THE GREAT PACOLET FLOOD OF JUNE 1903

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South Carolina is prone to flash flooding, although fortunately many events do not cause the loss of life. The purpose of this study is to describe a major flash flood in South Carolina as well as the associated weather that caused it. Flash flooding does pose a serious hazard to the palmetto state and should be considered in disaster preparedness planning.

The Pacolet river is a tributary of the Broad river and extends from western North Carolina southeastward to near Spartanburg, S. C. hence southeast to its confluence with the Broad river several miles above Lockhart, S. C.

THE GREAT PACOLET FLOOD

The greatest loss of life from river flooding this century in South Carolina occurred along the Pacolet River near Pacolet, S. C. during the early morning of June 6th, 1903. Damage was very heavy and in "1903" dollars was estimated to be near five million. Sixty-five people were drowned by the flood waters while many more were swept away but somehow managed to survive.

There was widespread disruption to the economy. Railway traffic was disrupted and many industrial installations along the river destroyed. The Southern Railway bridge over the Pacolet near Clifton, S. C. was "swept away" by the flood. This bridge was anchored on 45 foot high granite piers. Fourteen miles below Clifton, the clusters of textile mills along the Pacolet river were hit hard by the flood. Clifton Mill No. 1 and Pacolet Mill No. 1 and 2 were destroyed. There was a complete loss of corn and flour mills, dwellings, churches and businesses along the river. So quickly did the water rise, according to the Monthly Weather Review, that the area near the river was covered by 40 feet of water within an hour. The mills at Pacolet were on the west bank of the Pacolet river at a point where the normal depth is less than six feet, but the crest on the morning of June 6th reached about fifty feet.

While the enormity of the disaster focussed attention to the Pacolet area, heavy flood damage also occurred along other streams in northwest South Carolina. The Southern Railway bridge across the Tyger River near Greer was crushed into a mangled pile of steel. Flooding on the Enoree, Seneca and Keowee rivers was also very heavy. The high railroad bridge

over the Seneca river was destroyed, water and electricity to Anderson as well as train traffic to Spartanburg interrupted by the flooding. Newspapers following the event carried many accounts of personal losses, suffering and hardships caused by the flood. The June 8, 1903 Spartanburg Herald told of people floating by"would-be rescurers" only to be carried to a watery grave. It told of a man scantily attired in night clothes who sat for more than 6 hours in a tree before being rescued. Obviously the rushing waters made it difficult to save many who lost their lives.

Weather Conditions Associated With The Pacolet Flood:

Heavy rains on already wet soils preceded the flooding. The full extent of the rainfall will probably never be known, although it was apparently at a maximum over the Pacolet River valley. The nearest official station measuring rainfall was Spartanburg, S. C. where five inches fell during the 24 hours ending at 8AM on June 6th. Figure No. 1 lists known 24 hour rainfall for the period ending on the morning of June 6th. The synoptic weather maps for June 4th through June 6, 1903 show a slow moving cold front approaching South Carolina from the northwest. An area of low pressure developed in the Gulf south of New Orleans. This low pressure area tracked north-northeast across Alabama, Georgia and western South Carolina on the 5th. By the early morning of June 6th, the low pressure system was centered over western North Carolina and had intensified considerably. Strong convergence plus the upslope flow of warm moist air associated with the low pressure area as it tracked across northwestern South Carolina produced very heavy rainfall. Although the airflow above the surface in 1903 is largely conjecture, the strong similarity between the 1903 storm's movement and the October 10, 1976 storm is worthy of note. The 1976 low pressure also developed along a slow-moving weather front as it approached northwestern South Carolina. Once developed this low pressure area moved north-northeast across northwestern South Carolina producing heavy rainfall across the Broad River and its tributaries. Upper air information was, of course, available for the 1976 storm. There was a cut-off low at the 500MB

level located in the lower Mississippi valley. The zone of strongest westerlies extended eastward across southern Canada. There was also a deep southerly flow over northwestern South Carolina that steered the surface low pressure northward over the western Carolinas. Heavy rainfall associated with this system produced heavy flooding in the tributaries of the Broad river, including the Pacolet.

Figures 2-4 give the synoptic situation on the 4th, 5th and 6th of June 1903. Figures 5-7 are surface maps for the October 1976 flood-producing storm. Note the similarity between these two surface maps. Figures 8-12 are charts of the 850mb and the 500mb levels associated with the latter storm.

Frequency of Flash Flood Events:

Flash flooding is no stranger to South Carolina. A statistical study of maximum twentyfour hour rainfall amounts by Gillentine et all(1981) indicatesthat rainfall of the magnitude of the 1976 and perhaps the 1903 storms has a relatively short return period. In 1903 industry was clustered along the Pacolet river. Fortunately this is no longer true; yet flash flooding still causes disruption to the economy,as well as poses a threat to human life.

Perhaps the vulnerability of the area to flash flooding is best summed up by the 1903 Monthly Weather Review, page 261, written a short time after the Pacolet disaster: Similar disasters are possible...and no false sense of security should be assumed from the fact that nothing unusual has happened in the past."

