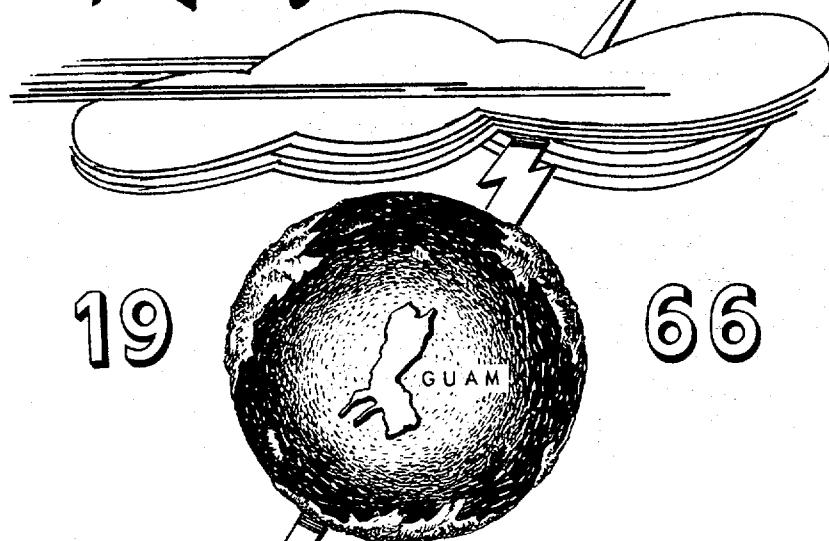


ANNUAL TYPHOON *Report*



FLEET WEATHER CENTRAL/JOINT TYPHOON WARNING CENTER
Guam, Mariana Islands

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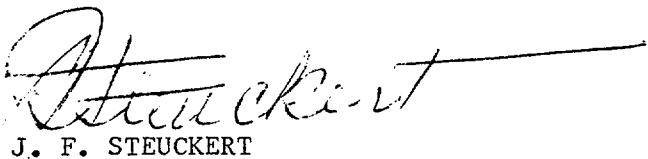
1966
ANNUAL TYPHOON REPORT

U. S. FLEET WEATHER CENTRAL/
JOINT TYPHOON WARNING CENTER
COMNAVMARIANAS BOX 12
FPO SAN FRANCISCO 96601

FWC/JTWC:ELG:jeh
3140
Ser: 59
10 February 1967

From: Commanding Officer, U. S. Fleet Weather Central/Joint Typhoon Warning Center, Guam
To: Chief of Naval Operations
Via: Commander in Chief, U. S. Pacific Fleet
Subj: Annual Typhoon Report, 1966; submission of
Ref: (a) OPNAV Instruction 3140.17E of 29 Oct 65
(b) SECNAV Instruction 5600.16 of 2 Nov 60

1. The Annual Typhoon Report, 1966, is submitted herewith in accordance with reference (a).
2. During calendar year 1966, a total of 20 typhoons, 10 tropical storms and 8 tropical depressions were detected in the Western North Pacific area between 180° longitude and the Malay Peninsula, north of the equator, for which 752 warnings were issued. 1966 was an unusual year in that tropical cyclone development occurred farther north than normal when compared with previous years. Also, as a result of the relatively flat pressure gradient throughout the Western North Pacific, storm tracks were noticeably scattered and erratic during the 1966 season.
3. Reference (a) directed the Fleet Weather Centrals at Pearl Harbor and Alameda to forward summaries of tropical cyclones in their areas to the Fleet Weather Central/Joint Typhoon Warning Center, Guam, for inclusion in the subject report. Fleet Weather Central Alameda issued a total of 296 warnings on 7 hurricanes, 6 tropical storms and 5 tropical depressions in their area of responsibility. Fleet Weather Central Pearl Harbor issued a total of 46 warnings on two hurricanes, one tropical storm and one tropical depression. A complete summary of tropical cyclones east of 180 degrees longitude is included in Annex A with the exception of Tropical Depression 22 which is included in the FWC/JTWC Guam portion of the report.
4. This report has been reviewed and approved in accordance with reference (b).


J. F. STEUCKERT

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COMSERVPAC (2)	55WRS (1)
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FOREWARD

This report is published annually and summarizes Western North Pacific Tropical Cyclones. Annex A is added to summarize Tropical Cyclones from 180 degrees eastward to the North American Coast.

When directed by CINCPAC in May 1959, CINCPACFLT redesignated Fleet Weather Central Guam as Fleet Weather Central/Joint Typhoon Warning Center (FWC/JTWC), Guam with the following responsibilities:

1. To provide warnings to U. S. Government agencies for all tropical cyclones west of 180 degrees longitude north of the equator to the Asiatic coast and Malayan Peninsula.
2. To determine tropical cyclone reconnaissance requirements and assign priorities.
3. To conduct investigative and post analysis programs including preparation of the Annual Typhoon Report.
4. To conduct tropical cyclone forecasting and detection research as practicable.

Fuchu Air Force Weather Central, coordinating with Fleet Weather Facility Yokosuka was designated as alternate JTWC in case of failure of FWC/JTWC Guam.

The JTWC, which is an integral section of FWC/JTWC Guam, is staffed by three Air Force and three Navy meteorologists and three enlisted men from each service. The senior Air Force Officer has been designated as the Director, JTWC.

The Joint Hurricane Warning Center in Hawaii, a coordinated agency composed of the U. S. Weather Bureau, Honolulu, the Air Force Kunia Weather Center, and Fleet Weather Central Pearl Harbor, is responsible for surveillance and issuance of warnings in the Central North Pacific area north of the equator between 180 degrees and 140 degrees west.

The Fleet Weather Central, Alameda, California, is responsible for issuance of warnings between 140 degrees west and the North American Coast.

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CHAPTER I

OPERATIONAL PROCEDURES

A. GENERAL

Within Fleet Weather Central/Joint Typhoon Warning Center (FWC/JTWC), the responsibility for the basic analyses of the various charts lies with Fleet Weather Central (FWC). Surface prognoses are also prepared by FWC. Fleet Numerical Weather Facility (FNWF), Monterey, California, furnishes Northern Hemispheric computer analyses, prognoses and tropical cyclone steering trajectories. Joint Typhoon Warning Center (JTWC) is responsible for meso-analysis, typhoon forecasts and warnings.

B. ANALYSES

1. FWC:

a. Types of contour (c) and/or streamline (s) charts with standard times:

- (1) Surface; 0000Z, 0600Z, 1200Z and 1800Z (c).
- (2) Gradient level (2000 to 3000 ft. above ground); 0000Z, 0600Z, 1200Z and 1800Z (s).
- (3) 850mb; 0000Z and 1200Z (s).
- (4) 700mb; 0000Z and 1200Z (s) & (c).
- (5) 500mb; 0000Z and 1200Z (s) & (c).
- (6) 300mb; 0000Z and 1200Z (c).
- (7) 200mb; 0000Z and 1200Z (s).
- (8) Sea Surface Temperature Chart; 5-day mean composite updated once daily.

b. Other analyses:

- (1) Checkerboards or Stidd Diagram.
- (2) Time Cross-Sections.
- (3) Selected Upper Air Soundings.
- (4) Arowagram for Guam.
- (5) Nephanalyses.

2. JTWC:

a. Meso-analyses:

- (1) Sectional surface charts; hourly and 3-hourly as required.
- (2) Reconnaissance reports.
- (3) 700mb; 0000Z and 1200Z, 10-meter interval analysis (c).
- (4) 500mb; 0000Z and 1200Z, 20-meter interval analysis (c).
- (5) Stidd Diagram for selected stations as required.

b. Satellite Data:

Facsimile cloud photographs were received by the FWC APT ground equipment from ESSA II and NIMBUS weather satellites. Also, nighttime infrared data was received from NIMBUS. These data were very useful for initial identification of the tropical cyclone and in determining its location and stage of development. In addition, tropical cyclone bulletins, which gave the location and coded description of the disturbance, were received from the National Weather Satellite Center (NWSC).

c. Land Radar:

Land radar reports were used in conjunction with aircraft reports whenever possible. These reports included range and bearing of the eye from the reporting station, eye characteristics and occasionally the direction, speed and movement of the eye. A combination of attenuation, operator inexperience and the fact that the radar could see only the tops of distant storms made land radar reports obtained at long ranges often inaccurate. However, as the storms approached the radar stations, the accuracy usually improved markedly.

C. FORECAST AIDS:

1. Climatology

The following climatological publications are utilized:

a. Climatological Aid to Forecasting Typhoon Movement (1st Weather Wing).

b. Annual Typhoon Report, 1965 (covering years 1953-1965; FWC/JTWC).

c. Western Pacific Typhoon Tracks 1950-1959 (FWC/JTWC).

d. Far East Climatic Atlas (1st Weather Wing - February 1963).

e. Tropical Cyclones in the Western Pacific and China Sea Area (Royal Observatory, Hong Kong). This comprehensive publication covers 78 years of typhoon tracks.

2. Persistence

3. Computer Products:

During the 1966 typhoon season, the following computer products were utilized:

a. From FNWF: (1) Steering trajectories or forecast positions for 6, 12, 18, 24, 36, 48 and 72 hours for tropical cyclones as requested by JTWC for reconnaissance fixes at 0300Z and 1500Z.

(a). Three trajectories are provided: 1. 1000mb steering, 2. 500mb steering and 3. 500mb modified steering. The 500mb modified steering is furnished to account for empirically determined weaknesses in the 500mb steering model. The program for the above is presented in "Computer Products Manual, Technical Note No. 21" by LCDR R. E. Hughes, at Fleet Numerical Weather Facility pages 3.26-1 through 3.26-3, dated July 1966. A steering trajectory for 700mb is expected to be available during the 1967 season.

(2) The following listed products are utilized when applicable:

- (a) Surface isobaric analyses; 00Z and 12Z.
- (b) 700mb, 500mb, 300mb, and 200mb contour analyses; 00Z and 12Z.
- (c) Surface, 700mb, 500mb, 300mb, and 200mb 24, 36 and 48 hour prognoses.
- (d) 500mb isotach analyses; 00Z and 12Z.
- (e) 500mb 12 and 36 hour isotach prognoses.

b. From NMC, Suitland:

(1) NWP Barotropic prog positions for typhoons for 12, 24, 36, 48, 60 and 72 hours were received when, in the opinion of NWP, the Computer produced progs were reasonable.

4. Objective Methods:

During the 1966 typhoon season, the following individual objective methods were used by JTWC:

- a. WANG - Using 700mb data.
- b. AROWA - Using 700mb and/or 500mb data.
- c. FAIRLESS - Using surface data.
- d. TSE - Using 700mb data.

(1) This new method was used near the end of the typhoon season and the results compared favorably with other objective techniques. The initial steps in the calculations are similar to that of the AROWA method but the big factor in favor of the Tse method is the addition of the "over-all synoptic pattern which makes allowance for the stage of storm development, the size of the storm, and the interaction between storm's circulation and the basic current as well as the influence of the nearby storms or other significant disturbances." For further detail on the method the reader is referred to "A New Method for the Prediction of Typhoon Movement Using the 700mb Chart", by S.Y.W. Tse in the Quarterly Journal of the Royal Meteorological Society, Vol. 92, No. 392, pages 239 through 253, dated April 1966.

5. Coordination:

When a tropical cyclone for which warnings are being issued is north of 25N, Fuchu Air Force Weather Central transmits position forecasts twice daily to JTWC which are used for comparison and consideration prior to issuance of the JTWC warning. Coordination with other Air Force and Navy activities is on an "as required" basis depending upon the location of a particular tropical cyclone.

D. WARNINGS:

Warnings are filed and transmitted every six hours at synoptic times of 0000Z, 0600Z, 1200Z and 1800Z. In accordance with CINCPAC Instruction 3140.1G the message contains the present warning position of the tropical cyclone which is valid for the scheduled transmission time. Therefore, the 24 and 48 hour warning forecast positions are actually 30 and 54 hour forecasts from the last synoptic time.

The warning position of a tropical cyclone is actually a short range forecast from the last "best" position. The last "best" position is usually about 3 hours old based on land radar or reconnaissance fixes, 3 to 6 hours old based on surface synoptic reports, or 6 to 12 hours old based on upper air synoptic reports. It is for this reason that the 0600Z warnings, for example, may not agree with the position of the tropical cyclone as indicated by the 0600Z analysis. Amendments are issued when this difference is significant.

The numbering of tropical warnings run consecutively regardless of whether the cyclone is upgraded or downgraded from tropical depression, tropical storm or typhoon. If warnings are discontinued and the circulation regenerates, the new series of warnings are numbered consecutively from the number of the last warning of the previous series. Amendments and corrections which are issued as required are given the same numbers as the warning which they amend or correct.

All 24, 48 and 72 hour forecasts made when a tropical cyclone is of tropical storm or typhoon intensity are verified against the "best track" as determined in post-cyclone analysis.

The 1966 verification summary is contained in Chapter IV.

E. FORECASTING PROCEDURE:

In preparation for issuance of the initial warning on a tropical cyclone, a track based on climatology is developed. This track is prepared for a time interval of 4 or 5 days at the speed indicated by climatology. Next, the track is modified in accordance with the existing and forecast upper air pattern, after which the initial warning is prepared and issued.

The basic forecasting technique used throughout the 1966 season was a subjective modification of the numerical steering prediction. Modifications were based on climatology and subjective evaluations of meso-analyzed 700mb and 500mb charts.

If the steering forecast looked reasonable, it was then checked for consistency with climatology and past history. The upper air charts were checked for areas of maximum divergence, areas offering the least resistance to the forward motion of the storm and the 700mb height criteria of Wang. An AROWA grid computation was made on the 700mb chart for most forecasts. In addition, a FAIRLESS computation was made on the surface chart for most forecasts, especially in the early stages. A TSE computation was also made for the storms near the end of the season.

A subjective integration of all the factors listed above was then used to establish or modify the forecast track of the storm. Speed of movement was then forecast from history, climatology, and the steering forecast.

CHAPTER II

RECONNAISSANCE

A. GENERAL

Land stations in the tropical Pacific are sparse. Although additional observing units are expected to be installed at strategic locations in the future, the stations will continue to remain widely scattered. Ships which transmit observations are usually concentrated along the shipping lanes which generally do not pass through the areas of formation and development of tropical systems. Also, ships which are near a system will normally take evasive action as soon as the first warning is received. The pictures received from the ESSA II and NIMBUS Satellites have proven to be a tremendous aid, especially in first locating suspect areas. However, the satellites cannot report the winds, pressures, and other important data needed to properly analyze a tropical cyclone. Aerial reconnaissance thus remains the only method available which provides sufficient surface and upper air data for complete and proper analysis of a tropical cyclone.

Reconnaissance aircraft are able to remain in the area of a storm to provide an accurate position and to report the various storm characteristics such as eye shape, intensity, etc. By taking dropsondes or making ascent or descent soundings the aircraft is able to obtain the lapse rate profile to the surface, heights of standard levels, sea level pressures, and temperature and dew point at any level.

The accuracy of tropical warnings is directly related to the quality and quantity of reconnaissance data received from the aircraft. Continuous surveillance of tropical systems is of the utmost importance in order to insure that warnings are issued in time to facilitate proper preparations for safeguarding life and property.

B. RECONNAISSANCE RESPONSIBILITY

During 1966 two squadrons were assigned the responsibility of tropical cyclone reconnaissance to meet the requirements of the Joint Typhoon Warning Center, Guam. These squadrons were the U. S. Navy Airborne Early Warning Squadron One (VW-1), equipped with EC121K aircraft based at the Naval Air Station, Agana, Guam and the U. S. Air Force 54th Weather Reconnaissance Squadron (54WRS), equipped with WC-130 aircraft based at Andersen Air Force Base, Guam.

C. EVALUATION OF DATA

During the 1966 season four fixes per day were normally scheduled on typhoons and tropical storms. Tropical Depressions were scheduled for one

or more fixes per day depending on location, potential, and feasibility of radar coverage.

In general, low or intermediate (1500ft or 700mb) level fixes were made by VW-1 at 0900Z and 1500Z and intermediate (700mb) level fixes were made by the 54WRS at 2100Z and 0300Z. High level (500mb) fixes were made on storms over high terrain. In addition to the fixes, both squadrons flew synoptic and investigative flights throughout the year.

Aerial reconnaissance can be divided, according to data gathered, into three categories: peripheral data, eye data from penetration, and eye data from radar.

Peripheral data is all information reported enroute to and outside the eye of the storm. It includes weather, sea level pressure if aircraft is at low level or pressure-height if at mid or high level, a complete description of clouds including types, amount and height of bases and tops if feasible, flight altitude wind, temperature and dew point, and the surface wind if the sea surface is visible. Dropsonde data were also provided. This same type of data is provided on all synoptic tracks and investigations. The WC-130 usually flew at 700mb but on occasion flew at 500mb, or 1500 ft. EC121K aircraft normally flew either at 1500 feet or 700mb, but at times mountainous terrain required the flight to be at 500mb.

Eye data from penetration includes all information reported in peripheral data plus eye size, shape, description, slope, cloudiness, maximum flight level wind, surface wind and surge, if any, and other remarks which might be of help to the forecaster such as feeder band description, direction and speed of movement of the center, etc. If possible, a dropsonde is also made in the eye.

Eye data from radar provide a description of the radar eye and its locations, including description of spiral bands and height and width of the wall clouds. Also included is the aircraft position at the time the radar observation is taken and the maximum observed winds if possible.

On all eye messages a center selection evaluation of either "Positive", "Fair" or "Poor" is given along with an estimate of the navigation accuracy of the fix and a statement of the type of navigation fix used by the aircraft. These were used by JTWC as a guide in evaluating fix accuracy. With radar fixes from a considerable distance, attenuation can distort the radar image; therefore, this must be considered when evaluating the fix.

During 1966, daylight penetrations were made on all but a few of the most severe storms. When possible, EC121K aircraft also penetrated the

storms for the night fixes. These penetrations were normally made at 1500 ft or below on the evening fix and 700mb at night.

AIRCRAFT RECONNAISSANCE DATA

(Number of Fixes and Investigations)

1961	1962	1963	1964	1965	1966
350	496	465	772	666	674

In addition there were 197 synoptic tracks flown by the two squadrons during 1966.

The information received from the aircraft was continually checked for consistency and accuracy. Where possible, JTWC graphs and other aids were used to check and compare data with previous reports. Verification was immediately requested from the observing aircraft on any apparent discrepancy in the data.

D. COMMUNICATIONS

The primary means of communications between ground and reconnaissance aircraft was voice single sideband for 54WRS. VW-1 commenced the year using radiotelegraph (CW) and converted to voice single sideband early in the season. Andersen Airways (AIE2), Guam was the primary air to ground station for aircraft using single sideband. Naval Communications Station, Guam was the primary station for aircraft using CW. Clark Airways, (AIC2), Republic of the Philippines, Fuchu Airways (AIF2), Japan, and Kadena Airways (AID2), Okinawa, were the secondary air to ground stations. Naval Communications Station, Philippines, and Naval Communications Station, Japan acted as secondary CW stations. Data received by AIE2 and NCS Guam were relayed to JTWC by the local circuit 3L28. This circuit also connects VW-1, 54WRS, and Naval Air Station, Agana, Guam. Data received by AIC2, AIF2, and AID2 were normally phoned to JTWC, followed by a message transmitted through the Defense Communications System. Data received at the Naval Communications Stations in the Philippines and Japan were relayed to JTWC by the NTX system.

When aircraft were in contact with AIE2 or NCS Guam the eye reports were normally received by JTWC in sufficient time to allow the forecaster to make a comprehensive study of the information prior to warning time. However, when the aircraft had to communicate through one of the secondary stations there were many cases of excessive delay in receipt of the eye data. In some instances, it was not received until after warning time.

This problem was alleviated to a certain extent in the South China Sea area by requesting the air to ground station to pass the eye data to Fleet Weather Facility, Sangley Point immediately after receipt. Sangley would then relay the data to JTWC over the teletype circuit connecting FWF, Sangley Point and FWC/JTWC, Guam. The air to ground stations also aided greatly by phoning the eye reports to JTWC via the Joint Overseas Switchboard. If, however, the secondary ground stations relied solely on the NTX system in transmitting eye data to JTWC, the excessive delay in most cases made it impossible for a thorough analysis of the information before warning time.

Late in the season a test was conducted jointly by VW-1, NCS,Guam, and JTWC in which reconnaissance data were transmitted directly from the aircraft to JTWC utilizing receivers and transmitters at NCS Guam. This method proved to be efficient and quite acceptable and more tests are planned for the future. If the necessary equipment and frequencies to be used exclusively for Tropical Cyclone Reconnaissance are approved by CNO it is expected that practically all communication problems presently encountered will be reduced to a minimum.

The following statistics show the delays between time of fix and time of first receipt at JTWC. The methods used in getting the fix to JTWC are shown for comparison.

DELAY IN RECEIPT OF RECONNAISSANCE FIX DATA FOR 1966

METHOD	NUMBER OF CASES	MAX DELAY TIME	MIN DELAY TIME	AVG DELAY TIME
3L28	413	3 HRS 04 MIN	15 MIN	55 MIN
NTX	24	4 HRS 22 MIN	1 HR 15 MIN	2 HRS 11 MIN
SANGLEY PT POINT TO POINT	05	2 HRS 47 MIN	1 HR 25 MIN	2 HRS 03 MIN
TELEPHONE	123	4 HRS 33 MIN	FEW MINUTES	1 HR 09 MIN

The following are some revealing statistics on communications delays encountered in 1966 along with figures from previous years for comparison.

A COMPARISON OF DELAY TIME WITH PREVIOUS YEARS

	1964	1965	1966
MAX DELAY TIME	6 HRS 45 MIN	60 HRS 09 MIN	4 HRS 33 MIN
AVG DELAY TIME	1 HR 14 MIN	1 HR 05 MIN	1 HR 02 MIN
MIN DELAY TIME	8 Minutes	9 Minutes	"Few Minutes"
% OF EYE MESSAGES DELAYED MORE THAN 1 HOUR	59%	39%	38%
NUMBER OF FIXES RECEIVED AFTER WARNING TIME	46	34	30
% RECEIVED AFTER WARNING TIME	8%	6%	5%

E. SUMMARY OF RECONNAISSANCE SUPPORT

In an effort to make the crediting of the reconnaissance effort more objective and meaningful, a system was devised in 1965 to credit fixes and investigations. The same system, with minor changes to group fix and investigative flights together was used this past season. First of all, the problems of why a fix was early, late or missed completely, although of interest and concern to JTWC, belong to the Tropical Cyclone Reconnaissance Coordinator (TCRC). The time of warning and inherent communications delays were the determining factors used in the crediting scheme. Obviously it would be desirable to have the fix made as near warning time as possible, but, the communications delays have been such that fixes must be made about 3 hours before warning time. This usually allows ample time to digest the information after receipt of the data. The crediting system is described below.

DEFINITIONS OF FIX CREDITS

<u>CLASS</u>	<u>DEFINITION</u>	
1	Full Credit	From 1 hour before to $\frac{1}{2}$ hour after levied time. (Includes fixes made on investigative flights.)
2	Full Credit	No center or eye found, but otherwise falls into Class 1 above. (Includes investigative flights on which no center was found.)

<u>CLASS</u>	<u>DEFINITION</u>	
3	Early/Late	Greater than 1 hour but not more than 1½ hours before levied time or greater than ½ hour but not more than 2 hours after levied time.
4	Very Early or Very Late	Greater than 1½ hours before or 2 hours after levied time.
5	Attempted but missed fix	Recon provided some useful peripheral data but no fix was made. Reasons may include clearance problems, mechanical trouble, low fuel, etc., etc.
6	Missed Fix	Due to complete abort, aircraft was airborne but provided no useful data, aircraft never got airborne, squadron unable to provide fix for unspecified reasons.

This system, although as objective as possible, requires subjective evaluation of some fixes. For example, a plane could be in the area assigned on time when the storm had accelerated unexpectedly and could not be reached within the normal time limits by the reconnaissance aircraft. In this case, full credit would be given with no penalty for being late.

Applying the above criteria for the 1966 season, the following statistics are obtained:

EVALUATION OF TIMELINESS OF RECONNAISSANCE FOR 1966

Class	FIXES		INVESTIGATIONS		TOTALS
	Number	Class	Number		
1	513	1	40		553
2	14	2	80		94
3	20				20
4	7				7
5	0				0
6	10				10

CHAPTER III

JTWC STUDIES

This Chapter is a collection of studies conducted during the 1966 typhoon season. Some topics appear in their entirety. Other topics are of a continuing nature and will be completed when data becomes available.

The following is a list of the topics discussed in this Chapter:

- A. USE OF COMPUTER PRODUCTS AT JTWC.
- B. STATISTICAL VERIFICATION PROGRAM.
- C. TROPICAL CYCLONE INTENSIFICATION RATE VERSUS SEA SURFACE TEMPERATURE AND LATITUDE.
- D. TYPHOON FORMATION WITHIN THE ZONE OF THE ITC.
- E. VERIFICATION OF WEATHER SATELLITE DATA.

A. USE OF COMPUTER PRODUCTS AT JTWC

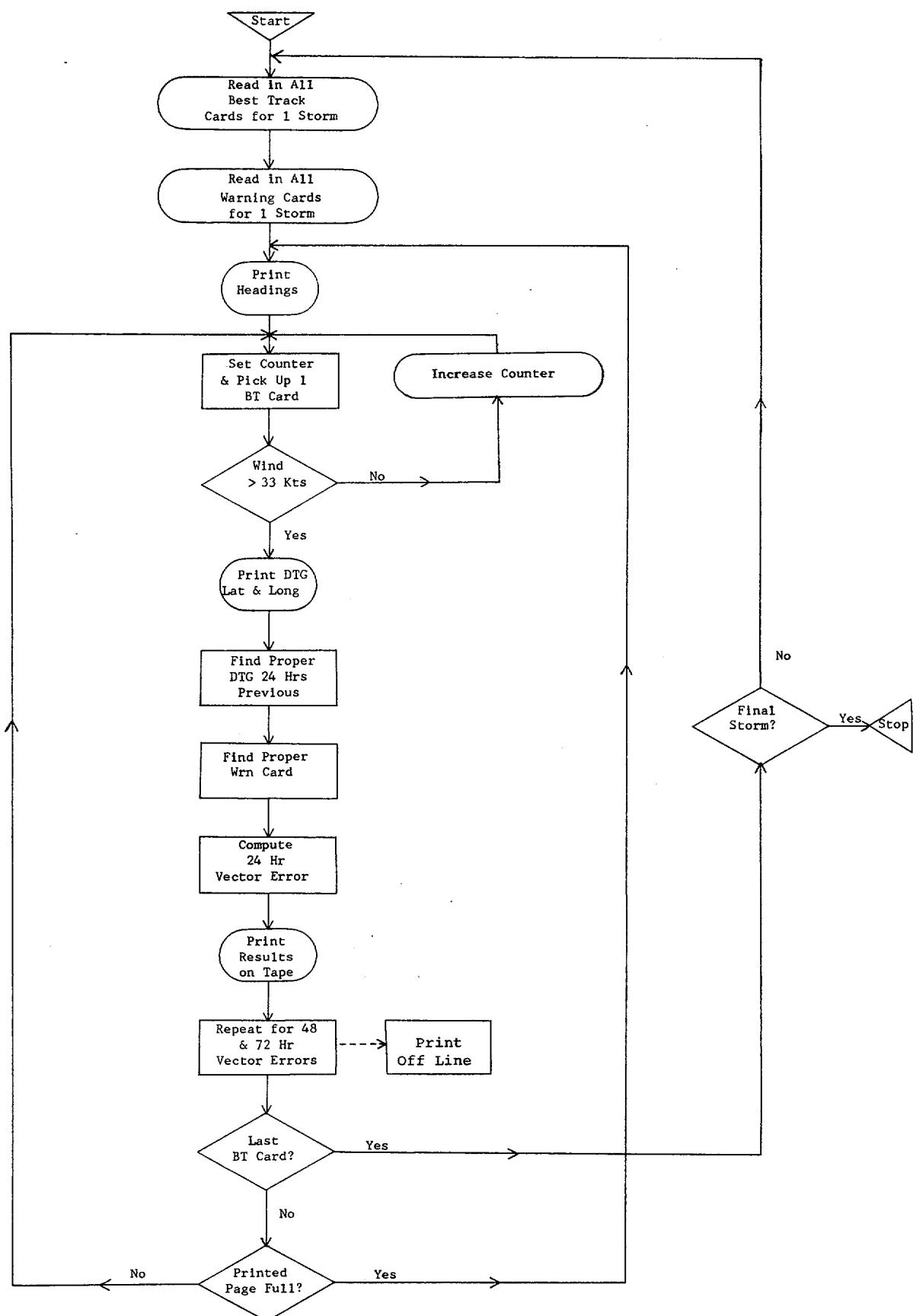
With the arrival of the CDC 3100 computer at FWC/JTWC Guam, it has become possible to partially automate the writing of the Annual Typhoon Report. The reasons for using the computer are twofold. First, to simplify the preparation of the typhoon report; and second, to build up a climatological record of past storms which can be referred to rapidly through the use of the computer. Much of the research efforts this past year were devoted to automating a large portion of the annual report.

The first step, which is being used in the present edition, is the automation of four sets of logs and the machine printing of the fix, the statistics and the verification pages for the report. The logs, which are kept on all storms, have been written to facilitate using numbered codes for all entries. The logs are double checked for accuracy and the data are cut on Hollerith machine cards. The computer programs are such that one or multiple storms may be run at any one time. The data card information is read into the computer, processed and printed for inclusion in the Typhoon report. As a by-product, a machine printout is also obtained of the delay between fix time versus its first receipt at JTWC and a fix classification of all reconnaissance flown.

It is expected that after several years of data have been compiled, these logs along with the computer print-outs will furnish the raw material for development of additional aids in forecasting typhoon formation and movement. For this reason, additional information that would prove useful in typing storms is being included on the 0000Z and 1200Z logs. This information includes the height and latitude of the 700mb trough west of the storm, the vertical extent of the storm, etc.

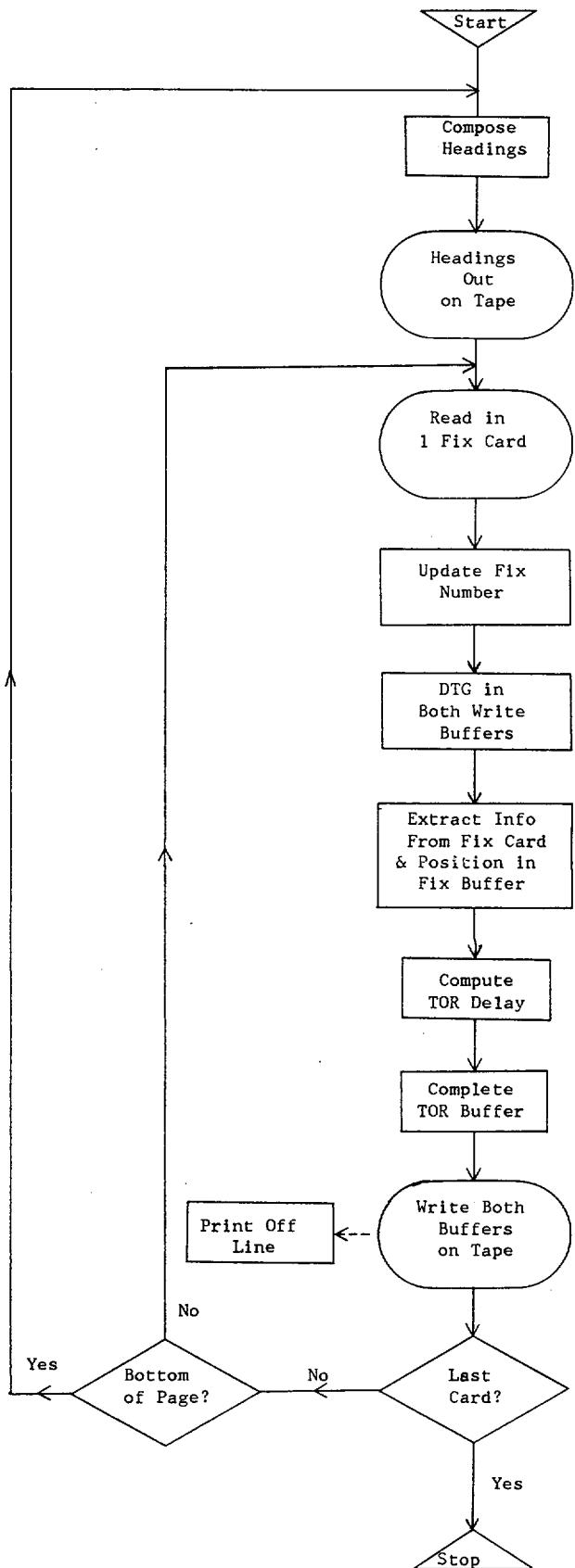
Plans for the future include automating existing objective techniques and the development of a grid type objective forecast which can be rapidly calculated by the computer.

Simplified flow diagrams for the three computer programs now being used in JTWC are depicted in figures (III-1, III-2, and III-3).



