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EVALUATION OF THE PASSIVE REMOTE CROSSWIND SENSOR.(U)
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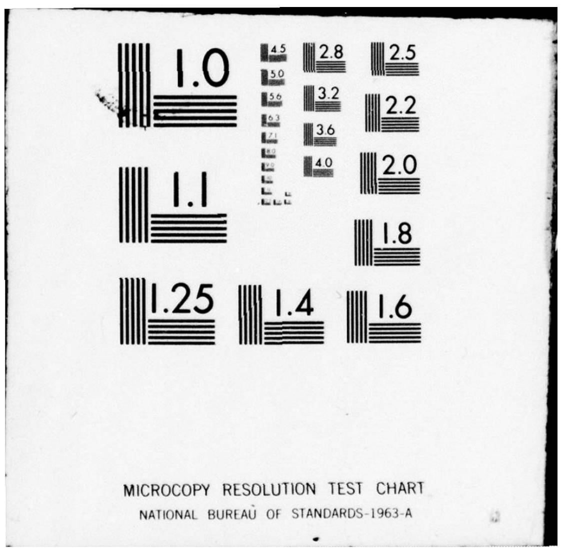
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EVALUATION OF THE PASSIVE REMOTE CROSSWIND SENSOR

MAY 1979

By

RUBEN RODRIGUEZ

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US Army Electronics Research and Development Command

Atmospheric Sciences Laboratory

White Sands Missile Range, N.M. 88002

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Field measurements of integrated path crosswinds were made at Biggs Optical Range, Biggs Army Airfield, Fort Bliss, Texas, during the period 31 January to 8 March 1978 with the passive remote crosswind sensor, a system that measures crosswinds by detecting and analyzing the movement of atmospheric scintillations. Data collected with this sensor were compared to integrated path wind averages measured by the calibrated anemometer array. Presented in this report are X-Y scatter plots, derived weighting functions, analog comparative

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plots, and sampled analog data. Conclusions and recommendations are made in the last sections.

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ACKNOWLEDGMENT

The authors thank Messrs. Glenn Hoidale, David Favier, and William Hatch of the Atmospheric Sensing Division and Messrs. John Hines and Charles White of the Meteorological Support Division for their assistance in manning the meteorological optical measuring system and the Optical Range at Biggs Army Airfield, Fort Bliss, Texas, during the conduct of the test.

CONTENTS

INTRODUCTION

The state of the atmosphere affects tactical Army operations and the contributing weapons systems employment. To increase the relative combat power of the friendly forces, meteorological parameters must be measured at the time and location of the action. An important parameter in atmospheric measurements, particularly for ballistic weapon employment, is integrated (projectile) path crosswinds.

The purpose of this report is to present the results of the evaluation of the passive remote crosswind sensor (PRCS), a sensor designed to measure average path crosswinds. This evaluation is based on comparative data taken during a test period of 31 January to 8 March 1978 at Biggs Optical Range (BOR), Biggs Army Airfield, Fort Bliss, Texas. Included as part of the report are daily weather summaries of atmospheric parameters prevailing at BOR.

The PRCS is a compact, lightweight, prototype instrument designed for portable passive monostatic operation. This sensor uses available ambient light for its operation. Nighttime operation can be obtained by using a light source and operating in a bistatic mode. The evaluation tests were conducted cognizant that the PRCS is a research instrument and not intended for prolonged field use without reconfiguration.

Results of collected data are presented in this report, with an evaluation and analysis that determine the accuracy, reliability, and applicability of the PRCS.

INSTRUMENTATION REQUIREMENT

Crosswinds along a ballistic projectile trajectory contribute significantly to the total weapon error. D. L. Walters[1] has shown that direct fire crosswind errors on representative armor projectiles are significantly greater than head and tail wind errors. To increase the first-round-hit probability, crosswinds must be accurately known immediately before a firing. Knowledge and application of crosswind information to fire control systems can also increase the standoff range of friendly weapons without degrading the accuracy of the weapons.

Several remote crosswind sensors have been developed in the recent past. Four systems were evaluated at BOR during the test period. The evaluation results of the PRCS are presented in this report. The results of the other system evaluations are reported separately.

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[1]D. L. Walters, 1975, "Crosswind Weighting Functions for Direct-Fire Projectiles," ECOM Report 5570, Atmospheric Sciences Laboratory, White Sands Missile Range, NM

The PRCS is a prototype of a system that can become a candidate for future tactical weapon system integration as a sensor in tank or mobile antitank fire control systems.

An experimental prototype model of the PRCS[2,3,4] proved the concept of operational feasibility but was bulky and limited to AC power operation. The system used for the test discussed herein was an exploratory development prototype that was completed in 1977. The evaluation of this system contributes to the necessary data base required for continuing future development to satisfying the stated tactical requirements.

System Description

The PRCS is a compact, lightweight, battery-operated sensor system capable of passively acquiring scintillation data and resolving atmospheric wind components from these sensed data. Characteristics of the instrument tested (fig. 1) are summarized in table 1. The PRCS is compact because it uses ambient light from a naturally illuminated scene for operation rather than requiring a laser or other light source for supplementary illumination.

The operation of the PRCS is based on the principle that thermal gradients in the atmosphere cause variations in the index of refraction which in turn generate scintillation patterns that are transported by the wind. The PRCS measures the transverse speed of these patterns and electronically calculates the crosswind velocity.

The PRCS consists of two identical sets of optics with photodiodes located near their focal points. A particular scintillation pattern "signature" will be detected by one of the photodiodes; and as this pattern is transported by the wind, a short time later it will be detected by the other photodiode. The photodiode signal output is filtered and delayed by use of a shift register delay technique.[5] Next, fourteen

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[2]G. R. Ochs and G. F. Miller, 1972, "Pattern Velocity Computers: Two Types Developed for Wind Velocity Measurement by Optical Means," Review of Scientific Instruments, Vol 43, No. 6, pp 879-882

[3]S. F. Clifford, G. R. Ochs, and Ting-i Wang, 1975, "Optical Wind Sensing by Observing the Scintillations of a Random Scene," Applied Optics, Vol 14, No. 12, pp 2844-2850

[4]D. L. Walters, 1977, "Passive Remote Crosswind Sensor," Applied Optics, Vol 16, No. 10, pp 2625-2626

[5]G. R. Ochs et al., 1977, "A Second Generation Passive Optical Crosswind Monitor," ECOM Report 77-8, Atmospheric Sciences Laboratory, White Sands Missile Range, NM

TABLE 1. PRCS PHYSICAL AND ELECTRICAL CHARACTERISTICS

Receiver optics	Twin apertures, 2.5 cm diameter
Photo detectors	A pair of United Detector Technology pin spot 2D photodiodes
Angular field of view	3 deg
Time constant	Variable (3 to 10 sec)
Function switch	Bat, 0, +, -, lock, run
Power switch	On, off, chg
Scale switch	5, 10, 20 m/sec
Output connectors	Wind, lock signal, signal 1, signal 2
Size	30 x 25 x 13 cm
Weight	2.5 kg
Power requirements	Eight 1.2 V NiCd rechargeable batteries or 120 V AC

time lags, adjustable by a feedback loop, are sequenced in order to obtain the scintillation pattern covariance function. This function provides a measurement of the time delay between the arrival of the two scintillation "signature" signals at the PRCS photodiodes. The crosswind velocity can thus be determined since the distance between the two samples volumes is a known function of the optics and remains constant. Therefore, the crosswind velocity is inversely proportional to the time delay between signals as computed from the covariance function.

TEST SUPPORT

Biggs Optical Range

This range is located approximately 400 m NW of the main runway at Biggs Army Airfield, Fort Bliss, Texas. A linear instrumented path 2064 m long is emplaced on a heading of 49 degrees from True North. Two 3.5-m towers are located at the endpoints of the path with a 3-m tower aligned at the 500-m point of the path. These towers provide solid test beds for electro-optical instrumentation. A linear array of 3-m high anemometers parallel to the path is offset 3 m to the southeast of the optical path, and these anemometers are oriented to measure northwest-southeast winds, i.e., "cross" winds to the optical path. This array consists of 21 anemometers spaced 25 m apart for the first 500 m of path length and 15 anemometers spaced 100 m apart for the remaining 1500 m of path length (fig. 2).

The instrumentation path is specifically designed to test optical wind measurement systems. All data outputs from the instrumentation are recorded in digital format in the meteorological optical measuring system van.

The surrounding terrain features are flat, with the optical path cleared of natural vegetation to minimize windflow field characteristics. Westerly winds prevail, but morning convection winds frequently occur.

Meteorological Optical Measuring System

The meteorological optical measuring system (MOMS) is a mobile, self-contained data collection and reduction system containing analog and digital subsystems specifically engineered for the measurement and recording of atmospheric meteorological data. The system utilizes an HP 2100 computer system as a controller and is managed by an in-house developed program that samples the various sensors at preset rates, stores these data, then reduces and analyzes these data according to a developed software program. Output format capabilities are raw scatter graphs, time averaged plots, printer, limited strip chart, and digital tape (fig. 3).

During these tests, analog wind data from the anemometer array and the PRCS output were recorded on digital tape. Other meteorological data simultaneously recorded were atmospheric pressure, temperature, refractive index structure coefficient, and dew point.

As part of the data collection and analysis effort, data analysis was conducted both on-line and off-line. The FORTRAN program for the primary data effort is shown in Appendix D. The primary results provided were X-Y scatter plots and resultant weighting function diagrams of the PRCS versus the anemometer array.

Remote Sensing Van

The remote sensing van (RSV) is a 5-ton, 6-by-6, M820 expandable van which contains inherent prime-mover mobility and provides test-bed facilities. The RSV "folds" to standard van width for transport and expands to 4.3 m for in situ operation. The RSV is a stable platform for optical equipment tests and provides test-bed facilities by housing test equipment and ancillary dedicated test items support equipment. An environmental isolation screen with two 30- by 45-cm integral glass plates has been fabricated for use so that the rear doors can be opened for optics line-of-sight test capability while test environmental conditions are retained inside the RSV. Figure 4 shows a "downrange" view of the RSV in operating configuration.

TEST DESCRIPTION, CONDUCT, AND PROCEDURES

The PRCS evaluation period was 31 January to 8 March 1978 at Biggs Optical Range. Equipment support was provided by MOMS and the RSV.

The evaluation mission was two-fold: (1) determining the accuracy and weighting function of the PRCS and (2) testing its operational characteristics for effects due to vibration and weather conditions (i.e., rain) on operation.

Because of its physical configuration, the PRCS is capable of immediate setup and operation. The incorporation of rechargeable NiCd batteries as the power source allows minimal setup time and adds to the portability of the instrument. Twelve-hour continuous operation with a 6-hour charge time is standard. Enhancing the scene that the PRCS is viewing will add to its capability of properly analyzing the moving scintillation patterns. This enhancement is accomplished by "aiming" the instrument at a contrasting scene. Since the PRCS has a 3-degree field of view, it is rather easy to assure that a contrasting scene viewed through the boresight is in the field of view.

Three specific targets were used: (1) a white and green van 7.3 by 4.6 m (24 by 15 ft), (2) a 1.2 by 1.8 m (4 by 6 ft) section of painted plywood, and (3) a 12.2 m (40-ft) power pole with the sky as background. Data collected indicate that with these three targets, the PRCS obtained sufficient signal to lock on and function properly (Appendix B).

Ranges

During the tests, various ranges (distances to the target) were used to determine the effect of target range on the weighting function, lockon setting time, and signal-to-noise ratio of the PRCS. The targets previously described were sited 500 m from the PRCS. Proper lockon operation was observed in all target cases. However, placing the same target at 2000 m and operating the PRCS caused erratic output. It can be surmised that since the area of the field of view at 2000 m is 16 times as great as at 500 m, the viewed target-enhanced scintillations were so far down in signal compared to system noise that operation became intermittent at best. Tests were not extended to larger target contrasting scenes.

Variations in the weighting function due to range are presented later in the results section of this report.

Weather Conditions

The PRCS is a passive system which depends on the availability of ambient light for its operation; therefore, these tests were conducted only during daylight hours. The system can be operated during darkness by using a light source in a bistatic mode; however, in this configuration the PRCS could no longer be classified as passive.

A detailed summary of weather conditions existing during the test period is shown in Appendix C. These data are from the National Weather Service located at the El Paso International Airport approximately 6 km from BOR. A synoptic weather summary for the surface and 500 mb altitude is also shown.

The PRCS provided correlatable crosswind measurements during the ambient weather conditions experienced. Exceptions were during the periods of negligible winds (crosswinds) and rainstorms. During periods when no crosswinds were experienced, the PRCS signal would "wander" because the circuitry measured a "zero average time delay." The PRCS uses the techniques of covariance function slope proportionality to mean frequency; and with this technique, the zero average time delay signals yield an indeterminate answer. During heavy rain conditions, the overriding "optical noise" was generated and the signal-to-noise ratio degenerated below the operating threshold and caused wind signal lockon failure.

DATA COLLECTION AND RESULTS

Mathematical Background

In statistical bivariate analysis, a scatter plot is useful for the evaluation of experimental data. During these tests, scatter plots were generated to determine the accuracy of the PRCS measurements.

For the scatter plots employed, the average path crosswinds measured by "grouping" weighted anemometer outputs of the array are plotted on the abscissa, and the measured average outputs of the PRCS are plotted on the ordinate. These two values were plotted as an ordered pair. To make this comparison applicable, a large number of these sets of values had to be compared. This comparison should result in a statistically sound conclusion. A Fortran IV program (Appendix D) was developed to sample and plot the experimental data.

The usefulness and simplicity of the scatter diagram are shown in figure 5. The first (plot A) scatter plot shows a straight line with a 45-degree slope and passing through the origin. In this case a one-to-one correspondence (complete agreement) exists between the contributing systems. Plot B differs in that the slope of the line is no longer 45 degrees. This case indicates that the ordinate values have to be adjusted by including a constant multiplicative factor (M). Plot C shows the resultant line no longer passing through the origin, which signifies that the ordinate values have to be further adjusted by including an offset value, Y_o.

Since experimental data rarely yield complete correspondence between test system and "base" systems, data obtained were linearized by employing the least squares fit method. The result was then a line represented as

$$Y = A_o + A_1 X ,$$

where[6]

$$A_0 = \frac{(\Sigma Y)(\Sigma X^2) - (\Sigma X)(\Sigma XY)}{N(\Sigma X^2) - (\Sigma X)^2} ,$$

$$A_1 = \frac{N(\Sigma XY) - (\Sigma X)(\Sigma Y)}{N(\Sigma X^2) - (\Sigma X)^2} ,$$

and N = number of samples.

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[6]A. Papoulis, 1965, _Probability, Random Variables, and Stochastic Processes_, McGraw-Hill, New York

The method of least squares allows extreme values to weigh too heavily on the result; therefore, when this technique was used to evaluate the PRCS, as well as other test systems, care was taken to investigate extremely large differences (on actual measurements) to insure that they were legitimate and not caused by mechanical or electrical malfunctions of one of the systems. Subjective caution also allowed for the fact that the mechanical anemometers have a certain amount of inertia which normally results in an erroneous output when the wind velocity is below the threshold value of the anemometers. Therefore, it is necessary to consider the values close to zero carefully and prudently. The anemometers used minimized this anomaly however, since they are research quality propeller anemometers with a threshold value of 0.2 to 0.3 m/sec.

Scatter plots can be generated by using either straight average or weighted average values from the analog wind averager (AWA) as the abscissa input. First, plots were generated by using straight average values; in later tests, after the weighting function of the PRCS had been determined, scatter plots with weighted average values from the AWA were generated.

Both types of plots are illustrated in Appendix A; however, more emphasis is given to the weighted value plots.

Before these weighted values could be used, the PRCS weighting function had to be determined. These weighting functions were computed by considering different groups of anemometers as a least squares basis set. Mathematically, the measurements of the PRCS are represented as a linear combination of different groups of anemometers which can be expressed as

$$W_{PRCS} = \sum_{i=1}^{n} a_i \, w_i$$

where

W_{PRCS} = PRCS wind measurements,

w_i = i^{th} anemometer wind measurement,

and

a_i = i^{th} correlation coefficient.

Various sets of coefficients, a_i, are obtained by employing different groupings of anemometers to compute n^{th} order least squares analyses. Since the range was 2 km long, weighting functions out to that range can be obtained for wind sensors being tested.

Results of Data Analysis

The weighting functions and scatter plots obtained under varying weather conditions are shown in Appendix A. A generalized weighting function and a scatter plot generally describing the PRCS are shown in figure 6.

The scatter plot of 14 February (Appendix A), along with the average values and standard deviation, shows that the values of the PRCS are related to those of the AWA by the mathematical formula, $Y = 1.101 X + 0.143$, and that the PRCS output of crosswind velocities is in agreement with the anemometer array measured crosswinds in 90 percent of the tested cases with a relative error of less than 11 percent.

It can be deduced from the weighting function plots that the PRCS weighs measured optical data in the region from 150 m to 250 m from the receiver most heavily. Also, optical crosswind measurements beyond 500 m show minimal effect on the output value of the PRCS.

CONCLUSIONS

During daylight hours and under normal area weather conditions, the PRCS performed within specified accuracy limits by measuring crosswind velocities within 7 percent of anemometer array measurements. However, under adverse weather conditions (i.e., rain) the PRCS operation deteriorated and this resulted in erroneous readings. For satisfactory operation, natural light, a contrasting scene, and atmospheric scintillations should exist. These conditions determine the signal-to-noise ratio and must occur in such a combination as to provide a signal above the PRCS threshold.

The PRCS was easy to align; the entire procedure usually took less than 5 minutes. The PRCS should be aligned after it is emplaced for operation on a vibrationless foundation. Any vibration experienced by the PRCS will be interpreted as crosswind information and thus an erroneous windspeed reading will result. PRCS operation is optically dependent on scintillation pattern movement from one detector to the other; and movement of the instrument itself rather than scintillation patterns within the scene is electronically interpreted as pattern movements, thus yielding false output data.

Operation of the PRCS requires proper system lockon to the correct signal. This lockon is electrically accomplished by means of a feedback loop. After lockon is established, the system computes the covariance function and determines the time delay necessary to measure the wind velocity. When only longitudinal winds exist, no time delay results and the system output is in error. The feedback loop causes the output signal to oscillate between maxima.

The calculated PRCS weighting function indicates that crosswinds closer than 25 m or farther than 500 m affect the output reading minimally, while crosswinds approximately 275 m from the system contribute maximum weight to the instrument's operation.

