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REVIEW OF THE NMC NUMERICAL GUIDANCE SUITE IN 1987
AND A PREVIEW OF CHANGES IN 1988
PART IV

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5. General Performance Characteristics of RAFS 1987: Robert Bell

In this section we discuss some strengths and weaknesses of the RAFS noted from operational experience during the year. First, the strengths:

- o Surface pressure. The NGM is particularly good on the maintenance and building of anticyclones at the surface.

- o There has been a major improvement in the low level temperatures. Forecasts in the early days of the NGM frequently featured too much evaporative cooling, causing problems with the subsequent intensity of overrunning since thermal gradients had been artificially tightened. Some qualification of this observation appears necessary. Since October 1987, the NGM is now somewhat too warm at low levels, at least in the eastern half of the U.S. In some heavy precipitation situations, the bias has also been overcorrected to some extent.

- o The NGM is very realistic--and accurate--in forecasting the development of dryslots around occluding cyclones.

- o The NGM generally does a good job of phasing short waves from separate streams into a deeper long wave trough.

These are only some of the strengths noted during the year. On the whole, the RAFS performs at a high level, and gives quite useful guidance. Like all models, it also has weaknesses; some of the most prominent noted during the year are:

- o Contrary to the first winter of RAFS operations when cold air domes swept down the lee of the western mountains and into the Gulf of Mexico much faster and stronger than in the real world, the current version is frequently too slow in this process. This slow spread of cold domes causes errors in low level convergence and the advance of precipitation.

Figures D-1 through D-8 illustrate a typical case in which this occurred. In Figure D-1, the 36 h RAFS surface forecast shows a frontal zone NE-SW through central Texas; the corresponding boundary layer winds (Figure D-2) confirm this. The 24 h 850 mb temperature forecast clearly indicates the front through central Texas, as indicated in Figure D-~~4~~3. The verifying surface analysis (Figure D-5), however, shows that the front had already moved well into the Gulf of Mexico, with a substantial cold ridge over Texas. This is confirmed by the 850 mb analysis verifying the 24 h forecast (Figure D-6). And, of course, no precipitation was observed over Texas in the 12 h period ending 12Z November 26, 1987 (Figure D-7 and D-8).

- We have occasionally noted that the NGM has trouble generating saturation and warm-sector precipitation. This seems especially the case since the correction of the cold bias in October.

- In the recent past, the RAFS has exhibited overdevelopment of short waves into closed circulations. This occurs despite a single, strong, low-amplitude jet and long wave pattern. One result is solutions which are much too slow. An example is shown in Figure D-7. Note the cutoff low formed over the Big Bend region in the 48 h 500 mb forecast. The verifying analysis, Figure D-9, shows the system in the real atmosphere over Missouri. This type of error may be associated with a particular synoptic regime, but if so, it did not afflict the LFM. Figure D-10 shows the 48 h LFM prediction which is much too far south--a common LFM error--but at the right longitude and with much more accurate intensity.

[Editor's Note: The reference to Figure 7 in the last paragraph above is incorrect. The 48-hour RAFS forecast discussed is not shown in any of the figures.]

