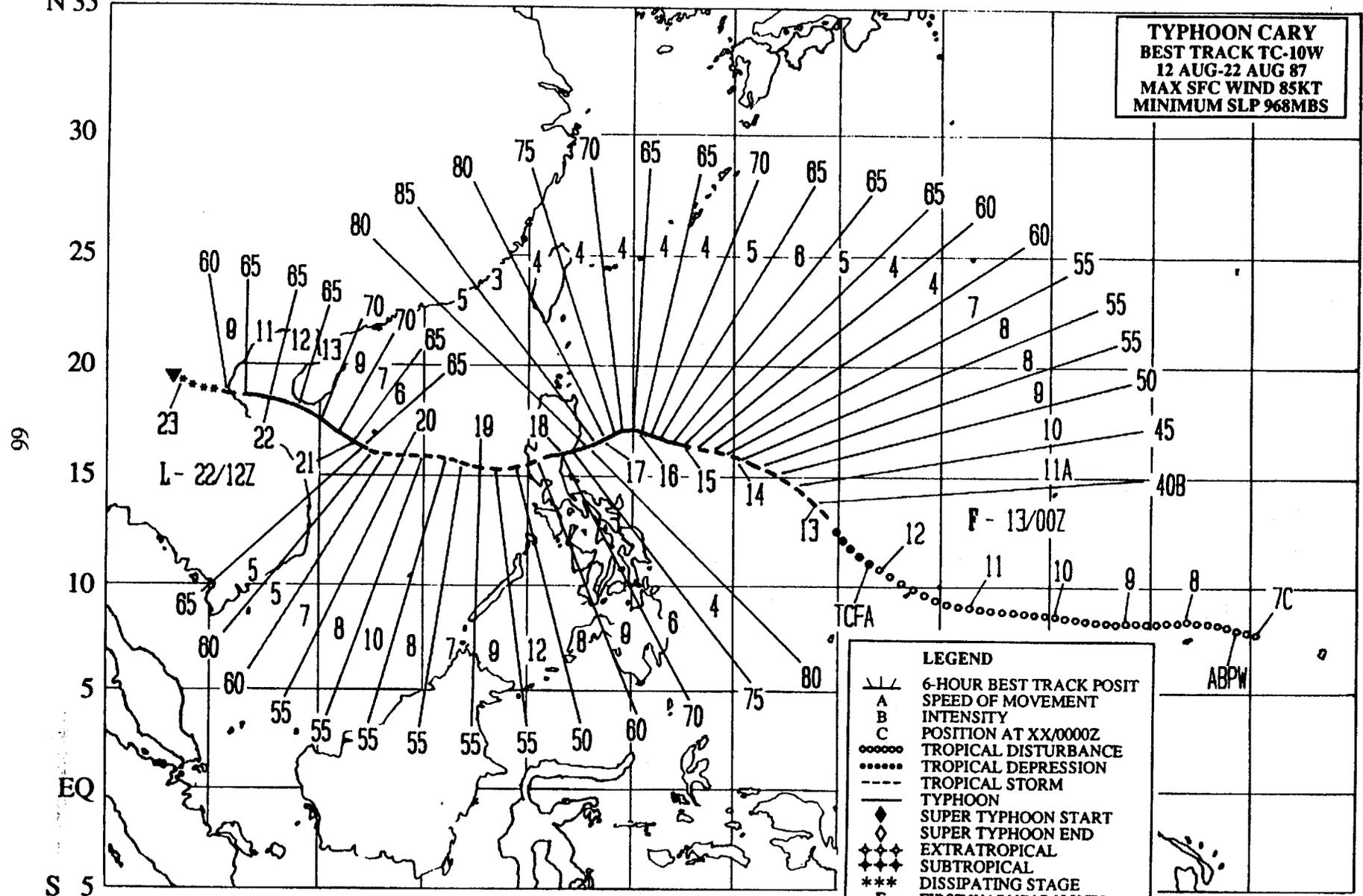


E 100 105 110 115 120 125 130 135 140 145 150 155 160 E
 N 35

TYPHOON CARY
BEST TRACK TC-10W
12 AUG-22 AUG 87
MAX SFC WIND 85KT
MINIMUM SLP 968MBS



LEGEND

- 6-HOUR BEST TRACK POSIT
- A SPEED OF MOVEMENT
- B INTENSITY
- C POSITION AT XX/0000Z
- TROPICAL DISTURBANCE
- TROPICAL DEPRESSION
- TROPICAL STORM
- TYPHOON
- ◆ SUPER TYPHOON START
- ◇ SUPER TYPHOON END
- ◆◆◆◆ EXTRATROPICAL
- ◆◆◆◆ SUBTROPICAL
- *** DISSIPATING STAGE
- F FIRST WARNING ISSUED
- L LAST WARNING ISSUED

