Climatic Atlas of Texas

LP-192

TEXAS DEPARTMENT OF WATER RESOURCES

DECEMBER 1983

CLIMATIC ALTAS OF TEXAS

By

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PREFACE

Climatological data is published in the form of tables with columns of numbers that indicate average conditions for a designated place. These data are used to define climate in terms of precipitation, temperature, evaporation and wind—the primary components of climatic description. However, the use of rows and columns of numbers is awkward when trying to visualize and interpret the relative changes of climatic components over a large area. The purpose of this atlas is to illustrate the statewide distribution of these primary climatic components. This is accomplished by contour analysis of data points on state maps that delineate county shapes and show county names. These maps depict long-term averages of monthly and annual climatic conditions. The maps were analyzed by Department meteorologists.

The authors of this atlas wish to thank the Chief of the Weather and Climate Section, Robert F. Riggio, for his guidance and William H. Hanshaw for plotting the data; Bobbie R. Critendon in Surface Water Data for his review of the evaporation analyses; Data Systems staff members Carl A. Johnson and Marion H. Porter for developing the computer-generated wind roses; and Graphic Arts staff members Carey E. Johnson and Ellen A. Wadsworth for drafting the contour maps.

ABSTRACT

Climate is the history of weather and is defined by the long-term averages of atmospheric variables such as precipitation, temperature, evaporation and wind. This atlas identifies "average" conditions of these four major components of climate through a series of maps and wind roses.

The maps depict the statewide distribution of monthly and annual values of **average precipitation, average temperature,** and **average gross lake surface evaporation rates.** Wind roses show the frequency of occurrence of **average wind direction and speed** in selected cities across the State.

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INTRODUCTION

Climate is the long-term history of weather. **Weather** is the result of short-term changes in the atmosphere caused by the movement of large air masses. Weather is reported by cloud cover, precipitation, visibility, temperature, relative humidity, wind, air pressure and atmospheric phenomena. The climate of an area is described in terms of its major components which most often are **average precipitation, average temperature, average evaporation rates,** and **average wind direction and speed.**

The statewide distribution of these four climatic components are illustrated for Texas by the series of maps and wind roses in this atlas. The maps have been analyzed using 30-year records, whereas the wind roses are based upon approximate 10-year to 20-year records.

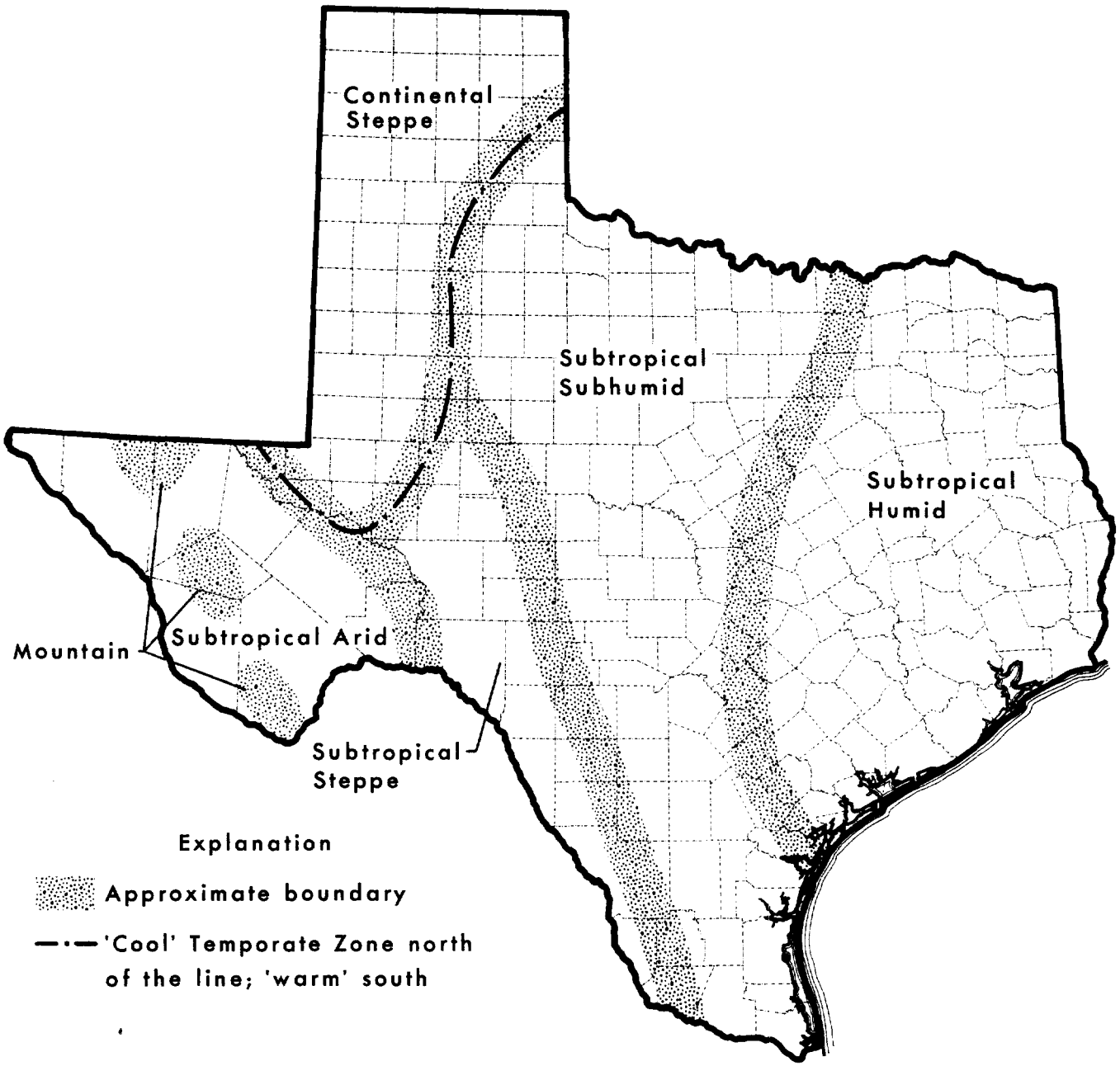
The earliest known descriptions of climate, made by the Greek Civilization, are based on the influence of the sun on the earth. The word climate is derived from the Greek **klima** which means "inclination" of the sun. The evolution of describing the climate of an area began by dividing the earth into zones which accounted for the effects of the solar influence. Today, the names of these zones and their location in the northern hemisphere are "Frigid" in the polar latitudes, "Temperate" in the mid-latitudes, and "Torrid" in the tropical latitudes. The major classification scheme which describes global climate today was developed by W. Köppen in 1918 and C. W. Thorthwaite in 1931. These schemes are based on average annual and seasonal temperature and precipitation and have been expanded and altered by climatologists over the years to fill particular needs.

The State of Texas lies within both "cool" and "warm" parts of the Temperate Zone of the northern hemisphere. Texas has three major climatic types which are classified as **Continental, Mountain,** and **Modified Marine.** There are no distinct boundaries which divide these climate types, but the approximate area of Texas that each encompasses is indicated on the following map by the broad stippled lines.

A Continental Steppe climate is prevalent in the Texas High Plains. This climate type is typical of interiors of continents and is characterized by large variations in the magnitude of ranges in daily temperature extremes, low relative humidity, and irregularly-spaced rainfall of moderate amounts. The main feature of this climate in Texas is semi-arid with mild winters.

The Mountain climate is dominant in the Guadalupe, Davis and Chisos Mountains of the Trans-Pecos region of Texas. The characteristics of this climate are cooler temperatures, lower relative humidity, orographic precipitation anomalies and less dense air. The mountain climate is contrasted by the Subtropical Arid climate of the surrounding lowlands.

Most of the State, climatologically, has a Modified Marine climate which is classified and named "Subtropical," with four subheadings. A marine climate is caused by the predominant onshore flow of tropical maritime air from the Gulf of Mexico. The onshore flow is modified by a decrease in moisture content from east to west and by intermittent seasonal intrusions of continental air. The four subheadings of Subtropical—Humid, Subhumid, Semi-arid and Arid—account for the changes in moisture content of the northward flow of Gulf air across the State.



Regions of Climate Classification in Texas

The climatic descriptions of the regions delineated on the map are given below:

— The eastern third of Texas has a Subtropical Humid climate that is most noted for warm summers.

— The central third of Texas has a Subtropical Subhumid climate characterized by hot summers and dry winters.

— The broad swath of Texas from the mid-Rio Grande Valley to the Pecos Valley has a Subtropical Steppe climate and is typified by semi-arid to arid conditions.

— The basin and plateau region of the Trans-Pecos features a Subtropical Arid climate that is marked by summertime precipitation anomalies of the mountain relief.

— A Mountain type climate is common in the higher elevations of the Guadalupe, Davis and Chisos mountains.

The variation of climate types in Texas is caused by the physical influences of the State being located (1) downwind from mountain ranges to the west, (2) proximate to the Gulf of Mexico and the southern Great Plains, (3) west of the center of the Bermuda high pressure cell, (4) at relatively a low latitude, and by (5) the changes in land elevation from the high plains and mountains to the coastal plains. These influences on the weather—particularly on the moisture content of the air—define climate and are evident by comparing the changes of contour patterns that are illustrated on the monthly series of maps in the following sections.

Anomalous climatic events can cause severe hardships on the State's economy. Prolonged dry periods can cause losses in food and fiber production; flooding can cause losses to private and public property and increased transportation costs; and prolonged extreme temperatures—high and low—can increase costs of additional energy consumption. In any given year these losses can exceed $1 billion. This atlas provides information concerning average climatic conditions which can be used as a basis for studying and understanding the relative adversities of future anomalous climatic events.

AVERAGE PRECIPITATION

Definition of Terms

Precipitation consists of any or all of the forms of water droplets, whether liquid or solid, that fall from the atmosphere and reach the ground. Liquid precipitation includes drizzle as well as rainfall, whereas solid precipitation consists of snow, ice pellets, hail, ice crystals, and freezing rain or drizzle.

Values of average precipitation depicted on pages 6-18 are expressed in inches and are based upon observations of both liquid and solid precipitation. The water equivalent (liquid content) of solid precipitation was, in most cases, determined by melting the solid form of precipitation, then measuring its liquid equivalent.

Source of Data

Precipitation data were obtained through the Cooperative Observer Network of the National Weather Service. Measurements of precipitation were made daily at 389 sites in Texas, including all National Weather Service (NWS) and Federal Aviation Administration (FAA) weather-observing stations.

Nearly all of the measurements of precipitation were made using a standard, 8-inch non-recording rain gage furnished the observer by the NWS. This gage, whose capacity is 20 inches, provides the capability of measuring the water equivalent of precipitation easily to hundredths of an inch. At about one of every 20 weather-observing sites, measurements of precipitation were made with a weighing-type recording rain gage having the capability to provide information on the intensity and distribution of precipitation as well as quantity of precipitation.

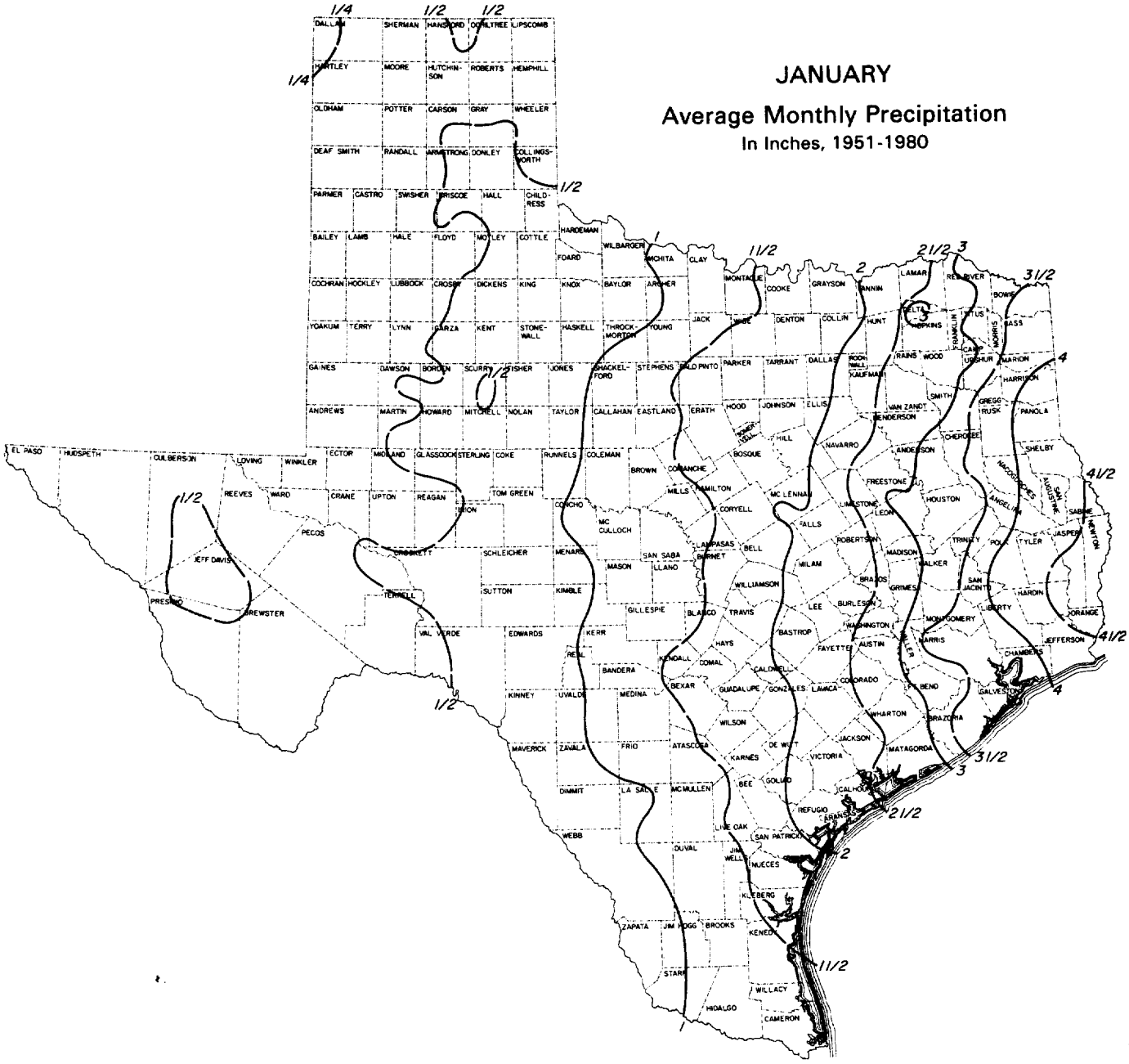
Period of Record

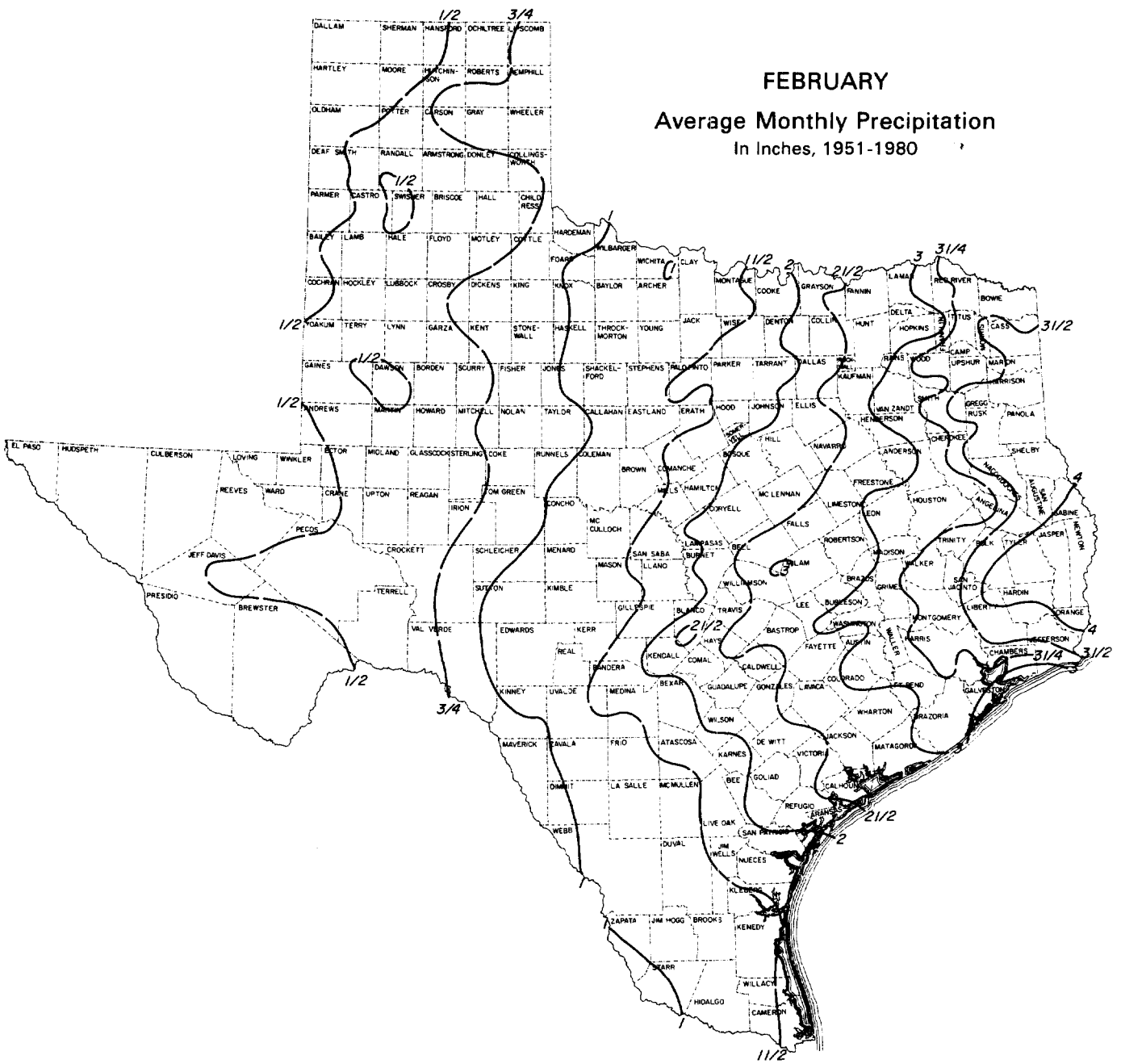
The analyses of average precipitation given on the following pages are based upon observations made at 389 cooperative weather stations in Texas. These stations were selected from among the more than 600 precipitation-gaging sites now existing in Texas because complete or nearly-continuous weather records have been obtained (listed in the Appendix) for a 30-year period. Continuous data for periods of at least 30 years are believed by climatologists to be representative of "average" conditions.

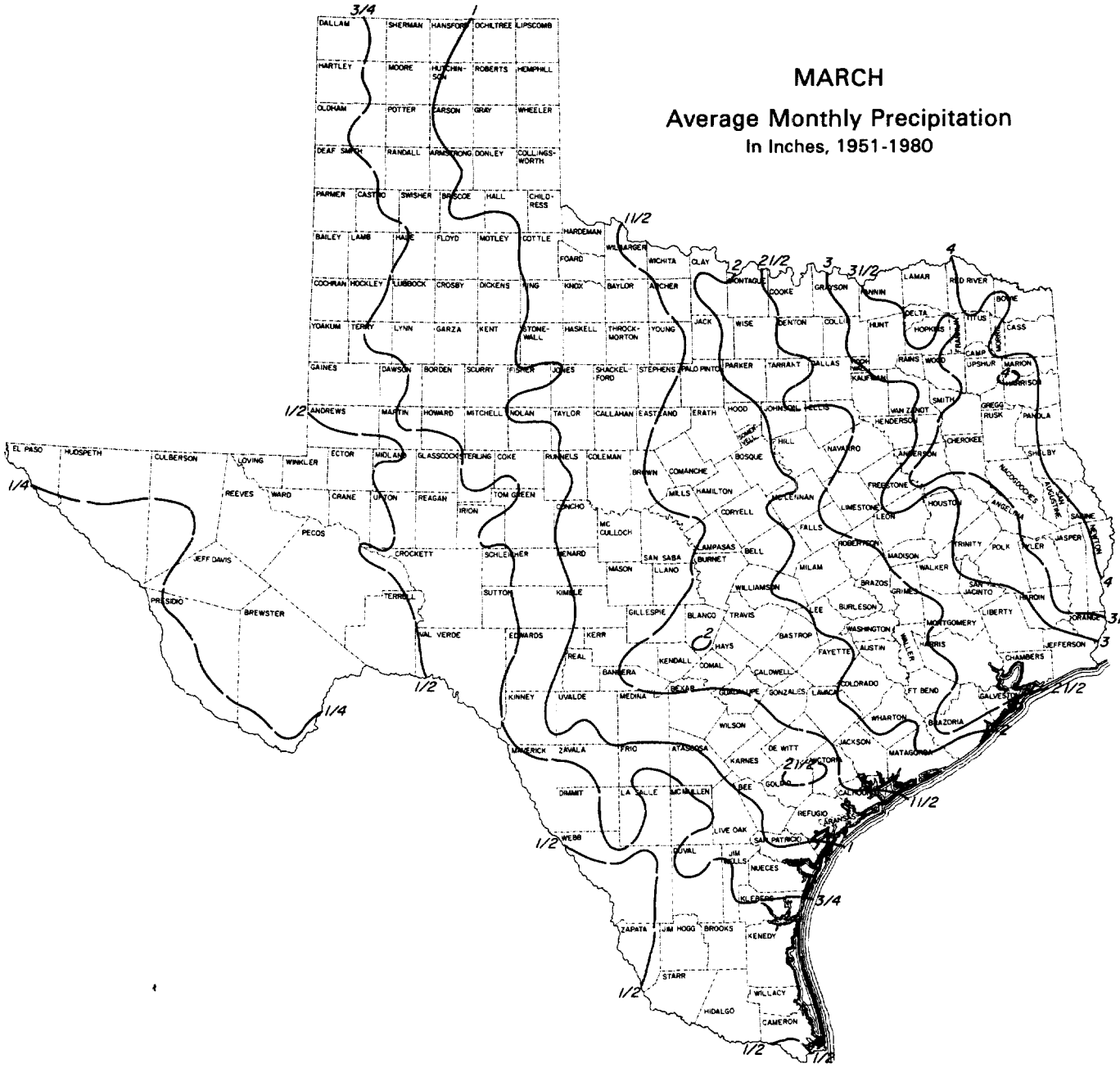
The data used in the analyses of mean precipitation are for the period 1951-1980.

NOTE: Caution should be exercised in interpolating for average precipitation in the mountain-basin-plateau region in western Texas where differences of several inches may occur because of abrupt changes in land elevation.

AVERAGE MONTHLY PRECIPITATION MAPS


JANUARY
Average Monthly Precipitation
In Inches, 1951-1980
1/4
1/2
1/2
1/4
1/2
1
1 1/2
2
2 1/2
3
3 1/2
4
4 1/2
1/2
1/2
1/2
1 1/2
2
2 1/2
3
3 1/2
4
4 1/2
1
1 1/2
DALLAM
SHERMAN
HANSFORD
OCHILTREE
LIPSCOMB
HARTLEY
MOORE
HUTCHIN-SON
ROBERTS
HEMPHILL
OLDHAM
POTTER
CARSON
GRAY
WHEELER
DEAF SMITH
RANDALL
ARMSTRONG
DONLEY
COLLINGS-WORTH
PARMER
CASTRO
SWISHER
BRISCOE
HALL
CHILD-RESS
BAILEY
LAMB
HALE
FLOYD
MOTLEY
COTTLE
HARDEMAN
FOARD
WILBARGER
WICHITA
CLAY
MONTAGUE
COOKE
GRAYSON
FANNIN
LAMAR
RED RIVER
BOWIE
COCHRAN
HOCKLEY
LUBBOCK
CROSBY
DICKENS
KING
KNOX
BAYLOR
ARCHER
YOAKUM
TERRY
LYNN
GARZA
KENT
STONE-WALL
HASKELL
THROCK-MORTON
YOUNG
JACK
WISE
DENTON
COLLIN
HUNT
DELTA
HOPKINS
FRANKLIN
TITUS
MORRIS
CASS
GAINES
DAWSON
BORDEN
SCURRY
FISHER
JONES
SHACKEL-FORD
STEPHENS
PALO PINTO
PARKER
TARRANT
DALLAS
ROCK-WALL
KAUFMAN
RAINS
WOOD
UPSHUR
MARION
HARRISON
ANDREWS
MARTIN
HOWARD
MITCHELL
NOLAN
TAYLOR
CALLAHAN
EASTLAND
ERATH
HOOD
JOHNSON
ELLIS
VAN ZANDT
SMITH
GREGG
RUSK
PANOLA
HENDERSON
CHEROKEE
ANDERSON
SHELBY
EL PASO
HUDSPETH
CULBERSON
LOVING
WINKLER
ECTOR
MIDLAND
GLASSCOCK
STERLING
COKE
RUNNELS
COLEMAN
BROWN
COMANCHE
BOSQUE
HILL
NAVARRO
FREESTONE
LIMESTONE
LEON
HOUSTON
NACOGDOCHES
ANGELINA
SABINE
REEVES
WARD
CRANE
UPTON
REAGAN
IRION
TOM GREEN
MILLS
HAMILTON
MC LENNAN
CORYELL
FALLS
ROBERTSON
MADISON
TRINITY
POLK
TYLER
JASPER
NEWTON
CONCHO
MC CULLOCH
PECOS
CROCKETT
SCHLEICHER
MENARD
MASON
SAN SABA
LLANO
LAMPASAS
BURNET
BELL
MILAM
BRAZOS
GRIMES
WALKER
SAN JACINTO
HARDIN
JEFF DAVIS
PRESIDIO
BREWSTER
TERRELL
SUTTON
KIMBLE
WILLIAMSON
GILLESPIE
BLANCO
TRAVIS
LEE
BURLESON
WASHINGTON
MONTGOMERY
LIBERTY
ORANGE
VAL VERDE
EDWARDS
KERR
HAYS
BASTROP
AUSTIN
FAYETTE
HARRIS
JEFFERSON
CHAMBERS
REAL
KENDALL
COMAL
BANDERA
BEXAR
GUADALUPE
CALDWELL
GONZALES
LAVACA
COLORADO
FT BEND
GALVESTON
KINNEY
UVALDE
MEDINA
WILSON
WHARTON
BRAZORIA
MAVERICK
ZAVALA
FRIO
ATASCOSA
DE WITT
JACKSON
MATAGORDA
KARNES
VICTORIA
DIMMIT
LA SALLE
MC MULLEN
BEE
GOLIAD
CALHOUN
REFUGIO
ARANSAS
WEBB
LIVE OAK
SAN PATRICIO
DUVAL
JIM WELLS
NUECES
KLEBERG
ZAPATA
JIM HOGG
BROOKS
KENEDY
STARR
WILLACY
HIDALGO
CAMERON


FEBRUARY
Average Monthly Precipitation
In Inches, 1951-1980


MARCH
Average Monthly Precipitation
In Inches, 1951-1980
3/4
1
1 1/2
2
2 1/2
3
3 1/2
4
1/2
1/4
3 1/2
2 1/2
1 1/2
3/4
1/2
1/2
1/2
1/4
DALLAM
SHERMAN
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WICHITA
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GRAYSON
FANNIN
LAMAR
RED RIVER
BOWIE
COCHRAN
HOCKLEY
LUBBOCK
CROSBY
DICKENS
KING
KNOX
BAYLOR
ARCHER
YOAKUM
TERRY
LYNN
GARZA
KENT
STONEWALL
HASKELL
THROCKMORTON
YOUNG
JACK
WISE
DENTON
COLLIN
HUNT
DELTA
HOPKINS
FRANKLIN
TITUS
CASS
MORRIS
GAINES
DAWSON
BORDEN
SCURRY
FISHER
JONES
SHACKELFORD
STEPHENS
PALO PINTO
PARKER
TARRANT
DALLAS
KAUFMAN
RAINS
WOOD
UPSHUR
CAMP
MARION
HARRISON
ANDREWS
MARTIN
HOWARD
MITCHELL
NOLAN
TAYLOR
CALLAHAN
EASTLAND
ERATH
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COLEMAN
BROWN
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FREESTONE
LIMESTONE
HOUSTON
ANGELINA
SABINE
REEVES
WARD
CRANE
UPTON
REAGAN
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CONCHO
MILLS
HAMILTON
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MCLENNAN
LEON
PECOS
MC CULLOCH
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POLK
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SCHLEICHER
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WILLIAMSON
BRAZOS
GRIMES
SAN JACINTO
HARDIN
LIBERTY
ORANGE
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TRAVIS
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BURLESON
WASHINGTON
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JEFFERSON
VAL VERDE
EDWARDS
KERR
HAYS
BASTROP
FAYETTE
AUSTIN
HARRIS
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BEXAR
GUADALUPE
GONZALES
LAVACA
KINNEY
UVALDE
MEDINA
WHARTON
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DE WITT
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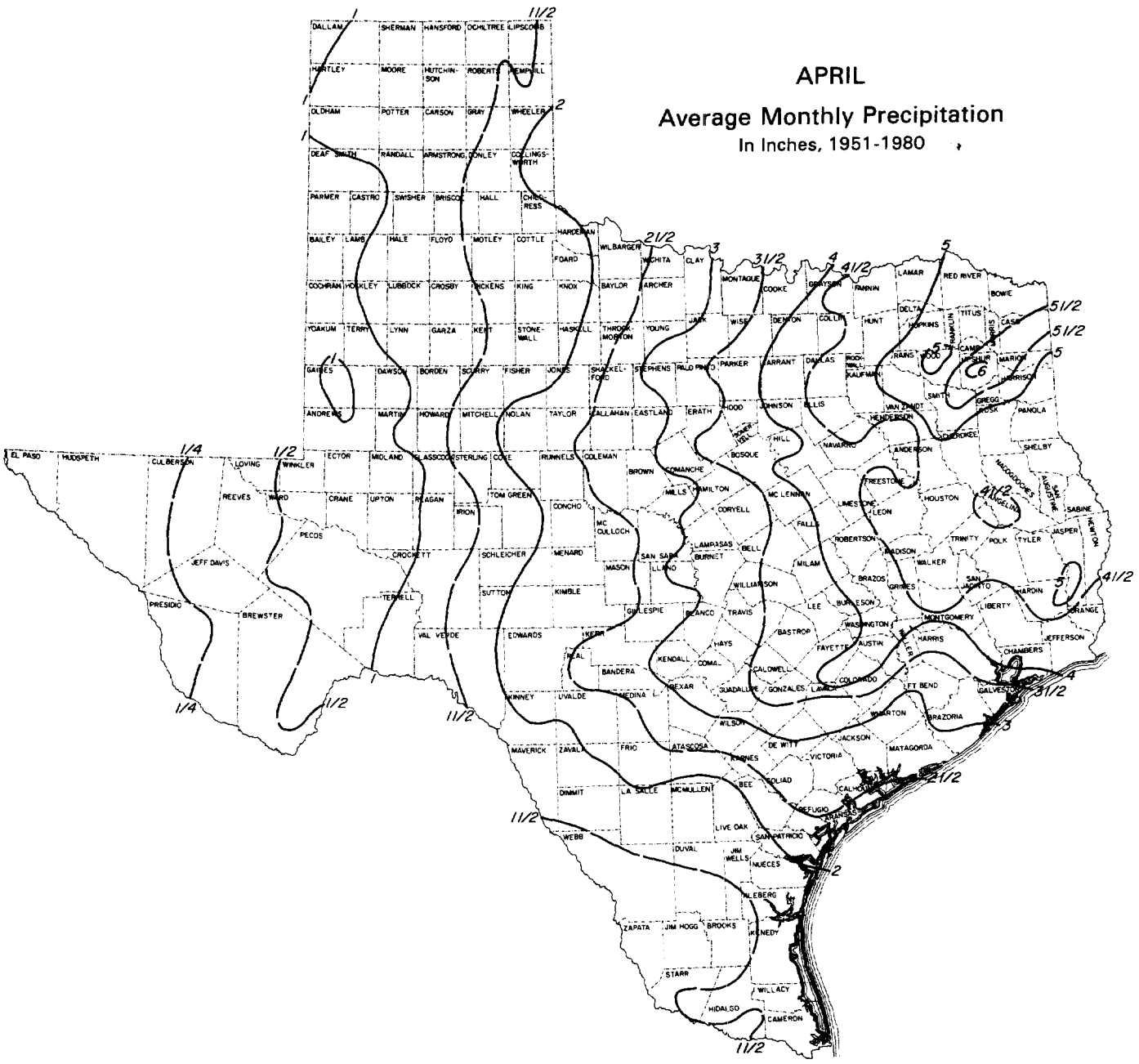
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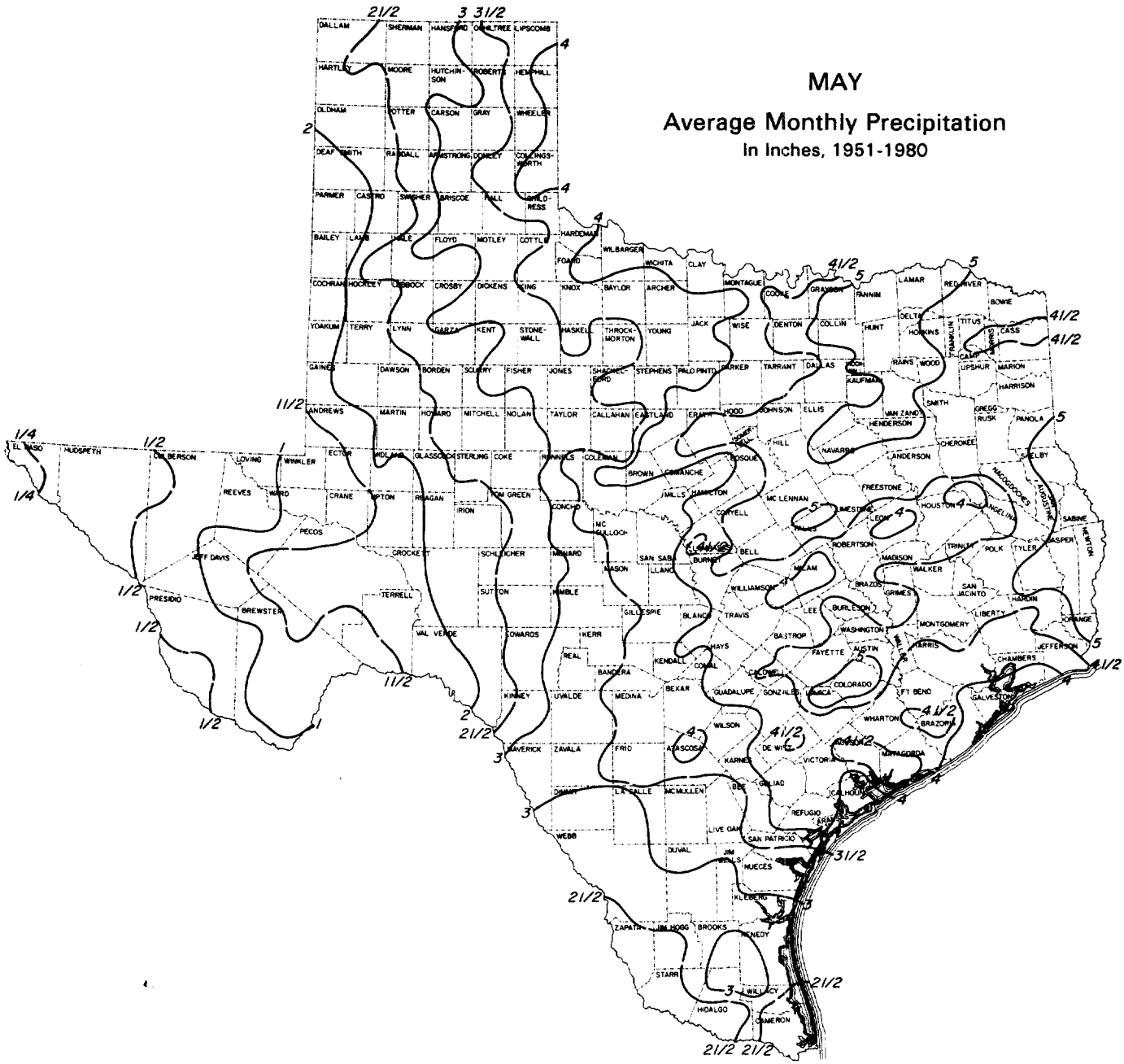
Average Monthly Precipitation
In Inches, 1951-1980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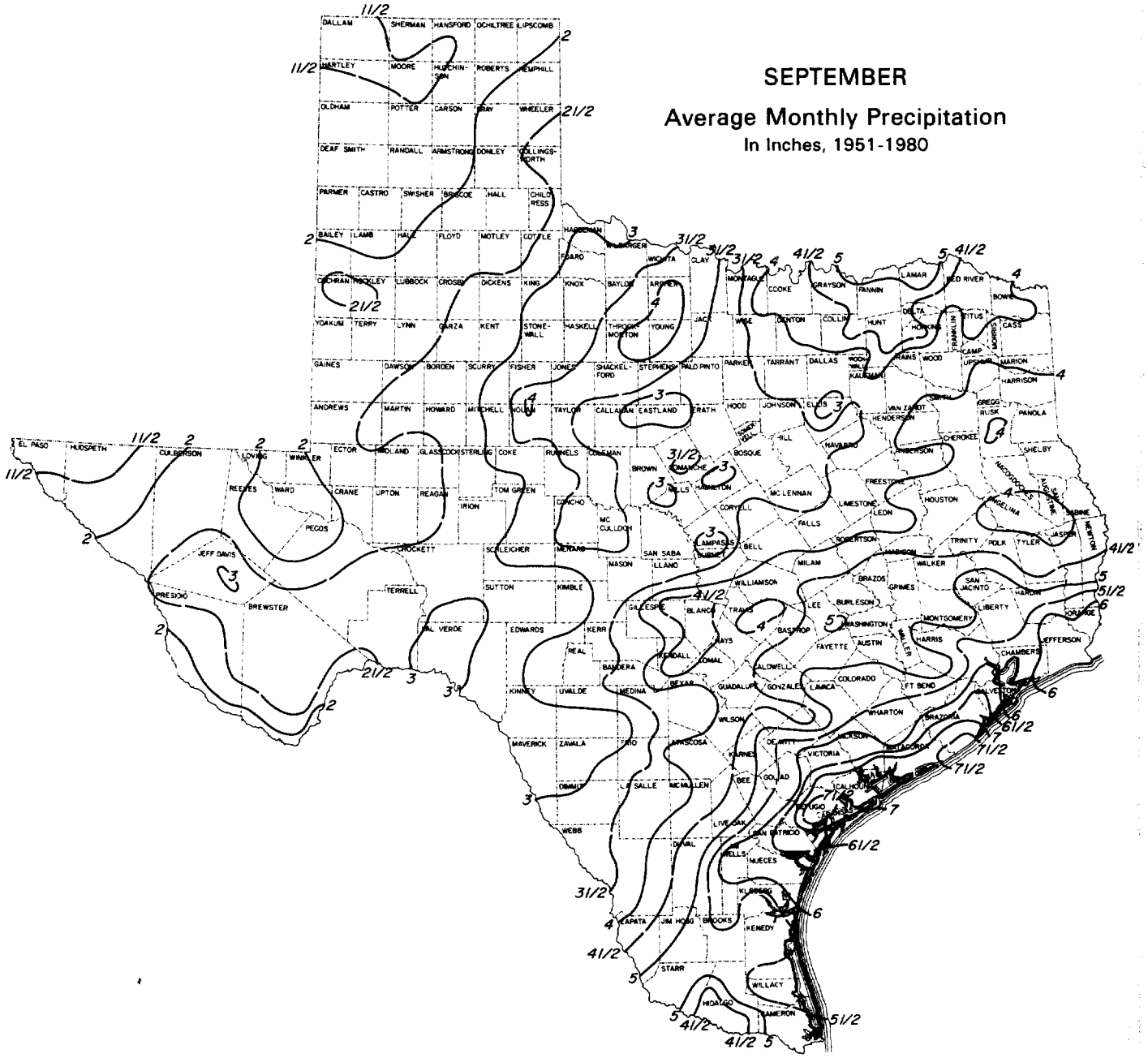
Average Monthly Precipitation
In Inches, 1951-1980


JUNE
Average Monthly Precipitation
In Inches, 1951-1980


JULY
Average Monthly Precipitation
In Inches, 1951-1980


AUGUST
Average Monthly Precipitation
In Inches, 1951-1980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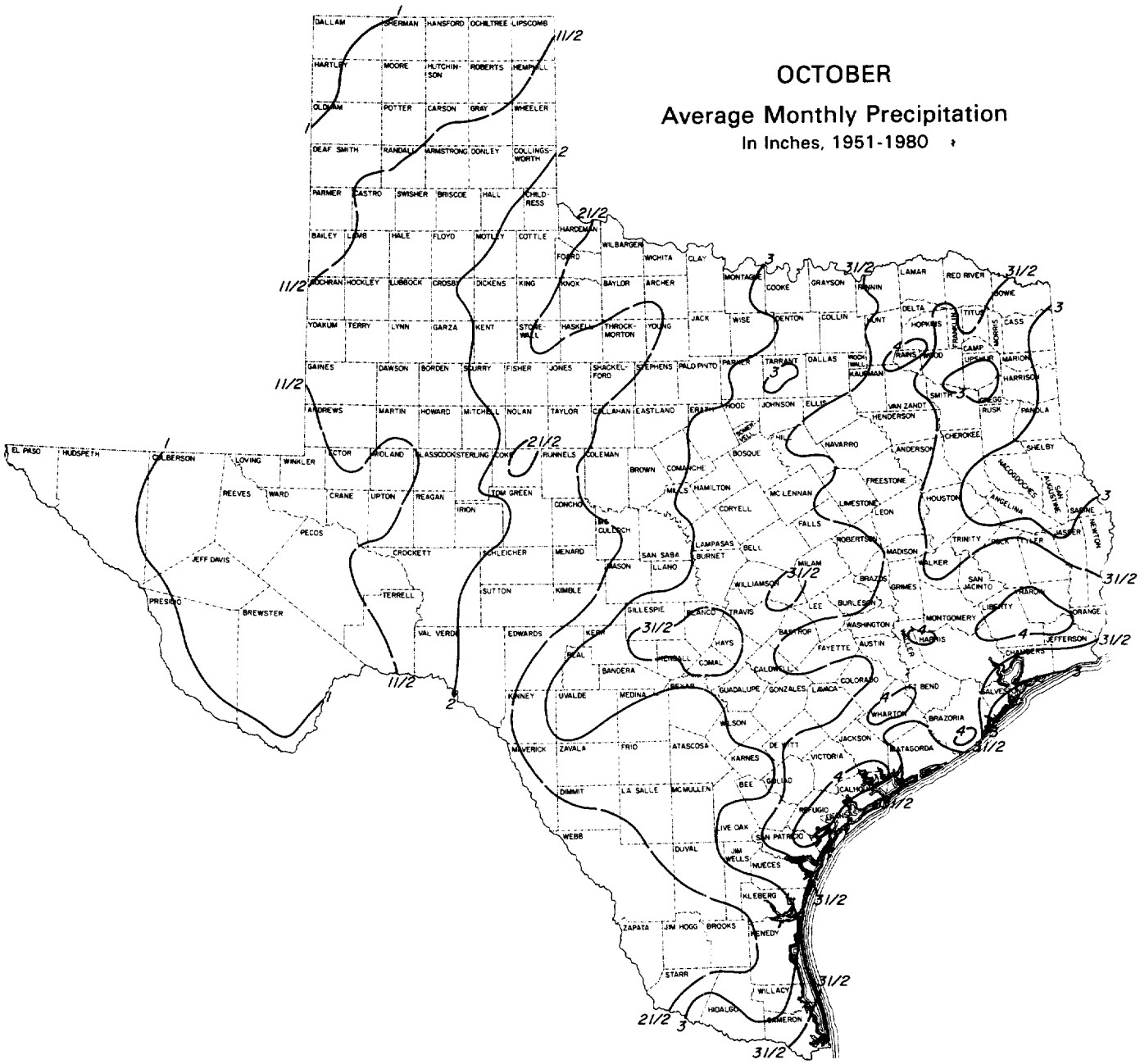
In Inches, 1951-1980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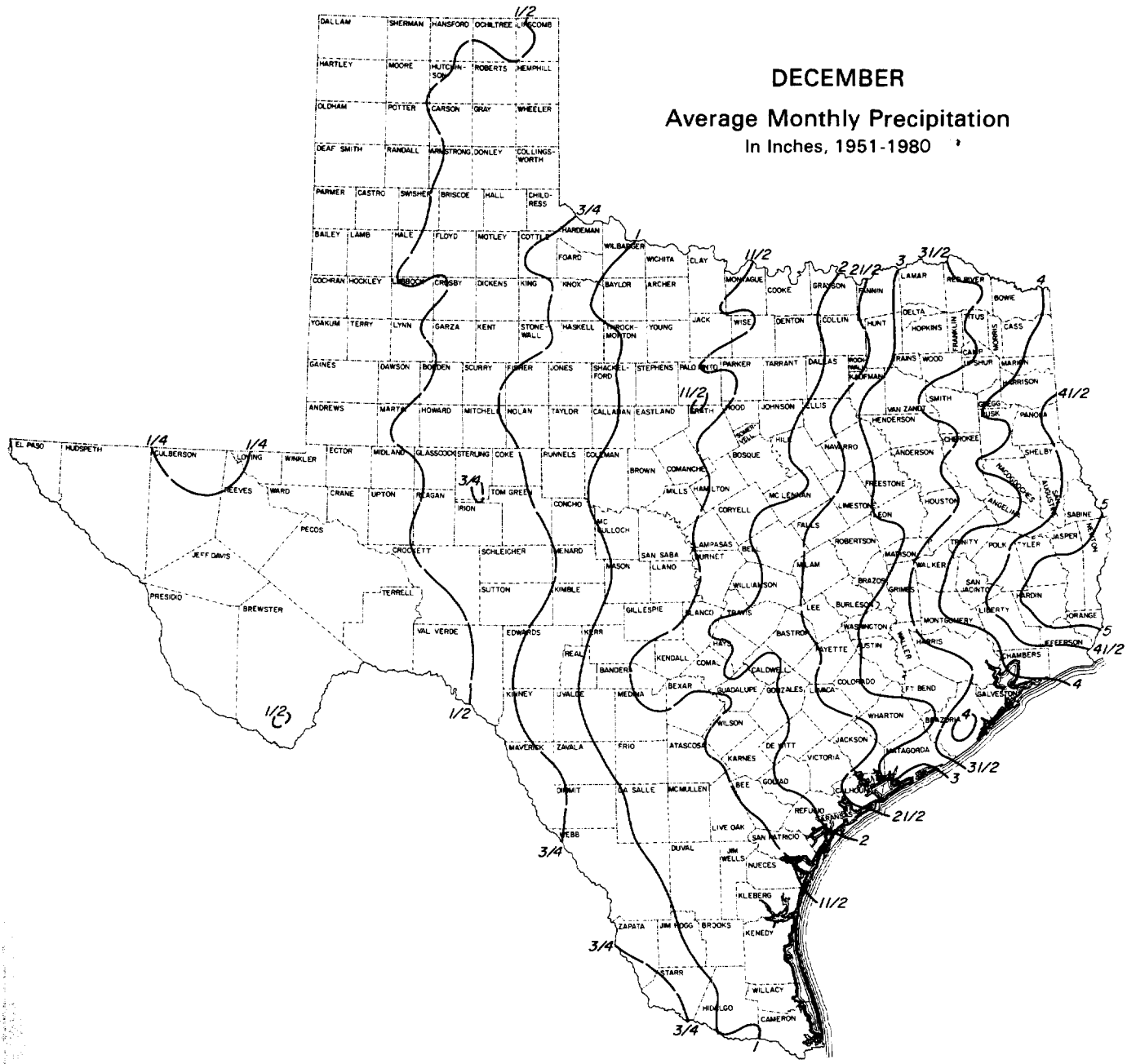
Average Monthly Precipitation
In Inches, 1951-1980


NOVEMBER
Average Monthly Precipitation
In Inches, 1951-1980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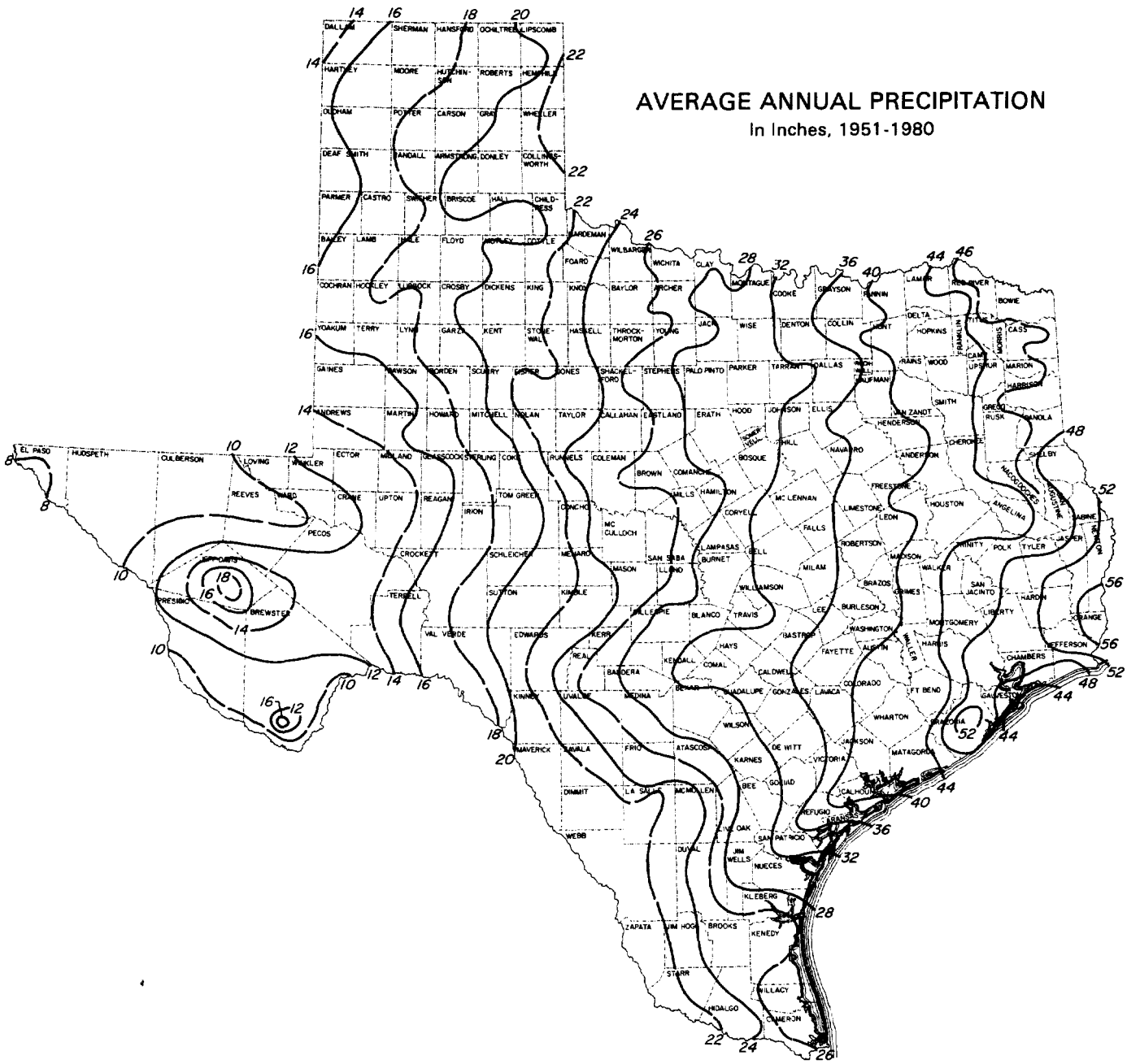
Average Monthly Precipitation
In Inches, 1951-1980


AVERAGE ANNUAL PRECIPITATION
In Inches, 1951-1980

AVERAGE TEMPERATURE

Definition of Terms

Temperature is a register of the amount of heat contained by the air at surface and is measured in degrees on the Fahrenheit (F) temperature scale by alcohol or mercury thermometers.

Average monthly low temperature is the average of the daily minimum temperatures observed at a reporting station for the month. **Average monthly high temperature** is the daily average of the high temperatures for the month. **Average annual low (high) temperature** is the average of the monthly lows (highs) for the year. And, **average annual temperature** is the average value of the annual low and high temperatures.

There are 15 state maps on the following pages which depict average temperature conditions by isothermal contour analysis to the nearest whole degree F. The set of 12 maps on pages 22-33 illustrates average monthly low temperatures. The set of maps on pages 36-47 gives mean monthly high temperatures. The contour maps of average annual low and high temperature are on pages 48 and 49. And, the average annual temperature map is on page 50.

Source of Data

The temperature data used to analyze the sets of maximum, minimum and average annual contour maps was collected by the National Weather Service and its Cooperative Observer Network.

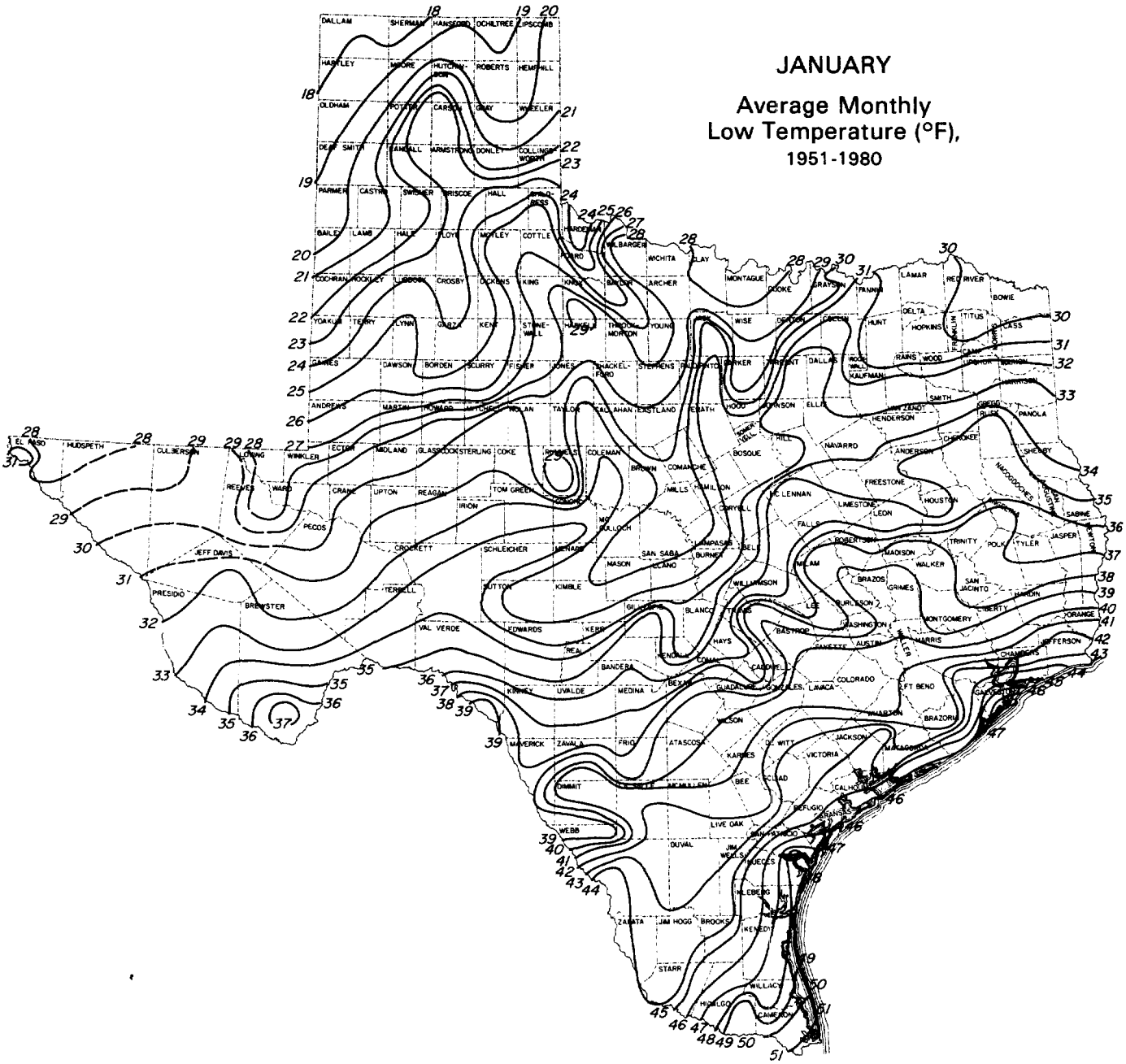
Maximum and minimum temperatures are indicated by specially designed thermometers. Maximum temperature is shown by the height of a column of mercury that does not recede back into its reservoir upon cooling. Minimum temperature is shown by the position of a tiny plastic rod (with spherical ends) that is carried to the lowest temperature by the alcohol medium in a horizontally-mounted thermometer. The rod is left in place at the lowest temperature as the alcohol medium rises again with heating. These thermometers, and a mercury thermometer that indicates immediate air temperature changes, are housed in an instrument shelter at eye-level height above the ground. The shelter is a white louvered box made of wood and is mounted on a stand which protects the thermometers from heating by direct sunlight; cooling by strong winds and other wind-precipitation effects. Maximum and minimum temperature readings are taken daily by trained observers.

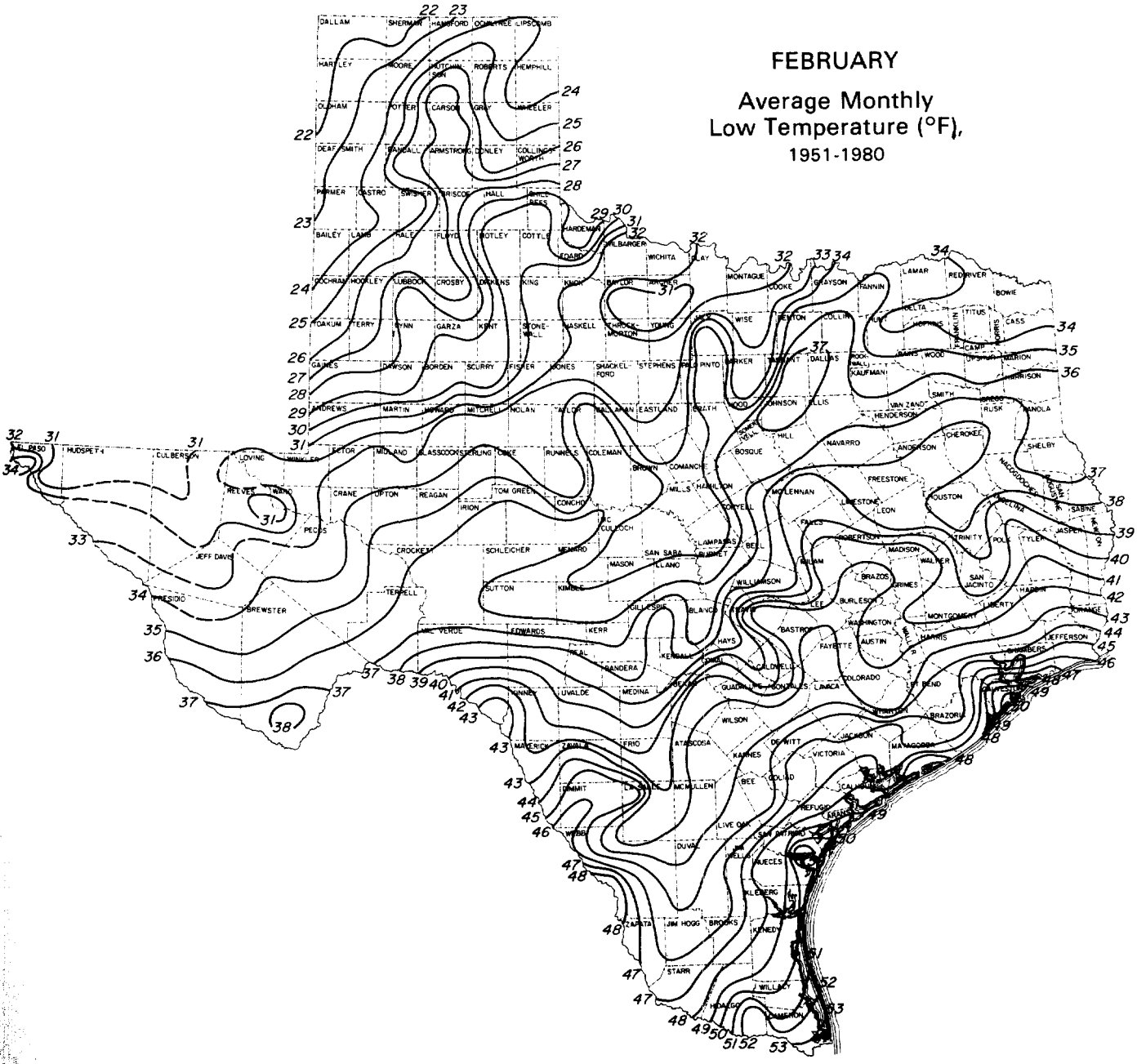
Period of Record

The isothermal contour analyses of the set of 15 maps that illustrate average maximum, minimum and annual temperature distribution across the state of Texas are based on temperature data collected from 156 reporting stations (listed in the Appendix). These stations have a continuous record of at least 30 years of data. The period of record for this analysis is 1951-1980. This period is thought by climatologists to be representative of average temperature conditions for a location.

NOTE: Caution should be used in interpolating for average temperature in the mountain-basin-plateau region in western Texas where differences of several degrees may occur because of abrupt changes in land elevation.

