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Objective Forecast of Precipitation over the Western Region of the United States

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Western Region

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OBJECTIVE FORECAST OF PRECIPITATION OVER THE WESTERN REGION OF THE UNITED STATES

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OBJECTIVE FORECAST OF PRECIPITATION OVER THE WESTERN REGION OF THE UNITED STATES

ABSTRACT

The case classification by 500-mb flow types described in the first chapter represents an objective synthesis of synoptic information which has subjectively and successfully been used by experienced forecasters in predicting the weather.

This information is presented in the form of a climatology of 500-mb winter flow patterns. It consists of the frequency of occurrences of seven characteristic 500-mb height configurations and associated patterns of vorticity, vertical velocity, higher and lower pressure levels, dew-point depressions, frequency of precipitation, etc. This stratification of probability of precipitation represents a refinement in the forecast of precipitation probabilities over simple climatology.

The type classification is used as a stratification criterion in the second chapter to obtain predictive equations for precipitation probability. Different predictive variables are stressed within the different types. Based on the reduction of variance and the Brier P-score, it appears that the stratification leads to signigicant improvement in the regression equations. In effect, the stratification includes a pattern comparison which could never be included in finite regression equations. The results are promising and the method can presently be applied in operational forecasting at very minimal computer cost.

I. SYNOPTIC CLIMATOLOGY OF 500-MB WINTER TYPES

A. Introduction

Precipitation forecasting is limited by several basic problems. One of the most serious is the specification of the exact location of the mesoscale precipitation bands even if a perfect synoptic scale forecast is available. This problem can be alleviated by experienced forecasters who give satisfactory subjective local predictions based on their knowledge of the flow characteristics and precipitation occurrence. Objective predictions can be useful to satisfy users' demands and to implement numerical forecasts at the local level.

It is the purpose of this chapter to present an objective correlation method of classification of 500-mb heights and associated precipitation occurrence. Some similar methods are reported in References 1, 2, 3, and 4. The results are easy to interpret synoptically and provide quantitative justification to complement much of what is already intuitively clear.

In Section B the typing method is presented; atmospheric variables useful to describe the different types are presented in Section C; the climatology of the types is presented in Section D; and the distinctness of the types is further discussed in Section E.

B. Typing Method

The original intention was to use types already selected and documented by Augulis (Reference 3). These types were too numerous and not sufficiently distinct for the present investigation. Few types, with a relatively large number of cases in each, are required, so that:

1) The regression equations can be obtained.

2) The estimates are statistically stable.

3) The computational task of screening predictors for each type and for each station is feasible.

The various types to be used are obtained in the following way:

a) The 500-mb height fields at the grid points presented in Reference 3 are used. This height field is chosen since it is satisfactorily predicted by Numerical Weather Prediction (NWP) and is known to be a good aid to forecast meteorological phenomena. In this investigation we try to extract the large-scale characteristics of the flow as they relate to precipitation occurrence. Therefore, the heights at a relatively few grid points are necessary and the selected 52-point grid adequately describes this large scale. The data sample consists of 1176 sets of 500-mb heights at the 52 grid points. They cover the National Weather Service Western Region for 0000 and 1200 GMT during the months December 1961-1967, January and February 1962-1968.

b) Each set of 52 points is correlated with all other 1175 sets forming a correlation coefficient matrix R^o. An element r_{ij} of the matrix R^o is the correlation coefficient between dates i and j. Column i consists of the correlations between case (date) i and all other 1175 cases. A count of the number of correlations larger than 0.8 is made for each column. The case column with the most significant correlations n_I is chosen as Type I. All elements involving these n_I significantly correlated cases are removed from the matrix. The procedure is repeated to select all successive types until either ten types are selected or the last type selected removes less than fifteen cases.

c) On the basis of the original matrix R^o, each case of the data sample is placed in the type with which it correlates most highly. Seven types are delineated by the described method. Pertinent information is presented in Table I. The computer program used for typing is a modified version of a program borrowed from Aerospace Science Division of the 4th Weather Wing, Air Weather Service, adapted to the University of Utah UNIVAC 1108.

C. Atmospheric Variables

The 850- 700-, 500-, and 300-mb height fields; the 850-, 700-, and 500-mb dew-point depressions for a 14 by 13 grid covering the region of interest; and precipitation amounts for 29 stations obtained from the Techniques Development Laboratory (TDL) data files are used in subsequent analysis. The precipitation files are extended to include a total of 42 stations.

The above data are used to obtain variables such as 850- 500-mb thicknesses, 500- 300-mb thicknesses, 500-mb absolute vorticities, thermal advections, vertical velocities, and partitioned vertical velocities due to vorticity and thermal advection. The absolute vorticities are computed considering geostrophic relative vorticities. The thermal advections consist of the 500- 850-mb thicknesses advected by the 500-mb geostrophic winds. A two-level quasi-geostrophic model is used to obtain the vertical velocity fields. This model uses the height fields at 300 and 700 mb to obtain the total omega and partial omegas due to laplacian of thermal advection and differential vorticity advection. Similar models have been used in the past (Reference 5).

The vertical velocities at 500 mb are obtained by integrating the finite difference form of the "omega" equation:

$$\nabla^2 (\sigma \omega) + f_o^2 \frac{\partial^2 \omega}{\partial p^2} = f_o \frac{\partial}{\partial p} (V \cdot \nabla \xi_a) - \nabla^2 (V \cdot \nabla \frac{\partial \phi}{\partial p})$$

where σ is the static stability $\frac{0.05\text{m}^2}{\text{Sec}^2\text{mb}^2}$ (Reference 6)

$\omega = \frac{dp}{dt}$; p is the pressure

$\phi = g Z$ is the geopotential height

f_o is the Coriolis parameter

ξa is the absolute vorticity

Partitioned omegas ω_1 and ω_2 are obtained from:

$$\nabla^2(\sigma \omega_1) + f_o^2 \frac{\partial^2 \omega_1}{\partial p^2} = f_o \frac{\partial}{\partial p} (V \cdot \nabla \xi_a)$$

$$\nabla^2 (\sigma \omega_2) + f_0^2 \frac{\partial^2 \omega_2}{\partial p^2} = - \nabla^2 \left(\mathcal{V} \cdot \nabla \frac{\partial \phi}{\partial p} \right)$$

Homogenous boundary conditions are used. Therefore:

$$\omega = \omega_1 + \omega_2$$

The vertical velocity $w = \frac{dz}{dt}$ is obtained by setting $w = - \frac{\omega}{\rho g}$

Some computational details are given in Appendix A.

After the atmospheric variables are obtained for all times and for each of the 14 x 13 grid points, values at 43 grid points are extracted for subsequent analysis. Figure 1 depicts this grid together with the 42 western stations considered for precipitation occurrence. The different atmospheric variables are then grouped into the seven types described earlier.

D. Climatology of Types

Figure 2 depicts the probability of precipitation for the nonstratified (ALL) and the seven types. Figures 3 through 14 show the means and standard deviations for 850-, 500-, and 300-mb height fields, the 500 - 850-mb and 500 - 300-mb thickness fields, dew-point depression at 850 and 700 mb, 500-mb absolute vorticity, thickness advection and total and partitioned vertical velocity fields. The mean values give a smoothed representation of the typical synoptic situation characteristic of the overall and seven types.

The height fields show that the overall configuration is characterized by a flat ridge with considerable variability over the Gulf of Alaska. Type 1 is similar to the overall field as expected from the large number of cases included in this type. Types 2 and 4 are similar to each other in that the 43-point grid displays a ridge near 140W and 120W, respectively. Types 3 and 5 each have a trough line off the coast near 140W and 120W, respectively. Types 6 and 7 contrast in the sense that 6 is a southwest-to-northeast tilted ridge, 7 a southwest-to-northeast tilted trough.

The standard deviations of the types are usually smaller than that of the overall sample. This is expected if the method used is successful in discriminating among different flow configurations. Since the type variability at some grid points is still quite large, the distinctness of the types will be discussed in the next section.

Figures 3, 4, 5, and 10 show large variabilities in regions with pronounced cyclonic activity, while smaller standard deviations are found near the semipermanent anticyclonic zones.

Figures 3 through 7 reveal that most of the atmospheric baroclinicity for all types is concentrated in the lower layers. Figure 11 gives a quantitative description of this baroclinicity. Here negative values represent positive thickness advections, and positive values negative thickness advections.

Figures 12, 13, and 14 reveal that the largest contribution to the total vertical velocity is due to the vorticity advection forcing. This is expected because most of the thermal advection takes place at the lower levels and is not picked up at 500 mb. The average centers of rising and sinking motions correspond well with the average position of troughs and ridges. This indicates that the height correlations of deviations from the means are small compared to the products of mean values. The values of vertical velocities obtained with this model are comparable with daily values obtained by NMC using a primitive equation model.

Figures 8 and 12 compare well in the sense that dry regions are associated with sinking motions and moist regions with rising motions. The mean 700-mb dew-point depressions (Figure 9) are quite homogenous horizontally and little can be concluded from them.

In Figure 2 the frequency of precipitation for all stations for the developmental sample is given. The solid lines represent fraction over normal. The vertical velocities and topographical effect seem to explain most of the frequency of precipitation patterns in the figures.

In general, then, the mean fields depict synoptically consistent situations for all types. Since the averaged fields reproduce the general nonlinear characteristics, vertical velocities, thermal advections, etc., of the individual situations, we might tentatively conclude that the variations within types are small, and therefore the typing is adequate. This is further explored in the next section.

E. Characteristics of Types

In this section statistics are presented to show that the separation by types results in a significant stratification of the atmospheric fields over most of the region considered.

First, the ratio of the variation between types to the variation within types at each grid point is considered. This is the F value generally used for the analysis of variance.

$$F = \frac{\sum_{i=1}^{7} (\overline{x}_i - \overline{x})^2 / 6}{\sum_{i=1}^{7} \sum_{t=1}^{n_i} (x_{ti} - \overline{x}_i)^2 \; / \; (N - 7)}$$

where $N = \sum_{i=1}^{7} N_i$; N_i is the number of cases in Type i

$$\overline{X}_i = \sum_{t=1}^{N_i} X_{ti}/N_i$$

and $$\overline{X} = \sum_{i=1}^{7} \sum_{t=1}^{N_i} X_{ti} / N$$

If it can be assumed that the seven types are random samples drawn from normal populations with the same variances, the hypothesis that the means of the populations are equal can be tested. Under the stated assumptions, if $F > 2.80$, this hypothesis can be rejected at the 1% confidence level; and it can be concluded that the samples come from different populations.

Figure 15 depicts the F values for three fields. The dashed regions indicate where F is less than 2.80. For almost all the grid points for all the fields considered significantly large F values are obtained.

Even if the above assumptions are not completely valid, the F values give an indication of the distinctness of the types. The highest values are expected and found at the 500-mb level. Maxima are found in regions of prevailing cyclonic activity, with a 5° eastward shift of the 850-mb values relative to the 500-mb values. Thus the types seem to differentiate well in these regions, in spite of large variabilities within some of the types. Minimum values are found in the low latitudes of the Pacific area which are characterized by small fluctuations. The cold surface highs which dominate the winter pattern east of the Rockies cause small F values for the 850-mb heights.

To test the distinctness between two types, the Z-statistics are used:

$$Z = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{\sum_{t=1}^{N_i} \frac{(X_{t1} - \overline{X}_1)^2}{(N_1 - 1)N_1} + \sum_{t=1}^{N_a} \frac{(X_{t2} - \overline{X}_2)^2}{(N_2 - 1)N_2}}}$$

This statistic can be used to test the hypothesis that the samples drawn from populations 1 and 2 have equal means, if similar assumptions as before are made. If $|Z|>2.6$ this hypothesis is rejected at the 1% probability level and therefore it is concluded that the samples have been drawn from two different populations.

Figure 16 depicts the Z-statistics for the 500-mb height between some selected types. The dashed region indicates again where $|Z| < 2.6$. The Z-statistics between Type 1 and Type 2 through 5 reveal the main characteristics of the first five types. Types 4 and 6 and 2 and 7 are qualitatively similar. Nevertheless the corresponding Z-statistics show that they are significantly different over most of the grid. The ridge and trough positions characteristic of each type can be easily seen. The intensity, though, is not comparable since the magnitude of the standard deviation is much smaller in ridge than in trough areas.

II. REGRESSION ANALYSIS AND RELATED STATISTICS

A. Introduction

In the first chapter the observed frequency of precipitation at 42 western stations associated with different 500-mb flow types were presented. These precipitation frequencies represent the probability of precipitation for each flow type forecast by climatology. This is already an improvement over climatological forecasts which do not consider flow types. Further improvement can be achieved by considering meaningful predictors within each type. This is commonly done in probabilistic prediction in meteorology. This field has been extensively explored in the past; a comprehensive survey of main contributions up to 1969 is given in Reference 7. Recently, Klein (Reference 8) reported on probability of precipitation obtained for 108 stations in the U.S.A. using the perfect-prog method. Glahn and Lowry applied a similar approach using NMC forecast data (Reference 9).

A stepwise multiple regression analysis is used in this investigation to select the most meaningful predictors and to derive forecasting equations. Similar methods are presented and discussed in References 10 through 15. The present work differs from others in that a stratification based on flow types is used in the regression analysis.

The method that is used is presented in Section B; characteristics of the regression analysis considering a binary dependent variable are discussed in Section C; and the results obtained are discussed in Section D.

B. Development of Method

The twenty-one predictor fields considered are presented in Table 2. The heights considered are departures from the constants given in this table. Predictors 1 through 19 and 21 are obtained at 43 grid points (Figure 1). Predictor 20 is obtained at 43 stations (Table 4). Most of these fields have been discussed in the previous chapter (Section C). A smaller grid is considered here for computational economy. It is felt that the smaller grid conveys all the essential information included in the larger grid used to define the types.

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The occurrence of precipitation at the 42 western stations is defined through a binary code. This code takes value 0 if there has been ~~less than~~ 0.01 inches of precipitation in the next 12 hours; and 1 if there has been over 0.01 inches, [redacted].

Data for six winters (December 1961-1966, January and February 1962-1967) are considered to develop the predicting equations; while one winter (December 1967 through February 1968) is used to test the equations.

The twenty-one predictors are screened with respect to occurrence of precipitation at all stations. The screening procedure consists of a multiple regression analysis computed in a step manner. At each step one variable is added to the regression equation. This variable is the one which gives the highest reduction in the variance of the predicted variable (predictand). When a selected predictor decreases this variance less than 1% or there have been 10 predictors already chosen, the screening procedure is stopped.

For convenience and computational economy, the regression analysis is performed in the following consecutive steps:

<u>Step 1</u>: The means, standard deviations, sums of cross-products of deviations from means, and correlation coefficients were computed for all predictor fields for non-stratified and stratified data. The first three quantities are stored in temporary files. In this way the sums of cross-products of deviations from means for each predictor field are computed only once, thus saving an appreciable amount of computer time.

<u>Step 2</u>: The precipitation codes for all stations are regressed in the 21 predictor fields one at a time, using a version of the stepwise multiple regression program from the IBM Scientific Subroutine Package modified to suit our needs. At this time the two best grid points for predictors 1 through 19 and 21 and two best stations for predictor 20 for each station are selected. These grid points are depicted in Tables 5 through 11 for nonstratified data and for types one to six. A zero in these tables indicates a reduction for less than 1% of the variance of the predictand variable, and so the regression analysis is stopped before choosing the corresponding predictor. Due to the small number of cases resulting in Type 7, these data are not included in the present analysis.

At this point 42 x 7 = 294 new data files are created. Each file consists of the best two grid point time series from all predictors for one station. In the computation of these files any date for which any predictor is missing is discarded. Thus the total number of cases is considerably reduced. The data sample is significantly reduced when dew-point fields are considered since they are only available for about half of the cases. Therefore, separate data files including and excluding dew-point depressions are created for the non-stratified data; while no dew-point depressions are considered for the stratified data. The total number of cases for the stratified and non-stratified data for the final regression analysis are given in Table 12.

Step 3: The regression analysis is now performed in the new data files for all stations. The resulting equations are depicted in Figures 17 through 24. The number in parenthesis indicates the predictor chosen. The corresponding code is shown in Table 13.

Step 4: Predictand estimates are now obtained by applying the regression equations to the dependent samples. These estimates are divided into 12 classes. The first class includes negative values, and the twelfth class values larger than one. Classes two through eleven are ten equally separated classes, at 0.1 increments. The frequency of precipitation for each class is then obtained. The results are shown in Tables 14, 15, 16 and 17.

Step 5: Independent data samples are used to test the nonstratified equations (with and without dew points) and the equations for Types 1, 2, and 3. The number of cases involved are 123 for the nonstratified data and 30, 23, 32 for Types 1, 2, and 3, respectively. The equations for Types 4, 5, and 6 are not tested since very few independent cases are available.

C. Regression Analysis on Binary Predictand

The implications of applying the usual least-square regression analysis to a binary dependent vairable are discussed in this section.

The customary estimate of the correlation coefficient between X and Y is:

$$r = \frac{\frac{1}{N} \sum_{i=1}^{N} (X_i - \overline{X}) \quad (Y_i - \overline{Y})}{S_X \quad S_Y}$$

$$\text{where}\quad S_y = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(Y_i - \overline{Y})^2}$$

and other quantities are defined below.

When Y is a binary variable as previously defined, it can be easily shown that

$$r = \frac{(\overline{X}_1 - \overline{X}_o)\sqrt{P(1-P)}}{S_x} = \frac{(\overline{X}_1 - \overline{X})}{S_x}\sqrt{\frac{P}{(1-P)}} \qquad (3.1)$$

the so-called point biserial correlation coefficient (Reference 16) where:

N is the total number of cases

$\overline{X} = \frac{1}{N}\sum_{i=1}^{N} X_i$; X average

$\overline{X}_1$ is the X average for the cases for which Y = 1

$\overline{X}_o$ same as above when Y = 0

$P = \frac{N_1}{N}$ the frequency of precipitation

N_1 is the number of cases with Y = 1

$S_x = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(X_i - \overline{X})^2}$ is the standard deviation of X.

Thus, if p and S_x are known (Figures 2 through 11), r indicates the average spread of X for the cases with and without precipitation. Thus, large r indicates that the variable X discriminates well the states of rain and no rain.

The regression equation of Y in M variables X_j ($1 \leq j \leq m$) gives:

$$E\,(Y/X_1,\ X_2 \ldots\ldots X_m) = \sum_{j=1}^{M} \beta j\ \ Xm \ + \alpha$$

where E denotes the expected value

β_j and α are the expected values of the corresponding parameters estimated from the sample.

$$\text{But } E\,(Y/X_1,\ X_2\ \ldots X_m) = \sum_{k=0}^{1} Y_k\ f(Y_k\ /X_1,\ X_2 \ldots X_m) = f(Y_{k=1}/X_1,\ X_2 \ldots X_m)$$

for the case when Y is a binary variable. Here $f(Y_{k=1}/X_1,\ X_2 \ldots X_m)$ denotes the probability that Y takes value one, for the given X_1, $X_2, \ldots X_m)$. In our case this will correspond to the probability of precipitation. Nevertheless, the values obtained from the regression equation will not necessarily be between 0 and 1 (Reference 17).

For example, for a one-dimensional case only for those values of X such that:

$$\overline{X} + \frac{(1-p)}{p}\ \frac{s_x^2}{(\overline{X}_1 - \overline{X})} \geq X \geq \overline{X} - \frac{s_x^2}{(\overline{X}_1 - \overline{X})}$$

$$\text{will} \quad 1 \geq Y \geq 0$$

Clearly then, it isn't known if the probabilities obtained from the regression equations are good estimates of the probability of precipitation to be determined. Step 4 of Section B is designed to avoid these difficulties. A similar approach is suggested by Morrison (Reference 18) and has been applied before when categorical variables are involved (References 12 and 15).

The method selected to obtain the regression equations (Section B) is of practical convenience, but which statistics are appropriate to test the reliability of the estimated parameters is not clear. To do this, the multivariate probability distributions should be known (References 16, 20, and 21) and the effect of the stepwise method (Miller, Reference 19) and of the selections in Step 2 and 3 (Section B) should be considered. Here the results will be presented without attempting to place confidence bands in the estimated parameters.

D. Discussion of Results

Figures 25 and 26 show the correlation coefficients between occurrence of precipitation at four selected stations and the grid-point 500-mb heights, vorticities, and vertical velocities for the nonstratified data. The stations are Los Angeles, Astoria, Phoenix and Salt Lake City, chosen to represent coastal, desertic and intermountain regions. This correlation coefficient r is defined in (3.1). For any one map in these figures, p is constant and is given in Figure 2. The s_x for 500-mb heights, vorticity and vertical velocity at all grid points are given in Figures 4, 10, and 12. The standard deviations of vorticity and vertical velocity present little horizontal variation, while the standard deviations of the 500-mb heights present a maximum in the Gulf of Alaska. According to (3.1), this maximum would tend to decrease r in this region.

Figures 25 and 26 show that lower-than-normal heights at 500 mb over or to the west of the station favors precipitation. Thus, precipitation in Salt Lake City is frequent when the high-level trough is almost overhead; implying that the surface front has already passed and the wind at the lower levels is from the west or the northwest. This type of configuration is empirically known to cause precipitation at this location. It can also be deduced that stronger than normal southwesterly flow over the coastal stations and south, southeasterly flow over Phoenix favors precipitation in these stations (References 12 and 22). Furthermore, the relative position with respect to the stations for stronger than normal vorticity and vertical velocities which favor precipitations can be easily determined from the other correlation fields. Thus, quite complete weather models, similar to those presented by Klein (Reference 12), can be obtained for each station. In these models the optimum regions for precipitation in all of the atmospheric variables considered can be determined from the respective correlation fields.

Table 18 shows the number of times each field is selected as the first or second predictor for all stations. As expected, previous 12-hour precipitation is by far the most frequently chosen predictor for the nonstratified data. There are two main justifications for this. First, winter precipitation occurrences at nearby stations are highly correlated; combining the effect of persistence and upstream weather (Reference 8 and others). Second, previous 12-hour precipitation is a binary predictor and as such will tend to predict better a binary predictand when a linear regression analysis is done. From the definition of r equation (3.1), it is clear that r=1 is only possible when X is a binary variable identical to Y; and therefore:

$$\overline{X}_1 = 1; \ \overline{X} = p \ ; \ S_x = \sqrt{p(1-p)}$$

If X is a continous variable, r=1 will only be accidentally obtained.

The three first columns of Table 18 indicate that a height field is the next most frequently chosen predictor. For Types 2 to 6, predictors chosen more than 8 times follow:

Type 2. 500-mb vorticity, vertical velocity due to vorticity advection, 850-mb height, and thickness advection.

Type 3. 850- and 700-mb height and 500-mb vorticity.

Type 4. thickness advection, 500-mb vorticity, and vertical velocities.

Type 5. 500-mb vorticity.

Type 6. 850-mb height and thickness advection.

Figure 27 depicts the chosen predictors for the four stations discussed above. As expected from the strong correlation values (Figures 25 and 26), the 500-mb height at grid points to the northwest and the vertical velocity at the nearest grid point are chosen. All stations pick up previous precipitation at the same or nearby stations accounting for persistence or upstream weather. Los Angeles and Salt Lake City also choose 300- and 850-mb heights to the west and east of the stations, respectively, and vertical velocity and vorticity at 500 mb, respectively. Since the precipitation frequency in Phoenix is low, the best predictors of precipitation are the previous 12-hour precipitation occurrence at Flagstaff and Yuma. The information synthesized numerically in these equations is known to local forecasters.

Table 19 gives the percentage of the total variance of the predictand explained by the considered predictors or reduction of variance (RV). Table 20 gives the standard error of estimate S. For a binary variable it can be easily shown that:

$$RV = 1 - \frac{P}{p\,(1-p)}$$

where $P = S^2$ is the Brier P-score

$p\,(1-p)$ gives the sample variance of the binary predictand. Thus, stations with very high and very low precipitation frequencies present small variabilities; while the largest variations would be expected at stations with $p = .5$.

Tables 19 and 20 compare the RV and S for the nonstratified and stratified cases. In general, the RV is higher in the stratified than in the nonstratified data. However, there are some exceptions to this general conclusion. We may expect the RV of the stratified data to be smaller than the RV of the nonstratified data if:

$$\frac{P_{\text{stratified}}}{P_{\text{nonstratified}}} > \frac{\left\{p(1-p)\right\}_{\text{stratified}}}{\left\{p(1-p)\right\}_{\text{nonstratified}}}$$

This may occur if:

a) $P_{\text{strat}} > P_{\text{nonst}}$

$p_{\text{strat}} > p_{\text{nonst}}$

or

b) Pstrat <Pnonst

pstrat <pnonst

or

c) Pstrat >Pnonst

pstrat <pnonst

a) applies to those stations that have precipitation frequencies over normal (Figure 2) in the stratified data. If climatology is used as a forecast P = p(1-p) indicating that it is harder to forecast at stations with larger variabilities. Thus, we may expect a decrease in skill (higher P) for larger p (up to p = 0.5). Similarly with a decrease of p we may expect an increase in skill and lower P. This corresponds to case b).

Both cases a) and b) could lead to larger or smaller values of RV, depending upon the relative increase or decrease of P and p. If the increase or decrease is of the order of a few percent, it is difficult to assess if a decrease of RV means a real decrease in skill.

Table 19 shows that the RV for the nonstratified data is larger than the RV obtained in Type 1 in 20 stations, in Types 2 and 3 in 11 stations. All of these cases except for two fall in categories a) or b). The two exceptions are for Eugene and Portland in Type 2 for which decreases in p are accompanied by increase in P as indicated in c), indicating a definite decrease in skill.

In general, these results tend to indicate that the stratification leads to significant improvement in the regression equations. Caution should be exercised in this interpretation since the samples for the stratified cases are much smaller than the nonstratified cases.

Table 19 also shows that inclusion of dew-point depressions leads to larger RV.

The root-mean-square errors (RMSE) for the nonstratified data and Types 1, 2, and 3 for the independent sample are presented in Tables 21 and 22.

The RMSE are obtained using the probability estimate given by the predictive equations (first and second rows of numbers) and the probability estimate given by the relative frequency of the corresponding probability category. (Method explained in Section 2, Step 4; results presented in third and fourth rows of numbers, Tables 21 and 22, for nonstratified data and Types 1, 2, and 3.)

As previously indicated, the independent sample consisted only of 123, 30, 23, and 32 cases for the nonstratified sample and types 1, 2, and

3, respectively. These samples are very small and any conclusions to be drawn from them are very tentative. The Scientific Services Division of the Western Region Headquarters of the National Weather Service will be testing the equations further and their results will be reported in the future.

Tables 21 and 22 show no appreciable systematic differences in the RMSE obtained from both methods described above, indicating no appreciable bias in the predictive equations.

The RMSE of the probability estimate given by the predictive equations is smaller for the stratified than for the nonstratified data except for:

Type 1: Boise, Pendleton, and Kalispell.

Type 2: Billings, Salt Lake City, Boise, Great Falls, Missoula, Seattle, Kalispell, Havre, Milford, Pocatello, Glasgow, Lewiston, and Portland.

Type 3: Burns, Pendleton, San Francisco, Spokane, Walla Walla, Kalispell, Lewiston, Winnemucca.

Most of these stations are located in regions of high variability of precipitation occurrence. It is tentatively concluded from the test in the independent data that stratification leads to improvement of verification in a large majority of the stations tested.

To implement these equations for forecasts longer than 12 hours, data obtained from the numerical forecast charts will have to be used. In this case the equations will probably not behave as well as when real data are used, since errors which are inherent to the numerical prognosis have not been built into the predictive equations. If the numerical models predict the future fields perfectly (perfect prog approach), the equations obtained in this investigation should hold as well as when real data are used. The main advantage of the perfect prog assumption used to develop the equations in this study is that they are physically realistic; that is, the physics implied or described by the equations correspond to characteristics of the real atmosphere and are not inherent to the numerical model used. Of secondary importance is the fact that once the equations are derived using a statistically stable sample, they should hold for all future forecasts. If the equations are derived using the output of the numerical models as predictors, whenever the models are modified, all of the equations would have to be recomputed.

III. SUMMARY AND RECOMMENDATIONS

The present investigation gives numerical and objective relationships between synoptic scale flows and precipitation occurrence suitable to incorporate in Numerical Weather Prediction. Many of these relationships are empirically known to experienced forecasters who apply them in a subjective manner.

In the first chapter an objective correlation method is used to classify 500-mb winter flows. The characteristics, climatology, and distinctness of the seven types delineated by this method are discussed and described by a variety of atmospheric variables.

This classification is used as a stratification criterion for the regression analysis applied in Chapter II. Predictive equations for the nonstratified sample, including and excluding dew-point fields, and for six types, for 42 western stations are obtained. The equations are tested in the developmental sample and in an independent sample for the nonstratified data and for Types 1, 2, and 3.

The stratifications by 500-mb flow types appears to improve the forecast of precipitation probability. Different predictor variables are stressed within the different types. In effect, the stratification includes a pattern comparison which could never be included in finite regression equations. The results are promising and the method can presently be applied in operational forecasting at very minimal computer costs.

It is recommended that the predictive equations be tested further as more data are collected. Then, it will be possible to adequately compare the predictions obtained from the equations developed in the present investigation with other existing equations.

IV. APPENDIX A

The partitioning of the vertical velocities requires homogeneous lateral boundary conditions. Since the grid used is rather small (14 x 13 grid points), the results in the interior of the grid may be affected by the boundary values. This is tested by experimenting with nonzero boundary conditions. The results obtained differ in a small percentage in the regions of strong vertical velocities close to the boundaries. Within 2 grid points away from the boundaries, the results are practically identical to those obtained using homogeneous boundary conditions.

Several tests were run to obtain the best relaxation coefficient for this grid. This is found to be 1.35, in agreement with other results in the literature for Helmholtz-type equations (like the omega equation) for a grid of this size.

Whenever the residual error falls below the prescribed value of 10^{-17} m^{-1} sec^{-1} the relaxation is assumed to have converged. Tests run with prescribed values five times as large prove to leave the results unaffected. Therefore, it is felt that this is a suitable value for the upper bound of the residual error.

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VI. BIBLIOGRAPHY

1. LUND, I. A. *Map-Pattern Classification by Statistical Methods,* JAM, 2, p. 56, 1963.

2. GODSKE, C. L. *Statistics of Meteorological Variables.* Geofysisk Institutt, Universiter I Bergen, Final Report, CRL, No. AF 61(052) 416, 1965.

3. AUGULIS, R. P. *Precipitation Probabilities in the Western Region Associated with Winter 500-mb Types,* ESSA Tech. Memo, WBTM WR 45-1, 91 pp, 1969.

4. LUND, I. A. *Climatology as a Function of Map Type.* AFCRL-72-0173. Environmental Research Papers, No. 391, 15 pp, 1972.

5. KRISHNAMURTI, T. N. *Diagnostic Studies for Weather Systems of Low and High Latitides* (Roseby Number 1), AFCRL-67-0128, 1967.

6. GATES, W. L. *Static Stability Measures in the Atmosphere,* JAM, Vol. 18, p. 526, 1961.

7. MURPHY, Allan H. and R. A. ALLEN. *Probabilistic Prediction in Meteorology,* A Bibliography. ESSA Technical Memorandum WBTM TDL 35, 60 pp, 1970.

8. KLEIN, W. H. *Computer Prediction of Precipitation Probability in the United States,* JAM, Vol. 10, No. 5, p. 903, 1971.

9. GLAHN, N. R. and D. A. LOWRY. *An Operational Method for Objectively Forecasting Probability of Preicpitation.* ESSA Tech. Memo, WBTM TDL 27, 24 pp, 1969.

10. KLEIN, W. H., B. M. LEWIS, and I. ENGER. *Objective Prediction of Five-Day Mean Temperature During Winter,* JAM, Vol. 16, No. 6, p. 672, 1959.

11. KLEIN, W. H. *Specification of Precipitation from the 700-Millibar Correlation,* MWR, Vol. 91, p 527, 1963.

12. KLEIN, W. H., C. W. CROCKETT, and J. F. ANDREWS. *Objective Prediction of Daily Precipitation and Cloudiness,* Journal of Geophsyical Research, Vol. 70, No. 4, p 801, 1965.

13. KLEIN, W. H. *An Objective Method of Predicting Quantitative Precipitation in the Tennessee and Cumberland Valleys*, Proceedings of the First National Conference on Statistical Meteorology, Hartford, Connecticut, May 27-29, 1968.

14. KLEIN, W. H. *The Precipitation Program of the Techniques Development Laboratory.* Bulletin of the AMS, Vol. 48, No. 12, p 890, 1967.

15. AUBERT, E. J., I. A. LUND, and A. THOMASELL, JR. *Some Objective Six-Hour Predictions Prepared by Statistical Methods*, JAM, Vol. 16, p 436, 1959.

16. TATE, R. F. *Applications of Correlation Models for Biserial Data.* American Statistical Association J., p 1078, 1955.

17. NETER, J. and E. S. MAYNES. *On the Appropriateness of the Correlation Coefficient with a o, 1 Dependent Variable.* American Statistical Association J., Vol. 65, No. 330, p 501, 1970.

18. MORRISON, D. G. *Upper Bounds for Correlations Between Binary Outerness and Probabilistic Predictions.* American Statistical Association J., Vol. 67, No. 337, p 68, 1972.

19. MILLER, R. G. *Statistical Prediction by Discriminant Analysis.* Meteorological Monograph, No. 25, Vol. 4, Published by the AMS, 54 pp, 1962.

20. WARNER, S. L. *Multivariate Regression of Dummy Variates Under Normality Assumptions.* American Statistical Association J., p 1056, 1963.

21. TATE, R. F. *Conditional-Normal Regression Models.* American Statistical Association J., p 477, June 1966.

22. STIDD, C. K. *The Use of Correlation Fields in Relating Precipitation to Circulation*, Journal of Meteorology, Vol. 11, p 202, 1954.