TYPHOON CARY (10W)

Typhoon Cary was the second significant tropical cyclone to develop in August. It shared the western North Pacific with Super Typhoon Betty (09W) for four days; coexisted with Super Typhoon Dinah (11W) for one and a half days, and then was part of the first three-storm situation of 1987 for 12-hours with Dinah (11W) and Tropical Storm Ed (12W).

Cary was first identified on the 6th of August as an area of convection, that persisted longer than usual in the monsoon trough 200 nm (370 km) to the southwest of the island of

Pohnpei in the eastern Caroline Islands. As a result, the cloud system was placed on the Significant Tropical Weather Advisory (ABPW PGTW) at 070600Z. The system remained broad and poorly organized over the next four days. By the 12th, upper-level outflow had improved and was unrestricted in all quadrants. Additionally, satellite intensity analysis (Dvorak, 1984) showed winds of 25 kt (13 m/sec). A Tropical Cyclone Formation Alert (TCFA) followed at 120300Z.

Aircraft reconnaissance at 122302Z estimated the maximum surface winds at 55 kt

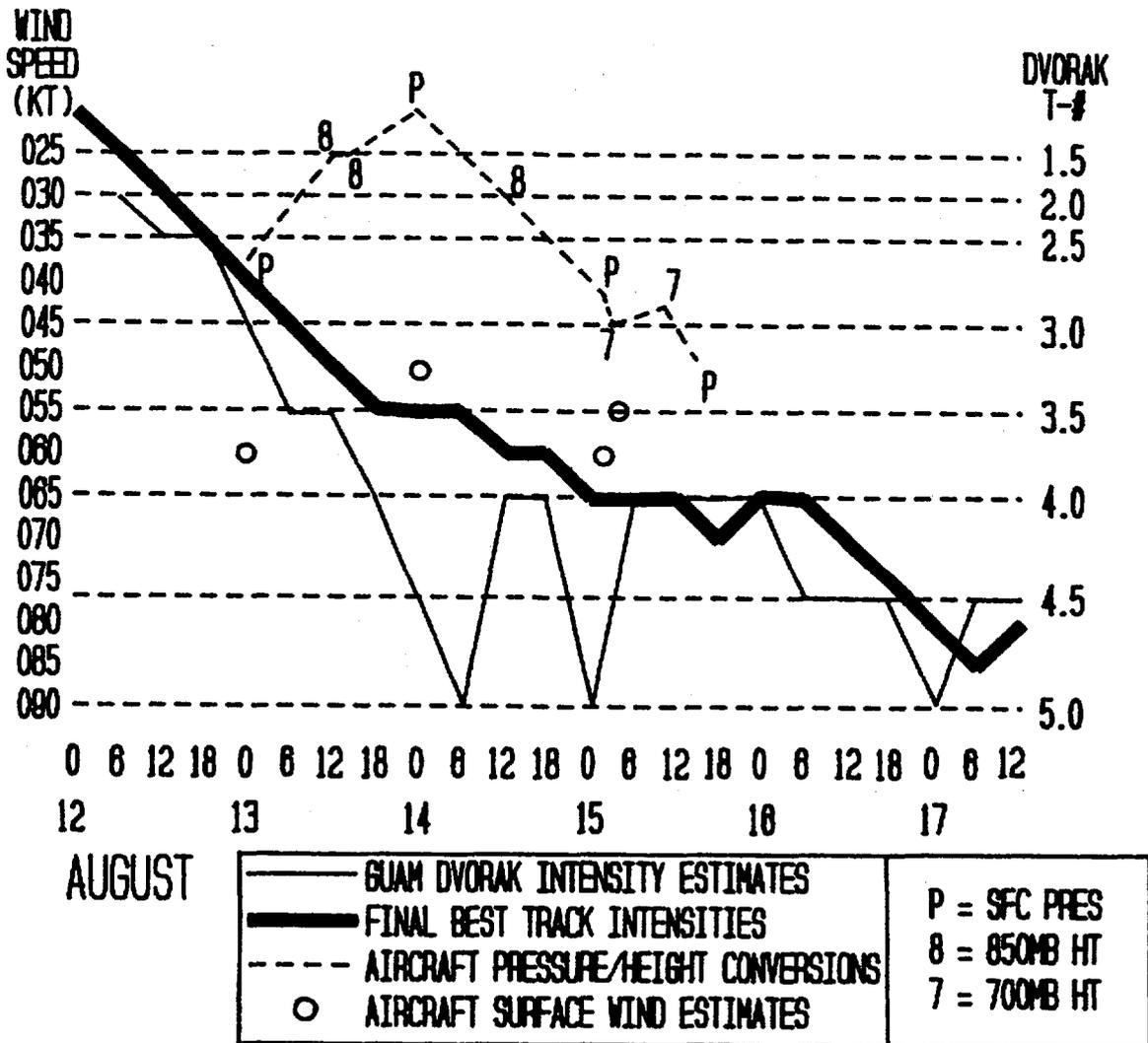


Figure 3-10-1. Time series from 120000Z to 171200Z October showing the natural scatter of raw intensity data and the resulting final best track intensities.

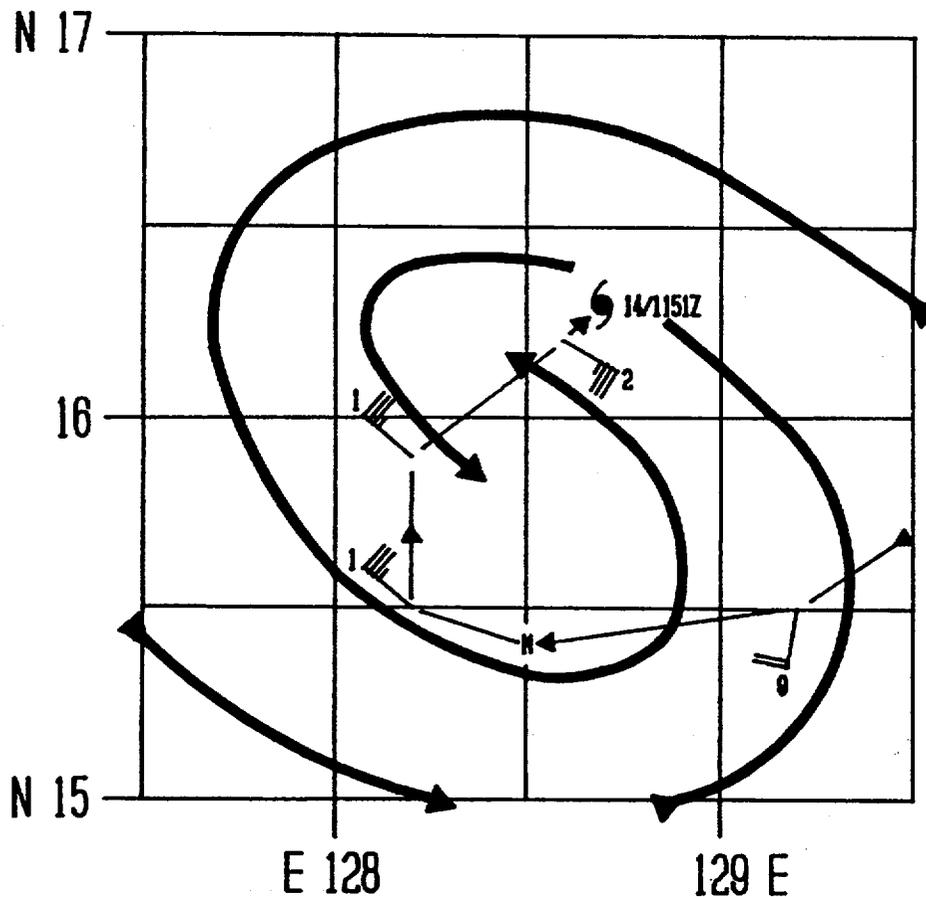


Figure 3-10-2. Plot of data from an aircraft reconnaissance mission at 141151Z August, indicating that the circulation center at flight level (850 mb) was about 18 nm (33 km) to the south of the aircraft fix position.