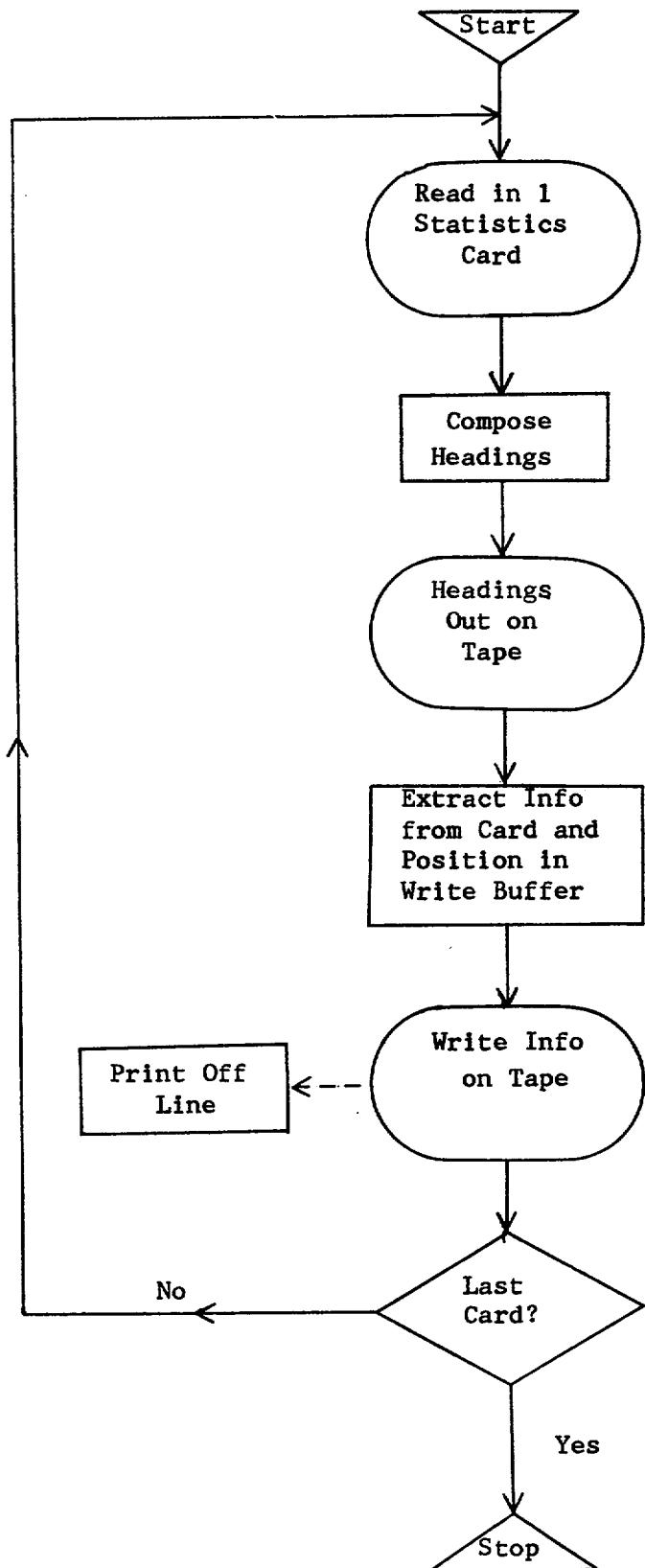
Flow Diagram for Vector Error Computation Program

Figure III-1



Flow Diagram for Fix Page Program

Figure III-2



Flow Diagram for Statistics Page Program

Figure III-3

B. STATISTICAL VERIFICATION PROGRAM

The study of R.M.S. (Root Mean Square) forecast errors initiated last year was continued this year using 1966 data.

The study provides a breakdown of forecasting errors by latitude for the 24, 48 and 72 hour forecasts (see table III-1). Two measures of dispersion were computed.

1. The R.M.S. of the Vector Error. Assuming a circular normal distribution of errors, 63% of the forecasts made should verify within one R.M.S. of the actual position and 98% within two R.M.S. (see AWS Technical Report #164, dated August 1962).

2. The R.M.S. of the right angle error (equivalent in this case to the standard deviation). Assuming a normal distribution, 68% of the forecasts should be within one R.M.S. right or left of track and 95% within two R.M.S. Since the R.M.S. of the vector error is theoretically 1.4 times greater than the R.M.S. of the right angle error for a normal circular distribution, these two figures can be used to determine the approximate shape of the "error" envelope. However, analysis of the data for the past two seasons indicate that the speed error is about 20% greater than the course error (see last column of Table III-1). The actual error envelope is therefore elliptical and oriented with the long axis coincident with the forecasted track.

A continued study of forecasting errors is planned in order to provide a better basis for command decisions involving areas threatened by tropical storms.

As a result of this study JTWC is concentrating its research efforts towards developing techniques which will reduce the error in forecasting a storm's speed of movement.

	1. R.M.S. OF VECTOR ERROR (MI)	2. .707 x R.M.S. OF VECTOR ERROR (MI)	3. STANDARD DEVIATION OF RIGHT ANGLE ERROR (MI)	PERCENT VARIATION $(\frac{2-3}{2})$
<u>24 HOUR</u>				
TOTAL	165	117	71	19
UNDER 20N	131	93	58	11
20N-30N	166	117	75	13
ABOVE 30N	240	170	79	41
UNDER 35N	159	112	70	16
ABOVE 35N	281	199	106	39
<u>48 HOUR</u>				
TOTAL	332	235	160	12
UNDER 20N	197	139	98	9
20N-30N	354	250	191	4
ABOVE 30N	433	306	163	38
UNDER 35N	320	226	163	8
ABOVE 35N	505	357	113	59
<u>72 HOUR</u>				
TOTAL	513	363	229	21
UNDER 20N	260	184	108	30
20N-30N	521	368	258	16
ABOVE 30N	695	491	299	27
UNDER 35N	495	349	224	18
ABOVE 35N	694	491	297	39

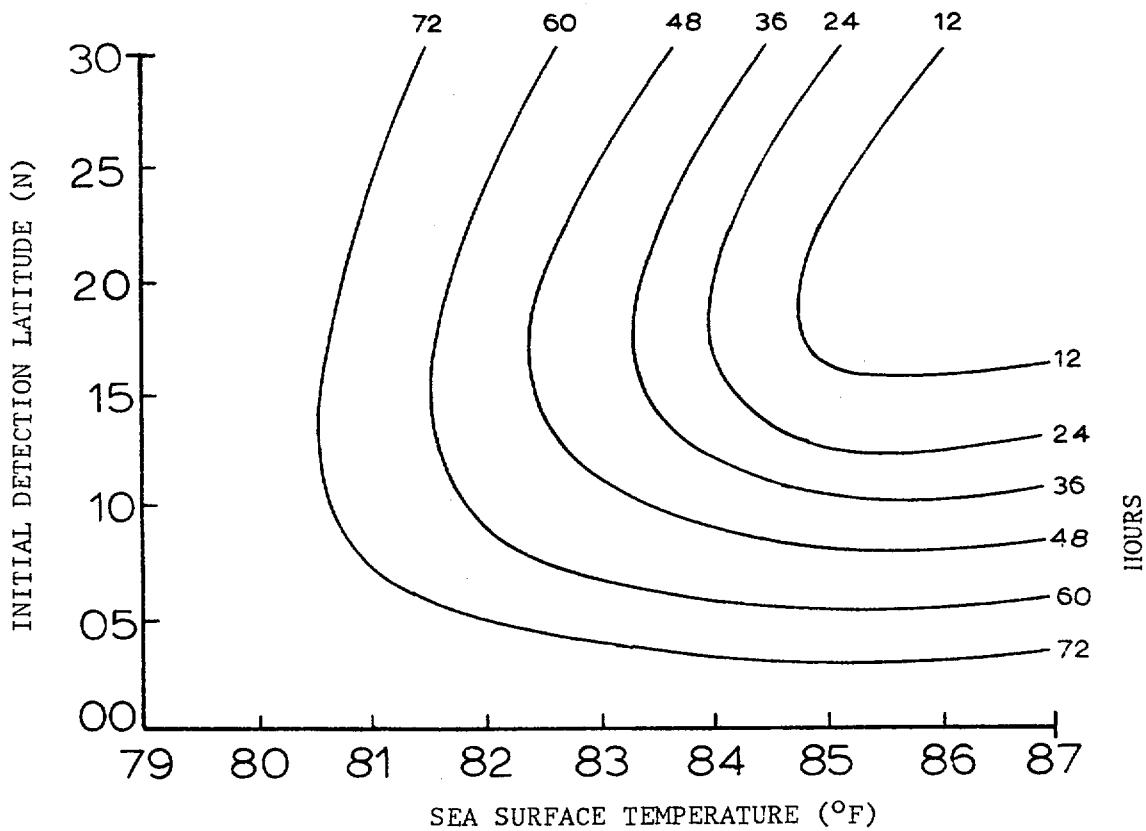
TABLE III-1

C. TROPICAL CYCLONE INTENSIFICATION RATE VERSUS SEA SURFACE TEMPERATURE AND LATITUDE

A study was made this past year to determine the effect, if any, the sea surface temperature and latitude have on the time required for a tropical depression to attain tropical storm intensity. Data for 56 typhoons and tropical storms from 1965 and 1966 were processed and a fair correlation was shown to exist which indicates a more rapid rate of intensification occurs as both latitude and sea surface temperature increase. The relationships are by no means perfect because other meteorological considerations such as the amount of low level feed of moist warm air into the cyclone, the degree of high level divergence over the cyclone, etc., also have a direct influence on intensification rates. Figure III-4 is a smooth graph, summarizing the results of the study.

Further evaluation concerning the validity of the graph as a forecasting tool will be made during the 1967 typhoon season.

Figure III-4 Smooth Analysis of the Intensification Time in Hours



D. TYPHOON FORMATION WITHIN THE ZONE OF THE ITC

Major Robert W. Fett, USAF
54th Weather Reconnaissance Sq.
Guam, Mariana Islands

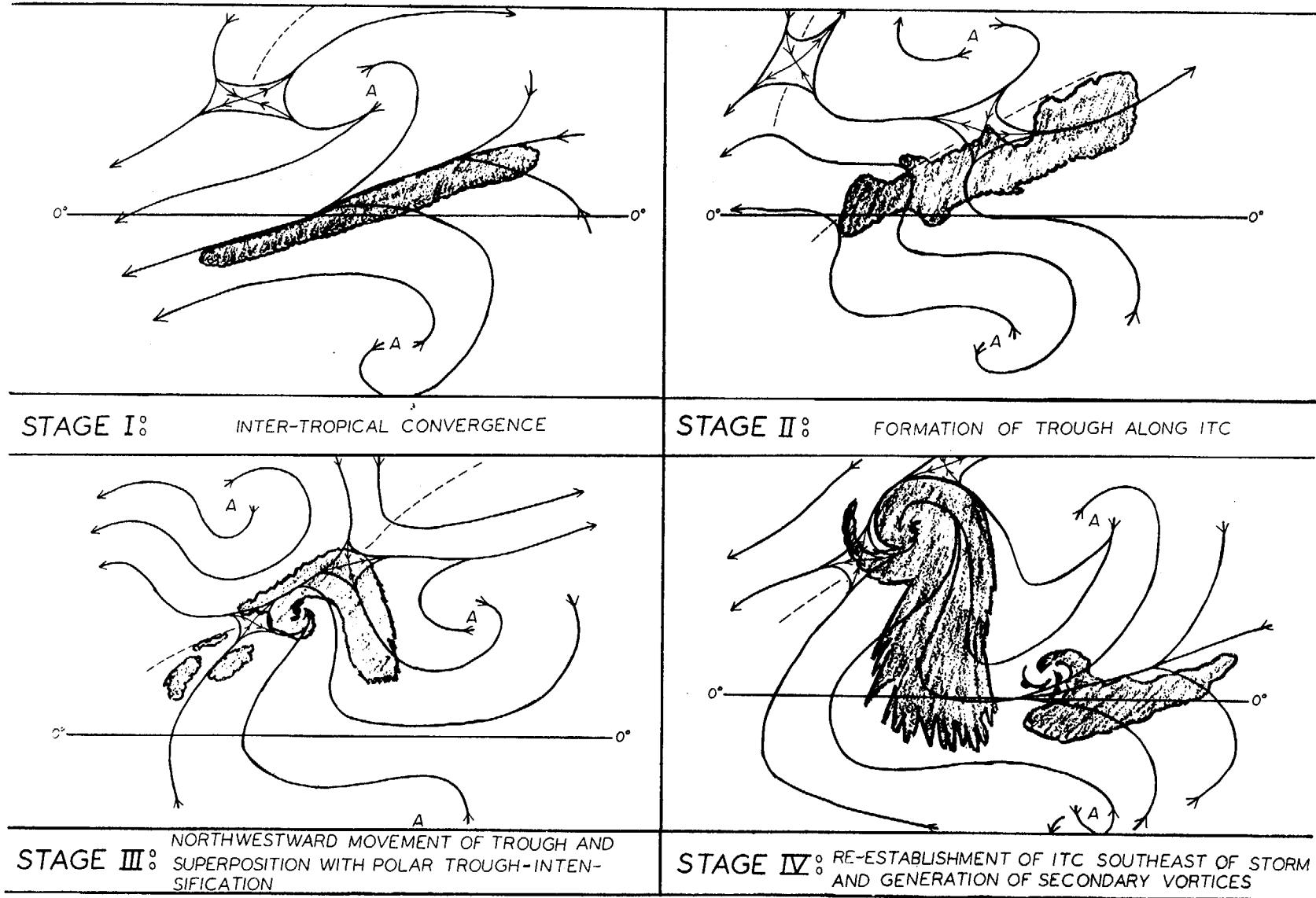
A study of the early development of typhoon MARIE, which was generated during the latter portion of October 1966, revealed that this storm formed within the zone of the ITC without any easterly wave inter-action. Satellite pictures of the storm area including infra-red read-out during the night-time hours were compared with conventional and reconnaissance data. This comparison suggested a model of typhoon formation distinct from those storms originating as a result of the intensification of easterly waves. The model is shown in figure III-5. Four separate stages of development are defined in relationship to 700mb streamlines.

- | | |
|-----------|---|
| Stage I | In Stage I outflowing air from anticyclones of the northern and southern hemisphere converge near the equator along an asymptote conventionally referred to as the Inter-tropical Convergence Zone (ITC). Cloudiness forms primarily on the southern side of the convergence asymptote. |
| Stage II | In Stage II an elongated trough is formed between the northern and southern hemispheric anticyclones. Formation of the trough is attributed to the reduction of pressure through the release of latent heat of condensation which occurred as a result of forced convection necessitated by the Stage I configuration. Cloudiness as in Stage I and in the typical easterly wave pattern remains dominantly south and east of the trough axis. The trough area may contain occasional embedded closed circulations. However, maximum sustained surface wind speeds will normally not exceed 30 knots. |
| Stage III | In Stage III vortices generated within the trough area of maximum relative vorticity have further developed. The trough has moved northwestward around the northern hemispheric anticyclone where super-position of the ITC trough with the polar trough has been achieved. At this time a transfer of energy from the westerlies to the easterlies is possible, increasing wind speeds (and hence cyclonic vorticity) northwest of the storm center. Rapid intensification follows as tropical storm intensities are attained. |

TYPHOON DEVELOPMENT WITHIN THE ZONE OF THE ITC

29

Figure III-5



Stage IV As the storm reaches typhoon intensity it continues its generally northwesterly movement around the northern hemispheric anticyclone and the ITC is reformed at lower latitudes. With the re-establishment of the ITC in the wake of the original storm the cycle of formation has been completed. The stage is now set for the establishment of a new ITC trough and the generation of vortices in a manner similar to the development of the original storm.

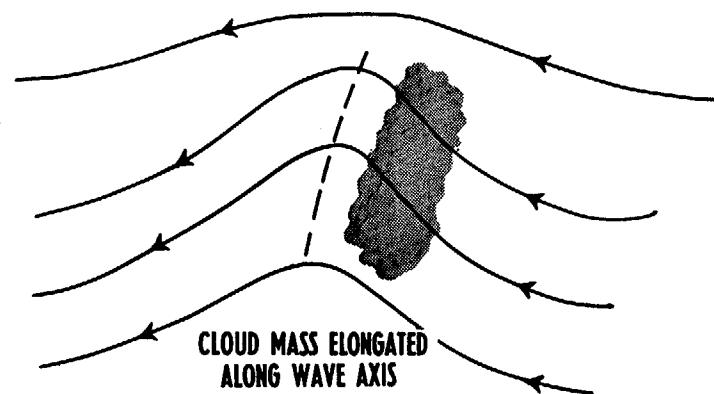
It should be noted that this model is similar in many respects to the model of typhoon development from an easterly wave configuration (figure III-6). Both models depend upon the generation of vortices within a trough. Intensification of an easterly wave, as in the ITC model, is commonly attributed to polar trough interactions. Vortices developing within the ITC trough, when viewed by satellite, frequently assume an appearance similar to the stages of development of an easterly wave. Such similarities undoubtedly account for the many confused analyses and mistaken inferences which have led to opposing interpretations of the same phenomena. However, the over-all pattern of each type of development when viewed by satellite is quite different. Wave-like disturbances have a notable absence of peripheral cloudiness in their immediate vicinity (see figure III-7, which shows an easterly wave in the Gulf of Mexico); whereas ITC cloudiness is connective and elongated over long distances more or less parallel to the equator (see figure III-8, which shows a polar front and ITC near 10 N). Disturbances developing on the ITC protrude perpendicular to the main band as shown in the schematic model in Stage IV (figure III-5). Surveillance satellites such as the ATC (Advanced Technology Satellite) hovering great distances above the earth provide integrated pictures over large areas so that it should be an easy matter to differentiate between the separate types of development.

Further research and accumulation of additional examples will be necessary to verify the general applicability of this model. Of particular interest is the question regarding the percentage of cases that result from either ITC or easterly wave development in comparison to the total. The typical upper-air pattern over the ITC in each of the various stages is also an item of interest that may be crucial with respect to the development problem. Recognition and documentation of these major characteristics will be an important step toward improved analyses and forecasts of the future.

FORMATIVE STAGES OF TROPICAL CYCLONE DEVELOPMENT

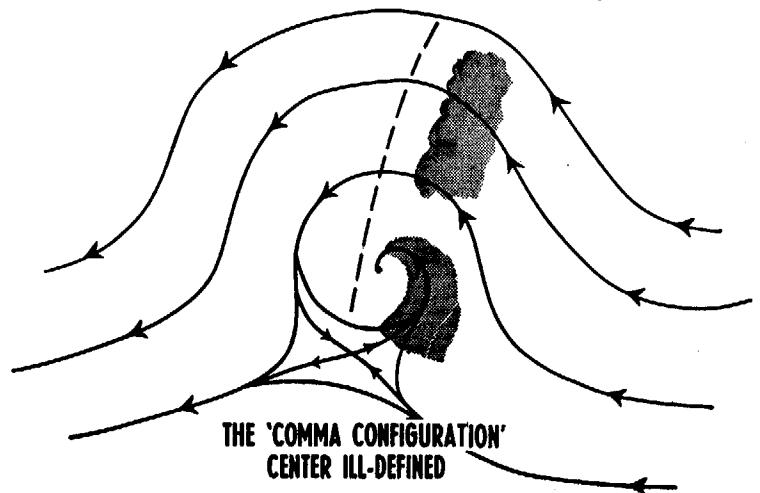
A.

THE TROPICAL DISTURBANCE
(NO CLOSED SURFACE ISOBARS)



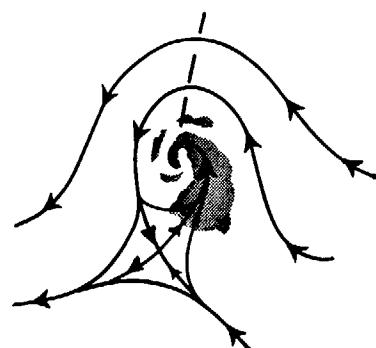
B.

THE TROPICAL DEPRESSION I
MAX. CENTRAL ISOTACH LESS THAN 20 KTS



C.

THE TROPICAL DEPRESSION II
MAX. CENTRAL ISOTACH 20-30 KTS



D.

THE TROPICAL DEPRESSION III — TROPICAL STORM I
MAX. CENTRAL ISOTACH 31-40 KTS

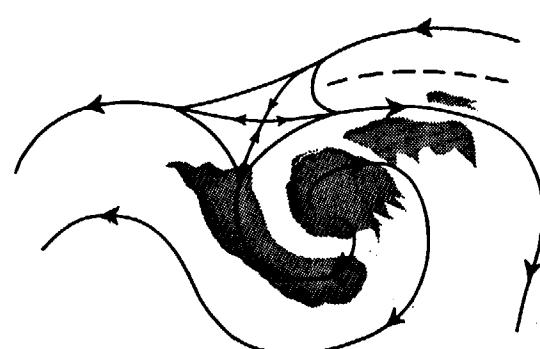
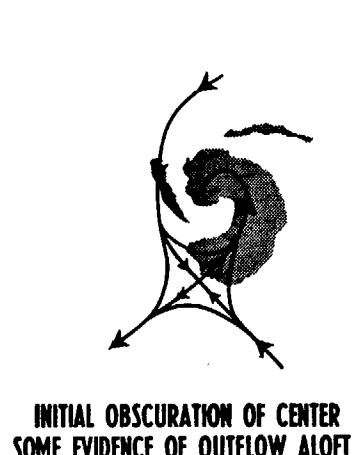
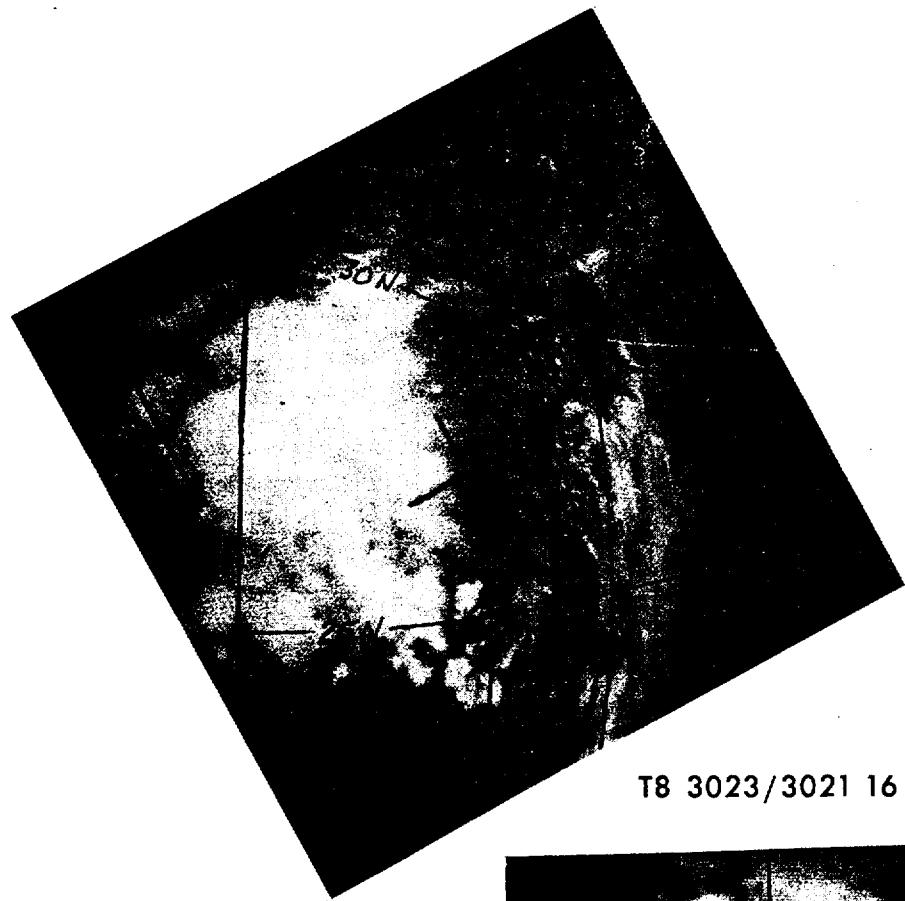


Figure III-6



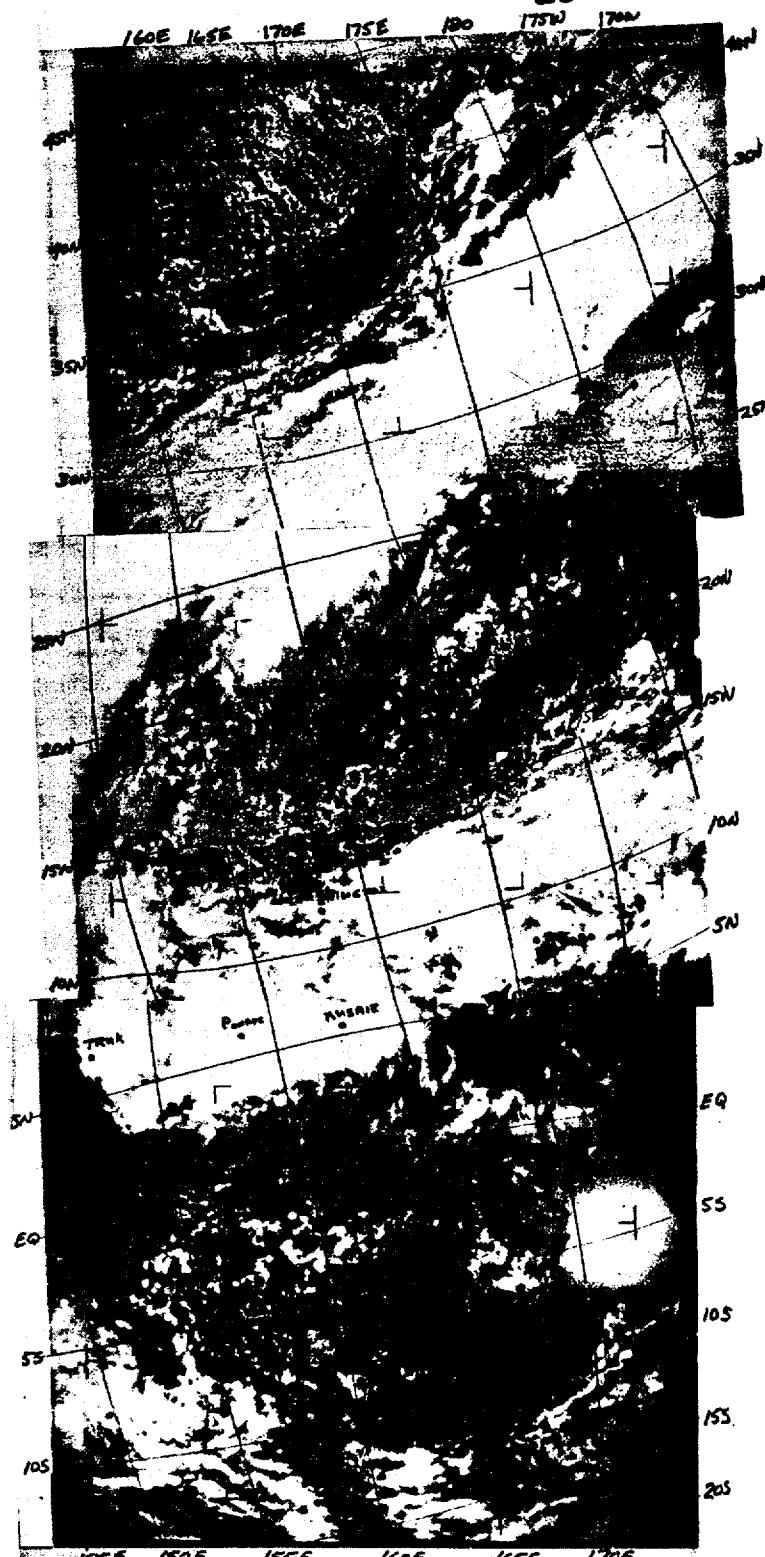
T8 3023/3021 16 JULY 1964 1903Z



Figure III-7

ESSA II
ORBIT # 3048 PICT # 1
DATE 26 OCT 66 PICT TIME 2106Z
LAT 35.3N LONG 172.8E
SUPERVISOR DE

26 OCT 2106Z



ESSA II
ORBIT # 3048 PICT # 3
DATE 26 OCT 66 PICT TIME 2118Z
LAT 24.5S LONG 161.9E
SUPERVISOR DE

Figure III-8

E. VERIFICATION OF WEATHER SATELLITE DATA

With the launching of the operational weather satellite, it has been anticipated that this new meteorological observation tool would be able to locate and identify tropical cyclones in data-sparse regions of the Pacific Ocean and thus aid in the prediction of typhoon movement and intensity. To a large extent this has been realized. There is no doubt that satellite cloud pictures have aided in the locating of tropical cyclones and have also given an estimate of the maximum wind speed of the storms.

FWC/JTWC, through the APT ground station equipment, has begun to utilize the information received from ESSA II and NIMBUS weather satellites launched in 1966 to locate tropical cyclones and estimate their maximum wind speeds. The question of whether or not the satellite data could locate the center of the storms with sufficient accuracy to satisfy certain recon requirements was investigated. A verification program was started in 1965 and continued throughout this past season using National Environmental Satellite Center (NESC) data. It was noted that there was an elapsed time of about 11 hours between picture time and time of receipt of the NESC bulletin at FWC/JTWC, so that in most cases, the information did not have nearly as much value as that received from the local APT equipment. The following is a comparison of position and wind errors for 1965 and 1966 of the NESC bulletins:

POSITION ERROR

	<u>1965</u>	<u>1966</u>
NUMBER OF CASES	75	71
AVERAGE POSITION ERROR	81 nm	49 nm
MEDIAN POSITION ERROR	55 nm	39 nm
RANGE OF POSITION ERROR	0-425 nm	5-219 nm

WIND SPEED ERROR

	<u>1965</u>	<u>1966</u>
NUMBER OF CASES	61	59
AVERAGE WIND ERROR	17 kts	18 kts
MEDIAN WIND ERROR	11 kts	13 kts
RANGE OF WIND ERROR	0-60 kts	0-83 kts

In comparing the two years, there was an improvement in accuracy of the storm location while the accuracy of the estimated wind speeds remained the same. The improvement in the location of the storms can probably be attributed to the direct view of the earth by the satellites in 1966 as compared to the angled view of the previous TIROS satellites.

The satellite locations of the storms were verified against the "best track" plots of the individual storms.

ESSA II and NIMBUS transmit daytime cloud pictures while only NIMBUS transmits nighttime infrared data. Graphs of the frequency of position errors of the satellite data are shown in figures III- 9 through III-12. A summary of the position errors of data taken from weather satellite pictures received at FWC/JTWC follows:

POSITION ERRORS OF WEATHER SATELLITE DATA

	ESSA II & NIMBUS DAY	NIMBUS NIGHT	COMBINED DAY & NIGHT
NUMBER OF CASES	104	65	169
AVG POSIT ERROR	65 nm	96 nm	78 nm
MEDIAN POSIT ERROR	55 nm	82 nm	65 nm
RANGE POSIT ERROR	5-255 nm	10-398 nm	5-398 nm

It is interesting to note that location errors are not much greater than the average grid error.

