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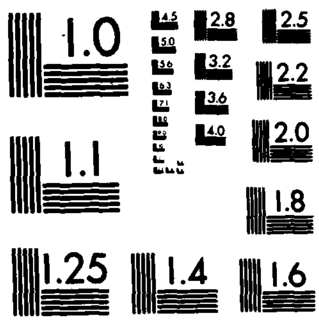
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TERMINAL FORECAST REFERENCE NOTEBOOK

FOR

GRAFENWOEHR AAF, FRG

APPROVED FOR PUBLIC RELEASE:
DISTRIBUTION UNLIMITED

PUBLISHED BY
DETACHMENT 7
7TH WEATHER SQUADRON
2ND WEATHER WING (MAC)
UNITED STATES AIR FORCE
1 OCTOBER 1982

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TERMINAL FORECAST REFERENCE NOTEBOOK

GRAFENWOEHR AAF, FRG

17 JUNE 1981

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SECTION 1

LOCATION AND TOPOGRAPHY

LOCATION AND TOPOGRAPHY

Grafenwoehr Army Airfield (49°42'N 11°57'E, elev 1362ft), located in the gently rolling hills of the Oberpfalz region of northern Bavaria, lies approximately 22 nautical miles west of the Czechoslovakian border, 10 nautical miles west of Weiden, and 38 nautical miles northeast of Nuernberg. Vilseck AAF (8 nautical miles to the southwest, 49°36'N 11°48'E, elev 1353ft) and Hohenfels AAF (29 nautucal miles to the SSW, 49°13'N 11°50'E), are auxiliaries to Grafenwoehr and experience similar weather (See Figure 1-1)

The topography surrounding the airfield consist of hills, shallow valleys, small lakes and streams, heavily wooded sections and cultivated farmland. The Czechoslovakian-German border to the northeast, east and southeast is prominent, having a rugged appearance and elevations to 4815ft MSL. The Fraenkischer Jura range of hills (oriented N-S) lies 15 nautical miles west of Grafenwoehr and have elevations to 2600ft MSL. These hills also divide drainage of the area. Drainage of the eastern slopes (Grafenwoehr, Vilseck and Hohenfels) is southward to the Donau (Danube) River while the western slopes drain westward to the Main River.

Topography affects the local weather in several ways. The extreme eastern location of the airfield, with respect to the rest of Germany, causes continental airmasses to prevail more often than at those stations in the western portion of Germany. Fog formation is enhanced by an abundance of small streams, lakes and condensation nuclei (very fine dust particles). The nuclei are created, under dry conditions, from the magnitude of vehicle activity within the Grafenwoehr Training Area. As Figure 1-1 shows, the airfield is situated in the lowest portion of the surrounding 25 mile area. When a weak gradient exists, a drainage flow develops. This causes cooler temperatures, adding to the high incidence of radiation fog. The ridge line to the west prevents the airfield from experiencing strong surface winds, when a strong southerly to westerly gradient flow exists. But, the range can cause a significant cross wind component when this condition prevails. The Roter Main valley causes northwesterly to northerly flow to produce the strongest winds. Upslope motion develops in southerly to westerly flow, while downslope motion occurs with northerly to easterly flow. The terrain has little effect on southeasterly and northwesterly flow.

Figure 1-2 depicts the meteorological instrumentation of the airfield. The airfield buildings are within 1000 ft of the wind sensor. This affects the measurement of winds from the SSW through WSW. But, those same buildings act as a buffer to the touch down point of the primary runway. Therefore, the position of the sensor probably gives a true representation of wind conditions near the touchdown point.

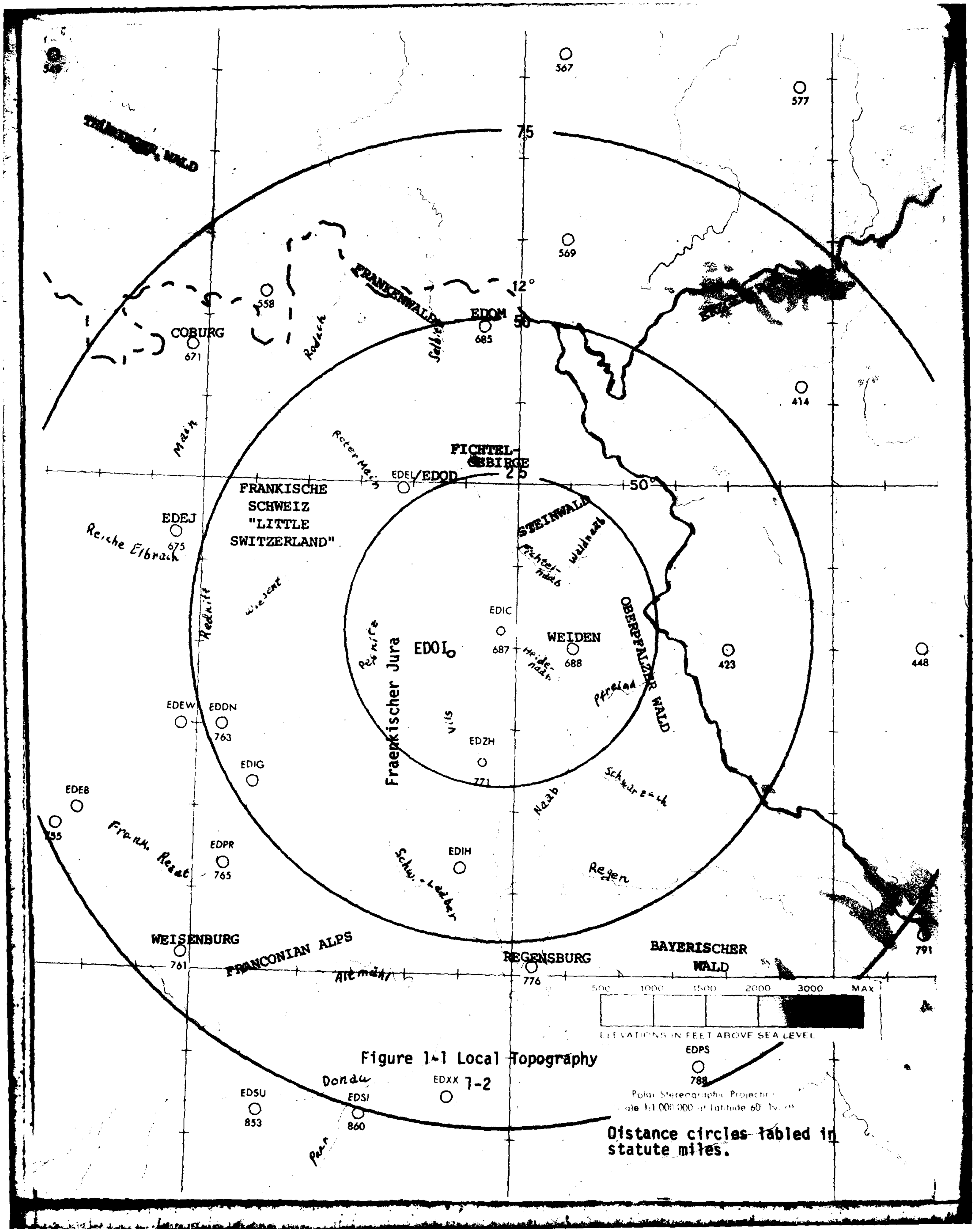


Figure 1-1 Local Topography

Distance circles labled in statute miles.

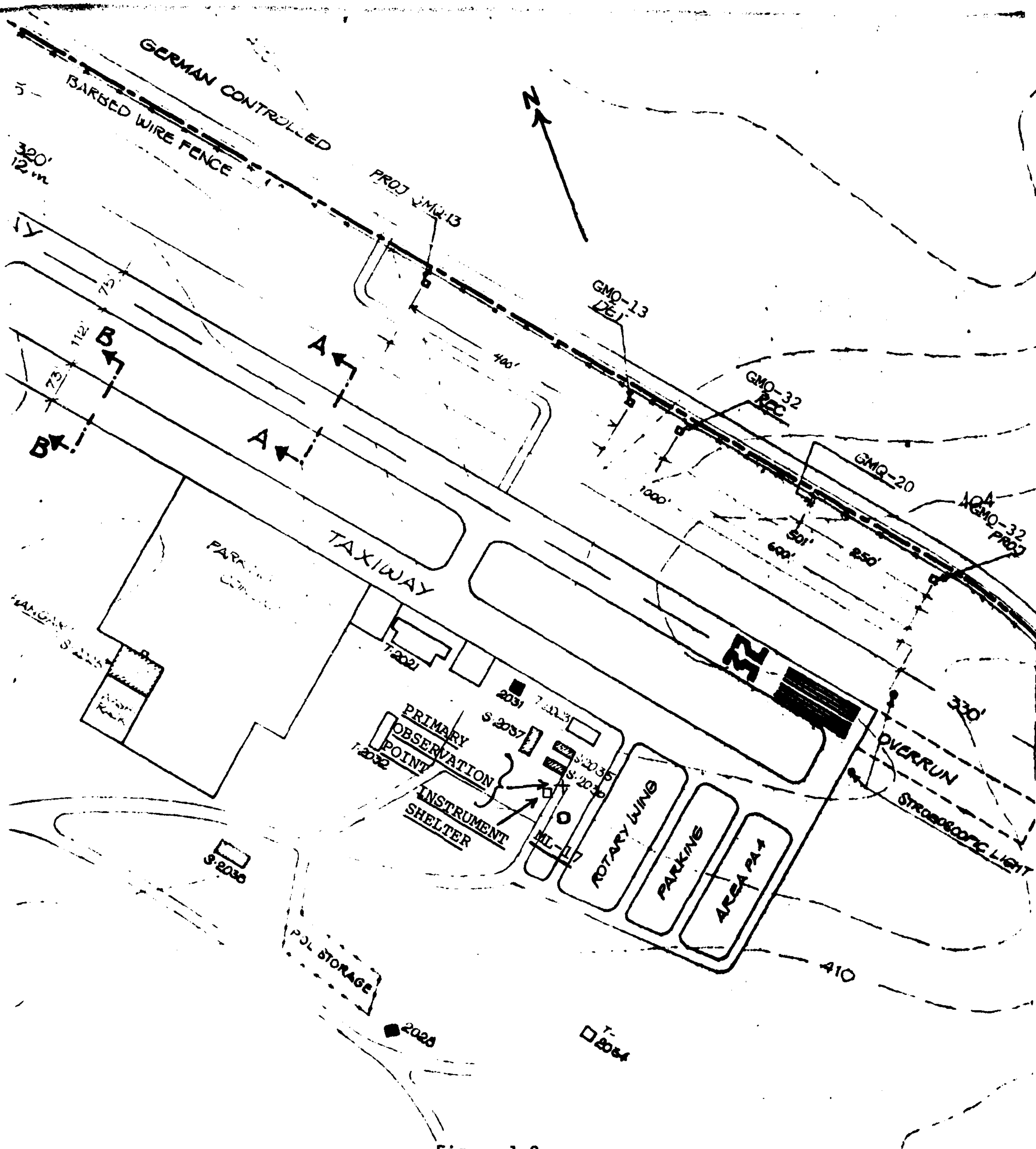


Figure 1-2
METEOROLOGICAL INSTRUMENTATION

SECTION 2

CLIMATIC AIDS

CLIMATIC AIDS

OPERATIONALLY CRITICAL WEATHER ELEMENTS: Table 2-1 lists those elements which affect operations at Grafenwoehr. In most situations, the customer's complex mission and the experience of the individual tasked to complete a specific operation prevent listing one specific threshold value. Our customer expects us to make forecasts of various meteorological elements so the operator can make a logical go/no go decision. Ceiling, visibility, and icing are the critical elements which occur the most often. Generally, an observed ceiling of less than 1000 ft at Grafenwoehr will indicate ceilings are zero in the higher terrain surrounding Grafenwoehr.

