U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE
NATIONAL METEOROLOGHICAL CENTER

OFFICE NOTE 343

S1 SCORE VERIFICATION
OCTOBER 1975-DECEMBER 1987

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INTRODUCTION

NMC has used the Teweles-Wobus S1 Score (1954) to evaluate the quality of weather forecasts for many years. The S1 Score is easy to calculate and simple to use. The score is defined:

$$S1\ \text{Score} = 100\ \frac{\Sigma|e_G|}{\Sigma|G_L|}$$

where, e_G = the error in the forecast gradient
G_L = observed or forecast gradient, whichever is larger

An objective verification and comparison of NMC operational forecast models using the S1 Score was begun in October 1975 by Robert van Haaren (1978). In succeeding years, this program was maintained, in turn, by Donald Marks, Benjamin Watkins, and Carl McCalla.

NMC operational forecasts models in October 1975 were the Six-Layer Primitive Equation (6LPE), the Limited Area Fine-Mesh, and the Barotropic models. Forecast grid mesh lengths were 381 KM for the 6LPE (or coarse-mesh model) and 190.5KM for the LFM.

Operational analyses used at NMC in October 1975 were the Cressman (or successive correction technique) and the Hough (or Flattery Spectral) methods; the former was used in the LFM and the latter in the 6LPE and Barotropic models.

Verification results, October 1975 thru December 1987, are summarized in tables; a brief discussion is presented in the next section.

DISCUSSION

S1 Score verification results are most frequently cited for subareas of a 63 point lat-lon grid; gridpoint spacing is five degrees latitude by ten degrees longitude for the area bounded by 25 to 55 degrees north and 65 to 145 degrees west longitude. Subarea networks are shown in Figure I; the 49 point grid (49PT) is on the top half and the 33 point grids, west (WEST33) and east (EAST33), on the bottom half of the figure.

The 63 point grid closely approximates the station verification network used by Teweles-Wobus; the difference in gridpoint spacing across the verification area is ignored in the calculation of the S1 Score.

S1 scores are summarized in tables for the 49PT and 33 point grids as follows:

TABLE	AREA	LVL	PERIOD	RECORD	FCST	MODELS
I	49PT	MSL	Month	OCT75-DEC87	12-48HR	Coarse-mesh Fine-mesh
II	49PT	500MB	Month	OCT75-DEC87	12-48HR	Coarse-mesh Fine-mesh
III	49PT	500MB	Month	OCT75-DEC87	36HR	Barotropic
IV	WEST33 EAST33	500MB	Month	MAR78-DEC87	12-48HR	Coarse-mesh
V	WEST33 EAST33	500MB	Month	MAR78-DEC87	12-48HR	Fine-mesh
VI	WEST33 EAST33	500MB	Month	MAR78-DEC87	12-48HR	Barotropic
VII	49PT	MSL 500MB	Year	1976-1987	12-48HR	Coarse-mesh Fine-mesh
VIII	WEST33 EAST33	500MB	Year	1979-1987	12-48HR	Coarse-mesh Fine-mesh Barotropic

Note that Coarse-mesh refers to both PE and Spectral models.

S1 scores are affected by the relative smoothness or noisiness (higher values) of model forecast fields (see van Haaren, 1978). There is a seasonal variation in scores, larger in the warm season (due to weaker gradients) and lower in the cool seasons. Also, scores can vary with the choice in size and density of points in the verification networks.

Significant changes to the trend in model S1 scores are the result of modifications to forecast models and the ease of predictability of the weather regime; to illustrate this, the 36 hour monthly, seasonal, and yearly scores from the tables are plotted in a series of figures.

Figures IIa-c are the 36 hour mean sea level 49PT monthly, seasonal, and yearly S1 scores respectively; coarse-mesh scores (PE thru JUL80 and Spectral model from AUG80) are plotted along with the difference in score, LFM minus PE or Spectral. The seasonal variation is clearly depicted in Figure IIb. There is a sharp drop in yearly scores, Figure IIc, between 1977 and 1978 and between 1986 and 1987; the former drop was due to a halving of the PE forecast mesh length (to the original LFM length) in JAN78 and the latter drop was due to the change in Spectral model from 12 to 18 layers and the inclusion of GFDL physics in NOV86. In contrast, there was no immediate impact associated with the introduction of the Spectral model in AUG80.

Figures IIIa-c are the 36 hour 500MB 49PT monthly, seasonal and yearly S1 scores respectively; PE and Spectral scores plus differences, both the LFM and Barotropic minus the PE or

Spectral, are plotted on all three graphs; Barotropic S1 scores are also included on the seasonal and yearly graphs. In the yearly graph, Figure IIIc, the difference in PE-Spectral scores with the LFM and Barotropic improves by two points in 1978 and and 1987. Barotropic yearly scores, rather consistent thru 1983, were lower during period 1984 thru 1987; part of the lowering of Spectral scores during the latter period was due to the overall "easier" weather regime, but model change contributed significantly to the improvement recorded in 1987.

EAST33 and WEST33 36 hour 500MB S1 scores are presented in Figures IV and V respectively; graphs a-c are for monthly, seasonal, and yearly data; PE-Spectral and Barotropic scores plus PE-Spectral differences with LFM and Barotropic scores are plotted. Yearly scores average five points higher over WEST33; Barotropic scores were lower over EAST33 during the last three years; the improvement in the Spectral model forecasts over both the LFM and Barotropic during 1987 is more strongly depicted over EAST33 than WEST33.

REFERENCES

Teweles, S. and H. Wobus, 1954: Verification of Prognostic Charts. Bull. Amer. Meteor. Soc., 35, pp. 455-463.

van Haaren, R. J., 1978: Comparative Verification of the National Meteorological Center's (NMC) Operational Forecast Models. Preprints, Conference on Weather Forecasting and Analysis and Aviation Meteorology, October 16-19, 1978, Silver Spring, MD. (AMS).

TABLE I: MONTHLY S1 SCORE ... MEAN SEA LEVEL

VERIFICATION GRID: 49 point lat-lon grid. This is a subset of a 63 point grid which covers the area between 65 and 145 west longitude and between 25 and 55 north latitude. Gridpoint spacing is 5 degrees latitude by 10 degrees longitude.

VERIFYING ANALYSES
COARSE-MESH MODEL: Hough analysis thru 25Jul84, Optimum Interpolation method 26Jul84 -
FINE-MESH MODEL: Cressman analysis

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	COARSE-MESH MODEL.....				FINE-MESH MODEL.....			
MON YR	12HR	24HR	36HR	48HR	12HR	24HR	36HR	48HR
OCT 75	37.9	47.5	56.0	....	40.8	45.7	54.9	....
NOV 75	37.7	46.2	55.3	....	40.9	46.7	54.9	....
DEC 75	37.8	46.3	56.1	63.4	39.7	47.5	55.4	....
JAN 76	36.8	45.4	53.8	60.7	37.6	44.5	54.0	....
FEB 76	40.0	49.3	58.2	65.9	39.5	46.7	55.3	62.9
MAR 76	38.5	48.1	57.4	66.8	37.7	44.7	51.7	56.7
APR 76	39.2	46.4	55.3	62.5	39.0	44.5	51.7	59.8
MAY 76	39.2	47.1	55.8	64.1	38.6	45.0	51.9	58.6
JUN 76	41.9	48.1	56.5	63.0	40.0	46.6	54.8	59.5
JUL 76	42.6	47.0	54.0	60.4	40.5	46.8	53.9	58.4
AUG 76	43.7	49.5	55.2	61.5	41.4	47.1	53.7	59.6
SEP 76	43.5	51.8	59.4	67.4	41.9	47.2	52.8	60.7
OCT 76	36.4	43.7	51.8	59.1	37.2	42.0	49.4	57.2
NOV 76	35.3	42.1	49.2	55.2	37.5	43.5	50.6	58.0
DEC 76	38.6	45.7	54.4	61.7	38.3	44.3	52.0	59.0
JAN 77	38.3	48.4	56.3	63.3	37.6	45.8	53.3	62.1
FEB 77	37.2	45.7	54.3	61.7	36.1	44.9	53.7	62.0
MAR 77	35.9	44.7	53.2	59.4	34.5	42.3	49.7	56.7
APR 77	39.0	46.1	54.4	61.1	37.3	43.6	52.4	57.9
MAY 77	40.3	46.6	56.5	63.4	39.1	45.2	53.8	61.8
JUN 77	40.7	48.6	57.3	64.8	38.3	46.0	54.7	61.3
JUL 77	42.5	49.1	57.0	63.7	38.6	44.3	52.6	57.8
AUG 77	45.3	50.6	58.3	64.6	39.8	44.6	51.9	56.7
SEP 77	42.1	48.9	56.9	63.7	39.0	45.3	51.4	58.4
OCT 77	36.1	42.6	50.3	55.6	36.9	40.0	46.0	50.3
NOV 77	35.2	44.1	52.6	61.8	39.8	45.8	53.8	61.2
DEC 77	34.6	42.4	51.1	59.3	38.0	46.3	54.5	61.6

TABLE I(CONTINUED): MONTHLY S1 SCORE ... MEAN SEA LEVEL

	COARSE-MESH MODEL.....				FINE-MESH MODEL.....			
MON YR	12HR	24HR	36HR	48HR	12HR	24HR	36HR	48HR
JAN 78	32.9	39.7	47.9	55.0	34.9	42.2	50.4	58.3
FEB 78	35.0	41.8	51.7	55.5	35.0	44.0	50.5	57.8
MAR 78	36.5	42.4	52.7	59.2	34.1	41.2	50.7	57.4
APR 78	33.9	38.9	47.4	51.2	32.8	39.3	46.9	53.4
MAY 78	35.9	42.5	52.3	58.7	35.2	41.6	50.1	57.9
JUN 78	38.4	43.7	51.3	57.4	34.7	40.6	49.1	54.8
JUL 78	39.7	43.6	51.1	56.5	35.9	42.1	49.7	53.7
AUG 78	38.9	43.8	50.1	54.7	35.1	41.8	49.0	54.1
SEP 78	38.5	44.8	55.6	62.0	35.2	42.7	53.5	60.2
OCT 78	32.6	37.1	45.4	52.2	33.3	38.9	45.7	50.0
NOV 78	34.7	41.9	49.7	54.1	35.3	42.8	49.4	56.5
DEC 78	35.4	42.7	51.1	58.3	36.2	43.3	50.2	56.3
JAN 79	33.5	40.9	49.5	59.3	35.6	43.6	50.7	57.3
FEB 79	34.6	40.9	48.8	52.9	33.8	42.2	48.5	54.6
MAR 79	35.6	41.0	49.3	54.5	34.0	40.6	46.5	54.4
APR 79	39.6	45.0	54.4	60.5	37.0	44.3	52.8	59.6
MAY 79	38.4	43.5	52.6	58.5	36.5	42.8	50.6	57.8
JUN 79	38.7	42.0	51.1	57.1	35.9	41.7	49.4	56.9
JUL 79	41.1	44.3	53.3	58.9	35.5	42.2	51.1	55.7
AUG 79	42.1	45.7	54.6	61.2	37.5	42.6	51.9	57.9
SEP 79	37.0	40.6	48.9	55.6	34.4	39.8	47.6	52.8
OCT 79	36.2	41.7	49.6	56.2	34.6	41.3	49.0	55.4
NOV 79	35.2	41.2	49.0	55.0	35.0	41.9	48.6	56.3
DEC 79	33.1	39.0	47.3	52.6	34.3	41.4	48.6	55.9
JAN 80	34.1	41.6	49.9	55.8	35.6	43.2	49.5	57.4
FEB 80	35.2	41.6	50.8	56.5	35.5	44.0	51.1	57.8
MAR 80	34.8	39.5	47.3	52.3	34.2	41.4	47.0	53.1
APR 80	35.7	41.3	49.8	54.7	35.2	42.5	48.7	52.9
MAY 80	38.0	42.5	51.0	56.6	36.2	42.0	50.6	58.1
JUN 80	37.1	42.2	50.9	58.9	35.7	44.9	51.2	57.5
JUL 80	38.4	44.7	54.8	62.0	38.6	44.8	52.4	59.6
AUG 80	36.1	42.2	50.9	58.0	36.2	40.9	48.5	52.7
SEP 80	35.4	43.0	51.4	57.8	35.4	40.0	48.8	55.8
OCT 80	30.2	37.5	45.4	51.9	33.1	38.5	46.9	54.2
NOV 80	28.1	36.1	43.4	51.2	33.3	39.5	46.1	54.1
DEC 80	32.4	40.7	46.2	51.8	32.1	39.0	46.1	52.8
JAN 81	31.5	39.9	47.1	53.1	33.8	41.6	48.3	55.7
FEB 81	31.2	39.1	46.3	54.3	33.6	41.4	47.6	57.8
MAR 81	32.6	39.9	47.9	54.9	35.2	42.3	49.1	56.5
APR 81	33.1	39.6	47.2	54.9	34.2	40.6	47.9	54.4
MAY 81	35.2	42.5	51.4	58.3	36.8	41.1	48.1	54.3
JUN 81	37.9	46.6	55.9	63.5	36.9	43.1	51.7	58.1
JUL 81	38.9	45.8	54.3	61.4	35.4	39.3	47.0	51.7

TABLE I(CONTINUED): MONTHLY S1 SCORE ... MEAN SEA LEVEL

	COARSE-MESH MODEL.....				FINE-MESH MODEL.....			
MON YR	12HR	24HR	36HR	48HR	12HR	24HR	36HR	48HR
AUG 81	40.4	46.6	55.0	61.6	36.8	41.2	48.5	52.7
SEP 81	35.0	41.6	50.3	57.6	34.9	40.8	47.6	54.1
OCT 81	29.5	37.1	45.5	53.1	34.5	39.0	46.2	53.5
NOV 81	29.7	38.9	46.5	53.5	33.4	41.9	47.8	53.9
DEC 81	30.0	39.2	47.6	56.2	35.2	43.5	51.1	58.9
JAN 82	31.1	40.4	47.1	54.6	35.5	43.0	51.1	59.4
FEB 82	31.4	40.3	48.0	56.6	35.2	42.0	50.3	57.5
MAR 82	30.1	37.9	45.4	53.3	35.6	42.5	49.8	58.1
APR 82	30.4	38.9	46.5	52.5	32.9	40.0	47.6	54.3
MAY 82	36.0	44.8	54.4	61.5	35.8	42.5	50.4	56.9
JUN 82	40.5	48.6	58.6	65.4	38.3	44.6	52.3	56.4
JUL 82	41.6	48.6	57.3	63.1	37.4	41.4	50.0	53.7
AUG 82	41.1	48.2	56.5	62.8	36.7	41.7	48.6	55.1
SEP 82	35.4	42.5	50.7	57.5	34.6	39.5	45.9	57.8
OCT 82	28.8	37.2	45.6	52.8	32.4	39.7	46.7	53.1
NOV 82	28.5	37.7	45.9	51.2	33.7	40.7	48.4	54.8
DEC 82	27.8	36.7	44.7	52.8	33.1	41.8	49.6	57.6
JAN 83	28.2	36.4	43.9	51.1	33.9	41.9	49.8	56.5
FEB 83	28.3	37.1	46.0	53.4	32.7	40.7	48.4	57.5
MAR 83	27.0	36.0	42.8	49.1	30.2	37.8	45.2	52.3
APR 83	31.7	42.8	50.9	57.9	36.4	44.1	52.3	58.7
MAY 83	32.8	42.4	50.3	56.2	35.1	41.9	50.1	55.1
JUN 83	33.7	42.3	51.9	57.8	37.4	42.7	50.3	55.4
JUL 83	33.8	42.0	52.8	60.2	36.9	43.6	53.3	58.4
AUG 83	36.4	44.6	54.3	61.5	39.1	43.7	52.7	57.7
SEP 83	29.6	37.9	46.6	53.1	33.6	38.3	45.8	52.7
OCT 83	30.8	37.6	46.0	52.2	34.0	39.5	46.5	52.3
NOV 83	31.7	39.0	46.8	53.6	32.2	42.2	49.7	55.7
DEC 83	34.9	42.6	49.6	55.6	36.4	44.2	52.3	59.6
JAN 84	34.6	40.0	46.6	52.7	36.8	43.3	50.0	56.9
FEB 84	30.6	38.8	47.1	55.1	34.5	42.0	48.7	55.6
MAR 84	30.3	39.6	46.9	53.1	35.4	43.4	50.7	57.3
APR 84	30.7	37.2	45.4	52.5	35.0	42.3	49.1	55.8
MAY 84	33.6	40.4	48.8	55.0	35.1	41.2	49.5	54.3
JUN 84	36.3	40.6	50.7	57.7	35.5	41.1	50.6	56.5
JUL 84	38.5	40.5	49.0	55.3	35.0	39.0	48.2	53.3
AUG 84	36.1	39.0	46.9	53.6	35.5	39.7	47.0	51.9
SEP 84	29.3	39.9	44.9	55.2	33.8	38.6	46.9	51.6
OCT 84	27.7	37.9	46.4	53.3	34.3	41.8	50.2	57.1
NOV 84	26.7	37.4	44.9	51.7	33.2	41.1	47.6	52.9
DEC 84	27.8	38.3	46.2	53.6	36.7	43.8	51.2	59.7