Figure III-9

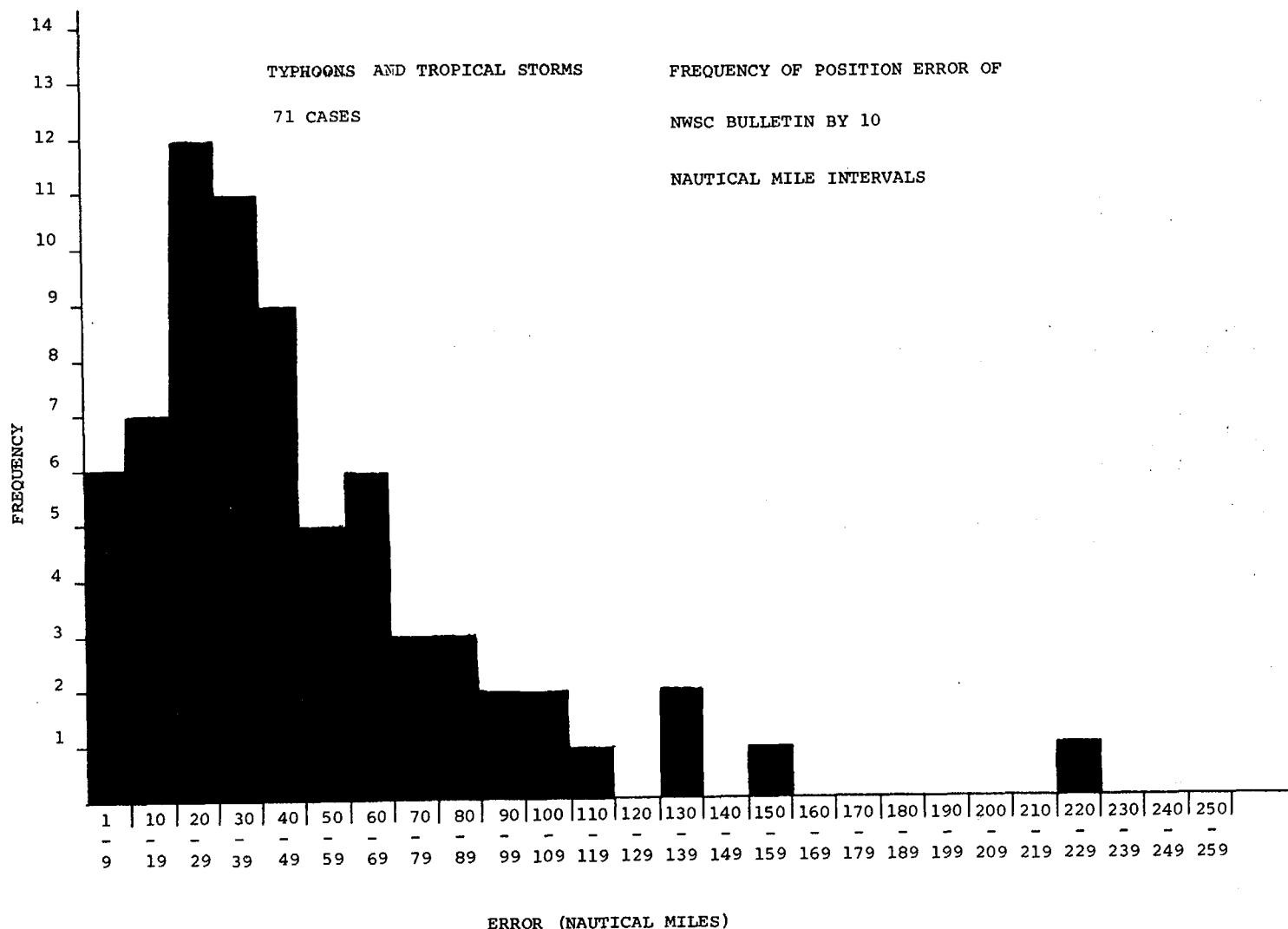


Figure III-10

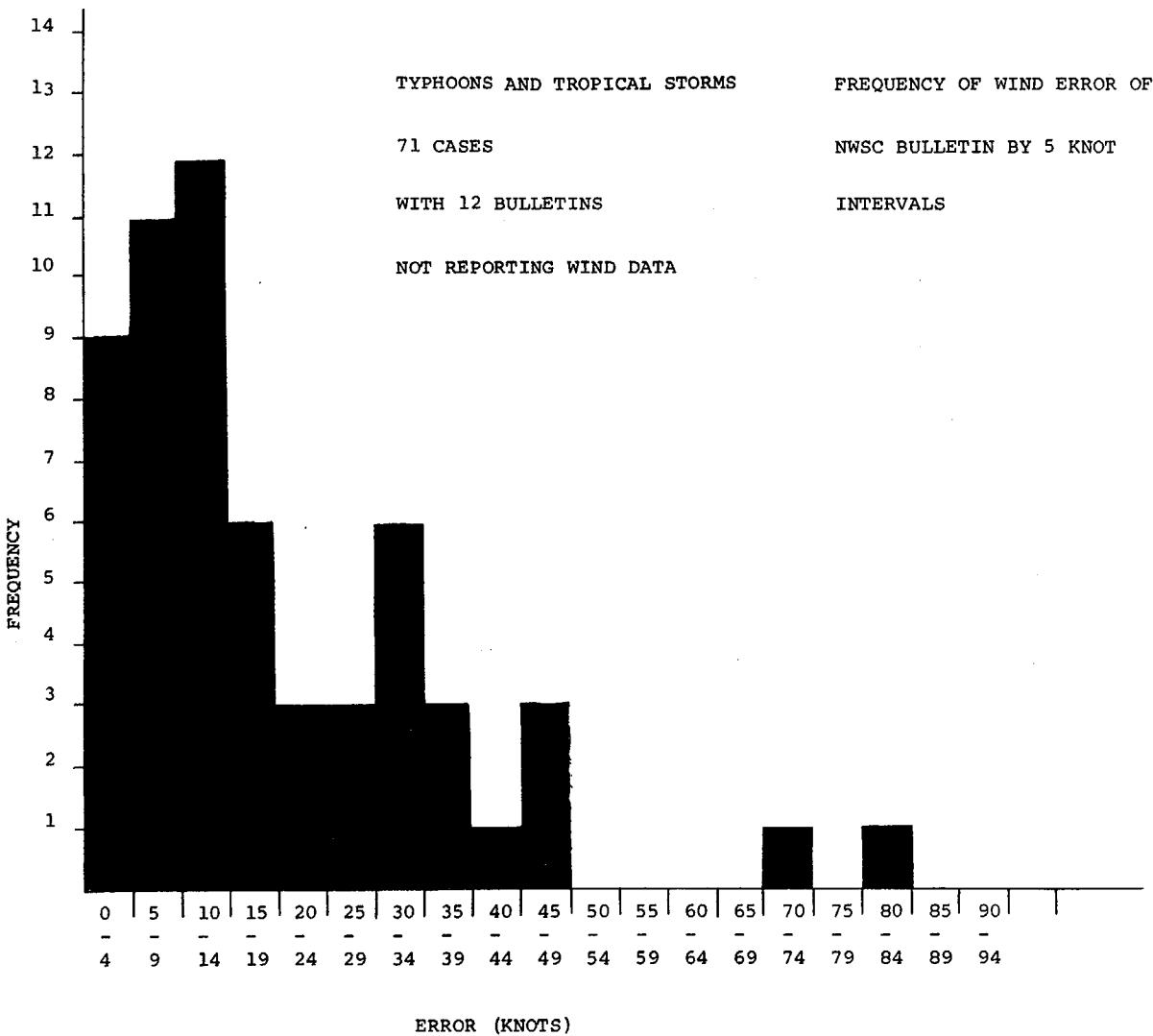
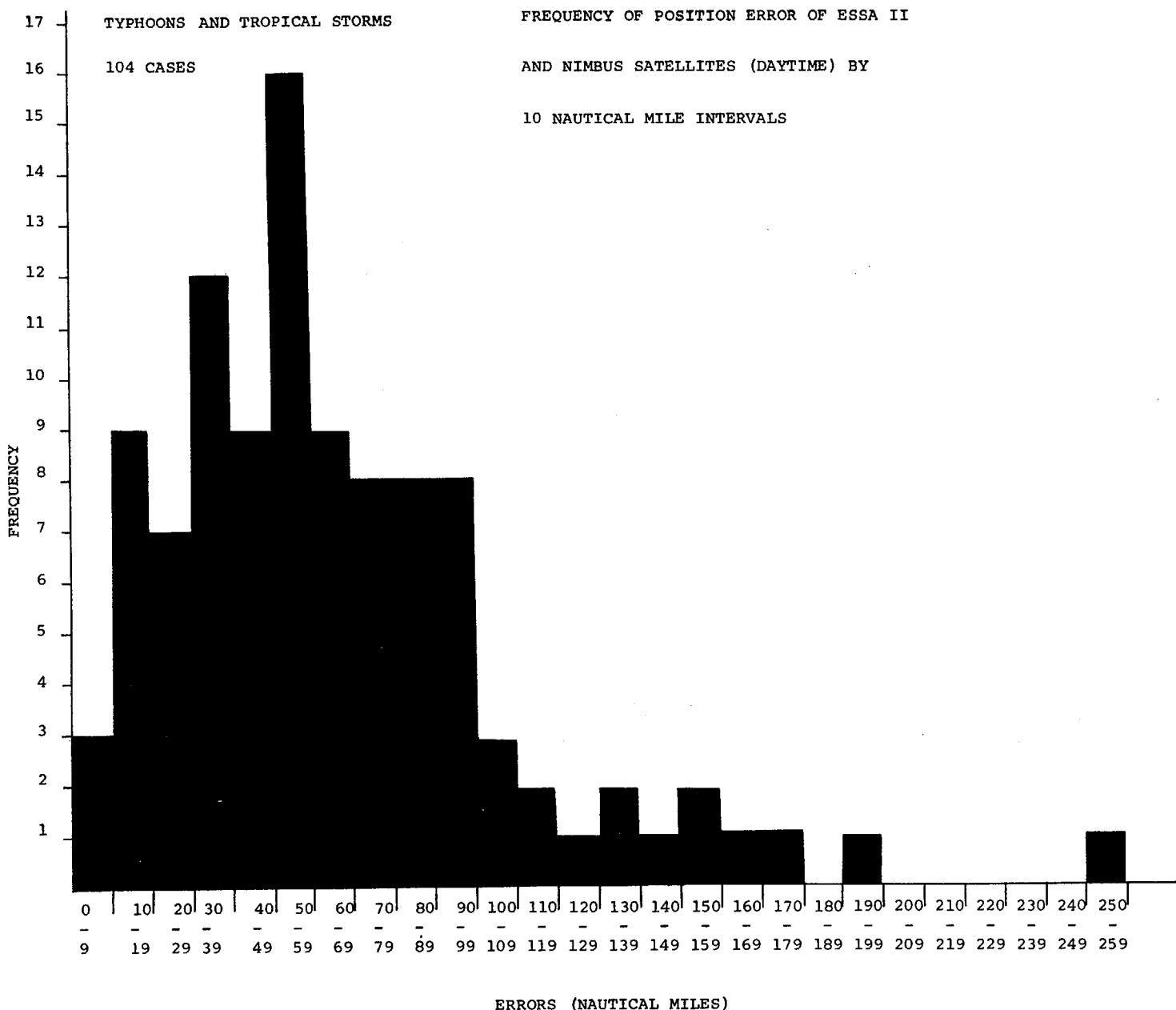
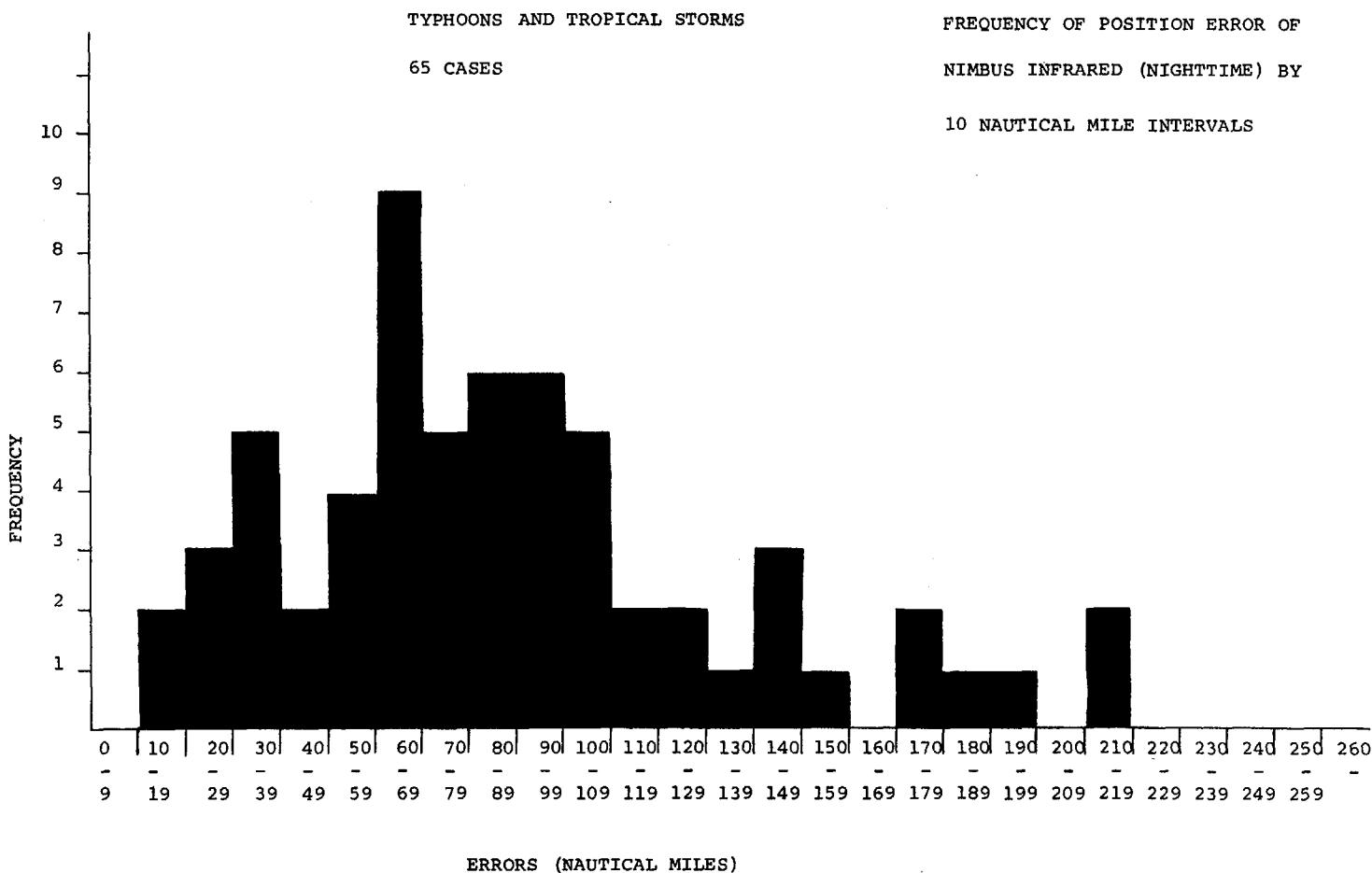


Figure III-11



39

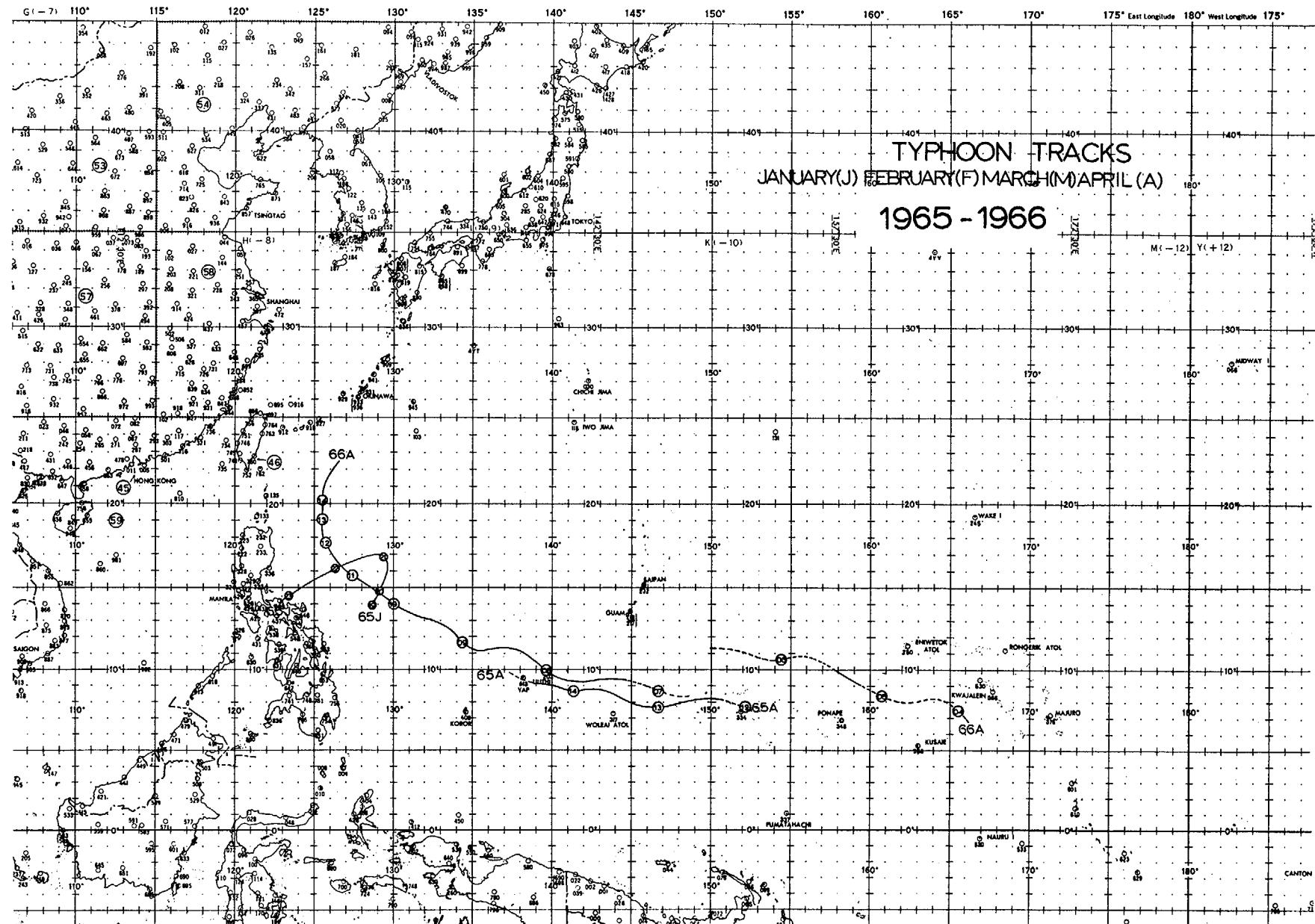
Figure III-12

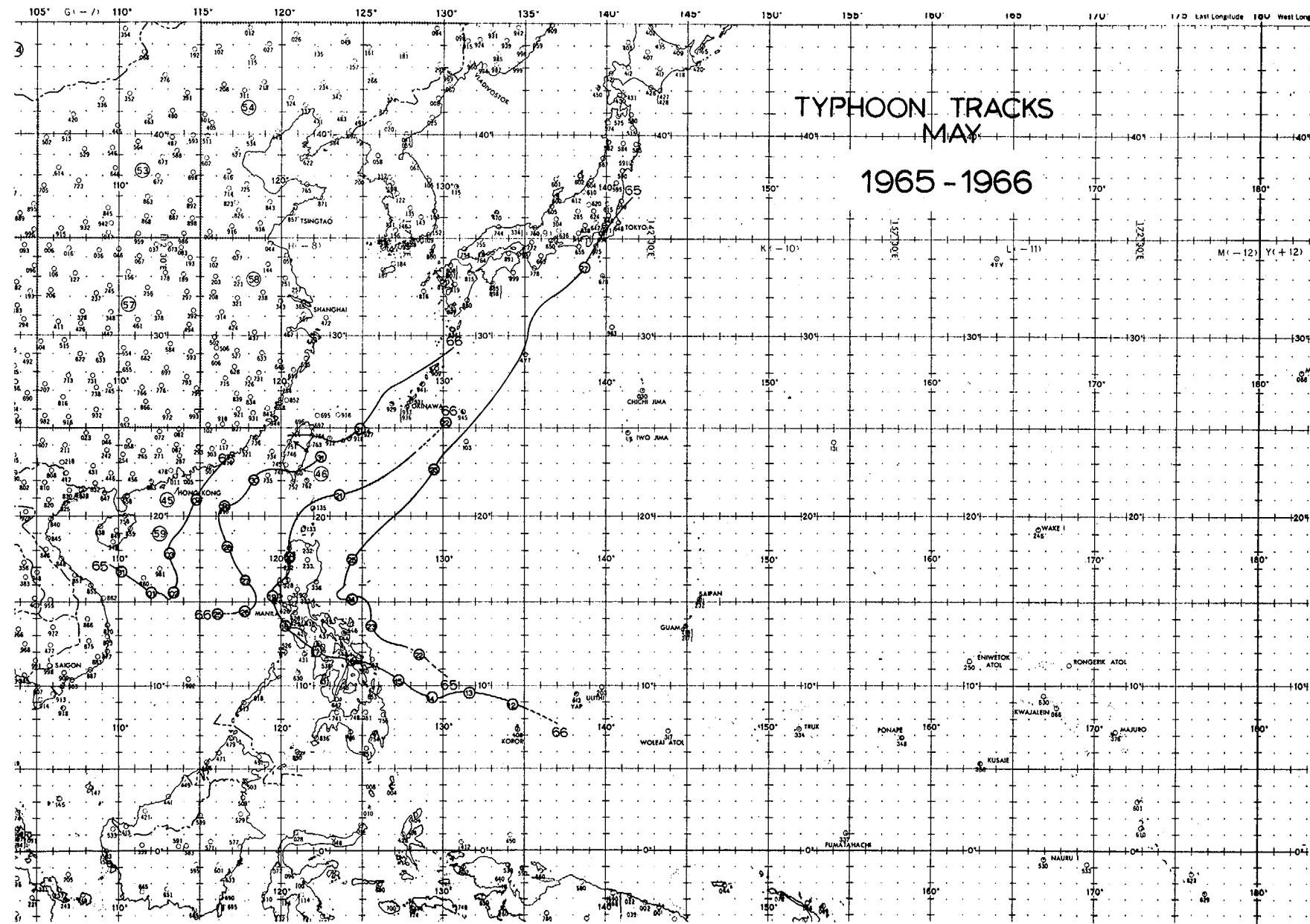


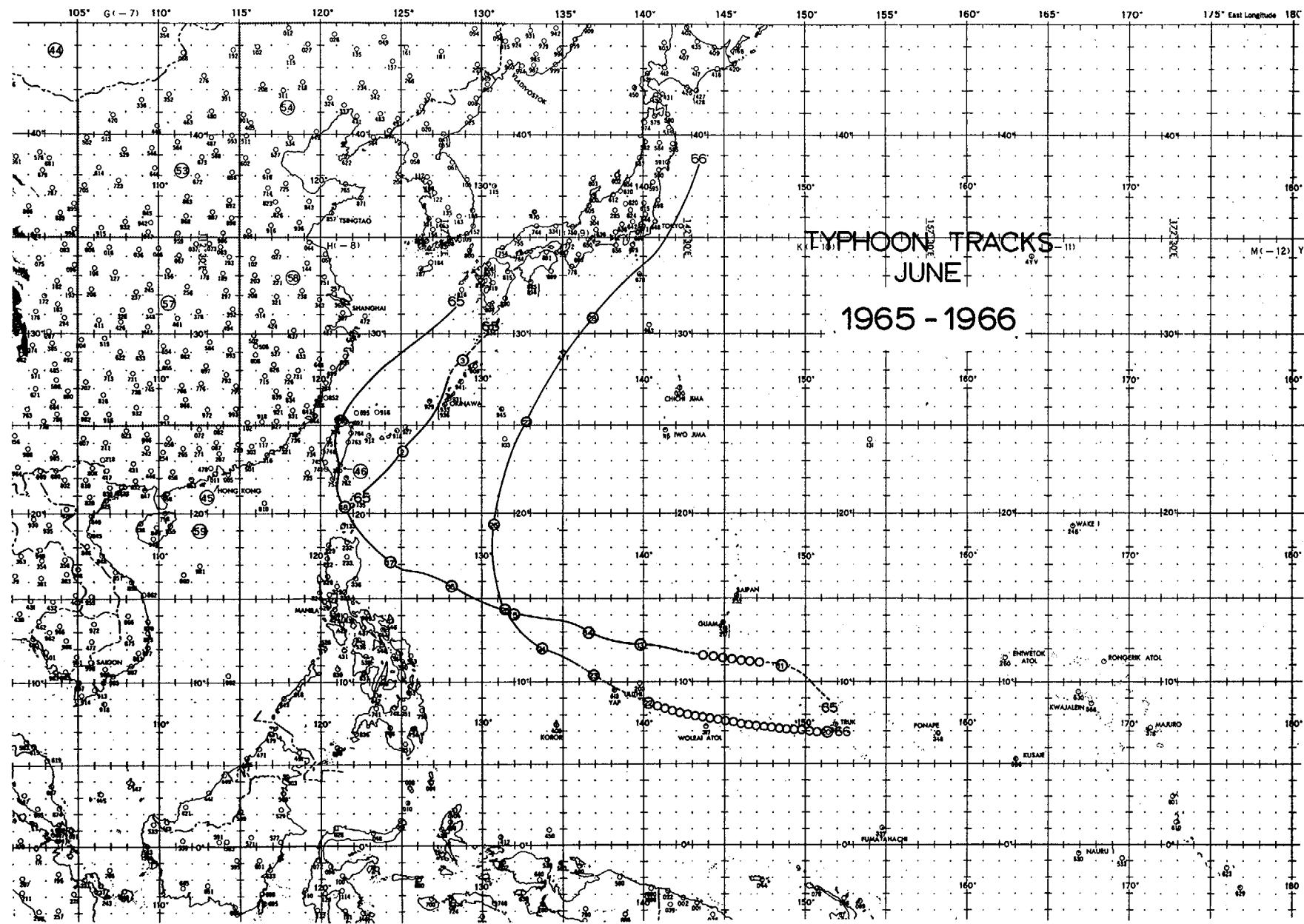
TYPHOON TRACKS

1965-1966

Storm tracks from 1953 through 1964 have been discontinued this year due to the extreme crowding that has occurred. Tracks for the 1965-1966 seasons are included in this report. For all tracks, by month, prior to 1965 see prior Typhoon Reports.