TABLE 1

NUMERICAL INFORMATION REGARDING TYPING PROCEDURE

Type No.	No. of Significant Correlations	No. of Cases in Final Assignment	Date of Selected Column
1	693	411	1-12-67, 12Z
2	172	170	2-13-66, 00Z
3	102	206	1-28-67, 12Z
4	54	133	12-31-61, 12Z
5	37	79	12-30-64, 12Z
6	26	74	12-16-65, 12Z
7	18	31	2-26-62, 00Z
8	11		1-31-63, 00Z

TABLE 2

PREDICTOR FIELDS - UNITS AND CONSTANTS

Predictor Number	Predictor Field	Units	Additive Constant
1	Height at 850 mb	meters	1457
2	Height at 700 mb	meters	3011
3	Height at 500 mb	meters	5572
4	Height at 300 mb	meters	9159
5	Dewpoint depression at 850 mb	10^{-3} °C	
6	Dewpoint depression at 700 mb	10^{-3} °C	
7	Dewpoint depression at 500 mb	10^{-3} °C	
8	Height tendency at 850 mb	meters/12 hours	
9	Height tendency at 700 mb	meters/12 hours	
10	Height tendency at 500 mb	meters/12 hours	
11	Thickness of 300-500 mb layer	meters	3587
12	Thickness tendency of 300-500 mb layer	meters/12 hours	
13	Thickness of 850-500 mb layer	meters	4115
14	Absolute vorticity at 500 mb	10^{-6} $\sec^{-1}$	
15	Thickness tendency of 850-500 mb layer	meters/12 hours	
16	Vorticity tendency at 500 mb	10^{-6} $\sec^{-1}$/12 hrs	
17	Vertical velocity at 500 mb (Total)	mm $\sec^{-1}$	
18	Vertical velocity at 500 mb (Thickness)	mm $\sec^{-1}$	
19	Vertical velocity at 500 mb (Vorticity)	mm $\sec^{-1}$	
20	Previous 12-hour precipitation indicator	Dichotomous Variable (0-1)	
21	Temperature advections	10^{-2} °C/12 hrs	

TABLE 3

STATION CODE FOR TABLES 5 THROUGH 11

1.	Ely	15.	Pendleton	29.	Portland
2.	Bakersfield	16.	Eureka	30.	Olympia
3.	Tucson	17.	Medford	31.	Walla-Walla
4.	Las Vegas	18.	Seattle	32.	Astoria
5.	Phoenix	19.	Fresno	33.	Salem
6.	Yuma	20.	Los Angeles	34.	Eugene
7.	Sacramento	21.	Milford	35.	Kalispell
8.	Santa Maria	22.	Reno	36.	Havre
9.	Billings	23.	San Diego	37.	Helena
10.	Salt Lake City	24.	Winslow	38.	Glasgow
11.	Boise	25.	San Francisco	39.	Lewiston
12.	Burns	26.	Pocatello	40.	Elko
13.	Great Falls	27.	Spokane	41.	Winnemucca
14.	Missoula	28.	Red Bluff	42.	Flagstaff

TABLE 4

STATION CODE FOR PREDICTOR 20

(Previous 12-hour Precipitation Indicator)

✓ 1.	Ely ☆O	✓ 15.	Billings ☆O	✓ 29.	Fresno ☆O
2.	Bakersfield	✓ 16.	Salt Lake City ☆O	✓ 30.	Olympia ☆O
3.	Tucson	✓ 17.	Boise ☆O	31.	Walla-Walla
✓ 4.	Las Vegas ☆O	18.	Burns	✓ 32.	Astoria ☆O
✓ 5.	Los Angeles ☆O	✓ 19.	Great Falls ☆O	33.	Salem
6.	Milford	✓ 20.	Missoula ☆O	34.	Eugene
✓ 7.	Phoenix ☆O	✓ 21.	Pendleton ☆O	35.	Kalispell
✓ 8.	Reno ☆O	✓ 22.	Pocatello ☆O	36.	Havre
✓ 9.	San Diego ☆O	✓ 23.	Spokane ☆O	✓ 37.	Helena ☆O
10.	Winslow	✓ 24.	Eureka ☆O	✓ 38.	Glasgow ☆O
11.	Yuma	25.	Red Bluff	39.	Idaho Falls
✓ 12.	Sacramento ☆O	✓ 26.	Medford ☆O	40.	Lewiston
✓ 13.	San Francisco ☆O	✓ 27.	Portland ☆O	41.	Elko
14.	Santa Maria	✓ 28.	Seattle ☆O	42.	Winnemucca
				✓ 43.	Flagstaff ☆O

TABLE 5

FIRST TWO PREDICTORS SELECTED IN PRELIMINARY SCREENING OF PREDICTOR FIELDS FOR NONSTRATIFIED DATA

VARIABLES CORRESPONDING TO PREDICTORS 1 THROUGH 21 ARE GIVEN IN TABLE 2. FOR ALL PREDICTORS (EXCEPT NUMBER 20) STATION NUMBERS (TABLE 3) ARE GIVEN ON THE FIRST LINE, BEST AND NEXT-TO-BEST GRID-POINTS (FIGURE 1) ON THE SECOND AND THIRD LINES, RESPECTIVELY. THE SECOND AND THIRD LINES FOR PREDICTOR 20 (PREVIOUS 12-HOUR PRECIPITATION INDICATOR) ARE STATION NUMBERS (TABLE 4).

PREDICTOR 1

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
36	32	43	37	40	41	21	27	1	39	25	26	35	25	20	15	15	10	27	27	36	27	33	41	21	31	15	16	15	6	11	6	11	11	10	25	31	25	15	26	26	37
43	43	42	39	0	39	43	43	31	42	38	33	5	5	41	43	34	33	41	43	32	41	29	29	43	41	27	43	28	28	23	17	23	28	29	5	5	5	28	38	41	42

PREDICTOR 2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
32	27	43	33	41	41	22	27	1	36	20	15	31	20	15	21	15	6	27	33	36	27	33	40	16	26	10	16	10	6	11	6	6	11	10	25	25	25	15	21	21	37
43	0	2	30	0	39	43	43	25	43	41	29	1	37	41	41	38	33	43	43	30	41	29	35	27	38	36	43	38	27	29	17	29	29	27	36	39	32	27	29	38	39

PREDICTOR 3

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
32	27	43	33	37	41	16	27	19	32	20	15	25	14	15	16	15	6	27	27	32	22	33	40	16	26	6	16	6	2	6	6	6	11	10	14	14	14	10	21	21	37
43	0	30	30	35	35	43	43	1	38	40	29	1	40	37	29	41	37	43	42	20	29	29	39	43	40	29	43	29	6	0	23	29	28	27	0	1	7	37	29	41	39

PREDICTOR 4

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
26	27	40	33	37	41	16	27	19	26	15	15	19	14	15	16	15	6	22	22	32	22	33	40	16	20	6	16	6	2	6	6	6	11	5	14	14	14	6	21	21	37
30	43	35	30	35	35	42	43	1	29	29	29	1	36	37	38	37	37	43	33	38	29	29	39	43	29	29	40	29	18	29	28	29	28	0	31	1	12	29	33	38	39

PREDICTOR 5

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
37	37	43	37	43	40	33	37	25	31	26	21	25	22	21	22	27	21	37	37	43	37	41	40	33	37	16	27	21	15	21	11	16	16	15	14	21	14	21	22	21	37
31	35	41	20	40	39	13	35	15	41	21	20	6	14	20	27	21	43	35	8	25	42	40	42	27	26	20	33	43	16	23	21	5	5	20	21	19	39	43	26	33	43

PREDICTOR 6

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
42	38	29	34	6	38	38	38	23	36	0	4	26	3	0	38	2	25	34	26	33	22	26	4	2	33	26	2	12	15	26	41	19	19	12	16	0	29	16	25	13	11
21	28	39	39	29	6	2	20	0	33	0	0	0	11	0	2	11	7	0	25	36	0	22	37	38	0	30	0	19	0	3	19	15	10	0	13	0	10	0	29	0	25

PREDICTOR 7

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
1	5	0	0	19	38	5	10	29	1	1	5	0	37	33	5	37	12	5	5	1	37	27	38	5	5	33	0	11	0	28	2	11	1	19	9	36	11	7	37	19	1
0	34	0	0	0	0	37	4	0	43	33	37	0	2	0	0	6	28	0	0	0	1	5	0	37	0	5	0	0	0	7	19	5	0	12	0	33	21	36	3	0	9

PREDICTOR 8

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
42	21	37	0	27	0	31	16	25	26	31	31	15	35	31	12	31	20	16	17	26	16	42	32	31	39	25	26	7	10	15	12	20	15	20	31	31	25	26	31	42	40
21	40	42	0	42	0	12	36	39	42	21	11	39	15	7	32	16	7	36	41	39	33	28	42	17	21	11	16	31	23	23	15	23	23	41	0	10	21	0	17	13	27

PREDICTOR 9

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
40	40	38	34	42	40	32	16	10	15	31	31	39	31	26	32	26	20	36	17	42	32	40	42	32	35	20	32	7	10	15	15	15	15	15	25	31	25	15	26	32	40
21	22	42	40	34	0	22	37	39	42	16	11	10	15	16	12	16	7	16	41	26	16	27	37	17	21	11	12	25	33	0	7	0	0	0	0	2	21	0	16	0	27

PREDICTOR 10

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
36	40	38	40	42	43	32	37	35	39	26	26	31	25	26	26	26	15	37	37	39	32	40	42	32	31	20	27	20	11	15	10	15	15	15	2	20	14	15	26	27	40
21	17	42	28	28	0	12	22	10	21	16	11	10	0	12	12	12	7	17	17	21	12	27	32	12	16	31	28	7	12	0	13	0	11	0	19	1	22	0	0	0	17

PREDICTOR 11

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
26	21	40	27	37	37	11	21	19	26	15	15	19	14	10	11	6	1	21	27	32	16	27	40	11	20	6	11	6	2	6	1	6	6	5	5	14	14	5	15	15	3
42	39	35	35	29	35	39	39	1	28	17	18	30	39	29	39	40	30	39	39	41	42	35	42	39	39	31	39	23	18	29	25	29	29	20	0	31	8	31	33	38	35

PREDICTOR 12

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
36	16	39	40	40	40	26	32	30	36	26	7	25	25	20	26	26	15	32	32	35	27	36	40	26	31	15	21	20	6	0	10	10	11	36	0	14	30	0	26	26	36
0	32	37	0	0	0	0	22	0	35	0	0	0	0	0	0	0	0	0	16	37	0	41	32	0	0	0	0	0	0	0	0	0	0	19	0	1	0	0	0	0	37

PREDICTOR 13

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
27	22	43	33	41	41	12	27	19	26	21	11	14	14	6	16	11	2	22	22	32	22	33	43	16	21	6	12	11	2	2	2	2	7	5	5	14	5	1	21	16	37
29	39	39	39	29	39	42	36	35	35	37	9	35	31	40	40	18	25	29	39	39	29	39	42	36	29	31	36	37	25	29	1	29	29	20	9	31	9	18	32	29	39

PREDICTOR 14

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
32	22	43	37	43	37	21	27	19	32	20	15	20	20	15	21	21	11	21	22	32	21	37	40	21	26	15	16	15	11	11	6	11	11	6	10	15	10	15	21	21	37
16	37	42	22	37	43	17	16	26	31	21	21	19	14	6	11	11	6	27	33	40	22	38	41	22	15	6	17	6	7	12	7	6	6	15	20	14	20	6	11	16	27

PREDICTOR 15

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
32	37	42	43	40	43	21	32	25	31	26	7	25	20	21	21	21	15	37	37	36	27	43	40	27	26	15	21	15	11	16	11	11	11	25	14	14	35	0	21	21	32
22	17	37	0	33	0	0	12	30	21	39	21	1	0	0	8	0	41	9	12	22	13	16	37	8	22	31	0	40	33	0	4	0	30	0	0	35	0	0	0	11	43

PREDICTOR 16

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
36	37	37	40	21	40	7	16	1	21	26	26	31	25	26	32	26	15	16	17	36	16	41	42	27	31	20	21	15	11	21	1	11	11	1	0	20	0	15	26	21	37
21	40	38	0	33	0	32	37	10	36	25	7	1	20	7	20	21	14	7	16	42	33	40	43	12	32	21	27	26	0	0	11	10	21	10	0	7	0	0	21	26	40

PREDICTOR 17

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
35	40	37	34	42	43	32	37	10	35	31	26	30	25	26	26	26	20	37	37	35	37	43	42	32	30	20	26	20	15	21	15	15	21	10	25	25	25	15	26	26	40
40	41	42	36	28	38	21	36	35	30	0	36	10	24	25	36	30	43	25	43	27	36	34	37	21	31	19	38	21	11	0	19	26	10	20	15	20	32	25	30	36	28

PREDICTOR 18

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
32	41	43	0	43	43	38	38	24	39	16	36	31	31	40	36	36	20	38	38	32	38	43	43	38	31	31	38	31	21	21	21	21	21	30	26	19	30	26	36	36	43
41	28	0	0	34	0	36	34	39	21	40	21	32	0	21	31	31	0	34	34	43	34	28	20	31	32	30	36	21	34	0	0	38	32	22	20	6	32	38	16	16	34

PREDICTOR 19

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
36	40	37	34	42	40	32	37	35	35	31	26	30	25	26	26	26	20	37	37	35	37	40	42	32	35	20	26	20	15	15	15	15	15	10	25	25	19	15	26	32	40
35	31	42	36	28	36	27	35	10	27	32	31	31	0	35	31	30	10	31	39	27	31	34	37	27	25	0	27	31	12	0	20	20	31	7	15	20	7	25	30	8	39

PREDICTOR 20

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41	29	11	43	43	11	12	29	19	41	41	34	37	37	31	34	34	30	12	14	1	12	5	43	13	41	31	25	33	30	33	32	33	33	35	36	37	38	40	42	42	43
5	8	3	4	11	43	20	13	37	16	31	18	36	40	40	24	24	28	8	5	43	8	43	11	24	22	28	34	32	32	31	30	32	30	30	35	35	36	33	33	34	29

PREDICTOR 21

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
37	34	41	34	34	34	36	34	30	33	37	36	19	39	36	36	36	32	34	34	42	36	34	34	36	32	36	36	30	22	10	32	22	22	26	21	21	32	36	37	36	4
34	43	0	28	41	42	38	38	32	42	40	33	32	31	39	31	37	30	38	38	34	27	0	0	10	36	24	10	10	36	36	37	36	36	21	19	19	30	39	36	37	26

TABLE 6

SAME AS TABLE 5 FOR TYPE 1

```
TYPE      1

PREDICTOR      1

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 36 36 41 37 40 41 21 26 35 35 25 26 35 25 20 26 26 10 26 26 39 26 41 42 26 31 20 21 20  6 11  6 11 15 15 25 20 20 15 26 26 37
 41 24 38 24 26 29 41 43 19 30 41 34 19 40 42 38 33 28 41 43 24 39 29  0 41 38 35 38 34 21 14 23 28 28 21  5 14  5 28 33 29 29

PREDICTOR      2

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 31 37 43 33 41 41 21 27 35 35 20 20 31 20 20 21 15 10 21 27 36 27 41 40 21 26 15 21 15  6 11  6 11 11 15 25 20 25 15 15 21 37
 30 43  2 39 34 42 43 43  9 30 41 29  9 40 39 38 29 19  0 43 24 43 43  0 41 41 26 41 28 15 29 23 28 29 21  1 39 27 28 29 29 42

PREDICTOR      3

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 26 32 43 33 37 41 21 27 19 31 14 20 20 14 15 21 15  6 21 22 32 22 37 40 21 26 15 16 15  2 29  6 11 11  6 20 10 14 41 15 21 37
 43 31  2 23 35 42 43 43  1 32 41 43  1 40 40 33 29 23 42 42 24 42 42  2 41 42 31 38 29 22 17 23 28 29 29  2  1  4 10 40 29 42

PREDICTOR      4

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 26 32 40 33 37 41 21 26 19 26 14 15 14 14 39 15 15  6 21 27 32 21 37 40 21 20 15 16 29  2 29  6  6 11  6 14 39 14 29 15 15 37
 43 24 35 23 35 42 43 39  1 29 36 29  5 36 15 43 23 36 42 42 38 39 42  2 41 42 25 34 15 18 28 13 29 29 23 30 15 29  0 37 29 42

PREDICTOR      5

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 41 37 43 37 43 43 37 37 25 31 21 27 25 22 21 27 27 21 37 37 43 37 37 42 33 37 20 37 21 15 21 11 21 21  5 14 39 14 21 22 33 41
 24 30 24 39 27  5 24 20 20 33 14 14  6 19 33 21 21 41 35 43  5 42  5  5 37 25 16 27 41 38  0  2 24 24 20 41  2  2 24  2 21  5

PREDICTOR      6

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 43 38 34  2  6  2 26  9 24 38 36  4 42 24 12 26 40 17 13 26 33  1  2 33 27 37 22  2 12 41 26  1 12 12 12 22 40 10 17 13 29  6
 38 32  2  9 34 12 27 20 22 36 39 29 38  1 38  4 34  1  3 43 32 33 38  6 15  4 30 12 19 15 28 25 15 43 30 10 22 22  3 25  4  4

PREDICTOR      7

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 41 34  9 28 17  4 33 29 29  9  9 12 16 17 35 22  1  1 37  5 34 37 34 17 37  9  9 29 16 39 22  1  7 22  9  9 34 17 12 37 39 25
 29 16 43  4 16  7 27  1 10 34 22  5  7 13 22 30 43 18 27 34 32  5 36 36  5  2 17 37  9 37 36 13 38  3 14 13 27  9  9  9 32 40

PREDICTOR      8

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 39 39 37  4 26 42 12 16 25 26 31 31 15 11  7 12 31 20 16 35 26 36 42 32 12 39 25 12  7  6  3  3  3  3 20 31 31 25  3 31  0 42
 27 27 39 38 40 38 36 40 39 39 12 16  8 31 26 36 12  8 43 27 39 16 33 42 43 21 11  5 25  4  2  6 15 15 27  9 21 26  0  0  0 27

PREDICTOR      9

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 39 40 38 29 34 40 12 22 20 21 31 31 15 11 12 12 12 14 22 22 27 36 28 33 12 39 14 12  7  6  6  3 15 15 15 25 25 25  4 26 26 40
 22 28 42 37 42 38 36 36 39 39 16 16 35 31 26 26 26  4 43 41 39 16 43 42  7 22 11  6 31 33  8  6 42  3  0  5  4 27  0 18 20 34

PREDICTOR     10

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 36 40 38 41 33 34 32 22 10 39 26 26 10 25 26 26 26 15 36 36 39 32 28 33 12 22 20 12  7  6 18  6 11 11 11 26 26 28  0 26 27 40
 28 27 42 38 36 40 12 36 39 21  5 10 36 19 25 12 43  8 18 22 27 18 40 42 27 36 31 27 24 33  2 23 42  3 10  5  4 20  0 14  0 34

PREDICTOR     11

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 26 32 40 32 37 37 21 26 19 26 37 15 14 17 39 15 15 25 21 21 26 39 32 40 21 20 18 34 23  2 29  2  2  2 23 30 35 29 29 15 15 32
 40 30 35 39 38 39 39 39 40 27 19 18 38 15 18 33 33  1 39 35 30 21 35  1 33 39 25 21  6 43 34 13 23 29 25 19 19 30 20 33 38 39

PREDICTOR     12

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 31 22 38 43 40 33 26 22 35 35 29 26 31 20 20 26 31 10 36 32 39 26 27 40 31 31 30 21 20  2  0  7  6  6 19 21 20 24  0 21 29 36
 19 36  0 17 38 40  0 32 43 31 39  0 22  0 12 37 34 29 26 22 31  0 36 32  0 22 15  0 32 26  0 17 29 29 36 27  0 31  0 31  0 22

PREDICTOR     13

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 21 37 43 33 41 41 27 27 19 26 40 21 14 10 36 21 18 25 27 27 32 39 37 40 16 21 25 36  6  2 18  2  2  2 20  5 36  5 26 21 21 37
 42 24 39 18 29 29 36 39 39 39 14 18  9 40  2 40 21  6 36 36 39 27 39 39 29 39 18 27 18 15 24  3 18 18 10 36 14 18 14 32 23 39

PREDICTOR     14

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 32 32 43 37 40 37 21 32 25 32 20 21 14 14 40 21 21  6 21 26 32 27 41 40 21 26 15 21 15  2 21  6 11 11  6 25 10 24 10 21 21 37
 31 37 42 33 32 43 17 21 43 31 40 20 26 11 30 15 15 15 32 27 40 21 37 31 27 21 31 27 23 33  0 18 18 28 15 30 15 10 29 11 18 32

PREDICTOR     15

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 32 40 42 41 40 43 21 26 30 31 26 26 26 20 15 26 21 30 26 26 42 26 43 42 27 26 25 21 15  2 10  2 11 11 25 21 35 30 16 21 21 43
 28 22 37 18 33 34 15 23 41 22 36 10  5 19 10 14 10 21 18  9 33 31 27 33 12 22 21 14 19 42 16  0 42 14 16 39 21 26  0 10  1 13

PREDICTOR     16

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 21 27 37 37 33 40  7 16 39 21 26 26 10 25 26 26 26 15 16 16 21 26 33 32 12 16 20 12  7 11 18  6 11 11 11  5 26 24  0 26 21 33
  9 16 38  2 36 34 37 22 31 39 33 33 26 33  7 12 12 10 22  8 39 27 16 33  3 22 21  3 26  4  3  0 42 30 10 25  4 39  0 16 31 16

PREDICTOR     17

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 35 27 37 34 33 40 37 30 35 35 32 32 30 19 32 31 26 20 40 43 35 37 43 37 32 35 20 26 25 11 21 10 10 21 20 25 20 25 15 26 32 40
 27 31 39 40 39 38 17 40 25 27 34 25 24 32 10 11 30 19 38 24 27 39 33 39 30 30 19  5 43 10 14  8 16 27 10 32 30 37  6  0 40 33

PREDICTOR     18

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 39 43 43 40 43 38 40 31 39 39 40 33 31 31 40 27 40 30 40 40 42 28 43 42 28 40 30 23 30 16 20 16 22 22 22 36 36 32 20 27 40 40
 40 33 41 41 41 43 10 43 33 21  5 36 28 22 38  6  6 40 27 21 21 40 38 15 38 39 41 36 22 27 40 19 28 33 30  8 32 30 40 22 16 34

PREDICTOR     19

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 35 27 37 28 33 40 37 35 35 35 32 16 30 25 32 31 26 20 35 31 35 37 33 37 16 35 20 32 20 11 14 10 10 15 10 25 20 19 15 26 40 40
 36 36 40 40 42 33  8  8 31 27 40 32  0 32  0 26 30 10 41 41 27 39 40 42 33 23 19  8 40 10 27  5  0 40  7 15 30 24  6 16 32 33

PREDICTOR     20

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 41  8 11 43 11 11 42 14 19 41 27 34 36 40 31 41 34 30  8  5 43  8  5 43 24 41 31 25 33 32 31 32 33 33 30 36 37 36 40 41 41 29
 29  2  3 14 43  0 13  8 38 16 41 41 37 23 40 34 24 28 12 12  1 25 11  9 13 21 35 31 34 30 33 30 29 31 40 21 40 35 30 42 29 43

PREDICTOR     21

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 37 43  2 34 34 34 36 37 36 33 25 33 25 26  2 33 36 35 37 26 42 28 34 21 33 37 21 36 30 16 10  7 22 22 25 21 21 32 29 33 41 34
 22 33 39 12 39 33 37 12 25 42 14 29 14 22 36 36 37 36 40  2 34 22 17 34 36 40 25 14 22  7 26 34 11 33 21 20 20 13  7 36 19 43
```

TYPE 2

TABLE 7

SAME AS TABLE 5 FOR TYPE 2

PREDICTOR 1

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18	30	42	0	42	38	3	37	5	36	26	26	35	38	26	21	15	41	13	35	36	0	41	42	10	36	22	0	23	6	20	10	1	15	10	10	5	19	15	26	26	40
37	24	14	0	14	18	10	42	31	34	28	39	5	5	14	34	43	15	7	33	21	0	35	14	26	17	15	0	15	16	28	22	8	31	31	11	14	40	13	9	28	24

PREDICTOR 2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
18	33	40	0	42	41	3	33	1	36	18	21	31	24	20	21	15	28	1	33	36	0	41	42	6	31	23	0	15	2	15	6	1	15	6	27	36	19	15	26	21	37
32	42	32	0	6	30	34	40	10	34	15	33	37	28	32	38	13	15	13	40	21	0	43	14	27	12	15	0	28	12	28	22	8	20	31	14	20	26	13	22	14	24

PREDICTOR 3

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
9	27	43	0	40	40	22	33	19	32	18	21	19	24	21	21	21	30	1	33	32	0	33	40	27	26	43	0	15	6	10	6	6	11	31	37	35	26	15	26	21	32
32	7	41	0	34	39	3	43	43	33	20	33	8	35	36	31	23	29	32	43	27	0	20	41	6	12	15	0	28	17	5	12	4	13	11	5	14	38	13	13	14	24

PREDICTOR 4

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
9	27	40	0	40	40	22	27	19	31	13	21	8	24	20	21	21	30	1	33	32	0	33	40	27	25	42	0	15	2	35	6	1	11	31	37	35	26	9	13	21	32
10	11	37	0	34	39	0	11	2	11	20	33	14	35	39	31	17	23	13	39	27	0	25	41	36	34	15	0	28	3	11	12	4	23	11	5	1	41	15	26	23	24

PREDICTOR 5

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
33	0	42	0	43	41	28	38	15	15	21	2	15	3	34	27	26	2	0	38	29	0	37	42	27	9	28	0	8	26	29	27	9	16	42	5	27	14	26	26	27	43
29	0	39	0	26	39	43	5	41	29	26	26	16	4	6	41	28	4	0	5	38	0	43	14	43	38	37	0	16	27	7	7	26	43	36	6	6	42	9	29	7	28

PREDICTOR 6

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
21	0	13	0	29	19	13	15	38	32	18	28	32	17	21	13	2	28	0	28	18	0	27	26	9	28	18	0	14	26	7	5	8	5	29	18	5	29	38	5	18	9
36	0	29	0	9	13	41	33	15	9	2	8	4	20	13	6	3	33	0	5	36	0	5	18	6	14	9	0	16	18	42	38	28	28	5	37	36	26	14	28	6	29

PREDICTOR 7

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
1	0	13	0	29	3	5	36	42	42	33	43	35	28	41	21	33	31	0	36	5	0	28	9	38	43	27	0	26	37	14	8	9	18	27	27	42	6	42	36	9	6
41	0	31	0	9	6	33	39	41	8	27	41	9	1	36	4	27	43	0	18	27	0	27	14	43	5	42	0	9	5	26	27	18	14	26	38	8	29	28	38	42	7

PREDICTOR 8

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
40	13	37	0	27	0	16	41	25	42	11	11	10	31	36	16	11	2	9	9	21	0	41	37	38	15	6	0	26	11	1	1	11	1	19	15	5	25	37	10	32	42
21	37	42	0	42	0	3	28	1	26	26	26	36	25	12	32	26	5	13	32	38	0	28	42	16	39	29	0	6	16	11	10	12	42	2	11	7	5	33	19	16	27

PREDICTOR 9

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
33	12	27	0	21	13	16	41	36	40	11	11	36	31	32	11	11	2	9	37	21	0	41	32	38	15	2	0	2	10	1	15	15	38	15	2	1	36	15	26	32	40
21	7	42	0	41	7	28	28	14	15	26	26	10	32	17	26	26	43	13	28	36	0	38	42	31	39	16	0	29	22	15	7	37	17	31	15	20	25	12	22	16	4

PREDICTOR 10

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21	37	37	0	41	34	12	37	31	36	11	11	31	25	26	11	11	2	9	37	36	0	35	42	33	15	2	0	2	10	1	10	32	2	10	2	20	36	12	23	26	40
32	38	39	0	39	38	28	28	24	21	30	21	24	39	17	27	2	15	8	28	21	0	28	32	16	31	16	0	1	27	43	5	20	30	4	6	1	41	15	40	12	28

PREDICTOR 11

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
10	32	39	0	39	40	27	32	19	31	33	20	39	39	39	21	14	30	18	32	31	0	36	39	27	25	42	0	23	18	34	5	5	5	25	31	35	25	14	17	21	32
3	11	24	0	34	42	36	11	11	6	26	19	19	19	27	35	19	23	1	11	2	0	39	24	36	34	2	0	15	2	24	25	23	23	29	5	1	12	2	37	12	33

PREDICTOR 12

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
24	23	36	0	36	34	32	23	30	18	38	38	25	25	4	11	18	16	27	23	35	0	3	38	32	30	1	0	20	28	1	7	43	16	30	10	14	26	21	33	11	36
42	22	39	0	35	43	12	22	31	15	22	22	24	6	31	27	38	7	20	22	15	0	30	24	11	13	42	0	39	26	38	15	24	27	32	1	1	35	20	4	38	12

PREDICTOR 13

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
32	27	43	0	43	43	22	33	14	26	18	21	35	36	10	22	21	30	1	33	32	0	33	40	22	26	42	0	15	9	31	1	6	1	20	35	31	25	15	41	21	21
39	2	38	0	38	42	0	43	6	11	21	40	25	19	2	28	7	29	32	39	33	0	14	41	8	28	21	0	31	6	16	20	43	43	5	4	14	12	12	13	26	37

PREDICTOR 14

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32	37	43	0	43	40	6	37	15	32	20	21	8	24	25	21	21	15	32	37	32	0	37	40	9	32	15	0	15	2	10	6	6	1	31	35	10	26	15	38	21	32
1	22	42	0	2	4	22	27	14	2	28	20	24	35	26	22	20	28	13	33	18	0	25	12	7	26	16	0	43	41	19	24	17	15	20	25	19	36	17	20	16	40

PREDICTOR 15

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21	2	42	0	6	43	8	2	25	32	11	27	25	20	26	27	11	15	32	37	32	0	36	42	20	31	2	0	2	32	15	10	27	30	5	2	14	36	15	29	26	32
36	22	37	0	38	28	42	22	30	15	21	11	11	41	27	11	23	2	26	19	16	0	18	2	28	10	3	0	37	17	12	24	10	37	37	6	10	26	17	41	2	28

PREDICTOR 16

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21	12	2	0	2	36	28	28	6	32	26	11	31	31	26	11	26	2	9	28	32	0	36	2	28	32	2	0	2	32	15	10	32	2	37	2	20	16	15	20	26	22
36	11	37	0	18	34	16	12	32	7	30	26	1	17	12	12	2	15	26	7	21	0	7	37	16	15	16	0	20	18	19	20	10	37	10	17	1	36	12	40	12	4

PREDICTOR 17

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
35	22	42	0	6	39	13	27	30	35	11	16	30	26	32	16	16	21	35	40	21	0	43	42	17	16	32	0	25	14	8	15	33	21	15	14	20	36	25	33	36	33
15	38	40	0	37	37	11	38	6	21	32	32	13	5	43	26	26	11	7	24	35	0	30	40	11	35	20	0	21	28	20	14	43	12	14	25	24	19	17	26	26	30

PREDICTOR 18

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27	16	42	0	38	21	33	34	24	32	27	27	24	12	28	16	27	22	43	34	32	0	34	38	20	28	11	0	15	6	25	15	21	24	5	5	14	24	21	21	16	43
38	34	17	0	41	37	39	16	27	43	21	19	14	21	6	28	21	7	32	38	24	0	37	42	6	43	31	0	19	26	27	5	40	22	32	15	31	23	35	15	40	32

PREDICTOR 19

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35	16	41	0	37	37	13	16	30	35	31	31	24	24	32	16	16	21	15	27	21	0	27	37	17	16	32	0	26	28	8	14	33	20	14	19	20	36	25	33	16	21
15	27	42	0	6	35	11	27	6	21	16	16	13	20	43	27	27	12	26	24	30	0	35	42	28	35	20	0	19	17	20	15	20	24	15	33	19	7	33	15	26	33

PREDICTOR 20

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
24	12	11	0	43	14	18	12	37	17	27	34	37	35	31	34	34	32	29	12	22	0	12	43	24	41	31	0	33	32	32	32	1	33	35	36	35	38	34	30	34	26
17	0	43	0	11	7	41	10	20	19	31	17	27	37	12	42	42	19	22	9	41	0	14	10	26	22	32	0	32	1	13	37	32	32	28	30	37	28	23	6	42	18

PREDICTOR 21

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
33	28	7	0	41	34	7	28	30	32	27	27	24	25	26	16	16	13	32	39	27	0	34	29	12	27	9	0	6	11	6	15	21	21	27	19	14	22	34	1	28	27
41	41	34	0	2	41	29	7	10	3	34	32	35	41	41	23	4	19	37	7	41	0	40	40	38	5	11	0	11	36	13	10	42	32	15	40	25	42	14	36	16	17

TABLE 8

SAME AS TABLE 5 FOR TYPE 3

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TYPE     3

PREDICTOR     1

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 36 36 41 41 40 41 26 26 42 39 25 15 35 25 20 15 20 41 27 26 40 26 38 41 26 25 15 21 15  6 11 11 11 11 15 26 15 20 11 39 31 38
 27 41 23 22  1 12 39 43 19  4 38  9  5  3 37  4 38 10 41 43  1 42 34 29  5  3 32  4 33 41 37 41 38 38 37 32 27 33 23 42 38 34

PREDICTOR     2

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 36 31 43 41 40 43 26 26 35 39 20 15 25 20 20 15 10 43 27 26 40 26 37 41 27 25 10 21 15  6 11 11 11 11 10 20 20 20 15 31 31 38
 27 43 13 22 42  8 42 43 10  4 38 24 19  4 37  4 34 10 41  3 43 39  0 34 43 41 36  4 33 41 37 35 38 41  4  1 36 33 35 29 38 34

PREDICTOR     3

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 32 32 41 41 40 41 21 26 24 31 20 15 20 20 14 11 15 43 27 26 40 21 37 41 21 20  6 21 15 11 11 11 11 11 10 20 15 14 15 26 26 37
  3 43 23  2 42 30 42 42  5  1 34 29 15 36 34 43 34 10 41  3 43 34  2 35 39 41  1 43 37 37 37 20 41 41 24 39 27 17 32 41 38 35

PREDICTOR     4

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 26 26 41 37 37 41 21 26 24 36  5 15 20 14 14 11  6 40 21 26 40 15 37 37 21 26  6 21 11 11 10 11 11 11 19 14 15 10 15 21 21 33
  3 35 13 35 39 35 42 42  5 41 29 39 35 42 29 41 34  6 43 43 43 39 43 29 39 38 29 42 41 37 38 20 37 41 40  0 27 12 31  4 34 29

PREDICTOR     5

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 41 37 43 43 41 43 28 37 25 41 26 20 37 28 20 22 22 21 37 37 36 37 43 43 28 26 36 28 16 16 28 16 27 28 38 37 28 37 28 38 26 37
 26  3 14 11 18  5 37 42 11 37 22 27 30 26 21  5 20 22 36 29 43 26 36 28 37 37 28 29  5 43 26 43  5  5 26 14 26 43  9 42 38 43

PREDICTOR     6

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 25  1 34 34 34  4  5 10  3 28 13  3 43 11  4  5  5 34 15  8 27  5 43 43  5 18  5 14  6  6 26  5  6  8  5 43 28 43  5  9  5  0
 41 35 41 37 40  9 42 33 25 12 34 43 26 23 16 17 34  3  1 29 28 16 28 36 37 27 28 27  5  7  9 28 16 16 28  5  5 28 18 18 18  0

PREDICTOR     7

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 23 42  2 17  1 22 17 42 19 15 34 33 18 18 34  4  4 13 40 18  5 27 29 29 16 18 36  8 36 36  8  8  8  8 14 28 29 43 29 16 16  5
 14  5 29 18 19 42 18  7  3 23 11  5 24 11 42  7 37 34  7  5 26 28  9  9 29 16  5 18  5 37 26 28 27  5 29 43 18 18  8 36  8 42

PREDICTOR     8

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 27 27 39 34 29 36 28 16 30 26 21 11  4 15  8 17 26 20 31  9 34 31 25 29 28 35 25 22  7 17 23 17 17 17 41  4 22 21  5 32 32 36
 41 36  3 40 26 37 36  3 17 42 31 26 26 35 31 13 37  7 28 27 42 24 30 18 36 17 18  3 25 15  5 15 26 21 22 27  4 33 32 37 18 26

PREDICTOR     9

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 27 36 42 40 29 39 16 36 24 26 31 11 21 35  8 12 26  7 26  4 39 26 39 29 16 25 11 30  7 15 38 15 15 15 42  4 31 16  5 26 32 36
 41 27 34 34 18 38 26 16 20  9 21 15  4 15 25  4 37 15  4 28 33 21 26 18 32 20 20 22 25  7  5 23 38 23 34 18 22 33 28 20 18 26

PREDICTOR    10

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
  8 31 29 39 28 40 11 20 24 27 11  6 15 11 11 21  7 15 32 25 39 26 39 29 32 31 42 29 15 15 38 15 21 15 42  6 32 12  7 26 27 40
 39 23 39 22 40 34 32  3 20  3 32 39 37 27 18 16 21 33  4 28 34  4 24 39 16 21 20 26  6 37 21 18 38 38 33 18 38  2 21 11 11  1

PREDICTOR    11

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 26 26 37 37 32 37 15 21 24 20  5 15 10 14 10 11  5 37 21 26 20 15 32 37 15 20  9 15 11  7  5  5 11 11  5  5  5  5 10 15 15 27
 35 35 30 35 39 39 42 39  5  2  2 39 32 39 28  9 34  6 39 43  2 39 39 39 39 39  6  4 38 37 34  1 33 38 24 19 11  9 35  4 33 35