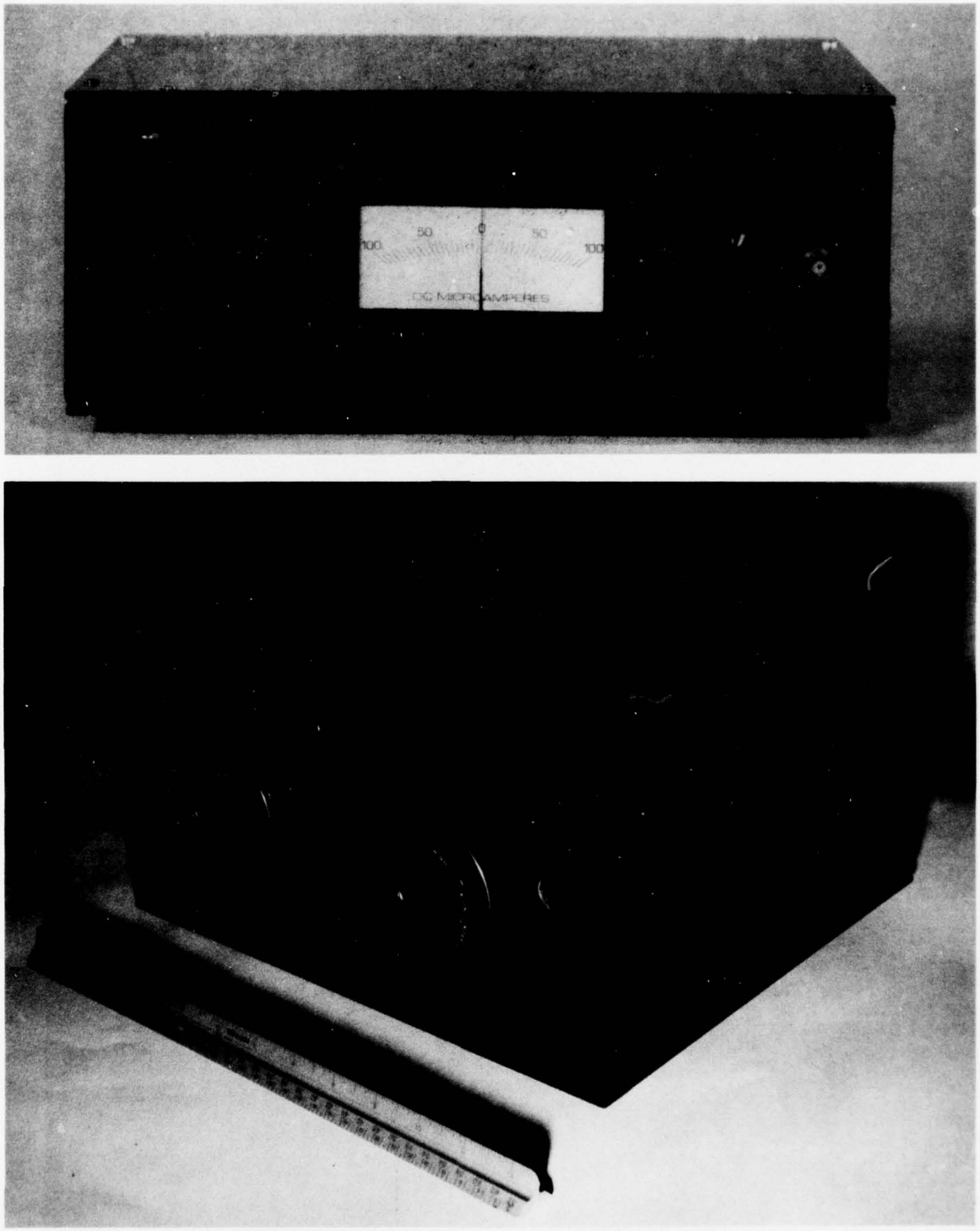

Figure 1. PRCS front and oblique views.

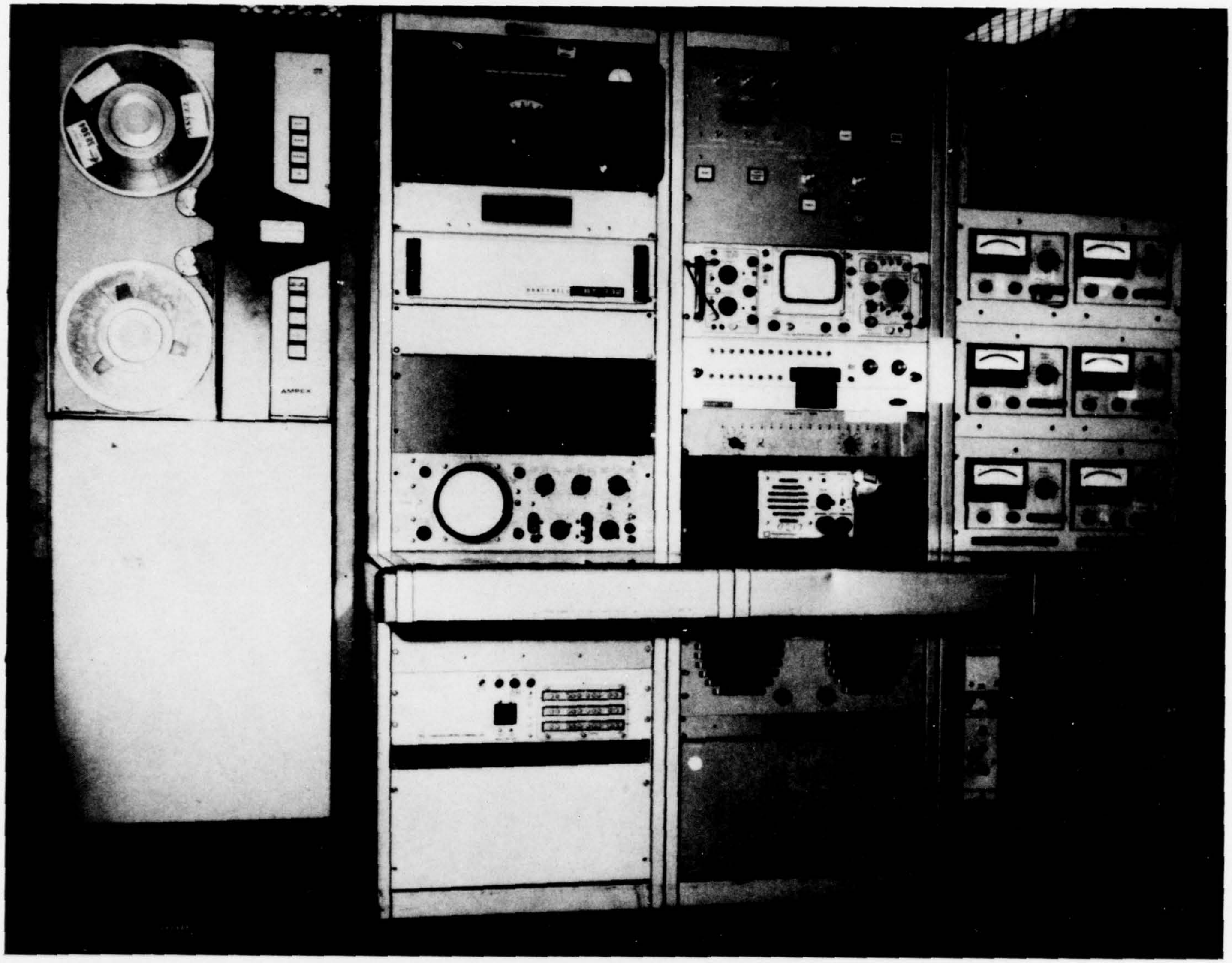

Figure 2. Biggs Optical Range.

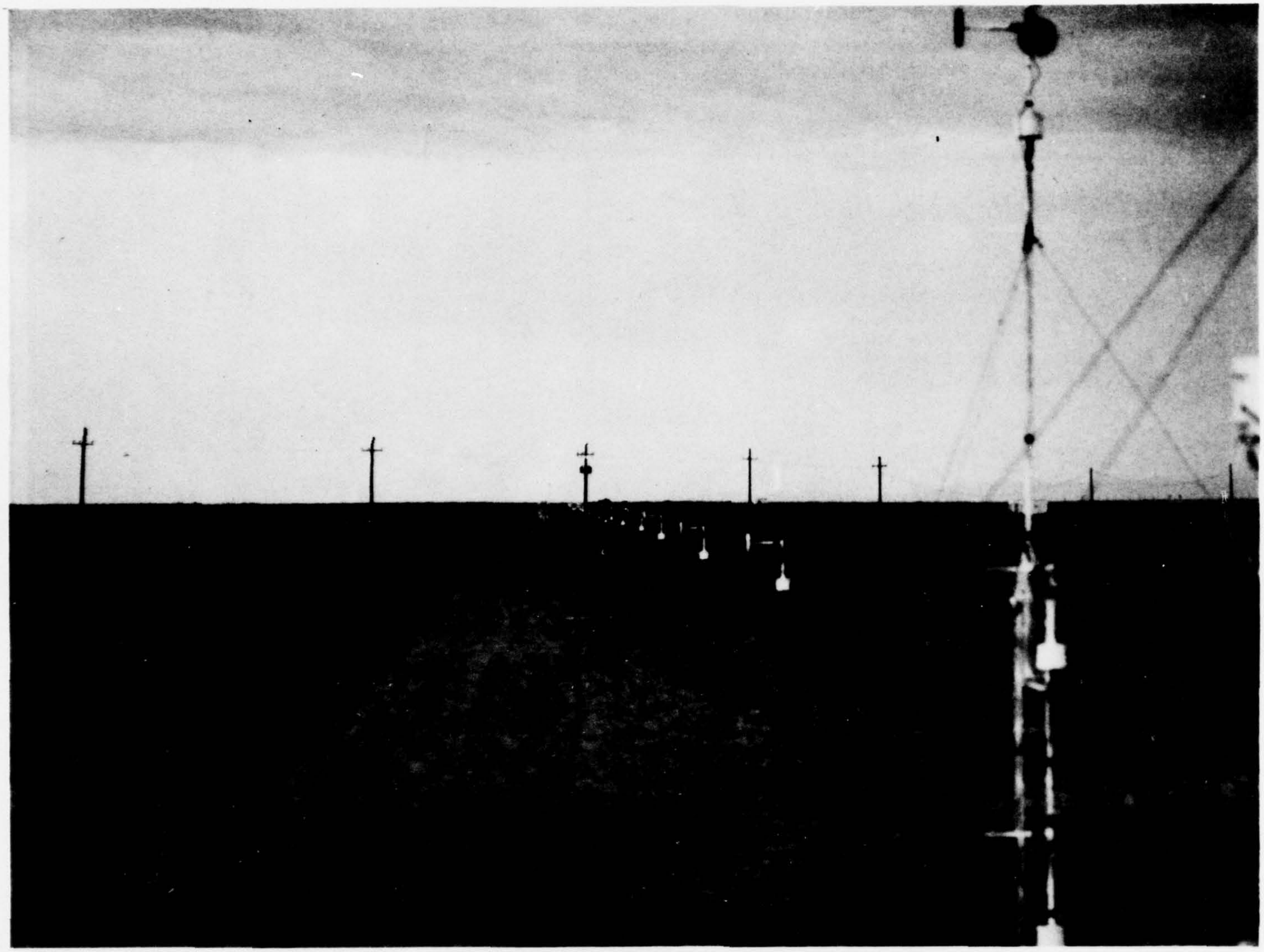

Figure 3. Meteorological optical measuring system.

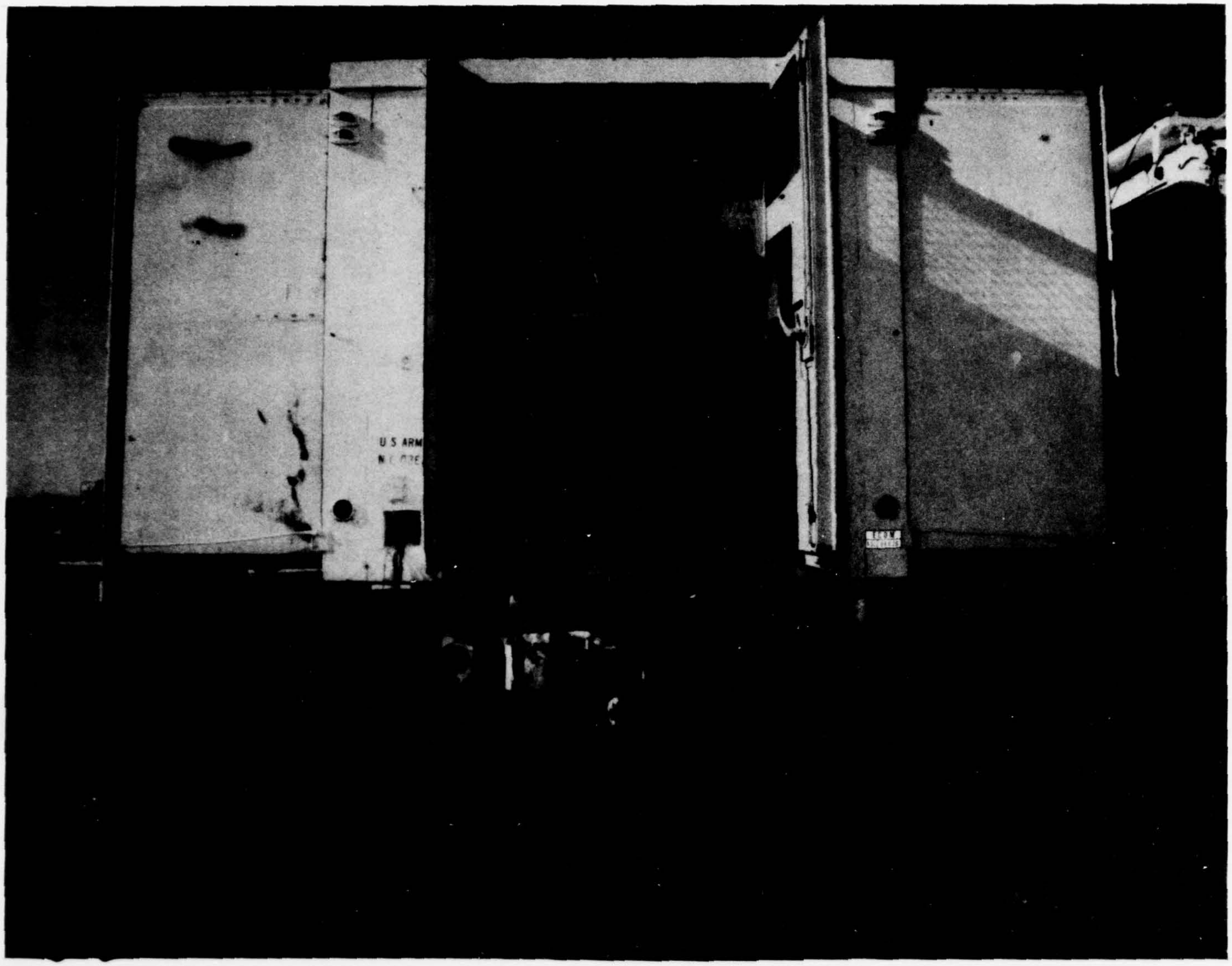

Figure 4. Remote sensing van.

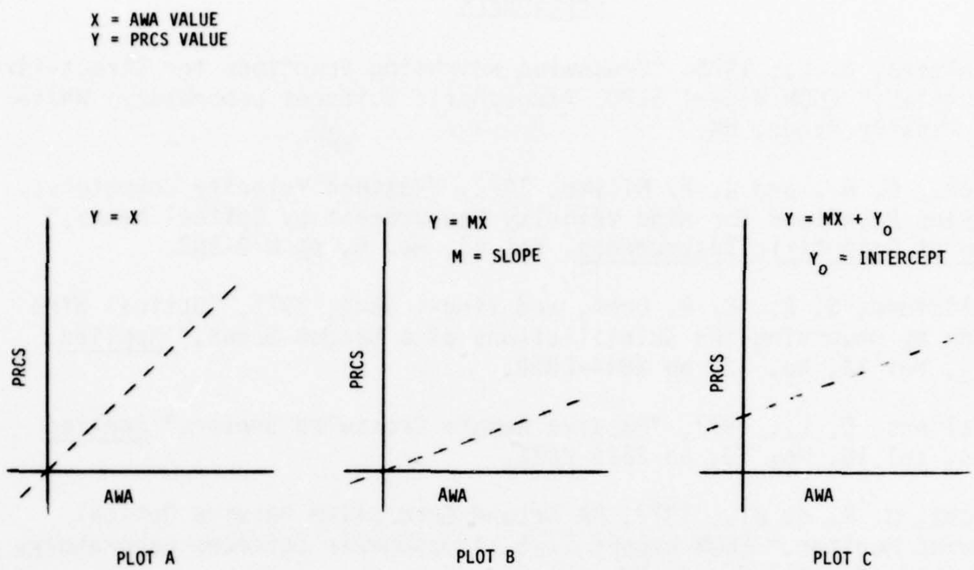

Figure 5. Scatter diagram variations.

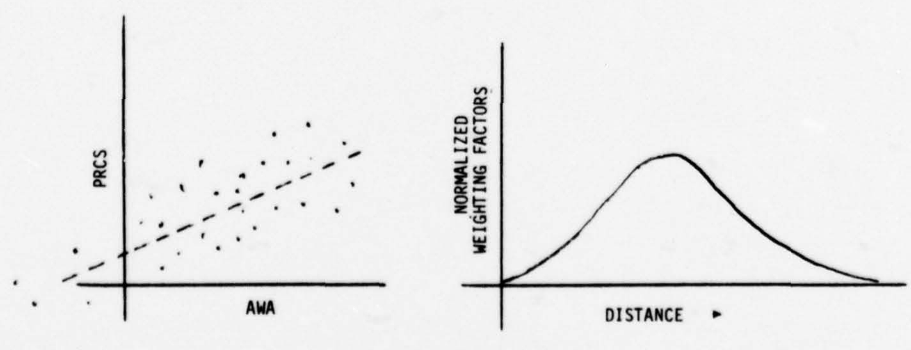

Figure 6. Typical scatter plot and weighting function.

REFERENCES

1. Walters, D. L., 1975, "Crosswind Weighting Functions for Direct-Fire Projectiles," ECOM Report 5570, Atmospheric Sciences Laboratory, White Sands Missile Range, NM.

2. Ochs, G. R., and G. F. Miller, 1972, "Pattern Velocity Computers: Two Types Developed for Wind Velocity Measurement by Optical Means," Review of Scientific Instruments, Vol 43, No. 6, pp 879-882.

3. Clifford, S. F., G. R. Ochs, and Ting-i Wang, 1975, "Optical Wind Sensing by Observing the Scintillations of a Random Scene," Applied Optics, Vol 14, No. 12, pp 2844-2850.

4. Walters, D. L., 1977, "Passive Remote Crosswind Sensor," Applied Optics, Vol 16, No. 10, pp 2625-2626.

5. Ochs, G. R. et al., 1977, "A Second Generation Passive Optical Crosswind Monitor," ECOM Report 77-8, Atmospheric Sciences Laboratory, White Sands Missile Range, NM.