TABLE I(CONTINUED): MONTHLY S1 SCORE ... MEAN SEA LEVEL

	COARSE-MESH MODEL.....				FINE-MESH MODEL.....			
MON YR	12HR	24HR	36HR	48HR	12HR	24HR	36HR	48HR
JAN 85	26.7	36.1	43.1	50.2	34.4	42.3	48.7	54.1
FEB 85	26.2	36.5	45.4	53.2	35.1	41.3	48.1	53.9
MAR 85	27.0	37.2	45.8	53.4	34.2	42.2	48.7	55.8
APR 85	30.1	38.6	48.6	55.8	37.3	43.7	51.3	57.9
MAY 85	32.2	40.2	50.6	59.0	36.8	43.1	49.9	56.8
JUN 85	32.8	39.8	50.9	58.7	35.4	42.0	49.5	56.0
JUL 85	37.6	40.6	51.2	58.5	36.4	40.2	48.7	54.6
AUG 85	34.8	37.7	47.6	55.7	36.1	41.3	48.7	55.1
SEP 85	28.3	35.8	44.9	52.6	34.8	40.0	46.7	52.8
OCT 85	25.9	34.6	43.2	49.8	33.8	40.3	46.2	52.6
NOV 85	28.3	40.4	49.5	58.0	38.7	46.2	53.9	62.0
DEC 85	26.8	34.8	42.9	49.7	36.6	43.1	49.3	54.7
JAN 86	25.3	35.1	43.4	50.8	34.1	41.1	47.7	54.3
FEB 86	28.0	38.6	47.3	55.3	36.1	43.7	51.0	57.8
MAR 86	26.8	35.4	42.7	49.9	34.3	40.6	46.6	53.1
APR 86	28.7	38.5	47.6	55.3	35.2	41.7	48.1	57.8
MAY 86	30.1	37.4	46.7	53.3	35.8	42.2	49.0	53.5
JUN 86	35.2	39.1	47.7	54.9	35.0	40.4	48.3	52.8
JUL 86	37.1	39.3	49.2	56.6	35.9	41.9	49.9	54.9
AUG 86	35.9	38.1	46.9	53.2	35.2	38.6	46.5	50.7
SEP 86	30.3	35.4	43.8	51.0	33.6	39.6	46.1	52.0
OCT 86	27.8	36.8	45.8	52.4	33.1	39.1	44.5	50.4
NOV 86	24.4	34.4	42.6	50.2	35.5	42.2	48.9	56.5
DEC 86	21.1	29.3	36.5	43.4	35.3	41.8	48.2	54.3
JAN 87	21.3	30.4	38.2	45.4	35.5	43.3	49.2	55.4
FEB 87	20.9	30.6	40.0	47.1	33.6	41.5	49.1	55.5
MAR 87	20.9	29.3	36.1	43.2	34.0	39.7	45.9	52.0
APR 87	25.3	34.4	42.2	49.1	36.7	42.8	49.8	55.4
MAY 87	29.1	33.5	40.0	45.5	35.4	39.8	47.5	53.7
JUN 87	28.3	35.5	41.5	46.2	35.3	40.5	47.4	52.2
JUL 87	31.0	36.8	42.2	47.1	38.8	45.1	53.6	59.2
AUG 87	30.0	36.3	41.4	46.1	35.6	40.3	47.4	52.0
SEP 87	28.6	36.2	42.5	48.6	35.9	41.8	47.8	52.6
OCT 87	22.0	30.4	37.0	44.5	33.8	38.7	44.7	51.5
NOV 87	19.5	27.4	34.0	40.2	33.0	39.7	44.4	50.1
DEC 87	20.3	28.2	35.6	42.2	35.1	43.2	48.1	54.1

TABLE II: MONTHLY S1 SCORE ... 500MB

VERIFICATION GRID: 49 point lat-lon grid. This is a subset of a 63 point grid which covers the area between 65 and 145 west longitude and between 25 and 55 north latitude. Gridpoint spacing is 5 degrees latitude by 10 degrees longitude.

VERIFYING ANALYSES
COARSE-MESH MODEL: Hough analysis thru 25Jul84, Optimum Interpolation method 26Jul84 -
FINE-MESH MODEL: Cressman analysis

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	COARSE-MESH MODEL.....				FINE-MESH MODEL.....			
MON YR	12HR	24HR	36HR	48HR	12HR	24HR	36HR	48HR
OCT 75	23.3	31.7	38.7	....	18.7	25.5	34.7	....
NOV 75	21.9	29.4	36.5	....	18.1	25.2	33.8	....
DEC 75	20.9	28.4	35.1	40.1	16.4	22.8	29.9	....
JAN 76	20.6	26.9	33.8	38.4	15.6	22.5	30.5	....
FEB 76	20.2	26.5	32.0	37.3	15.7	21.2	28.0	36.1
MAR 76	19.7	26.8	34.0	40.0	15.8	21.8	28.8	34.2
APR 76	24.3	32.1	40.6	47.3	21.0	27.7	36.3	46.0
MAY 76	24.9	32.4	39.2	47.1	20.0	26.4	34.6	42.0
JUN 76	26.7	32.1	37.6	43.9	22.3	28.1	36.2	43.3
JUL 76	26.8	31.7	38.5	44.6	22.9	28.0	34.6	42.2
AUG 76	25.2	31.7	38.2	44.7	22.1	27.5	34.6	42.3
SEP 76	23.6	29.9	36.1	42.6	20.5	25.1	32.7	39.2
OCT 76	20.7	27.3	32.9	38.7	18.0	23.5	31.3	37.8
NOV 76	19.6	25.3	30.6	35.5	16.3	21.8	28.9	35.5
DEC 76	18.9	25.5	31.3	36.8	15.0	20.2	26.5	32.7
JAN 77	20.6	28.4	35.1	41.0	16.9	24.4	31.7	38.4
FEB 77	20.9	27.9	34.0	39.2	16.9	24.0	30.9	37.0
MAR 77	20.7	29.5	35.0	40.2	17.5	23.6	29.7	36.8
APR 77	20.8	26.5	31.7	37.6	17.6	22.6	28.9	34.8
MAY 77	22.5	29.1	35.3	41.1	20.2	26.4	33.4	41.0
JUN 77	25.0	31.6	38.5	44.3	22.6	28.4	35.4	42.3
JUL 77	24.3	30.2	36.7	42.1	21.3	25.6	31.5	36.3
AUG 77	22.4	27.3	33.7	38.9	19.9	24.2	31.1	35.6
SEP 77	23.5	30.0	36.5	42.4	21.3	26.1	32.7	38.5
OCT 77	21.9	29.8	37.6	44.1	19.3	25.0	31.3	36.4
NOV 77	20.0	27.9	33.5	39.8	17.9	23.3	30.1	37.5
DEC 77	19.6	25.5	31.6	36.7	17.7	23.9	31.2	38.5

TABLE II(CONTINUED): MONTHLY S1 SCORE ... 500MB

MON YR	COARSE-MESH MODEL..... 12HR	24HR	36HR	48HR	FINE-MESH MODEL..... 12HR	24HR	36HR	48HR
JAN 78	20.5	26.4	32.5	38.3	18.0	23.8	31.5	39.0
FEB 78	20.8	25.6	31.3	36.4	19.2	25.2	32.1	38.1
MAR 78	18.1	23.3	29.8	35.7	17.2	23.0	29.7	36.3
APR 78	22.0	27.8	34.9	41.3	19.8	25.8	33.2	41.7
MAY 78	22.2	28.8	35.5	41.0	25.0	27.1	34.9	41.2
JUN 78	22.7	27.2	33.7	38.9	22.0	26.9	32.2	37.5
JUL 78	24.5	28.6	34.2	38.0	21.9	26.0	32.1	36.6
AUG 78	22.9	27.6	32.8	37.5	20.5	25.4	31.4	36.9
SEP 78	23.4	28.4	34.8	39.5	20.5	25.6	32.7	39.6
OCT 78	19.8	25.0	31.4	36.3	17.6	22.1	27.8	33.1
NOV 78	18.8	24.0	29.2	33.7	17.2	22.8	29.2	35.1
DEC 78	18.0	23.7	29.8	34.9	16.4	22.0	28.6	34.4
JAN 79	18.9	25.3	32.3	38.6	17.2	23.6	31.1	38.1
FEB 79	18.2	22.9	27.8	31.5	16.6	21.5	27.8	33.9
MAR 79	20.0	25.4	32.1	37.7	18.6	24.4	31.3	39.0
APR 79	19.5	25.3	31.5	38.2	18.4	24.1	30.5	37.4
MAY 79	21.3	27.6	32.8	38.8	21.2	26.6	34.0	40.2
JUN 79	22.2	27.3	32.4	37.7	20.3	25.1	31.3	37.4
JUL 79	24.9	29.2	34.9	39.6	23.9	28.0	34.1	39.3
AUG 79	23.4	27.8	33.2	37.9	22.0	26.2	32.1	37.0
SEP 79	21.2	26.0	31.7	37.2	20.3	24.8	30.9	36.2
OCT 79	19.4	25.2	30.2	34.9	20.3	24.6	30.9	37.0
NOV 79	18.4	24.5	29.0	35.2	18.2	23.5	29.9	36.3
DEC 79	18.3	23.4	28.8	33.6	17.9	23.6	30.7	36.8
JAN 80	18.2	23.6	28.3	34.1	17.6	23.9	31.7	38.4
FEB 80	19.2	24.9	29.8	35.7	18.1	24.5	31.3	38.9
MAR 80	18.9	23.9	28.7	34.4	17.7	23.3	29.5	35.4
APR 80	20.4	26.5	32.3	38.0	19.3	26.2	32.5	39.1
MAY 80	21.8	27.4	34.0	39.9	20.8	27.5	35.4	42.3
JUN 80	21.4	25.8	31.4	36.5	19.8	25.2	32.0	38.1
JUL 80	21.8	26.4	31.7	36.4	21.9	25.9	31.6	37.7
AUG 80	20.5	25.6	30.8	35.4	22.6	26.2	32.1	36.9
SEP 80	16.7	22.3	27.6	32.4	18.2	22.4	28.9	35.4
OCT 80	15.1	21.1	27.0	32.8	16.9	22.7	29.7	35.9
NOV 80	15.5	21.8	28.3	34.7	17.7	23.6	30.4	36.6
DEC 80	13.7	18.9	24.1	29.2	14.9	19.9	25.7	31.7
JAN 81	15.6	21.2	27.0	32.3	17.2	23.3	29.5	36.2
FEB 81	15.6	22.0	28.4	34.4	16.9	22.6	30.5	37.4
MAR 81	18.2	25.3	32.4	38.3	19.5	27.2	34.6	41.2
APR 81	16.0	22.1	27.8	33.2	17.0	22.3	29.7	36.8
MAY 81	19.6	26.4	32.6	38.5	20.0	26.0	33.2	40.0
JUN 81	19.6	26.5	32.2	37.8	20.5	26.3	34.0	40.2
JUL 81	21.3	27.5	32.8	38.2	23.1	27.4	33.5	39.8

TABLE II(CONTINUED): MONTHLY S1 SCORE ... 500MB

MON YR	COARSE-MESH MODEL..... 12HR	24HR	36HR	48HR	FINE-MESH MODEL..... 12HR	24HR	36HR	48HR
AUG 81	22.3	28.2	33.6	38.2	23.9	29.0	33.6	39.2
SEP 81	18.9	26.0	32.2	37.8	21.2	26.3	33.0	39.3
OCT 81	15.0	20.7	26.8	33.0	17.7	23.1	29.2	36.1
NOV 81	17.6	23.6	29.8	35.3	18.7	25.2	31.2	37.2
DEC 81	15.4	21.7	27.8	33.9	16.9	23.1	30.6	37.1
JAN 82	13.8	19.0	24.0	28.7	15.0	20.3	26.6	33.2
FEB 82	13.9	19.1	23.5	27.6	15.8	21.2	27.2	32.8
MAR 82	15.7	21.8	27.0	32.3	17.4	24.2	32.3	39.4
APR 82	16.4	21.8	27.2	33.0	17.3	22.8	30.0	36.8
MAY 82	19.8	27.4	34.5	40.8	20.4	26.3	33.7	41.5
JUN 82	19.3	25.5	31.3	36.2	20.2	24.8	31.5	36.8
JUL 82	20.6	26.2	32.0	37.0	21.9	26.2	32.8	38.4
AUG 82	18.2	22.8	27.5	32.0	18.6	23.1	28.5	35.0
SEP 82	17.6	23.4	29.1	35.1	20.4	25.3	31.4	37.1
OCT 82	17.1	22.9	28.9	35.1	16.9	22.8	29.1	35.5
NOV 82	15.0	20.5	25.5	30.0	16.1	21.1	26.6	31.8
DEC 82	15.2	21.4	27.1	32.6	16.5	22.7	29.7	36.7
JAN 83	16.1	22.2	28.2	34.1	16.9	23.6	30.6	36.7
FEB 83	17.8	24.0	29.6	35.7	17.5	23.6	30.8	39.0
MAR 83	18.7	25.3	30.7	36.2	19.2	26.0	32.4	40.2
APR 83	17.6	24.6	30.8	37.4	18.7	25.0	32.1	39.3
MAY 83	17.7	24.1	29.5	34.7	18.4	23.9	30.8	37.0
JUN 83	19.7	26.4	32.1	38.4	20.7	26.0	32.5	38.5
JUL 83	19.1	25.4	31.1	36.5	20.7	26.0	32.9	39.0
AUG 83	17.9	23.4	28.3	33.0	20.7	24.1	29.5	35.2
SEP 83	16.7	22.2	27.1	32.2	18.6	22.8	27.7	32.9
OCT 83	16.8	23.5	29.1	35.0	18.4	23.6	29.7	35.3
NOV 83	18.0	25.4	31.0	37.1	18.3	25.9	33.2	39.7
DEC 83	15.9	20.5	25.6	30.6	15.7	20.5	26.9	33.6
JAN 84	15.6	19.7	24.5	29.7	15.0	20.1	26.1	32.5
FEB 84	17.0	23.0	29.5	36.2	17.6	24.2	31.4	37.0
MAR 84	16.6	22.3	27.9	33.4	17.4	24.0	30.5	36.6
APR 84	18.0	24.4	30.6	36.1	18.5	25.5	33.4	40.4
MAY 84	17.2	23.2	28.8	34.4	17.7	22.7	28.9	34.6
JUN 84	18.9	25.2	31.4	37.0	20.1	25.4	32.2	37.8
JUL 84	18.6	24.1	29.2	34.6	20.6	24.8	30.3	35.5
AUG 84	16.7	23.2	29.4	35.3	20.9	25.2	30.8	36.5
SEP 84	14.4	21.1	27.3	32.7	18.6	22.6	29.0	33.3
OCT 84	13.6	20.6	26.6	32.1	18.2	24.0	30.0	34.9
NOV 84	16.1	23.3	29.6	35.3	17.9	24.5	31.1	37.1
DEC 84	11.8	18.3	24.7	31.0	15.0	20.7	26.3	32.6

TABLE II(CONTINUED): MONTHLY S1 SCORE ... 500MB

	COARSE-MESH MODEL.....				FINE-MESH MODEL.....			
MON YR	12HR	24HR	36HR	48HR	12HR	24HR	36HR	48HR
JAN 85	12.5	18.7	25.4	32.5	15.9	22.1	28.6	35.0
FEB 85	12.1	18.9	25.1	31.0	15.6	20.0	26.2	32.3
MAR 85	14.3	21.3	27.7	32.8	17.5	23.8	29.9	36.0
APR 85	13.3	19.9	25.7	31.6	17.8	23.1	28.7	34.7
MAY 85	15.3	23.2	30.7	37.6	19.3	24.9	31.6	38.3
JUN 85	15.9	24.2	31.8	39.1	19.4	24.6	31.4	38.2
JUL 85	16.5	22.9	28.1	32.8	20.9	25.1	30.5	35.1
AUG 85	16.5	23.6	29.4	34.7	22.0	26.2	31.1	36.4
SEP 85	13.8	21.8	28.5	34.5	20.6	24.3	29.1	34.2
OCT 85	12.8	19.4	25.3	30.9	17.2	21.9	27.0	32.0
NOV 85	11.8	18.8	24.9	30.4	16.7	22.1	27.8	34.0
DEC 85	11.0	16.8	22.7	28.6	14.9	20.5	26.3	31.6
JAN 86	12.0	18.6	25.0	31.3	15.6	21.5	27.7	34.2
FEB 86	12.7	19.1	25.3	31.8	15.8	21.1	27.8	33.6
MAR 86	12.7	18.5	24.0	28.9	16.5	21.8	27.3	32.8
APR 86	14.0	21.4	27.9	34.2	19.3	25.2	31.0	37.3
MAY 86	15.2	22.5	28.8	33.8	19.4	24.6	30.5	35.9
JUN 86	14.6	20.6	26.1	31.6	19.3	23.9	29.8	35.4
JUL 86	17.3	23.6	29.1	34.0	21.3	26.2	32.1	37.0
AUG 86	15.9	22.0	28.0	33.4	21.0	25.5	31.5	35.8
SEP 86	13.9	19.6	25.0	30.6	17.9	22.7	28.2	33.2
OCT 86	13.0	19.7	26.6	32.5	18.0	23.0	28.4	34.0
NOV 86	11.0	16.7	22.4	28.7	15.2	19.9	25.5	31.4
DEC 86	12.0	18.5	24.4	29.9	17.7	23.8	29.9	36.2
JAN 87	11.3	18.1	24.9	30.9	16.3	23.1	29.7	36.1
FEB 87	12.6	19.8	26.1	32.1	18.1	24.4	31.5	37.3
MAR 87	12.5	19.4	25.6	31.5	18.0	24.6	31.1	37.2
APR 87	13.0	20.7	27.7	33.6	18.4	24.5	30.6	36.8
MAY 87	13.4	20.0	25.9	30.9	19.2	24.5	30.1	35.6
JUN 87	13.1	18.9	24.3	28.7	19.4	23.7	29.3	34.5
JUL 87	14.7	20.2	25.7	30.6	20.9	25.3	30.4	35.1
AUG 87	13.6	19.8	25.0	29.6	20.2	24.1	28.9	33.1
SEP 87	12.2	18.0	23.4	29.0	18.6	23.4	28.6	33.7
OCT 87	10.6	16.3	21.6	26.9	17.1	21.8	27.7	33.5
NOV 87	11.4	17.7	23.6	29.2	17.2	23.3	28.5	33.7
DEC 87	11.0	16.9	22.7	28.2	17.0	23.2	29.0	34.9

TABLE III: MONTHLY S1 SCORE ... 500MB
36 HOUR FINAL BAROTROPIC

VERIFICATION GRID: 49 point lat-lon grid. This is a subset of a 63 point grid which covers the area between 65 and 145 west longitude and between 25 and 55 north latitude. Gridpoint spacing is 5 degrees latitude by 10 degrees longitude.