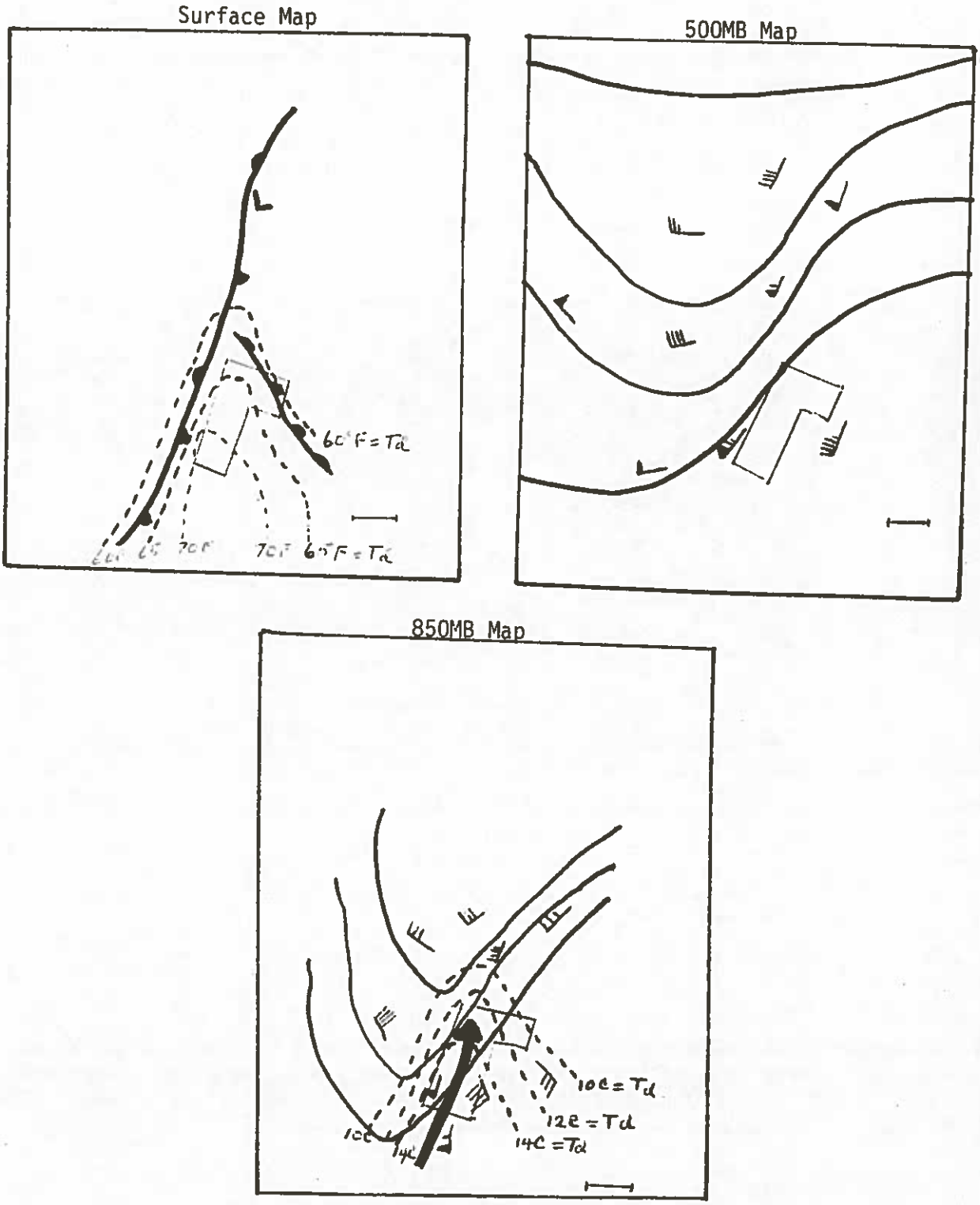
Comparison With Maddox's Study:

Flash flood events have been studied by Maddox. He found (Synoptic and meso scale aspects of flash flood events. Bull. Amer. Meteor. Soc, 60, No.2) certain characteristics and features that were common to almost all flash flood events, including:

1. Heavy rains were produced by convective storms.
2. Surface dewpoint temperatures were very high.
3. Large moisture contents were present through a deep tropospheric layer.
4. Vertical wind shear was weak to moderate through the cloud depth.

Each of the events, June 6, 1903 and October 9, 1976, conform very closely to Maddox's synoptic type flash flood model. There was a relatively intense synoptic scale frontal system and associated cyclone . The 500mb cut-off low moved slowly northeastward. This combination allowed convective type rainfall to develop and move repeatedly over the same general area. Terrain features obviously interacted with the low level flow and helped generate localized regions of very heavy rainfall.

MADDOX'S SYNOPTIC TYPE FLASH FLOOD MODEL



Boxed area shows most likely area for maximum rainfall. Temperatures shown are dew point temperatures.

