.9 99.9
7 28		9 11 12 31 33 24 10	11.8 20.8 29.2 37.1 44.5 51.4 63.8 74.4 83.4 90.9 97.1 99.9 99.9 99.9 99.9
7 29		1 5 5 20 16 12 2	12.1 21.5 30.3 38.5 46.2 53.4 66.3 77.3 86.7 94.5 99.9 99.9 99.9 99.9 99.9
7 30		1 5 5 21 16 12 3	15.8 29.3 42.0 53.9 65.1 75.4 94.1 99.9 99.9 99.9 99.9 99.9 99.9 99.9 99.9
7 31		1 4 4 19 15 10 3	9.9 19.2 27.9 36.1 43.7 50.8 63.6 74.6 83.9 91.6 98.0 99.9 99.9 99.9 99.9
7 32		4 5 11 13 26 23 14	12.9 19.8 26.3 32.3 38.0 43.3 52.8 60.9 67.8 73.6 78.4 82.2 85.3 87.7 89.5
7 33		4 5 16 21 33 25 11	14.9 21.9 28.5 34.6 40.4 45.7 55.7 64.3 71.6 77.7 82.7 86.3 90.0 92.6 94.5
7 34		2 5 21 25 33 27 13	17.4 23.1 28.4 33.4 38.1 42.4 50.2 56.9 62.6 67.4 71.3 74.4 77.0 78.9 80.4
7 35		3 7 21 25 33 27 13	19.4 24.4 29.1 33.5 37.6 41.4 48.3 54.2 59.2 63.4 66.9 69.7 71.9 73.6 75.0
8 6	BUFFALO, N Y	2 19 22 30 25 25 19	14.3 21.8 28.8 35.4 41.6 47.3 57.6 66.5 74.0 80.2 85.4 89.6 92.9 95.5 97.5
8 10		4 25 27 32 25 26 20	13.2 21.3 28.9 36.0 42.7 48.9 60.0 68.6 77.7 84.5 90.1 94.6 98.2 99.9 99.9
8 11		5 26 30 33 25 28	14.3 21.8 28.8 35.4 41.6 47.3 57.6 66.5 74.0 80.2 85.4 89.6 92.9 95.5 97.5
8 12		9 21 32 39 24 37 22	13.2 21.3 28.9 36.0 42.7 48.9 60.0 68.6 77.7 84.5 90.1 94.6 98.2 99.9 99.9
8 13		12 22 33 41 24 39 22	13.2 21.3 28.9 36.0 42.7 48.9 60.0 68.6 77.7 84.5 90.1 94.6 98.2 99.9 99.9
8 14		13 23 30 38 25 37 15	11.4 19.5 27.1 34.1 40.8 46.9 58.0 67.5 75.6 82.3 87.9 92.4 95.9 98.4 99.9
8 15		13 23 30 38 25 37 15	11.4 19.5 27.1 34.1 40.8 46.9 58.0 67.5 75.6 82.3 87.9 92.4 95.9 98.4 99.9
8 16		11 15 26 33 24 30 6	13.8 22.0 29.6 36.8 43.5 49.8 61.0 70.6 78.8 85.6 91.2 95.3 99.4 99.9 99.9
8 17		12 14 25 32 24 26 4	14.0 22.9 31.4 39.3 46.6 53.5 65.9 76.5 85.5 93.0 99.2 99.9 99.9 99.9 99.9
8 18		10 12 17 26 20 20 4	16.2 25.9 35.0 43.6 51.5 59.0 72.3 83.8 93.5 99.9 99.9 99.9 99.9 99.9 99.9
8 19	DES MOINES, IOWA	11 13 16 37 28 26 10	18.8 27.4 35.5 43.1 50.2 56.8 68.7 78.9 87.5 94.7 99.9 99.9 99.9 99.9 99.9
8 20		16 16 19 44 36 33 15	14.9 22.7 30.0 36.8 43.1 49.1 59.7 68.9 76.6 83.1 88.4 92.7 96.2 98.9 99.9
8 21		18 17 20 43 39 35 16	8.4 14.2 19.7 24.8 29.6 34.1 42.1 49.0 54.8 59.7 63.7 66.9 69.5 71.5 73.1
8 22		12 12 15 35 33 29 12	5.8 12.2 18.2 23.9 29.2 34.2 43.0 50.6 57.1 62.5 66.9 70.5 73.4 75.6 77.3
8 23		2 6 8 24 20 17 6	11.6 21.9 31.5 40.6 49.0 56.9 71.0 83.2 93.5 99.9 99.9 99.9 99.9 99.9 99.9
8 24		2 5 8 22 19 15 5	9.8 18.3 26.3 33.7 40.7 47.2 58.9 68.9 77.4 84.5 90.4 95.1 98.9 99.9 99.9
8 25		1 3 5 18 15 11 3	12.6 20.3 27.6 34.4 40.7 46.7 57.3 66.4 74.2 80.6 85.9 90.3 93.7 96.4 98.4
8 26		5 7 13 14 28 22 13	8.5 12.8 16.8 20.6 24.1 27.4 33.3 38.4 42.7 46.3 49.3 51.7 53.6 55.1 56.2
8 27		7 9 13 13 25 23 15	11.9 17.6 23.0 28.1 32.8 37.2 45.1 51.9 57.7 62.5 66.4 69.7 72.2 74.2 75.7
8 28		2 4 17 21 25 24 11	12.0 18.7 24.9 30.8 36.3 41.4 50.5 58.4 65.1 70.6 75.2 78.9 81.9 84.2 86.0
8 29	DETROIT, MICH	3 11 17 25 21 23 15	9.9 19.4 28.1 36.6 44.3 51.5 64.5 75.7 85.1 93.0 99.5 99.9 99.9 99.9 99.9
8 30		2 13 17 28 20 23 17	14.6 24.3 33.4 41.9 49.9 57.3 67.1 78.4 88.0 96.0 99.9 99.9 99.9 99.9 99.9
8 31		9 21 30 39 18 36 21	11.9 21.4 30.4 38.8 46.7 54.0 67.1 78.4 88.0 96.0 99.9 99.9 99.9 99.9 99.9
8 32		10 21 30 39 18 36 21	11.9 21.4 30.4 38.8 46.7 54.0 67.1 78.4 88.0 96.0 99.9 99.9 99.9 99.9 99.9
8 33		11 22 28 37 20 32 17	9.6 17.9 25.5 33.0 39.8 46.2 57.6 67.4 75.7 82.6 88.3 93.0 96.7 99.5 99.9
8 34		12 17 28 35 26 26 7	13.2 23.0 32.1 40.7 48.8 56.3 69.8 81.3 91.1 99.3 99.9 99.9 99.9 99.9 99.9
8 35		14 17 28 35 26 25 6	19.8 28.7 37.1 44.9 52.2 59.0 71.3 81.7 90.6 98.1 99.9 99.9 99.9 99.9 99.9
8 36		15 16 26 34 25 25 7	
8 37		12 14 20 31 22 23 6	
8 38		15 15 21 44 35 35	
8 39	ERIE, PA	2 6 8 24 20 17 6	
8 40		2 5 8 22 19 15 5	
8 41		1 3 5 18 15 11 3	
8 42		5 7 13 14 28 22 13	
8 43		7 9 13 13 25 23 15	
8 44		2 4 17 21 25 24 11	
8 45		2 7 18 24 24 24 13	
8 46		3 11 17 25 21 23 15	
8 47		2 13 17 28 20 23 17	
8 48		9 21 30 39 18 36 21	
8 49	PROVIDENCE, R I	10 21 30 39 18 36 21	
8 50		11 22 28 37 20 32 17	
8 51		12 17 27 34 26 26 7	
8 52		14 17 28 35 26 25 6	
8 53		15 16 26 34 25 25 7	
8 54		12 14 20 31 22 23 6	
8 55		15 15 21 44 35 35	
8 56		2 6 8 24 20 17 6	
8 57		2 5 8 22 19 15 5	
8 58		1 3 5 18 15 11 3	
8 59	TOLEDO, OHIO	5 7 13 14 28 22 13	
8 60		7 9 13 13 25 23 15	
8 61		2 4 17 21 25 24 11	
8 62		2 7 18 24 24 24 13	
8 63		3 11 17 25 21 23 15	
8 64		2 13 17 28 20 23 17	
8 65		9 21 30 39 18 36 21	
8 66		10 21 30 39 18 36 21	
8 67		11 22 28 37 20 32 17	
8 68		12 17 27 34 26 26 7	