6. Papoulis, A., 1965, Probability, Random Variables, and Stochastic Processes, McGraw-Hill, New York.

APPENDIX A

PRCS SCATTER PLOTS AND WEIGHTING FUNCTIONS

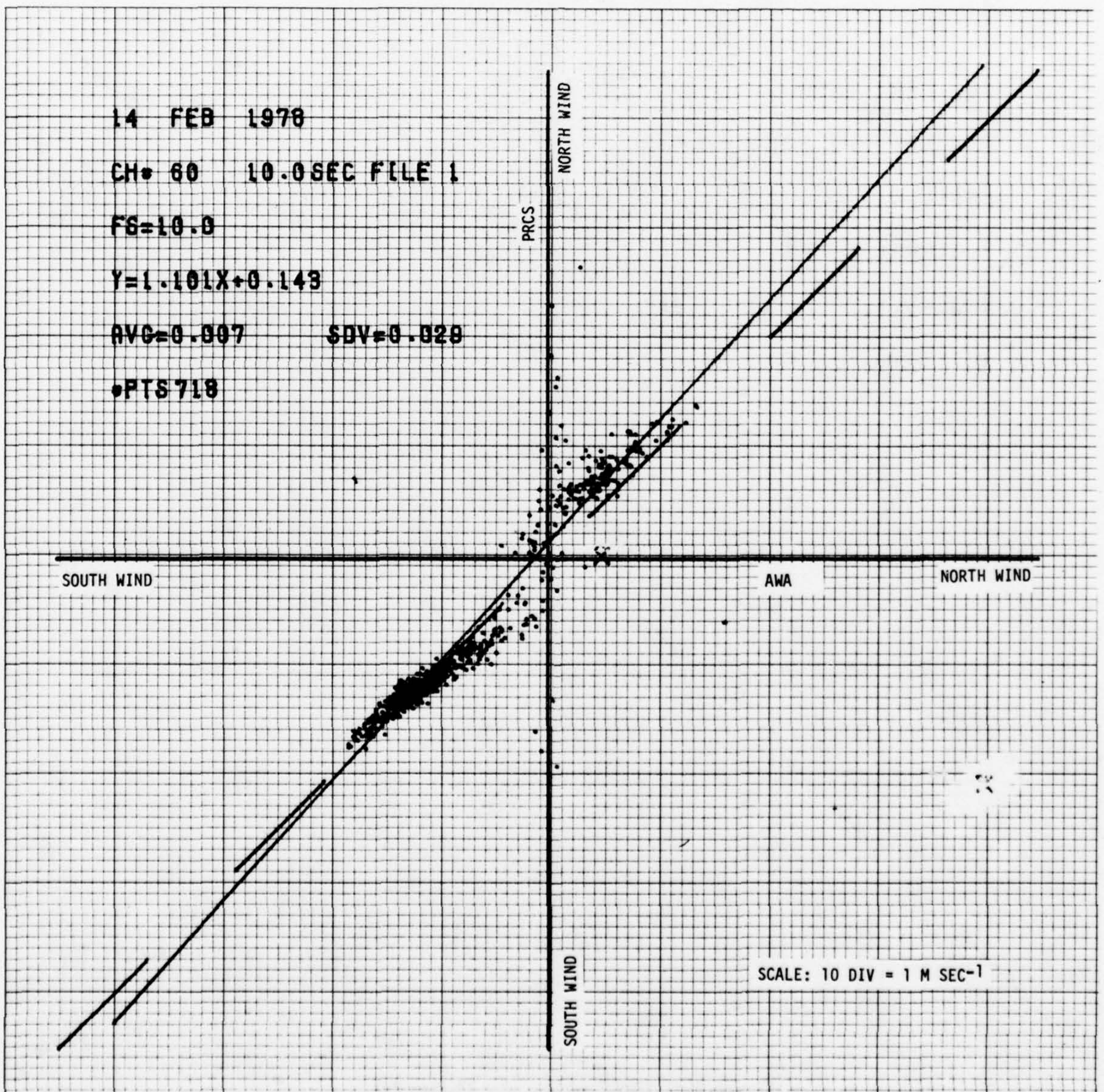

Figure A-1. PRCS scatter plot (14 Feb 78).

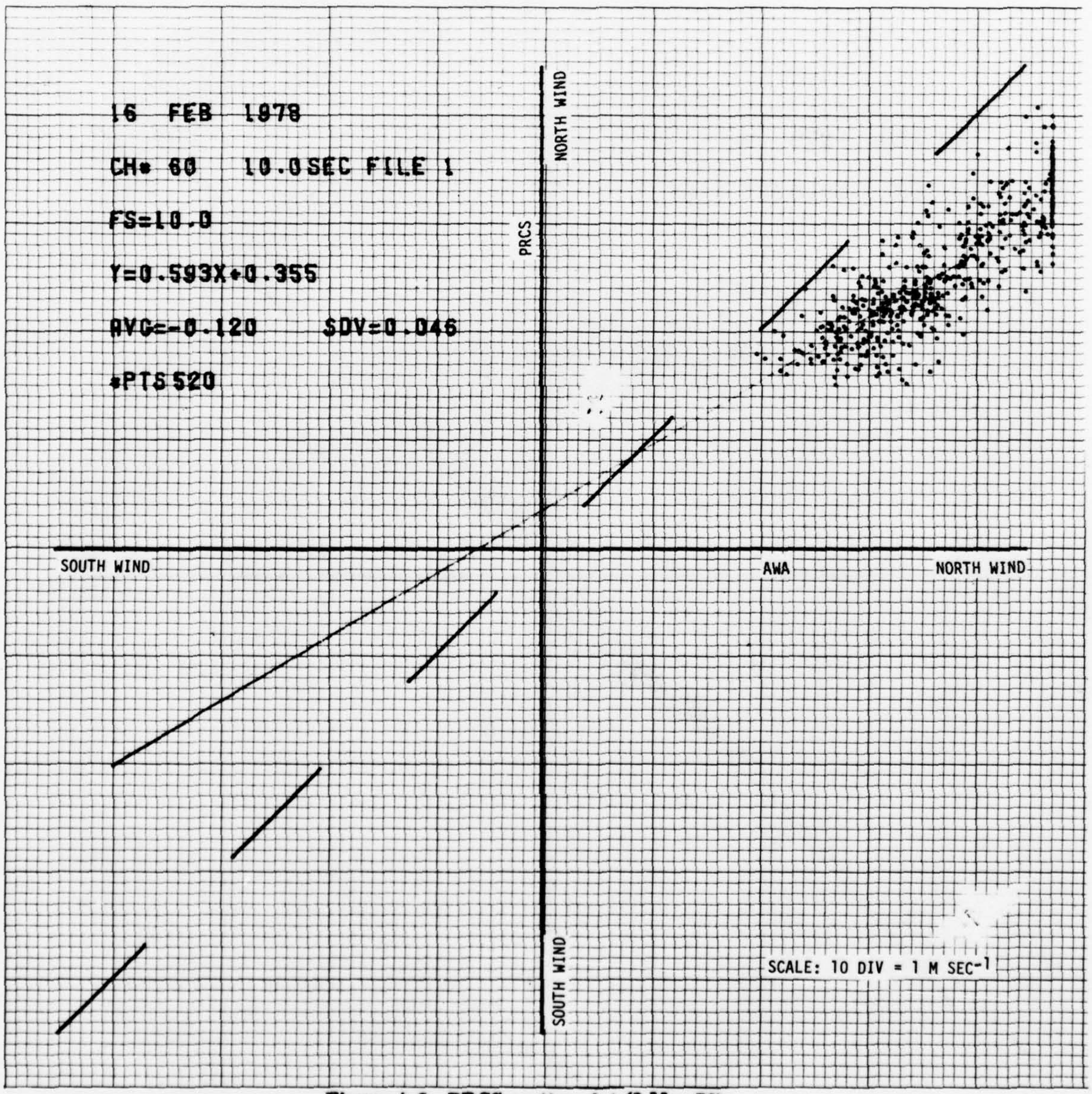

Figure A-2. PRCS scatter plot (3 Mar 78).

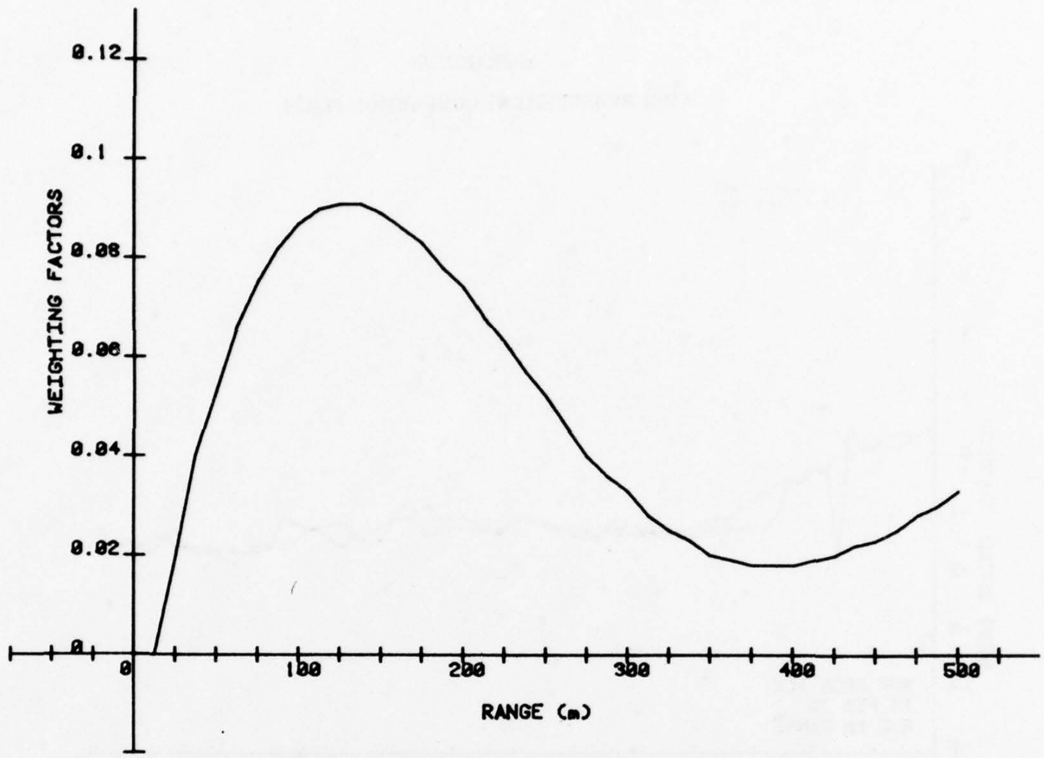

Figure A-3. PRCS weighting function (14 Feb 78).

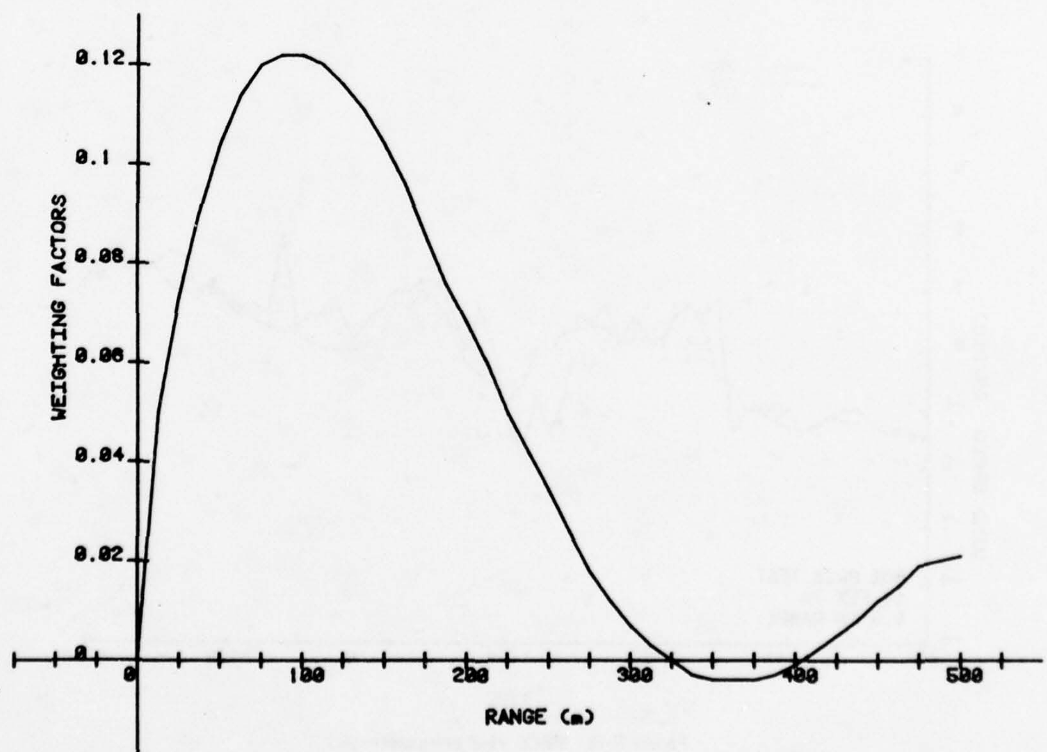

Figure A-4. PRCS weighting function (3 Mar 78).

APPENDIX B

WIND MEASUREMENT COMPARISON PLOTS

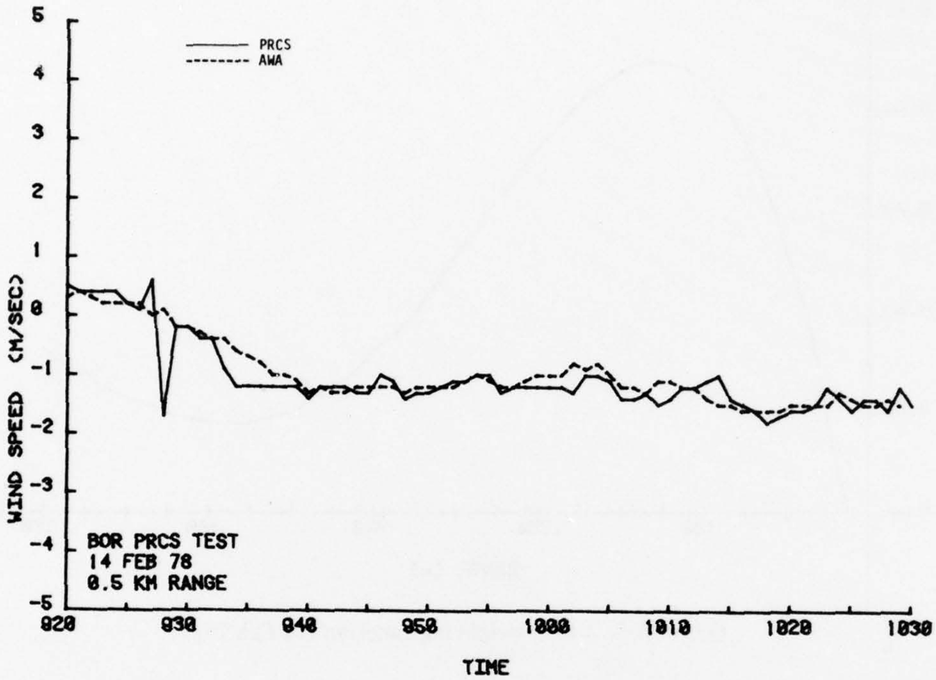

Figure B-1a. PRCS wind comparison plot.

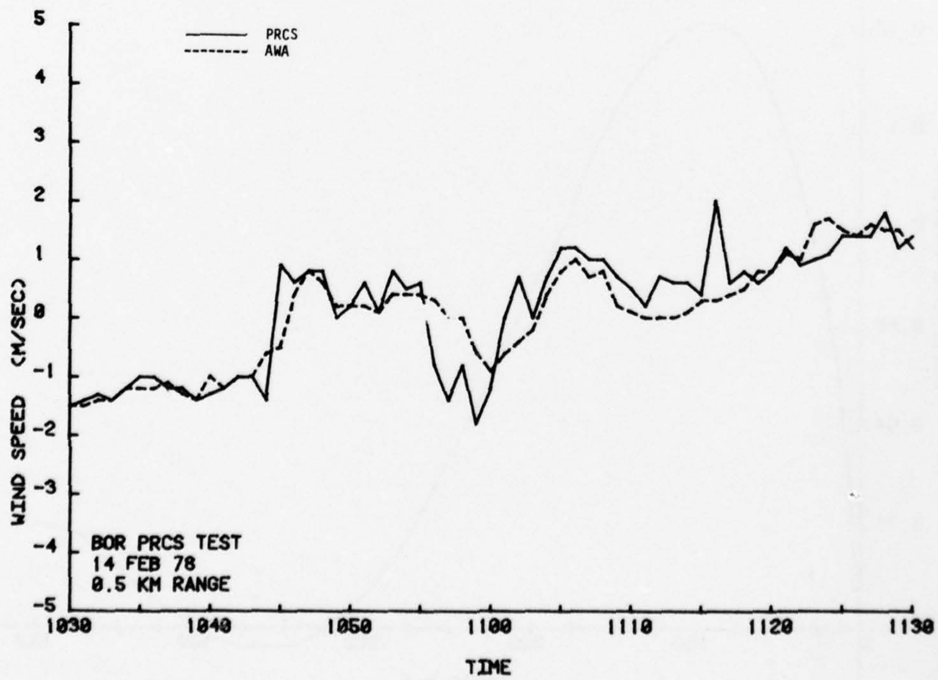

Figure B-1b. PRCS wind comparison plot.

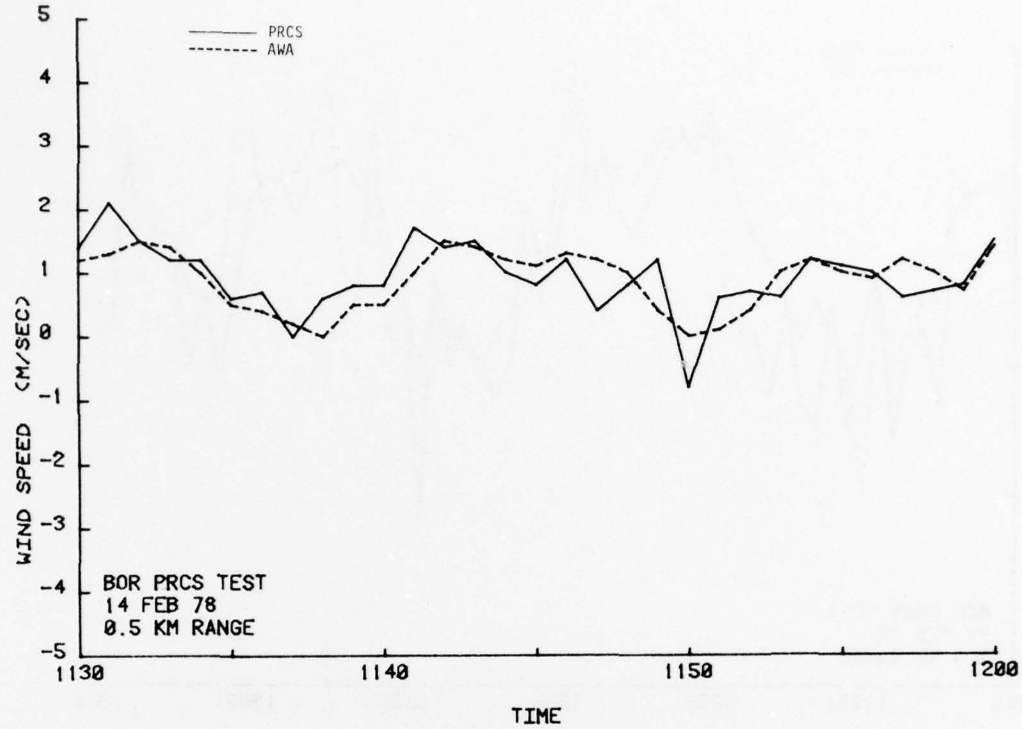

Figure B-1c. PRCS wind comparison plot.