AVERAGE MONTHLY LOW TEMPERATURE MAPS


JANUARY
Average Monthly
Low Temperature (°F),
1951-1980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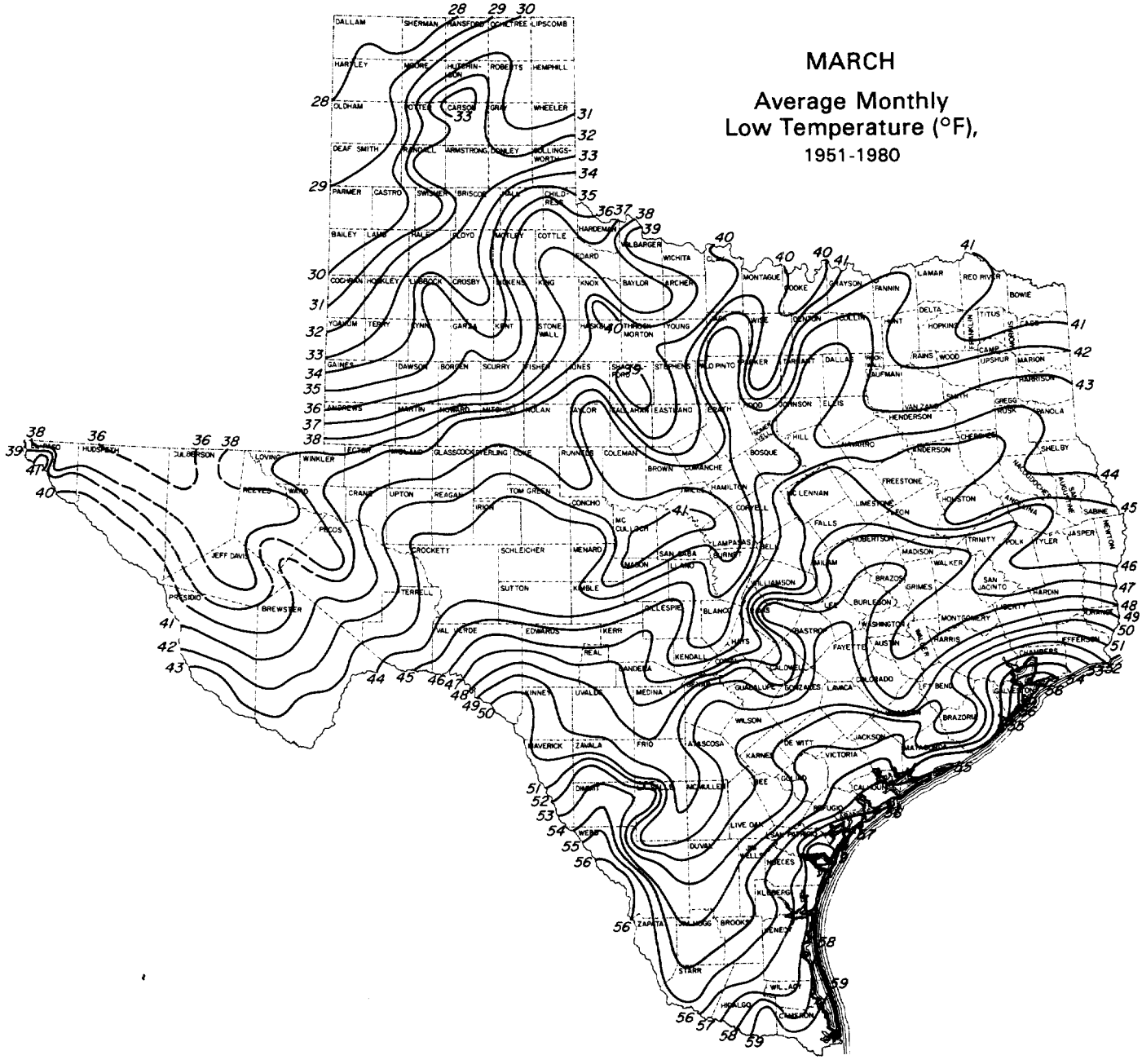
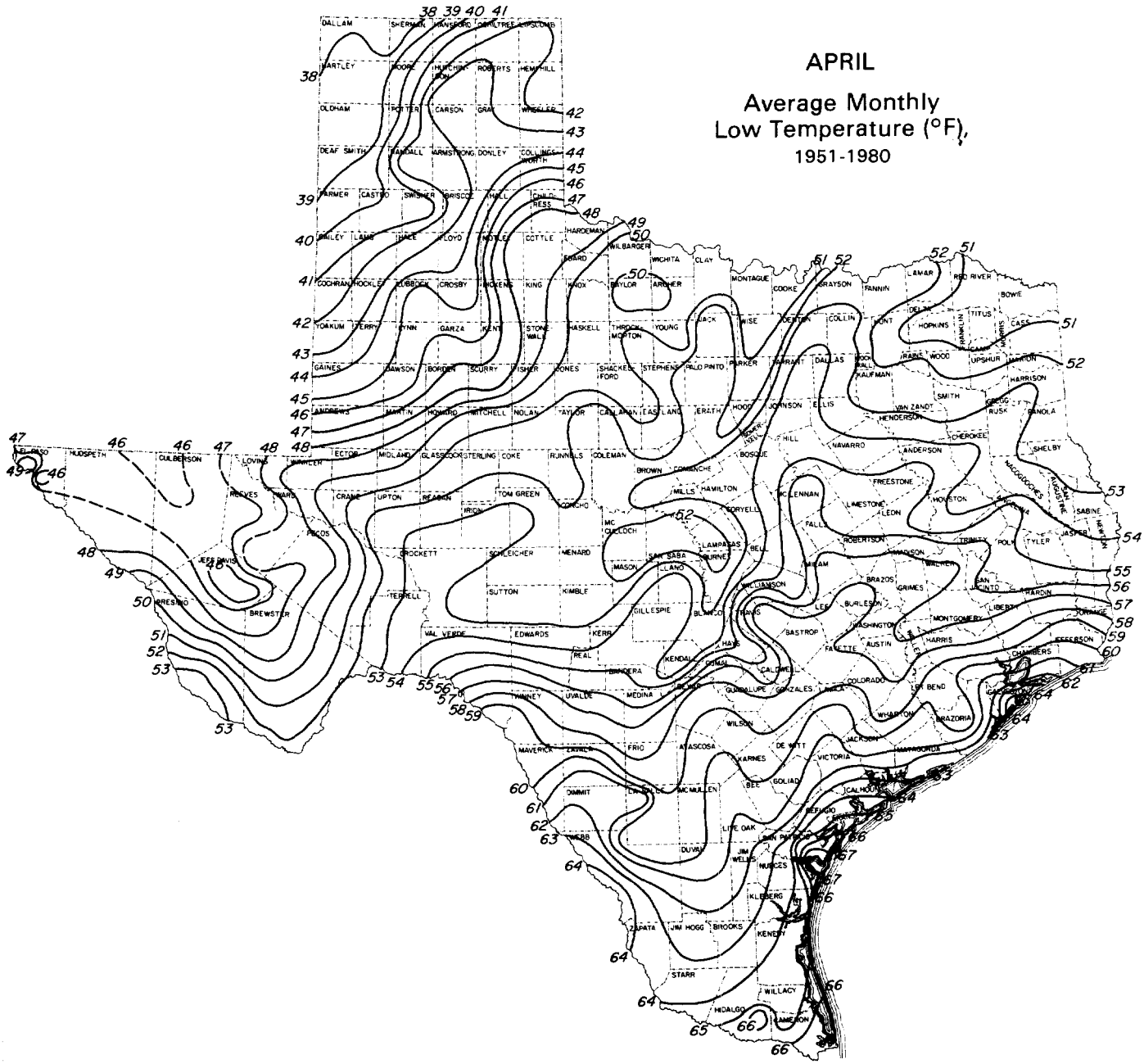
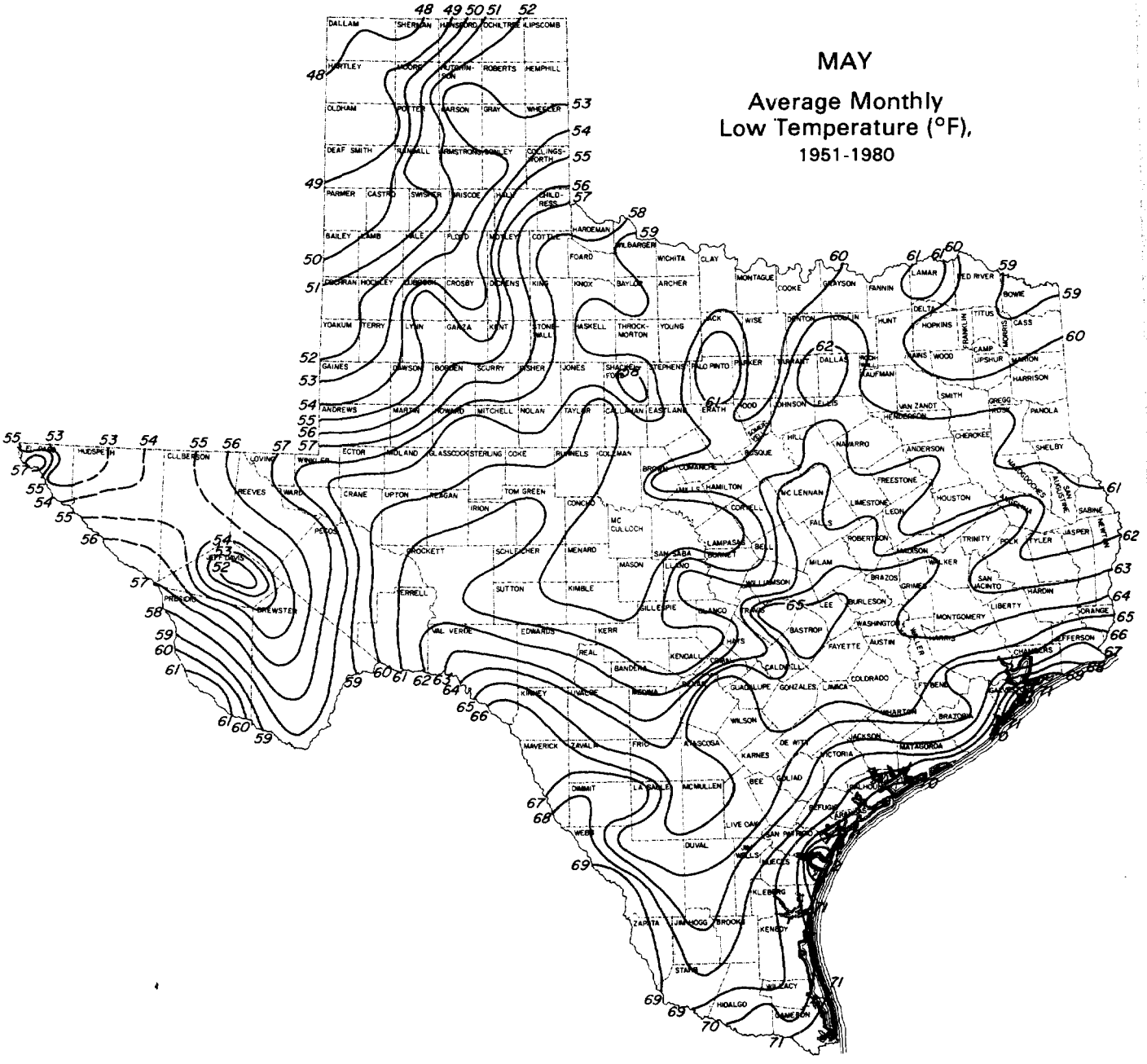
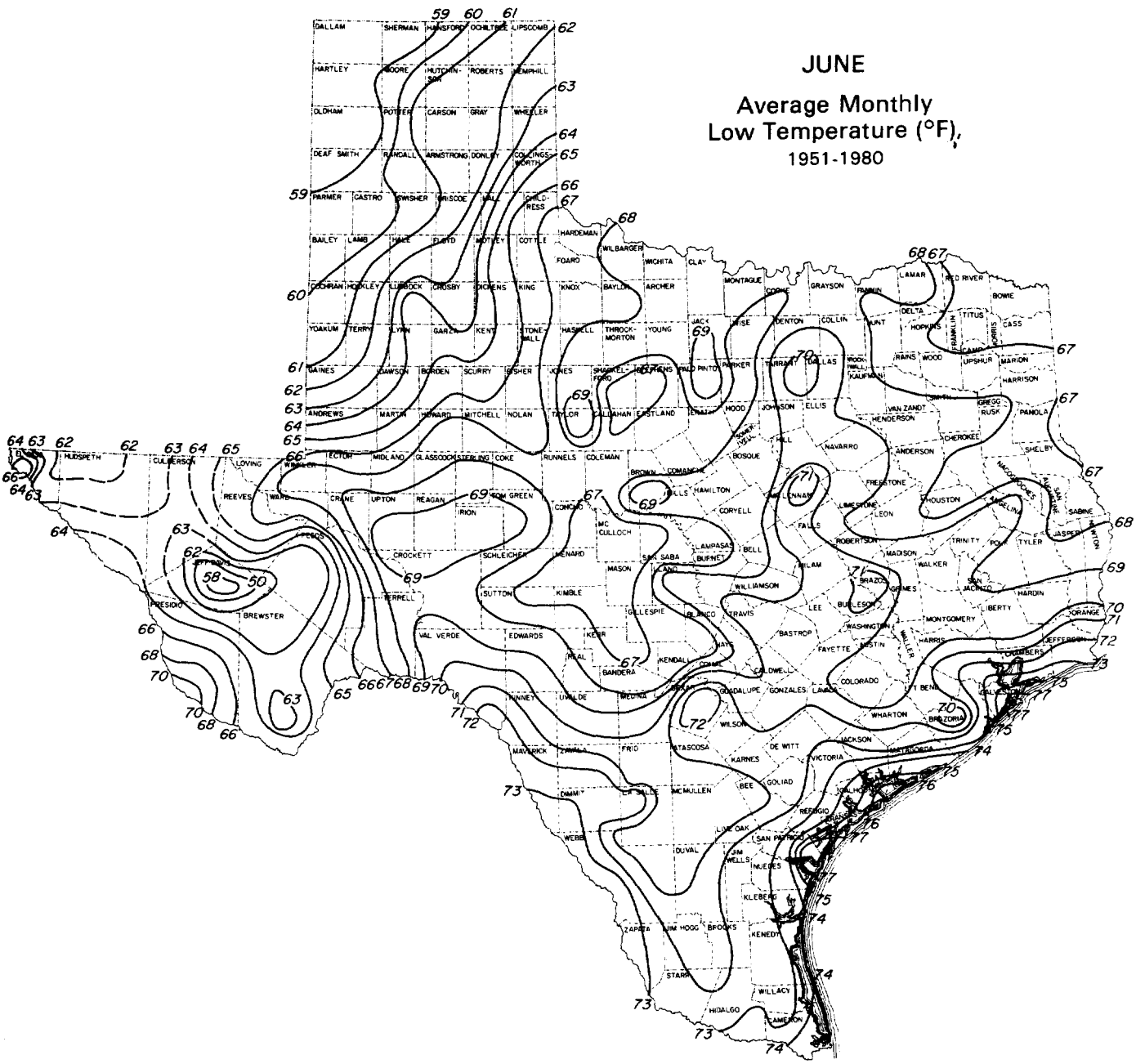
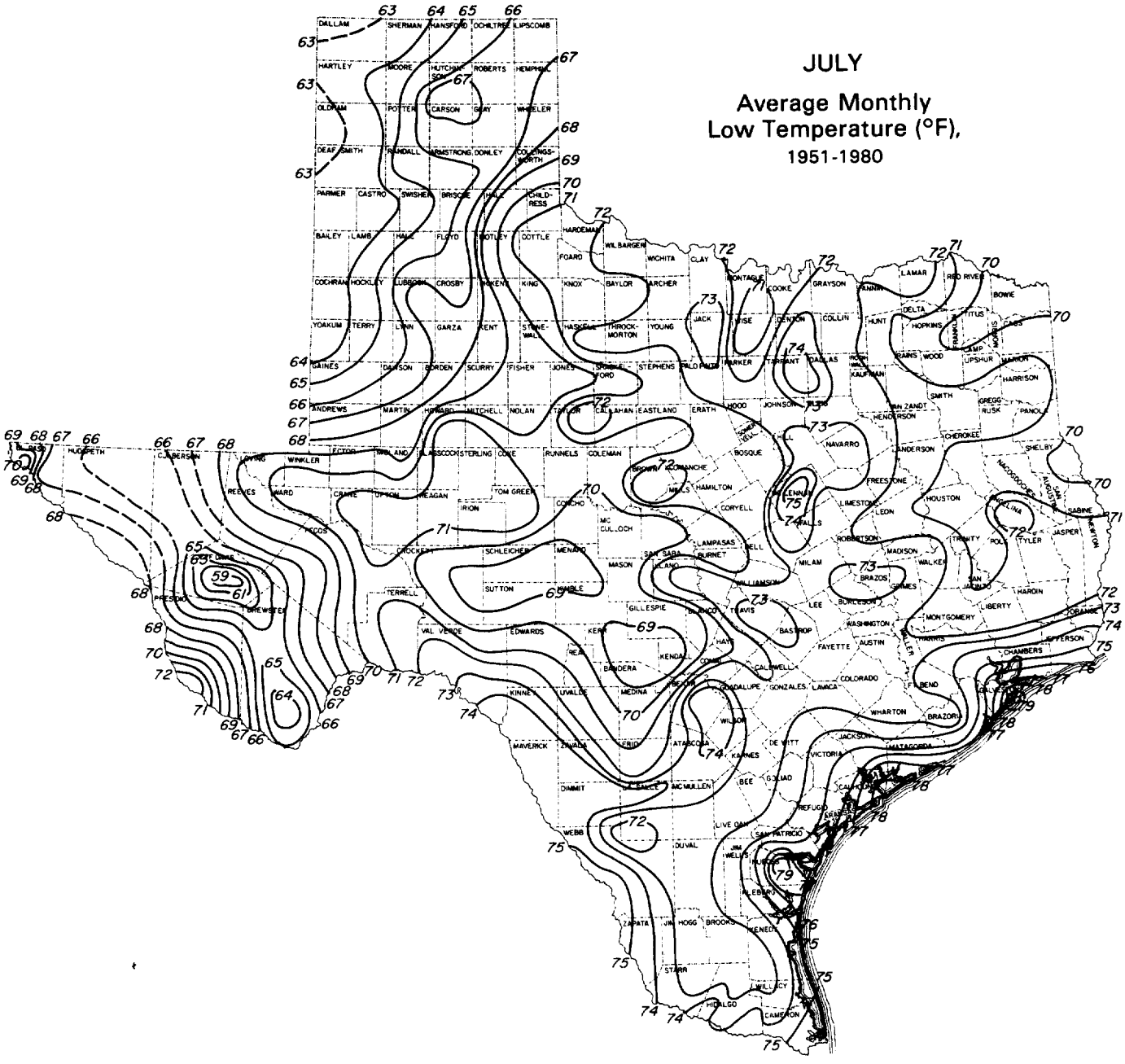
Average Monthly
Low Temperature (°F),
1951-1980