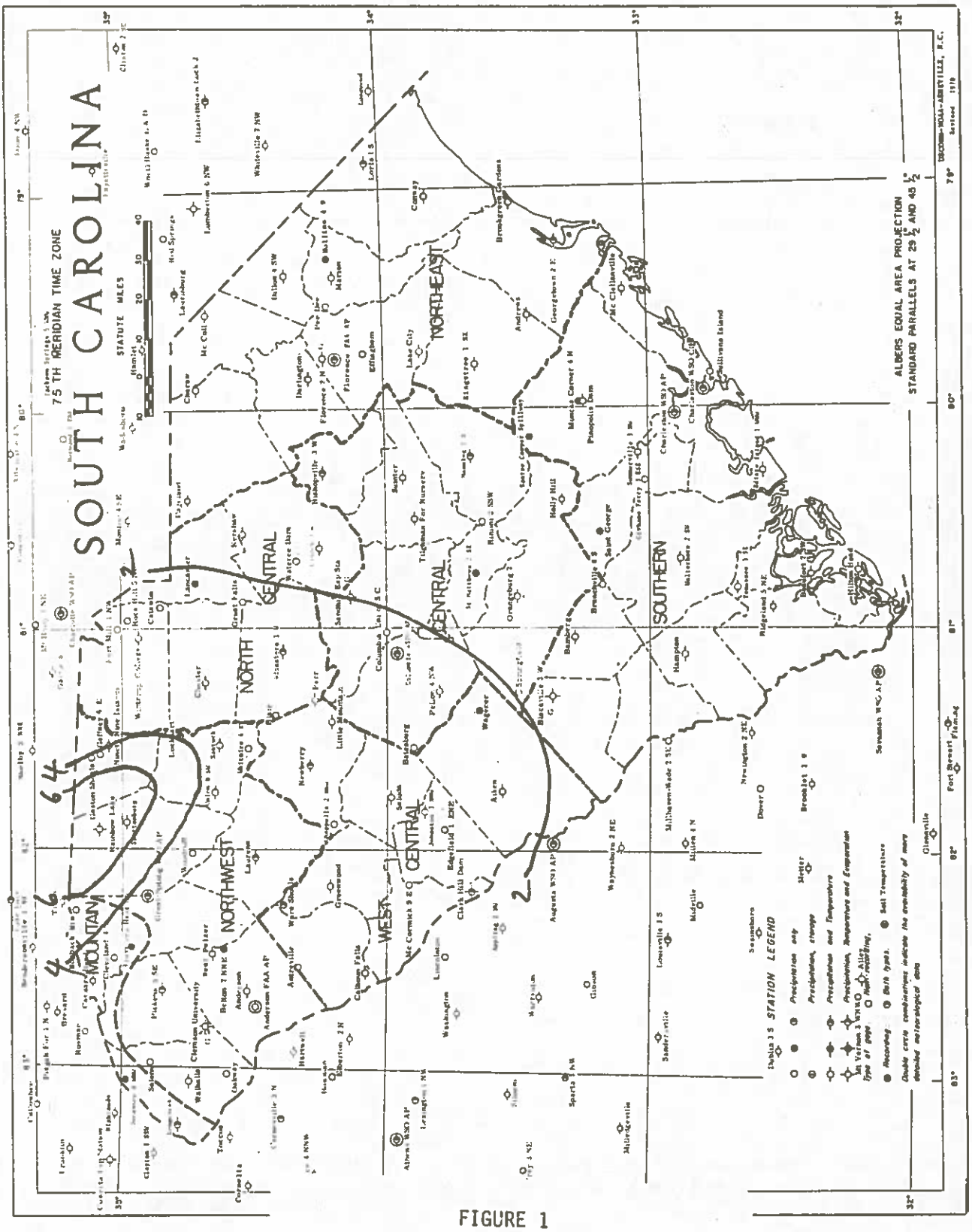


FIGURE 1

RAINFALL - June 5-6, 1903

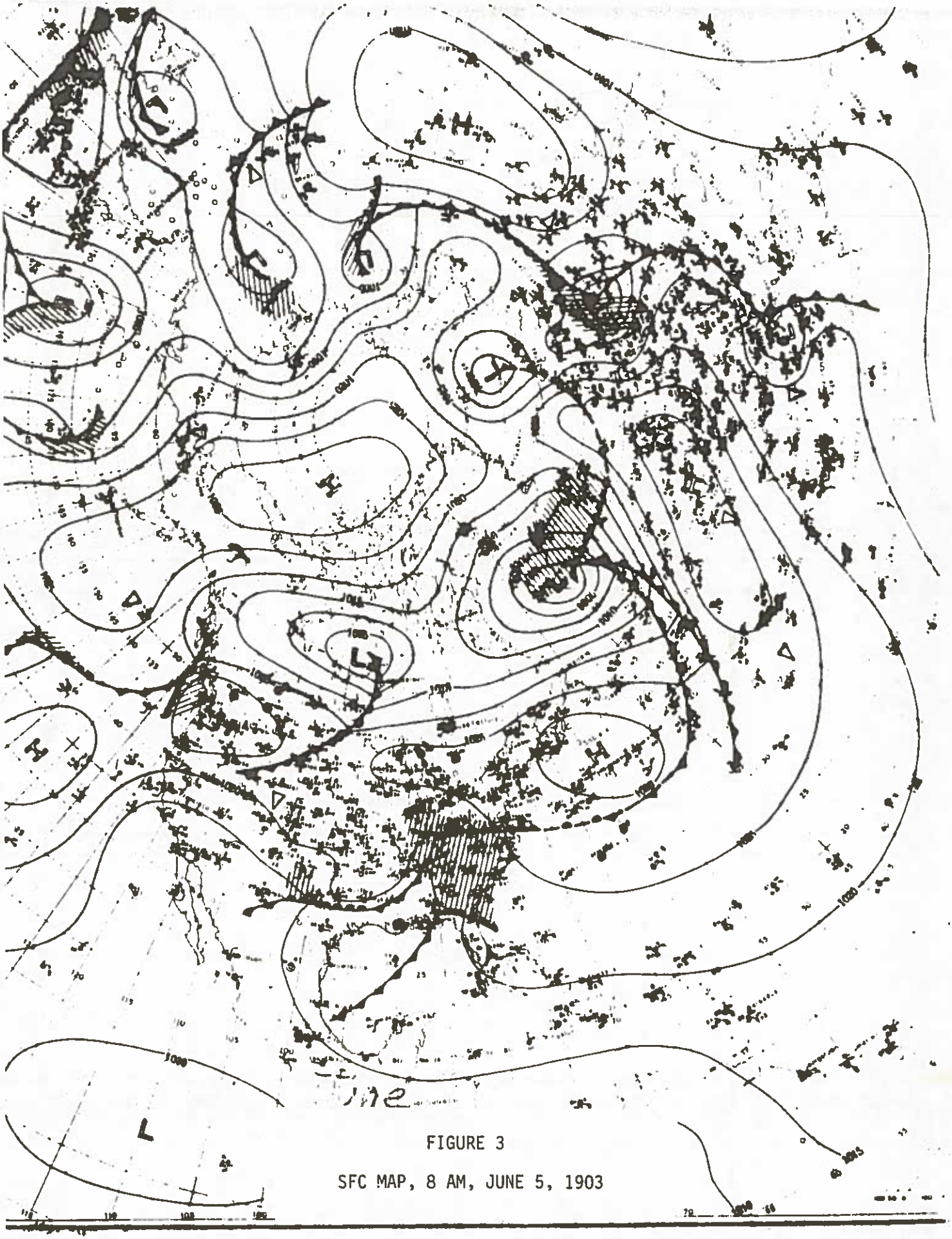


FIGURE 3

SFC MAP, 8 AM, JUNE 5, 1903