LOCALLY AVAILABLE AIDS: The various indexes identify those AWS and 2 WW publications available within the detachment. In addition, the following are available:

a. Baur Type Catalog

b. European Weather as it Affects Army Aviation

c. Index of Caramate Programs

d. Upslope/Lee Effect Charts

e. USAREUR and 7th Army, Civil Twilight Tables

f. USAREUR and 7th Amry, Nautical Twilight Tables

g. USAREUR and 7th Amry, Sunrise/Sunset Tables

h. RUSSWO

i. State of the Ground Summary

j. Trappenberg Study

k. Wind Stratified Conditional Climatology (Percent Frequency of Specified Weather Categories). Three different sets are available. One is for the standard TAF catagories; the second is for conditions less than 500/1/2 or equal to or greater than 500/1/2; and the third is for conditions less than 1000/2.7 or equal to or greater than 1000/2.7.

CLIMATIC BRIEF: The AWS Climatic Brief shown in table 2-2is an updated extract of the Grafenwoehr brief listed in USAFETAC/DS-791090. The extreme maximum and minimum temperatures; maximum 24 hour precipitation and snowfall; and extreme wind speed values are the updated quantities.

TABLE 2-1

OPERATIONALLY CRITICAL WEATHER ELEMENTS

1. AIRCRAFT OPERATIONS

	WX ELEMENT	VALUE	IMPACT
A. UH-1	Thunderstorms	Flight prohibited into thunderstorms	
	Turbulence	$\geq$MDT	Restricts Operations
	Icing	$\geq$LGT	Restricts Operations
	Sustained SFC Wind	30KTS	Restricts Starts
	Gust Spread	$\geq$15KTS	Restricts Starts
	Tail Wind	30kts	Restricts Starts
	Cross Wind	35KTS	Restricts Hovers
	Ceiling	500ft	IFR Only
	Visibility	0.5NM (Day)	IFR Only
		1.0NM (Night)	IFR Only
B. U-21	Thunderstorms	Flight prohibited into thunderstorms	
	Turbulence	$\geq$MDT	Restricts Operations
	Icing	LGT	(4)
	Sustained SFC wind	(1)	(1)
	Cross Wind	(2)	Restricts Operations
	Ceiling	(3)	(3)
	Visibility	(3)	(3)
	Low Level Wind Shear	Variable	(4,5)

2. GROUND OPERATIONS

	WX ELEMENT	VALUE	IMPACT
	Thunderstorms	Munition issue and firing stops	
	Wind	$\geq$30KTS	Firing Stops
	Temperature	$\geq$29°C(85°F)	Firing Stops

3. GROUND OPERATIONS

	WX ELEMENT	VALUE	IMPACT
	Lightning	Within 5NM	Refueling Stops
	Crosswind	(2)	Restricts Operations

NOTES: (1) Limitations for the U-21 vary according to the experience level of the pilot and other factors such as airspeed, runway length, etc. It is not possible to list all combinations.

(2) No specific value can be stated because other factors must be considered besides wind velocity and runway heading. By agreement, our customer is interested in a forecast of crosswinds which equal or exceed 25kts.

(3) Ceilings and visibility limitations are listed in DOD FLIPs. Again the experience level of the pilot is the determining factor as to which value will apply.

(4) Light or greater can severely restrict operating altitude. Flight decision varies with severity.

(5) Pilot experience and severity are important factors of consideration.

4. LOCAL POINT WARNING CRITERIA: Weather warning criteria are in accordance with USAREUR Reg 115-2 and include:

a. Tornadoes

b. Surface Winds: 50 knots or greater.

c. Surface winds: equal or greater to 35 knots but less than 50 knots.

d. Hail: 3/4 inch or greater.

e. Hail: Equal or greater than 1/4 inch but less than 3/4 inch.

f. Freezing Precipitation.

g. Snow: 6 inches or more within 12 hours.

h. Snow: equal or greater that 2 inches but less than 6 inches within 12 hours.

i. Rain: equal or greater than 2 inches within 12 hours.

j. Temperature: Ø°F (-18°C) or less.

TABLE 2-2

AWS CLIMATIC BRIEF — Prepared by ETAC (MAR 1972)

GRAFENWOEHR AAF, GERMANY — N 49 42 E 11 57 — PERIOD: 1959-70 — FIELD ELEVATION: 1360 ft — WBAN # 34189 — WMO # 10687 — STN LTRS: EDIC

MONTH	TEMPERATURE (°F) Extreme Maximum *	Mean Daily Maximum	Mean Daily Minimum	Extreme Minimum *	PRECIPITATION (in) Mean Total	Maximum in 24 Hours *	Mean Snowfall	Max Snowfall in 24 Hours *	WIND (KT) Prevailing Direction [1]	Mean Speed	Extreme (Peak) * (Gust) Speed	MEAN Relative Humidity (%) 0400	Relative Humidity (%) 1300	Dew Point (°F)	Vapor Pressure (in Hg)	Pressure Altitude 99.95% (feet)	MEAN NUMBER OF DAYS Precip ≥ 0.01	Precip ≥ 0.5	Snowfall ≥ 0.1	Snowfall ≥ 1.5	Thunderstorms	Fog (< 7 miles)	Temperature (°F) Maximum ≥ 90	Maximum ≥ 80	Minimum ≤ 32	Minimum ≤ 0	Mean Clouds (Tenths)
JAN	51	31	20	-18	1.8	1.3	11	7	W	4	46	89	83	23	.12	2200	14	1	10	2	#	24	0	0	28	3	8
FEB	60	36	23	-18	2.1	1.3	9	10	W	5	67	89	80	26	.14	2350	14	1	10	2	#	20	0	0	21	2	8
MAR	74	43	27	-7	2.2	3.1	8	6	W	6	58	89	72	30	.17	2200	14	1	7	2	#	22	0	0	21	1	7
APR	84	54	36	16	2.2	1.5	2	4	W	5	40	90	62	37	.22	2100	14	1	3	#	2	21	0	#	10	0	7
MAY	88	63	43	23	2.1	1.6	#	1	W	5	50	91	59	44	.29	1850	14	1	#	0	3	22	0	1	2	0	7
JUN	94	70	49	29	3.4	1.5	0	0	W	5	43	91	56	50	.36	1700	15	2	0	0	7	20	#	5	0	0	7
JUL	94	73	51	34	3.0	3.5	0	0	W	4	58	92	56	52	.39	1750	13	2	0	0	6	24	1	8	0	0	6
AUG	91	70	50	32	2.5	1.9	0	0	W	4	37	92	62	52	.39	1750	14	1	0	0	4	24	1	4	0	0	7
SEP	88	65	45	27	2.3	1.2	0	0	W	4	41	94	63	48	.34	1800	13	1	0	0	2	25	0	1	2	0	6
OCT	79	57	38	14	1.4	1.2	#	1	W	4	44	94	70	42	.27	1950	10	#	#	0	#	27	0	0	8	0	7
NOV	65	43	33	3	2.0	0.9	3	7	W	4	48	91	80	34	.20	2200	15	1	4	#	#	25	0	0	16	0	8
DEC	54	32	23	-18	2.3	1.0	9	6	W	4	56	90	85	25	.14	2400	14	1	10	2	0	24	0	0	26	2	8
ANN	94	53	36	-18	27.3	35	42	10	W	5	67	91	69	39	.24	2050	164	13	44	8	24	278	2	19	134	8	7
EYR	9	9	9	9	9	9	9	9	12	12	9	12	12	12	12	11	9	9	9	9	9	9	9	9	9	9	12

REMARKS:

* UPDATED THROUGH MAR 1981

[1] EAST, SEP THRU JUN, IS SIGNIFICANT AS A SECONDARY PREVAILING DIRECTION FOR ITS FREQUENT OCCURRENCE.

RUSSWO POR: HOURLY OBS: 5901-7012; DAILY OBS: 6206-7012.

NOTE: *DATA NOT AVAILABLE. #LESS THAN 0.5 DAY, 0.5 OR 0.05 INCH, OR 0.5 PERCENT (%) AS APPLICABLE.

FLYING WEATHER (% FREQ)	HOURS (LST)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	EYR
CIG less than 3000 feet and/or VSBY less than 3 miles	00-02	79	66	50	33	26	17	15	22	38	57	62	72	45	9
	03-05	79	70	60	48	41	35	40	41	57	66	66	72	56	11
	06-08	79	74	72	54	46	36	43	50	64	74	73	75	62	12
	09-11	78	72	64	46	35	28	29	37	45	61	68	78	53	12
	12-14	69	63	53	37	29	23	23	30	26	41	57	73	44	12
	15-17	64	53	46	27	19	18	14	18	16	31	52	69	36	12
	18-20	71	60	44	21	15	14	9	12	15	33	55	72	35	12
	21-23	77	65	45	22	18	11	9	14	19	43	57	72	38	9
	ALL HOURS	74	65	55	37	29	23	23	29	35	51	62	73	46	
CIG less than 1500 feet and/or VSBY less than 3 miles	00-02	71	54	40	23	18	13	12	17	34	48	49	59	37	9
	03-05	71	58	48	38	35	30	33	36	51	58	55	60	48	11
	06-08	69	62	61	46	36	28	35	43	59	66	62	64	53	12
	09-11	69	61	49	25	17	11	12	22	34	50	55	69	40	12
	12-14	55	43	28	12	7	6	4	9	11	26	41	60	25	12
	15-17	52	36	22	9	5	5	3	7	7	18	38	57	22	12
	18-20	62	47	27	11	7	5	3	5	9	23	41	59	25	12
	21-23	67	53	34	14	10	8	5	9	15	34	44	60	29	9
	ALL HOURS	64	52	39	22	17	13	13	19	28	40	48	61	34	
CIG less than 1000 feet and/or VSBY less than 2 miles	00-02	46	28	22	12	11	7	6	8	21	33	32	36	22	9
	03-05	43	33	27	23	22	20	20	23	38	42	38	36	30	11
	06-08	46	43	39	28	22	17	17	28	46	50	40	40	35	12
	09-11	47	42	27	12	7	4	4	10	17	35	38	46	24	12
	12-14	36	28	13	4	3	3	2	3	5	13	25	37	14	12
	15-17	33	22	11	2	2	2	2	2	4	8	24	36	12	12
	18-20	40	23	13	3	3	2	1	2	4	13	25	37	14	12
	21-23	45	26	15	5	4	4	2	3	7	20	28	38	16	9
	ALL HOURS	42	31	21	11	9	7	7	10	18	27	31	38	21	
CIG less than 200 feet and/or VSBY less than ½ mile	00-02	4	5	4	3	4	2	2	3	12	16	8	6	6	9
	03-05	6	6	5	7	10	8	7	9	22	21	9	7	10	11
	06-08	6	12	10	7	7	6	4	10	23	24	9	6	10	12
	09-11	6	9	4	1	#	#	#	#	5	10	7	5	4	12
	12-14	3	3	#	0	0	#	0	0	0	1	2	2	1	12
	15-17	2	2	#	0	0	0	0	0	#	#	2	2	1	12
	18-20	4	3	1	0	0	0	0	0	1	2	5	3	2	12
	21-23	7	5	3	1	1	1	#	#	3	8	6	5	3	9
	ALL HOURS	5	6	3	2	3	2	2	3	8	10	6	5	4	

AWS FORM NOV 67 62

SECTION 3

APPROVED LOCAL FORECAST STUDIES

APPROVED LOCAL FORECAST STUDIES

INTRODUCTION: Forecast studies and rules of thumb (ROT) provide objective methods of forecasting specific operational meteorological values or elements. Before a study or ROT can be used it must be evaluated. When you evaluate a study or ROT make two parallel forecasts. The first forecast is made without using the study/ROT and the second is the objective forecast derived from the study/ROT. The results are then subjected to tests of statistical significance. Using this procedure, one year of data is usually sufficient to determine whether or not a study/ROT should be used routinely. If you are not familiar with statistical significance tests, seek assistance from 7WS/DON.