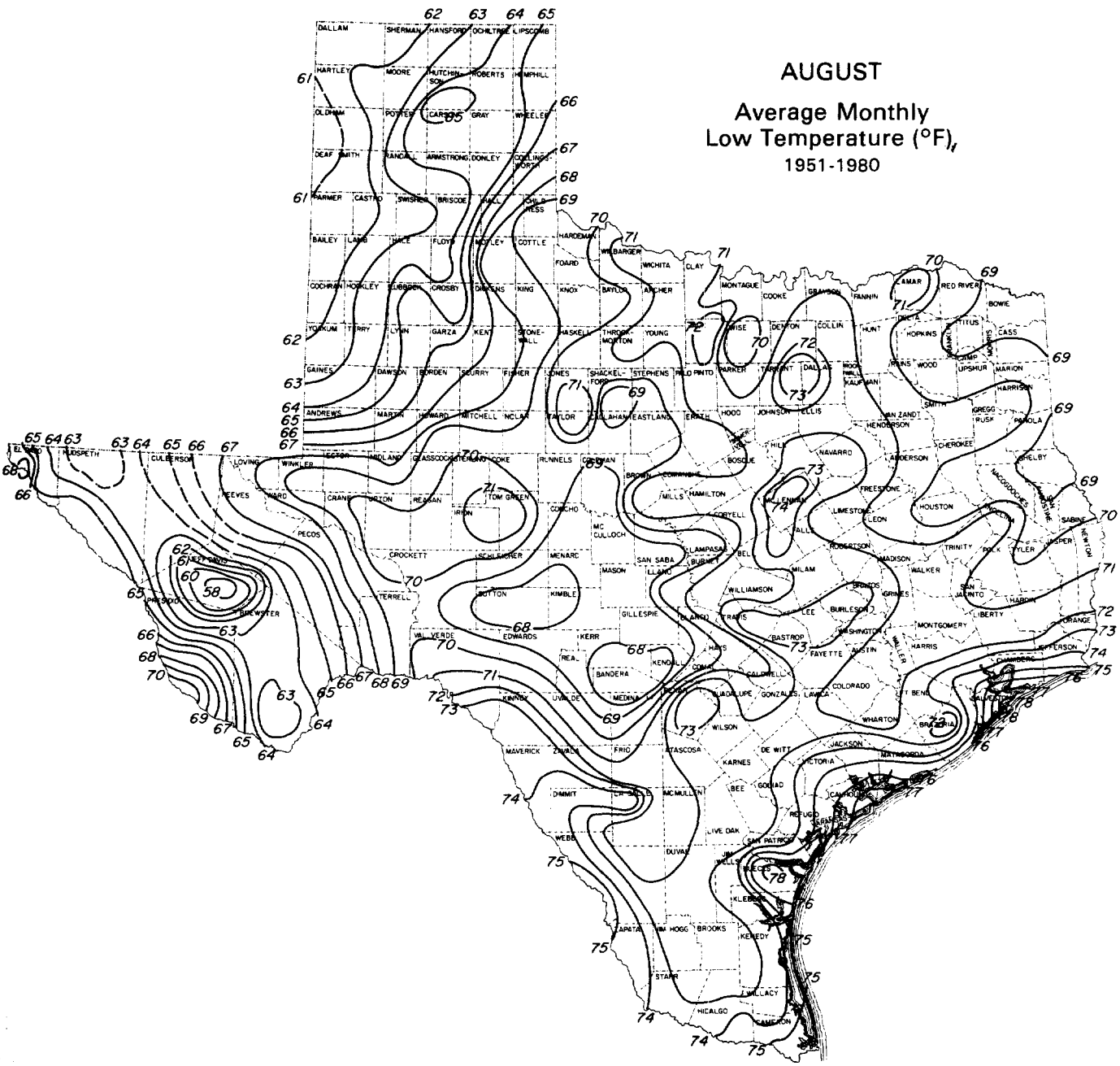

MARCH
Average Monthly
Low Temperature (°F),
1951-1980

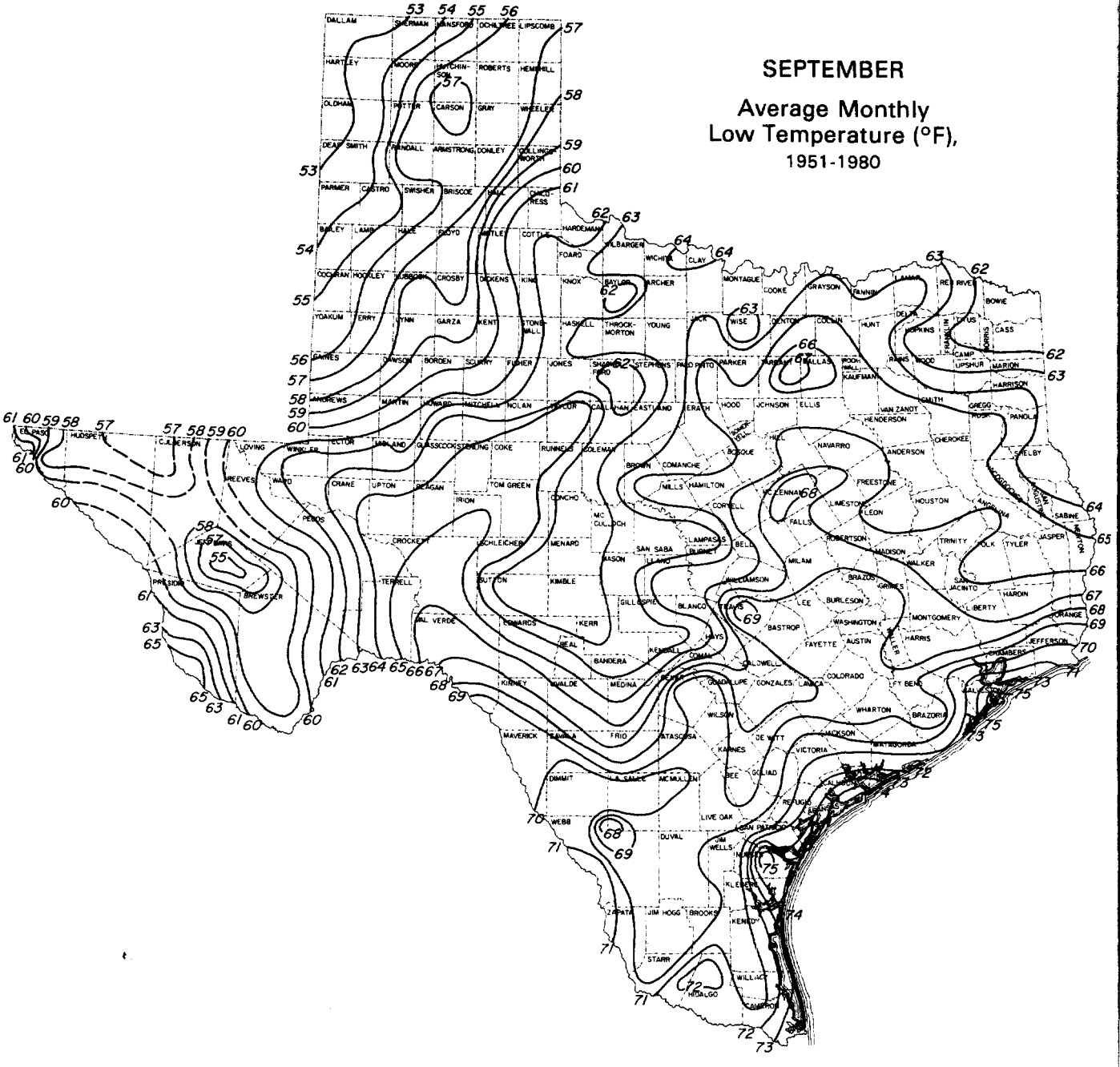

APRIL
Average Monthly
Low Temperature (°F),
1951-1980

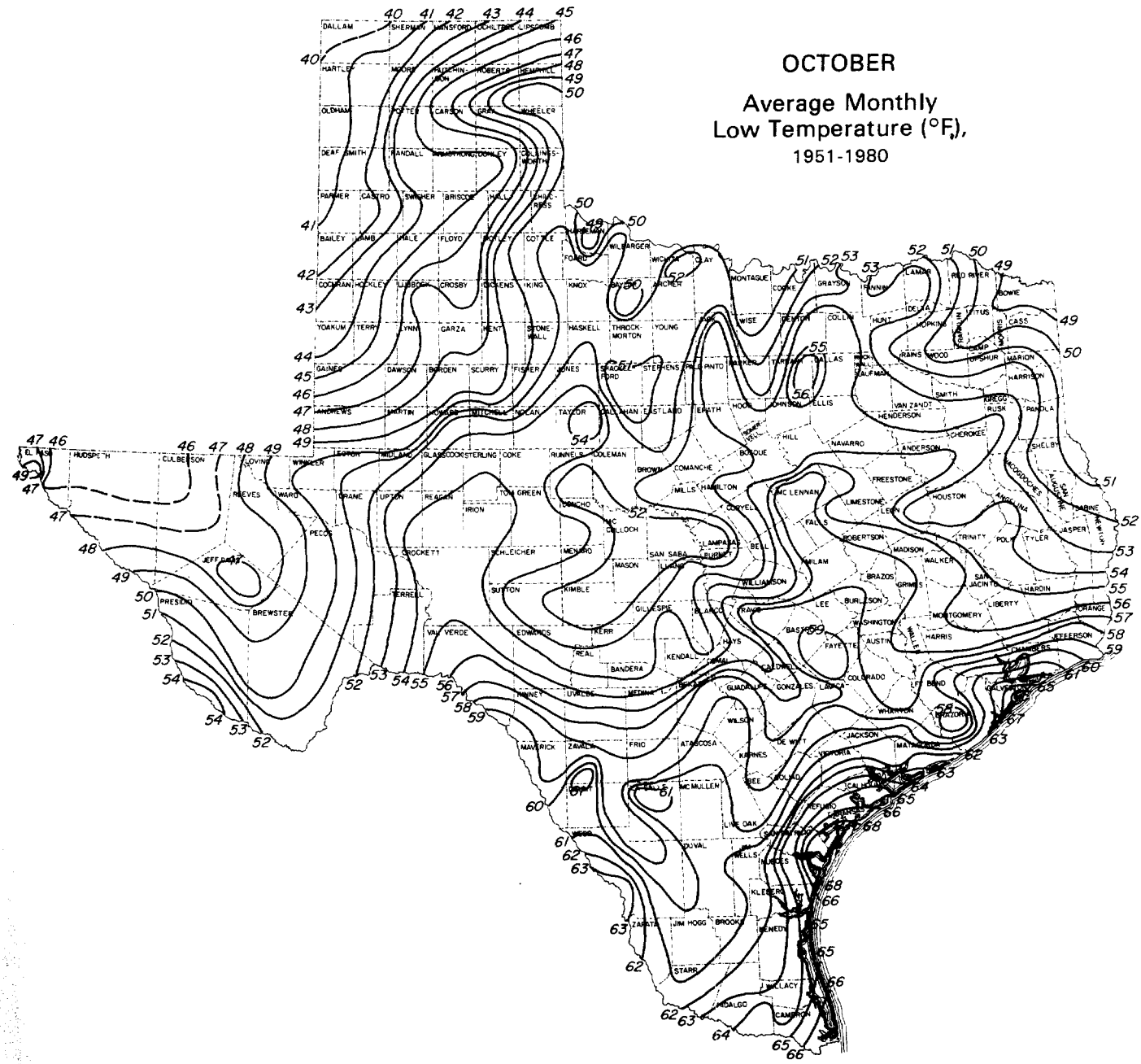

MAY
Average Monthly
Low Temperature (°F),
1951-1980

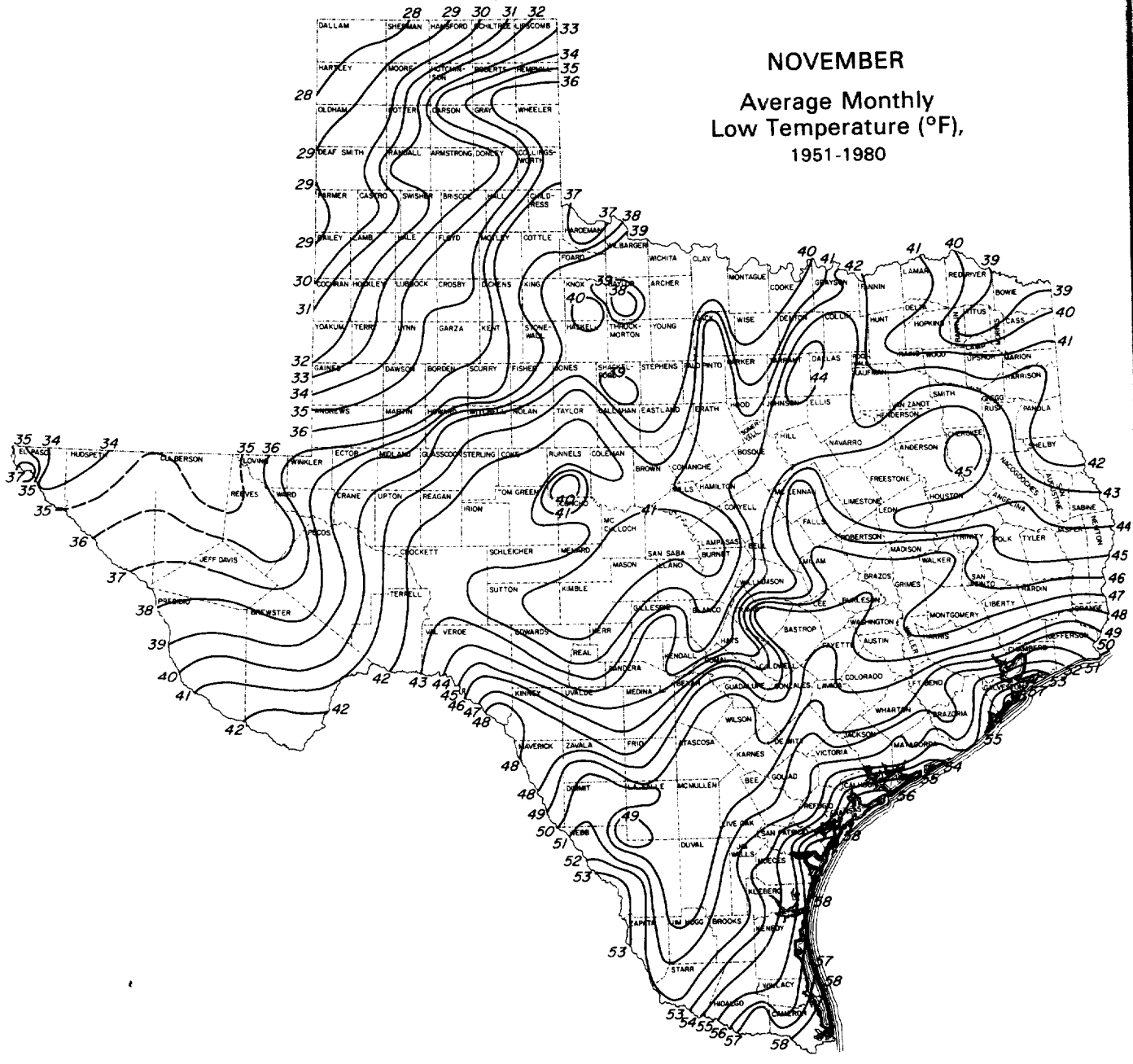

JUNE
Average Monthly
Low Temperature (°F),
1951-1980

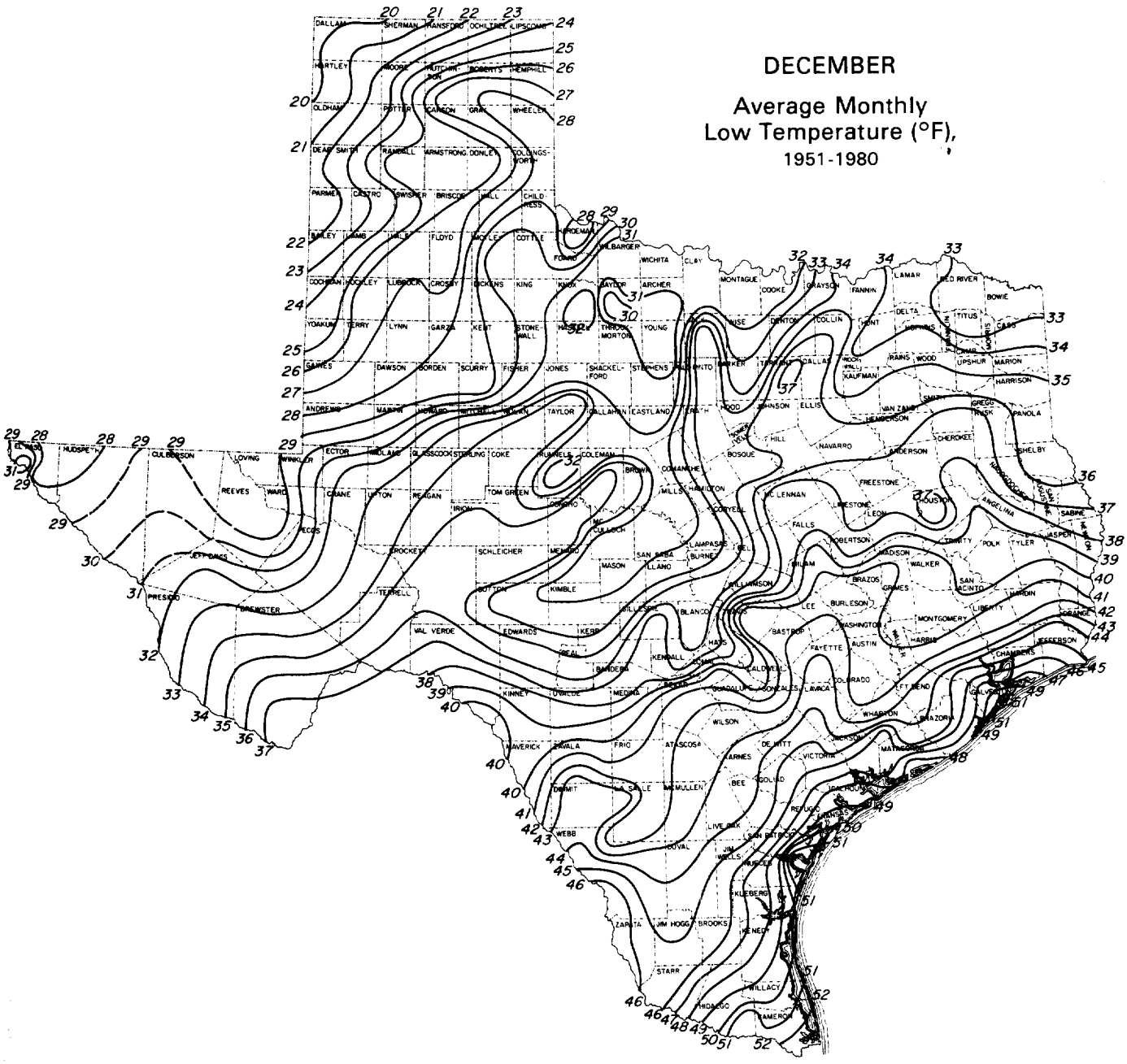

JULY
Average Monthly
Low Temperature (°F),
1951-1980


AUGUST
Average Monthly
Low Temperature (°F),
1951-1980

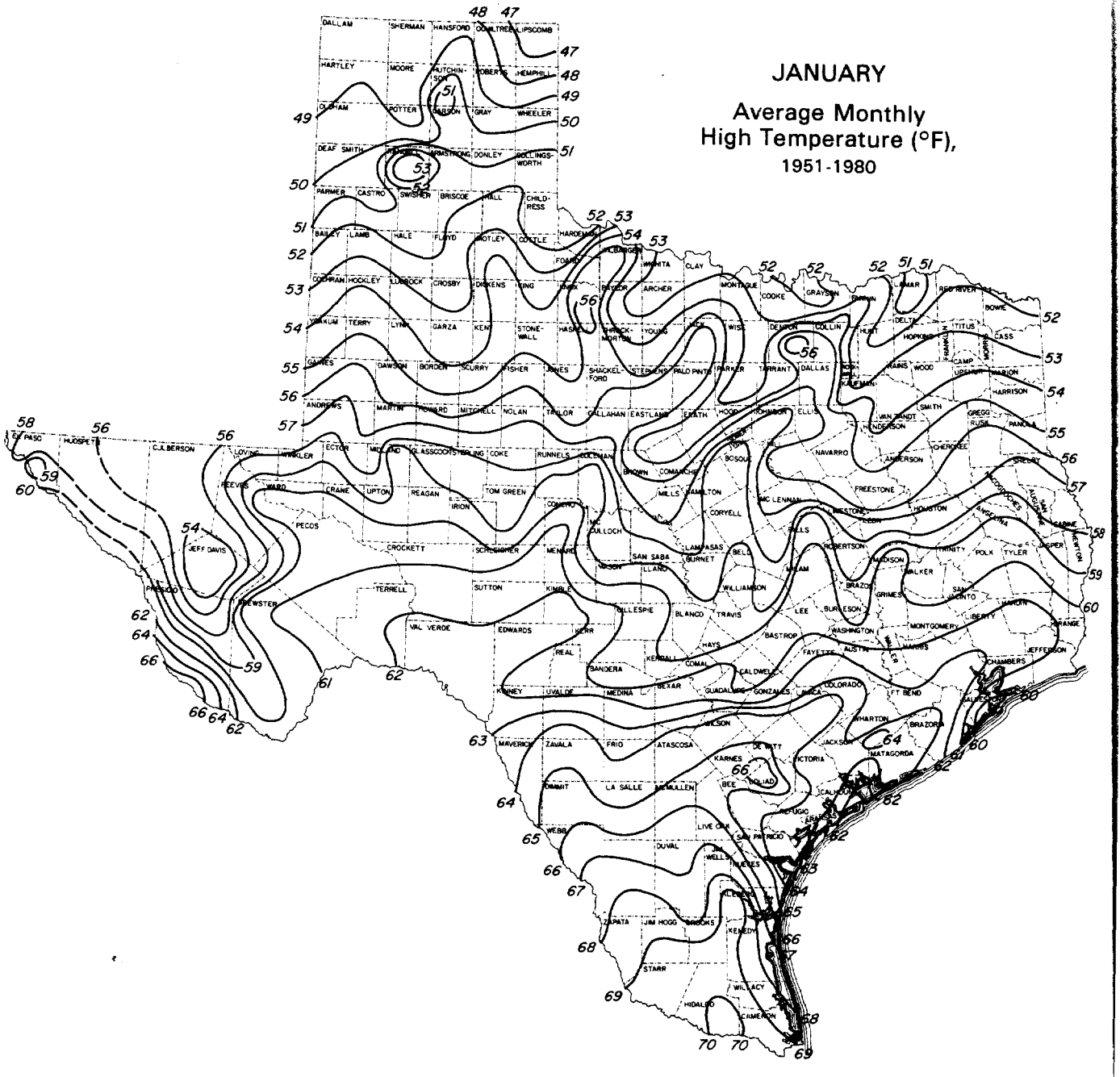

SEPTEMBER
Average Monthly
Low Temperature (°F),
1951-1980

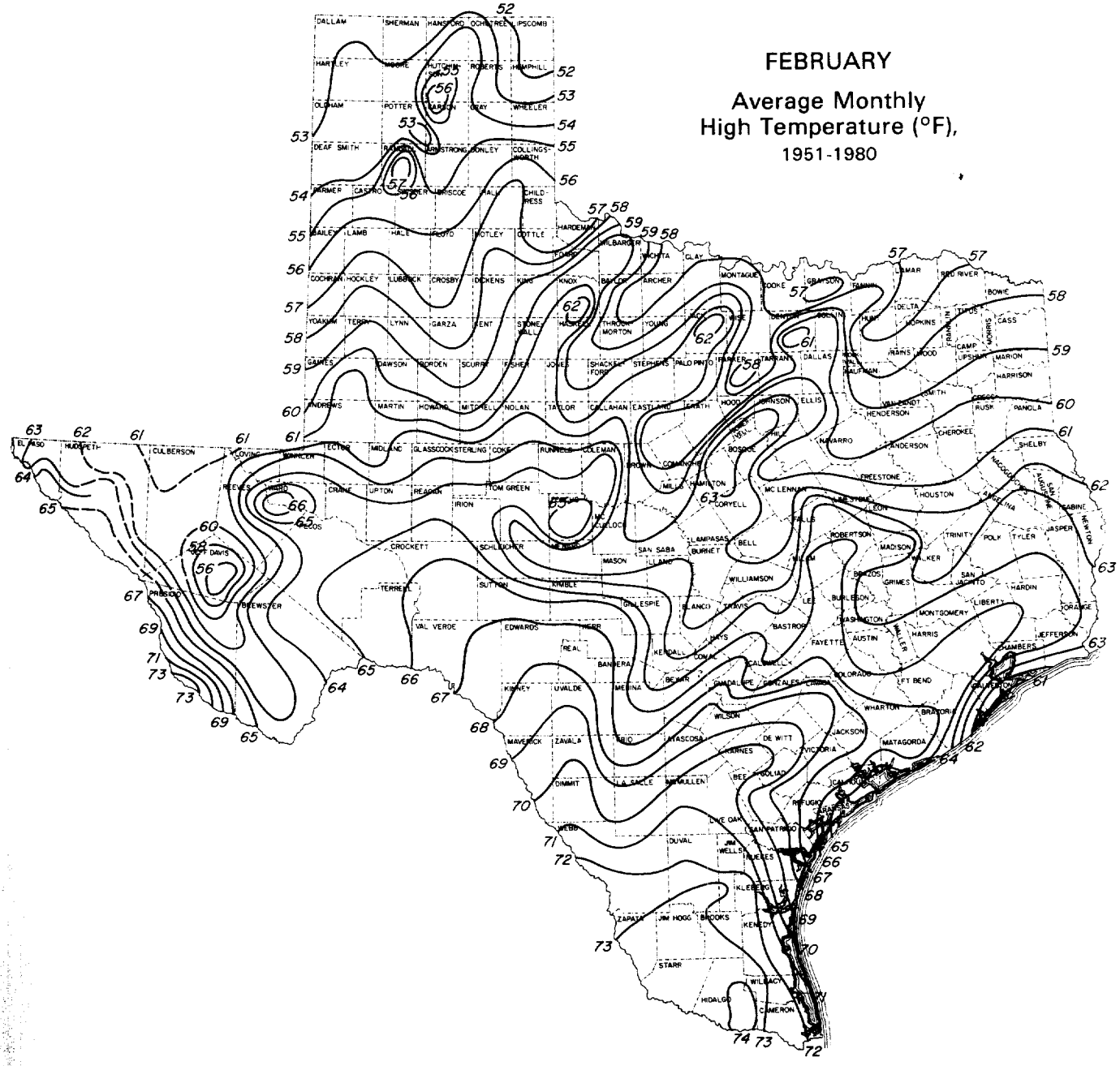

OCTOBER
Average Monthly
Low Temperature (°F),
1951-1980

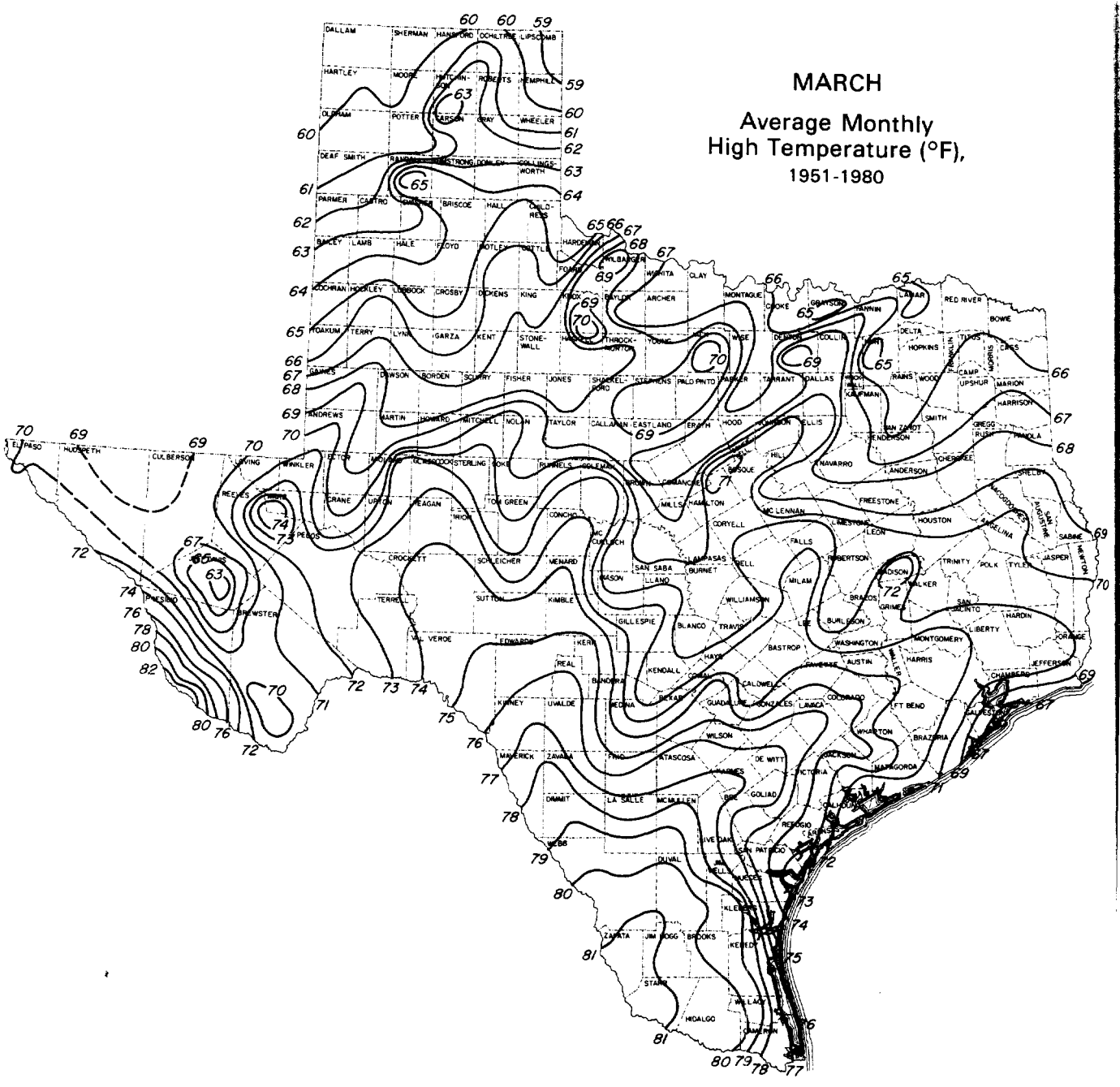

NOVEMBER
Average Monthly
Low Temperature (°F),
1951-1980

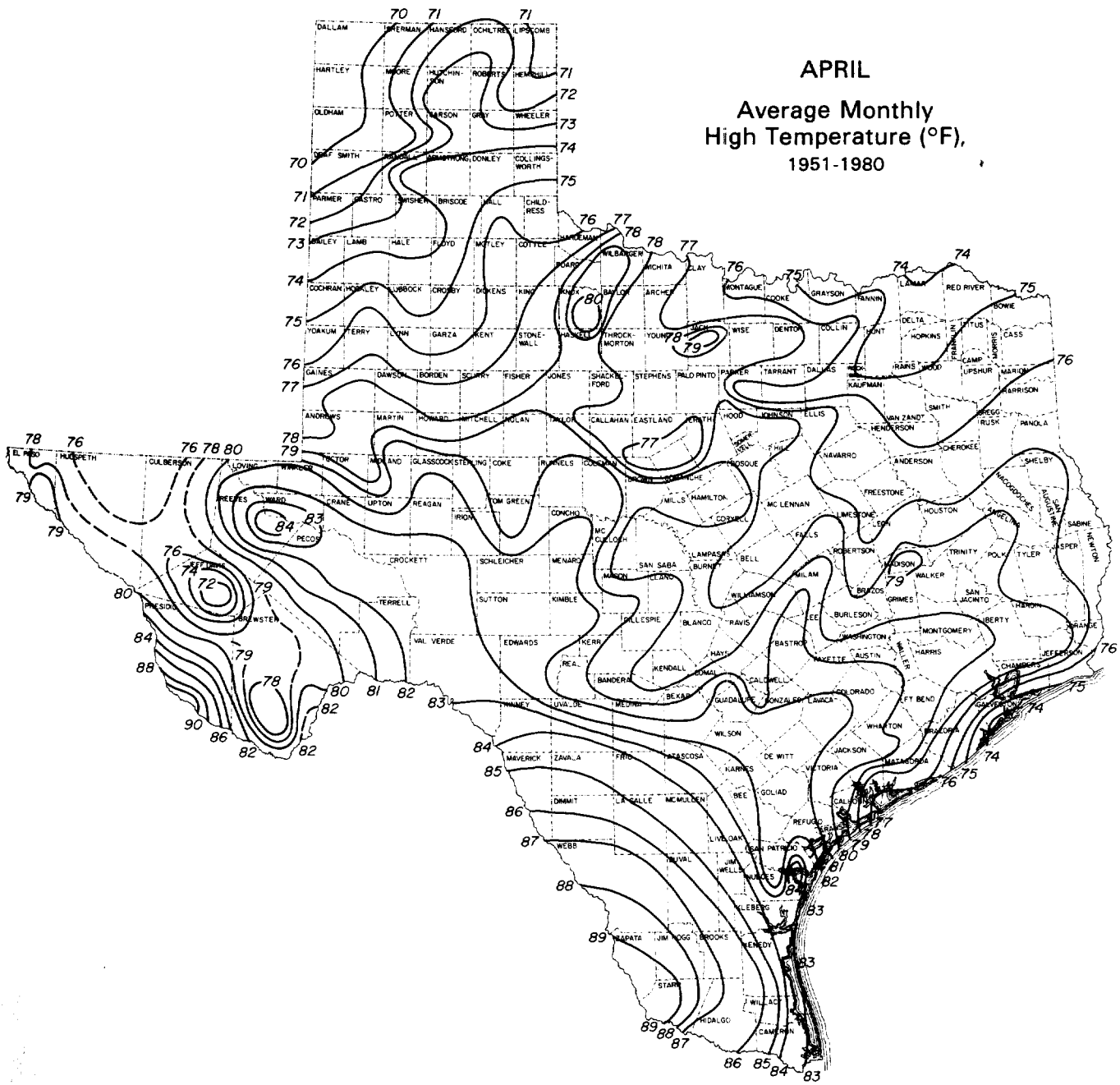

DECEMBER
Average Monthly
Low Temperature (°F),
1951-1980

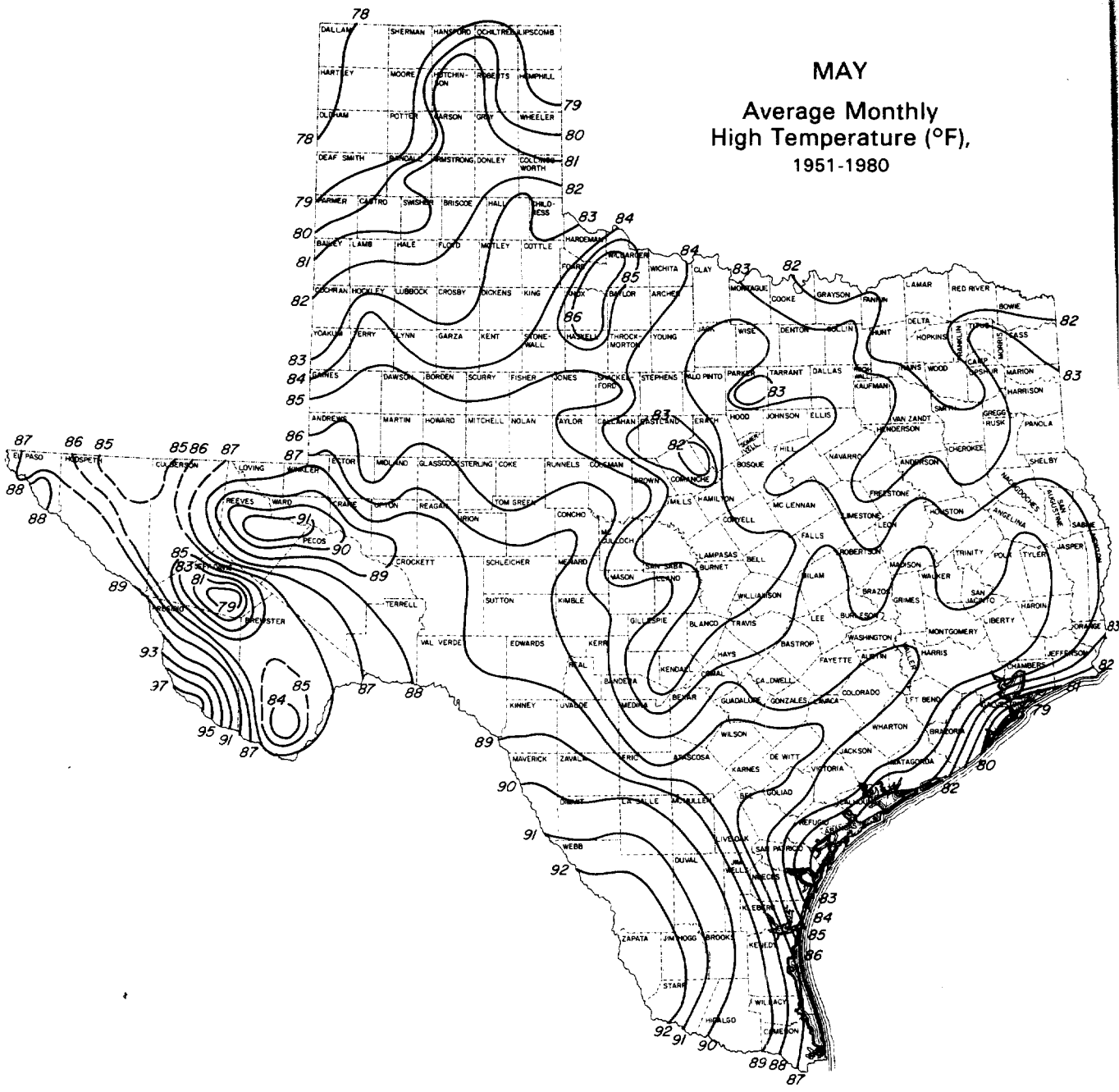
AVERAGE MONTHLY HIGH TEMPERATURE MAPS

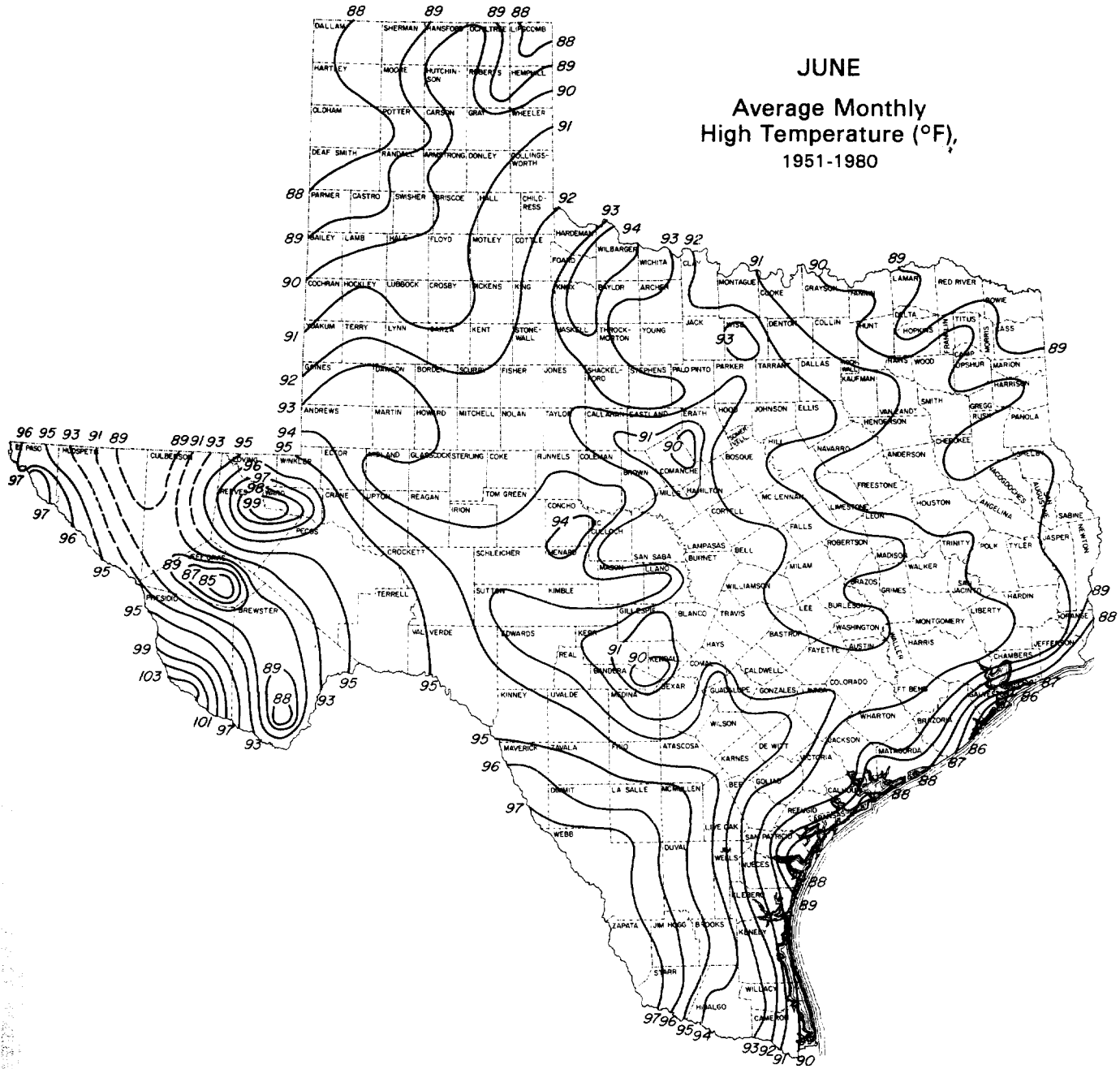

JANUARY
Average Monthly
High Temperature (°F),
1951-1980

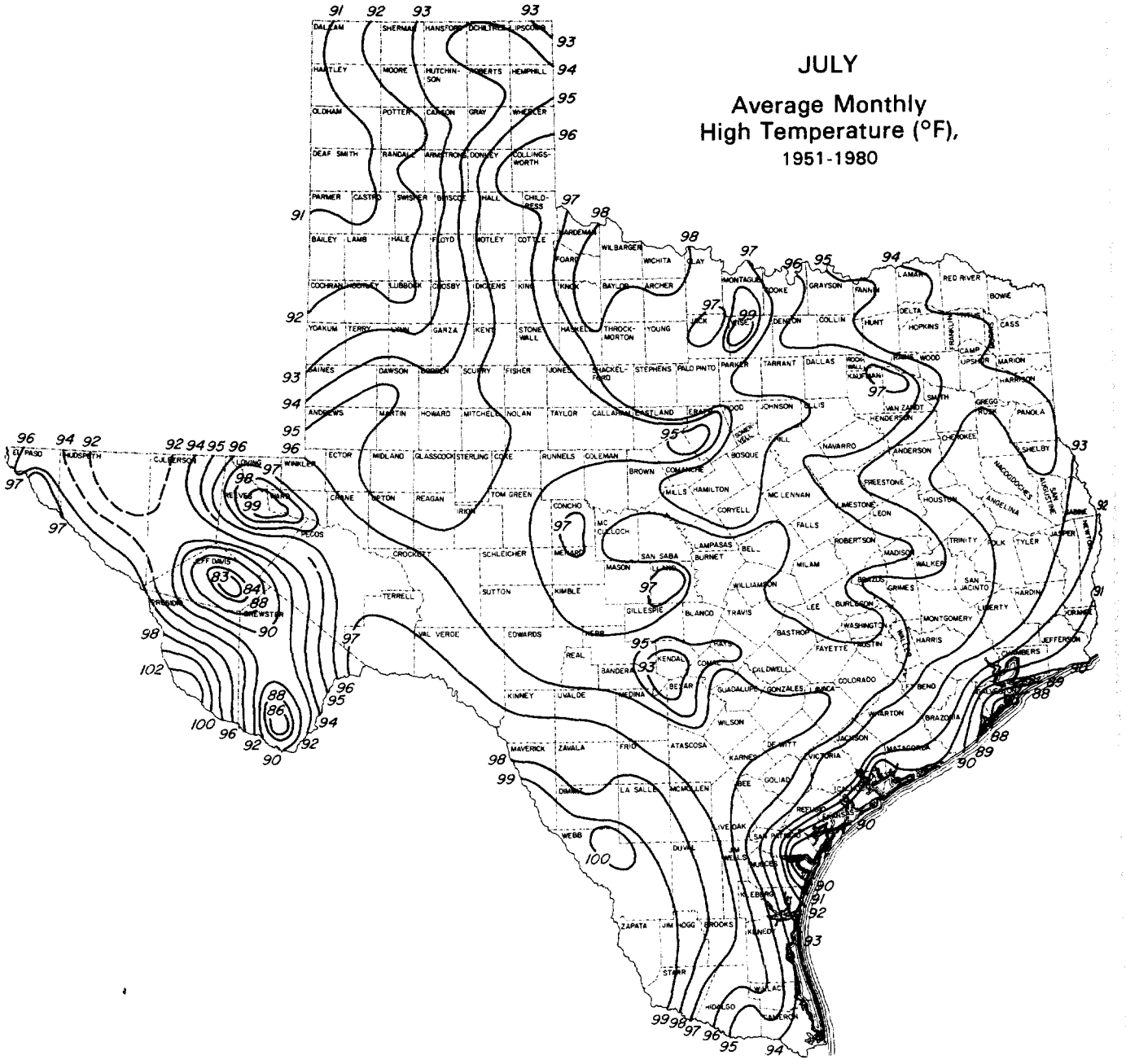

FEBRUARY
Average Monthly
High Temperature (°F),
1951-1980

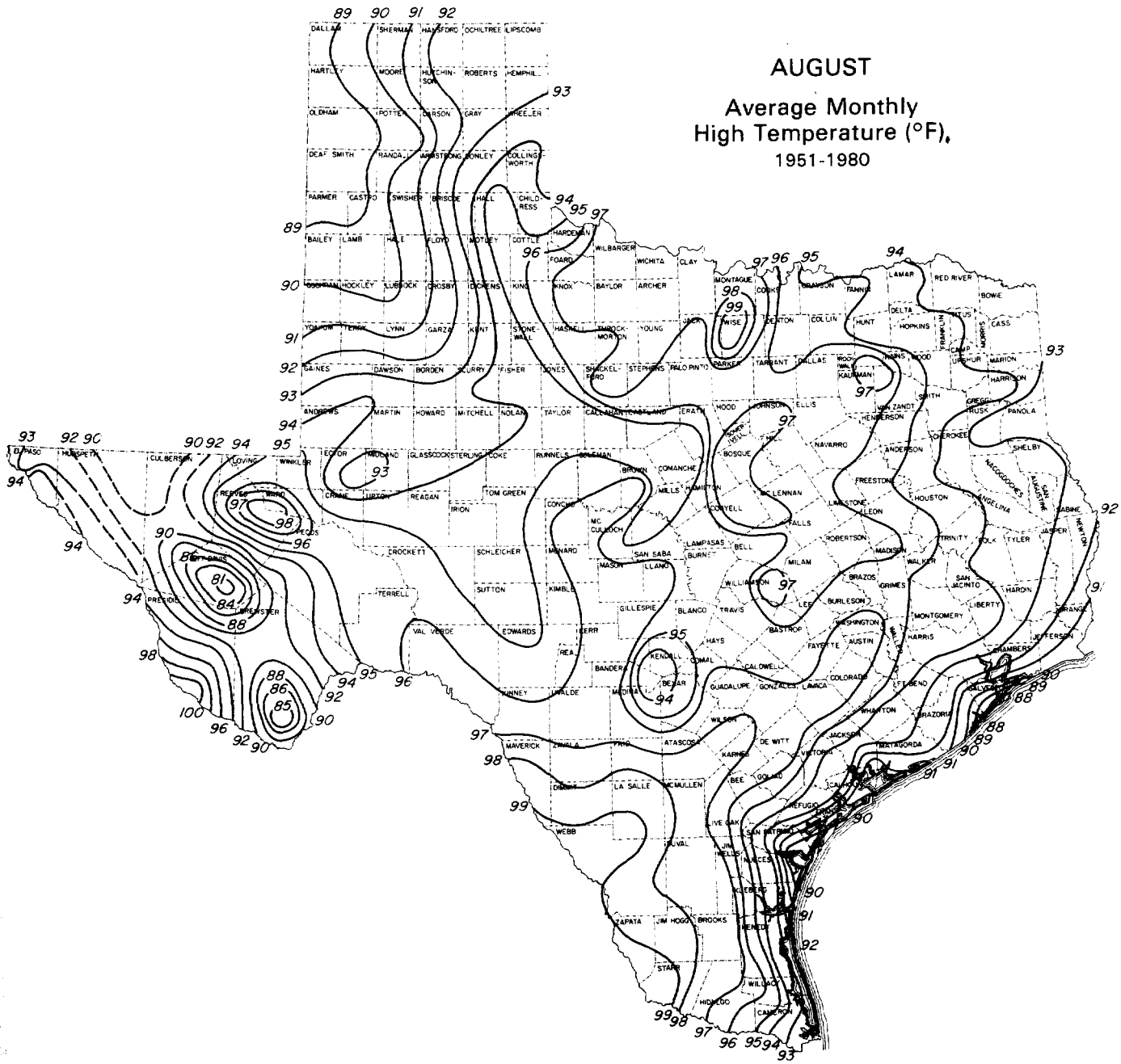

MARCH
Average Monthly
High Temperature (°F),
1951-1980

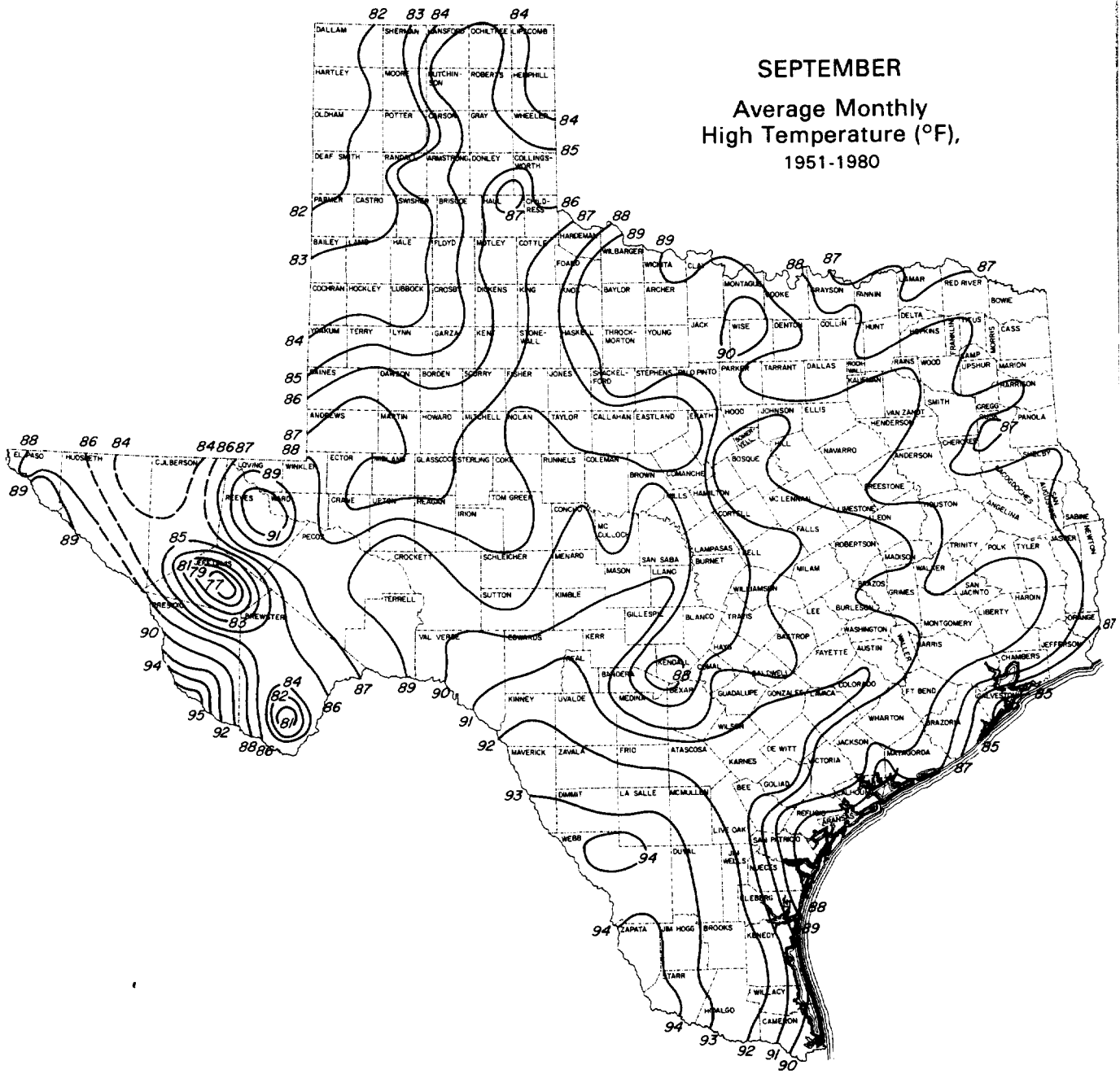

APRIL
Average Monthly
High Temperature (°F),
1951-1980

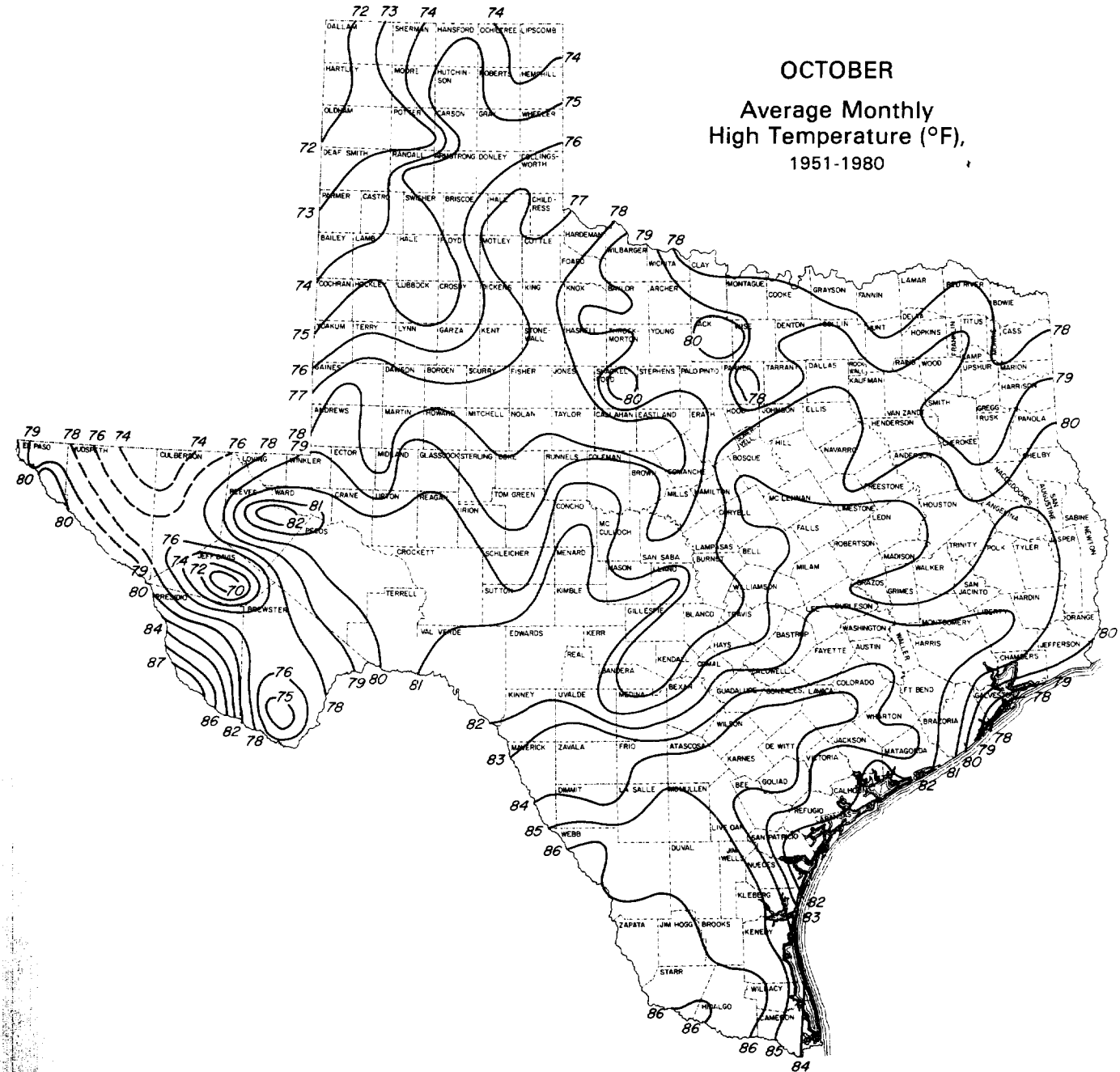

MAY
Average Monthly
High Temperature (°F),
1951-1980

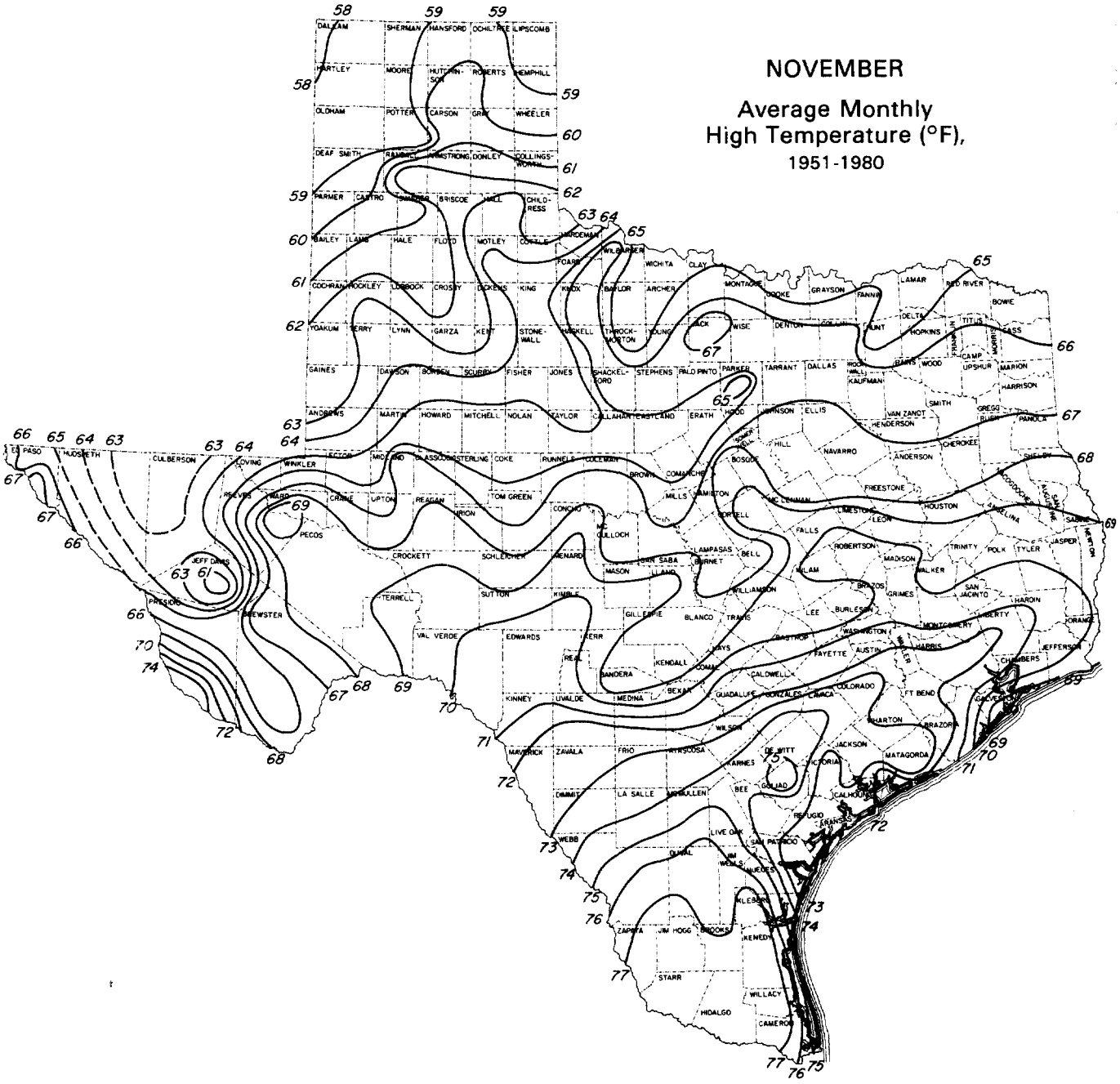

JUNE
Average Monthly
High Temperature (°F),
1951-1980

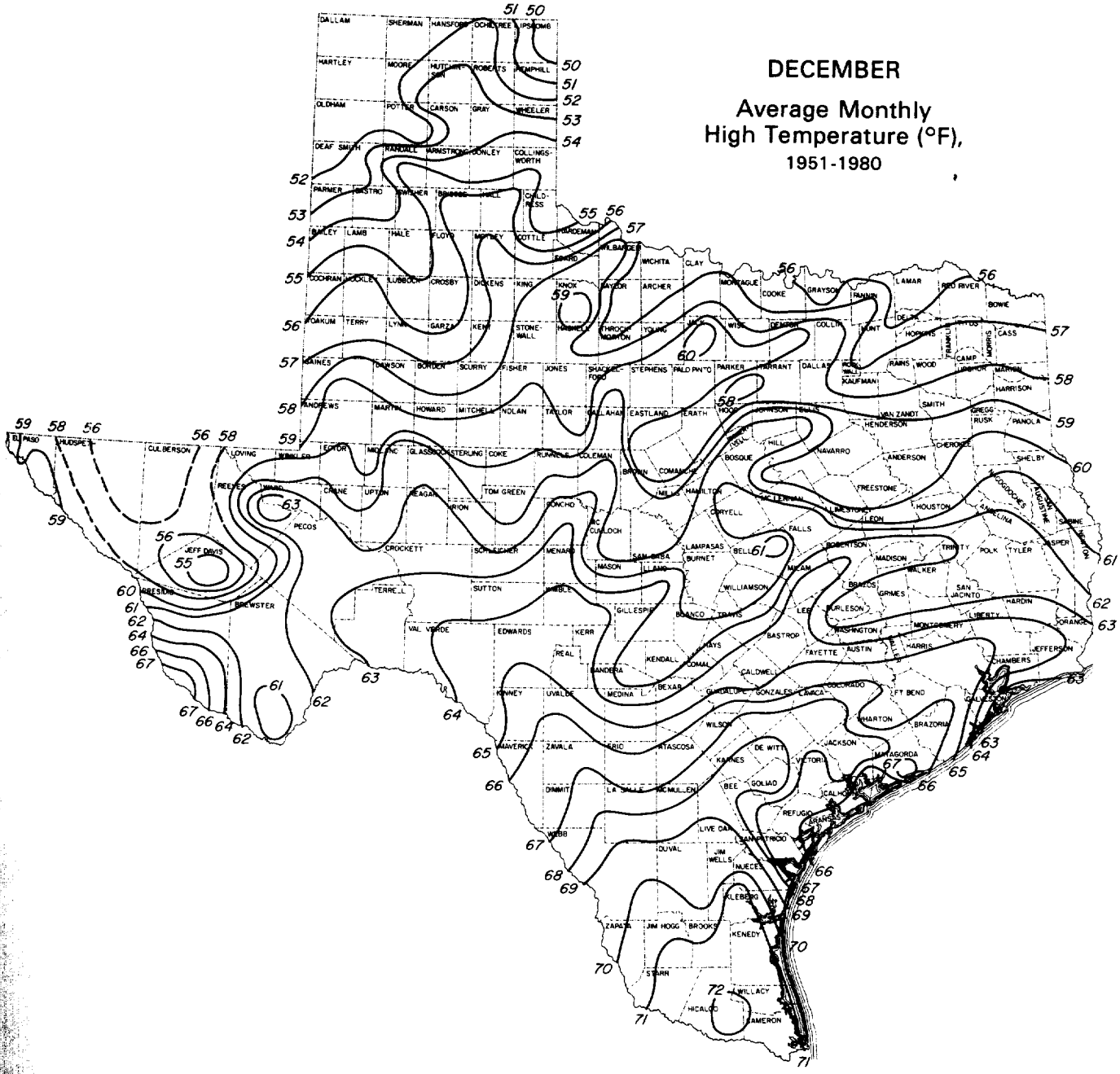

JULY
Average Monthly
High Temperature (°F),
1951-1980

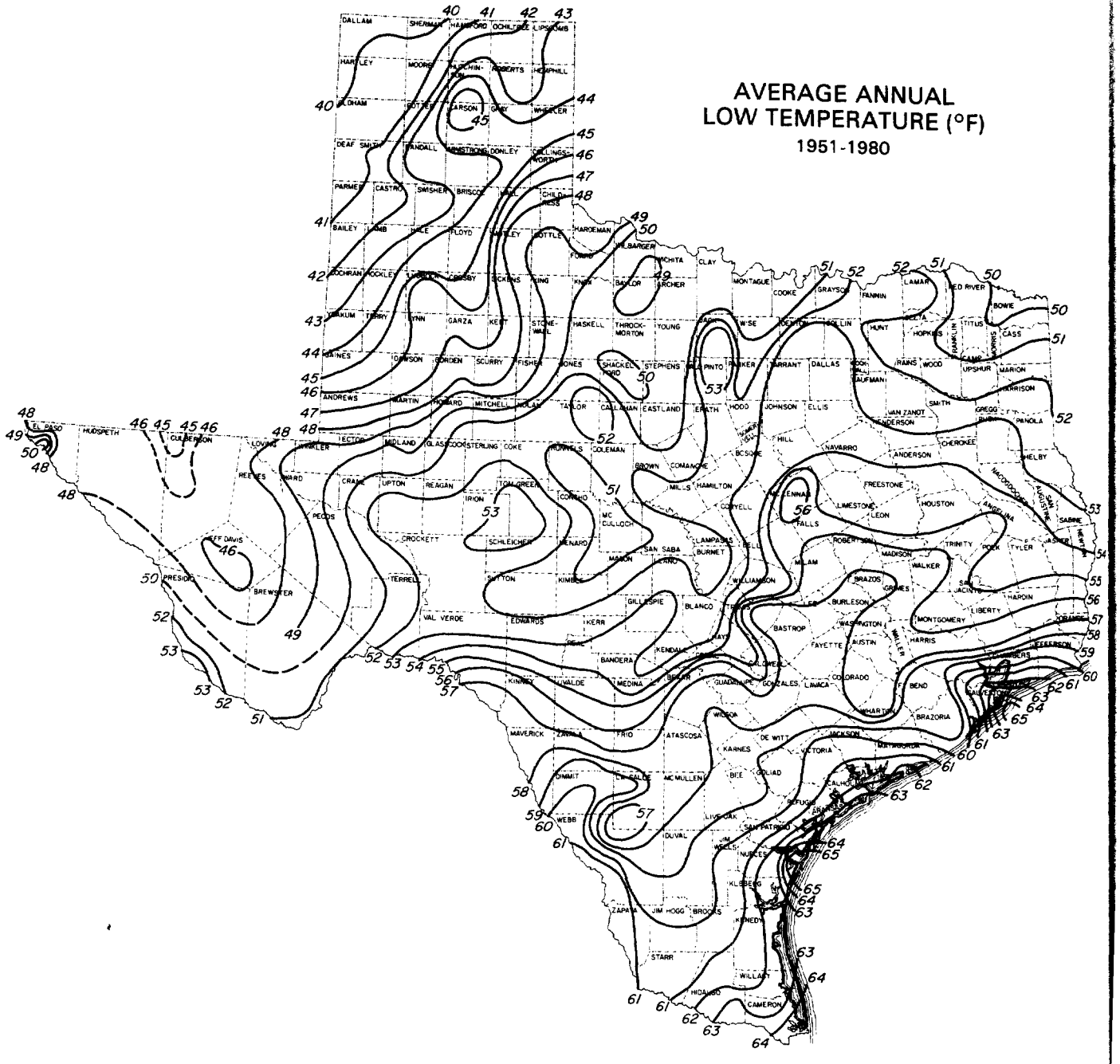

AUGUST
Average Monthly
High Temperature (°F),
1951-1980

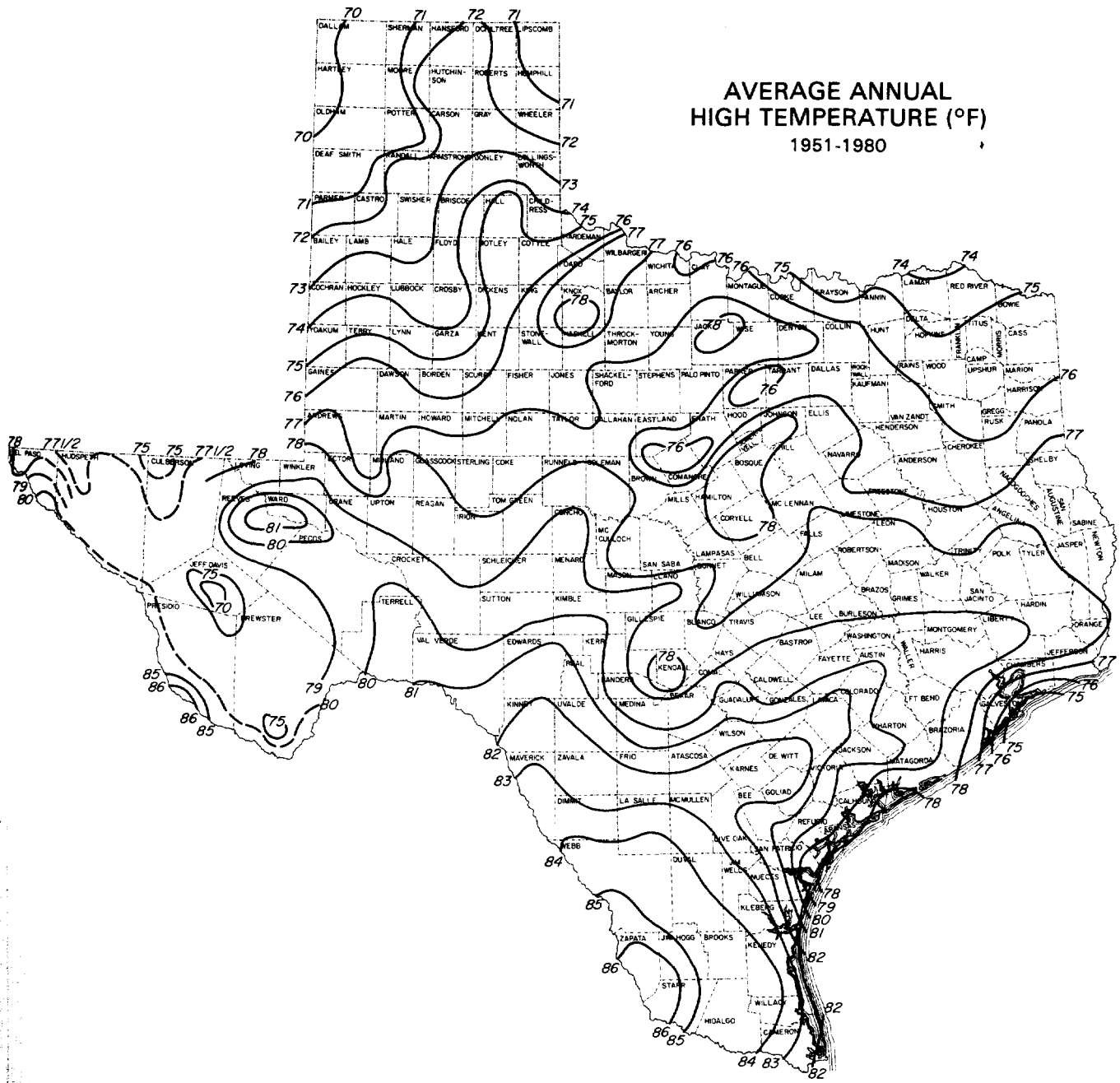

SEPTEMBER
Average Monthly
High Temperature (°F),
1951-1980

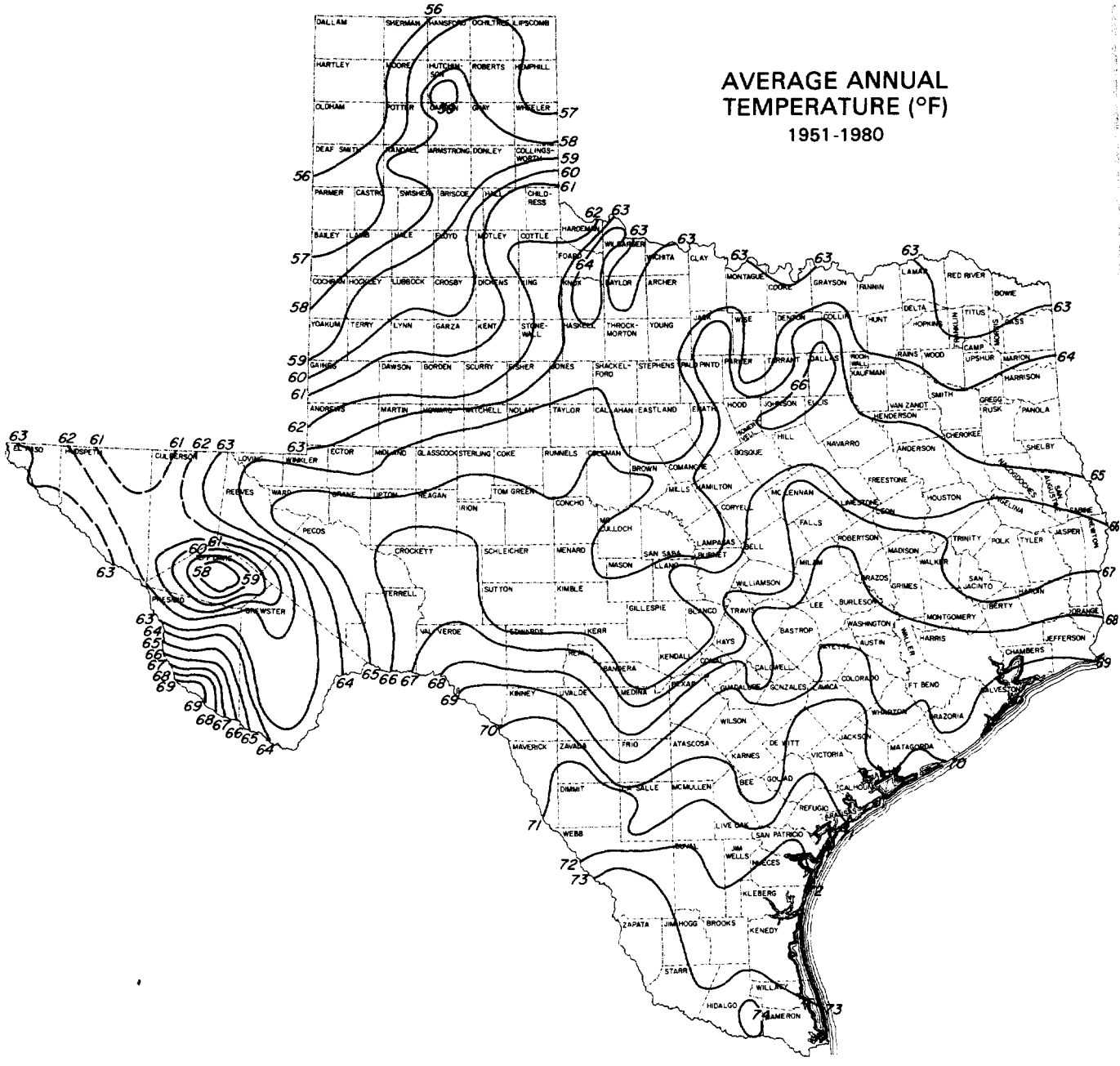

OCTOBER
Average Monthly
High Temperature (°F),
1951-1980


NOVEMBER
Average Monthly
High Temperature (°F),
1951-1980


DECEMBER
Average Monthly
High Temperature (°F),
1951-1980


AVERAGE ANNUAL
LOW TEMPERATURE (°F)
1951-1980


AVERAGE ANNUAL
HIGH TEMPERATURE (°F)
1951-1980


AVERAGE ANNUAL
TEMPERATURE (°F)
1951-1980

AVERAGE GROSS LAKE SURFACE EVAPORATION RATES

Definition of Terms

Evaporation is the change of state of water from a liquid to a gas (vapor). Gross lake surface evaporation is the total evaporative loss from a lake surface. The **average monthly gross lake surface evaporation rate** is the depth in inches that a lake surface is reduced by evaporation for the month. Similarly, the **average annual gross lake surface evaporation rate** is the evaporative loss in inches for the year.

There are 13 state maps on pages 54-66 which illustrate average gross lake surface evaporation rates for each month and for the year as a whole. The monthly rates are a 30-month average for each of the twelve months; the annual rate is a 30-year average.

Source of Data

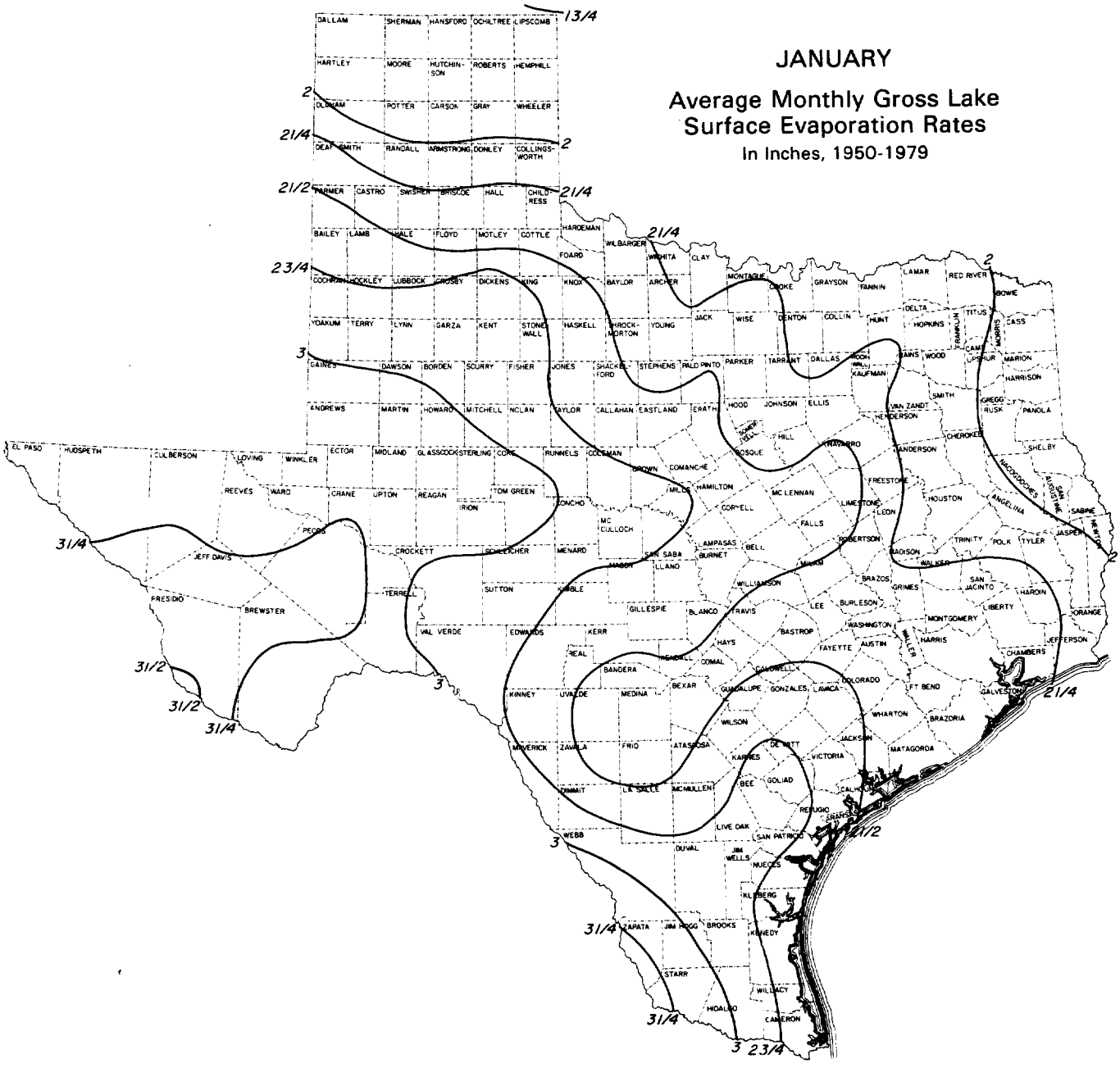
The average gross lake surface evaporation rate data illustrated in this atlas were provided by the Department's Surface Water Data Unit. Evaporation readings are recorded daily at 90 cooperative sites across Texas (see list in Appendix). Of these 90 sites, 45 are maintained by the Texas Department of Water Resources; 34 by the National Weather Service; and, 11 by the International Boundary and Water Commission. These sites make pan evaporation readings using a standard 4-foot diameter pan.

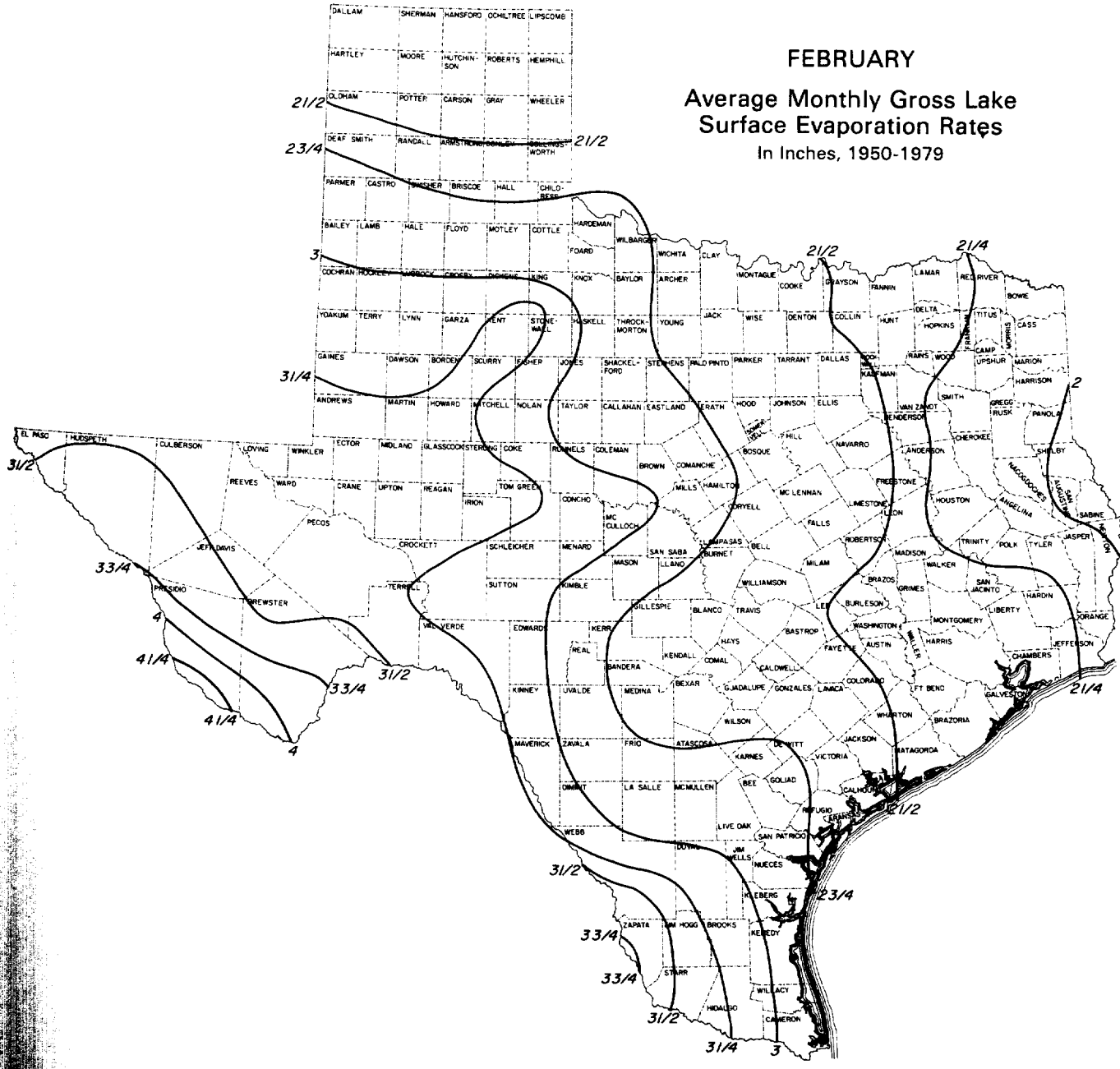
The evaporation readings are converted into gross lake surface evaporation rate-averages by a Department computer program. These data are available in computer print-out form which list monthly and annual averages for equally-sized areas in Texas. The areas are quadrangles which are dimensioned by whole degrees of latitude and longitude. One rate value is given per quadrangle which represents the average value of that area at its center point. There are 75 one-degree quadrangle center-points which cover Texas (see index map in Appendix). The maps in this atlas were drawn by isoline contour analysis to illustrate the distribution of average gross lake surface evaporation rates across the State.

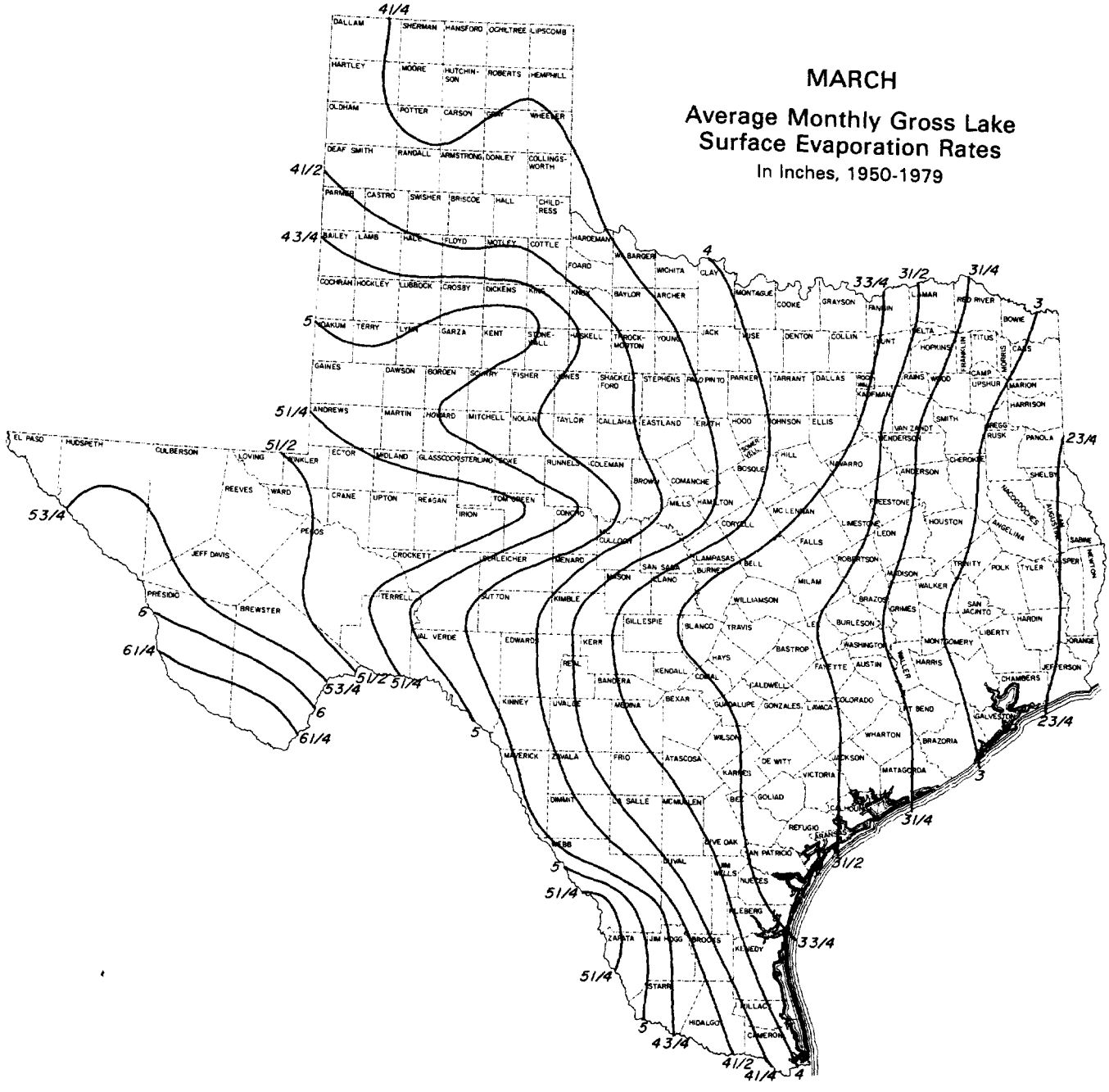
Period of Record

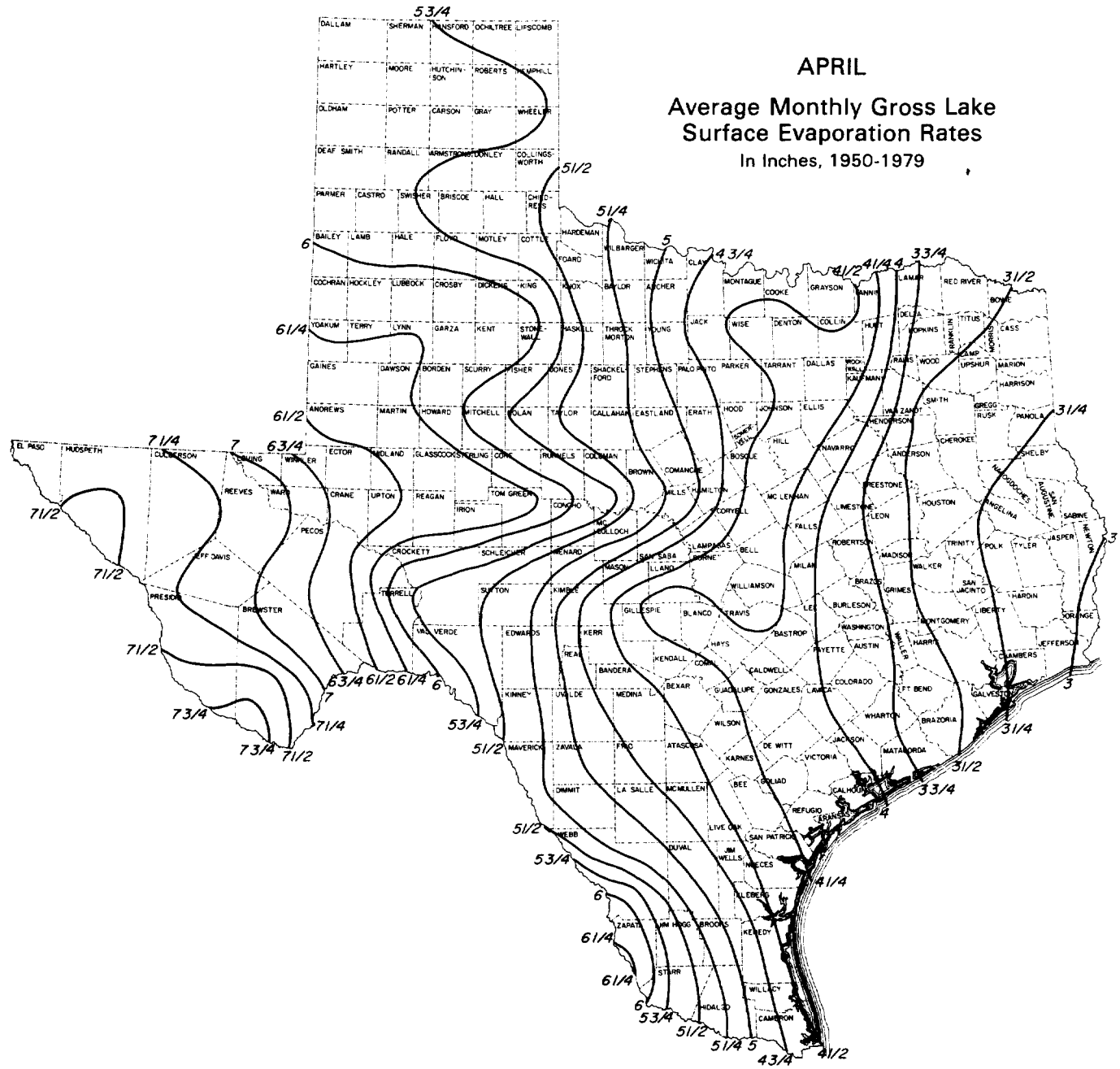
The following set of maps which illustrate average monthly and annual gross lake surface evaporation rates across Texas are based on data collected during the 30-year period 1950-1979. This period of time is thought by climatologists to be representative of average evaporation rates across Texas.

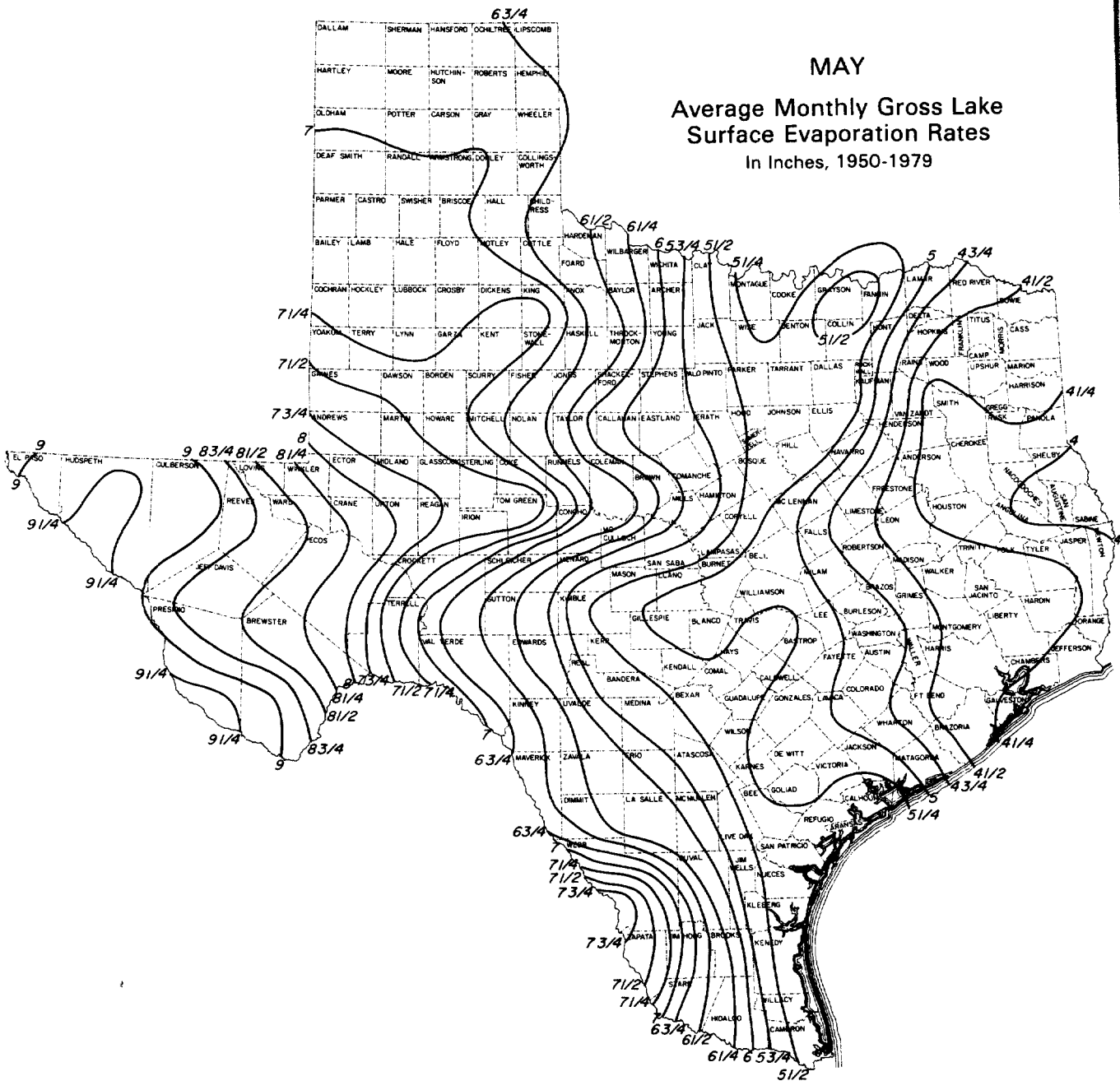
AVERAGE MONTHLY GROSS LAKE SURFACE EVAPORATION RATE MAPS

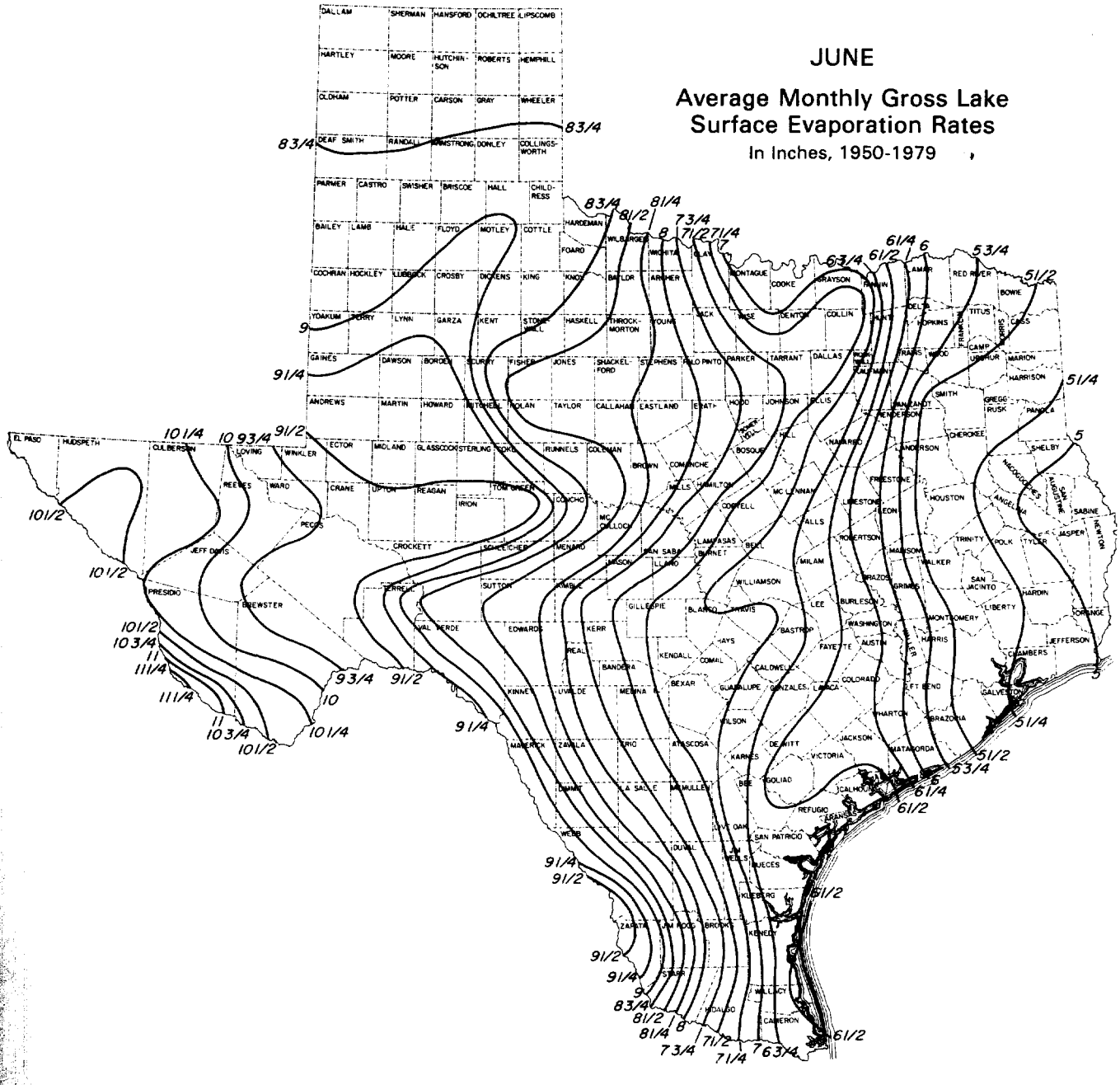

JANUARY
Average Monthly Gross Lake Surface Evaporation Rates
In Inches, 1950-1979
13/4
2
21/4
21/2
23/4
3
31/4
31/2
2
21/4
21/4
2
21/2
3
31/4
31/4
3
23/4

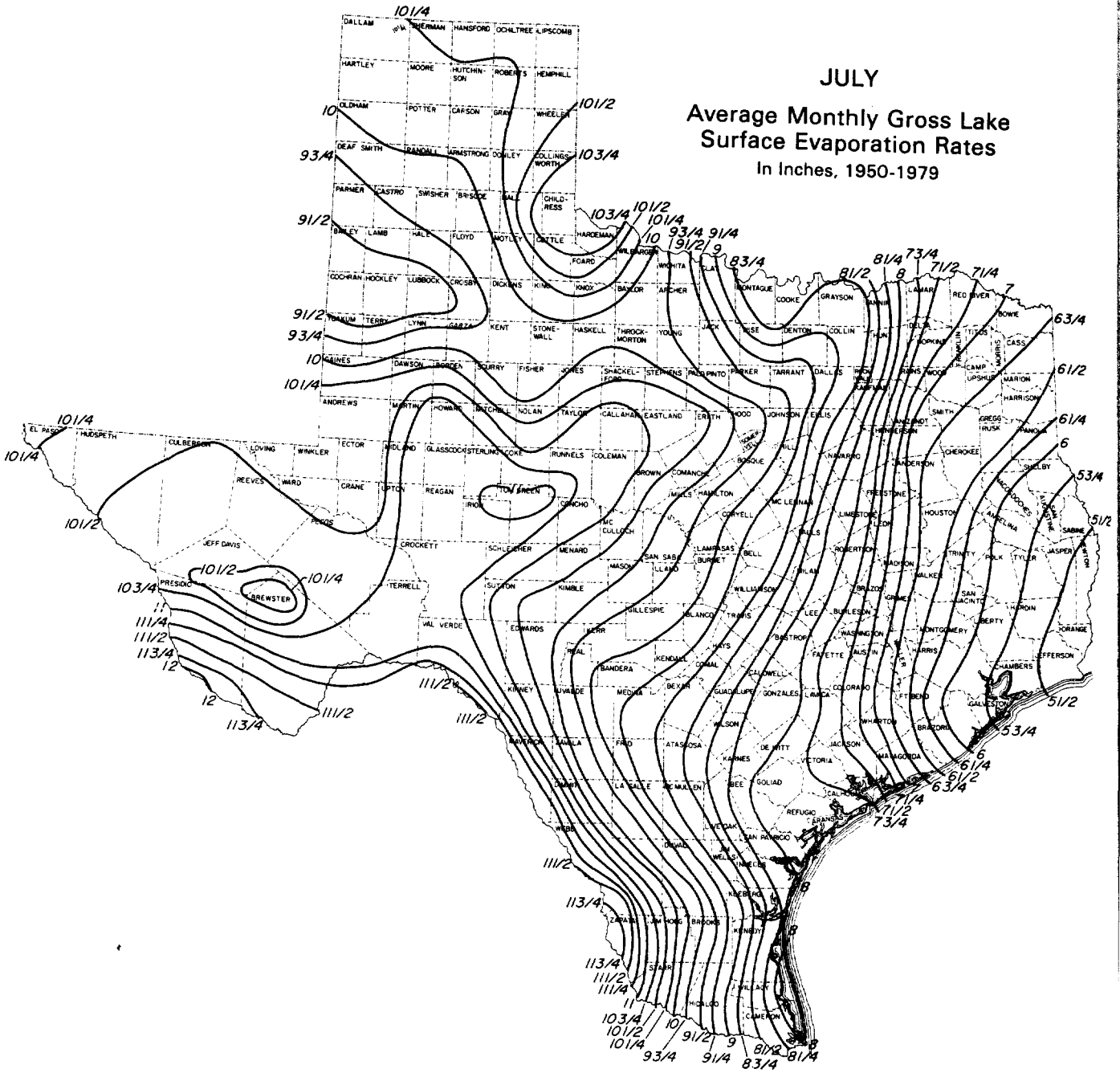

FEBRUARY
Average Monthly Gross Lake Surface Evaporation Rates
In Inches, 1950-1979
21/2
23/4
21/2
3
31/4
21/2
21/4
2
31/2
33/4
4
41/4
33/4
31/2
41/4
4
21/4
23/4
21/2
31/2
33/4
33/4
31/2
31/4
3

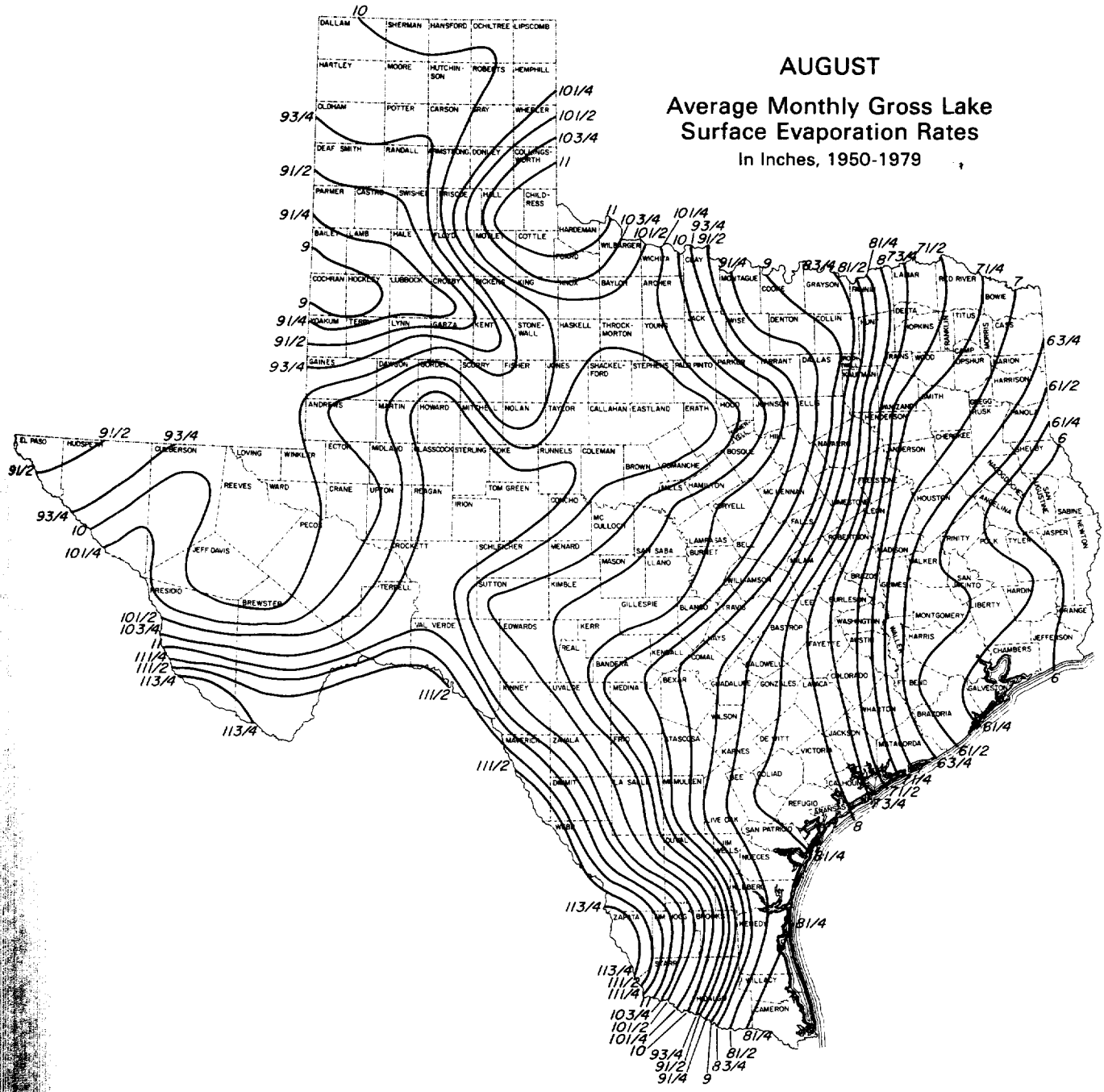

MARCH
Average Monthly Gross Lake Surface Evaporation Rates
In Inches, 1950-1979
41/4
41/2
43/4
5
51/4
51/2
53/4
6
61/4
4
33/4
31/2
31/4
3
23/4
5
51/4
51/2
53/4
6
61/4
5
51/4
5
43/4
41/2
41/4
4
33/4
31/2
31/4
3
23/4