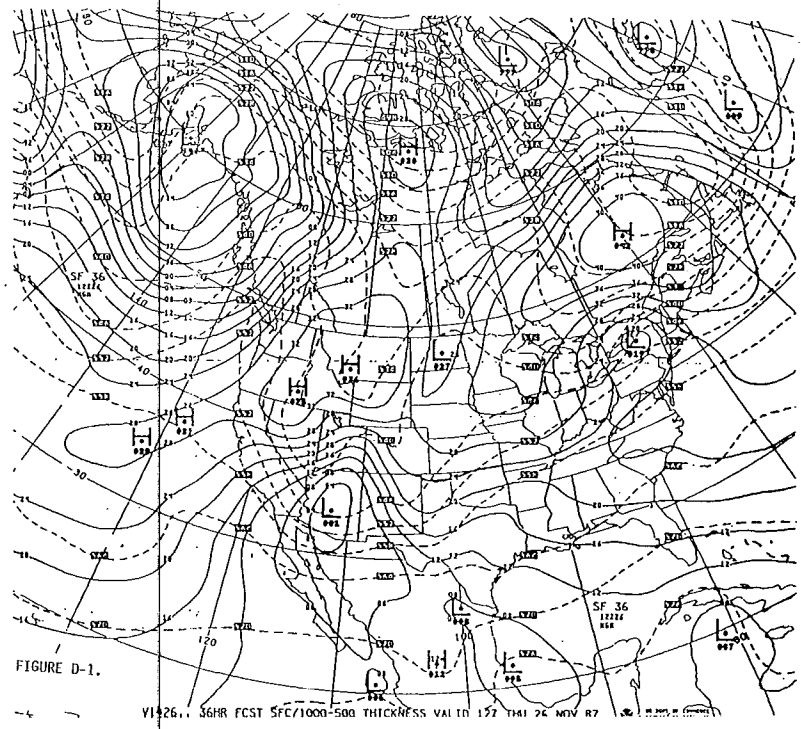

FIGURE D-1.

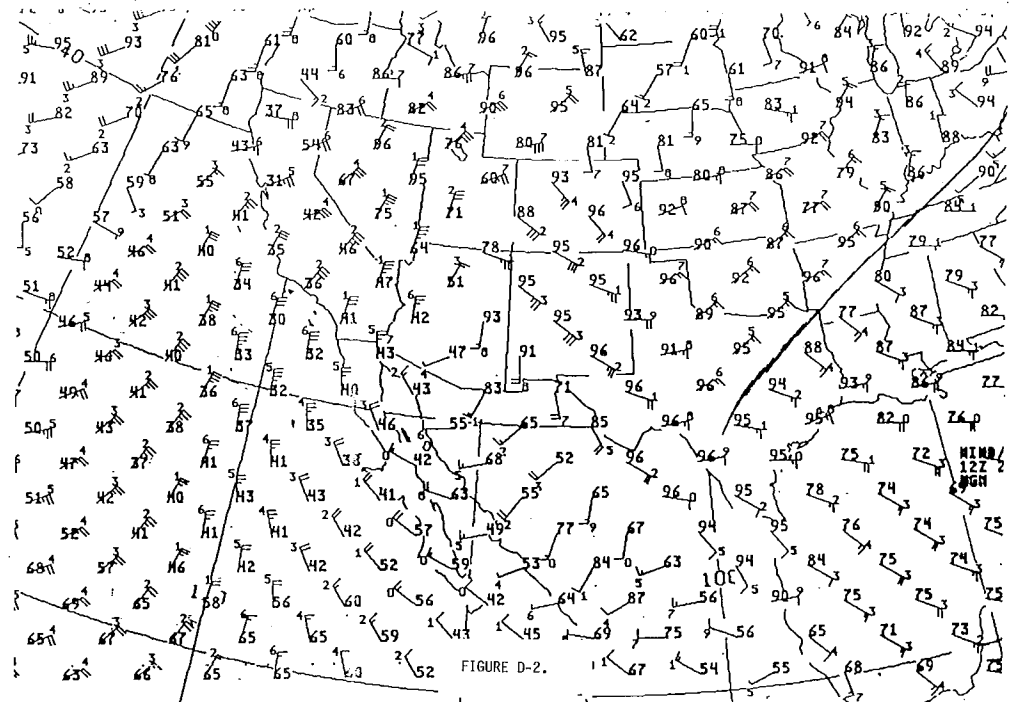

FIGURE D-2.