PREDICTOR    12

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 39 26 42 40 40 40 26 26 39 40  7  2 17 26 11 27 36 37 26 16 39 21 31 42 26 12 18 26 21 11 26 22 16 11  5  9 21 12 43  1 39 37
  3 15  1 41 41  2 12 24 19 41 25 28 32 19 15 24 21 43 21 27 25 12 39 24 12 37 36  0 37 37 29 29 37 38 31  3  7 19 31 30 20 42

PREDICTOR    13

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
  8 27 43 41 37 41 15 22 24 31  5 11 14 14  5 21 11 40 22 22 37 16 37 37 27 26  9 27 11  7  5  7 11 11  5 14  5 14 15 21 21 22
 26 39 39 39 39 39 33 42 39 39 29  9 35 40 29 41 29  1 29 29  6 34 39 24 14 40  5  9 41 29 25 24 24 43 19 25 31  9 26 36 34 30

PREDICTOR    14

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 26 22 43 40 40 40 15 32 31  3 15 15 20 20 20 15 15 15 32 32 40 20 37 40 27 31  6 21 15 11 16 11 11 11 15 20 15 15 15 21 21 12
  8 25 37 37 36 22 32 17 13 40 26  6 31 19 40 16  6 27 21  8 36 21 11 12 15 20 15 15 11 41 10 42  8  8  6 19  6 21 16  9 29 38

PREDICTOR    15

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 41 41 23 43 31 40  7 20 14 31 12 29 31 20 42 21 21 25 37 31 39 20 31 40  7 31 40 42 15 25 20 25 22 16  5  9 31 12 38 20 21 40
 26 23 20 25 43 28 21 28 31 27 22 31 18  1  7  2 29 28 33 41 28 11 12 30 15 41 23 29 33 11 24 22 37 25 39 11 32 42 21 24  5 25

PREDICTOR    16

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 41 41 21 22 36 40 11 16 20 26  7 43 31  1 11 15 21 15  7 25 28 20  2 22  7 21 11 21 15 15 23 15 11 11  7  4 32 12 21 30 27 12
 25 25 11 40 26 23  7 20 24  7  6 40 21 11 10 21 18 14 36 36 39 18 22 29 16 31 15 12 11 11 42 16 38  7 33  9  3  2 18 27  7 40

PREDICTOR    17

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 40 36 42 39 39 39 36 36 13 37 31 20 25 36 14 26 20 15 36 36 39 25 43 43 36 22 20 20 21 10 15 15 15 15 20 16 20 14 20 26 26 40
 13 22 15 34 17 34 38 38 24 36 13 36 16 16  5 14 16 34 38 22 37 22 39 39 20 36 16 36 31 23  6 20 14 25 10 20 22 16 13 32 23 39

PREDICTOR    18

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 38 41 19 43 39 43 31 41 23 39 26 36 31 31 36 36 36 37 38 13 43 38 35 43 31 31  5 31 36 36 37  7  5  5 14 31 31 31 14 36 36 43
 25 13 22 12 43 20 36 36 30 34 37 13 32 36 31 31 39  6 34 36 35 36 34 20 38 38 13 14  5 34 23  5 36 12 30 25 27 37 23 38 39 38

PREDICTOR    19

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 40 40 42 39 39 42 31 31 13 37 31 20 31 31 20 26 15 15 31 39 39 31 39 39 31 31 20 20 15 15 15 15 15 15 15 31 20 20 20 26 23 39
 38 31 15 38 28 34 37 20 14 39 19 37 16 11 17 15 20 14 27 16 32 20 24 34 27 32  6 36 31 40 23 39 43 20 31 16 39 35 13 30 31 40

PREDICTOR    20

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 14  5  4 43 43  4 13 12 15 43 42 18 36 26 31 34 34 30 12  5  4 12 43  4 13 42 31 25 33 32 33 30 33 33 35  5 26 40 31 42  5  5
  1 14 11  4  4  1 24 29 19 14 26 26 37 20 26 24 26  8 41 14 43  8 19 43 24  2 28 34 32 23 31 32 20 20 30 35 20 19 33  4  3  8

PREDICTOR    21

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 32 32  2 34 43 34 40 32  9 33 32 36 31 31 36 36 36 36 32 32 25 27 34 43 40 37 13 36 36  2 36 14  5  5 14 31 27 22 36 37 37 34
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TYPE   4

TABLE 9

SAME AS TABLE 5 FOR TYPE 4

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PREDICTOR    1

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  0  0  3  0  0  0 41  0  1  3 26 29 31 32  1 27 27 27 41  0 38 41 43  0 12 14 36 41 28 23 23 29 29 38 36 43 14 21 27 22 21 41

PREDICTOR    2

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
  0  0  2  0  0  0 21  0 30  3 43 31 31 25 10 21 31 10 21  0 39 21 34  0 16 31 10 21  1  6 16  1 15 21 14 19 39 43  6 31 21 21
  0  0 40  0  0  0  7  0  1 31 21 40  5 32  9  2 41  9  7  0 35  7 14  0  7 39 42  7 17 29 11 29 34 29  9 43  1  3 27  6 29  7

PREDICTOR    3

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
  0  0  3  0  0  0 21  0 24  3 43 25  9 25 15 16 21 10 21  0  2 21  5  0 16  3 24 21 10  6 16  6 26 16 14 43 14 43  2 26 21 21
  0  0 40  0  0  0 25  0 43 43 27 41 25 39 21  7 11 40 25  0 38 25 29  0  7 42 42 35 17 41 21 18 41 29 36 24  1  4 37 31 15 25

PREDICTOR    4

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
  0  0  3  0  0  0  9  0 24  3 43 20 24 24  3 16 21  5  9  0 11  9  5  0 16  4 24 16 10  6 41  2 39 16 19 43 14 41  2 20 16  9
  0  0 40  0  0  0 21  0 43 42 11 41  6 12 12  7  7  3 21  0 20 21 18  0 18 43 42 39 17 40 17 18 37 41 36 24  1 25 32 35 41 21

PREDICTOR    5

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
  0  0 41  0  0  0 21  0  0 32 34 21 21 34 22 21 21  3 21  0 29 37  5  0 37 43 28 37 16 27  0 43 16 16  6 14 16 16  0 16  0 37
  0  0  3  0  0  0 39  0  0 40 30 41 41 10 10 40 40 11 39  0 43 36 43  0 36  7 37 36 18 43  0 27  9  9 37 42 18 14  0 18  0 36

PREDICTOR    6

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
  0  0 13  0  0  0 39  0  0 13 12 39 39  3 19 39 39 30 39  0  6 37  7  0 37 28 36 37  8 38  0 43 37 43  5 26  8  6  0  8  0 37
  0  0 31  0  0  0 40  0  0 40 13 19 19 40 39 22 22 19 40  0 42  9 38  0  9 38  9  9 36 36  0  8 43 38 29 28 36 38  0 36  0  9

PREDICTOR    7

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
  0  0 11  0  0  0 10  0  0 11 12 13 13 41  3 13 13 23 10  0 18 14 37  0 14 27 26 14 18 37  0  9 28  9 14  6 18  6  0 18  0 14
  0  0 12  0  0  0 41  0  0 12 10 11 11 33 22 32 32  1 41  0 27 28 36  0 28  7 43 28  8  7  0 27  9 28 42  5  8  5  0  8  0 28

PREDICTOR    8

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
  0  0 37  0  0  0 14  0 10 32 30 14 19 32 14 40  3 40 14  0  2 14 43  0 14 32  5 14 12  7  3 12 12 12 13 23 14 39  5 14 12 14
  0  0 42  0  0  0  3  0 36 42 18  1 40 35  2 15 32 42  3  0 31  3 41  0  3 41 32  3  1  1 11  5 19 37 41 41 40 33  2 33 16  3

PREDICTOR    9

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
  0  0 37  0  0  0 37  0 11 21 31 11 31 11 14 37 37 33 37  0 38 37 30  0 37 21  1 37 11 27  3 12 17 37 23 20 10 20  5 10 17 37
  0  0 42  0  0  0 14  0 35 42 24 16 14 35 29 15 11 29 14  0 42 14 26  0 14 35 27 14  1 33 23  1 14  8 11 23 31 39 27 37 22 14

PREDICTOR   10

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
  0  0 27  0  0  0 37  0 10 27 25 11 30 11 29 37 39 40 37  0 32 37 24  0 37 27 23 37 11 20  3 12 14  4 23 37  6 20 36  6  2 37
  0  0 30  0  0  0  7  0 30 40  1 39  6  9 15 11 11 13  7  0 40  7  0  0  7 36 18  7 17 32 23  1 32 31 16 39 22  4 14 39 12  7

PREDICTOR   11

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
  0  0  3  0  0  0 29  0 14  8 38 10  5 24 24  6 21  5 29  0  6 29 36  0 18 16 36 16 41  2 41  2 39  7  5 40 14 40 41 15 16 29
  0  0 40  0  0  0 17  0 31 42 11 17  6  7 41 18 40 36 17  0 42 17 28  0  6 35 24 40 42 12 43 38 37 38 12 12  1  4  9 35 41 17

PREDICTOR   12

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
  0  0 30  0  0  0 37  0 43 39 24 42  6  6 14  9  4 18 37  0 24 37 43  0 37 31 29 37 14 21  7 27 16 16 11  6  6  4 39 42 40 37
  0  0 32  0  0  0 40  0  8 24  1 40  3 27 20 37 41 39 40  0  1 40 42  0 40 41 36 40 11 15 36 14 37 42 18 38 21 34 42  1 21 40

PREDICTOR   13

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
  0  0  3  0  0  0  9  0 19  8 35 12 19 25 20 16 21 14  9  0  2  9  5  0 16 11 24 16 39  2 41 35 26 16  5 43 14 41 41 16 16  9
  0  0 43  0  0  0  6  0 36 30 27 14  6 11  6 42 40  1  6  0 39  6 18  0 42 35 22 35 40 41 18 37 37 41 12 24 30 26 14  2 15  6

PREDICTOR   14

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
  0  0 22  0  0  0 21  0 30 39 21 39 26 38 39 16 21  3 21  0 40 21  1  0 16 32 38 21 39 19 16  6  7 16 14  5 39 19 12 26 21 21
  0  0 40  0  0  0  6  0 35 27 11 21 24 25 42 26 26 12  6  0 15  6 18  0  6 15 27 33 15 41 39 15  6 26 28 19 14  9 39  5 22  6

PREDICTOR   15

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
  0  0 27  0  0  0  9  0 25 19 19 39 24 11 13 26 22  6  9  0 35  9 43  0 10 25 14 33 39 20 41 14 39 36  2 33  6 33  6 26 27  9
  0  0 31  0  0  0 33  0 28 38 21  1  6 34 28 22 11 18 33  0 32 33 39  0 23  4 34 13 40 25 39  9 37  4 18  4 39 38 13  1 40 33

PREDICTOR   16

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
  0  0 32  0  0  0  7  0 10 41 10 22  4 14 39 16 26 31  7  0 32  7 22  0 16 10 23 18 39 20 41 12 16 16 13 37  4 33 39 26 12  7
  0  0 37  0  0  0 37  0 28 10 21 26 24 13 31 26 22 42 37  0 18 37  9  0 17 37  7 33 22 35 16 16 20  4 41 15 41 14 15 10 16 37

PREDICTOR   17

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
  0  0 32  0  0  0 12  0 10 32 32 15 30 10 13 19 15  7 12  0 39 12 32  0 19 36 35 12 15 35 19 42 11 16 38 24 35 37  7 35 21 12
  0  0 17  0  0  0 23  0 15 40 35 21  6 28 39  8 21 14 23  0 36 23  0  0  8 32  8 21 20 14 24 31 15 12 11 14  6 25 19 15 22 23

PREDICTOR   18

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
  0  0 22  0  0  0 10  0 25 32 25 21 19 41 15 36 22 15 10  0 37 10 35  0 10 25  6 10 15 32  8 25 33 33  6 14 39 20 15 25 25 10
  0  0 27  0  0  0 13  0 33 24 41 34 31 21 11 34 21 16 13  0 42 13 30  0 15 32 17 25 28 25 13 23 31 26  7 35 19  5 10 34 40 13

PREDICTOR   19

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
  0  0 37  0  0  0 12  0 10 30 25 15  6 28 15 25 32  7 12  0 39 12 27  0  8 25 35 12 15 42 19  8 11 35 11 37  6 33 20 25 21 12
  0  0  7  0  0  0 23  0 15 39  6 32 28 10 20  8 15 26 23  0 36 23 21  0 19 20 13 25 20 25 24 25 15 32 38 25 30 37 11 20 38 23

PREDICTOR   20

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
  0  0  3  0  0  0 17  0 28  2 17 26 26 23 18 26 34 30 17  0 22 17  0  0 17  2 23 17 34 32  0 32 33 26 23 36 26 26 10 26  0 17
  0  0 20  0  0  0 34  0 23  3 34 34 37 20 30 34 26 20 34  0 26 34  0  0 34  0 10 34 10 24  0 17 22 17 18 28 37 21 40  0  0 34

PREDICTOR   21

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
  0  0 16  0  0  0  3  0 30 24 24 30 25 20 15 33 35 15  3  0 38  3 38  0 10 24 15 24 15 15 17 21 33 38 26 18 39 27 15 24 38  3
  0  0 27  0  0  0 10  0 25 16  6 39 29  6  7 36  8 24 10  0 42 10 27  0  3 33 20  6  7 22  1  8 27 11 28 19 19 37  7 27  6 10
```

TYPE 5

TABLE 10

SAME AS TABLE 5 FOR TYPE 5

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PREDICTOR   1

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 40 33 34 40 31 34 22 32 20 39 30 40 34 20 34 31 20 41 32 32 39 32 36 26 27 35 37 43 15 11 27 31  6 43 19 34 34 25 37 32 43 33
  2 19 33 11 19 11 32  4 31 20 34 39 31 10 22 39 34 33  4 38 19 40 33 14 38  5 20 14 27 13 21 37  5 11 22 20 26 38 24 40  5 31

PREDICTOR   2

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 31 32 30 31 40 34 22 32 10 31 31 33 34 20 34 20 20 21 32 32 36 27 36 26 27 31 37 24 15 11 27 20  6 11 30 20 42 25 37 27 41 33
 41 19 34 32  4 11 41 40  3 20 39 32 19 32 20 10 34 22  4 43 42 38 13 25 38 26 20 27 23  5 10 23 40  5 14 27 35 36 24 41 32 41

PREDICTOR   3

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 32 22 30 32 32 30 22 22 31 31 21 13 20 10 34 21 20 21 22 27 31 21 33 27 21 31 32 19 11 11 27 21  6 11 25 14 24 14 23 24 41 22
 19 20 40 23 31 11 41 32 33 20 11 19 21 33 10 13 31 22 41 13 33 41 34 28 43 39 20  5 35  5 36 23 43  5 36 17 34 33 11 43 21 16

PREDICTOR   4

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 32 21 40 32 32 30 22 22 19 31 21 13 20 10 34 21 10 21 21 27 32 16 17 30 21 26 35 19 11 11 27 21  6 11 25 24 24  5 23 24 41 22
 40 39 31 23 30 41 41 41 33 39 30 19 32 30 10 13 23 10 39 43 43 41 32 19 43 43 32 13 22  5 40 22 17 27 36  5 38 37 43 43 21 35

PREDICTOR   5

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 31 41 40 31 40 19 33 41 22 31 20 39 20 20 20 22 22 33 41 37 43 37 37 42 28 37 37 26  5  5 37 16  5  5 26  7 26 14 37 38  9 37
 39 22 31 13  1 41 40 22 20 19  4 34 40 41 32 11 41 13 22 27 42 26 43 36 18 26  8  7 42 16 43  9 26 29  6 27 18 26 38 36 28 27

PREDICTOR   6

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 30 34 30 39 39 30 34  1 31 23 34 12 22  2  3 23  3 22  1 14 18 43  9 37 38 43 18  7  9  5 36 42  8 18 37 37 28 42 18 42  9 26
 34 30 31 34 23 23  2 41  1 39 40 40 32  3  2  1 34 39 12 26  7 38 16 14 29  6 37 27  5 26  6  7  6  9 29 29 18 43 38  5  7 42

PREDICTOR   7

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 31 31 13 39 22 20 41 13 33  1 34 22 23 10 33  2 21 30 31  5  5 28  5 38  5  6 14 38 14 14 28 37 16  8 26 42 37 29 37 37 42  5
 33 34 11 22 21 39 11 10 30 21 12 39 32 34 20 32 23 31 13 26 14 29 29 26  9 26 28 37 28 18 43 26  6 43  7 27  9  5 26 16 43 27

PREDICTOR   8

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 34 23 12 33 34 32 12 23 13 32 21 39 30 30 30 11 30 12 22 23 34 24 23 38 11 21 27 32 32 24 20  6  6 43 15 31 30 35 21 36 27 13
 20 20 31 40 31  3  2 20 32 13 40 31 13 34  3 30 11 20 33 20 19 17 35 36 36  7 19  8 24 16 32 42 25 16 35 21 43 40 43 11 17 15

PREDICTOR   9

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 21 23  3 23 34 40 13 23  4 32 30 40 19 19 19 11 11 12 23 23 27 24 40 38 11 22 14 32 32 37 20  6 40 43 22 25 30 25 15 36 27 13
 19 20 22 33 40 34  2 21 32 39 12 31 40 34  3 30 31 20 33 15 19 17 20 36 43 41 39 43 25 24 32 35  6 33 39 14  7 34 19 12 11 40

PREDICTOR  10

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 40 23  3 23 40 40 19 23  4 39 12 40 19 19 12 31 11 12 30 40 39 19 40 38 17 31 10 26 33  5 10 30  6 40 22 25 19 31 15 32 21 40
 21 19 21 19 34 23  4 30 21 20 21 20 12 34 10 11 20 34 13 17 20 10 15 40 32 27 37 42 10 43 33 26  5  5 23 30  7 34 26 24 30 13

PREDICTOR  11

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 21 39 40 32 30 30 39 39 20 20 21  3 10 30 13 21 11  1 39 24 21 39 35 30 24 24 39 19  7 11 40 24  6 11 25 24 35 35 17 24 36 35
 39 32 31 41 19 41 11 21 22 39 23 22 34 10 39 31 13 11 21 27 42 20 27 19 11 26 40 17 33 12 33 15 17 27 43 12 20 24 24  5 21 22

PREDICTOR  12

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 32 32  3 32 32 13  1 30 21 32 20 11 20 20 13 20 40  2 19 32 36 23 32 40 14 14 40 15 43 43 14  5 37 36 16  5 30 30 14 27 38 32
 21  2 40 39  2 19  4  1 33 21 10 19 10 11 40 32 20 19  1  7 23 13  7 38 41 13 13 23 38 16 40 20  6 24 24 40 25  6 32 19  8  7

PREDICTOR  13

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 39 39 40 39 30 30 30 39 19 39 30 13 10 30 13 30 31 20 39 39 33 24 39 35 24 39 22 19 11 11 24 21  6 11 26  5 41 31 17 24  5 39
 41 11 32 32 40 11 12 22 39 31 20 21 31 10  1 39 10 19 22 33 39  7 41 40 16 26 23 35 10 10 30 33 43 27  5  8 27 14  7 15 19 40

PREDICTOR  14

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 31 33 40 11 40 13 22 32 31 31 11 10 20 20 34 22 20  2 41 28 31 26 37 40 27 31 32 19 31 11 27 33  6 11 26 20 37 20 26 22 21 33
 33 12 39 33 32 40 12 22  3 39 30 21 19 30 10 20 22 13 33 43 33 27 43 27 12 20 41 30 33 43 36 41 40 12 22 34 38 19 13 21 17 22

PREDICTOR  15

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 37 25  3  5 40 43 27 25 30 36 26 10 24 20 17 20 42 24 19 37 36 19 37 40 20 26 37 21  6 33 33 41  6  5 16 12  7 30 26 27 22 43
  5 31 40 32 29 24  2 37 39  5  6 43 27 24 37  1 20  8 13 25  5 28  7 34 19 27 12 42 30  5 36 25 43 30 27 30 24 26 17 25 35 25

PREDICTOR  16

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 27 19  7 36 40  5 10 21 27 27 25 40 25 25  7 25 25  7 17 17 36 10 15 32 17 25 13 42 10  5 36 30  5 33 22 16  7 26 15 27 21 28
  9 21 39 24  1  7 27 10 21 39  7  9 12 43 14 27 26 30 37 40 20 19 40 39 26 30 10  8  6 33 37 37 21 35 11 38 19 25 22 35 40 40

PREDICTOR  17

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 26 38 36 28 25 42 36 38 26 26 15  6 25 25 14 15 25  7 38 38 14 38 37 28 36 35 14 42 42 28 37 38 15 15 27 25 25 25 36 38 42 37
  5 16  7 35 28 37 37 26 27  5 35 14  6  6 36 25 26 37 43 37 35 27 35 42 37 15 27 36 35 14 17 37 35  5  5  6 26 43 27 15  8 35

PREDICTOR  18

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 37 25 36 36 43 38 38 38 28 36 25 37 26  7  7 26 42  6 38 38 42 25 37 43 38 26 36 15  6  6  5  6  5  5  7 26 28 26  5 15 17 38
 42 42 37  6 38 26 15 43 15 42 17 42  7 25 37 16  7 35 43 42 36 27 42  8 43 28 27 38 15 15 36 16 27 16 28  5 37 16 27 14 38 43

PREDICTOR  19

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 36 37 36 36 36 42 37 25 27 27 25 14 25 25 14 25 26 38 37 37 14 25 37 28 25 25 36 42 42 37 37 38 15  5 27 17 25 26 37 16 42 37
  5 36  7 28 38  5 36 14 17 14  6  6  6 14 36 26 25 25 36 43 35 14 36 42 37 27 14  8 17 42 17 42  8 15 28  6 26 27 27 43  8 35

PREDICTOR  20

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
  5 12 11  1 43 32 12 12 15 14  8  5 20 21 31 12 31 30 42 14  1 42  5  7 12 14 28 25 30 34 37 32 35 14 27 31 40 21 22 42 25 43
 13  5 33  6  5 43 11 41 37  6 18 32  7 28 40 40 20 18 43 12 41 12 29 11 23 41  7  8 34  7 25 11 43  1 21 20 42 38 25 15 31 14

PREDICTOR  21

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 40 25 38 40 32 38 38 37 36 36 31 40 24 24 22 26 26 23 32 40 40 19 40 39 25 26 22 17 43 40  5 42 10 10 21 26 40 30 31 11 17 40
 31 40 24 43  7  5 27 33 21 43 32 38 41 23 30 35 28 34 38 26 37 27 13 32 27 31  6 21 24 34 21 43 27 34 20 22 32 23  7 10 41 38
```

TYPE 6

TABLE 11

SAME AS TABLE 5 FOR TYPE 6

```
PREDICTOR    1

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 32 29 22 37 38 41 27 34 19 31 26 15  5 28 15 25 25 29  2 28 36 32 33 22 25 26 15  9 15  6  6 10 15 15  6 20 35 41  1 26  9 27
 21 17 14 32 19 42 37  3 35  4 33 39 35 35  2 24 24 15  7 23 19 10 37  1  1 32 36  7 27  5 42 33 37 32 41 18  1 12 17 37 27 39

PREDICTOR    2

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 32 12 43 43 38 41 17 28 39 31 26 15 35 30 15 26 21 18 33 28 36 32 33 41 25 25 15 16 15  6  6  6 15 15  6 20 35 41  1 20 21 37
 21 43 14 30 37 17 43 43  5  4 22 33  5 33  2 40 40 20 38 42 20 11  2  1 42 18 36 40 37 37 35 17 31 31 37 18  2 37 13  1 19 39

PREDICTOR    3

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 32 12 43 43 41 17 17 28 29 31 26 10 31 30 15 20 18  9 33 28 32 32 33 41 17 20 10 16 20  6  1  6 15 11  6 26 20 38  1 15 27 37
  6 38  3 30  6  1 43 42  5 35 23 31  1 12  2 35 16 20 38 42 21  2  4  1 37 18  4 42 13 14 42 17 26  7 33 29  2  4 23  1 24 35

PREDICTOR    4

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 32  1 43 40 37 17 17 33 31 31 20 10 25 25 15 20  9 15 27 28 32 32 33  2 10 20 10 12 20 10 16  1 15 11 10 26 20 38  6 15 27 37
  6  3 30 26 11  1 41 43  5 18  1 25  1 12 12 30 15  4 11 42 43 43  4 35 40  9  4 40 13 43 40 17 26 18 27 29  2  4 11  1 24 35

PREDICTOR    5

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 33  2 43 40 37 40  2 37 36 36  6 12 19 16  8 36 42 21  2 28 28 27 38 14  6 16 26  6 16 16 16  7  8  8  7  6  6 14 42  6 27 37
 25 19 25 26 40 35 32  9 19 18 26 18  6 32  2  5 40 38 32  9 26 38 26 37 28  8  5 28 37 14  7 16 27 26 43 42 16 43 26 16  5  8

PREDICTOR    6

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 43 11 11 11 11 11 17  4 25 15 23  3 25  3 31 25 25 38 11 27  8  7  7 38  8 29 16  8  5 26  5 43  5 26 26  7  6 42  5 27  9 16
 17 29 20 22  5 10 32 30 20 29 25 40 14 11  6 18 18  4 41  8 38 37 16 43  6 18  6  6  9  5 37 18 26  5 28 27  5 28 26 18 27 36

PREDICTOR    7

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 34  3 39 22 41 41 22 19 30 40 33 23 39 32 39 34 22 34 34 42  9 37  8 29 28  5 37 28 38 29 18 16 37 29 26 43 37 38 36 38 18  8
  4 30 20 30 23 22 34  4 22 32 23  4 22 23 31  3 33  2 22 26 38  8 29 37 18  9 42 18 37 26 36 27 14  8 38 36 38 27 37 28 29  5

PREDICTOR    8

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 37 21 38 32 17 34 22 41 20 15 32 36 20 42  2 11 15 26 27 18 26 21  1  5 31 27 26  9  3 23 38  8 20 23 14 10  6 19 10 26 13 38
 21 43  3 40 19 18 43 33  3 41 15 23 21 10 23 37  9 33 34 34 28 26 20  7 41  3 23 41 23 18 22 10 29 15 23 24 42 39 17  3 40 23

PREDICTOR    9

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 37 38 38 18 28 34 25 22  3 37 26 36 39 39 23 11 27 21 26 18 21 16  6  5 31 27 20 13 23 23 38 13 20 23 14 30  6 19  5 26 23 38
 27 36 43 34 38 14 38 41 10 15 20 18  5  6  2 27 15 35 14 34 34 33 23 40 41  3 23 24  6 10 22 10 23 15 23 29 43 28 17  4 33 23

PREDICTOR   10

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 37 18 38 18 28 35 33 41  3 37 26 18  5 39 23 11 27 21 31 41 21 17 41  1 32 26 20 24  6 23 38 10 15 23 10  6  6  8 23 20 20 38
 21 38  9 24 29 43 14  9 15 10 29 32 39  6 39 27 15 35 37 30 38 33 30 42 23  7 23 37 23 38 14 42 29 15 23  5 43 14  6 23 17  1

PREDICTOR   11

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 36 36 40 40 37 17 17 33 25 31 20 43 19 27 15 20 15 10 19 27 36 32 33  2 10 20 43 23 20 41 22 43 21 15 10 26 20 38 22 21 23 32
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PREDICTOR   12

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 37 15 37 42 27 34 29 17 24 36 16  9  5 18  4 11 23 42 26 37  2 12 38 23 10 31 20 23 25  9 29 43 42 15 10 17 29 39 42 25 16 38
 22 29 36 18 23  1 26 22 10 37  5 21 30 35 35 23 31 20 43 24 40 33 27  1 32  9 42 28  2 33 41  5 20 35 43 34  1 30 11  7 17 25

PREDICTOR   13

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 32  3 43  3 41 41 17 33 25 26 21 15 14 14 10 15 18 15 27 33 32 27 33 41 13 20 10 12 20 15 16  1 15 11 10 10 14 34  1 21 22 37
  6  1 36 10 42  1 43 42 24  5 17  7  1 12 11 36 16  4 11 42 39 12 23  1 37 18  4  4  3  7 21 40 43 18 39  9  2 29 36  2 34 36

PREDICTOR   14

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 32 17 43 37 43 41 17 33 32 32 21 15 20 33 15 21 16 20 27 33 32 33 27 43 17 15 10  9 20 43 35  1 11 11 10  4 15 14  1 21  9 37
 37  9 42 10 37 17  9 12 13 13 16 33  6 37  6 20 20  1  5 16 37 38 38 37  9 26 31 35 21 15  1 15 22 22 42 23 41 18 36 15 16  4

PREDICTOR   15

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 37  3 33  8 28 26 33 27 22  1 26 18 25 31 18 26 21 21 37 41 22  8 15  1 26  6 23 33  6 23 11 33 18 23 10  8 20 39 33 23 12 12
 22 23  9 14  1 17 29 37 32 40  5 32 19 12 27 27 15 29 31 30 24 37 22 43 23 37 10 18 30  4 31 15 15 11 33 27 40 12 36 20 13 19

PREDICTOR   16

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 37 37 38 14 28  7 22 22  3  1 26 33 10 39  2 11 15 21  9  9 17 33  4  6 23  6 23 18  6 23 22 13  2  2 10  6  8 42 18  8 18 23
  5 43  6 28 19  4 37 20  2 20  1 20 39 27 23 25 27 34 37 41 21 17 22 42 26 18 36 28 23 12  2 38 23 23 37 16 27 15 11 17 20 35

PREDICTOR   17

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 36 37 17 38 42  6 37 37 35  6 25  7 14 14 25 16 15 26 27 37 35 37 28 42  6  6 26 37 26 17 28 38 26 26 37 17 25 42 15 26 26 28
  6 43  6 42 28 43 27 43 43 36 15 35 35 28 35 25 27 43 43 43 27 17 43 38 16 25 16 27 14 37 27 26 17 35 14  6  6 25 35 37 36 38

PREDICTOR   18

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
  5  6 36 43 36 15 28 37  6  5 16 42  5 36 42 25 43 42 16 38 14 28 37 27 15 28 15 28 15  7 17 15  7  7 42  6 16 25 26 16 16 36
 15 16  7 14  6 42 17 28 14 26  5 16  8 16 16 43 16  8 25 28 27  7 43 42 25 16 16 43 42 27  6 42  8 42 35 15 42 15 28 26 17 43

PREDICTOR   19

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 36 37 36 38 42  8 37 43 35  6 15  7  5 14 35 25 43  7 43 43 14 37 43 42  6  6 26 37 25 17 28 38 26  7 37 17 25 25 17 26 26 28
  6 26  6  7 27 36 26 26 17 36 25 37 35 28 26 15  6 43 28 37 16 17 28 38 15 37 37 38 37 37 42 17 37 37 15  5 28 42 15 35  7 38

PREDICTOR   20

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 41 15  7 11 11 43 25  2 19 41 34 20 37 37 31 34 34 30  8 14  1 21  9 43 42 23 40 25 33 30 12 32 30 33 30 36 37 33 31 33 41 25
 42 16 30  1  9 24  2 25 34 22 10 34 20 43 35 28 22 41 26 25 29 32  2 11 25 41 33  2 35  6 22 43 40 37 32 11 20 35 22 21 42  2

PREDICTOR   21

  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
 19 36 37 16 34 25 34 34 32 27 27 16 42 36 21 22 43 22 28 23 24 32 17 13 31 22 16 13 12 21 17 26 21 32 29  4 20 43 12 21 28 36
  3 34  8  1 17 41 13 13 17 10 32 38 27 16 22 31 22 21  6 34 27 33 34 12 13  3 38  8 25  6 39 24 32 21  7 27 33 24 11 22  6 17
```

TABLE 12

NUMBER OF CASES IN NON-STRATIFIED AND STRATIFIED SAMPLES FOR FINAL REGRESSION ANALYSIS

Non-Stratified Sample	769
Non-Stratified Sample with Dew-Points	408
Type 1	276
Type 2	124
Type 3	139
Type 4	75
Type 5	47
Type 6	67

TABLE 13

PREDICTOR CODE FOR FINAL REGRESSION EQUATIONS

Predictor Number	
1,2	First two grid-points for 850 mb heights.
3,4	" " " for 700 mb heights.
5,6	" " " for 500 mb heights.
7,8	" " " for 300 mb heights.
9,10	" " " for 850 mb height tendencies.
11,12	" " " for 700 mb height tendencies.
13,14	" " " for 500 mb height tendencies.
15,16	" " " for 300-500 mb thicknesses.
17,18	" " " for 300-500 mb thickness tendencies.
19,20	" " " for 500-850 mb thicknesses.
21,22	" " " for 500 mb vorticities.
23,24	" " " for 500-850 mb thickness tendencies.
25,26	" " " for 500 mb vorticity tendencies.
27,28	" " " for 500 mb vertical velocities (Total)
29,30	" " " for 500 mb vertical velocities due to thickness advection.
31,32	" " " for 500 mb vertical velocities due to vorticity advection.
33,34	Previous precipitation selected for first two stations.
35,36	First two grid-points for thickness advections.
37,38	" " " for 850 mb dew-point depressions.
39,40	" " " for 700 mb dew-point depressions.
41,42	" " " for 500 mb dew-point depressions.