VERIFYING ANALYSES: Hough analysis thru 25Jul84, Optimum Interpolation method 25Jul84 -

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	36 HOUR FINAL BAROTROPIC								
MON	1975	1976	1977	1978	1979	1980	1981	1982	1983
JAN		37.6	40.3	39.4	40.1	40.6	38.6	36.5	39.2
FEB		36.7	38.9	39.8	39.1	38.8	39.9	35.6	41.1
MAR		37.8	40.4	38.4	41.3	44.2	41.4	38.9	44.4
APR		42.1	41.3	44.3	39.6	41.4	37.6	40.0	44.0
MAY		42.8	40.8	42.7	42.4	40.7	41.4	43.5	37.1
JUN		44.8	41.7	40.8	39.7	39.3	40.6	38.6	40.0
JUL		42.4	37.4	39.9	42.2	36.9	41.7	40.1	39.6
AUG		42.0	36.1	38.6	40.6	37.9	41.8	37.4	36.7
SEP		43.8	41.9	38.3	39.8	38.6	41.4	39.5	38.8
OCT	44.5	32.9	43.4	40.2	43.0	35.3	38.8	39.6	40.9
NOV	....	33.9	40.0	39.1	38.2	38.8	38.7	38.3	42.2
DEC	39.4	36.1	39.3	37.0	39.0	35.8	35.8	39.0	35.9

MON	1984	1985	1986	1987
JAN	35.0	35.3	36.7	39.8
FEB	40.0	35.0	36.5	39.5
MAR	38.6	33.4	39.3	37.4
APR	42.5	39.2	38.7	39.2
MAY	39.4	39.3	36.1	39.6
JUN	38.8	41.1	36.3	37.0
JUL	37.0	36.9	36.3	36.8
AUG	38.4	38.6	36.5	35.9
SEP	38.4	38.3	36.0	35.3
OCT	36.2	39.2	36.5	35.4
NOV	44.0	36.2	35.6	39.5
DEC	35.8	33.0	38.2	39.7

TABLE IV: COARSE-MESH MODEL 500MB S1 SCORE
WEST33 AND EAST33

VERIFICATION GRID: 33 point lat-lon grids for western and eastern United States. WEST33 is the area between 105W and 145W, 25N and 55N; EAST33 is the area between 65W and 105W, 25N and 55N; gridpoint spacing is 5 degrees latitude by 10 degrees longitude.

VERIFYING ANALYSIS: Hough analysis thru 25Jul84, Optimum Interpolation method 26Jul84 -

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	WEST33.....				EAST33.....			
MON YR	12HR	24HR	36HR	48HR	12HR	24HR	36HR	48HR
MAR 78	24.5	31.5	38.0	44.0	15.5	19.4	25.5	31.1
APR 78	24.9	29.8	36.6	42.2	19.7	23.9	29.4	36.3
MAY 78	24.1	32.4	39.3	42.8	23.0	27.4	35.4	39.6
JUN 78	25.8	33.8	39.2	44.8	22.4	24.6	30.6	34.4
JUL 78	29.4	34.0	39.1	45.5	24.6	26.2	31.5	33.6
AUG 78	25.1	31.2	36.1	40.7	24.6	28.7	33.8	38.6
SEP 78	26.5	31.8	37.1	42.8	22.2	25.8	32.8	36.1
OCT 78	23.6	30.4	34.6	40.0	18.7	23.1	30.8	34.7
NOV 78	23.0	31.1	33.9	39.6	17.4	22.0	27.0	32.9
DEC 78	21.0	27.7	32.5	37.6	17.0	21.7	27.9	31.5
JAN 79	23.8	31.3	37.1	44.5	17.3	22.0	29.0	33.5
FEB 79	21.4	25.6	29.5	32.9	17.0	20.8	27.1	29.3
MAR 79	23.6	29.4	36.6	40.8	18.0	22.5	28.6	34.9
APR 79	23.0	29.7	34.2	39.7	18.5	23.1	29.5	36.1
MAY 79	23.9	31.1	36.3	41.5	20.4	25.4	30.3	36.5
JUN 79	25.1	30.8	35.6	40.3	21.9	26.3	31.3	36.3
JUL 79	28.0	32.8	38.2	43.0	24.8	28.0	33.1	37.0
AUG 79	28.8	33.6	39.7	43.8	22.2	25.6	30.3	34.6
SEP 79	27.3	31.6	38.5	42.8	19.6	24.2	29.0	34.5
OCT 79	23.0	29.0	33.0	37.6	17.8	22.7	28.0	32.5
NOV 79	22.8	29.4	33.0	37.4	16.3	22.0	26.4	32.8
DEC 79	21.4	25.7	30.8	35.1	17.3	22.9	28.3	32.8
JAN 80	21.9	27.5	31.4	37.6	17.2	22.3	27.0	32.2
FEB 80	24.4	30.9	35.7	40.0	16.8	21.5	26.3	32.2
MAR 80	23.6	29.0	33.8	37.9	16.7	20.8	25.2	31.3
APR 80	22.7	28.8	34.2	39.0	19.5	24.8	30.5	36.5
MAY 80	24.2	30.4	36.4	41.7	20.6	24.9	30.7	36.1
JUN 80	24.9	29.7	34.4	39.6	20.3	24.0	29.3	33.8

TABLE IV(CONTINUED): COARSE-MESH MODEL 500MB S1 SCORE
WEST33 AND EAST33

MON YR	WEST33 12HR	WEST33 24HR	WEST33 36HR	WEST33 48HR	EAST33 12HR	EAST33 24HR	EAST33 36HR	EAST33 48HR
JUL 80	24.1	28.6	33.4	38.5	21.4	25.3	30.6	34.8
AUG 80	24.7	30.7	35.2	39.2	19.7	23.9	29.5	34.6
SEP 80	20.7	26.4	31.8	36.6	15.2	20.3	25.4	30.6
OCT 80	19.0	26.0	31.9	37.4	13.7	19.0	24.3	30.1
NOV 80	19.5	26.4	32.5	40.2	13.1	18.8	25.5	32.4
DEC 80	18.5	24.3	29.8	33.5	11.6	16.3	21.3	27.0
JAN 81	22.8	29.8	36.4	40.4	12.7	17.2	28.6	28.0
FEB 81	20.2	26.7	33.6	39.9	13.4	19.6	26.0	31.6
MAR 81	22.0	30.2	36.7	41.9	15.7	21.4	28.2	33.8
APR 81	19.5	26.1	31.6	36.8	14.0	19.4	25.0	30.6
MAY 81	22.1	28.8	34.1	39.2	18.0	24.1	30.7	36.7
JUN 81	22.0	28.7	34.1	38.7	18.4	24.8	30.9	36.8
JUL 81	27.2	33.6	38.3	43.6	19.3	25.0	31.2	36.6
AUG 81	25.3	31.2	35.9	39.9	21.6	27.0	33.4	38.3
SEP 81	22.0	29.6	35.5	40.5	17.5	24.1	29.8	35.7
OCT 81	18.2	24.0	29.5	35.9	13.6	19.5	26.2	32.1
NOV 81	21.2	26.7	31.9	35.5	14.8	20.7	27.4	34.2
DEC 81	18.8	25.4	31.5	36.2	13.3	19.0	24.9	31.4
JAN 82	17.6	22.5	27.0	31.5	12.0	17.2	22.4	26.9
FEB 82	18.5	23.7	27.3	30.9	11.7	17.0	22.2	26.5
MAR 82	19.2	25.7	31.1	35.9	12.9	17.1	23.2	28.4
APR 82	18.4	23.2	27.6	31.8	15.1	20.8	26.4	30.9
MAY 82	21.3	29.0	35.8	42.5	19.7	26.6	33.2	38.9
JUN 82	23.5	28.8	34.2	38.6	17.2	22.7	28.5	33.2
JUL 82	24.7	30.3	36.4	40.4	18.6	23.5	29.3	34.5
AUG 82	23.3	28.0	32.8	36.8	16.1	20.4	24.9	29.2
SEP 82	21.1	26.8	33.0	39.2	17.0	22.4	27.8	33.2
OCT 82	19.8	25.5	31.3	36.5	16.1	21.7	27.7	34.6
NOV 82	18.5	24.6	30.1	34.5	12.8	17.5	22.0	26.2
DEC 82	19.0	26.5	31.8	36.9	13.0	18.6	24.0	29.2
JAN 83	20.7	26.5	31.6	36.3	13.5	19.1	25.7	31.8
FEB 83	20.4	26.6	31.7	35.2	15.5	21.2	27.6	34.4
MAR 83	20.1	26.3	30.6	35.2	16.6	22.4	28.3	34.3
APR 83	20.1	26.4	31.8	38.2	15.9	22.2	28.6	34.4
MAY 83	21.2	27.2	32.9	38.2	16.3	21.9	26.8	31.1
JUN 83	22.5	28.8	34.8	40.4	18.2	24.0	29.2	35.8
JUL 83	21.5	27.9	33.1	37.1	18.3	23.5	29.8	36.0
AUG 83	21.5	27.2	31.5	36.2	16.9	22.0	27.6	32.0
SEP 83	21.3	27.0	31.8	36.0	15.0	20.1	25.3	30.7
OCT 83	20.1	27.5	32.4	37.0	15.5	20.8	26.7	33.4
NOV 83	19.7	27.0	31.5	34.8	16.5	22.7	29.0	36.7
DEC 83	20.2	26.1	29.9	34.6	13.8	17.7	23.3	27.8

TABLE IV(CONTINUED): COARSE-MESH MODEL 500MB S1 SCORE
WEST33 AND EAST33

MON YR	WEST33 12HR	WEST33 24HR	WEST33 36HR	WEST33 48HR	EAST33 12HR	EAST33 24HR	EAST33 36HR	EAST33 48HR
JAN 84	20.8	26.5	31.4	37.7	13.6	17.2	21.5	26.1
FEB 84	21.7	28.0	33.5	37.9	14.6	20.2	27.1	34.8
MAR 84	19.9	26.0	31.1	35.7	15.2	20.5	26.0	31.9
APR 84	19.9	26.4	32.2	37.1	16.7	22.5	28.4	34.0
MAY 84	20.8	27.0	32.4	36.7	15.6	21.0	26.3	32.3
JUN 84	22.7	28.9	34.2	38.1	17.4	22.6	28.8	34.7
JUL 84	23.2	28.8	33.8	39.1	17.9	22.6	27.6	32.9
AUG 84	20.2	27.1	33.3	38.7	16.6	22.4	28.7	35.0
SEP 84	18.4	25.3	30.7	35.6	12.9	19.2	26.3	31.9
OCT 84	15.3	22.5	28.1	32.9	12.6	19.5	25.9	31.6
NOV 84	19.8	26.6	32.6	37.4	13.3	19.7	26.4	32.3
DEC 84	15.1	22.6	29.7	37.0	10.0	15.5	21.3	26.8
JAN 85	18.3	25.9	33.2	39.9	10.6	16.0	22.0	28.6
FEB 85	15.7	22.7	28.1	33.8	10.9	17.2	23.6	29.1
MAR 85	17.7	25.2	30.4	33.6	12.0	18.3	24.9	30.9
APR 85	16.7	24.0	29.8	34.2	12.1	18.4	24.4	30.7
MAY 85	19.2	27.3	34.1	40.3	13.3	20.1	27.3	38.9
JUN 85	18.8	26.6	33.9	39.6	15.3	22.9	30.8	38.9
JUL 85	20.5	28.1	33.4	37.6	15.2	20.5	26.3	31.2
AUG 85	19.1	26.5	31.9	35.8	16.6	23.1	29.8	35.9
SEP 85	16.7	25.1	31.9	37.9	13.2	20.6	27.4	33.3
OCT 85	15.3	22.2	27.3	31.8	11.4	17.6	24.0	30.3
NOV 85	14.3	21.1	27.0	33.4	11.2	18.1	24.2	29.0
DEC 85	15.5	23.2	29.6	35.4	9.3	14.4	19.8	25.3
JAN 86	17.3	25.6	31.0	35.1	9.8	15.1	21.6	29.0
FEB 86	16.3	22.8	28.5	34.1	10.8	16.7	23.0	29.2
MAR 86	15.8	22.9	28.9	33.2	10.8	15.4	20.2	25.0
APR 86	16.2	24.6	30.5	35.8	13.0	19.7	26.3	32.7
MAY 86	16.2	23.4	29.3	33.1	15.4	22.4	29.3	35.0
JUN 86	17.9	24.2	29.9	34.9	13.7	19.1	24.5	30.3
JUL 86	20.0	26.5	31.9	36.3	15.9	21.5	27.3	32.5
AUG 86	20.6	27.5	32.6	36.7	14.7	20.3	26.8	32.9
SEP 86	16.0	21.9	27.8	34.1	13.3	18.8	23.9	28.8
OCT 86	16.5	23.3	29.9	35.3	11.5	18.1	31.6	31.0
NOV 86	14.4	20.4	26.2	31.8	9.7	15.2	21.1	27.2
DEC 86	15.7	23.2	29.4	34.8	10.1	15.5	21.1	26.4

TABLE IV(CONTINUED): COARSE-MESH MODEL 500MB S1 SCORE
WEST33 AND EAST33

	WEST33				EAST33			
MON YR	12HR	24HR	36HR	48HR	12HR	24HR	36HR	48HR
JAN 87	14.0	21.3	27.1	31.2	10.0	16.3	23.1	29.6
FEB 87	15.1	23.4	30.0	35.0	11.0	17.5	22.9	29.0
MAR 87	15.2	23.0	28.0	31.9	11.1	17.2	23.7	30.4
APR 87	14.9	22.6	28.8	32.3	12.1	19.8	27.4	34.4
MAY 87	15.8	23.3	29.7	34.4	12.4	18.2	23.4	28.1
JUN 87	15.7	21.8	27.5	31.2	12.3	17.6	22.9	27.2
JUL 87	15.8	21.8	27.3	31.5	14.8	19.2	24.5	29.7
AUG 87	16.8	23.2	28.8	33.1	13.1	18.5	23.3	27.7
SEP 87	14.8	21.2	26.3	31.6	12.0	17.3	22.5	27.9
OCT 87	14.1	20.9	26.6	31.2	9.7	14.8	19.9	24.9
NOV 87	13.8	20.6	26.4	30.8	10.2	16.0	21.7	27.8
DEC 87	13.2	19.7	24.6	29.1	9.7	15.2	21.3	27.0

TABLE V: FINE-MESH MODEL 500MB S1 SCORE
WEST33 AND EAST33

VERIFICATION GRID: 33 point lat-lon grids for western and eastern United States. WEST33 is the area between 105W and 145W, 25N and 55N; EAST33 is the area between 65W and 105W, 25N and 55N; gridpoint spacing is 5 degrees latitude by 10 degrees longitude.