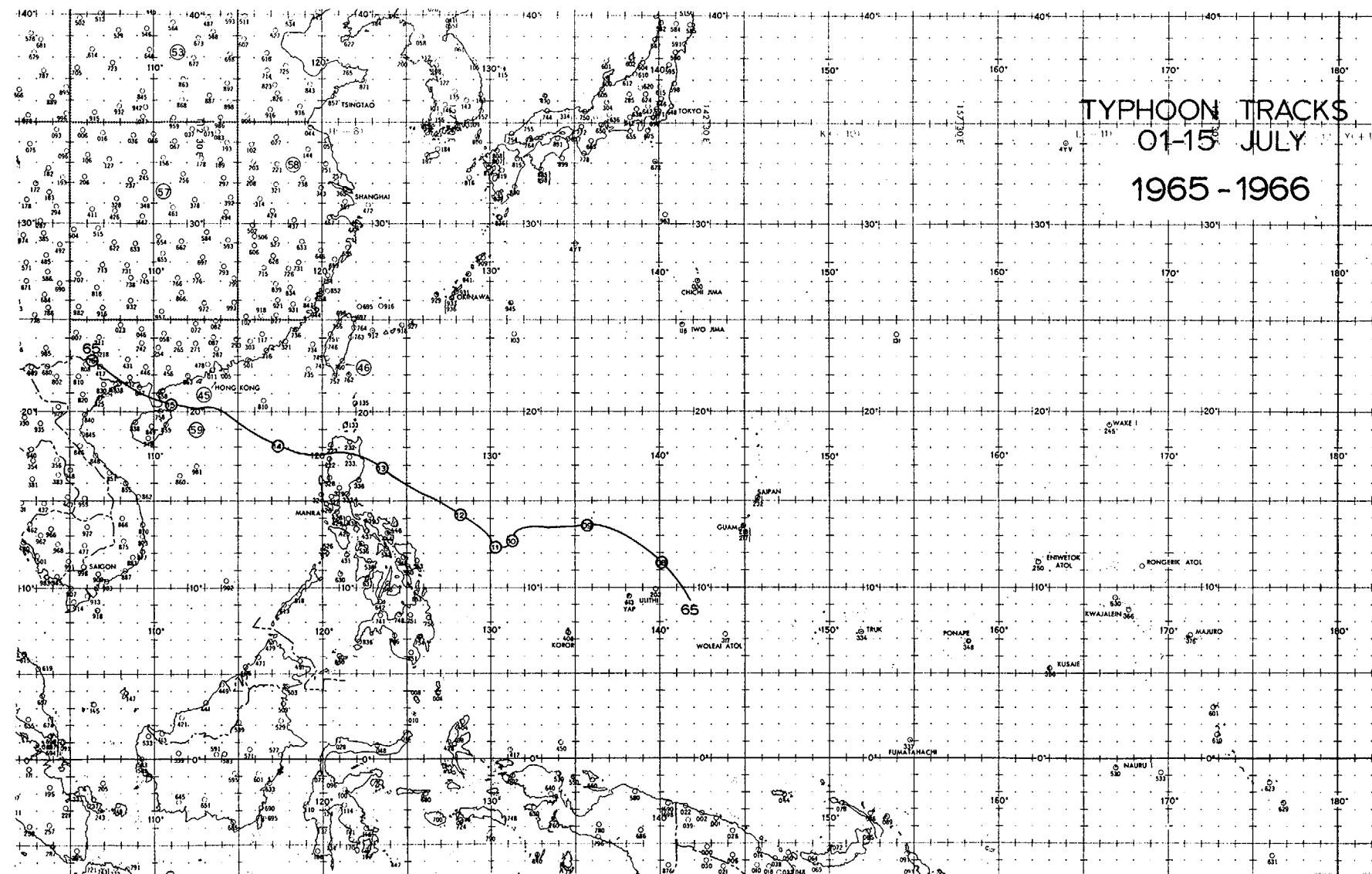






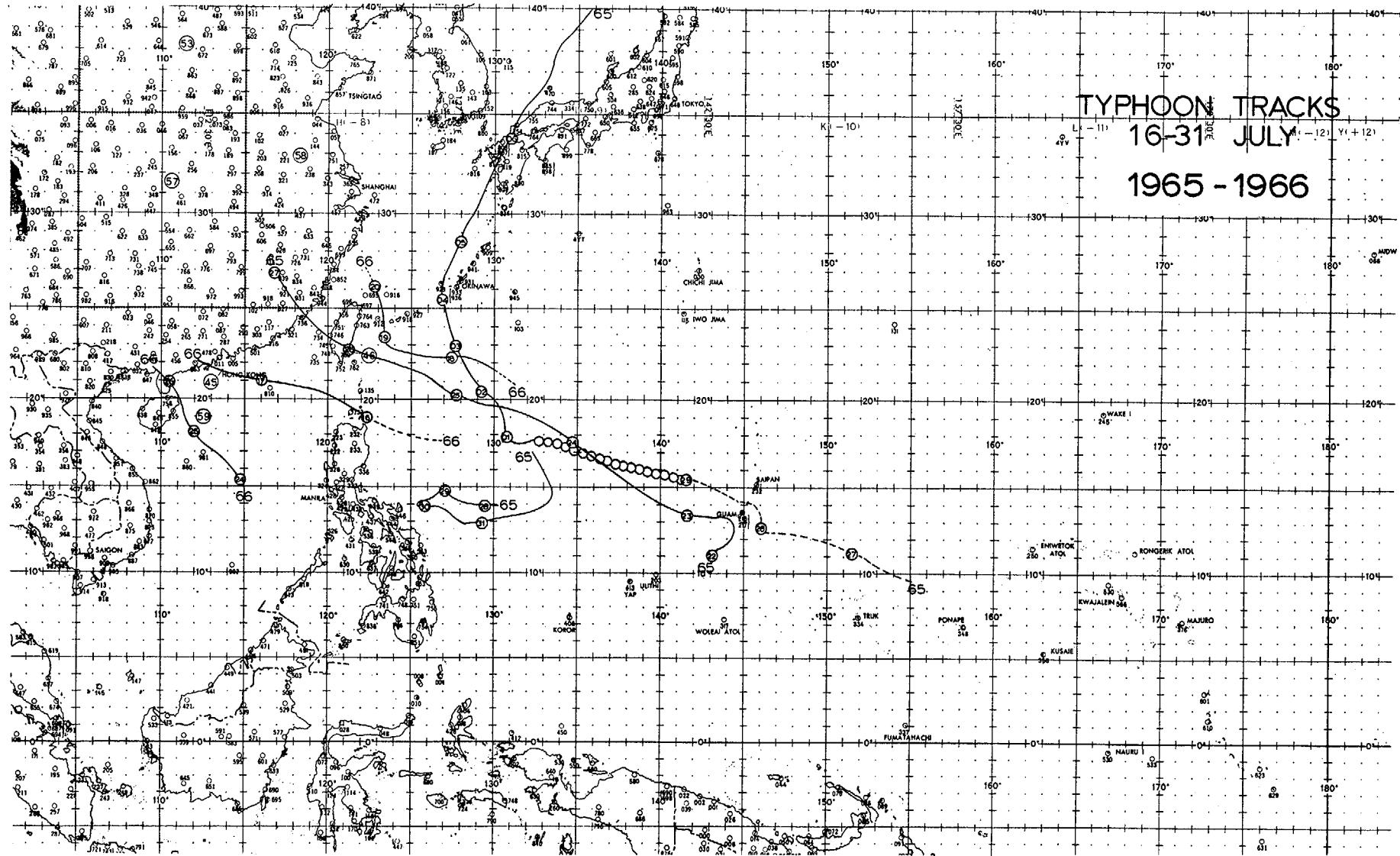
TYPHOON TRACKS
01-15 JULY

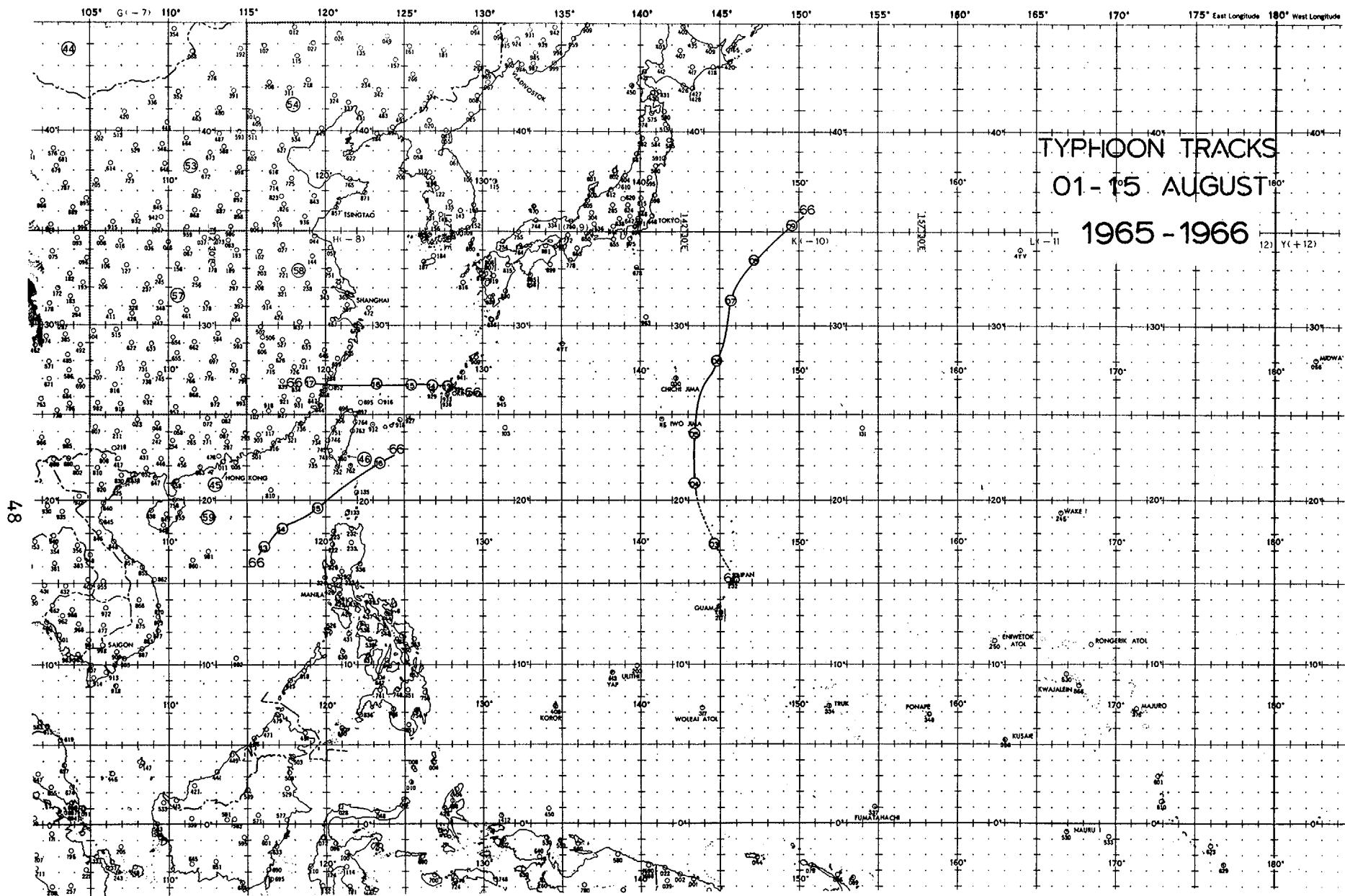
1965 - 1966

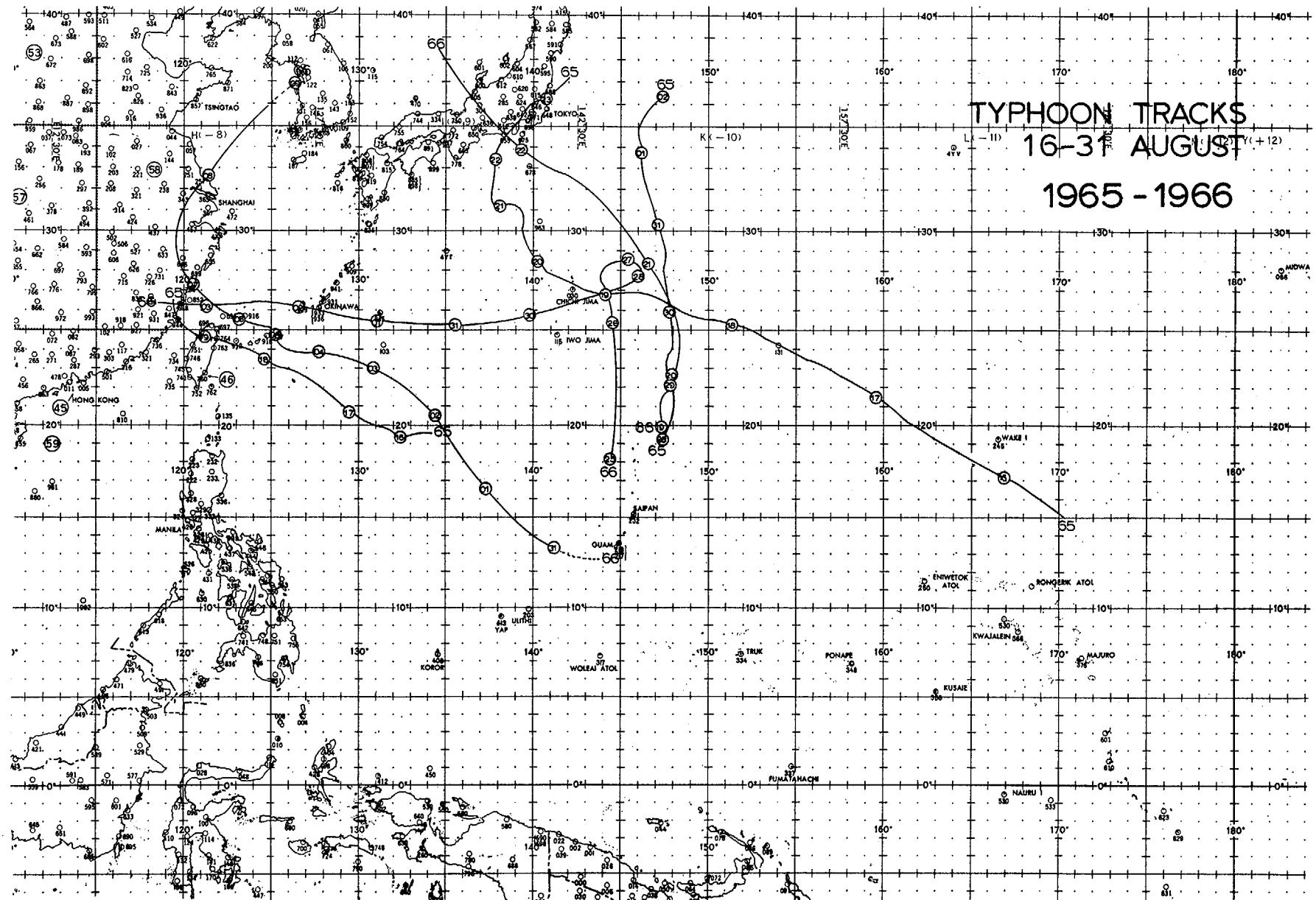


TYPHOON TRACKS
16-31 JULY

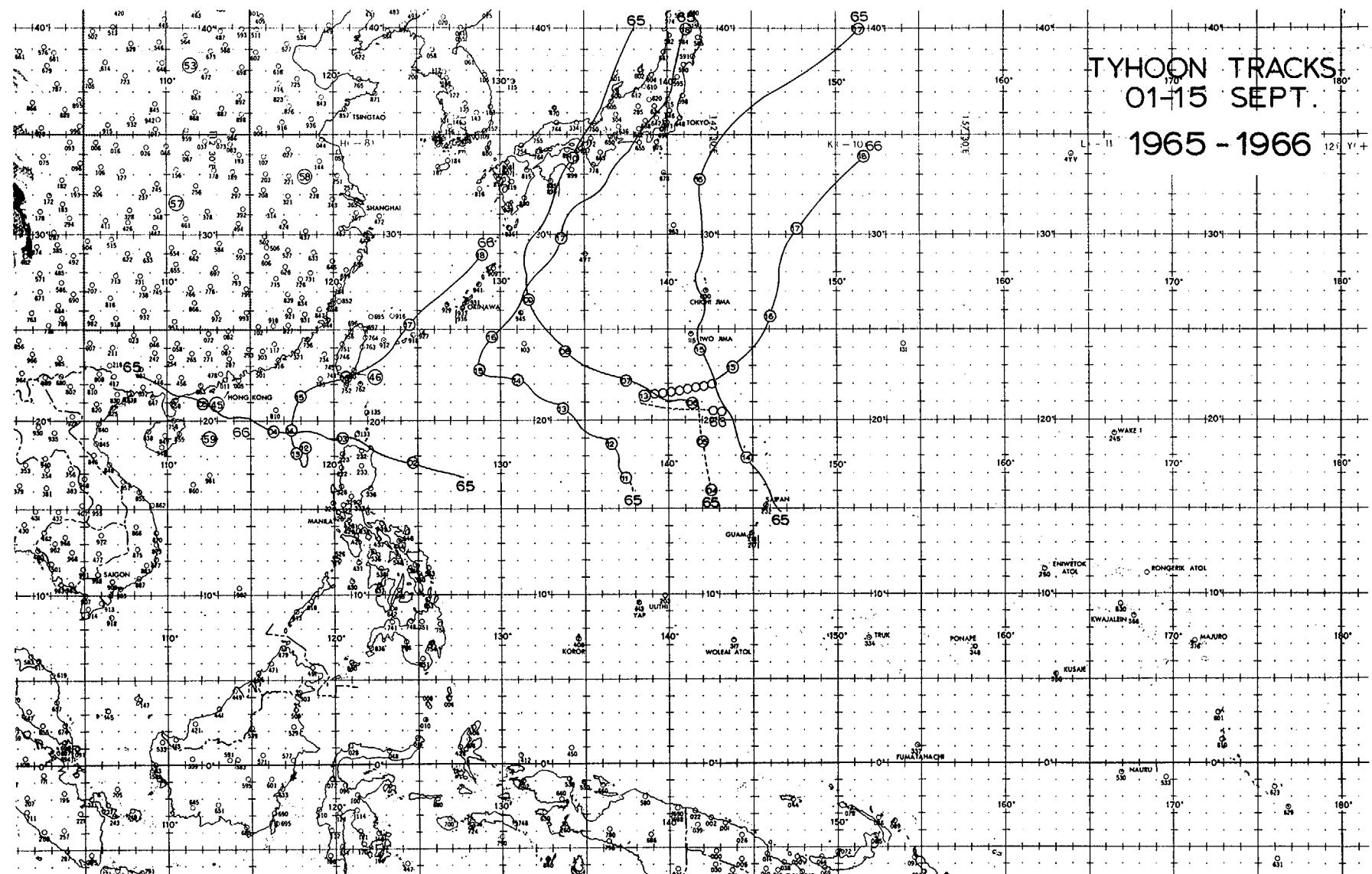
1965 - 1966







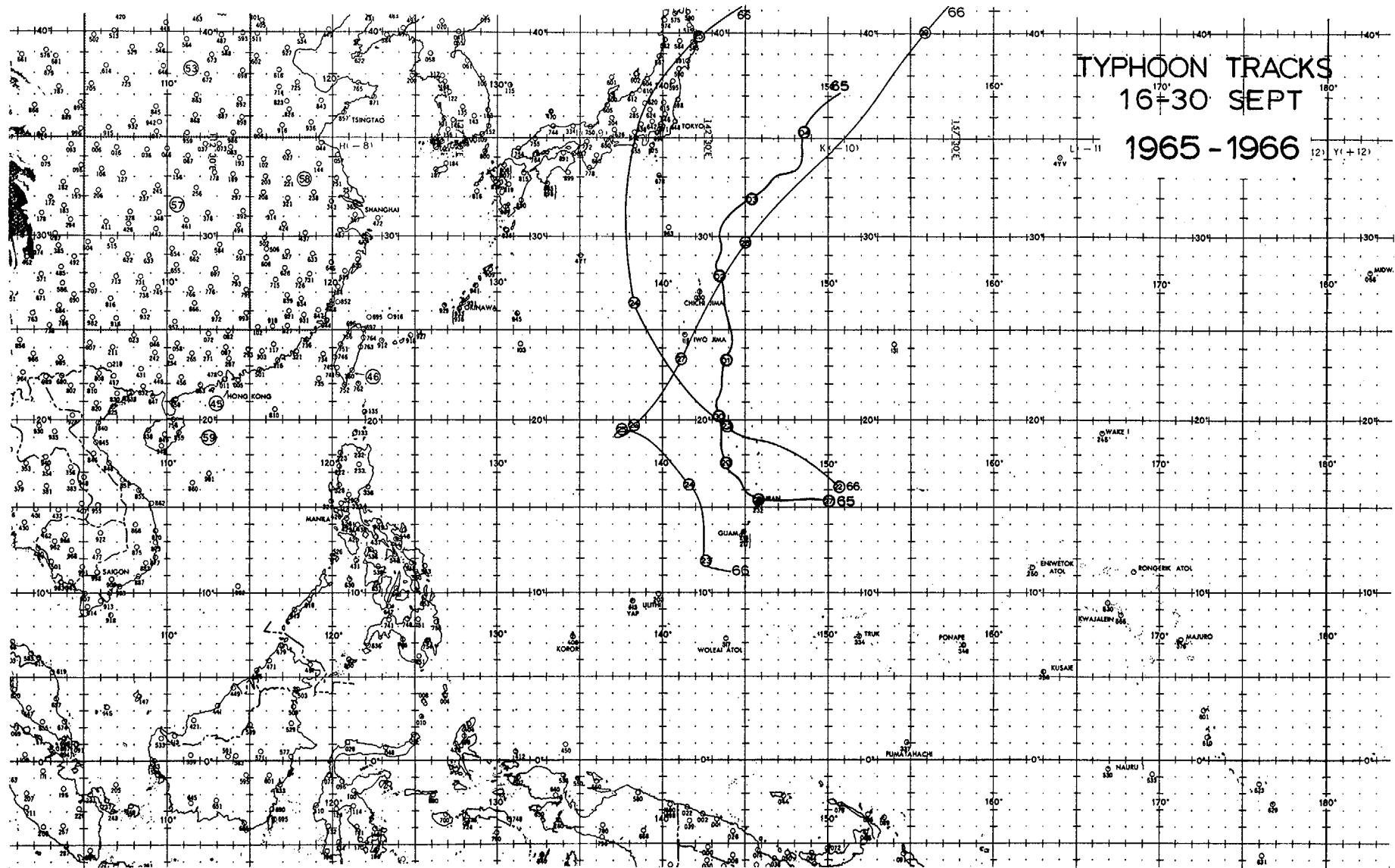
4
5

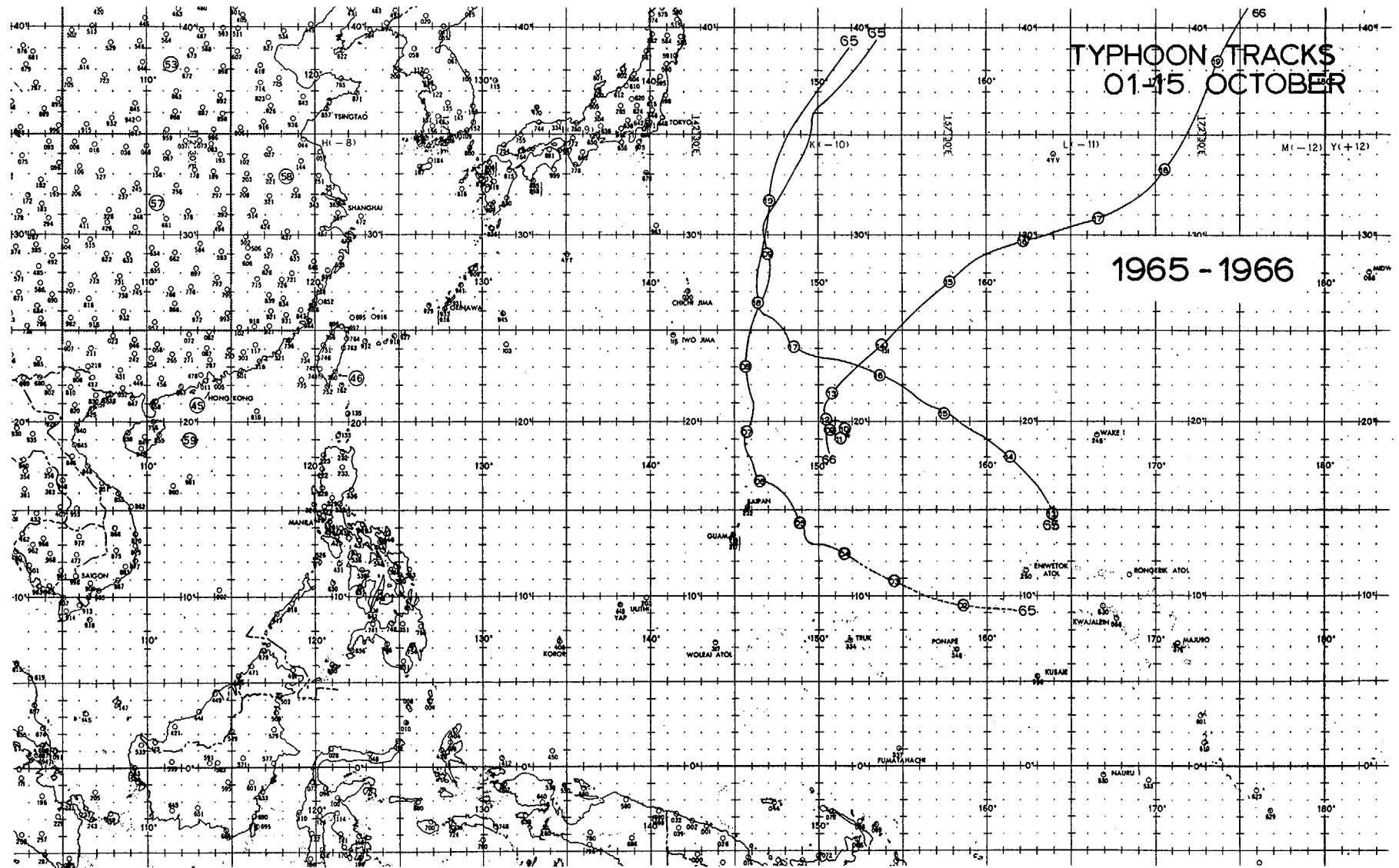


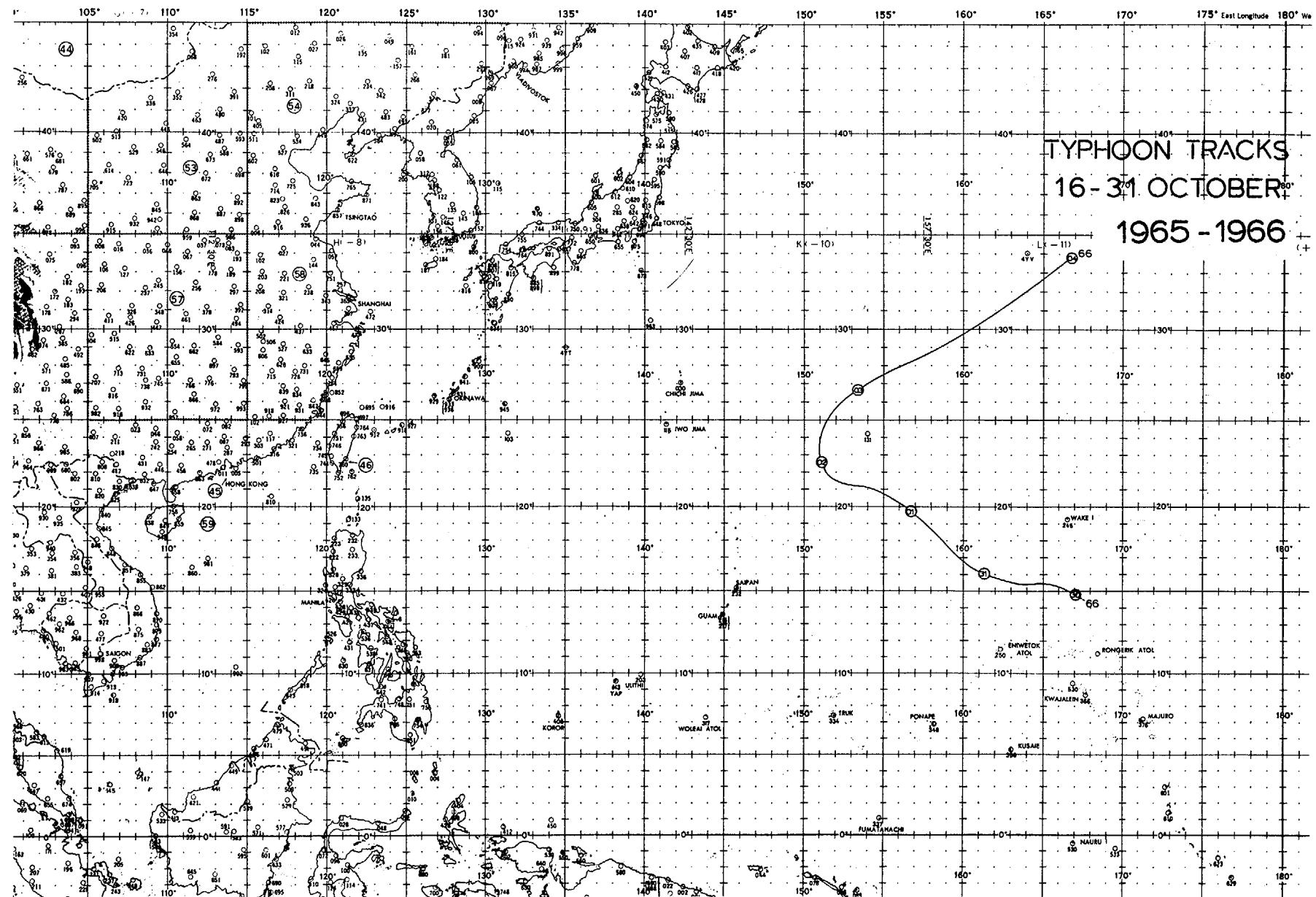
TYHOON ¹⁷⁰ **TRACKS** ₁₆
01-15 SEPT.

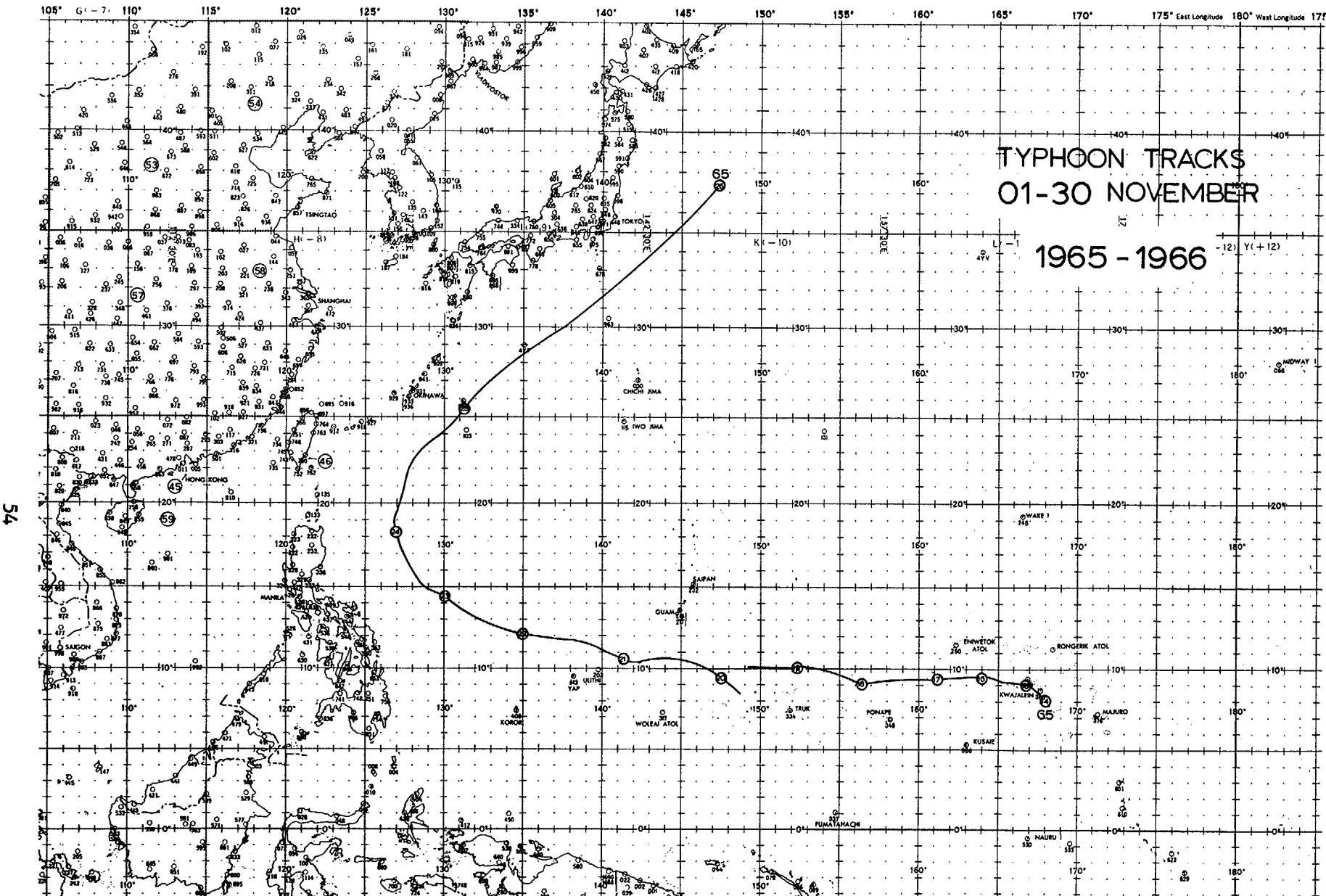
1965 - 1966

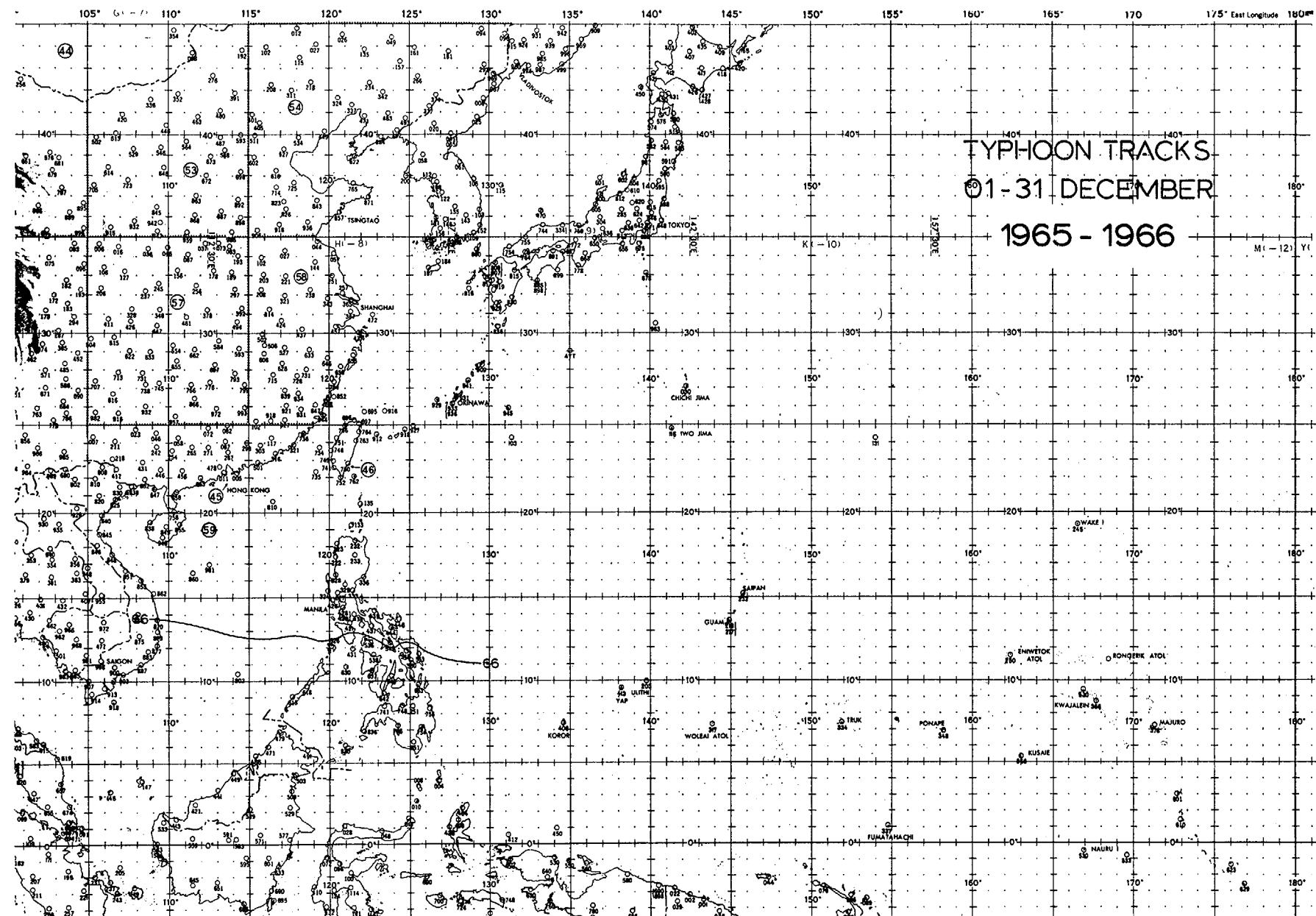
TYPHOON TRACKS
16-30 SEPT
1965 - 1966











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TYPHOON FREQUENCY

10 YEAR PERIOD

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL TOTAL
1957	1			1	1	1	1	2	5	3	3		18
1958	1				1	2	5	3	3	3	1	1	20
1959				1			1	5	3	3	2	2	17
1960						2	2	8		4	1	1	19
1961			1		2	1	3	3	5	3	1	1	20
1962				1	2		5	7	2	4	3		24
1963				1	1	2	3	3	3	4		2	19
1964					2	2	6	3	5	3	4	1	26
1965					1	2	2	4	3	5	2	1	21
1966					1	2	1	3	6	4	2	0	20
AVE	.3	.0	.1	.7	1.3	1.3	3.3	4.3	3.5	3.1	1.6	.9	20.4

CHAPTER IV

SUMMARY OF TROPICAL CYCLONES 1966

During 1966 the Joint Typhoon Warning Center issued a total of 752 tropical warnings on 20 typhoons, 10 tropical storms and 8 tropical depressions. Warnings were issued on two or more tropical cyclones simultaneously on a total of 46 calendar days; on 17 of the 46 days three tropical cyclones were in existence.

The following data for the JTWC area of responsibility is presented for comparison:

COMPARATIVE WESTERN PACIFIC TROPICAL CYCLONE DATA

	1959	1960	1961	1962	1963	1964	1965	1966
TOTAL NUMBER OF WARNINGS	583	776	738	815	663	730	805	752
CALENDAR DAYS OF WARNING	137	157	165	154	146	153	167	155
TROPICAL DEPRESSIONS	7	3	11	9	3	5	6	8*
TROPICAL STORMS	9	8	11	6	6	14	13	10
TYPHOONS	17	19	20	24	19	26	21	20
TOTAL TROPICAL CYCLONES	65	56	69	56	33	52	40	38*

*Cyclone number 22 was used by JHWC in Hawaii. This accounts for the difference between the cyclone numbers used versus the total tropical cyclones for the Western Pacific.

In the area of the North Pacific Ocean east of 180 degrees 342 warnings were issued on a total of 19 tropical cyclones (See Annex A). 1966 was an unusual year in that a tropical cyclone developed in the area between 140 degrees and 180 degrees west necessitating the transfer of a cyclone number (22) from FWC/JTWC to JHWC in Hawaii.

There were only 3 "Super Typhoons" (maximum sustained surface winds of 130 knots or greater) compared with a record 11 during 1965. The most intense storm of 1966 was Typhoon KIT (22-28 June) with a maximum sustained surface wind of 170 knots. The minimum 700mb height of 2095 meters was observed at 260227Z. The minimum sea level pressure was not observed at this time but was believed to have been less than the 914mb observed at 252100Z. The reconnaissance aircraft encountered severe hail and turbulence at 700mb during the 260227Z fix.

No example of the Fujiwhara Effect occurred during 1966. Typhoon SUSAN was absorbed in the circulation of Typhoon TESS on the 16th of August.

A study of rapid movement of some typhoons prior to becoming extra-tropical was made. There were only two good examples of this phenomenon this year -- Typhoon IDA (22-25 Sept) and Typhoon JUNE (22-29 Sept).

Another significant feature of a typhoon that occurred during the 1966 season was the development of a secondary vortex within the same general circulation of a storm system. This occurred first with Typhoon HESTER (03-14 April). The original vortex dissipated south of Guam and a second vortex formed within the same circulation further to the south. This situation is a duplication of what happened to Typhoon FAYE in the same geographical area during November 1965.

The second example of this phenomenon occurred as Typhoon JUDY (25-31 May) approached Taiwan on 30 May. An eddy effect occurred in the northern portion of the Formosa Straits creating a secondary center in that area. As the original center moved across southern Taiwan at 10 knots the new center moved across northern Taiwan at 15 knots and appeared to join the 500mb system and rapidly increase in forward speed to 25 knots by 310000Z. This was verified by a three hourly surface meso-analysis of the Taiwan reporting stations during this period. The existence of two centers was also evident on the APT readout of the ESSA II satellite.

An abnormal number of tropical cyclones developed in the South China Sea during the 1966 season. Another interesting feature was the development of 12 tropical cyclones within a 450 mile radius of Guam.

As in other years, the 24, 48 and 72-hour mean forecast error for each typhoon was computed by two methods. In addition to the standard mean forecast error (Tables IV-1 and IV-2), a computation of closest-distance (right angle) error from best track (Table IV-3) has been included for comparison. This error computation is based on the closest right angle distance of the forecast position to the best track without regard to time.

The following tabulation of the average forecast error for the past 17 years is given for comparison:

FORECAST VERIFICATION
AVERAGE ERROR NAUTICAL MILES

	24 HR	48 HR	72 HR
1950-58	170	---	---
1959	117	267	---
1960	177	354	---
1961	136	274	---
1962	144	287	476
1963	127	246	374
1964	133	284	429
1965	151	303	418
1966	136	280	432

TABLE IV-1

1966 AVERAGE FORECAST ERRORS*

TYPHOON	24 HR FORECASTS		48 HR FORECASTS		72 HR FORECASTS	
	NO. OF CASES	MEAN ERROR (MI)	NO. OF CASES	MEAN ERROR (MI)	NO. OF CASES	MEAN ERROR (MI)
HESTOR	30	76	18	123	9	171
IRMA	39	93	32	203	12	402
JUDY	23	114	16	261	5	344
KIT	23	142	15	449	6	846
MAMIE	7	194	--	--	--	--
NINA	7	105	--	--	--	--
ORA	9	131	1	366	--	--
RITA	22	155	8	284	4	645
SUSAN	13	97	5	301	--	--
TESS	14	90	5	260	--	--
VIOLA	9	218	5	476	--	--
ALICE	35	170	21	434	5	596
CORA	33	103	27	198	7	385
ELSIE	22	99	15	240	4	484
FLOSSIE	16	135	8	269	2	507
IDA	10	315	3	658	--	--
JUNE	25	211	19	412	7	435
KATHY	38	134	24	247	11	391
MARIE	18	254	12	343	4	478
PAMELA	17	61	12	119	3	164

AVERAGE ERROR - 24 HR FORECASTS (410 CASES) ... 136 MI

AVERAGE ERROR - 48 HR FORECASTS (246 CASES) ... 280 MI

AVERAGE ERROR - 72 HR FORECASTS (79 CASES) ... 432 MI

*Includes Forecast Errors during tropical storm intensity

TABLE IV-2

1966 FORECAST ERRORS*
(IN TERMS OF CLOSEST DISTANCE TO BEST TRACK)

TYPHOON	24 HR FORECASTS		48 HR FORECASTS		72 HR FORECASTS	
	NO. OF CASES	MEAN ERROR (MI)	NO. OF CASES	MEAN ERROR (MI)	NO. OF CASES	MEAN ERROR (MI)
HESTER	25	36	18	74	9	70
IRMA	37	60	32	135	12	236
JUDY	21	54	15	103	5	127
KIT	19	114	15	262	6	466
MAMIE	4	58	--	--	--	--
NINA	8	94	1	163	--	--
ORA	4	32	--	--	--	--
RITA	19	54	8	126	4	455
SUSAN	12	55	5	187	--	--
TESS	10	48	5	200	--	--
VIOLA	12	81	8	151	2	314
ALICE	35	103	21	339	5	454
CORA	31	58	29	134	8	199
ELSIE	22	65	15	149	4	298
FLOSSIE	12	72	8	161	2	143
IDA	10	64	3	68	--	--
JUNE	24	142	19	263	7	193
KATHY	26	48	19	89	11	186
MARIE	17	129	12	158	4	108
PAMELA	17	21	12	39	3	63

AVERAGE ERROR - 24 HR FORECASTS (365 CASES) ... 71 MI

AVERAGE ERROR - 48 HR FORECASTS (245 CASES) ... 160 MI

AVERAGE ERROR - 72 HR FORECASTS (81 CASES) ... 229 MI

*Includes Forecast Errors during tropical storm intensity

TABLE IV-3

To better understand the areas in which larger or smaller errors occur, the mean and right angle errors are tabulated with respect to latitude for the 24, 48 and 72 hour forecast positions (table IV-4). Also distances from positions given in the bulletins versus the best track positions is summarized (table IV-5). Possibly this information will give the user a better understanding of the ability of JTWC to forecast the effects of a typhoon in a particular area.