TABLE 1. CONTINUED

MOR GRD		WEATHER STATION	3-YR AVG TSTM RELATIVE FREQ												12-36 HR TSTM FCST PROBABILITY FOR SELECTED FREQUENCY-K-INDEX PRODUCTS																
ROW	COL		MAR	APR	MAY	JUN	JUL	AUG	SEP							125	250	375	500	625	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	
9	26	CLEVELAND, OHIO	17	16	21	42	36	37	15						17.2	25.8	34.0	41.6	48.7	55.4	67.3	77.6	86.3	93.5	99.5	99.9	99.9	99.9	99.9	99.9	
9	27		13	13	16	36	32	33	13						18.1	28.0	37.3	46.0	54.2	61.8	75.4	87.0	96.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9
9	28		8	9	13	33	29	28	11						12.4	22.2	31.5	40.2	48.3	55.9	69.5	81.1	91.0	99.2	99.9	99.9	99.9	99.9	99.9	99.9	99.9
9	29	BRADFORD, PA	5	7	12	30	25	22	11						14.7	25.5	35.7	45.2	54.0	62.3	77.2	89.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9
9	30		3	5	10	24	21	16	8						14.4	25.8	36.5	46.5	55.9	64.7	80.4	93.8	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9
9	34		6	7	17	28	31	26	14						10.9	21.9	32.2	41.9	50.9	59.3	74.4	87.4	98.7	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9
9	35	BRIDGEPORT, CONN	6	8	18	26	34	27	15						11.9	21.4	30.4	38.7	46.6	53.9	67.0	78.2	87.7	95.7	99.9	99.9	99.9	99.9	99.9	99.9	99.9
9	36		6	8	16	20	31	24	15						10.0	19.6	28.7	37.1	45.0	52.4	65.6	77.0	86.6	94.7	99.9	99.9	99.9	99.9	99.9	99.9	99.9
9	38		8	9	13	15	25	21	15						12.4	20.7	28.4	35.6	42.3	48.6	60.0	69.6	77.9	84.7	90.4	95.0	98.6	99.9	99.9	99.9	99.9
10	6	BUZZARDS BAY L.SHI	2	8	17	24	19	22	12						8.5	13.8	18.9	23.6	27.9	32.0	39.4	45.2	51.0	55.5	59.2	62.2	64.5	66.4	67.8	70.6	
10	7		3	12	18	26	18	22	13						8.9	15.3	21.3	26.9	32.1	37.0	45.8	53.3	59.1	65.0	69.4	72.9	75.8	78.0	79.6	81.0	
10	8		4	15	19	29	19	23	15						13.9	18.8	23.5	27.9	32.0	35.8	42.7	48.6	53.5	57.7	61.1	63.9	66.1	67.9	69.3	70.6	
10	9	RUSSELL, KANS	4	15	19	30	19	23	15						11.5	16.7	21.6	26.1	30.4	34.4	41.6	47.7	53.0	57.3	60.9	63.8	66.1	67.9	69.3	70.6	
10	10		3	14	18	30	17	22	15						12.1	18.2	23.9	29.2	34.2	38.9	47.2	54.4	60.5	65.6	69.8	73.2	75.9	78.0	79.6	81.0	
10	11		3	14	18	30	17	22	15						11.8	17.5	22.9	27.9	32.6	37.0	44.9	51.6	57.3	62.1	66.1	69.3	71.8	73.3	75.3	76.3	
10	13	TOPEKA, KANS	8	22	28	32	17	34	19						14.2	21.0	27.4	33.4	39.0	44.3	53.6	61.7	68.5	74.2	78.9	82.7	85.8	88.1	89.9	90.9	
10	14		10	22	31	38	17	37	20						8.3	17.1	25.2	32.9	40.1	46.8	58.7	69.0	77.7	85.0	91.0	95.9	99.9	99.9	99.9	99.9	
10	15		9	20	27	36	15	32	16						11.3	21.8	31.6	40.8	49.4	57.4	71.8	84.1	94.5	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9
10	18	KANSAS CITY, MO	12	21	24	30	26	24	9						9.2	18.3	26.8	34.7	42.1	49.1	61.5	72.1	81.2	88.7	93.0	99.9	99.9	99.9	99.9	99.9	
10	20		12	16	26	30	27	23	7						12.6	22.8	32.3	41.2	49.5	57.3	71.2	83.2	93.3	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9
10	21		11	13	23	29	24	24	14						14.2	24.5	34.2	43.2	51.7	59.6	73.8	86.0	96.3	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9
10	22	YOUNGSTOWN, OHIO	9	9	16	35	31	32	14						11.7	21.6	30.8	39.5	47.7	55.2	68.8	80.5	90.4	98.6	99.9	99.9	99.9	99.9	99.9	99.9	99.9
10	23		7	8	16	35	31	29	15						11.7	21.6	30.8	39.5	47.7	55.2	68.8	80.5	90.4	98.6	99.9	99.9	99.9	99.9	99.9	99.9	99.9
10	24		5	5	13	28	26	21	12						14.7	25.3	35.3	44.7	53.5	61.7	76.3	88.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9
10	30	ALLENSTOWN, PA	11	10	21	32	35	31	18						10.4	20.4	29.7	38.4	46.6	54.2	67.9	79.7	89.6	97.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9
10	34		11	11	21	28	36	30	20						11.0	21.0	30.4	39.3	47.5	55.2	69.0	80.9	90.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9
10	36		9	9	16	20	31	25	17						6.0	10.5	14.6	18.5	22.1	25.5	31.6	36.8	41.3	45.0	48.0	50.5	52.5	54.0	55.2	56.2	57.2
11	6	ISLIP, N Y	3	9	19	30	21	25	13						8.2	15.0	21.5	27.5	33.1	38.4	47.8	55.9	62.7	68.5	73.2	77.0	80.0	82.4	84.2	85.2	
11	7		4	12	20	28	19	23	12						11.8	17.1	22.0	26.7	31.1	35.1	42.4	48.7	54.0	58.4	62.1	65.0	67.4	69.2	70.6	71.6	
11	9		5	15	21	29	19	23	12						11.2	16.1	20.7	25.0	29.1	32.8	39.6	45.4	50.3	54.4	57.7	60.5	62.6	64.3	65.6	66.6	67.6
11	10	DODGE CITY, KANS	5	18	22	29	18	25	14						12.3	18.5	24.4	30.0	35.1	40.0	48.6	56.0	62.3	67.5	71.9	75.4	78.2	80.3	82.0	83.0	
11	11		6	21	24	30	17	30	16						12.9	19.3	25.3	30.9	36.1	41.0	49.8	57.4	63.7	69.1	73.5	77.0	79.9	82.1	83.8	84.8	
11	12		8	22	26	31	17	32	18						10.8	16.9	22.7	28.0	33.0	37.7	46.1	53.3	59.3	64.4	68.6	72.0	74.7	76.9	78.5	79.9	
11	13	RICHARDS, CEBIAUR AF	9	23	28	32	15	34	19						15.0	22.8	30.2	37.1	43.6	49.6	60.4	69.7	77.5	84.1	89.5	93.9	97.4	99.9	99.9	99.9	
11	14		11	23	30	39	16	36	21						9.3	17.3	24.9	31.9	38.5	44.6	55.7	65.1	73.1	79.8	85.3	89.8	93.4	96.1	98.3	99.3	
11	15		10	20	24	34	14	28	15						12.5	23.1	33.0	42.2	50.9	59.0	73.5	85.9	96.5	99.9	99.9	99.9	99.9	99.9	99.9	99.9	
11	17	WHITEMAN AFB MO.	10	18	19	26	22	19	9						10.6	21.0	30.8	39.9	48.4	56.4	70.6	82.9	93.2	99.9	99.9	99.9	99.9	99.9	99.9	99.9	
11	18		13	21	23	30	28	22	10						10.0	18.3	26.0	33.3	40.1	46.4	57.7	67.5	75.7	82.6	88.3	92.9	96.6	99.4	99.9	99.9	
11	19		12.4	21.0	29.1	36.7	43.8	50.4	62.7	72.4	81.1	88.3	94.2	99.1	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	
11	23	SPRINGFIELD, ILL	9.0	17.8	26.1	33.9	41.1	47.9	60.0	70.4	79.2	86.6	92.7	97.6	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	
11	24		10.8	19.3	27.3	34.8	41.8	48.3	60.0	70.1	78.6	85.7	91.6	96.3	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	
11	25		10.7	19.8	28.4	36.5	44.0	51.0	63.6	74.3	83.5	91.1	97.4	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	
11	29	DAYTON, OHIO	7	10	15	33	28	29	10						13.1	22.8	31.8	40.2	48.1	55.5	68.7	80.1	89.7	97.7	99.9	99.9	99.9	99.9	99.9	99.9	
11	30		7	7	15	32	30	29	12						11.5	20.3	28.7	36.4	43.7	50.5	62.7	73.2	82.0	89.4	95.5	99.9	99.9	99.9	99.9	99.9	
11	33		7	7	15	32	30	27	14						12.0	21.3	30.1	38.2													

TABLE 1. CONTINUED

[illegible]