VERIFYING ANALYSIS: Hough analysis thru 25Jul84, Optimum Interpolation method 26Jul84 -

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	WEST33.....				EAST33.....			
MON YR	12HR	24HR	36HR	48HR	12HR	24HR	36HR	48HR
MAR 78	24.8	31.9	40.2	47.5	13.1	17.5	22.7	28.8
APR 78	25.3	29.9	37.8	44.0	16.2	21.7	26.7	35.6
MAY 78	22.9	30.1	38.7	42.2	19.4	24.3	30.6	35.6
JUN 78	24.4	30.3	36.6	43.8	20.1	23.5	28.4	32.4
JUL 78	27.0	33.0	37.5	45.5	19.9	24.3	28.0	33.6
AUG 78	22.7	27.5	32.9	37.7	19.5	23.7	28.9	34.8
SEP 78	24.4	31.0	37.1	44.1	19.1	22.7	29.3	36.2
OCT 78	22.3	29.6	33.1	39.8	16.5	19.4	25.5	30.2
NOV 78	21.0	29.7	34.6	41.4	14.5	19.3	23.4	29.9
DEC 78	20.8	26.6	34.1	40.4	15.0	19.4	24.9	30.0
JAN 79	22.5	29.2	36.5	44.1	15.6	20.3	26.5	32.0
FEB 79	19.4	25.8	32.3	37.9	14.7	16.7	22.5	26.6
MAR 79	21.8	28.2	36.8	43.6	16.3	19.9	26.8	33.6
APR 79	22.3	27.9	33.5	40.4	16.1	21.0	27.3	33.5
MAY 79	23.4	29.9	37.1	42.6	19.2	23.0	29.7	36.1
JUN 79	24.8	29.3	34.7	40.1	19.2	22.7	28.8	35.0
JUL 79	26.4	31.8	37.5	43.0	22.4	25.7	31.8	36.6
AUG 79	27.9	32.1	37.0	42.1	18.9	21.8	27.6	31.8
SEP 79	24.6	31.2	37.2	42.7	17.4	20.2	25.6	30.5
OCT 79	23.7	29.9	35.4	41.3	16.7	20.6	26.4	32.3
NOV 79	23.0	29.1	35.1	41.3	15.1	19.1	25.4	31.6
DEC 79	22.2	29.4	36.0	41.5	15.4	20.0	26.4	32.8
JAN 80	21.8	28.7	36.2	42.6	15.1	20.6	27.9	34.2
FEB 80	25.4	32.9	39.6	45.1	15.5	19.0	25.3	32.9
MAR 80	23.3	29.5	34.2	38.8	14.9	19.3	25.4	31.7
APR 80	23.2	30.2	35.7	41.4	17.7	22.9	28.6	35.4
MAY 80	24.5	31.6	39.8	45.8	18.1	23.1	29.9	37.1
JUN 80	23.4	29.1	36.1	42.0	17.9	22.2	28.2	34.0

TABLE V(CONTINUED): FINE-MESH MODEL 500MB S1 SCORE
WEST33 AND EAST33

MON YR	WEST33 12HR	WEST33 24HR	WEST33 36HR	WEST33 48HR	EAST33 12HR	EAST33 24HR	EAST33 36HR	EAST33 48HR
JUL 80	23.5	27.7	34.0	39.8	19.6	22.9	28.2	33.5
AUG 80	25.5	29.3	35.1	40.0	19.7	22.7	28.3	33.2
SEP 80	21.1	25.8	33.0	39.7	15.3	18.6	24.1	29.8
OCT 80	21.2	28.8	35.1	40.0	13.8	18.2	24.3	30.5
NOV 80	21.7	28.6	35.2	36.4	14.0	18.7	25.5	33.2
DEC 80	19.4	25.2	31.2	36.1	12.0	16.4	22.2	28.6
JAN 81	24.7	32.7	40.3	46.8	13.3	17.5	22.6	28.9
FEB 81	21.1	28.4	35.9	42.4	14.2	19.9	26.3	33.0
MAR 81	24.2	31.6	39.3	44.8	16.7	22.5	28.8	35.2
APR 81	20.9	27.4	34.5	40.4	15.0	19.7	26.1	33.6
MAY 81	23.0	30.5	37.9	45.1	18.5	22.5	28.8	34.4
JUN 81	23.4	31.0	37.7	42.1	17.8	21.9	28.8	36.1
JUL 81	28.0	33.8	40.0	47.9	21.0	24.0	29.6	34.6
AUG 81	27.2	31.0	37.3	42.9	22.3	25.5	31.5	36.9
SEP 81	23.5	30.1	36.6	42.4	18.3	22.3	28.8	34.8
OCT 81	19.6	25.2	32.1	38.9	14.6	19.5	25.5	32.9
NOV 81	21.8	29.3	34.9	39.4	15.4	19.9	26.2	33.3
DEC 81	20.2	27.2	33.4	39.5	13.9	19.0	26.5	33.6
JAN 82	18.0	23.1	28.5	34.6	12.6	17.8	24.3	30.7
FEB 82	18.9	24.2	29.9	33.7	14.3	19.8	26.3	32.9
MAR 82	20.4	28.2	34.8	40.4	14.0	19.3	27.5	35.4
APR 82	19.3	24.5	30.4	36.0	16.0	20.8	27.9	35.1
MAY 82	22.3	28.9	36.5	44.0	20.0	25.6	33.2	40.8
JUN 82	24.7	31.1	39.2	45.8	17.2	20.3	26.1	31.0
JUL 82	25.2	30.9	37.8	44.2	19.6	22.2	27.7	32.0
AUG 82	23.6	28.6	35.7	43.3	16.5	19.9	24.3	29.5
SEP 82	22.1	27.9	34.6	40.9	18.0	21.8	26.9	32.0
OCT 82	20.4	26.6	32.5	39.2	16.0	20.7	27.2	33.7
NOV 82	19.6	25.3	31.2	36.1	13.3	16.8	21.4	26.4
DEC 82	19.7	27.6	34.1	40.9	13.3	18.4	25.4	32.3
JAN 83	21.1	29.5	36.7	40.7	13.9	19.0	25.2	32.1
FEB 83	20.7	28.5	36.1	41.7	14.7	19.3	26.1	34.5
MAR 83	20.9	28.2	34.6	40.6	16.1	21.5	28.0	35.9
APR 83	21.1	27.2	33.8	39.8	16.4	22.3	28.7	36.0
MAY 83	21.2	26.7	33.9	40.3	16.2	20.5	26.4	31.8
JUN 83	22.9	29.0	35.3	41.0	19.2	22.9	28.6	34.6
JUL 83	22.4	27.8	34.8	40.8	20.0	23.6	29.7	35.6
AUG 83	22.5	26.5	32.6	40.0	18.9	21.7	26.5	30.6
SEP 83	21.1	26.2	31.8	37.4	16.1	19.4	24.3	28.9
OCT 83	20.5	26.9	32.4	37.9	15.6	19.7	26.3	32.0
NOV 83	20.7	28.7	34.8	39.4	15.3	21.1	28.6	36.4
DEC 83	20.3	26.9	33.9	40.9	13.2	17.3	22.4	28.4

TABLE V(CONTINUED): FINE-MESH MODEL 500MB S1 SCORE
WEST33 AND EAST33

MON YR	WEST33 12HR	WEST33 24HR	WEST33 36HR	WEST33 48HR	EAST33 12HR	EAST33 24HR	EAST33 36HR	EAST33 48HR
JAN 84	20.3	27.3	35.1	42.1	12.7	16.4	21.0	26.8
FEB 84	20.9	28.4	35.4	40.0	15.0	21.1	27.8	33.9
MAR 84	21.2	29.3	36.2	41.4	15.4	20.6	26.1	31.8
APR 84	20.2	28.0	35.6	41.3	16.2	21.7	29.3	36.3
MAY 84	21.1	26.9	33.3	38.7	15.8	19.3	25.1	31.4
JUN 84	23.4	29.3	35.0	40.7	18.4	22.0	28.2	33.4
JUL 84	24.5	28.6	34.3	39.5	19.1	21.8	27.0	31.6
AUG 84	22.7	27.6	33.8	40.0	19.2	22.8	28.1	32.9
SEP 84	21.5	26.5	33.1	36.9	16.2	19.5	25.4	30.2
OCT 84	19.2	25.2	31.5	35.9	16.3	21.3	27.3	33.0
NOV 84	21.5	29.3	35.7	41.1	15.8	21.2	27.6	33.7
DEC 84	18.0	24.6	32.0	38.3	12.7	17.0	22.2	28.2
JAN 85	21.9	29.8	37.8	44.6	12.8	17.6	22.9	28.8
FEB 85	18.1	22.2	29.3	34.5	13.6	18.3	24.0	30.3
MAR 85	19.4	26.8	33.3	39.2	14.5	20.2	26.2	31.8
APR 85	20.5	26.4	32.8	37.9	16.0	20.7	26.4	32.6
MAY 85	22.1	28.3	35.7	42.7	16.8	21.5	27.3	33.0
JUN 85	21.6	26.8	33.9	40.9	18.3	23.2	29.4	35.9
JUL 85	24.6	29.6	35.8	41.0	18.0	21.4	26.2	30.4
AUG 85	23.0	27.8	33.3	39.3	20.7	24.5	29.1	34.5
SEP 85	21.3	27.0	32.1	38.6	17.2	21.8	26.8	31.5
OCT 85	18.3	23.8	29.3	34.8	15.4	19.5	24.7	30.3
NOV 85	18.4	24.2	30.3	37.2	14.8	19.9	25.8	31.5
DEC 85	20.5	27.4	34.5	39.8	12.7	17.0	22.0	27.3
JAN 86	20.6	28.5	34.4	39.8	13.2	17.5	24.1	24.1
FEB 86	19.9	26.1	32.6	36.9	13.1	17.8	23.9	30.1
MAR 86	19.8	26.9	32.8	37.0	13.6	17.8	22.8	28.5
APR 86	20.5	26.1	32.1	37.3	17.8	23.7	29.5	36.2
MAY 86	19.5	26.0	32.7	37.8	19.1	23.4	29.1	34.6
JUN 86	21.6	27.3	34.3	41.0	16.3	20.6	25.8	31.2
JUL 86	22.9	27.8	35.0	41.5	18.6	23.0	28.7	33.1
AUG 86	24.6	28.9	35.6	40.0	17.2	22.0	27.9	32.4
SEP 86	19.6	24.7	31.2	37.6	15.6	19.8	24.9	29.6
OCT 86	20.8	26.2	31.6	38.2	14.4	19.4	25.1	30.5
NOV 86	17.9	23.6	30.1	35.6	13.3	17.5	22.0	28.2
DEC 86	21.4	29.1	36.2	42.4	14.2	19.0	24.1	30.7

TABLE V(CONTINUED): FINE-MESH MODEL 500MB S1 SCORE
WEST33 AND EAST33

MON YR	WEST33 12HR	WEST33 24HR	WEST33 36HR	WEST33 48HR	EAST33 12HR	EAST33 24HR	EAST33 36HR	EAST33 48HR
JAN 87	19.2	26.5	32.5	38.1	13.6	19.6	25.7	32.7
FEB 87	19.5	27.5	35.6	40.6	14.8	20.3	26.4	32.5
MAR 87	18.7	25.6	31.1	36.2	15.8	22.5	29.2	35.9
APR 87	18.5	25.6	32.0	37.3	16.5	22.6	28.9	35.9
MAY 87	20.8	26.9	33.7	40.1	17.0	21.8	26.7	31.7
JUN 87	20.6	25.1	32.2	37.9	17.2	21.5	26.6	32.0
JUL 87	21.2	26.1	31.7	36.7	18.5	22.5	27.8	32.0
AUG 87	23.2	26.4	32.0	36.7	16.1	19.9	24.4	28.7
SEP 87	20.0	25.0	31.3	36.3	15.5	20.4	25.3	30.5
OCT 87	19.6	25.5	32.4	39.4	13.5	18.0	23.3	28.6
NOV 87	18.3	24.9	30.6	35.7	14.0	19.4	24.7	30.1
DEC 87	18.3	23.8	28.8	33.6	13.8	19.9	26.5	33.3

TABLE VI: FINAL BAROTROPIC 500MB S1 SCORE
WEST33 AND EAST33

VERIFICATION GRID: 33 point lat-lon grids for western and eastern United States. WEST33 is the area between 105W and 145W, 25N and 55N; EAST33 is the area between 65W and 105W, 25N and 55N; gridpoint spacing is 5 degrees latitude by 10 degrees longitude.

VERIFYING ANALYSIS: Hough analysis thru 25Jul84, Optimum Interpolation method 26Jul84 -

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	WEST33				EAST33			
MON YR	12HR	24HR	36HR	48HR	12HR	24HR	36HR	48HR
MAR 78	24.2	36.2	44.6	52.3	16.6	26.1	33.3	39.6
APR 78	26.3	34.4	44.6	49.6	21.3	31.8	40.9	44.8
MAY 78	24.6	36.9	46.5	50.3	22.7	32.2	41.2	47.6
JUN 78	25.7	36.9	44.9	49.9	22.9	30.5	37.6	40.1
JUL 78	27.0	37.9	45.9	53.2	22.9	30.4	35.6	40.5
AUG 78	24.1	33.8	39.8	46.3	22.4	29.6	37.4	43.2
SEP 78	26.5	36.3	42.3	50.2	22.5	30.2	38.6	45.2
OCT 78	29.9	39.4	46.8	54.4	22.8	31.4	39.2	44.7
NOV 78	27.2	36.9	42.1	46.6	20.3	31.2	38.9	43.2
DEC 78	27.0	35.3	42.9	47.7	19.8	27.7	34.7	40.6
JAN 79	28.7	40.3	46.6	54.6	21.5	31.8	40.3	45.7
FEB 79	25.9	35.7	43.4	48.9	20.2	28.9	36.5	42.9
MAR 79	27.1	35.9	42.6	49.1	22.4	32.7	41.7	47.3
APR 79	27.6	34.3	39.5	46.1	21.5	31.6	39.0	45.0
MAY 79	27.6	36.2	42.3	49.6	24.9	33.9	41.4	48.6
JUN 79	31.2	38.0	44.8	48.7	27.4	36.6	44.6	51.9
JUL 79	31.9	37.1	44.5	51.3	30.0	37.2	42.4	47.1
AUG 79	34.6	40.0	48.1	55.0	25.0	31.7	38.8	43.6
SEP 79	27.5	35.7	43.9	49.8	22.4	30.4	38.4	43.9
OCT 79	25.0	34.2	43.2	51.9	21.5	30.2	38.7	45.7
NOV 79	25.3	33.5	41.1	47.7	19.4	28.4	36.6	44.7
DEC 79	26.1	33.4	41.1	49.5	21.3	31.0	38.5	44.6
JAN 80	27.1	36.1	43.5	49.9	21.9	32.4	41.0	46.5
FEB 80	28.0	38.1	44.9	51.3	19.9	27.1	36.7	41.5
MAR 80	28.9	39.7	45.9	52.8	22.0	31.4	37.8	49.1
APR 80	26.5	37.0	44.3	52.9	23.1	32.9	41.5	49.5
MAY 80	28.9	37.9	45.1	52.9	23.1	32.3	39.3	45.8
JUN 80	24.2	33.5	41.4	49.0	22.6	30.1	36.7	43.7

TABLE VI (CONTINUED): FINAL BAROTROPIC 500MB S1 SCORE
WEST33 AND EAST33

MON YR	WEST33 12HR	WEST33 24HR	WEST33 36HR	WEST33 48HR	EAST33 12HR	EAST33 24HR	EAST33 36HR	EAST33 48HR
JUL 80	23.7	35.7	39.2	48.0	21.9	28.1	34.8	39.7
AUG 80	24.7	33.3	39.8	45.9	23.0	32.0	37.4	42.5
SEP 80	22.0	32.5	38.6	47.4	19.9	27.6	35.3	39.2
OCT 80	21.9	32.4	38.7	46.1	17.7	26.6	34.0	40.2
NOV 80	22.1	29.6	37.2	42.2	18.8	28.8	35.7	42.5
DEC 80	21.3	29.4	35.9	42.8	18.1	27.7	34.8	40.1
JAN 81	25.2	35.7	45.6	52.7	18.0	28.5	35.3	42.9
FEB 81	22.6	30.8	38.2	49.6	20.1	30.8	38.2	44.0
MAR 81	23.8	34.5	42.2	50.5	21.2	30.1	37.8	45.6
APR 81	22.1	31.9	38.8	46.4	20.7	28.8	36.4	41.1
MAY 81	25.3	35.8	41.3	49.8	22.6	31.9	38.6	45.1
JUN 81	24.3	34.2	39.1	46.8	22.7	31.1	39.0	43.7
JUL 81	30.5	41.7	47.6	56.3	24.7	32.3	39.2	45.5
AUG 81	28.4	37.7	43.4	52.1	25.0	35.0	40.1	47.8
SEP 81	22.0	31.8	38.7	46.3	22.6	34.7	42.6	48.0
OCT 81	20.7	30.3	37.4	44.3	19.2	28.7	37.6	44.0
NOV 81	21.3	30.9	37.1	42.9	22.1	30.8	39.7	45.8
DEC 81	19.6	28.4	33.6	40.3	18.3	28.0	35.5	41.1
JAN 82	20.2	29.8	37.0	44.9	20.1	30.0	37.0	43.6
FEB 82	21.2	29.8	37.8	45.9	16.9	25.0	33.0	38.8
MAR 82	21.4	32.3	39.9	48.1	18.4	26.7	34.1	39.5
APR 82	21.9	32.2	39.5	45.7	20.1	29.4	36.9	44.1
MAY 82	23.4	32.9	41.2	50.1	24.6	32.8	41.3	47.7
JUN 82	25.1	31.2	38.7	43.7	21.5	28.4	34.9	40.8
JUL 82	25.6	34.1	41.4	47.4	23.7	29.8	36.3	41.6
AUG 82	24.6	31.9	39.1	45.5	20.6	27.5	32.9	38.5
SEP 82	23.5	33.8	40.8	49.4	20.4	28.9	36.6	42.7
OCT 82	23.8	33.3	43.3	48.6	20.2	31.1	38.3	46.2
NOV 82	22.1	31.6	39.5	46.0	18.2	27.9	35.3	40.3
DEC 82	23.4	34.2	42.9	50.3	18.1	28.0	36.4	43.0
JAN 83	22.3	33.3	42.2	50.3	18.0	26.8	35.9	42.2
FEB 83	22.1	32.2	41.0	48.6	20.3	30.3	40.1	47.1
MAR 83	22.1	33.2	41.5	48.8	21.1	32.6	41.7	48.8
APR 83	23.1	31.0	43.3	48.6	19.7	30.0	39.6	47.0
MAY 83	22.4	31.2	37.5	44.9	19.1	28.0	35.9	42.5
JUN 83	23.7	32.9	40.3	47.4	22.5	30.7	38.8	45.7
JUL 83	22.4	31.5	37.8	45.7	21.9	30.5	37.0	42.2
AUG 83	24.8	31.4	34.8	44.5	20.8	27.6	38.0	39.6
SEP 83	23.0	32.1	38.4	44.4	20.0	28.8	37.3	43.3
OCT 83	21.5	32.4	39.6	47.1	20.3	30.4	40.5	47.4
NOV 83	21.5	33.1	41.4	47.4	20.8	31.7	40.6	50.1
DEC 83	21.0	30.1	37.8	44.3	17.6	26.4	33.7	39.2