TABLE 14

FREQUENCY OF PRECIPITATION FOR 12-ESTIMATE INTERVALS FOR NON-STRATIFIED DEVELOPMENTAL SAMPLE

NON STRATIFIED CASES

ELY	BFL	TUS	LAS	PHX	YUM	SAC	SMX	BIL	SLC	BOI	BNO	GTF	MSO	PDT	EKA	MFR	SEA	FAT	LAX	MLF
.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.01	.00	.00	.02	.01	.00	.01	.01	.00	.00	.00
.01	.01	.01	.00	.00	.01	.02	.01	.01	.01	.03	.04	.02	.03	.04	.01	.01	.03	.02	.01	.02
.06	.17	.08	.10	.00	.13	.04	.08	.08	.07	.11	.02	.13	.14	.07	.05	.07	.09	.06	.05	.07
.14	.12	.29	.45	.00	.29	.20	.06	.26	.16	.23	.14	.27	.15	.21	.17	.19	.36	.15	.26	.19
.40	.45	.31	.20	.34	.13	.38	.44	.30	.29	.29	.40	.22	.30	.39	.31	.26	.20	.33	.23	.36
.25	.33	.50	.55	.20	.58	.48	.55	.38	.47	.54	.41	.34	.60	.37	.41	.35	.33	.52	.47	.59
.77	.71	.71	.00	.00	.63	.39	.56	.68	.61	.52	.62	.64	.53	.56	.64	.56	.59	.63	.25	.55
1.00	.57	.83	.00	.00	.00	.62	.72	1.00	.73	.64	.63	.74	.81	.65	.75	.77	.64	.67	.83	.85
.50	.60	.69	.00	.00	.00	.92	.86	.89	1.00	1.00	.75	.92	.76	.79	.83	.95	.74	1.00	1.00	.75
.00	.00	.67	.00	.88	.00	1.00	1.00	1.00	1.00	.91	1.00	.67	.83	.81	.84	1.00	.89	1.00	1.00	.60
.00	.00	.66	.00	.00	.00	1.00	1.00	.00	.00	.00	.00	1.00	.80	.00	.95	.00	.91	.00	1.00	1.00
.00	1.00	1.00	.00	.00	.00	1.00	.00	.00	.00	.00	.00	1.00	1.00	.00	1.00	1.00	1.00	.00	1.00	1.00

RNO	SAN	INW	SFO	PIH	GEG	RBL	PDX	OLM	ALW	AST	SLM	EUG	FCA	HVR	HLN	GGW	LWS	EKO	WMC	FLG
.00	.00	.00	.00	.00	.01	.00	.01	.02	.02	.00	.01	.01	.10	.01	.00	.02	.02	.00	.01	.00
.01	.01	.01	.01	.02	.03	.01	.00	.00	.07	.00	.01	.03	.06	.02	.05	.04	.05	.02	.04	.00
.05	.06	.08	.07	.12	.09	.08	.00	.10	.10	.07	.10	.06	.12	.12	.08	.12	.10	.09	.12	.06
.19	.16	.14	.13	.18	.21	.22	.19	.17	.18	.14	.16	.08	.22	.27	.23	.18	.25	.21	.17	.20
.33	.24	.25	.30	.36	.31	.41	.00	.28	.38	.26	.27	.35	.27	.35	.39	.36	.33	.34	.33	.31
.55	.56	.46	.44	.56	.58	.33	.00	.42	.49	.57	.42	.41	.45	.50	.49	.56	.45	.50	.58	.19
.50	.73	1.00	.59	.73	.62	.70	.26	.52	.52	.65	.54	.60	.64	.36	.76	.60	.58	.76	.60	.54
.82	.77	.83	.77	.67	.65	.70	.00	.79	.72	.71	.83	.75	.65	.73	.64	.78	.77	.60	.67	.61
1.00	.86	.78	.85	.63	.76	.86	.00	.87	1.00	.84	.85	.89	.80	1.00	.50	.83	.43	.83	1.00	.90
1.00	.78	.50	1.00	.75	.81	.67	.82	.90	.00	.91	.97	.89	1.00	1.00	.60	.67	1.00	.78	.00	1.00
.00	1.00	.00	1.00	.00	1.00	.00	.00	.92	.00	.95	.92	.97	1.00	.00	.00	.00	.00	1.00	.00	1.00
.00	.00	.00	1.00	.00	.00	.00	.00	.98	.00	.99	1.00	.97	1.00	.00	1.00	.00	.00	1.00	.00	1.00

NON STRATIFIED CASES INCLUDING DEW POINT DEPRESSIONS

ELY	BFL	TUS	LAS	PHX	YUM	SAC	SMX	BIL	SLC	BOI	BNO	GTF	MSO	PDT	EKA	MFR	SEA	FAT	LAX	MLF
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.02	.00	.02	.00	.00	.01	.02	.00	.00	.00
.00	.00	.01	.00	.00	.00	.01	.00	.02	.01	.02	.02	.01	.05	.04	.00	.01	.02	.00	.01	.01
.02	.17	.02	.00	.00	.03	.00	.03	.08	.05	.05	.06	.07	.11	.10	.07	.02	.10	.07	.08	.12
.15	.25	.26	.41	.00	.13	.21	.13	.16	.13	.19	.23	.21	.11	.19	.10	.14	.17	.14	.20	.06
.32	.31	.27	.75	.23	.50	.19	.29	.42	.26	.37	.29	.36	.33	.00	.28	.21	.50	.10	.29	.27
.55	.22	.67	1.00	.57	.80	.58	.46	.55	.44	.39	.57	.39	.41	.00	.41	.41	.45	.50	.20	.54
.69	.60	.33	.00	1.00	.50	.53	.53	.56	.50	.65	.63	.62	.64	.53	.56	.60	.50	.57	.55	.75
.67	.68	.90	.00	.67	.00	.64	.87	1.00	.68	.56	.58	.58	.69	.52	.71	.80	.57	.93	.71	.63
.67	1.00	1.00	.00	.78	.00	.92	1.00	.00	.86	.88	.92	.92	.92	.80	.91	.93	.82	1.00	.92	1.00
.00	.00	.50	.00	1.00	.00	1.00	1.00	.00	1.00	1.00	.75	1.00	1.00	.93	1.00	1.00	.91	1.00	1.00	.66
1.00	.00	1.00	.00	.00	.00	1.00	.00	.00	1.00	1.00	.00	1.00	1.00	.00	.89	.67	.94	1.00	1.00	1.00
.00	.00	1.00	.00	.00	.00	1.00	.00	.00	.00	.00	.00	1.00	1.00	.00	1.00	1.00	.91	.00	.00	1.00

RNO	SAN	INW	SFO	PIH	GEG	RBL	PDX	OLM	ALW	AST	SLM	EUG	FCA	HVR	HLN	GGW	LWS	EKO	WMC	FLG
.00	.00	.00	.00	.00	.01	.00	.00	.00	.00	.00	.00	.00	.02	.01	.00	.01	.03	.02	.01	.00
.01	.01	.01	.01	.00	.04	.00	.00	.00	.07	.10	.07	.03	.09	.02	.01	.06	.06	.02	.05	.00
.06	.05	.00	.02	.09	.05	.06	.00	.07	.05	.13	.08	.07	.05	.05	.09	.06	.07	.06	.08	.03
.21	.00	.00	.03	.26	.14	.19	.15	.13	.15	.07	.18	.27	.20	.20	.22	.20	.23	.18	.20	.16
.36	.15	.26	.32	.35	.33	.26	.00	.34	.40	.13	.32	.20	.33	.41	.43	.25	.28	.37	.25	.17
.32	.73	.50	.52	.60	.34	.54	.00	.34	.40	.42	.45	.57	.44	.41	.56	.59	.47	.52	.35	.73
.69	.00	.00	.04	.67	.76	.74	.21	.59	.64	.55	.53	.58	.50	.65	.40	.67	.59	.68	.75	.50
.83	.40	.00	.74	.67	.73	.59	.00	.71	.67	.90	.71	.73	.78	.71	.80	.75	.84	.60	.67	.46
1.00	.90	.80	.81	.82	.86	.91	.00	.85	1.00	.77	.90	.73	1.00	.88	.00	1.00	.67	.63	1.00	1.00
1.00	1.00	.89	1.00	.60	.85	1.00	.83	.91	.50	.96	.93	.96	.92	.75	1.00	.67	1.00	.83	1.00	.95
1.00	.00	1.00	1.00	.67	1.00	1.00	.00	.95	1.00	.96	.97	.95	1.00	.00	1.00	1.00	.00	1.00	1.00	1.00
.00	.00	.00	1.00	1.00	1.00	.00	.00	1.00	.00	.99	1.00	1.00	1.00	.00	.00	.00	1.00	1.00	.00	1.00

TABLE 15

SAME AS TABLE 14 FOR TYPES 1 AND 2

TYPE 1

ELY	BFL	TUS	LAS	PHX	YUM	SAC	SMX	BIL	SLC	BOI	BNO	GTF	MSO	PDT	EKA	MFR	SEA	FAT	LAX	MLF
.00	.00	.00	.00	.01	.00	.00	.00	.00	.00	.00	.02	.00	.00	.00	.02	.04	.00	.00	.00	.00
.01	.01	.02	.00	.00	.00	.02	.33	.01	.03	.00	.02	.00	.05	.05	.06	.00	.00	.01	.00	.00
.04	.03	.06	.00	.00	.11	.02	.15	.00	.02	.11	.00	.08	.10	.07	.04	.03	.10	.06	.07	.03
.21	.10	.22	.14	.00	.00	.16	.15	.32	.09	.16	.15	.25	.17	.20	.13	.25	.13	.31	.25	.27
.40	.55	.13	.67	.32	1.00	.36	.29	.53	.50	.38	.27	.69	.21	.36	.39	.24	.40	.00	.25	.25
.50	.00	.60	1.00	1.00	.00	.63	.67	.40	.43	.56	.52	.67	.44	.33	.50	.48	.65	.50	.75	.60
.75	1.00	.50	1.00	.00	.71	.33	1.00	.60	.70	.57	.47	.67	.75	.36	.57	.64	.44	.83	1.00	.93
1.00	.50	.75	.00	.00	.00	1.00	1.00	.67	.75	.71	.83	.33	.78	.69	.71	.73	.63	.50	.00	1.00
1.00	1.00	1.00	.00	.00	1.00	1.00	1.00	.00	.50	.64	1.00	.80	.83	.85	.85	1.00	.82	1.00	.00	.80
.00	.00	1.00	.00	.00	.30	1.00	.00	.00	1.00	1.00	1.00	.00	1.00	.85	1.00	.67	.88	.00	.00	.50
.00	.00	.00	.00	1.00	.00	.00	1.00	.00	1.00	1.00	1.00	.00	1.00	1.00	1.00	1.00	.95	.00	.00	.00
.00	.00	1.00	.00	.00	.00	.00	.00	.00	1.00	.00	1.00	.00	1.00	1.00	1.00	1.00	1.00	.00	.00	.00

RNO	SAN	INW	SFO	PIH	GEG	RBL	PDX	OLM	ALW	AST	SLM	EUG	FCA	HVR	HLN	GGW	LWS	EKO	WMC	FLG
.00	.00	.00	.00	.00	.14	.00	.00	.00	.05	.00	.00	.00	.00	.04	.00	.02	.00	.00	.00	.00
.00	.00	.01	.02	.02	.05	.01	.03	.00	.06	.00	.00	.08	.06	.01	.04	.06	.07	.02	.07	.00
.00	.06	.06	.02	.14	.09	.06	.14	.07	.06	.00	.00	.03	.08	.05	.10	.04	.10	.15	.09	.00
.11	.14	.07	.17	.04	.10	.28	.25	.11	.26	.00	.18	.12	.22	.17	.10	.21	.17	.08	.11	.11
.25	.25	.29	.23	.23	.15	.29	.30	.16	.30	.00	.29	.21	.27	.50	.31	.20	.43	.45	.37	.20
.75	.75	.71	.45	.55	.48	.60	.64	.41	.48	.31	.39	.49	.39	.50	.67	.56	.35	.47	.61	.75
1.00	.75	1.00	1.00	.56	.67	.71	.50	.63	.60	.56	.77	.69	.67	.80	.67	.67	.54	.60	.63	.57
1.00	.60	.67	1.00	.86	.80	.75	1.00	.66	.82	.74	.68	.79	.80	1.00	1.00	1.00	.73	.80	.50	1.00
.00	.50	1.00	1.00	.66	.69	.00	.78	.92	.60	.81	.93	.86	.78	1.00	1.00	.88	.88	.86	1.00	1.00
.00	.00	.00	.00	1.00	.95	1.00	.86	.95	1.00	.91	.94	1.00	1.00	1.00	1.00	1.00	1.00	.88	.00	1.00
.00	1.00	.00	.00	1.00	1.00	.00	.92	1.00	.00	.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.00	1.00
.00	1.00	.00	1.00	.00	1.00	.00	1.00	1.00	1.00	.98	1.00	.95	1.00	1.00	.00	1.00	1.00	1.00	.00	.00

TYPE 2

ELY	BFL	TUS	PHX	YUM	SAC	SMX	BIL	SLC	BOI	BNO	GTF	MSO	PDT	EKA	MFR	SEA	FAT	LAX	MLF	SAN
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.05	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.06	.00	.00	.00	.00	.00	.00	.00	.00	.02	.00	.00	.00	.00
.00	.00	.15	.05	.00	.00	.00	.00	.00	.05	.00	.00	.15	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.20	.20	.50	.00	.00	.22	.00	.00	.00	.27	.00	.15	.00	.14	.27	.00	.00	.00	.50
1.00	.00	.11	.00	1.00	1.00	1.00	.27	.14	.25	.00	.46	.13	.60	.00	1.00	.00	1.00	1.00	.57	1.00
.00	.00	.60	1.00	1.00	.00	.00	.50	.80	.75	1.00	.13	.50	.50	1.00	.00	1.00	.00	.00	.33	.00
.00	.00	.00	.00	.00	.00	.00	.71	1.00	1.00	1.00	.58	.71	1.00	1.00	.50	1.00	.00	1.00	.67	.00
1.00	.00	1.00	.00	.00	.00	.00	.80	1.00	1.00	1.00	1.00	.70	1.00	.00	1.00	1.00	.00	.00	.00	.00
.00	.00	1.00	1.00	.00	.00	.00	.63	1.00	1.00	.00	.75	.80	.00	1.00	1.00	.00	.00	.00	1.00	1.00
1.00	1.00	1.00	.00	.00	.00	1.00	1.00	1.00	1.00	.00	1.00	1.00	.00	.00	.00	.00	.00	1.00	1.00	.00
.00	.00	1.00	.00	.00	.00	.00	1.00	1.00	.00	1.00	1.00	1.00	.00	1.00	.00	1.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	1.00	.00	.00	.00	1.00	1.00	1.00	1.00	.00	1.00	.00	.00	1.00	.00

INW	SFO	PIH	GEG	PDX	OLM	ALW	AST	SLM	EUG	FCA	HVR	HLN	GGW	LWS	EKO	WMC	FLG
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.05	.00	.00	.00	.00	.00	.00	.00	.09	.04	.00	.00	.00
.00	.00	.06	.06	.06	.00	.05	.00	.00	.04	.00	.07	.05	.08	.00	.00	.05	.00
.00	.00	.10	.00	.25	.08	.17	.05	.17	.11	.15	.15	.07	.00	.09	.00	.17	.00
.50	.00	.53	.29	.17	.25	.40	.27	.33	.33	.26	.50	.07	.10	.36	.67	.40	.20
.50	1.00	.38	.67	.17	.63	1.00	.75	.43	1.00	.45	.22	.67	.33	.80	.75	.00	.60
1.00	1.00	.67	.75	.64	1.00	1.00	.45	1.00	1.00	.62	.60	.56	.60	.67	.00	1.00	1.00
.00	.00	.67	1.00	1.00	.00	.00	.88	1.00	.00	.89	.86	.90	.91	1.00	1.00	.00	1.00
1.00	.00	1.00	1.00	1.00	1.00	.00	.86	1.00	.00	.67	.67	.83	1.00	1.00	.00	1.00	1.00
1.00	.00	.00	1.00	1.00	.00	.00	.86	.00	.00	1.00	1.00	1.00	1.00	.00	.00	.00	.00
1.00	.00	1.00	1.00	1.00	.00	.00	1.00	1.00	.00	1.00	1.00	1.00	1.00	.00	.00	.00	.00
.00	.00	1.00	.00	.00	.00	.00	1.00	.00	1.00	1.00	.00	1.00	1.00	.00	.00	1.00	1.00

TABLE 16

SAME AS TABLE 14 FOR TYPES 3 AND 4

TYPE 3

ELY	BFL	TUS	LAS	PHX	YUM	SAC	SMX	BIL	SLC	BOI	BNO	GTF	MSO	PDT	EKA	MFR	SEA	FAT	LAX	MLF
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.02	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.05	.00	.04	.03	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.05	.07	.00	.00	.04	.05	.04
.00	.00	.00	.17	.00	.00	.07	.06	.14	.00	.07	.00	.13	.15	.21	.21	.13	.00	.12	.15	.33
.33	.56	1.00	.00	.00	.50	.29	.17	.50	1.00	.36	.42	.00	.25	.38	.50	.50	.13	.17	.17	.00
1.00	1.00	.50	1.00	1.00	1.00	.43	1.00	1.00	1.00	.25	.22	.60	.20	.31	.18	.31	.60	.60	.50	.00
1.00	1.00	.00	.00	1.00	1.00	.55	.60	1.00	.00	1.00	.67	.67	.67	.83	.50	.60	.60	.67	1.00	1.00
.00	.00	.00	1.00	1.00	1.00	1.00	1.00	.00	.00	1.00	.83	1.00	1.00	.83	.79	.80	.65	1.00	1.00	1.00
.00	.00	1.00	1.00	.00	.00	.78	1.00	.00	.00	1.00	.80	1.00	.86	.75	.82	1.00	.85	1.00	1.00	.00
.00	.00	.00	.00	.00	.00	1.00	.00	.00	.00	1.00	1.00	.00	1.00	.83	1.00	1.00	.94	1.00	1.00	1.00
.00	.00	.00	.00	.00	.00	1.00	.00	.00	.00	1.00	.00	1.00	1.00	1.00	.83	1.00	1.00	1.00	.00	.00
.00	.00	.00	.00	.00	.00	1.00	1.00	.00	.00	1.00	.00	.00	1.00	1.00	1.00	1.00	1.00	.00	.00	.00

RNO	SAN	INW	SFO	PIH	GEG	RBL	PDX	OLM	ALW	AST	SLM	EUG	FCA	HVR	HLN	GGW	LWS	EKO	WMC	FLG
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.06	.00	.20	.00	.06	.00	.00	.00	.00	.00	.00	.00	.06	.00	.00	.00
.04	.00	.00	.00	.00	.00	.07	.09	.00	.07	.00	.11	.00	.05	.05	.00	.05	.07	.04	.06	.06
.15	.00	.00	.06	.18	.21	.05	.00	.33	.13	.00	.09	.08	.06	.00	.00	.00	.13	.15	.21	.07
.14	.50	.00	.38	.22	.25	.22	.00	.00	.37	.00	.36	.29	.42	.14	.27	.00	.17	.33	.25	.38
.50	.75	1.00	.40	.57	.50	.67	.47	.25	.40	.00	.25	.50	.44	1.00	.86	1.00	.38	.40	.50	.33
.50	1.00	1.00	.75	.50	.70	.55	.65	.73	.63	.40	.70	.55	.75	.67	1.00	1.00	.79	1.00	.67	1.00
1.00	.00	1.00	.71	1.00	.75	.64	.86	.53	.60	.67	.63	.86	.83	1.00	.75	1.00	.70	.00	1.00	1.00
1.00	.00	1.00	.86	1.00	.78	.82	.94	1.00	1.00	.85	.88	.92	.67	1.00	.00	1.00	.83	1.00	1.00	1.00
1.00	.00	.00	1.00	1.00	1.00	1.00	.77	.94	1.00	1.00	1.00	.83	1.00	1.00	1.00	.00	.80	.00	1.00	1.00
.00	.00	.00	1.00	1.00	1.00	.50	1.00	1.00	1.00	.97	1.00	1.00	1.00	.00	.00	.00	1.00	.00	1.00	1.00
1.00	.00	.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.94	1.00	1.00	1.00	.00	.00	.00	1.00	1.00	.00

TYPE 4

TUS	SAC	BIL	SLC	BOI	BNO	GTF	MSO	PDT	EKA	MFR	SEA	FAT	MLF	RNO	SAN	SFO	PIH	GEG	RBL	PDX
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.20	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.67	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	1.00	.00	1.00	.00	1.00	.00	1.00	.00	.00	.50	.00	.00	.00	1.00	.00	.00	.00	.00	.00
.00	.00	.00	1.00	1.00	.00	1.00	1.00	.00	1.00	.00	1.00	.00	.00	.00	.00	.00	.00	.00	.00	1.00
1.00	.00	1.00	.00	.00	1.00	.00	1.00	1.00	.00	1.00	1.00	1.00	1.00	.00	.00	1.00	.00	1.00	1.00	1.00
1.00	1.00	.00	.00	1.00	.00	.00	1.00	1.00	.00	.00	1.00	.00	.00	1.00	.00	.00	1.00	1.00	.00	.00
1.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	1.00	.00	.00	.00	.00	.00	.00	1.00	.00	1.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	1.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	1.00	.00	.00	.00	.00	.00	.00	.00	1.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

OLM	ALW	AST	SLM	EUG	FCA	HVR	HLN	GGW	LWS	EKO	WMC	FLG
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.17	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00
.67	1.00	.00	.00	.00	.75	1.00	1.00	1.00	.00	.00	.00	.00
1.00	.00	1.00	.00	1.00	1.00	.00	.00	.00	1.00	.00	.00	.00
1.00	.00	1.00	1.00	1.00	1.00	1.00	.00	1.00	.00	1.00	1.00	.00
1.00	.00	1.00	.00	.00	1.00	1.00	.00	.00	.00	.00	.00	1.00
1.00	.00	1.00	.00	.00	1.00	.00	.00	.00	1.00	.00	.00	.00
1.00	.00	1.00	.00	.00	1.00	1.00	.00	.00	.00	.00	.00	.00
.00	.00	1.00	.00	.00	1.00	.00	.00	.00	.00	.00	.00	.00

TABLE 17

SAME AS TABLE 14 FOR TYPES 5 AND 6

TYPE 5

ELY	BFL	TUS	LAS	PHX	YUM	SAC	SMX	BIL	SLC	BOI	BNO	GTF	MSO	PDT	EKA	MFR	SEA	FAT	LAX	MLF
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.33	.00	.14	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.25	.00	.00	.00	.25	.00	.00	.00	.00	.00	.00
1.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.67	.00	.67	.33	1.00	.50	.33	.33	.00	.00	.00
.00	.67	.00	.00	1.00	.00	1.00	1.00	.00	1.00	1.00	.00	.50	1.00	.00	.00	1.00	1.00	.00	1.00	1.00
1.00	1.00	.00	1.00	1.00	.00	1.00	1.00	.00	1.00	1.00	1.00	1.00	1.00	.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	.00	1.00	1.00	.00	1.00	1.00	1.00	1.00	.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	.00	.00	.00	.00	1.00	1.00	.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

RNO	SAN	INW	SFO	PIH	GEG	RBL	PDX	OLM	ALW	AST	SLM	EUG	FCA	HVR	HLN	GGW	LWS	EKO	WMC	FLG
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.17	.00	.00	.00	.13	.00	.00	.00
.50	.00	.00	.00	.50	.25	.00	.00	.00	1.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	1.00	.00	1.00	.25	.00	.00	.00	.00	.00	.00	.50	.00	.86	.25	.50	.00	.33	.00
1.00	.00	1.00	1.00	1.00	.00	1.00	.00	1.00	1.00	.00	.00	1.00	.00	1.00	1.00	.75	.00	1.00	.50	1.00
.50	1.00	.00	.00	.80	.50	1.00	1.00	.00	1.00	.00	.00	.67	.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	.00	1.00	1.00	.67	.00	1.00	1.00	1.00	.00	.75	1.00	1.00	1.00	1.00	1.00
1.00	1.00	.00	1.00	.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.50	1.00	.00	1.00	1.00	1.00
1.00	1.00	.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

TYPE 6

ELY	BFL	TUS	LAS	PHX	YUM	SAC	SMX	BIL	SLC	BOI	BNO	GTF	MSO	PDT	EKA	MFR	SEA	FAT	LAX	MLF
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.13	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.20	.00	.00	.00	.00	.00	.00	.00
.00	.00	.50	1.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.50	.00	.20	.00	.00	.17
.44	.00	.00	1.00	.33	.00	.00	.00	.75	.20	.00	.00	.33	1.00	.00	.00	.00	.50	1.00	.50	.17
.75	1.00	1.00	.00	1.00	1.00	.00	1.00	.50	1.00	1.00	.75	1.00	.25	.00	.50	1.00	.50	.00	1.00	1.00
1.00	.00	.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.33	1.00	1.00	1.00	.00	1.00	1.00	1.00	.00	1.00	.80
1.00	.00	1.00	1.00	1.00	1.00	.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	.00	1.00	.00	1.00	.00	.00	1.00	.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.00	1.00	.00	1.00	1.00
1.00	.00	1.00	.00	.00	1.00	.00	.00	1.00	1.00	1.00	1.00	.00	1.00	.00	.00	.00	.00	1.00	1.00	1.00
.00	.00	1.00	.00	1.00	.00	.00	.00	.00	1.00	1.00	1.00	1.00	.00	.00	.00	1.00	1.00	.00	1.00	.00

RNO	SAN	INW	SFO	PIH	GEG	RBL	PDX	OLM	ALW	AST	SLM	EUG	FCA	HVR	HLN	GGW	LWS	EKO	WMC	FLG
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.14	.00	.00	.00	.00
.13	.00	.00	.00	.00	.10	.00	.00	.00	.14	.00	.10	.00	.17	.00	.17	.13	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.20	.00	.00	.00	.00	.00	.00	.20	.67	.00	.33	.33
1.00	.00	.25	.00	1.00	1.00	1.00	1.00	.29	1.00	.25	1.00	.00	.50	.00	.50	.50	1.00	.50	.00	.50
1.00	1.00	1.00	1.00	.00	.00	.00	.60	1.00	1.00	1.00	.67	1.00	1.00	1.00	.50	.50	.00	1.00	1.00	.00
1.00	1.00	1.00	.00	1.00	.00	.00	1.00	.75	1.00	1.00	1.00	.67	.67	1.00	.67	1.00	1.00	1.00	1.00	1.00
.00	1.00	1.00	.00	.00	1.00	.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	.00	1.00	1.00	.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.00	.00	.00	.00	.00	1.00	1.00
.00	1.00	1.00	.00	.00	.00	1.00	1.00	1.00	.00	1.00	1.00	1.00	1.00	.00	1.00	1.00	.00	1.00	.00	1.00
.00	1.00	1.00	.00	1.00	.00	.00	1.00	1.00	1.00	1.00	1.00	.00	1.00	.00	1.00	.00	1.00	.00	1.00	1.00

TABLE 18

NUMBER OF TIMES EACH PREDICTOR FIELD IS SELECTED AS THE FIRST OR SECOND PREDICTOR IN THE FINAL EQUATIONS FOR ALL STATIONS

	Non-Stratified Sample		Type					
		with Dew-Points	1	2	3	4	5	6
850 mb Height	10	13	8	9	24	5	7	12
700 mb Height	5	3	12	5	9	3	5	6
500 mb Height	7	3	2	2	2	0	4	2
300 mb Height	1	0	1	2	4	2	4	1
850 mb Height Tendencies	0	2	2	3	6	0	6	5
700 mb Height Tendencies	0	0	2	5	0	2	8	5
500 mb Height Tendencies	0	0	1	4	1	3	2	3
300-500 mb Thickness	0	0	0	2	1	3	2	4
300-500 mb Thickness Tendencies	0	0	0	4	1	6	4	4
500-850 mb Thickness	1	1	1	2	3	4	5	7
500 mb Vorticity	1	3	1	12	8	9	12	8
500-850 mb Thickness Tendencies	0	0	0	3	1	3	3	4
500 mb Vorticity Tendency	0	0	0	4	2	5	5	6
500 mb Vertical Velocity (Total)	2	3	1	3	1	9	2	3
500 mb Vertical Velocity (Thickness Adv.)	0	0	0	4	6	8	3	2
500 mb Vertical Velocity (Vorticity Adv.)	0	1	2	9	2	2	2	1
Previous Precipitation	57	50	45	2	6	7	2	1
Thickness Advection	0	0	6	9	7	13	8	10
850 mb Dew Point Depression		4						
700 mb Dew Point Depression		1						
500 mb Dew Point Depression		0						

TABLE 19

REDUCTION OF VARIANCE

Station	Non-Stratified Data		Types					
		with Dew-Points	1	2	3	4	5	6
ELY	.357	.406	.381	.509	.439		.824	.555
BFL	.350	.394	.422	.821	.368		.693	.538
TUS	.445	.488	.561	.432	.402	.757	.694	.716
LAS	.237	.266	.386		.521		.790	.537
PHX	.510	.524	.644	.385	.523		.708	.692
YUM	.273	.351	.474	.348	.483		.790	.655
SAC	.463	.556	.361	.394	.514	.720	.840	.694
SMX	.485	.514	.437	.560	.521		.798	.671
BIL	.319	.264	.310	.451	.399	.434	.789	.581
SLC	.386	.270	.458	.590	.399	.793	.818	.634
BOI	.314	.320	.380	.505	.493	.562	.681	.725
BNO	.313	.349	.471	.582	.461	.599	.710	.647
GTF	.416	.434	.353	.551	.558	.509	.679	.623
MSO	.319	.354	.344	.413	.592	.594	.721	.617
PDT	.456	.497	.485	.462	.428	.623	.742	.656
EKA	.506	.537	.437	.590	.550	.574	.717	.606
MFR	.416	.434	.408	.582	.586	.641	.767	.674
SEA	.505	.504	.439	.446	.461	.644	.745	.634
FAT	.400	.476	.368	.355	.503	.642	.812	.649
LAX	.511	.508	.316	.546	.443		.810	.757
MLF	.420	.486	.412	.552	.476	.690	.816	.637
RNO	.383	.441	.465		.523	.720	.733	.560
SAN	.508	.534	.550	.448	.452	.447	.804	.808
INW	.455	.508	.399	.589	.581		.672	.723
SFO	.484	.550	.452	.533	.544	.681	.781	.548
PIH	.373	.421	.428	.364	.542	.740	.722	.664
GEG	.353	.429	.395	.524	.500	.654	.689	.649
RBL	.380	.403	.316		.400	.673	.697	.723
PDX	.555	.332	.529	.464	.467	.651	.840	.756
OLM	.501	.356	.453	.390	.434	.594	.765	.643
ALW	.208	.381	.313	.314	.441	.486	.695	.533
AST	.467	.484	.284	.512	.294	.658	.778	.673
SLM	.487	.465	.419	.478	.453	.564	.733	.701
EUG	.497	.519	.472	.389	.493	.578	.625	.711
FCA	.186	.297	.360	.437	.528	.633	.670	.577
HVR	.250	.329	.307	.432	.587	.648	.842	.606
HLN	.247	.256	.331	.515	.448	.436	.526	.585
GGW	.228	.284	.363	.476	.466	.569	.662	.426
LWS	.235	.357	.316	.360	.413	.692	.726	.560
EKO	.359	.393	.439	.418	.535	.631	.822	.581
WMC	.266	.298	.253	.539	.534	.660	.700	.635
FLG	.535	.245	.524	.575	.485	.720	.847	.763

TABLE 20

STANDARD ERROR OF ESTIMATE

Station	Non-Stratified Sample		Types					
		with Dew-Points	1	2	3	4	5	6
ELY	.216	.231	.192	.129	.145		.203	.280
BFL	.203	.217	.181	.040	.202		.285	.155
TUS	.219	.207	.199	.240	.164	.105	.095	.244
LAS	.155	.152	.116		.146		.144	.178
PHX	.181	.187	.148	.179	.133		.234	.242
YUM	.166	.172	.123	.132	.125		.152	.198
SAC	.256	.262	.241	.074	.335	.068	.231	.074
SMX	.210	.225	.187	.088	.224		.250	.193
BIL	.286	.283	.269	.357	.175	.189	.152	.218
SLC	.273	.270	.278	.212	.116	.078	.210	.295
BOI	.321	.320	.342	.213	.258	.145	.304	.241
BNO	.330	.349	.316	.135	.335	.081	.290	.259
GTF	.289	.289	.268	.340	.208	.153	.283	.275
MSO	.346	.345	.332	.372	.277	.160	.305	.265
PDT	.294	.299	.309	.222	.348	.134	.268	.230
EKA	.315	.323	.337	.140	.342	.118	.247	.244
MFR	.309	.326	.328	.137	.299	.108	.274	.180
SEA	.347	.353	.378	.224	.370	.235	.260	.271
FAT	.224	.231	.194	.106	.241	.073	.231	.155
LAX	.190	.210	.156	.109	.224		.232	.194
MLF	.241	.247	.227	.208	.172	.070	.214	.294
RNO	.208	.236	.146		.234	.068	.272	.209
SAN	.197	.204	.172	.122	.169	.095	.233	.200
INW	.197	.195	.172	.194	.137		.210	.257
SFO	.264	.271	.237	.092	.327	.072	.265	.126
PIH	.293	.291	.286	.318	.235	.065	.297	.237
GEG	.349	.339	.356	.232	.354	.178	.321	.198
RBL	.275	.293	.257		.386	.071	.266	.099
PDX	.325	.332	.346	.288	.377	.129	.187	.249
OLM	.355	.356	.350	.279	.331	.239	.192	.274
ALW	.370	.381	.375	.226	.372	.092	.302	.268
AST	.352	.327	.339	.354	.316	.224	.113	.307
SLM	.356	.369	.384	.236	.364	.184	.186	.250
EUG	.343	.348	.367	.213	.362	.142	.226	.209
FCA	.409	.374	.378	.381	.316	.247	.295	.299
HVR	.298	.313	.295	.335	.218	.149	.192	.143
HLN	.325	.322	.277	.333	.233	.131	.363	.302
GGW	.323	.326	.310	.336	.177	.144	.299	.320
LWS	.368	.348	.380	.284	.366	.100	.276	.237
EKO	.304	.306	.307	.174	.231	.078	.242	.290
WMC	.301	.305	.310	.197	.254	.074	.295	.204
FLG	.241	.245	.193	.213	.218	.068	.218	.263

TABLE 21

ROOT MEAN SQUARE ERRORS

NON-STRATIFIED SAMPLE

ELY	BFL	TUS	LAS	PHX	YUM	SAC	SMX	BIL	SLC	BOI	BNO	GTF	MSO	PDT	EKA	MFR	SEA	FAT	LAX	MLF
.328	.309	.356	.211	.370	.231	.495	.360	.406	.416	.373	.460	.485	.515	.481	.611	.506	.655	.410	.339	.354

RNO	SAN	INW	SFO	PIH	GEG	RBL	PDX	OLM	ALW	AST	SLM	EUG	FCA	HVR	HLN	GGW	LWS	EKO	WMC	FLG
[illegible]	.360	.269	.534	.404	.588	.563	.602	.657	.531	.560	.656	.632	.499	.381	.476	.408	.528	.415	.342	.471

ELY	BFL	TUS	LAS	PHX	YUM	SAC	SMX	BIL	SLC	BOI	BNO	GTF	MSO	PDT	EKA	MFR	SEA	FAT	LAX	MLF
.339	.316	.359	.217	.367	.227	.514	.365	.414	.428	.388	.468	.495	.522	.481	.615	.531	.652	.412	.343	.347

RNO	SAN	INW	SFO	PIH	GEG	RBL	PDX	OLM	ALW	AST	SLM	EUG	FCA	HVR	HLN	GGW	LWS	EKO	WMC	FLG
.357	.348	.288	.55[illegible]	.408	.54[illegible]	.575	.6[illegible]4	.673	.532	.557	.672	.660	.506	.365	.483	.403	.526	.419	.347	.462

NON-STRATIFIED SAMPLE INCLUDING DEW POINTS

ELY	BFL	TUS	LAS	PHX	YUM	SAC	SMX	BIL	SLC	BOI	BNO	GTF	MSO	PDT	EKA	MFR	SEA	FAT	LAX	MLF
.345	.279	.365	.211	.370	.231	.424	.298	.372	.442	.350	.457	.487	.521	.484	.502	.517	.670	.323	.286	.369

RNO	SAN	INW	SFO	PIH	GEG	RBL	PDX	OLM	ALW	AST	SLM	EUG	FCA	HVR	HLN	GGW	LWS	EKO	WMC	FLG
.355	.362	.296	.443	.391	.573	.525	.611	.606	.488	.452	.649	.636	.505	.368	.492	.394	.537	.439	.350	.407

ELY	BFL	TUS	LAS	PHX	YUM	SAC	SMX	BIL	SLC	BOI	BNO	GTF	MSO	PDT	EKA	MFR	SEA	FAT	LAX	MLF
.356	.279	.371	.222	.365	.231	.449	.3[illegible]3	.388	.459	.349	.467	.464	.542	.484	.523	.519	.681	.350	.278	.374

RNO	SAN	INW	SFO	PIH	GEG	RBL	PDX	OLM	ALW	AST	SLM	EUG	FCA	HVR	HLN	GGW	LWS	EKO	WMC	FLG
.360	.347	.291	.454	.414	.585	.565	.611	.621	.495	.483	.662	.646	.513	.377	.505	.401	.542	.427	.344	.436

TABLE 22
ROOT MEAN SQUARE ERRORS FOR TYPES 1, 2 AND 3

TYPE 1

ELY	BFL	TUS	LAS	PHX	YUM	SAC	SMX	BIL	SLC	BOI	RNO	GTF	MSO	PDT	EKA	MFR	SEA	FAT	LAX	MLF
.223	.195	.185	.080	.072	.032	.227	.223	.330	.268	.401	.400	.328	.497	.504	.244	.277	.581	.235	.249	.264
RNO	SAN	INW	SFO	PIH	GEG	RBL	PDX	OLM	ALW	AST	SLM	EUG	FCA	HVR	HLN	GGW	LWS	EKO	WMC	FLG
.145	.191	.132	.297	.313	.434	.135	.609	.586	.518	.415	.346	.474	.589	.367	.438	.367	.452	.266	.219	.138