APPROVED STUDIES: There are no approved studies for Grafenwoehr.

RULES OF THUMB: There are no established rules of thumb for Grafenwoehr.

FORECASTING HINTS: A notebook of forecasting hints and memos is maintained in the forecast section. The 2 WW Scientific Services Office routinely publishes selected articles. These hints form the basis of the forecasting hints notebook.

SECTION 4

WEATHER CONTROLS

WEATHER CONTROLS

INTRODUCTION: Table 4-1 graphically portrays the primary forecasting problems, by month, which one encounters while forecasting at Grafenwoehr. The primary macroscale features which influence the European regime are the Azores High, Icelandic Low, and the Siberian High. Figures 4-1, 4-2, and 4-3 depict their respective positions and the typical characterics of each, while figures 4-4 and 4-5 depict the mean seasonal paths of migratory cyclones and anticyclones. Before one can fully understand the complexity of the European regime a definition of the short wave trough is necessary.

SHORT WAVE TROUGH: The following example defines the short wave trough: Consider the typical winter situation represented in figure 4-6. Frequently, a synoptic scale low breaks out of the Icelandic low and moves along one of the cyclone tracks depicted in figure 4-4. This low is associated with a well defined, synoptic scale wave, clearly identifiable at all levels through at least 500MB. This pattern, although a short wave, is not the short wave under discussion, as it can easily be tracked in upper analyses and machine progs. The scales of motion are depicted in figure 4-7. Most of the short waves will be surface features, but some will have sufficient depth to extend to a routine analysis level. These deep waves can be identified on the gradient and 850MB charts by wind shifts or velocity maxima. To identify short waves, analyze surface isobaric patterns at 1 to 2mb intervals and then analyze gradient level flow lines, 850MB level flow lines, and isotherms to locate which troughs are vertically deep. These short wave troughs have a wave length varying from a few to several hundred kilometers. The frequency of passage at a given point varies from 90 minutes to 9 to 12 hours. The shorter the wave, the more rapidly it travels, and the less the impact upon the weather. The 90 minute waves may merely increase cloudiness and produce short periods of precipitation, while the 9 to 12 hours waves may bring significant deterioration of sensible weather. On the 90 minute end of the scale, every third or fourth wave may be detectable at the gradient level, while at the 9 to 12 hour end, they are likely to be detectable through 850MB. The waves detectable at gradient and 850MB levels are important to identify and prog because the associated weather is much more significant than that with the intervening shallow waves.

THE SIBERIAN HIGH: The Siberian High extends westward into Europe several times during the average winter. The associated cold front usually pushes through the FRG from NE to SW to become stationary in central France. This southwestward movement is the prime reason the Siberian High is a significant forecast problem. One must overcome the traditional west to east movement of frontal systems and be aware of those situations which would produce the east to west movement of CP airmasses. This nearly always occurs in conjunction with a blocking (Omega) high at 500MB off the French coast and a deep cold core low at 500MB over western Russia. The situation presists until the block breaks down, usually 7 to 10 days. Surface isotherms pack at the frontal boundary, but the leading edge of the front is too shallow to analyze at 850MB. You can find the frontal inversion on a Skew-T usually between 500 and 1200 feet (see figure 4-8). The front moves into the FRG as a persistent cold easterly wind. Often the CP airmass will become deep enough (3000 feet) in this area to prevent the persistent stratus usually associated with the more shallow portions of the airmass (1200 feet). With this deep situation, Grafenwoehr can expect dense radiation fog near sunrise which will produce freezing fog in the more colder airmasses. When the long wave pattern begins to shift, the High will recede eastward as a warm front. As the High begins to recede the depth of the airmass becomes more shallow in this area. Stratus and/or dense fog will persist until the warm front passes.

PERSISTENT STRATUS: Figure 4-9 shows a typical persistent stratus situation. Breakup of the situation occurs with frontal passage and sometimes with short wave passage. Passage of a short wave may only improve conditions for 2-3 hours.

FOG: A recognized problem in central Germany and at Grafenwoehr is the determination of the fog formation mechanism. The two most prevalent mechanisms are upslope and radiation.

a. Upslope fog/stratus requires a surface inversion several hundred feet deep, moist air within this layer, and a proper wind direction. The GMGO Upslope and Lee Effect maps provide the proper wind direction for Grafenwoehr, generally south through west. Gradient winds in excess of 20kts will create stratus formation rather than fog formation.

b. Radiation fog formation occurs almost daily near sunrise, when Grafenwoehr is under the influence of weak gradient flow. The abundance of moisture sources surrounding the airfield and the creation of condensation nulclei by vehicular activity on the adjacent ranges, causes Grafenwoehr to have one of the highest incidences of fog occurrences in central Germany. Conditional climatology tables offer a first guess of break out time. They must be used with caution, however, as the formation of cloud layers above the fog will severly hamper breakout.

PRECIPITATION:

a. Continuous, Showery, Thunderstorms: Most events occur with defined systems or the short wave already mentioned. Traditional analysis and prognosis methods or the method discussed with the short wave can be used to forecast these events. But, one must be aware of the less frequent events created under air mass situations. Post frontal, cold air advection can cause instability showers during all seasons while airmass/orographic thunderstorms develop during the summer months.

b. Mixed/Freezing Precipitation: The primary seasons are late fall and early spring, but given the right synoptic situation, mixed/freezing precipitation can occur throughout the winter. Mixed precipitation tends to be associated with the retreat of the Siberian High. The temperature within the advancing air mass determine whether the precipitation will be mixed or snow. Freezing precipitation usually comes ahead of the warm front associated with a cyclone on the southern track. The surface must be frozen, preferably for several days, otherwise, the heat capacity of the soil will prevent freezing precipitation. There are two variations, widespread and spotty freezing precipitation.

(1) Widespread Freezing Precipitation: Figure 4-10 is the model for widespread freezing precipitation. The key is the position of the 850 mb 0°C isotherm in relation to the warm front. As the warm front passes, freezing precipitation will continue if the surface air is close to or below freezing in the warm sector. The ice may be covered by snow as the cold front passes. Alternately, heavy rain in the warm sector will usually melt existing ice. When predicting freezing precipitation, start time is the arrival of the 0°C 850mb isotherm and stop time is the arrival of the warm front.

(2) Spotty Freezing Precipitation (See Figure 4-11): Here the 0°C isotherm only goes north of the warm front in the cold pockets associated with the mesoscale lows. There are two components of motion to predict. The short wave component and the warm frontal component. The vector resultant is usually toward the northeast. The areas of freezing precipaitation are small. They may track continuously or they may jump in response to orographic and other effects. In this situation, you can make good area forecasts, but point forecasting is very difficult.

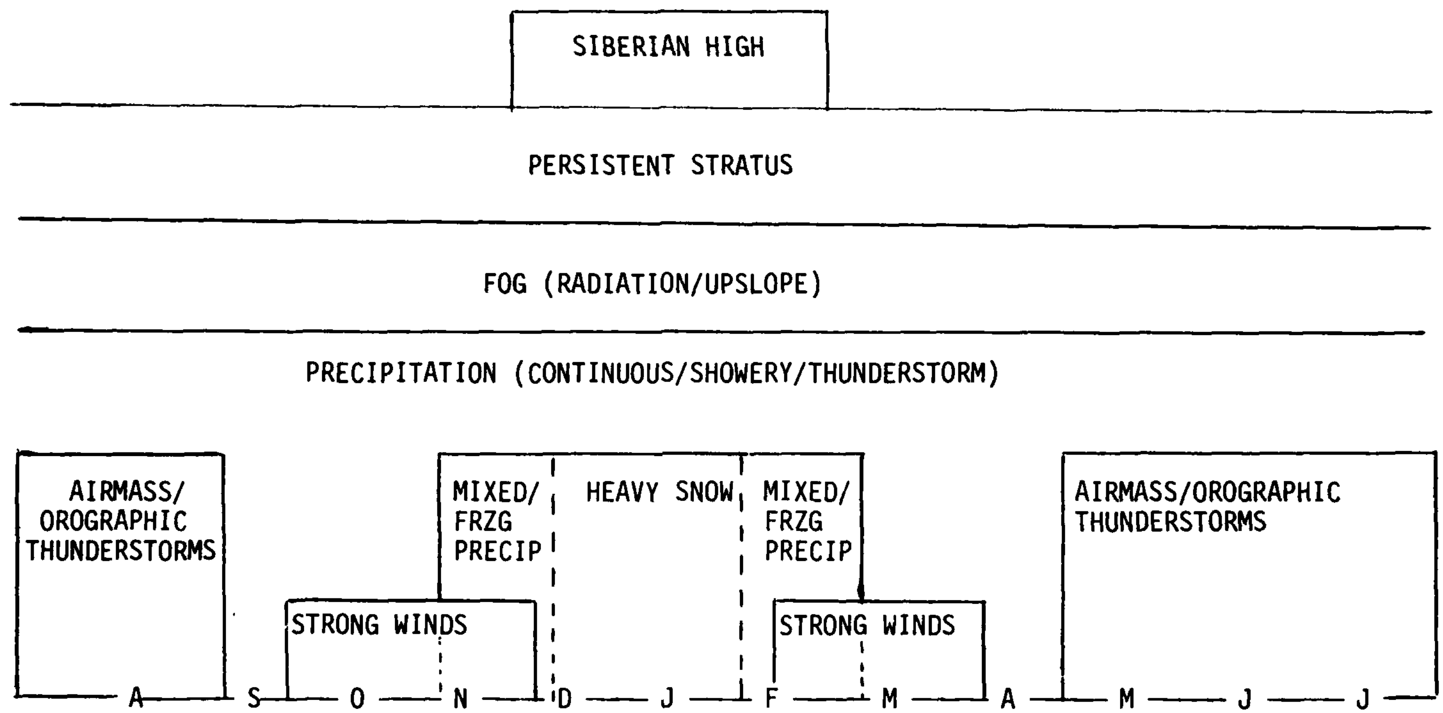
c. Heavy Snow: The heavy snow (8 to 10 inches) situation (See figure 4-12) develops when the 500MB long wave trough axis is situated near the zero merdian. This causes the major cyclone track to shift to a southwest-northeast orientation. Along this track the favored area for cyclogenesis is the Gulf of Genoa or the Adriatic Sea. Those cyclones which track within five degrees to the east of Grafenwoehr usually produce the heaviest snow fall.