TABLE VI(CONTINUED): FINAL BAROTROPIC 500MB S1 SCORE
WEST33 AND EAST33

MON YR	WEST33 12HR	WEST33 24HR	WEST33 36HR	WEST33 48HR	EAST33 12HR	EAST33 24HR	EAST33 36HR	EAST33 48HR
JAN 84	20.7	30.3	37.6	46.6	16.8	25.0	32.8	36.7
FEB 84	23.1	34.1	41.3	47.6	19.0	29.2	37.9	45.3
MAR 84	21.6	31.9	39.5	47.9	19.1	28.1	35.7	42.5
APR 84	21.6	33.6	41.3	49.9	20.9	32.0	40.5	48.9
MAY 84	24.4	33.0	40.1	45.6	23.0	32.5	39.3	45.4
JUN 84	25.4	35.5	41.7	48.4	22.8	31.2	38.7	44.2
JUL 84	25.9	33.1	39.5	45.8	21.8	29.7	36.3	42.1
AUG 84	22.8	32.0	41.0	47.2	19.7	29.8	36.6	42.8
SEP 84	20.5	32.3	40.4	48.1	18.2	29.0	37.3	45.3
OCT 84	19.7	30.3	35.6	42.0	17.6	27.4	35.0	43.1
NOV 84	23.4	33.8	41.3	48.6	21.1	33.3	41.9	48.7
DEC 84	17.9	28.3	36.2	45.0	15.8	25.6	32.8	36.7
JAN 85	20.8	31.7	43.0	51.9	16.0	24.3	31.8	38.9
FEB 85	19.7	29.8	38.1	44.7	16.3	26.1	32.8	35.8
MAR 85	19.8	31.9	41.1	50.2	17.3	27.8	36.6	43.6
APR 85	20.0	29.3	38.5	45.6	18.0	28.1	35.8	41.9
MAY 85	21.3	33.3	43.8	52.6	17.6	26.8	34.0	40.2
JUN 85	20.6	30.9	39.7	47.0	20.5	30.4	40.8	46.6
JUL 85	22.1	31.0	39.9	45.6	18.8	26.6	33.5	38.4
AUG 85	22.2	32.0	41.0	47.2	19.7	30.2	37.0	43.5
SEP 85	21.1	32.2	41.3	47.4	19.1	28.7	38.3	44.0
OCT 85	20.0	29.2	38.4	44.7	18.9	29.2	38.3	44.8
NOV 85	18.7	30.0	37.5	44.4	17.0	27.7	37.2	44.1
DEC 85	19.3	31.7	39.0	47.1	15.7	24.5	31.3	35.8
JAN 86	20.2	30.9	40.2	47.9	16.6	26.2	34.3	40.8
FEB 86	20.3	30.7	39.2	46.0	16.6	27.7	34.4	40.1
MAR 86	19.7	31.8	41.7	49.4	17.8	27.0	35.7	41.9
APR 86	19.2	30.3	39.2	48.6	18.3	28.6	37.9	46.3
MAY 86	18.3	28.0	36.3	42.5	19.7	29.7	37.5	43.9
JUN 86	21.4	28.8	41.5	46.5	19.6	24.3	35.3	39.0
JUL 86	19.9	30.2	38.4	45.8	18.8	27.6	35.2	41.5
AUG 86	21.8	32.4	40.2	47.3	18.4	28.1	34.3	41.3
SEP 86	19.6	29.8	37.6	45.2	18.1	27.5	34.9	41.0
OCT 86	19.1	29.2	37.3	46.0	17.4	26.9	36.9	43.1
NOV 86	19.1	29.9	38.3	45.2	16.2	26.5	33.8	40.1
DEC 86	20.5	32.6	41.8	50.9	16.3	26.7	34.7	40.9

TABLE VI(CONTINUED): FINAL BAROTROPIC 500MB S1 SCORE
WEST33 AND EAST33

MON YR	WEST33 12HR	WEST33 24HR	WEST33 36HR	WEST33 48HR	EAST33 12HR	EAST33 24HR	EAST33 36HR	EAST33 48HR
JAN 87	19.7	31.8	41.7	48.6	18.0	30.2	38.8	47.0
FEB 87	20.7	32.7	42.2	58.8	18.6	28.4	37.1	42.8
MAR 87	18.1	29.7	37.4	46.4	17.2	27.4	35.9	43.4
APR 87	19.7	30.4	38.7	46.0	18.1	30.0	39.6	48.2
MAY 87	20.6	31.6	40.9	48.1	18.6	28.5	37.4	42.9
JUN 87	21.9	32.3	44.9	49.3	17.0	26.8	34.0	40.1
JUL 87	20.1	30.5	37.9	44.6	18.7	26.8	35.0	39.4
AUG 87	21.8	31.2	40.2	47.5	18.0	26.8	33.6	39.1
SEP 87	19.5	29.1	38.5	44.6	17.4	26.5	34.4	42.3
OCT 87	19.1	29.4	39.0	46.7	15.5	24.7	33.3	39.4
NOV 87	18.4	31.0	38.7	48.0	16.7	29.2	38.8	46.1
DEC 87	20.0	32.5	41.8	49.5	16.6	28.1	36.8	44.7

TABLE VII: AVERAGE YEARLY S1 SCORES
MEAN SEA LEVEL AND 500MB

VERIFICATION GRID: 49 point lat-lon grid. This is a subset of a 63 point grid which covers the area between 65 and 145 west longitude and between 25 and 55 north latitude. Gridpoint spacing is 5 degrees latitude by 10 degrees longitude.

VERIFYING ANALYSES
COARSE-MESH MODEL: Hough analysis thru 25Jul84, Optimum Interpolation method 26Jul84 -
FINE-MESH MODEL: Cressman analysis

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	COARSE-MESH MODEL.....				FINE-MESH MODEL.....			
MEAN SEA LEVEL	12HR	24HR	36HR	48HR	12HR	24HR	36HR	48HR
1976	39.6	47.0	55.1	62.3	39.1	45.2	52.6	59.1
1977	38.9	46.5	54.8	61.9	37.9	44.5	52.3	59.0
1978	36.0	41.9	50.5	56.2	34.8	41.7	49.6	55.8
1979	37.1	42.2	50.7	56.9	35.4	42.0	49.6	56.2
1980	34.6	41.1	49.3	55.6	35.1	41.7	48.9	55.5
1981	33.8	41.4	49.6	56.9	35.1	41.3	48.4	55.1
1982	33.6	41.8	50.1	57.0	35.1	41.6	49.2	56.2
1983	31.6	40.1	48.5	55.2	34.8	41.7	49.7	56.0
1984	31.9	39.1	47.0	54.1	35.1	41.4	49.2	55.3
1985	29.8	37.7	47.0	54.5	35.8	42.1	49.1	55.5
1986	29.2	36.4	45.0	52.2	34.9	41.1	47.9	54.0
1987	24.8	32.4	39.2	45.4	35.2	41.4	47.9	53.6
500 MB								
1976	22.6	29.0	35.4	41.4	18.8	24.5	31.9	39.2
1977	21.9	28.6	34.9	40.6	19.1	24.8	31.5	37.8
1978	21.1	26.4	32.5	37.6	19.6	24.6	31.3	37.4
1979	20.5	25.8	31.4	36.8	19.6	24.7	31.3	37.4
1980	18.6	24.0	29.5	34.9	18.8	24.3	30.9	37.2
1981	17.9	24.3	30.3	35.9	19.4	25.2	31.9	38.4
1982	16.9	22.7	28.2	33.4	18.1	23.4	30.0	36.3
1983	17.7	23.9	29.4	35.1	18.7	24.2	30.8	37.2
1984	16.2	22.4	28.3	34.0	18.1	23.6	30.0	35.7
1985	13.8	20.8	27.1	33.0	18.2	23.2	29.0	34.8
1986	13.7	20.1	26.1	31.7	18.1	23.3	29.2	34.7
1987	12.4	18.8	24.7	30.1	18.4	23.8	29.6	35.1

TABLE VIII: AVERAGE YEARLY 500MB S1 SCORES
WEST33 AND EAST33

VERIFICATION GRID: 33 point lat-lon grids for western and eastern United States. WEST33 is the area between 105W and 145W, 25N and 55N; EAST33 is the area between 65W and 105W, 25N and 55N; gridpoint spacing is 5 degrees latitude by 10 degrees longitude.

VERIFYING ANALYSIS: Hough analysis thru 25Jul84, Optimum Interpolation method 26Jul84 -

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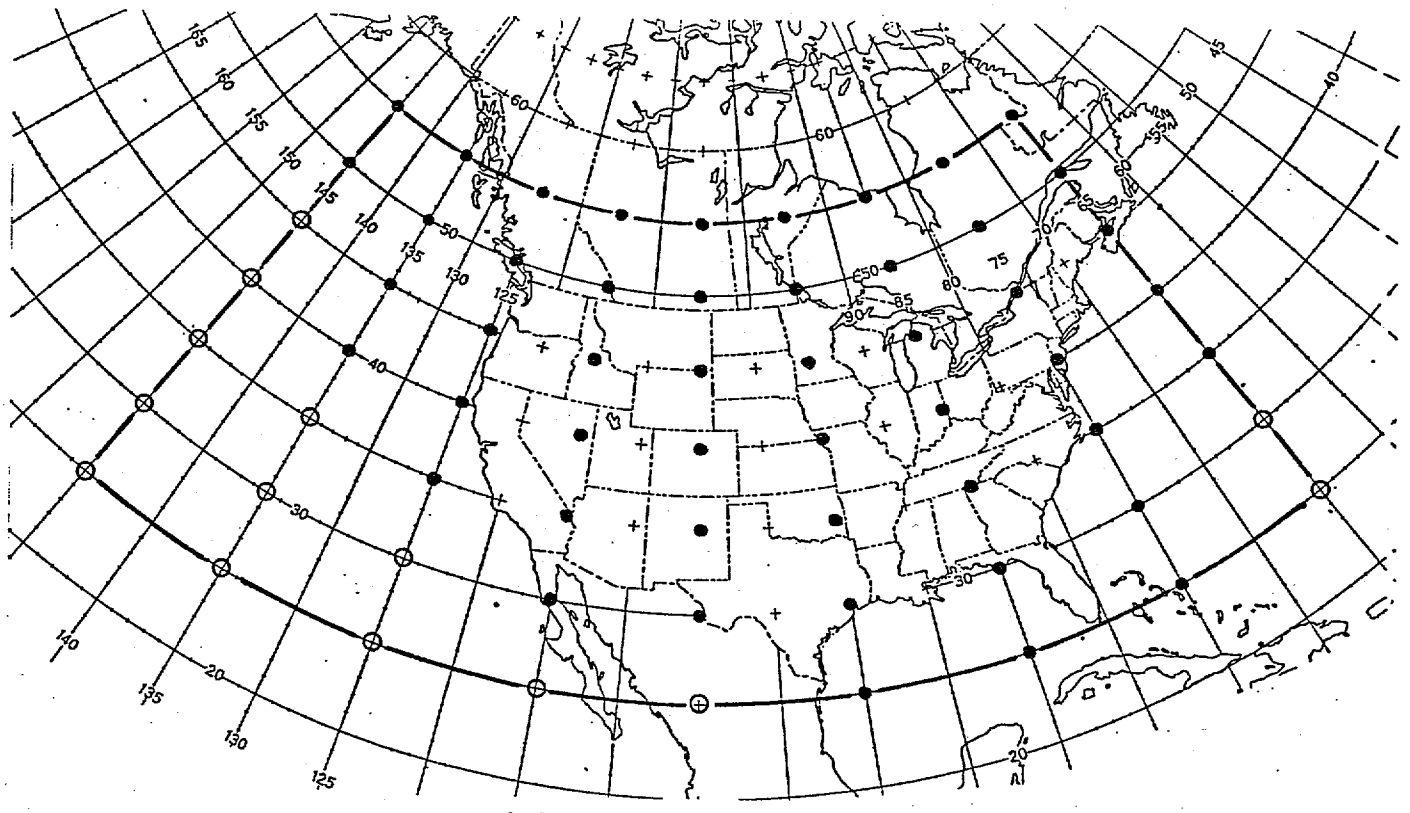
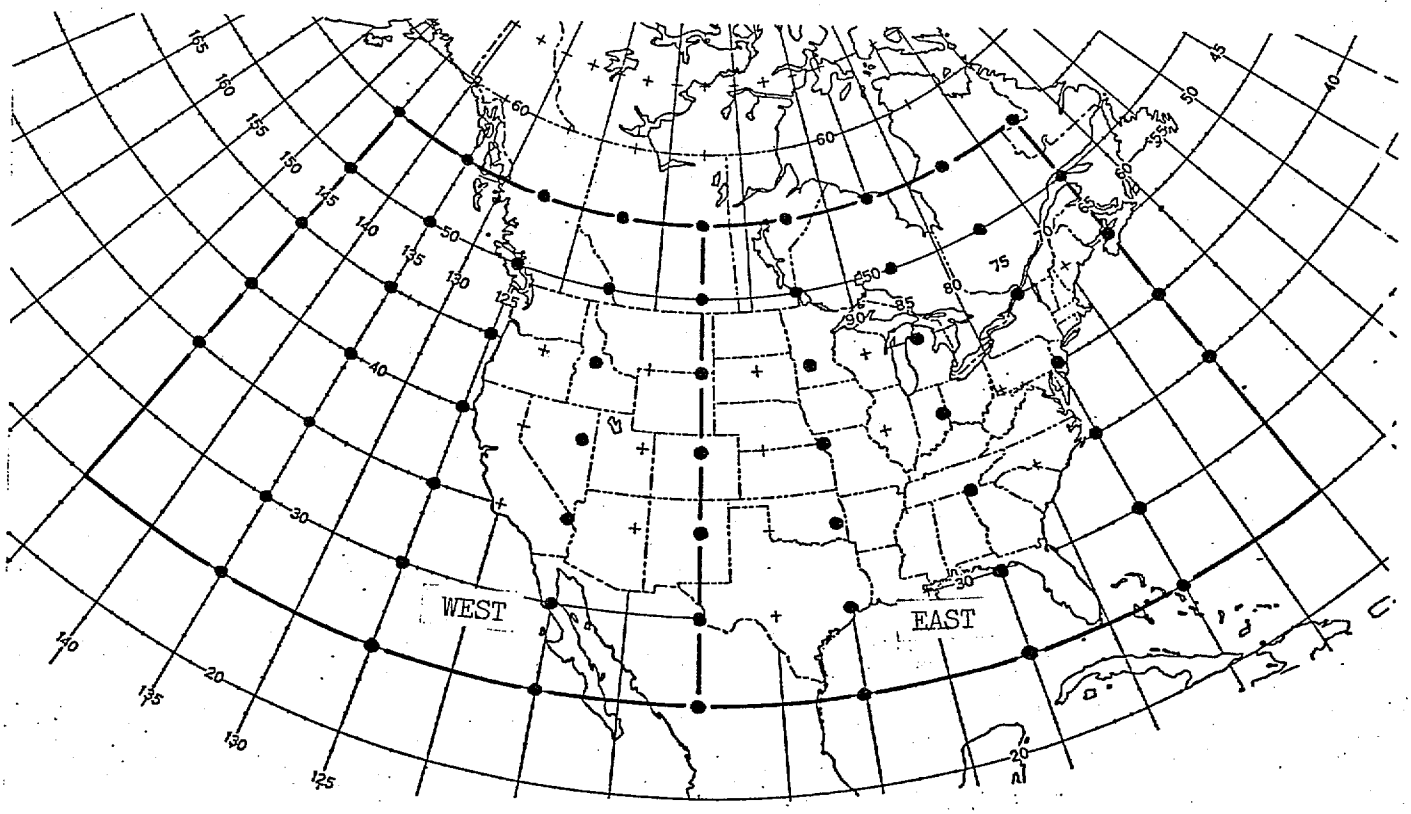
	WEST33.....				EAST33.....			
COARSE-MESH	12HR	24HR	36HR	48HR	12HR	24HR	36HR	48HR
1979	24.4	30.0	35.3	40.0	19.3	23.8	29.3	34.3
1980	22.3	28.2	33.4	38.4	17.2	21.8	27.1	32.6
1981	21.8	28.4	34.1	39.0	16.0	21.8	28.5	33.8
1982	20.4	26.2	31.6	36.3	15.2	20.5	26.0	31.0
1983	20.8	27.0	32.0	36.6	16.0	21.5	27.3	33.2
1984	19.8	26.3	31.9	37.0	14.7	20.2	26.2	32.0
1985	17.3	24.8	30.9	36.1	12.6	18.9	25.4	31.9
1986	16.9	23.9	29.7	34.6	12.4	18.2	24.7	30.0
1987	14.9	21.9	27.6	31.9	11.5	17.3	23.0	28.6
FINE-MESH								
1979	23.5	29.5	35.8	41.8	17.3	21.0	27.1	32.8
1980	22.8	28.9	35.4	40.6	16.1	20.4	26.5	32.8
1981	23.2	29.9	36.7	42.7	16.8	21.2	27.5	33.9
1982	21.2	27.3	33.8	40.0	15.9	20.3	26.5	32.7
1983	21.3	27.7	34.2	40.0	16.3	20.7	26.7	33.0
1984	21.2	27.6	34.2	39.7	16.1	20.4	26.2	31.9
1985	20.8	26.7	33.2	39.3	15.9	20.5	25.9	31.5
1986	20.8	26.8	33.2	38.8	15.6	20.1	25.7	30.8
1987	19.8	25.7	32.0	37.4	15.5	20.7	26.3	32.0
BARO								
1979	28.2	36.2	43.4	50.2	23.2	32.1	39.8	45.9
1980	24.9	34.6	41.2	48.4	21.0	29.8	37.1	43.4
1981	23.8	33.7	40.3	48.2	21.4	30.9	38.3	44.6
1982	23.0	32.3	40.1	47.2	20.3	28.8	36.1	42.3
1983	22.5	32.0	39.6	46.8	20.2	29.5	38.2	44.5
1984	22.2	32.3	39.6	46.9	19.6	29.4	37.0	43.4
1985	20.5	31.1	40.1	47.4	17.9	27.5	35.6	41.5
1986	19.9	30.4	39.3	46.8	17.8	27.2	35.4	41.7
1987	20.0	31.0	40.1	48.1	17.5	27.8	36.2	42.9