ELY	BFL	TUS	LAS	PHX	YUM	SAC	SMX	BIL	SLC	BOI	BNO	GTF	MSO	PDT	EKA	MFR	SEA	FAT	LAX	MLF
.212	.227	.165	.006	.061	.000	.170	.295	.347	.290	.405	.442	.323	.486	.515	.223	.271	.581	.229	.250	.266
RNO	SAN	INW	SFO	PIH	GEG	RBL	PDX	OLM	ALW	AST	SLM	EUG	FCA	HVR	HLN	GGW	LWS	EKO	WMC	FLG
.261	.224	.251	.305	.291	.459	.213	.606	.594	.498	.419	.326	.464	.598	.338	.482	.402	.466	.247	.248	.030

TYPE 2

ELY	BFL	TUS	LAS	PHX	YUM	SAC	SMX	BIL	SLC	BOI	BNO	GTF	MSO	PDT	EKA	MFR	SEA	FAT	LAX	MLF
.312	.043	.154		.250	.079	.098	.057	.496	.603	.388	.328	.609	.707	.435	.194	.084	.768	.078	.080	.367
RNO	SAN	INW	SFO	PIH	GEG	RBL	PDX	OLM	ALW	AST	SLM	EUG	FCA	HVR	HLN	GGW	LWS	EKO	WMC	FLG
	.071	.229	.107	.585	.366		.690	.563	.477	.498	.611	.516	.716	.620	.372	.757	.582	.139	.201	.281

ELY	BFL	TUS	LAS	PHX	YUM	SAC	SMX	BIL	SLC	BOI	BNO	GTF	MSO	PDT	EKA	MFR	SEA	FAT	LAX	MLF
.365	.000	.109		.277	.000	.000	.042	.563	.725	.55[illegible]	.326	.613	.630	.480	.380	.018	.302	.000	.000	.331
RNO	SAN	INW	SFO	PIH	GEG	RBL	PDX	OLM	ALW	AST	SLM	EUG	FCA	HVR	HLN	GGW	LWS	EKO	WMC	FLG
	.000	.167	.043	.629	.37[illegible]		.833	.601	.442	.505	.649	.501	.785	.762	.650	.648	.695	.090	.084	.315

TYPE 3

ELY	BFL	TUS	LAS	PHX	YUM	SAC	SMX	BIL	SLC	BOI	RNO	GTF	MSO	PDT	EKA	MFR	SEA	FAT	LAX	MLF
.243	.248	.235	.140	.155	.135	.538	.287	.245	.334	.367	.606	.251	.446	.573	.479	.506	.506	.300	.314	.185
RNO	SAN	INW	SFO	PIH	GEG	RBL	PDX	OLM	ALW	AST	SLM	EUG	FCA	HVR	HLN	GGW	LWS	EKO	WMC	FLG
.365	.197	.160	.587	.357	.689	.507	.536	.372	.700	.288	.442	.461	.534	.237	.323	.159	.628	.349	.379	.150

ELY	BFL	TUS	LAS	PHX	YUM	SAC	SMX	BIL	SLC	BOI	RNO	GTF	MSO	PDT	EKA	MFR	SEA	FAT	LAX	MLF
.225	.330	.213	.000	.000	.000	.513	.335	.206	.354	.468	.548	.221	.495	.570	.507	.497	.519	.299	.271	.113
RNO	SAN	INW	SFO	PIH	GEG	RBL	PDX	OLM	ALW	AST	SLM	EUG	FCA	HVR	HLN	GGW	LWS	EKO	WMC	FLG
.314	.220	.000	.567	.354	.729	.530	.598	.346	.677	.278	.389	.456	.571	.228	.312	.034	.625	.352	.399	.033

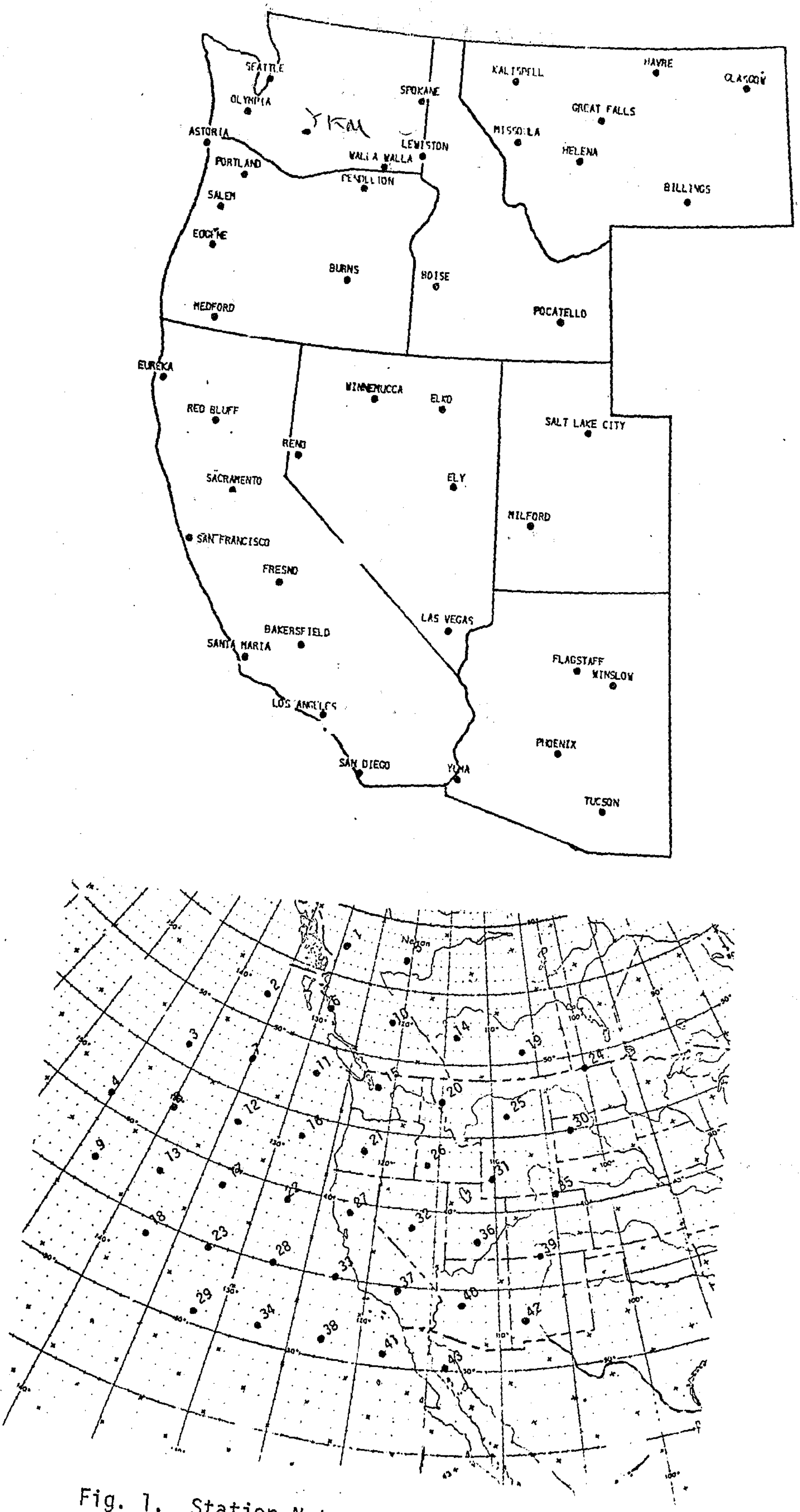
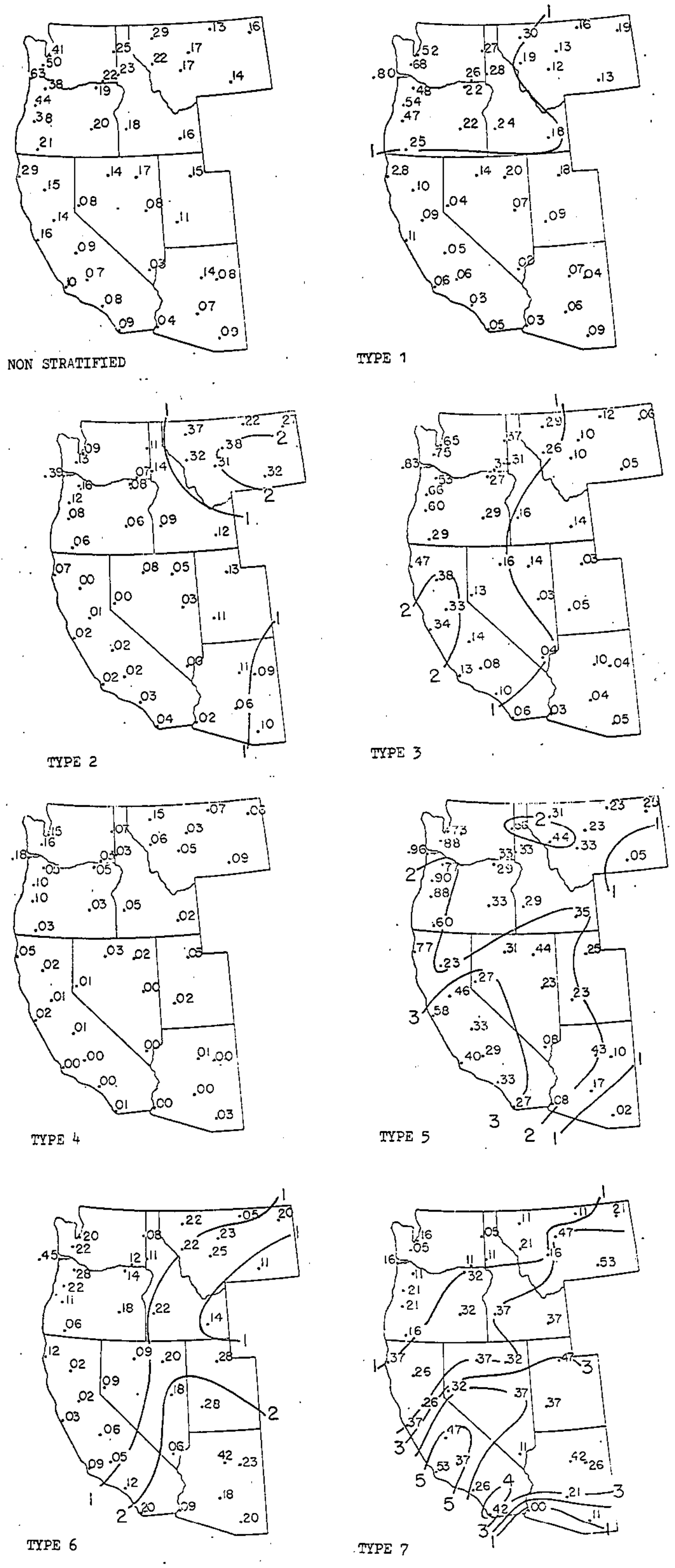


Fig. 1. Station Network and 43-Point Grid.

FIGURE 2

PRECIPITATION FREQUENCIES. SOLID LINES REPRESENT FRACTION OVER NORMAL



NON STRATIFIED

TYPE 1

TYPE 2

TYPE 3

TYPE 4

TYPE 5

TYPE 6

TYPE 7

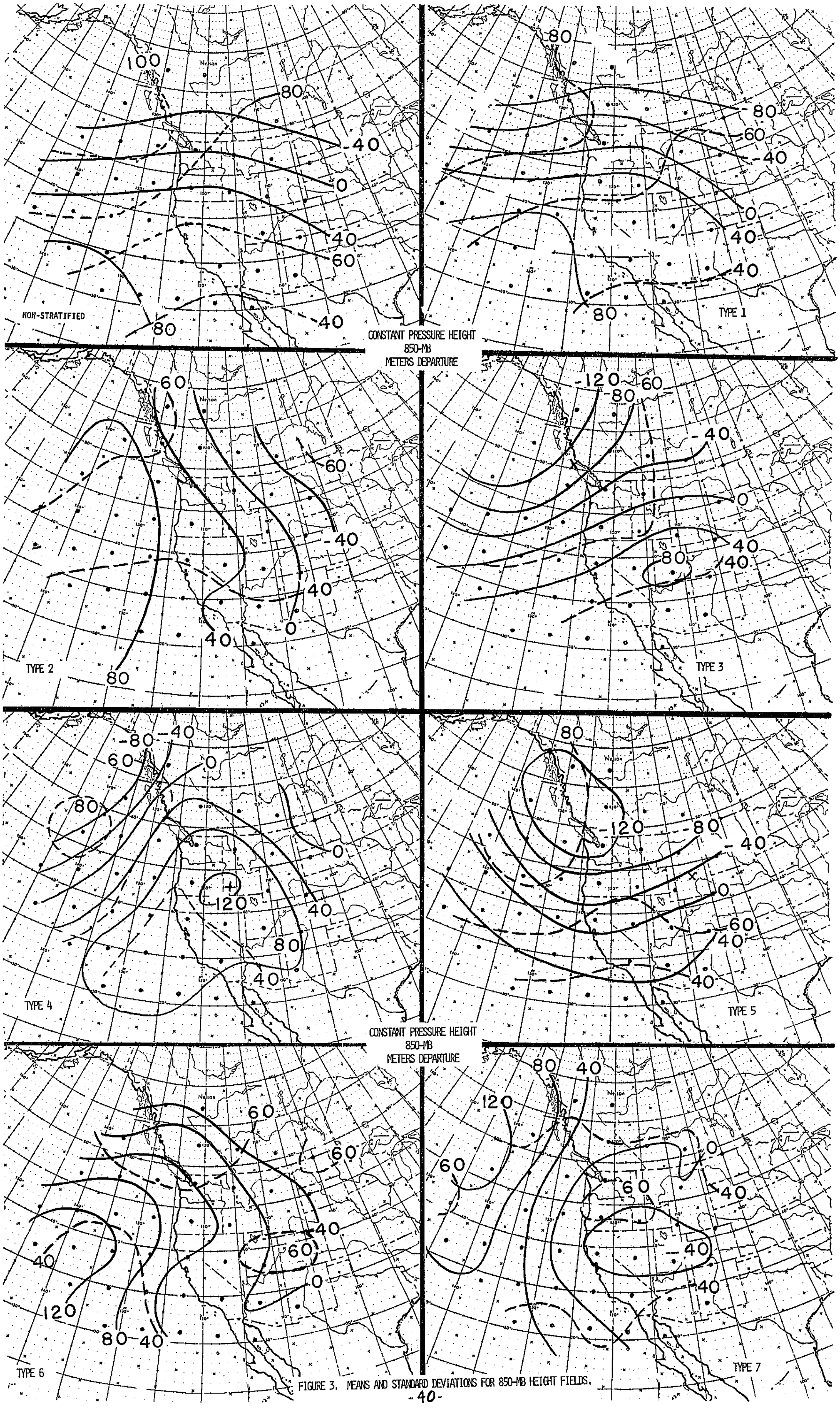


FIGURE 3. MEANS AND STANDARD DEVIATIONS FOR 850-MB HEIGHT FIELDS.

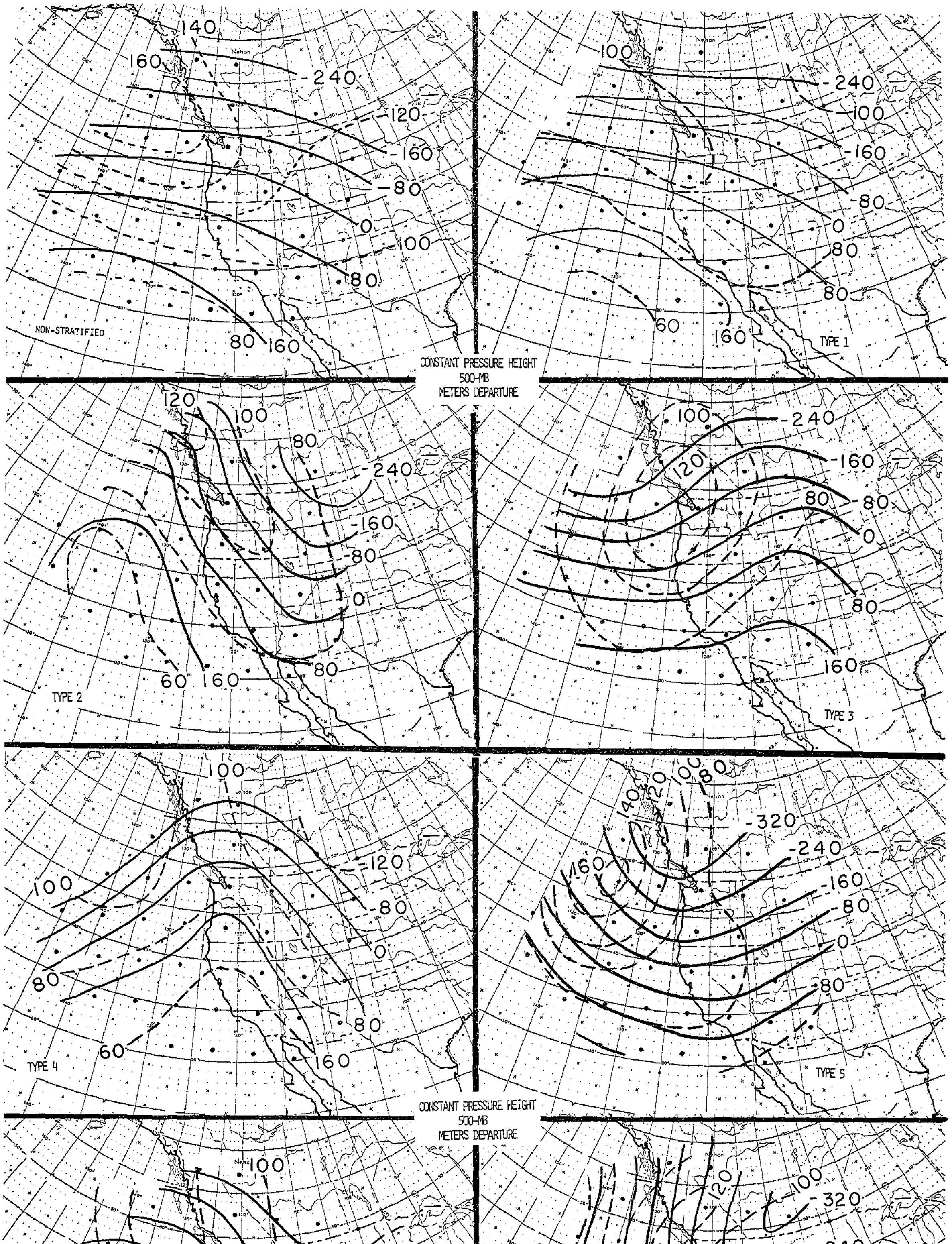


FIGURE 4. MEANS AND STANDARD DEVIATIONS FOR 500-MB HEIGHT FIELDS.

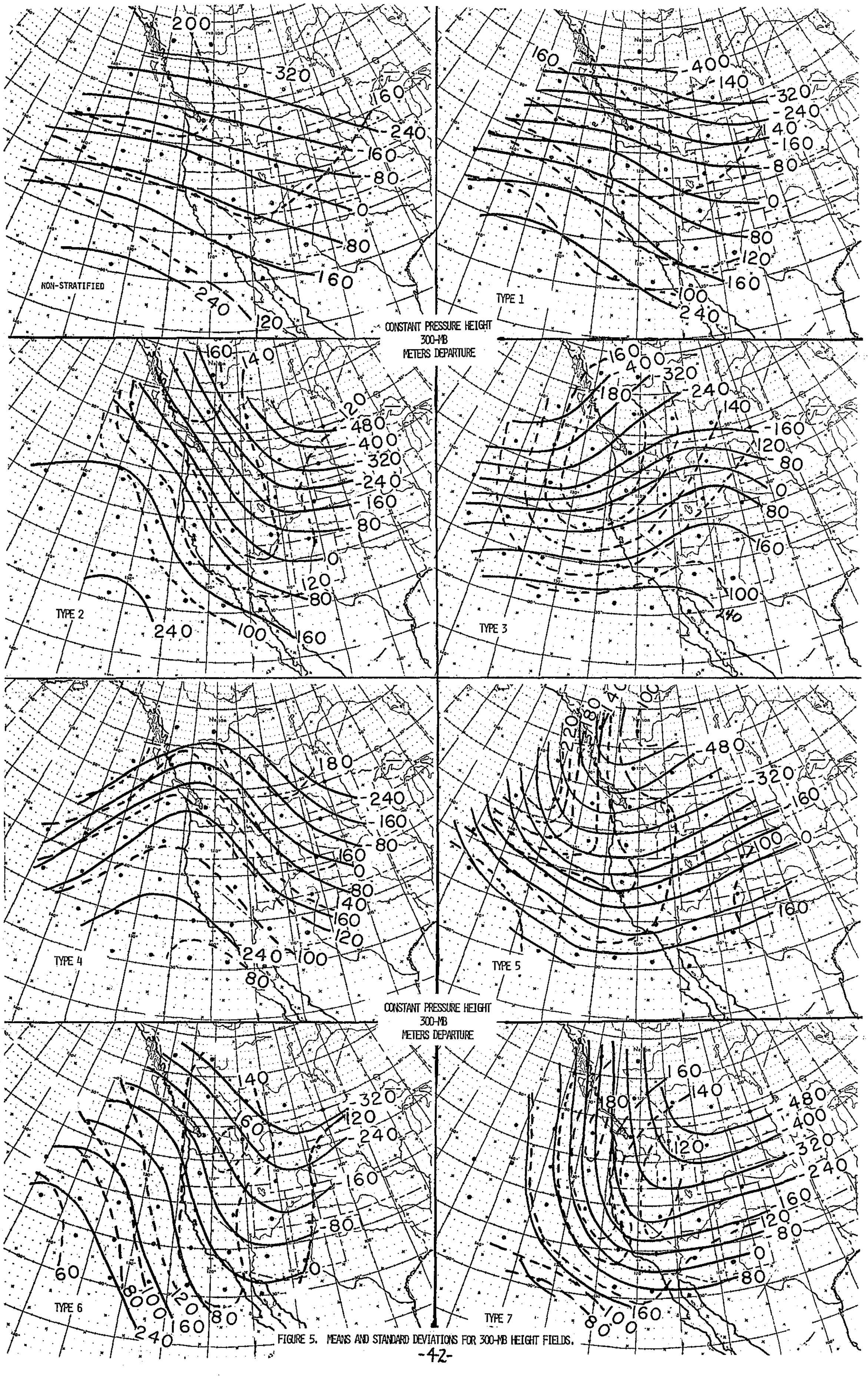


FIGURE 5. MEANS AND STANDARD DEVIATIONS FOR 300-MB HEIGHT FIELDS.

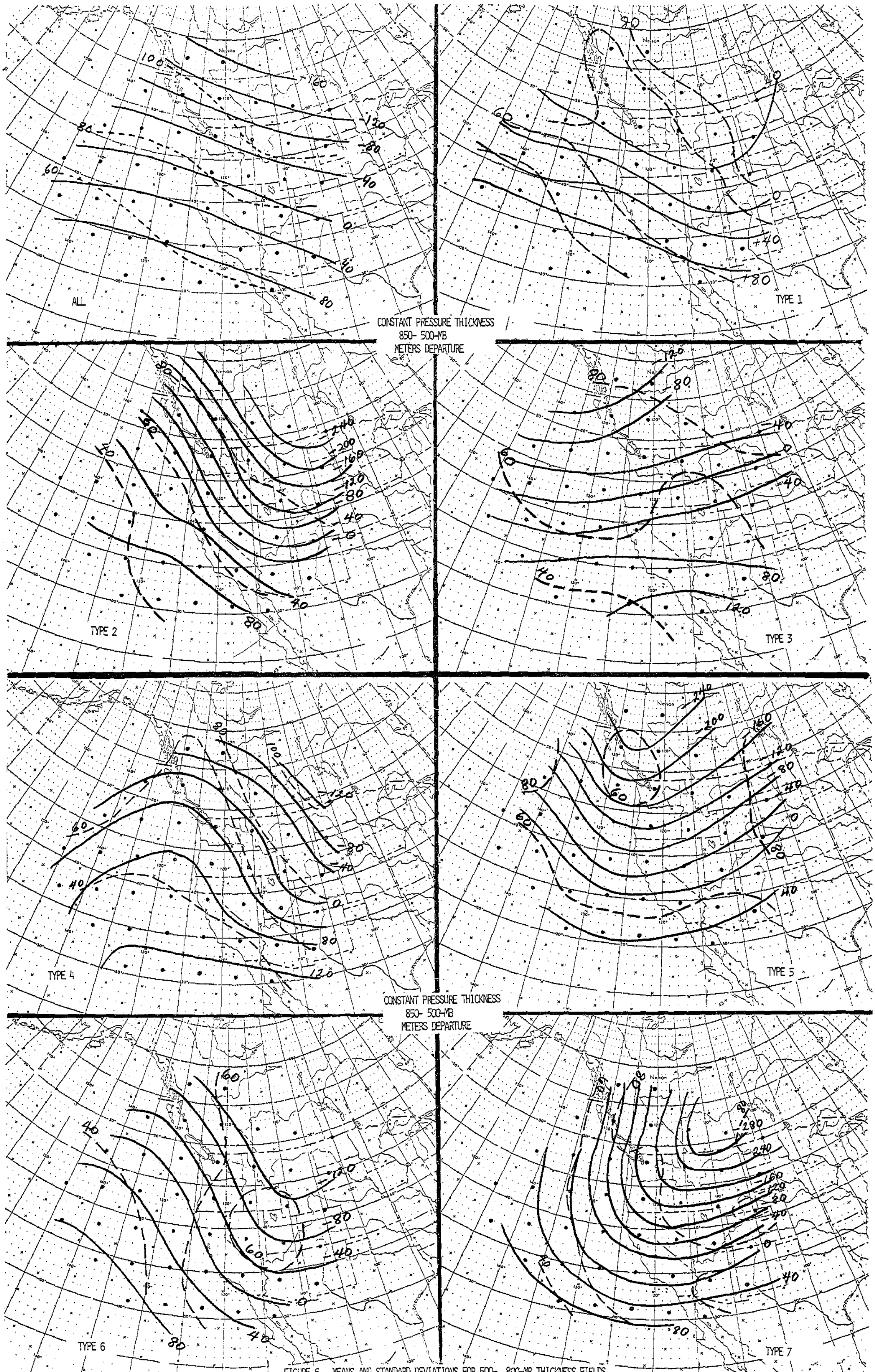


FIGURE 6. MEANS AND STANDARD DEVIATIONS FOR 500- 800-MB THICKNESS FIELDS.

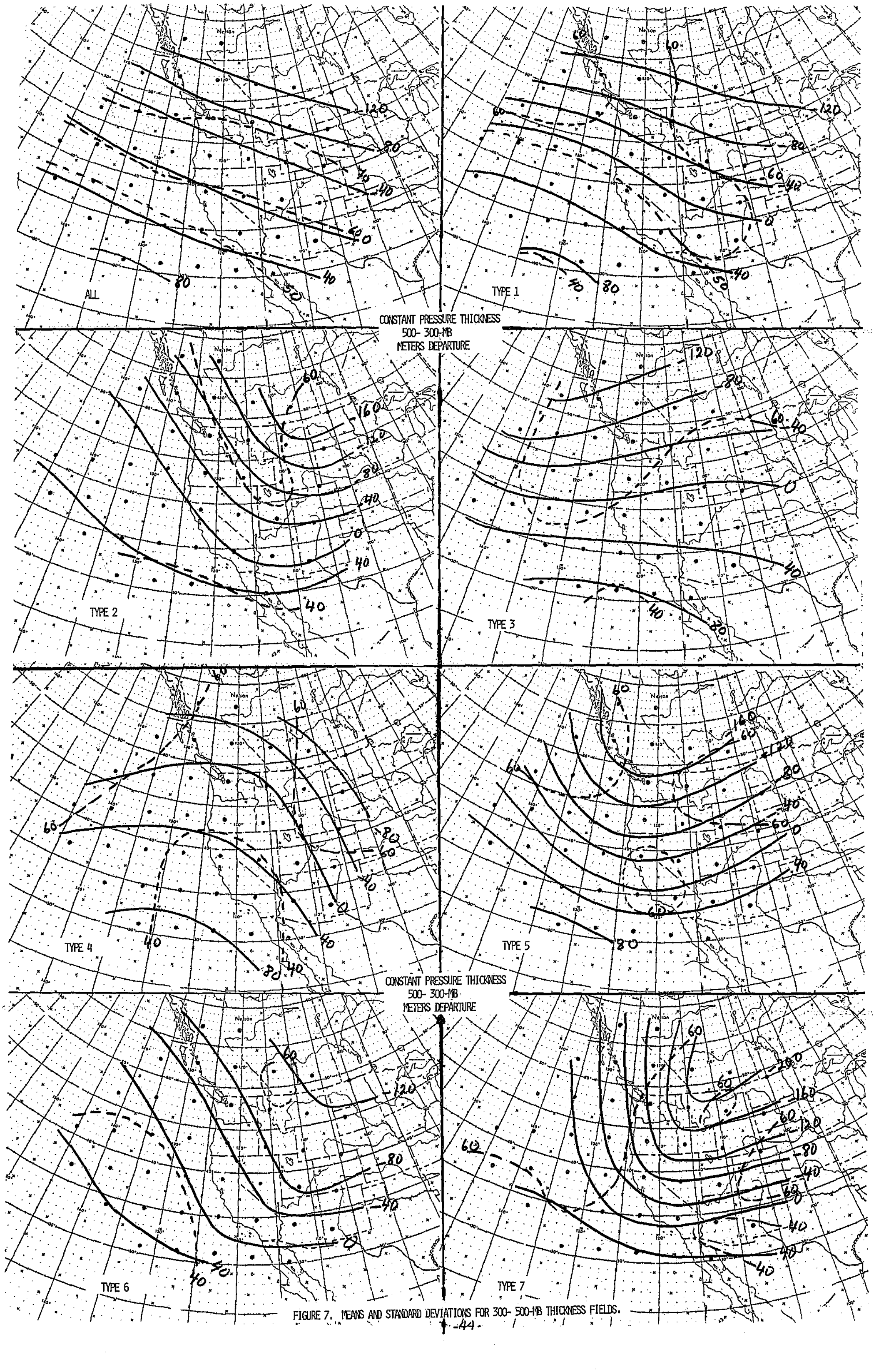


FIGURE 7. MEANS AND STANDARD DEVIATIONS FOR 300- 500-MB THICKNESS FIELDS.

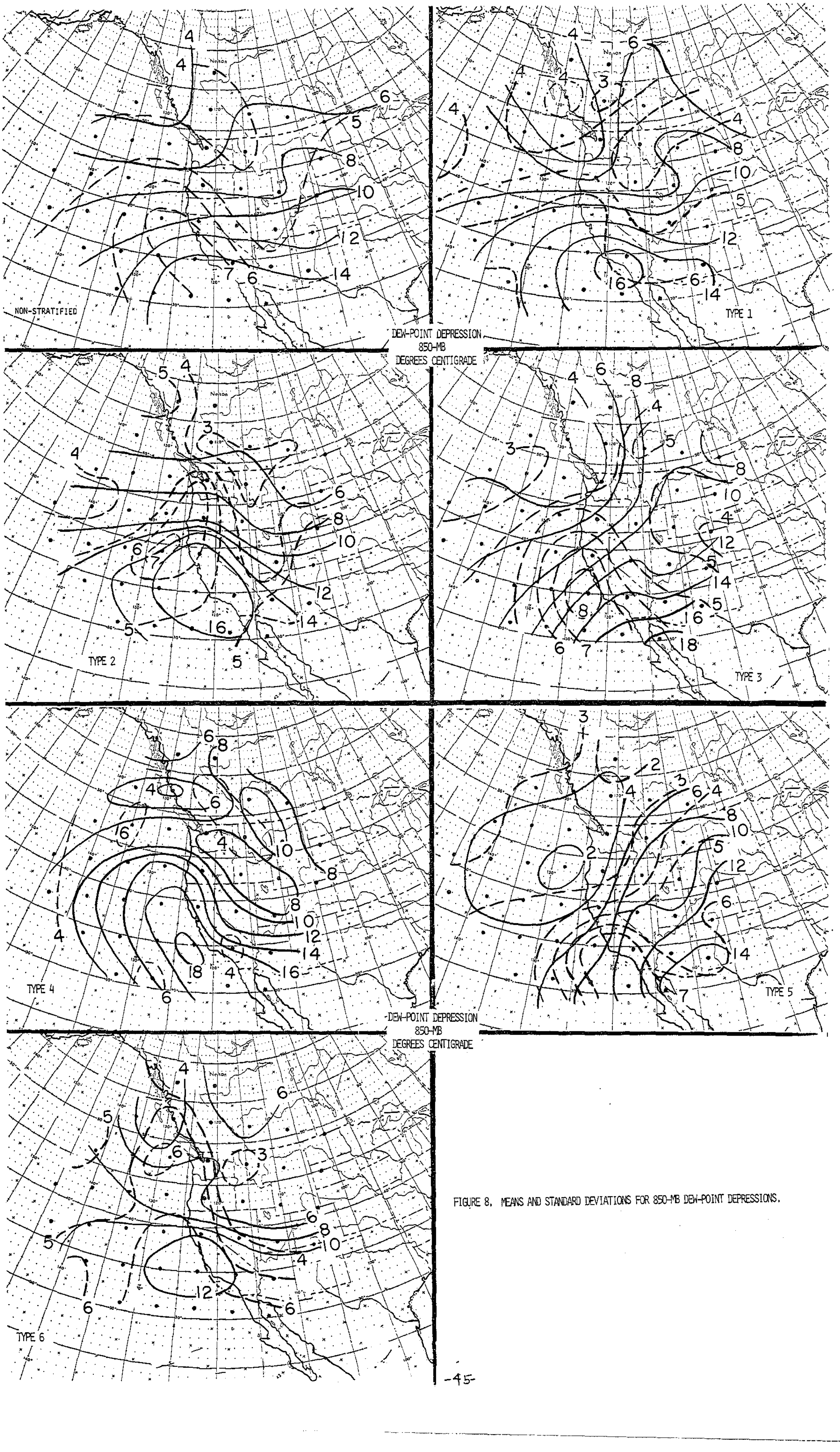


FIGURE 8. MEANS AND STANDARD DEVIATIONS FOR 850-MB DEW-POINT DEPRESSIONS.