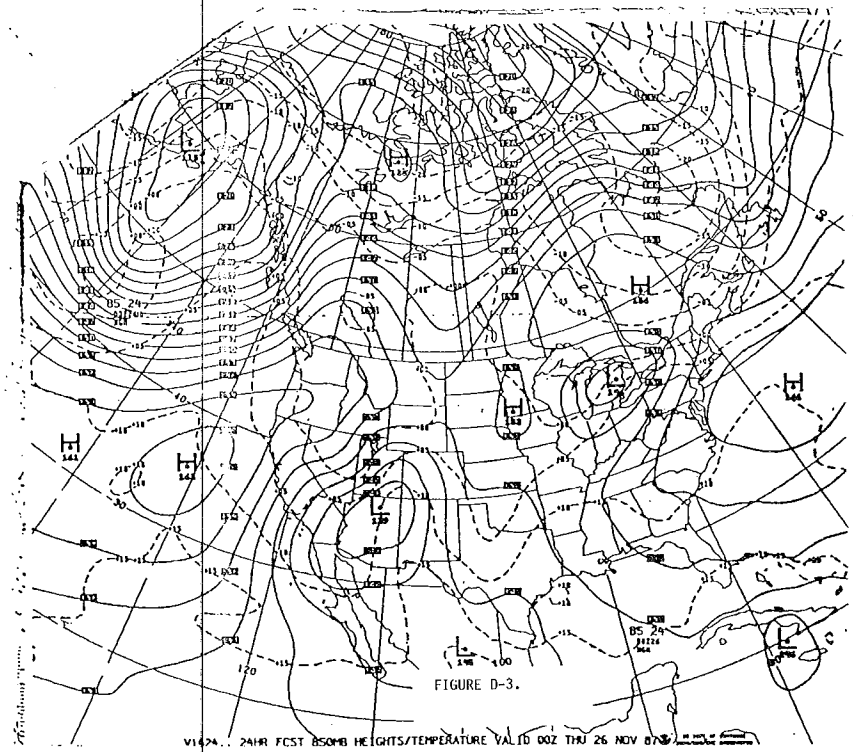

FIGURE D-3.

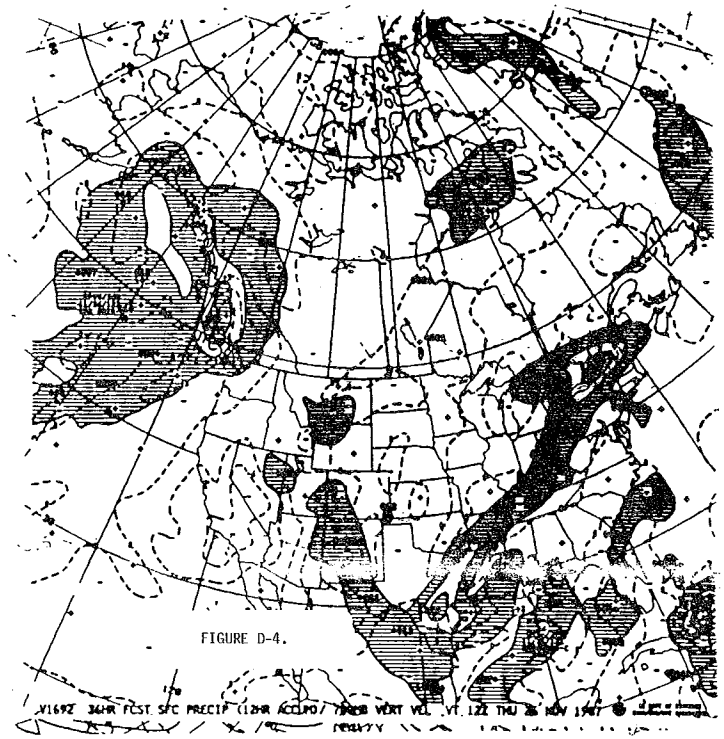

FIGURE D-4.