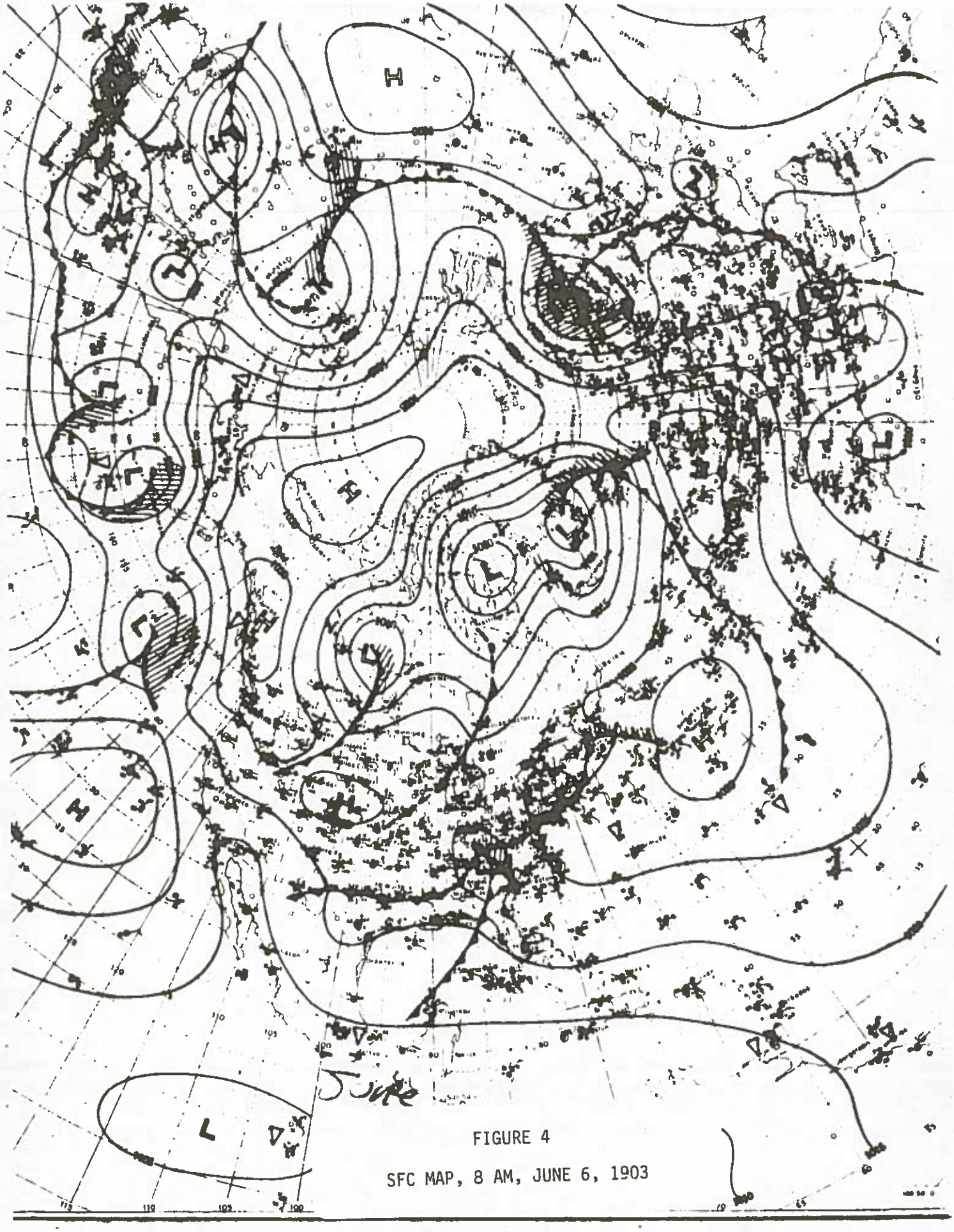


FIGURE 4

SFC MAP, 8 AM, JUNE 6, 1903

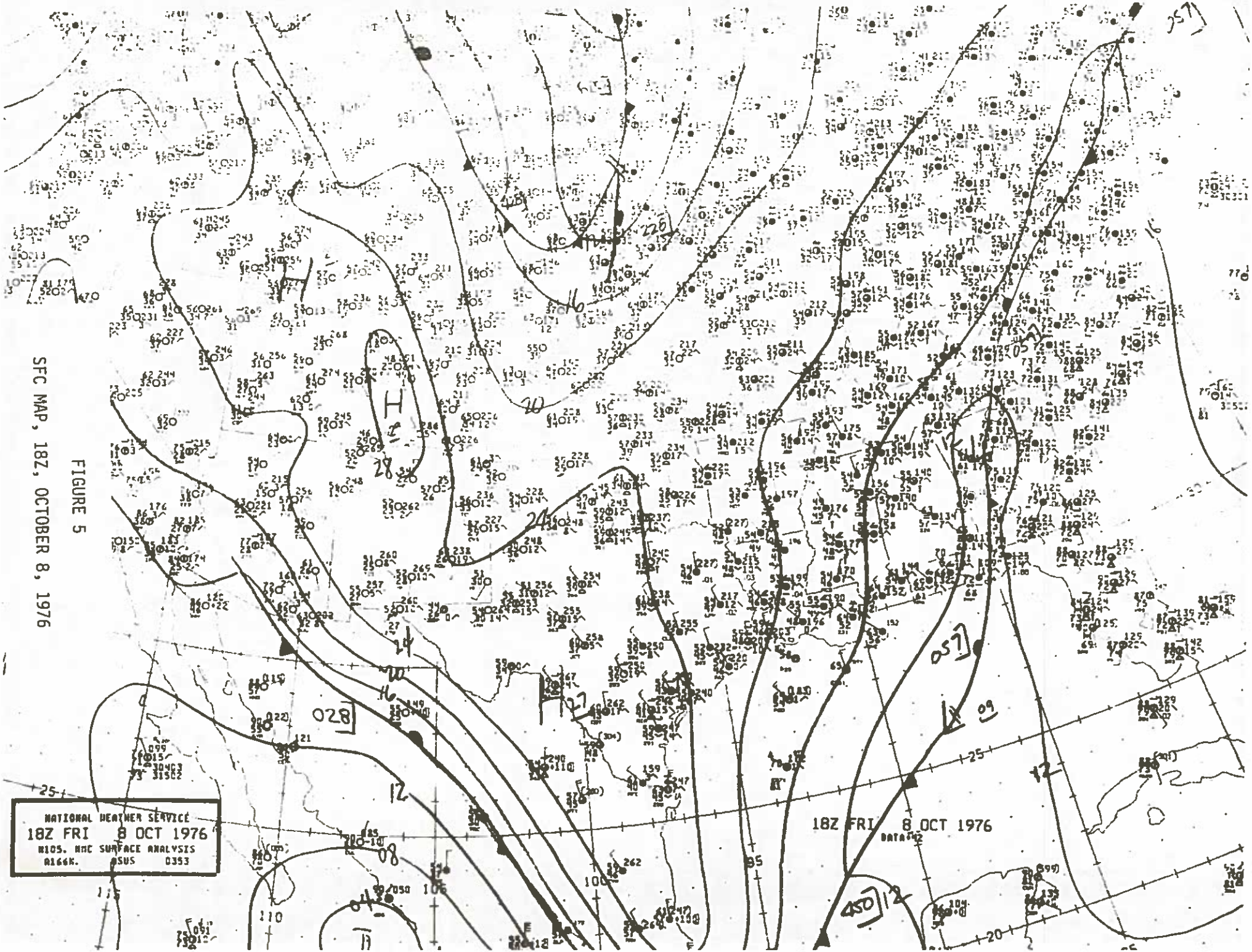


FIGURE 5

SFC MAP, 18Z, OCTOBER 8, 1976