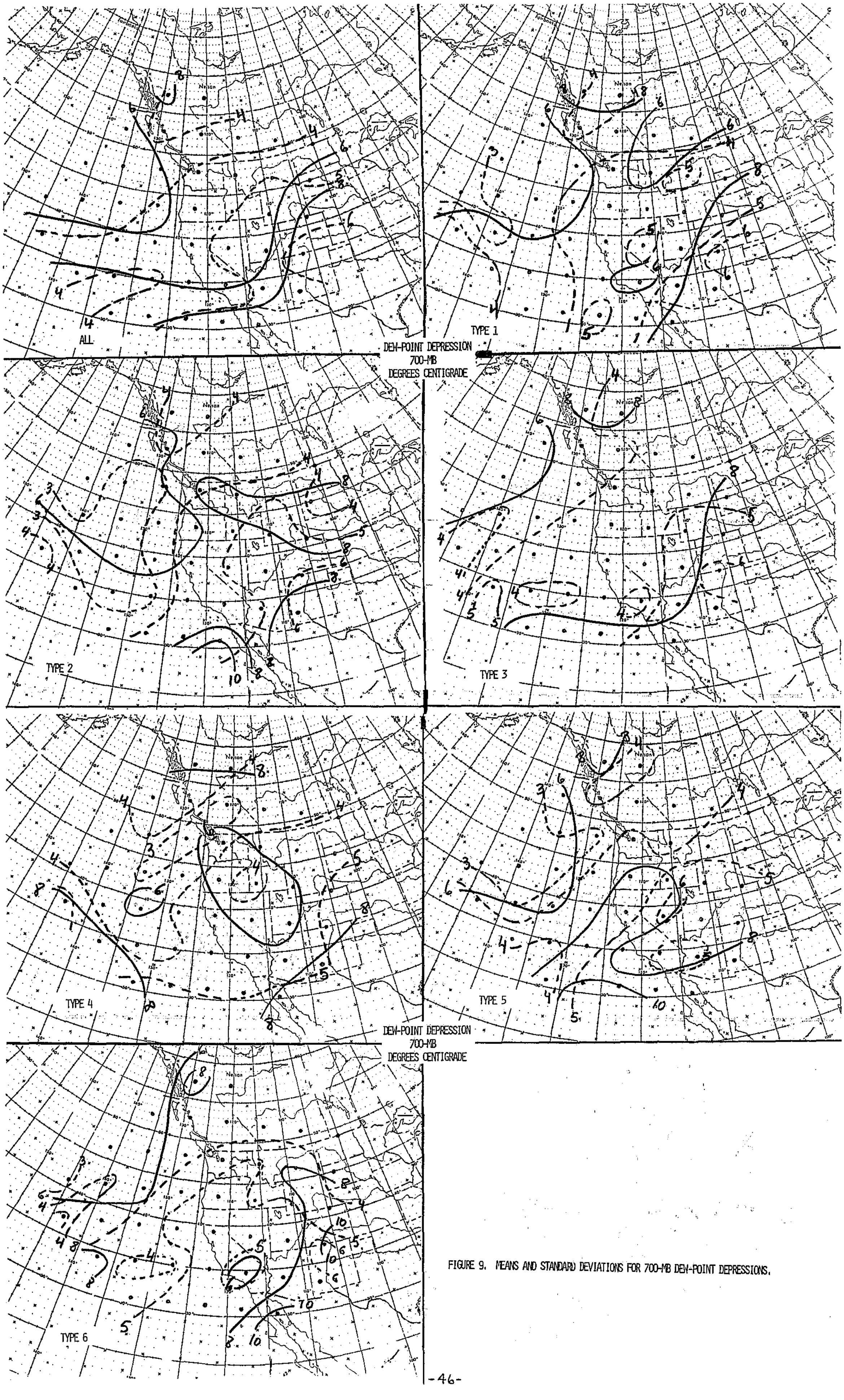


FIGURE 9. MEANS AND STANDARD DEVIATIONS FOR 700-MB DEW-POINT DEPRESSIONS.

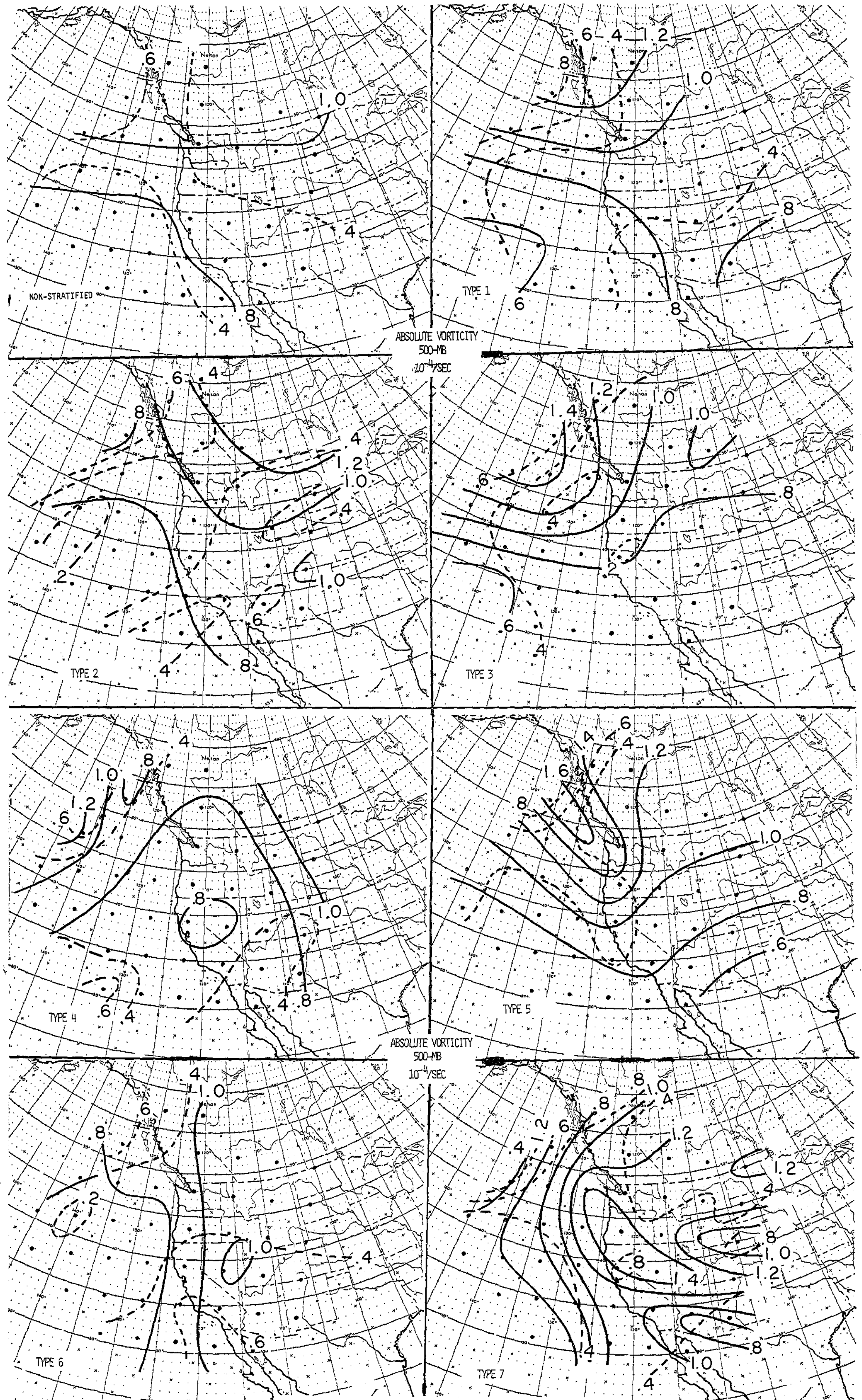


FIGURE 10. MEANS AND STANDARD DEVIATIONS FOR 500-MB ABSOLUTE VORTICITIES.

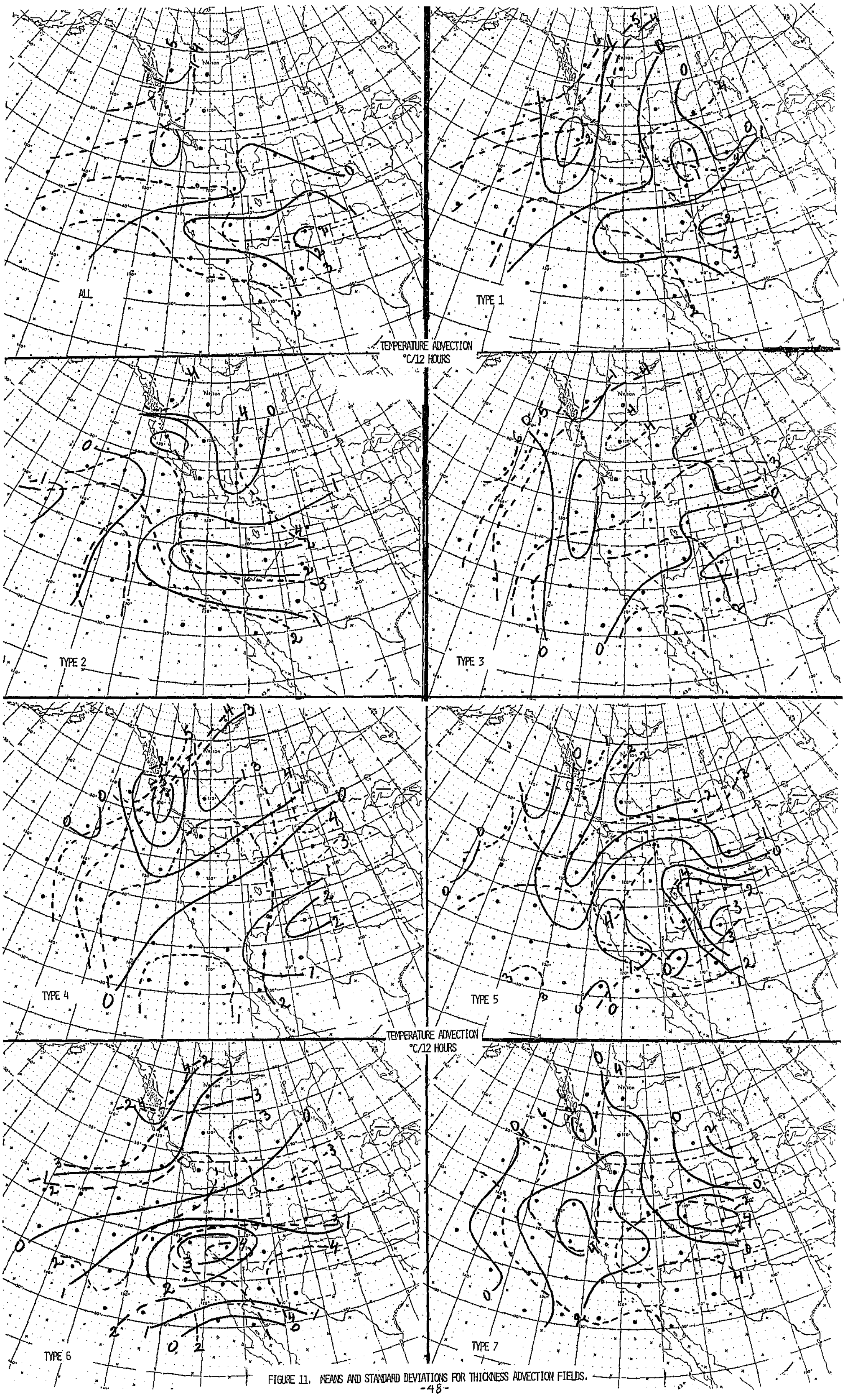


FIGURE 11. MEANS AND STANDARD DEVIATIONS FOR THICKNESS ADVECTION FIELDS.

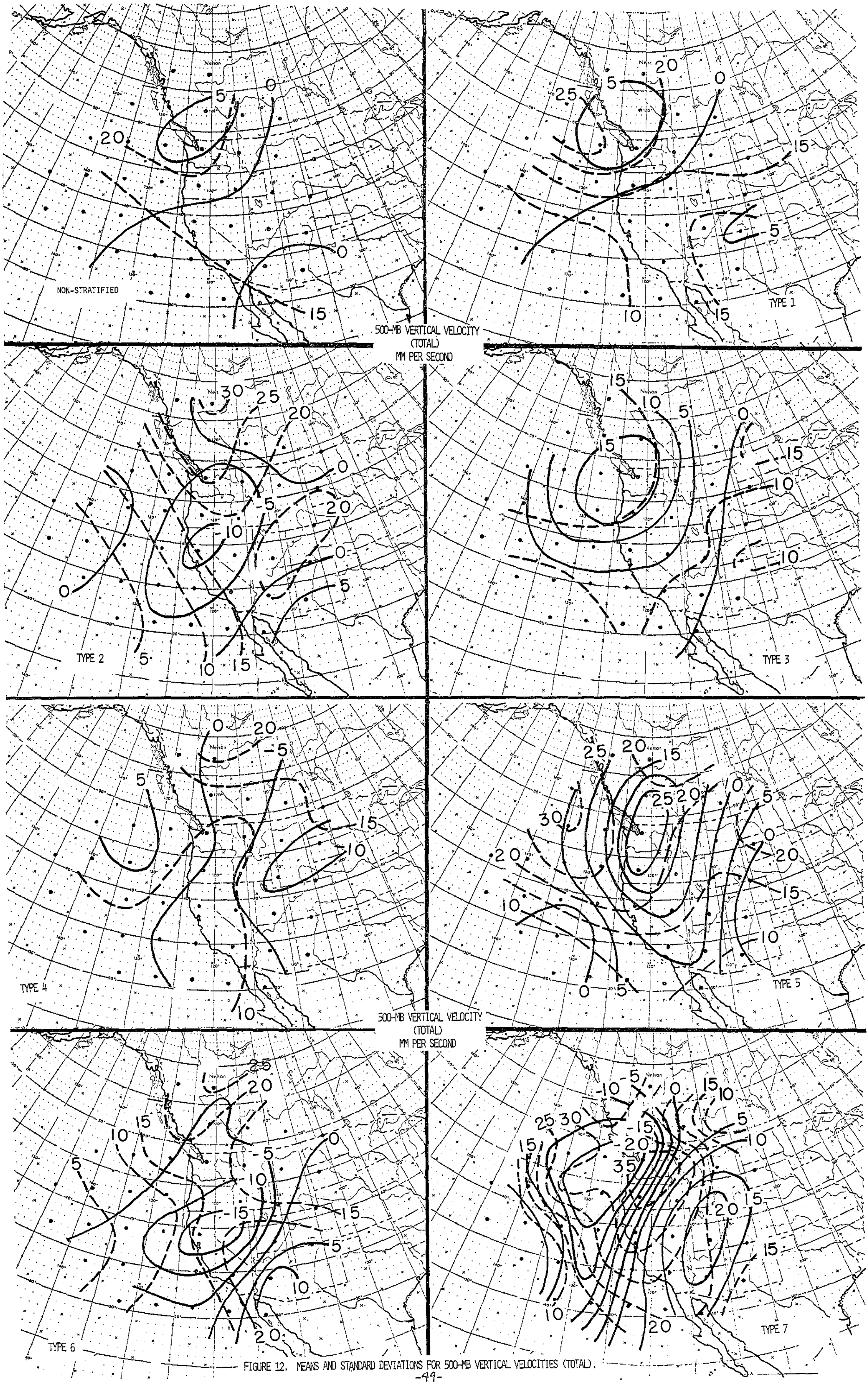


FIGURE 12. MEANS AND STANDARD DEVIATIONS FOR 500-MB VERTICAL VELOCITIES (TOTAL).

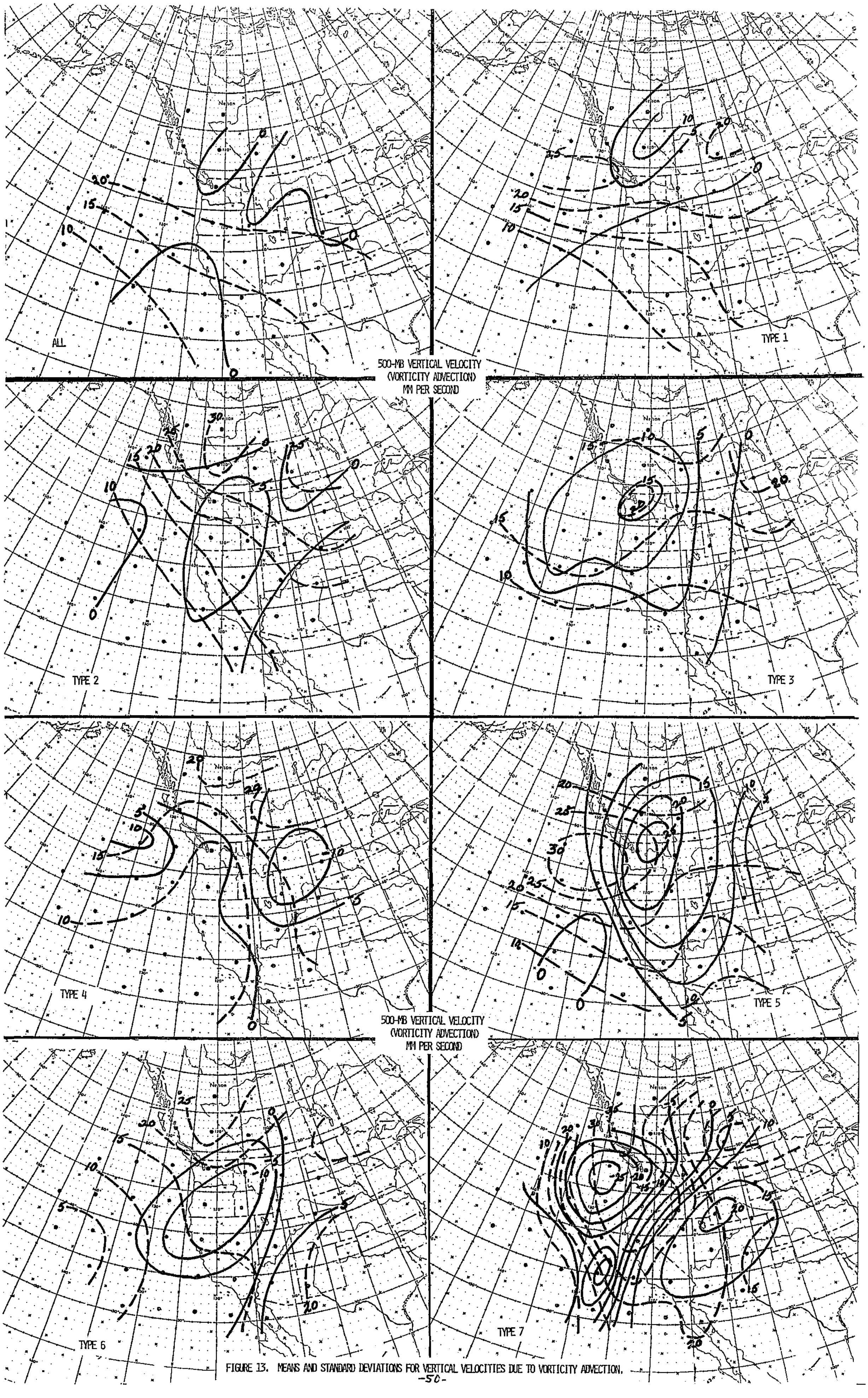


FIGURE 13. MEANS AND STANDARD DEVIATIONS FOR VERTICAL VELOCITIES DUE TO VORTICITY ADVECTION.

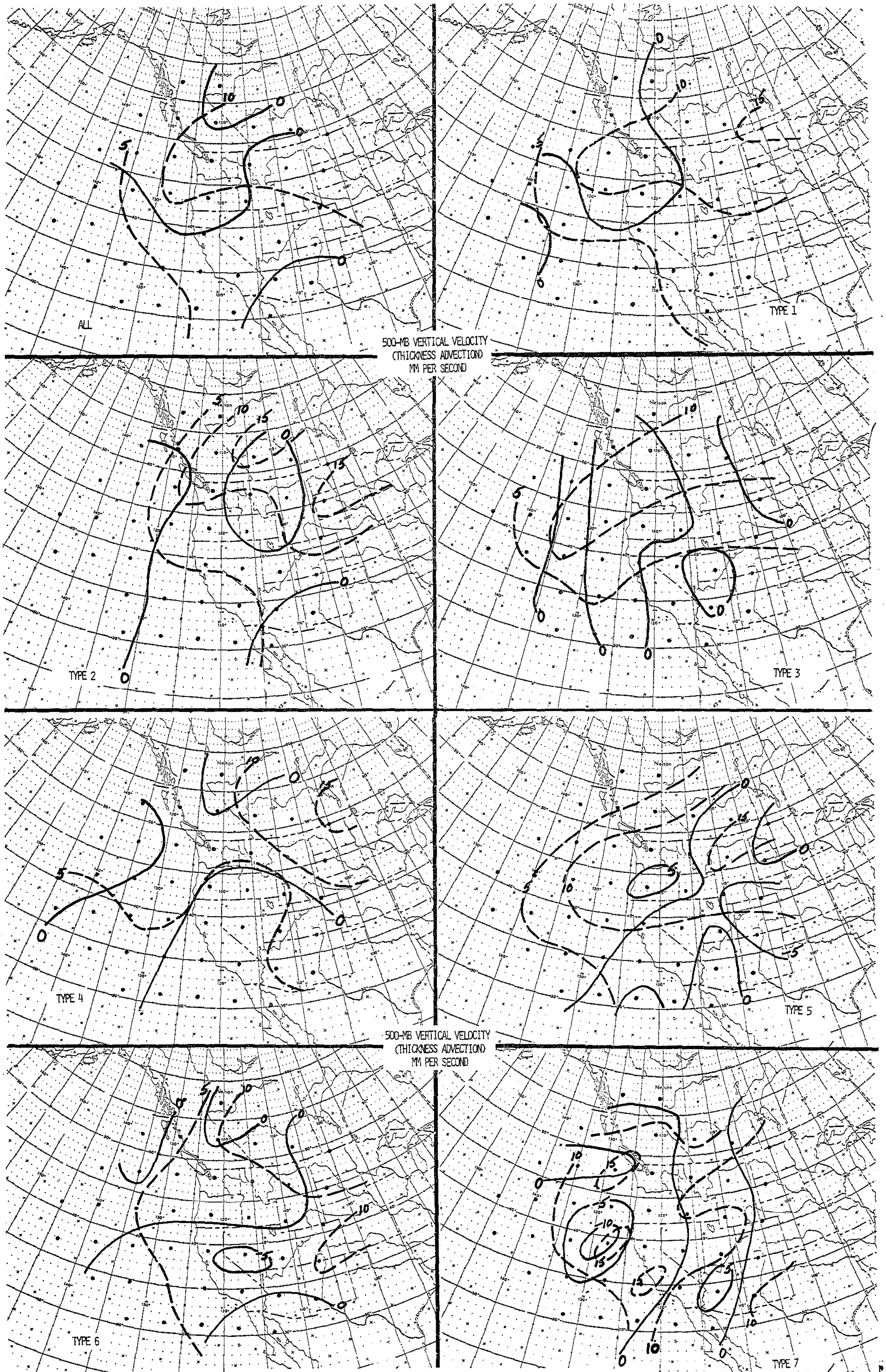


FIGURE 14. MEANS AND STANDARD DEVIATIONS FOR VERTICAL VELOCITIES DUE TO THICKNESS ADVECTION.

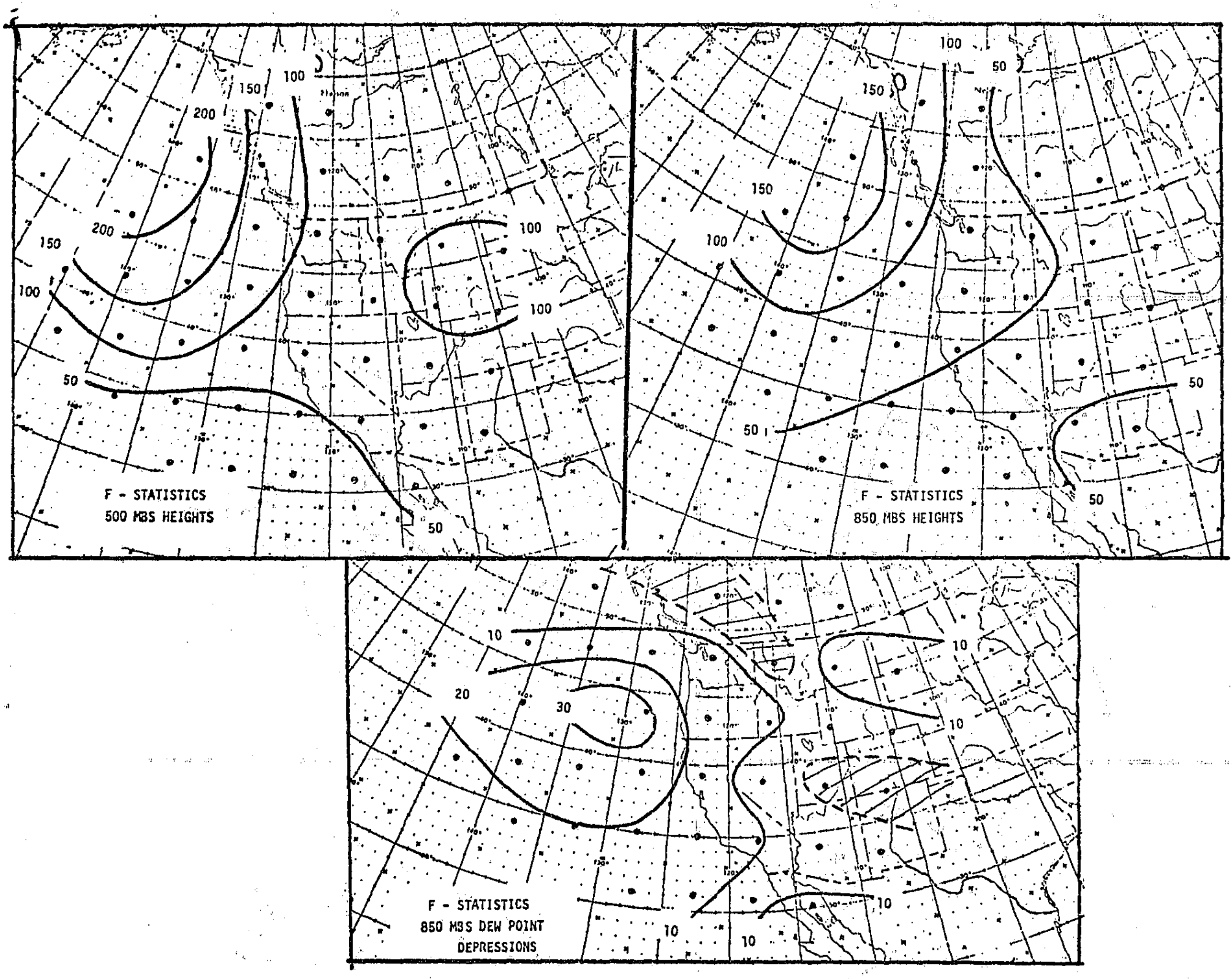


Fig. 15. F statistics.

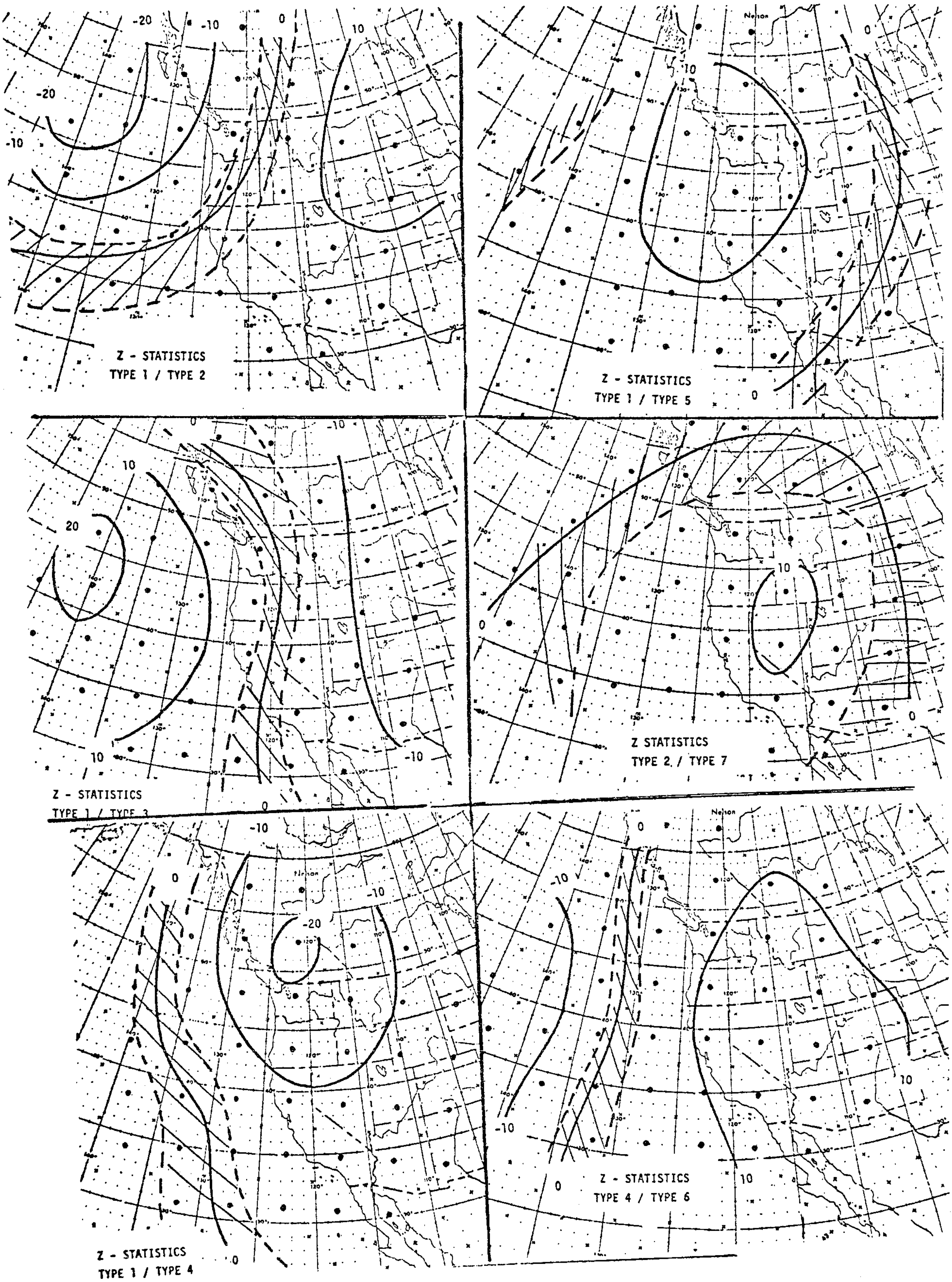


Figure 16. Z Statistics for 500-mb Heights Between Selected Types.

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ELY   INTERCEPT          .06804
  .21701*(33) -.00089*( 1)  .24021*(34) -.00594*(29)

BFL   INTERCEPT          .06952
  .24679*(33) -.00047*( 5)  .20349*(34) -.00507*(30)

TUS   INTERCEPT          .17249
  .45895*(33) -.00084*( 5)  .26561*(34)  .00121*(13) -.00080*(14)

LAS   INTERCEPT        -1.18366
  .15577*(33)  .22306*(34)  .00[illegible]*(20) -.00074*(17)

PHX   INTERCEPT          .00096
  .35641*(33)  .47431*(34)

YUM   INTERCEPT          .00257
  .13375*(34)  .28390*(33)  .00193*(31) -.00218*(32)

SAC   INTERCEPT          .10279
 -.00062*( 5)  .32155*(33)  .00324*(31)  .14645*(34) -.00035*(36)

SMX   INTERCEPT          .09844
  .30229*(33) -.00065*( 5)  .16514*(34)  .00316*(27)  .00083*(14)

BIL   INTERCEPT         1.85752
 -.00114*(19)  .15607*(34)  .16185*(33) -.00143*(27)  .00070*(20)  .00046*( 3)

SLC   INTERCEPT         -.03137
 -.00100*( 1)  .23725*(33)  .00098*( 9)  .18188*(34)  .00137*(21) -.00601*(29)

BOI   INTERCEPT         -.06574
  .33653*(33)  .22974*(34) -.00110*(11)  .00049*( 8) -.00073*( 1)

BNO   INTERCEPT          .09748
  .26043*(33)  .24405*(34) -.00094*( 1)

GTF   INTERCEPT         3.16139
  .33518*(33)  .29178*(34) -.00075*(19) -.00101*(13)  .00033*( 6)

MSO   INTERCEPT          .11549
  .28743*(33)  .22559*(34) -.00233*( 1)  .00104*( 2)  .00061*( 6)

PDT   INTERCEPT          .03195
  .44375*(33)  .22937*(34) -.00048*( 3)

EKA   INTERCEPT          .19226
 -.00125*( 5)  .23082*(33)  .00178*(12)  .16983*(34)

MFR   INTERCEPT        -4.15624
  .26840*(33) -.00092*( 1)  .20774*(34)  .00099*(20) -.00128*(11)

SEA   INTERCEPT          .05378
  .52149*(33)  .22113*(34) -.00133*(13)

FAT   INTERCEPT         -.03452
  .22850*(33) -.00110*( 3)  .00036*( 8)  .16439*(34)  .00086*(22)

LAX   INTERCEPT          .07503
  .30458*(33) -.00033*( 7)  .23114*(34)  .00230*(27)  .00905*(29) -.01313*(30)

MLF   INTERCEPT         -.09891
  .33528*(33)  .00163*(21)  .21323*(34)  .00331*(27)  .00014*(35)

RNO   INTERCEPT          .02497
  .20151*(33) -.00116*( 3)  .15950*(34)  .01013*(29) -.01712*(30)  .00091*( 4)

SAN   INTERCEPT          .13372
  .33453*(33)  .21558*(34) -.00068*( 5) -.00355*(28)  .00043*(16)  .00128*(25)

INW   INTERCEPT          .01193
  .33765*(33)  .34671*(34)  .00242*(27) -.00196*(28)

SFO   INTERCEPT          .08645
 -.00212*( 1)  .22862*(33)  .00196*( 2)  .00082*(14)  .00170*(25)  .10967*(34)

PIH   INTERCEPT        -3.73669
  .34325*(33) -.00136*( 1)  .19136*(34)  .00091*(20)

GEG   INTERCEPT          .05899
  .33499*(33)  .26396*(34)  .00507*(27)

RBL   INTERCEPT          .12546
  .36889*(33) -.00126*( 1)  .00153*(26)  .00203*(25)  .00098*(10)

PDX   INTERCEPT         -.01869
  .57622*(33)  .24368*(34)

OLM   INTERCEPT          .14919
 -.00154*( 1)  .27550*(34)  .00346*(28)  .16341*(33)  .00176*(25)

ALW   INTERCEPT          .06469
  .21585*(33)  .20511*(34)  .00348*(27)

AST   INTERCEPT          .14739
 -.00106*( 5)  .30714*(33)  .00076*( 6)  .00342*(27)  .00164*(12)

SLM   INTERCEPT          .11893
 -.00050*( 5)  .24724*(33)  .00215*(25) -.00197*( 1)  .00134*( 2)

EUG   INTERCEPT          .00907
 -.00178*( 3)  .31083*(33) -.00145*(14)  .00137*( 4)

FCA   INTERCEPT          .07619
  .00444*(27)  .23327*(33)  .00449*(28)  .00128*( 2)

HVR   INTERCEPT          .10487
  .25423*(33) -.00177*( 1)  .00322*(27)  .00729*(30) -.00820*(29)  .00083*( 4)  .00057*( 2)

HLN   INTERCEPT         3.11022
  .22090*(33)  .00317*(27)  .00463*(28) -.00073*(19)  .00026*( 8)  .09336*(34)

GGW   INTERCEPT          .08209
 -.00150*( 1)  .16891*(33)  .00645*(29)  .17493*(34)  .00030*( 8)

LWS   INTERCEPT          .05811
  .28517*(33)  .20881*(34)  .00907*(29) -.00149*(11)

EKO   INTERCEPT          .07467
 -.00148*( 1)  .30492*(33)  .00476*(27)  .00021*(35)  .00089*( 4)

WMC   INTERCEPT         -.06662
 -.00041*( 3)  .26903*(33)  .00164*(21)  .11291*(34)

FLG   INTERCEPT          .25671
 -.00306*( 3)  .30588*(33)  .00079*( 6)  .17884*(34)
```

Figure 17. Final Regression Equations for Non-Stratified Data.