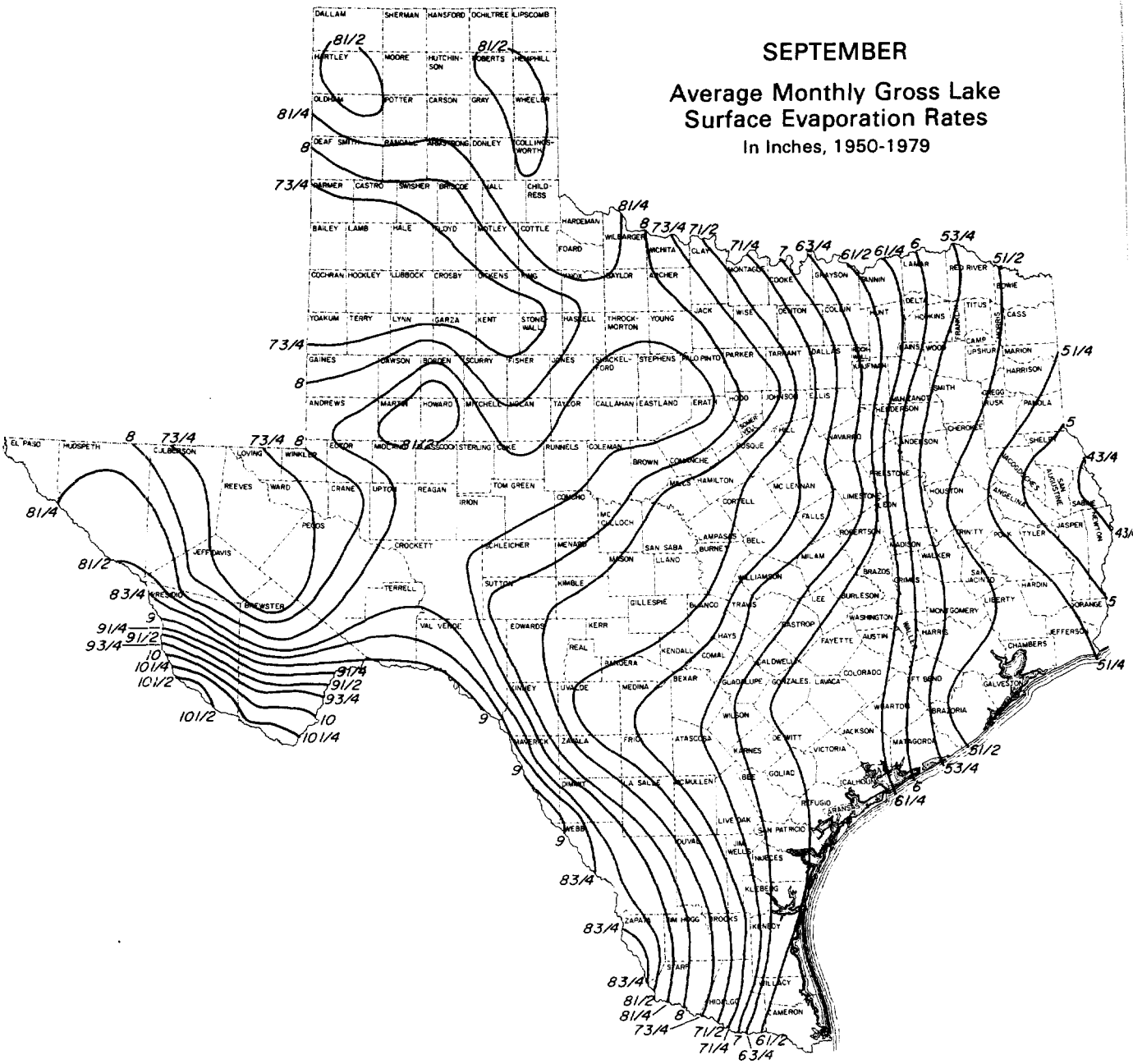

APRIL
Average Monthly Gross Lake Surface Evaporation Rates
In Inches, 1950-1979

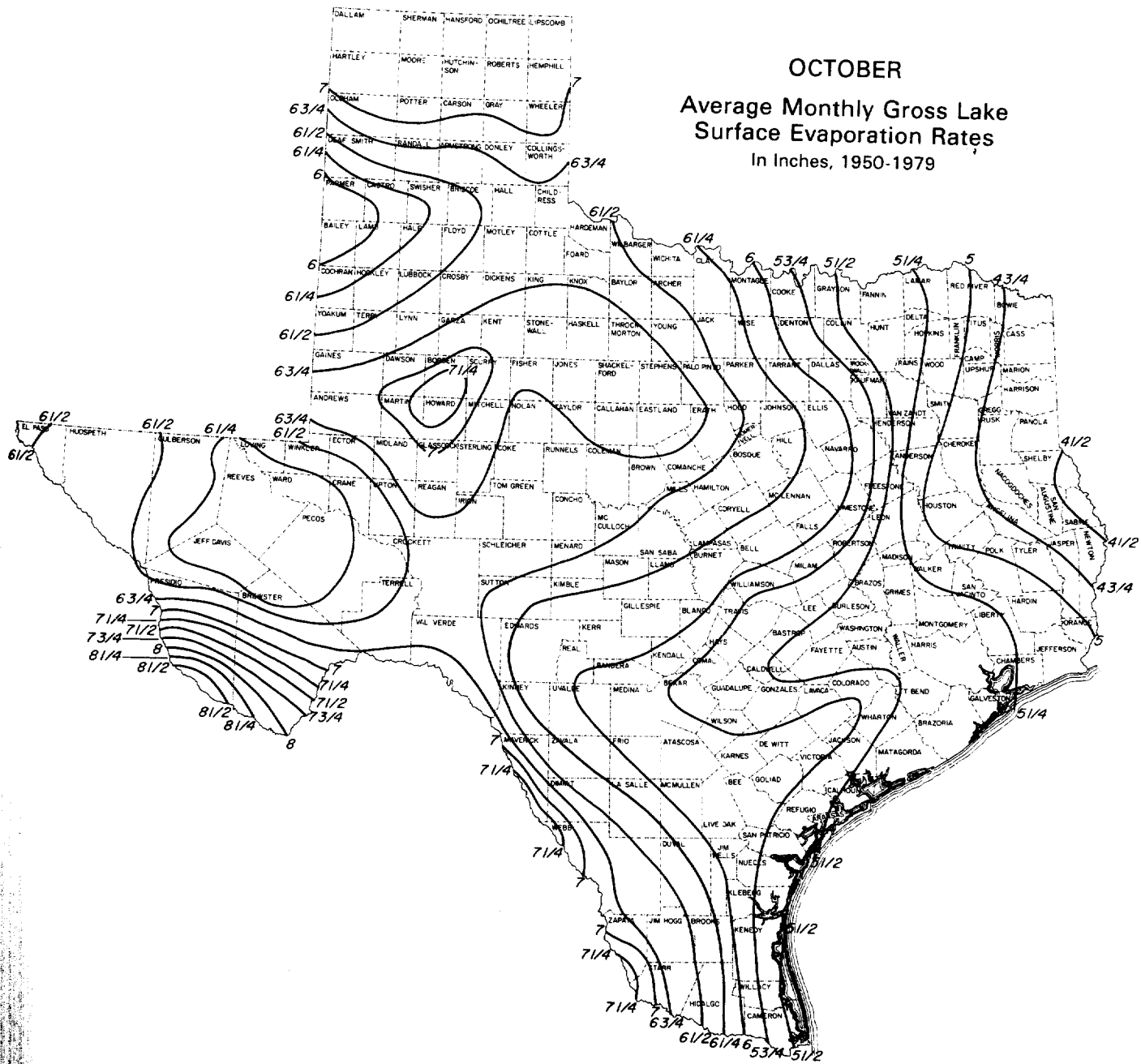

MAY
Average Monthly Gross Lake
Surface Evaporation Rates
In Inches, 1950-1979

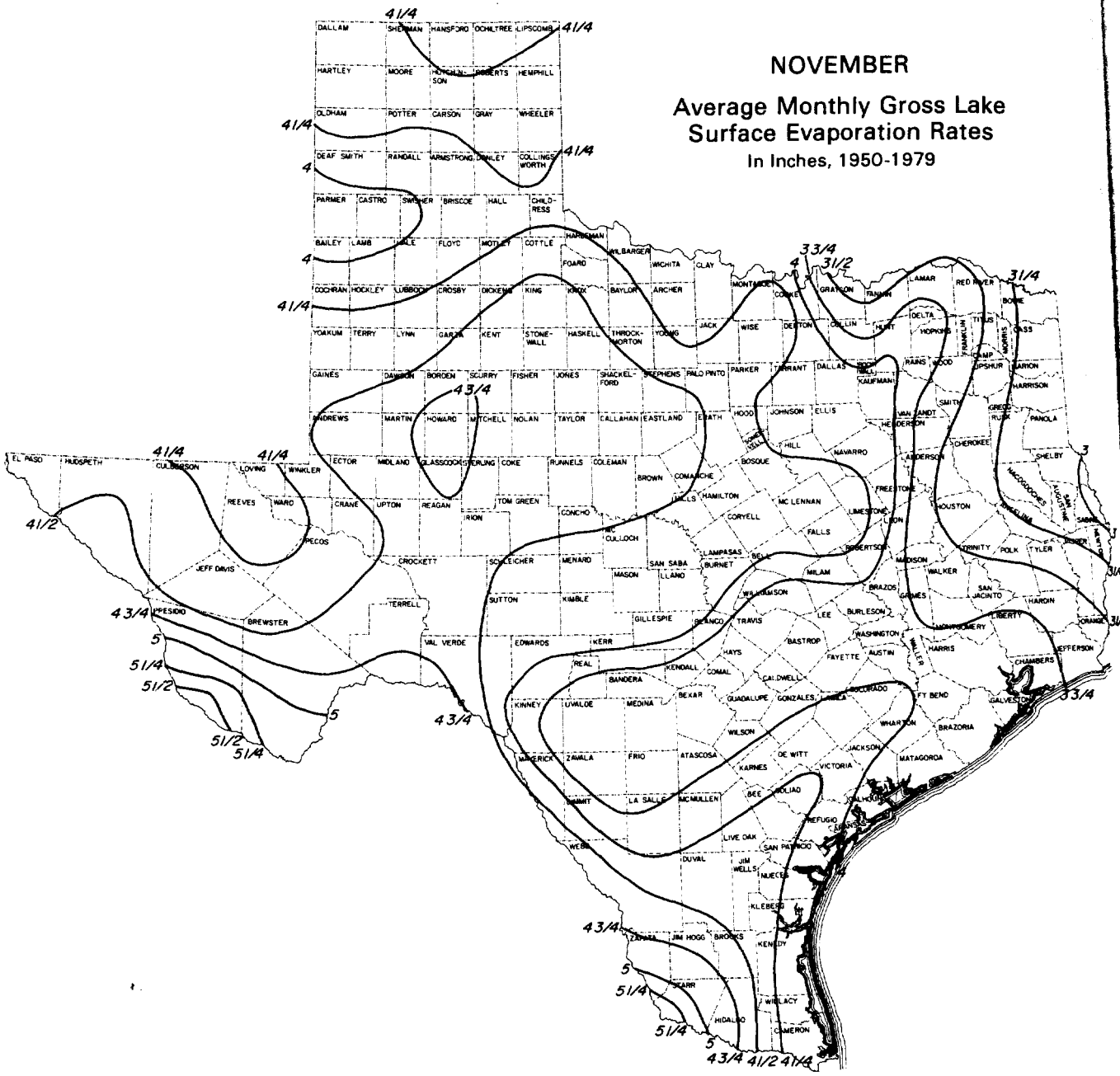

JUNE
Average Monthly Gross Lake Surface Evaporation Rates
In Inches, 1950-1979

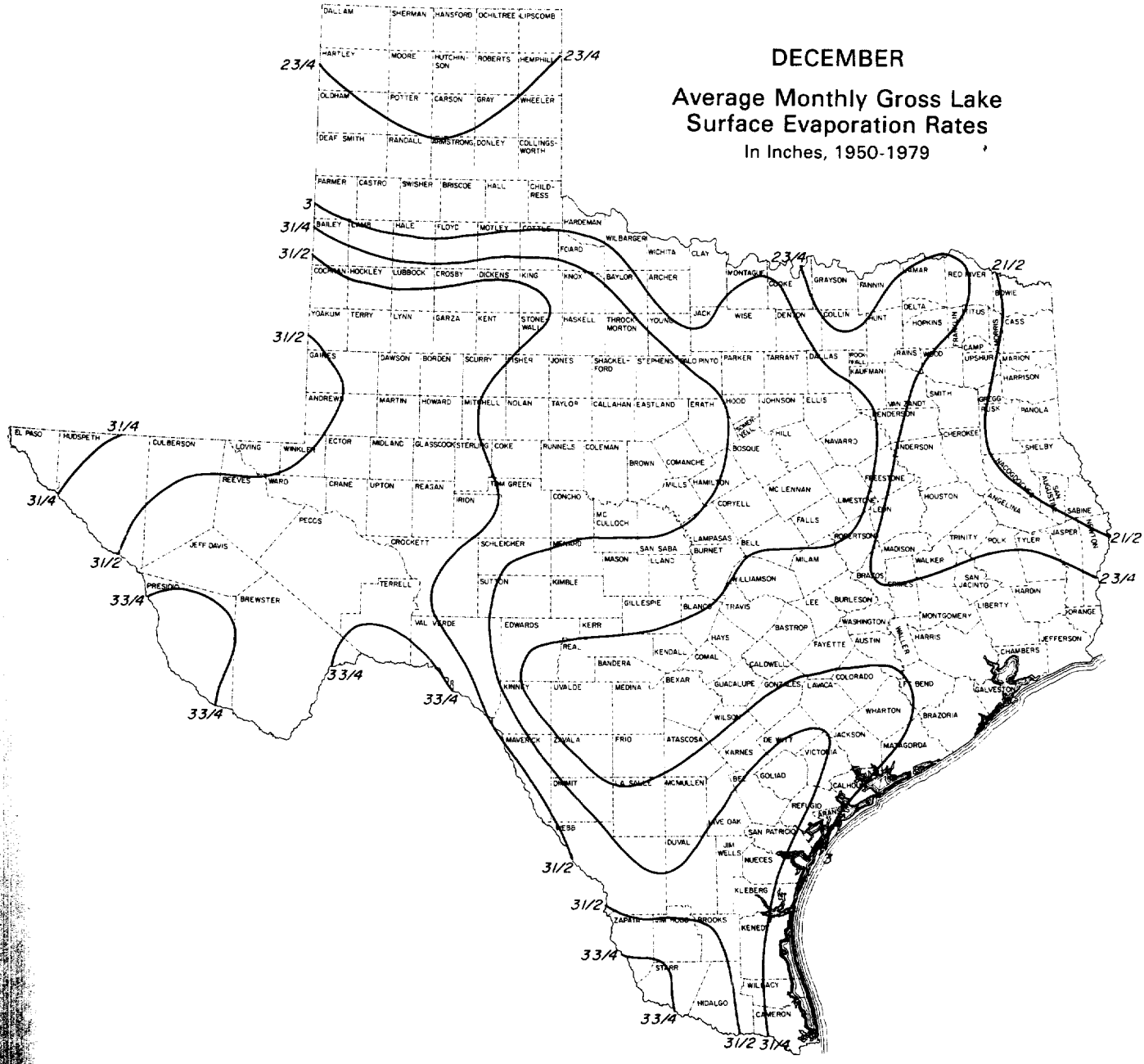

JULY
Average Monthly Gross Lake Surface Evaporation Rates
In Inches, 1950-1979

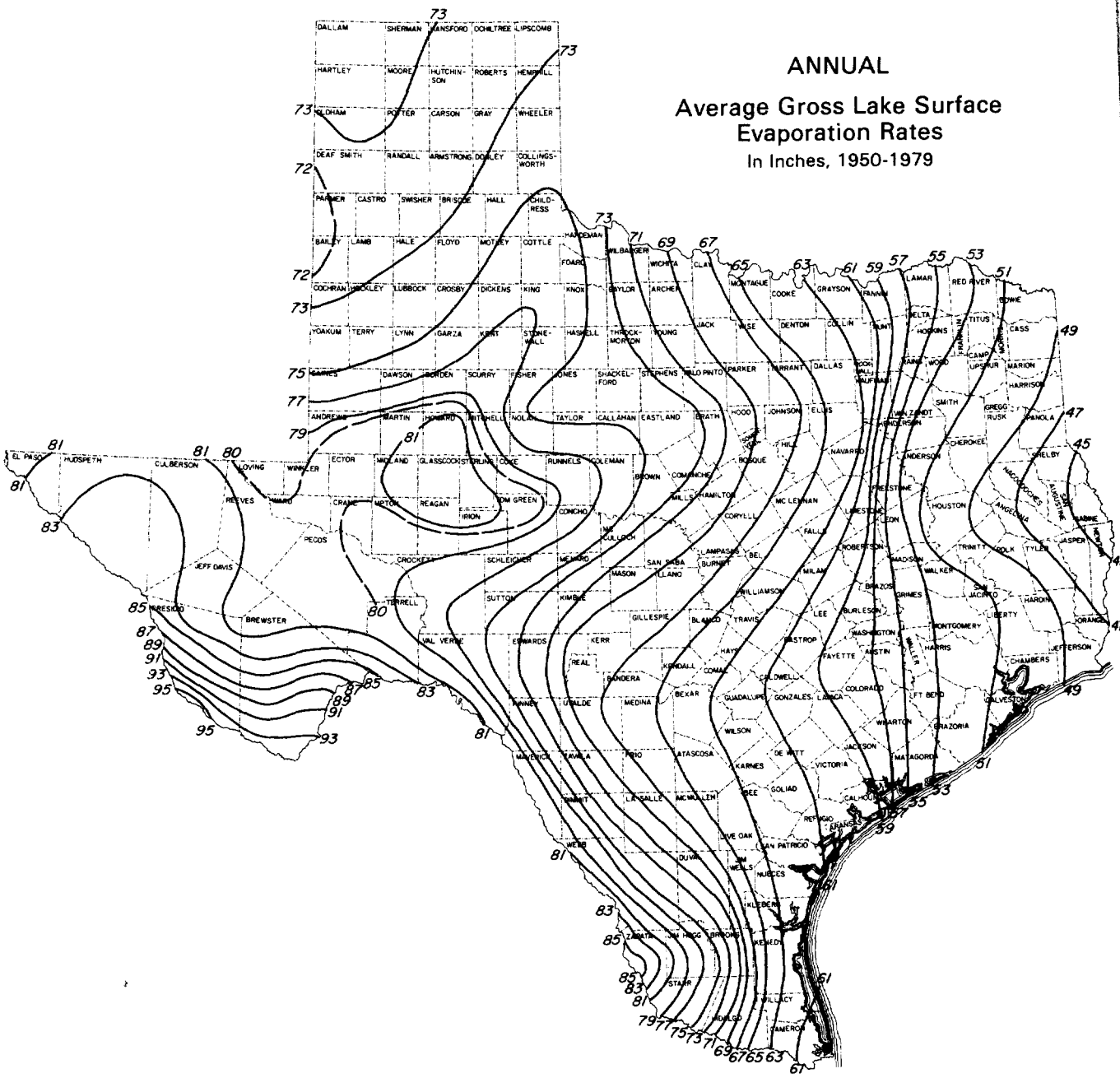

AUGUST
Average Monthly Gross Lake
Surface Evaporation Rates
In Inches, 1950-1979


SEPTEMBER
Average Monthly Gross Lake Surface Evaporation Rates
In Inches, 1950-1979


OCTOBER
Average Monthly Gross Lake Surface Evaporation Rates
In Inches, 1950-1979


NOVEMBER
Average Monthly Gross Lake Surface Evaporation Rates
In Inches, 1950-1979
41/4
41/2
43/4
5
51/4
51/2
4
33/4
31/2
31/4
3


DECEMBER
Average Monthly Gross Lake Surface Evaporation Rates
In Inches, 1950-1979
23/4
23/4
3
31/4
31/2
31/2
31/4
31/4
31/2
33/4
33/4
33/4
23/4
21/2
23/4
21/2
31/2
31/2
33/4
33/4
31/2 31/4
3


ANNUAL
Average Gross Lake Surface Evaporation Rates
In Inches, 1950-1979

AVERAGE WIND DIRECTION AND SPEED

Definition of Terms

Wind is simply air in motion relative to the surface of the earth. The terms **wind speed** and **wind direction** almost always denote the horizontal component of the movement of air.

Values of average wind speed depicted by wind roses on pages 70-137 are expressed in knots (1 knot = 1 nautical mile per hour = 1.15 miles per hour). Wind speeds have been categorized as follows:

Knots	Miles per hour
1-3	1-3
4-7	4-8
8-10	9-12
11-13	13-15
14-18	16-21
over 18	over 21

Wind direction is expressed by each of 16 compass points (N, NNE, NE, . . . WNW, NW, NNW). The stems of the wind rose point in the directions **from which** the wind blows.

Source of Data

Wind data were obtained from weather-observing installations operated by the National Weather Service and the Federal Aviation Administration. Wind speed and wind direction at these sites were measured once each hour near the top of the hour by taking a 1-minute average of prevailing wind conditions. Whereas measurements were made each hour, only readings at 3-hour intervals were entered into weather annals subsequent to 1964. Hence, the wind roses on the following pages reflect cumulative mean wind conditions based upon measurements made at 3-hour intervals at the following times (CST): 12 midnight, 3 a.m., 6 a.m., 9 a.m., 12 noon, 3 p.m., 6 p.m., and 9 p.m.

Period of Record

Average wind conditions for selected cities in Texas are based upon weather observations for periods as indicated below:

Abilene	1961-1980
Amarillo	1961-1980

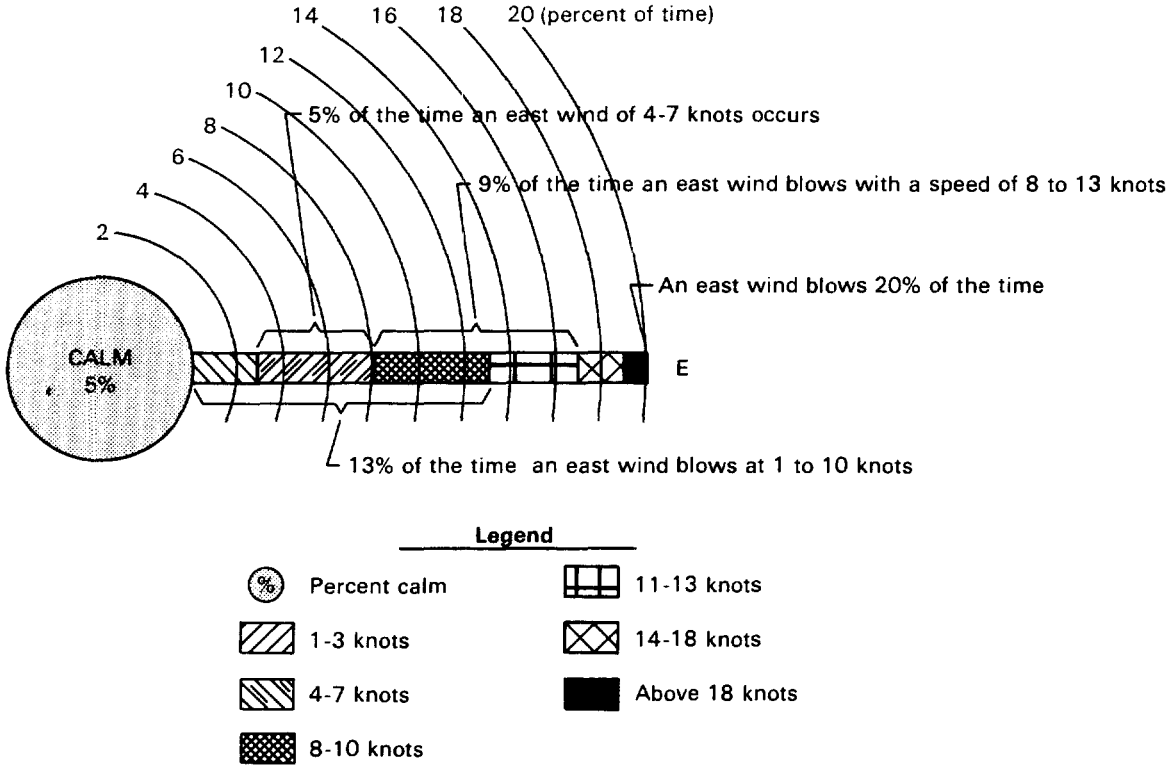
Austin	1961-1980
Brownsville	1961-1980
Corpus Christi	1961-1980
Dallas-Ft. Worth	1961-1980
Del Rio	1963-1979
El Paso	1961-1980
Houston	1971-1980
Laredo	1948-1965
Lubbock	1961-1980
Lufkin	1961-1980
Midland	1961-1980
San Angelo	1961-1980
San Antonio	1961-1980
Waco	1968-1980
Wichita Falls	1961-1980
Victoria	1961-1980

Wind data are complete or nearly continuous for the time intervals listed above.

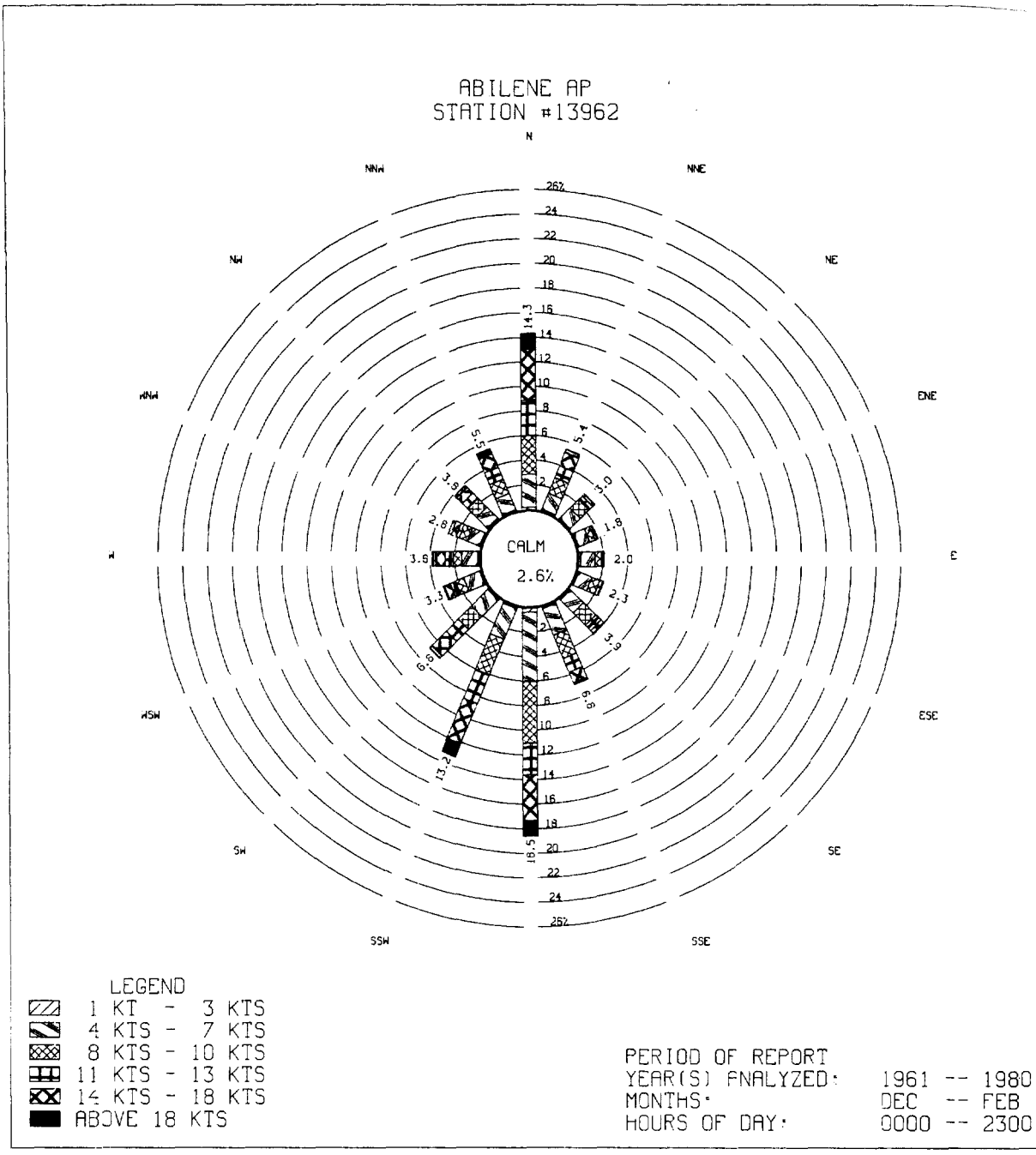
For each location, a set of four wind roses—one for each season of the year—is presented. The seasons are defined as follows:

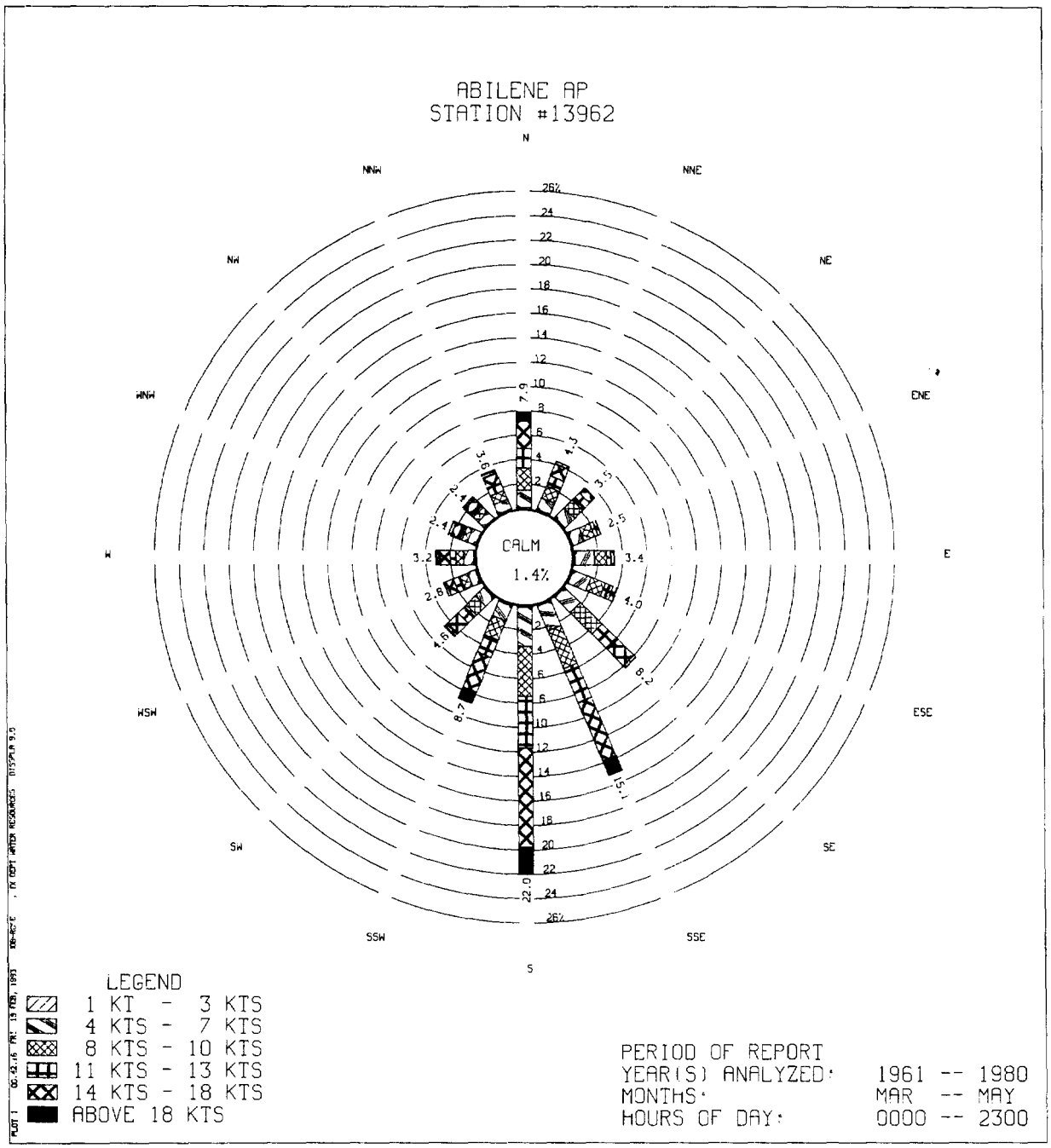
Winter	December through February
Spring	March through May
Summer	June through August
Autumn	September through November

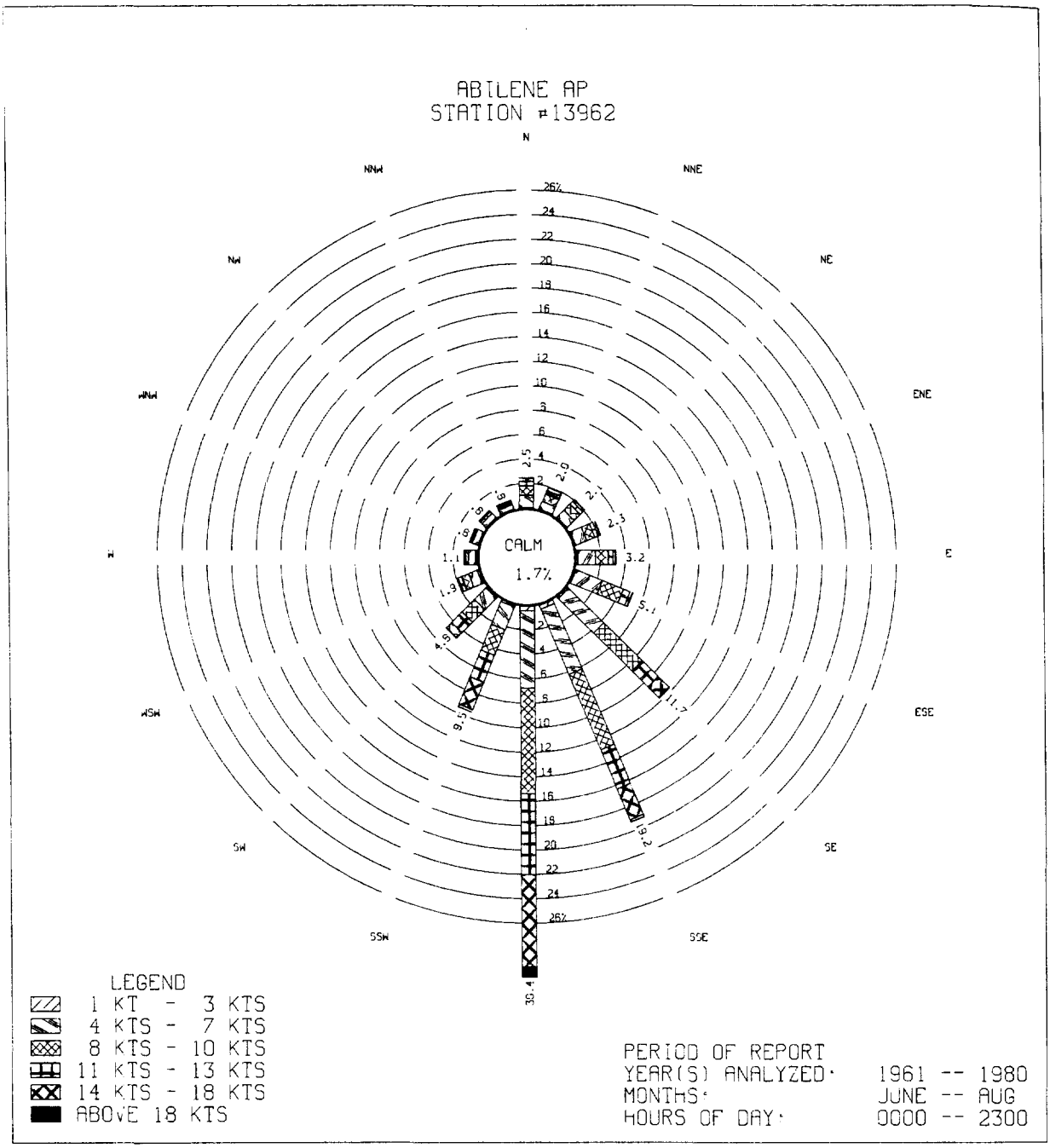
The use of a wind rose is depicted below:

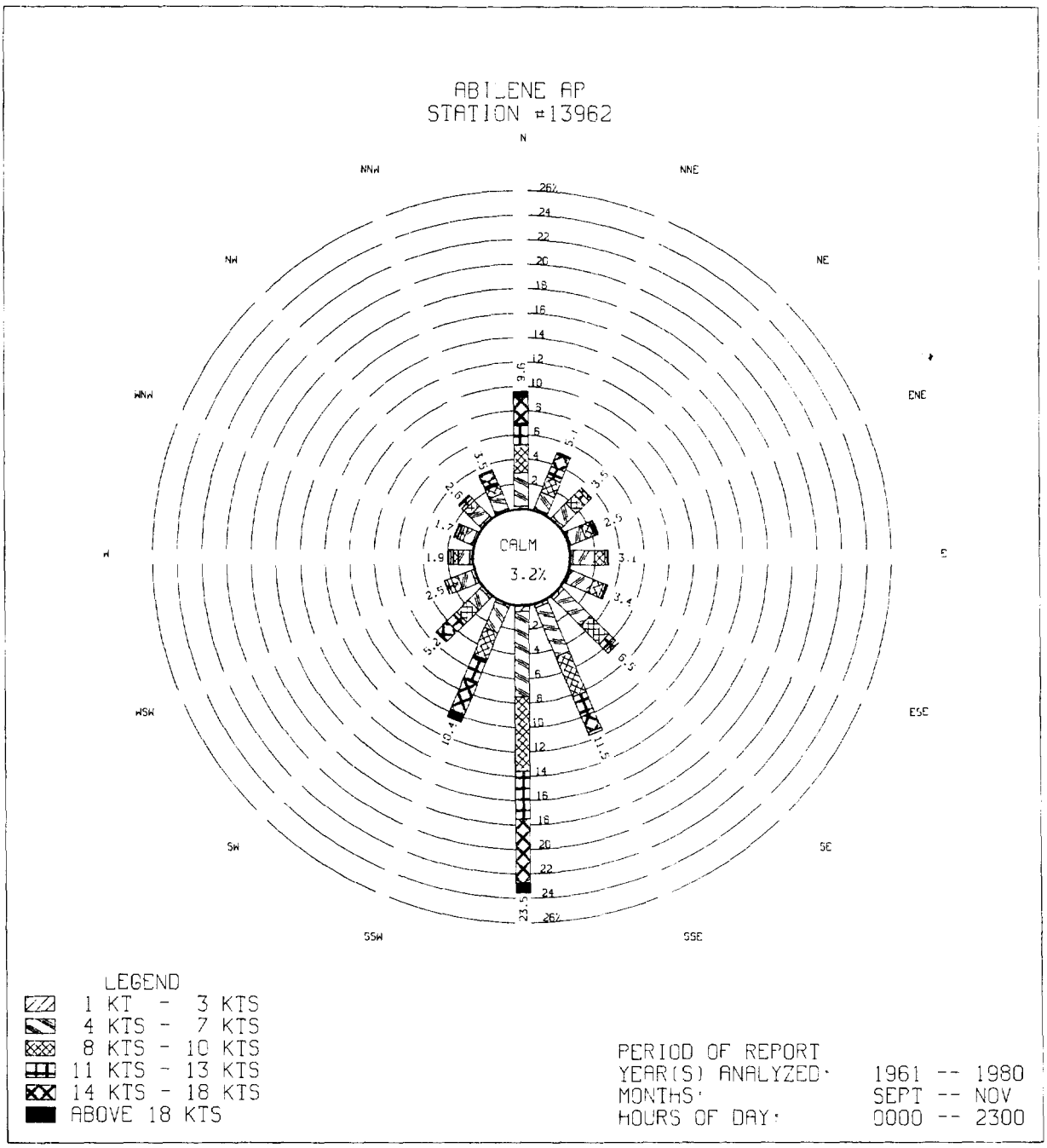


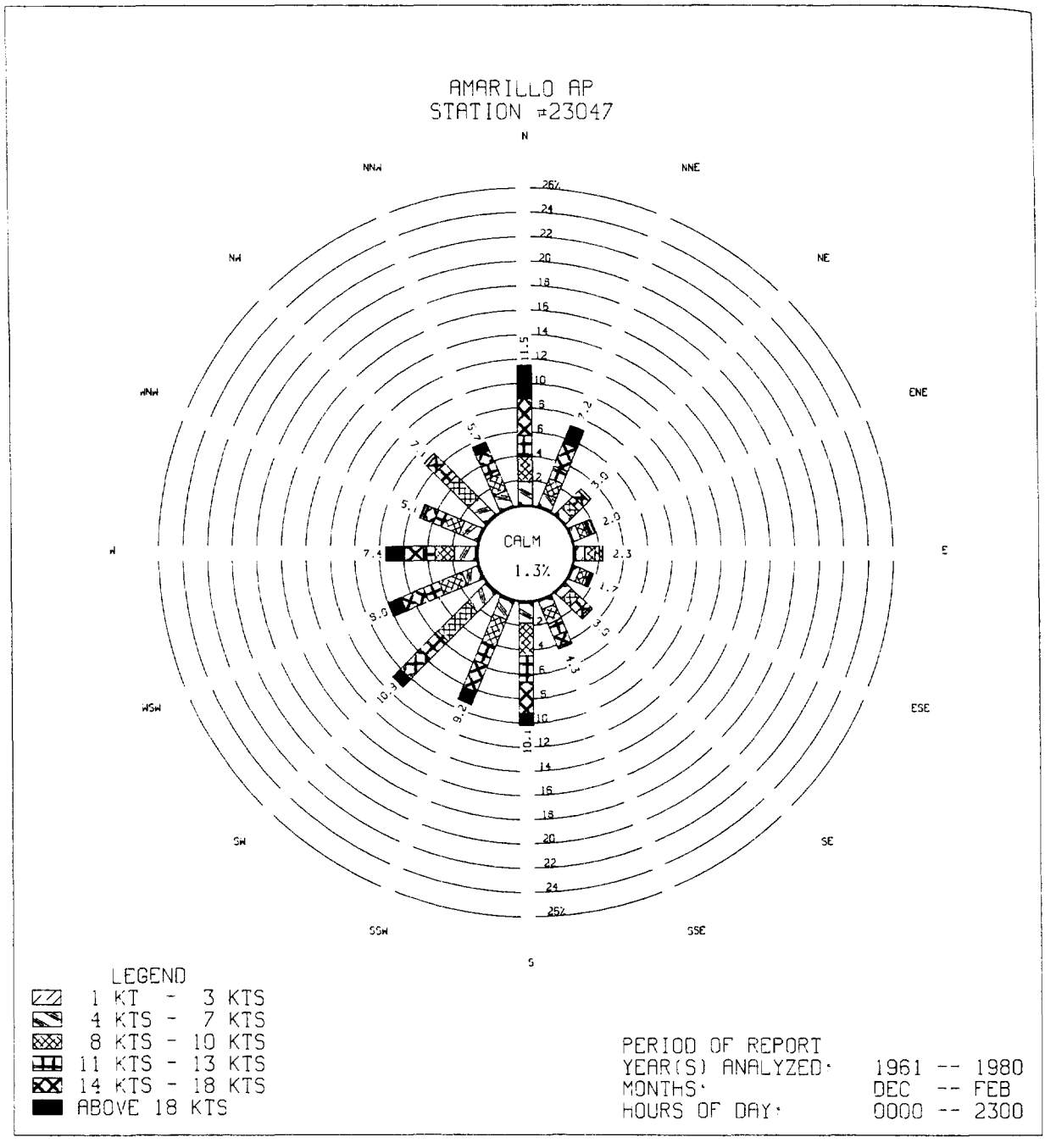
WIND ROSES

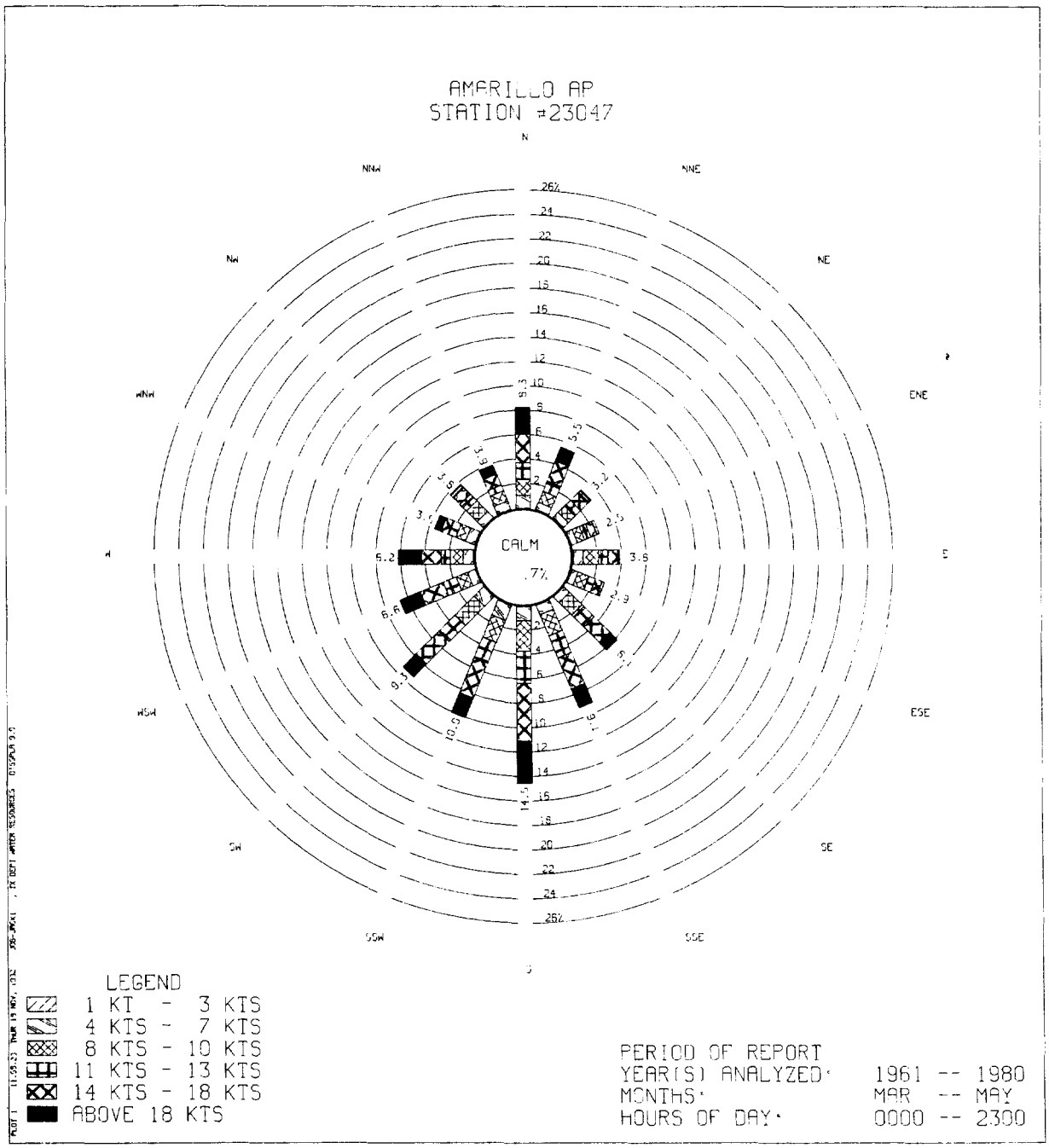

ABILENE AP
STATION #13962
N
NNW
NNE
NW
NE
WNW
ENE
W
E
WSW
ESE
SW
SE
SSW
SSE
26%
24
22
20
18
16
14
12
10
8
6
4
2
CALM
2.6%
14.3
5.4
5.0
1.8
2.0
2.3
3.9
9.6
16.5
13.2
8.9
3.5
3.6
2.8
3.9
5.5
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: DEC -- FEB
HOURS OF DAY: 0000 -- 2300

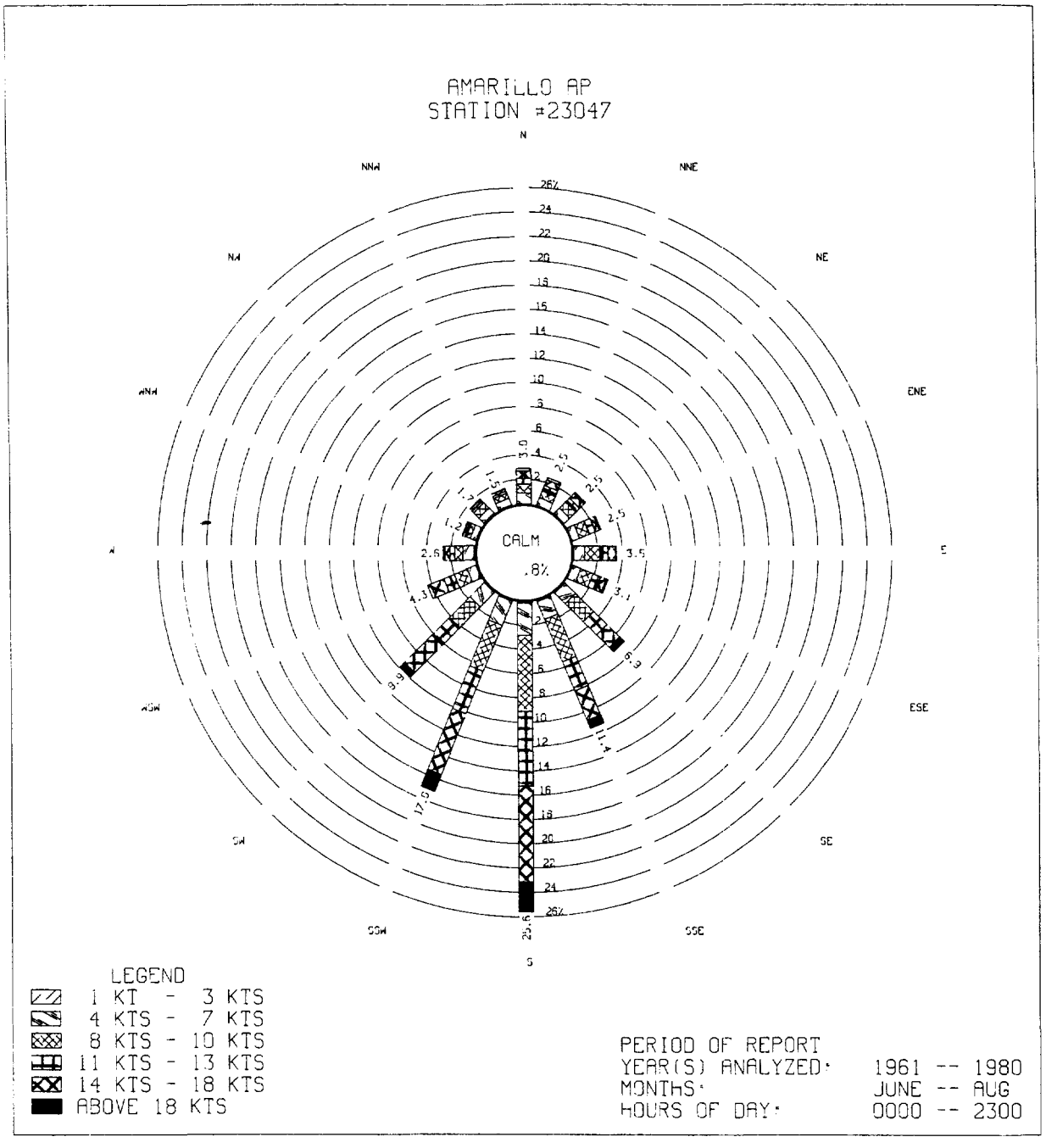

ABILENE AP
STATION #13962
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
26%
24
22
20
18
16
14
12
10
8
6
4
2
CALM
1.4%
7.9
4.3
3.5
2.5
3.4
4.0
6.2
15.1
22.0
8.7
4.6
2.8
3.2
2.4
2.1
3.6
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: MAR -- MAY
HOURS OF DAY: 0000 -- 2300

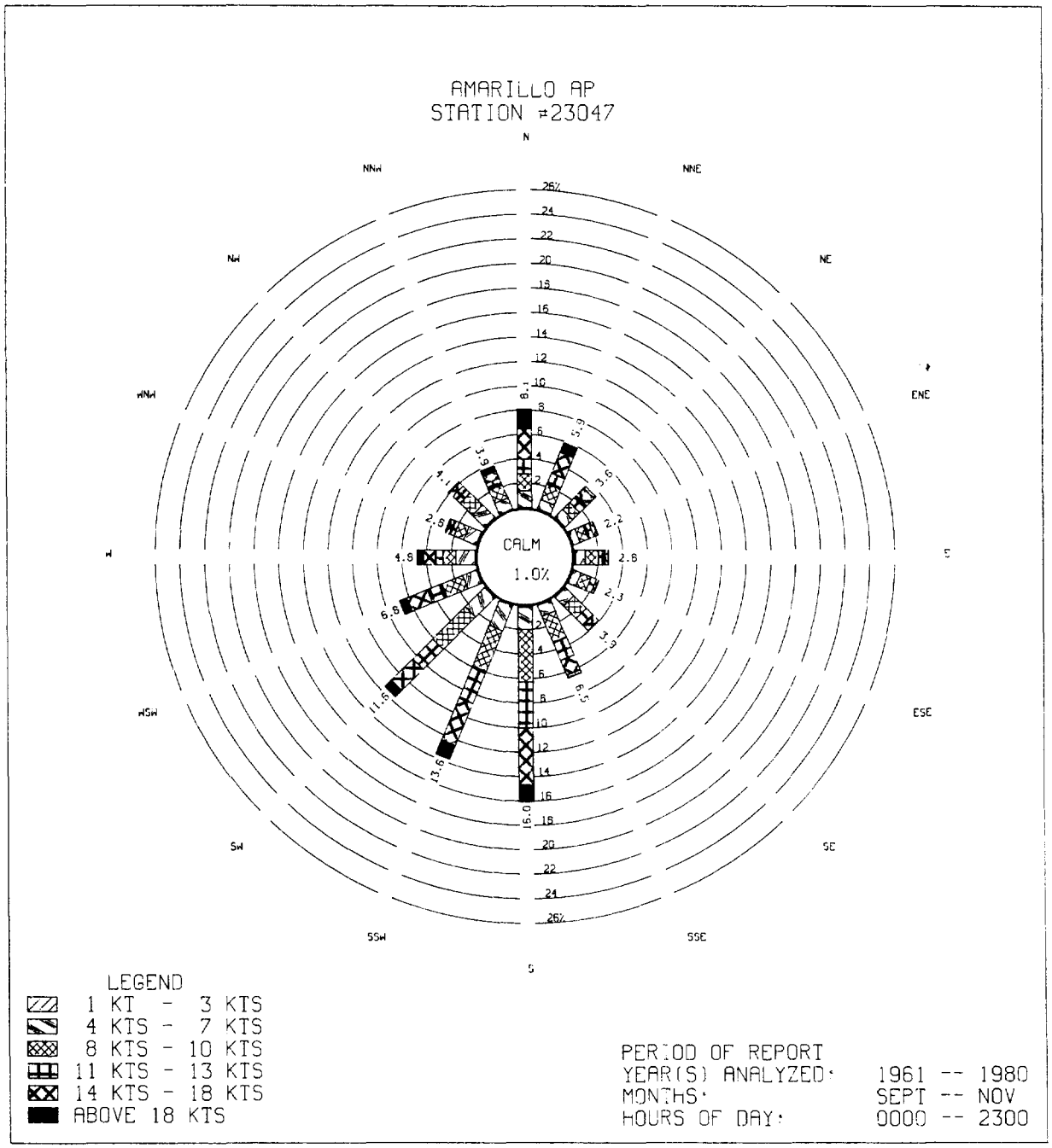

ABILENE AP
STATION #13962
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
26%
24
22
20
18
16
14
12
10
8
6
4
2
CALM
1.7%
2.5
2.0
2.1
2.3
3.2
5.1
11.7
19.2
30.4
9.5
4.5
1.3
1.1
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: JUNE -- AUG
HOURS OF DAY: 0000 -- 2300

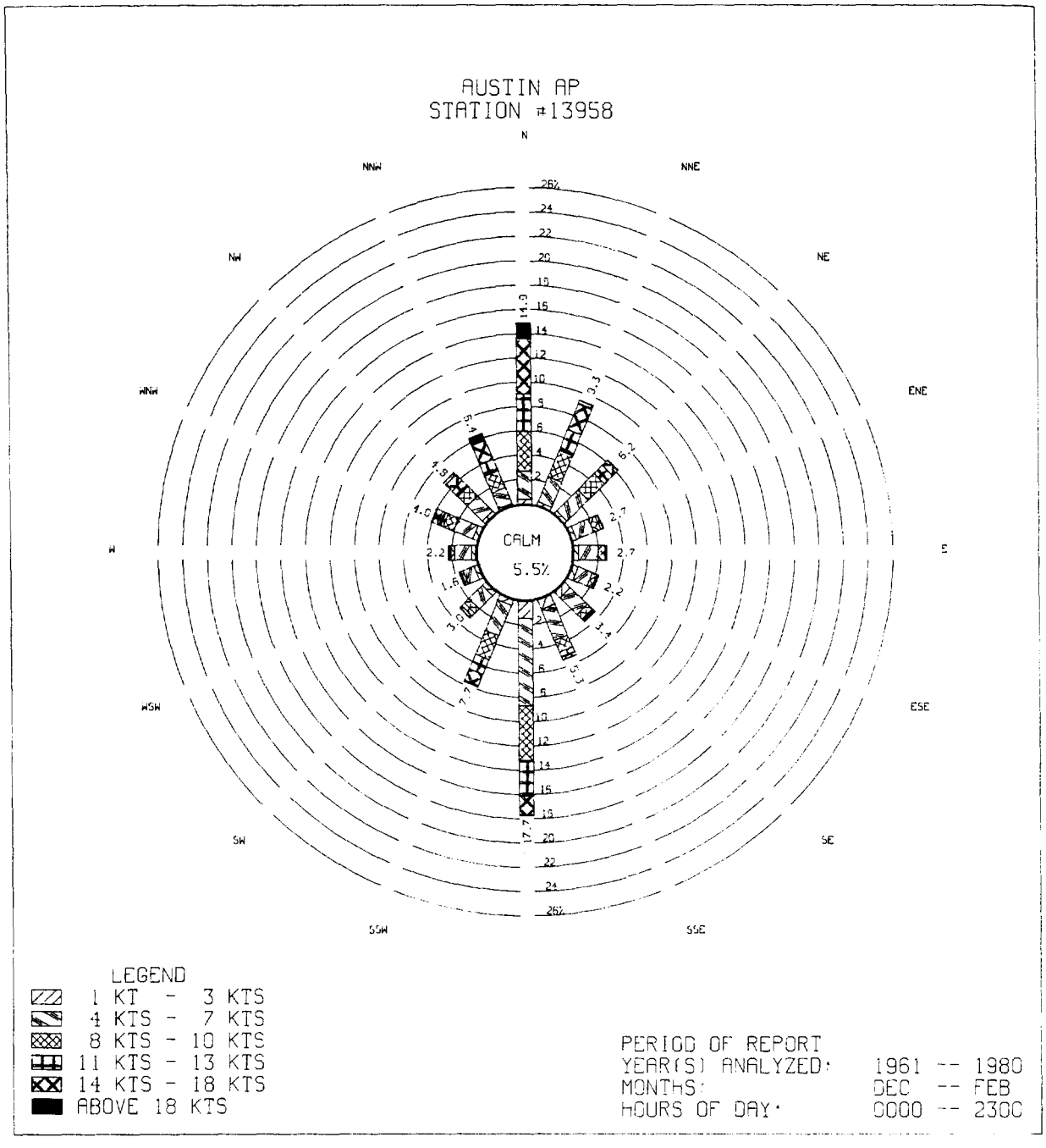

ABILENE AP
STATION #13962
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
26%
24
22
20
18
16
14
12
10
8
6
4
2
CALM
3.2%
9.6
5.1
3.5
2.5
3.1
3.4
6.5
11.5
23.5
10.4
5.5
2.5
1.9
1.7
2.0
5.5
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: SEPT -- NOV
HOURS OF DAY: 0000 -- 2300

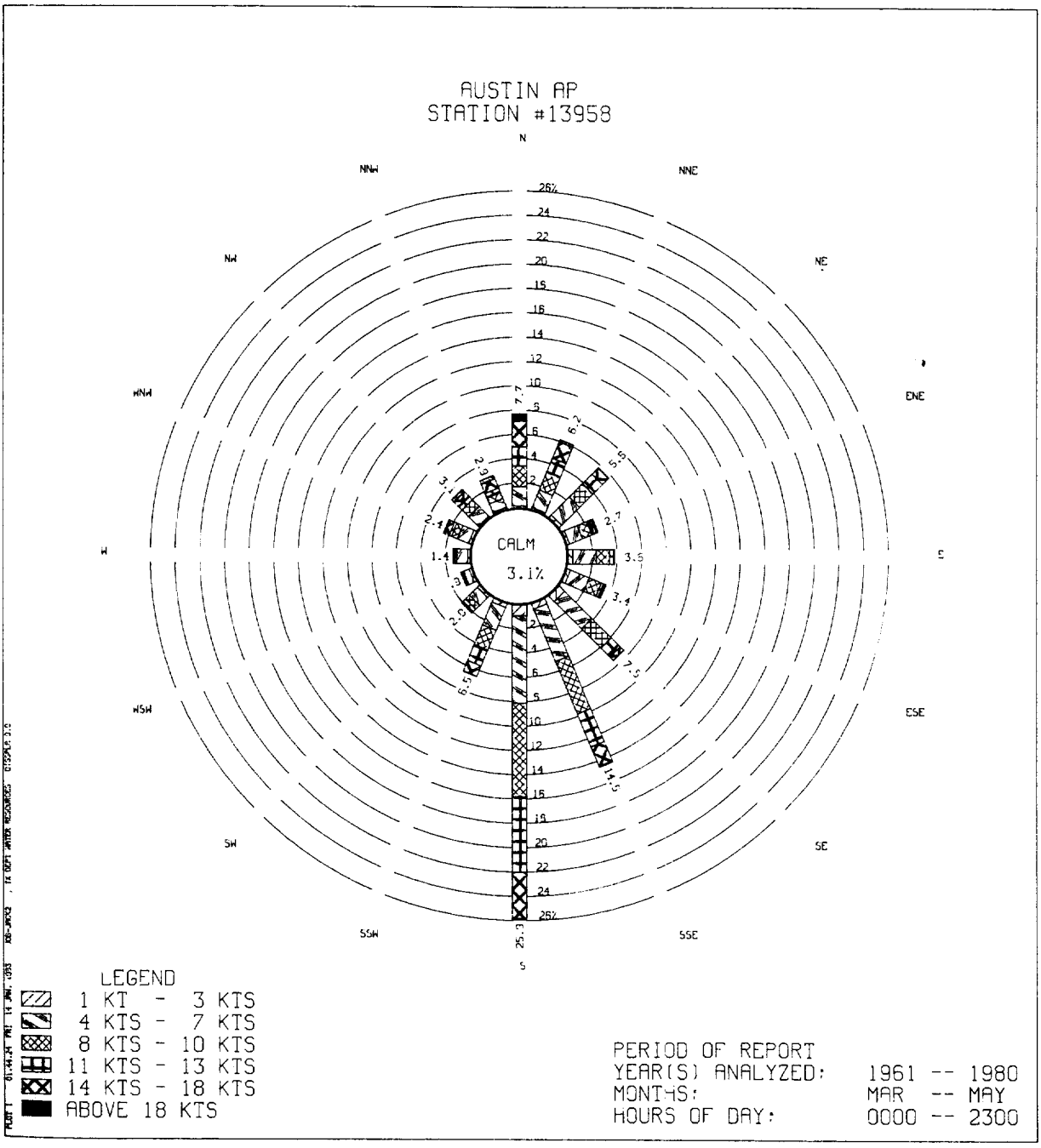

AMARILLO AP
STATION #23047
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
26%
24
22
20
18
16
14
12
10
8
6
4
2
CALM
1.3%
11.5
7.2
3.9
2.0
2.3
1.7
4.0
4.3
10.1
9.2
10.3
9.0
7.4
5.1
7.1
5.2
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: DEC -- FEB
HOURS OF DAY: 0000 -- 2300

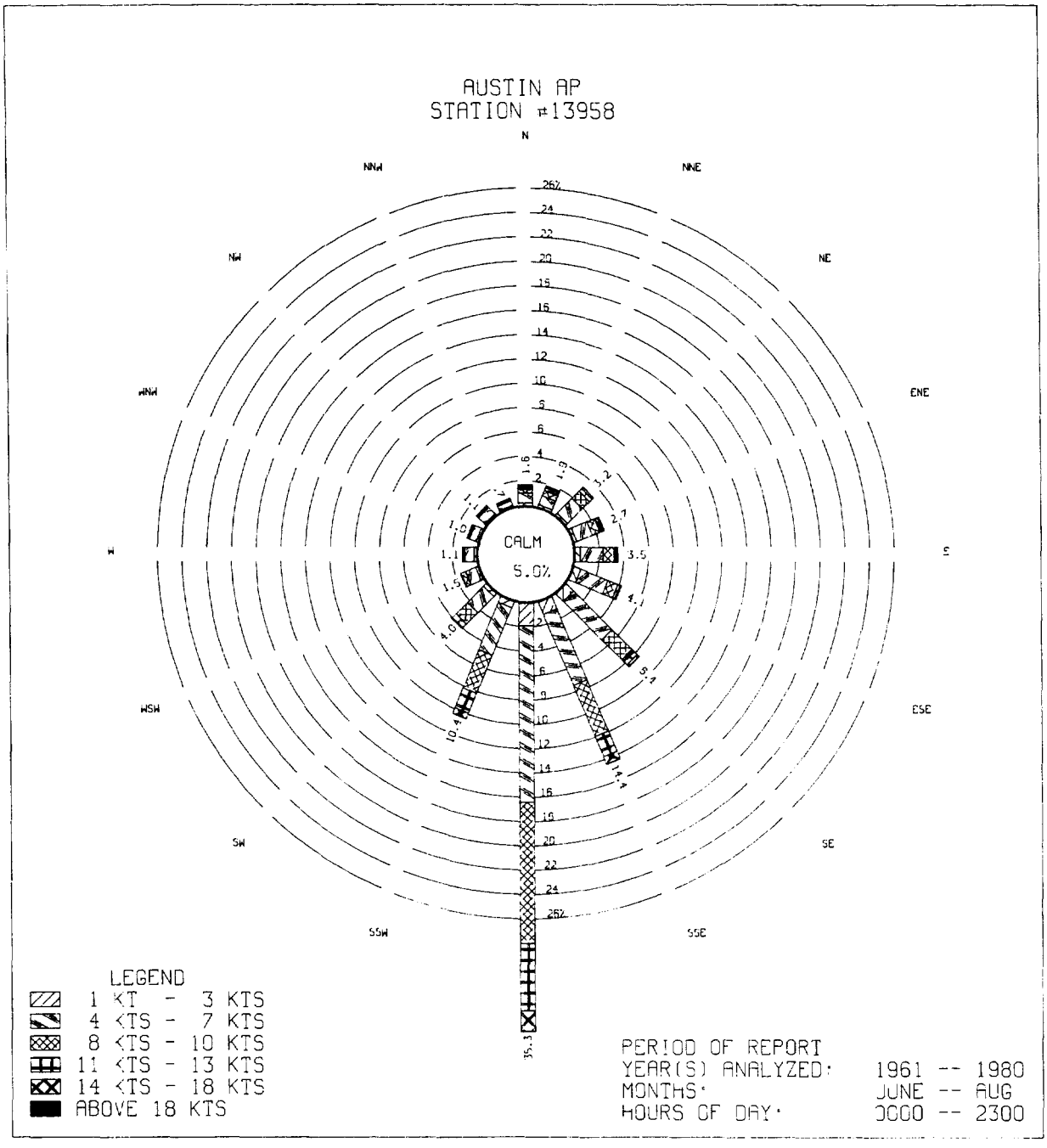

AMARILLO AP
STATION #23047
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
26%
24
22
20
18
16
14
12
10
8
6
4
2
CALM
.7%
9.3
5.5
3.2
2.5
3.6
2.9
5.1
7.6
14.5
10.9
9.3
6.6
5.2
3.0
3.6
5.6
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: MAR -- MAY
HOURS OF DAY: 0000 -- 2300