AIR MASS/OROGRAPHIC THUNDERSTORMS: The key ingredients are warm air advection at the surface, a deep layer of low level moisture and solar heating. The best forecast tool for measuring instability, in Europe, is the total-total (TT) index (See Table 4-2). A typical pattern is a stationary, Modifying air mass. After a few days, a few thunderstorms occur in later afternoon. The next day thunderstorms are widespread. The overturning resulting from the thunderstorms stabilizes the air mass, and the following day there are fewer storms. The cycle repeats until the air mass changes. On any given day, analyze the TT and prog the maxima. Use Table 4-2 to make the forecast. Anywhere in the day to day sequence discussed above, the arrival of a short wave trough will trigger locally numerous thunderstorms, day or night. However, the TT max and the sort wave must be independently progged as they move at different rates and the short wave will tend to outrun the instability maxima. Figure 4-13 shows a typical orographic thunderstorm situation.

STRONG WINDS: As stated in Section 1, the surrounding topography affords a significant amount of protection from synoptic situations which would produce winds in excess of 35 knots. Eventhough there has been an occurrence of winds in excess of 35 knots in each month, the event is still rare. Thunderstorm downrush causes the summertime occurrence while the winter time occurrence are attributed to strong gradient flow. The most likely period to anticipate the strong wind synoptic situations to develop are the Fall and Spring season. Those situations which would cause a northwest gradient wind will be amplified by the Rotor Main Valley. Generally a 50 knots northwesterly to northerly gradient wind is needed to produce a 35 knot surface wind. On the other hand, a southerly to westerly wind of 50 knots would cause a cross wind in excess of 24 knots. Rarely will a synoptic situation develop which would cause a notheasterly cross wind problem or a southerly max speed problem.

TABLE 4-1

FORECASTING PROBLEMS BY MONTH



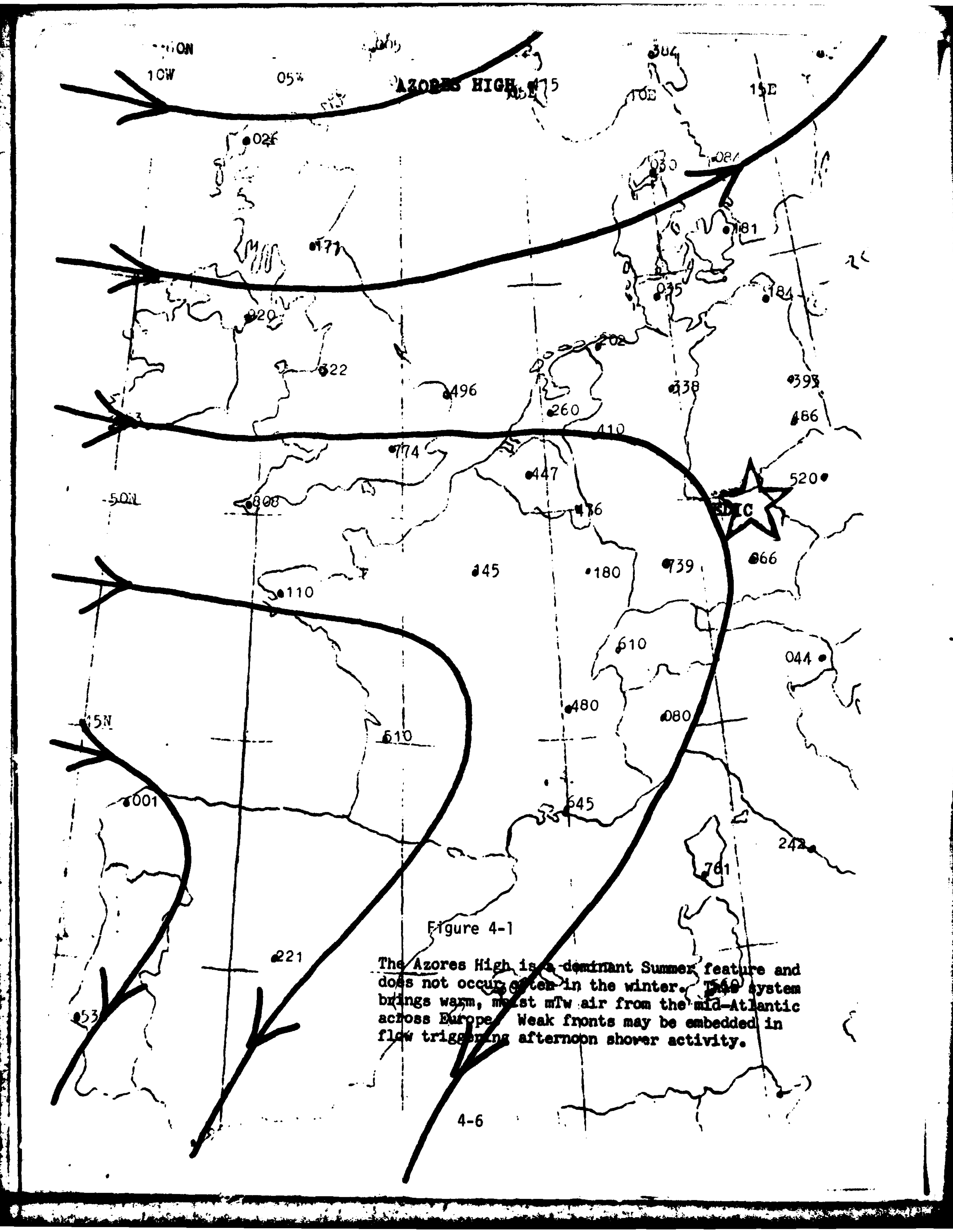


Figure 4-1

The Azores High is a dominant Summer feature and does not occur often in the winter. This system brings warm, moist mTw air from the mid-Atlantic across Europe. Weak fronts may be embedded in flow triggering afternoon shower activity.

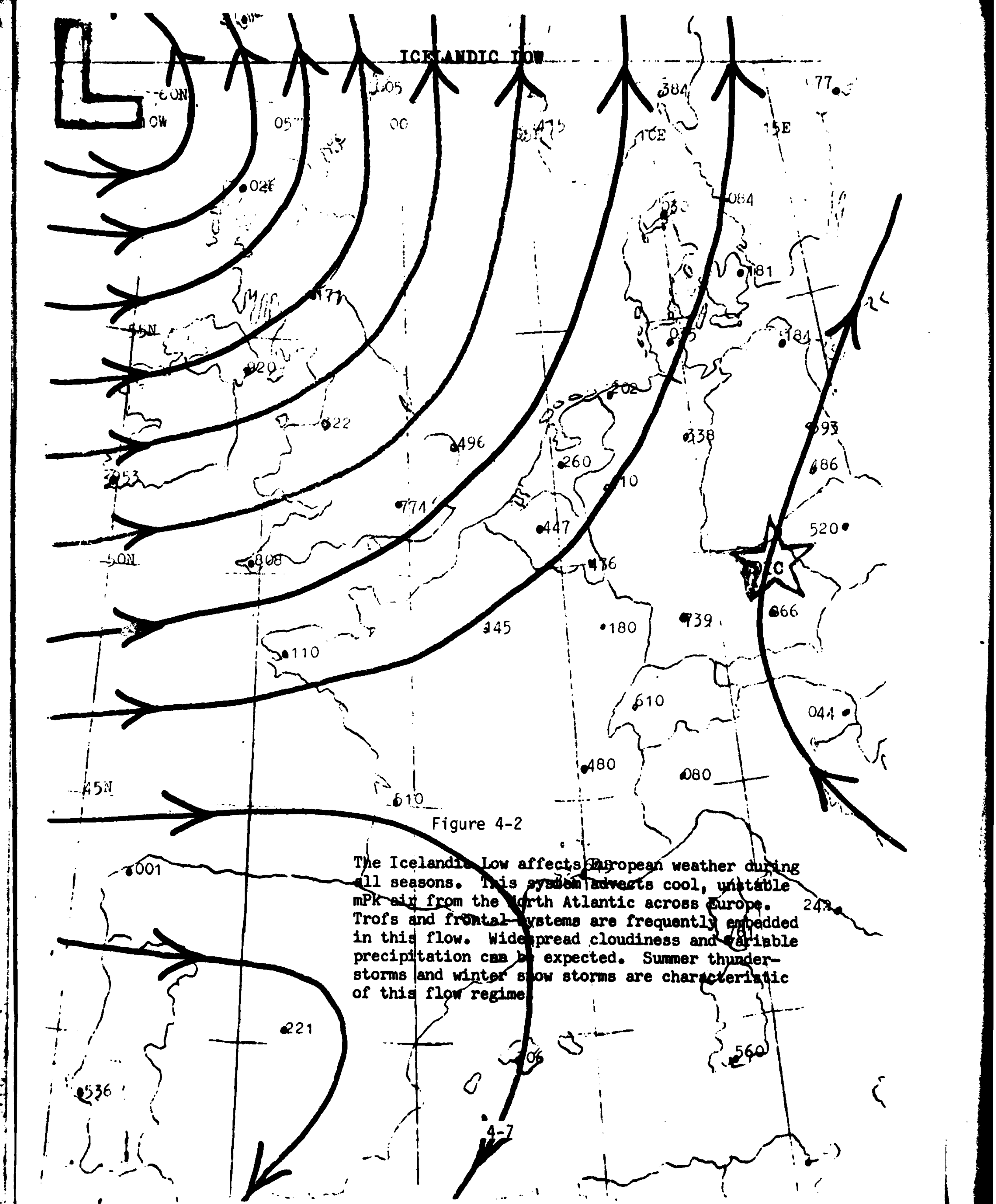


Figure 4-2

The Icelandic Low affects European weather during all seasons. This system advects cool, unstable mPK air from the North Atlantic across Europe. Trofs and frontal systems are frequently embedded in this flow. Widespread cloudiness and variable precipitation can be expected. Summer thunderstorms and winter snow storms are characteristic of this flow regime.