TABLE 1. CONTINUED

HQR GRD ROW COL		WEATHER STATION	3-YR AVG TSTM RELATIVE FREQ												12-36 HR TSTM FCST PROBABILITY FOR SELECTED FREQUENCY-K-INDEX PRODUCTS														
			MAR	APR	MAY	JUN	JUL	AUG	SEP							125	250	375	500	625	750	1000	1250	1500	1750	2000	2250	2500	2750
14	11		9	16	24	28	20	24	13						11.3	18.3	24.7	30.8	36.5	41.8	51.3	59.5	66.4	72.2	76.9	80.8	83.9	86.3	88.1
14	12		13	20	23	30	23	31	20						14.2	21.9	29.1	35.8	42.1	48.0	58.6	67.6	75.3	81.7	87.0	91.2	94.7	97.3	99.3
14	13		15	20	23	30	25	35	21						8.3	17.0	25.2	32.8	40.0	46.7	58.7	68.9	77.6	84.9	90.9	95.8	99.7	99.9	99.9
14	14		13	16	17	25	23	30	16						10.5	19.4	27.6	35.4	42.7	49.4	61.6	72.0	80.9	88.2	94.3	99.3	99.9	99.9	99.9
14	15		17	16	23	31	32	34	16						11.6	19.6	27.2	34.3	40.9	47.1	58.2	67.7	75.8	82.5	88.1	92.6	96.2	99.0	99.9
14	16		20	17	24	32	33	38	20						11.1	19.2	26.8	33.9	40.5	46.7	57.8	67.4	75.1	82.2	87.8	92.3	95.9	98.7	99.9
14	17		18	15	23	34	34	37	19						11.4	19.5	27.0	34.0	40.6	46.8	57.8	67.3	75.3	82.0	87.5	92.0	95.6	98.3	99.9
14	18	LEXINGTON, KY	8	9	18	35	30	30	13						8.5	16.2	23.5	30.3	36.6	42.5	53.1	62.2	69.9	76.3	81.6	85.9	89.4	92.0	94.1
14	19	RICHMOND, VA	12	12	20	22	29	26	20						14.5	22.5	30.1	37.2	43.8	50.0	61.1	70.6	78.6	85.4	90.9	95.4	99.0	99.9	99.9
14	20		15	15	23	34	35	30	25						12.9	20.7	28.1	34.9	41.4	47.4	58.2	67.4	75.2	81.8	87.2	91.6	95.0	97.8	99.8
14	21		14	15	20	33	34	29	24						12.9	21.0	28.6	35.6	42.3	48.5	59.6	69.1	77.1	83.9	89.4	93.9	97.5	99.9	99.9
14	22	HALLOPS ISLAND, VA	7	16	25	22	22	21	12						10.5	17.2	23.4	29.2	34.7	39.8	48.8	56.7	63.1	68.9	73.5	77.2	80.2	82.5	84.2
15	1	FT. SILL OK.	7	16	25	22	22	21	12						12.4	19.8	26.8	33.3	39.4	45.1	55.3	64.0	71.4	77.6	82.7	86.9	90.1	92.7	94.7
15	2		8	17	28	25	24	22	12						10.5	17.2	23.4	29.2	34.7	39.8	48.8	56.7	63.1	68.9	73.5	77.2	80.2	82.5	84.2
15	3		9	17	27	29	24	24	13						11.2	19.4	27.1	34.2	40.9	47.2	58.4	68.1	76.2	83.0	88.7	93.2	96.8	99.7	99.9
15	4		10	15	24	23	20	22	13						10.4	18.8	26.6	33.9	40.8	47.1	58.6	68.4	76.8	83.7	89.5	94.1	97.8	99.9	99.9
15	5		12	17	25	30	28	32	22						11.5	18.6	25.1	31.3	37.0	42.4	52.1	60.3	67.3	73.2	78.0	81.9	85.0	87.4	89.4
15	6		17	19	27	34	34	39	26						11.0	18.5	25.6	32.2	38.4	44.1	54.5	63.5	70.8	77.1	82.3	86.5	89.8	92.4	94.4
15	7		18	18	24	32	32	37	23						6.2	12.7	18.8	24.6	29.9	34.9	43.9	51.5	58.0	63.5	68.0	71.6	74.5	76.8	78.5
15	8		15	15	31	30	32	32	17						11.0	20.0	28.5	36.4	43.9	50.8	63.2	73.9	82.9	90.5	96.7	99.9	99.9	99.9	99.9
15	9		20	15	24	33	35	41	20						10.8	20.2	29.0	37.2	44.9	52.1	65.0	76.1	85.4	93.3	99.7	99.9	99.9	99.9	99.9
15	10	CAMPBELL AAF KY.	20	15	24	33	35	41	20						11.9	20.7	28.9	36.6	43.8	50.5	62.6	72.9	81.7	89.0	95.1	99.9	99.9	99.9	99.9
15	11		21	15	22	34	36	41	20						11.3	20.3	28.8	36.7	44.1	51.0	63.4	74.1	83.1	90.6	96.8	99.9	99.9	99.9	99.9
15	12		15	12	18	33	32	35	17						12.9	22.0	30.6	38.7	46.2	53.2	65.8	76.6	85.8	93.4	99.8	99.9	99.9	99.9	99.9
15	13		12	10	25	37	41	34	11						13.6	21.7	29.3	36.5	43.1	49.4	60.5	70.1	78.3	85.0	90.6	95.2	98.8	99.9	99.9
15	14		12	11	25	37	44	34	11						12.3	21.2	29.5	37.4	44.7	51.5	63.7	74.2	83.1	90.6	96.7	99.9	99.9	99.9	99.9
15	15		8	8	20	30	38	27	8						10.7	19.2	27.2	34.7	41.8	48.3	60.1	70.2	78.7	85.9	91.8	96.5	99.9	99.9	99.9
15	16	NORFOLK, VA	13	13	20	22	34	29	26						11.7	16.6	21.3	25.7	29.8	33.6	40.4	46.3	51.3	55.4	58.9	61.6	63.8	65.6	66.9
16	1		4	16	21	25	40	27	16						11.4	17.3	22.8	28.0	32.8	37.4	45.5	52.4	58.3	63.3	67.3	70.6	73.2	75.3	76.8
16	2		5	17	22	26	36	26	16						9.1	15.7	22.0	27.8	33.3	38.3	47.5	55.3	61.9	67.5	72.1	75.8	78.7	81.0	82.8
16	3		9	15	25	26	27	22	16						10.4	18.8	26.6	33.9	40.8	47.2	58.7	68.5	76.9	83.9	89.6	94.3	98.0	99.9	99.9
16	4		9	13	22	27	23	21	13						17.7	26.1	34.0	41.4	48.3	54.7	66.3	76.2	84.6	91.7	97.5	99.9	99.9	99.9	99.9
16	5		20	20	32	40	41	44	33						18.5	27.0	34.9	42.4	49.3	55.8	67.4	77.4	85.9	92.9	98.8	99.9	99.9	99.9	99.9
16	6		23	20	32	40	41	42	31						17.7	26.3	34.4	42.0	49.0	55.6	67.5	77.7	86.3	93.5	99.4	99.9	99.9	99.9	99.9
16	7	JONESBORO, ARK	22	19	33	39	38	38	27						14.5	22.1	29.1	35.8	42.0	47.7	58.1	67.0	74.6	80.9	86.1	90.3	93.6	96.2	98.2
16	8	BLYTHEVILLE AFB AR	22	18	37	38	39	36	27						13.1	22.2	30.7	38.7	46.1	53.1	65.6	76.3	85.4	92.9	99.2	99.9	99.9	99.9	99.9
16	9		20	17	40	37	39	38	27						11.2	19.9	28.0	35.7	42.8	49.4	61.4	71.6	80.3	87.6	93.6	98.4	99.9	99.9	99.9
16	10		18	15	36	34	38	38	24						8.3	15.9	22.9	29.5	35.7	41.5	51.8	60.7	70.7	79.1	86.2	92.0	96.7	99.9	99.9
16	11		18	14	30	34	37	41	21						11.8	20.3	28.2	35.7	42.6	49.1	60.7	70.7	79.1	86.2	92.0	96.7	99.9	99.9	99.9
16	12		19	14	25	35	37	41	20						13.0	21.5	29.5	36.9	43.9	50.4	62.1	72.2	80.6	87.8	93.6	98.3	99.9	99.9	99.9
16	13	NASHVILLE, TENN	21	16	22	37	39	45	21						9.2	18.5	27.3	35.5	43.2	50.3	63.2	74.2	83.5	91.3	97.7	99.9	99.9	99.9	99.9
16	14		15	14	18	33	35	36	18						10.5	18.4	25.3	32.7	39.2	45.3	56.1	65.5	73.4	80.0	85.4	89.8	93.3	96.1	98.1
16	15		9	9	20	33	34	31	10						14.3	22.8	30.7	38.1	45.0	51.4	63.0	72.9	81.4	88.4	94.2	98.9	99.9	99.9	99.9
16	16	BRISTOL, TENN	10	11	27	39	41	37	11						12.8	21.5	29.8	37.5	44.7	51.4	63.5	73.8	82.6	89.9	96.0	99.9	99.9	99.9	99.9
16	17		11	10	29	41	44	38	12						14.2	22.8	30.8	38.5	45.6	52.2	64.0	74.2	82.8	90.0	95.9	99.9	99.9	99.9	99.9
16	18		8	9	25	35	41	33	12						12.8	21.5	29.8	37.5	44.7	51.4	63.5	73.8	82.6	89.9	96.0	99.9	99.9	99.9	99.9
16	19		14	13	25	35	40	36	30						11.4	18.7	25.5	31.9	37.9	43.5	53.6	62.2	69.5	75.6	80.7	84.7	88.0	90.5	92.4
16	20		15	14	28	29	43	40	33						9.7	14.4	18.8	23.0	26.9	30.5	37.0	42.5	47.2	51.2	54.4	57.1	59.1	60.8	62.0
16	21		3	16	22	23	43	29	18						9.1	13.7	18.1	22.2	26.0	29.6	35.9	41.4	46.1	50.0	53.2	55.7	57.8	59.4	60.6
16	22		4	18	24	24	35	27	19						9.4	15.5	21.2</												