FORECAST ERROR TABULATION (MI) - 1966

	NUMBER OF CASES	ERROR		RIGHT ANGLE	
		MEAN	R.M.S.	MEAN	R.M.S.
<u>24 Hour</u>					
Total	365	136	165	71	95
Below 20N	131	104	131	58	83
20N-30N	191	142	166	75	102
Above 30N	43	20.7	240	79	100
Below 35N	351	132	159	70	94
Above 35N	14	241	281	106	122
<u>48 Hour</u>					
Total	245	283	332	160	206
Below 20N	70	170	197	98	127
20N-30N	136	310	354	191	240
Above 30N	39	389	433	163	190
Below 35N	232	272	320	163	209
Above 35N	13	478	505	113	146
<u>72 Hour</u>					
Total	81	439	513	229	287
Below 20N	20	214	260	108	129
20N-30N	45	466	521	258	309
Above 30N	16	646	695	299	358
Below 35N	75	422	495	224	286
Above 35N	6	653	694	297	298

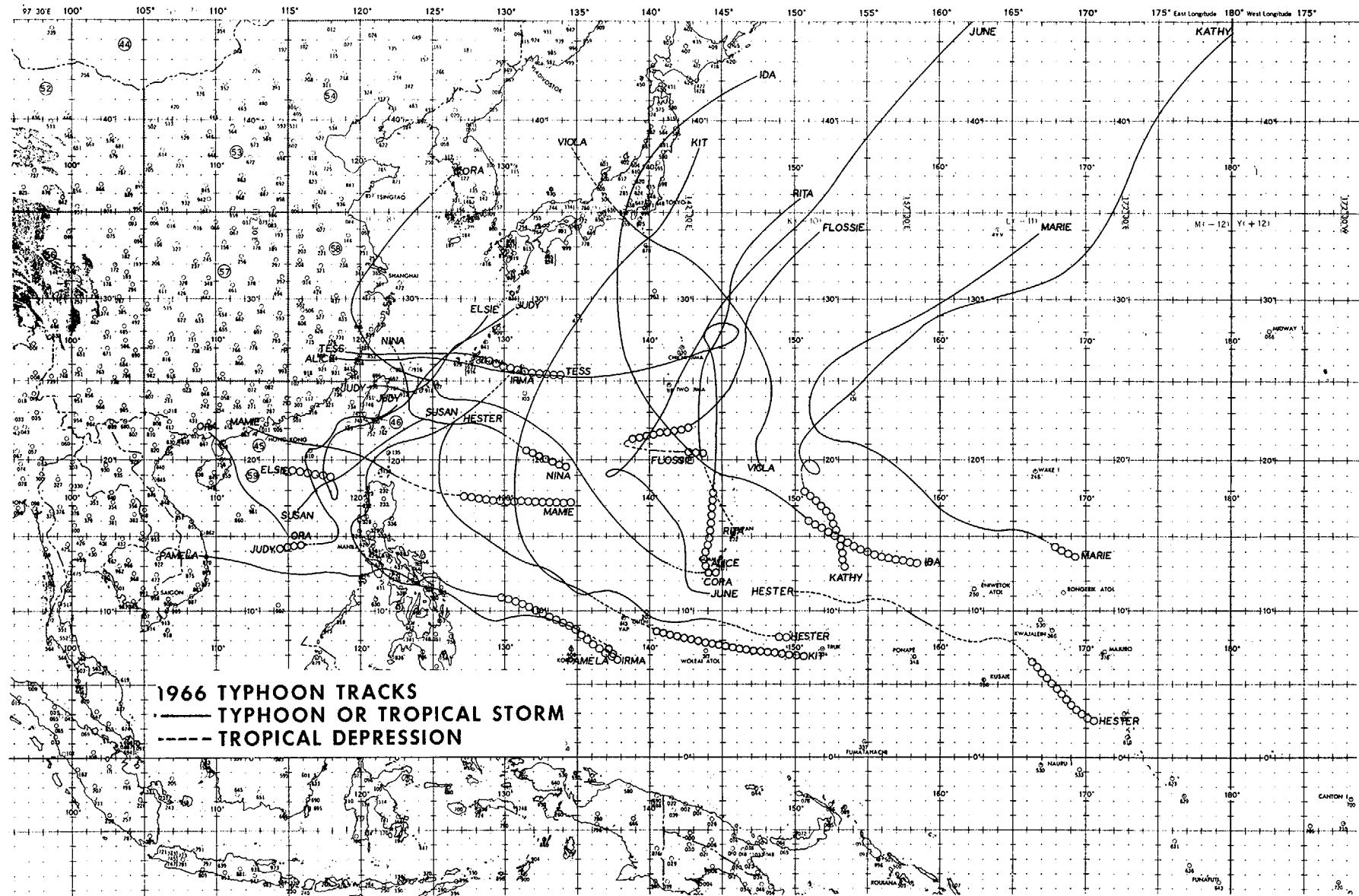
TABLE IV-4

DISTANCE BETWEEN OPERATIONAL WARNING
POSITS AND BEST TRACK POSITS

CYCLONE	CASES	CYCLONE AVERAGE (MI)	MAX (MI)	MIN (MI)
1. HESTER	47	25	105	03
2. IRMA	44	22	132	05
3. JUDY	28	20	58	00
4. KIT	28	26	94	00
5. LOLA	10	42	102	05
6. MAMIE	11	44	113	07
7. NINA	13	25	54	05
8. ORA	13	35	77	00
9. PHYLLIS	9	26	57	08
10. RITA	28	30	92	05
11. SUSAN	17	22	83	02
12. TESS	19	20	75	05
13. T.D.	4	47	93	15
14. VIOLA	16	19	49	04
15. WINNIE	15	20	59	04
16. ALICE	39	16	47	00
17. BETTY	6	17	57	00
18. CORA	40	29	133	05
19. T.D.	5	42	65	06
20. T.D.	17	94	256	07
21. DORIS	16	24	54	04
22. T.D.	10	31	118	00
23. ELSIE	26	22	69	01
24. FLOSSIE	20	42	131	06
25. GRACE	11	61	119	06
26. HELEN	21	28	46	04
27. IDA	14	37	83	04
28. JUNE	30	38	200	00
29. KATHY	49	41	260	04
30. T.D.	12	46	250	13
31. T.D.	5	101	67	00
32. LORNA	26	23	81	00
33. MARIE	22	44	146	06
34. T.D.	8	38	91	12
35. T.D.	5	48	125	05
36. NANCY	32	29	164	02
37. OLGA	13	32	138	01
38. T.D.	6	78	202	15
39. PAMELA	23	18	48	02

OVERALL AVERAGE 31.5

TABLE IV-5



1966 TROPICAL CYCLONES

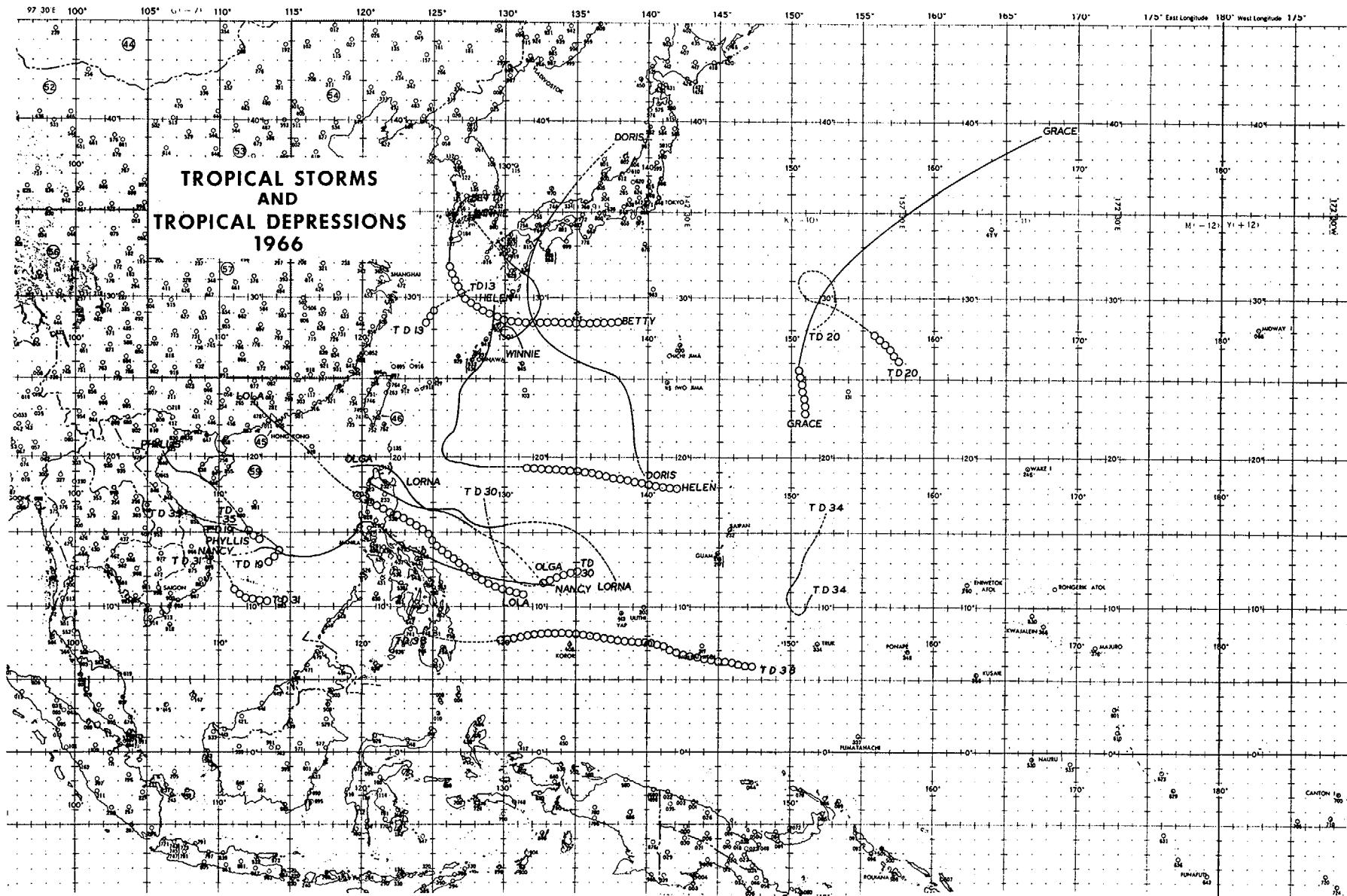
CYCLONE	TYPE	NAME	*DATE	*CALENDAR DAYS OF WARNING	*MAX SFC WNDS	MIN	MAX RADIUS SFC CIRC	TOTAL NO. WARNINGS	NO. ISSUED AS WARNINGS ISSUED TYPHOON	*DISTANCE TRAVELED
01	T	HESTER	03 APR-14 APR	12	85	979	360	47	15	2676
02	T	IRMA	11 MAY-22 MAY	12	120	970	350	44	28	2150
03	T	JUDY	25 MAY-31 MAY	7	85	970	350	28	14	1536
04	T	KIT	22 JUN-28 JUN	7	170	914	600	28	19	2286
05	TS	LOLA	11 JUL-14 JUL	4	60	992	290	10	-	552
06	T	MAMIE	15 JUL-17 JUL	3	85	987	225	11	3	882
07	T	NINA	17 JUL-20 JUL	4	65	995	200	13	1	702
08	T	ORA	23 JUL-26 JUL	4	85	977	450	13	8	516
09	TS	PHYLLIS	31 JUL-02 AUG	3	45	991	160	9	-	456
10	T	RITA	02 AUG-09 AUG	8	80	977	500	28	4	1332
11	T	SUSAN	12 AUG-16 AUG	5	80	978	275	17	3	606
12	T	TESS	12 AUG-17 AUG	6	90	972	400	19	4	522
13	TD		17 AUG-18 AUG	1	30	994	155	4	-	108
67	T	VIOLA	19 AUG-22 AUG	4	90	975	275	16	9	1404
	TS	WINNIE	20 AUG-24 AUG	4	60	971	310	15	-	750
	T	ALICE	25 AUG-03 SEP	10	130	937	350	39	18	2238
	TS	BETTY	29 AUG-30 AUG	2	60	---	170	6	-	240
	T	CORA	30 AUG-09 SEP	11	150	917	600	39	24	2358
	TD		01 SEP-02 SEP	2	30	1001	180	5	-	202
	TD		05 SEP-09 SEP	5	30	998	165	17	-	660
	TS	DORIS	06 SEP-10 SEP	5	50	979	160	16	-	1494
	TD		10 SEP-12 SEP	3	30	1004	240	10	-	540
	T	ELSIE	11 SEP-18 SEP	8	115	943	400	26	16	1134
	T	FLOSSIE	12 SEP-18 SEP	7	75	963	350	21	4	1122
	TS	GRACE	14 SEP-17 SEP	4	60	972	270	11	-	1212
	TS	HELEN	19 SEP-24 SEP	6	60	982	630	21	-	936
	T	IDA	22 SEP-25 SEP	4	100	961	225	14	8	2112

1966 TROPICAL CYCLONES (Cont'd)

CYCLONE	TYPE	NAME	*DATE	*CALENDAR		*MAX	MIN	MAX	TOTAL	NO.	NO.	WARNINGS	*DISTANCE
				DAY'S OF	WARNING	SFC	OBS	RADIUS	WARNINGS	ISSUED AS	TYphoon	TRAVELED	
				WNDS	SLP	SFC	CIRC	ISSUED					
28	T	JUNE	22 SEP-29 SEP	8	95	962	475	30	8			2898	
29	T	KATHY	08 OCT-20 OCT	13	100	947	500	49	41			2466	
30	TD		09 OCT-12 OCT	4	30	998	245	13	-			462	
31	TD		21 OCT-25 OCT	5	25	1001	230	5	-			168	
32	TS	LORNA	27 OCT-02 NOV	7	60	952	375	26	-			1320	
33	T	MARIE	29 OCT-04 NOV	7	100	946	550	23	17			2196	
34	TD		31 OCT-02 NOV	3	30	995	210	9	-			540	
35	TD		11 NOV-12 NOV	2	25	1005	150	5	-			216	
36	TS	NANCY	18 NOV-26 NOV	9	60	976	370	32	-			1326	
37	TS	OLGA	22 NOV-25 NOV	4	45	993	245	14	-			942	
38	TD		18 DEC-19 DEC	2	30	999	150	6	-			282	
39	T	PAMELA	25 DEC-31 DEC	7	90	967	275	23	10			1224	
68		TOTALS		222					762			254	

*DATA TAKEN FROM BEST TRACK

**TROPICAL STORMS
AND
TROPICAL DEPRESSIONS
1966**



TROPICAL STORMS 1966
POSITION DATA

TROPICAL STORM LOLA
11 JUL-14 JUL

DTG	LAT	LONG	DTG	LAT	LONG
111800Z	17.6N	119.5E	130000Z	20.9N	115.6E
120000Z	18.2N	118.7E	130600Z	21.5N	114.8E
120600Z	18.8N	117.8E	131200Z	22.2N	113.9E
121200Z	19.6N	117.2E	131800Z	22.8N	113.1E
121800Z	20.3N	116.4E	140000Z	23.7N	112.2E

TROPICAL STORM PHYLLIS
31 JUL-02 AUG

DTG	LAT	LONG	DTG	LAT	LONG
311800Z	15.3N	112.0E	020000Z	18.7N	108.2E
010000Z	16.1N	111.2E	010600Z	19.0N	107.2E
010600Z	16.8N	110.5E	021200Z	19.3N	106.7E
011200Z	17.6N	109.9E	021800Z	20.2N	106.1E
011800Z	18.4N	109.2E			

TROPICAL STORM WINNIE
20 AUG-24 AUG

DTG	LAT	LONG	DTG	LAT	LONG
201200Z	26.9N	131.2E	220600Z	29.3N	132.4E
201800Z	27.3N	130.9E	221200Z	30.3N	132.3E
210000Z	27.7N	130.6E	221800Z	31.2N	131.6E
210600Z	28.1N	130.3E	230000Z	31.8N	130.7E
211200Z	27.8N	129.7E	230600Z	32.5N	129.8E
211800Z	27.6N	130.8E	231200Z	33.3N	129.0E
220000Z	28.4N	131.9E	231800Z	34.0N	128.2E
			240000Z	34.7N	127.4E

TROPICAL STORM BETTY
29 AUG-30 AUG

DTG	LAT	LONG	DTG	LAT	LONG
291200Z	32.0N	126.2E	300600Z	34.5N	126.5E
291800Z	32.8N	126.2E	301200Z	35.2N	126.8E
300000Z	33.7N	126.3E	301800Z	35.8N	127.5E

TROPICAL STORM DORIS
06 SEP-10 SEP

DTG	LAT	LONG	DTG	LAT	LONG
060600Z	18.7N	139.7E	080600Z	27.2N	132.9E
061200Z	19.2N	139.5E	081200Z	28.8N	131.9E
061800Z	19.9N	139.2E	081800Z	30.6N	131.7E
070000Z	21.3N	139.0E	090000Z	31.8N	131.7E
070600Z	23.3N	138.8E	090600Z	33.5N	132.3E
071200Z	25.1N	137.8E	091200Z	35.3N	133.5E
071800Z	25.5N	136.2E	091800Z	37.0N	135.2E
080000Z	26.1N	134.4E	100000Z	38.7N	137.5E

TROPICAL STORM GRACE
14 SEP-17 SEP

DTG	LAT	LONG	DTG	LAT	LONG
141200Z	25.7N	150.5E	160000Z	34.1N	156.9E
141800Z	26.7N	150.7E	160600Z	35.5N	159.4E
150000Z	27.9N	151.1E	161200Z	36.9N	161.9E
150600Z	29.0N	151.6E	161800Z	38.2N	164.5E
151200Z	30.7N	152.8E	170000Z	39.1N	167.3E
151800Z	32.5N	154.7E			

TROPICAL STORM HELEN
19 SEP-24 SEP

DTG	LAT	LONG	DTG	LAT	LONG
190000Z	19.4N	131.3E	211800Z	21.6N	126.3E
190600Z	19.4N	130.8E	220000Z	22.3N	126.8E
191200Z	19.4N	130.3E	220600Z	23.1N	126.9E
191800Z	19.3N	129.6E	221200Z	24.0N	126.9E
200000Z	19.3N	129.0E	221800Z	24.7N	127.2E
200600Z	19.4N	128.3E	230000Z	25.3N	127.8E
201200Z	19.5N	127.7E	230600Z	26.1N	128.5E
201800Z	19.6N	127.1E	231200Z	27.0N	128.8E
210000Z	19.6N	126.5E	231800Z	28.2N	129.1E
210600Z	20.1N	125.8E	240000Z	29.6N	129.3E
211200Z	20.9N	125.9E			

TROPICAL STORM LORNA
27 OCT-02 NOV

DTG	LAT	LONG	DTG	LAT	LONG
270600Z	11.6N	137.7E	301200Z	16.6N	125.5E
271200Z	12.0N	136.6E	301800Z	16.6N	124.4E
271800Z	12.4N	137.5E	310000Z	16.9N	123.3E
280000Z	12.9N	137.2E	310600Z	17.4N	122.3E
280600Z	13.6N	136.8E	311200Z	18.0N	121.3E
281200Z	14.3N	136.0E	311800Z	18.3N	120.7E
281800Z	15.1N	134.7E	010000Z	18.6N	120.6E
290000Z	15.6N	133.3E	010600Z	19.0N	120.8E
290600Z	15.7N	131.8E	011200Z	19.1N	121.0E
291200Z	15.5N	130.2E	011800Z	18.7N	121.2E
291800Z	15.3N	128.7E	020000Z	18.4N	121.4E
300000Z	15.8N	127.5E	020600Z	18.2N	121.7E
300600Z	16.5N	126.5E	021200Z	18.1N	122.2E

TROPICAL STORM NANCY
18 NOV-26 NOV

DTG	LAT	LONG	DTG	LAT	LONG
180600Z	11.5N	132.5E	220600Z	13.9N	118.1E
181200Z	11.7N	130.8E	221200Z	13.7N	117.5E
181800Z	11.9N	129.1E	221800Z	13.6N	116.8E
190000Z	12.3N	127.5E	230000Z	13.5N	116.3E
190600Z	12.7N	126.1E	230600Z	13.5N	115.8E
191200Z	13.2N	125.0E	231200Z	13.5N	115.1E
191800Z	13.7N	123.9E	231800Z	13.7N	114.4E
200000Z	14.1N	123.0E	240000Z	13.8N	114.1E
200600Z	14.6N	122.1E	240600Z	13.9N	113.9E
201200Z	15.1N	121.4E	241200Z	14.0N	113.7E
201800Z	15.5N	120.8E	241800Z	14.1N	113.3E
210000Z	15.6N	120.2E	250000Z	13.9N	112.9E
210600Z	15.4N	119.8E	250600Z	13.8N	112.4E
211200Z	14.9N	119.4E	251200Z	13.6N	111.9E
211800Z	14.4N	119.0E	251800Z	13.5N	111.4E
220000Z	14.1N	118.6E	260000Z	13.3N	110.9E

TROPICAL STORM OLGA
22 NOV-25 NOV

DTG	LAT	LONG	DTG	LAT	LONG
220600Z	11.6N	132.7E	240000Z	17.2N	123.5E
221200Z	12.8N	131.8E	240600Z	18.6N	122.7E
221800Z	13.9N	130.5E	241200Z	19.4N	121.3E
230000Z	14.6N	128.9E	241800Z	19.5N	120.0E
230600Z	15.4N	127.5E	250000Z	19.5N	119.7E
231200Z	16.1N	126.2E	250600Z	19.4N	119.4E
231800Z	16.6N	124.8E			

TROPICAL DEPRESSIONS 1966
POSITION DATA

TROPICAL DEPRESSION ONE THREE
17 AUG-18 AUG

DTG	LAT	LONG	DTG	LAT	LONG
171200Z	29.4N	125.2E	180000Z	29.9N	126.6E
171800Z	29.7N	125.9E	180600Z	30.2N	127.4E

TROPICAL DEPRESSION ONE NINE
01 SEP-02 SEP

DTG	LAT	LONG	DTG	LAT	LONG
010000Z	14.0N	114.0E	011800Z	15.0N	112.0E
010600Z	14.6N	113.6E	020000Z	15.2N	110.9E
011200Z	14.9N	113.0E			

TROPICAL DEPRESSION TWO ZERO
05 SEP-09 SEP

DTG	LAT	LONG	DTG	LAT	LONG
050600Z	27.9N	155.5E	071200Z	31.5N	151.6E
051200Z	28.3N	154.9E	071800Z	31.2N	152.2E
051800Z	28.7N	154.3E	080000Z	30.7N	152.7E
060000Z	29.1N	153.4E	080600Z	30.2N	152.9E
060600Z	29.4N	152.5E	081200Z	29.5N	153.0E
061200Z	29.7N	151.7E	081800Z	28.9N	152.8E
061800Z	30.1N	150.9E	090000Z	28.5N	152.3E
070000Z	30.8N	150.5E	090600Z	28.0N	151.5E
070600Z	31.3N	150.9E			

TROPICAL DEPRESSION TWO TWO
10 SEP-12 SEP

DTG	LAT	LONG	DTG	LAT	LONG
101800Z	15.3N	149.0W	120000Z	15.2N	153.2W
110000Z	15.2N	149.5W	120600Z	15.2N	154.6W
110600Z	15.2N	150.0W	121200Z	15.1N	156.2W
111200Z	15.2N	151.0W	121800Z	14.9N	157.6W
111800Z	15.2N	152.0W	122100Z	14.8N	158.4W

TROPICAL DEPRESSION THREE ZERO
09 OCT-12 OCT

DTG	LAT	LONG	DTG	LAT	LONG
090600Z	11.5N	132.4E	101800Z	13.9N	129.4E
091200Z	11.5N	131.7E	110000Z	14.6N	129.2E
091800Z	11.6N	131.0E	110600Z	15.2N	129.0E
100000Z	12.1N	130.4E	111200Z	15.9N	128.8E
100600Z	12.7N	130.0E	111800Z	16.6N	128.7E
101200Z	13.3N	129.7E	120000Z	17.2N	128.6E

TROPICAL DEPRESSION THREE ONE
21 SEP-22 SEP

DTG	LAT	LONG	DTG	LAT	LONG
211200Z	11.5N	111.0E	220600Z	13.0N	109.9E
211800Z	12.1N	110.8E	221200Z	13.2N	108.9E
220000Z	12.6N	110.4E			

TROPICAL DEPRESSION THREE FOUR
31 OCT-02 NOV

DTG	LAT	LONG	DTG	LAT	LONG
310600Z	10.9N	151.6E	010600Z	13.0N	150.9E
311200Z	09.7N	150.8E	011200Z	14.1N	151.4E
311800Z	10.7N	149.8E	011800Z	15.2N	152.0E
010000Z	11.9N	150.4E	020000Z	16.3N	152.3E

TROPICAL DEPRESSION THREE FIVE
11 NOV-12 NOV

DTG	LAT	LONG	DTG	LAT	LONG
110600Z	15.4N	111.1E	120000Z	16.0N	108.3E
111200Z	15.5N	110.0E	120600Z	16.2N	107.4E
111800Z	15.7N	109.2E			

TROPICAL DEPRESSION THREE EIGHT
18 DEC-19 DEC

DTG	LAT	LONG	DTG	LAT	LONG
180000Z	07.7N	129.5E	181800Z	07.7N	126.6E
180600Z	07.6N	128.5E	190000Z	07.8N	125.7E
181200Z	07.6N	127.5E	190600Z	07.9N	124.8E

CHAPTER V

INDIVIDUAL TYPHOONS OF 1966

The statistics, fix data and verification pages for each typhoon have been automated. The typhoons are identified by cyclone number rather than by name throughout Chapter 5.

For convenience a list of cyclone numbers versus typhoon names follows:

CYCLONE	NAME
01	HESTER
02	IRMA
03	JUDY
04	KIT
06	MAMIE
07	NINA
08	ORA
10	RITA
11	SUSAN
12	TESS
14	VIOLA
16	ALICE
18	CORA
23	ELSIE
24	FLOSSIE
27	IDA
28	JUNE
29	KATHY
33	MARIE
39	PAMELA

See Appendix A for definitions or clarification of certain words and phrases that appear in this chapter.

TROPICAL CYCLONE 01 - 04/03/0600Z TO 04/14/1800Z

I. DATA

A. STATISTICS

1. NUMBER OF WARNINGS ISSUED - 47
2. NUMBER OF WARNINGS WITH TYPHOON INTENSITY - 15
3. TOTAL DISTANCE TRAVELED DURING TROPICAL WARNING PERIOD - 2676 MI

B. CHARACTERISTICS AS A TYPHOON

1. MINIMUM OBSERVED SLP - 979MB AT 120842Z
2. MINIMUM OBSERVED 700MB HEIGHT - 2963M. AT 112115Z
3. MAXIMUM SURFACE WIND - 085 KTS (FROM BEST TRACK)
4. MAXIMUM RADIUS OF SURFACE CIRCULATION - 360 MI

II. DEVELOPMENT

A. INITIAL IMPETUS - LOW LEVEL SURGE INTO CYCLONIC CIRCULATION FROM THE SOUTH WITH SUBSEQUENT DIVERGENCE AT 200MB LEVEL

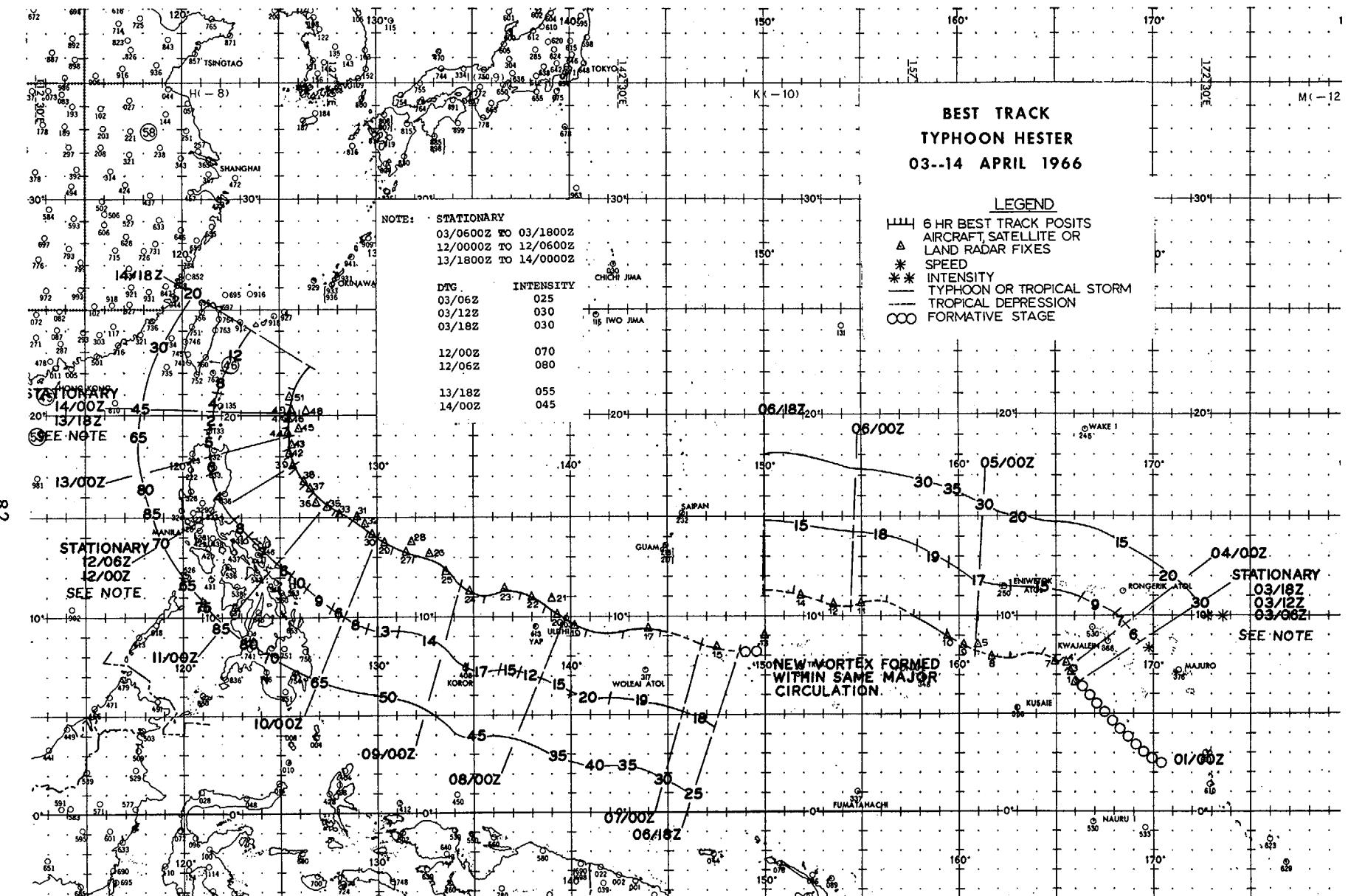
B. INITIAL SURFACE VORTEX

1. JUNCTION VORTEX AT 010000Z
2. SURFACE PRESSURE LESS THAN 1006MB

C. 200MB FLOW ABOVE SURFACE VORTEX

1. INITIAL - SOUTHEAST
2. UPON REACHING TYPHOON INTENSITY - SOUTH

III. FINAL DISPOSITION - DISSIPATED OVER WATER



FIX NO.	TIME	POSIT	EYE FIXES CYCLONE			01	UBS	MIN	FL1	EYE	ORIEN-	EYE	THKNS	
			UNIT- METHOD	LVL	FLT		SFC	MIN	LVL	TT/TD	FORM	TATION	DIA	WALL
			-ACCY	LVL	WND		SLP	700M						CLOUD
1	030545Z	06.8N 166.0E	54-P-P10	0460M	023	025	001	---	--/-	CIRC	----	50	N.F.B.	
2	032100Z	06.8N 166.1E	54-P-P10	700MB	---	030	002	3100	11/-	CIRC	----	30	N.F.B.	
3	040200Z	07.3N 165.9E	LND RDR	---	---	---	---	---	--/-	----	----		F.B.	
4	040245Z	07.6N 165.4E	54-P-P10	0460M	030	030	001	---	--/-	CIRC	----	30	N.F.B.	
5	040340Z	08.5N 161.0E	TIROS	STG A	DIA 03	BNDs	-							
6	040400Z	07.4N 165.6E	LND RDR	---	---	---	---	---	--/-	----	----		F.B.	
7	040625Z	07.8N 165.0E	54-P-L05	0460M	017	015	001	---	--/-	CIRC	----	40	F.B.	
8	042100Z	08.0N 161.8E	54-P-P05	0460M	020	020	001	---	--/-	CIRC	----	00	N.F.B.	
9	050245Z	08.6N 160.2E	54-P-P05	0460M	030	035	000	---	--/-	CIRC	----	50	F.B.	
10	050305Z	09.0N 159.5E	TIROS	STG A	DIA --	BNDs	-							
11	052200Z	10.7N 155.0E	54-P-P05	0460M	015	030	002	---	--/-	CIRC	----	10	F.B.	
12	060310Z	10.6N 153.5E	54-P-F05	0460M	020	030	004	---	--/-	----	----		F.B.	
13	060410Z	09.0N 150.0E	TIROS	STG B	DIA --	BNDs	-							
14	061050Z	11.1N 151.9E	VW-P-L15	0460M	040	030	003	---	--/-	----	----		F.B.	
15	062116Z	08.5N 147.5E	54-P-P05	0460M	---	025	004	---	--/-	CIRC	----	08	N.F.B.	
16	070837Z	09.4N 144.1E	VW-P-P10	0440M	040	040	001	---	--/-	CIRC	----	30	F.B.	
17	072115Z	09.7N 140.1E	54-P-P03	0460M	035	020	998	---	--/-	CIRC	----	40	N.F.B.	
18	080245Z	10.1N 139.2E	54-P-P01	0460M	035	035	996	---	--/-	----	----		F.B.	
19	080429Z	11.0N 139.0E	TIROS	STG X	DIA 02	BNDs	2							
20	080845Z	10.9N 138.0E	VW-P-P05	0250M	025	035	995	---	--/-	CIRC	----	10	07	
21	081430Z	11.3N 136.5E	VW-R-P10	700MB	050	---	---	---	--/-	CIRC	----	10	--	
22	082100Z	11.1N 134.8E	54-P-P02	700MB	030	---	000	3079	10/-	CIRC	----	08	10	
23	090500Z	12.5N 133.4E	54-P-P05	700MB	040	045	987	3008	12/-	CIRC	----	20	--	
24	090920Z	13.2N 132.6E	VW-R-F05	0380M	060	040	---	---	--/-	CIRC	----	20	--	

FIX NO.	TIME	PUSIT	EYE FIXES CYCLONE			OI			MIN 700MB	FLT LVL TT/TD	EYE FORM	ORIEN- TATION	EYE DIA	THKNS WALL CLOUD
			UNIT- METHOD -ACCY	FLT LVL	FLT WND	OBS SFC	OBS MIN SLP	MIN HGT						
25	091005Z	13.3N 131.5E	VW-P-P05	0290M	---	---	988	---	---	---	CIRC	----	30	12
26	091450Z	13.9N 131.7E	VW-P-P05	---	---	---	---	---	---	---	CIRC	----	25	10
27	092100Z	13.8N 130.3E	54-P-P03	700MB	050	050	987	2987	12/-	CIRC	----	40	05	
28	100300Z	14.3N 129.7E	54-P-P03	700MB	045	065	993	3045	15/-	CIRC	----	30	--	
29	100509Z	15.0N 129.0E	TIROS	STG X	DIA 04	BNDS 2								
30	100854Z	14.7N 129.3E	VW-P-P03	0390M	050	065	991	---	---	---	CIRC	----	40	11
31	101511Z	15.2N 128.0E	VW-R-F02	3260M	058	---	---	---	---	---	CIRC	----	40	--
32	101610Z	15.4N 128.0E	VW-UNK--	700MB	---	---	---	---	---	---	---			--
33	102100Z	15.5N 127.4E	54-P-P05	700MB	050	---	995	2996	12/-	CIRC	----	30	--	
34	110300Z	15.8N 126.9E	54-P-P05	700MB	060	085	992	3036	15/-	CIRC	----	60	07	
35	110903Z	16.6N 126.4E	VW-P-P02	0310M	055	050	990	2954	14/-	ELIP	NW-SE	30X20	F.B.	
36	111405Z	16.9N 126.2E	VW-P-P02	2950M	050	---	991	---	16/12	CIRC	----	40	--	
37	112115Z	17.7N 125.5E	54-P-P03	700MB	065	---	986	2963	13/-	CIRC	----	40	F.B.	
38	120300Z	17.8N 125.4E	54-P-P03	700MB	050	070	990	2984	14/-	ELIP	NW-SE	40X20	F.B.	
39	120842Z	17.9N 125.4E	VW-P-P05	0240M	080	085	979	---	---	CIRC	----	19	F.B.	
40	121500Z	18.2N 125.3E	VW-P-P03	700MB	---	---	989	2987	17/08	----				F.B.
41	122050Z	18.6N 125.5E	54-P-P05	700MB	060	---	987	2963	14/-	CIRC	----	08	10	
42	130215Z	19.2N 125.4E	54-P-P05	700MB	047	080	996	3027	13/-	CIRC	----	05	10	
43	130506Z	19.5N 126.0E	TIROS	STG X	DIA 04	BNDS 3								
44	130903Z	19.9N 125.4E	VW-P-P02	0260M	035	045	997	---	---	CIRC	----	30	--	
45	131605Z	20.0N 125.2E	VW-P-F10	700MB	058	---	---	3100	14/04	CIRC	----	10	F.B.	
46	132100Z	20.3N 126.3E	54-P-P05	700MB	039	---	991	3063	13/-	----				F.B.
47	132200Z	20.2N 125.6E	54-P-P--	700MB	---	040	---	---	---	---	---			--
48	140300Z	20.4N 125.5E	54-P-P05	700MB	040	045	000	3063	14/-	CIRC	----	60	F.B.	