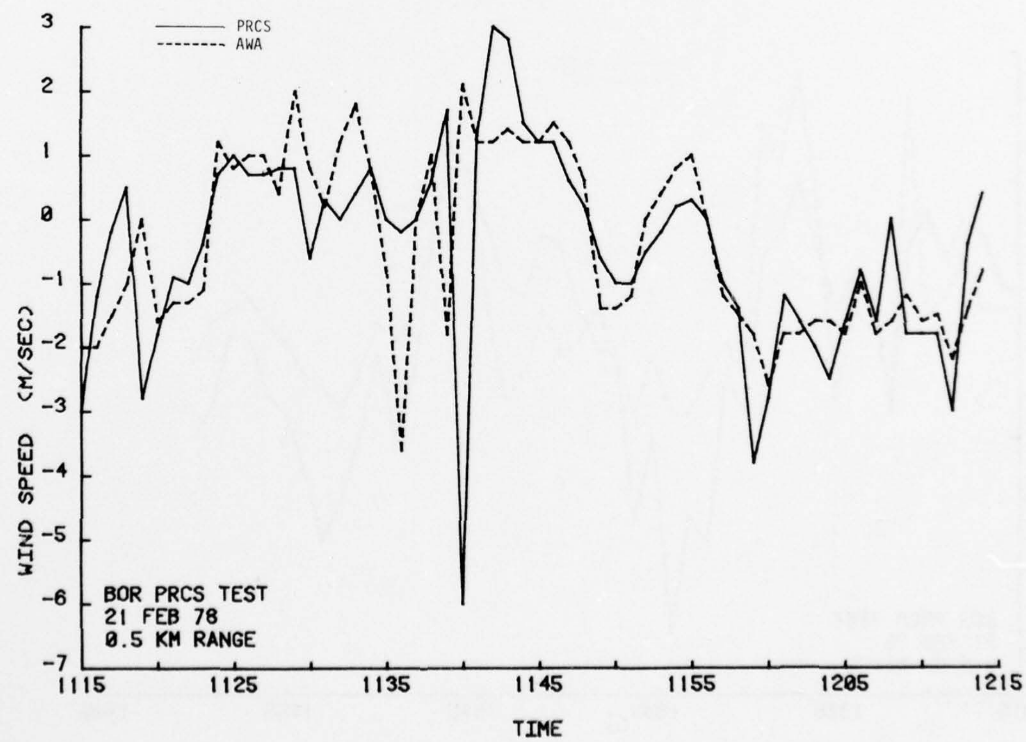

Figure B-2a. PRCS wind comparison plot.

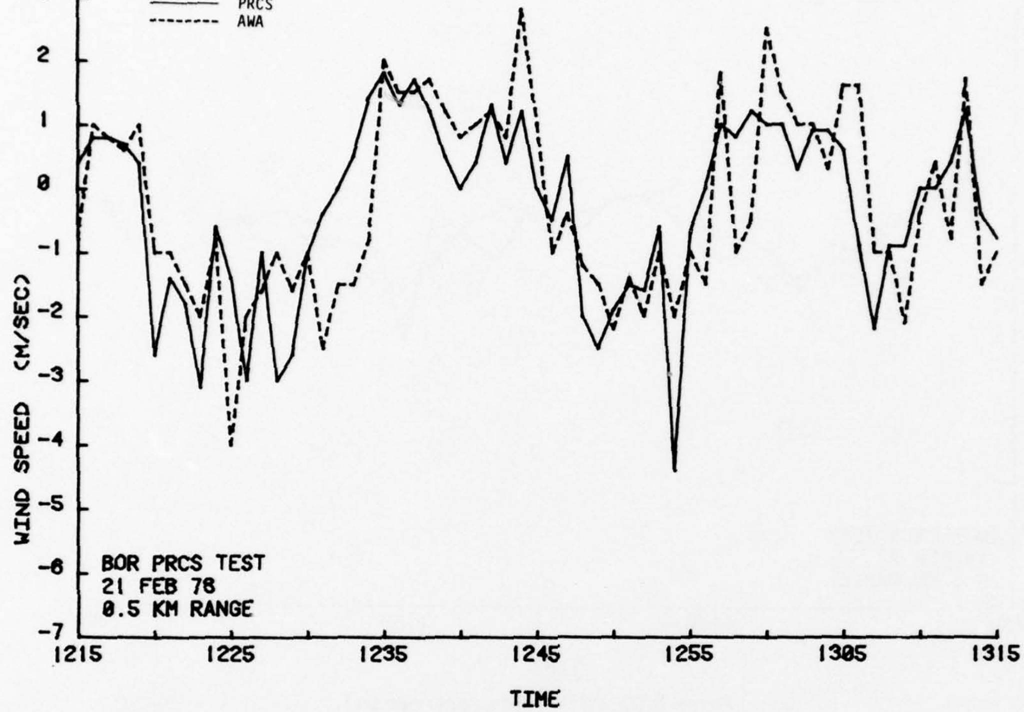

Figure B-2b. PRCS wind comparison plot.

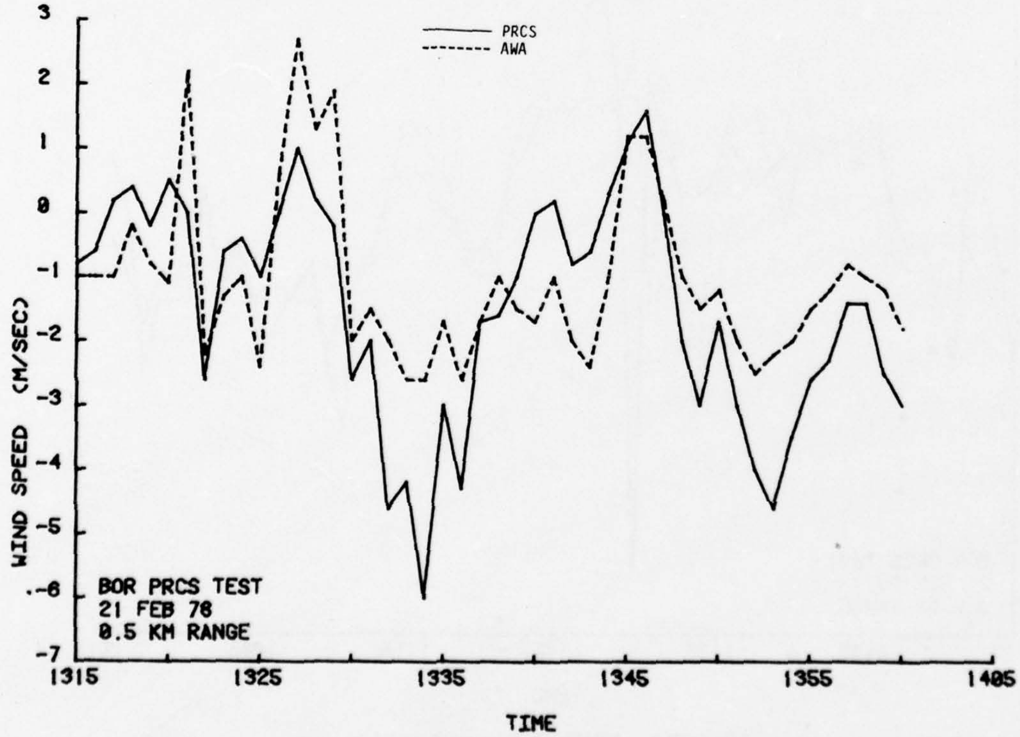

Figure B-2c. PRCS wind comparison plot.

APPENDIX C
DAILY WEATHER PARAMETERS

NWS FORM F-6 (3-74)

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

PRELIMINARY LOCAL CLIMATOLOGICAL DATA

STATION: El Paso, International Airport, TX

MONTH: FEBRUARY | YEAR: 1978

LATITUDE: 31° 48' N | LONGITUDE: 106° 24' W | GROUND ELEVATION (ft): 3918 FT | STANDARD TIME: MTN

Day	Temperature °F: Maximum	Minimum	Average	Departure from normal	Degree days (Base 65°): Heating	Cooling	Precipitation (In.): Total (Water equivalent)	Snowfall, ice pellets	Snow, ice pellets or ice on ground at 5AM	Wind: Average speed (m.p.h.)	Fastest mile: Speed (m.p.h.)	Direction	Sunshine: Total (Hrs. and tenths)	Percent of possible	Sky cover sunrise to sunset (Tenths)	Weather occurrences	SKY MID TO MID	PK MPH	GUST DIRT	TIME
1	2	3	4	5	6a	6b	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	67	39	53	+7	12	0	0	0	0	5.7	13	28	626	98	3		1	24	W	1249
2	55	41	48	+2	17	0	T	0	0	5.8	9	10	571	89	4		4	17	NE	0803
3	64	37	51	+5	14	0	0	0	0	5.0	10	02	644	100	0		1	15	NE	1203
4	72	33	53	+7	12	0	0	0	0	7.2	17	04	627	97	4		4	23	NE	1649
5	63	35	49	+2	16	0	0	0	0	4.5	13	13	446	69	9		8	16	SE	1639
6	53	44	49	+2	16	0	.27	0	0	6.2	15	22	36	6	10	1	8	24	W	1833
7	62	46	54	+7	11	0	0	0	0	9.8	18	22	545	84	5		5	25	SW	0438
8	62	46	54	+7	11	0	.03	0	0	14.6	29	26	331	51	6		5	45	W	2019
9	63	37	50	+3	15	0	0	0	0	6.0	22	28	632	97	2		1	28	W	0004
10	74	37	56	+8	9	0	0	0	0	4.8	12	14	593	90	3		3	23	SW	1354
11	57	43	50	+2	15	0	.04	0	0	9.6	24	25	605	9	10		7	35	W	1248
12	51	39	45	-3	20	0	0	0	0	11.7	22	25	430	65	5		7	43	W	1418
13	53	39	46	-2	19	0	0	0	0	10.5	25	25	593	90	6		6	39	W	0457
14	53	41	47	-1	18	0	.02	0	0	10.4	21	26	367	55	7		7	40	W	2122
15	54	33	44	-4	21	0	0	0	0	7.1	21	26	593	89	2		3	29	SW	0012
16	55	35	45	-4	20	0	0	0	0	14.7	28	30	466	70	5		3	44	NW	1956
17	45	25	35	-13	30	0	0	0	0	3.2	12	01	474	71	7		4	17	N	0057
18	48	28	38	-11	27	0	0	0	0	3.4	14	25	645	96	2		1	17	N	1306
19	47	27	37	-12	28	0	0	0	0	7.6	14	02	556	83	5		4	30	NE	1411
20	57	28	43	-6	22	0	0	0	0	6.6	13	23	673	100	0		0	21	SW	0254
21	58	28	43	-7	22	0	0	0	0	3.9	7	06	675	100	0		0	13	SE	1457
22	63	29	46	-4	19	0	0	0	0	3.1	9	01	649	96	9		7	12	SW	1306
23	68	31	50	0	15	0	0	0	0	3.1	7	20	666	98	6		4	15	NE	0217
24	71	32	52	+2	13	0	0	0	0	7.7	18	29	680	100	0		0	29	NW	1702
25	73	35	54	+4	11	0	0	0	0	6.0	13	23	682	100	1		0	23	SW	1614
26	74	44	59	+8	6	0	T	0	0	8.2	17	22	3	0	10		9	30	SW	2236
27	65	50	58	+7	7	0	.06	0	0	9.9	18	24	234	34	8		8	31	SW	0002
28	73	50	62	+11	3	0	.05	0	0	9.9	16	22	310	45	8	1	9	29	SW	1340
29																				
30																				
31																				
SUM	1700	1032	—	—	449	0	.47	0	—	206.2	—	—	13807	---	137	—	119	45	W	2019
AVG	60.7	36.9	—	—	—	—	—	—	—	7.4	FASTEST	DIRECTION	POSSIBLE	%		—				
										MISC. →	29	26	18583	74	4.9	—	4.3			

TEMPERATURE DATA

- AVERAGE MONTHLY: 48.8
- DEPARTURE FROM NORMAL: +0.4
- HIGHEST: 74 ON 10th, 26th
- LOWEST: 25 ON 17th
- NUMBER OF DAYS WITH –
  - MAX. 32° OR BELOW: 0
  - MAX. 90° OR ABOVE: 0
  - MIN. 32° OR BELOW: 8
  - MIN. 0° OR BELOW: 0
- HEATING DEGREE DAYS (Base 65°)
  - TOTAL THIS MONTH: 449
  - DEPARTURE FROM NORMAL: -16
  - SEASONAL TOTAL: 1908
  - DEPARTURE FROM NORMAL: -353
- COOLING DEGREE DAYS (Base 65°)
  - TOTAL THIS MONTH: 0
  - DEPARTURE FROM NORMAL: 0
  - SEASONAL TOTAL: 0
  - DEPARTURE FROM NORMAL: 0

PRECIPITATION DATA

- TOTAL FOR THE MONTH: .47 IN.
- DEPARTURE FROM NORMAL: +.05 IN.
- GREATEST IN 24 HRS: .27 ON 6th
- SNOWFALL, ICE PELLETS
  - TOTAL FOR THE MONTH: 0 IN.
  - GREATEST IN 24 HRS: 0 ON –
  - GREATEST DEPTH ON GROUND: 0 ON –

WEATHER

- NUMBER OF DAYS –
  - CLEAR (Scale 0–3): 10
  - PARTLY CLOUDY (Scale 4–7): 11
  - CLOUDY (Scale 8–10): 7
  - WITH 0.01 INCH OR MORE PRECIP.: 6
  - WITH 0.10 INCH OR MORE PRECIP.: 1
  - WITH 0.50 INCH OR MORE PRECIP.: 0
  - WITH 1.00 INCH OR MORE PRECIP.: 0

SYMBOLS USED IN COLUMN 16

1 = FOG
2 = FOG WITH VISIBILITY ¼ MILE OR LESS
3 = THUNDER
4 = ICE PELLETS
5 = HAIL
6 = GLAZE OR RIME
7 = DUSTSTORM OR SANDSTORM
8 = SMOKE OR HAZE
9 = BLOWING SNOW
X = TORNADO

MAXIMUM PRECIPITATION

Δt (Minutes)	5	10	15	20	30	45	60	80	100	120	150	180
PRECIPITATION (Inches)	.02	.03	.04	.04	.05	.06	.08	.10	.11	.14	.16	.20
ENDED: DATE	27	06	06	06	06	06	06	06	06	06	06	06
TIME	2312	1200	1200	1200	1200	1200	1200	1220	1220	1200	1200	1300

BAROMETRIC PRESSURE (Climatological station elevation)

- ____ FT. M.S.L.
- MONTHLY AVERAGE STATION ____ IN.
- HIGHEST SEA-LEVEL: 30.40 IN. ON 21st
- LOWEST SEA-LEVEL: 29.46 IN. ON 11th

WS FORM F-6
(8-74)

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

PRELIMINARY LOCAL CLIMATOLOGICAL DATA

STATION: El Paso, International Airport, TX

MONTH: MARCH　YEAR: 1978

LATITUDE: 31° 48′ N　LONGITUDE: 106° 24′ W　GROUND ELEVATION (H): 3918 FT　STANDARD TIME: MTN

DAY	TEMPERATURE °F: MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	DEGREE DAYS (Base 65°): HEATING	COOLING	PRECIPITATION (In.): TOTAL (Water equivalent)	SNOWFALL, ICE PELLETS	SNOW, ICE PELLETS OR ICE ON GROUND AT 5AM	WIND: AVERAGE SPEED (m.p.h.)	FASTEST MILE: SPEED (m.p.h.)	DIRECTION	SUNSHINE: TOTAL (Hrs. and tenths)	PERCENT OF POSSIBLE	SKY COVER SUNRISE TO SUNSET (Tenths)	WEATHER OCCURRENCES	SKY MID TO MID	PK MPH	GUST DIRT	TIME
1	2	3	4	5	6a	6b	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	68	52	60	+9	5	0	.07	0	0	12.2	30	25	153	22	9		8	49	W	2054
2	70	52	61	+10	4	0	T	0	0	12.8	30	23	330	48	8		7	41	SW	0156
3	70	52	61	+10	4	0	0	0	0	18.5	29	28	601	87	5		4	41	SW	1031
4	67	33	50	-2	15	0	0	0	0	7.8	14	20	667	96	4		2	18	W	0348
5	77	51	64	+12	1	0	T	0	0	14.3	29	26	528	76	8		6	49	SW	2302
6	65	47	56	+4	9	0	T	T*	0	13.4	23	23	483	69	8	5	7	37	SW	0113
7	55	35	45	-7	20	0	T	0	0	6.0	27	28	285	41	7		5	30	W	0001
8	69	30	50	-2	15	0	0	0	0	6.0	15	24	704	100	0		0	21	SW	1021
9	77	37	57	+4	8	0	0	0	0	7.0	15	23	684	97	2		2	23	SW	0133
10	68	47	58	+5	7	0	0	0	0	18.6	35	26	666	94	3		2	62	SW	1258
11	66	44	55	+2	10	0	0	0	0	10.3	21	29	710	100	0		0	32	W	0016
12	65	35	50	-3	15	0	T	0	0	12.4	29	26	410	58	6		5	46	SW	1807
13	59	42	51	-3	14	0	0	0	0	17.2	25	27	540	76	4		4	40	W	2154
14	65	40	53	-1	12	0	0	0	0	15.1	23	27	716	100	0		0	35	W	1925
15																				
16																				
17																				
18																				
19																				
20																				
21																				
22																				
23																				
24																				
25																				
26																				
27																				
28																				
29																				
30																				
31																				
SUM																				
AVG											FASTEST	DIRECTION	POSSIBLE	%						

MISC. →

TEMPERATURE DATA

AVERAGE MONTHLY ______
DEPARTURE FROM NORMAL ______
HIGHEST ______ ON ______
LOWEST ______ ON ______
NUMBER OF DAYS WITH -
MAX. 32° OR BELOW ______
MAX. 90° OR ABOVE ______
MIN. 32° OR BELOW ______
MIN. 0° OR BELOW ______
HEATING DEGREE DAYS (Base 65°)
TOTAL THIS MONTH ______
DEPARTURE FROM NORMAL ______
SEASONAL TOTAL ______
DEPARTURE FROM NORMAL ______
COOLING DEGREE DAYS (Base 65°)
TOTAL THIS MONTH ______
DEPARTURE FROM NORMAL ______
SEASONAL TOTAL ______
DEPARTURE FROM NORMAL ______