```
ELY   INTERCEPT       -.17371
 .22959*(33)  .00142*(21)  .19979*(34) -.00148*(11)  .00006*(39)  .00016*(35)

BFL   INTERCEPT        .12378
 .23238*(34)  .18611*(33) -.00010*(37)  .00006*(38)  .00022*(36)

TUS   INTERCEPT        .21000
 .29159*(34)  .37801*(33) -.00184*( 3) -.00096*(14)  .00195*(11)  .00026*( 8)

LAS   INTERCEPT       -.10887
 .14017*(33)  .00006*(39) -.00085*(17)  .00004*(40)  .00032*(16)  .00059*(21)

PHX   INTERCEPT       -.09615
 .34007*(33)  .35386*(34)  .00314*(27)  .00007*(39)  .00065*(16)

YUM   INTERCEPT        .05309
 .12616*(34)  .00222*(31)  .14789*(33) -.00242*(32) -.00003*(36)  .00008*(38) -.00008*(37)  .00074*( 2) -.00095*( 1)

SAC   INTERCEPT        .23475
-.00155*( 1)  .22975*(33)  .00209*( 2) -.00010*(37) -.00040*(36)  .00217*(12) -.00142*(11)

SMX   INTERCEPT        .21415
-.00018*(37)  .24687*(33)  .00216*( 4)  .00036*(35) -.00068*( 5)  .00084*(14)

BIL   INTERCEPT       2.65935
-.00063*(19)  .18508*(33) -.00010*(37)  .00009*(38) -.00070*(23)

SLC   INTERCEPT       -.03646
-.00078*( 1)  .27853*(33)  .30219*(34)  .00112*( 9)  .00229*(26) -.00592*(29)  .00110*(21)

BOI   INTERCEPT        .14768
 .22695*(34)  .26981*(33) -.00024*(37)  .00377*(32)  .00170*( 2) -.00080*( 1)

BNO   INTERCEPT        .25064
 .20584*(33)  .21767*(34)  .00193*(22) -.00018*(39) -.00017*(38) -.00017*(41)

GTF   INTERCEPT       3.50193
 .30327*(34)  .30699*(33) -.00083*(19) -.00168*(13)  .00107*( 2) -.00014*(35)

MSO   INTERCEPT       -.00476
-.00158*( 1)  .17614*(34)  .19751*(33)  .00118*( 4) -.00131*( 3)

PDT   INTERCEPT        .01404
 .49825*(33)  .17111*(34) -.00051*( 3)

EKA   INTERCEPT        .25952
-.00246*( 3)  .00173*( 4) -.00011*(38) -.00167*(17)  .14264*(33)

MFR   INTERCEPT      -6.24331
 .27124*(33) -.00115*( 1)  .00263*(12)  .00148*(20) -.00225*(11)  .13777*(34) -.00122*(14)

SEA   INTERCEPT        .28752
 .55103*(33) -.00192*( 9) -.00014*(39)  .15760*(34) -.00018*(42)

FAT   INTERCEPT        .11776
 .19920*(33) -.00016*(37)  .00125*(21)  .00041*( 8)  .01544*(29) -.02205*(30)

LAX   INTERCEPT        .21681
 .32485*(33) -.00012*(37)  .00393*(31)  .19701*(34)

MLF   INTERCEPT       -.26931
 .22303*(34)  .30315*(33)  .00150*(21)  .00023*(35)  .00293*(25)  .00008*(39)  .00087*(22)  .00007*(40)

RNO   INTERCEPT       -.04697
 .26705*(33) -.00150*( 1) -.00156*(23)  .00080*( 6)  .17053*(34)  .00748*(29)

SAN   INTERCEPT        .10336
 .26441*(34)  .35354*(33) -.00114*( 3)

INW   INTERCEPT        .00186
 .37664*(33)  .41589*(34)  .00197*(26)

SFO   INTERCEPT        .29140
-.00166*( 1) -.00015*(37)  .00081*( 6)  .00155*(12)  .17384*(33)  .00202*(25)

PIH   INTERCEPT      -6.10600
 .29185*(33) -.00113*( 1)  .17446*(34)  .00148*(20) -.00483*(29) -.00007*(37)

GEG   INTERCEPT        .14804
 .26080*(33) -.00207*( 1)  .00187*( 2) -.00021*(38)  .15070*(34)  .00139*(24)

RBL   INTERCEPT        .14868
 .26810*(33) -.00092*( 1) -.00010*(23) -.00007*(37)  .00140*( 2)  .00264*(25)  .00654*(30)  .00131*(10)

PDX   INTERCEPT       -.04583
 .60055*(33)  .24960*(34).

OLM   INTERCEPT        .11055
-.00128*( 1)  .31645*(34)  .00104*( 4) -.00053*( 7)  .00210*(25) -.00013*(37)

ALW   INTERCEPT      -6.71387
 .18903*(33) -.00236*( 9) -.00017*(37) -.00020*(41)  .00170*(20) -.00012*(38)

AST   INTERCEPT        .36128
-.00050*( 5)  .27452*(33) -.00027*(37)  .00121*(14)  .00157*(21)

SLM   INTERCEPT       -.03665
-.00056*( 5)  .19258*(33)  .00243*(25)  .13960*(34) -.00163*( 1)  .00158*( 4)

EUG   INTERCEPT       -.21063
-.00040*( 5)  .28075*(33)  .00236*( 2) -.00171*( 1)  .00207*(21)

FCA   INTERCEPT        .37676
 .26374*(33)  .00398*(27) -.00024*(38)  .00156*(18)  .00022*(36) -.00011*(37)

HVR   INTERCEPT      -4.14691
 .22737*(33)  .00874*(27) -.00007*(37)  .13662*(34) -.00532*(31)  .00095*(21)  .00101*(20)  .00228*(28)  .00118*( 2) -.00105*( 1)

HLN   INTERCEPT       2.51355
-.00040*( 1)  .00154*(21)  .22741*(33) -.00207*( 9) -.00063*(19)

GGW   INTERCEPT        .18959
-.00115*( 1)  .18044*(34)  .00026*( 8)  .00382*(29) -.00012*(37)  .15499*(33) -.00119*( 9)

LWS   INTERCEPT       -.00735
 .30349*(33)  .00132*(27) -.00011*(37)  .00850*(29) -.00136*(11)  .00169*( 2) -.00097*( 1)  .00012*(42)

EKO   INTERCEPT        .21139
 .31920*(33) -.00124*( 1)  .00230*(26)  .00032*(35)  .00979*(27) -.00011*(38) -.00538*(31)

WMC   INTERCEPT       -.23622
 .00239*(21)  .29460*(33)  .11723*(34)  .00013*(39)  .00790*(29) -.00253*(28)

FLG   INTERCEPT        .37123
-.00123*( 3)  .38037*(33)  .00538*(27) -.00013*(37)
```

Fig. 18. Final regression equations for non-stratified data including depression fields.

```
ELY   INTERCEPT        -.06615
  .13838*(33)  .00035*(35)  .15762*(34)  .00841*(30)  .00381*(27)  .00096*(18)  .00033*( 8)

BFL   INTERCEPT         .07771
  .25754*(33) -.00248*( 3)  .00053*(21)  .00012*( 8)  .00170*( 4)  .15159*(34) -.00293*(27)  .00044*( 6)

TUS   INTERCEPT         .18397
  .33405*(34)  .48874*(33) -.00157*( 3)  .00006*(35)  .00160*(17) -.00148*(25)

LAS   INTERCEPT        -.03499
  .00023*(35)  .19635*(33) -.15885*(34)  .00047*(22)  .00045*(26)  .00090*(25) -.00005*(36)  .00033*(16) -.00233*(27)

PHX   INTERCEPT         .00662
  .58129*(33)  .32036*(34)  .00166*(32)

YUM   INTERCEPT         .00222
  .47068*(33)  .00027*(35)  .00169*(27)  .00073*(17)

SAC   INTERCEPT        3.22423
 -.00365*( 3)  .00622*(31)  .16812*(33)  .00140*(11)  .00284*(30)  .00209*(21)  .00222*( 5) -.00078*(20)

SMX   INTERCEPT         .05202
  .33529*(34) -.00103*( 5)  .20319*(33)  .00141*(11)  .00111*( 4)

BIL   INTERCEPT        -.50975
  .26083*(33) -.00074*(19)  .00025*(35)  .00086*(20)  .09776*(34) -.00052*( 4)

SLC   INTERCEPT        -.08467
 -.00121*( 1)  .28613*(34)  .00181*(21)  .17670*(33) -.00819*(29)  .00320*(27)

BOI   INTERCEPT         .04744
 -.00155*( 1)  .21767*(33)  .28395*(34)  .00177*(18) -.00393*(32) -.00243*(17) -.00013*(36)  .00188*(26)

BNO   INTERCEPT        -.05068
 -.00154*( 3)  .19906*(33)  .20866*(34) -.02099*(29)  .00051*(36)  .00125*(12)  .00115*(16)  .00194*(26)

GTF   INTERCEPT       -1.96049
  .19283*(33)  .21394*(34) -.00040*(19)  .00183*(27)  .00088*(20)  .00151*( 2) -.00160*( 1)

MSO   INTERCEPT        -.09989
  .23685*(33)  .00026*( 1)  .00187*( 2)  .13143*(34)  .00026*(35) -.00211*( 3)  .00133*(15)  .00084*(24)  .00164*(25)

PDT   INTERCEPT        3.17146
  .40472*(33)  .28453*(34) -.00075*(13) -.00077*(20) -.00124*(26)

EKA   INTERCEPT         .15492
 -.00353*( 3)  .00248*(11)  .00192*( 4)  .17041*(33)

MFR   INTERCEPT       -7.39576
 -.00141*( 3)  .28004*(34)  .20474*(33)  .00175*(20)  .00202*(21) -.00152*(14)  .00106*(11)

SEA   INTERCEPT         .08867
  .39664*(33)  .23825*(34) -.00102*(13)  .00204*(12) -.00098*( 1)

FAT   INTERCEPT        -.03295
  .33748*(33) -.00063*( 1)  .00133*(21)  .12963*(34) -.00129*(25)  .00253*(28)

LAX   INTERCEPT       -2.12165
  .22322*(33)  .13586*(34) -.00055*( 7)  .00052*(20)  .00082*( 2)

MLF   INTERCEPT         .08004
  .24003*(33) -.00078*( 1)  .00327*(27)  .00018*(35)  .00099*(21)  .00059*( 4)  .14543*(34)

RNO   INTERCEPT       -2.94712
  .29259*(33)  .00052*(35)  .16488*(34)  .00173*(27) -.00015*(36)  .00027*(24)  .00102*(26) -.00564*(29) -.00061*( 5)  .00072*(20)

SAN   INTERCEPT        -.07137
  .56125*(33)  .00123*(22)  .00046*(35)  .01157*(30) -.00367*(28) -.00138*(25)

INW   INTERCEPT        -.00077
  .27716*(33)  .19840*(34) -.00646*(29) -.00411*(31) -.00093*(13)

SFO   INTERCEPT        -.09606
 -.00346*( 3)  .00153*(11) -.01383*(29)  .00037*( 6)  .16399*(34)  .00235*(21)  .00154*( 5)

PIH   INTERCEPT         .15908
  .00072*( 1)  .00232*(13)  .17778*(34)  .15169*(33) -.00528*( 3)  .00227*( 5) -.00587*(30)  .00303*(28)

GEG   INTERCEPT         .09294
  .33901*(33)  .32186*(34)  .00422*(27) -.00116*(11)

RBL   INTERCEPT        -.07318
 -.00139*( 1)  .00191*( 9)  .17057*(33)  .00095*(24)  .00051*( 8)  .00110*(22)

PDX   INTERCEPT         .12057
  .41958*(33)  .36044*(34)  .00641*(29)

OLM   INTERCEPT         .12164
 -.00216*( 1)  .30905*(33)  .00523*(27)  .00108*( 2) -.00154*(16) -.00276*(26) -.00124*(24)  .00059*( 8)

ALW   INTERCEPT        -.04986
  .20678*(33)  .18936*(34) -.00018*(35)  .00191*(15)  .01131*(30) -.00024*(36)  .00193*(13)  .00388*(32) -.00315*(28)

AST   INTERCEPT         .22563
 -.00169*( 3)  .00170*( 4)  .19175*(33)  .00085*( 9)  .00319*(30)

SLM   INTERCEPT        -.05054
 -.00070*( 3)  .21857*(33)  .00207*( 4) -.00161*(15)  .24473*(34) -.00188*( 1)

EUG   INTERCEPT        -.13475
 -.00158*( 3)  .30335*(33)  .00235*(25)  .00189*( 4) -.00284*(26)  .00957*(29) -.00106*(15)

FCA   INTERCEPT        4.60621
  .00537*(27)  .14981*(34)  .00491*(28)  .00095*( 8)  .00138*(10) -.00374*( 1) -.00022*(35)  .00089*( 7) -.00111*(20)  .00219*( 2)

HVR   INTERCEPT         .12368
  .23043*(33)  .00034*(35) -.00029*(36) -.00188*(11)  .00143*(12)  .10824*(34)  .00136*(18)  .00663*(29)

HLN   INTERCEPT        -.01813
  .23050*(33)  .00025*(35) -.00015*(36)  .00160*(21)  .00087*(22)  .00230*( 2) -.00195*( 1)  .00089*(23)

GGW   INTERCEPT        2.38812
  .33484*(33) -.00161*( 9) -.01251*(29)  .13446*(34)  .00164*(13)  .00597*(30) -.00062*(19)  .00047*( 8)

LWS   INTERCEPT       -7.72752
  .28904*(33)  .20056*(34)  .00914*(29)  .00189*(19) -.00355*(32) -.00081*( 3)

EKO   INTERCEPT        -.06564
 -.00138*( 3)  .26512*(34)  .00522*(27)  .23979*(33)  .00182*(26)  .00104*( 4)

WMC   INTERCEPT         .00658
 -.00110*( 3) -.00581*(31)  .20512*(33)  .00171*(21)

FLG   INTERCEPT         .19389
 -.00147*( 5)  .00045*( 8)  .23415*(34)  .00112*(14)  .00323*(27)
```

Figure 19. Final Regression Equations for Type I.

```
ELY   INTERCEPT       -.13746
  .00024*(35) -.00184*(11) -.00233*(25) -.00025*(36)  .00080*( 3) -.00045*(15) -.06845*(34) -.00312*(29)

BFL   INTERCEPT       -.01780
  .00028*(35)  .00013*(36)  .00030*(16) -.00072*(17) -.00061*(25)  .00048*(18)  .00030*(23)  .00032*(14)

TUS   INTERCEPT        .10927
 -.00112*( 3)  .00496*( 9)  .30962*(34) -.00268*(10)  .00874*(29)

PHX   INTERCEPT      -4.68834
  .00085*(22) -.00033*(35)  .00074*( 3)  .00112*(20) -.00153*( 5)  .00162*(17) -.00093*(18)  .00106*(15) -.00744*(29) -.00067*(23)

YUM   INTERCEPT        .19186
  .00218*(26) -.00161*( 3)  .00096*( 4)  .00099*(22)  .00081*(11) -.00123*(18) -.00241*(29)  .00033*( 8)  .00136*(14) -.00171*(24)

SAC   INTERCEPT        .04879
 -.00707*(31) -.00035*( 6)  .00043*(13) -.00074*(15)  .00078*(32)  .00033*(16) -.00083*(26)  .00008*(36)  .00026*(21)

SMX   INTERCEPT       -.00874
  .00015*(35) -.00405*(25) -.00145*(17)  .00135*(18)  .07514*(34) -.00170*(31) -.00008*(36)

BIL   INTERCEPT       3.25816
 -.00075*(23)  .00162*( 1) -.00075*(19) -.00159*(24) -.00344*(28)  .14172*(34)  .00901*(30)

SLC   INTERCEPT       -.15068
  .00242*(21) -.00347*(17) -.00136*(31) -.00119*(22)  .00080*( 6)  .00211*(26) -.00224*( 9)  .00136*(24)  .09135*(34)  .00419*(27)

BOI   INTERCEPT        .08032
  .00429*(13) -.00151*(22)  .00119*(14) -.00411*(23)  .00161*(21) -.01055*(29)  .00743*(30)  .00192*(17) -.11628*(33) -.00047*(36)

BNO   INTERCEPT       -.09465
  .00101*(21)  .00220*(11) -.00098*(10) -.12638*(33) -.00766*(29)  .00128*( 2) -.00200*( 3)  .00140*( 4) -.00235*(28)

GTF   INTERCEPT       -.15252
 -.00038*(23) -.03105*(32) -.00187*(26)  .00021*(36)  .00235*(24)  .00280*(22)  .00647*(27) -.00640*(30) -.00182*(18)  .00074*( 7)

MSO   INTERCEPT       -.48753
  .00124*(21) -.00114*(11)  .23224*(33) -.00267*(18)  .00044*(36) -.00203*(17) -.00148*( 9) -.00108*( 5)  .00138*( 4)  .00256*(32)

PDT   INTERCEPT       3.99962
 -.00209*( 1)  .00234*(12)  .00038*(36)  .00152*( 2)  .12502*(33) -.00159*(17) -.00085*(20)  .00079*( 7) -.00121*( 5)  .00084*(15)

EKA   INTERCEPT       5.02237
 -.00501*(31) -.00278*(19)  .00161*(20)  .00050*(28) -.00035*(35)  .00212*(11) -.00161*(12) -.00248*(24) -.00189*(25)

MFR   INTERCEPT       -.04398
  .00120*(21) -.00034*(36) -.00036*(35)  .00130*(11) -.00100*(10)  .00135*( 9)

SEA   INTERCEPT      -4.12261
 -.00187*(17)  .00101*(19)  .00172*(16)  .00204*(12)  .00130*(21) -.00062*(35) -.00497*(32)  .00779*(31) -.00648*(27)

FAT   INTERCEPT       -.05520
  .00567*(29)  .00153*(22) -.00198*(25)  .00027*(21) -.00073*( 1)  .03272*(34)  .00006*(35) -.00146*(28)  .00064*( 9)  .00031*(24)

LAX   INTERCEPT       -.04049
 -.00108*( 1) -.00015*(36) -.00442*(25)  .00114*( 9)  .00075*(22) -.00096*(17)  .00079*(18)

MLF   INTERCEPT       -.31564
  .00289*(21)  .00166*(22) -.00180*(30) -.00396*(29) -.00028*(36) -.00163*( 1)  .00133*( 2)

SAN   INTERCEPT        .06903
 -.00101*( 1) -.00100*(17) -.00380*( 9)  .00183*(10)  .00184*(12) -.00025*( 2) -.00116*(24) -.00060*(13)  .00059*(23)  .18955*(33)

INW   INTERCEPT       1.04277
  .00093*(21)  .00190*(25) -.00223*(17)  .00175*(16) -.00156*( 4) -.00026*(20)  .00053*(35) -.00247*( 3)  .00493*(27)  .00237*( 6)

SFO   INTERCEPT        .10149
 -.00802*(31)  .00179*(32)  .00229*(28) -.00067*(17) -.00088*(21) -.00274*(29)  .00428*(30)  .00182*(25) -.00099*(26) -.00051*(12)

PIH   INTERCEPT      -6.26839
 -.00022*(35)  .00126*(16) -.00812*(27) -.00086*(15) -.00325*(18) -.00100*(17)  .00182*(21)  .00166*( 9) -.01421*(29)  .00144*(20)

GEG   INTERCEPT        .32361
  .00163*(11) -.00040*(36) -.00370*(10) -.00218*(22)  .00493*(31) -.00030*(35) -.00146*(24)  .00304*(32)  .00279*(12) -.14651*(33)

PDX   INTERCEPT       3.87294
  .00027*(13)  .12450*(34)  .00122*(21)  .00332*(12)  .00761*(29)  .00180*(15) -.00145*( 9) -.00100*(19)  .00150*( 1)  .00116*(18)

OLM   INTERCEPT      -8.23149
 -.00030*( 1)  .00055*(31)  .00111*(21)  .00194*(19)  .00150*(22)  .00253*(27)  .00197*(17)  .01741*(29) -.00022*(36)  .00783*(30)

ALW   INTERCEPT       -.31079
  .01717*(27)  .00079*(13) -.00858*(30)  .00149*(22)  .00151*(21) -.09380*(33) -.00120*(24)

AST   INTERCEPT        .18703
 -.00370*( 1)  .00304*( 2)  .00595*(28)  .00161*(14)  .00437*(27)  .11708*(33)

SLM   INTERCEPT       -.12694
 -.00185*( 1) -.00368*(30) -.00182*(14) -.00282*(17)  .00023*(36)  .00107*( 2)  .27546*(33) -.00234*(32)  .00124*(21) -.00013*(35)

EUG   INTERCEPT        .17776
 -.00021*( 7) -.00171*(17) -.00166*(25) -.00018*(35) -.00146*( 1)  .00200*(11)  .00068*(14)

FCA   INTERCEPT        .71979
  .00310*(31)  .00186*(24) -.00338*(21) -.00033*(36)  .19441*(33)  .00724*(30) -.00361*(25) -.00070*( 6) -.00909*(29) -.00116*( 9)

HVR   INTERCEPT       -.03640
  .00109*(13)  .00319*(27)  .00018*(35)  .00017*(36) -.00903*(29) -.00113*(21) -.00158*( 4)  .00229*( 2) -.00182*( 1)  .00046*( 7)

HLN   INTERCEPT        .41980
  .00484*( 9)  .00196*(10)  .00202*(16)  .00444*(27)  .18187*(33) -.00094*(17)

GGW   INTERCEPT     -15.80267
  .00161*(15) -.00197*( 3)  .00271*(17) -.00654*(32)  .00040*(36)  .00264*(20) -.00226*(22)  .00126*(19)  .00420*(29) -.00086*( 5)

LWS   INTERCEPT       -.25678
 -.00445*(26)  .00109*(21)  .00083*( 7)  .00470*(30)  .00214*(17) -.00197*(23) -.00098*(15)  .00196*(12) -.13023*(34)

EKO   INTERCEPT       -.07644
 -.00363*(31)  .00789*(29)  .00145*(21) -.00006*(35)  .00177*(28) -.00041*( 5)  .00114*(23)  .00073*(15)  .00086*(26) -.00276*(30)

WMC   INTERCEPT     -23.07833
 -.00024*(21)  .01191*(29) -.00130*(11) -.00820*( 5)  .00177*( 4)  .00222*( 2)  .00565*(19)  .00255*(12)  .00456*( 3)  .00177*(32)

FLG   INTERCEPT        .17355
 -.00104*( 1) -.00525*(27)  .00107*( 4) -.00234*(12)  .00020*(35) -.00268*(25) -.00153*(18) -.00144*(17)  .00235*(28)  .00079*(22)
```

Fig. 20. Final regression equations for Type 2.

```
ELY   INTERCEPT      2.22419
 -.00150*( 1)  .00126*( 9) -.00053*(19) -.00302*(32)  .00273*(28) -.00185*(23) -.00326*(30)  .00800*(29) -.00032*( 6)  .00101*( 2)

BFL   INTERCEPT      -.00004
 -.00135*( 5)  .00186*( 9)  .00293*(25)  .00340*( 2) -.00369*( 1)  .00280*( 3)  .00145*(22)  .11300*(34)

TUS   INTERCEPT       .19398
 -.00279*( 1)  .00022*( 8)  .27157*(34)  .00072*(22)  .00081*(18)  .00121*(13) -.00108*(25) -.00007*(35)  .00049*(16) -.15615*(33)

LAS   INTERCEPT      3.98300
 -.00253*( 1)  .17055*(33)  .00581*(31)  .00034*( 6)  .00115*( 9)  .00122*(16) -.00087*(20)  .00221*(30)  .00023*(35)

PHX   INTERCEPT       .18289
  .00474*(31)  .22885*(33) -.00334*(32)  .00273*(28) -.00153*( 3) -.00186*(26)  .00073*( 8)  .00108*( 9) -.00085*( 6)

YUM   INTERCEPT       .09103
 -.00041*( 1)  .00128*(21)  .00109*(16)  .00130*(22) -.00187*( 3)  .00050*( 4)  .00317*(10) -.00159*( 9)  .14240*(33)

SAC   INTERCEPT       .37265
 -.00324*( 1)  .00527*( 9)  .00885*(28)  .00098*(13)  .13835*(34)  .00643*(27)

SMX   INTERCEPT      7.47396
 -.00018*( 5)  .00419*( 2) -.00098*(25) -.00186*(19)  .00034*(35) -.00100*(14)  .17700*(33) -.17749*(34)  .00182*(21)  .00129*(26)

BIL   INTERCEPT      2.25429
 -.00107*(19) -.00135*(24) -.00152*( 1)  .00060*(16)  .00065*(13) -.00081*(10)  .00055*(20)  .00218*(27)

SLC   INTERCEPT      -.05614
 -.00876*(29)  .00156*(22)  .00169*(10)  .00539*(28) -.00153*(25) -.00326*(27)  .00030*(14)  .00018*( 6)

BOI   INTERCEPT      -.04421
  .00045*(35)  .00154*(17)  .00283*(18) -.00162*( 3)  .00184*( 4)  .00153*(23) -.01456*(30) -.00146*(14)

BNO   INTERCEPT       .00451
 -.00126*( 3)  .00669*(25)  .01019*(30) -.00088*(35)  .00242*( 4) -.00149*( 2) -.00305*(18)  .00158*( 6) -.00027*(36)  .00188*(11)

GTF   INTERCEPT      2.96321
 -.01348*(29) -.00186*( 9) -.00069*(19) -.01117*(30)  .00091*( 2)  .14060*(34) -.00017*(36)  .00218*(11) -.00171*(14)  .00213*(32)

MSO   INTERCEPT      -.72807
 -.00458*( 3) -.02561*(29)  .20891*(33)  .00500*(21)  .00396*(22) -.00049*(35)  .00234*( 5)

PDT   INTERCEPT       .08527
  .00059*( 1)  .00428*( 4)  .00150*(17) -.00365*(28)  .00276*( 5) -.00751*( 3) -.00294*(26) -.00182*( 9)  .14863*(33) -.00253*(10)

EKA   INTERCEPT      -.32285
 -.00162*( 7) -.00185*( 2) -.00414*(17)  .00188*(11)  .00140*( 6)

MFR   INTERCEPT      -.66107
 -.00572*( 1)  .00285*( 2)  .00503*(25)  .00330*(21)  .00097*( 8) -.00148*(15)  .00252*( 3)  .00157*(22)

SEA   INTERCEPT      -.23360
  .00560*( 3)  .00232*(21) -.01894*(29)  .00253*(24) -.00208*( 9)  .00113*(10) -.00118*(22) -.00105*( 2) -.00353*(18)  .00310*(17)

FAT   INTERCEPT      5.54681
 -.00036*( 7)  .00321*(21)  .00044*( 8)  .00029*(35) -.00845*( 1)  .00232*(10)  .00258*( 2)  .00573*( 3) -.00110*(14) -.00142*(19)

LAX   INTERCEPT      -.27722
 -.00024*( 3)  .14978*(33)  .01004*(27)  .00135*(22)  .00267*(10)  .00386*(32) -.00057*( 6)

MLF   INTERCEPT      -.20197
  .38107*(34) -.00153*(13)  .00182*(21) -.00059*(15)  .00153*(22)

RNO   INTERCEPT     -6.74983
 -.00122*( 1)  .00176*(21)  .17937*(33)  .00057*(35)  .00157*(20) -.00046*(36)  .00487*(27)  .00097*(10)

SAN   INTERCEPT       .06186
 -.00157*( 3)  .23321*(33)  .00249*(12) -.00129*(13) -.00076*(14) -.00081*(24) -.00094*(25)  .00059*( 8) -.00044*(36)  .00026*(35)

INW   INTERCEPT       .02336
  .28800*(34) -.00227*( 1) -.00196*(25)  .00063*(22)  .00167*(11) -.00034*(35)  .00037*( 8)  .00009*(36)  .00253*(31)  .00215*(30)

SFO   INTERCEPT       .09740
 -.00412*( 1)  .00408*( 9)  .00251*( 2)  .00328*( 4)  .00261*(21) -.01146*(29)  .00187*(17)

PIH   INTERCEPT       .04372
  .00087*(35) -.01277*(29)  .01632*(30)  .34070*(34)  .16442*(33) -.00117*(10) -.00248*(18) -.00331*(32)

GEG   INTERCEPT     -4.44689
  .00362*(21) -.00494*(25)  .00135*(22)  .00159*(23)  .00094*(19) -.00025*(36) -.00335*(12)  .00362*( 2) -.00301*(10) -.00211*( 1)

RBL   INTERCEPT      -.01163
 -.00217*( 3) -.00160*( 2)  .00337*(23)  .00266*(13)  .00230*(21) -.00213*(11)  .10455*(34)

PDX   INTERCEPT     -7.92735
  .00320*(21) -.00162*( 1)  .00495*( 2) -.00250*(15)  .00180*(19)  .01002*(28)  .00589*(27)  .13352*(34)

OLM   INTERCEPT       .12313
  .00139*(31)  .00484*( 2)  .00189*(21)  .00015*(35)  .00246*( 9)  .00638*(28) -.14954*(33) -.00095*( 1)

ALW   INTERCEPT      -.22081
 -.00181*( 1)  .00313*( 9)  .00078*( 8) -.02156*(30) -.00420*(26) -.02265*(29) -.00390*(25)  .00252*(17) -.00215*(10) -.00104*(15)

AST   INTERCEPT       .50827
  .00221*(21)  .00546*(28)  .00339*( 2)  .00747*(32) -.16543*(33) -.00793*(29) -.00155*(22)

SLM   INTERCEPT      -.34189
 -.00217*( 1)  .00388*( 2)  .00287*( 9)  .00227*(22) -.00026*(35)  .00162*(21)

EUG   INTERCEPT      -.09398
 -.00310*( 1)  .00417*( 2)  .00324*( 9)  .00344*(32) -.00296*(10)  .00350*(18)  .00685*(28)

FCA   INTERCEPT      -.28476
 -.00019*(35) -.00207*(15)  .01288*(30)  .00185*(17)  .00301*(10)  .00062*( 8)  .00479*( 9)  .14385*(33)  .12495*(34)  .00912*(29)

HVR   INTERCEPT     10.37662
 -.00250*(19) -.01060*(29)  .01074*(30)  .23675*(33)  .00148*(23)  .00210*(25)  .00072*( 7)  .00553*(28)  .00041*(35)

HLN   INTERCEPT      -.26118
 -.00106*( 3)  .00036*( 4) -.01636*(30)  .18924*(34)  .00397*(32)  .00306*(28)  .00154*(21) -.00813*(29) -.00131*(26)  .00065*( 6)

GGW   INTERCEPT       .49655
 -.00015*(35) -.00015*(19)  .00175*(11)  .15318*(34)  .00112*(27)  .00346*(28) -.00094*(26)  .00019*(36)  .00091*(18)  .00081*(21)

LWS   INTERCEPT      -.03910
 -.00138*( 1)  .00134*( 2) -.00046*(35) -.00211*( 9)  .00696*(23) -.00378*(17)  .21125*(34)  .00139*(16) -.00029*(36) -.00289*(10)

EKO   INTERCEPT       .10274
  .00086*(35)  .01742*(29) -.00134*( 1)  .00087*(21) -.00397*( 9)  .00411*(10)  .00073*(14) -.00070*(16)

WMC   INTERCEPT    -13.96106
  .00066*(35) -.00064*(36)  .00216*(21)  .00328*(20) -.00455*( 3) -.25606*(33)  .00307*( 1) -.00274*( 9)  .00068*(14)

FLG   INTERCEPT       .08403
 -.00312*( 1)  .00085*( 8)  .00072*(31) -.00084*( 7)  .00107*(16)  .00039*(36)  .00116*(21)  .00573*(27)  .00152*(12)  .01008*(29)
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Fig. 21. Final regression equations for Type 3.

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TUS   INTERCEPT        1.19157
 -.00032*(35)  .00214*(22) -.00072*( 1) -.00347*(26) -.01395*(30)  .00114*( 9) -.00059*(14) -.00129*(25) -.00031*(19)

SAC   INTERCEPT         .18502
  .22777*(33) -.00459*(27) -.00073*( 3) -.19361*(34) -.00092*(11) -.00029*( 7) -.00048*(12) -.00250*(29)  .00090*(18) -.00101*(17)

BIL   INTERCEPT        -.13242
  .00019*(35) -.00694*(31)  .11648*(34)  .00082*(32) -.00064*( 5)  .00062*( 4) -.01973*(30) -.00452*(29)  .00609*(28)  .00058*( 6)

SLC   INTERCEPT        -.93180
  .61962*(33) -.00668*(27) -.01026*(29)  .00082*(16) -.00019*( 7) -.00041*( 1)  .00022*(20)

BOI   INTERCEPT        -.49960
  .00091*(15) -.00024*(13) -.00132*(14)  .00381*(22) -.00161*(12) -.21633*(33)  .00236*(21) -.00204*(25)  .00009*(35)  .00030*( 8)

BNO   INTERCEPT         .14437
 -.00022*(27)  .00237*(26)  .00094*( 9) -.00156*(17) -.00592*(31) -.00925*(29)  .00317*(28) -.25240*(33) -.00096*( 4)  .00384*(32)

GTF   INTERCEPT         .05877
 -.00007*(35) -.00192*(25) -.00028*(36)  .01816*(30)  .00099*(24)  .00428*(27) -.00136*(10) -.24995*(33)  .00104*( 9) -.00294*(29)

MSO   INTERCEPT        -.26181
  .00293*(21) -.00023*(36) -.00048*(35) -.00195*(24) -.00696*(27)  .10870*(34)  .00111*(14) -.00192*(25)  .01466*(30)  .00067*(16)

PDT   INTERCEPT         .05021
  .00004*(29) -.00103*(26) -.00115*( 4) -.00882*(31) -.00155*(11)  .00208*(17) -.00231*(18)  .00478*(30)  .00011*(36) -.00042*(15)

EKA   INTERCEPT         .10911
  .00093*(22) -.00208*(24) -.00178*(28)  .00142*(14) -.00346*( 1)  .00052*(16)  .00087*(17)  .00257*( 2) -.00137*(11)  .00132*(25)

MFR   INTERCEPT        -.04190
  .00102*(22)  .00250*(21) -.00531*(32)  .00133*(17) -.00258*(23) -.00337*( 1)  .00154*(12) -.00157*(18)  .00268*( 2)  .00628*(27)

SEA   INTERCEPT        -.79895
 -.00054*(35)  .00020*(20)  .01377*(32) -.00253*(17) -.00859*(28)  .00160*(23) -.00108*( 4)  .00178*(11) -.00183*( 3)  .00180*( 2)

FAT   INTERCEPT         .15568
  .14673*(33) -.00368*(27) -.00108*( 3)  .00026*( 6) -.00091*(17)  .00373*(32) -.00279*(29)  .00425*(30)

MLF   INTERCEPT        1.87284
  .00128*(21) -.00047*(19)  .00131*(11) -.00172*(25) -.00547*(30)  .00045*( 9) -.00037*(17)  .00028*(16)

RNO   INTERCEPT         .18502
  .22777*(33) -.00459*(27) -.00073*( 3) -.19361*(34) -.00092*(11) -.00029*( 7) -.00048*(12) -.00250*(29)  .00090*(18) -.00101*(17)

SAN   INTERCEPT        -.00363
 -.00228*(17) -.00026*(35)  .00012*(36)  .00555*(31) -.00264*(25)  .00100*(11) -.00519*(29)  .00293*(30)  .00076*(18)  .00050*(24)

SFO   INTERCEPT         .06268
  .25716*(33) -.00121*(11) -.18021*(34)  .00099*(26) -.00023*( 7) -.00221*(28) -.00607*(29)  .00514*(30) -.00110*(17)  .00081*(18)

PIH   INTERCEPT        -.03115
 -.01032*(30)  .00290*(27) -.00648*(28) -.00078*(24) -.00114*(15)  .00048*(16) -.23369*(33) -.00176*(26)  .00027*( 8)  .00016*(36)

GEG   INTERCEPT        -.17602
 -.00065*(35)  .00231*(21) -.00042*(36) -.00260*(17)  .00072*( 8)  .00411*(14) -.00014*( 7) -.00226*(13) -.00131*(22) -.00097*( 3)

RBL   INTERCEPT         .12948
  .18164*(33) -.00272*(27) -.00070*( 3) -.00040*(12) -.11485*(34) -.00287*(29) -.00157*(17)  .00085*(18) -.00252*(11)  .00148*(13)

PDX   INTERCEPT        -.22079
  .00683*(31) -.00268*(30) -.00079*(35)  .00184*(25)  .00194*(11)  .00121*(15) -.01976*(27)  .00732*(32)  .00194*(21)  .00012*(36)

OLM   INTERCEPT         .03641
 -.00243*( 1)  .00129*( 2) -.00517*(26) -.02450*(29)  .00036*(36)  .00733*(11) -.00526*(12) -.00511*(17)  .00289*(18)

ALW   INTERCEPT         .02036
 -.01362*(29)  .00085*(17) -.0009[illegible]  .00182*(30)  .00097*(12) -.00018*(13) -.00033*(10) -.00004*(36)  .00046*(15) -.00020*( 8)

AST   INTERCEPT        -.05433
 -.00057*( 3) -.04087*(30)  .42729*(34) -.00283*( 1)  .00190*( 4) -.00373*(25) -.00407*(31)

SLM   INTERCEPT        -.13127
 -.00331*(17)  .00207*(21)  .00094*(12)  .00165*(11) -.00168*(14)  .00134*(10) -.00288*(26) -.00573*(32)  .00225*(18) -.02037*(29)

EUG   INTERCEPT         .14349
 -.00298*(26) -.00203*(17)  .00113*(12) -.00249*(18) -.00226*(10)  .00071*(35)  .00839*(32)  .00259*(31)  .00305*(11) -.00049*( 1)

FCA   INTERCEPT       -4.30501
 -.00720*(11) -.00056*(35) -.01295*(32) -.00084*(36)  .00319*(12) -.00201*( 3)  .00372*(24) -.00372*(26)  .00112*(19) -.00204*(22)

HVR   INTERCEPT         .53255
 -.00198*( 7)  .00233*(23)  .00820*(30)  .00232*(27)  .00466*(28) -.00121*( 1)  .00421*(29)  .00293*(15)  .00127*(24)  .00155*(11)

HLN   INTERCEPT        2.58522
  .00078*(23) -.00152*(25) -.00072*(10) -.00294*(28) -.00062*(19)  .00056*( 2) -.00138*(12)  .00131*(26) -.20872*(33)  .00072*(11)

GGW   INTERCEPT         .39316
  .00029*(15)  .00091*(14)  .00084*(12)  .01077*(28) -.00158*( 1)  .00217*(13) -.00217*(24)  .00141*(17) -.00164*(18) -.00103*( 5)

LWS   INTERCEPT         .12123
  .00969*(29)  .00303*(17)  .00369*(27) -.00635*(32)  .00122*( 4) -.00114*(11) -.00152*(13) -.00185*(18)  .00182*(12) -.00051*(10)

EKO   INTERCEPT        3.46669
  .00091*(21)  .00061*(13) -.00142*(17)  .00025*(36) -.00082*(19)  .00191*(25) -.25745*(33)  .00229*(27)  .00214*(32) -.00015*( 8)

WMC   INTERCEPT         .12654
  .00235*(27) -.00152*(17) -.01285*(30) -.00129*(25) -.00045*( 8)  .00068*(11)  .00515*(31)  .00246*(32) -.00058*(18)

FLG   INTERCEPT         .18502
  .22777*(33) -.00459*(27) -.00073*( 3) -.19361*(34) -.00092*(11) -.00029*( 7) -.00048*(12) -.00250*(29)  .00090*(18) -.00101*(17)
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Fig. 22. Final regression equations for Type 4.