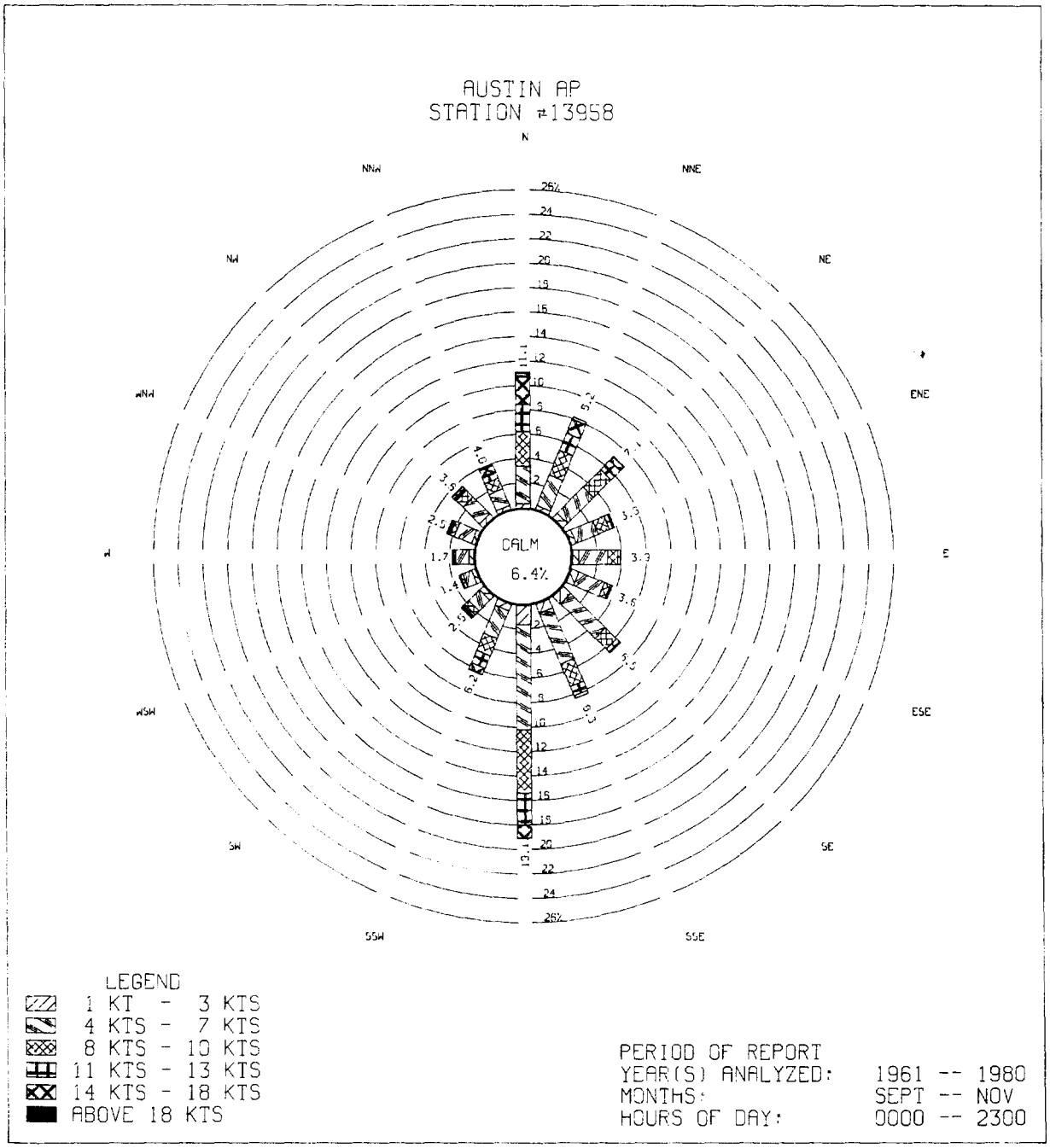

AMARILLO AP
STATION #23047
N
NNW
NNE
NW
NE
WNW
ENE
W
E
WSW
ESE
SW
SE
SSW
SSE
S
CALM
.8%
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: JUNE -- AUG
HOURS OF DAY: 0000 -- 2300

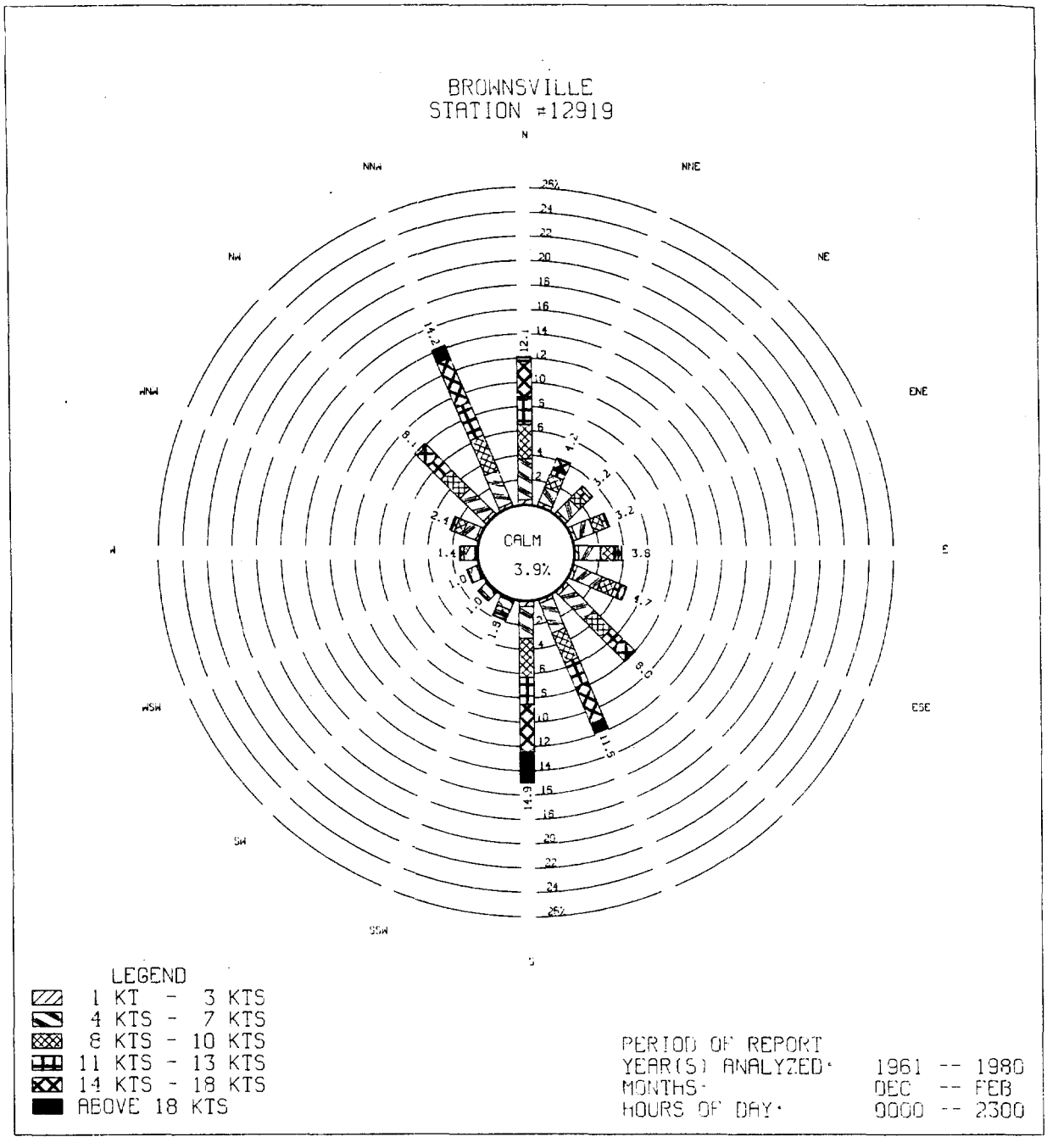

AMARILLO AP
STATION #23047
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
26%
24
22
20
18
16
14
12
10
8
6
4
2
CALM
1.0%
8.1
5.9
3.6
2.2
2.8
2.3
4.9
5.5
6
8
10
12
14
16
16.0
18
20
22
24
26%
13.6
11.6
6.8
4.8
2.8
4.1
3.6
5.9
3.6
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: SEPT -- NOV
HOURS OF DAY: 0000 -- 2300

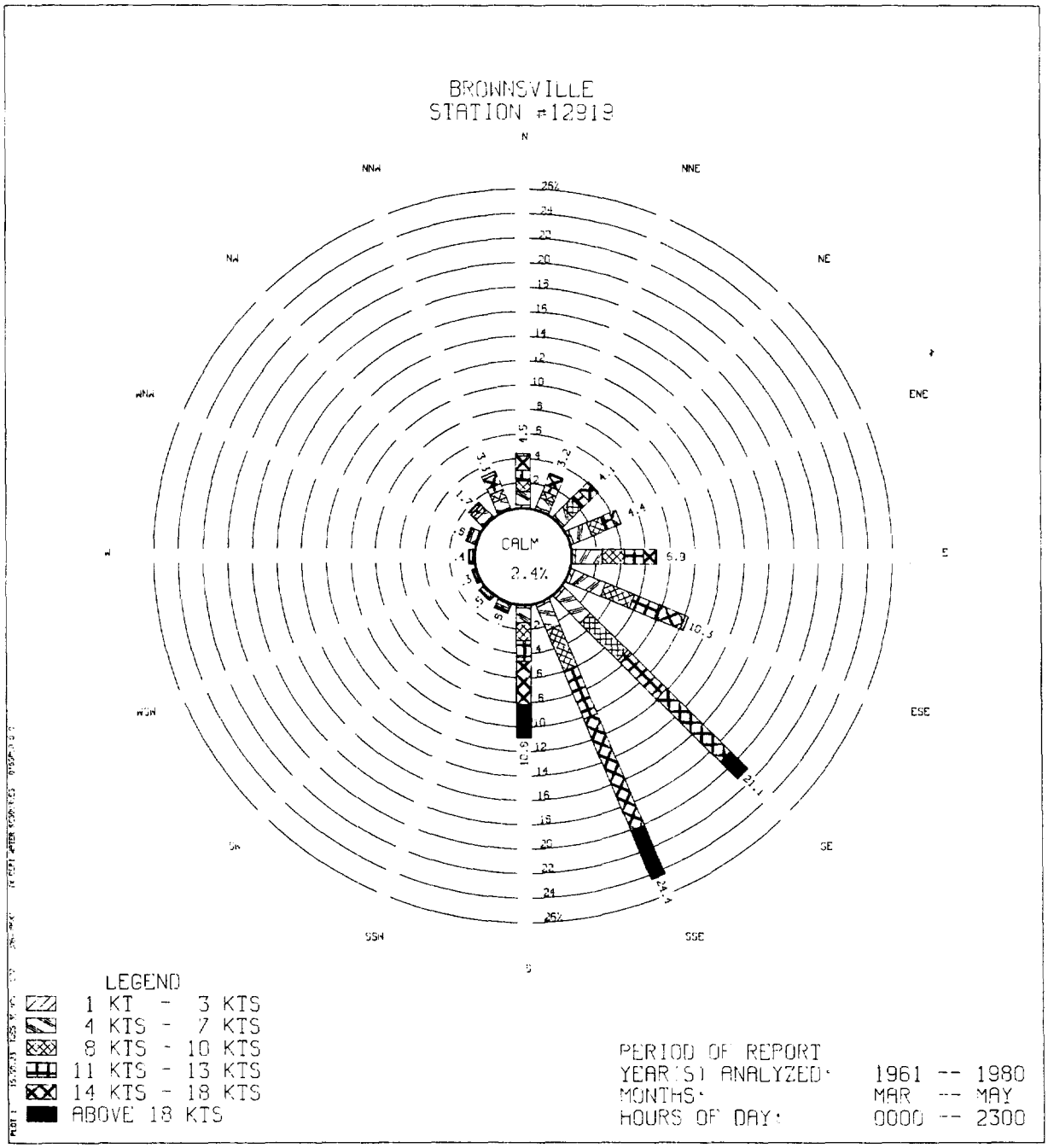

AUSTIN AP
STATION #13958
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
CALM
5.5%
14.3
3.3
6.2
2.7
2.7
2.2
3.4
5.3
17.7
7.7
3.0
1.6
2.2
4.0
4.9
5.4
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: DEC -- FEB
HOURS OF DAY: 0000 -- 2300

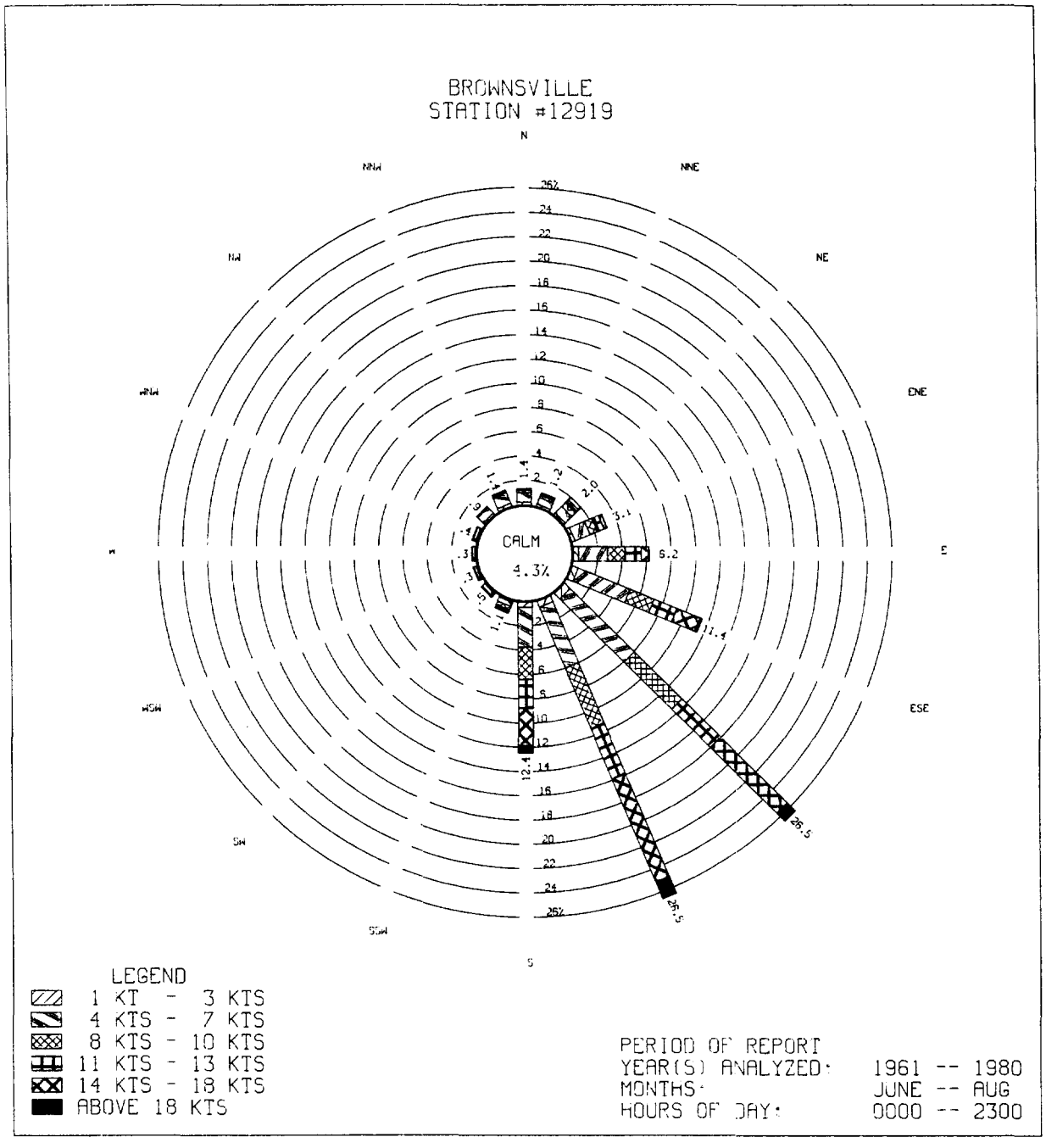

AUSTIN AP
STATION #13958
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
26%
24
22
20
18
16
14
12
10
8
6
4
2
CALM
3.1%
7.7
6.2
5.9
2.7
3.5
3.4
7.5
14.5
25.9
6.5
2.5
.3
1.4
.4
3.1
2.6
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: MAR -- MAY
HOURS OF DAY: 0000 -- 2300

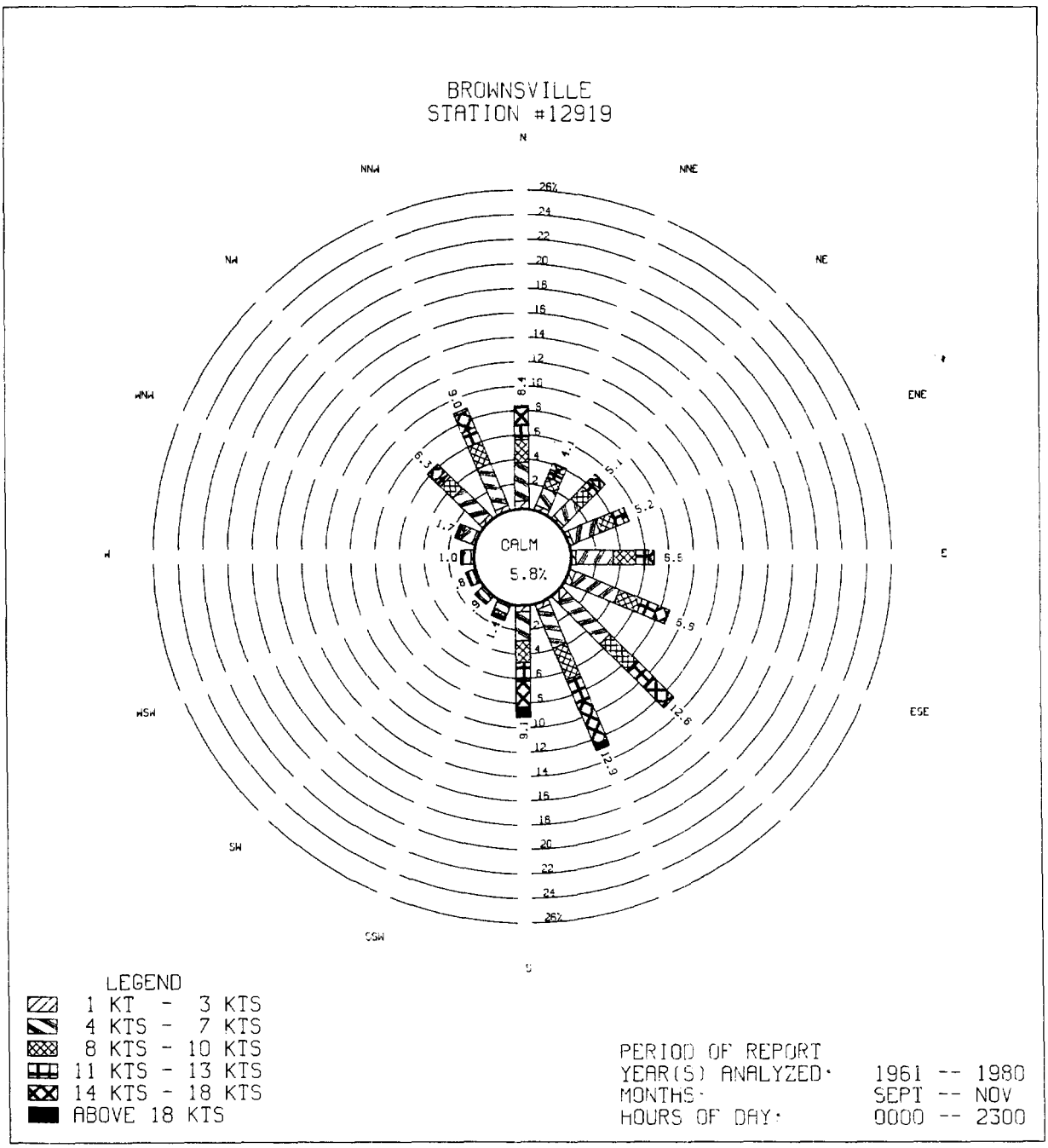

AUSTIN AP
STATION #13958
N
NNW
NNE
NW
NE
WNW
ENE
W
E
WSW
ESE
SW
SE
SSW
SSE
CALM
5.0%
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: JUNE -- AUG
HOURS OF DAY: 0000 -- 2300

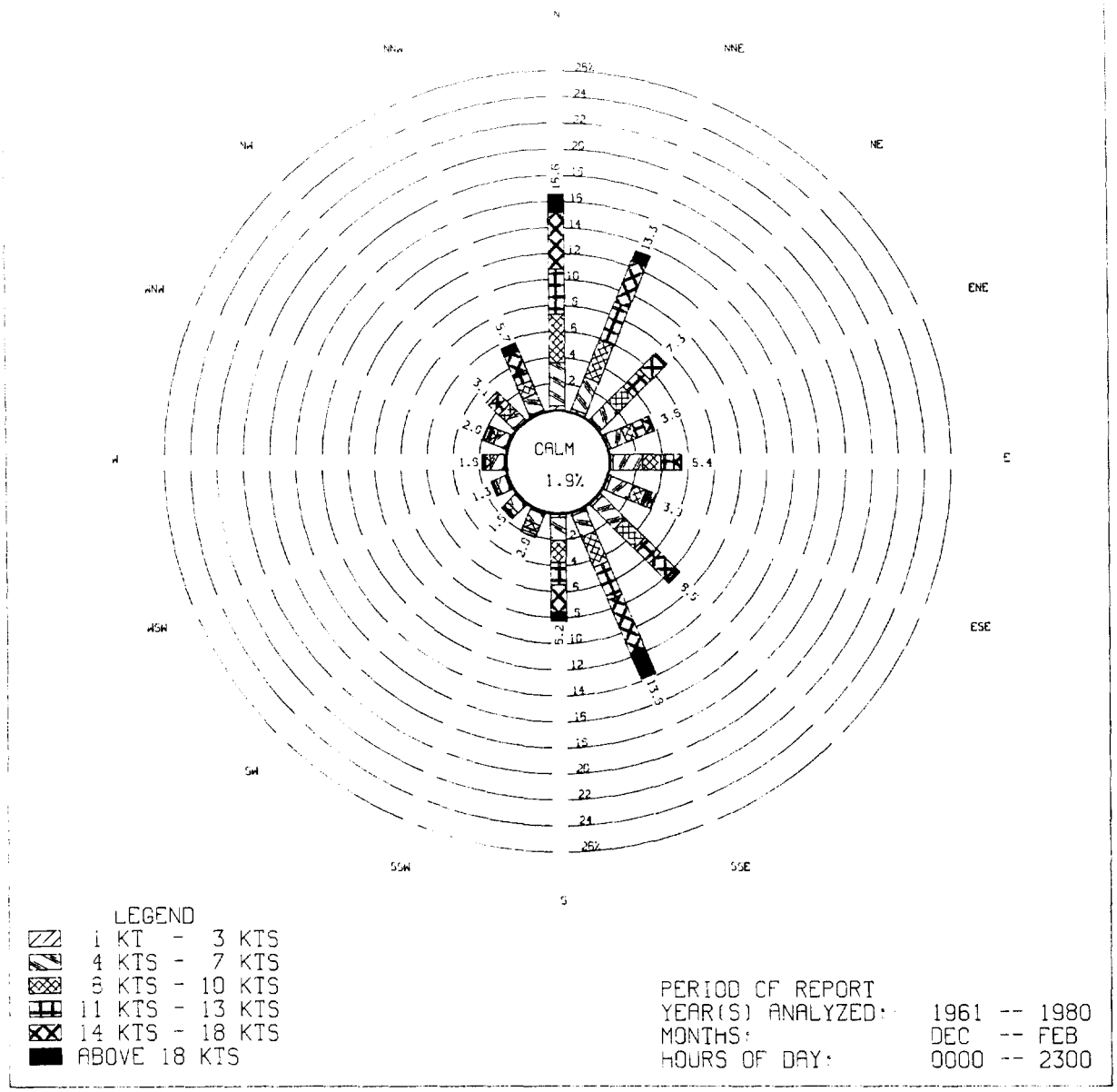

AUSTIN AP
STATION #13958
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
CALM
6.4%
26%
24
22
20
18
16
14
12
10
8
6
4
2
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: SEPT -- NOV
HOURS OF DAY: 0000 -- 2300

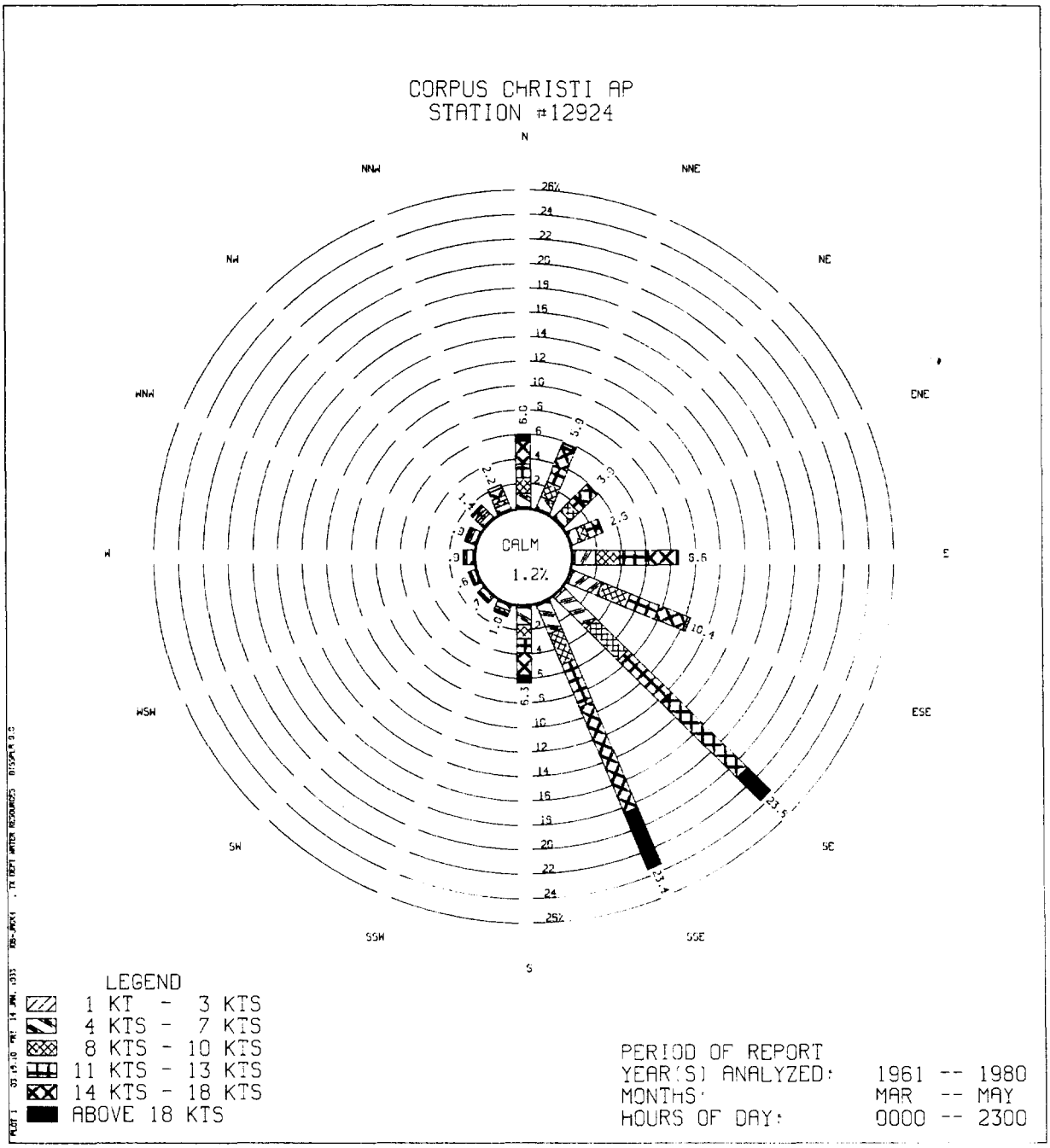

BROWNSVILLE
STATION #12919
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
CALM
3.9%
14.2
12.1
4.2
3.2
3.2
3.8
9.0
11.5
14.9
1.8
1.9
1.0
1.4
2.1
8.1
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: DEC -- FEB
HOURS OF DAY: 0000 -- 2300

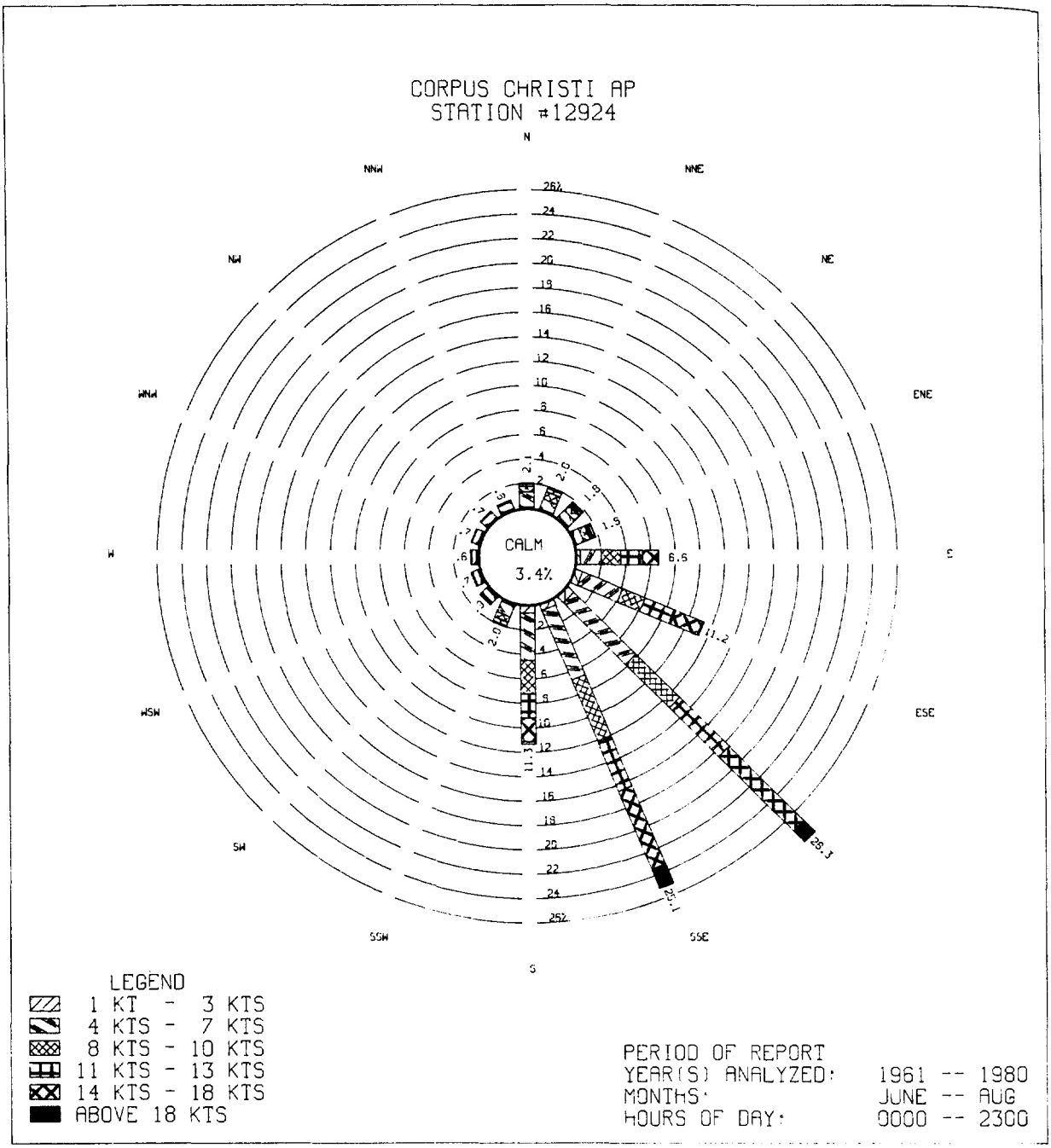

BROWNSVILLE
STATION #12919
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
25%
24
22
20
18
16
14
12
10
8
6
4
2
CALM
2.4%
6.9
10.5
21.1
24.4
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEARS ANALYZED: 1961 -- 1980
MONTHS: MAR -- MAY
HOURS OF DAY: 0000 -- 2300

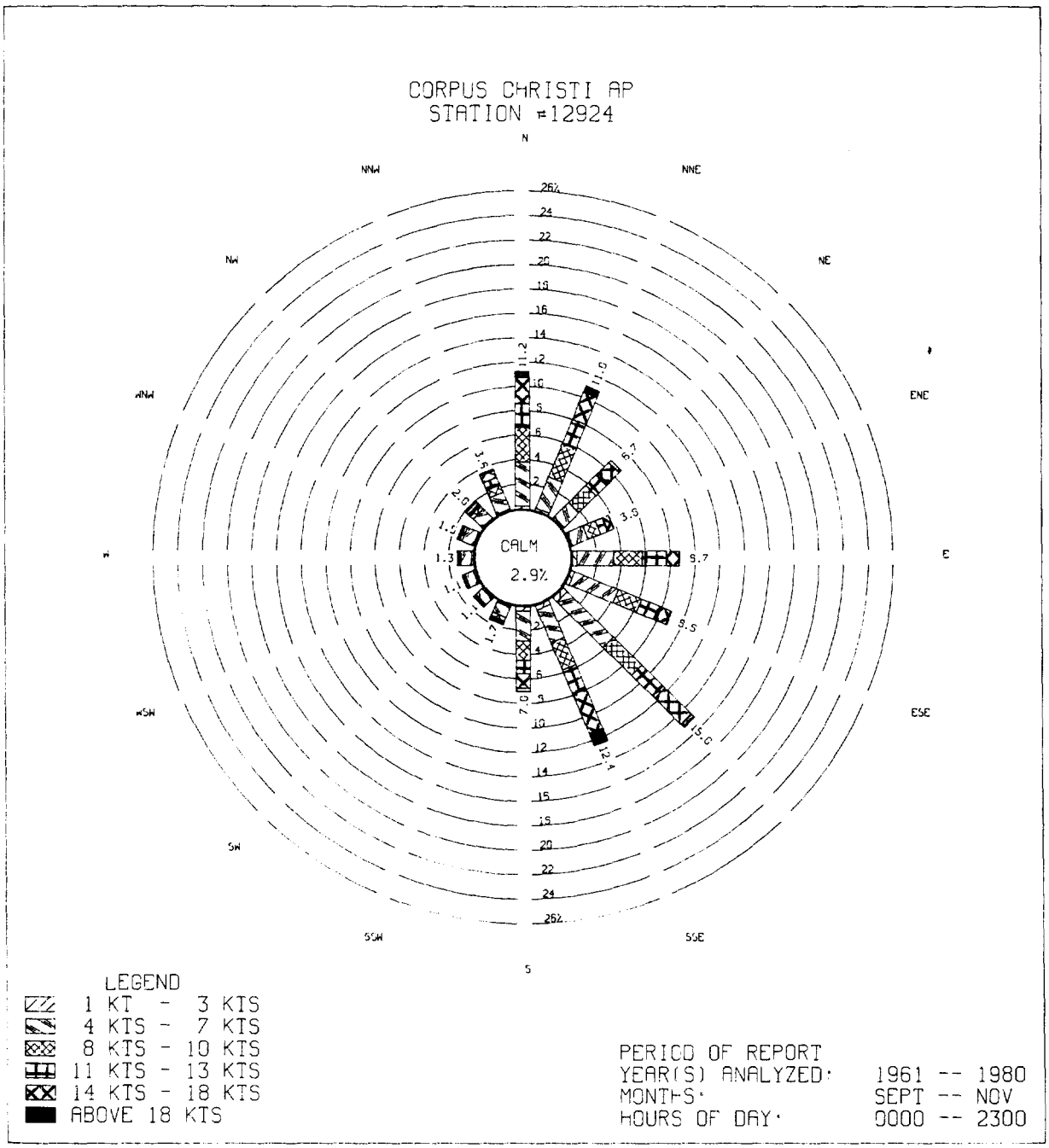

BROWNSVILLE
STATION #12919
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
26%
24
22
20
18
16
14
12
10
8
6
4
2
CALM
4.3%
6.2
11.4
26.5
26.5
12.4
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: JUNE -- AUG
HOURS OF DAY: 0000 -- 2300

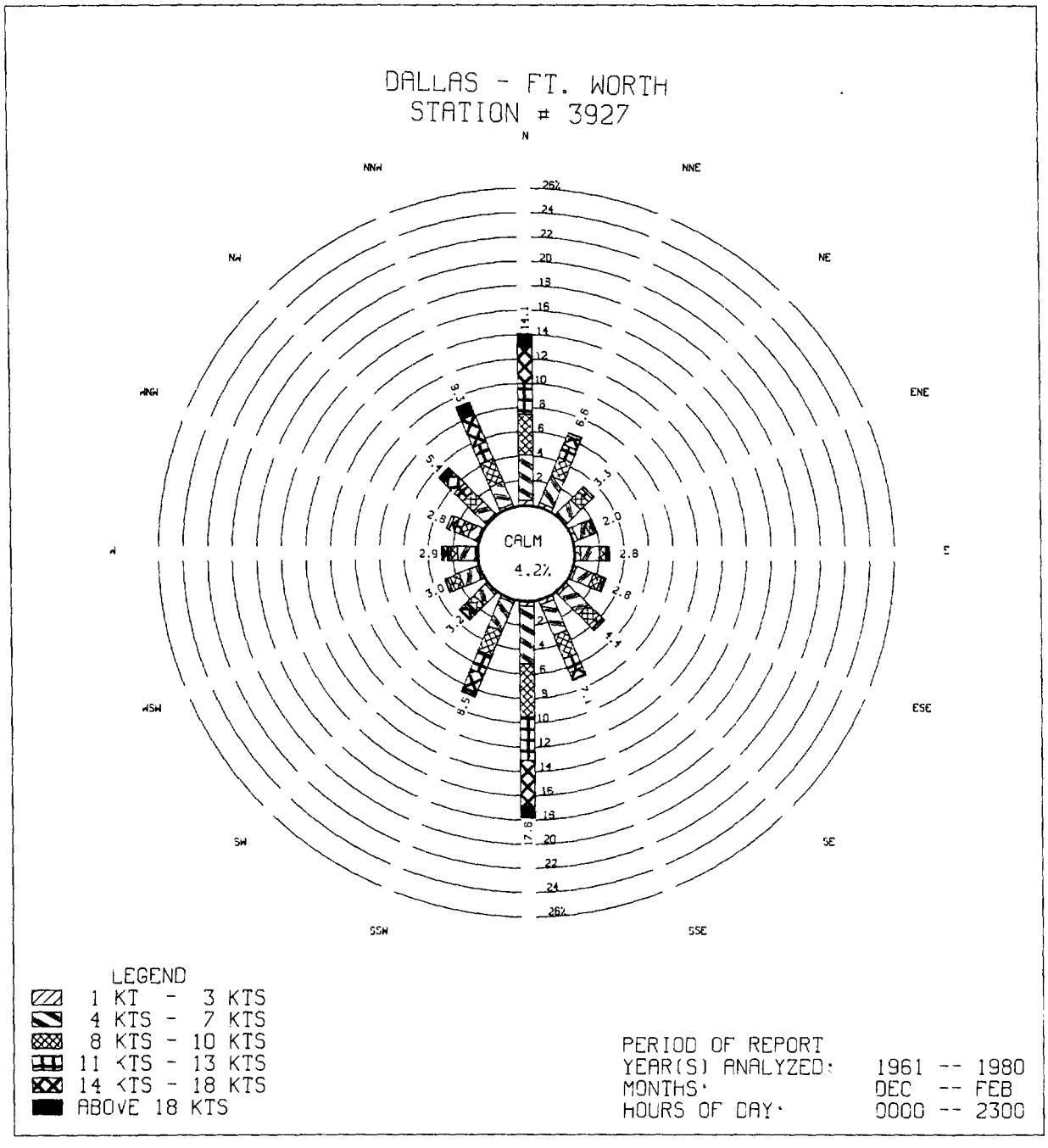

BROWNSVILLE
STATION #12919
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
26%
24
22
20
18
16
14
12
10
8
6
4
2
CALM
5.8%
8.4
4.1
5.1
5.2
6.8
6.9
12.6
12.9
9.1
1.4
.8
1.0
1.7
6.3
6.0
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: SEPT -- NOV
HOURS OF DAY: 0000 -- 2300

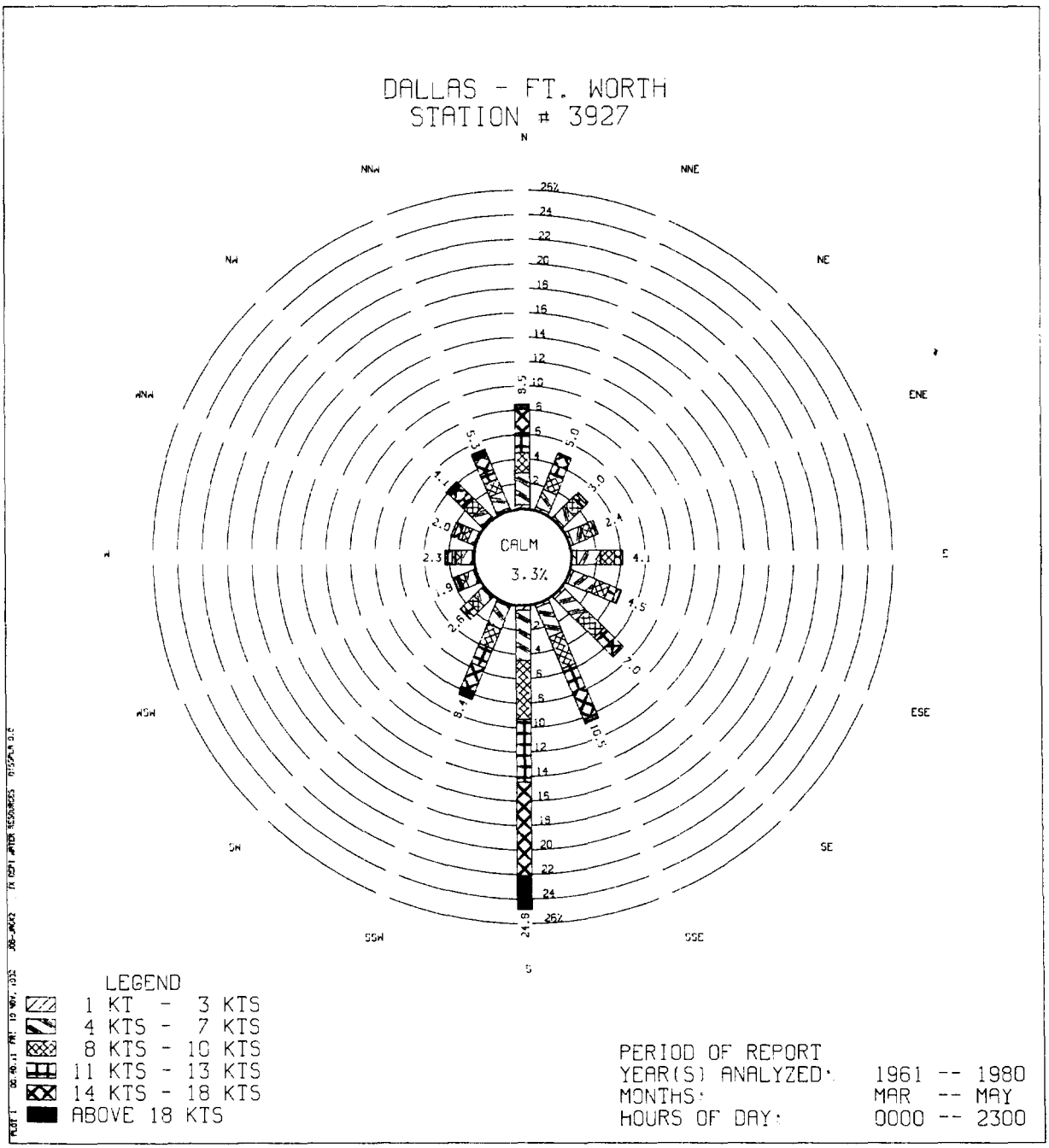

N
NNE
NE
ENE
E
ESE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
25%
24
22
20
18
16
14
12
10
8
6
4
2
CALM
1.9%
13.3
7.3
3.6
5.4
3.3
5.5
13.6
5.2
2.9
1.5
1.3
1.9
2.9
3.4
5.3
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: DEC -- FEB
HOURS OF DAY: 0000 -- 2300

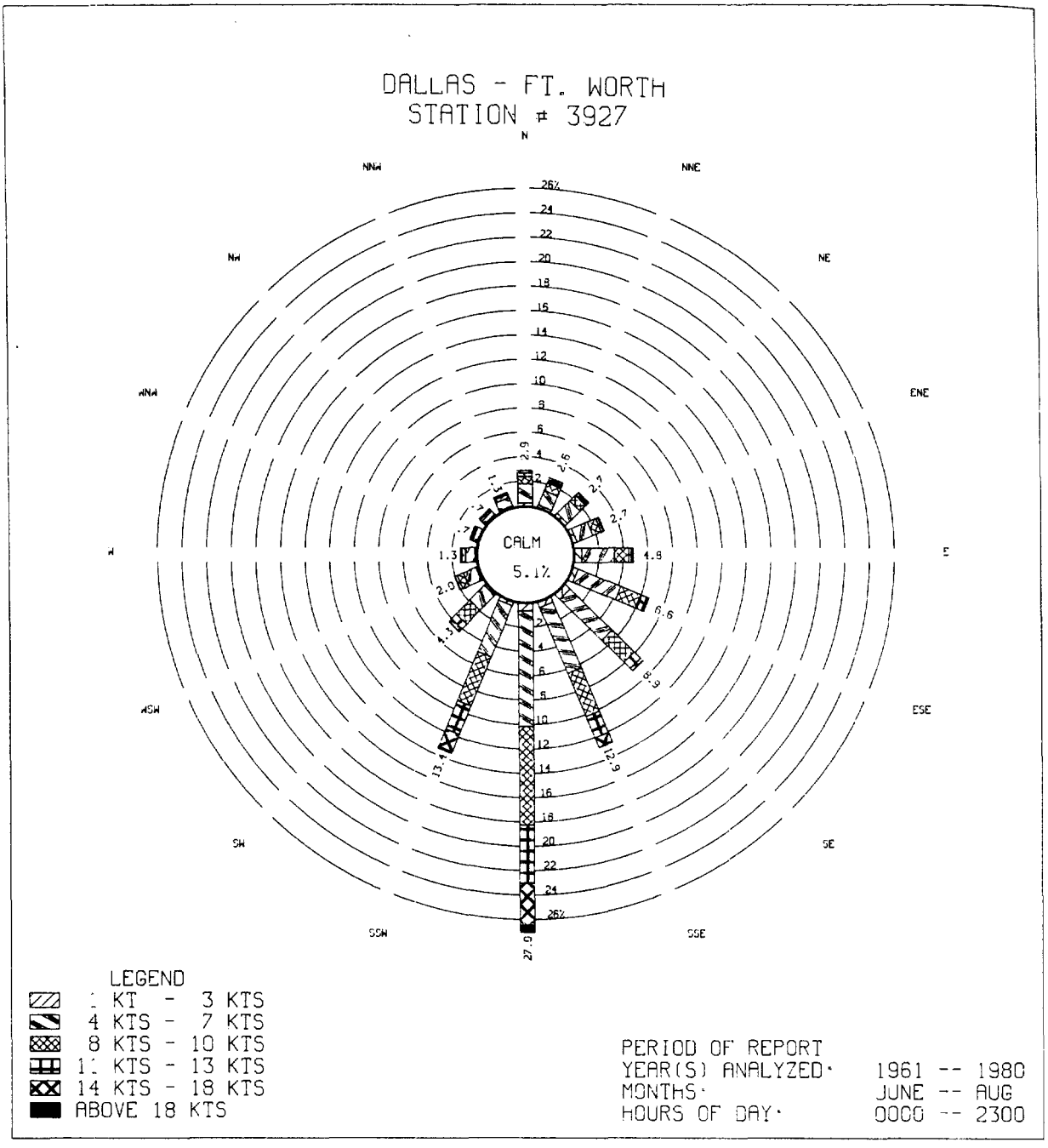

CORPUS CHRISTI AP
STATION #12924
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
CALM
1.2%
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: MAR -- MAY
HOURS OF DAY: 0000 -- 2300

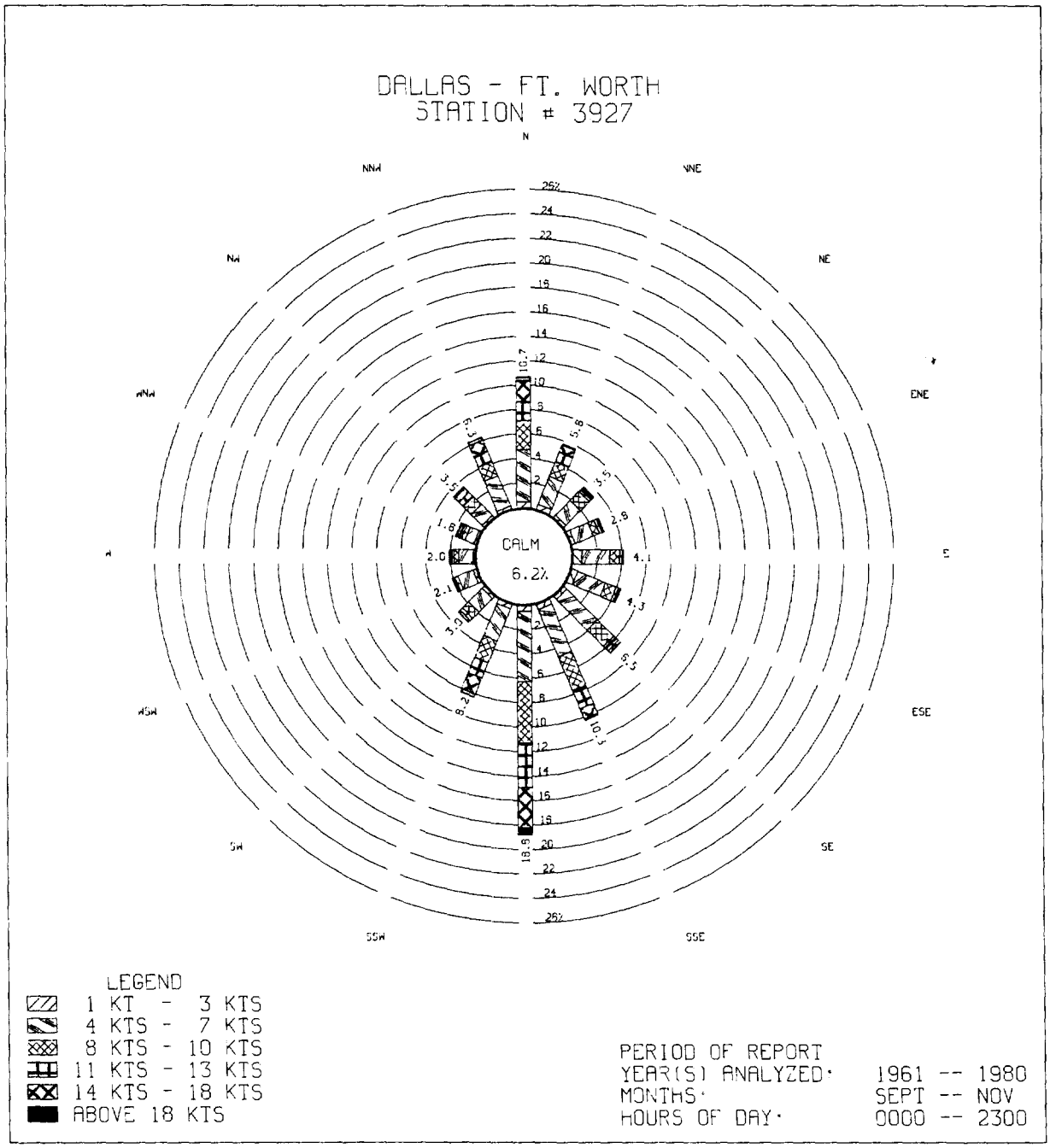

CORPUS CHRISTI AP
STATION #12924
N
NNW
NNE
NW
NE
WNW
ENE
W
E
WSW
ESE
SW
SSW
SSE
S
CALM
3.4%
6.6
11.2
28.3
25.1
11.3
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: JUNE -- AUG
HOURS OF DAY: 0000 -- 2300

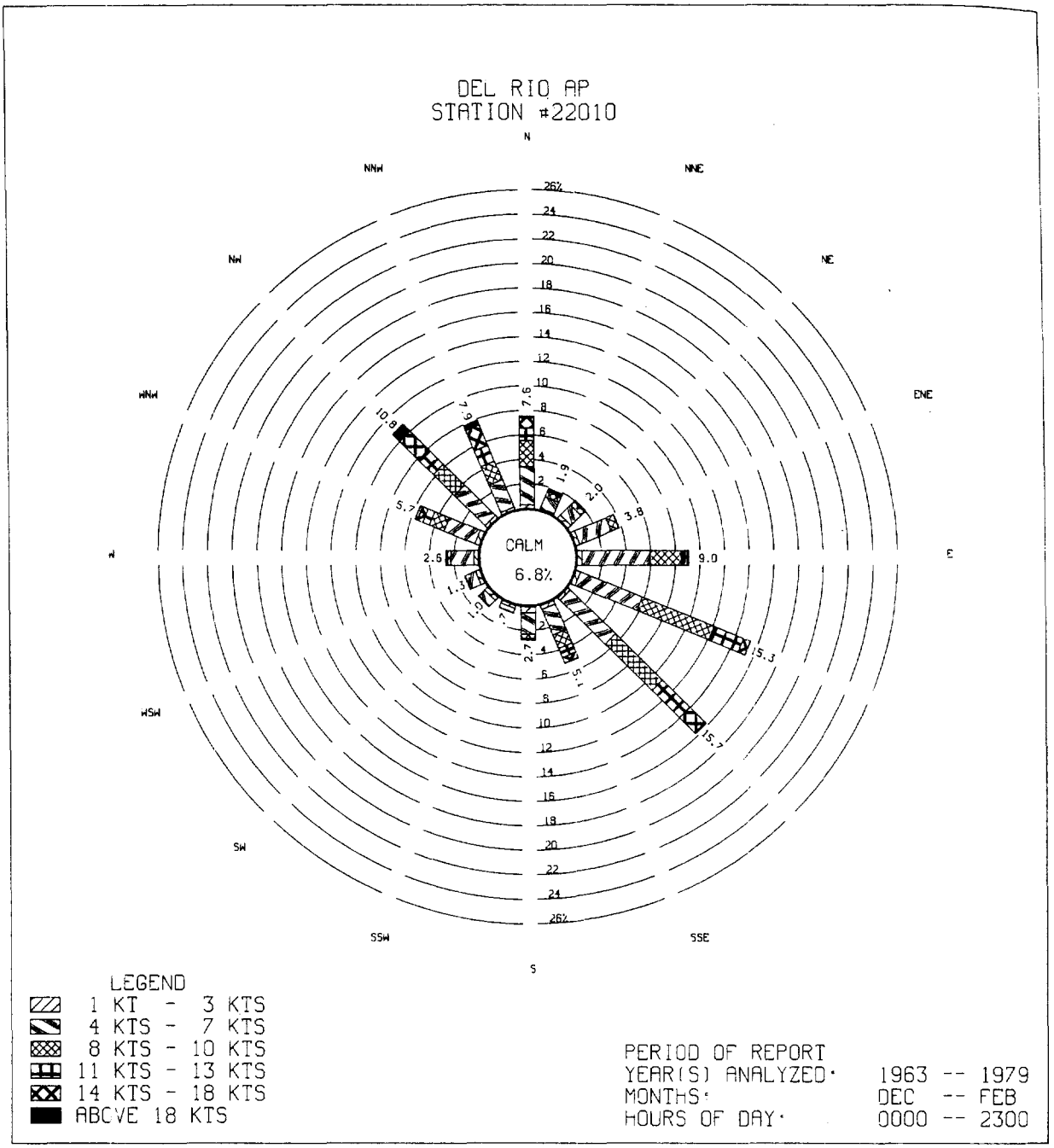

CORPUS CHRISTI AP
STATION #12924
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
CALM
2.9%
11.2
11.0
6.7
3.9
5.7
9.5
15.6
12.4
7.0
1.7
1.1
1.3
1.5
2.0
3.5
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: SEPT -- NOV
HOURS OF DAY: 0000 -- 2300

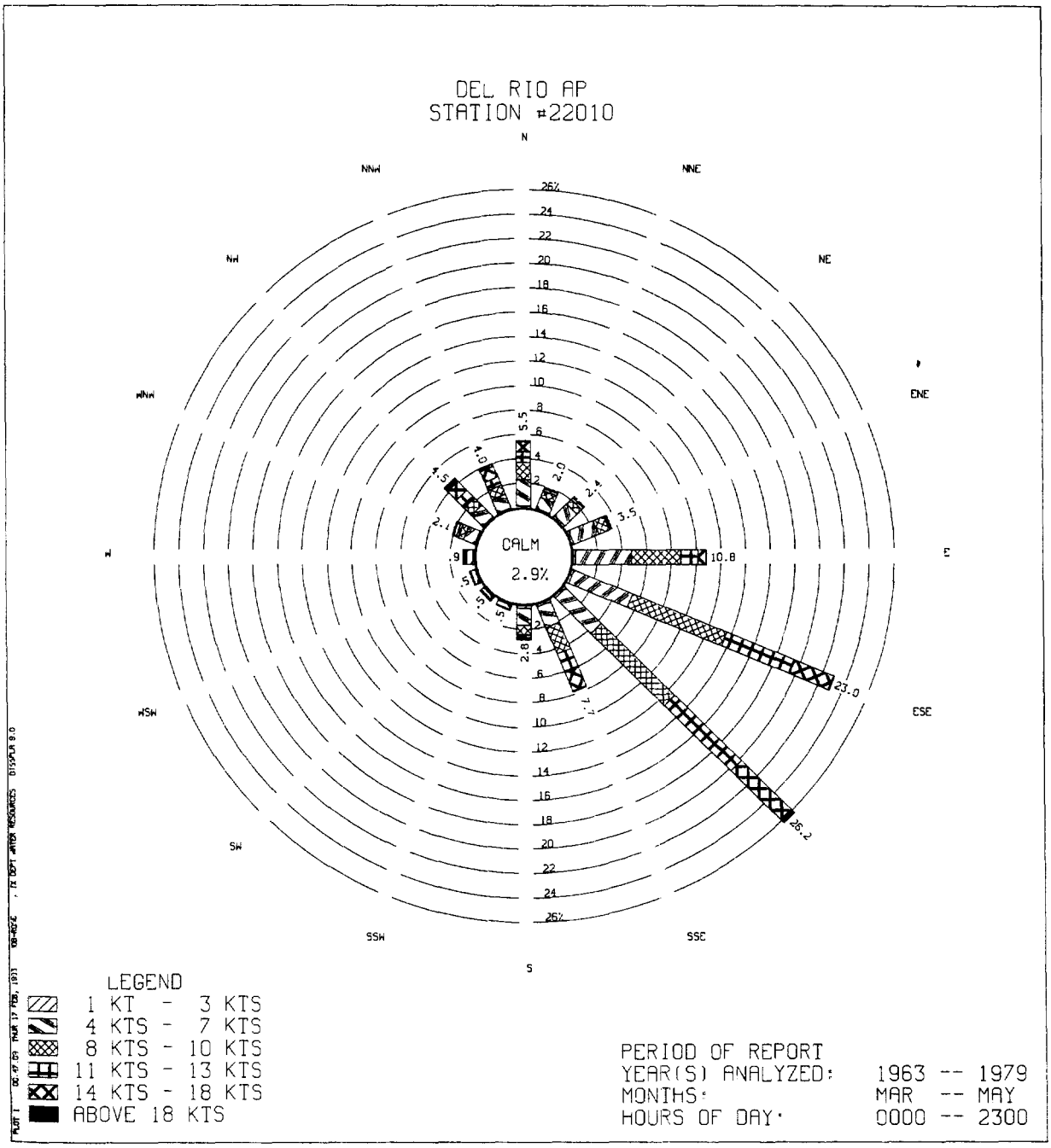

DALLAS - FT. WORTH
STATION # 3927
N
NNW
NNE
NW
NE
WNW
ENE
W
E
WSW
ESE
SW
SE
SSW
SSE
26%
24
22
20
18
16
14
12
10
8
6
4
2
CALM
4.2%
14.1
6.5
6.6
5.4
3.3
2.9
2.0
2.9
2.8
3.0
2.8
3.2
4.4
8.5
17.8
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: DEC -- FEB
HOURS OF DAY: 0000 -- 2300


DALLAS - FT. WORTH
STATION # 3927
N
NNW
NNE
NW
NE
WNW
ENE
W
E
WSW
ESE
SW
SE
SSW
SSE
S
26%
24
22
20
18
16
14
12
10
8
6
4
2
CALM
3.3%
8.5
5.3
5.0
4.1
3.0
2.4
2.0
2.3
4.1
1.9
4.5
2.6
7.0
8.4
10.5
24.9
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: MAR -- MAY
HOURS OF DAY: 0000 -- 2300

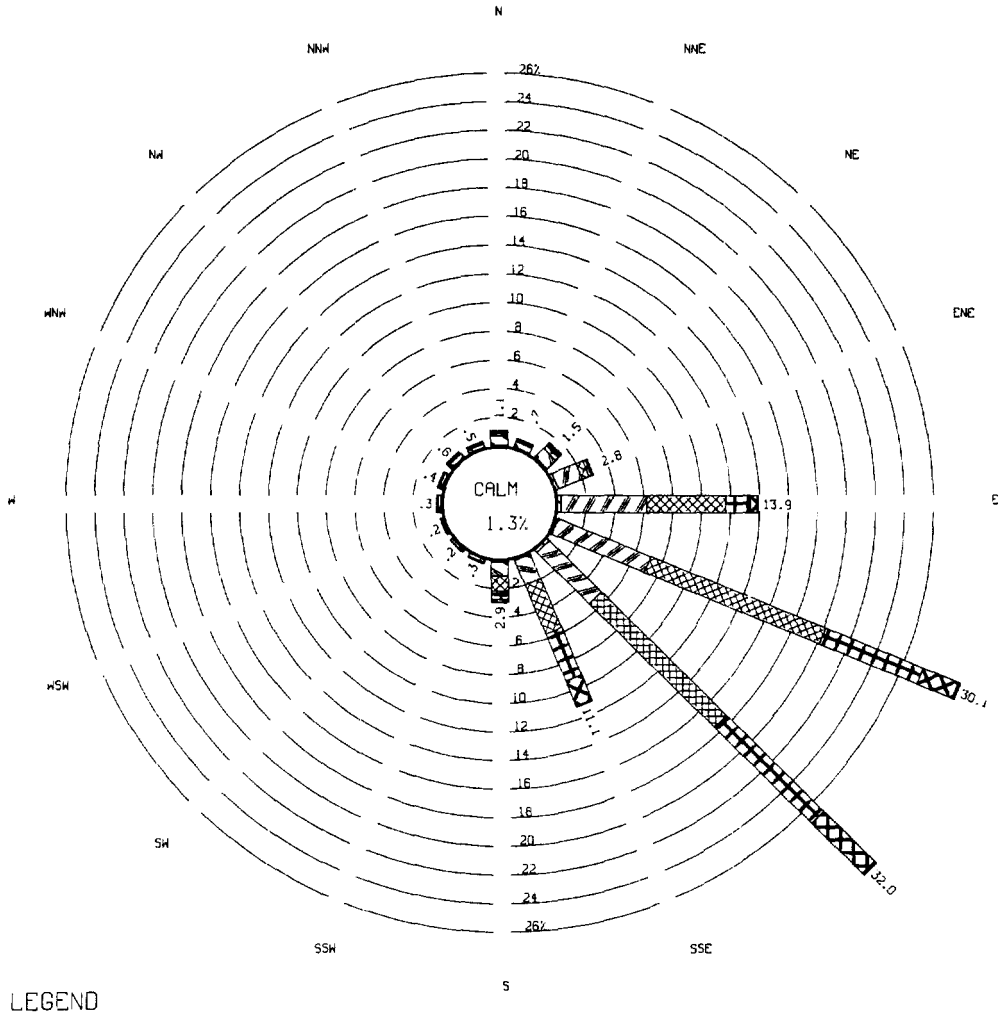

DALLAS - FT. WORTH
STATION # 3927
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
26%
24
22
20
18
16
14
12
10
8
6
4
2
CALM
5.1%
2.9
2.6
2.7
2.7
1.9
6.6
8.9
12.9
27.0
13.4
4.3
2.0
1.3
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: JUNE -- AUG
HOURS OF DAY: 0000 -- 2300


DALLAS - FT. WORTH
STATION # 3927
N
NNW
NNE
NW
NE
WNW
ENE
W
E
WSW
ESE
SW
SE
SSW
SSE
25%
24
22
20
18
16
14
12
10
8
6
4
2
CALM
6.2%
16.7
5.8
3.5
2.8
4.1
4.3
5.5
10.5
18.6
8.2
3.0
2.1
2.0
1.8
5.5
5.5
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: SEPT -- NOV
HOURS OF DAY: 0000 -- 2300


DEL RIO AP
STATION #22010
N
NNE
NE
ENE
E
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
26%
24
22
20
18
16
14
12
10
8
6
4
2
CALM
6.8%
7.6
1.9
2.0
3.8
9.0
15.3
15.7
10.8
7.9
5.7
2.6
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1963 -- 1979
MONTHS: DEC -- FEB
HOURS OF DAY: 0000 -- 2300