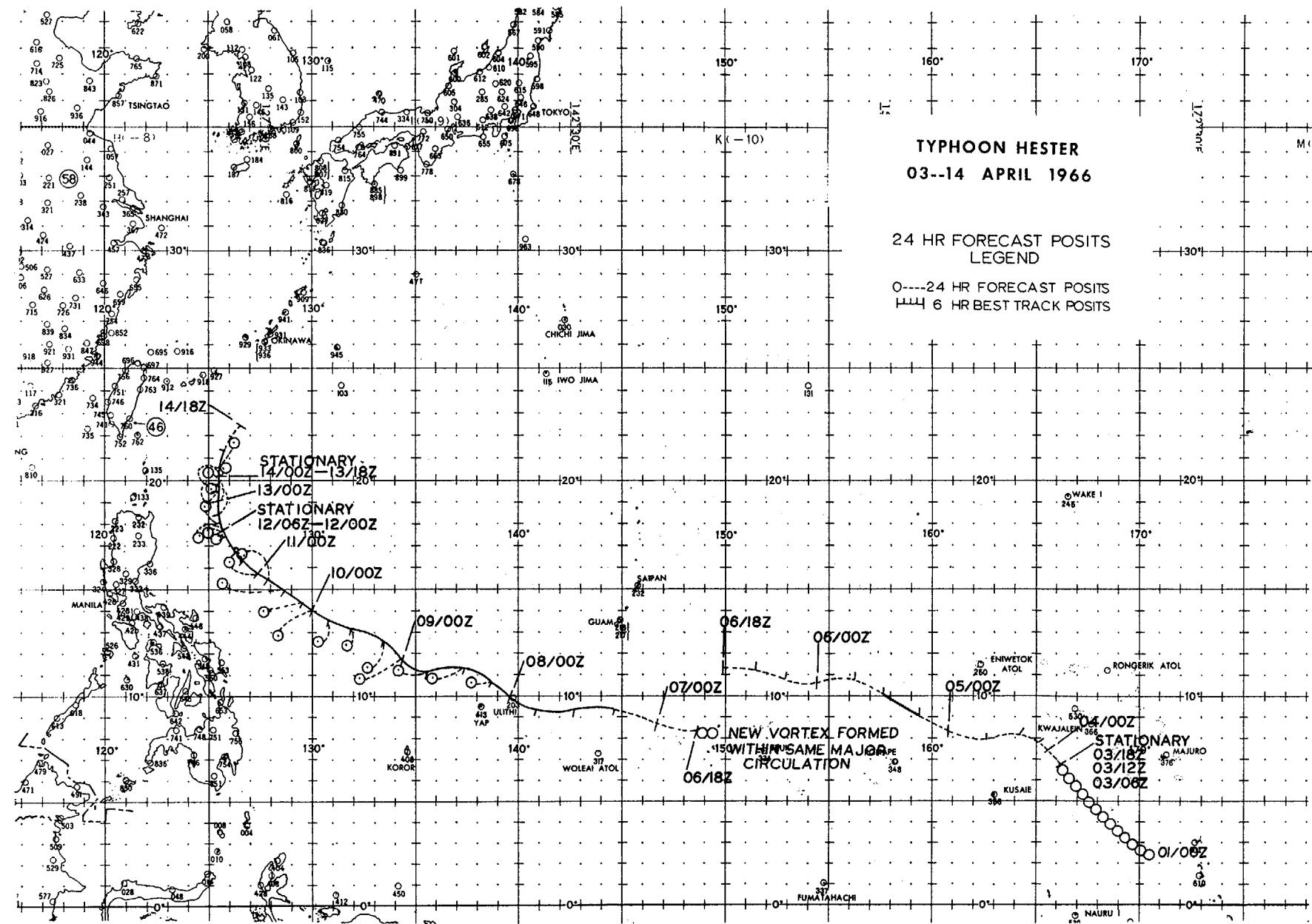
EYE FIXES CYCLONE 01

FIX NO.	TIME	PUSIT	UNII:-		OBS	OBS	MIN	700MB	FLT	LVL	EYE	ORIEN-	EYE	WALL	THKNS
			METHOD	-ACCY											
49	140856Z	21.0N 125.4E	VW-P-PO5	0180M	029	020	997	---	--/--	CIRC	---	15	N.F.B.		

TROPICAL CYCLONE 01 - 04/03/0600Z TO 04/14/1800Z
 POSITION AND FORECAST VERIFICATION DATA

UTG	STORM POSITION	24 HR. ERROR	48 HR. ERROR	72 HR. ERROR
	LAT. LUNG.	DEG. DIST.	DEG. DIST.	DEG. DIST.
050600Z	09.0N 159.4E	103-0180	-----	-----
070600Z	09.3N 144.8E	024-0132	-----	-----
071200Z	09.3N 142.9E	050-0192	-----	-----
071800Z	09.4N 140.9E	055-0228	-----	-----
080000Z	09.9N 139.6E	270-0006	-----	-----
080600Z	10.6N 138.6E	270-0048	-----	-----
081200Z	11.2N 137.2E	256-0072	-----	-----
081800Z	11.0N 135.5E	282-0078	-----	-----
090000Z	11.6N 134.2E	230-0120	-----	-----
090600Z	12.6N 133.3E	207-0078	-----	-----
091200Z	13.1N 131.9E	180-0042	-----	-----
091800Z	13.6N 130.7E	202-0060	-----	-----
100000Z	14.0N 130.0E	236-0114	251-0192	-----
100600Z	14.4N 129.5E	257-0102	224-0144	-----
101200Z	14.9N 128.7E	277-0174	231-0120	-----
101800Z	15.4N 127.8E	318-0078	237-0108	-----
110000Z	15.7N 127.2E	294-0072	274-0150	282-0162
110600Z	16.2N 126.6E	000-0006	268-0162	240-0114
111200Z	16.8N 126.2E	146-0018	289-0180	-----
111800Z	17.4N 125.7E	270-0006	334-0096	277-0096
120000Z	17.7N 125.5E	270-0024	321-0114	332-0138
120600Z	17.7N 125.5E	255-0042	344-0084	293-0162
121200Z	18.0N 125.4E	336-0054	333-0048	-----
121800Z	18.4N 125.3E	355-0072	348-0090	005-0216
130000Z	19.0N 125.3E	351-0078	331-0072	-----
130600Z	19.5N 125.4E	211-0030	306-0078	022-0258
131200Z	19.9N 125.5E	204-0054	003-0150	-----
131800Z	20.2N 125.5E	234-0030	013-0162	026-0210
140000Z	20.2N 125.5E	034-0018	017-0204	-----
140600Z	20.5N 125.5E	025-0084	360-0072	019-0186

AVERAGE 24 HOUR ERROR - 0076 MI.
 AVERAGE 48 HOUR ERROR - 0123 MI.
 AVERAGE 72 HOUR ERROR - 0171 MI.



8

TROPICAL CYCLONE 02 - 05/11/0600Z TU 05/22/0000Z

I. DATA

A. STATISTICS

1. NUMBER OF WARNINGS ISSUED - 44
2. NUMBER OF WARNINGS WITH TYPHOON INTENSITY - 28
3. TOTAL DISTANCE TRAVELED DURING TROPICAL WARNING PERIOD - 2150 MI

B. CHARACTERISTICS AS A TYPHOON

1. MINIMUM OBSERVED SLP - 970MBAS AT 170300Z
2. MINIMUM OBSERVED 700MB HEIGHT - 2856M. AT 150300Z
3. MAXIMUM SURFACE WIND - 120 KTS (FROM BEST TRACK)
4. MAXIMUM RADIUS OF SURFACE CIRCULATION - 350 MI

II. DEVELOPMENT

A. INITIAL IMPETUS - LOW LEVEL SURGE INTO CYCLONIC CIRCULATION FROM THE SOUTH WITH SUBSEQUENT DIVERGENCE AT 200MB LEVEL

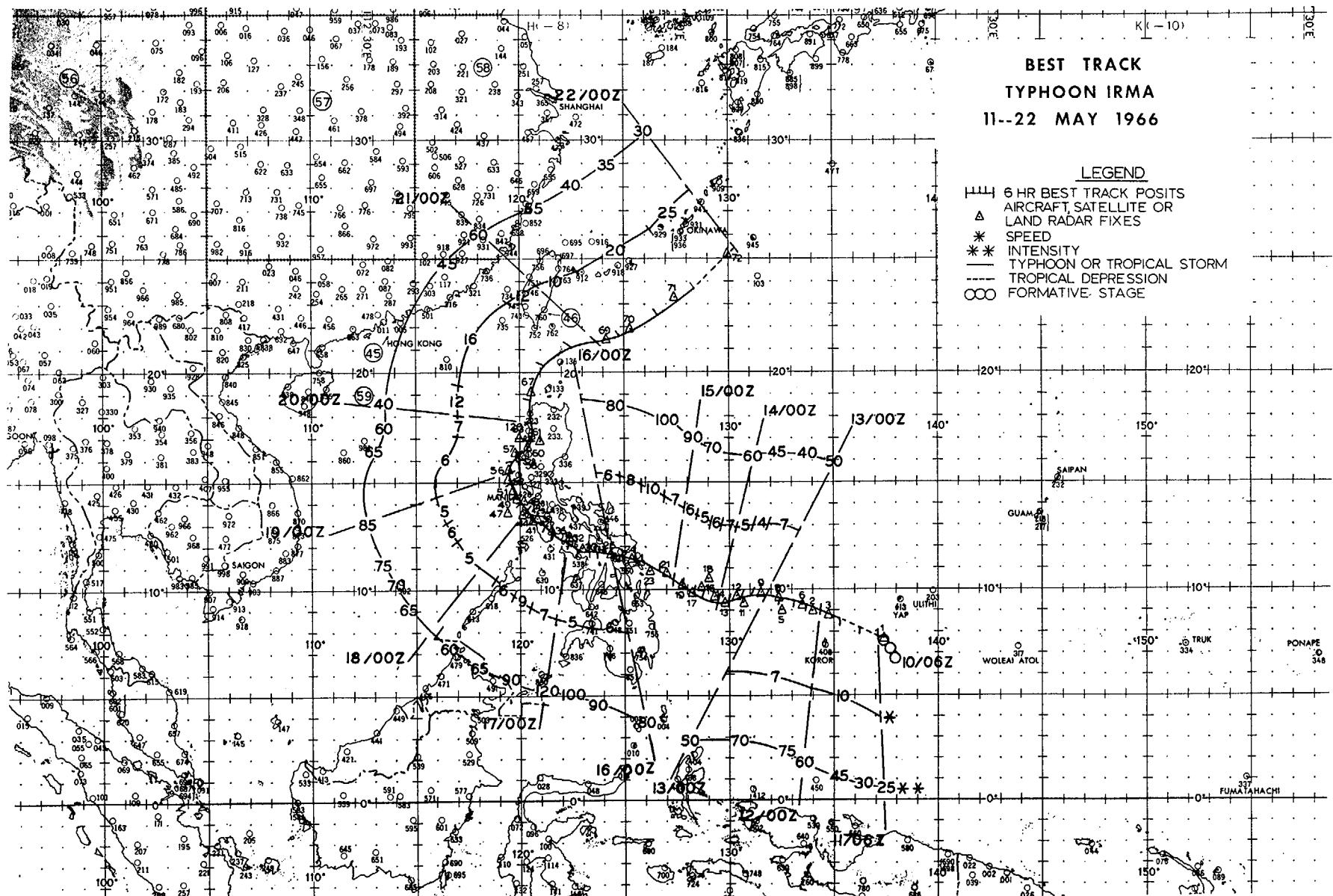
B. INITIAL SURFACE VORTEX

1. JUNCTION VORTEX AT 100000Z
2. SURFACE PRESSURE LESS THAN 1007MB

C. 200MB FLOW ABOVE SURFACE VORTEX

1. INITIAL - EAST
2. UPON REACHING TYPHOON INTENSITY - SOUTHWEST

III. FINAL DISPOSITION - BECAME EXTRATROPICAL



FIX NO.	TIME	PUSIT	EYE FIXES CYCLONE			02		MIN 700MB	FLT LVL	EYE FORM	ORIEN- TATION	EYE DIA	THKNS WALL CLOUD
			UNIT- METHOD	FLT	OBS	OBS	MIN						
			-ACCY	LVL	LVL	SFC	SLP						
	110340Z	07.8N 137.3E	54-P-F20	0460M	025	025	004	---	--/--	----	----	----	----
	110521Z	09.0N 134.0E	TIROS	STG A	DIA 05	BNDS	-						
	112130Z	08.8N 134.7E	54-P-POS	0470M	040	050	998	---	--/--	CIRC	----	10	--
	120230Z	09.3N 133.9E	54-P-POS	700MB	060	075	988	3027	16/--	CIRC	----	10	--
	120446Z	09.0N 132.5E	TIROS	STG X	DIA 04	BNDS 2							
	120900Z	09.3N 133.5E	VW-P-P02	0230M	060	055	983	3042	15/--	CIRC	----	02	10
	121408Z	09.8N 132.4E	VW-P-P02	700MB	035	---	993	3042	16/13	CIRC	----	06	10
	122100Z	09.6N 132.3E	54-P-P03	700MB	040	070	991	3008	15/--	CIRC	----	18	10
	130245Z	09.8N 131.5E	54-P-P03	700MB	040	050	002	3094	15/--	CIRC	----	30	N.F.B.
	130930Z	09.7N 130.5E	VW-R-F10	0430M	---	040	---	---	--/--	CIRC	----	30	08
10	131200Z	10.0N 130.3E	VW-UNK--	0920M	---	---	---	---	--/--	----	----	----	--
	131415Z	09.8N 130.3E	VW-R-P05	700MB	---	---	---	---	--/--	CIRC	----	18	07
	132117Z	09.5N 129.8E	54-P-P02	700MB	---	045	996	3036	13/--	ELIP	NE-SW	45X36	--
	140230Z	09.7N 129.3E	54-P-P02	700MB	050	060	990	3033	13/--	CIRC	----	20	--
	140516Z	10.5N 129.0E	TIROS	STG X	DIA 03	BNDS 3							
	140915Z	10.1N 128.6E	VW-P-P03	0240M	040	060	989	---	--/--	CIRC	----	26	08
	141200Z	09.9N 128.2E	VW-UNK--	0960M	---	---	---	---	--/--	----	----	----	--
	141445Z	10.0N 127.9E	VW-R-POS	700MB	070	---	---	---	--/--	CIRC	----	12	10
	142100Z	10.2N 127.7E	54-P-P03	700MB	070	075	976	2883	15/--	CIRC	----	20	10
	150100Z	10.6N 127.3E	54-UNK--	700MB	---	---	---	---	--/--	----	----	----	10
	150300Z	10.8N 127.0E	54-P-P03	700MB	085	100	973	2856	15/--	ELIP	N-S	40X30	10
	150441Z	11.0N 126.5E	TIROS	STG X	DIA 04	BNDS 4							
	150900Z	10.8N 126.2E	VW-R-F15	0370M	---	065	---	---	--/--	CIRC	----	20	15
	151445Z	11.4N 125.3E	VW-R-P02	---	---	---	---	---	--/--	CIRC	----	25	10

FIX NO.	TIME	PUSIT	EYE FIXES CYCLONE				02		MIN 700MB	FLI LVL TT/TD	EYE FORM	ORIEN- TATION	EYE DIA	THKNS WALL CLOUD
			UNIT- METHOD	FLT	OBS	OBS	MIN							
			-ACCY	FLT	LVL	SFC	MIN	SLP						
	152100Z	11.6N 124.7E	54-P-P02	500MB	070	---	---	---	--/--	CIRC	----	40	--	
	160300Z	11.7N 124.1E	54-P-P02	500MB	060	080	978	---	--/--	CIRC	----	20	--	
	160546Z	12.0N 124.0E	TIROS	STG X	DIA 04	BNDs 3								
	160830Z	11.9N 123.5E	VW-UNK--		---	---	---	---	--/--	----			--	
	160850Z	11.8N 123.6E	VW-P-P03	700MB	080	045	992	2977	--/--	CIRC	----	20	12	
	161430Z	11.9N 123.0E	VW-R-P--	700MB	---	---	---	---	--/--	CIRC	----	20	10	
	162100Z	12.0N 122.5E	54-P-P03	500MB	050	060	974	---	--/--	CIRC	----	18	10	
	170300Z	12.4N 122.2E	54-P-P01	500MB	065	120	971	2834	14/07	CIRC	----	10	--	
	170510Z	12.5N 122.0E	TIROS	STG X	DIA 03	BNDs 2								
	170600Z	12.7N 121.8E	LND RDR		---	---	---	---	--/--	----			--	
T6	170752Z	12.8N 121.7E	VW-UNKOS		---	---	---	---	--/--	----			--	
	170827Z	12.8N 121.6E	VW-P-P02	700MB	---	075	986	2932	11/05	CIRC	----	09	02	
	171400Z	13.3N 120.9E	LND RDR		---	---	---	---	--/--	----			--	
	171417Z	13.3N 120.8E	VW-UNK10		---	---	---	---	--/--	----			--	
	171445Z	13.3N 120.8E	VW-R-P10	700MB	---	---	---	---	--/--	----			--	
	172100Z	13.5N 120.5E	54-P-P02		---	---	---	---	--/--	----			--	
	172110Z	13.2N 120.5E	LND RDR		---	---	---	---	--/--	----			--	
	172200Z	13.5N 120.5E	ACFT RDR		---	---	---	---	--/--	----			--	
	172354Z	13.4N 120.1E	LND RDR		---	---	---	---	--/--	----			--	
	180143Z	13.5N 120.1E	SHIP RDR		---	---	---	---	--/--	----			--	
	180200Z	13.5N 120.1E	SHIP RDR		---	---	---	---	--/--	----			--	
	180300Z	14.2N 119.7E	54-P-P02	500MB	050	050	---	---	--/--	----			--	
	180400Z	13.7N 119.4E	SHIP RDR		---	---	---	---	--/--	----			--	
	180500Z	14.1N 120.2E	LND RDR		---	---	---	---	--/--	----			--	

FIX NO.	TIME	PUSIT	EYE FIXES CYCLONE			02			MIN 700MB	FLT LVL	LT/TD	EYE FORM	ORIENT-ATION	EYE DIA	THKNS WALL CLOUD	
			UNII-METHOD -ACCY	FLT LVL	LVL WND	OBS SFC	OBS WND	SLP								
49	180905Z	14.3N 119.9E	VW-P-P02	700MB	060	055	---	---	10/-	CIRC	----	18	--			
50	181200Z	14.5N 119.7E	LND RDR		---	---	---	---	---/-	----						
51	181447Z	14.7N 119.7E	VW-P-P02	700MB	---	---	---	---	3048	15/-	ELIP	NW-SE	26X17	--		
52	181830Z	15.2N 119.4E	LND RDR		---	---	---	---	---/-	----	ELIP	NW-SE	--X--	--		
53	182100Z	15.3N 119.4E	54-P-P00	700MB	060	---	981	2920	16/-	CIRC	----	20	05			
54	190200Z	15.6N 119.5E	LND RDR		---	---	---	---	---/-	----						
55	190300Z	15.7N 119.4E	54-P-P00	700MB	060	080	982	2938	16/-	CIRC	----	20	10			
56	190541Z	15.5N 119.5E	TIROS	STG X	DIA 03	BNDS 2										
57	190900Z	16.3N 119.9E	VW-R-P02	700MB	---	---	---	---	---/-	CIRC	----	10	--			
58	191130Z	16.2N 120.1E	LND RDR		---	---	---	---	---/-	----						
59	191400Z	16.4N 120.3E	LND RDR		---	---	---	---	---/-	CIRC	----	05	--			
60	191445Z	16.6N 120.4E	VW-R-F10	700MB	---	---	---	---	---/-	----						
61	191500Z	16.9N 121.0E	LND RDR		---	---	---	---	---/-	----						
62	192130Z	16.8N 120.2E	54-R-P02		---	---	---	---	---/-	CIRC	----	15	N.F.B.			
63	200000Z	17.0N 120.0E	ACFT RDR		---	---	---	---	---/-	----						
64	201008Z	19.6N 120.3E	VW-P-F05	700MB	030	040	---	3081	13/-	ELIP	NE-SW	40X25	--			
65	201300Z	19.5N 120.4E	VW-UNK--	700MB	---	---	---	---	---/-	----						
66	201420Z	19.2N 120.5E	VW-P-F02	700MB	035	---	003	3109	13/05	ELIP	NE-SW	30X20	--			
67	202215Z	21.5N 123.6E	54-P-P03	700MB	025	055	004	3063	11/-	----						
68	210300Z	21.4N 124.1E	54-P-P03	700MB	030	050	002	3066	12/-	----						
69	210917Z	21.9N 125.2E	VW-P-P02	0240M	030	045	994	---	---/-	CIRC	----	30	--			
70	211437Z	23.3N 127.4E	VW-R-F15	0280M	040	---	---	---	---/-	----						
71	212325Z	25.2N 130.0E	54-P-P03	0450M	030	030	999	---	---/-	----						

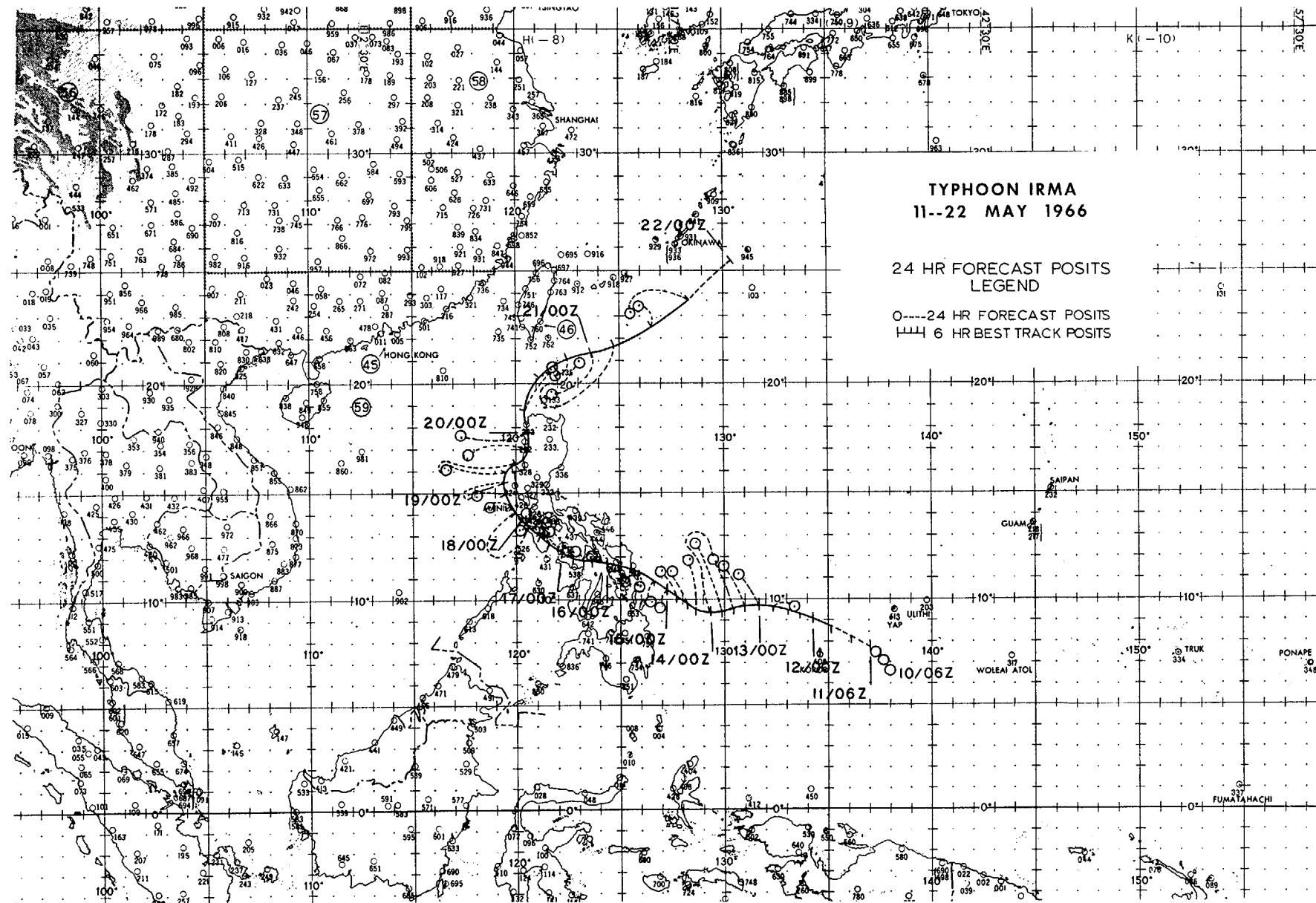
TROPICAL CYCLONE 02 - 05/11/0600Z TO 05/22/0000Z
 POSITION AND FORECAST VERIFICATION DATA

DTG	STORM	POSITION	24 HR. ERROR	48 HR. ERROR	72 HR. ERROR
	LAT.	LNG.	DEG. DIST.	DEG. DIST.	DEG. DIST.
111800Z		08.6N 135.2E	-----	-----	-----
120000Z	09.0N	134.3E	-----	-----	-----
120600Z	09.3N	133.7E	111-0156	-----	-----
121200Z	09.5N	133.1E	111-0156	-----	-----
121800Z	09.7N	132.4E	102-0054	-----	-----
130000Z	09.8N	131.7E	328-0090	-----	-----
130600Z	09.7N	131.0E	334-0126	-----	-----
131200Z	09.6N	130.3E	347-0132	-----	-----
131800Z	09.5N	129.9E	338-0198	-----	-----
140000Z	09.5N	129.4E	003-0150	336-0252	-----
140600Z	09.7N	128.8E	352-0132	337-0282	-----
141200Z	09.9N	128.2E	333-0090	341-0282	-----
141800Z	10.2N	127.8E	329-0078	343-0330	-----
150000Z	10.5N	127.3E	189-0042	003-0300	-----
150600Z	10.9N	126.7E	180-0060	356-0210	004-0528
151200Z	11.3N	125.8E	164-0042	347-0168	-----
151800Z	11.5N	125.0E	164-0042	005-0150	024-0648
160000Z	11.6N	124.4E	131-0072	171-0078	-----
160600Z	11.7N	123.8E	314-0006	165-0072	-----
161200Z	11.8N	123.2E	323-0030	141-0036	-----
161800Z	11.9N	122.8E	312-0096	161-0018	-----
170000Z	12.2N	122.3E	325-0090	126-0060	-----
170600Z	12.6N	121.8E	344-0042	311-0072	170-0072
171200Z	13.0N	121.2E	348-0030	317-0084	-----
171800Z	13.3N	120.6E	350-0036	325-0156	171-0042
180000Z	13.7N	120.3E	190-0036	310-0156	-----
180600Z	14.1N	120.0E	165-0048	309-0090	327-0120
181200Z	14.5N	119.8E	264-0054	298-0072	-----
181800Z	15.0N	119.5E	270-0078	288-0072	334-0222
190000Z	15.5N	119.4E	244-0078	250-0120	-----
190600Z	16.0N	119.7E	271-0174	247-0114	275-0234
191200Z	16.4N	120.2E	263-0192	269-0228	-----
191800Z	16.9N	120.5E	260-0156	268-0294	266-0282
200000Z	17.7N	120.5E	269-0174	256-0294	-----

TROPICAL CYCLONE 02 - 05/11/0600Z TO 05/22/0000Z
POSITION AND FORECAST VERIFICATION DATA (CONT)

DTG	STORM POSITION	24 HR. ERROR	48 HR. ERROR	72 HR. ERROR
	LAT. LUNG.	DEG. DIST.	DEG. DIST.	DEG. DIST.
200600Z	18.9N 120.4E	042-0132	261-0378	248-0330
201200Z	20.3N 121.1E	064-0036	249-0426	-----
201600Z	21.1N 122.5E	202-0060	245-0474	253-0588
210000Z	21.3N 123.8E	232-0162	259-0504	-----
210600Z	21.6N 124.8E	250-0102	050-0312	264-0816
211200Z	22.7N 126.8E	324-0048	048-0306	-----
211800Z	23.8N 128.3E	255-0156	057-0126	264-0948

AVERAGE 24 HOUR ERROR - 0093 MI.
AVERAGE 48 HOUR ERROR - 0203 MI.
AVERAGE 72 HOUR ERROR - 0402 MI.



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TROPICAL CYCLONE 03 - 05/25/0000Z TO 05/31/1800Z

I. DATA

A. STATISTICS

1. NUMBER OF WARNINGS ISSUED - 28
2. NUMBER OF WARNINGS WITH TYPHOON INTENSITY - 14
3. TOTAL DISTANCE TRAVELED DURING TROPICAL WARNING PERIOD - 1536 MI

B. CHARACTERISTICS AS A TYPHOON

1. MINIMUM OBSERVED SLP - 970MB AT 280845Z
2. MINIMUM OBSERVED 700MB HEIGHT - 2855M. AT 280250Z
3. MAXIMUM SURFACE WIND - 085 KTS (FROM BEST TRACK)
4. MAXIMUM RADIUS OF SURFACE CIRCULATION - 350 MI