SIBERIAN HIGH

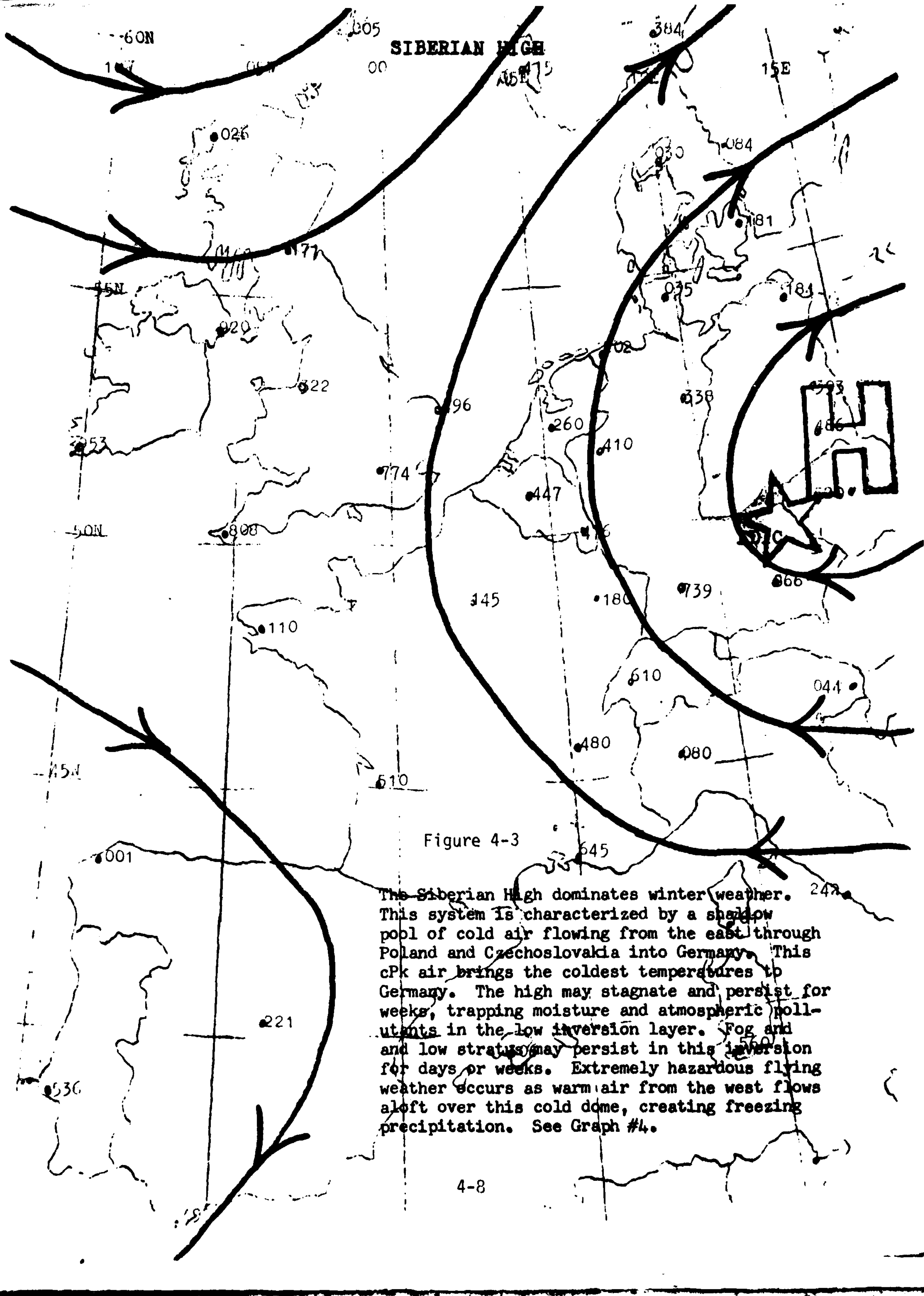
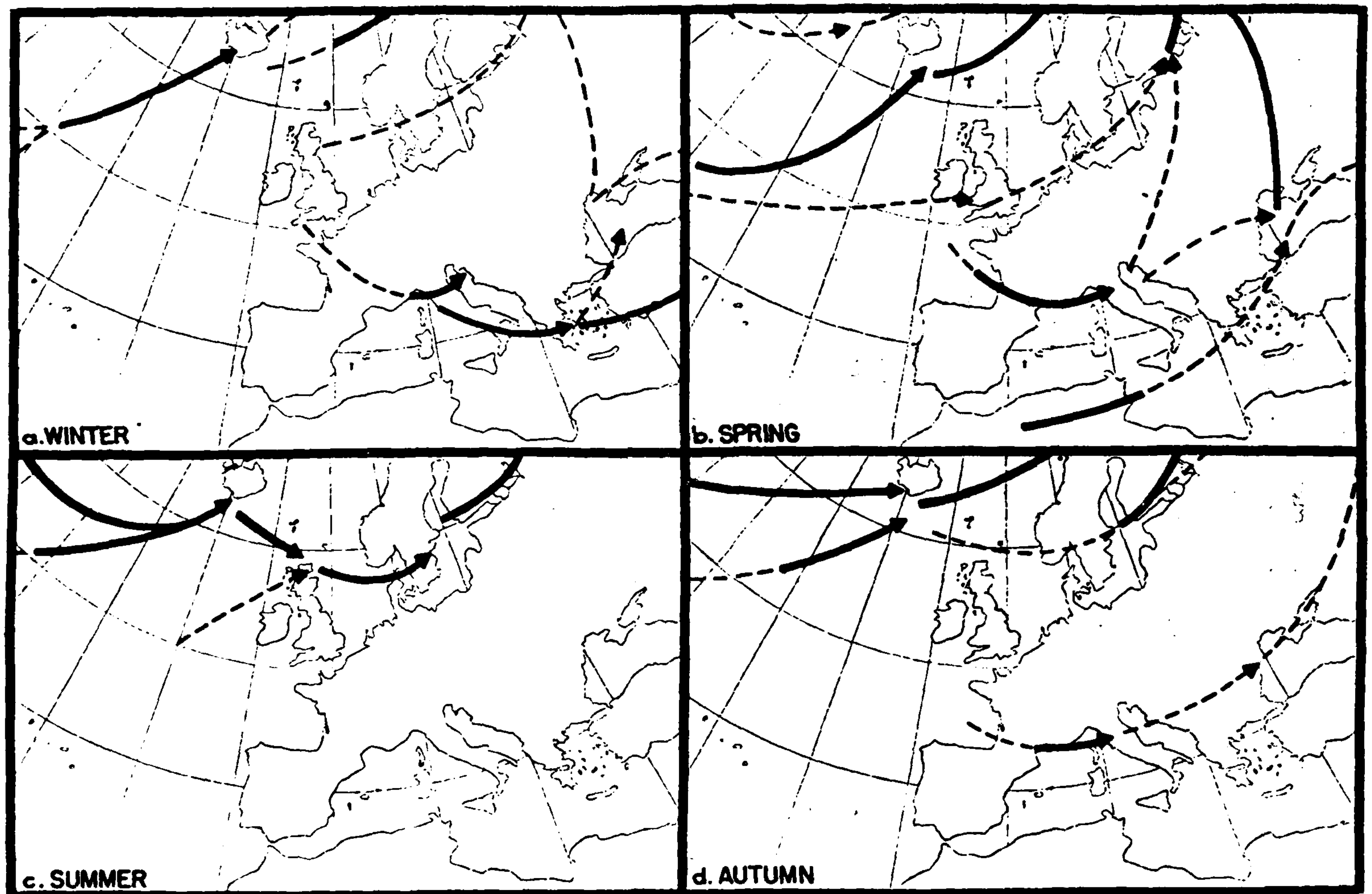


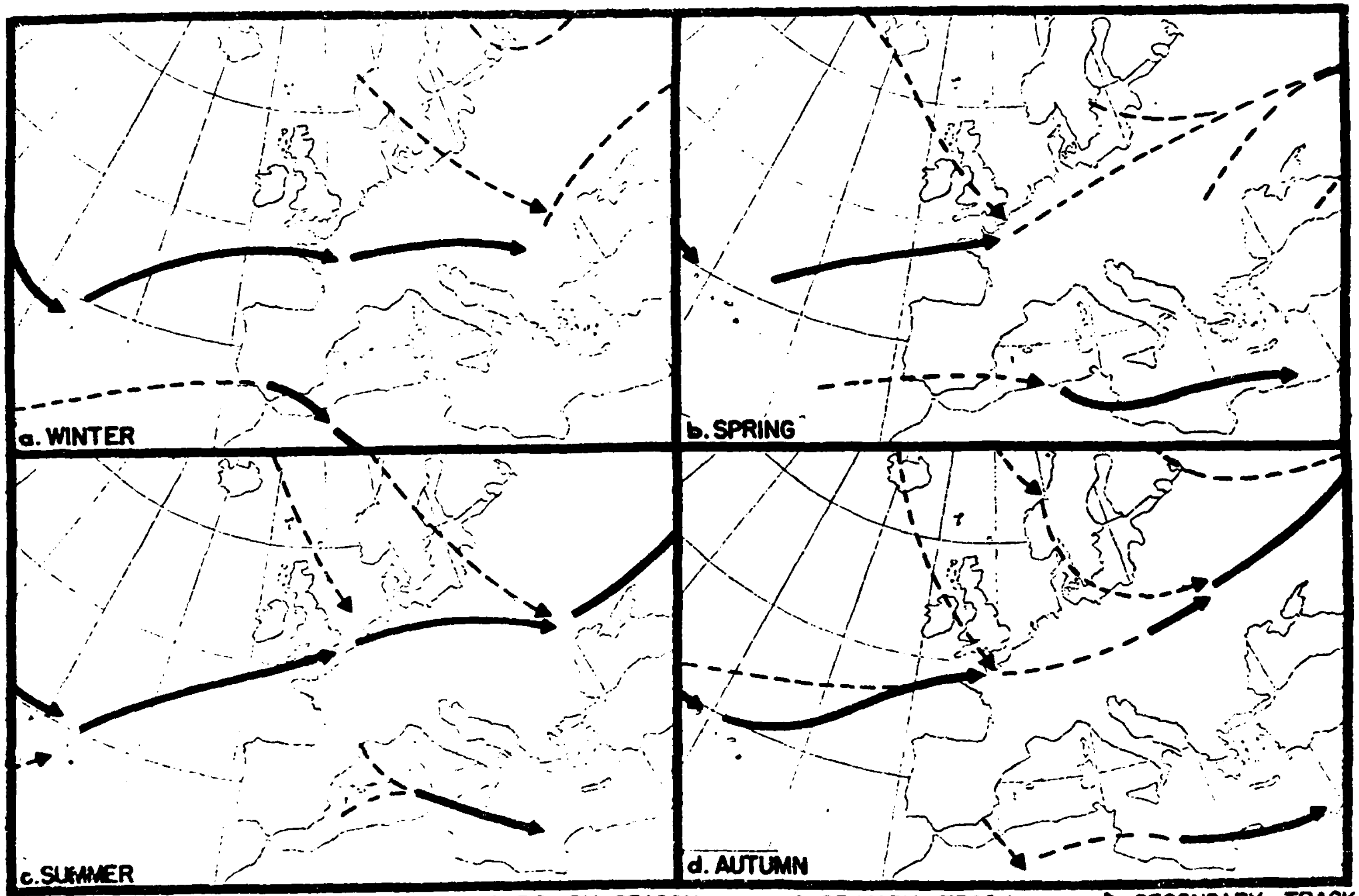
Figure 4-3

The Siberian High dominates winter weather. This system is characterized by a shallow pool of cold air flowing from the east through Poland and Czechoslovakia into Germany. This cPk air brings the coldest temperatures to Germany. The high may stagnate and persist for weeks, trapping moisture and atmospheric pollutants in the low inversion layer. Fog and low stratus may persist in this inversion for days or weeks. Extremely hazardous flying weather occurs as warm air from the west flows aloft over this cold dome, creating freezing precipitation. See Graph #4.