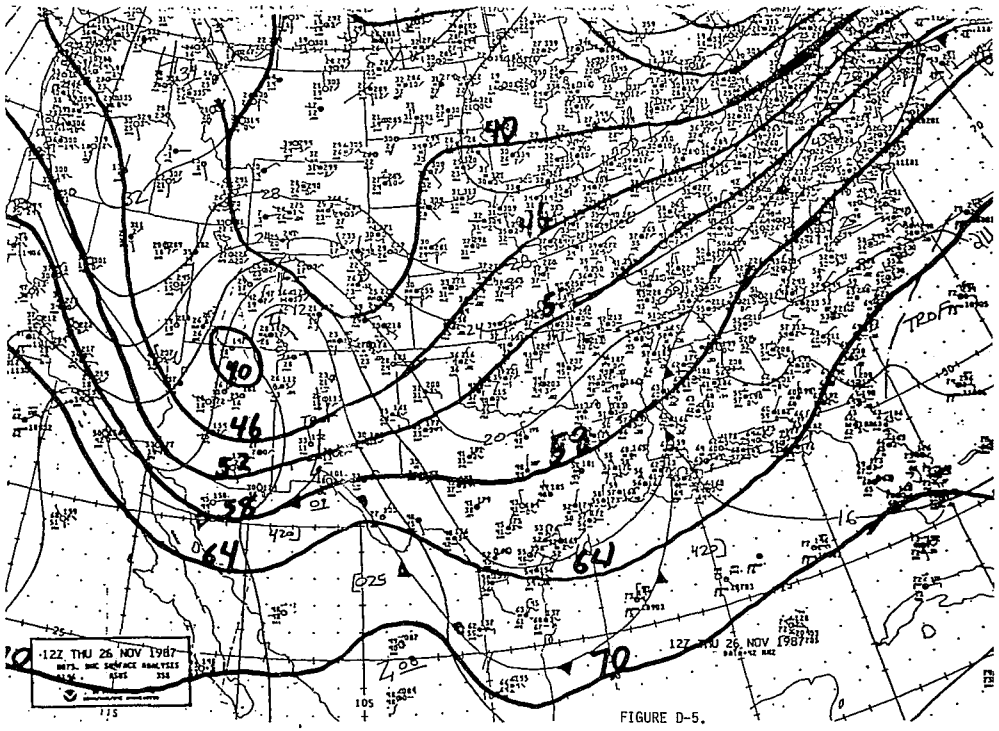

FIGURE D-5.