PRECIPITATION DATA

TOTAL FOR THE MONTH ______ IN.
DEPARTURE FROM NORMAL ______ IN.
GREATEST IN 24 HRS. ______ ON ______
SNOWFALL, ICE PELLETS
TOTAL FOR THE MONTH ______ IN.
GREATEST IN 24 HRS. ______ ON ______
GREATEST DEPTH ON GROUND ______ ON ______

WEATHER

NUMBER OF DAYS -
CLEAR (Scale 0–3) ______
PARTLY CLOUDY (Scale 4–7) ______
CLOUDY (Scale 8–10) ______
WITH 0.01 INCH OR MORE PRECIP. ______
WITH 0.10 INCH OR MORE PRECIP. ______
WITH 0.50 INCH OR MORE PRECIP. ______
WITH 1.00 INCH OR MORE PRECIP. ______

SYMBOLS USED IN COLUMN 16

1 = FOG
2 = FOG WITH VISIBILITY ¼ MILE OR LESS
3 = THUNDER
4 = ICE PELLETS
5 = HAIL
6 = GLAZE OR RIME
7 = DUSTSTORM OR SANDSTORM
8 = SMOKE OR HAZE
9 = BLOWING SNOW
X = TORNADO

MAXIMUM PRECIPITATION												
Δt (Minutes)	5	10	15	20	30	45	60	80	100	120	150	180
PRECIPITATION (Inches)												
ENDED DATE												
TIME												

BAROMETRIC PRESSURE
(Climatological station elevation)

(Hpc) ______ FT., M. S. L.
MONTHLY AVERAGE STATION ______ IN.
HIGHEST SEA-LEVEL ______ IN. ON ______
LOWEST SEA-LEVEL ______ IN. ON ______

*T-Hail

APPENDIX D

FORTRAN IV DATA PLOT PROGRAMS

```
$WLTRC T=00004 IS ON CR00002 USING 00019 BLKS R=0146

FTN4,L,T
      PROGRAM WLTRC,3
C**********************************************************
C     WLTRC IS USED TO LOAD COMMON WITH THE DESIRED
C     PARAMETERS FOR REAL TIME ANALYSIS WITH WLTRR.
C**********************************************************
      COMMON F,S(94),IT(6)
      COMMON A3(3,3),B3(3)
      COMMON A4(4,4),B4(4)
      COMMON A5(5,5),B5(5)
      COMMON A7(7,7),B7(7)
      COMMON A10(10,10),B10(10)
      COMMON P,MN,IS,IMT,MS,MAVG
      COMMON SN,SX,SY,SYX,SXX,XC,YC,DA,DS
      COMMON WT(21),IARRY
      COMMON SUMB(5),BALL(29)
      COMMON IW1,IW2,IW3,IW4,IW5,IW9,IWZ
      COMMON F9,S9(94)
      DIMENSION IP(5)
      CALL RMPAR(IP)
      LU1=IP(1)
      LU2=IP(2)
      LU3=IP(3)
      LP=IP(4)
      IF(LU1.EQ.0)LU1=1
      IF(LU2.EQ.0)LU2=1
      IF(LU3.EQ.0)LU3=1
      IF(LP.EQ.0)LP=1
C     ZERO OUT ARRAYS
      DO 1 I=1,10
      DO 1 J=1,10
      A10(I,J)=0.0
      B10(I)=0.0
      IF(I.GT.7.OR.J.GT.7)GO TO 1
      A7(I,J)=0.0
      B7(I)=0.0
      IF(I.GT.5.OR.J.GT.5)GO TO 1
      A5(I,J)=0.0
      B5(I)=0.0
      IF(I.GT.4.OR.J.GT.4)GO TO 1
      A4(I,J)=0.0
      B4(I)=0.0
      IF(I.GT.3.OR.J.GT.3)GO TO 1
      A3(I,J)=0.0
      B3(I)=0.0
1     CONTINUE
C     ZERO SUMS FOR WLTR1
```

```
      P=0.0
      DA=0.0
      DS=0.0
      SN=0.0
      SX=0.0
      SY=0.0
      SYX=0.0
      SXX=0.0
C     GET CALIBRATION AND WEIGHTS FOR WLTR1
      IF(LP.NE.1)WRITE(LP,199)
199   FORMAT(1H1,2X,"CALIBRATION FACTORS FOR REAL TIME ANALYSIS
     *1H0,2X,"WEIGHTS FOR ANEMOMETERS ARE"/)
      IF(LU1.EQ.1)WRITE(1,99)
99    FORMAT("INPUT WEIGHTS"/)
      DO 2 I=1,21
      IF(LU1.EQ.1)WRITE(1,98)I
      READ(LU1,*)WT(I)
      IF(LP.NE.1)WRITE(LP,198)I,WT(I)
2     CONTINUE
98    FORMAT(I2,3X,"_")
198   FORMAT(1H ,I2,F10.5)
      IF(LU2.EQ.1)WRITE(1~97)
97    FORMAT("INPUT XCAL, YCAL".3X,"_")
      READ(LU2,*)XC,YC
      IF(LP.NE.1)WRITE(LP,197)XC,YC
197   FORMAT(1H0,2X,"XCAL,YCAL ARE",F10.7,", "'.F10.7)
      IF(LU2.EQ.1)WRITE(1,96)
96    FORMAT("INPUT # OF SENSOR",3X,"_")
      READ(LU2,*)IS
      IF(LP.NE.1)WRITE(LP,196)IS
196   FORMAT(1H0,2X,"SENSOR #",I4)
      IF(LU2.EQ.1)WRITE(1,95)
95    FORMAT("INPUT TIME INTERVAL IN MINUTES FOR WLTR3",3X,"_")
      READ(LU2,*)MN
      IF(LP.NE.1)WRITE(LP,195)MN
195   FORMAT(1H0,2X,"LEAST SQUARES READOUT EVERY",I3," MINUTES"
      IF(LU2.EQ.1)WRITE(1,94)
94    FORMAT("INPUT MINUTES FOR AVERAGES",3X,"_")
      READ(LU2,*)MAVG
      IF(LP.NE.1)WRITE(LP,194)MAVG
194   FORMAT(1H0,2X,"AVERAGES REPORTED EVERY",I3," MINUTES")
C     DETERMINE IF .5K OR 2K WANTED.
      IF(LU2.EQ.1)WRITE(1,93)
93    FORMAT("ENTER 0 FOR .5K OR 2 FOR 2K",3X,"_")
      READ(LU2,*)IARRY
      IF(IARRY.EQ.0)WRITE(LP,193)
      IF(IARRY.EQ.2)WRITE(LP,200)
193   FORMAT(1H0,2X,"ANALYSIS FOR THE 1/2 K ARRAY")
200   FORMAT(1H0,2X,"ANALYSIS FOR THE   2 K ARRAY")
      IF(LU3.EQ.1)WRITE(1,92)
92    FORMAT("INPUT 0 OR 1 FOR SUBS DESIRED"/
     *"OR TO DESIGNATE OTHER PARAMETERS")
      IF(LP.NE.1)WRITE(LP,192)
```

```
192   FORMAT(1H0,2X,"SUBS DESIRED OR OTHER PARAMETERS")
91    FORMAT("IW1",3X,"_")
90    FORMAT("IW2",3X,"_")
89    FORMAT("IW3",3X,"_")
88    FORMAT("IW4",3X,"_")
87    FORMAT("IW5",3X,"_")
86    FORMAT("IW9",3X,"_")
191   FORMAT(1H ,2X,"IW1",I5)
190   FORMAT(1H ,2X,"IW2",I5)
189   FORMAT(1H ,2X,"IW3",I5)
188   FORMAT(1H ,2X,"IW4",I5)
187   FORMAT(1H ,2X,"IW5",I5)
186   FORMAT(1H ,2X,"IW9",I5)
      IF(LU3.EQ.1)WRITE(1,91)
      READ(LU3,*)IW1
      IF(LP.NE.1)WRITE(LP,191)IW1
      IF(LU3.EQ.1)WRITE(1,90)
      READ(LU3,*)IW2
      IF(LP.NE.1)WRITE(LP,190)IW2
      IF(LU3.EQ.1)WRITE(1,89)
      READ(LU3,*)IW3
      IF(LP.NE.1)WRITE(LP,189)IW3
      IF(LU3.EQ.1)WRITE(1,88)
      READ(LU3,*)IW4
      IF(LP.NE.1)WRITE(LP,188)IW4
      IF(LU3.EQ.1)WRITE(1,87)
      READ(LU3,*)IW5
      IF(LP.NE.1)WRITE(LP,187)IW5
      IF(LU3.EQ.1)WRITE(1,86)
      READ(LU3,*)IW9
      IF(LP.NE.1)WRITE(LP,186)IW9
      WRITE(1,85)
85    FORMAT("ENTER FILE # ON TAPE",3X,"_")
      READ(1,*)IWZ
      IF(LP.NE.1)WRITE(LP,185)IWZ
185   FORMAT(1H0,2X,"TAPE FILE #",I2)
      WRITE(1,84)
84    FORMAT("INPUT TIME INTERVAL IN SECONDS",3X,"_")
      READ(1,*)MS
      IF(LP.NE.1)WRITE(LP,184)MS
184   FORMAT(1H0,2X,"AVERAGING TIME IS",I3," SECONDS")
      WRITE(1,83)
83    FORMAT(/"THAT'S ALL, THANKS")
      STOP
      END
      END$
```

```
$WLTRR T=00004 IS ON CR00002 USING 00011 BLKS R=0082

FTN4,L,T
      PROGRAM WLTRR,3
C*****************************************************
C     WLTRR IS A PROGRAM FOR REAL TIME ANALYSIS OF THE'
C     WEIGHTING FACTORS OF VARIOUS SENSORS.  IT IS CALLED
C     BY MOMSA.  WLTRC MUST FIRST BE CALLED TO SET UP
C     PARAMETERS.  SOME OF THE PARAMETERS CALLED FOR MAY
C     NOT PERTAIN TO WLTRR, BUT MUST BE ANSWERED.  THE
C     SCHEDULING TIME IN SECONDS IS SET IN MOMSA, BUT THE
C     SAME INFORMATION SHOULD BE ENTERED IN WLTRC FOR THE
C     PRINTOUT.
C****************************************************/
      COMMON F,S(94),IT(6)
      COMMON A3(3,3),B3(3)
      COMMON A4(4,4),B4(4)
      COMMON A5(5,5),B5(5)
      COMMON A7(7,7),B7(7)
      COMMON A10(10,10),B10(10)
      COMMON P,MN,IS,IMT,MS,MAVG
      COMMON SN,SX,SY,SYX,SXX,XC,YC,DA,DS
      COMMON WT(21),IARRY
      COMMON SUMB(5),BALL(29)
      COMMON IW1,IW2,IW3,IW4,IW5,IW9,IWZ
      COMMON F9,S9(94)
      DIMENSION NW4(3),MON(2)
      DATA NW4/2HWL,2HTR,2H4 /
C     ENTER HERE ON CONTINUATION.
C     CHECK TO SEE IF ANALYSIS TERMINATED.
      IF(IMT.GT.1)GO TO 69
C     IF FIRST TIME THROUGH, PRINT TIME ON LINE PRINTER.
C     AND ZERO AVERAGES.
      IF(P.GT.0.0)GO TO 2
      IDAY=IT(5)
      IY=IT(6)
      CALL DATE(IDAY,MON,IY)
      WRITE(6,99)IS,MS,IT(4),IT(3),IT(2),IDAY,MON,IY
99    FORMAT(1H1,"REAL TIME ANALYSIS OF CH #",I3/
     *1H ,"WITH ",I2," SECOND AVERAGE"/
     *"FOR DATA BEGINNING",I3,":",I2,":",I2," ON",I3,1X,2A2,I4//)
      F9=0.0
      DO 1 I=1,94
1     S9(I)=0.0
C     DRAW GRID FOR LINEARITY PLOT.
      IF(IW1.EQ.0.AND.IW2.EQ.0)GO TO 2
      CALL WLTR5
2     CONTINUE
C     SUM FOR AVERAGES
      IF(IW9.EQ.0)GO TO 3
      CALL WLTR9
3     CONTINUE
C     CHECK FOR .5K OR 2K RANGE.
      IF(IARRY.EQ.0)GO TO 6
      K=0
      DO 4 I=1,21,4
      K=K+1
4     S(K)=S(I)
      DO 5 I=22,36
      K=K+1
```

```
5       S(K)=S(I)
6       CONTINUE
C       SUM ALL POINTS.
        P=P+F
C       CALL LINEARITY PLOT.
        IF(IW1.EQ.0)GO TO 7
        CALL WLTR1
7       CONTINUE
C       CHECK SWITCH REGISTER FOR TERMINATION.
        ISW=ISSW(15)
        IF(ISW.NE.0)GO TO 68
C       LOAD UP ARRAYS FOR FIT TO WEIGHTING FACTORS.
        IF(IW2.EQ.0)GO TO 69
        CALL WLTR2
C       IF ITS TIME, PRINT OUT PRESENT WEIGHTING FACTORS.
        MO=MOD(IT(3),MN)
        IF(MO.NE.0)GO TO 69
        IF(IT(2).NE.0)GO TO 69
        CALL WLTR3
        GO TO 69
C       TERMINATION SEQUENCE
68      CONTINUE
        IMT=69
        CALL WLTR5
        CALL WLTR3
        CALL EXEC(9,NW4)
69      CONTINUE
        CALL EXEC(6,0,-1)
        END
        END$
```

SWLTR1 T=00004 IS ON CR00002 USING 00006 BLKS R=0045

```
FTN4,L,T
      SUBROUTINE WLTR1
C***************************************************************
C     WLTR1 IS A SUBROUTINE OF WLTRR.  IT IS USED TO PLOT
C     THE CORRELATION OF THE WEIGHTED AVERAGE OF THE
C     ANEMOMETERS AND A SENSOR, AND COMPUTE CORRELATION.
C***************************************************************
      COMMON F,S(94),IT(6)
      COMMON A3(3,3),B3(3)
      COMMON A4(4,4),B4(4)
      COMMON A5(5,5),B5(5)
      COMMON A7(7,7),B7(7)
      COMMON A10(10,10),B10(10)
      COMMON P,MN,IS,IMT,MS,MAVG
      COMMON SN,SX,SY,SYX,SXX,XC,YC,DA,DS
      COMMON WT(21),IARRY
      COMMON SUMB(5),BALL(29)
      COMMON IW1,IW2,IW3,IW4,IW5,IW9,IWZ
      COMMON F9,S9(94)
      CALL PLTLU(10)
      CALL SFACT(15.,10.)
      Y=S(IS)*YC/F
      X=0.0
      DO 1 I=1,21
      X=X+S(I)*WT(I)*XC/F
1     CONTINUE
      SN=SN+1.0
      D=(Y-X)/10
      DA=DA+D
      DS=DS+D*D
      SX=SX+X
      SY=SY+Y
      SYX=SYX+Y*X
      SXX=SXX+X*X
      Z=ABS(X)
      IF(Z.GE.4.75)X=4.75*X/Z
      IX=(X*1000.+5000.)*2./3.
      Z=ABS(Y)
      IF(Z.GE.4.75)Y=4.75*Y/Z
      IY=Y*1000.+5000.
      CALL PLT(0,0,1,IX,IY)
69    CONTINUE
      RETURN
      END
      END$
```

```
SWLTR2 T=00004 IS ON CR00002 USING 00009 BLKS R=0075

FTN4,L,T
      SUBROUTINE WLTR2
C**************************************************************
C     WLTR2 IS A SUBROUTINE OF WLTRR.  IT IS USED TO LOAD THE
C     ARRAYS FOR A LEAST SQUARES FIT FOR WEIGHTING FACTORS.
C**************************************************************
      COMMON F,S(94),IT(6)
      COMMON A3(3,3),B3(3)
      COMMON A4(4,4),B4(4)
      COMMON A5(5,5),B5(5)
      COMMON A7(7,7),B7(7)
      COMMON A10(10,10),B10(10)
      COMMON P,MN,IS,IMT,MS,MAVG
      COMMON SN,SX,SY,SYX,SXX,XC,YC,DA,DS
      COMMON WT(21),IARRY
      COMMON SUMB(5),BALL(29)
      COMMON IW1,IW2,IW3,IW4,IW5,IW9,IWZ
      COMMON F9,S9(94)
      DIMENSION T(22),D(10)
      DO 1 I=1,21
1     T(I)=S(I)*XC/F
      T(22)=S(IS)*YC/F
      DO 3 J=1,3
      D(J)=0.0
      DO 2 K=1,7
      L=(J-1)*7+K
2     D(J)=D(J)+T(L)
      D(J)=D(J)/7.
      B3(J)=B3(J)+T(22)*D(J)
      DO 3 I=1,J
      A3(I,J)=A3(I,J)+D(I)*D(J)
3     CONTINUE
      DO 5 J=1,4
      D(J)=0.0
      DO 4 K=1,5
      L=(J-1)*5+K
4     D(J)=D(J)+T(L)
      D(J)=D(J)/5.
      B4(J)=B4(J)+T(22)*D(J)
      DO 5 I=1,J
      A4(I,J)=A4(I,J)+D(I)*D(J)
5     CONTINUE
      DO 7 J=1,5
      D(J)=0.0
      DO 6 K=1,4
      L=(J-1)*4+K
6     D(J)=D(J)+T(L)
      D(J)=D(J)/4.
      B5(J)=B5(J)+T(22)*D(J)
      DO 7 I=1,J
      A5(I,J)=A5(I,J)+D(I)*D(J)
7     CONTINUE
      DO 9 J=1,7
      D(J)=0.0
      DO 8 K=1,3
      L=(J-1)*3+K
8     D(J)=D(J)+T(L)
      D(J)=D(J)/3.
```

```
      B7(J)=B7(J)+T(22)*D(J)
      DO 9 I=1,J
      A7(I,J)=A7(I,J)+D(I)*D(J)
9     CONTINUE
      DO 11 J=1,10
      D(J)=0.0
      DO 10 K=1,2
      L=(J-1)*2+K
10    D(J)=D(J)+T(L)
      D(J)=D(J)/2.
      B10(J)=B10(J)+T(22)*D(J)
      DO 11 I=1,J
      A10(I,J)=A10(I,J)+D(I)*D(J)
11    CONTINUE
69    CONTINUE
      RETURN
      END
      END$
```