MEAN PATHS OF CYCLONES BY SEASON. ——▶ PRIMARY TRACK; – – ▶ SECONDARY TRACK.

Figure 4-4



MEAN PATHS OF ANTICYCLONES BY SEASON. ⟶ PRIMARY TRACK; - - → SECONDARY TRACK.

Figure 4-5

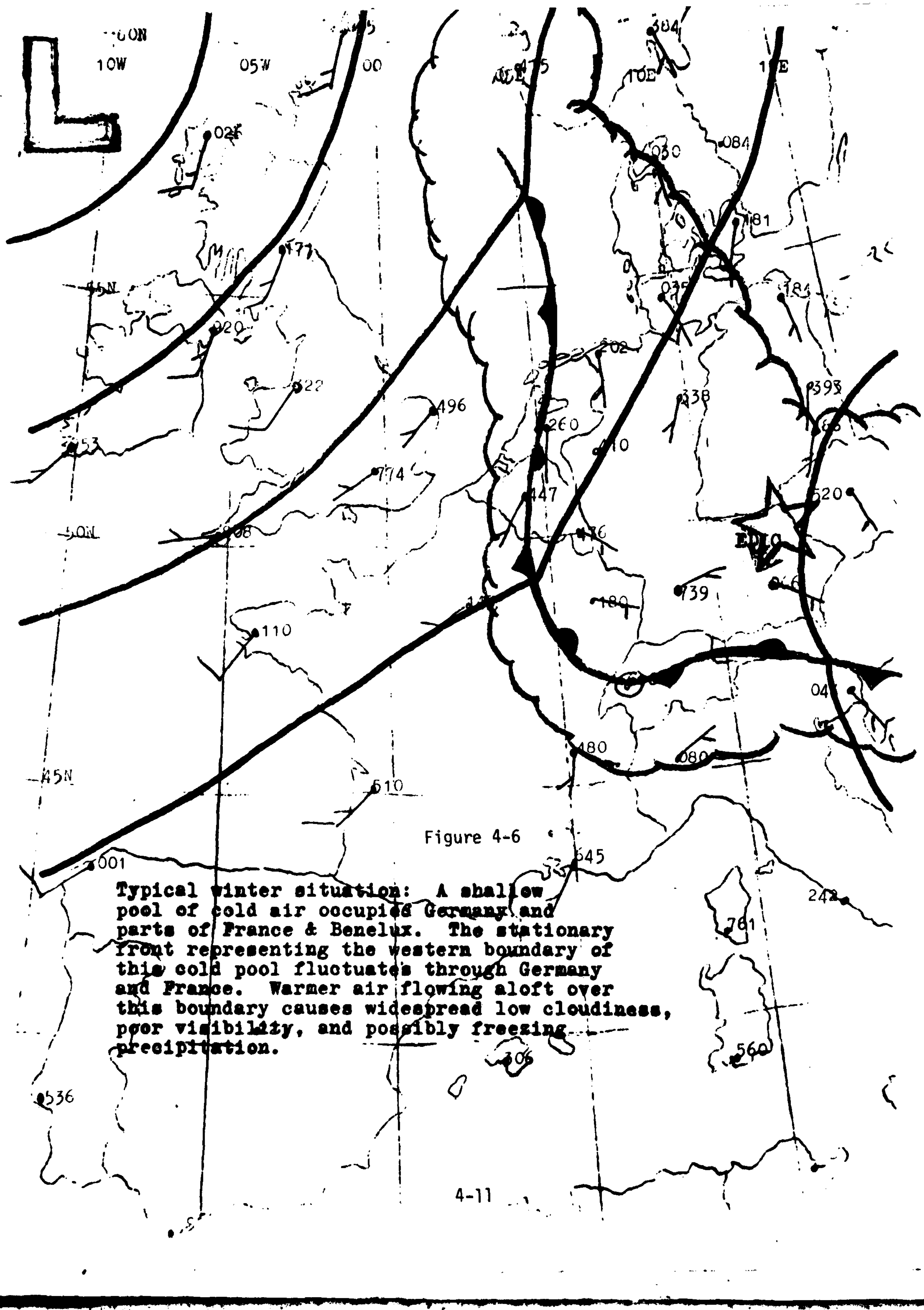


Figure 4-6

Typical winter situation: A shallow pool of cold air occupies Germany and parts of France & Benelux. The stationary front representing the western boundary of this cold pool fluctuates through Germany and France. Warmer air flowing aloft over this boundary causes widespread low cloudiness, poor visibility, and possibly freezing precipitation.