II. DEVELOPMENT

A. INITIAL IMPETUS - A COLD CORE LOW BECOMING WARM CORE AFTER DEVELOPMENT OF DIVERGENCE AT 200MB

B. INITIAL SURFACE VORTEX

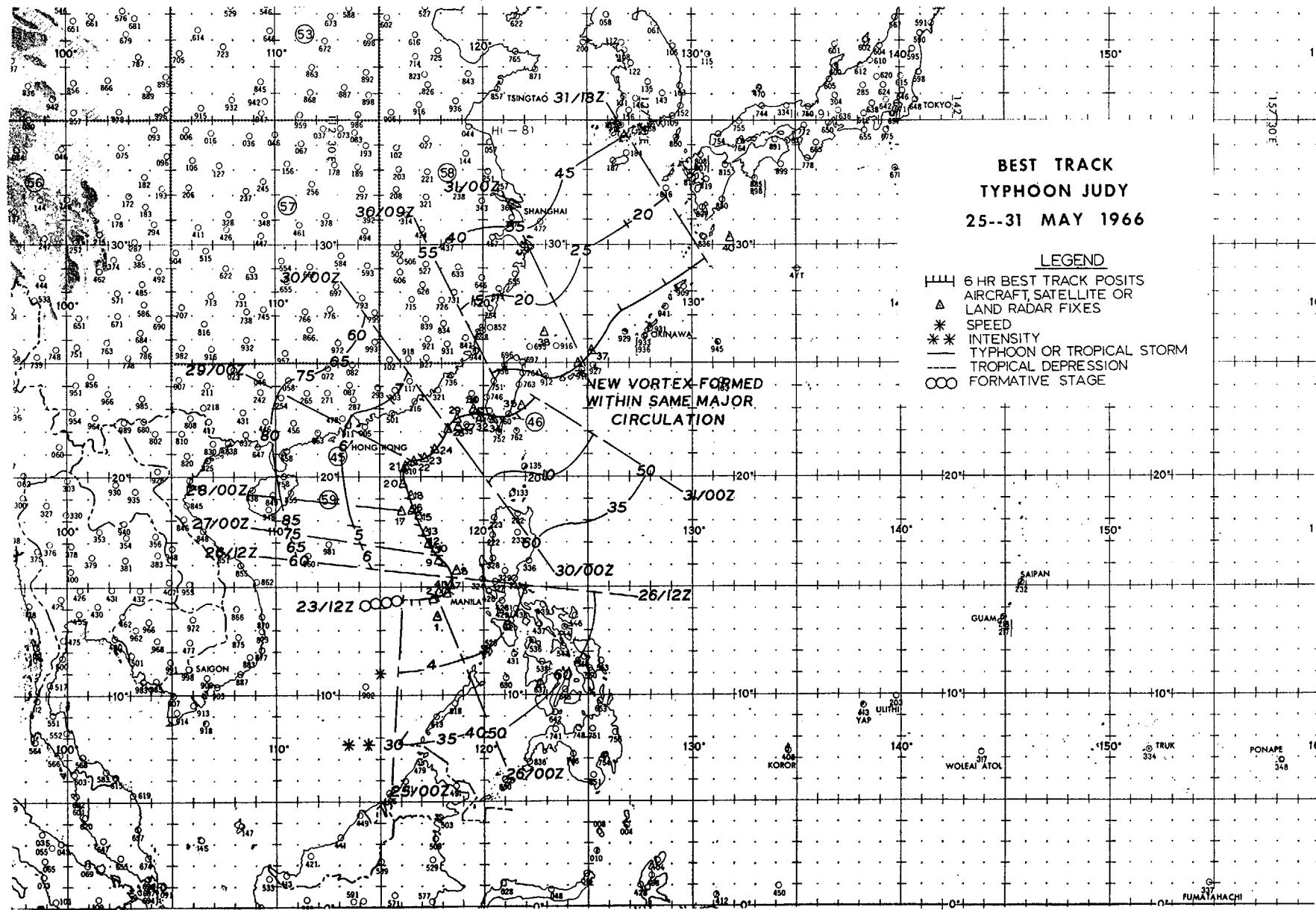
1. COLD VORTEX AT 231200
2. SURFACE PRESSURE LESS THAN 1006MB

C. 200MB FLOW ABOVE SURFACE VORTEX

1. INITIAL - VARIABLE
2. UPON REACHING TYPHOON INTENSITY - VARIABLE

III. FINAL DISPOSITION - BECAME EXTRATROPICAL

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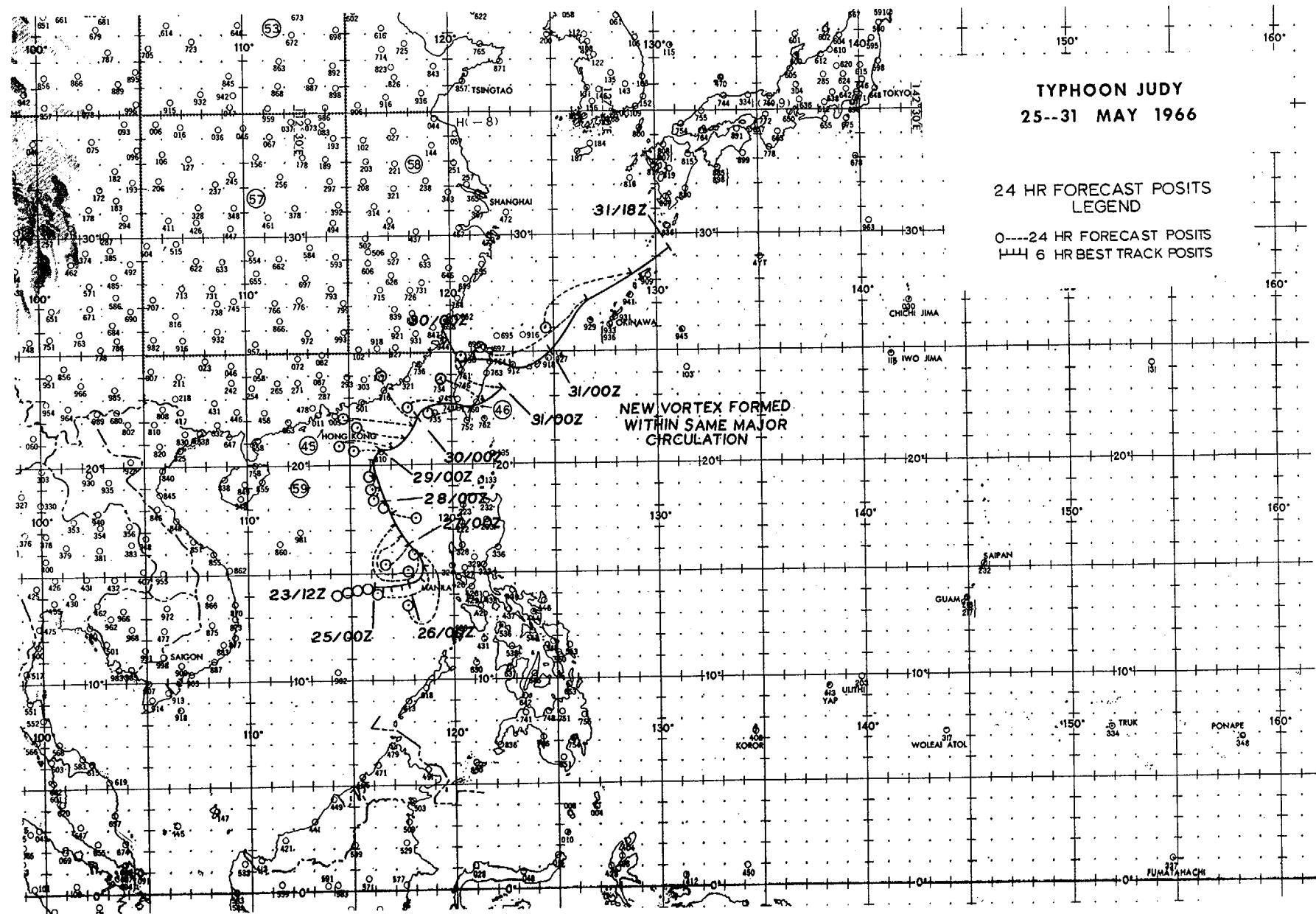
FIX NO.	TIME	PUSIT	EYE FIXES CYCLONE				03			MIN 700MB HGT	FLT LVL TT/TD	EYE FORM	ORIEN- TATION	EYE DIA	THKNS WALL CLOUD
			UNIT- METHOD	FLT	OBS	OBS	MIN								
			-ACCY	LVL	SFC	SLP	700MB								
1	251205Z	13.6N 117.8E	VW-R-F10	0400M	036	035	---	---	---	---	---	---	---	---	F.B.
2	252150Z	14.6N 117.6E	54-P-P02	700MB	045	045	991	3008	14/07	CIRC	---	---	10	---	F.B.
3	260115Z	14.8N 118.3E	VW-P-P10	700MB	045	060	---	3048	---	CIRC	---	---	18	---	F.B.
4	260315Z	14.7N 117.9E	54-P-P02	700MB	040	060	993	3033	15/--	CIRC	---	---	10	---	F.B.
5	260420Z	14.5N 118.0E	LND RDR		---	---	---	---	---	---	---	---	---	---	--
6	260730Z	15.1N 117.7E	VW-UNK--		---	---	---	---	---	---	---	---	---	---	F.B.
7	260845Z	15.0N 118.3E	VW-P-P02	0270M	050	060	974	---	---	CIRC	---	---	25	---	F.B.
8	261515Z	15.7N 118.6E	VW-R-F10	700MB	033	---	---	---	---	CIRC	---	---	30	---	F.B.
9	262200Z	16.3N 117.8E	54-P-P02	700MB	080	060	984	2951	15/--	CIRC	---	---	10	---	F.B.
10	270308Z	16.7N 117.6E	54-P-P02	700MB	065	065	982	2941	15/--	CIRC	---	---	10	---	F.B.
11	270601Z	16.5N 111.7E	TIROS	STG X	DIA 03	BNDS 3									
12	270930Z	17.0N 117.4E	VW-P-P02	0270M	075	075	977	---	---	CIRC	---	---	30	---	F.B.
13	271405Z	17.5N 117.2E	ACFT RDR		---	---	---	---	---	---	---	---	---	---	--
14	271445Z	17.6N 117.3E	VW-R-P10	700MB	046	---	---	---	---	CIRC	---	---	25	---	F.B.
15	272200Z	18.3N 116.9E	54-P-P03	700MB	060	040	976	2896	16/--	CIRC	---	---	20	02	
16	280250Z	18.6N 116.5E	54-P-P03	700MB	065	070	972	2855	15/--	CIRC	---	---	20	05	
17	280526Z	18.5N 116.0E	TIROS	STG X	DIA 04	BNDS 4									
18	280800Z	19.1N 116.4E	VW-UNK--		---	---	---	---	---	---	---	---	---	---	--
19	280845Z	19.2N 116.7E	VW-P-P02	0300M	090	085	970	---	---	CIRC	---	---	20	---	--
20	281445Z	19.7N 116.1E	VW-R-P05		---	---	---	---	---	CIRC	---	---	25	---	--
21	282138Z	20.6N 116.2E	54-P-P05	700MB	040	075	978	2917	15/--	ELIP	NW-SE	40X30	15		
22	290300Z	20.8N 116.6E	54-P-P00	700MB	040	065	984	2951	17/--	CIRC	---	---	30	---	F.B.
23	290915Z	20.9N 117.1E	VW-P-P02	0310M	070	080	970	---	---	ELIP	NE-SW	40X20	---	---	--
24	291300Z	21.2N 117.6E	VW-UNK--		---	---	---	---	---	---	---	---	---	---	--

FIX NO.	TIME	PUSIT	EYE FIXES CYCLONE			03		MIN 700MB	FLT LVL TT/ID	EYE FORM	ORIEN- TATION	EYE DIA	THKNS WALL CLOUD
			UNIT- METHOD -ACCY	FLT LVL	OBS SFC WND	OBS MIN SLP	FLT LVL						
25	291440Z	21.3N 117.6E	VW-P-P05	700MB	040	---	992	3010	12/03	CIRC	----	30	F.B.
26	292215Z	22.1N 118.2E	54-P-P00	700MB	080	050	---	2944	19/--	CIRC	----	20	05
27	292230Z	22.3N 118.7E	LND RDR		---	---	---	---	--/--	----	----		--
28	292230Z	22.3N 118.8E	LND RDR		---	---	---	---	--/--	----	----		--
29	300300Z	22.5N 118.7E	54-P-P00	700MB	060	060	987	2954	16/--	CIRC	----	40	F.B.
30	300557Z	23.0N 119.5E	TIROS	STG X	DIA 03	BNDS 3							
31	300730Z	22.5N 119.5E	LND RDR		---	---	---	---	--/--	----	----		--
32	300830Z	22.7N 119.9E	LND RDR		---	---	---	---	--/--	CIRC	----	26	--
33	300845Z	22.9N 119.8E	VW-P-P02	700MB	035	050	996	---	--/--	CIRC	----	30	N.F.B.
34	301030Z	22.5N 120.4E	LND RDR		---	---	---	---	--/--	CIRC	----	20	--
66	302230Z	23.2N 121.8E	54-P-P00	700MB	018	055	---	3115	09/--	CIRC	----	30	--
36	310030Z	25.0N 124.5E	LND RDR		---	---	---	---	--/--	----	----		--
37	310200Z	25.5N 125.1E	LND RDR		---	---	---	---	--/--	----	----		--
38	310240Z	26.4N 122.9E	54-P-L02	700MB	035	050	006	3097	11/--	----	----		--
39	312222Z	30.3N 131.8E	54-P-P02	0470M	046	045	998	---	--/--	----	----		--

TROPICAL CYCLONE 03 - 05/25/0000Z TO 05/31/1800Z
 POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION	24 HR. ERROR		48 HR. ERROR		72 HR. ERROR	
		LAT.	LONG.	DEG. DIST.	DEG. DIST.	DEG. DIST.	DEG. DIST.
251200Z	14.4N 116.9E	-----	-----	-----	-----		
251800Z	14.5N 117.3E	-----	-----	-----	-----		
260000Z	14.6N 117.7E	256-0114	-----	-----	-----		
260600Z	14.9N 118.3E	257-0174	-----	-----	-----		
261200Z	15.5N 118.4E	237-0150	-----	-----	-----		
261800Z	15.9N 118.1E	185-0138	-----	-----	-----		
270000Z	16.4N 117.6E	219-0072	-----	-----	-----		
270600Z	16.8N 117.4E	173-0102	-----	-----	-----		
271200Z	17.3N 117.2E	150-0096	-----	-----	-----		
271800Z	17.8N 116.9E	104-0072	178-0240	-----	-----		
280000Z	18.4N 116.7E	180-0012	204-0162	-----	-----		
280600Z	19.0N 116.5E	202-0030	178-0204	-----	-----		
281200Z	19.6N 116.3E	189-0042	164-0180	-----	-----		
281800Z	20.2N 116.1E	170-0036	165-0090	187-0372	-----		
290000Z	20.7N 116.4E	265-0066	234-0120	-----	-----		
290600Z	20.8N 117.0E	270-0138	246-0126	201-0306	-----		
291200Z	20.2N 117.5E	304-0144	274-0156	-----	-----		
291800Z	21.7N 118.0E	277-0174	256-0192	234-0228	-----		
300000Z	22.3N 118.3E	318-0132	282-0276	-----	-----		
300600Z	22.7N 119.3E	270-0072	276-0366	256-0342	-----		
301200Z	22.6N 120.4E	267-0090	280-0354	-----	-----		
301800Z	22.7N 121.5E	303-0126	281-0438	266-0474	-----		
310000Z	23.5N 122.3E	309-0132	-----	-----	-----		
310600Z	27.1N 126.3E	247-0282	251-0330	-----	-----		
311200Z	28.2N 128.7E	238-0246	245-0480	-----	-----		
311800Z	29.4N 130.4E	-----	244-0474	-----	-----		

AVERAGE 24 HOUR ERROR - 0114 MI.
 AVERAGE 48 HOUR ERROR - 0261 MI.
 AVERAGE 72 HOUR ERROR - 0344 MI.



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TROPICAL CYCLONE 04 - 06/22/0000Z TO 06/28/1800Z

I. DATA

A. STATISTICS

1. NUMBER OF WARNINGS ISSUED - 28
2. NUMBER OF WARNINGS WITH TYPHOON INTENSITY - 19
3. TOTAL DISTANCE TRAVELED DURING TROPICAL WARNING PERIOD - 2286 MI

B. CHARACTERISTICS AS A TYPHOON

1. MINIMUM OBSERVED SLP - 914MBS AT 252100Z
2. MINIMUM OBSERVED 700MB HEIGHT - 2095M. AT 260227Z
3. MAXIMUM SURFACE WIND - 170 KTS (FROM BEST TRACK)
4. MAXIMUM RADIUS OF SURFACE CIRCULATION - 600 MI

II. DEVELOPMENT

A. INITIAL IMPETUS - DEVELOPMENT OF DIVERGENCE AT 200MB LEVEL OVER SURFACE CYCLONIC CIRCULATION

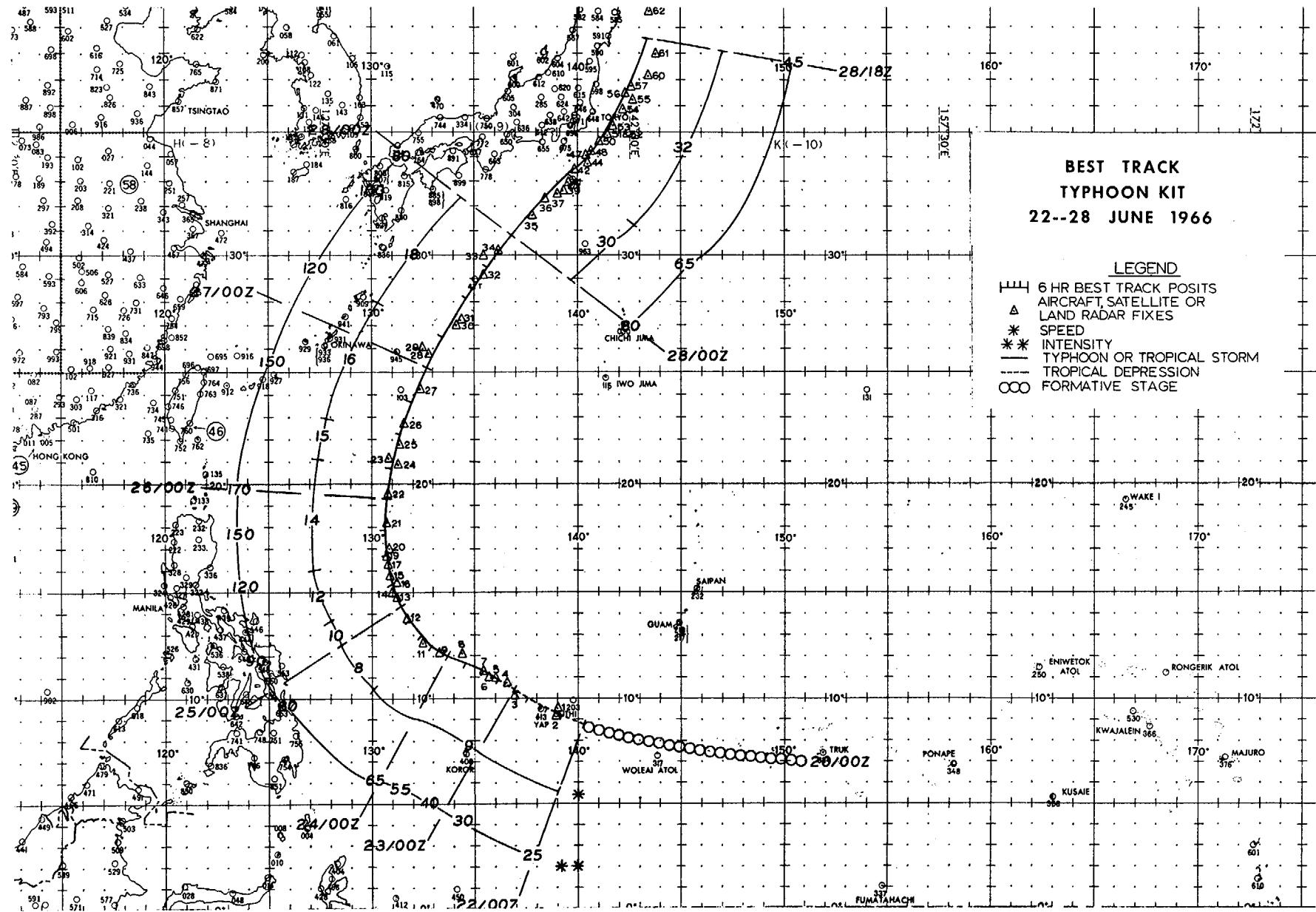
B. INITIAL SURFACE VORTEX

1. JUNCTION VORTEX AT 200000Z
2. SURFACE PRESSURE LESS THAN 1008MB

C. 200MB FLOW ABOVE SURFACE VORTEX

1. INITIAL - SOUTHEAST
2. UPON REACHING TYPHOON INTENSITY - NORTHEAST

III. FINAL DISPOSITION - BECAME EXTRATROPICAL



FIX NO.	TIME	PUSIT	UNIT- METHOD -ACCY	EYE FIXES CYCLONE			04		MIN	700MB	FLT	LVL	EYE	ORIEN- TATION	EYE DIA	THKNS WALL CLOUD
				FLT	LVL	WND	OBS	SFC	MIN	SLP	HGT	TT/TD				
104	1 220407Z	09.5N 139.0E	TIROS	STG D	DIA 03	BNDs 1										
	2 220844Z	09.3N 138.9E	54-P-P02	0460M	018	025	001		---		---	---	CIRC	----	40	N.F.B.
	3 222045Z	10.1N 136.9E	54-P-P05	0460M	030	030	001		---		---	---	---	----		--
	4 230200Z	10.8N 136.5E	54-P-P05	0460M	041	040	998		---		---	---	CIRC	----	15	F.B.
	5 230511Z	11.0N 136.0E	TIROS	STG C	DIA --	BNDs -										
	6 230848Z	10.9N 135.8E	VW-P-P05	0440M	---	030	995		---		---	---	CIRC	----	20	F.B.
	7 231430Z	11.3N 135.4E	VW-R-F05	4270M	034	---	---		---		---	---	CIRC	----	25	F.B.
	8 232113Z	12.1N 134.4E	54-P-P02	700MB	045	065	998	3054	13/-			CIRC	----	30	F.B.	
	9 240250Z	12.2N 133.3E	54-P-P02	700MB	050	070	992	3018	15/-			CIRC	----	10	05	
	10 240436Z	12.0N 133.0E	TIROS	STG X	DIA 04	BNDs 3										
	11 240859Z	12.7N 132.5E	VW-P-P05	0270M	---	065	988		---		---	---	CIRC	----	10	09
	12 242107Z	13.7N 131.8E	54-P-P03	700MB	056	080	975	2863	14/-			CIRC	----	20	--	
	13 250308Z	14.8N 131.3E	54-P-P02	700MB	075	080	965	2804	17/-			CIRC	----	13	07	
	14 250403Z	15.0N 131.0E	TIROS	STG X	DIA 04	BNDs 3										
	15 250800Z	15.7N 130.9E	VW-UNK--	0390M	---	---	---	---	---		---	---	---	----		--
	16 250834Z	15.6N 131.2E	VW-R-P--	0390M	---	---	---	---	---		---	---	CIRC	----	14	--
	17 250908Z	16.3N 130.8E	VW-R-P05	0390M	---	065	---	---	---		---	---	CIRC	----	14	05
	18 251000Z	16.6N 130.7E	VW-UNK--	1200M	---	---	---	---	---		---	---	---	----		--
	19 251200Z	16.7N 130.7E	VW-UNK--	1040M	---	---	---	---	---		---	---	---	----		--
	20 251436Z	17.0N 130.9E	VW-R-P05	1020M	---	---	---	---	---		---	---	CIRC	----	09	05
	21 252100Z	18.3N 130.7E	54-P-P03	700MB	060	170	914	2310	22/-			CIRC	----	07	03	
	22 260227Z	19.6N 130.7E	54-P-P03	700MB	122	180	---	2095	27/-			CIRC	----	09	03	
	23 260800Z	21.1N 130.7E	VW-UNK--	0380M	---	---	---	---	---		---	---	---	----		--
	24 260850Z	20.9N 131.2E	VW-R-P02	0310M	070	075	---	---	---		---	---	CIRC	----	07	07

FIX NO.	TIME	POSIT	EYE FIXES CYCLONE			04		MIN 700MB	FLI LVL	EYE FORM	ORIEN- TATION	EYE DIA	THKNS WALL CLOUD
			UNIT- METHOD	LVL	FLT	OBS SFC	OBS MIN	SLP					
	261200Z	21.8N 131.3E	VW-UNK--	0850M	---	---	---	---	--/--	---	---	---	--
	261432Z	22.7N 131.6E	VW-R-POS	3200M	---	---	---	---	--/--	CIRC	----	06	--
	262110Z	24.3N 132.3E	S4-P-P02	700MB	100	150	912	2338	18/--	CIRC	----	08	10
	270248Z	25.8N 132.8E	S4-P-P02	700MB	075	150	938	2545	17/--	CIRC	----	13	10
	270436Z	26.0N 132.5E	TIROS	STG X	DIA 06	BNDS 4		---	--/--	CIRC	----	15	--
	270836Z	27.0N 134.1E	VW-UNK--	0290M	---	---	---	---	--/--	CIRC	----	15	--
	270908Z	27.2N 134.2E	VW-R-POS	0290M	120	090	---	---	--/--	CIRC	----	11	10
	271500Z	29.1N 135.3E	VW-R-F02	700MB	---	---	---	---	--/--	----	----	----	--
	271800Z	30.0N 135.3E	LND RDR	---	---	---	---	---	--/--	----	----	----	--
	272100Z	30.2N 136.1E	S4-P-P03	700MB	050	075	962	2749	14/--	CIRC	----	30	F.B.
10	280300Z	31.7N 137.9E	S4-P-P03	700MB	066	065	964	2801	12/--	CIRC	----	30	F.B.
	280300Z	32.3N 138.5E	LND RDR	---	---	---	---	---	--/--	----	----	----	--
	280402Z	32.5N 139.0E	TIROS	STG X	DIA 06	BNDS 3		---	--/--	----	----	----	--
	280430Z	32.6N 138.9E	LND RDR	---	---	---	---	---	--/--	----	----	----	--
	280500Z	32.6N 139.2E	LND RDR	---	---	---	---	---	--/--	----	----	----	--
	280530Z	32.8N 139.3E	LND RDR	---	---	---	---	---	--/--	----	----	----	--
	280600Z	32.9N 139.6E	LND RDR	---	---	---	---	---	--/--	----	----	----	--
	280600Z	33.3N 139.8E	LND RDR	---	---	---	---	---	--/--	----	----	----	--
	280700Z	33.3N 140.0E	LND RDR	---	---	---	---	---	--/--	----	----	----	--
	280800Z	33.7N 140.4E	LND RDR	---	---	---	---	---	--/--	----	----	----	--
	280800Z	33.8N 140.2E	LND RDR	---	---	---	---	---	--/--	----	----	----	--
	280830Z	33.9N 140.3E	LND RDR	---	---	---	---	---	--/--	----	----	----	--
	280835Z	34.0N 140.3E	VW-UNK--	---	---	---	---	---	--/--	----	----	----	--
	280900Z	34.2N 140.5E	LND RDR	---	---	---	---	---	--/--	----	----	----	--

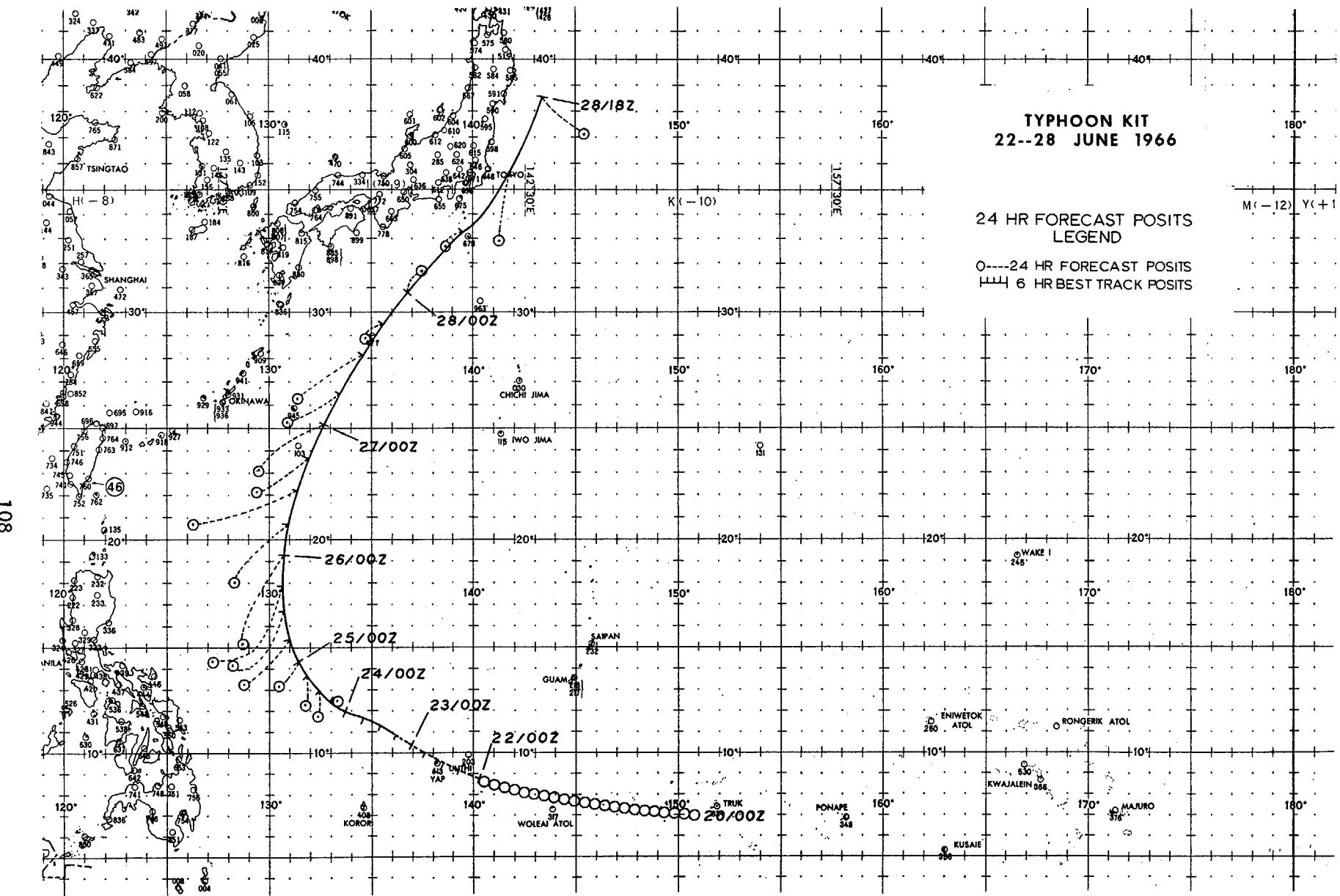
FIX NO.	TIME	PUSIT	EYE FIXES CYCLONE			04			MIN 700MB	FLT LVL	TT/TD	EYE FORM	ORIEN- TATION	EYE DIA	THKNS WALL CLOUD
			UNIT- MEHTUD -ACCY	FLT LVL	FLT WND	OBS SFC	OBS MIN SLP	---							
49	280911Z	34.1N 140.3E	VW-P-P02	0320M	---	055	968	---	---/---	CIRC	---	25	--		
50	281000Z	34.5N 141.0E	LND RDR		---	---	---	---	---/---	---			--		
51	281100Z	34.8N 141.4E	LND RDR		---	---	---	---	---/---	---			--		
52	281145Z	34.8N 141.4E	VW-UNK--		---	---	---	---	---/---	---			--		
53	281200Z	35.3N 141.9E	LND RDR		---	---	---	---	---/---	---			--		
54	281300Z	36.0N 142.2E	LND RDR		---	---	---	---	---/---	---			--		
55	281400Z	36.4N 142.7E	LND RDR		---	---	---	---	---/---	---			--		
56	281400Z	36.5N 142.4E	VW-UNK--		---	---	---	---	---/---	---			--		
57	281430Z	36.7N 142.6E	VW-R-P05		---	---	---	---	---/---	---			--		
58	281500Z	36.9N 142.9E	LND RDR		---	---	---	---	---/---	---			--		
59	281500Z	36.9N 143.2E	LND RDR		---	---	---	---	---/---	---			--		
60	281600Z	37.2N 143.4E	LND RDR		---	---	---	---	---/---	---			--		
61	281700Z	38.0N 143.9E	LND RDR		---	---	---	---	---/---	---			--		
62	282130Z	39.7N 143.5E	54-P-F02	700MB	060	045	---	---	---/---	---			N.F.B.		

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TROPICAL CYCLONE 04 - 06/22/0000Z TO 06/28/1800Z
 POSITION AND FORECAST VERIFICATION DATA

DTG	STORM LAI.	POSITION LONG.	24 HR. ERROR DEG. DIST.	48 HR. ERROR DEG. DIST.	72 HR. ERROR DEG. DIST.
230600Z	10.9N	136.2E	128-0210	-----	-----
231200Z	11.3N	135.4E	180-0054	-----	-----
231800Z	11.6N	134.6E	180-0060	-----	-----
240000Z	12.0N	133.7E	193-0054	-----	-----
240600Z	12.4N	132.9E	090-0012	-----	-----
241200Z	13.0N	132.3E	180-0072	-----	-----
241800Z	13.7N	131.8E	180-0084	-----	-----
250000Z	14.4N	131.4E	217-0090	-----	-----
250600Z	15.3N	131.0E	227-0174	204-0114	-----
251200Z	16.6N	130.8E	226-0210	202-0258	-----
251800Z	17.9N	130.7E	225-0288	202-0306	-----
260000Z	19.4N	130.8E	204-0282	219-0396	-----
260600Z	20.7N	130.9E	223-0216	226-0528	217-0438
261200Z	22.2N	131.3E	253-0294	228-0582	-----
261800Z	23.7N	131.9E	236-0168	229-0690	215-0690
270000Z	25.2N	132.7E	235-0210	220-0654	-----
270600Z	26.5N	133.5E	241-0156	231-0606	230-0954
271200Z	28.1N	134.6E	239-0204	252-0624	-----
271800Z	29.5N	135.7E	237-0060	242-0492	232-1122
280000Z	30.9N	136.9E	030-0048	241-0486	-----
280600Z	33.1N	139.3E	226-0042	237-0372	238-1104
281200Z	35.5N	141.8E	191-0156	235-0426	-----
281800Z	38.5N	143.2E	131-0126	196-0204	233-0768

AVERAGE 24 HOUR ERROR - 0142 MI.
 AVERAGE 48 HOUR ERROR - 0449 MI.
 AVERAGE 72 HOUR ERROR - 0846 MI.