(25 m/sec), but the minimum surface pressure reported was only 996 mb, which usually supports a maximum wind speed of 37 kt (19 m/sec). At 121800Z, satellite intensity analysis determined that Cary's intensity was 35 kt (17 m/sec). Subsequent satellite intensity analysis, six hours later, indicated that Cary had winds of 45 kt (23 m/sec). Based on these intensity estimates the first warning on Tropical Storm Cary was issued at 130000Z with winds of 50 kt (26 m/sec) gusting to 65 kt (33 m/sec). Post-analysis revealed that Cary most probably had an intensity of 40 kt (21 m/sec) at the time of the first warning, and had reached tropical storm intensity six hours earlier at 121800Z.

The synoptic feature that dominated the low-level steering flow was the subtropical

ridge to the north. With Cary embedded in the monsoon trough east of Super Typhoon Betty (09W), the initial forecast reasoning was for Cary to track northwestward south of the ridge, closely paralleling the track of Betty (09W). The intensity was expected to increase at a normal rate, but the initial intensification and development of Cary was inhibited by Betty (09W) to the west. As Betty (09W) began to weaken as it crossed the Philippine Islands, Cary's upper-level outflow improved enough to allow development.

Satellite intensity analysis over the next 36-hours indicated that Cary developed rapidly to 90 kt (46 m/sec) at 140600Z. Post-analysis revealed that the satellite-derived intensity estimate ("T-number") was incorrect -



Figure 3-10-3. Typhoon Cary at near maximum intensity and approaching landfall on the island of Luzon (170036Z August DMSP visual imagery).

the diameter of the cold convective cover was misinterpreted as the diameter of a central dense overcast. Aircraft reconnaissance during the same period indicated that Cary was weakening (see Figure 3-10-1). Aircraft reconnaissance at 140029Z reported maximum winds of 50 kt (26 m/sec), however, a minimum sea-level pressure of only 1004 mb was reported, which normally supports only 21 kt (11 m/sec). Aircraft reconnaissance at 141151Z found 850 mb winds of 36 kt (19 m/sec) and an 850 mb height of only 1425 meters, which extrapolated to about

1000 mb surface pressure and surface winds of 30 kt (15 m/sec). The accuracy of the latter fix was especially questionable since the flight-level winds did not support the position in the vortex data message as being the low-level center. Additionally, the Aerial Reconnaissance Weather Officer indicated there was frequent lightning in all quadrants, possible multiple centers and that a penetration of the center was not feasible on this mission. Possibly the 850 mb fix (as indicated on Figure 3-10-2) should have been made about 18 nm (33 km) to the south as shown by the streamline analysis. Also, the excessive scatter (see Figure 3-10-1) of the intensity data acquired by different platforms during this phase of Cary's life is not often observed.

The last scheduled western North Pacific aircraft reconnaissance mission was flown on the 15th of August. At 151405Z, the maximum 700 mb winds reported were 61 kt (31 m/sec), and the 700 mb height was 3007 meters. This corresponds to about a 990 mb surface pressure and 46 kt (24 m/sec) winds. These values represented the strongest winds and lowest pressures found by aircraft reconnaissance on this system. Earlier Dvorak intensity estimates at 150600Z showed winds of 90 kt (46 m/sec). Post-analysis settled on a maximum wind of about 70 kt (41 m/sec) at 151800Z (see Figure 3-10-1).

Cary reached its maximum intensity of 85 kt (44 m/sec) at 170600Z, shortly before making landfall on eastern Luzon (Figure 3-10-3). The intensity dropped from 85 kt (44 m/sec) to 50 kt (26 m/sec) as Cary crossed the Philippine Islands. Extensive flooding was reported in the northern Philippine Islands. There were no reports of casualties.

Cary continued onward across the South China Sea and reintensified to 70 kt (36 m/sec) just southeast of the island of Hainan. The closest point of approach was 15 nm (28 km) to the south of Hainan at 211800Z. Cary then tracked toward the west through the Gulf of Tonkin and swept into northern Vietnam at 221200Z. The final warning was issued at that time. The dissipating system with its residual vorticity and moisture tracked northwestward over land into Burma before finally losing its identity on satellite imagery.