TABLE 1. CONTINUED

MCR GRO ROW COL	WEATHER STATION	3-YR AVG TSTM MAR APR MAY JUN JUL AUG SEP	RELATIVE FREQ	12-36 HR TSTM 125 250 375 500 675 750 1000 1250 1500 1750 2000 2250 2500 2750 3000	FCST PROBABILITY FOR SELECTED FREQUENCY-K-INDEX PRODUCTS
17 7	LITTLE ROCK, ARK	11 17 23 26 35 28 20	26 35 28 20	11.9 19.7 27.0 33.8 40.2 46.1 56.8 66.0 73.7 80.2 85.6 89.9 93.3 96.0 98.1	93.3 96.0 98.1
17 8		13 17 25 27 35 29 22	27 35 29 22	10.9 18.8 26.3 33.2 39.7 45.8 56.6 66.0 73.9 80.5 85.9 90.3 93.8 96.6 98.7	93.8 96.6 98.7
17 14		24 22 37 46 49 47 38	46 49 47 38	17.6 25.5 33.0 40.0 46.5 52.6 63.6 72.9 80.9 87.5 93.0 97.4 99.9 99.9 99.9	99.9 99.9 99.9
17 15		29 24 40 49 51 49 38	49 51 49 38	14.0 21.5 28.5 35.1 41.2 46.9 57.2 66.0 73.5 79.8 84.9 89.1 92.4 95.0 97.0	92.4 95.0 97.0
17 16		27 22 41 47 47 43 33	47 43 33	15.8 23.7 31.1 38.1 44.6 50.6 61.5 70.8 78.7 85.3 90.7 95.1 98.6 99.9 99.9	95.1 98.6 99.9
17 17	MEMPHIS, TENN	26 20 41 43 46 41 32	43 46 41 32	14.1 21.1 27.6 33.8 39.5 44.9 54.5 62.8 69.7 75.6 80.4 84.3 87.4 89.8 91.7	84.3 87.4 89.8 91.7
17 18		23 18 41 39 44 38 30	44 38 30	13.0 21.1 28.6 35.8 42.4 48.6 59.7 69.3 77.4 84.1 89.7 94.2 97.8 99.9 99.9	94.2 97.8 99.9 99.9
17 19		19 15 36 36 42 38 26	36 42 38 26	15.1 24.0 32.3 40.1 47.3 54.1 66.3 76.7 85.6 93.0 99.1 99.9 99.9 99.9 99.9	99.9 99.9 99.9 99.9
17 21		14 12 22 33 35 36 18	33 35 36 18	14.4 21.7 28.5 34.9 40.8 46.4 56.3 64.9 72.1 78.2 83.2 87.3 90.5 93.0 94.9	83.2 87.3 90.5 93.0 94.9
17 22		15 14 20 34 38 39 19	34 38 39 19	10.9 18.2 25.0 31.3 37.3 42.9 52.9 61.4 68.7 74.8 79.8 83.8 87.0 89.5 91.5	83.8 87.0 89.5 91.5
17 23	ASHEVILLE, N C	13 13 19 34 37 36 17	34 37 36 17	12.4 20.4 27.9 34.9 41.5 47.7 58.7 68.1 76.1 82.8 88.3 92.8 96.4 99.1 99.9	92.8 96.4 99.1 99.9
17 26		10 10 29 40 41 39 15	40 41 39 15	9.4 16.1 22.3 28.1 33.6 38.7 47.8 55.7 62.3 67.9 72.5 76.2 79.1 81.4 83.2	76.2 79.1 81.4 83.2
17 27		9 10 30 40 40 36 15	40 40 36 15	15.0 23.2 30.9 38.0 44.8 51.0 62.3 71.9 80.1 86.9 92.5 97.1 99.9 99.9 99.9	92.5 97.1 99.9 99.9 99.9
17 33		8 8 26 36 39 32 15	36 39 32 15	13.6 21.3 28.6 35.4 41.8 47.7 58.4 67.5 75.2 81.7 87.0 91.4 94.8 97.5 99.5	87.0 91.4 94.8 97.5 99.5
17 34		18 14 32 33 47 48 40	32 33 47 48 40	16.6 24.8 32.4 39.6 46.3 52.5 63.7 73.3 81.4 88.2 93.8 98.4 99.9 99.9 99.9	93.8 98.4 99.9 99.9 99.9
18 2	CAPE HATTERAS, N C	20 15 33 34 44 47 40	33 34 44 47 40	13.8 20.1 25.9 31.4 36.6 41.4 50.0 57.4 63.6 68.8 73.1 76.6 79.4 81.6 83.2	76.6 79.4 81.6 83.2
18 3		3 14 23 21 40 28 20	21 40 28 20	11.4 15.7 19.7 23.5 27.1 30.3 36.3 41.3 45.6 49.2 52.2 54.6 56.5 58.0 59.1	52.2 54.6 56.5 58.0 59.1
18 4		4 17 23 21 36 25 20	21 36 25 20	11.0 16.2 21.0 25.5 29.8 33.7 40.8 46.9 52.0 56.3 59.9 62.8 65.0 66.8 68.2	62.8 65.0 66.8 68.2
18 6		5 18 23 21 33 25 18	21 33 25 18	8.7 14.4 19.7 24.7 29.4 33.7 41.5 48.2 53.9 58.6 62.5 65.7 68.2 70.2 71.7	68.2 70.2 71.7
18 8		11 19 24 26 38 30 23	24 26 38 30 23	12.3 18.2 23.7 28.9 33.7 38.3 46.4 54.0 61.8 66.0 70.2 73.7 76.5 78.6 80.3	76.5 78.6 80.3
18 9	ABILENE, TEX	18 20 29 29 40 32 28	29 40 32 28	11.3 17.5 23.3 28.8 33.9 38.7 47.2 54.6 60.7 66.9 71.1 74.6 77.3 79.5 81.1	74.6 77.3 79.5 81.1
18 14		17 17 26 28 35 27 24	26 28 35 27 24	14.3 21.6 28.5 34.9 41.0 46.6 56.6 65.3 72.6 78.7 83.8 87.3 91.1 93.6 95.6	87.3 91.1 93.6 95.6
18 15		22 18 35 45 47 43 33	35 45 47 43 33	15.9 23.7 31.0 37.8 44.1 50.1 60.7 69.9 77.6 84.1 89.5 93.8 97.2 99.9 99.9	93.8 97.2 99.9 99.9 99.9
18 16		26 19 39 46 51 45 32	39 46 51 45 32	13.9 21.7 29.1 36.0 42.5 48.5 59.4 68.6 76.5 83.1 88.5 92.9 96.4 99.1 99.9	92.9 96.4 99.1 99.9 99.9
18 17		26 18 38 43 51 45 31	38 43 51 45 31	14.7 22.7 30.1 37.1 43.6 49.7 60.6 70.0 77.9 84.5 90.0 94.4 98.0 99.9 99.9	94.4 98.0 99.9 99.9 99.9
18 18	DALLAS-FT WORTH, T	22 17 37 40 50 42 29	37 40 50 42 29	8.2 15.9 23.1 29.9 36.2 42.1 52.7 61.8 69.4 75.9 81.2 85.5 88.9 91.5 93.6	81.2 85.5 88.9 91.5 93.6
18 24		14 12 25 38 42 43 20	25 38 42 43 20	13.7 20.4 26.8 32.7 38.3 43.5 52.8 60.8 67.5 73.2 77.9 81.6 84.7 87.0 88.8	81.6 84.7 87.0 88.8
18 25		14 11 30 40 41 43 20	30 40 41 43 20	13.1 21.0 28.4 35.4 41.9 48.0 58.9 68.3 76.2 82.9 88.3 92.8 96.3 99.0 99.9	92.8 96.3 99.0 99.9 99.9
18 26		13 11 32 41 41 42 21	32 41 41 42 21	15.2 23.1 30.4 37.3 43.7 49.7 60.5 69.7 77.6 84.1 89.5 93.9 97.3 99.9 99.9	93.9 97.3 99.9 99.9 99.9
18 30		14 11 35 41 53 50 38	35 41 53 50 38	15.7 23.0 29.9 36.3 42.3 47.9 58.0 66.6 73.9 80.0 85.0 89.1 92.3 94.9 96.8	89.1 92.3 94.9 96.8
18 31	GREENVILLE, S C POPE AFB NC.	18 15 39 44 56 57 46	39 44 56 57 46	17.7 24.8 31.4 37.7 43.5 49.0 58.7 67.1 74.2 80.1 85.0 89.0 92.1 94.6 96.5	92.1 94.6 96.5
18 32		22 16 42 46 57 62 49	42 46 57 62 49	15.0 22.5 29.6 36.2 42.4 48.2 58.5 67.4 74.9 81.2 86.4 90.5 93.9 96.5 98.5	93.9 96.5 98.5
19 6		13 20 29 27 39 32 28	29 27 39 32 28	15.3 23.1 30.4 37.3 43.7 49.7 60.4 69.6 77.4 84.0 89.3 93.7 97.2 99.9 99.9	93.7 97.2 99.9 99.9 99.9
19 7		18 21 31 30 41 53 50 38	31 30 41 53 50 38	10.5 17.8 24.7 31.3 37.4 43.1 53.4 62.1 69.6 75.8 80.9 85.1 88.4 91.0 92.9	85.1 88.4 91.0 92.9
19 8		20 22 32 30 42 32 30	32 30 42 32 30	14.5 20.0 25.1 29.8 34.3 38.5 45.9 52.4 57.8 62.3 66.1 69.1 71.5 73.4 74.8	71.5 73.4 74.8
19 9	GREENWOOD, MISS	19 19 28 28 37 28 25	28 28 37 28 25	17.0 22.6 27.9 32.9 37.5 41.8 49.6 56.2 61.9 66.6 70.5 73.6 76.1 78.1 79.8	76.1 78.1 79.8
19 17		27 18 35 43 56 50 29	35 43 56 50 29	13.3 21.0 28.1 34.8 41.0 46.9 57.3 66.3 73.9 80.3 85.5 89.8 93.2 95.8 97.8	93.2 95.8 97.8
19 20		20 14 32 40 56 41 24	32 40 56 41 24	12.4 20.4 27.9 34.9 41.5 47.6 58.6 68.0 76.0 82.6 88.1 92.6 96.1 98.9 99.9	92.6 96.1 98.9 99.9 99.9
19 21		19 14 32 39 55 41 21	32 39 55 41 21	16.0 24.0 31.5 38.5 45.0 51.2 62.2 71.6 79.6 86.3 91.3 96.2 99.3 99.9 99.9	96.2 99.3 99.9 99.9 99.9
19 24		19 14 33 43 49 48 25	33 43 49 48 25	13.4 20.7 27.2 33.4 39.1 44.5 54.1 62.4 69.4 75.2 80.1 84.0 87.1 89.5 91.3	87.1 89.5 91.3
19 25	DOBBINS AFB GA. ATHENS, GA	20 14 38 45 50 48 28	38 45 50 48 28	11.8 18.3 24.3 30.0 35.3 40.2 49.1 56.7 63.1 68.5 72.9 76.5 79.4 81.6 83.3	76.5 79.4 81.6 83.3
19 26		16 12 36 43 46 43 27	36 43 46 43 27	12.3 19.1 25.6 31.6 37.2 42.4 51.8 59.9 66.7 72.5 77.2 81.0 84.0 86.4 88.2	81.0 84.0 86.4 88.2
19 30		19 13 42 49 61 58 47	42 49 61 58 47	15.5 22.7 29.4 35.7 41.6 47.1 57.0 65.5 72.7 78.7 83.6 87.6 90.8 93.3 95.2	90.8 93.3 95.2
19 31		22 17 44 52 62 66 56	44 52 62 66 56	14.3 21.5 28.2 34.5 40.4 45.8 55.7 64.1 71.3 77.2 82.2 86.1 89.3 91.3 93.7	86.1 89.3 91.3 93.7
19 32		23 18 45 52 61 68 58	45 52 61 68 58	17.5 24.0 30.0 35.7 41.1 46.0 54.9 62.6 69.0 74.4 78.9 82.5 85.4 87.6 89.3	82.5 85.4 87.6 89.3
20 7	ROBERT-GRAY AAF TX WACO, TEX	19 22 34 30 42 34 32	22 34 30 42 34 32	15.9 21.8 27.5 32.7 37.6 42.2 50.5 57.5 63.5 68.5 72.6 76.0 78.6 80.7 82.3	78.6 80.7 82.3
20 8		20 21 32 29 41 31 30	21 32 29 41 31 30	15.5 21.2 26.6 31.7 36.4 40.9 48.8 55.6 61.4 66.2 70.1 73.4 75.9 77.9 79.4	73.4 75.9 77.9 79.4