DEL RIO AP
STATION #22010
N
NNE
NE
ENE
E
ESE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
26%
24
22
20
18
16
14
12
10
8
6
4
2
CALM
2.9%
5.5
4.0
4.5
2.1
2.0
2.4
3.5
10.8
23.0
26.2
2.8
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1963 -- 1979
MONTHS: MAR -- MAY
HOURS OF DAY: 0000 -- 2300

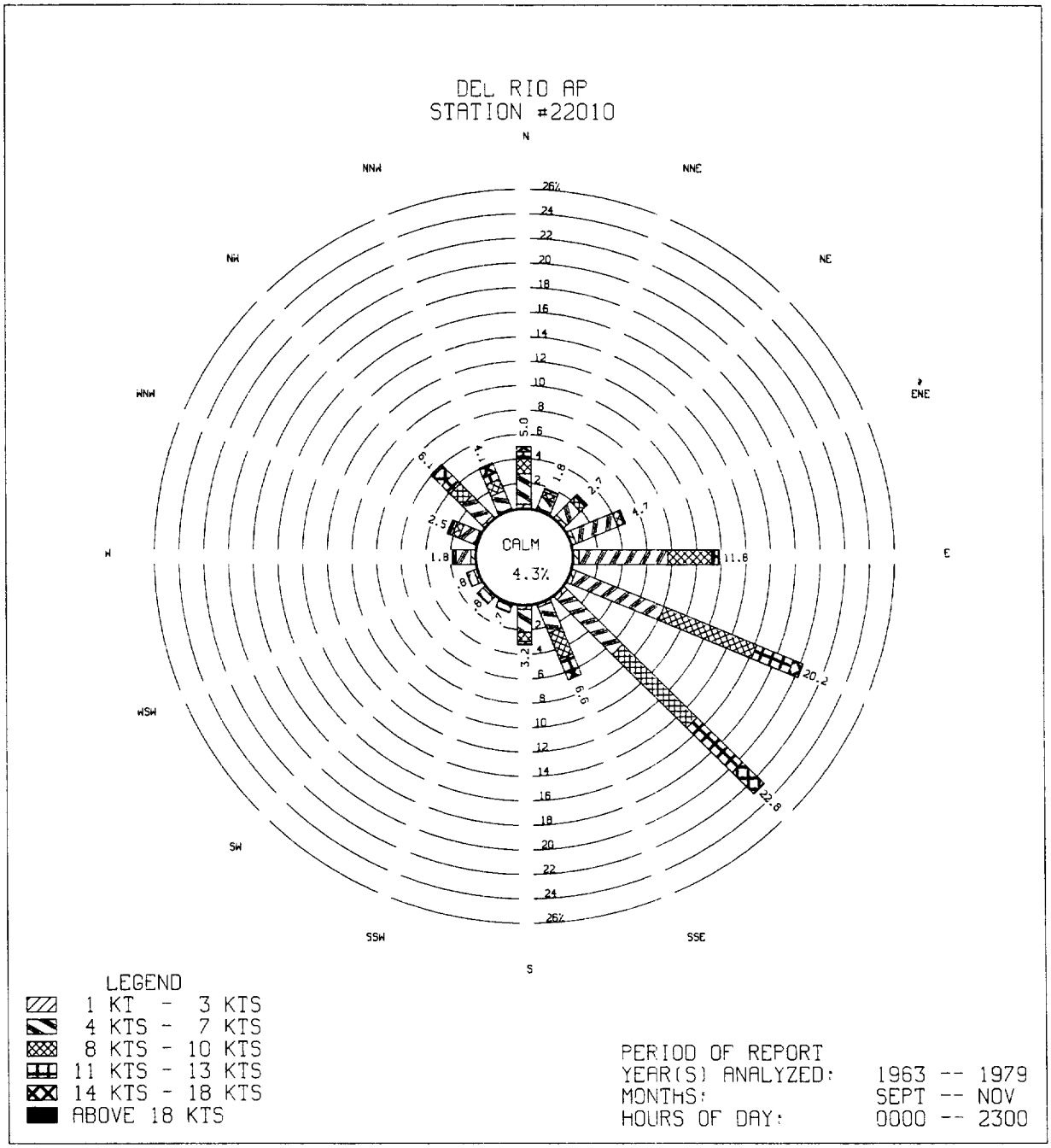
DEL RIO AP
STATION #22010

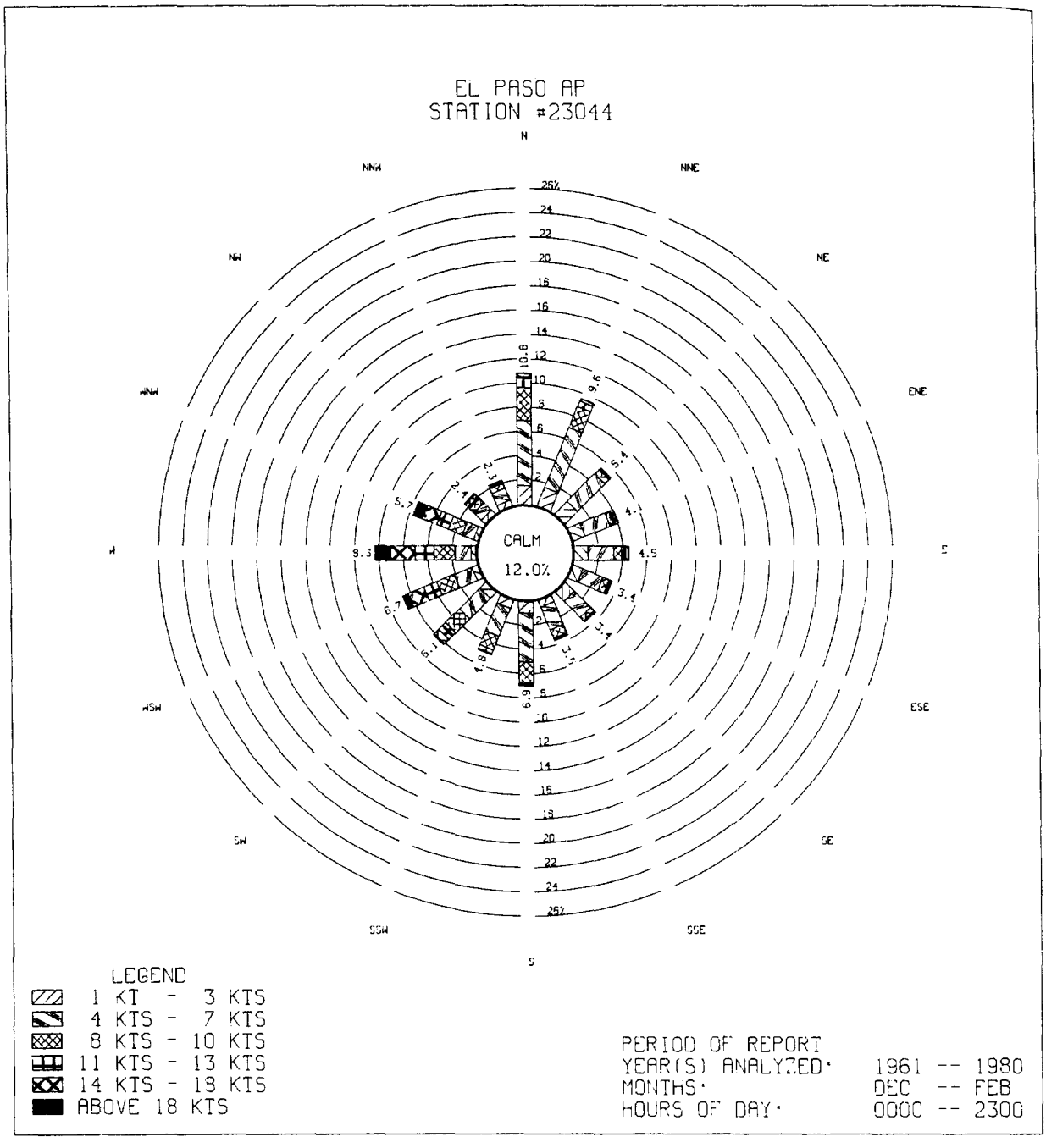


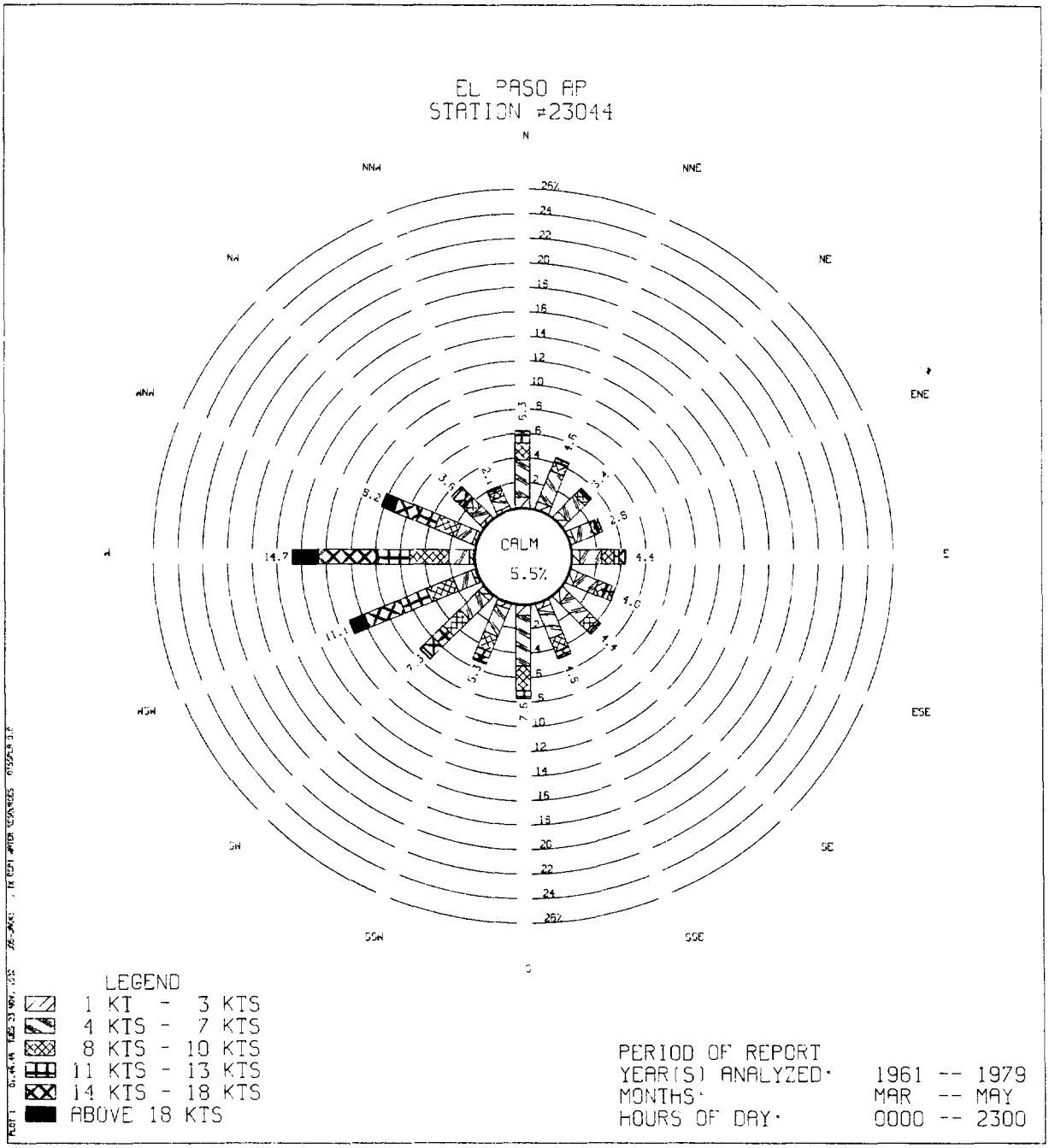
LEGEND

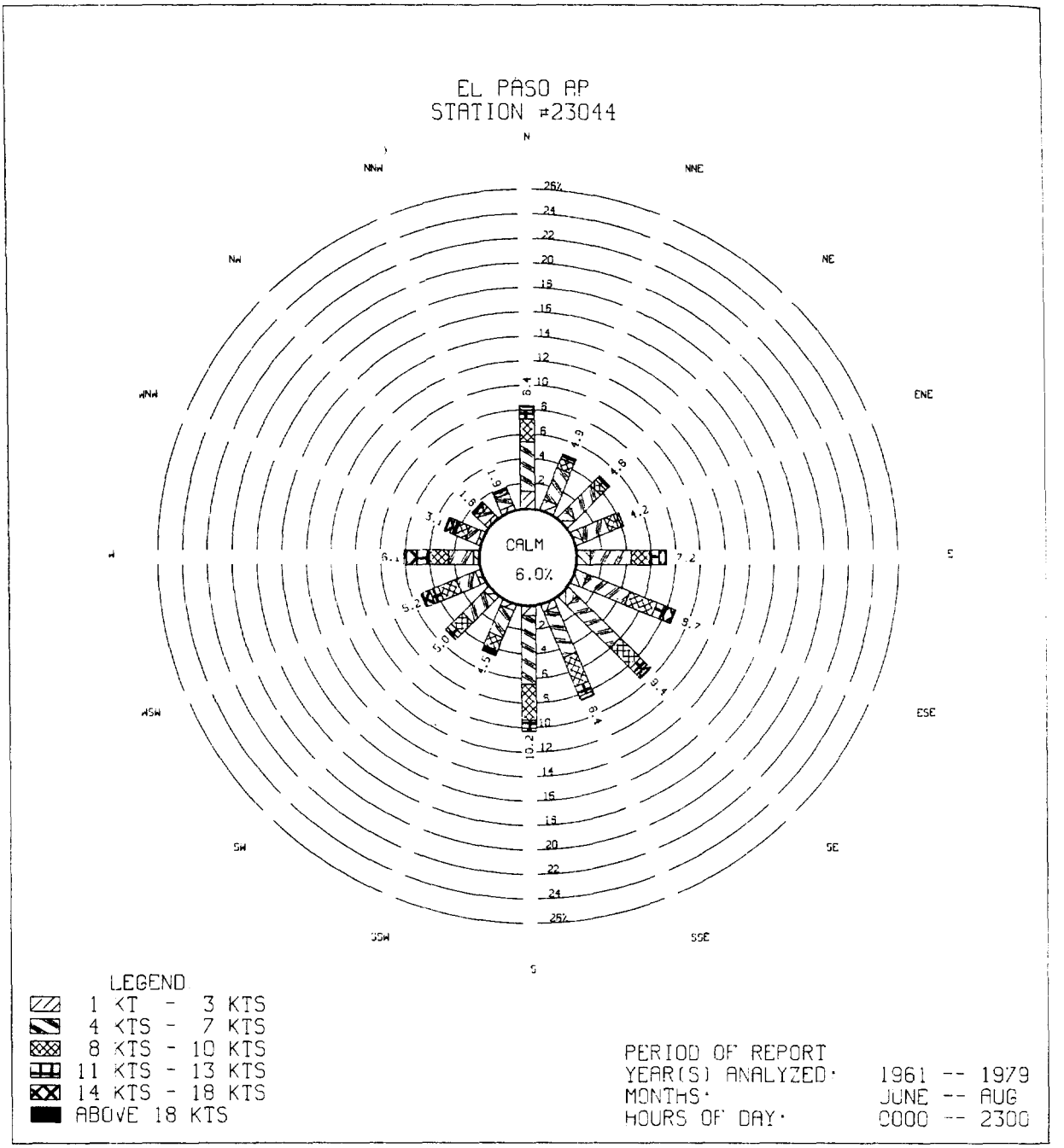
1 KT - 3 KTS	
4 KTS - 7 KTS	
8 KTS - 10 KTS	
11 KTS - 13 KTS	
14 KTS - 18 KTS	
ABOVE 18 KTS	

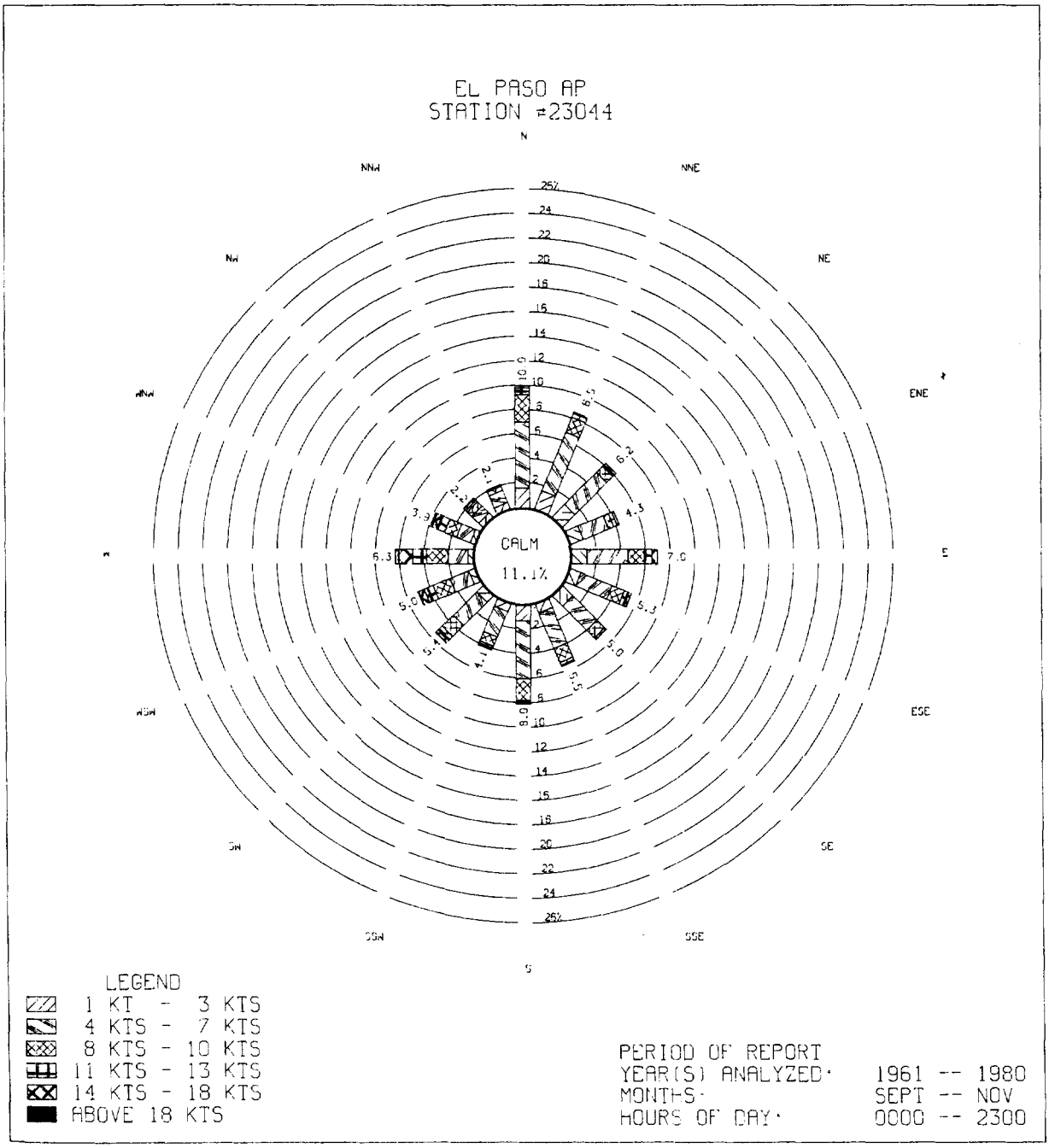
PERIOD OF REPORT	
YEAR(S) ANALYZED:	1963 -- 1979
MONTHS:	JUNE -- AUG
HOURS OF DAY:	0000 -- 2300

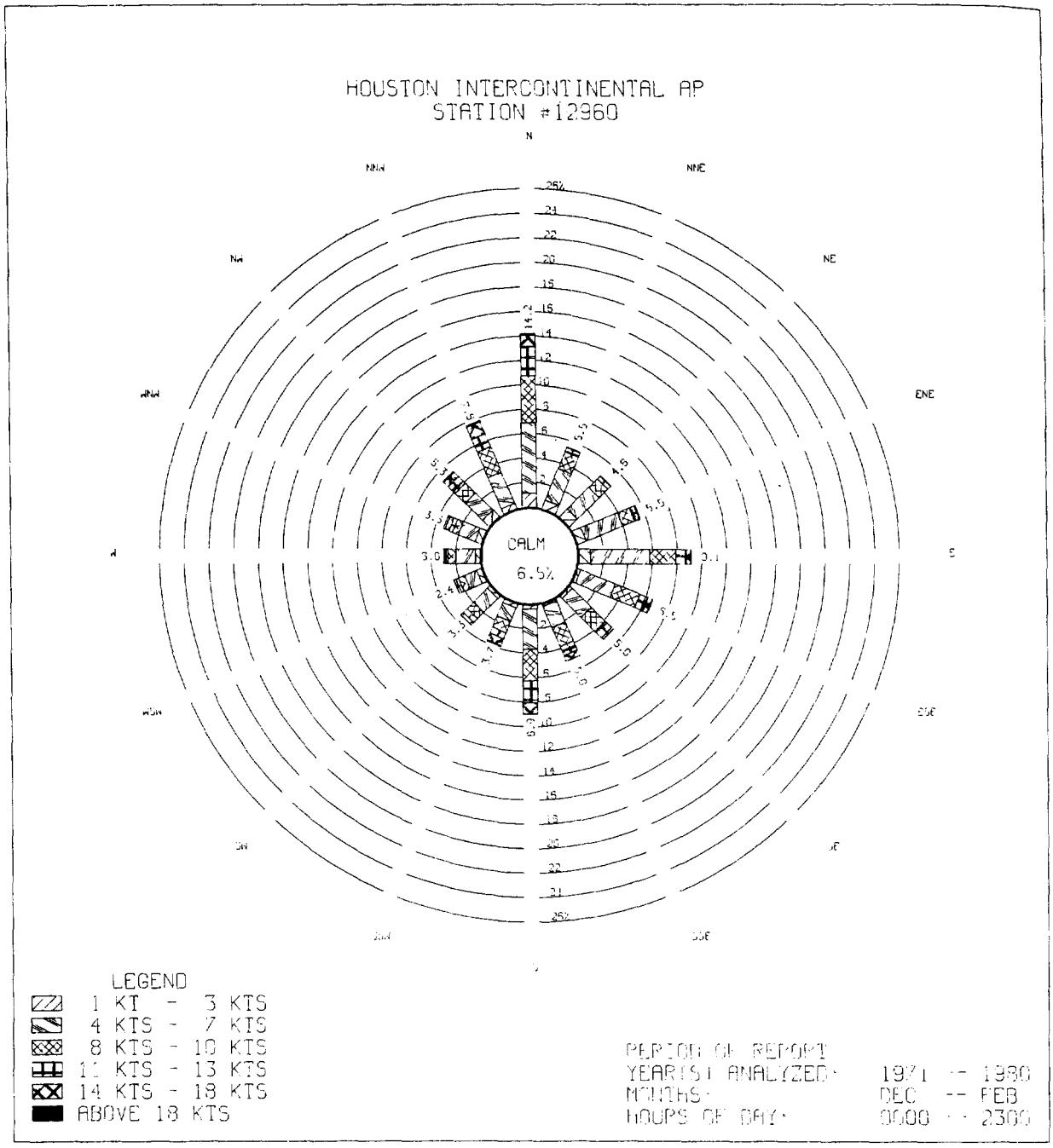

DEL RIO AP
STATION #22010
N
NNW
NNE
NW
NE
WNW
ENE
W
E
WSW
SW
SSW
SSE
S
26%
24
22
20
18
16
14
12
10
8
6
4
2
CALM
4.3%
5.0
4.1
6.1
1.8
2.7
4.7
2.5
1.8
11.6
.8
.6
.7
3.2
6.9
20.2
22.9
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1963 -- 1979
MONTHS: SEPT -- NOV
HOURS OF DAY: 0000 -- 2300

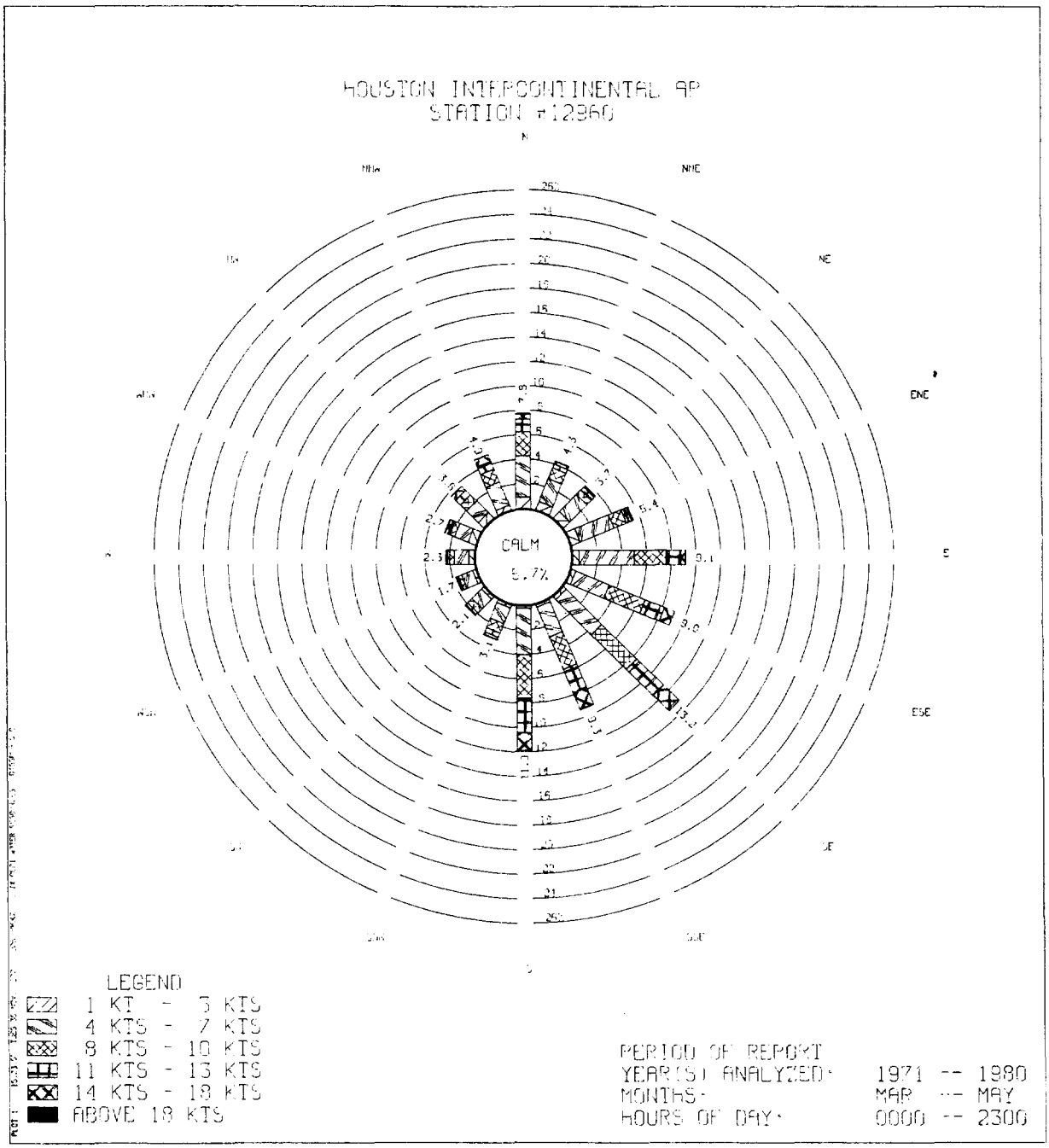

EL PASO AP
STATION #23044
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
CALM
12.0%
10.8
9.6
5.4
4.1
4.5
3.4
5.4
3.5
6.9
4.8
6.1
6.7
9.3
5.7
2.1
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: DEC -- FEB
HOURS OF DAY: 0000 -- 2300

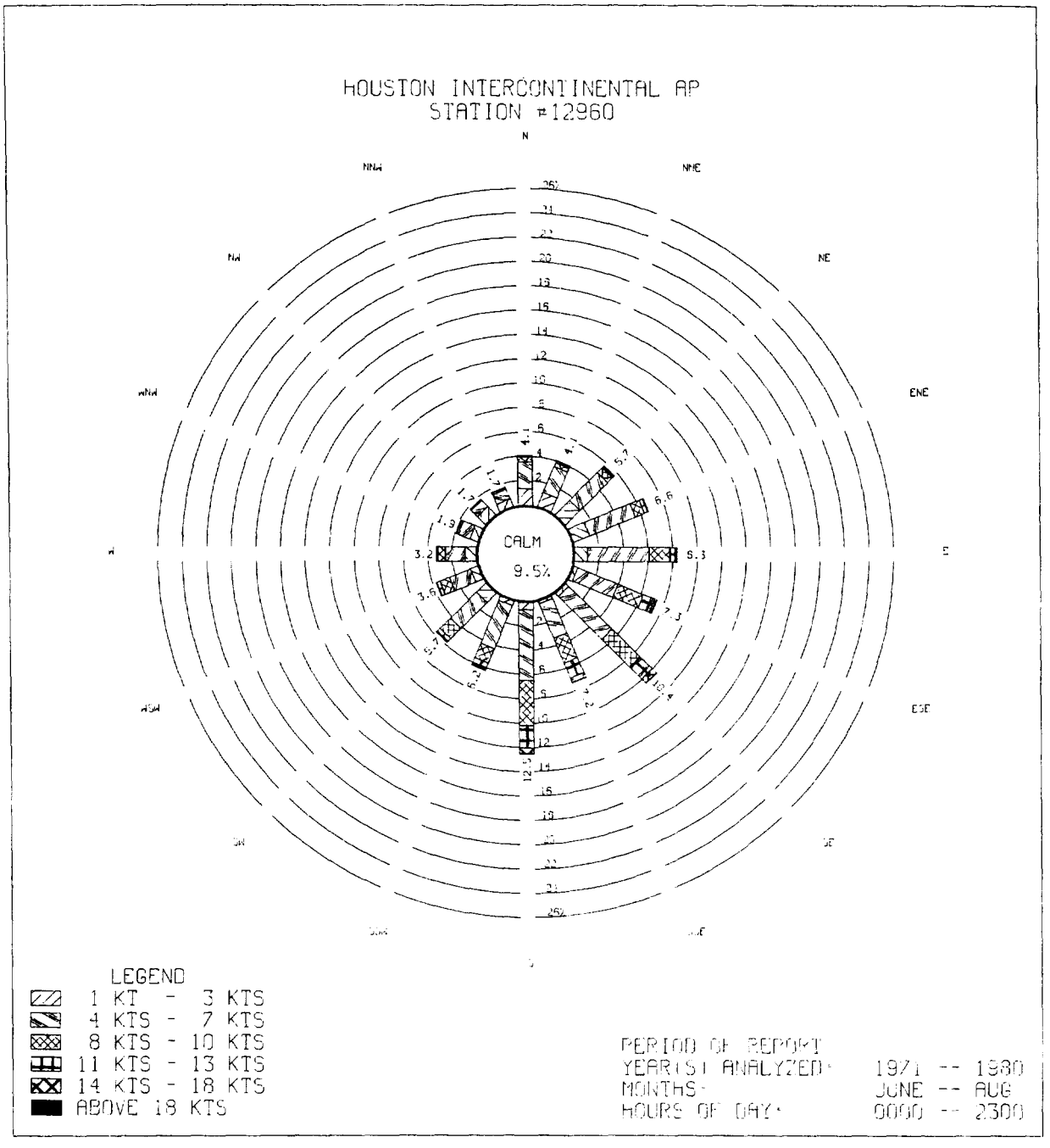

EL PASO AP
STATION #23044
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
26%
24
22
20
18
16
14
12
10
8
6
4
2
CALM
5.5%
14.7
11.1
5.2
3.9
2.1
5.3
4.4
4.0
7.5
5.3
4.5
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1979
MONTHS: MAR -- MAY
HOURS OF DAY: 0000 -- 2300

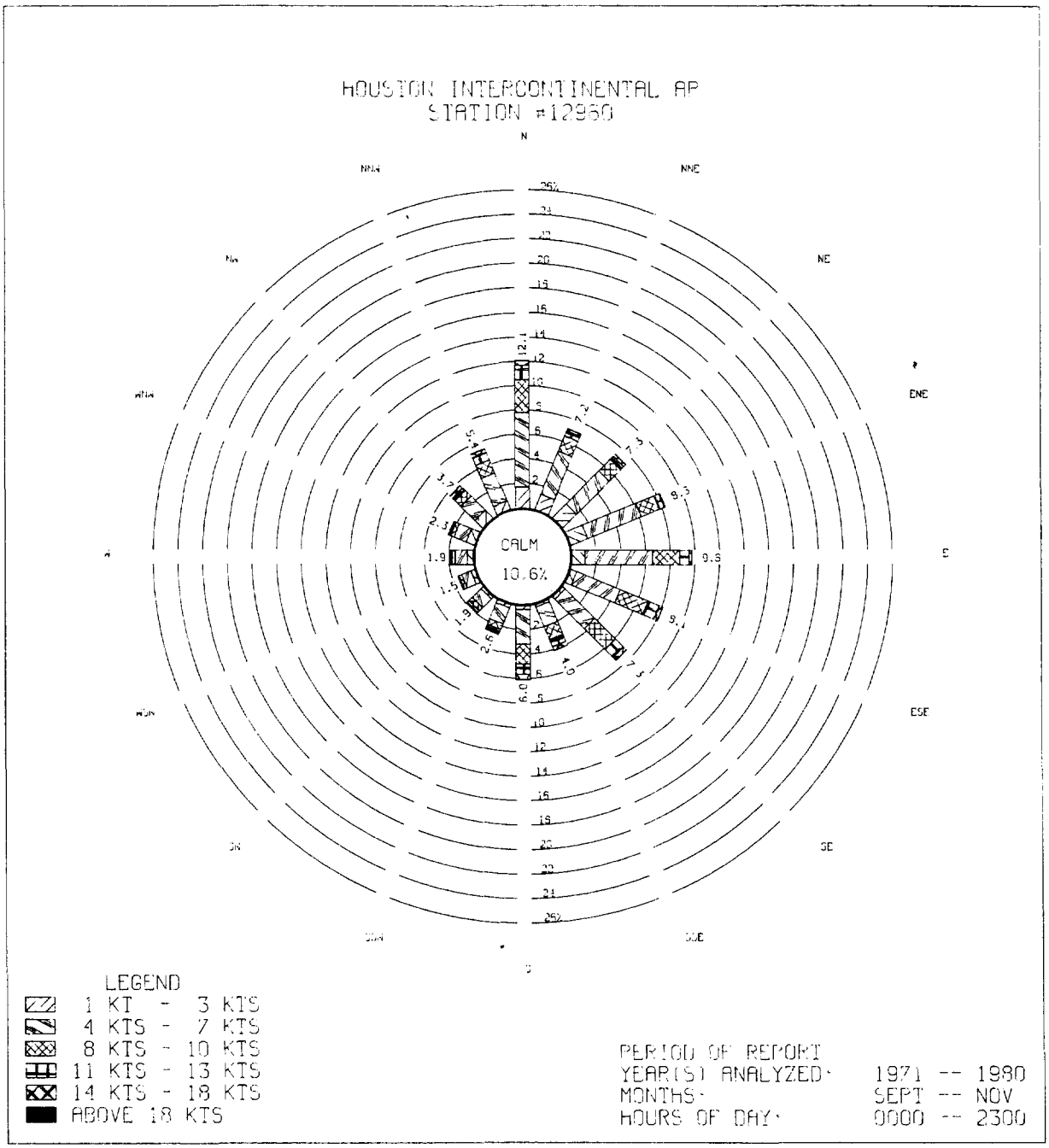

EL PASO AP
STATION #23044
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
26%
24
22
20
18
16
14
12
10
8
6
4
2
CALM
6.0%
6.4
4.9
4.6
4.2
7.2
9.7
9.4
10.2
5.0
5.2
6.1
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1979
MONTHS: JUNE -- AUG
HOURS OF DAY: 0000 -- 2300

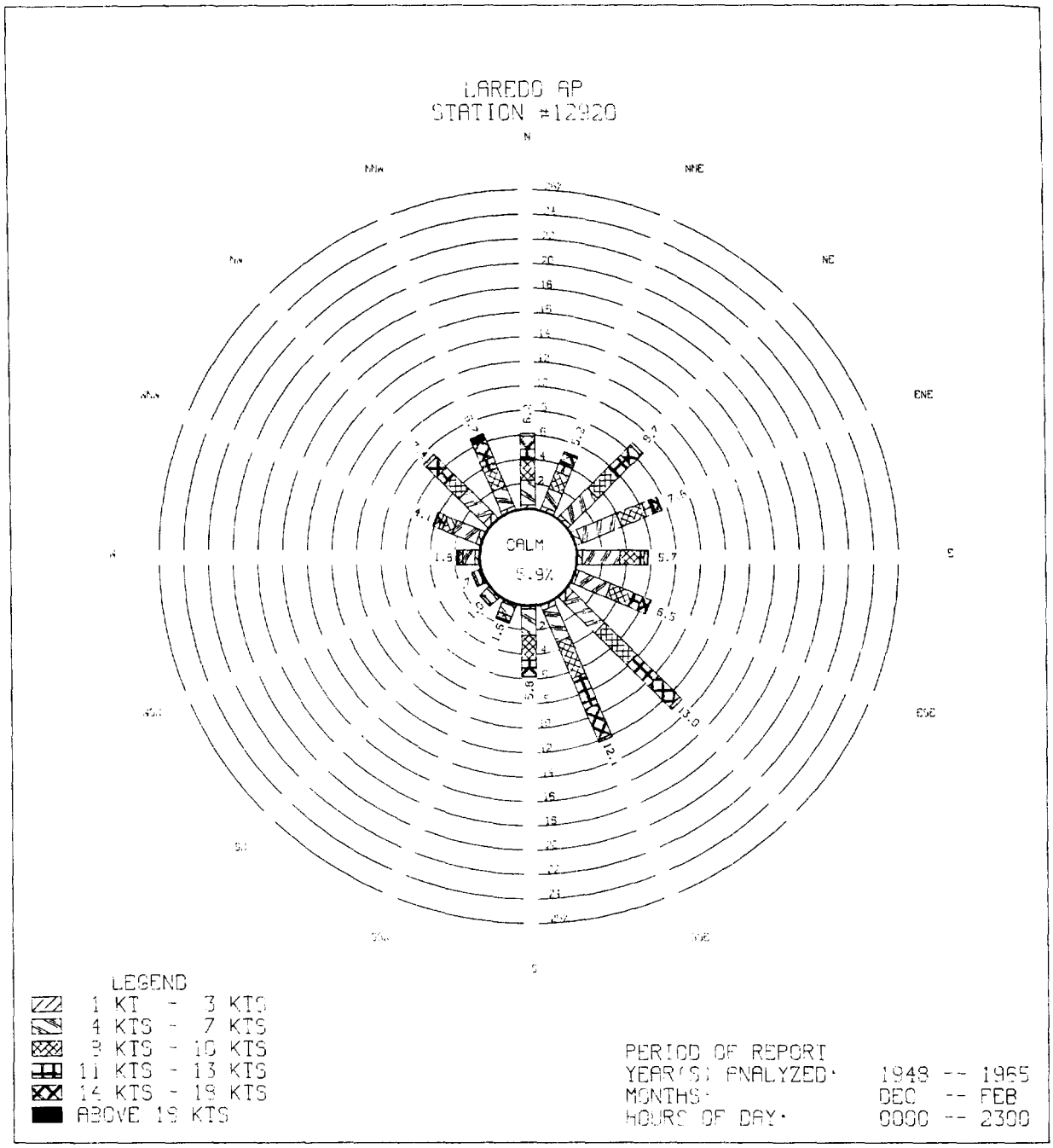

EL PASO AP
STATION #23044
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
CALM
11.1%
6.5
6.2
4.3
7.0
5.3
5.0
5.5
8.0
4.1
5.4
5.0
6.3
3.9
2.2
2.2
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: SEPT -- NOV
HOURS OF DAY: 0000 -- 2300

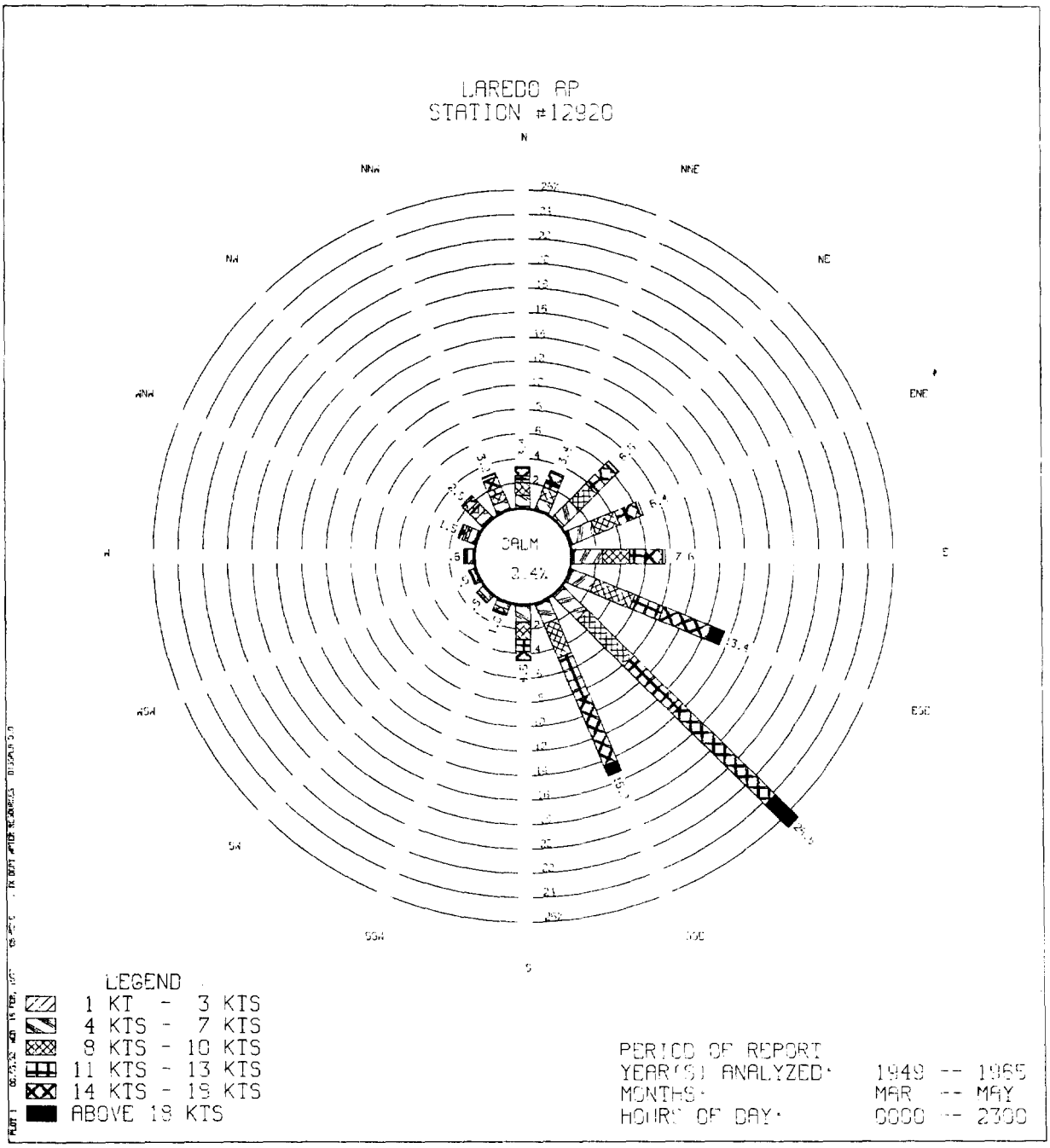

HOUSTON INTERCONTINENTAL AP
STATION #12960
N
NNW
NNE
NW
NE
WNW
ENE
W
E
WSW
ESE
SW
SE
SSW
SSE
CALM
6.5%
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEARS ANALYZED: 1971 -- 1980
MONTHS: DEC -- FEB
HOURS OF DAY: 0000 -- 2300

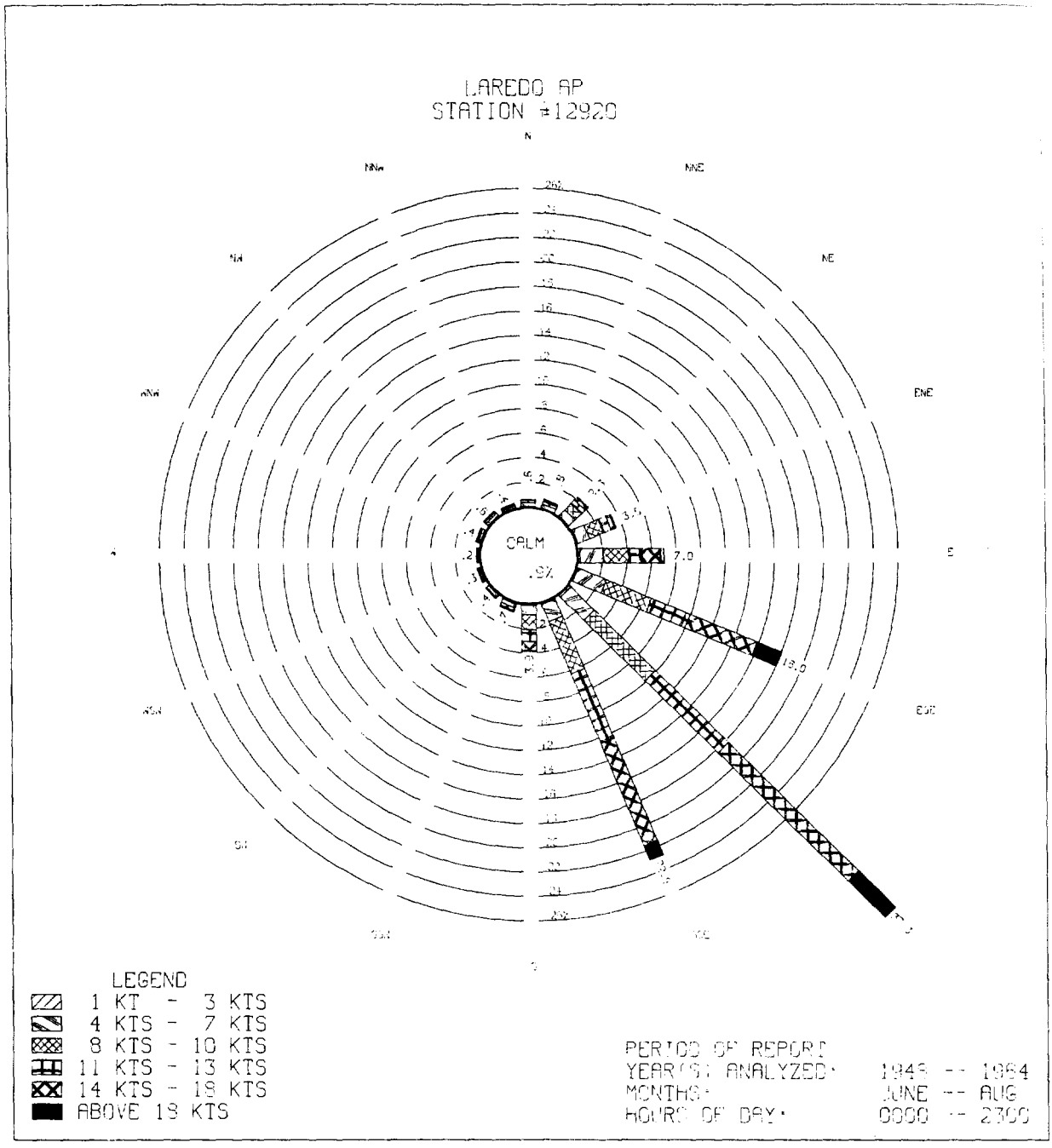

HOUSTON INTERCONTINENTAL AP
STATION #12960
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
CALM
5.7%
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1971 -- 1980
MONTHS: MAR -- MAY
HOURS OF DAY: 0000 -- 2300

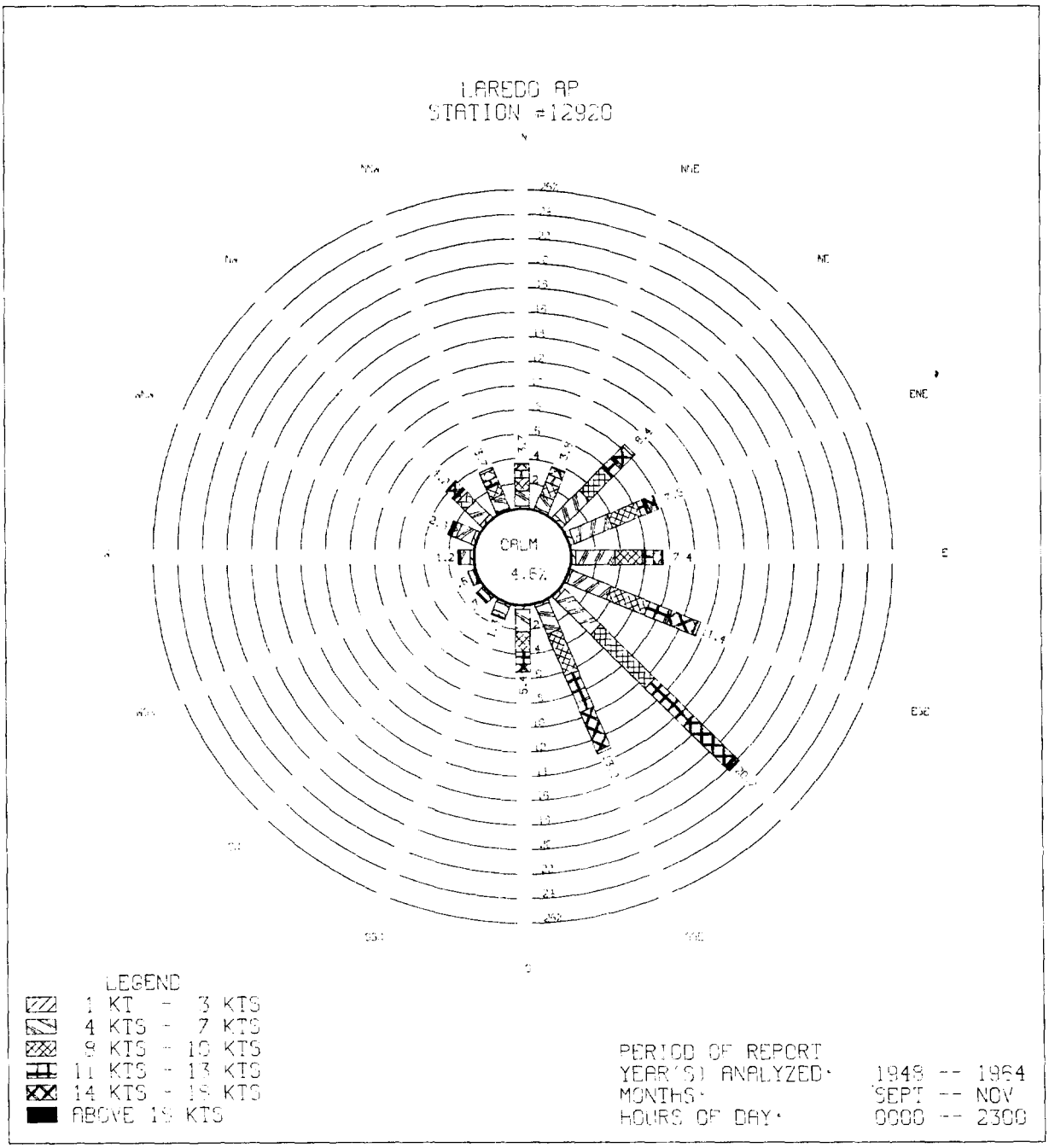

HOUSTON INTERCONTINENTAL AP
STATION #12960
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
CALM
9.5%
4.1
4.7
5.2
6.6
5.3
7.3
10.4
7.2
12.5
5.4
5.7
3.6
3.2
1.3
1.7
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEARS ANALYZED: 1971 -- 1980
MONTHS: JUNE -- AUG
HOURS OF DAY: 0000 -- 2300

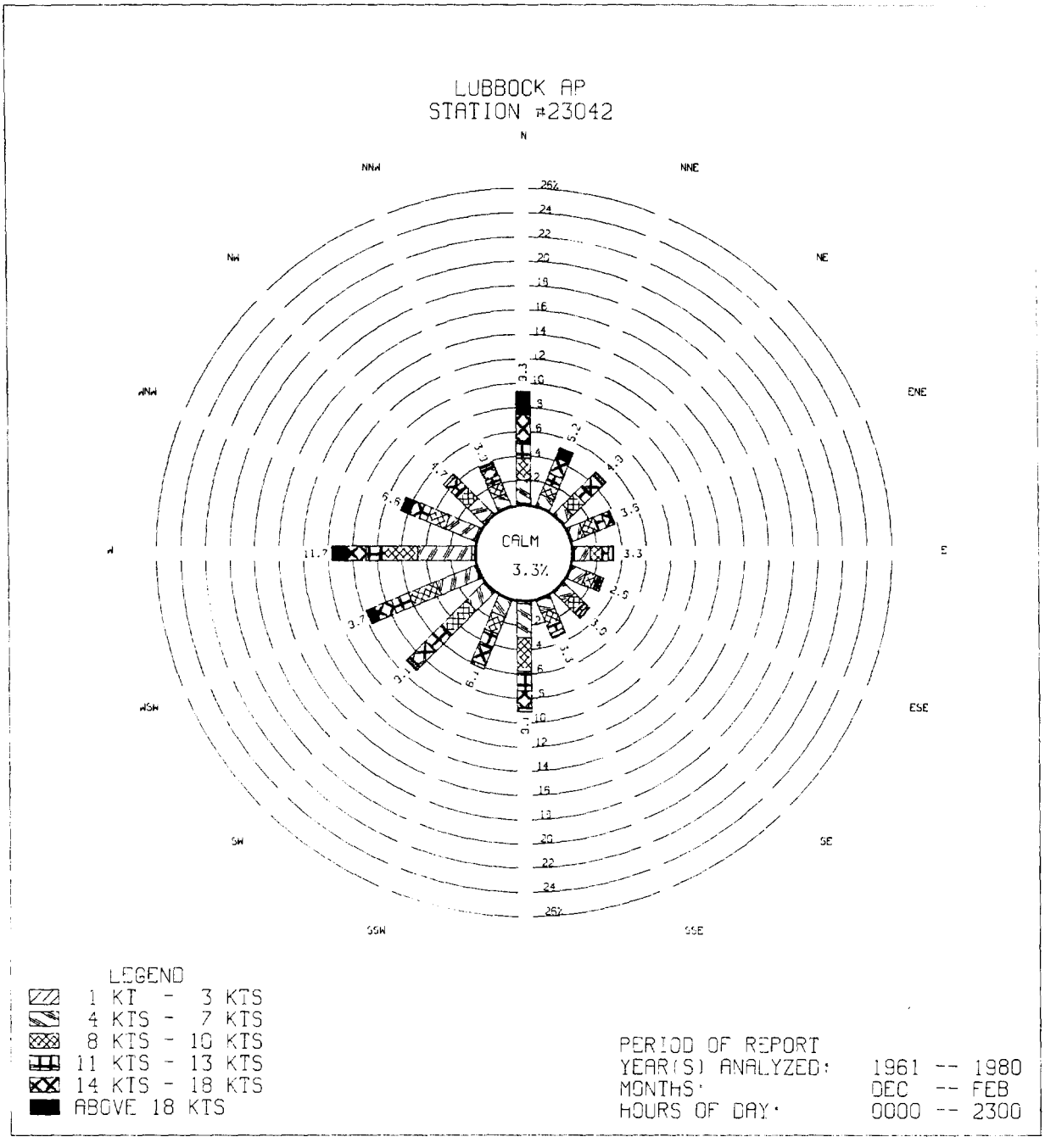

HOUSTON INTERCONTINENTAL AP
STATION #12960
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
CALM
10.6%
12.1
7.2
7.3
8.3
9.6
9.2
7.5
4.0
6.0
2.6
1.9
1.5
2.3
3.2
5.4
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1971 -- 1980
MONTHS: SEPT -- NOV
HOURS OF DAY: 0000 -- 2300

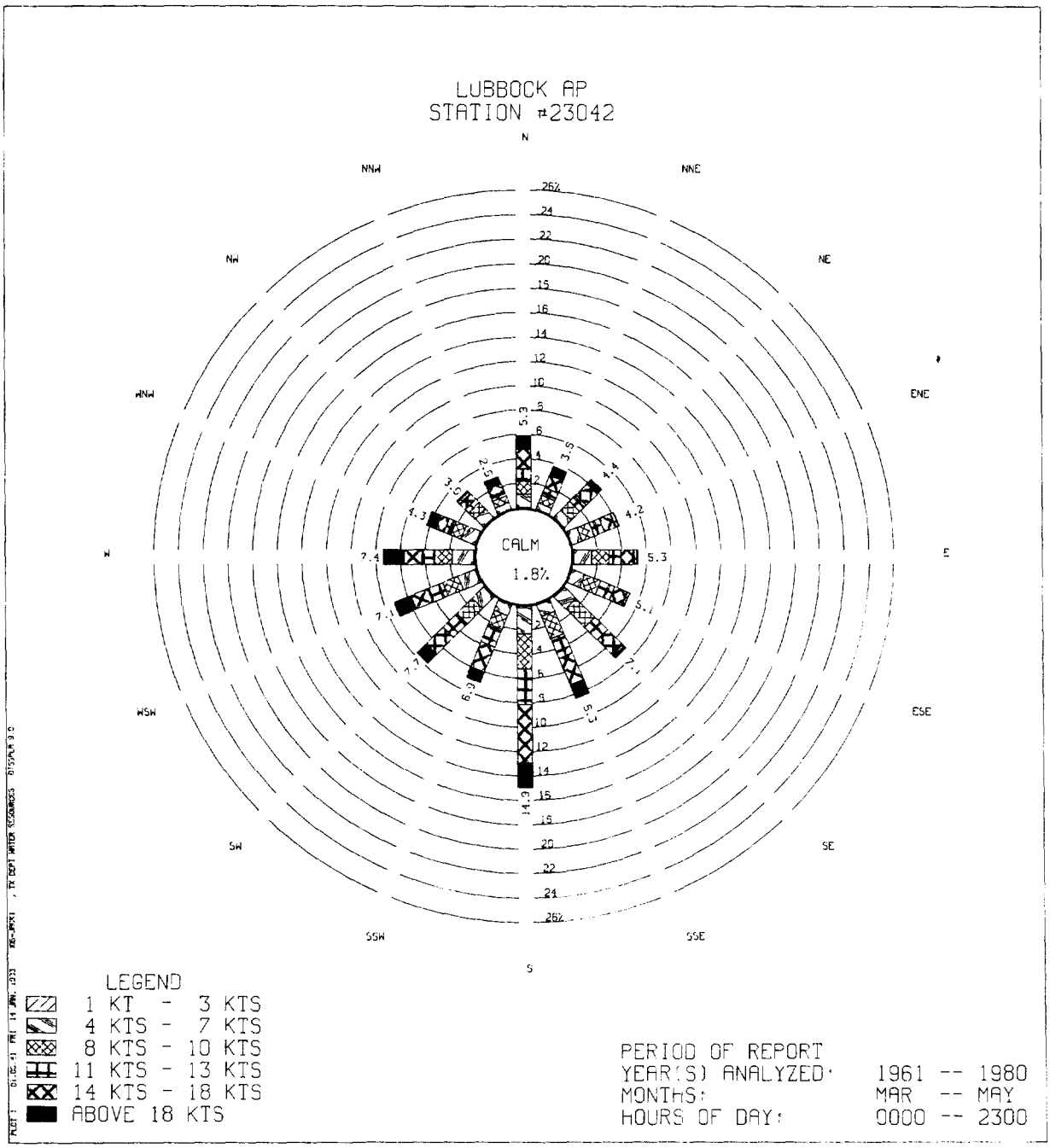

LAREDO AP
STATION #12920
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
CALM
5.9%
1.6
5.7
6.5
3.9
12.1
5.8
1.6
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1948 -- 1965
MONTHS: DEC -- FEB
HOURS OF DAY: 0000 -- 2300

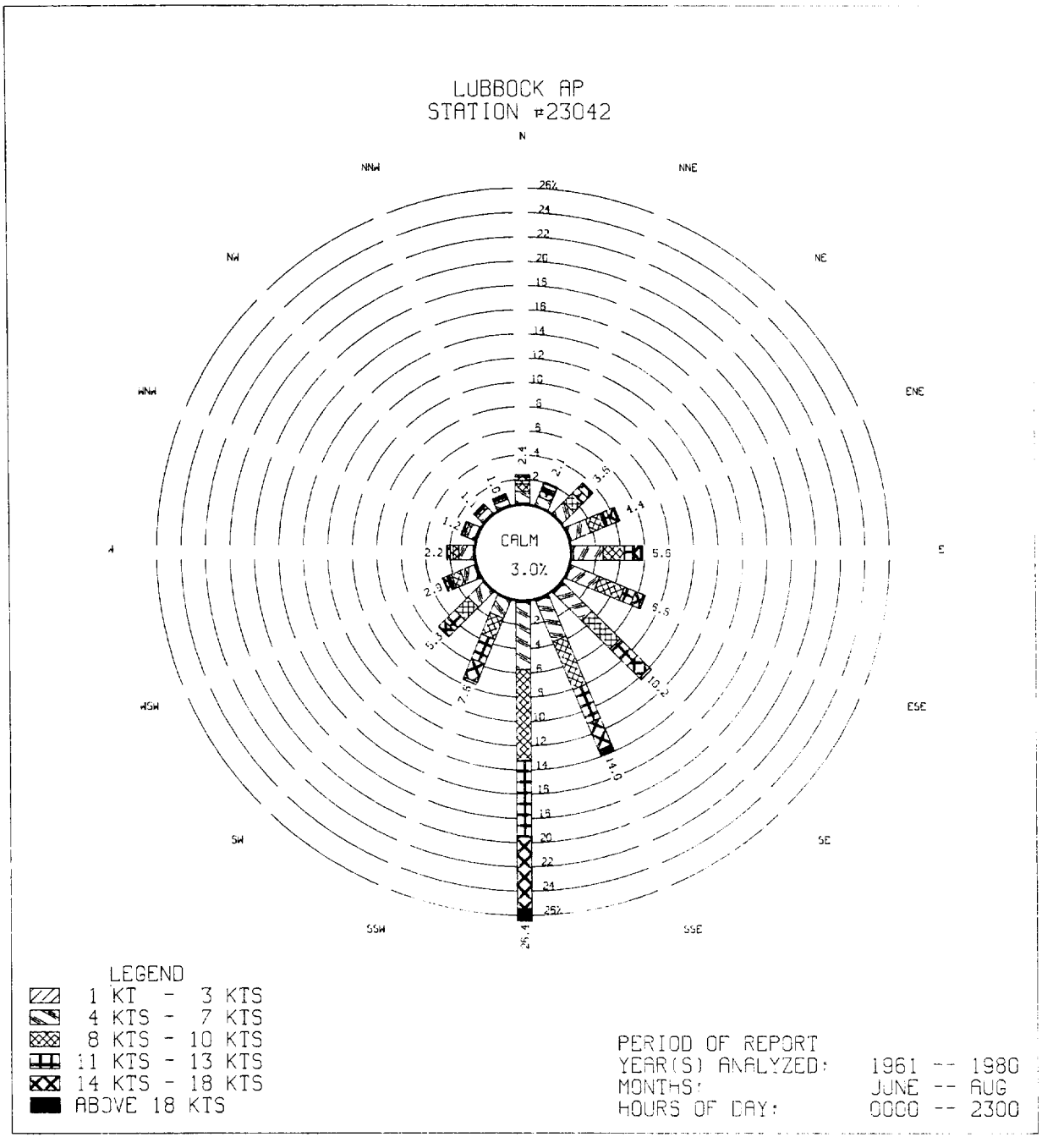

LAREDO AP
STATION #12920
N
NNW
NNE
NW
NE
WNW
ENE
W
E
WSW
ESE
SW
SSW
SSE
S
CALM
3.4%
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1949 -- 1965
MONTHS: MAR -- MAY
HOURS OF DAY: 0000 -- 2300