SWLTR3 T=00004 IS ON CR00002 USING 00012 BLKS R=0112

```
FTN4,L,T
      SUBROUTINE WLTR3
C*************************************************************
C     WLTR3 IS CALLED BY WLTRR FOR REAL TIME ANALYSIS
C     IT COMPUTES THE LEAST SQUARES FITS FOR THE WEIGHTING
C     FACTORS, AND SAVES THEM FOR WLTR4
C*************************************************************
      COMMON F,S(94),IT(6)
      COMMON A3(3,3),B3(3)
      COMMON A4(4,4),B4(4)
      COMMON A5(5,5),B5(5)
      COMMON A7(7,7),B7(7)
      COMMON A10(10,10),B10(10)
      COMMON P,MN,IS,IMT,MS,MAVG
      COMMON SN,SX,SY,SYX,SXX,XC,YC,DA,DS
      COMMON WT(21),IARRY
      COMMON SUMB(5),BALL(29)
      COMMON IW1,IW2,IW3,IW4,IW5,IW9,IWZ
      COMMON F9,S9(94)
      DIMENSION A(10,10),B(10)
      WRITE(6,99)IT(4),IT(3),IT(2),IT(1),P
99    FORMAT(//" AT",I3,":",I2,":",I2,".",I2," WITH",F9 0," POINTS )
      DO 67 I=1,5
67    SUMB(I)=0.0
      ISUMB=0
      IBALL=0
      DO 69 L=1,5
      GO TO (1,3,5,7,9),L
1     M=3
      DO 2 J=1,3
      B(J)=B3(J)
      DO 2 I=1,J
      A(I,J)=A3(I,J)
2     A(J,I)=A3(I,J)
      GO TO 11
3     M=4
      DO 4 J=1,4
      B(J)=B4(J)
      DO 4 I=1,J
      A(I,J)=A4(I,J)
4     A(J,I)=A4(I,J)
      GO TO 11
5     M=5
      DO 6 J=1,5
      B(J)=B5(J)
      DO 6 I=1,J
      A(I,J)=A5(I,J)
6     A(J,I)=A5(I,J)
      GO TO 11
7     M=7
      DO 8 J=1,7
      B(J)=B7(J)
      DO 8 I=1,J
      A(I,J)=A7(I,J)
8     A(J,I)=A7(I,J)
      GO TO 11
9     M=10
      DO 10 J=1,10
```

```
      B(J)=B10(J)
      DO 10 I=1,J
      A(I,J)=A10(I,J)
10    A(J,I)=A10(I,J)
11    CONTINUE
      ISUMB=ISUMB+1
      A11=A(1,1)
      IF(A11.EQ.0.0)GO TO 68
      DO 12 I=2,M
12    A(1,I)=A(I,1)/A11
      B(1)=B(1)/A11
      DO 16 J=2,M
      J1=J-1
      DO 14 I=J,M
      AS=0.0
      DO 13 K=1,J1
13    AS=AS+A(I,K)*A(K,J)
      A(I,J)=A(I,J)-AS
      IF(I.GT.J)A(J,I)=A(I,J)/A(J,J)
14    CONTINUE
      BS=0.0
      DO 15 K=1,J1
15    BS=BS+A(J,K)*B(K)
      AJJ=A(J,J)
      IF(AJJ.EQ.0.0)GO TO 68
16    B(J)=(B(J)-BS)/AJJ
      M1=M-1
      DO 18 I=1,M1
      BS=0.0
      MI=M-I
      MI1=MI+1
      DO 17 J=MI1,M
17    BS=BS+A(MI,J)*B(J)
      B(MI)=B(MI)-BS
18    CONTINUE
      WRITE(6,98)M,(B(I),I=1,M)
98    FORMAT(/" FOR M OF",I3/
     *1H ,10F6.3)
      DO 19 ISUM=1,M
      IBALL=IBALL+1
      SUMB(ISUMB)=SUMB(ISUMB)+B(ISUM)
      BALL(IBALL)=B(ISUM)
19    CONTINUE
      WRITE(6,97)SUMB(ISUMB)
97    FORMAT(1H ,"SUM OF WEIGHTS =",F8.5)
      GO TO 69
68    CONTINUE
      IBALL=IBALL+M
      WRITE(6,96)M
96    FORMAT(/" FOR M OF",I3," MATRIX IS SINGULAR")
69    CONTINUE
      RETURN
      END
      END$
```

SWLTR5 T=00004 IS ON CR00002 USING 00013 BLKS R=0105

```
FTN4,L,T
      SUBROUTINE WLTR5
C***********************************************************
C     WLTR5 IS USED TO DRAW THE GRIDS AND OTHER INFORMATION
C     ON THE PLOT FOR WLTRR.
C***********************************************************
      COMMON F,S(94),IT(6)
      COMMON A3(3,3),B3(3)
      COMMON A4(4,4),B4(4)
      COMMON A5(5,5),B5(5)
      COMMON A7(7,7),B7(7)
      COMMON A10(10,10),B10(10)
      COMMON P,MN,IS,IMT,MS,MAVG
      COMMON SN,SX,SY,SYX,SXX,XC,YC,DA,DS
      COMMON WT(21),IARRY
      COMMON SUMB(5),BALL(29)
      COMMON IW1,IW2,IW3,IW4,IW5,IW9,IWZ
      COMMON F9,S9(94)
      DIMENSION NA(2),NS(2),NP(2),NFS(2),NFL(2)
      DIMENSION MON(2),NCH(2),NSEC(2)
      DIMENSION NAME(9)
      DATA NAME/2HWE,2HIG,2HHT,2HIN,2HG ,2HFA,2HCT,2HOR,2HS /
      DATA NA/2HAV,2HG=/,NS/2HSD,2HY=/
      DATA NP/2H#P,2HTS/
      DATA NFL/2HFI,2HLE/,NFS/2HFS,2H= /
      DATA NSEC/2HSE,2HC /
      DATA NCH/2HCH,2H# /
      NY=54475B
      NX=54053B
      CALL PLTLU(10)
      CALL SFACT(15.,10.)
      CALL LLEFT
      CALL PLOT(0.0,0.0,-1)
      IF(IW1.EQ.0)GO TO 5
      CALL PLOT(0.5,5.0,3)
      CALL PLOT(9.5,5.0,2)
      CALL PLOT(5.0,0.5,3)
      CALL PLOT(5.0,9.5,2)
      CALL DASH(0.5,0.5,0.5,0.5,-1)
      CALL DASH(0.5,0.5,9.5,9.5,1)
      IF(IW5.LE.1)GO TO 69
      D=SX*SX-SN*SXX
      A=(SX*SY-SN*SYX)/D
      B=(SX*SYX-SY*SXX)/D
      X=-4.0
1     CONTINUE
      Y=A*X+B
      Z=ABS(Y)
      IF(Z.LE.4.75)GO TO 2
      X=X+.5
      GO TO 1
2     CONTINUE
      X=X+5.
      Y=Y+5.
      CALL PLOT(X,Y,3)
      X=4.0
3     CONTINUE
      Y=A*X+B
```

```
      Z=ABS(Y)
      IF(Z.LE.4.75)GO TO 4
      X=X-0.5
      GO TO 3
4     CONTINUE
      X=X+5.
      Y=Y+5.
      CALL PLOT(X,Y,2)
      DATT=DA/SN
      DSTT=SQRT((DS/SN)-DATT*DATT)
5     CONTINUE
      CALL LLEFT
      CALL PLOT(0.,0.,-1)
      IDAY=IT(5)
      IYEAR=IT(6)
      CALL DATE(IDAY,MON,IYEAR)
      DAY=IDAY
      YEAR=IYEAR
      FILE=IWZ
      CALL NUMB(1.0,9.0,0.14,DAY,0.0,-1)
      CALL SYMB(1.56,9.0,0.14,MON,0.0,3)
      CALL NUMB(2.25,9.0,0.14,YEAR,0.0,-1)
      CALL SYMB(1.0,8.5,0.14,NCH,0.0,3)
      CHN=IS
      CALL NUMB(1.56,8.5,0.14,CHN,0.0,-1)
      SEC=MS
      IF(MS.EQ.0)SEC=0.5
      CALL NUMB(2.25,8.5,0.14,SEC,0.0,1)
      CALL SYMB(2.85,8.5,0.14,NSEC,0.0,3)
      CALL SYMB(3.40,8.5,0.14,NFL,0.0,4)
      CALL NUMB(4.10,8.5,0.14,FILE,0.0,-1)
      IF(IW1.EQ.0)GO TO 68
      FS=5./(XC*30.)
      CALL SYMB(1.0,8.0,0.14,NFS,0.0,3)
      CALL NUMB(999.0,999.0,0.14,FS,0.0,1)
      CALL SYMB(1.0,7.5,0.14,NY,0.0,2)
      CALL NUMB(999.0,999.0,0.14,A,0.0,3)
      CALL SYMB(999.0,999.0,0.14,NX,0.0,2)
      CALL NUMB(999.0,999.0,0.14,B,0.0,3)
      CALL SYMB(1.0,7.0,0.14,NA,0.0,4)
      CALL NUMB(999.0,999.0,0.14,DATT,0.0,3)
      CALL SYMB(3.0,7.0,0.14,NS,0.0,4)
      CALL NUMB(999.0,999.0,0.14,DSTT,0.0,3)
      CALL SYMB(1.0,6.5,0.14,NP,0.0,4)
      CALL NUMB(999.0,999.0,0.14,SN,0.0,-1)
68    CONTINUE
      IF(IW2.EQ.0)GO TO 69
      CALL LLEFT
      CALL PLOT(0.0,0.0,-1)
      CALL PLOT(14.5,6.0,3)
      CALL PLOT(14.5,1.0,2)
      CALL PLOT(3.5,1.0,2)
      DX=0.5
      XT=3.5
      XS=3.43
      CH=0.0
      DCH=1.0
      DO 6 I=1,21
      XT=XT+DX
      XS=XS+DX
```

```
      CH=CH+DCH
      CALL PLOT(XT,1.0,3)
      CALL PLOT(XT,0.9,2)
      CALL NUMB(XS,0.8,0.07,CH,0.0,-1)
6     CONTINUE
      YT=0.0
      DY=1.0
      YS=-0.035
      CH=-0.02
      DCH=0.02
      DO 7 I=1,6
      YT=YT+DY
      YS=YS+DY
      CH=CH+DCH
      CALL PLOT(14.5,YT,3)
      CALL PLOT(14.6,YT,2)
      CALL NUMB(14.65,YS,0.07,CH,0.0,2)
7     CONTINUE
      CALL SYMB(7.5,0.25,0.14,NAME,0.0,17)
      CALL LLEFT
69    CONTINUE
      IW5=2
      RETURN
      END
      END$
```

```
SWLTR9 T=00004 IS ON CR00002 USING 00005 BLKS R=0038

FTN4,L,T
      SUBROUTINE WLTR9
C*************************************************************
C     WLTR9 IS A SUBROUTINE OF WLTRR WHICH MAY BE USED TO PRINT
C     AVERAGES OF ALL CHANNELS ON ANY LU.
C*************************************************************
      COMMON F,S(94),IT(6)
      COMMON A3(3,3),B3(3)
      COMMON A4(4,4),B4(4)
      COMMON A5(5,5),B5(5)
      COMMON A7(7,7),B7(7)
      COMMON A10(10,10),B10(10)
      COMMON P,MN,IS,IMT,MS,MAVG
      COMMON SN,SX,SY,SYX,SXX,XC,YC,DA,DS
      COMMON WT(21),IARRY
      COMMON SUMB(5),BALL(29)
      COMMON IW1,IW2,IW3,IW4,IW5,IW9,IWZ
      COMMON F9,S9(94)
      F9=F9+F
      DO 1 I=1,94
1     S9(I)=S9(I)+S(I)
      MO=MOD(IT(3),MAVG)
      IF(MO.NE.0)GO TO 69
      IF(IT(2).NE.0)GO TO 69
      IF(IW9.EQ.1)CALL PAGE(1)
      WRITE(IW9,99)IT(5),IT(4),IT(3),IT(2),IT(1)
99    FORMAT(1H1,"TIME ",5I4/)
      DO 2 I=1,94
      S9(I)=S9(I)/F9
2     CONTINUE
      WRITE(IW9,98)(I,S9(I+1),I=0,93)
98    FORMAT(6(1H ,@3,"=",F5.1))
      WRITE(IW9,97)F9
97    FORMAT(1H0,"# SAMPLES ",F7.0/1H1)
      IF(IW9.EQ.1)CALL COPY(1)
      F9=0.0
      DO 3 I=1,94
3     S9(I)=0.0
69    CONTINUE
      RETURN
      END
      END$
```

```
$WLTR4 T=00004 IS ON CR00002 USING 00013 BLKS R=0118

FTN4,L,T
      PROGRAM WLTR4
C*****************************************************************
C     WLTR4 IS CALLED BY WLTRR FOR REAL TIME ANALYSIS.
C*****************************************************************
      COMMON F,S(94),IT(6)
      COMMON A3(3,3),B3(3)
      COMMON A4(4,4),B4(4)
      COMMON A5(5,5),B5(5)
      COMMON A7(7,7),B7(7)
      COMMON A10(10,10),B10(10)
      COMMON P,MN,IS,IMT,MS,MAVG
      COMMON SN,SX,SY,SYX,SXX,XC,YC,DA,DS
      COMMON WT(21),IARRY
      COMMON SUMB(5),BALL(29)
      COMMON IW1,IW2,IW3,IW4,IW5,IW9,IWZ
      COMMON F9,S9(94)
      DIMENSION XV(29),YV(29),G(4,5),D(4,4),FP(5),V(4)
      DIMENSION WTN(21)
      DATA XV/4.,11.,18.,3.,8.,13.,18.,2.5,6.5,10.5,
     *14.5,18.5,2.,5.,8.,11.,14.,17.,20.,1.5,3.5,5.5,
     *7.5,9.5,11.5,13.5,15.5,17.5,19.5/
      CUBIC(V1,V2,V3,V4,X)=V1*X*X*X+V2*X*X+V3*X+V4
      CALL PLTLU(10)
      CALL SFACT(15.,10.)
      CALL LLEFT
      CALL PLOT(0.0,0.0,-1)
      CALL PLOT(3.5,1.0,3)
      N=0
      SUM=0.0
      DO 8 M=1,5
      SUM=SUM+SUMB(M)
      GO TO (1,2,3,4,5),M
1     J=3
      FJ=7.
      TFK=1.
      GO TO 6
2     J=4
      FJ=5.
      TFK=20./21.
      GO TO 6
3     J=5
      FJ=4.
      TFK=20./21.
      GO TO 6
4     J=7
      FJ=3.
      TFK=1.
      GO TO 6
5     J=10
      FJ=2.
      TFK=20./21.
6     CONTINUE
      DO 7 I=1,J
      N=N+1
      ISYMB=M
      DEN=TFK/(SUMB(M)*FJ)
      YV(N)=BALL(N)*DEN
```

```
      XP=XV(N)/2.+3.5
      YPL=YV(N)*50.+1.
      IF(YPL.LE.0.2)ISYMB=ISYMB+5
      IF(YPL.LE.0.2)YPL=0.2
      IF(YPL.GE.9.8)ISYMB=ISYMB+5
      IF(YPL.GE.9.8)YPL=9.8
      CALL SYMB(XP,YPL,0.14,ISYMB,0.0,-1)
7     CONTINUE
8     CONTINUE
      CALL PLOT(3.5,1.0,3)
      M=4
      M1=N
      N1=29
      N2=4
      N3=5
      CALL PLSFT(M,M1,N1,N2,N3,XV,YV,G,D,FP,V,IDN)
      IF(IDN.NE.1)GO TO 68
      V1=V(1)
      V2=V(2)
      V3=V(3)
      V4=V(4)
      SUMC=0.0
      ISYMB=3
      DO 9 L=1,21
      X=L
      Y=CUBIC(V1,V2,V3,V4,X)
      WTN(L)=Y
      SUMC=SUMC+Y
      X=X/2.+3.5
      YPL=Y*50.+1.
      IF(YPL.LT.0.2)YPL=0.2
      IF(YPL.GT.9.8)YPL=9.8
      CALL PLOT(X,YPL,ISYMB)
      ISYMB=2
9     CONTINUE
      CALL LLEFT
      DO 10 L=1,21
10    WTN(L)=WTN(L)/SUMC
      SUM=1./(SUM/5.)
      YCN=YC*SUM
      WRITE(6,99)
99    FORMAT(//" WEIGHTS ARE"/)
      DO 11 LS=1,19,3
      LN=LS+2
11    WRITE(6,98)LS,(WTN(L),L=LS,LN)
98    FORMAT(1H ,I3,3F10.5)
      WRITE(6,97)V1,V2,V3,V4
97    FORMAT(/" Y=",F8.5,"*X3+",F8.5,"*X2+",F8.5,"*X+",F8.5)
      WRITE(6,96)YCN
96    FORMAT(/" NEW YCAL =",F12.7)
      GO TO 69
68    IF(IDN.EQ.0)WRITE(6,95)
      IF(IDN.LE.-1)WRITE(6,94)
95    FORMAT(1H0,"MATRIX IS SINGULAR")
94    FORMAT(1H0,"NUMBER SIZE EXCEEDED")
69    CONTINUE
      STOP
      END
      END$
```

```
$WLTMC T=00004 IS ON CR00002 USING 00020 BLKS R=0146

FTN4,L,T
      PROGRAM WLTMC,3
C*******************************************************
C     WLTMC IS USED TO LOAD COMMON WITH THE DESIRED
C     PARAMETERS FOR MAG TAPE ANALYSIS WITH WLTMG.
C*******************************************************
      COMMON F,S(22),IT(6)
      COMMON A7(4,4),B7(4),XP7(4),NA7,NS7(4),SB7,BA7(4)
      COMMON A6(5,5),B6(5),XP6(5),NA6,NS6(5),SB6,BA6(5)
      COMMON A5(5,5),B5(5),XP5(5),NA5,NS5(5),SB5,BA5(5)
      COMMON A4(6,6),B4(6),XP4(6),NA4,NS4(6),SB4,BA4(6)
      COMMON A3(8,8),B3(8),XP3(8),NA3,NS3(8),SB3,BA3(8)
      COMMON A2(11,11),B2(11),XP2(11),NA2,NS2(11),SB2,BA2(11)
      COMMON P,NB,MN,IS,MS,IARRY
      COMMON IW1,IW2,IW3,IW4,IW5,IWZ
      COMMON WT(21)
      COMMON XC,YC,SN,SX,SY,SXX,SYX,DA,DS
      DIMENSION IP(5)
      CALL RMPAR(IP)
      LU1=IP(1)
      LU2=IP(2)
      LU3=IP(3)
      LP=IP(4)
      IF(LU1.EQ.0)LU1=1
      IF(LU2.EQ.0)LU2=1
      IF(LU3.EQ.0)LU3=1
      IF(LP.EQ.0)LP=1
C     ZERO OUT ARRAYS
      DO 1 I=1,11
      DO 1 J=1,11
      A2(I,J)=0.0
      B2(I)=0.0
      XP2(I)=0.0
      NS2(I)=0
      BA2(I)=0.0
      IF(I.GT.8.OR.J.GT.8)GO TO 1
      A3(I,J)=0.0
      B3(I)=0.0
      XP3(I)=0.0
      NS3(I)=0
      BA3(I)=0.0
      IF(I.GT.6.OR.J.GT.6)GO TO 1
      A4(I,J)=0.0
      B4(I)=0.0
      XP4(I)=0.0
      NS4(I)=0
      BA4(I)=0.0
      IF(I.GT.5.OR.J.GT.5)GO TO 1
      A5(I,J)=0.0
      B5(I)=0.0
      XP5(I)=0.0
      NS5(I)=0
      BA5(I)=0.0
      A6(I,J)=0.0
      B6(I)=0.0
      XP6(I)=0.0
      NS6(I)=0
      BA6(I)=0.0
```

```
      IF(I.GT.4.OR.J.GT.4)GO TO 1
      A7(I,J)=0.0
      B7(I)=0.0
      XP7(I)=0.0
      NS7(I)=0
      BA7(I)=0.0
1     CONTINUE
      NA7=0
      SB7=0.0
      NA6=0
      SB6=0.0
      NA5=0
      SB5=0.0
      NA4=0
      SB4=0.0
      NA3=0
      SB3=0.0
      NA2=0
      SB2=0.0
C     ZERO SUMS FOR WLTM1
      P=0.0
      DA=0.0
      DS=0.0
      SN=0.0
      SX=0.0
      SY=0.0
      SYX=0.0
      SXX=0.0
C     GET CALIBRATION AND WEIGHTS FOR WLTM1.
      IF(LP.NE.1)WRITE(LP,199)
199   FORMAT(1H1,2X,"CALIBRATION FACTORS FOR REAL TIME ANALYSIS"/
     *1H0,2X,"WEIGHTS FOR ANEMOMETERS ARE"/)
      IF(LU1.EQ.1)WRITE(1,99)
99    FORMAT("INPUT WEIGHTS"/)
      DO 2 I=1,21
      IF(LU1.EQ.1)WRITE(1,98)I
      READ(LU1,*)WT(I)
      IF(LP.NE.1)WRITE(LP,198)I,WT(I)
2     CONTINUE
98    FORMAT(I2,3X,"_")
198   FORMAT(1H ,I2,F10.5)
      IF(LU2.EQ.1)WRITE(1,97)
97    FORMAT("INPUT XCAL, YCAL",3X,"_")
      READ(LU2,*)XC,YC
      IF(LP.NE.1)WRITE(LP,197)XC,YC
197   FORMAT(1H0,2X,"XCAL,YCAL ARE",F10.7,",",F10.7)
      IF(LU2.EQ.1)WRITE(1,96)
96    FORMAT("INPUT # OF SENSOR",3X,"_")
      READ(LU2,*)IS
      IF(LP.NE.1)WRITE(LP,196)IS
196   FORMAT(1H0,2X,"SENSOR #",I4)
      IF(LU2.EQ.1)WRITE(1,95)
95    FORMAT("INPUT TIME INTERVAL IN MINUTES FOR WLTM3",3X,"_")
      READ(LU2,*)MN
      IF(LP.NE.1)WRITE(LP,195)MN
195   FORMAT(1H0,2X,"LEAST SQUARES READOUT EVERY",I3," MINUTES")
C     DETERMINE IF .5K OR 2K WANTED.
      IF(LU2.EQ.1)WRITE(1,93)
93    FORMAT("ENTER 0 FOR .5K OR 2 FOR 2K",3X,"_")
      READ(LU2,*)IARRY
```

```
      IF(IARRY.EQ.0)WRITE(LP,193)
      IF(IARRY.EQ.2)WRITE(LP,200)
193   FORMAT(1H0,2X,"ANALYSIS FOR THE 1/2 K ARRAY")
200   FORMAT(1H0,2X,"ANALYSIS FOR THE   2 K ARRAY")
      IF(LU3.EQ.1)WRITE(1,92)
92    FORMAT("INPUT 0 OR 1 FOR SUBS DESIRED"/
     *"OR TO DESIGNATE OTHER PARAMETERS")
      IF(LP.NE.1)WRITE(LP,192)
192   FORMAT(1H0,2X,"SUBS DESIRED OR OTHER PARAMETERS")
91    FORMAT("IW1",3X,"_")
90    FORMAT("IW2",3X,"_")
89    FORMAT("IW3",3X,"_")
88    FORMAT("IW4",3X,"_")
87    FORMAT("IW5",3X,"_")
191   FORMAT(1H ,2X,"IW1",I5)
190   FORMAT(1H ,2X,"IW2",I5)
189   FORMAT(1H ,2X,"IW3",I5)
188   FORMAT(1H ,2X,"IW4",I5)
187   FORMAT(1H ,2X,"IW5",I5)
      IF(LU3.EQ.1)WRITE(1,91)
      READ(LU3,*)IW1
      IF(LP.NE.1)WRITE(LP,191)IW1
      IF(LU3.EQ.1)WRITE(1,90)
      READ(LU3,*)IW2
      IF(LP.NE.1)WRITE(LP,190)IW2
      IF(LU3.EQ.1)WRITE(1,89)
      READ(LU3,*)IW3
      IF(LP.NE.1)WRITE(LP,189)IW3
      IF(LU3.EQ.1)WRITE(1,88)
      READ(LU3,*)IW4
      IF(LP.NE.1)WRITE(LP,188)IW4
      IF(LU3.EQ.1)WRITE(1,87)
      READ(LU3,*)IW5
      IF(LP.NE.1)WRITE(LP,187)IW5
      WRITE(1,85)
85    FORMAT("ENTER FILE # ON TAPE",3X,"_")
      READ(1,*)IWZ
      IF(LP.NE.1)WRITE(LP,185)IWZ
185   FORMAT(1H0,2X,"TAPE FILE #",I2)
      WRITE(1,84)
84    FORMAT("INPUT TIME INTERVAL IN SECONDS",3X,"_")
      READ(1,*)MS
      IF(LP.NE.1)WRITE(LP,184)MS
184   FORMAT(1H0,2X,"AVERAGING TIME IS",I3," SECONDS")
      WRITE(1,83)
83    FORMAT(/"THAT'S ALL, THANKS")
      STOP
      END
      END$
```

```
$WLTMG T=00004 IS ON CR00002 USING 00014 BLKS R=0114

FTN4,L,T
      PROGRAM WLTMG,3
C***********************************************
      COMMON F,S(22),IT(6)
      COMMON A7(4,4),B7(4),XP7(4),NA7,NS7(4),SB7,BA7(4)
      COMMON A6(5,5),B6(5),XP6(5),NA6,NS6(5),SB6,BA6(5)
      COMMON A5(5,5),B5(5),XP5(5),NA5,NS5(5),SB5,BA5(5)
      COMMON A4(6,6),B4(6),XP4(6),NA4,NS4(6),SB4,BA4(6)
      COMMON A3(8,8),B3(8),XP3(8),NA3,NS3(8),SB3,BA3(8)
      COMMON A2(11,11),B2(11),XP2(11),NA2,NS2(11),SB2,BA2(11)
      COMMON P,NB,MN,IS,MS,IARRY
      COMMON IW1,IW2,IW3,IW4,IW5,IWZ
      COMMON WT(21)
      COMMON XC,YC,SN,SX,SY,SXX,SYX,DA,DS
      DIMENSION ITM(5),IDT(94),IDATA(100)
      DIMENSION ST(37)
      DIMENSION NW4(3),MON(2)
      EQUIVALENCE (ITM(1),IDATA(1)),(IY,IDATA(6)),
     *(IDT(1),IDATA(7))
      DATA NW4/2HWL,2HTM,2H4 /
1     CONTINUE
      CALL EXEC(3,611B)
      CALL EXEC(13,9,ISTAT)
      ISTT=IAND(ISTAT,1B)
      IF(ISTT.NE.0)GO TO 1
      ISTT=IAND(ISTAT,200B)
      IF(ISTT.EQ.0)GO TO 2
      CALL EXEC(3,311B)
2     CONTINUE
      CALL EXEC(1,111B,IDATA,100)
      CALL EXEC(3,211B)
      SEC=MS
      IF(MS.EQ.0)SEC=0.5
      IDAY=ITM(5)
      LIT=ITM(3)
      CALL DATE(IDAY,MON,IY)
      WRITE(6,99)IS,SEC,IW3,ITM(4),ITM(3),ITM(2),IDAY,MON,IY
99    FORMAT(1H1,"ANALYSIS OF CH #",I3,", WITH",F5.1," SEC AVG."/
     *1H ,"WITH SLIDE FACTOR OF",I3/
     *1H ,"FOR DATA BEGINNING",I3,":",I2,":",I2," ON",I3,1X,2A2,I4
      CALL EXEC(11,ITM,IY)
      IDAY=ITM(5)
      CALL DATE(IDAY,MON,IY)
      WRITE(6,98)ITM(4),ITM(3),ITM(2),IDAY,MON,IY
98    FORMAT(1H ,"ANALYSIS STARTED",I3,":",I2,":",I2," ON",I3,1X,2A2
      IF(IW1.EQ.0)GO TO 3
      CALL WLTM5
3     CONTINUE
      DO 67 IRPT=1,32767
      F=0.0
      DO 4 I=1,37
4     ST(I)=0.0
      DO 6 I=1,200
      CALL EXEC(1,111B,IDATA,100)
      CALL EXEC(13,9,ISTAT)
      ISTAT=IAND(ISTAT,200B)
      IF(ISTAT.NE.0)GO TO 68
      F=F+1.
```

```
      DO 5 J=1,36
5     ST(J)=ST(J)+FLOAT(IDT(J))
      ST(37)=ST(37)+FLOAT(IDT(IS))
      IF(MS.EQ.0)GO TO 7
      ISTAT=MOD(ITM(2),MS)
      IF(ISTAT.NE.0)GO TO 6
      IF(ITM(1).GE.50)GO TO 6
      GO TO 7
6     CONTINUE
7     CONTINUE
      DO 8 J=1,6
8     IT(J)=IDATA(J)
      IF(IT(3).EQ.LIT)GO TO 9
      ISWTM=IT(3)+IT(4)*1000B
      CALL PSSW(ISWTM)
      LIT=IT(3)
9     CONTINUE
C     CHECK FOR .5K OR 2K RANGE
      IF(IARRY.LE.1)GO TO 12
      K=0
      DO 10 I=1,21,4
      K=K+1
10    S(K)=ST(I)*XC/F
      DO 11 I=22,36
      K=K+1
11    S(K)=ST(I)*XC/F
      GO TO 14
12    CONTINUE
      DO 13 I=1,21
13    S(I)=ST(I)*XC/F
14    CONTINUE
      S(22)=ST(37)*YC/F
C     SUM ALL POINTS
      P=P+F
      IF(IW1.EQ.0)GO TO 15
      CALL WLTM1
15    CONTINUE
      CALL WLTM2
      IF(MN.EQ.0)GO TO 67
      MO=MOD(IT(3),MN)
      IF(MO.NE.0)GO TO 67
      IF(IT(2).NE.0)GO TO 67
      IF(IT(1).GE.50)GO TO 67
      CALL WLTM3
67    CONTINUE
68    CONTINUE
      IF(IWZ.LE.1)GO TO 16
      CALL EXEC(3,211B)
      CALL EXEC(3,1411B)
      GO TO 17
16    CALL EXEC(3,411B)
17    CONTINUE
      IF(IW4.NE.1)GO TO 18
      CALL WLTM5
18    CONTINUE
      CALL WLTM3
      CALL EXEC(10,NW4)
69    CONTINUE
      STOP
      END
      END$
```