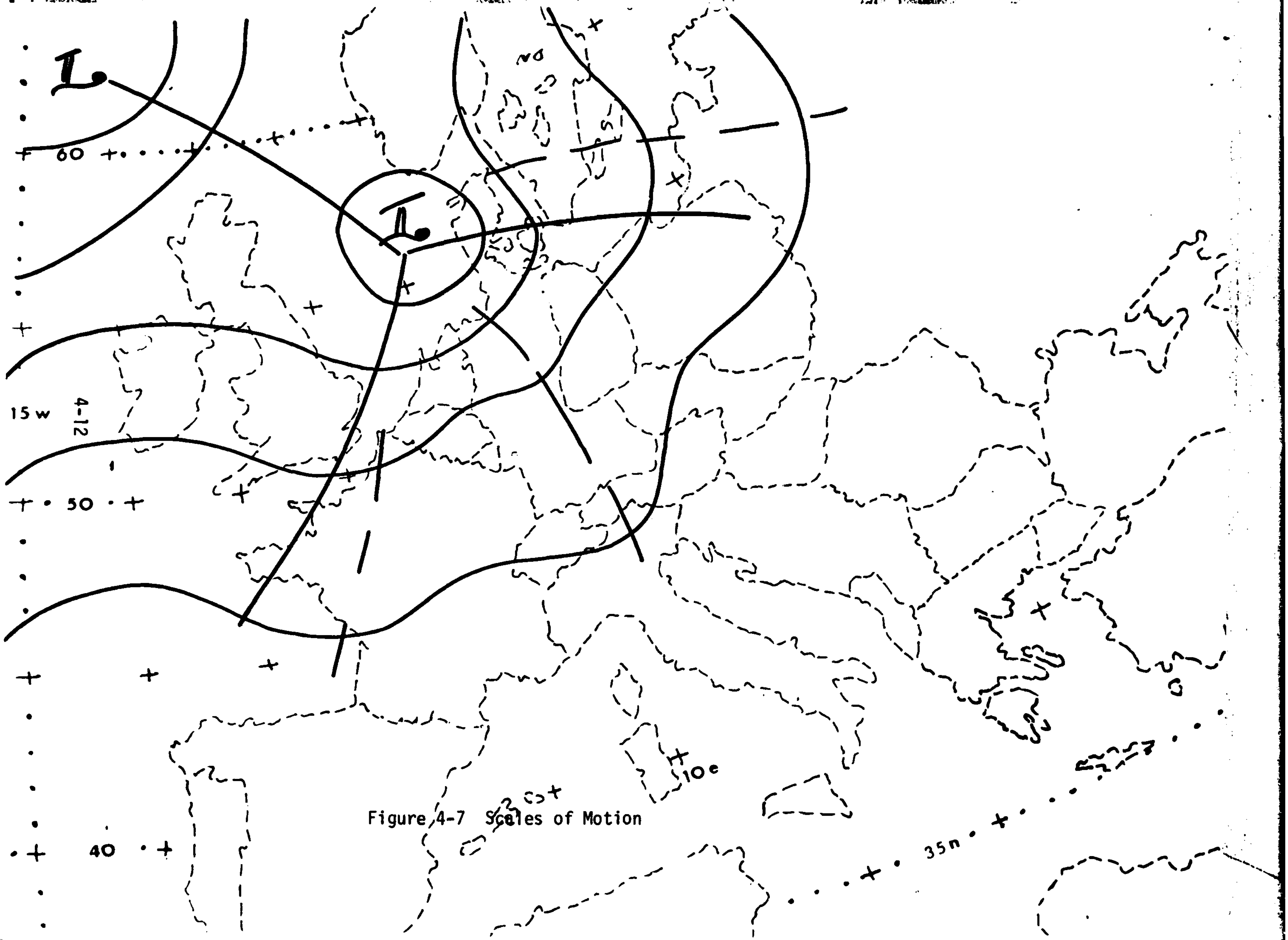


Figure 4-7 Scales of Motion

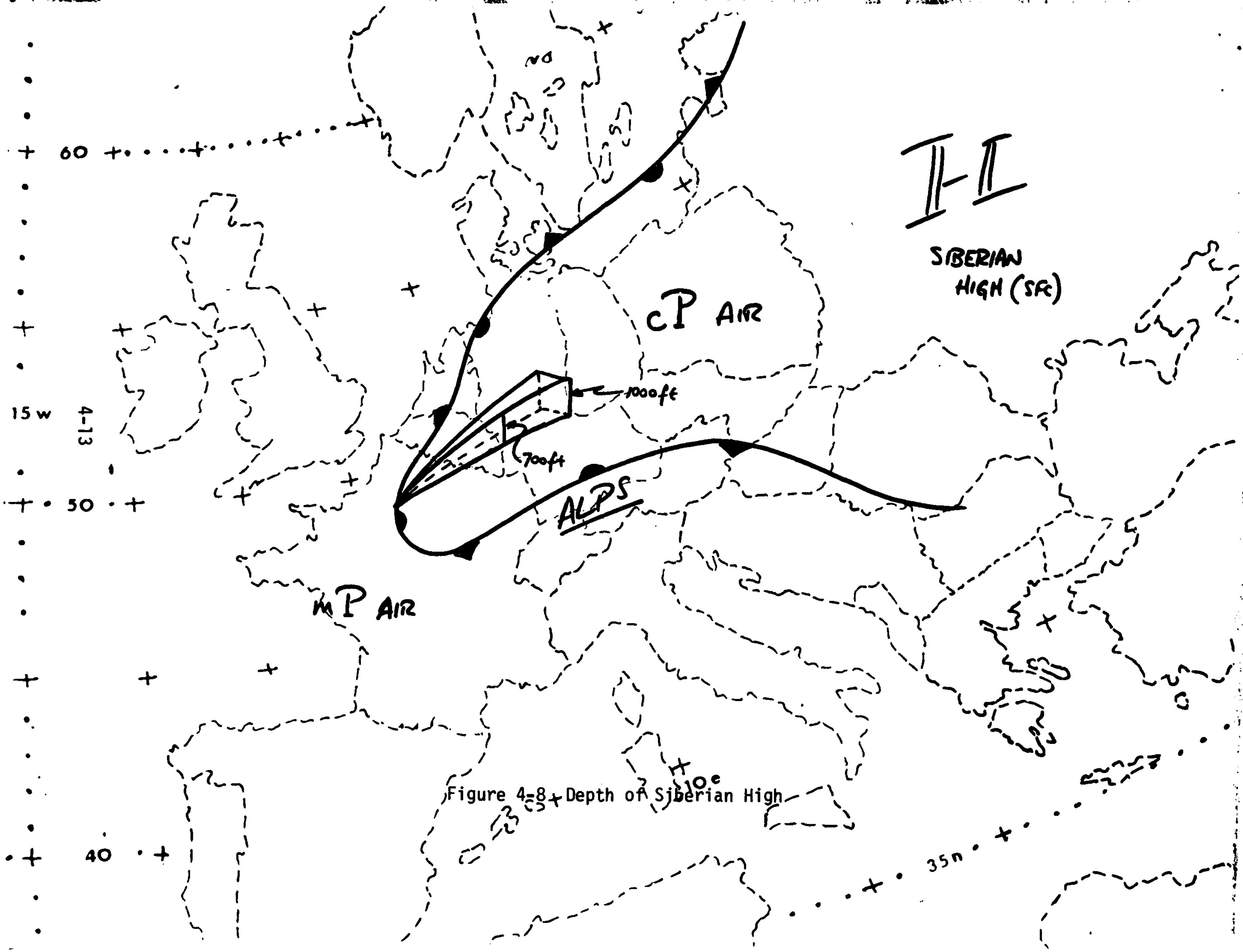


Figure 4-8 Depth of Siberian High

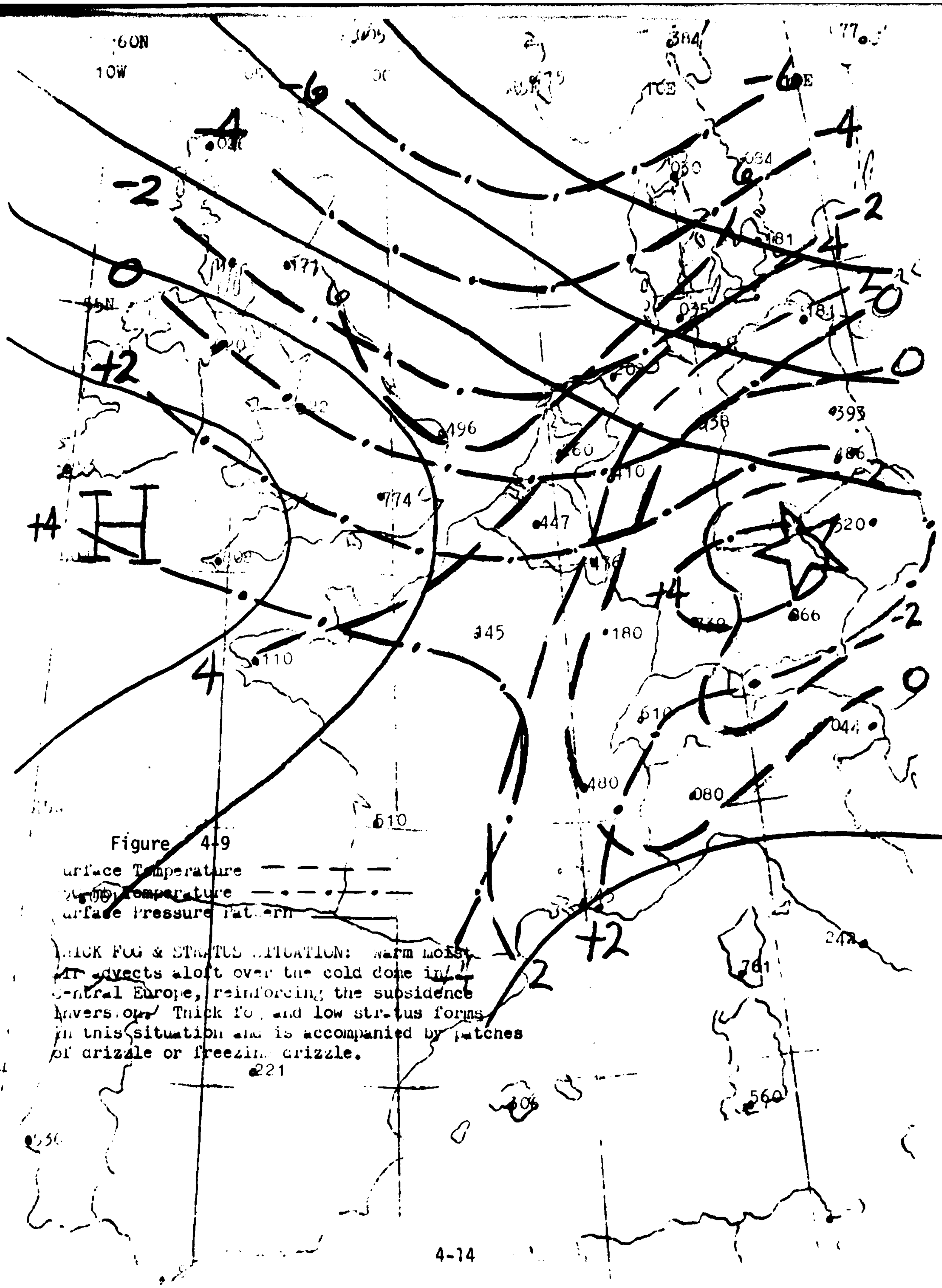


Figure 4-9

Surface Temperature — — — —
(illegible) Temperature — • — • — • —
Surface Pressure Pattern ————

THICK FOG & STRATUS SITUATION: Warm moist air advects aloft over the cold dome in central Europe, reinforcing the subsidence inversion. Thick fog and low stratus forms in this situation and is accompanied by patches of drizzle or freezing drizzle.