TABLE 1. CONTINUED

ROW	GRD COL	WEATHER STATION	3-YR AVG TSTM RELATIVE FREQ. MAR APR MAY JUN JUL AUG SEP	12-36 HR TSTM FCST PROBABILITY FOR SELECTED FREQUENCY-K-INDEX PRODUCTS 125 250 375 500 625 750 1000 1250 1500 1750 2000 2250 2500 2750 3000
20	16		29 19 36 49 61 56 29	13.8 21.2 25.2 34.8 40.9 46.6 56.9 65.7 73.1 79.3 84.5 88.6 91.9 94.5 96.5
20	17		30 19 35 47 63 55 30	10.8 18.1 24.9 31.4 37.4 43.0 53.1 61.7 69.0 75.1 80.2 84.3 87.5 90.0 92.0
20	18		28 17 33 45 62 53 28	13.2 20.7 27.8 34.5 40.7 46.9 55.8 65.8 73.4 79.7 85.0 89.2 92.5 95.2 97.2
20	19		26 17 33 45 63 51 28	11.0 18.2 25.0 31.4 37.3 42.9 52.8 61.4 68.9 74.7 79.7 83.7 86.9 89.4 91.3
20	20		26 17 36 46 63 50 28	12.1 19.1 25.7 31.8 37.6 43.0 52.6 60.9 67.4 73.8 78.6 82.5 85.6 88.1 89.9
20	21	BIRMINGHAM, ALA	27 18 40 47 67 51 27	14.3 22.0 29.3 36.2 42.5 48.5 59.2 68.4 76.1 82.6 88.0 92.3 95.8 98.5 99.9
20	22		24 17 37 45 61 49 25	16.2 23.7 30.6 37.2 43.3 49.0 59.2 68.0 75.4 81.6 86.8 90.9 94.2 96.8 99.7
20	24	ATLANTA, GA	24 17 36 45 52 48 27	12.1 18.9 25.2 31.2 36.7 41.9 51.2 59.1 65.9 71.5 76.2 79.9 82.9 85.3 87.1
20	25		21 15 40 47 52 49 30	11.4 18.3 24.9 31.0 36.7 42.1 51.7 59.9 66.9 72.7 77.5 81.4 84.5 86.9 88.7
20	26		18 14 38 45 49 46 30	13.3 20.0 26.3 32.2 37.7 42.8 52.0 59.9 66.5 72.2 76.8 80.6 83.5 85.9 87.6
20	28	POINTSETT AFR SC	15 10 37 46 52 45 32	11.8 18.7 25.2 31.3 37.0 42.3 51.8 59.9 66.3 72.6 77.4 81.2 84.3 86.7 88.5
20	29		17 11 39 49 57 53 40	12.1 18.8 25.1 31.0 36.6 41.7 50.9 58.9 65.5 71.2 75.8 79.5 82.6 84.9 86.7
20	30	MYRTLE BEACH SC.	17 11 38 49 57 53 49	17.7 25.6 33.0 39.9 46.4 52.5 63.3 72.6 80.5 87.1 92.6 97.0 99.9 99.9 99.9
20	31		20 15 39 50 58 64 58	12.8 20.2 27.1 33.6 39.7 45.3 55.4 64.1 71.5 77.7 82.7 86.8 90.1 92.7 94.6
21	4		7 24 32 24 39 31 37	13.4 19.9 25.9 31.6 37.0 41.9 50.8 58.5 64.9 70.3 74.8 78.4 81.3 83.5 85.2
21	5		12 26 35 28 43 38 39	11.2 18.4 25.1 31.4 37.3 42.9 52.7 61.2 68.4 74.4 79.4 83.4 86.6 89.1 91.0
21	6		15 25 36 30 43 38 38	11.3 18.2 24.7 30.8 36.4 41.7 51.2 59.4 66.3 72.1 76.9 80.7 83.8 86.2 88.0
21	16	JACKSON, MISS	29 20 37 53 69 61 30	13.3 20.8 27.8 34.4 40.6 46.3 56.7 65.0 73.0 79.3 84.5 88.7 92.0 94.6 96.0
21	17		31 21 36 51 70 59 31	12.1 19.7 26.8 33.4 39.6 45.4 55.8 64.7 72.3 78.6 83.8 88.0 91.4 94.0 96.0
21	18		28 19 34 50 67 58 32	11.4 18.9 26.0 32.5 38.7 44.4 54.7 63.6 71.0 77.3 82.5 86.6 90.0 92.6 94.5
21	19	HERIDIAN, MISS	27 19 34 51 67 57 33	9.3 16.6 23.3 29.7 35.6 41.2 51.1 59.6 66.9 72.9 77.9 81.5 85.1 87.6 89.5
21	20		27 20 36 52 67 57 34	14.3 21.2 27.6 33.7 39.3 44.6 54.0 62.1 69.0 74.8 79.5 83.3 86.4 88.9 90.6
21	21	MONTGOMERY, ALA	21 20 39 50 63 55 31	15.8 22.6 29.9 34.8 40.4 45.6 54.8 62.8 69.6 75.2 79.8 83.6 86.6 88.9 90.7
21	22		22 18 35 44 61 49 25	15.1 22.3 29.0 35.3 41.2 46.7 56.6 65.1 72.3 78.3 83.2 87.3 90.4 92.9 94.8
21	23		22 16 40 52 59 54 38	12.3 18.4 24.1 29.4 34.5 39.1 47.5 54.7 60.8 65.9 70.1 73.5 76.2 78.3 79.9
21	25	MACON, GA	21 16 40 52 59 54 38	11.2 18.1 24.6 30.7 36.4 41.8 51.3 59.5 66.4 72.2 77.0 80.8 83.9 86.3 88.1
21	28		15 10 36 48 56 50 39	11.5 18.2 24.4 30.3 35.8 41.0 50.2 58.1 64.8 70.4 75.0 78.7 81.7 84.0 85.8
21	29	CHARLESTON, S C	16 9 33 47 51 52 50	7.8 14.1 20.1 25.6 30.8 35.7 44.3 51.8 58.1 63.4 67.7 71.3 74.1 76.2 77.9
22	4		9 27 35 25 40 32 39	8.8 15.6 22.1 28.1 33.7 39.0 48.4 56.5 63.4 69.1 73.8 77.7 80.7 83.1 84.9
22	5		14 29 35 29 44 40 42	6.2 12.4 18.3 23.7 28.8 33.6 42.2 49.5 55.8 61.0 65.3 68.8 71.5 73.7 75.3
22	6	SAN ANTONIO, TEX	15 28 35 30 45 43 41	11.8 19.4 26.5 33.1 39.4 45.2 55.6 64.5 72.1 78.4 83.6 87.8 91.2 93.8 95.8
22	10		17 19 27 32 50 51 36	12.0 19.2 25.9 32.2 38.1 43.7 53.6 62.1 69.2 75.3 80.2 84.2 87.4 89.9 91.8
22	11		20 21 29 39 60 59 37	14.7 21.7 28.3 34.5 40.3 45.7 55.3 63.6 70.6 76.5 81.3 85.2 88.4 90.8 92.6
22	12		21 21 31 44 64 65 36	15.6 22.3 28.6 34.4 40.1 45.5 55.2 63.5 70.6 76.5 81.3 85.3 88.4 90.8 92.7
22	13		23 21 33 49 67 68 34	14.4 21.4 28.1 34.3 40.1 45.5 55.2 63.5 70.6 76.5 81.3 85.3 88.4 90.8 92.7
22	14	CLAIBORNE AFR LA	23 20 35 53 68 69 32	14.1 21.0 27.5 33.6 39.2 44.5 54.0 62.1 69.0 74.8 79.5 83.4 86.4 88.9 90.6
22	16	MCCOMB, MISS	29 22 38 58 75 69 34	13.6 21.3 28.6 35.4 41.7 47.7 58.3 67.4 75.1 81.6 86.9 91.2 94.7 97.3 99.4
22	17		30 23 38 55 77 68 36	13.1 20.4 27.3 33.8 39.9 45.5 55.7 64.4 71.7 77.9 83.0 87.1 90.4 92.9 94.9
22	18		28 23 36 56 75 67 38	11.5 18.9 25.9 32.4 38.5 44.2 54.4 63.2 70.6 76.8 82.0 86.1 89.4 92.0 93.9
22	20		25 23 38 61 71 65 42	14.3 21.2 27.7 33.8 39.5 44.8 54.3 62.5 69.4 75.2 79.9 83.8 86.9 89.3 91.1
22	21		26 22 40 57 70 63 39	15.0 21.6 27.7 33.5 38.9 43.9 52.9 60.6 67.2 72.7 77.2 80.8 83.7 86.0 87.7
22	25		21 17 40 56 60 60 45	20.5 27.1 33.2 39.0 44.4 49.4 58.4 66.2 72.7 78.2 82.7 86.4 89.3 91.6 93.3
22	26		23 19 42 58 66 64 51	15.0 21.9 28.5 34.6 40.3 45.6 55.2 63.4 70.3 76.3 80.9 84.8 87.9 90.3 92.2
22	27	WRIGHT AAF GA.	21 16 38 54 63 62 51	16.3 23.6 30.4 36.8 42.8 48.3 58.3 66.9 74.2 80.3 85.3 89.2 92.6 95.1 97.0
22	28	SAVANNAH, GA	17 12 32 49 57 55 48	8.9 15.6 21.8 27.7 33.1 38.2 47.4 55.2 62.0 67.5 72.0 75.8 78.7 81.0 82.8
22	29		14 8 28 44 49 50 47	9.7 15.8 21.5 26.9 31.9 36.6 44.9 52.1 58.2 63.3 67.5 70.9 73.6 75.7 77.3
23	4		9 24 32 43 34 32 36	6.9 14.9 22.4 29.4 35.9 42.1 53.0 62.4 70.4 77.1 82.6 87.0 90.6 93.3 95.4
23	5		12 27 32 27 40 41 43	10.7 17.6 24.1 30.2 35.8 41.1 50.7 58.8 65.8 71.5 76.3 80.2 83.2 85.6 87.5
23	6		12 26 31 28 41 46 43	8.7 16.6 24.0 31.0 37.5 43.6 54.5 63.8 71.7 78.4 83.8 88.2 91.8 94.5 96.6
23	9		13 18 26 27 38 48 37	10.6 18.4 25.8 32.7 39.1 45.1 55.8 65.1 72.9 79.4 84.8 89.2 92.7 95.4 97.4