SWLTM1 T=00004 IS ON CR00002 USING 00006 BLKS R=0043

```
FTN4,L,T
      SUBROUTINE WLTM1
C*************************************************************
C     WLTM1 IS USED TO MAKE THE CORRELATION PLOT OF A SENSOR
C     VERSUS A WEIGHTED AVERAGE OF 21 ANEMOMETERS FROM DATA
C     FROM MAG TAPE.
C**************************************************
      COMMON F,S(22),IT(6)
      COMMON A7(4,4),B7(4),XP7(4),NA7,NS7(4),SB7,BA7(4)
      COMMON A6(5,5),B6(5),XP6(5),NA6,NS6(5),SB6,BA6(5)
      COMMON A5(5,5),B5(5),XP5(5),NA5,NS5(5),SB5,BA5(5)
      COMMON A4(6,6),B4(6),XP4(6),NA4,NS4(6),SB4,BA4(6)
      COMMON A3(8,8),B3(8),XP3(8),NA3,NS3(8),SB3,BA3(8)
      COMMON A2(11,11),B2(11),XP2(11),NA2,NS2(11),SB2,BA2(11)
      COMMON P,NB,MN,IS,MS,IARRY
      COMMON IW1,IW2,IW3,IW4,IW5,IWZ
      COMMON WT(21)
      COMMON XC,YC,SN,SX,SY,SXX,SYX,DA,DS
      CALL PLTLU(10)
      CALL SFACT(15.,10.)
      Y=S(22)
      X=0.0
      DO 1 I=1,21
1     X=X+S(I)*WT(I)
      SN=SN+1.0
      D=(Y-X)/10
      DA=DA+D
      DS=DS+D*D
      SX=SX+X
      SY=SY+Y
      SYX=SYX+Y*X
      SXX=SXX+X*X
      Z=ABS(X)
      IF(Z.GE.4.75)X=4.75*X/Z
      IX=(X*1000.+5000.)*2./3.
      Z=ABS(Y)
      IF(Z.GE.4.75)Y=4.75*Y/Z
      IY=Y*1000.+5000.
      CALL PLT(0,0,1,IX,IY)
69    CONTINUE
      RETURN
      END
      END$
```

```
SWLTM2 T=00004 IS ON CR00002 USING 00021 BLKS R=0205

FTN4,L,T
      SUBROUTINE WLTM2
C**************************************************************
C     WLTM2 IS USED TO LOAD THE ARRAYS FOR THE LEAST SQUARES
C     CORRELATION FIT TO WEIGHTING FACTORS FOR DATA FROM MAG
C     TAPE.
C************************************************
      COMMON F,S(22),IT(6)
      COMMON A7(4,4),B7(4),XP7(4),NA7,NS7(4),SB7,BA7(4)
      COMMON A6(5,5),B6(5),XP6(5),NA6,NS6(5),SB6,BA6(5)
      COMMON A5(5,5),B5(5),XP5(5),NA5,NS5(5),SB5,BA5(5)
      COMMON A4(6,6),B4(6),XP4(6),NA4,NS4(6),SB4,BA4(6)
      COMMON A3(8,8),B3(8),XP3(8),NA3,NS3(8),SB3,BA3(8)
      COMMON A2(11,11),B2(11),XP2(11),NA2,NS2(11),SB2,BA2(11)
      COMMON P,NB,MN,IS,MS,IARRY
      COMMON IW1,IW2,IW3,IW4,IW5,IWZ
      COMMON WT(21)
      COMMON XC,YC,SN,SX,SY,SXX,SYX,DA,DS
      DIMENSION D(11),NS(11),XP(11)
      IF(IW2.GT.1.)GO TO 68
      NB=0
      NA7=0
      NA6=0
      NA5=0
      NA4=0
      NA3=0
      NA2=0
      DO 67 INOW=1,IW5
      GO TO (1,2,3,4,5,6),INOW
1     JCNT=4
      KCNT=7
      GO TO 7
2     JCNT=5
      KCNT=6
      GO TO 7
3     JCNT=5
      KCNT=5
      GO TO 7
4     JCNT=6
      KCNT=4
      GO TO 7
5     JCNT=8
      KCNT=3
      GO TO 7
6     JCNT=11
      KCNT=2
7     CONTINUE
      NA=1
      DO 9 J=1,JCNT
      NS(NA)=0
      XP(NA)=0.0
      DO 8 K=1,KCNT
      L=(J-1)*KCNT+K+IW3
      IF(L.LT.1.OR.L.GT.21)GO TO 8
      IFLAG=L
      NS(NA)=NS(NA)+1
      XP(NA)=XP(NA)+FLOAT(L)
8     CONTINUE
```

```
      IF(NS(NA).EQ.0)GO TO 9
      ADEC=NS(NA)
      XP(NA)=XP(NA)/ADEC
      NA=NA+1
9     CONTINUE
      NA=NA-1
      GO TO (10,12,14,16,18,20),INOW
10    NA7=NA
      IF(IFLAG.LT.21)NA7=0
      NB=NB+NA7
      DO 11 J=1,JCNT
      XP7(J)=XP(J)
11    NS7(J)=NS(J)
      GO TO 67
12    NA6=NA
      IF(IW3.LE.-6)IFLAG=0
      IF(IFLAG.LT.21)NA6=0
      NB=NB+NA6
      DO 13 J=1,JCNT
      XP6(J)=XP(J)
13    NS6(J)=NS(J)
      GO TO 67
14    NA5=NA
      IF(IFLAG.LT.21)NA5=0
      NB=NB+NA5
      DO 15 J=1,JCNT
      XP5(J)=XP(J)
15    NS5(J)=NS(J)
      GO TO 67
16    NA4=NA
      IF(IFLAG.LT.21)NA4=0
      NB=NB+NA4
      DO 17 J=1,JCNT
      XP4(J)=XP(J)
17    NS4(J)=NS(J)
      GO TO 67
18    NA3=NA
      IF(IW3.LE.-3)IFLAG=0
      IF(IFLAG.LT.21)NA3=0
      NB=NB+NA3
      DO 19 J=1,JCNT
      XP3(J)=XP(J)
19    NS3(J)=NS(J)
      GO TO 67
20    NA2=NA
      IF(IFLAG.LT.21)NA2=0
      NB=NB+NA2
      DO 21 J=1,JCNT
      XP2(J)=XP(J)
21    NS2(J)=NS(J)
67    CONTINUE
      IW2=2
68    CONTINUE
      IF(NA7.LE.0)GO TO 25
      L=0
      DO 24 J=1,NA7
      KJ=NS7(J)
      D(J)=0.0
      DO 22 K=1,KJ
      L=L+1
```

```
      D(J)=D(J)+S(L)
22    CONTINUE
      ADEC=KJ
      D(J)=D(J)/ADEC
      B7(J)=B7(J)+S(22)*D(J)
      DO 23 I=1,J
23    A7(I,J)=A7(I,J)+D(I)*D(J)
24    CONTINUE
25    CONTINUE
      IF(NA6.LE.0)GO TO 29
      L=0
      DO 28 J=1,NA6
      D(J)=0.0
      KJ=NS6(J)
      DO 26 K=1,KJ
      L=L+1
      D(J)=D(J)+S(L)
26    CONTINUE
      ADEC=KJ
      D(J)=D(J)/ADEC
      B6(J)=B6(J)+S(22)*D(J)
      DO 27 I=1,J
27    A6(I,J)=A6(I,J)+D(I)*D(J)
28    CONTINUE
29    CONTINUE
      IF(NA5.LE.0)GO TO 33
      L=0
      DO 32 J=1,NA5
      D(J)=0.0
      KJ=NS5(J)
      DO 30 K=1,KJ
      L=L+1
      D(J)=D(J)+S(L)
30    CONTINUE
      ADEC=KJ
      D(J)=D(J)/ADEC
      B5(J)=B5(J)+S(22)*D(J)
      DO 31 I=1,J
31    A5(I,J)=A5(I,J)+D(I)*D(J)
32    CONTINUE
33    CONTINUE
      IF(NA4.LE.0)GO TO 37
      L=0
      DO 36 J=1,NA4
      D(J)=0.0
      KJ=NS4(J)
      DO 34 K=1,KJ
      L=L+1
      D(J)=D(J)+S(L)
34    CONTINUE
      ADEC=KJ
      D(J)=D(J)/ADEC
      B4(J)=B4(J)+S(22)*D(J)
      DO 35 I=1,J
35    A4(I,J)=A4(I,J)+D(I)*D(J)
36    CONTINUE
37    CONTINUE
      IF(NA3.LE.0)GO TO 41
      L=0
      DO 40 J=1,NA3
```

```
      D(J)=0.0
      KJ=NS3(J)
      DO 38 K=1,KJ
      L=L+1
      D(J)=D(J)+S(L)
38    CONTINUE
      ADEC=KJ
      D(J)=D(J)/ADEC
      B3(J)=B3(J)+S(22)*D(J)
      DO 39 I=1,J
39    A3(I,J)=A3(I,J)+D(I)*D(J)
40    CONTINUE
41    CONTINUE
      IF(NA2.LE.0)GO TO 69
      L=0
      DO 44 J=1,NA2
      D(J)=0.0
      KJ=NS2(J)
      DO 42 K=1,KJ
      L=L+1
      D(J)=D(J)+S(L)
42    CONTINUE
      ADEC=KJ
      D(J)=D(J)/ADEC
      B2(J)=B2(J)+S(22)*D(J)
      DO 43 I=1,J
43    A2(I,J)=A2(I,J)+D(I)*D(J)
44    CONTINUE
69    CONTINUE
      RETURN
      END
      END$
```