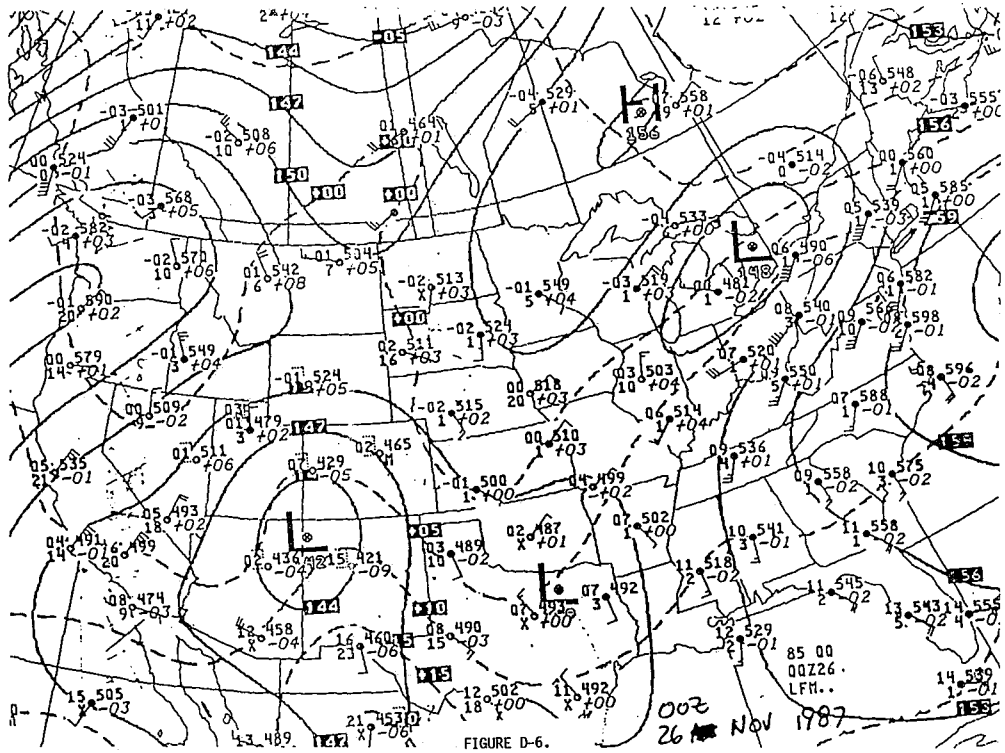

FIGURE D-6.

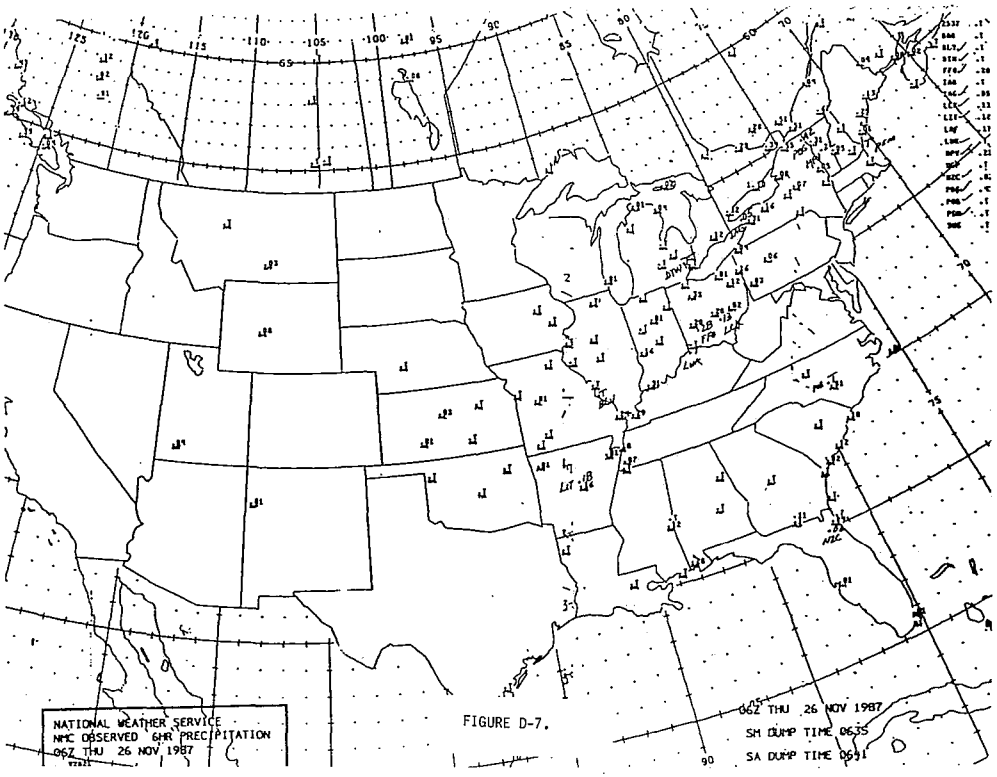

FIGURE D-7.