TABLE 1. CONTINUED

MOR GRD ROW COL	WEATHER STATION	3-YR AVG TSTM RELATIVE FREQ MAR APR MAY JUN JUL AUG SEP	12-36 HR TSTM FCST PROBABILITY FOR SELECTED FREQUENCY-K-INDEX PRODUCTS 125 250 375 500 625 750 1000 1250 1500 1750 2000 2250 2500 2750 3000
23 10	HOUSTON, TEX	16 20 23 33 48 55 41	10.0 17.1 23.8 30.1 35.9 41.4 51.2 59.6 66.7 72.6 77.5 81.5 84.6 87.1 89.0
23 11		19 21 30 38 57 63 41	10.9 18.2 25.0 31.4 37.4 43.0 53.0 61.6 68.9 74.9 80.0 84.0 87.3 89.8 91.7
23 12	PORT ARTHUR, TEX	20 22 32 43 64 70 40	11.5 19.1 26.3 33.1 39.4 45.2 55.8 64.8 72.5 78.9 84.2 88.4 91.8 94.5 96.5
23 13	LAKE CHARLES, LA	21 22 34 50 70 75 38	10.6 17.5 24.0 30.1 35.7 41.0 50.6 58.7 65.6 71.4 76.2 80.0 83.1 85.5 87.3
23 14		21 21 36 57 73 76 37	13.0 20.3 27.1 33.5 39.5 45.1 55.2 63.7 71.0 77.1 82.1 86.2 89.4 92.0 93.9
23 15		21 21 36 57 73 76 37	12.3 19.9 27.1 33.8 40.1 45.9 56.4 65.5 73.1 79.5 84.7 89.0 92.4 95.0 97.0
23 16		25 23 42 61 81 77 41	14.6 21.8 28.7 35.1 41.1 46.6 56.7 65.2 72.5 78.6 83.6 87.7 90.9 93.4 95.4
23 17		28 25 41 59 82 77 44	16.5 23.7 30.5 36.9 42.8 48.4 58.3 66.9 74.1 80.2 85.2 89.2 92.4 94.9 96.9
23 18		26 25 33 60 80 76 47	14.6 22.4 29.8 36.7 43.1 49.1 59.9 69.1 77.0 83.5 88.9 93.3 96.8 99.5 99.9
23 19	MOBILE, ALA	24 24 38 62 76 76 50	17.5 24.9 31.9 38.4 44.5 50.2 60.4 69.2 76.5 82.7 87.8 92.0 95.3 97.8 99.8
23 20		22 23 40 64 76 76 52	15.3 22.6 29.4 35.8 41.8 47.4 57.5 66.1 73.4 79.5 84.5 88.6 91.9 94.4 96.3
23 21		24 23 42 61 75 73 50	15.3 22.6 29.4 35.8 41.8 47.4 57.5 66.1 73.4 79.5 84.5 88.6 91.9 94.4 96.3
23 22		25 19 41 61 67 68 53	15.3 22.6 29.4 35.8 41.8 47.4 57.5 66.1 73.4 79.5 84.5 88.6 91.9 94.4 96.3
23 23		27 22 44 65 73 75 62	14.6 21.6 28.1 34.2 39.9 45.3 54.8 63.0 70.0 75.8 80.6 84.5 87.5 89.9 91.8
23 24		24 18 40 59 66 70 61	17.7 24.7 31.3 37.5 43.3 48.8 58.5 66.8 73.9 79.8 84.6 88.6 91.7 94.1 96.0
23 25		12 14 26 26 35 45 39	9.0 14.9 20.5 25.7 30.6 35.1 43.2 50.2 56.1 61.1 65.2 68.5 71.1 73.1 74.7
23 26		12 14 26 26 35 45 39	6.3 12.4 18.2 23.6 28.6 33.3 41.8 49.0 55.1 60.2 64.5 67.9 70.6 72.7 74.4
23 27		14 16 27 30 44 52 42	10.5 16.2 21.7 26.7 31.5 35.9 43.9 50.7 56.5 61.3 65.3 68.5 71.1 73.1 74.6
24 10	GALVESTON, TEX	15 16 29 33 53 61 43	10.7 17.4 23.7 29.6 35.1 40.2 49.5 57.4 64.1 69.7 74.3 78.1 81.1 83.4 85.2
24 11		15 17 29 33 53 61 43	12.0 18.7 25.1 31.0 36.5 41.7 50.9 58.9 65.6 71.2 75.9 79.6 82.6 85.0 86.7
24 12		15 17 31 45 68 74 42	11.7 19.5 26.9 33.7 40.2 46.2 57.0 66.2 74.0 80.5 85.9 90.3 93.8 96.5 98.6
24 13		16 18 34 53 73 76 43	18.3 25.1 31.5 37.5 43.1 48.3 57.7 65.7 72.5 78.2 82.9 86.7 89.7 92.1 93.9
24 14		23 21 43 61 83 82 50	16.1 23.0 29.5 35.6 41.2 46.5 56.0 64.2 71.1 76.9 81.6 85.5 88.6 90.9 92.8
24 15	NEW ORLEANS, LA	25 23 42 60 82 83 52	16.2 23.2 29.8 36.0 41.7 47.1 56.8 65.0 72.0 77.9 82.7 86.6 89.7 92.2 94.0
24 16		25 23 42 60 82 83 52	12.4 19.6 26.3 32.6 38.5 44.0 53.9 62.4 69.6 75.6 80.5 84.5 87.7 90.2 92.1
24 17	KEESLER AFB MS.	24 23 39 61 81 82 55	12.8 20.0 26.7 33.1 39.0 44.5 54.4 62.8 70.0 76.0 81.0 85.0 88.2 90.7 92.6
24 18		21 22 38 62 78 82 58	18.1 25.3 32.0 38.3 44.2 49.7 59.6 68.0 75.2 81.2 86.1 90.1 93.3 95.8 97.7
24 19		20 21 41 65 78 82 62	20.4 27.0 33.2 39.1 44.5 49.6 58.8 66.6 73.3 78.8 83.4 87.1 90.1 92.4 94.1
24 20	PENSACOLA, FLA	22 22 43 63 78 82 61	19.0 25.9 32.4 38.5 44.2 49.5 59.0 67.2 74.1 79.9 84.6 88.5 91.6 94.0 95.8
24 21	HURLBURT FLD FL.	24 22 43 64 78 82 61	11.9 19.0 25.7 32.0 37.8 43.3 53.1 61.4 68.6 74.5 79.4 83.4 86.5 89.0 90.9
24 22		24 21 40 60 75 78 58	14.9 22.0 28.7 35.0 40.8 46.3 56.1 64.5 71.6 77.5 82.4 86.4 89.5 92.0 93.9
24 23	MOODY AFB GA.	25 20 41 64 69 75 58	15.4 22.5 29.2 35.4 41.3 46.7 56.5 64.9 72.0 77.9 82.8 86.8 89.9 92.4 94.3
24 24	JACKSONVILLE, FLA	27 21 44 69 72 78 63	15.3 22.6 29.5 36.0 42.0 47.6 57.7 66.4 73.7 79.9 84.9 89.0 92.3 94.8 96.7
24 25		17 15 39 53 78 76 49	15.6 22.6 29.1 35.3 41.0 46.4 56.0 64.3 71.3 77.1 81.9 85.8 88.9 91.3 93.2
24 26		20 17 39 55 79 77 52	12.3 19.1 25.5 31.4 37.0 42.2 51.5 59.5 66.3 72.0 76.7 80.5 83.5 85.8 87.6
24 27	BOOTHVILLE, LA	22 21 36 62 76 86 67	17.9 24.6 30.9 36.8 42.4 47.5 56.8 64.7 71.5 77.1 81.7 85.5 88.5 90.8 92.6
24 28	TYNDALL AFB FL.	24 22 36 62 77 85 67	14.6 21.6 28.1 34.1 39.8 45.1 54.6 62.8 69.7 75.5 80.3 84.1 87.2 89.6 91.4
24 29	APALACHICOLA, FLA	24 21 37 65 76 84 66	12.5 19.7 26.4 32.8 38.7 44.2 54.1 62.6 69.7 75.8 80.7 84.7 87.9 90.4 92.3
24 30		26 19 46 68 75 67	14.6 21.6 28.1 34.1 39.8 45.1 54.6 62.8 69.7 75.5 80.3 84.1 87.2 89.6 91.4
24 31		24 21 37 65 76 84 66	3.9 12.1 19.8 27.0 33.7 40.0 51.2 60.9 69.0 75.9 81.5 86.1 89.7 92.5 94.7
24 32		24 17 43 61 60 69 69	5.8 12.7 19.2 25.3 30.9 36.2 45.7 53.8 60.7 66.5 71.2 75.1 78.2 80.5 82.4
24 33		6 8 23 26 35 51 51	17.8 24.8 31.4 37.5 43.3 48.6 58.3 66.5 73.5 79.3 84.2 88.1 91.2 93.6 95.4
24 34		26 18 49 77 80 83 73	13.9 20.9 27.6 33.8 39.5 45.0 54.7 63.0 70.0 75.9 80.8 84.7 87.8 90.3 92.1
24 35	DAYTONA BEACH, FLA	27 19 52 76 76 80 73	10.6 16.6 22.2 27.4 32.4 36.9 45.1 52.2 58.2 63.2 67.3 70.6 73.3 75.9 76.9
24 36		27 4 7 10 22 27 32 30 46	1.3 7.9 14.0 19.7 25.1 30.1 39.1 46.8 53.3 58.8 63.3 66.9 69.8 72.1 73.8
24 37		6 10 22 30 34 36 52	2.8 10.7 18.1 25.0 31.5 37.5 44.4 51.9 57.6 62.0 66.4 69.5 72.0 73.9 75.3
24 38		27 5 9 22 30 38 42 59	3.5 10.8 17.7 24.2 30.2 35.8 45.9 54.6 61.9 68.0 73.1 77.2 80.4 83.0 84.9
24 39		26 18 44 73 83 87 79	10.1 17.6 24.6 31.2 37.3 43.3 52.3 60.1 66.6 71.9 76.5 80.4 83.1 85.2 86.5
24 40		27 25 53 81 86 87 79	15.4 22.6 29.4 35.8 41.7 47.3 57.2 65.7 73.0 79.0 84.0 88.1 91.3 93.8 95.7
24 41		27 26 58 82 83 84 79	16.1 23.3 30.0 36.3 42.2 47.7 57.6 66.0 73.2 79.2 84.1 88.1 91.3 93.8 95.7
24 42	ORLANDO, FLA	27 27 19 58 82 83 84 79	12.9 20.3 27.1 33.6 39.6 45.2 55.2 63.9 71.2 77.3 82.3 86.4 89.7 92.2 94.1

TABLE 1. CONTINUED

MOR GRD ROW COL	WEATHER STATION	3-YR AVG TSTM RELATIVE FREQ												12-36 HR TSTM FCST PROBABILITY FOR SELECTED FREQUENCY-K-INDEX PRODUCTS																								
		MAR	APR	MAY	JUN	JUL	AUG	SEP							125	250	375	500	625	750	1000	1250	1500	1750	2000	2500	2750	3000										
25 4	BROWNSVILLE, TEX	6	13	24	29	31	30	42	1.8	8.6	14.9	20.9	26.4	31.6	40.9	48.3	55.6	61.2	65.9	69.7	72.7	75.0	76.8	2.1	9.3	16.0	22.4	28.2	33.7	43.6	52.1	59.2	65.2	70.2	74.2	77.4	79.8	81.7
28 5		5	11	20	31	37	38	54	3.8	11.0	17.8	24.2	30.1	35.6	45.6	54.1	61.3	67.4	72.4	76.4	79.6	82.1	84.0	7.7	15.2	22.3	28.9	35.0	40.8	51.1	59.9	67.4	73.7	78.9	83.1	86.4	89.0	91.0
28 6		20	18	46	75	84	88	83	11.0	18.4	25.4	31.9	38.0	43.7	54.0	62.8	70.2	76.4	81.5	85.7	89.0	91.6	93.5	16.5	23.7	30.4	36.8	42.7	48.2	58.1	66.6	73.8	79.8	84.8	88.8	92.0	94.5	96.4
28 26		TAMPA, FLA	25	20	55	84	89	88	83	8.0	15.6	22.8	29.6	35.8	41.7	52.2	61.3	68.9	75.3	80.6	84.9	88.3	90.9	92.9	2.6	9.4	15.9	21.9	27.5	32.8	42.2	50.3	57.2	62.9	67.7	71.5	74.5	76.9
28 27	AVON PARK AFR FL	23	20	57	80	84	83	83	8.1	15.5	22.4	28.9	35.0	40.7	50.9	59.6	67.0	73.2	78.3	82.4	85.7	88.3	90.2	12.0	19.4	26.3	32.8	38.9	44.6	54.7	63.5	70.9	77.0	82.1	86.3	89.5	92.1	94.1
28 28	PATRICK AFB FL	4	12	17	33	39	37	54	13.8	21.1	28.0	34.4	40.4	46.0	56.1	64.7	72.0	78.1	83.1	87.2	90.5	93.0	94.9	10.7	18.2	25.2	31.8	38.0	43.7	54.1	62.9	70.4	76.7	81.9	86.1	89.4	92.0	94.0
29 5	FORT MYERS, FLA	17	17	46	78	84	90	84	17.9	24.6	30.8	36.6	42.1	47.1	56.3	64.1	70.7	76.2	80.8	84.5	87.5	89.7	91.5	7.9	15.7	23.1	30.1	36.5	42.6	53.4	62.7	70.6	77.2	82.6	87.0	90.5	93.2	95.3
29 25		22	21	55	87	89	90	86	16.0	23.1	29.7	36.0	41.8	47.2	57.0	65.3	72.4	78.4	83.2	87.2	90.3	92.8	94.7	7.6	14.8	21.6	27.9	33.9	39.4	49.3	57.8	65.0	71.0	76.0	80.0	83.2	85.7	87.6
29 26		22	22	61	90	91	88	86	3.5	11.6	19.2	26.4	33.1	39.3	50.5	60.1	68.2	75.0	80.6	85.1	88.7	91.6	93.7	13.5	21.1	28.1	34.8	41.0	46.8	57.1	66.1	73.6	79.9	85.1	89.3	92.7	95.3	97.3
29 27		17	18	53	85	84	88	85	9.9	16.7	23.1	29.1	34.7	39.9	49.3	57.4	64.2	69.9	74.6	78.4	81.4	83.8	85.6	10.7	18.2	25.2	31.8	38.0	43.7	54.1	62.9	70.4	76.7	81.9	86.1	89.4	92.0	94.0
30 26	WEST PALM BEACH, F	18	22	60	86	89	84	89	17.9	24.6	30.8	36.6	42.1	47.1	56.3	64.1	70.7	76.2	80.8	84.5	87.5	89.7	91.5	7.9	15.7	23.1	30.1	36.5	42.6	53.4	62.7	70.6	77.2	82.6	87.0	90.5	93.2	95.3
30 28		15	19	56	78	83	80	85	16.0	23.1	29.7	36.0	41.8	47.2	57.0	65.3	72.4	78.4	83.2	87.2	90.3	92.8	94.7	7.6	14.8	21.6	27.9	33.9	39.4	49.3	57.8	65.0	71.0	76.0	80.0	83.2	85.7	87.6
30 29		14	20	59	90	88	91	91	3.5	11.6	19.2	26.4	33.1	39.3	50.5	60.1	68.2	75.0	80.6	85.1	88.7	91.6	93.7	13.5	21.1	28.1	34.8	41.0	46.8	57.1	66.1	73.6	79.9	85.1	89.3	92.7	95.3	97.3
31 27		16	21	60	88	88	88	91	9.9	16.7	23.1	29.1	34.7	39.9	49.3	57.4	64.2	69.9	74.6	78.4	81.4	83.8	85.6	10.7	18.2	25.2	31.8	38.0	43.7	54.1	62.9	70.4	76.7	81.9	86.1	89.4	92.0	94.0
31 28	MIAMI, FLA	16	21	59	83	85	86	89	7.6	14.8	21.6	27.9	33.9	39.4	49.3	57.8	65.0	71.0	76.0	80.0	83.2	85.7	87.6	3.5	11.6	19.2	26.4	33.1	39.3	50.5	60.1	68.2	75.0	80.6	85.1	88.7	91.6	93.7
31 29		12	19	55	85	84	87	88	13.5	21.1	28.1	34.8	41.0	46.8	57.1	66.1	73.6	79.9	85.1	89.3	92.7	95.3	97.3	9.9	16.7	23.1	29.1	34.7	39.9	49.3	57.4	64.2	69.9	74.6	78.4	81.4	83.8	85.6
32 27		15	19	56	83	84	85	89	9.9	16.7	23.1	29.1	34.7	39.9	49.3	57.4	64.2	69.9	74.6	78.4	81.4	83.8	85.6	10.7	18.2	25.2	31.8	38.0	43.7	54.1	62.9	70.4	76.7	81.9	86.1	89.4	92.0	94.0
32 28		HOMESTEAD AFB FL	13	18	56	80	83	84	89	7.6	14.8	21.6	27.9	33.9	39.4	49.3	57.8	65.0	71.0	76.0	80.0	83.2	85.7	87.6	3.5	11.6	19.2	26.4	33.1	39.3	50.5	60.1	68.2	75.0	80.6	85.1	88.7	91.6
32 29		12	19	55	85	84	87	88	13.5	21.1	28.1	34.8	41.0	46.8	57.1	66.1	73.6	79.9	85.1	89.3	92.7	95.3	97.3	9.9	16.7	23.1	29.1	34.7	39.9	49.3	57.4	64.2	69.9	74.6	78.4	81.4	83.8	85.6