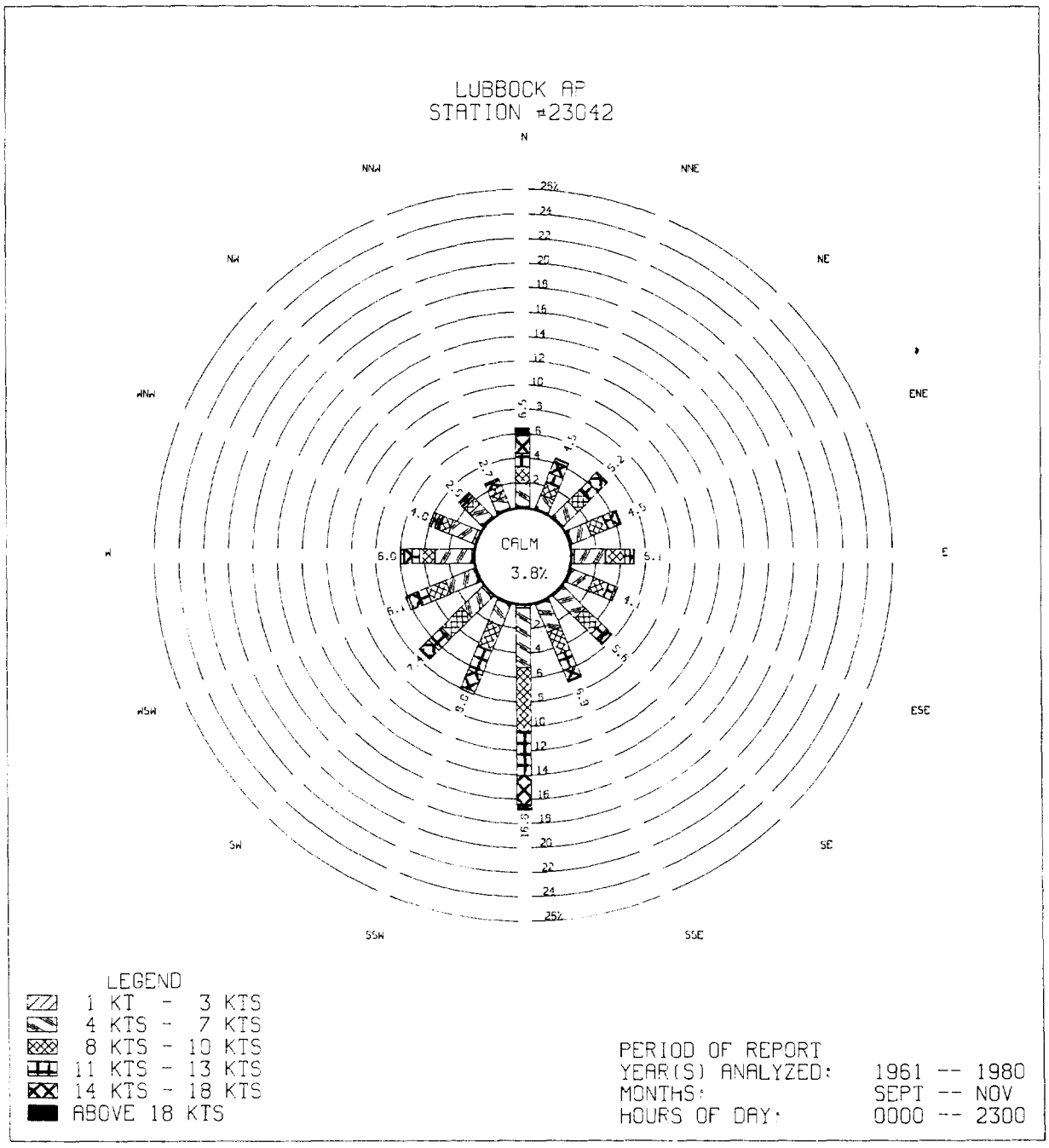

LAREDO AP
STATION #12920
N
NNW
NNE
NW
NE
WNW
ENE
W
E
WSW
ESE
SW
SE
SSW
SSE
S
CALM
.9%
7.0
18.0
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1948 -- 1964
MONTHS: JUNE -- AUG
HOURS OF DAY: 0000 -- 2300

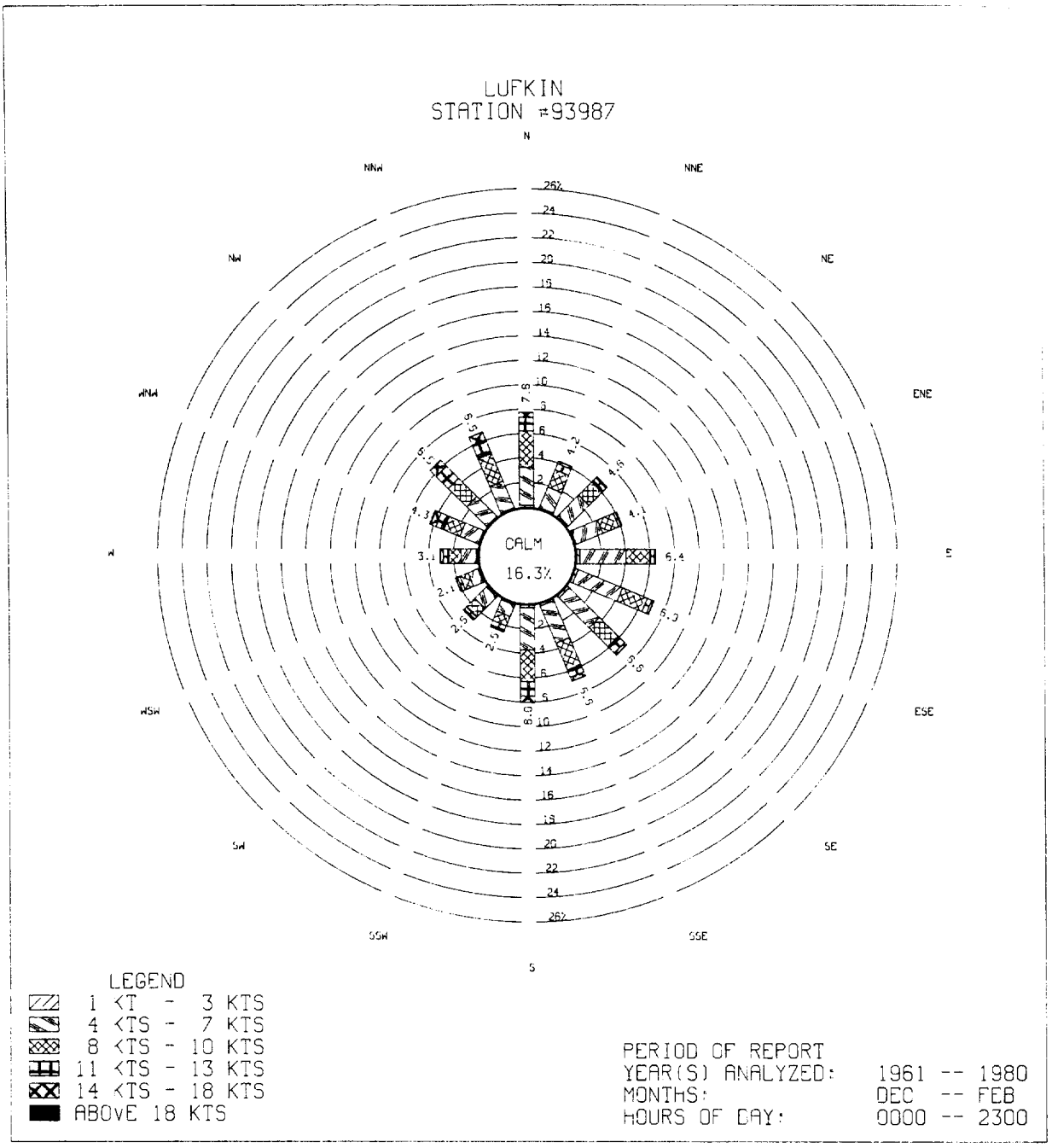

LAREDO AP
STATION #12920
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
CALM
4.6%
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1948 -- 1964
MONTHS: SEPT -- NOV
HOURS OF DAY: 0000 -- 2300

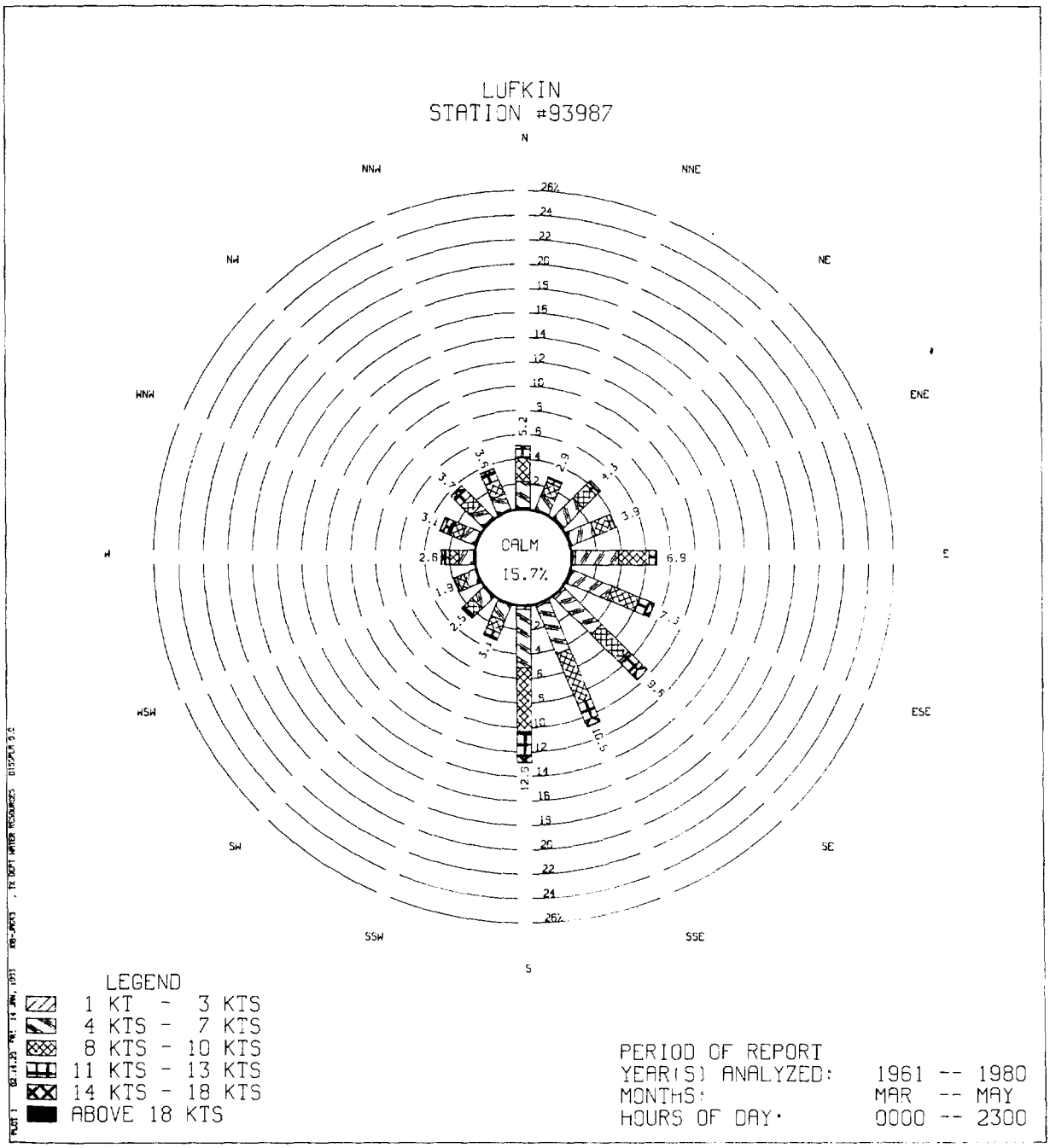

LUBBOCK AP
STATION #23042
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
CALM
3.3%
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: DEC -- FEB
HOURS OF DAY: 0000 -- 2300


LUBBOCK AP
STATION #23042
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
CALM
1.8%
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: MAR -- MAY
HOURS OF DAY: 0000 -- 2300

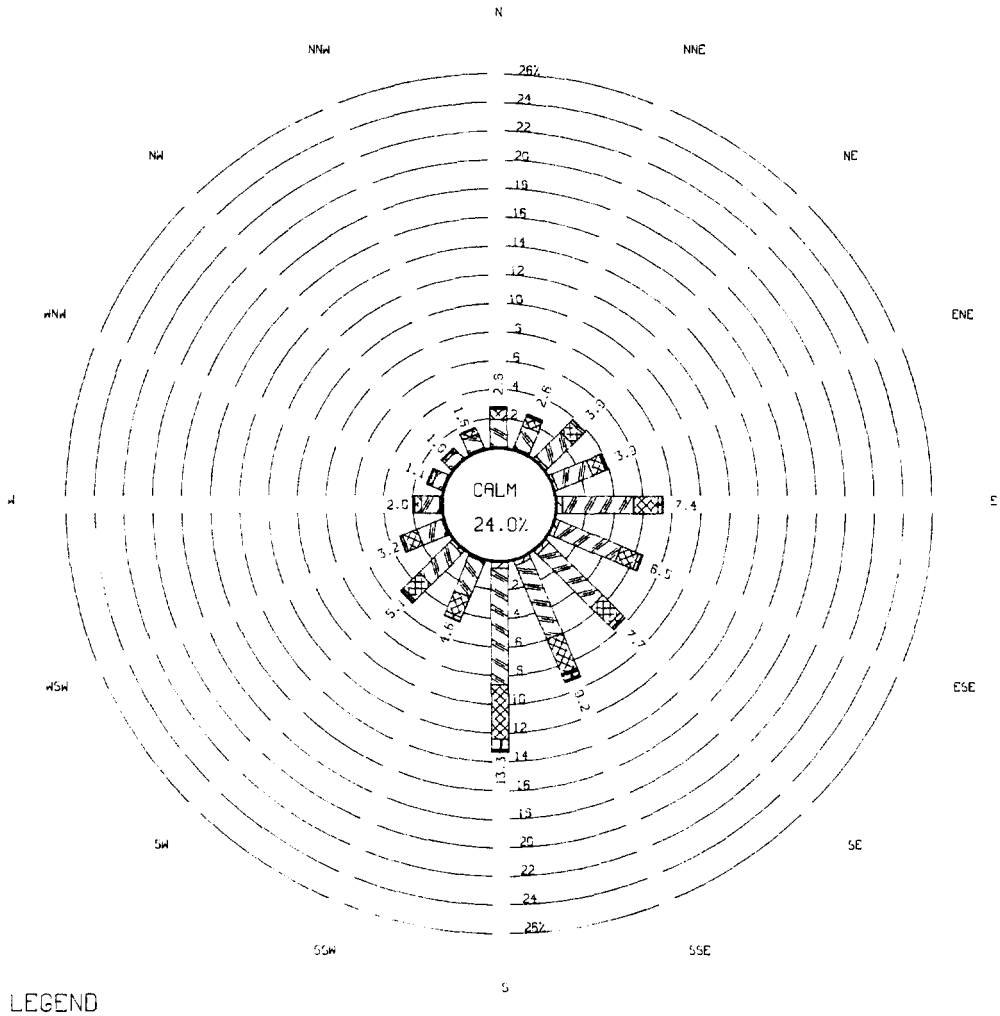

LUBBOCK AP
STATION #23042
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
CALM
3.0%
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: JUNE -- AUG
HOURS OF DAY: 0000 -- 2300


LUBBOCK AP
STATION #23042
N
NNW
NNE
NW
NE
WNW
ENE
W
E
WSW
ESE
SW
SE
SSW
SSE
CALM
3.8%
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: SEPT -- NOV
HOURS OF DAY: 0000 -- 2300


LUFKIN
STATION #93987
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
CALM
16.3%
7.8
4.2
4.5
4.1
6.4
6.0
5.6
5.5
8.0
5.5
2.5
2.5
2.1
3.1
4.3
5.5
5.5
LEGEND
1 <T - 3 KTS
4 <TS - 7 KTS
8 <TS - 10 KTS
11 <TS - 13 KTS
14 <TS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: DEC -- FEB
HOURS OF DAY: 0000 -- 2300


LUFKIN
STATION #93987
N
NNW
NNE
NW
NE
WNW
ENE
W
E
WSW
ESE
SW
SE
SSW
SSE
S
CALM
15.7%
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: MAR -- MAY
HOURS OF DAY: 0000 -- 2300

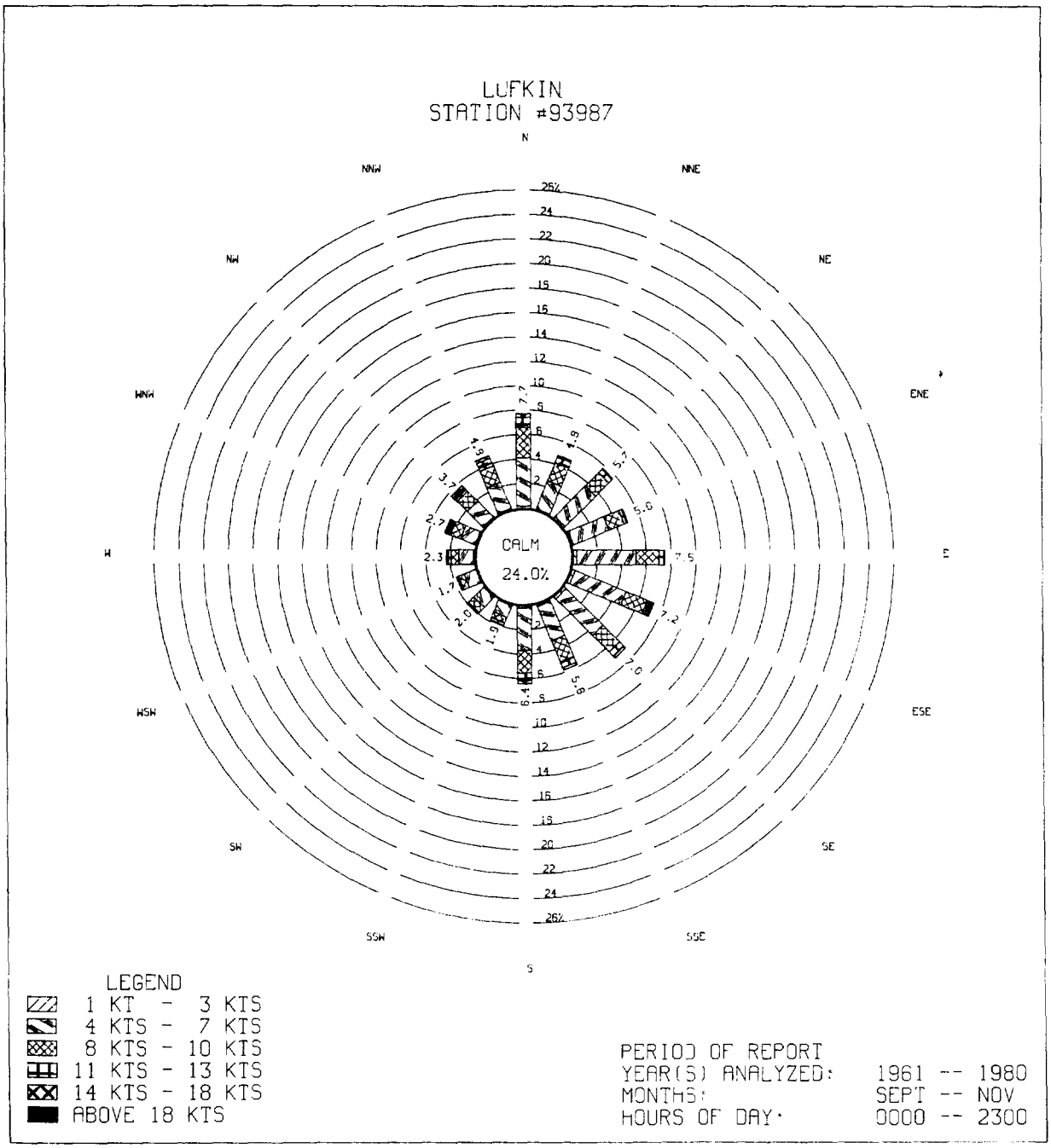
LUFKIN
STATION #93987

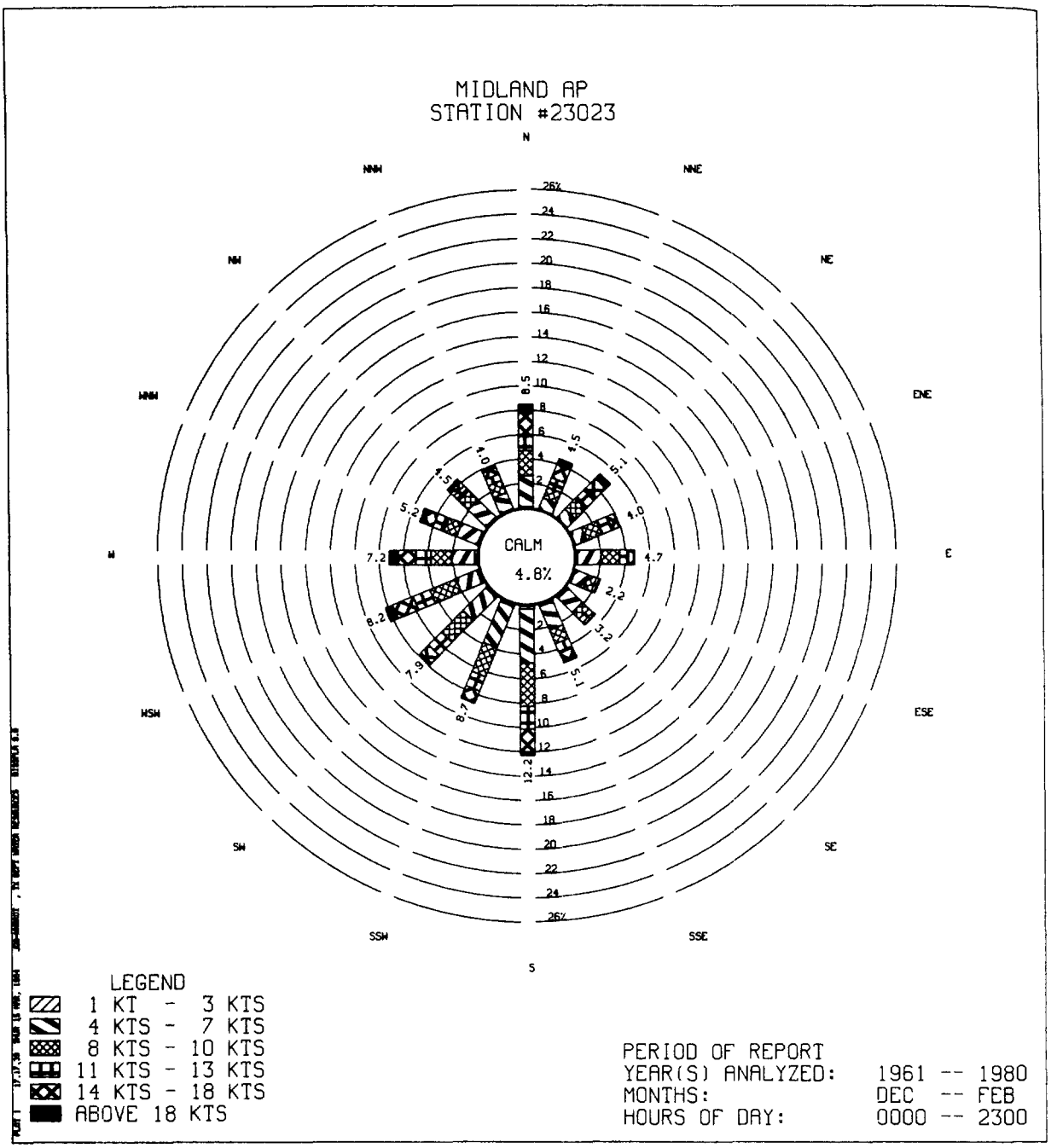


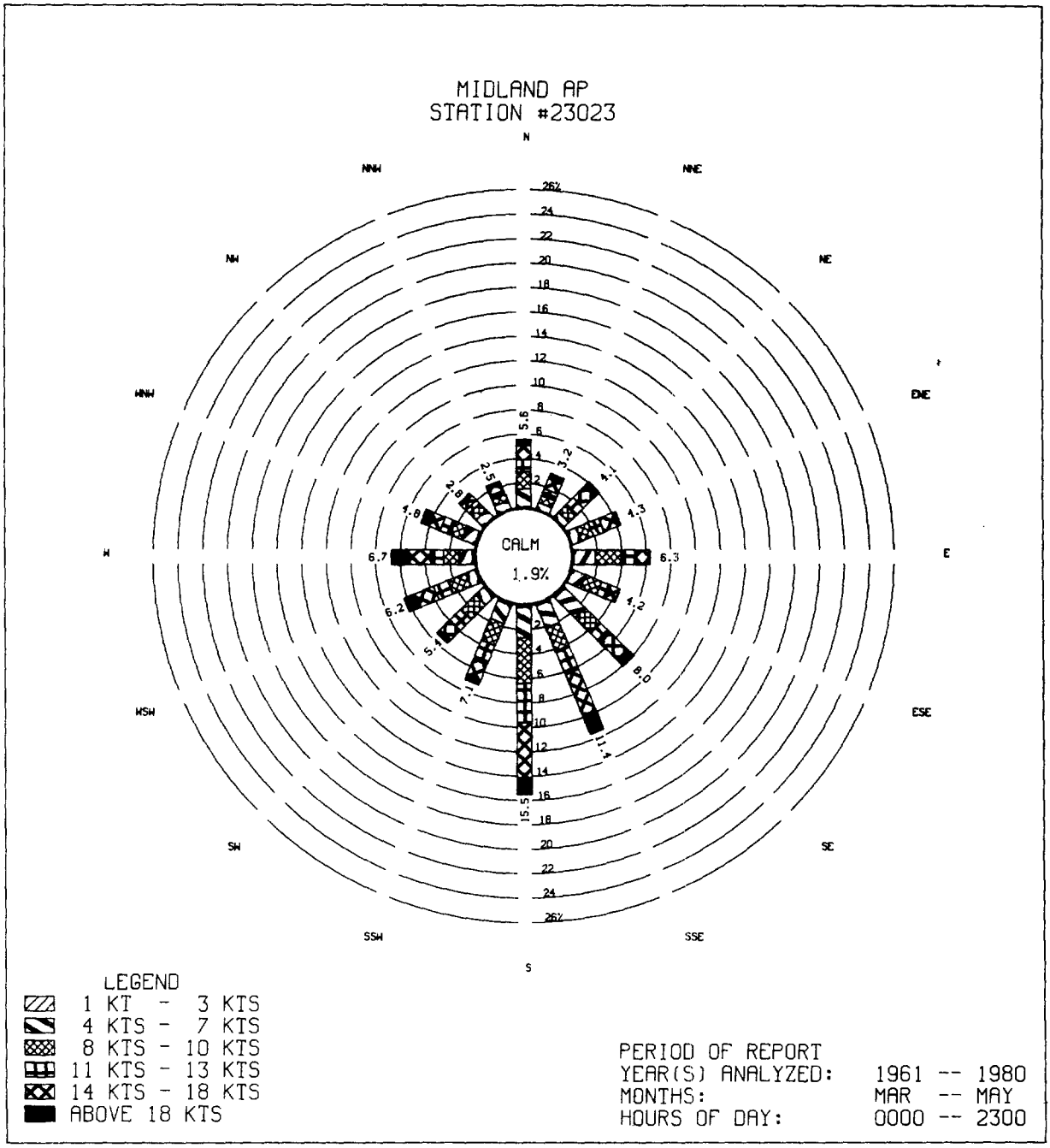
LEGEND

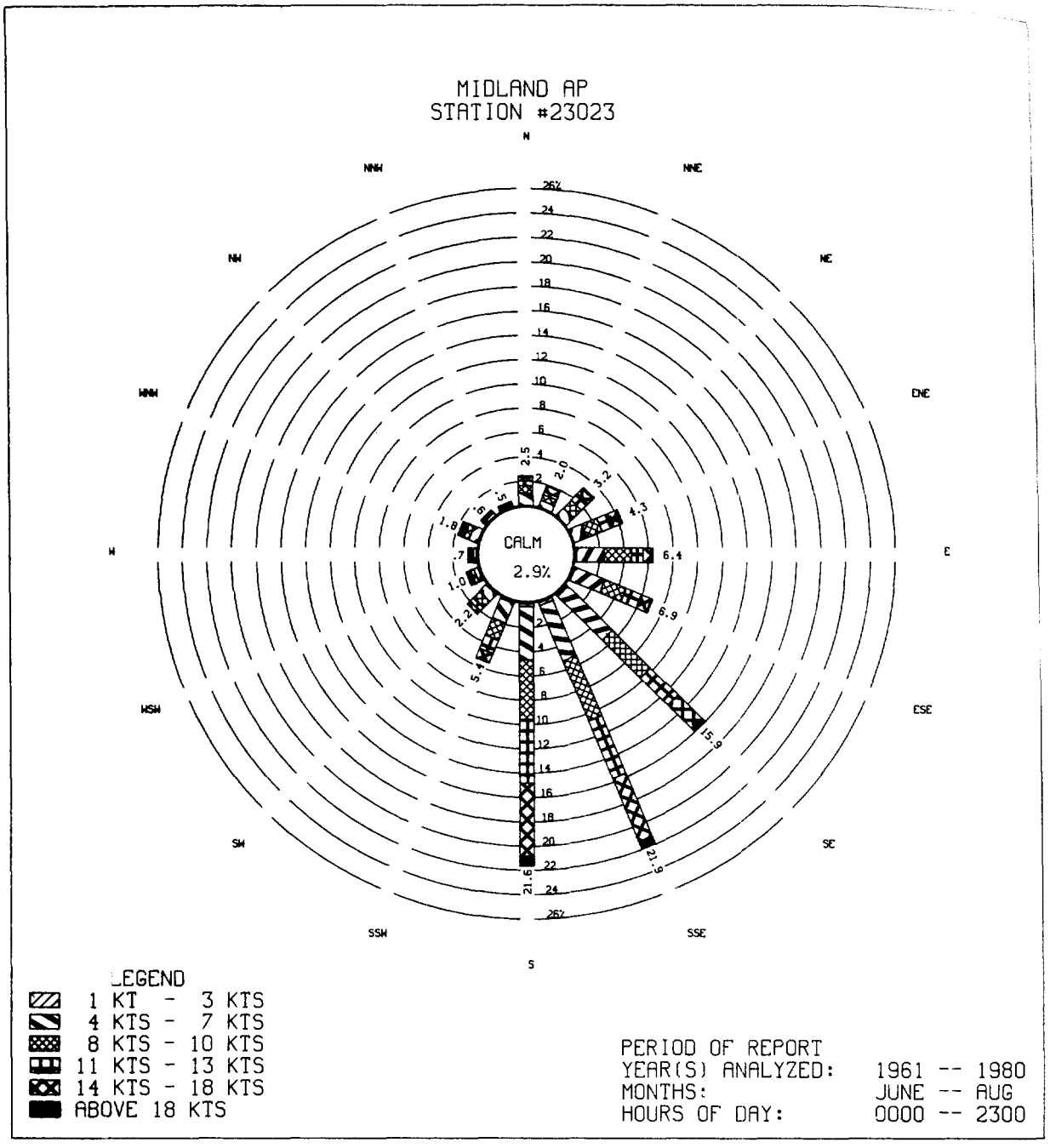
1 KT - 3 KTS	
4 KTS - 7 KTS	
8 KTS - 10 KTS	
11 KTS - 13 KTS	
14 KTS - 18 KTS	
ABOVE 18 KTS	

PERIOD OF REPORT	
YEAR(S) ANALYZED:	1961 -- 1980
MONTHS:	JUNE -- AUG
HOURS OF DAY:	0000 -- 2300

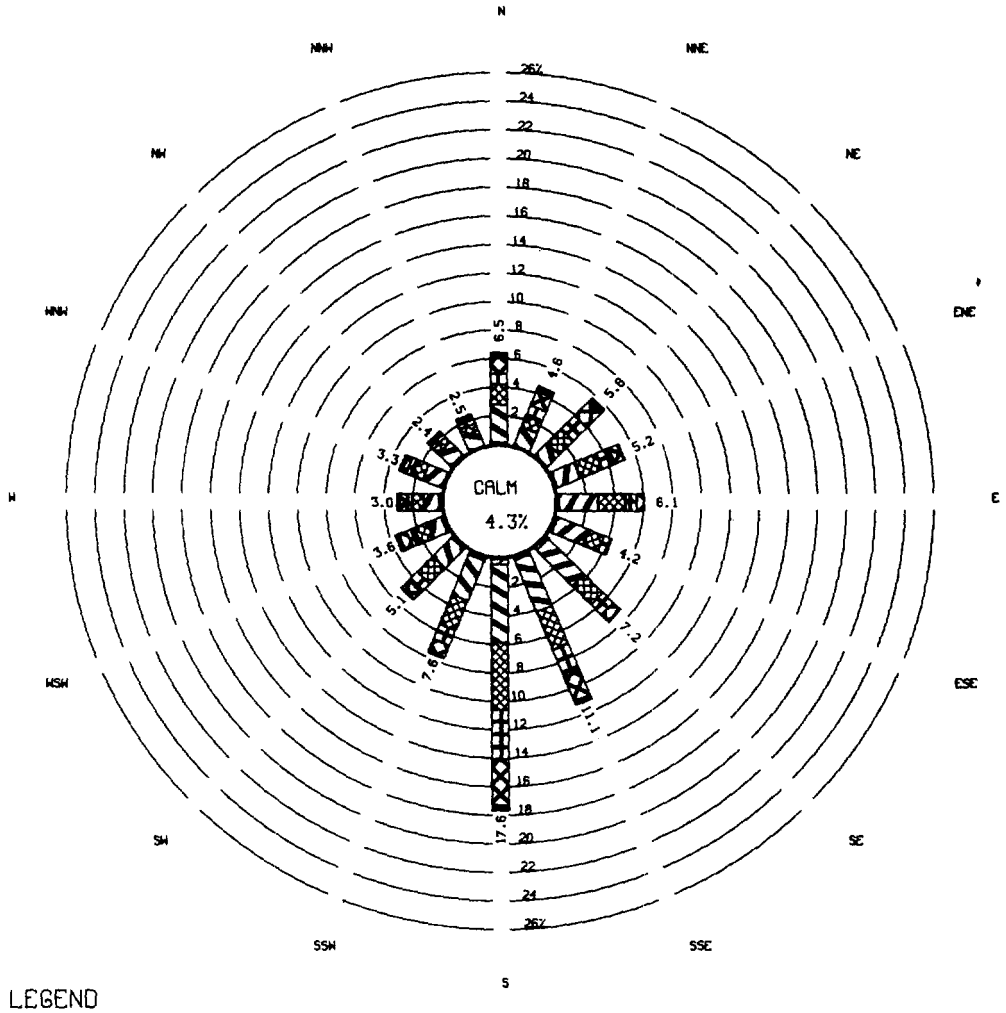

LUFKIN
STATION #93987
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
26%
24
22
20
18
16
14
12
10
8
6
4
2
CALM
24.0%
7.7
4.9
5.7
5.0
7.5
7.2
7.0
5.9
5.5
6.4
1.9
2.0
1.7
2.3
2.7
3.7
4.9
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: SEPT -- NOV
HOURS OF DAY: 0000 -- 2300


MIDLAND AP
STATION #23023
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
26%
24
22
20
18
16
14
12
10
8
6
4
2
CALM
4.8%
8.5
4.5
5.1
4.0
4.7
2.2
3.2
5.1
12.2
8.7
7.9
8.2
7.2
5.2
4.5
4.0
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: DEC -- FEB
HOURS OF DAY: 0000 -- 2300


MIDLAND AP
STATION #23023
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
26%
24
22
20
18
16
14
12
10
8
6
4
2
CALM
1.9%
5.6
3.2
4.1
4.3
6.3
4.2
8.0
11.4
15.5
7.1
5.4
6.2
6.7
1.8
2.5
2.8
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: MAR -- MAY
HOURS OF DAY: 0000 -- 2300


MIDLAND AP
STATION #23023
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
26%
24
22
20
18
16
14
12
10
8
6
4
2
CALM
2.9%
2.5
2.0
3.2
4.3
6.4
6.9
15.9
21.6
21.6
5.1
2.2
1.0
.7
1.8
.5
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: JUNE -- AUG
HOURS OF DAY: 0000 -- 2300

MIDLAND AP
STATION #23023



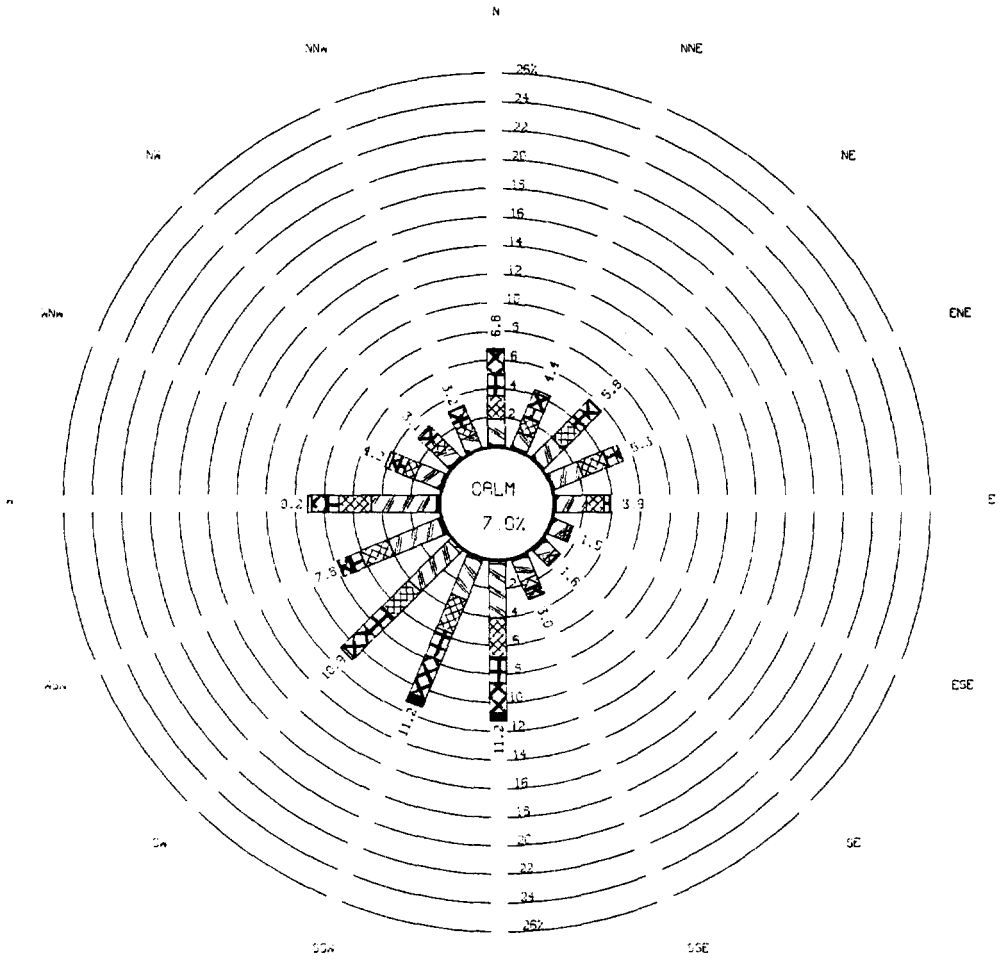
LEGEND

1 KT - 3 KTS	
4 KTS - 7 KTS	
8 KTS - 10 KTS	
11 KTS - 13 KTS	
14 KTS - 18 KTS	
ABOVE 18 KTS	

PERIOD OF REPORT

YEAR(S) ANALYZED:	1961 -- 1980
MONTHS:	SEPT -- NOV
HOURS OF DAY:	0000 -- 2300

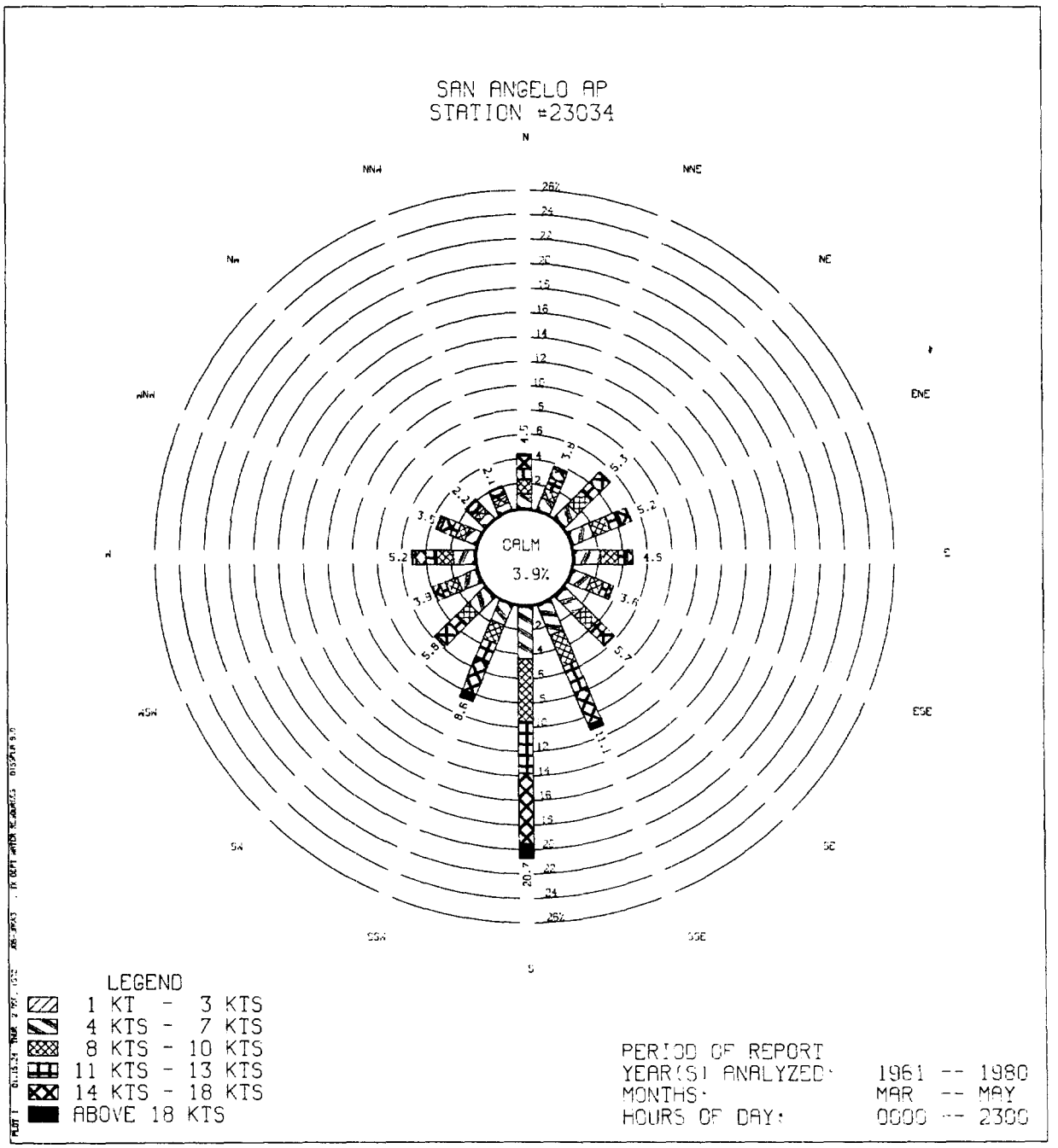
SAN ANGELO AP
STATION #23034

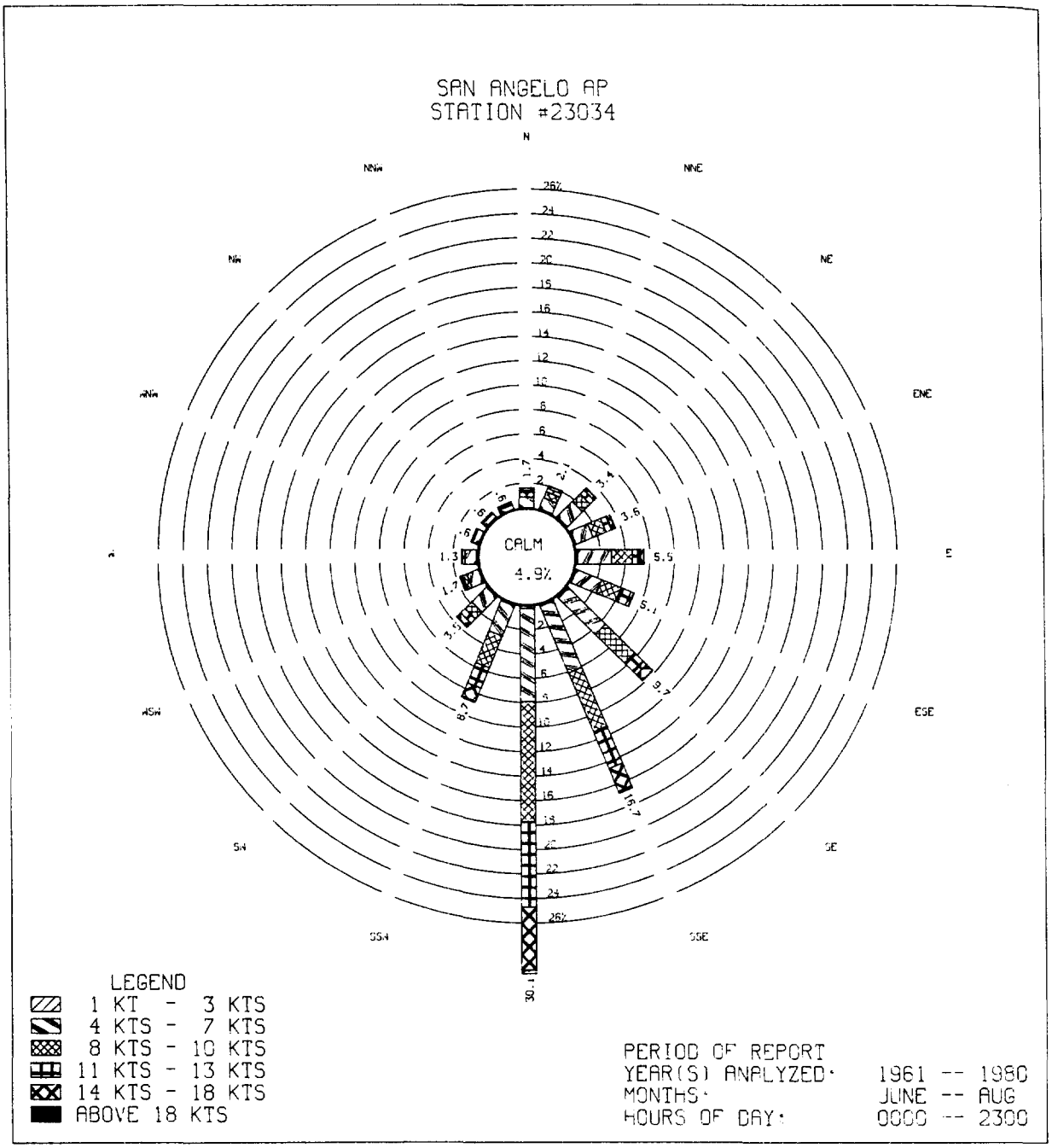


LEGEND

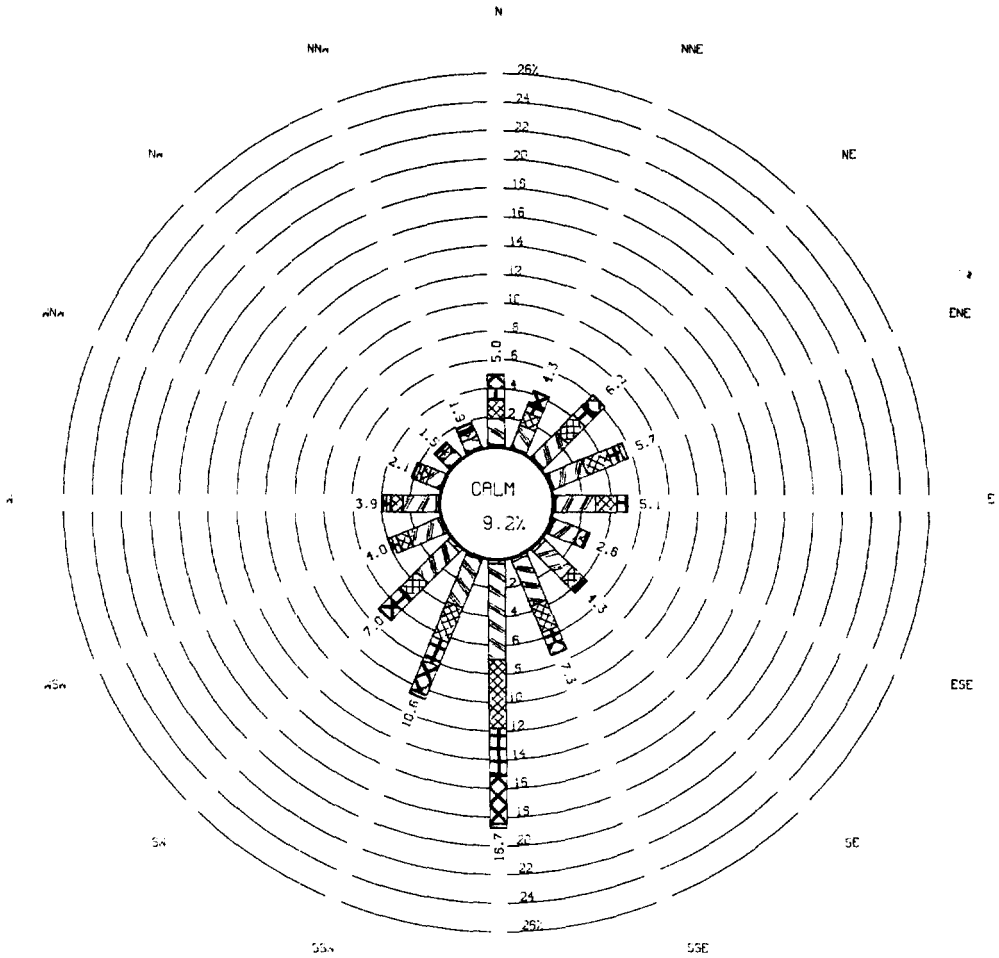
1 KT - 3 KTS	
4 KTS - 7 KTS	
8 KTS - 10 KTS	
11 KTS - 13 KTS	
14 KTS - 18 KTS	
ABOVE 18 KTS	

PERIOD OF REPORT	
YEAR(S) ANALYZED:	1961 -- 1980
MONTHS:	DEC -- FEB
HOURS OF DAY:	0000 -- 2300


SAN ANGELO AP
STATION #23034
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
CALM
3.9%
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: MAR -- MAY
HOURS OF DAY: 0000 -- 2300


SAN ANGELO AP
STATION #23034
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
CALM
4.9%
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: JUNE -- AUG
HOURS OF DAY: 0000 -- 2300

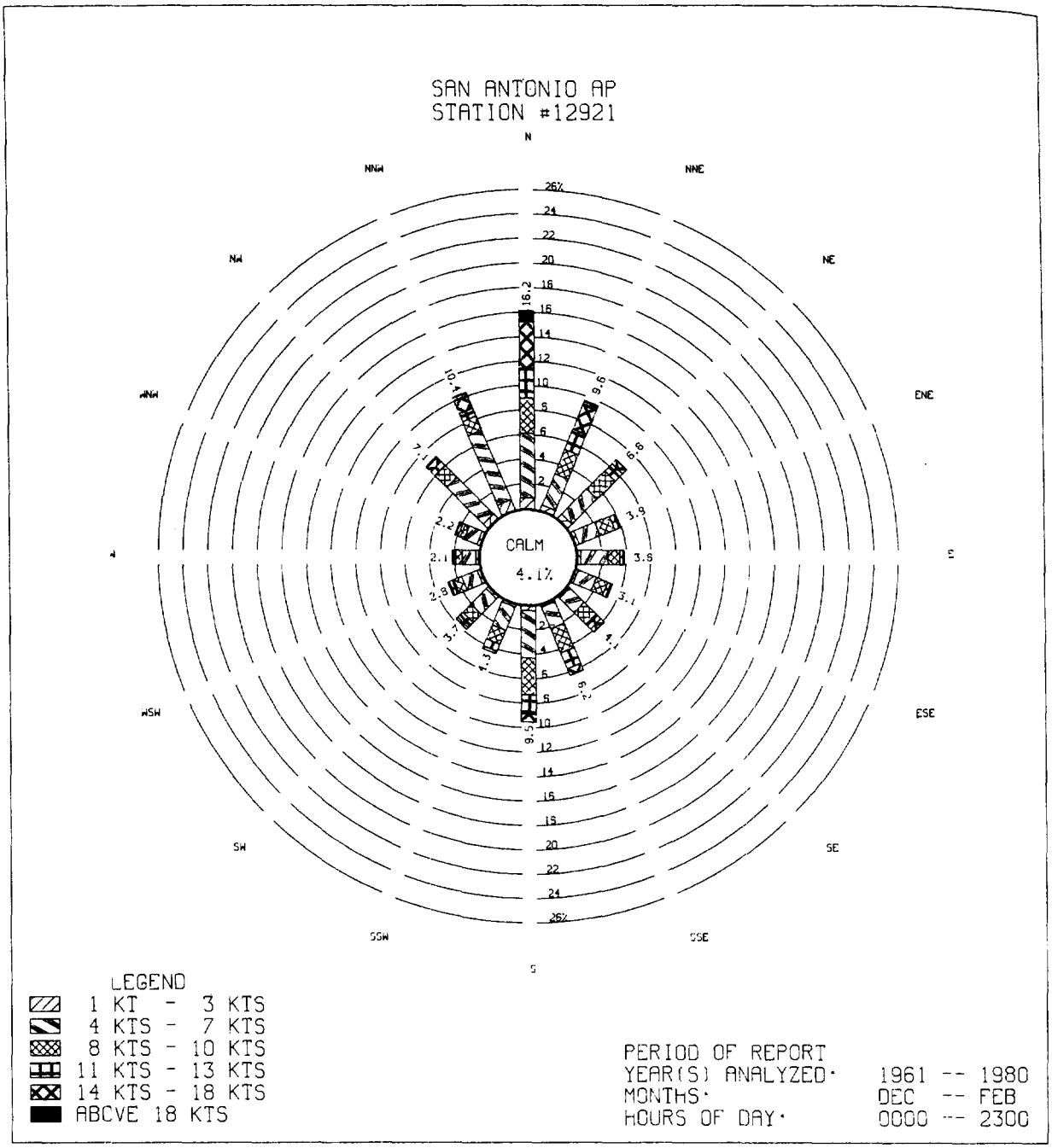
SAN ANGELO AP
STATION #23034

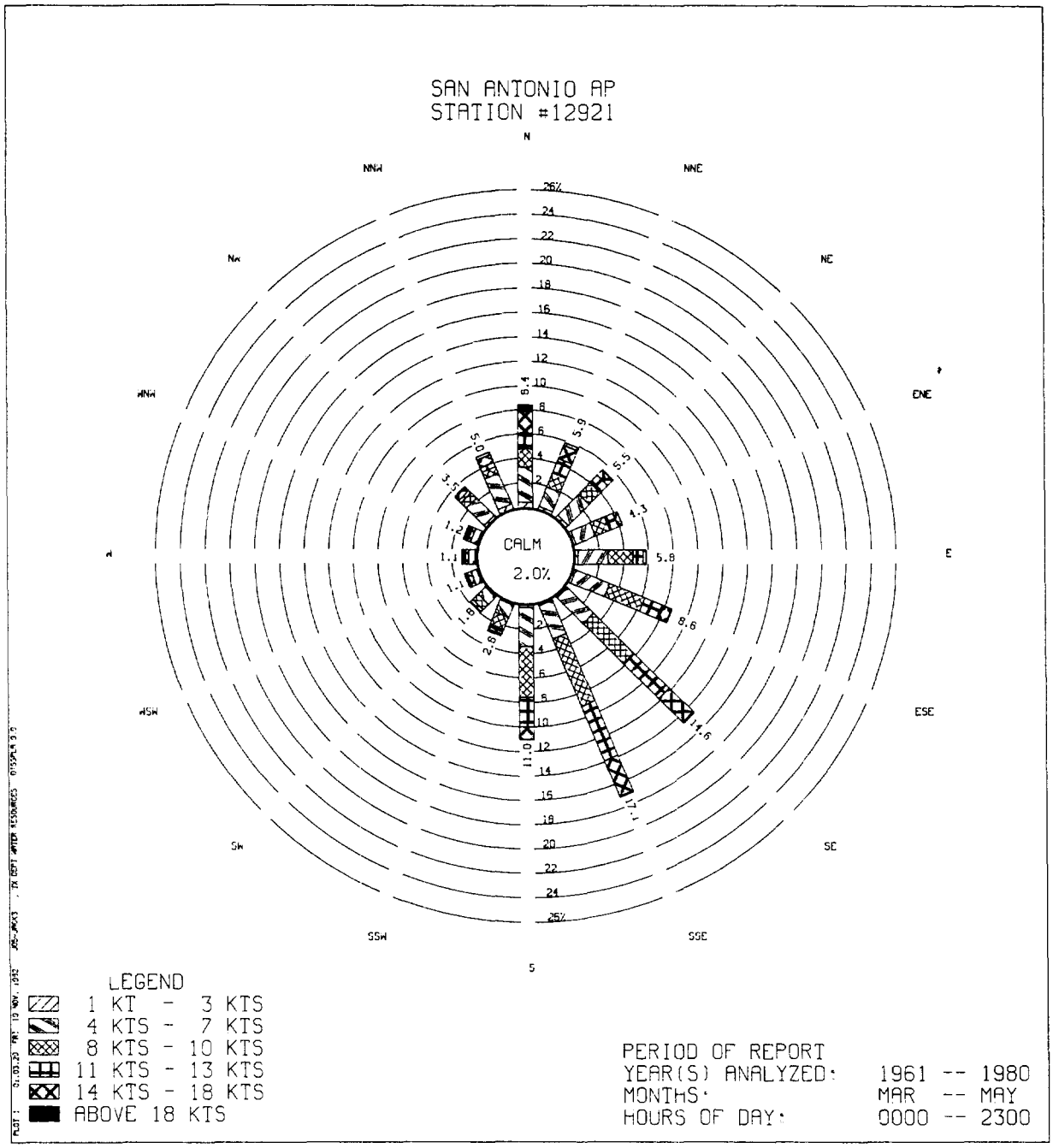


LEGEND

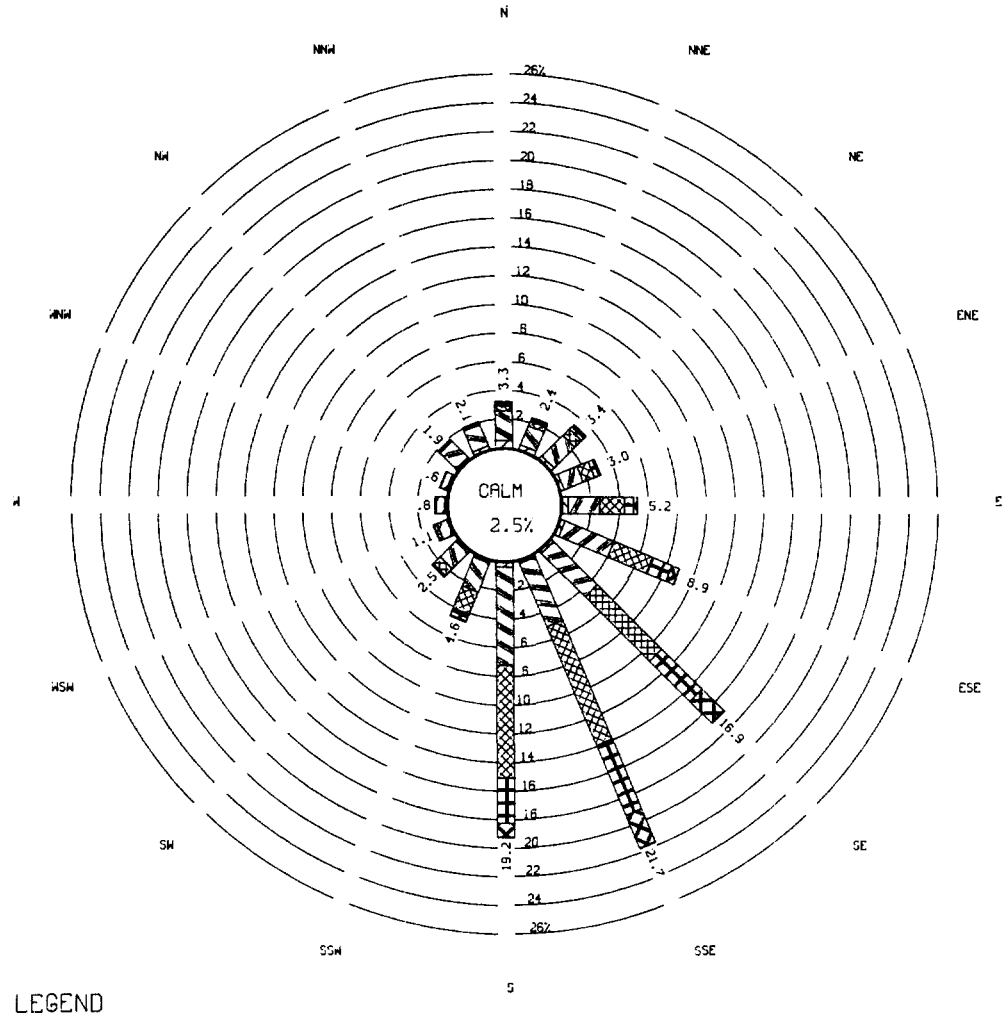
1 KT - 3 KTS	
4 KTS - 7 KTS	
8 KTS - 10 KTS	
11 KTS - 13 KTS	
14 KTS - 18 KTS	
ABOVE 18 KTS	

PERIOD OF REPORT	
YEAR(S) ANALYZED:	1961 -- 1980
MONTHS:	SEPT -- NOV
HOURS OF DAY:	0000 -- 2300


SAN ANTONIO AP
STATION #12921
N
NNW
NNE
NW
NE
WNW
ENE
W
E
WSW
ESE
SW
SE
SSW
SSE
S
26%
24
22
20
18
16
14
12
10
8
6
4
2
16.2
10.4
9.6
7.1
6.6
3.9
2.2
2.1
CALM
4.1%
3.8
2.9
3.7
3.1
4.3
4.1
5.2
9.5
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: DEC -- FEB
HOURS OF DAY: 0000 -- 2300


SAN ANTONIO AP
STATION #12921
N
NNW
NNE
NW
NE
WNW
ENE
W
E
WSW
ESE
SW
SE
SSW
SSE
S
26%
24
22
20
18
16
14
12
10
8
6
4
2
CALM
2.0%
8.4
5.9
5.5
5.0
4.3
3.3
1.2
1.1
5.8
1.1
1.8
2.8
8.6
14.6
11.0
17.1
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: MAR -- MAY
HOURS OF DAY: 0000 -- 2300