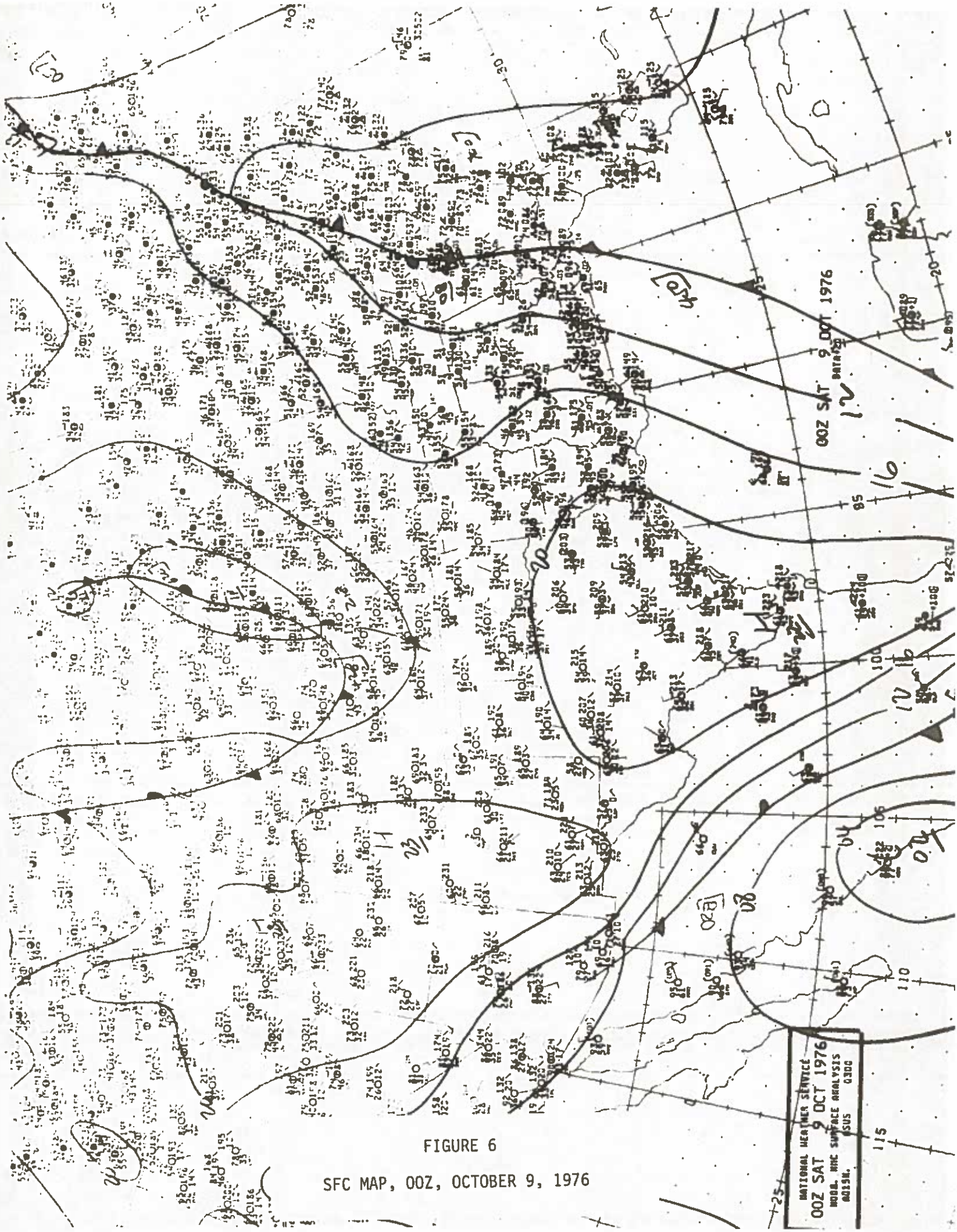


FIGURE 6

SFC MAP, 00Z, OCTOBER 9, 1976

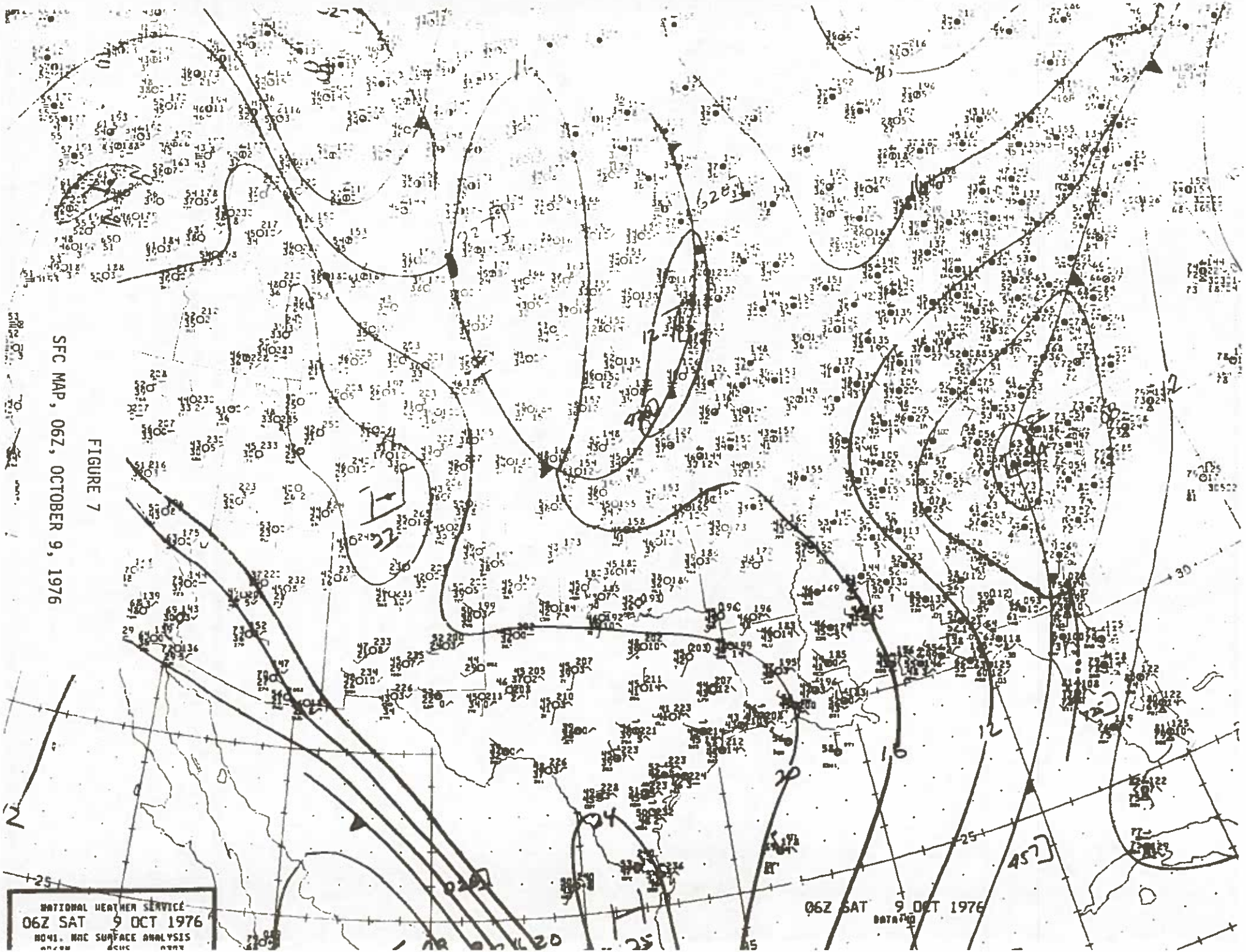


FIGURE 7