FIGURE I



49 POINT (●) AND 63 POINT (○,●) GRIDS



33 POINT WEST AND EAST GRIDS

FIGURE IIa

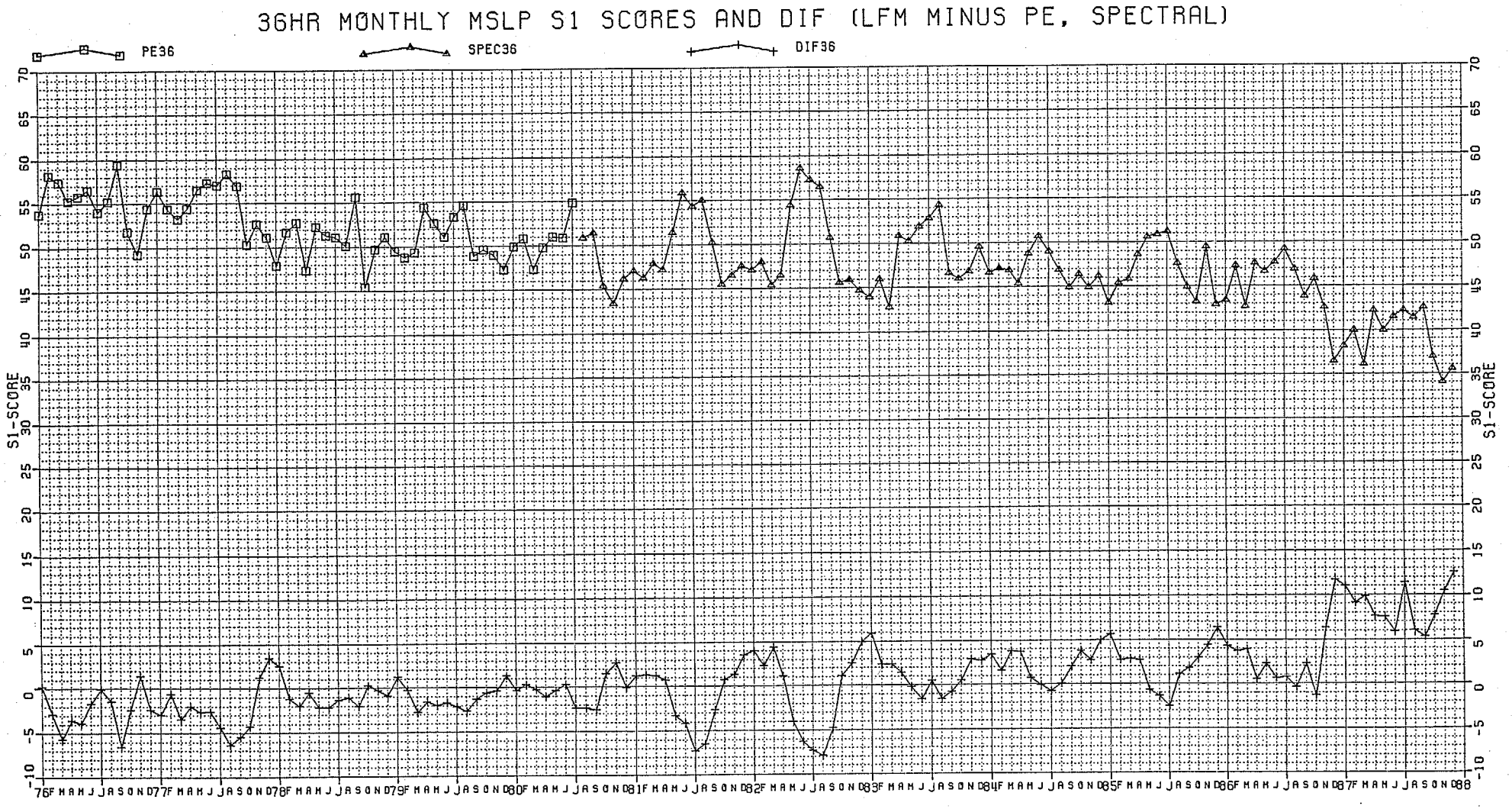

36HR MONTHLY MSLP S1 SCORES AND DIF (LFM MINUS PE, SPECTRAL)
PE36
SPEC36
DIF36
S1-SCORE
S1-SCORE
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
76F M A M J J A S O N D 77F M A M J J A S O N D 78F M A M J J A S O N D 79F M A M J J A S O N D 80F M A M J J A S O N D 81F M A M J J A S O N D 82F M A M J J A S O N D 83F M A M J J A S O N D 84F M A M J J A S O N D 85F M A M J J A S O N D 86F M A M J J A S O N D 87F M A M J J A S O N D 88

FIGURE IIb

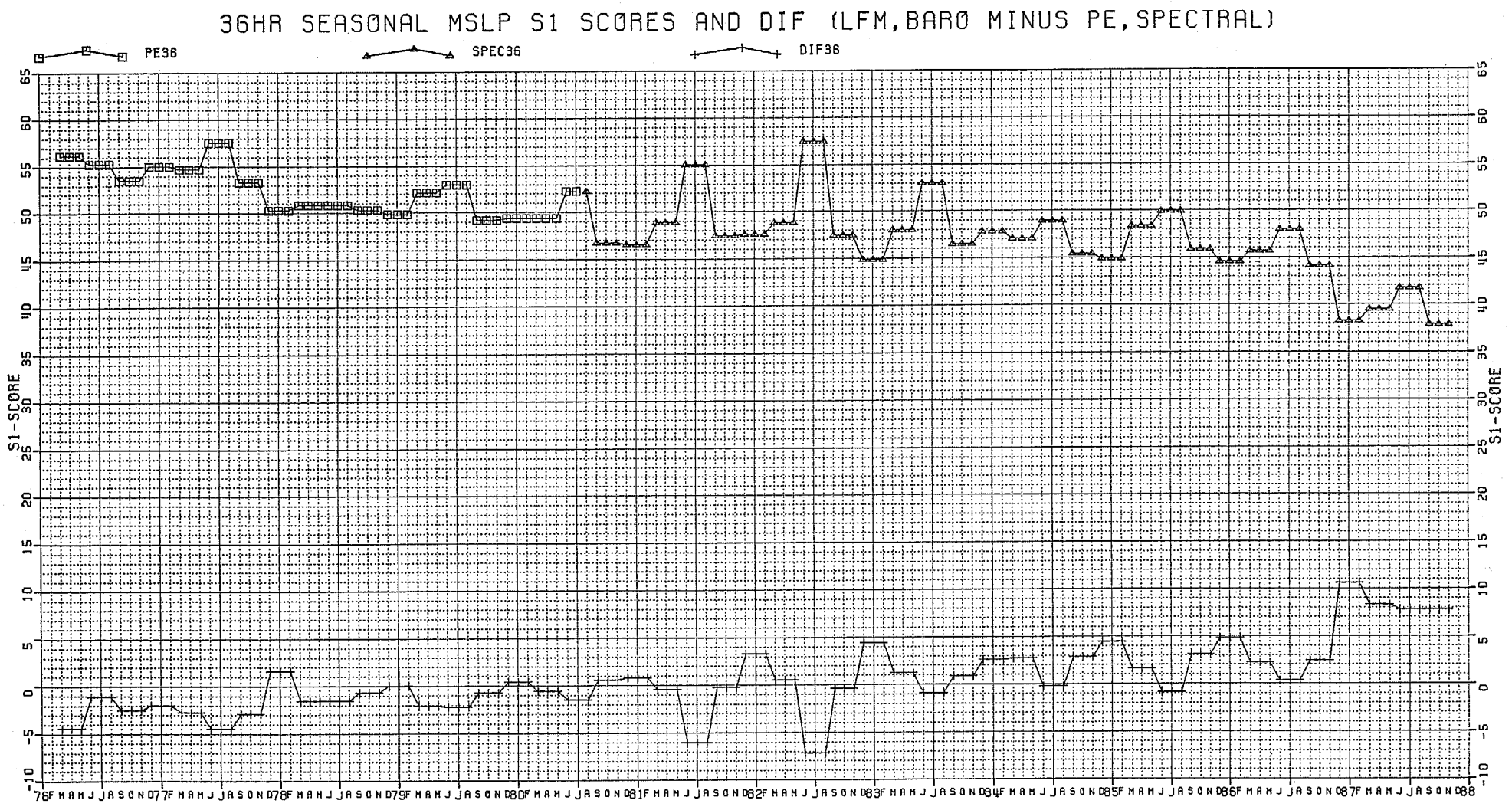

36HR SEASONAL MSLP S1 SCORES AND DIF (LFM,BARO MINUS PE,SPECTRAL)
PE36
SPEC36
DIF36
S1-SCORE
S1-SCORE
65
60
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
76F M A M J J A S O N D 77F M A M J J A S O N D 78F M A M J J A S O N D 79F M A M J J A S O N D 80F M A M J J A S O N D 81F M A M J J A S O N D 82F M A M J J A S O N D 83F M A M J J A S O N D 84F M A M J J A S O N D 85F M A M J J A S O N D 86F M A M J J A S O N D 87F M A M J J A S O N D 88

FIGURE IIc

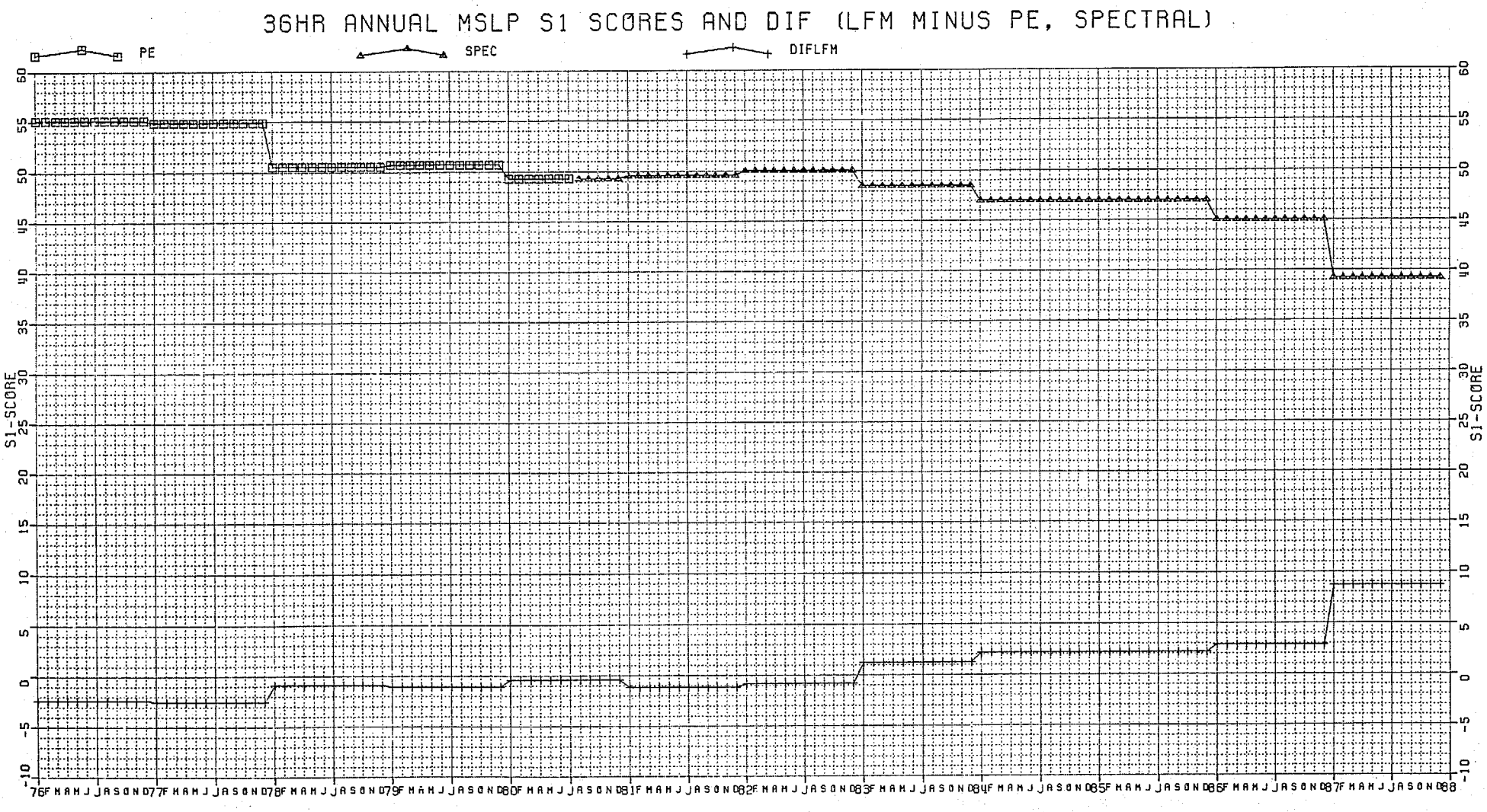
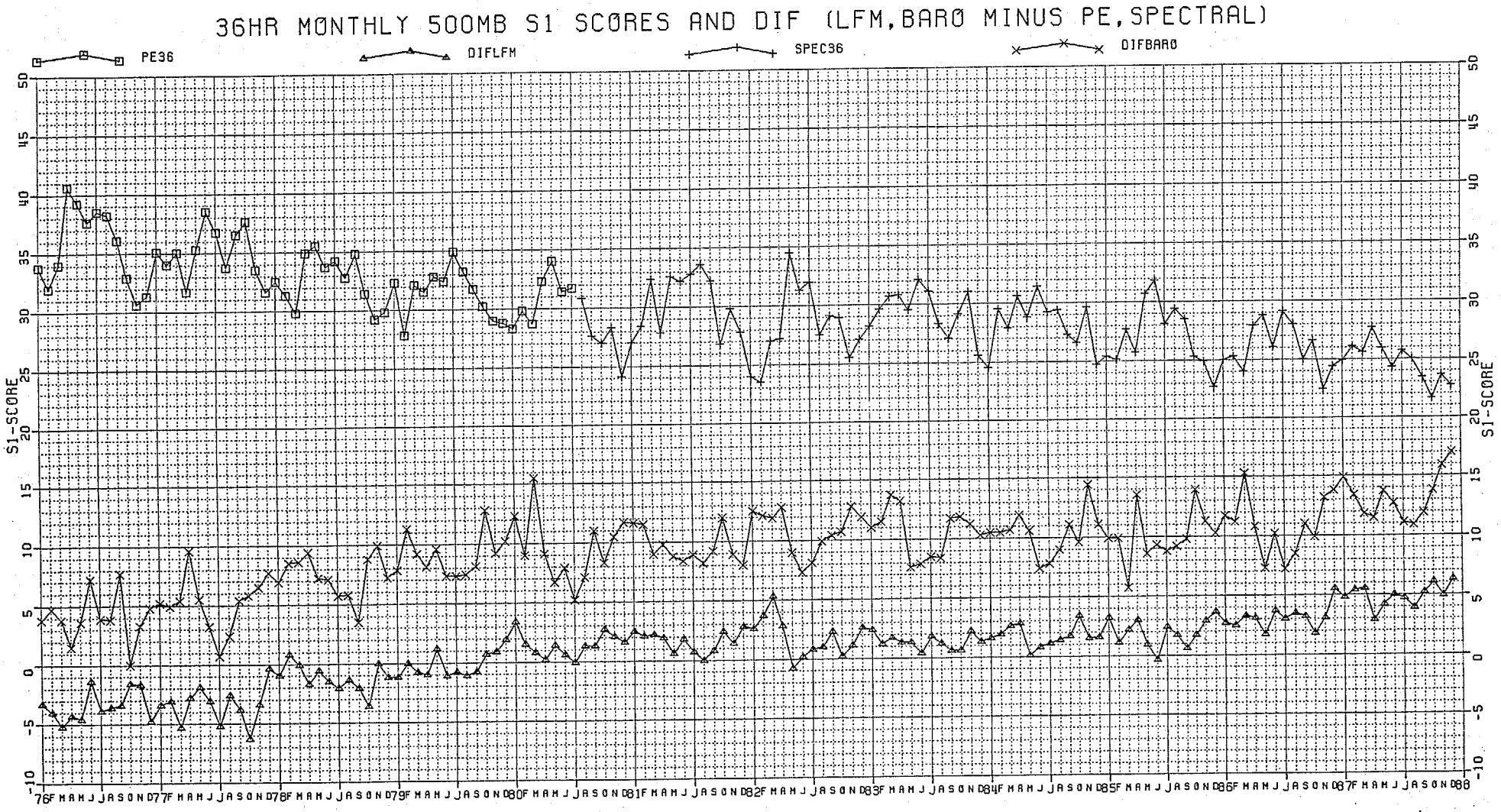

36HR ANNUAL MSLP S1 SCØRES AND DIF (LFM MINUS PE, SPECTRAL)
PE
SPEC
DIFLFM
S1-SCORE
60
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
76F M A M J J A S O N D 77F M A M J J A S O N D 78F M A M J J A S O N D 79F M A M J J A S O N D 80F M A M J J A S O N D 81F M A M J J A S O N D 82F M A M J J A S O N D 83F M A M J J A S O N D 84F M A M J J A S O N D 85F M A M J J A S O N D 86F M A M J J A S O N D 87F M A M J J A S O N D 88

FIGURE IIIa


36HR MØNTHLY 500MB S1 SCØRES AND DIF (LFM,BARØ MINUS PE,SPECTRAL)
PE36
DIFLFM
SPEC36
DIFBARØ
S1-SCØRE
S1-SCØRE
50
45
40
35
30
25
20
15
10
5
0
-5
-10
76F M A M J J A S O N D 77F M A M J J A S O N D 78F M A M J J A S O N D 79F M A M J J A S O N D 80F M A M J J A S O N D 81F M A M J J A S O N D 82F M A M J J A S O N D 83F M A M J J A S O N D 84F M A M J J A S O N D 85F M A M J J A S O N D 86F M A M J J A S O N D 87F M A M J J A S O N D 88