SWLTM3 T=00004 IS ON CR00002 USING 00011 BLKS R=0091

```
FTN4,L,T
      SUBROUTINE WLTM3
C**********************************************************
C     WLTM3 IS USED TO COMPUTE THE FIT FOR WEIGHTING FACTORS
C     FOR DATA FROM MAG TAPE.
C**********************************************
      COMMON F,S(22),IT(6)
      COMMON A7(4,4),B7(4),XP7(4),NA7,NS7(4),SB7,BA7(4)
      COMMON A6(5,5),B6(5),XP6(5),NA6,NS6(5),SB6,BA6(5)
      COMMON A5(5,5),B5(5),XP5(5),NA5,NS5(5),SB5,BA5(5)
      COMMON A4(6,6),B4(6),XP4(6),NA4,NS4(6),SB4,BA4(6)
      COMMON A3(8,8),B3(8),XP3(8),NA3,NS3(8),SB3,BA3(8)
      COMMON A2(11,11),B2(11),XP2(11),NA2,NS2(11),SB2,BA2(11)
      COMMON P,NB,MN,IS,MS,IARRY
      COMMON IW1,IW2,IW3,IW4,IW5,IWZ
      COMMON WT(21)
      COMMON XC,YC,SN,SX,SY,SXX,SYX,DA,DS
      DIMENSION A(11,11)
      WRITE(6,99)IT(4),IT(3),P
99    FORMAT(1H0,"AT",I3,":",I2," WITH",F10.0," POINTS")
      DO 69 L=1,IW5
      GO TO (1,3,5,7,9,11),L
1     CONTINUE
      IF(NA7.LE.0)GO TO 69
      DO 2 J=1,NA7
      BA7(J)=B7(J)
      DO 2 I=1,J
      A(I,J)=A7(I,J)
2     A(J,I)=A7(I,J)
      NG=7
      MTS=4
      CALL W3SUB(A,B7,XP7,NA7,NS7,SB7,BA7,NG,MTS)
      IF(NG.EQ.7)GO TO 69
      NB=NB-NA7
      NA7=-1
      GO TO 69
3     CONTINUE
      IF(NA6.LE.0)GO TO 69
      DO 4 J=1,NA6
      BA6(J)=B6(J)
      DO 4 I=1,J
      A(I,J)=A6(I,J)
4     A(J,I)=A6(I,J)
      NG=6
      MTS=5
      CALL W3SUB(A,B6,XP6,NA6,NS6,SB6,BA6,NG,MTS)
      IF(NG.EQ.6)GO TO 69
      NB=NB-NA6
      NA6=-1
      GO TO 69
5     CONTINUE
      IF(NA5.LE.0)GO TO 69
      DO 6 J=1,NA5
      BA5(J)=B5(J)
      DO 6 I=1,J
      A(I,J)=A5(I,J)
6     A(J,I)=A5(I,J)
      NG=5
```

```
      MTS=5
      CALL W3SUB(A,B5,XP5,NA5,NS5,SB5,BA5,NG,MTS)
      IF(NG.EQ.5)GO TO 69
      NB=NB-NA5
      NA5=-1
      GO TO 69
7     CONTINUE
      IF(NA4.LE.0)GO TO 69
      DO 8 J=1,NA4
      BA4(J)=B4(J)
      DO 8 I=1,J
      A(I,J)=A4(I,J)
8     A(J,I)=A4(I,J)
      NG=4
      MTS=6
      CALL W3SUB(A,B4,XP4,NA4,NS4,SB4,BA4,NG,MTS)
      IF(NG.EQ.4)GO TO 69
      NB=NB-NA4
      NA4=-1
      GO TO 69
9     CONTINUE
      IF(NA3.LE.0)GO TO 69
      DO 10 J=1,NA3
      BA3(J)=B3(J)
      DO 10 I=1,J
      A(I,J)=A3(I,J)
10    A(J,I)=A3(I,J)
      NG=3
      MTS=8
      CALL W3SUB(A,B3,XP3,NA3,NS3,SB3,BA3,NG,MTS)
      IF(NG.EQ.3)GO TO 69
      NB=NB-NA3
      NA3=-1
      GO TO 69
11    CONTINUE
      IF(NA2.LE.0)GO TO 69
      DO 12 J=1,NA2
      BA2(J)=B2(J)
      DO 12 I=1,J
      A(I,J)=A2(I,J)
12    A(J,I)=A2(I,J)
      NG=2
      MTS=11
      CALL W3SUB(A,B2,XP2,NA2,NS2,SB2,BA2,NG,MTS)
      IF(NG.EQ.2)GO TO 69
      NB=NB-NA2
      NA2=-1
69    CONTINUE
      RETURN
      END
C**************************************************************************
      SUBROUTINE W3SUB(A,B,XP,NA,NS,SB,BA,NG,MTS)
      DIMENSION A(11,11),B(MTS),XP(MTS),NS(MTS),BA(MTS)
      M=NA
      SB=0.0
      A11=A(1,1)
      IF(A11.EQ.0)GO TO 68
      DO 1 I=2,M
      A(1,I)=A(I,1)/A11
      BA(1)=BA(1)/A11
```

```
      DO 5 J=2,M
      J1=J-1
      DO 3 I=J,M
      AS=0.0
      DO 2 K=1,J1
    2 AS=AS+A(I,K)*A(K,J)
      A(I,J)=A(I,J)-AS
      IF(I.GT.J)A(J,I)=A(I,J)/A(J,J)
    3 CONTINUE
      BS=0.0
      DO 4 K=1,J1
    4 BS=BS+A(J,K)*BA(K)
      AJJ=A(J,J)
      IF(AJJ.EQ.0)GO TO 68
    5 BA(J)=(BA(J)-BS)/AJJ
      M1=M-1
      DO 7 I=1,M1
      BS=0.0
      MI=M-I
      MI1=MI+1
      DO 6 J=MI1,M
    6 BS=BS+A(MI,J)*BA(J)
      BA(MI)=BA(MI)-BS
    7 CONTINUE
      WRITE(6,99)NG
   99 FORMAT(1H0,"FOR GROUPS OF",I3)
      WRITE(6,98)(NS(J),J=1,M)
   98 FORMAT(1H ,"#",11I6)
      WRITE(6,97)(XP(J),J=1,M)
   97 FORMAT(1H ,"X",11F6.1)
      WRITE(6,96)(BA(J),J=1,M)
   96 FORMAT(1H ,"Y",11F6.3)
      DO 8 I=1,M
      SB=SB+BA(I)
    8 CONTINUE
      WRITE(6,95)SB
   95 FORMAT(1H ,"SUM OF WEIGHTS =",F8.5)
      GO TO 69
   68 CONTINUE
      WRITE(6,94)NG
   94 FORMAT(1H0,"FOR GROUPS OF",I3," MATRIX IS SINGULAR")
      NG=-1
   69 CONTINUE
      RETURN
      END
      END$
```

SWLTM5 T=00004 IS ON CR00002 USING 00018 BLKS R=0142

```
FTN4,L,T
      SUBROUTINE WLTM5
C*******************************************************
C     WLTM5 IS A PROGRAM WHICH WILL REPORT THE NECESSARY
C     INFORMATION ON PLOTS AND DRAW THE GRID IF REQUIRED.
C**********************************************
      COMMON F,S(22),IT(6)
      COMMON A7(4,4),B7(4),XP7(4),NA7,NS7(4),SB7,BA7(4)
      COMMON A6(5,5),B6(5),XP6(5),NA6,NS6(5),SB6,BA6(5)
      COMMON A5(5,5),B5(5),XP5(5),NA5,NS5(5),SB5,BA5(5)
      COMMON A4(6,6),B4(6),XP4(6),NA4,NS4(6),SB4,BA4(6)
      COMMON A3(8,8),B3(8),XP3(8),NA3,NS3(8),SB3,BA3(8)
      COMMON A2(11,11),B2(11),XP2(11),NA2,NS2(11),SB2,BA2(11)
      COMMON P,NB,MN,IS,MS,IARRY
      COMMON IW1,IW2,IW3,IW4,IW5,IWZ
      COMMON WT(21)
      COMMON XC,YC,SN,SX,SY,SXX,SYX,DA,DS
      DIMENSION NA(2),NS(2),NP(2),NFS(2),NFL(2)
      DIMENSION MON(2),NCH(2),NSEC(2)
      DATA NA/2HAV,2HG=/,NS/2HSD,2HV=/
      DATA NP/2H#P,2HTS/
      DATA NFL/2HFI,2HLE/,NFS/2HFS,2H= /
      DATA NSEC/2HSE,2HC /
      DATA NCH/2HCH,2H# /
      NY=54475B
      NX=54053B
      CALL PLTLU(10)
      CALL SFACT(15.,10.)
      CALL LLEFT
      CALL PLOT(0.0,0.0,-1)
      IF(IW1.EQ.0)GO TO 5
      CALL PLOT(0.5,5.0,3)
      CALL PLOT(9.5,5.0,2)
      CALL PLOT(5.0,0.5,3)
      CALL PLOT(5.0,9.5,2)
      CALL DASH(0.5,0.5,0.5,0.5,-1)
      CALL DASH(0.5,0.5,9.5,9.5,1)
      IF(IW1.LE.1)GO TO 69
      D=SX*SX-SN*SXX
      A=(SX*SY-SN*SYX)/D
      B=(SX*SYX-SY*SXX)/D
      X=-4.0
 1    CONTINUE
      Y=A*X+B
      Z=ABS(Y)
      IF(Z.LE.4.75)GO TO 2
      X=X+.5
      GO TO 1
 2    CONTINUE
      X=X+5.
      Y=Y+5.
      CALL PLOT(X,Y,3)
      X=4.0
 3    CONTINUE
      Y=A*X+B
      Z=ABS(Y)
      IF(Z.LE.4.75)GO TO 4
      X=X-0.5
```

```
      GO TO 3
4     CONTINUE
      X=X+5.
      Y=Y+5.
      CALL PLOT(X,Y,2)
      DATT=DA/SN
      DSTT=SQRT((DS/SN)-DATT*DATT)
5     CONTINUE
      CALL LLEFT
      CALL PLOT(0.,0.,-1)
      IDAY=IT(5)
      IYEAR=IT(6)
      CALL DATE(IDAY,MON,IYEAR)
      DAY=IDAY
      YEAR=IYEAR
      FILE=IWZ
      CHN=IS
      SEC=MS
      IF(MS.EQ.0)SEC=0.5
      FS=5./(XC*30.)
      CALL NUMB(1.0,9.0,0.14,DAY,0.0,-1)
      CALL SYMB(1.56,9.0,0.14,MON,0.0,3)
      CALL NUMB(2.25,9.0,0.14,YEAR,0.0,-1)
      CALL SYMB(1.0,8.5,0.14,NCH,0.0,3)
      CALL NUMB(1.56,8.5,0.14,CHN,0.0,-1)
      CALL NUMB(2.25,8.5,0.14,SEC,0.0,1)
      CALL SYMB(2.85,8.5,0.14,NSEC,0.0,3)
      CALL SYMB(3.40,8.5,0.14,NFL,0.0,4)
      CALL NUMB(4.10,8.5,0.14,FILE,0.0,-1)
      IF(IW1.EQ.0)GO TO 69
      CALL SYMB(1.0,8.0,0.14,NFS,0.0,3)
      CALL NUMB(999.0,999.0,0.14,FS,0.0,1)
      CALL SYMB(1.0,7.5,0.14,NY,0.0,2)
      CALL NUMB(999.0,999.0,0.14,A,0.0,3)
      CALL SYMB(999.0,999.0,0.14,NX,0.0,2)
      CALL NUMB(999.0,999.0,0.14,B,0.0,3)
      CALL SYMB(1.0,7.0,0.14,NA,0.0,4)
      CALL NUMB(999.0,999.0,0.14,DATT,0.0,3)
      CALL SYMB(3.0,7.0,0.14,NS,0.0,4)
      CALL NUMB(999.0,999.0,0.14,DSTT,0.0,3)
      CALL SYMB(1.0,6.5,0.14,NP,0.0,4)
      CALL NUMB(1.60,6.5,0.14,SN,0.0,-1)
      CALL LLEFT
69    CONTINUE
      IF(IW1.EQ.1)IW1=2
      RETURN
      END
      END$
```

```
$WLTM4 T=00004 IS ON CR00002 USING 00012 BLKS R=0097

FTN4,L,T
      PROGRAM WLTM4,3
C************************************************************
C     WLTM4 IS A PROGRAM WHICH NORMALIZES THE RESULTS OF WLTM3,
C     PLOTS, REPORTS, AND PUNCHES A TAPE OF THESE RESULTS.
C     IT CAN ALSO RESCHEDULE WLTMG FOR A REPEAT WITH A DIFFERENT
C     SLIDE FACTOR
C**************************************************
      COMMON F,S(22),IT(6)
      COMMON A7(4,4),B7(4),XP7(4),NA7,NS7(4),SB7,BA7(4)
      COMMON A6(5,5),B6(5),XP6(5),NA6,NS6(5),SB6,BA6(5)
      COMMON A5(5,5),B5(5),XP5(5),NA5,NS5(5),SB5,BA5(5)
      COMMON A4(6,6),B4(6),XP4(6),NA4,NS4(6),SB4,BA4(6)
      COMMON A3(8,8),B3(8),XP3(8),NA3,NS3(8),SB3,BA3(8)
      COMMON A2(11,11),B2(11),XP2(11),NA2,NS2(11),SB2,BA2(11)
      COMMON P,NB,MN,IS,MS,IARRY
      COMMON IW1,IW2,IW3,IW4,IW5,IWZ
      COMMON WT(21)
      COMMON XC,YC,SN,SX,SY,SXX,SYX,DA,DS
      DIMENSION NMG(3)
      DATA NMG/2HWL,2HTM,2HG /
      CALL EXEC(3,1004B)
      WRITE(4,99)NB
99    FORMAT(I3)
      DO 7 M=1,IW5
      GO TO (1,2,3,4,5,6),M
1     IF(NA7.LE.0)GO TO 7
      NG=7
      MTS=4
      CALL W4SUB(XP7,NA7,NS7,SB7,BA7,NG,MTS)
      GO TO 7
2     IF(NA6.LE.0)GO TO 7
      NG=6
      MTS=5
      CALL W4SUB(XP6,NA6,NS6,SB6,BA6,NG,MTS)
      GO TO 7
3     IF(NA5.LE.0)GO TO 7
      NG=5
      MTS=5
      CALL W4SUB(XP5,NA5,NS5,SB5,BA5,NG,MTS)
      GO TO 7
4     IF(NA4.LE.0)GO TO 7
      NG=4
      MTS=6
      CALL W4SUB(XP4,NA4,NS4,SB4,BA4,NG,MTS)
      GO TO 7
5     IF(NA3.LE.0)GO TO 7
      NG=3
      MTS=8
      CALL W4SUB(XP3,NA3,NS3,SB3,BA3,NG,MTS)
      GO TO 7
6     IF(NA2.LE.0)GO TO 7
      NG=2
      MTS=11
      CALL W4SUB(XP2,NA2,NS2,SB2,BA2,NG,MTS)
7     CONTINUE
      CALL EXEC(11,IT)
      WRITE(6,98)IT(4),IT(3),IT(2)
```

```
98    FORMAT(1H0,"ANALYSIS COMPLETED",I3,":",I2,":",I2)
      CALL EXEC(3,1004B)
      IF(IW4.EQ.1)GO TO 69
      IF(IW3.GE.0)GO TO 69
      IW3=IW3+1
      IF(IW3.EQ.0)IW4=1
      IW1=0
      IW2=1
C     ZERO OUT ARRAYS FOR WLTM2 AND 3
      DO 8 I=1,11
      DO 8 J=1,11
      A2(I,J)=0.0
      B2(I)=0.0
      NS2(I)=0
      IF(I.GT.8.OR.J.GT.8)GO TO 8
      A3(I,J)=0.0
      B3(I)=0.0
      NS3(I)=0
      IF(I.GT.6.OR.J.GT.6)GO TO 8
      A4(I,J)=0.0
      B4(I)=0.0
      NS4(I)=0
      IF(I.GT.5.OR.J.GT.5)GO TO 8
      A5(I,J)=0.0
      B5(I)=0.0
      NS5(I)=0
      A6(I,J)=0.0
      B6(I)=0.0
      NS6(I)=0
      IF(I.GT.4.OR.J.GT.4)GO TO 8
      A7(I,J)=0.0
      B7(I)=0.0
      NS7(I)=0
8     CONTINUE
      P=0.0
      CALL EXEC(10,NMG)
69    CONTINUE
      STOP
      END
C*************************************************************
      SUBROUTINE W4SUB(XP,NA,NS,SB,BA,NG,MTS)
      DIMENSION XP(MTS),NS(MTS),BA(MTS)
      CALL PLTLU(10)
      CALL SFACT(15.,10.)
      CALL LLEFT
      CALL PLOT(0.0,0.0,-1)
      CALL PLOT(3.5,1.0,3)
      DO 1 I=1,NA
      BA(I)=BA(I)/(SB*FLOAT(NS(I)))
      XV=XP(I)/2.+3.5
      YP=BA(I)*50.+1.
      IF(YP.LE.0.2)YP=0.2
      IF(YP.GE.9.8)YP=9.8
      CALL SYMB(XV,YP,0.14,NG,0.0,-1)
1     CONTINUE
      WRITE(6,99)NG
99    FORMAT(1H0,"NORMALIZED WEIGHTS FOR GROUPS OF",I3)
      WRITE(6,98)(NS(I),I=1,NA)
98    FORMAT(1H ,"#",11I6)
      WRITE(6,97)(XP(I),I=1,NA)
```

```
97    FORMAT(1H ,"X",11F6.1)
      WRITE(6,96)(BA(I),I=1,NA)
96    FORMAT(1H ,"Y",11F6.3)
      WRITE(4,95)(NG,NS(I),XP(I),BA(I),I=1,NA)
95    FORMAT(I2,",",I3,",",F5.1,",",F9.5)
      CALL LLEFT
      RETURN
      END
      END$
```

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