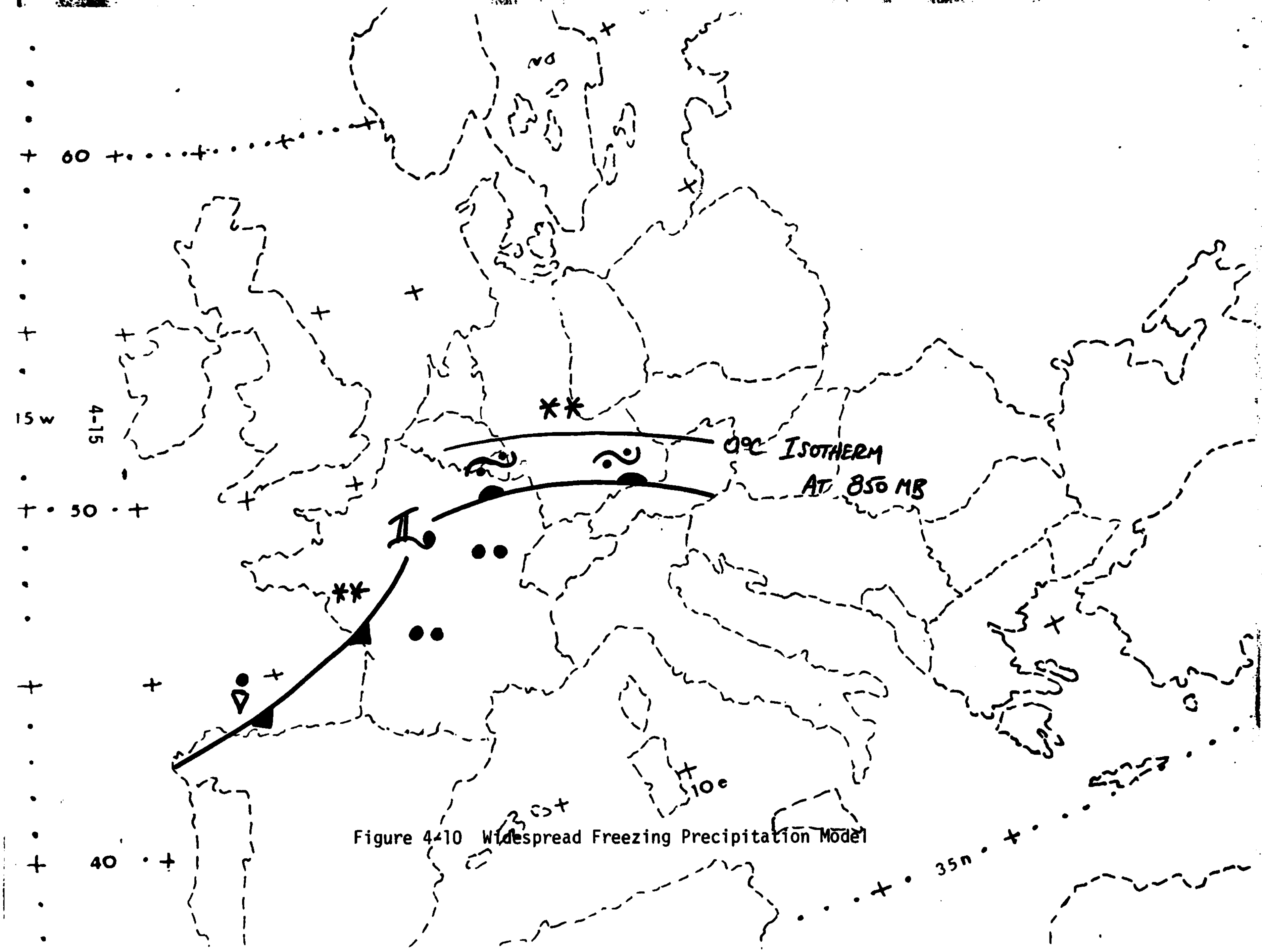


Figure 4-10 Widespread Freezing Precipitation Model

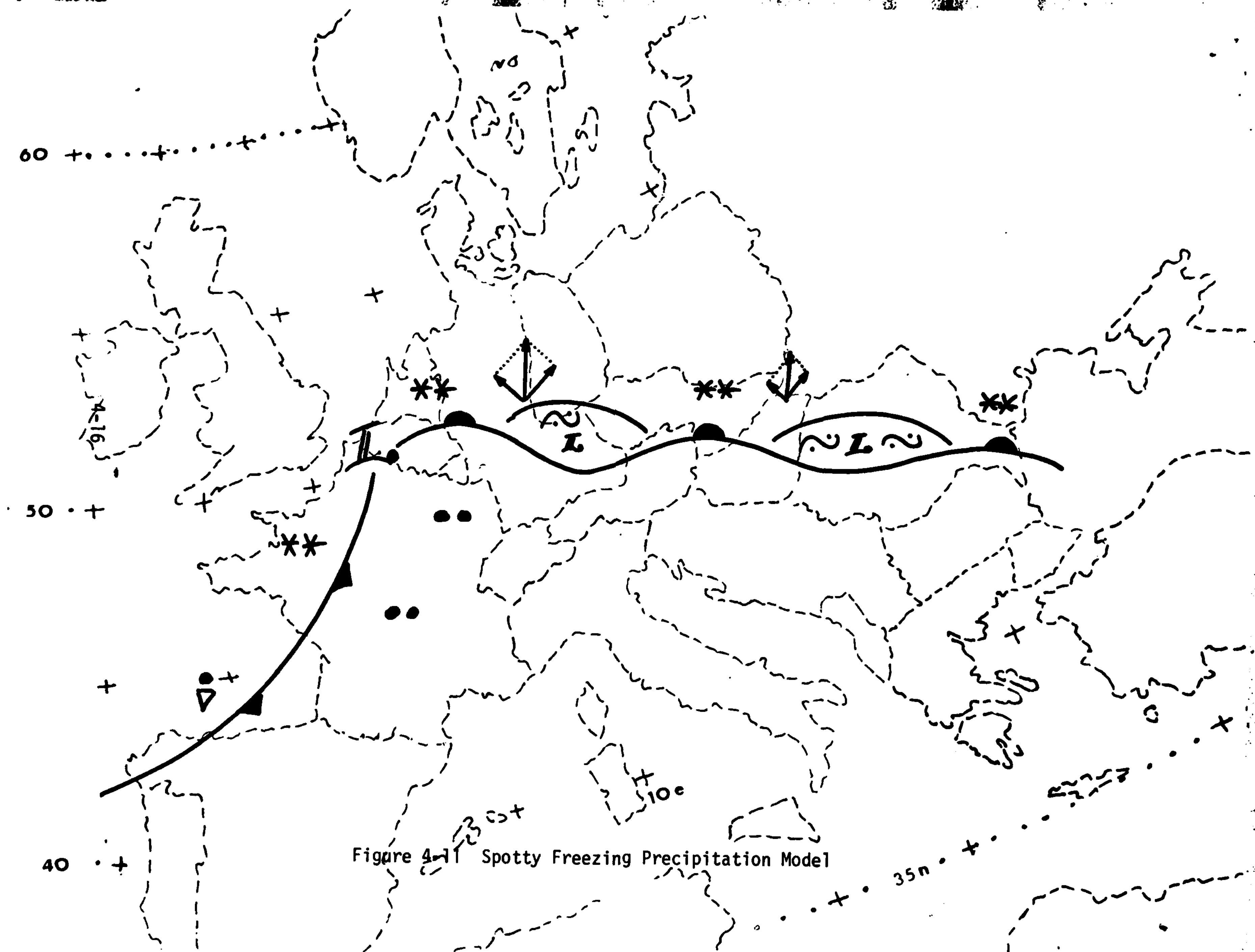


Figure 4-11 Spotty Freezing Precipitation Model

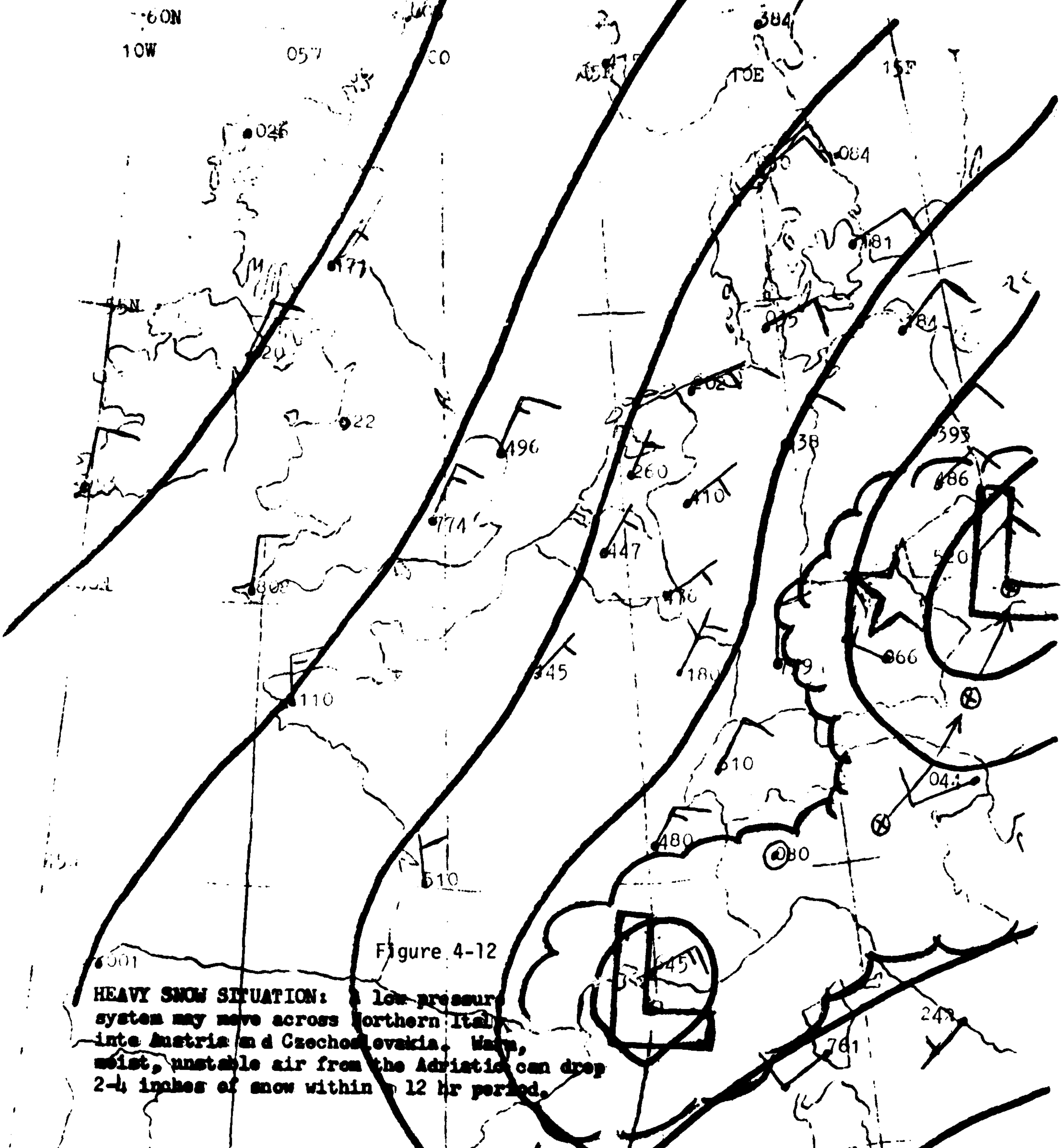


Figure 4-12

HEAVY SNOW SITUATION: A low pressure system may move across Northern Italy into Austria and Czechoslovakia. Warm, moist, unstable air from the Adriatic can drop 2-4 inches of snow within a 12 hr period.

TABLE 4-2

TOTAL-TOTALS INDEX VALUES GUIDE FOR FORECASTING THUNDERSTORMS

IN CENTRAL GERMANY

(MAY NEED ADJUSTING FOR SPECIFIC LOCATIONS IN GERMANY)

FORECAST	VT	CT	TT
ISOLATED	26	20 - 23	46 - 49
FEW	$\geq$ 28	20 - 24	50 - 52
SCATTERED	$\geq$ 28	22 - 26	53 - 55
NUMEROUS	$\geq$ 28	$\geq$ 26	$\geq$ 55

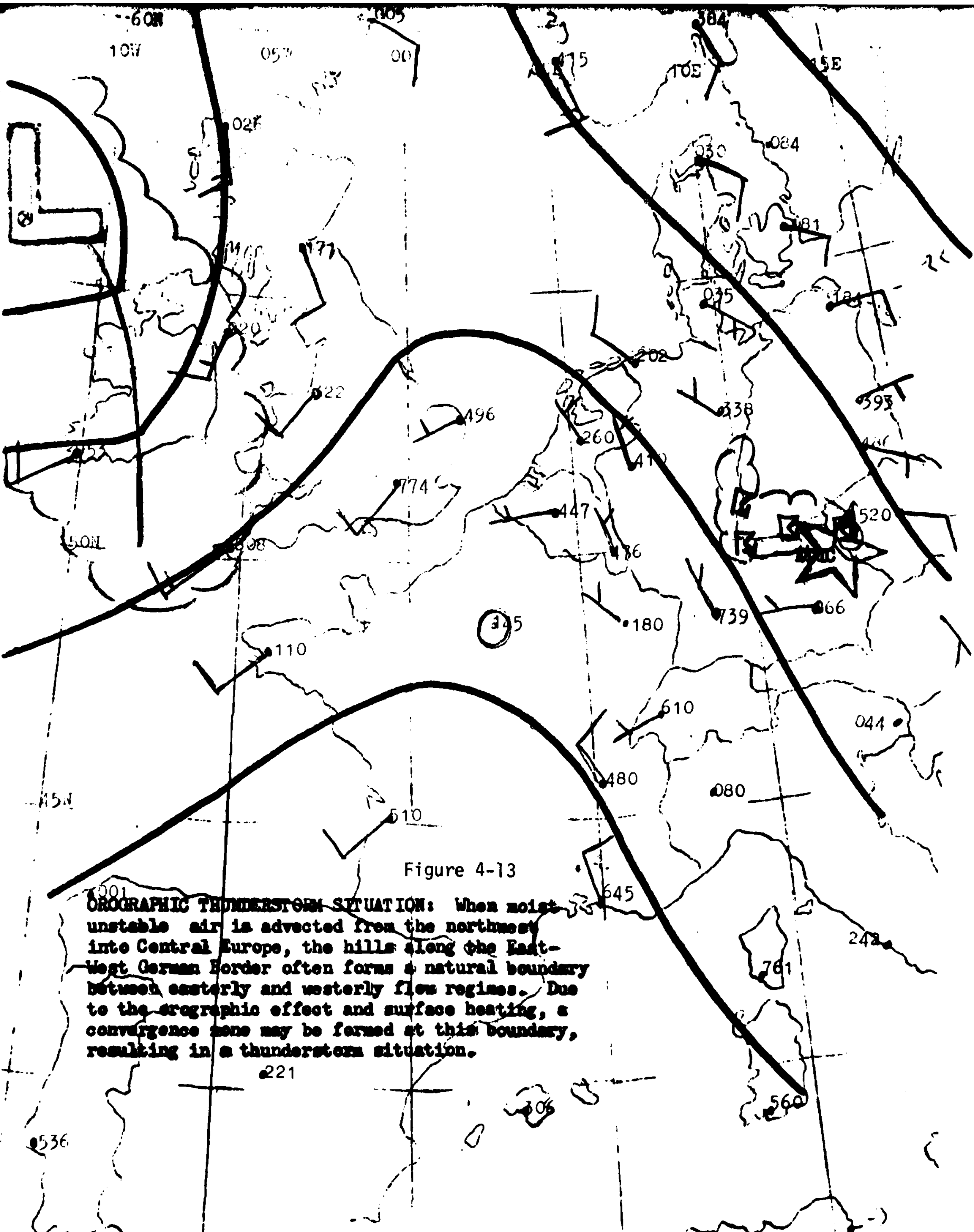


Figure 4-13

OROGRAPHIC THUNDERSTORM SITUATION: When moist unstable air is advected from the northwest into Central Europe, the hills along the East-West German Border often forms a natural boundary between easterly and westerly flow regimes. Due to the orographic effect and surface heating, a convergence zone may be formed at this boundary, resulting in a thunderstorm situation.

N

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