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ELY   INTERCEPT       6.93564
  .00092*(35) -.00092*( 1) -.02109*(29)  .00019*(36)  .00007*( 2)  .00182*(22)  .00269*(16)  .00256*( 9)  .00479*(23) -.00163*(20)
BFL   INTERCEPT       -.22379
 -.00615*( 1) -.00277*( 6)  .00295*(11)  .00380*(25)  .20641*(33)  .00274*( 3)  .00122*(23)
TUS   INTERCEPT       8.02912
 -.00051*(35)  .00220*(21)  .00240*(26) -.00215*(18)  .00148*( 2) -.00059*(23) -.00041*(10) -.00196*(20)  .00148*(16)  .00460*(29)
LAS   INTERCEPT      -4.95028
  .00090*(36)  .00433*( 9) -.00292*(26)  .00119*(19)  .11638*(33)  .00131*(23)
PHX   INTERCEPT        .32870
  .00635*( 9) -.00308*(10)  .00286*(21)  .00376*(26) -.25557*(34) -.00411*( 3) -.00129*( 4)  .00105*( 2)
YUM   INTERCEPT        .26538
 -.13384*(33)  .00310*(25)  .00109*( 5)  .02413*(29)  .00305*(22) -.00234*(17)  .00621*(30) -.09518*(34)  .00046*( 6)  .00603*(27)
SAC   INTERCEPT       -.07772
 -.01004*( 3)  .00310*(26) -.00661*(17)  .00007*(36)  .00396*( 4) -.52151*(34)  .00659*( 1)  .00117*(10) -.00048*(35)  .00174*( 9)
SMX   INTERCEPT      -7.15086
 -.00368*( 1) -.00440*(25) -.00177*(17)  .02372*(29)  .02125*(30)  .00177*(19)  .00316*(24)  .00182*(13)
BIL   INTERCEPT      -5.61233
 -.00365*(11)  .00273*(21)  .00059*( 1)  .00275*(22)  .00102*(18)  .00146*( 4) -.00106*(23)  .00127*(20) -.00218*( 9)  .00208*(13)
SLC   INTERCEPT        .41593
 -.00476*( 5) -.00302*(17)  .00438*(11)  .00176*(16)  .00409*( 6)  .00064*(36) -.20006*(34) -.00307*( 4) -.12785*(33)
BOI   INTERCEPT        .21745
  .00184*(25)  .00337*(12)  .00617*(18) -.00584*(24) -.00241*(15) -.00115*(21) -.00530*(10) -.00420*(29) -.17558*(33)  .00147*(14)
BNO   INTERCEPT        .40967
  .01071*(11)  .00824*(21)  .00091*(22)  .00648*(26)  .00499*(17)  .00255*( 8) -.00683*(31)  .00035*(36)  .00309*(14) -.00276*(12)
GTF   INTERCEPT       -.84923
  .00589*(21)  .00343*(22) -.00035*(35)  .00556*(18)  .00060*(36) -.00830*(29)  .01958*(32) -.01536*(28) -.00126*(14) -.00212*(17)
MSO   INTERCEPT       -.79484
  .00651*(21)  .00635*(25)  .00542*(12)  .00447*(24) -.02288*(29)  .26807*(34)  .00185*( 6) -.00298*( 3) -.00561*(32)  .00211*( 9)
PDT   INTERCEPT      -4.51005
 -.00675*(21) -.00111*(35)  .00663*(31) -.00421*(25)  .00820*(17) -.00504*(23) -.00794*(28) -.00024*(36) -.01857*(29)  .00130*(20)
EKA   INTERCEPT        .01319
 -.00285*( 5) -.00231*(10)  .00033*(36)  .00096*( 6)  .00304*(26) -.00714*(29)  .10633*(34)
MFR   INTERCEPT       -.02663
 -.00327*( 3)  .00524*(23) -.00164*( 9)  .00085*( 2)  .00362*(11) -.00053*(36) -.01755*(30)  .00337*(17)  .01147*(27)  .00316*(12)
SEA   INTERCEPT       1.31446
  .00280*(15) -.01831*(29) -.00112*(35) -.00233*(23)  .00655*(26) -.00104*( 7) -.00314*(10) -.00179*(22) -.00515*( 1)  .00193*( 2)
FAT   INTERCEPT      10.34806
 -.00272*( 1) -.00273*( 4) -.00318*(17)  .00340*(15)  .00234*(24)  .00607*(28)  .00027*(35) -.00243*(19)  .00375*(26)
LAX   INTERCEPT        .14810
 -.00149*( 1)  .00455*(21)  .00645*(26) -.00372*(22) -.00957*(32)  .01460*(29) -.00312*( 3)
MLF   INTERCEPT       8.53132
 -.00607*( 3)  .00388*(12) -.00617*(18)  .00443*(24)  .00595*(31) -.24679*(33)  .00414*( 9) -.00200*(20)  .00334*( 4)  .00031*(35)
RNO   INTERCEPT       -.29414
 -.00002*(19)  .00037*(35)  .00009*( 8) -.00696*( 3)  .00450*( 4) -.00653*(17)  .00474*( 2) -.00483*(28)  .00324*(18) -.00446*(29)
SAN   INTERCEPT       9.18493
 -.00684*( 1) -.00023*( 7) -.00354*(18)  .00946*(26) -.00394*( 9)  .00717*(27) -.17689*(34) -.00196*(12) -.00204*(19) -.00321*(22)
INW   INTERCEPT       6.92331
  .01113*(29) -.00270*(31)  .00220*(13)  .00247*(15) -.00124*(16) -.02584*(30) -.00164*(20)  .00390*(24)  .00738*(28)  .00113*(22)
SFO   INTERCEPT      -7.94561
  .00200*(19)  .01121*(12) -.00350*( 3)  .00403*( 9) -.00262*(10)  .00083*( 8)  .00269*(17)  .00193*(21) -.00211*(16)  .00200*( 5)
PIH   INTERCEPT        .03413
 -.00650*( 3) -.00401*(18) -.00296*(17)  .00251*(11)  .00242*(25)  .00993*(28)  .00423*(10)  .00377*( 4)  .00291*( 9) -.01013*(30)
GEG   INTERCEPT        .66930
 -.00379*(31)  .00146*(18)  .00026*(36) -.00044*(35) -.00370*(22) -.00790*(15)  .00748*(28)  .00596*(32)  .00459*(16) -.00168*( 1)
RBL   INTERCEPT       2.47128
 -.00055*(19)  .00034*(35)  .00417*(18) -.02226*(27) -.00510*(32)  .00174*( 3) -.00194*( 6)  .00162*( 7)  .00616*(28)  .00948*(30)
PDX   INTERCEPT       1.12232
 -.02550*(27)  .00334*( 9) -.00425*(22)  .00419*(10)  .00734*(28) -.00035*( 7) -.00272*(13)  .00445*(30) -.00376*(23)  .00213*(14)
OLM   INTERCEPT        .65836
 -.00120*( 7)  .00338*(23) -.00476*(22)  .00217*( 2) -.00045*(36)  .00224*(12)  .00128*(18) -.00597*(32) -.00259*(14)  .00253*(17)
ALW   INTERCEPT        .35940
  .00084*(27) -.13971*(34)  .00696*(25) -.00516*(26) -.00128*(21) -.00486*(18) -.00079*(35)  .00192*( 1) -.00034*(36) -.00301*(11)
AST   INTERCEPT       5.01137
 -.00162*(13) -.00136*(21) -.00106*( 3) -.00882*(32)  .00149*(17) -.00195*(10) -.00097*(20)  .00160*(23)  .00437*(27) -.00255*(30)
SLM   INTERCEPT        .35133
 -.00078*( 7)  .00440*(11) -.00173*(13) -.00285*(26)  .00106*( 6)  .00227*(14)  .00042*( 8)  .08863*(34)  .00150*(17)
EUG   INTERCEPT        .32843
  .00755*( 9) -.00107*( 5)  .00570*( 1)  .00265*(12) -.00471*(30)
FCA   INTERCEPT        .99128
 -.00157*(23)  .00251*( 7) -.00031*(36) -.00344*(12) -.00153*( 8)  .00178*(25)  .00174*(18)  .00473*(26)  .00286*( 9) -.00349*(11)
HVR   INTERCEPT        .44931
  .00155*(35) -.00356*(15)  .02845*(29) -.00066*(36) -.00266*(22)  .00498*(17)  .00589*(32) -.00559*(31)  .00191*( 5) -.00138*(23)
HLN   INTERCEPT        .33189
 -.00371*(21) -.00134*(11) -.01275*(29) -.00180*(22)  .00319*(23)  .00369*(17) -.00268*(16)  .00215*(15)
GGW   INTERCEPT       -.92244
 -.00394*(11)  .00187*(22)  .00266*(31) -.00424*(16)  .00352*(15) -.00599*(10)  .00491*(12)  .00419*( 2) -.00192*( 3)  .00031*(35)
LWS   INTERCEPT       -.05849
  .02407*(29)  .00238*(18)  .00430*(24) -.00448*( 9) -.00448*(10)  .00311*( 5) -.00104*( 8) -.00257*( 2)  .00030*(36) -.00239*(15)
EKO   INTERCEPT     -24.80081
  .00122*(19)  .00509*(20) -.00866*(28) -.00402*( 9)  .00562*( 2) -.00338*(18)  .00051*(35) -.00866*(30)  .00145*( 8) -.00350*( 4)
WMC   INTERCEPT       -.71285
  .00287*(21)  .00007*(35) -.00633*(27)  .00155*(22) -.00591*(17)  .00854*( 1) -.00188*(14) -.00062*(36) -.01790*(29) -.00136*( 2)
FLG   INTERCEPT      13.30981
 -.00944*( 1) -.00567*(13)  .00269*(22) -.00318*(20)  .00484*( 4)  .00484*(25)  .00020*(35)  .00094*(24)
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Fig. 23. Final regression equations for Type 5.

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ELY   INTERCEPT     -15.03589
 -.00170*(13) -.00347*(15) -.00187*(26)  .00026*(36) -.01357*(30)  .00138*(10)  .00252*(18)  .00357*(19)  .00233*(21) -.00346*(17)

BFL   INTERCEPT       -.14847
  .00329*(21) -.00050*(23)  .00152*( 9)  .00019*(35)  .00298*(25) -.00501*(31) -.00144*(22) -.00213*(24)  .00024*(36)  .00093*(12)

TUS   INTERCEPT      3.30867
 -.00292*(19) -.00228*(25)  .00216*(20)  .00525*( 9) -.00334*(18)  .01537*(28) -.01223*(32)  .02649*(30)  .00205*(22)  .00116*(21)

LAS   INTERCEPT       -.05113
  .00010*(36)  .00122*(21) -.00153*(17) -.00399*(11)  .19560*(33) -.00148*(25) -.10508*(34)  .00172*(12) -.00211*(18) -.00108*(10)

PHX   INTERCEPT      3.51742
  .32898*(34)  .00562*( 9) -.00159*(27) -.00237*(24)  .00114*(17)  .00241*(22) -.00271*( 2)  .00183*( 6)  .01057*(31) -.00092*(20)

YUM   INTERCEPT      6.64707
 -.00839*(27) -.00157*( 1) -.00341*(25) -.00418*( 9) -.00417*(26)  .00188*(13) -.00164*(20)  .00160*(16)  .00275*(28) -.00084*(14)

SAC   INTERCEPT      7.41488
 -.00179*(19) -.00120*(23)  .00103*(16)  .00036*(35)  .00196*(28) -.00166*(24) -.13849*(33)  .00069*( 3) -.00112*(10)  .00100*(32)

SMX   INTERCEPT        .02933
  .00040*(35) -.00370*(17)  .00187*(27) -.00170*(13)  .00116*( 2)  .00240*(26) -.00347*(25) -.01183*(30)  .00157*(23) -.00063*( 5)

BIL   INTERCEPT      4.58421
 -.00420*(25) -.00216*(19)  .00214*(26) -.29498*(34) -.00330*(22)  .00352*(28)  .00165*( 5)  .00104*(20)  .00101*( 1)  .00033*(36)

SLC   INTERCEPT       -.03680
  .00203*(23) -.00181*(15)  .00413*(16) -.00676*(18) -.29448*(34) -.00380*(26)  .01185*(30) -.00883*(11)  .00418*(10)  .00352*(13)

BOI   INTERCEPT     -14.20993
  .00729*(21) -.00567*(22) -.00725*(15)  .00334*(19) -.00632*( 3)  .00159*( 6)  .01512*(29)  .00259*( 7)  .00366*(31)  .00214*( 2)

BNO   INTERCEPT        .14489
  .00001*( 3)  .00275*(17) -.00186*(22)  .00304*(18) -.00558*(31) -.00403*(26)  .02567*(30) -.18935*(33) -.00094*( 7)  .00143*(16)

GTF   INTERCEPT      3.44017
 -.00071*(19)  .00115*( 1)  .00032*(35)  .00025*(36) -.00668*(10)  .00594*(32) -.00325*(31) -.05952*(30) -.00225*(22) -.00215*(21)

MSO   INTERCEPT        .03298
  .00281*(15)  .00098*(13)  .02271*(30)  .00227*(12) -.00111*( 5) -.01199*(29)  .00350*(25) -.00287*(11)

PDT   INTERCEPT        .05927
 -.00127*( 3) -.00180*(17)  .00209*( 4)  .00463*(13)  .00696*( 9)  .00595*(31) -.00060*(35) -.00591*(12)  .00756*(27)  .00158*(22)

EKA   INTERCEPT       -.04264
  .00367*(11)  .00022*(35) -.00528*(18) -.00307*(10) -.00102*(15)  .00188*(17)  .00207*(26) -.13532*(34)  .12963*(33)

MFR   INTERCEPT     -5.25230
 -.00037*(35) -.00134*(31) -.00152*(25) -.00275*( 1) -.00277*(17) -.00172*(11) -.00982*(30)  .00129*( 2)  .00127*(19) -.00257*(27)

SEA   INTERCEPT       -.74163
  .00303*( 3) -.00155*(13) -.00254*(17) -.00373*(26)  .06788*(30) -.00159*(12)  .00044*(35) -.17898*(34)  .00188*(22)  .00277*(21)

FAT   INTERCEPT        .16104
 -.00447*(25)  .00034*(26)  .00021*(36) -.00133*(27)  .01181*(29)  .00357*( 9)  .00170*(18) -.00198*(14)  .00435*(32)  .00069*(15)

LAX   INTERCEPT        .21342
 -.00650*( 3)  .00548*( 2)  .00152*( 6) -.01651*(30) -.00293*(17)  .00139*(14) -.00146*(21)  .31115*(34)  .00155*(18) -.00194*(10)

MLF   INTERCEPT     17.56626
 -.00160*(21)  .00291*( 9)  .00377*(22) -.00887*(10) -.00951*(25) -.00589*(31) -.00434*(19)  .35781*(34)  .00124*( 8) -.00151*( 2)

RNO   INTERCEPT        .15410
  .00230*(25) -.00120*( 7)  .00071*( 6) -.19464*(33) -.00474*(26)  .00105*(16)  .00207*(23) -.02125*(30) -.00018*(35) -.00127*(22)

SAN   INTERCEPT        .19734
 -.00206*( 5)  .00123*(35) -.00457*(17)  .00403*(18) -.00274*(12)  .00121*( 4) -.00921*(29) -.00337*(25)  .13736*(33)

INW   INTERCEPT     -8.33304
 -.00195*( 1)  .01023*(27) -.00170*( 6) -.00435*(17) -.00658*(31)  .00331*(22)  .00235*(10)  .00280*(21)  .00183*(19) -.00060*( 8)

SFO   INTERCEPT        .30528
 -.00206*(15) -.00252*(24) -.00145*(12) -.00108*( 9)  .00185*(16) -.00151*( 5)  .00059*( 6) -.00076*(22) -.00196*(31)  .00385*(28)

PIH   INTERCEPT     -7.03955
 -.00489*( 9)  .00190*(21) -.00606*(26) -.00211*(14)  .00158*(22)  .00162*(20)  .00594*(28) -.00421*(27)  .00211*(24)  .00942*(30)

GEG   INTERCEPT        .17659
 -.00516*(25) -.00306*(11) -.00078*(35) -.00043*(36)  .00867*(28) -.01453*(30) -.00093*( 1) -.10715*(34)  .00096*(21)

RBL   INTERCEPT      4.07132
  .00128*( 9) -.00040*(36)  .00045*(35)  .00358*(25) -.00044*(14)  .00200*(26) -.00097*(19)  .00049*( 6) -.00205*(31) -.00089*(17)

PDX   INTERCEPT     35.86633
  .00616*( 5)  .02290*(29) -.00808*(30)  .00314*( 6)  .00018*(26)  .16901*(34) -.00876*(19) -.00559*( 1) -.00223*( 9)  .00545*(27)

OLM   INTERCEPT        .34381
 -.00273*( 1) -.00055*(36) -.02493*(27) -.00599*(32)  .00378*( 2)  .00331*(14) -.00259*(12)  .00338*(17) -.00350*(25) -.00135*(15)

ALW   INTERCEPT       -.07723
  .00058*(35) -.00298*(17)  .00014*(36) -.00462*( 9)  .00427*(12) -.00401*(15)  .00295*(16)  .00393*(32)  .00145*( 2) -.00058*( 5)

AST   INTERCEPT        .04848
 -.00495*( 1)  .00135*( 4)  .00345*( 9) -.00257*(17)  .00169*(21)  .00281*( 2)  .00023*(36) -.00489*(25)

SLM   INTERCEPT        .24266
 -.00686*( 1)  .00325*( 2)  .00477*( 4) -.00316*(17)  .00252*(22) -.00111*( 8)  .00308*(23)

EUG   INTERCEPT       -.29428
 -.00240*( 1)  .00244*(21)  .23653*(33)  .00196*(13)  .00301*(22)  .00224*( 2)  .00615*(28) -.00024*(35) -.00506*(32)

FCA   INTERCEPT       -.08223
  .00231*(21) -.00286*( 1) -.00039*(35)  .00222*( 4)  .00926*(30)  .00168*(22) -.23854*(33)  .14626*(34) -.00154*( 9)  .00348*(12)

HVR   INTERCEPT        .32439
 -.00046*(35) -.00232*(11)  .00022*(36) -.00290*( 2) -.00191*(21) -.00611*(27) -.00202*(12) -.14151*(33) -.00096*(15) -.00065*(14)

HLN   INTERCEPT     11.44676
  .00037*(11) -.00278*(19)  .02107*(29)  .00157*( 6)  .00344*( 9)  .00308*(17)  .00052*(36) -.00719*(25) -.14972*(33) -.00206*(13)

GGW   INTERCEPT     -9.33381
 -.00291*(11)  .00222*(19) -.00281*(26) -.00289*(25)  .00248*(13)  .00032*(35)  .00116*(17) -.00101*( 2)  .00072*( 8)  .00145*(21)

LWS   INTERCEPT     -5.27169
 -.00159*( 1) -.00068*(35) -.00137*( 9) -.00239*(17) -.00217*(18)  .00354*( 2) -.00213*(15) -.00180*(16)  .00114*(20)  .00026*(36)

EKO   INTERCEPT      9.50846
 -.05704*(27) -.00221*(19)  .00164*( 4)  .07730*(30) -.00814*(25) -.00179*(12)  .01114*(29) -.00375*(28) -.00405*(26)  .06567*(31)

WMC   INTERCEPT       -.04278
  .00279*( 9)  .01641*(29) -.00194*(10) -.00114*(15)  .02335*(30)  .00396*(22)  .00488*(32) -.11254*(33) -.00135*(21)  .00162*(11)

FLG   INTERCEPT     -3.68663
 -.00384*( 3)  .00295*( 2) -.00260*(13) -.00138*(18)  .00479*( 7)  .35371*(34) -.00844*( 5) -.00212*(22)  .00109*(20)
```

Fig. 24. Final regression equations for Type 6.

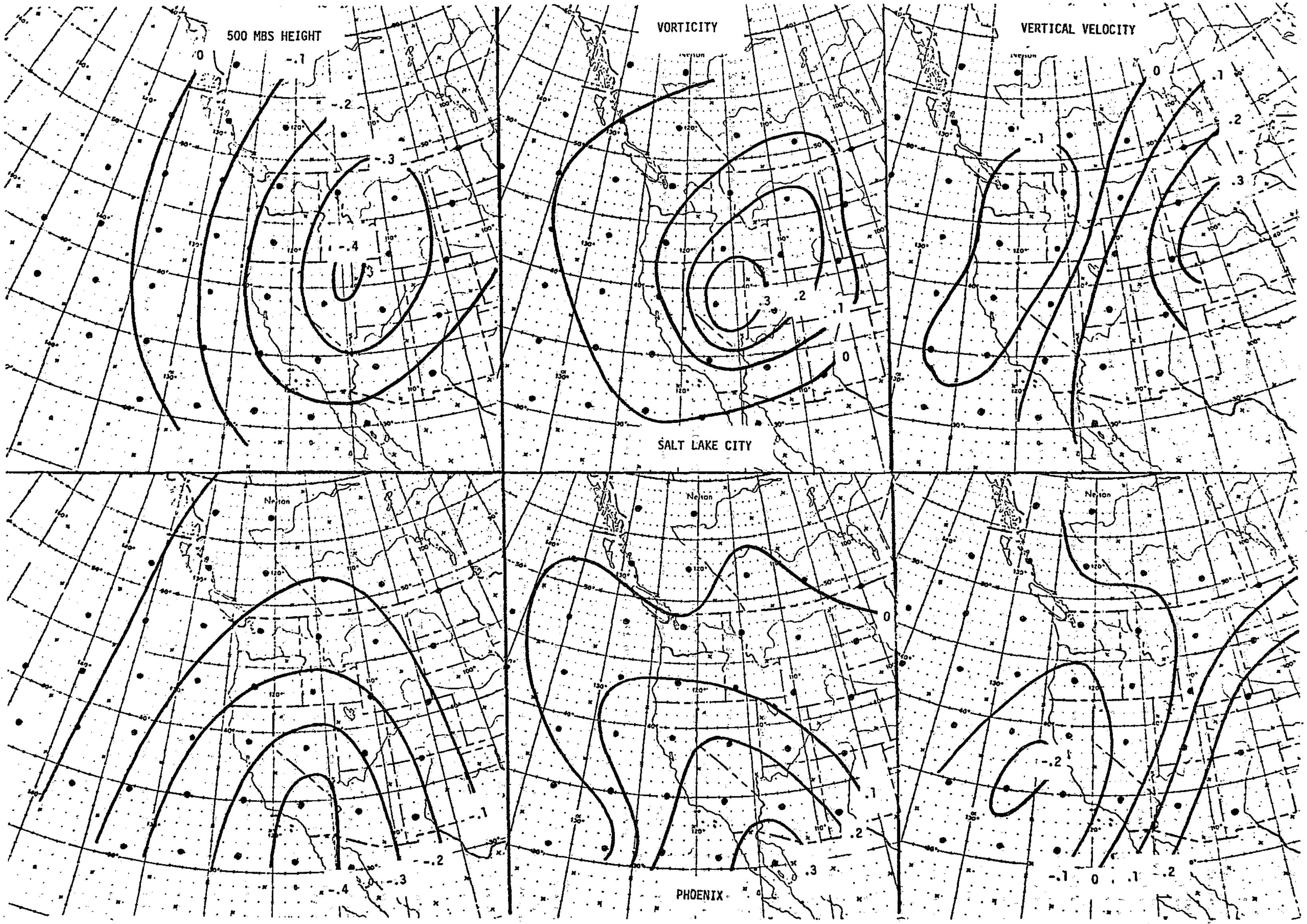


Fig. 25. Correlation coefficients for Salt Lake City and Phoenix.

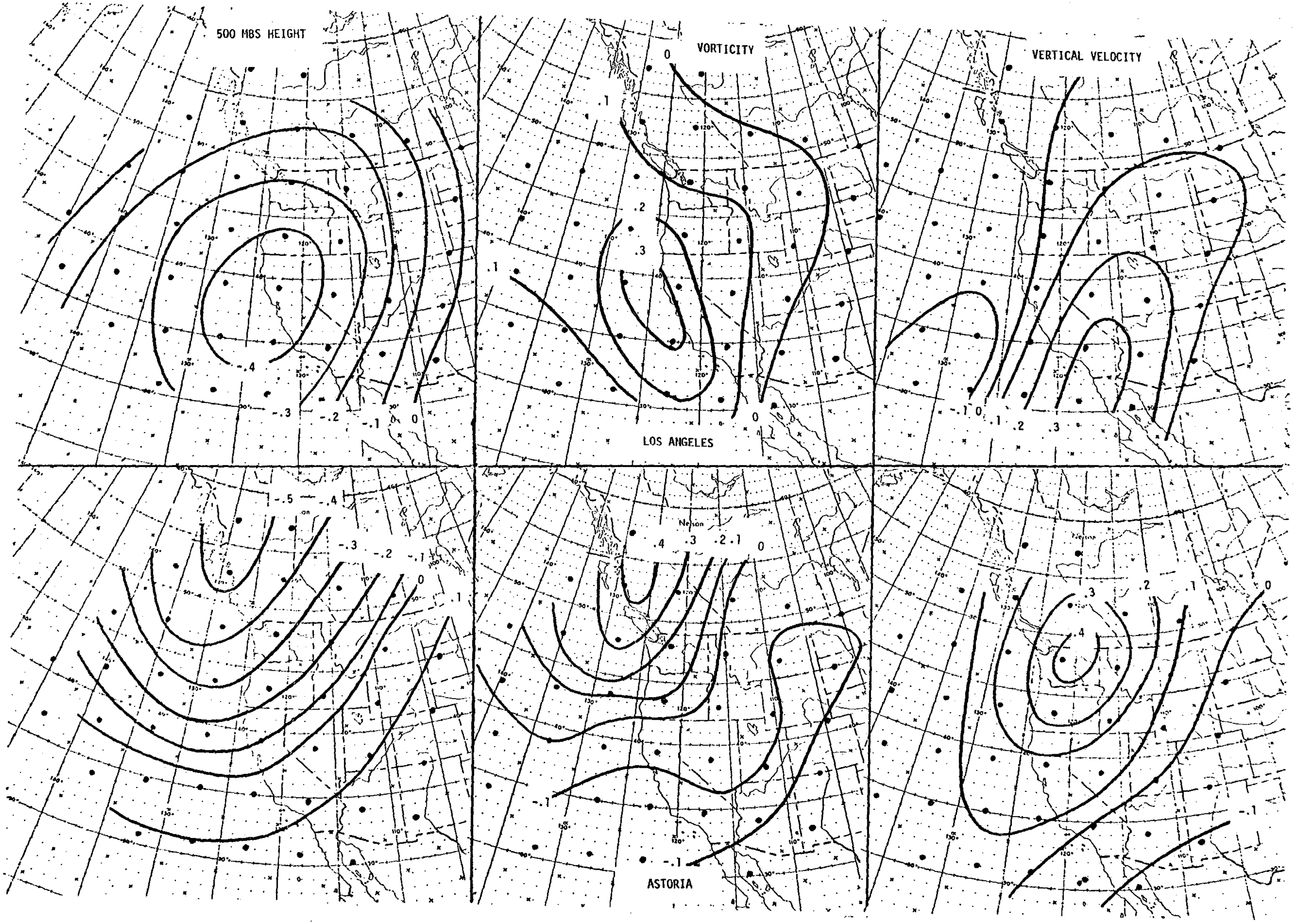
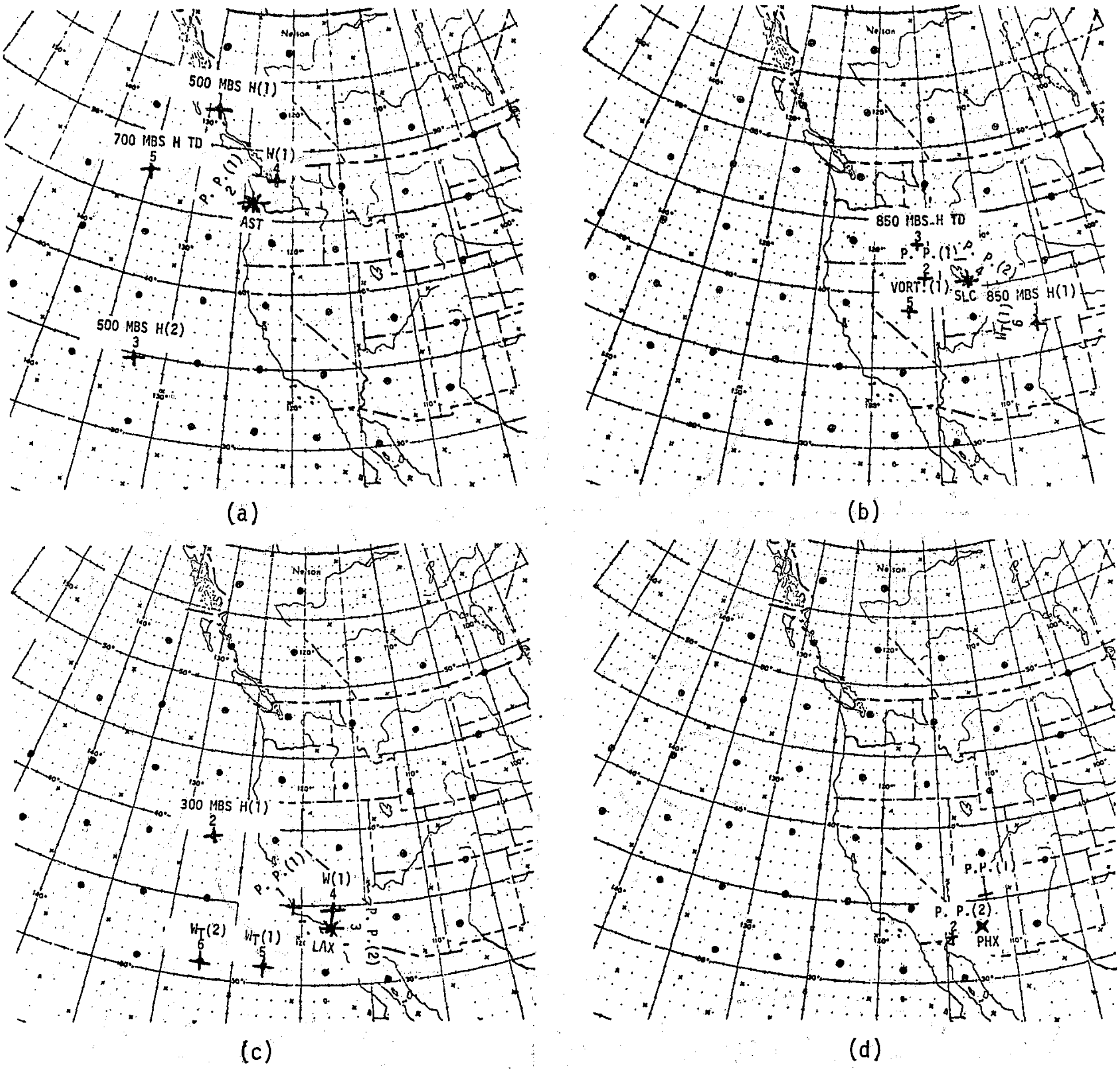


Fig. 26. Correlation coefficients for Los Angeles and Astoria.



(a) (b)

(c) (d)

Fig. 27. Predictors in final regression equations for Astoria (a), Los Angeles (b), Salt Lake City (c) and Phoenix (d).

X - station location. H - height.
\+ - predictor location. TD - tendency.
W - vertical velocity.
W_T - vertical velocity due to thermal advection.
P.P. - past precipitation over the previous 12 hours.

The numbers in parentheses indicate the best predictor chosen in the preliminary analysis (1) or the second best (2).

The single numbers indicate the order in which the predictors appear in the final regression equations.

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No. 45/3 Precipitation Probabilities in the Western Region Associated with Summer 500-mb Map Types. Richard P. Augulis. January 1970. (PB-189414)

No. 45/4 Precipitation Probabilities in the Western Region Associated with Fall 500-mb Map Types. Richard P. Augulis. January 1970. (PB-189435)

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