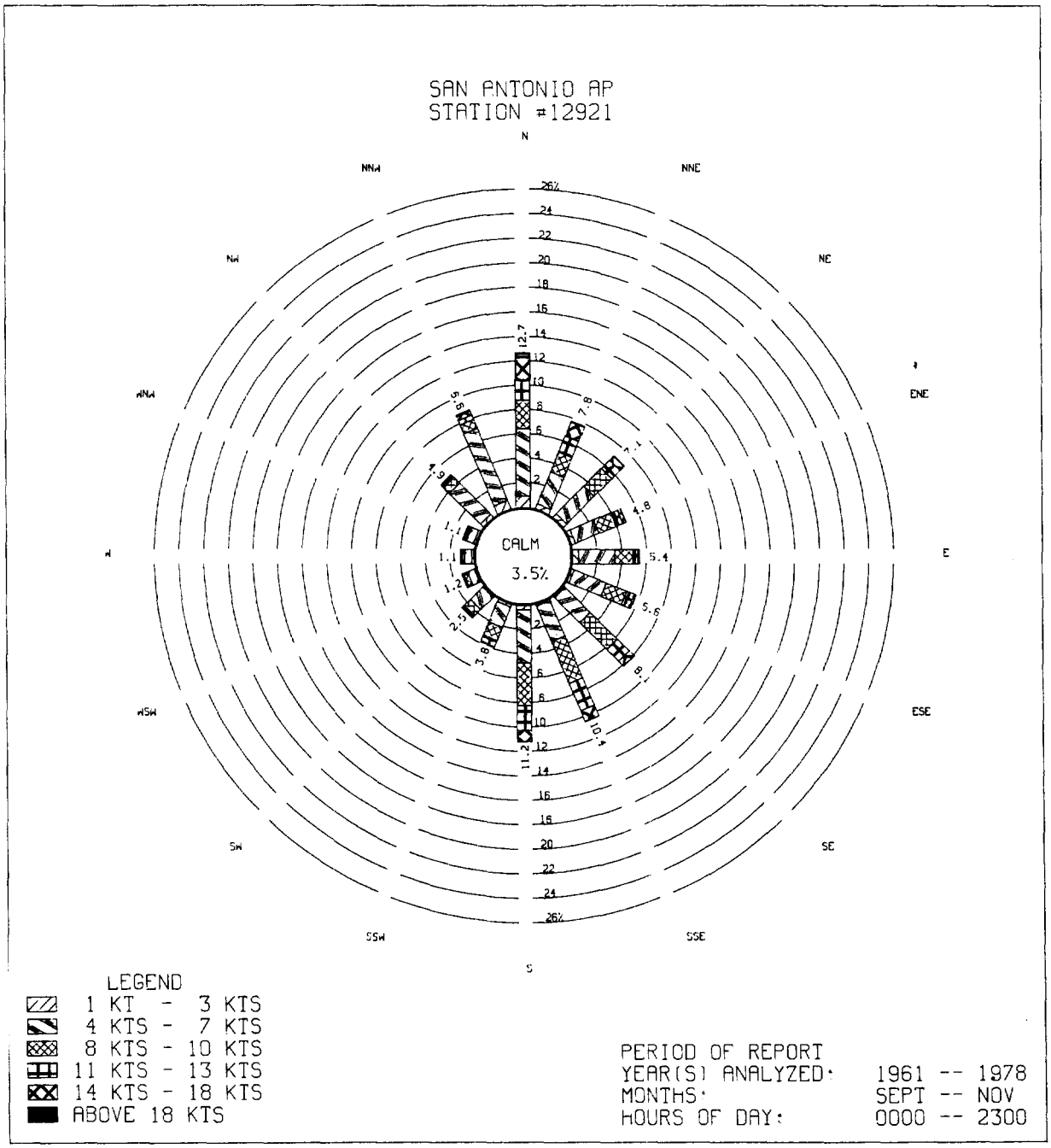
SAN ANTONIO AP
STATION #12921

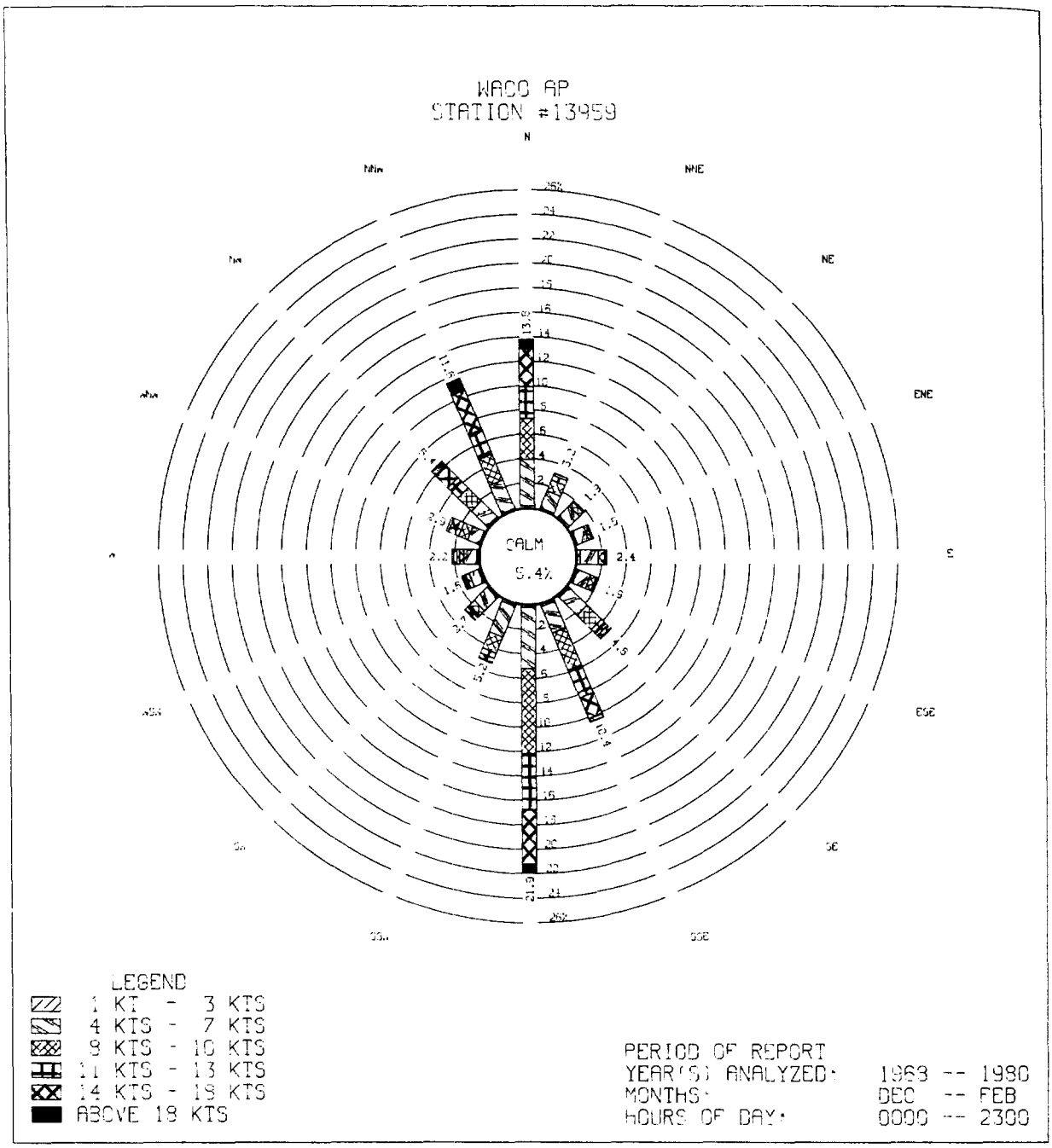


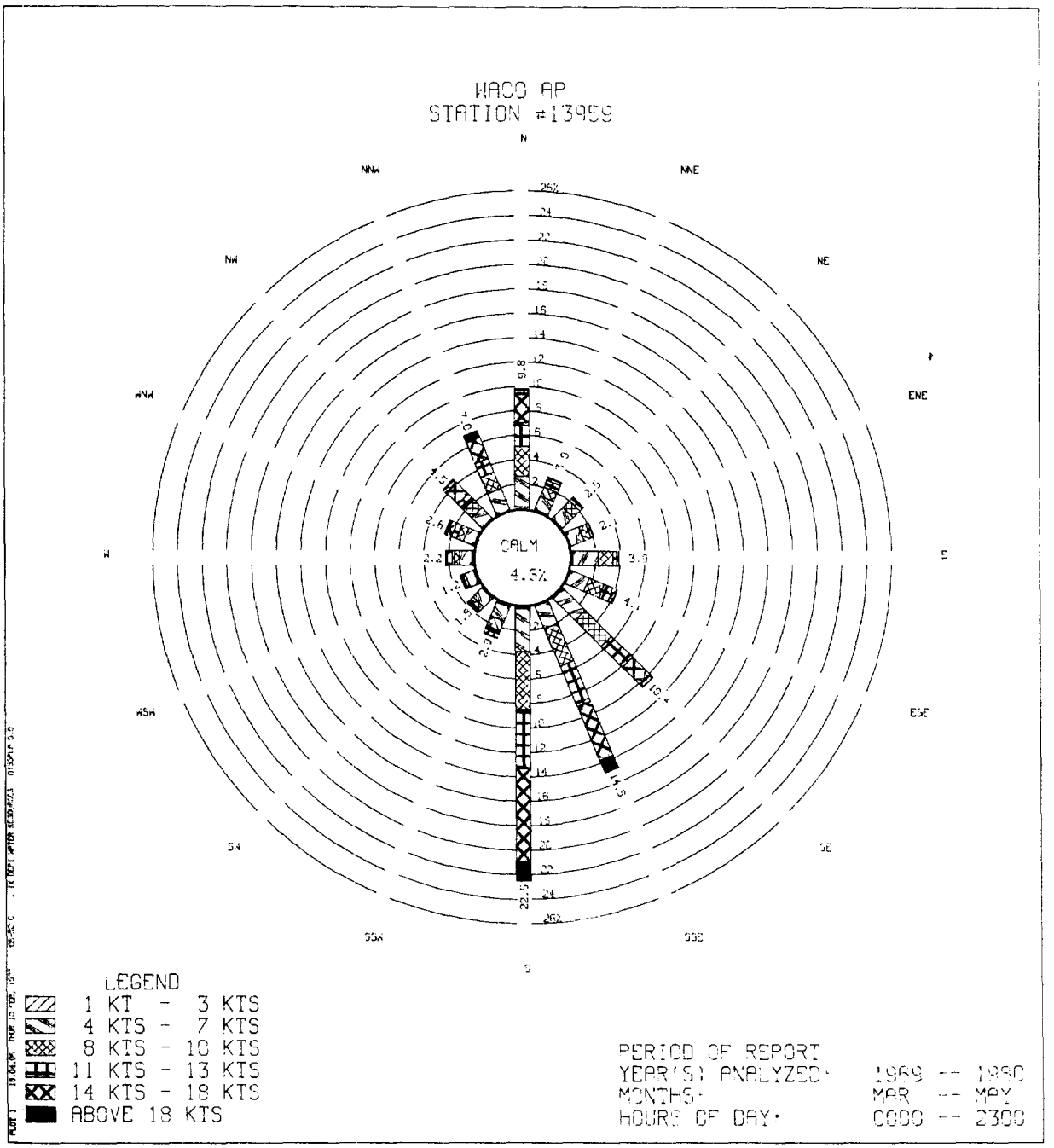
LEGEND

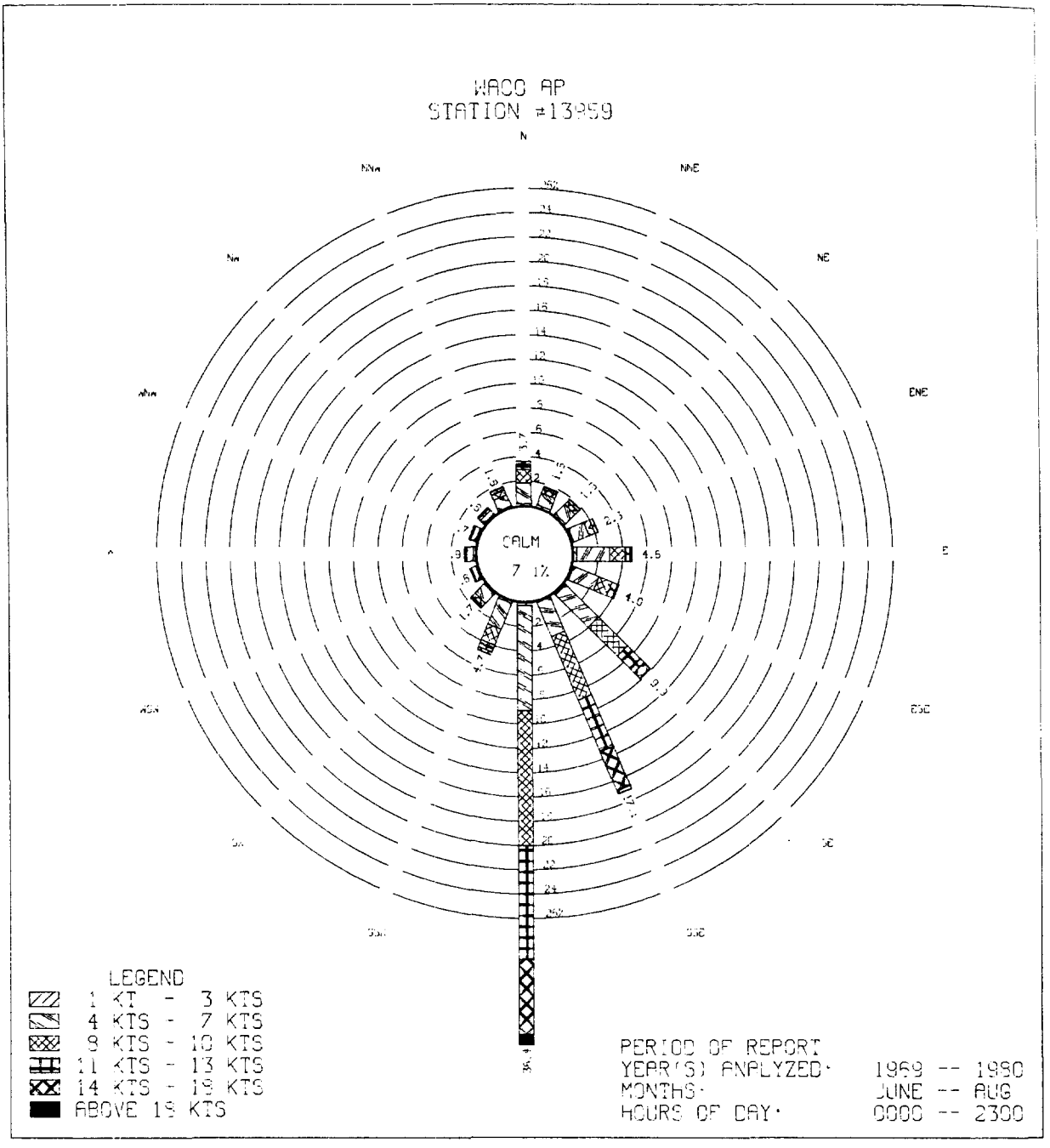
1 KT - 3 KTS	
4 KTS - 7 KTS	
8 KTS - 10 KTS	
11 KTS - 13 KTS	
14 KTS - 18 KTS	
ABOVE 18 KTS	

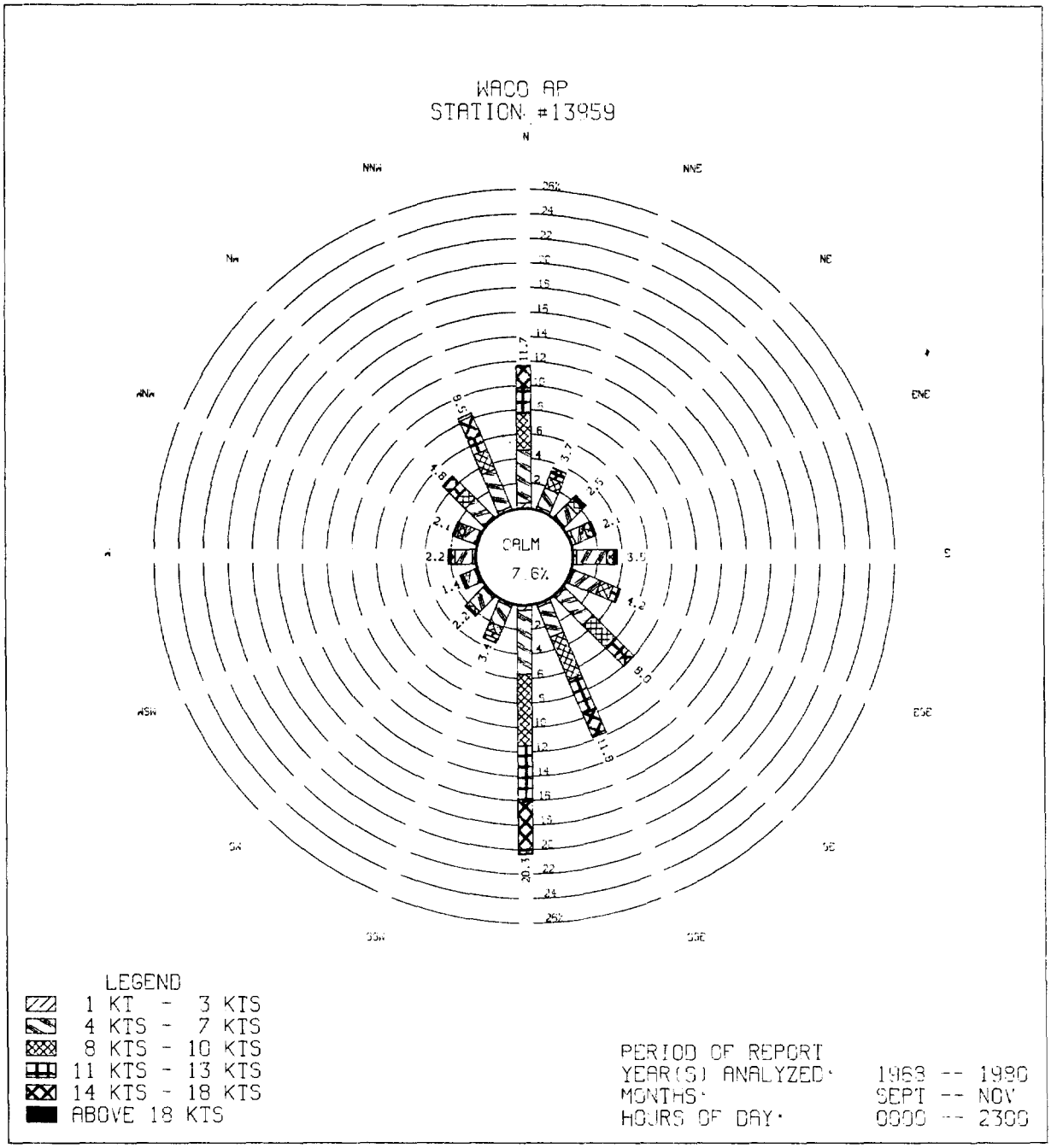
PERIOD OF REPORT	
YEAR(S) ANALYZED:	1961 -- 1978
MONTHS:	JUNE -- AUG
HOURS OF DAY:	0000 -- 2300

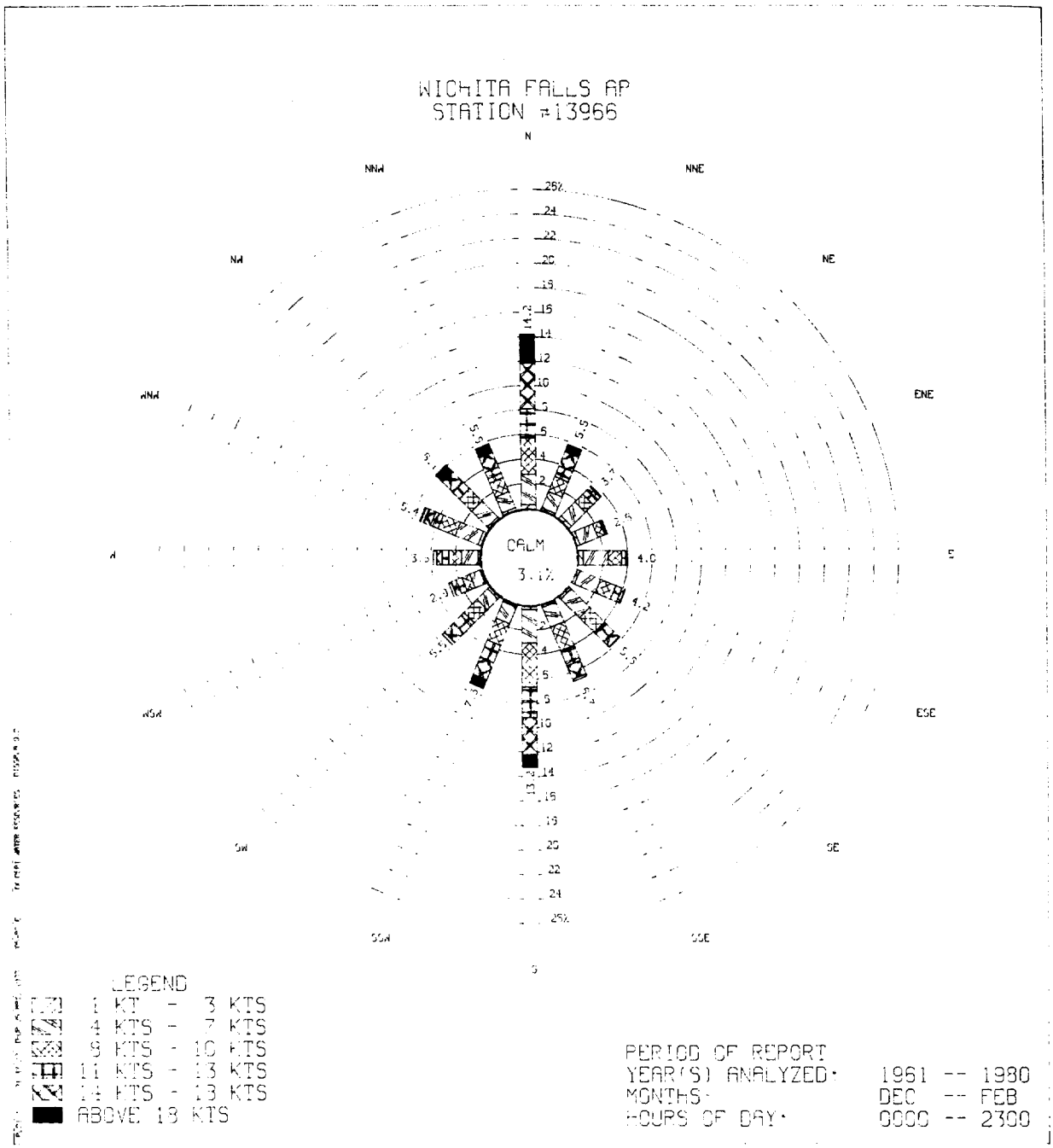

SAN ANTONIO AP
STATION #12921
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
CALM
3.5%
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1978
MONTHS: SEPT -- NOV
HOURS OF DAY: 0000 -- 2300

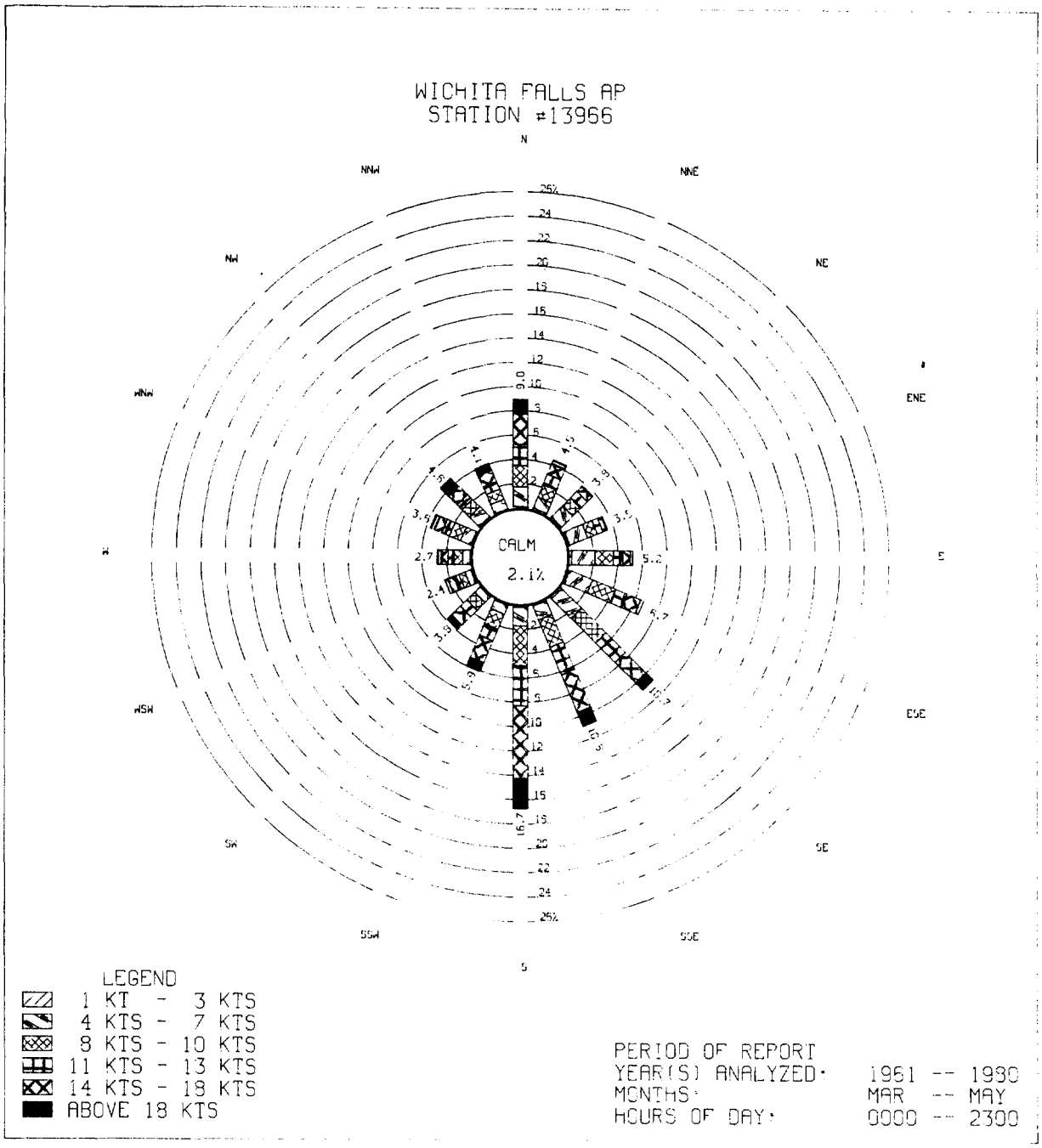

WACO AP
STATION #13959
N
NNE
NE
ENE
E
ESE
SE
SSE
CALM
5.4%
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1963 -- 1980
MONTHS: DEC -- FEB
HOURS OF DAY: 0000 -- 2300

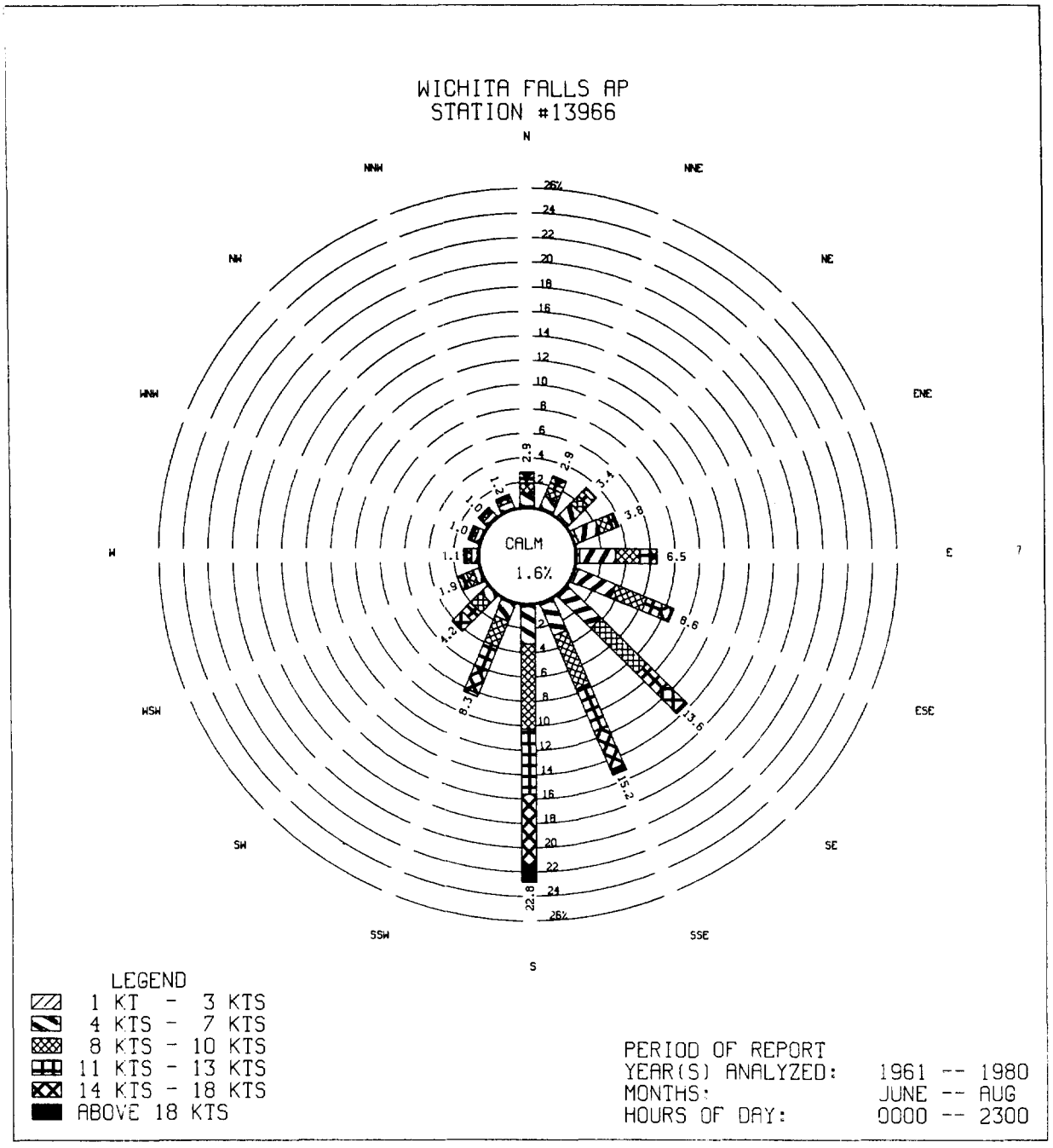

WACO AP
STATION #13959
N
NNW
NNE
NW
NE
WNW
ENE
W
E
WSW
ESE
SW
SE
SSW
SSE
S
CALM
4.6%
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1969 -- 1980
MONTHS: MAR -- MAY
HOURS OF DAY: 0000 -- 2300

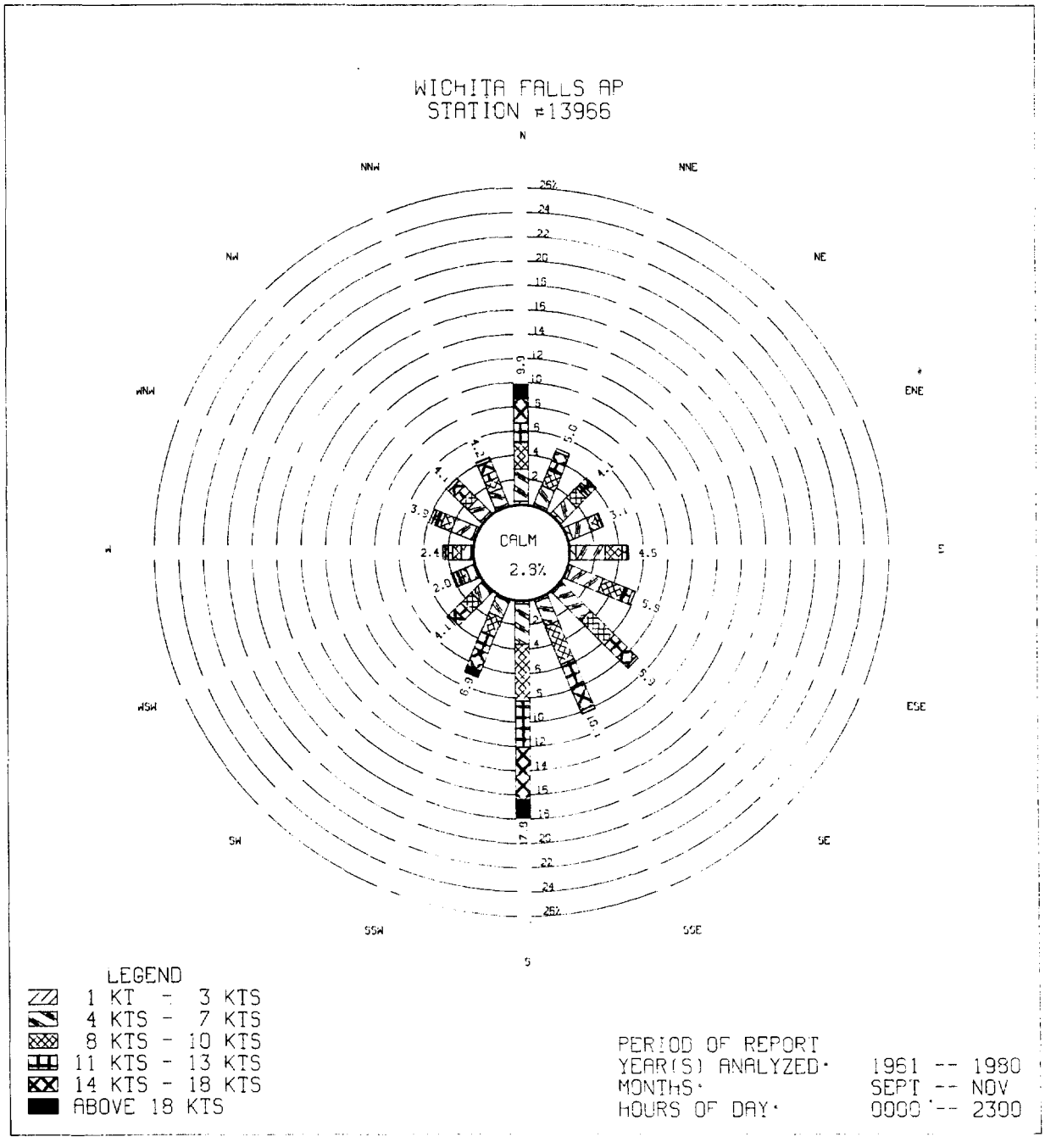

WACO AP
STATION #13959
N
NNW
NNE
NW
NE
WNW
ENE
E
WSW
ESE
SW
SE
SSW
SSE
CALM
7.1%
4.5
4.0
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1969 -- 1980
MONTHS: JUNE -- AUG
HOURS OF DAY: 0000 -- 2300

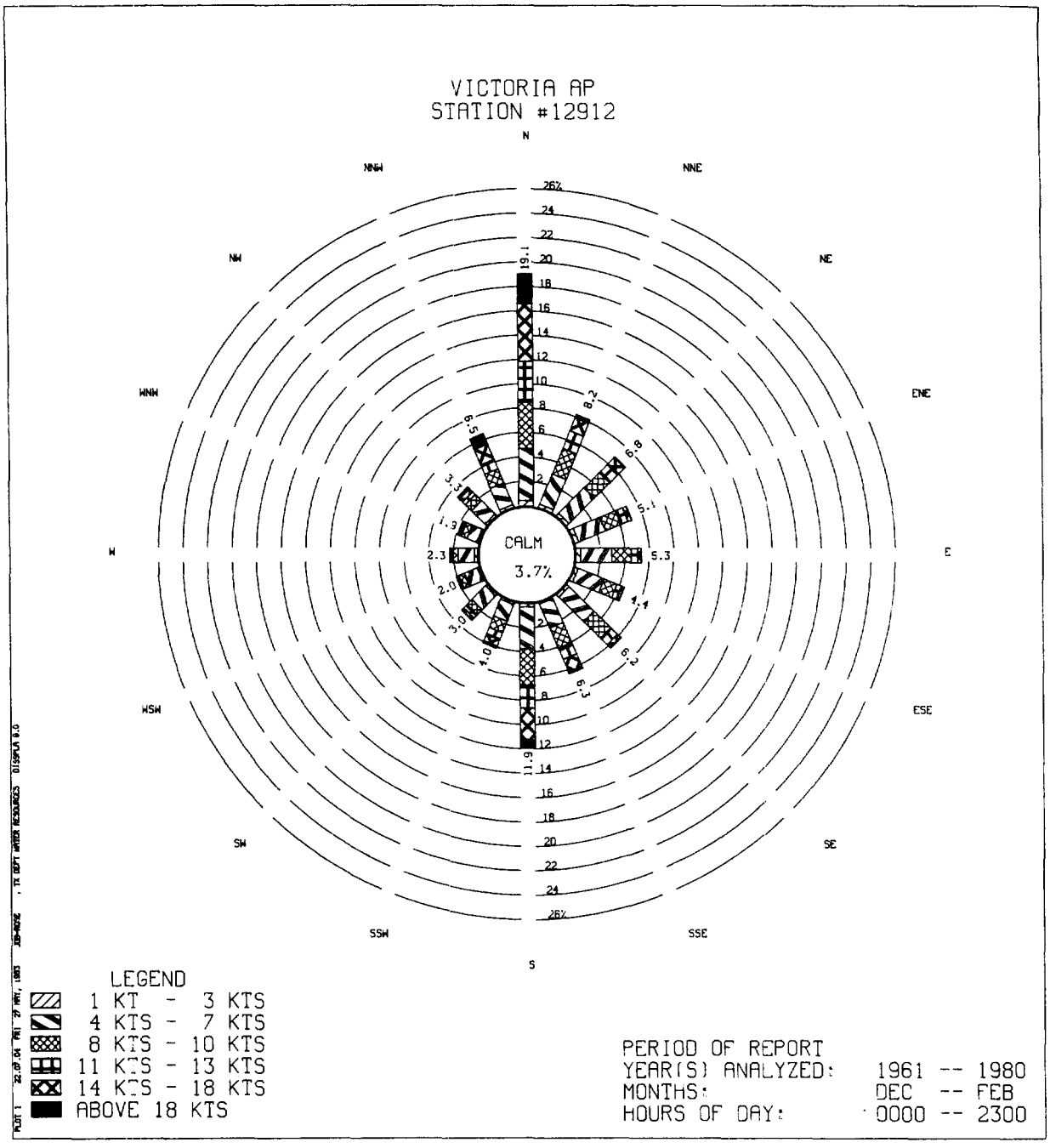

WACO AP
STATION #13959
N
NNW
NNE
NW
NE
WNW
ENE
W
E
WSW
ESE
SW
SE
SSW
SSE
CALM
7.6%
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1963 -- 1980
MONTHS: SEPT -- NOV
HOURS OF DAY: 0000 -- 2300

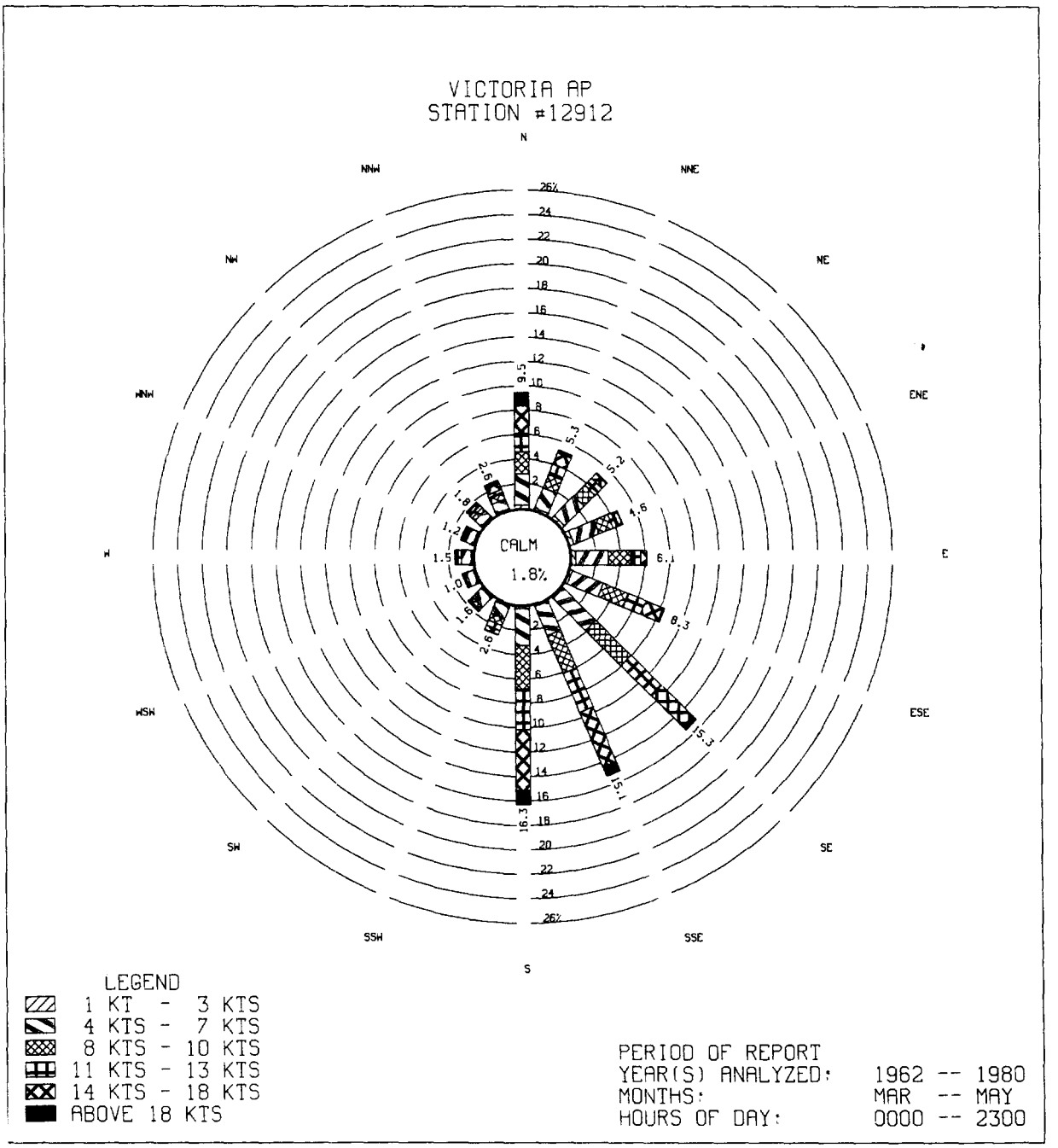

WICHITA FALLS AP
STATION #13966
N
NNW
NNE
NW
NE
WNW
ENE
W
E
WSW
ESE
SW
SE
SSW
SSE
S
CALM
3.1%
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: DEC -- FEB
HOURS OF DAY: 0000 -- 2300

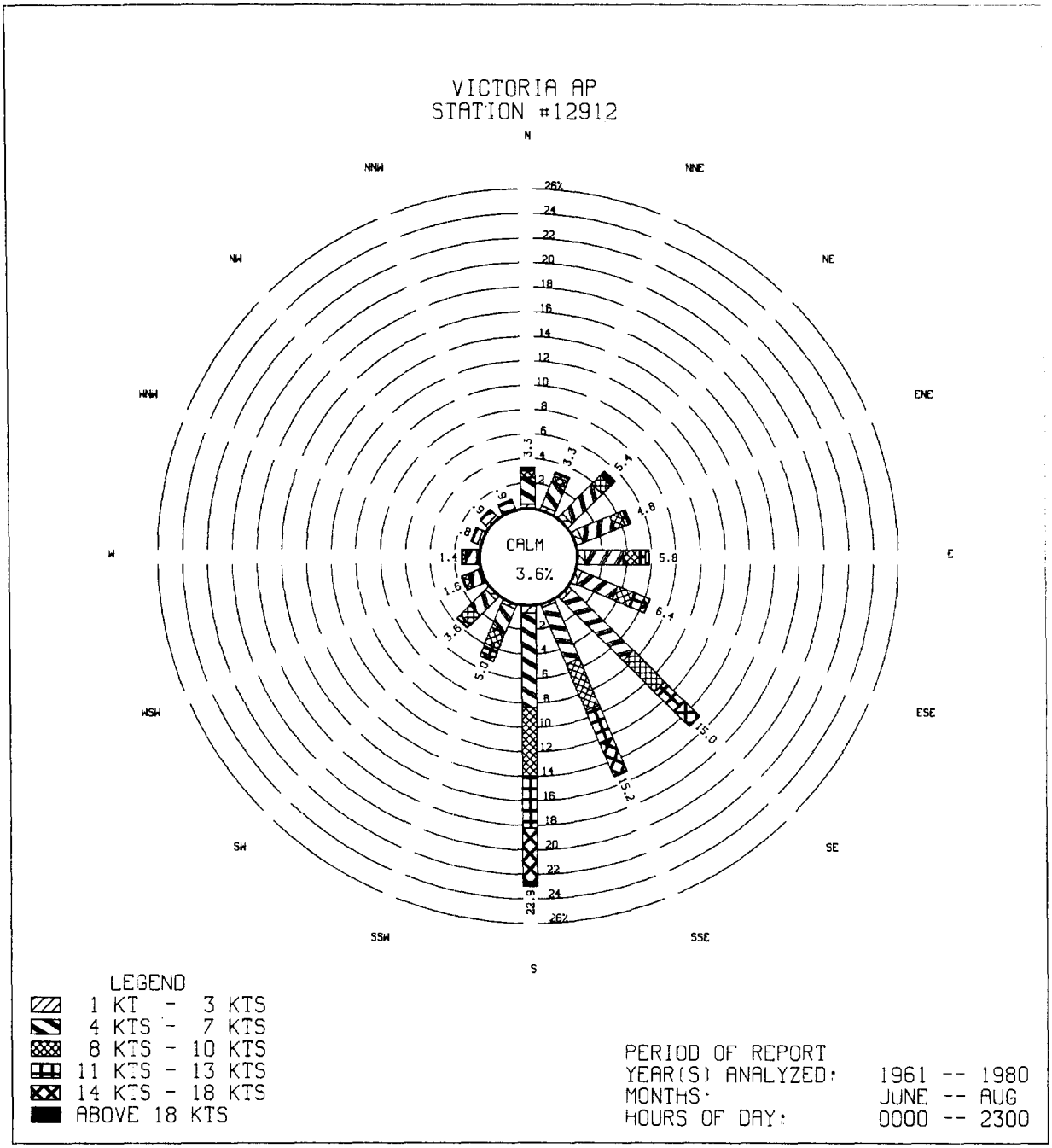

WICHITA FALLS AP
STATION #13966
N
NNW
NNE
NW
NE
WNW
ENE
W
E
WSW
ESE
SW
SE
SSW
SSE
S
25%
24
22
20
18
16
14
12
10
8
6
4
2
CALM
2.1%
9.0
4.1
4.6
3.6
2.7
2.4
3.9
5.9
3.9
3.5
5.2
5.7
10.2
15.5
16.7
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: MAR -- MAY
HOURS OF DAY: 0000 -- 2300

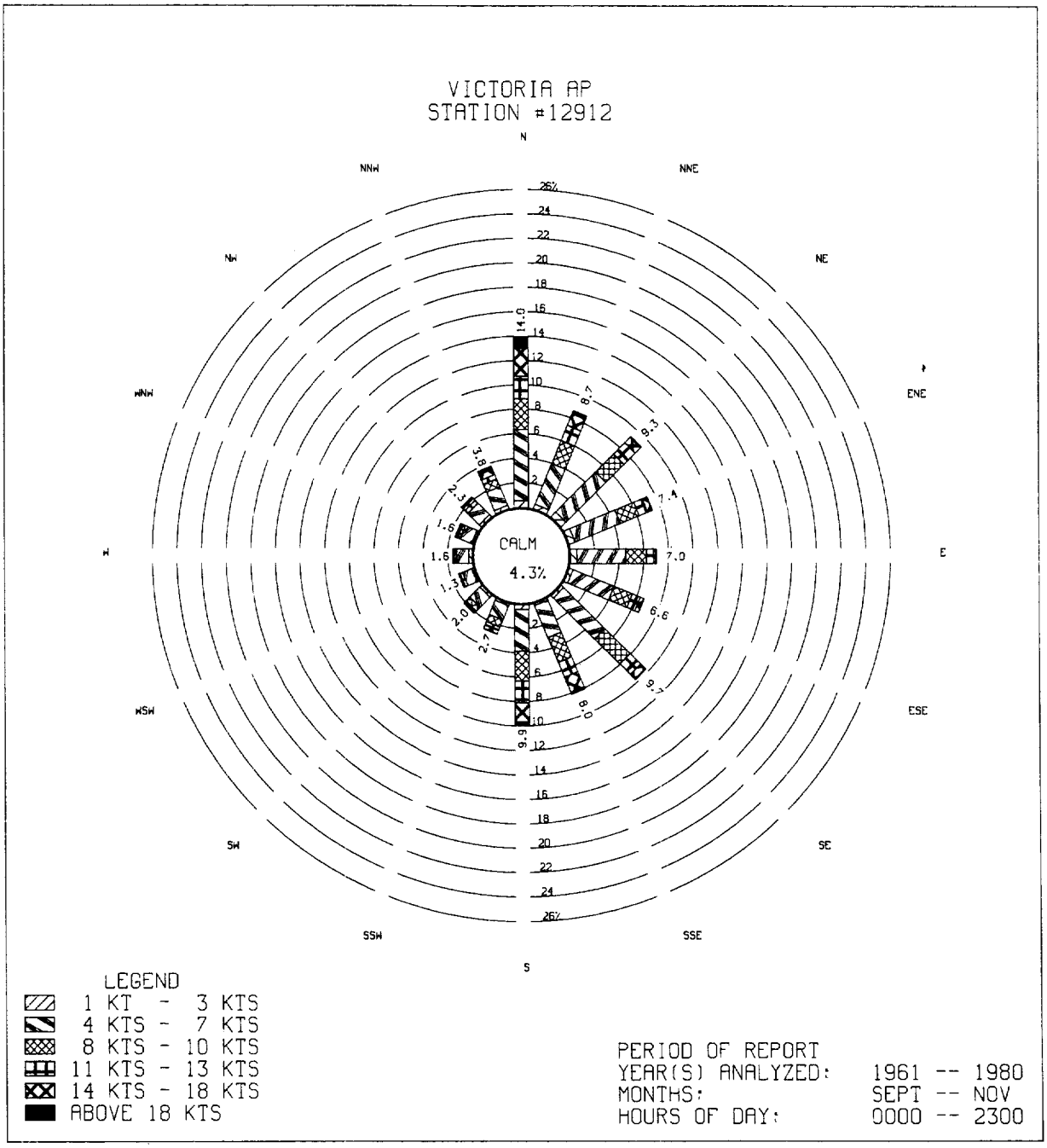

WICHITA FALLS AP
STATION #13966
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
26%
24
22
20
18
16
14
12
10
8
6
4
2
CALM
1.6%
2.9
4
2.9
3.4
3.8
6.5
8.6
13.6
15.2
22.8
1.2
1.0
1.0
1.1
1.9
4.2
8.3
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: JUNE -- AUG
HOURS OF DAY: 0000 -- 2300


WICHITA FALLS AP
STATION #13966
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
CALM
2.8%
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: SEPT -- NOV
HOURS OF DAY: 0000 -- 2300


VICTORIA AP
STATION #12912
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
26%
24
22
20
18
16
14
12
10
8
6
4
2
19.1
8.2
6.8
5.9
5.3
4.4
6.2
6.3
11.9
5.9
3.5
3.0
2.3
2.0
1.3
1.0
CALM
3.7%
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: DEC -- FEB
HOURS OF DAY: 0000 -- 2300


VICTORIA AP
STATION #12912
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
26%
24
22
20
18
16
14
12
10
8
6
4
2
CALM
1.8%
9.5
5.3
5.2
4.6
6.1
6.3
15.3
15.1
16.3
2.6
1.8
1.2
1.5
1.0
1.6
2.6
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1962 -- 1980
MONTHS: MAR -- MAY
HOURS OF DAY: 0000 -- 2300


VICTORIA AP
STATION #12912
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
26%
24
22
20
18
16
14
12
10
8
6
4
2
CALM
3.6%
3.3
3.3
5.4
4.8
5.8
6.4
15.0
15.2
22.9
5.0
3.6
1.6
1.4
.8
.6
.6
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: JUNE -- AUG
HOURS OF DAY: 0000 -- 2300


VICTORIA AP
STATION #12912
N
NNE
NE
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ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
CALM
4.3%
LEGEND
1 KT - 3 KTS
4 KTS - 7 KTS
8 KTS - 10 KTS
11 KTS - 13 KTS
14 KTS - 18 KTS
ABOVE 18 KTS
PERIOD OF REPORT
YEAR(S) ANALYZED: 1961 -- 1980
MONTHS: SEPT -- NOV
HOURS OF DAY: 0000 -- 2300

List of Precipitation (P) and Temperature (T) Reporting Stations

Operated by the National Weather Service

Abernathy	P	Brackettville	P
Ackerly	P	Brady	P & T
Abilene	P & T	Bravo	P
Albany	P & T	Brazos	P
Alice	P & T	Brenham	P & T
Alpine	P & T	Bridgeport	P
Alto	P	Brownfield	P
Alvin	P	Brownsville	P & T
Amarillo	P & T	Brownwood	P & T
Anahuac	P	Buffalo	P
Angleton	P & T	Bulverde	P
Anna	P	Bunker Hill	P
Antelope	P	Burket	P
Archer City	P	Burleson	P
Arlington	P	Burnet	P
Aspermont	P	Cameron	P & T
Athens	P	Camp Wood	P
Atlanta	P	Canadian	P
Austin	P & T	Candelaria	P
Baird	P	Canyon	P & T
Bakersfield	P	Carrollton	P
Ballinger	P & T	Carthage	P
Balmorea	P	Case Ranch	P
Bay City	P & T	Celia	P
Beaumont-Pt. Arthur	P & T	Center	P & T
Bedias	P	Centerville	P & T
Beeville	P & T	Childress	P & T
Benbrook Dam	P	Chisos Basin	P & T
Big Spring	P & T	Cibolo Creek	P
Big Wells	P	Clarendon	P & T
Blanco	P & T	Clarksville	P & T
Blewett	P	Cleburne	P & T
Boerne	P & T	Clodine	P
Bon Wier	P	Coldwater	P
Bonham	P & T	Coleman	P & T
Booker	P	College Station	P & T
Boquillas	P	Columbus	P
Borger	P & T	Comanche	P
Boxelder	P	Conlen	P
Boyd	P	Conroe	P & T

List of Precipitation (P) and Temperature (T) Reporting Stations—Continued

Cooper	P
Cope Ranch	P
Cornudas	P
Corpus Christi	P & T
Corsicana	P & T
Cottonwood	P
Cotulla	P & T
Cresson	P
Crockett	P & T
Crosbyton	P & T
Crowell	P
Crystal City	P & T
Cuero	P
Cypress	P
Daingerfield	P
Dalhart	P & T
Dallas-Fort Worth	P & T
Danevang	P & T
Darrouzett	P
Davilla	P
Dekalb	P
Denison Dam	P & T
Denton	P & T
Dialville	P
Dilley	P & T
Dime Box	P
Dimmitt	P
Doole	P
Dublin	P & T
Dundee	P
Eagle Pass	P & T
Eastland	P
Eden	P & T
Edna	P
Edom	P
Eldorado	P
Electra	P
El Paso	P & T
Emory	P
Encinal	P & T
Ennis	P
Evadale	P
Fairfield	P
Falfurrias	P & T
Falls City	P
Farmersville	P
Ferris	P
Fischers Store	P
Flatonia	P & T
Flomot	P
Floresville	P
Floydada	P
Follett	P & T
Forestburg	P
Forsan	P
Fort Stockton	P & T
Fowlerton	P
Fredericksburg	P & T
Freeport	P
Freer	P
Frost	P
Funk Ranch	P
Gail	P
Gainesville	P & T
Galveston	P & T
Gatesville	P & T
George West	P
Giddings	P
Gilmer	P & T
Girvin	P
Gold	P
Goldthwaite	P
Goliad	P & T
Gonzales	P
Graham	P & T
Grapeville	P
Greenville	P & T
Groveton	P
Gruver	P
Gunter	P
Guthrie	P
Hagansport	P
Hallettsville	P & T
Hamilton	P
Hamlin	P
Harleton	P
Harlingen	P & T
Harper	P
Hartley	P
Haskell	P & T

List of Precipitation (P) and Temperature (T) Reporting Stations—Continued

Hawkins	P
Henderson	P & T
Henrietta	P & T
Hereford	P & T
Hewitt	P
Hico	P & T
Higgins	P
Hillsboro	P & T
Honey Grove	P
Horger	P
Houston	P & T
Hunt	P
Huntsville	P & T
Hye	P
Imperial	P
Indian Gap	P
Jacksboro	P & T
Jasper	P
Jeddo	P
Jefferson	P
Jourdanton	P
Junction	P & T
Karnack	P
Kaufman	P & T
Kennedale	P
Kerrville	P
Kingsville	P & T
Knapp	P
La Grange	P
La Tuna	P & T
Lamesa	P & T
Lampasas	P & T
Laredo	P & T
Lavon Dam	P
Lawn	P
Lenorah	P
Levelland	P & T
Liberty	P & T
Linden	P
Lipan	P
Lipscomb	P
Littlefield	P
Livingston	P & T
Llano	P & T
Lockhart	P
Long Lake	P
Longview	P
Loop	P
Lorenzo	P
Lubbock	P & T
Lufkin	P & T
Luling	P & T
Madisonville	P & T
Marathon	P
Marlin	P & T
Marshall	P & T
Mason	P
Matador	P & T
Matagorda	P & T
Maud	P
McAllen	P & T
McCamey	P
McCook	P & T
McGregor	P
McKinney	P & T
Memphis	P & T
Menard	P
Mercedes	P
Mertzon	P
Mexia	P & T
Miami	P & T
Midland-Odessa	P & T
Mineola	P
Mineral Wells	P & T
Mission	P & T
Morgan Hill	P
Morse	P
Morton	P
Mount Locke	P & T
Mount Pleasant	P & T
Muenster	P
Muleshoe	P & T
Mullin	P
Munday	P & T
Naples	P
Negley	P
Nelson Ranch	P
New Braunfels	P & T
New Caney	P
New Gulf	P & T

List of Precipitation (P) and Temperature (T) Reporting Stations—Continued

Newport	P
Nix Store	P
Nixon	P & T
Northfield	P
Notla	P
Olney	P
Orange	P
Overton	P
Ozona	P
Paducah	P
Paint Rock	P
Palacios	P & T
Palestine	P & T
Palo Pinto	P
Pampa	P
Pandale	P
Panhandle	P
Paris	P & T
Pearsall	P
Pecos	P & T
Perryton	P
Pierce	P & T
Pilot Point	P
Pittsburg	P
Plains	P & T
Plainview	P & T
Port Lavaca	P & T
Port O'Connor	P & T
Post	P
Poteet	P & T
Presidio	P & T
Putnam	P
Quanah	P & T
Quitman	P
Rainbow	P
Raymondville	P & T
Red Bluff Crossing	P
Red Bluff Dam	P
Refugio	P
Richardson	P
Richland Springs	P
Richmond	P
Ringgold	P
Rio Grande City	P & T
Riomedina	P
Rising Star	P & T
Roanoke	P
Robert Lee	P
Robston	P
Rockland	P
Rockwall	P
Roscoe	P & T
Rosser	P
Rotan	P
Round Mountain	P
Runge	P
Rusk	P & T
Sabinal	P
San Angelo	P & T
San Antonio	P & T
San Marcos	P & T
San Saba	P
Sanderson	P
Sarita	P
Schulenburg	P
Seminole	P & T
Seymour	P & T
Shamrock	P
Sherman	P & T
Silverton	P
Sinton	P
Slaton	P
Slidell	P
Snyder	P & T
Sonora	P & T
Spearman	P & T
Stamford	P
Sterling City	P
Stratford	P & T
Strawn	P
Sugar Land	P & T
Sulphur Springs	P & T
Tahoka	P
Tampico	P
Tascosa	P
Taylor	P & T
Teague Ranch	P
Temple	P & T
Terrell	P
Thorton	P

List of Precipitation (P) and Temperature (T) Reporting Stations—Continued

Three Rivers	P	Waller	P
Throckmorton	P & T	Warren	P
Thurber	P	Washington	P
Tomball	P	Water Valley	P
Trent	P	Waxahachie	P & T
Trenton	P	Weatherford	P & T
Troy	P	Wellington	P
Tulia	P & T	Weslaco	P & T
Tyler	P	Wharton	P
Umbarger	P	Whitney Dam	P & T
Uvalde	P & T	Wichita Falls	P & T
Valentine	P	Wills Point	P & T
Valley View	P	Wink	P & T
Van Horn	P	Winnsboro	P
Vega	P & T	Winters	P
Vernon	P & T	Wolfe City	P
Victoria	P & T	Yoakum	P & T
Voss	P & T	Yorktown	P
Waco	P & T	Ysleta	P & T

List of Evaporation Reporting Stations

Texas Department of Water Resources

Amarillo
Angleton
Big Spring
Brownsville
Buchanan Dam
Chillicothe
College Station
Iowa Park
Ingram
Lake Bastrop
Lake Houston
Lake Tawakoni
Lake Travis
Lubbock
Montague
Nacogdoches
Oak Creek
Overton
Pecos
Possum Kingdom Dam
Prairie View
Riesel
Sonora
Spur
Stephenville
Sulphur Springs
Toledo Bend Dam
Wesley Seale Dam
Yoakum
Ysleta (TDWR)
Wirtz Dam
Conroe
Coffield
Renner
Greenbelt
Uvalde
Lake J.B. Thomas
Stanton
Throckmorton
Weslaco
Eagle Lake
Lake Livingston
Braunig Lake
Medina Lake (discontinued in 1982)
Lake Fork

National Weather Service

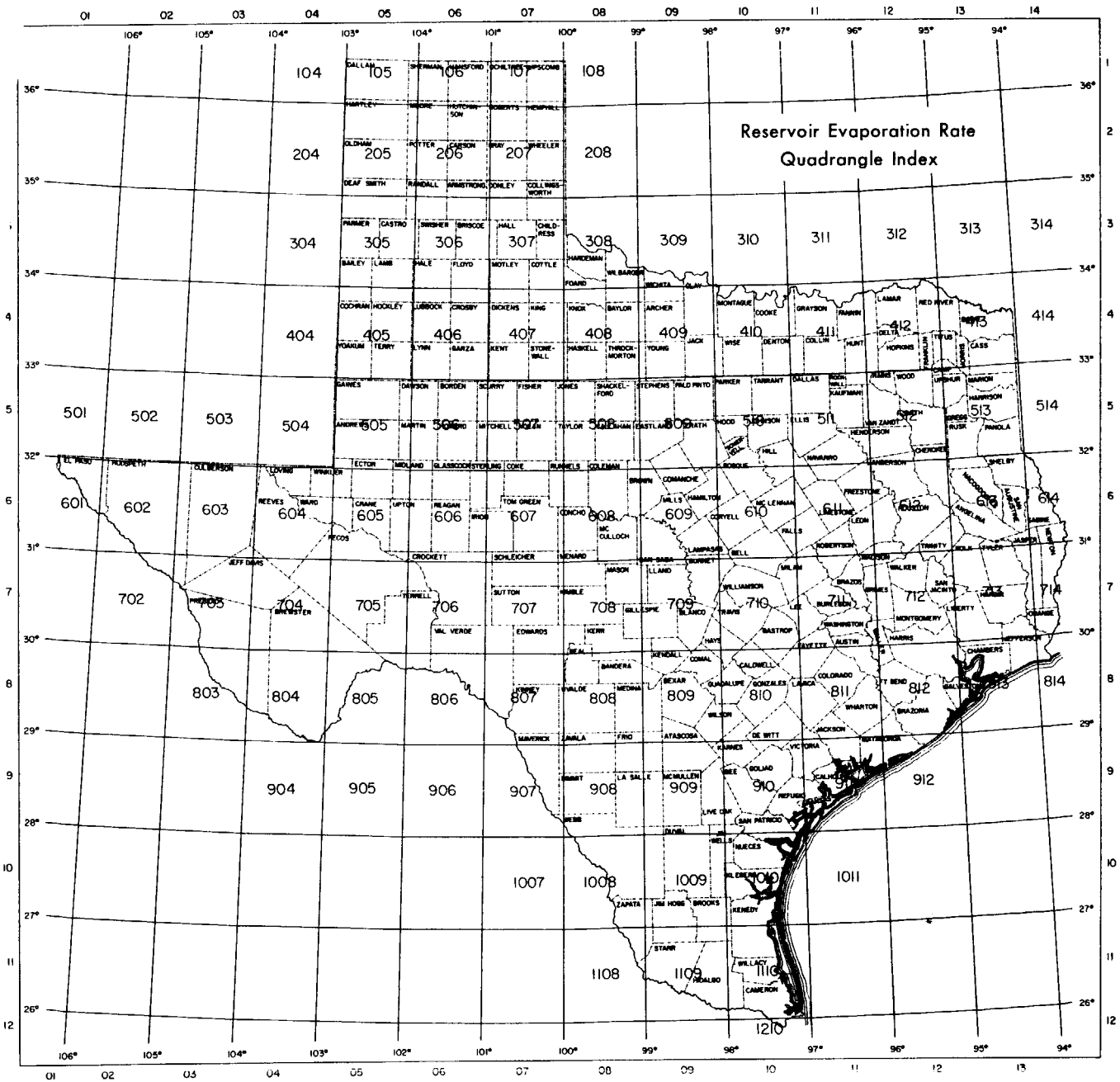
Hords Creek Dam
Lake Kemp
Bardwell Dam
Belton Dam
Benbrook Dam
Denison Dam
Georgetown Lake
Granger Dam
Grapevine Dam
Lavon Dam
Navarro Mills Dam
Proctor Reservoir
Stillhouse Hollow Dam
Waco Dam
Daingerfield 9S
Sam Rayburn Dam
Town Bluff Dam
Wright Patman D&L
Mount Locke
Red Bluff Dam
Ysleta (NWS)
Amistad Dam (NWS)
O. C. Fisher Dam
Austin WSO AP
Beeville 5 NE
Canyon Dam
Somerville Dam
Beaumont Research CTR
Point Comfort
Thompsons 3 WSW
Dilley
Rio Grande City 3W
McCook
Weslaco 2E

United States

Amistad Dam, Texas
Falcon Dam, Texas

Mexico (prior to 1980)

Ojinaga, Chihuahua
Acuna, Coahuila
La Amistad, Coahuila
Jimenez, Coahuila
Hidalgo, Coahuila
Nuevo Laredo, Tamaulipas
Nueva Cd. Guerrero, Tamaulipas
Mier, Tamaulipas
Retamal, Tamaulipas


Reservoir Evaporation Rate
Quadrangle Index