FIUGRE IIIb

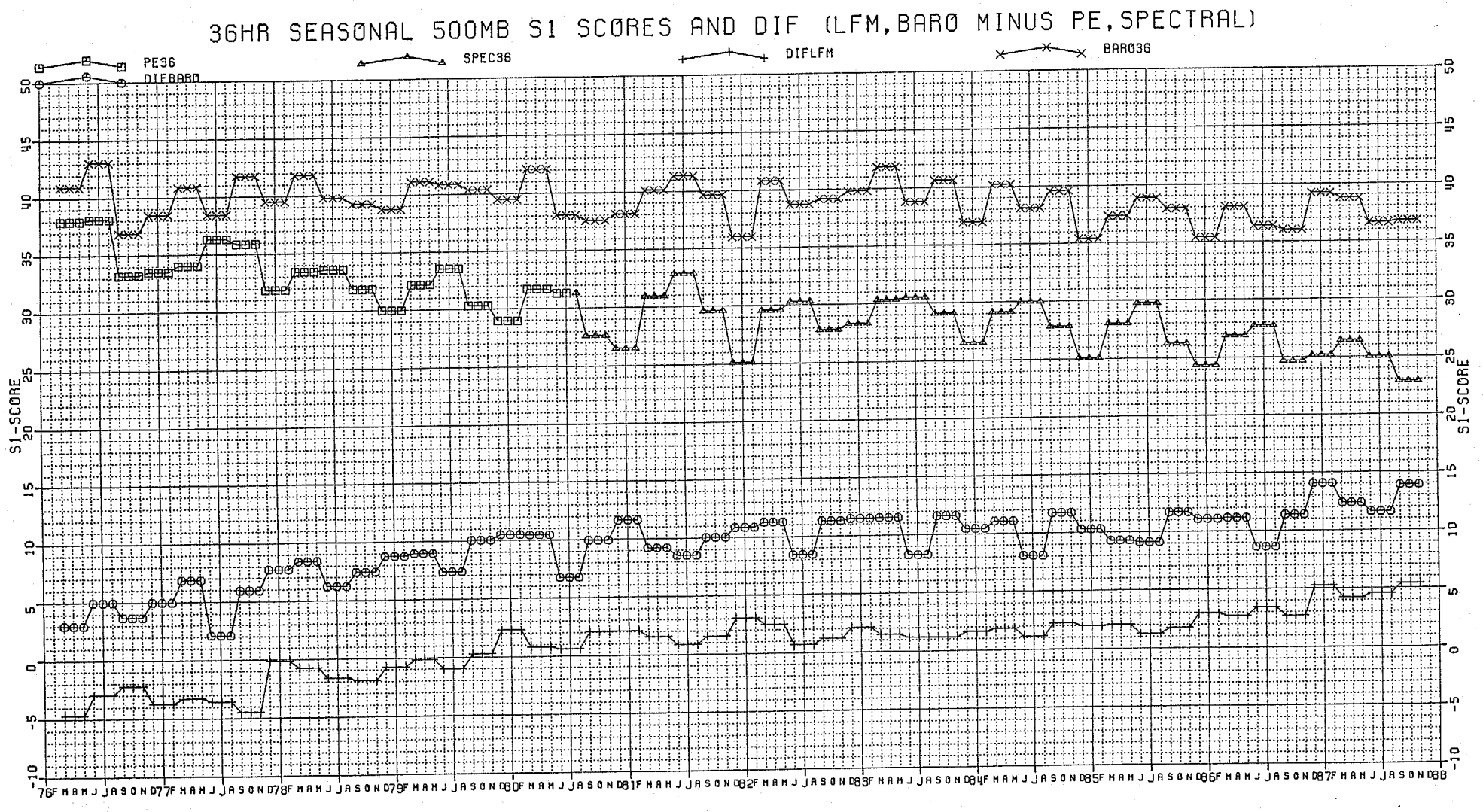

36HR SEASONAL 500MB S1 SCORES AND DIF (LFM,BARO MINUS PE,SPECTRAL)
PE36
DIFBARO
SPEC36
DIFLFM
BARO36
S1-SCORE
S1-SCORE
50
45
40
35
30
25
20
15
10
5
0
-5
-10
76F M A M J J A S O N D 77F M A M J J A S O N D 78F M A M J J A S O N D 79F M A M J J A S O N D 80F M A M J J A S O N D 81F M A M J J A S O N D 82F M A M J J A S O N D 83F M A M J J A S O N D 84F M A M J J A S O N D 85F M A M J J A S O N D 86F M A M J J A S O N D 87F M A M J J A S O N D 88

FIGURE IIIc

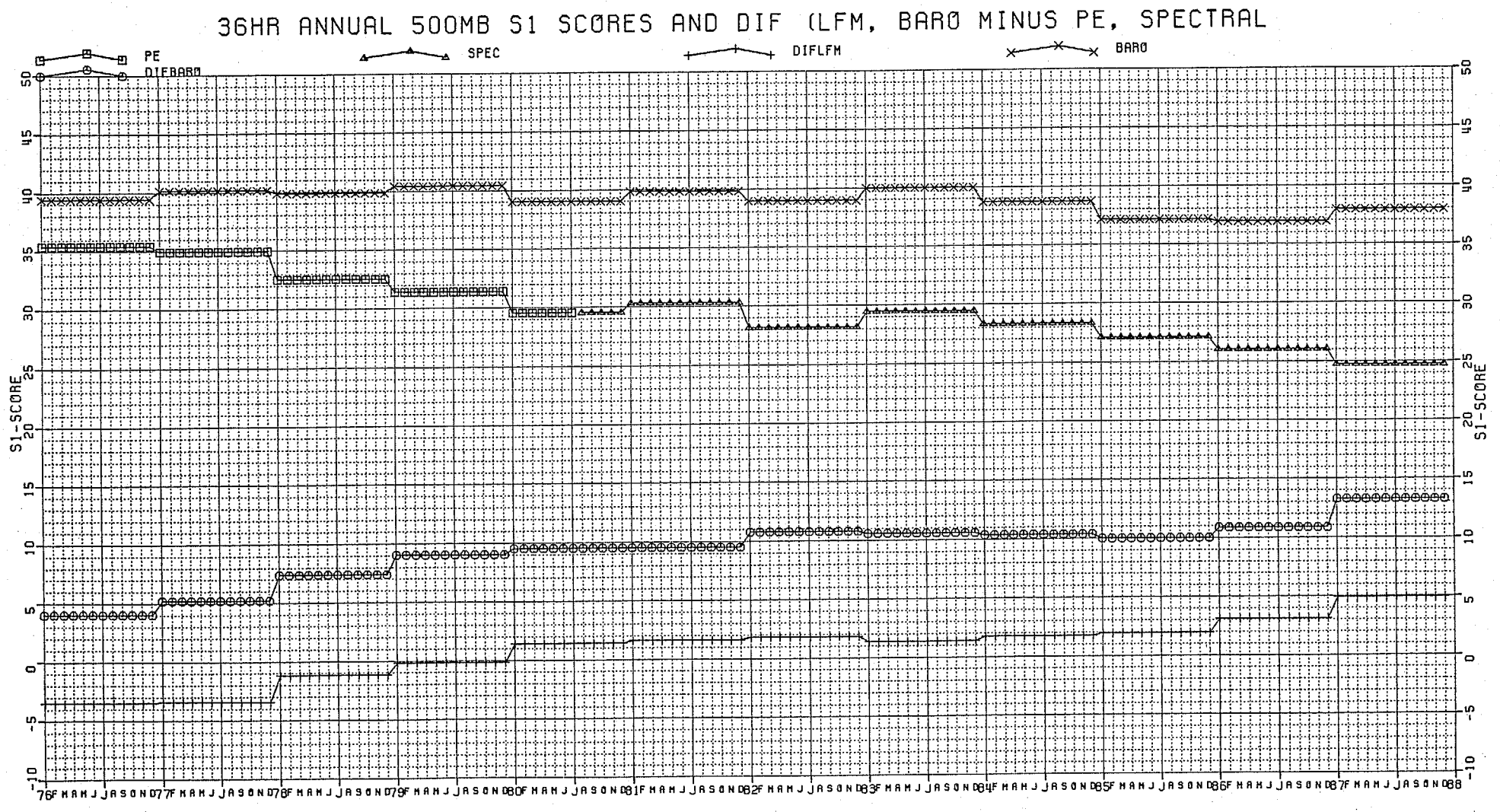

36HR ANNUAL 500MB S1 SCORES AND DIF (LFM, BARO MINUS PE, SPECTRAL
PE
DIFBARO
SPEC
DIFLFM
BARO
S1-SCORE
50
45
40
35
30
25
20
15
10
5
0
-5
-10
76F MAMJJASON077F MAMJJASON078F MAMJJASON079F MAMJJASON080F MAMJJASON081F MAMJJASON082F MAMJJASON083F MAMJJASON084F MAMJJASON085F MAMJJASON086F MAMJJASON087F MAMJJASON088

FIGURE IVa

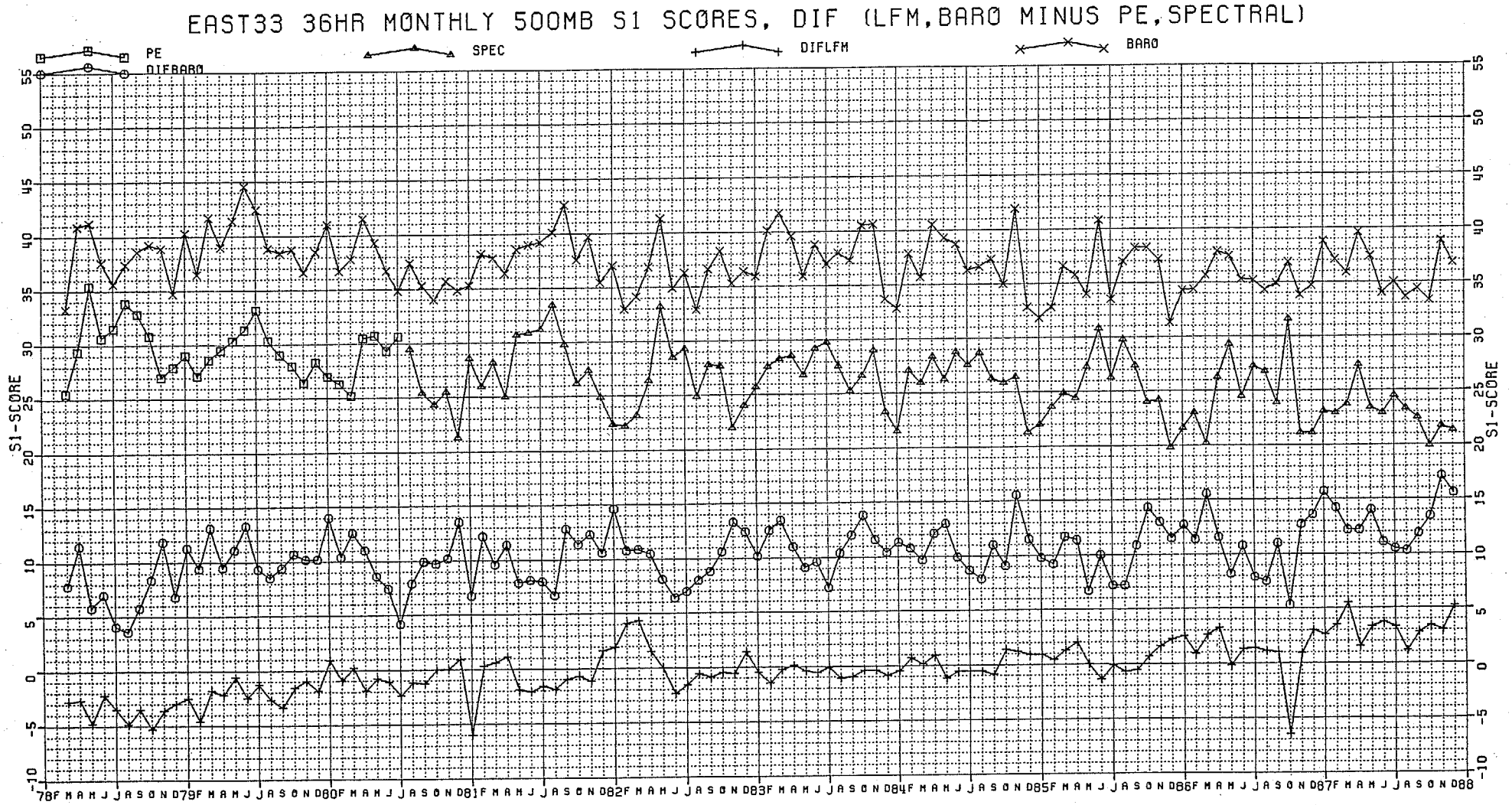

EAST33 36HR MONTHLY 500MB S1 SCORES, DIF (LFM,BARO MINUS PE,SPECTRAL)
PE
DIFBARO
SPEC
DIFLFM
BARO
S1-SCORE
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
78F M A M J J A S O N D 79F M A M J J A S O N D 80F M A M J J A S O N D 81F M A M J J A S O N D 82F M A M J J A S O N D 83F M A M J J A S O N D 84F M A M J J A S O N D 85F M A M J J A S O N D 86F M A M J J A S O N D 87F M A M J J A S O N D 88

FIGURE IVb

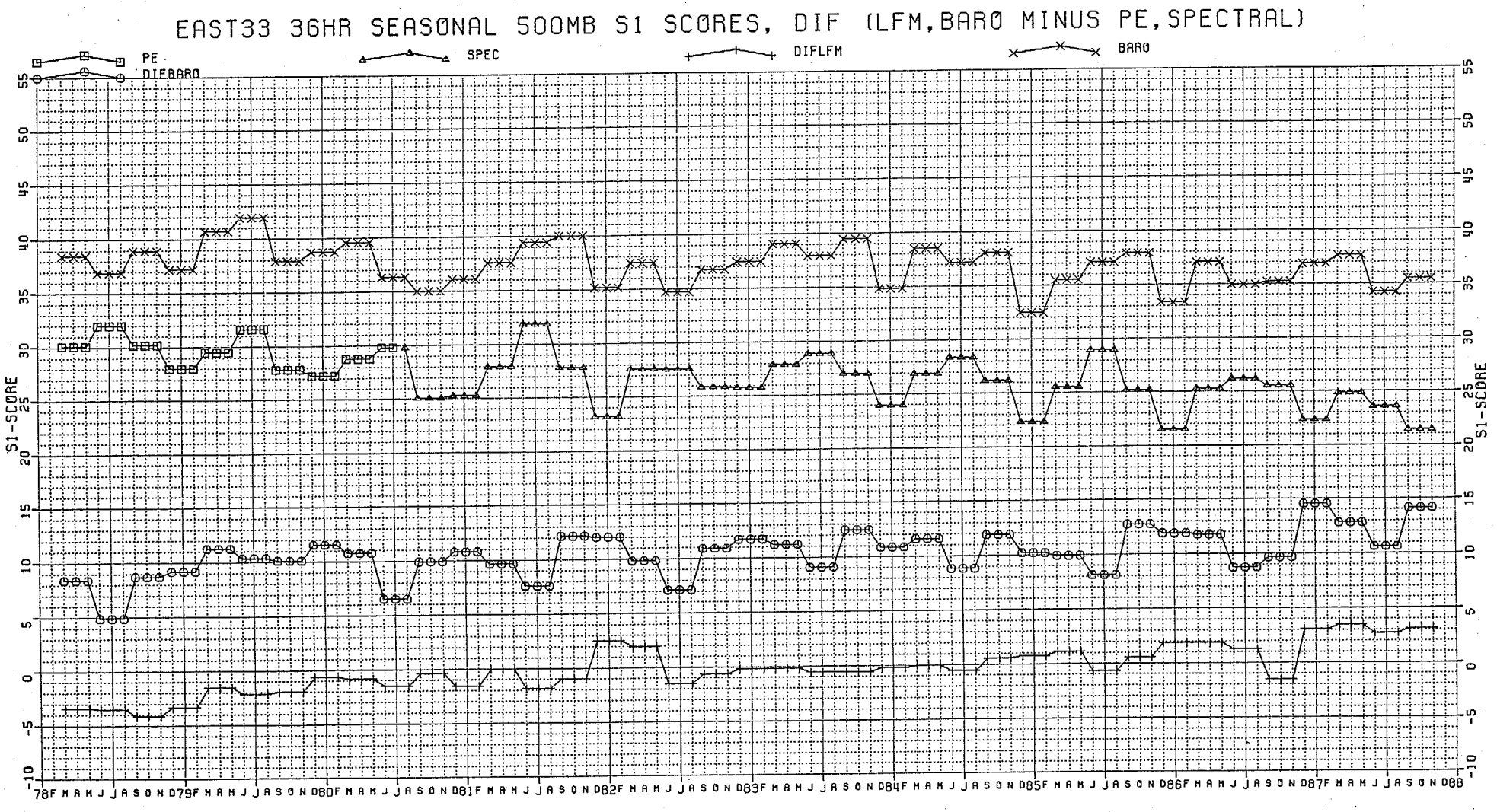

EAST33 36HR SEASONAL 500MB S1 SCORES, DIF (LFM,BARO MINUS PE,SPECTRAL)
PE
SPEC
DIFLFM
BARO
DIFBARO
S1-SCORE
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
78F M A M J J A S O N D79F M A M J J A S O N D80F M A M J J A S O N D81F M A M J J A S O N D82F M A M J J A S O N D83F M A M J J A S O N D84F M A M J J A S O N D85F M A M J J A S O N D86F M A M J J A S O N D87F M A M J J A S O N D88