SFC MAP, 06Z, OCTOBER 9, 1976

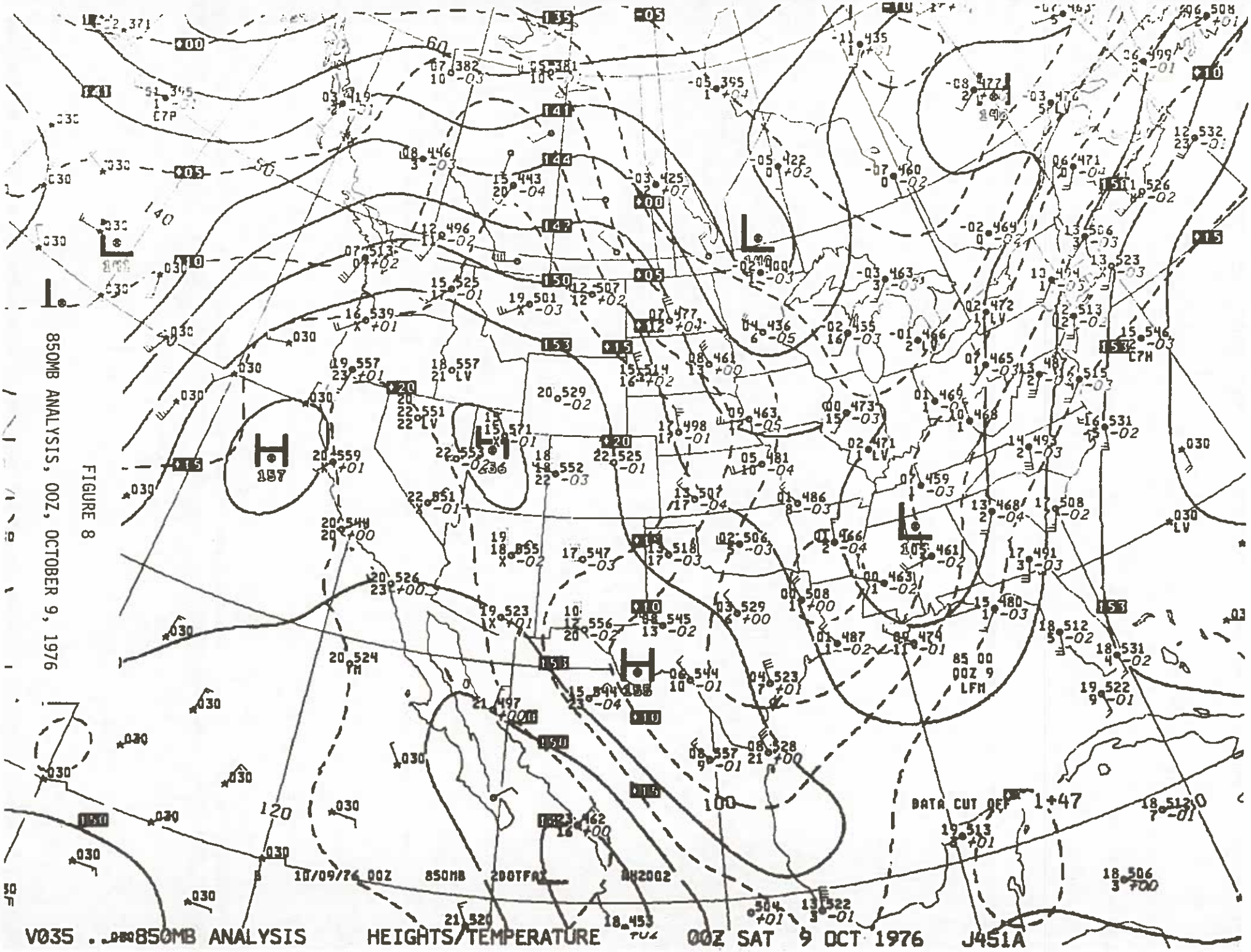


FIGURE 8 850MB ANALYSIS, 00Z, OCTOBER 9, 1976

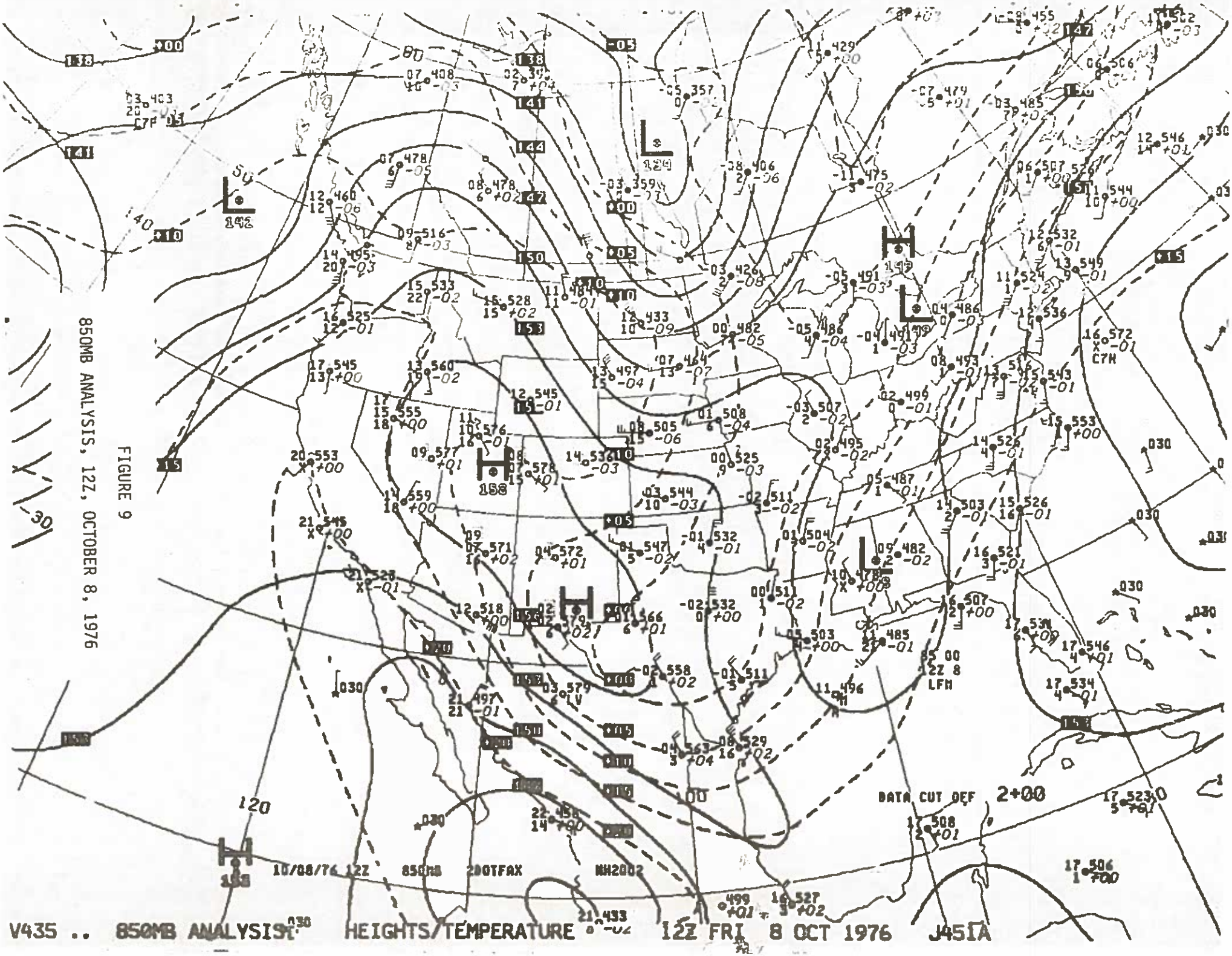