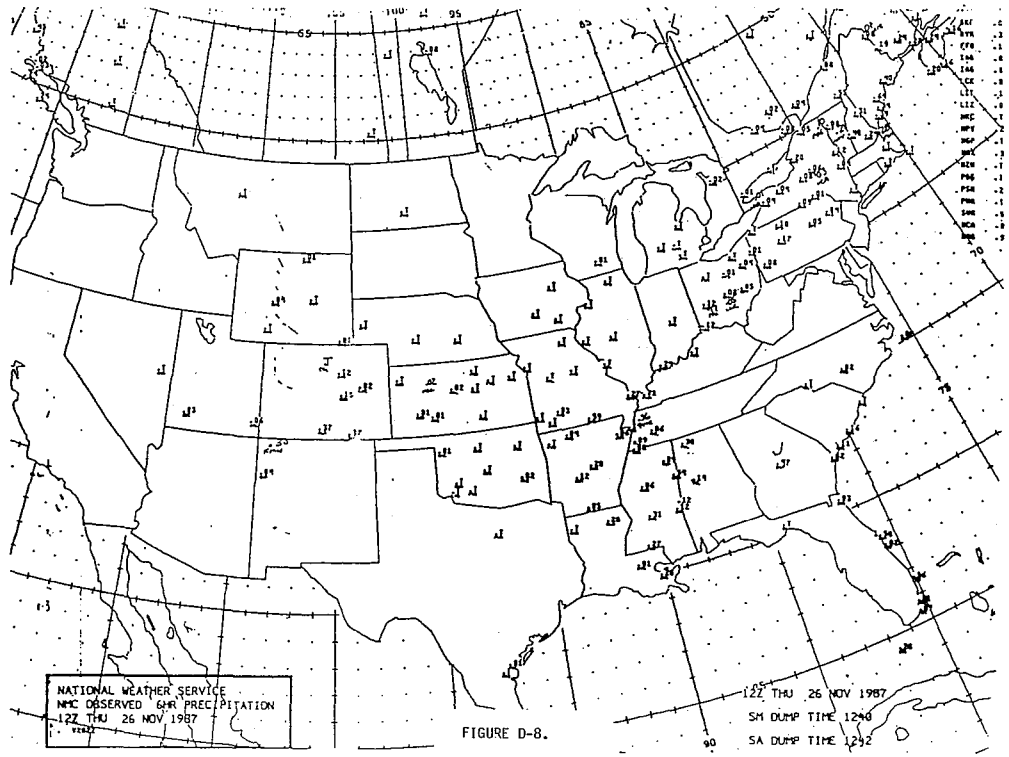

FIGURE D-8.