FIGURE IVc

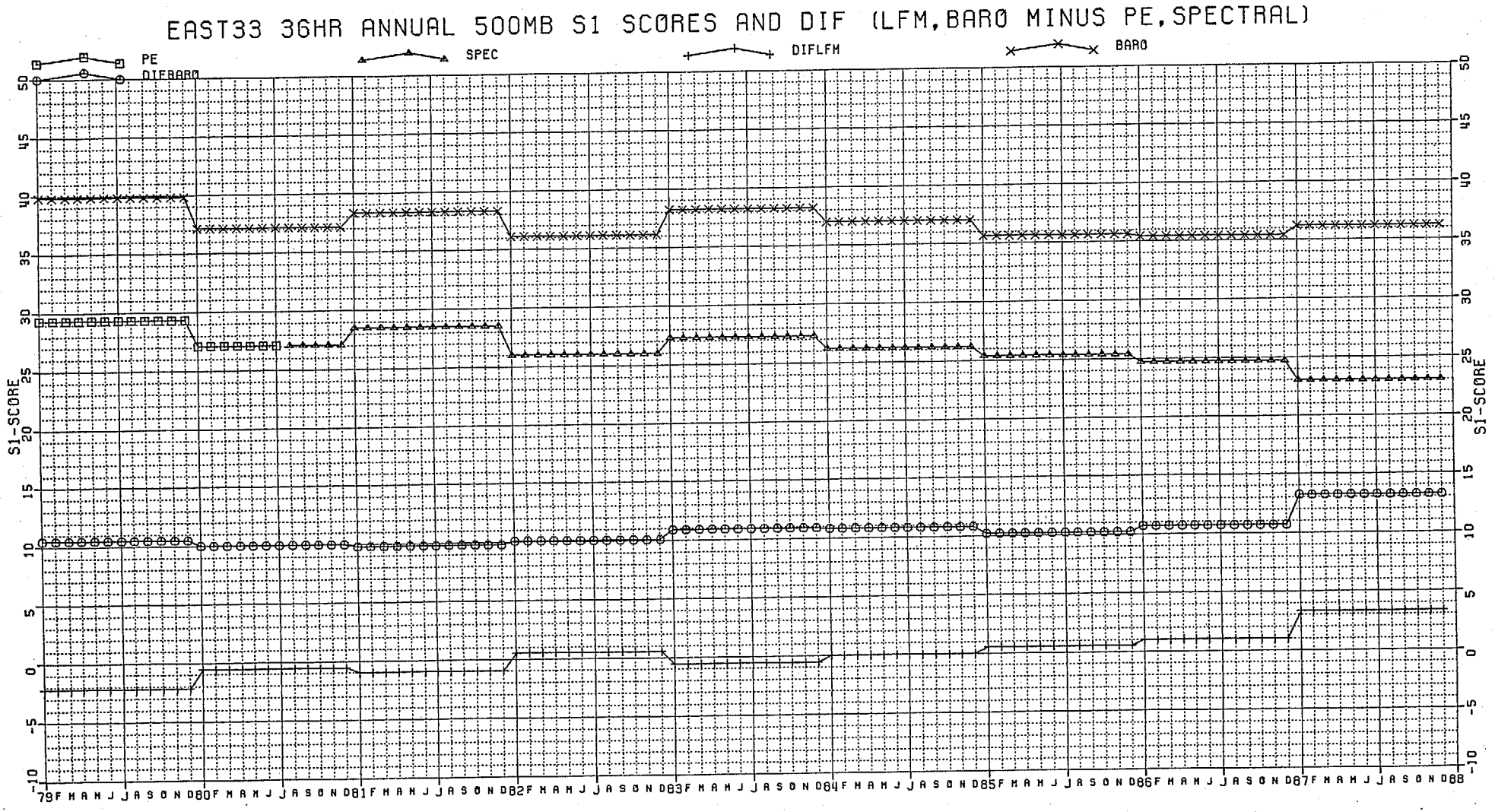

EAST33 36HR ANNUAL 500MB S1 SCORES AND DIF (LFM,BARO MINUS PE,SPECTRAL)
PE
DIFBARO
SPEC
DIFLFM
BARO
S1-SCORE
50
45
40
35
30
25
20
15
10
5
0
-5
-10
79F M A M J J A S O N D80F M A M J J A S O N D81F M A M J J A S O N D82F M A M J J A S O N D83F M A M J J A S O N D84F M A M J J A S O N D85F M A M J J A S O N D86F M A M J J A S O N D87F M A M J J A S O N D88

FIGURE Va

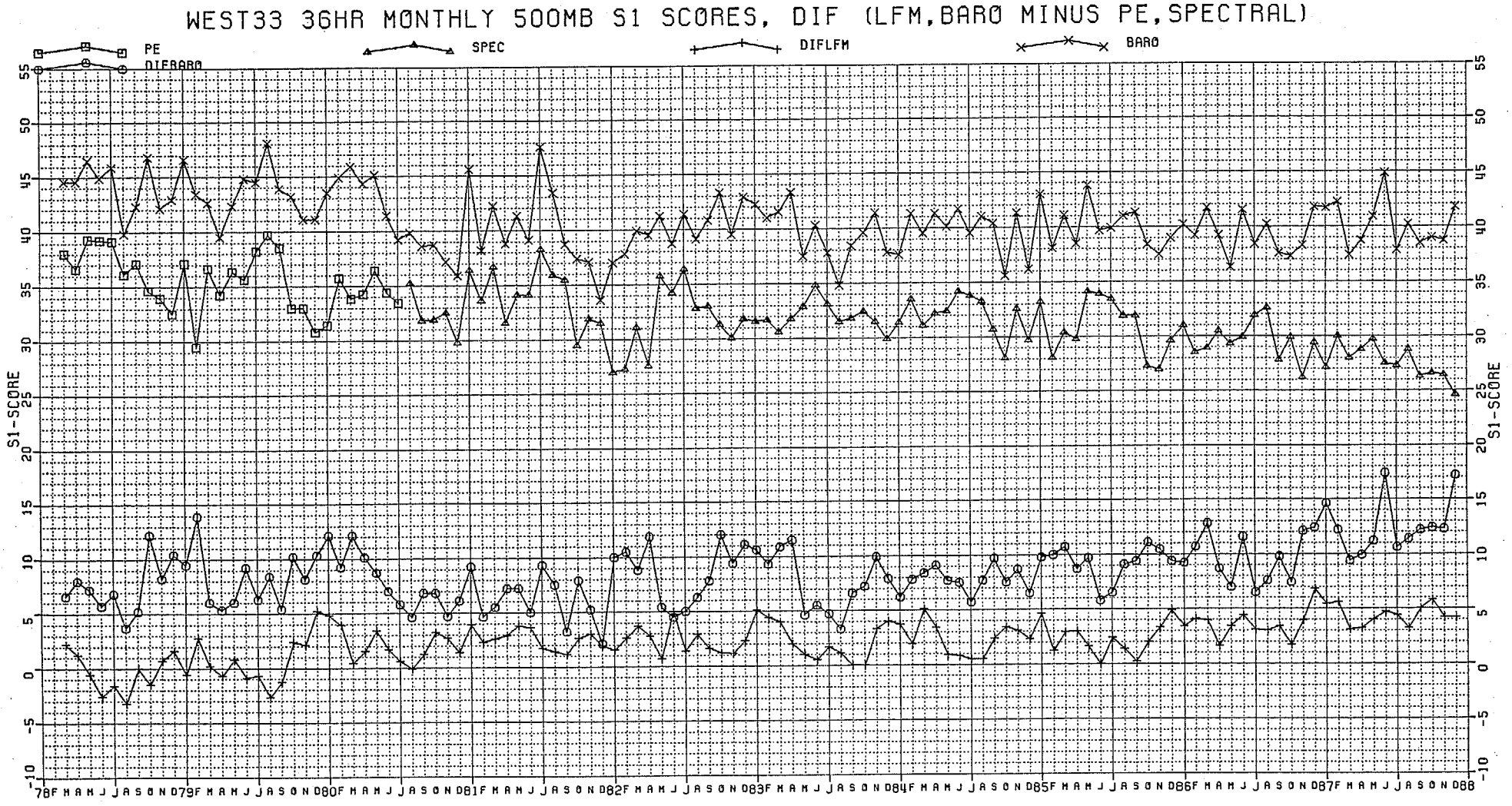

WEST33 36HR MØNTHLY 500MB S1 SCØRES, DIF (LFM,BARØ MINUS PE,SPECTRAL)
PE
DIFBARØ
SPEC
DIFLFM
BARØ
S1-SCORE
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
78F M A M J J A S Ø N D79F M A M J J A S Ø N D80F M A M J J A S Ø N D81F M A M J J A S Ø N D82F M A M J J A S Ø N D83F M A M J J A S Ø N D84F M A M J J A S Ø N D85F M A M J J A S Ø N D86F M A M J J A S Ø N D87F M A M J J A S Ø N D88

FIGURE Vb

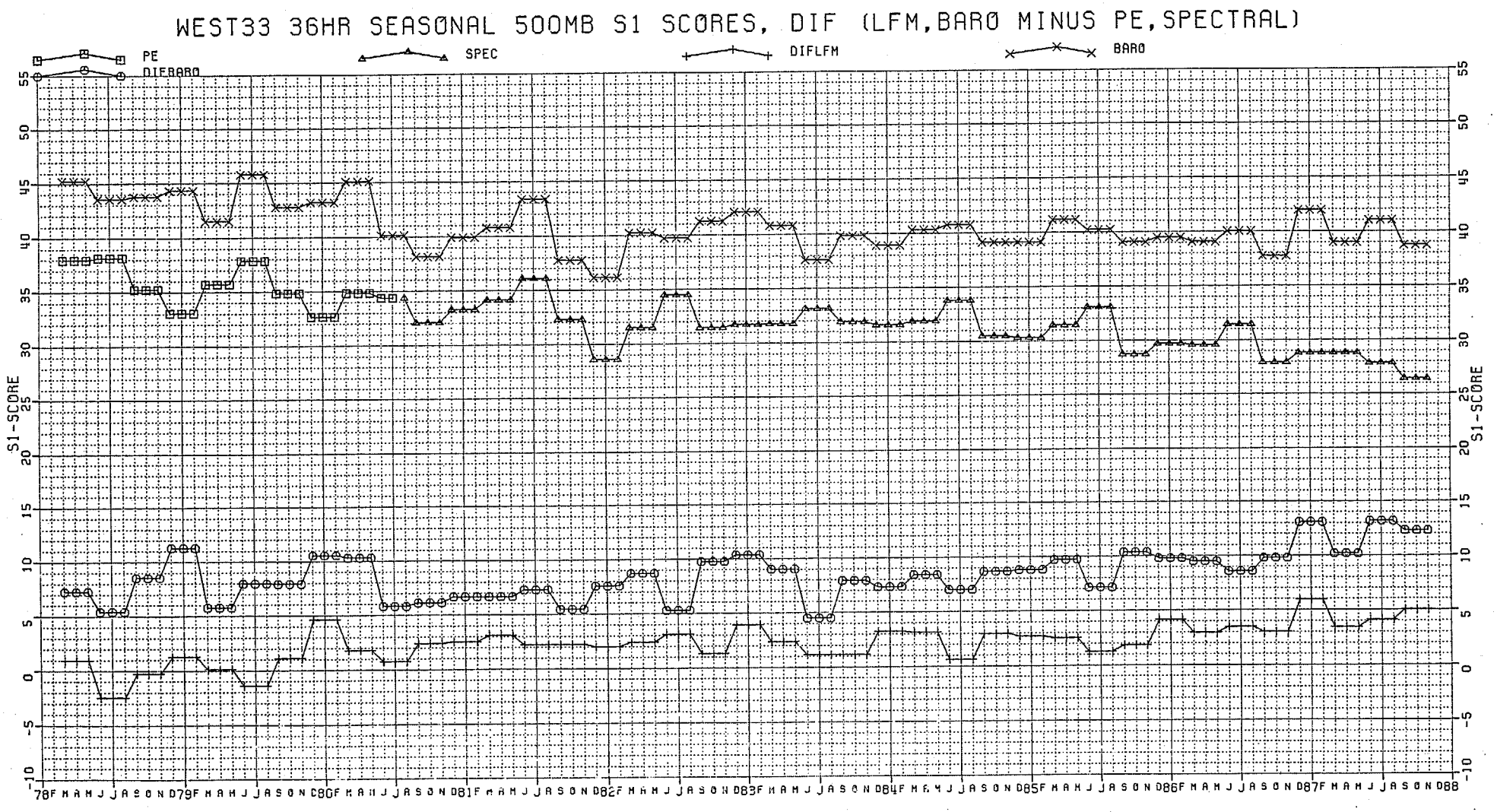
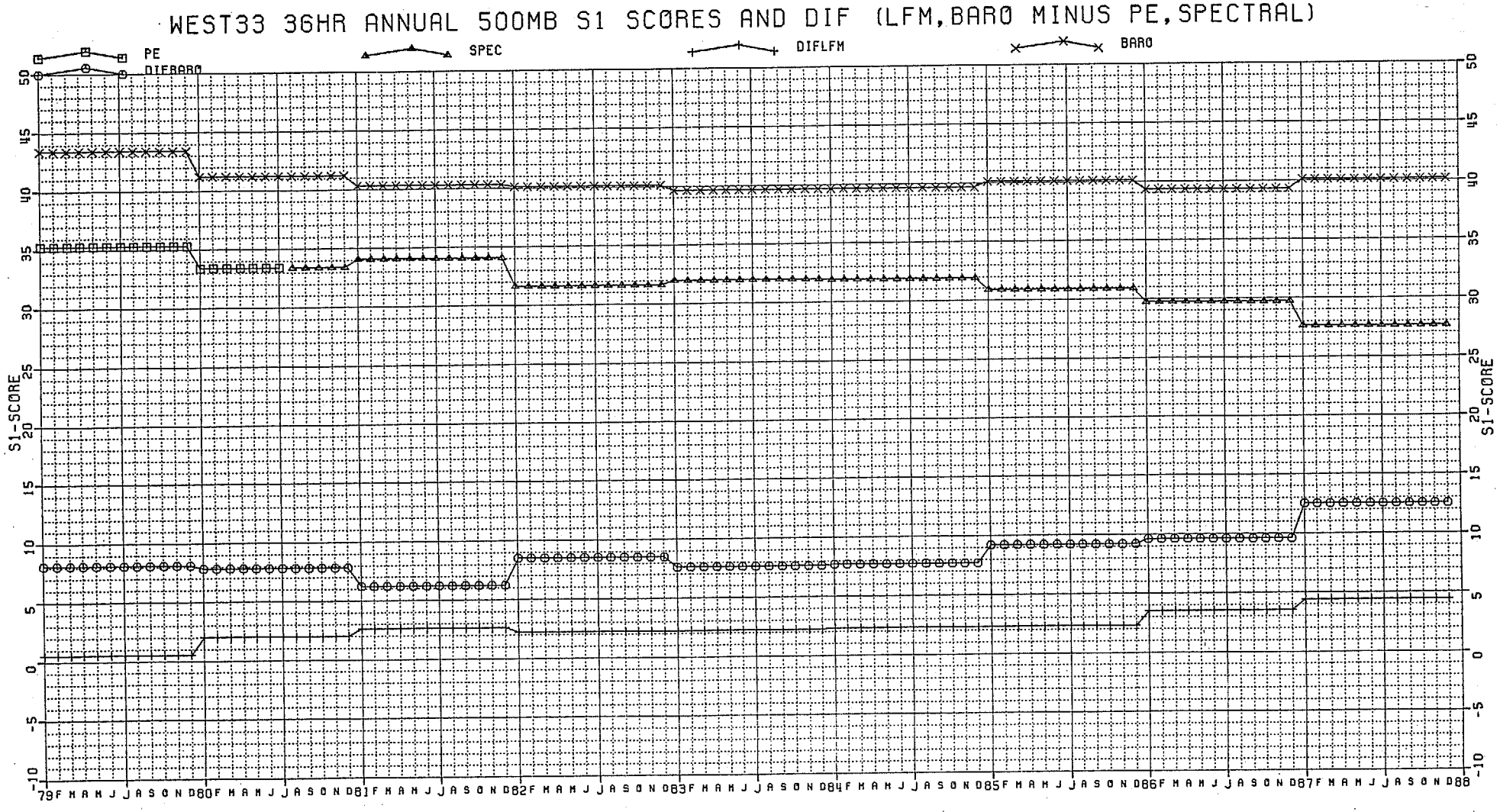

WEST33 36HR SEASØNAL 500MB S1 SCØRES, DIF (LFM,BARØ MINUS PE,SPECTRAL)
PE
DIFBARØ
SPEC
DIFLFM
BARØ
S1-SCØRE
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
78F M A M J J A S O N D79F M A M J J A S O N D80F M A M J J A S O N D81F M A M J J A S O N D82F M A M J J A S O N D83F M A M J J A S O N D84F M A M J J A S O N D85F M A M J J A S O N D86F M A M J J A S O N D87F M A M J J A S O N D88

FIGURE Vc


WEST33 36HR ANNUAL 500MB S1 SCORES AND DIF (LFM,BARO MINUS PE,SPECTRAL)
PE
DIFBARO
SPEC
DIFLFM
BARO
S1-SCORE
50
45
40
35
30
25
20
15
10
5
0
-5
-10
79F M A M J J A S O N D80F M A M J J A S O N D81F M A M J J A S O N D82F M A M J J A S O N D83F M A M J J A S O N D84F M A M J J A S O N D85F M A M J J A S O N D86F M A M J J A S O N D87F M A M J J A S O N D88