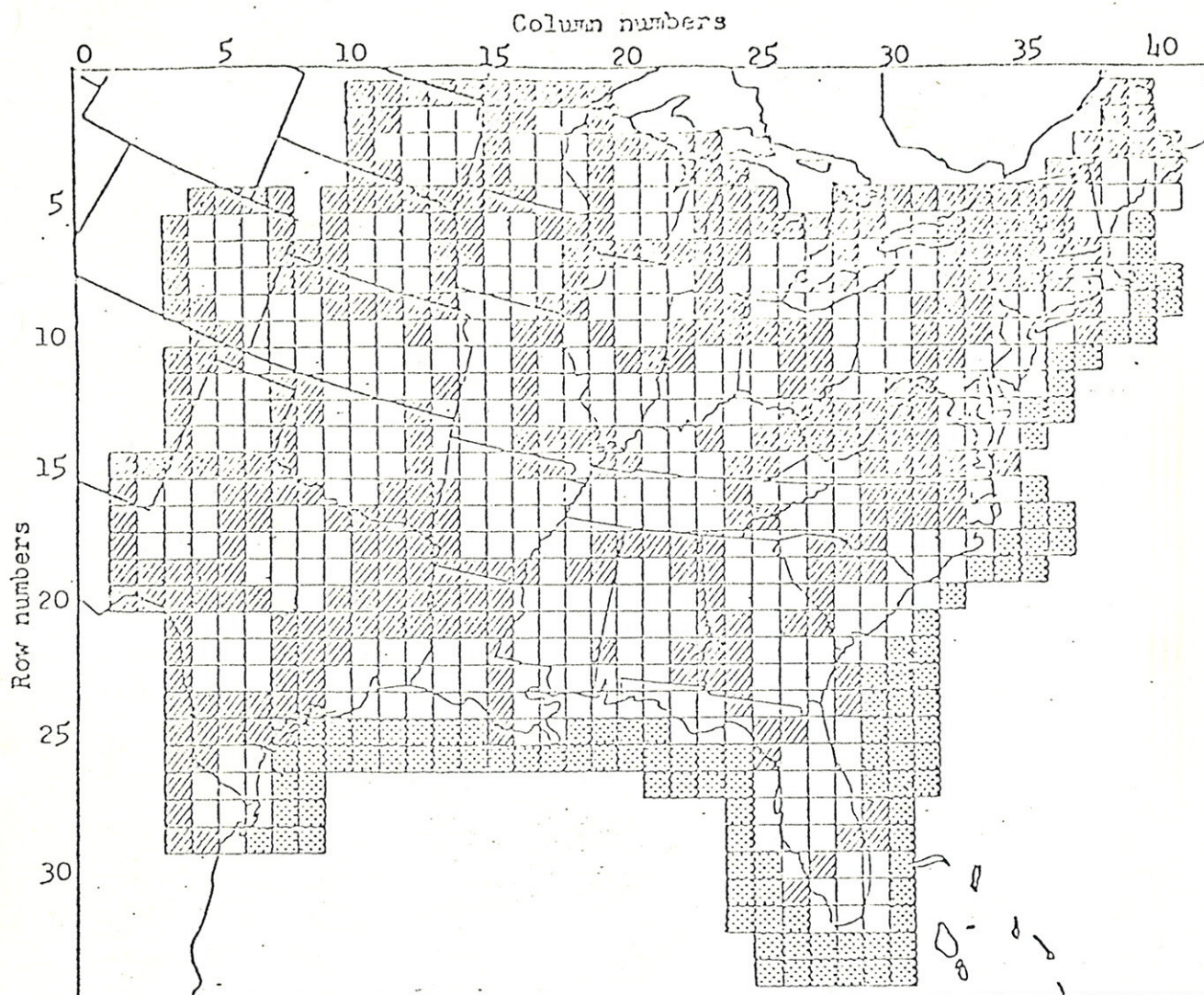


Figure 1. MDR grid region. Data from shaded overwater blocks were not used in the screening regression procedure. Hatched blocks have centers beyond 140-150 km from a radar site. Average thunderstorm relative frequencies from these blocks are not as dependable as those from the closer open blocks. To insure optimum results with the nomogram, data are given for the open blocks only in table 1.

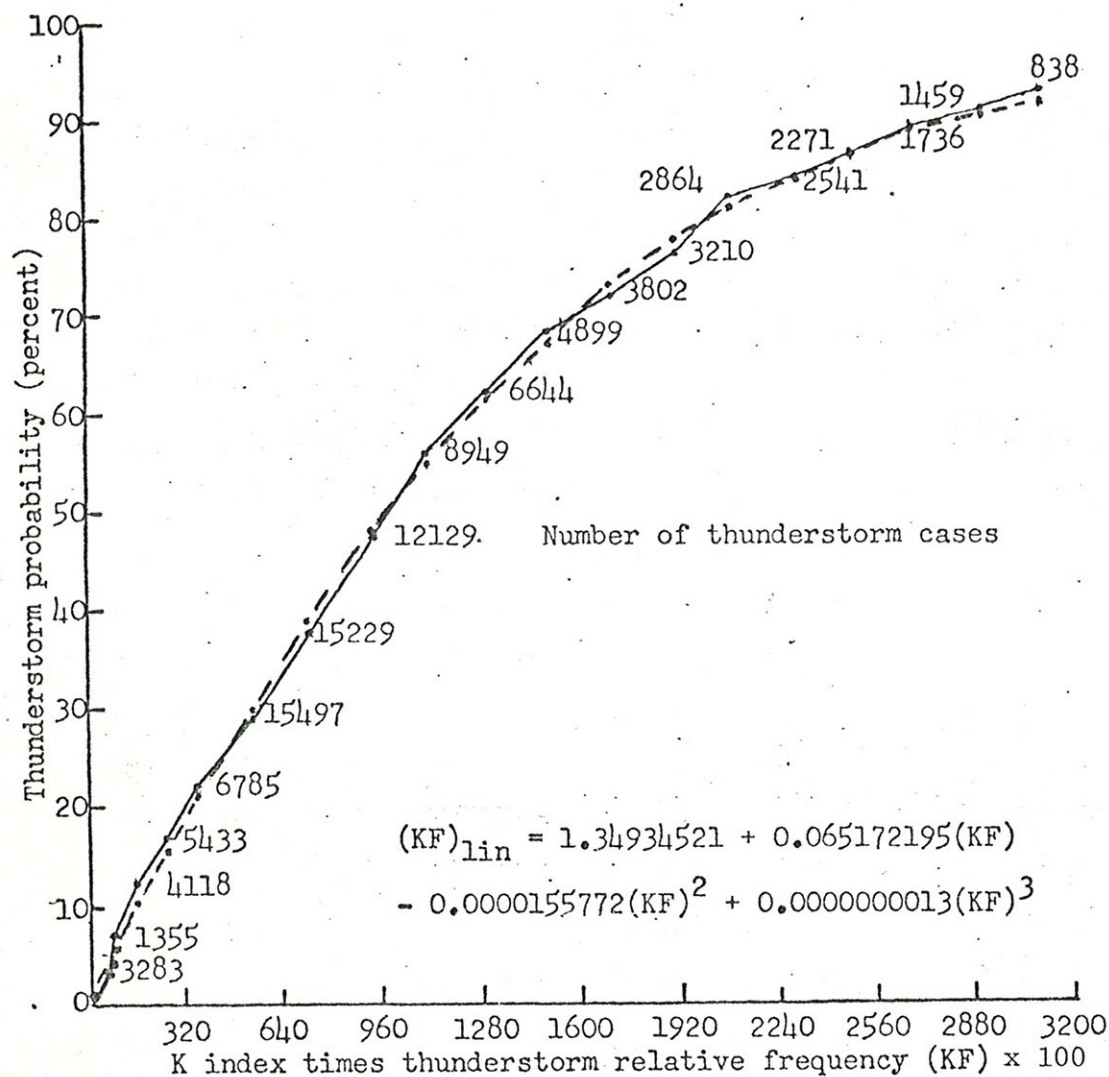


Figure 2. Solid curve shows the product of the K index and thunderstorm relative frequency plotted against thunderstorm probability. Data were for March 16 through September 15 for the years 1974, 1975 and 1976. Area included 761 overland MDR grid blocks. The dashed curve shows a third order polynomial fit to the basic data. The polynomial was used to linearize the frequency-K-index product.