FIGURE 9

850MB ANALYSIS, 12Z, OCTOBER 8, 1976

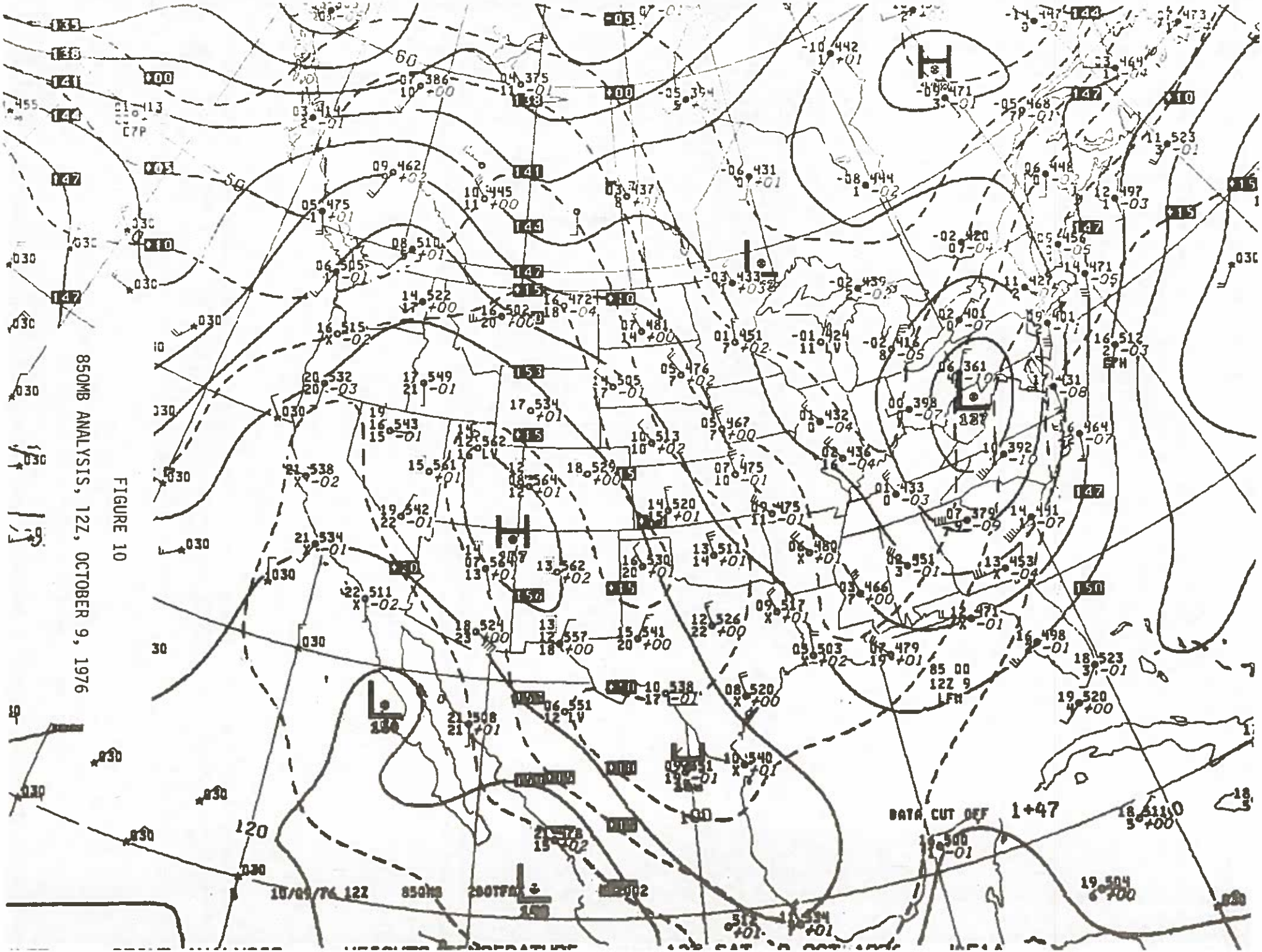


FIGURE 10

850MB ANALYSIS, 12Z, OCTOBER 9, 1976

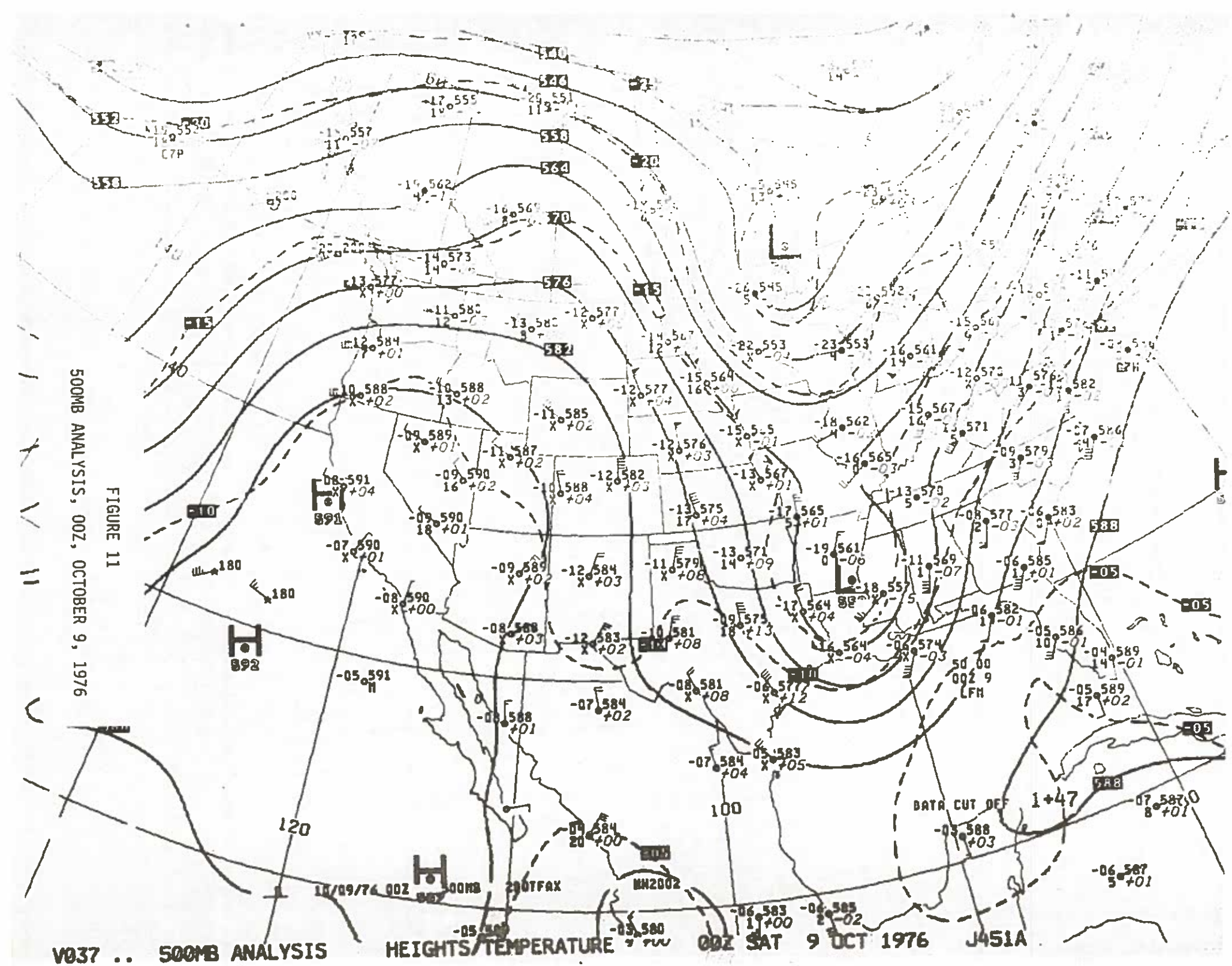