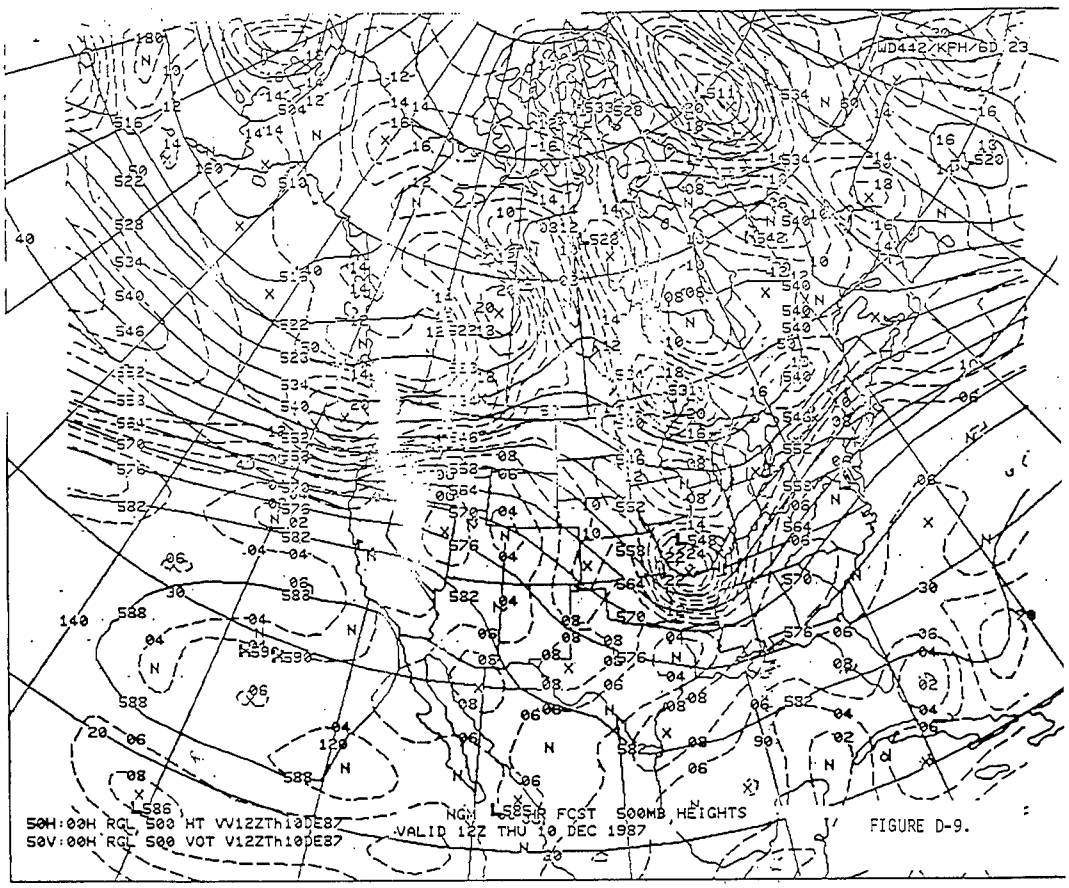

FIGURE D-9.

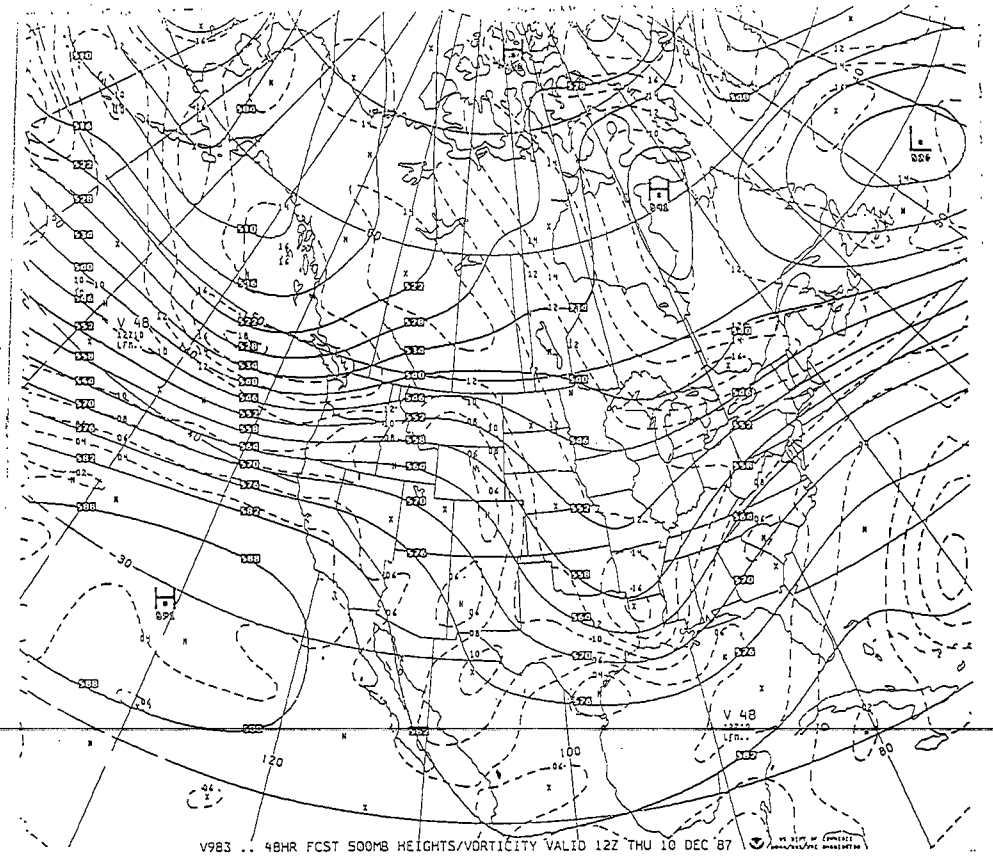

FIGURE D-10.