THUNDERSTORM PROBABILITY NOMOGRAM

from TDL Office Note 77-6 by Foster and Reap

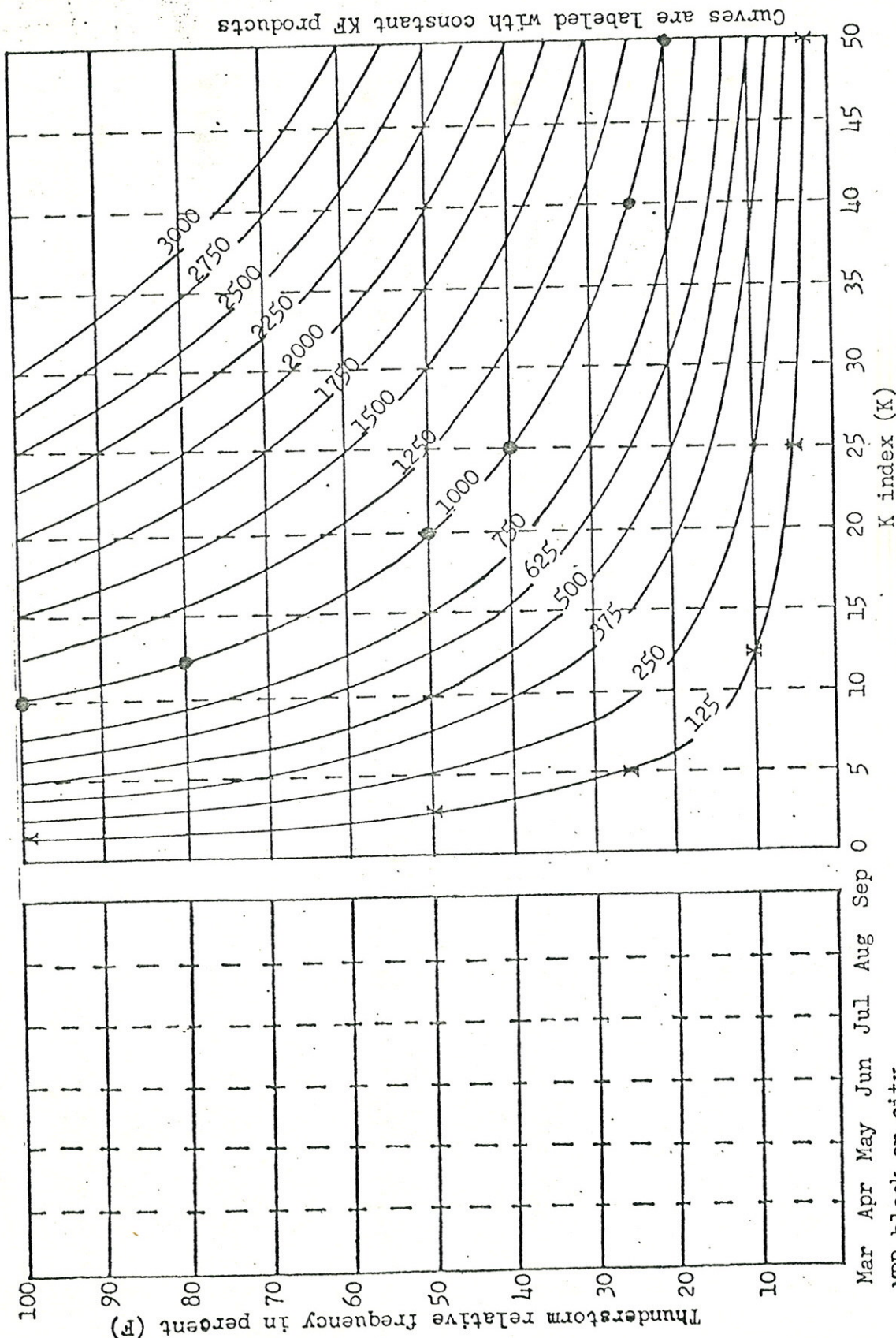
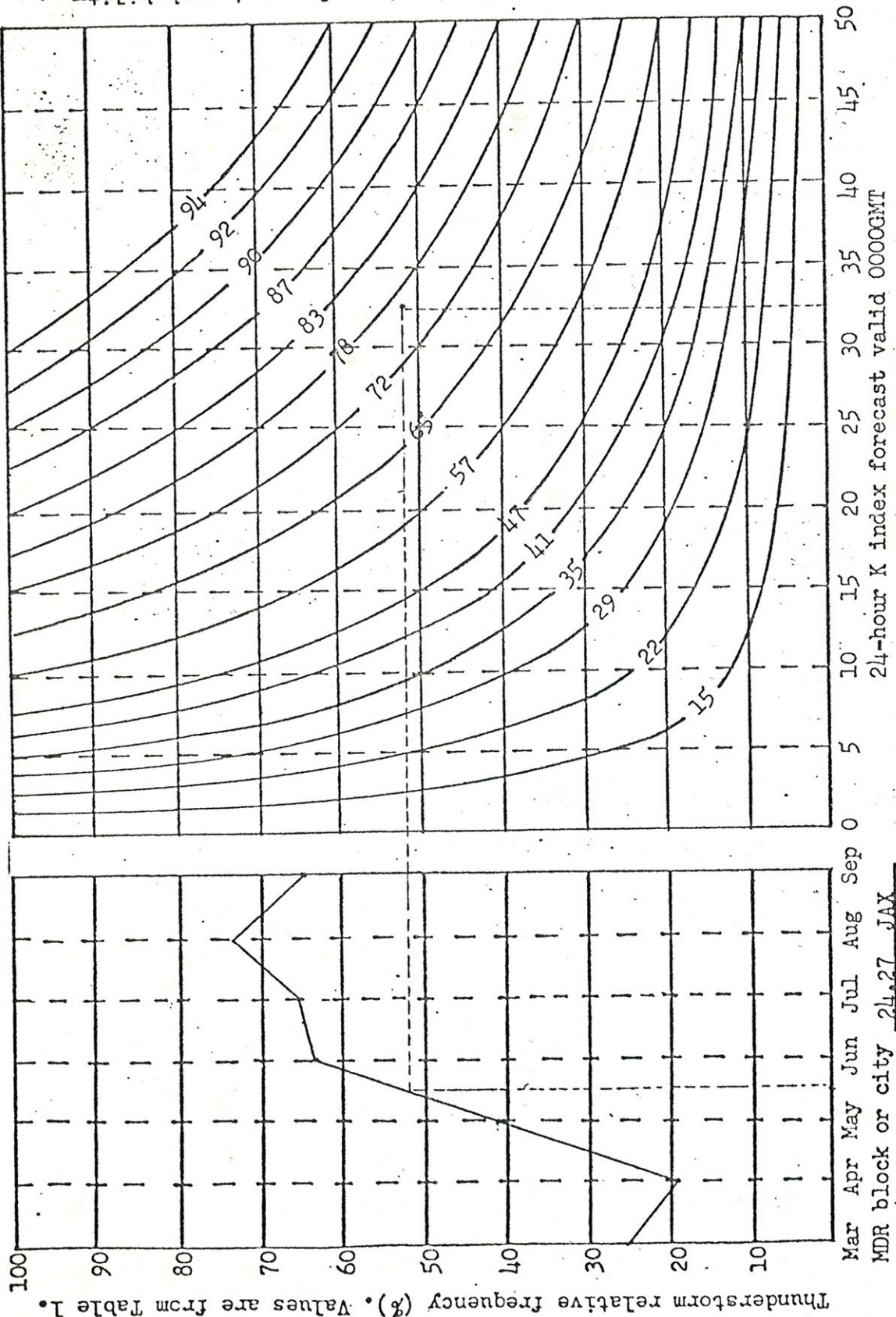


Figure 3. Basic thunderstorm probability nomogram.

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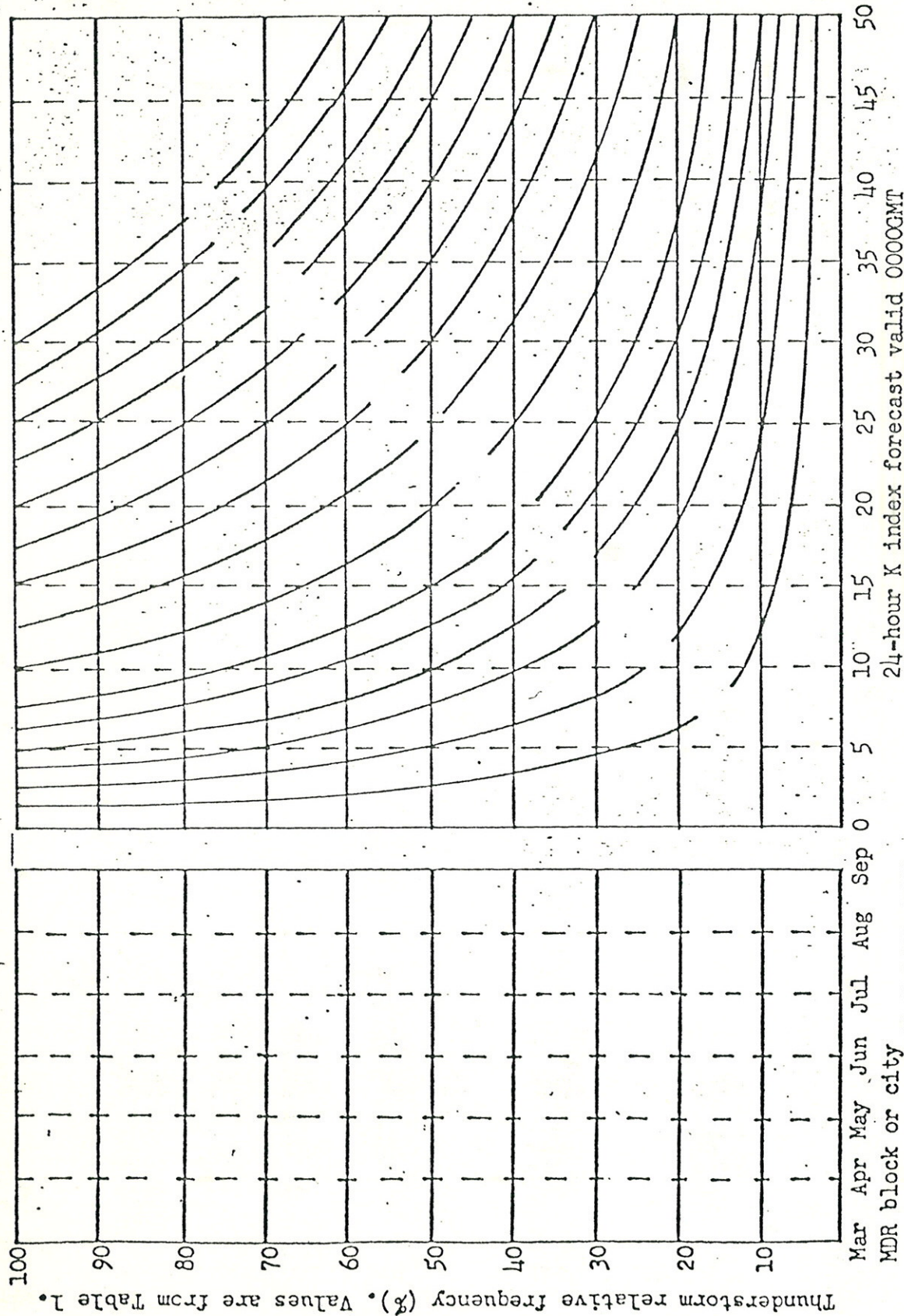


Curves are labeled with thunderstorm forecast probability valid + or - 12 hours from K index forecast. Values are from Table 1.

Figure 4. Thunderstorm probability nomogram completed for MDR block 24,27 which contains Jacksonville, Florida. Assuming a K index of 32 for 0000GMT June 1st, the thunderstorm probability forecast for Jacksonville and vicinity for the period 1200GMT May 31st until 1200GMT June 1st would be 75%.

THUNDERSTORM PROB LITY NOMOGRAM

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Curves are labeled with thunderstorm forecast probability valid + or - 12 hours from K index forecast. Values are from Table 1.