FIGURE 11

500MB ANALYSIS, 00Z, OCTOBER 9, 1976

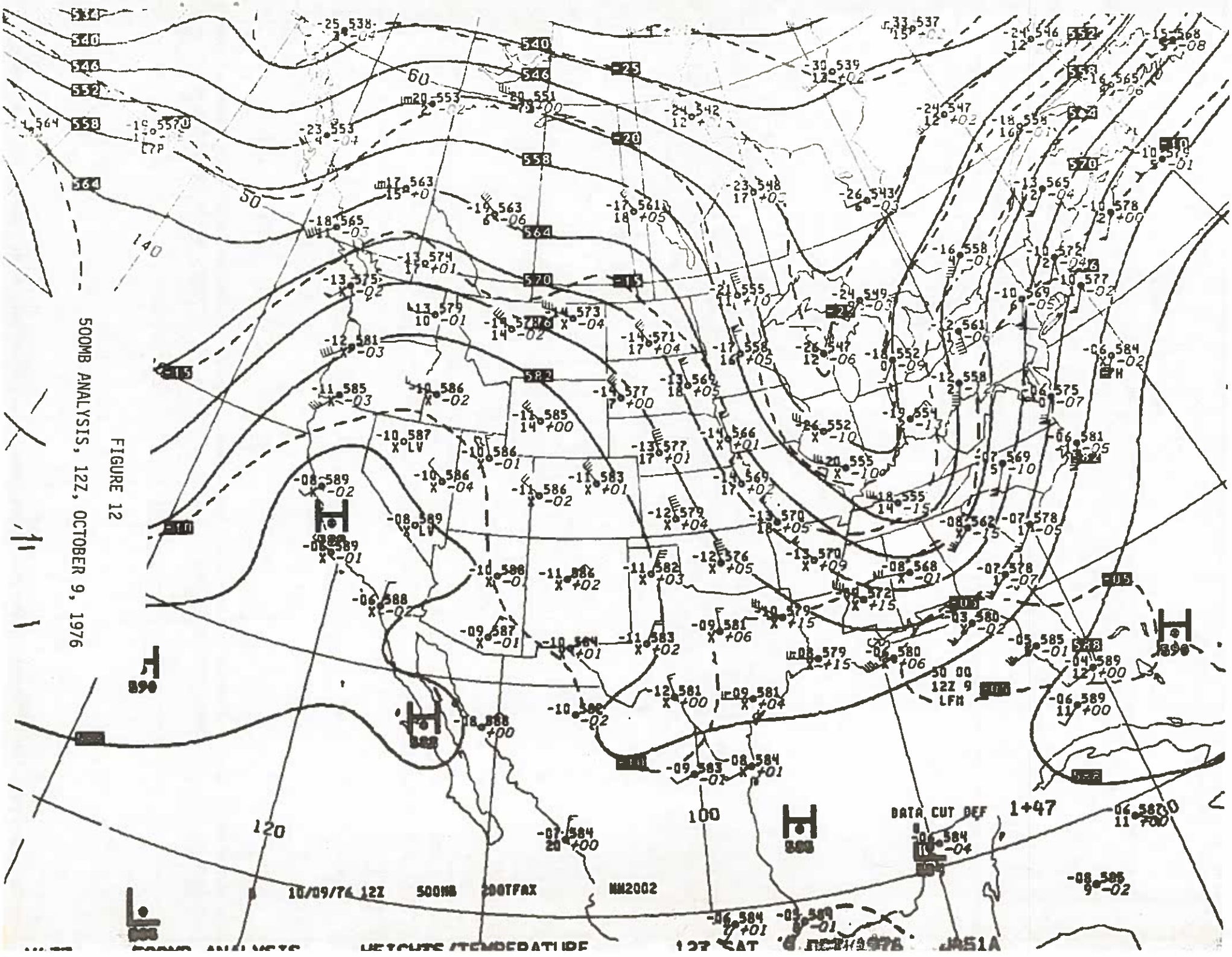


FIGURE 12

500MB ANALYSIS, 12Z, OCTOBER 9, 1976