TROPICAL CYCLONE 06 - 07/15/0600Z TO 07/17/1800Z

I. DATA

A. STATISTICS

1. NUMBER OF WARNINGS ISSUED - 11
2. NUMBER OF WARNINGS WITH TYPHOON INTENSITY - 03
3. TOTAL DISTANCE TRAVELED DURING TROPICAL WARNING PERIOD - 0882 MI

B. CHARACTERISTICS AS A TYPHOON

1. MINIMUM OBSERVED SLP - 987MB AT 162156Z
2. MINIMUM OBSERVED 700MB HEIGHT - 2987M. AT 162156Z
3. MAXIMUM SURFACE WIND - 085 KTS (FROM BEST TRACK)
4. MAXIMUM RADIUS OF SURFACE CIRCULATION - 225 MI

II. DEVELOPMENT

A. INITIAL IMPETUS - DEVELOPMENT OF DIVERGENCE AT 200MB LEVEL OVER SURFACE CYCLONIC CIRCULATION

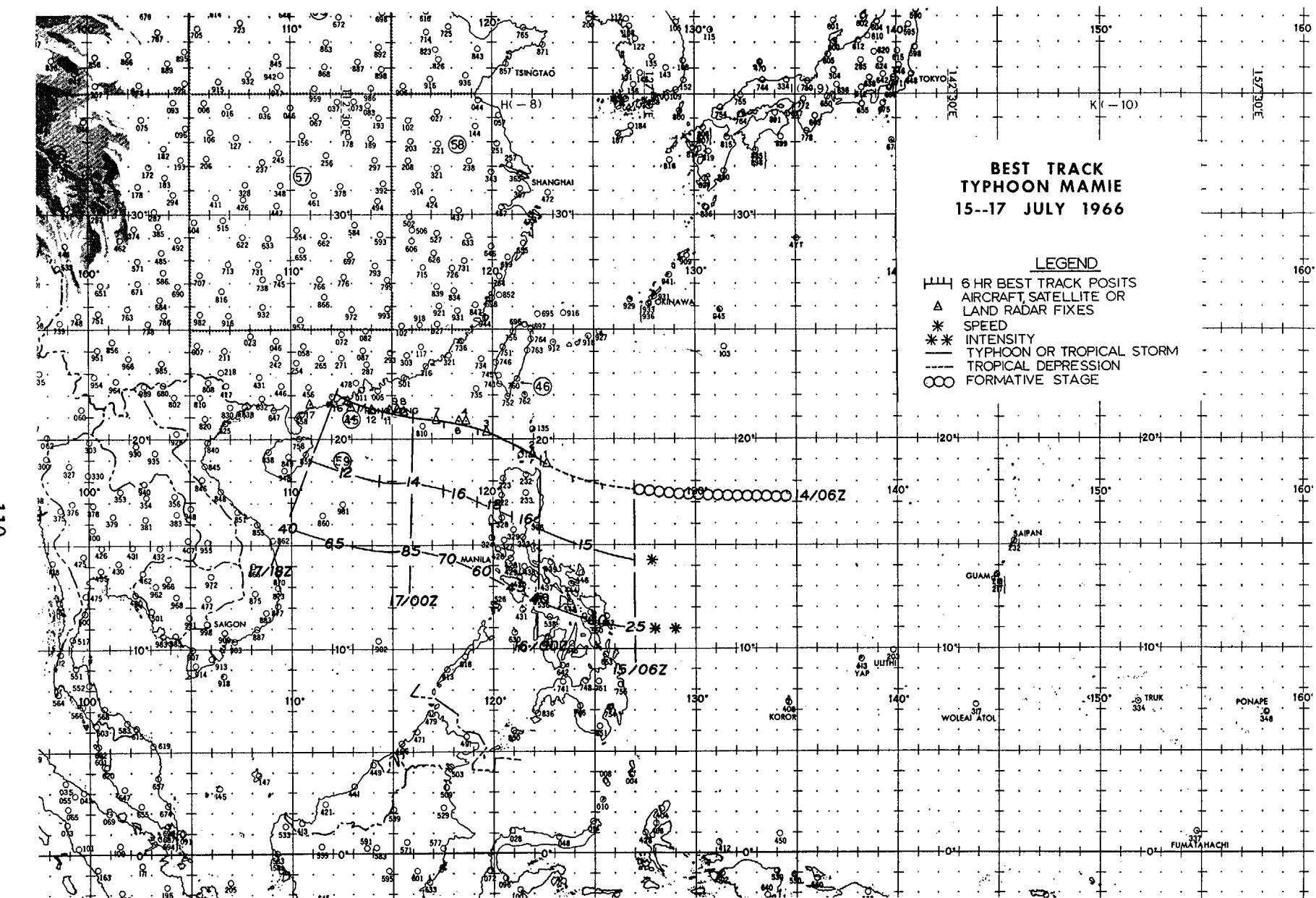
B. INITIAL SURFACE VORTEX

1. JUNCTION VORTEX AT 140600Z
2. SURFACE PRESSURE LESS THAN 1008MB

C. 200MB FLOW ABOVE SURFACE VORTEX

1. INITIAL - SOUTHEAST
2. UPON REACHING TYPHOON INTENSITY - NORTHEAST

III. FINAL DISPOSITION - DISSIPATED OVER LAND



FIX NO.	TIME	PUSIT	EYE FIXES CYCLONE			06			MIN 700MB	FLT LVL	TT/TD	EYE FORM	ORIEN- TATION	EYE DIA	THKNS WALL CLOUD
			UNIT- METHOD -ACCY	FLT LVL	LVL WND	OBS SFC	OBS SLP	MIN HGT							
1	160000Z	18.8N 122.5E	54-P-F01	700MB	040	040	001	3094	11/-	---				N.F.B.	
2	160225Z	19.3N 122.0E	54-P-F02	700MB	040	040	002	3094	12/-	---				N.F.B.	
3	161007Z	20.3N 119.8E	VW-P-P05	0400M	---	055	992	---	--/-	CIRC	---	25	F.B.		
4	161200Z	20.8N 118.7E	LND RDR		---	---	---	---	--/-	---				--	
5	161330Z	20.7N 118.8E	VW-UNK--	700MB	---	---	---	---	--/-	---				--	
6	161440Z	20.7N 118.4E	VW-P-P10	700MB	---	---	---	3090	15/-	ELIP	NW-SE	25X15		--	
7	162156Z	20.9N 117.1E	54-P-P02	700MB	045	075	987	2987	16/-	CIRC	---	20	15		
8	170200Z	21.2N 115.5E	SHIP RDR		---	---	---	---	--/-	---				--	
9	170300Z	21.3N 115.2E	SHIP RDR		---	---	---	---	--/-	---				--	
10	170300Z	21.1N 115.4E	54-P-P02	2580M	070	090	987	2999	17/-	CIRC	---	35		--	
11	170400Z	21.3N 114.9E	SHIP RDR		---	---	---	---	--/-	---				--	
12	170600Z	21.3N 114.0E	SHIP RDR		---	---	---	---	--/-	---				--	
13	170611Z	21.0N 114.5E	TIROS	STG X	DIA 02	BND 2									
14	170800Z	21.5N 113.9E	SHIP RDR		---	---	---	---	--/-	---				--	
15	170856Z	21.4N 113.9E	VW-R-P04	0230M	028	060	---	---	--/-	CIRC	---	20	F.B.		
16	171500Z	21.8N 112.8E	VW-R-F10	0400M	---	---	---	---	--/-	CIRC	---	28	F.B.		
17	172054Z	21.6N 111.0E	VW-UNK10		---	---	990	---	--/-	---				--	

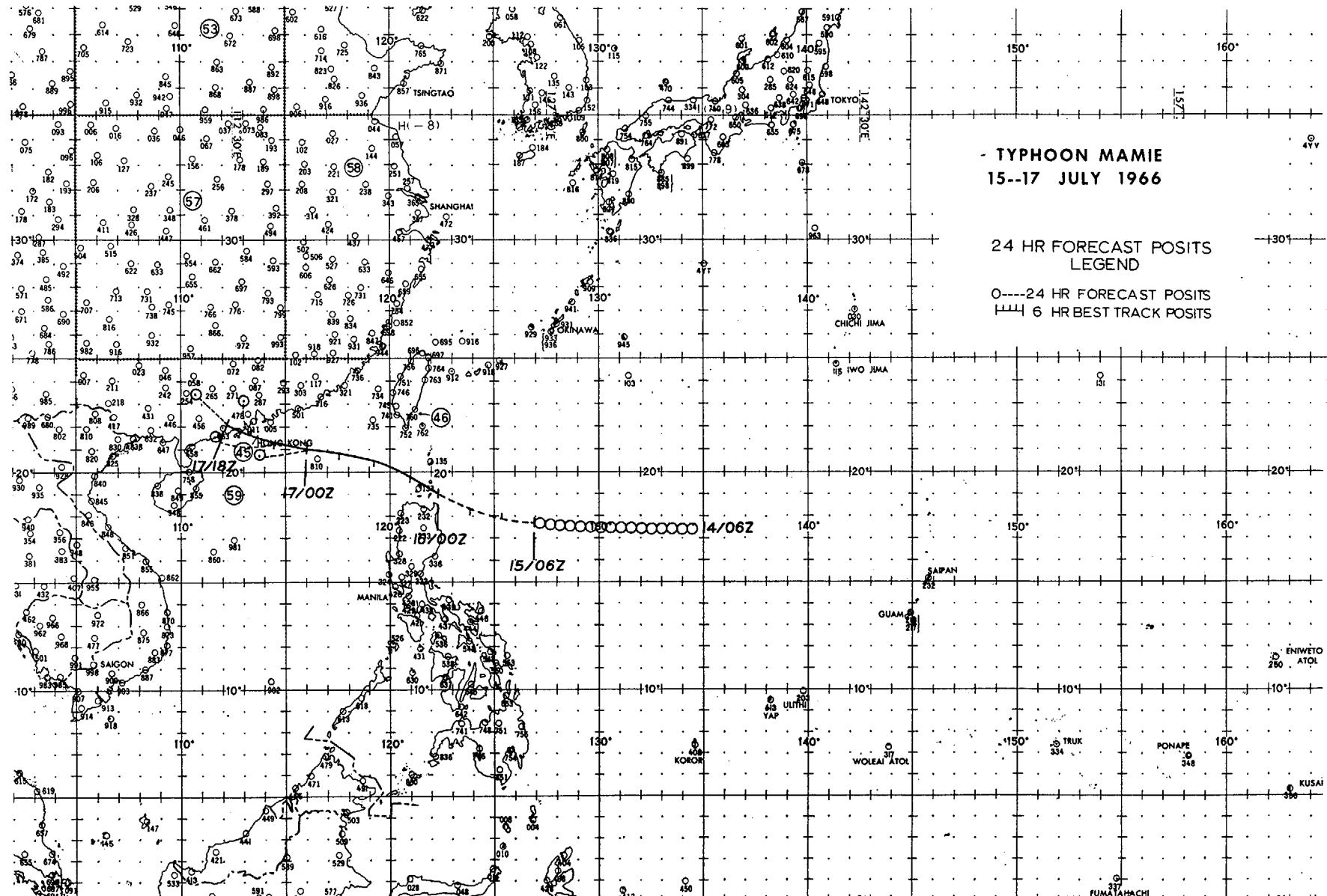
TROPICAL CYCLONE 06 - 07/15/0600Z TO 07/17/1800Z
POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION	24 HR. ERROR	48 HR. ERROR	72 HR. ERROR
	LAT. LONG.	DEG. DIST.	DEG. DIST.	DEG. DIST.
160000Z	19.0N 122.4E	-----	-----	-----
160600Z	19.8N 121.0E	096-0348	-----	-----
161200Z	20.5N 119.2E	098-0426	-----	-----
161800Z	20.8N 117.5E	104-0120	-----	-----
170000Z	21.0N 116.0E	096-0150	-----	-----
170600Z	21.2N 114.5E	082-0120	-----	-----
171200Z	21.6N 113.3E	352-0090	-----	-----
171800Z	22.1N 112.1E	314-0108	-----	-----

AVERAGE 24 HOUR ERROR - 0194 MI.

AVERAGE 48 HOUR ERROR - ---- MI.

AVERAGE 72 HOUR ERROR - ---- MI.



TROPICAL CYCLONE 07 - 07/17/0600Z TO 07/20/0600Z

I. DATA

A. STATISTICS

1. NUMBER OF WARNINGS ISSUED - 13
2. NUMBER OF WARNINGS WITH TYPHOON INTENSITY - 01
3. TOTAL DISTANCE TRAVELED DURING TROPICAL WARNING PERIOD - 0702 MI

B. CHARACTERISTICS AS A TYPHOON

1. MINIMUM OBSERVED SLP - 995MB AT 172055Z
2. MINIMUM OBSERVED 700MB HEIGHT - 3069M. AT 172055Z
3. MAXIMUM SURFACE WIND - 065 KTS (FROM BEST TRACK)
4. MAXIMUM RADIUS OF SURFACE CIRCULATION - 200 MI

II. DEVELOPMENT

A. INITIAL IMPETUS - DEVELOPMENT OF DIVERGENCE AT 200MB LEVEL OVER SURFACE CYCLONIC CIRCULATION

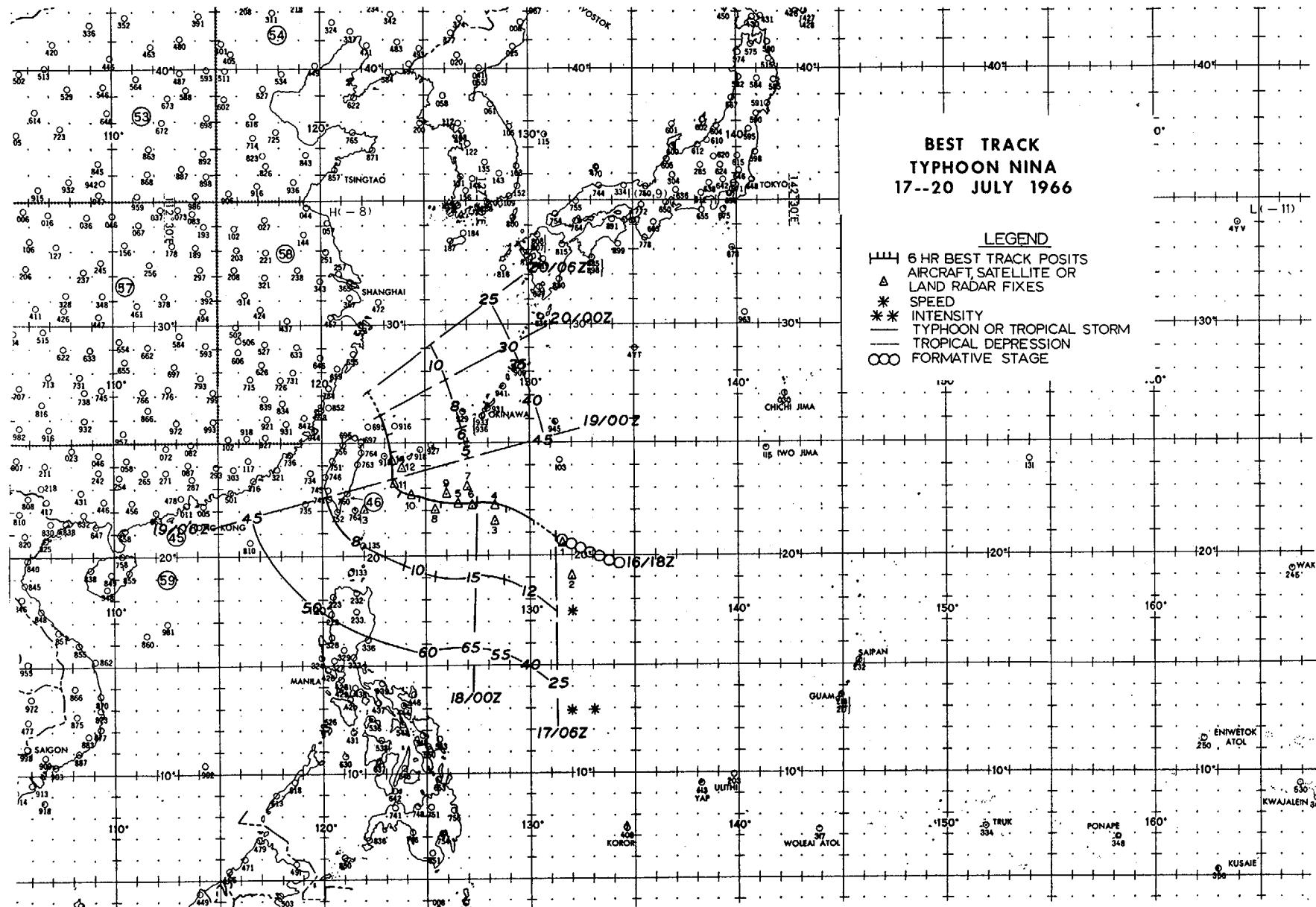
B. INITIAL SURFACE VORTEX

1. JUNCTION VORTEX AT 161800Z
2. SURFACE PRESSURE LESS THAN 1006MB

C. 200MB FLOW ABOVE SURFACE VORTEX

1. INITIAL - EAST
2. UPON REACHING TYPHOON INTENSITY - NORTHEAST

III. FINAL DISPOSITION - HIGH LEVEL CONVERGENCE DEVELOPED OVER LOW LEVEL SYSTEM

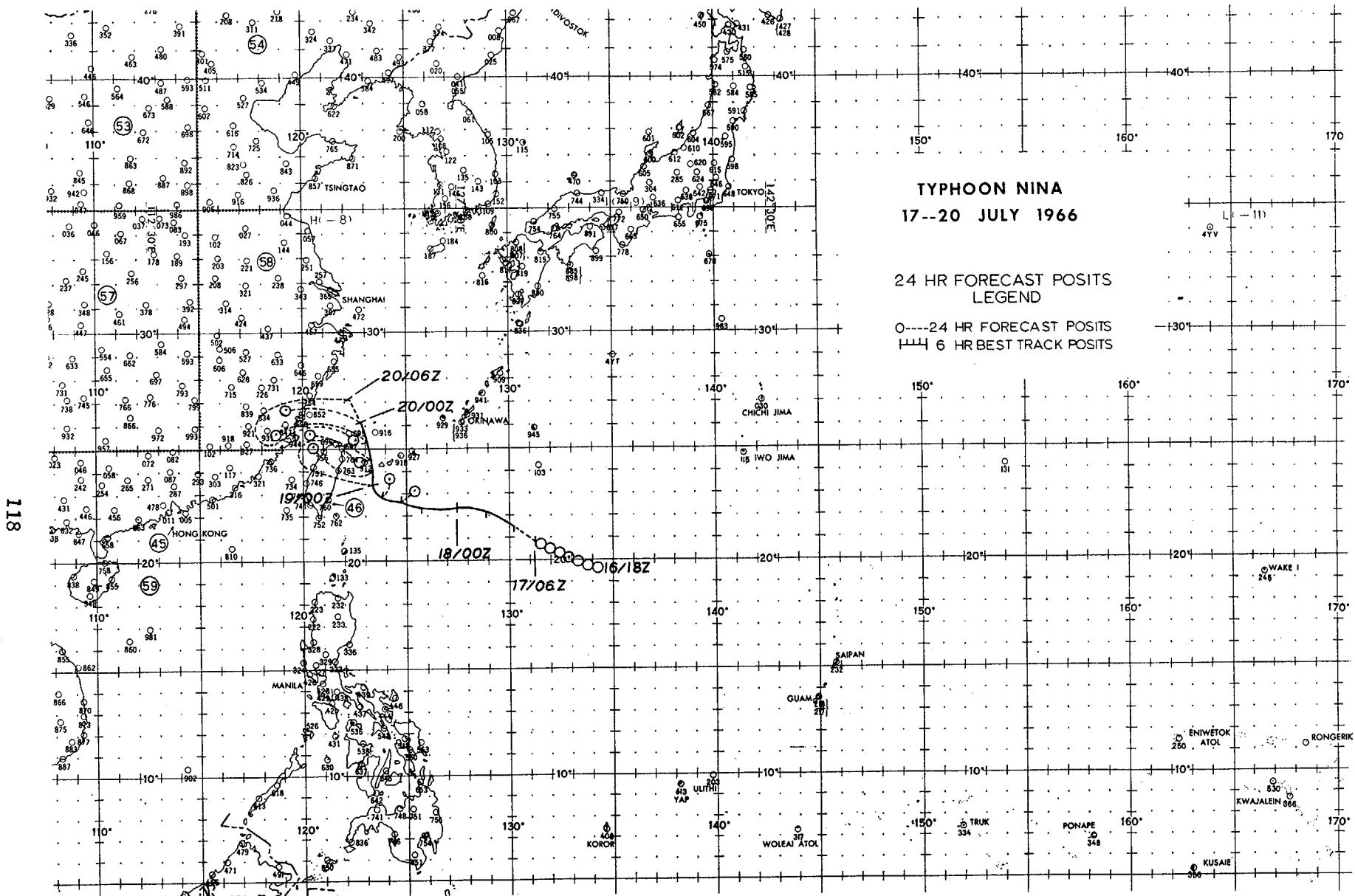


FIX NO.	TIME	POSIT	EYE FIXES CYCLONE			07			MIN 700MB	FLT LVL	TT/TD	EYE FORM	ORIEN- TATION	EYE DIA	THKNS WALL CLOUD
			UNIT- METHOD -ACCY	FLT LVL	LVL WND	OBS SFC WND	OBS MIN SLP	---							
1	170355Z	20.5N 131.5E	54-P-P03	0640M	023	025	004	---	---	---	---	CIRC	----	40	--
2	170431Z	19.0N 132.0E	TIROS	STG X	DIA --	BNDs -									
3	171820Z	21.6N 128.3E	54-P-P02	3480M	035	---	---	3079	11/--	CIRC	----	20	12		
4	172055Z	22.2N 128.2E	54-P-P02	700MB	045	070	995	3069	---	CIRC	----	15	--		
5	180255Z	22.3N 126.5E	54-P-P05	700MB	028	050	006	3115	14/--	CIRC	----	60	--		
6	180300Z	22.1N 127.1E	LND RDR		---	---	---	---	---	---	---				--
7	180536Z	23.0N 127.0E	TIROS	STG C	DIA --	BNDs -									
8	180545Z	22.0N 125.3E	ACFT RDR		---	---	---	---	---	---	---				--
9	180850Z	22.8N 126.0E	VW-P-F10	0430M	065	065	997	---	---	CIRC	----	60	--		
10	181500Z	22.7N 124.3E	VW-P-F05	700MB	048	---	---	3120	14/07	CIRC	----	35	--		
11	182158Z	23.2N 123.4E	54-P-P02	0450M	035	045	003	3109	---	ELIP	NE-SW	60X30	10		
12	190250Z	23.8N 123.8E	54-P-P02	0450M	030	050	006	3127	---	CIRC	----	10	15		
13	190501Z	22.0N 122.0E	TIROS	STG A	DIA --	BNDs -									
14	190800Z	24.2N 123.3E	VW-UNK05		---	---	---	---	---	---	---				--
15	190830Z	24.3N 123.3E	VW-P-P05	0580M	045	040	995	---	---	ELIP	NW-SE	30X15	12		

TROPICAL CYCLONE 07 - 07/17/0600Z TO 07/20/0600Z
POSITION AND FORECAST VERIFICATION DATA

UTG	STORM POSITION	24 HR. ERROR	48 HR. ERROR	72 HR. ERROR	
	LAT.	LONG.	DEG. DIST.	DEG. DIST.	DEG. DIST.
171200Z	21.5N	130.1E	-----	-----	-----
171800Z	22.1N	128.9E	-----	-----	-----
180000Z	22.2N	127.3E	-----	-----	-----
180600Z	22.3N	125.7E	064-0036	-----	-----
181200Z	22.6N	124.7E	046-0042	-----	-----
181800Z	22.9N	123.8E	016-0042	-----	-----
190000Z	23.5N	123.3E	343-0060	-----	-----
190600Z	24.0N	123.3E	293-0162	-----	-----
191200Z	24.6N	123.2E	291-0162	-----	-----
191800Z	25.4N	123.0E	272-0234	-----	-----

AVERAGE 24 HOUR ERROR - 0105 MI.
AVERAGE 48 HOUR ERROR - ---- MI.
AVERAGE 72 HOUR ERROR - ---- MI.



TROPICAL CYCLONE 08 - 07/23/0600Z TO 07/26/0600Z

119

I. DATA

A. STATISTICS

1. NUMBER OF WARNINGS ISSUED - 13
2. NUMBER OF WARNINGS WITH TYPHOON INTENSITY - 08
3. TOTAL DISTANCE TRAVELED DURING TROPICAL WARNING PERIOD - 0516 MI

B. CHARACTERISTICS AS A TYPHOON

1. MINIMUM OBSERVED SLP - 977MB AT 250900Z
2. MINIMUM OBSERVED 700MB HEIGHT - 2875M. AT 242225Z
3. MAXIMUM SURFACE WIND - 085 KTS (FROM BEST TRACK)
4. MAXIMUM RADIUS OF SURFACE CIRCULATION - 450 MI

II. DEVELOPMENT

A. INITIAL IMPETUS - LOW LEVEL SURGE INTO CYCLONIC CIRCULATION FROM THE SOUTH WITH SUBSEQUENT DIVERGENCE AT 200MB LEVEL

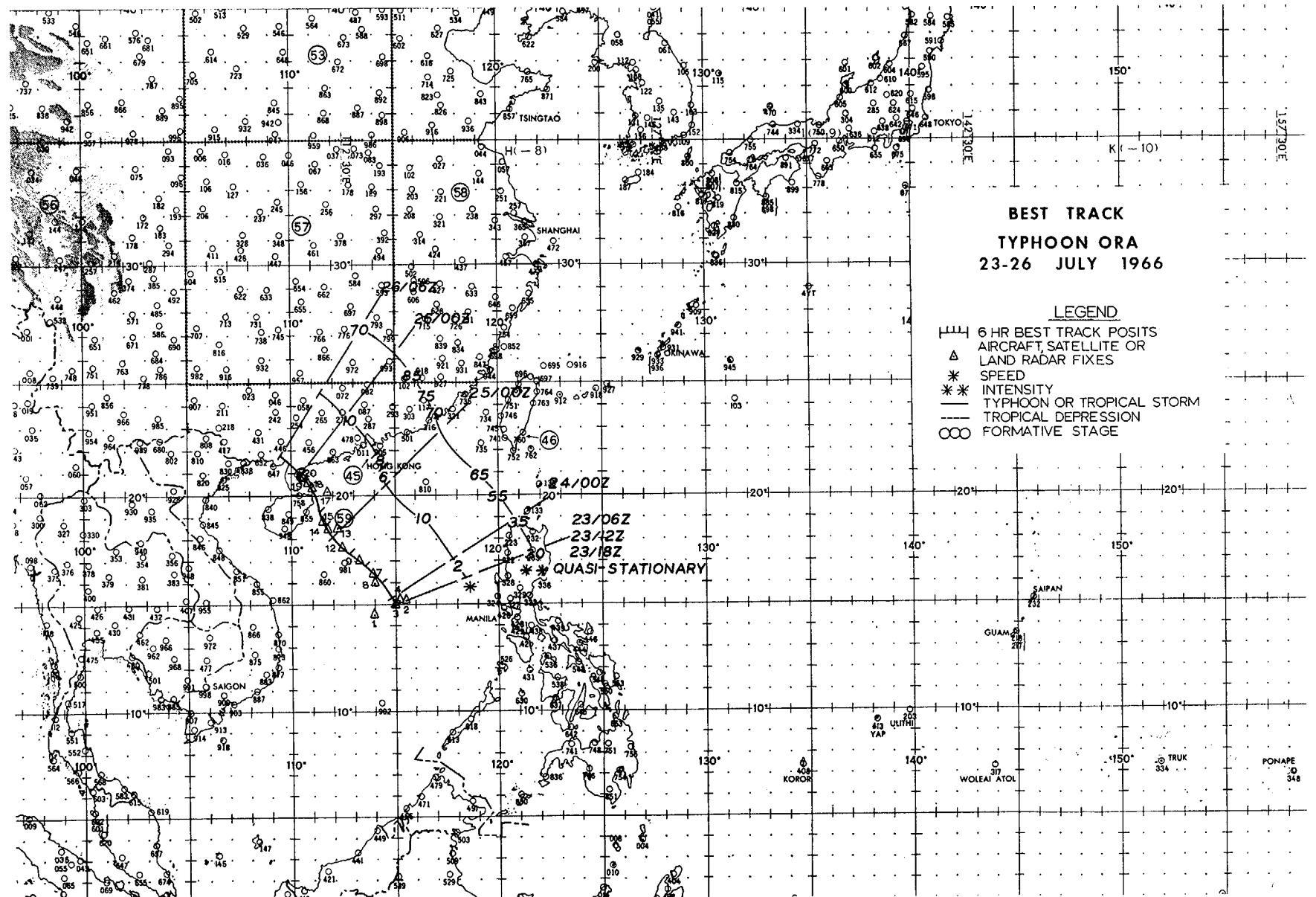
B. INITIAL SURFACE VORTEX

1. EMBEDDED VORTEX AT 211800Z
2. SURFACE PRESSURE LESS THAN 1004MB

C. 200MB FLOW ABOVE SURFACE VORTEX

1. INITIAL - NORTHEAST
2. UPON REACHING TYPHOON INTENSITY - NORTHEAST

III. FINAL DISPOSITION - DISSIPATED OVER LAND



FIX NO.	TIME	PUSIT	EYE FIXES CYCLONE			08	OBS	OBS	MIN	FLT	FLT	EYE	ORIEN-	EYE	THKNS
			UNIT-	METHOD	FLT		SFC	MIN	700MB	LVL	TT/TD	FORM	TATION	DIA	WALL
1	230030Z	14.6N 114.0E	VW-UNK--	VW-P-F10	0350M	016	035	994	---	--/-	---	---	---	---	F.B.
2	230920Z	15.2N 115.4E	VW-UNK--	VW-P-F10	0410M	035	030	997	---	--/-	---	---	---	---	N.F.B.
3	231204Z	15.0N 115.0E	VW-UNK--	VW-P-F10	0350M	---	025	997	---	--/-	---	---	---	---	N.F.B.
4	231435Z	15.1N 115.1E	VW-UNK--	VW-P-F10	0380M	---	---	994	---	--/-	---	---	---	---	N.F.B.
5	232207Z	14.6N 113.9E	54-P-F10	54-P-F10	1780M	035	025	---	---	--/-	---	---	---	---	F.B.
6	232300Z	15.2N 115.2E	54-UNK--	54-UNK--	---	---	050	---	---	--/-	---	---	---	---	--
7	240909Z	16.4N 113.9E	VW-P-P02	VW-P-P02	0270M	050	070	986	---	--/-	CIRC	---	30	---	--
8	241030Z	16.0N 114.0E	ACFT RDR	ACFT RDR	---	060	---	---	---	--/-	---	---	---	---	--
9	241435Z	17.0N 113.2E	VW-P-P03	VW-P-P03	0340M	---	060	982	---	--/-	---	---	---	---	F.B.
10	241525Z	17.0N 113.3E	VW-R-F05	VW-R-F05	700MB	055	---	---	3044	--/-	CIRC	---	25	---	--
11	241930Z	17.6N 112.5E	VW-P-P--	VW-P-P--	0330M	---	---	982	---	--/-	---	---	---	---	--
12	242120Z	17.7N 112.3E	VW-UNK--	VW-UNK--	---	---	---	---	---	--/-	---	---	---	---	--
13	242225Z	18.4N 112.2E	54-P-P03	54-P-P03	700MB	050	065	985	2875	15/-	CIRC	---	60	10	
14	250230Z	18.4N 111.8E	54-P-P03	54-P-P03	700MB	050	070	985	---	14/-	CIRC	---	60	---	--
15	250900Z	18.8N 111.5E	VW-P-P05	VW-P-P05	0260M	060	075	977	---	--/-	CIRC	---	60	---	F.B.
16	251350Z	20.0N 111.7E	VW-UNK--	VW-UNK--	700MB	---	---	---	---	--/-	---	---	---	---	--
17	251415Z	20.1N 111.7E	VW-R-F10	VW-R-F10	700MB	---	---	---	---	--/-	ELIP	NW-SE	60X50	F.B.	
18	251740Z	20.3N 111.0E	VW-UNK--	VW-UNK--	---	---	---	---	---	--/-	---	---	---	---	--
19	251940Z	20.5N 110.8E	VW-UNK--	VW-UNK--	2300M	---	---	---	---	--/-	---	---	---	---	--
20	252200Z	20.7N 110.5E	VW-R-P05	VW-R-P05	2310M	045	050	---	---	--/-	ELIP	N-S	32X15	F.B.	
21	252200Z	20.8N 110.4E	VW-UNK--	VW-UNK--	2270M	---	---	---	---	--/-	---	---	---	---	--
22	252230Z	20.3N 111.0E	54-R-F20	54-R-F20	700MB	---	090	---	---	--/-	ELIP	N-S	30X20	---	
23	260238Z	21.0N 110.5E	54-R-L10	54-R-L10	700MB	050	085	---	---	--/-	---	---	---	---	N.F.B.

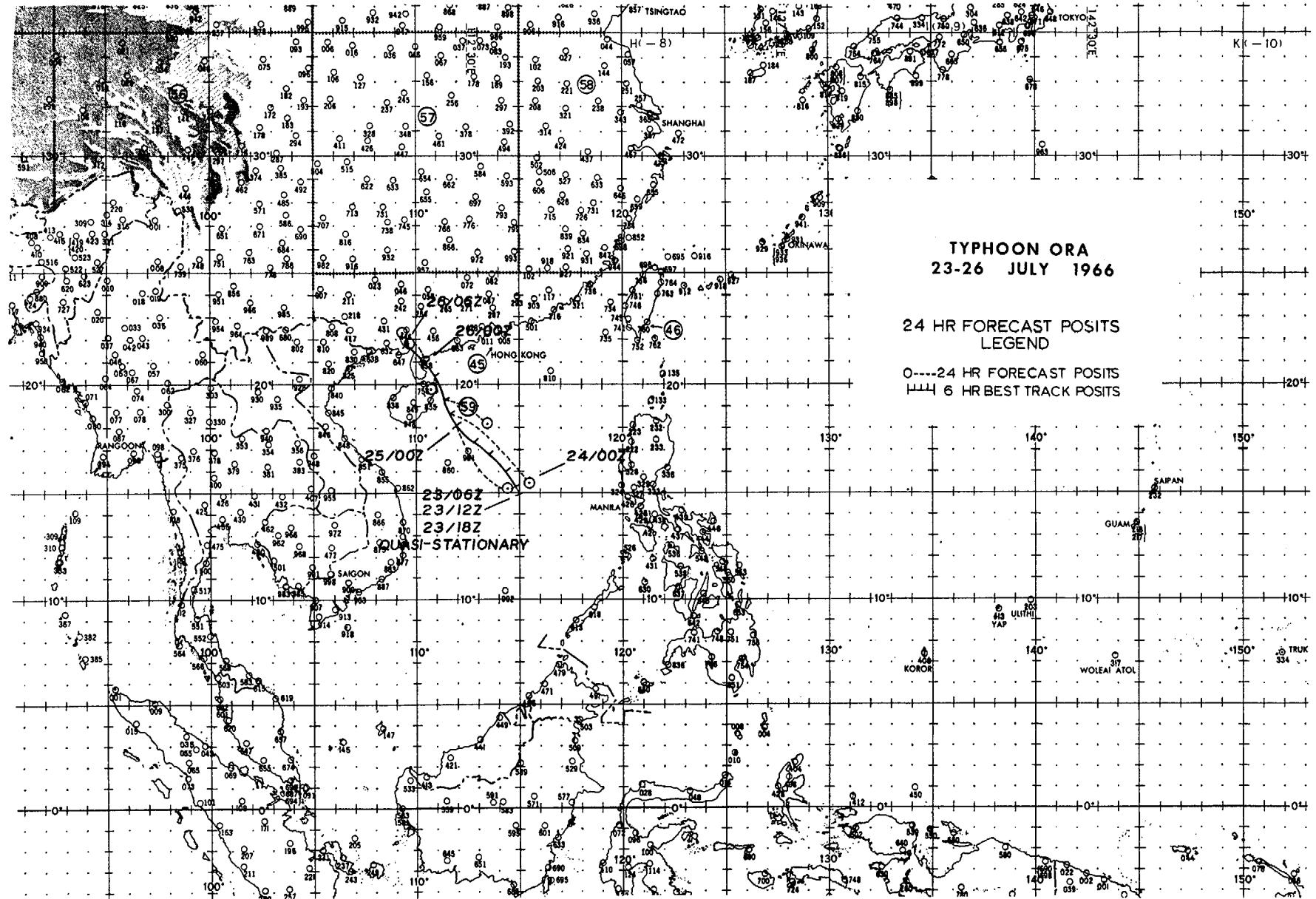
TROPICAL CYCLONE 08 - 07/23/0600Z TO 07/26/0600Z
 POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION LAT.	POSITION LONG.	24 HR. ERROR DEG. DIST.	48 HR. ERROR DEG. DIST.	72 HR. ERROR DEG. DIST.
240000Z	15.2N	114.9E	-----	-----	-----
240600Z	16.0N	114.3E	027-0024	-----	-----
241200Z	16.8N	113.5E	093-0186	-----	-----
241800Z	17.4N	112.8E	104-0210	-----	-----
250000Z	18.1N	112.0E	141-0222	-----	-----
250600Z	18.6N	111.6E	131-0288	-----	-----
251200Z	19.4N	111.3E	122-0132	-----	-----
251800Z	20.3N	110.9E	192-0030	-----	-----
260000Z	21.0N	110.2E	323-0060	-----	-----
260600Z	21.8N	109.6E	338-0030	121-0366	-----

AVERAGE 24 HOUR ERROR - 0131 MI.

AVERAGE 48 HOUR ERROR - 0366 MI.

AVERAGE 72 HOUR ERROR - ---- MI.



TROPICAL CYCLONE 10 - 08/02/1200Z TO 08/09/0600Z

I. DATA

A. STATISTICS

1. NUMBER OF WARNINGS ISSUED - 28
2. NUMBER OF WARNINGS WITH TYPHOON INTENSITY - 04
3. TOTAL DISTANCE TRAVELED DURING TROPICAL WARNING PERIOD - 1332 MI

B. CHARACTERISTICS AS A TYPHOON

1. MINIMUM OBSERVED SLP - 977MB AT 051021Z
2. MINIMUM OBSERVED 700MB HEIGHT - 2893M. AT 052150Z
3. MAXIMUM SURFACE WIND - 080 KTS (FROM BEST TRACK)
4. MAXIMUM RADIUS OF SURFACE CIRCULATION - 500 MI

II. DEVELOPMENT

A. INITIAL IMPETUS - UNSTABLE EASTERLY WAVE UNDER 200MB DIVERGENCE

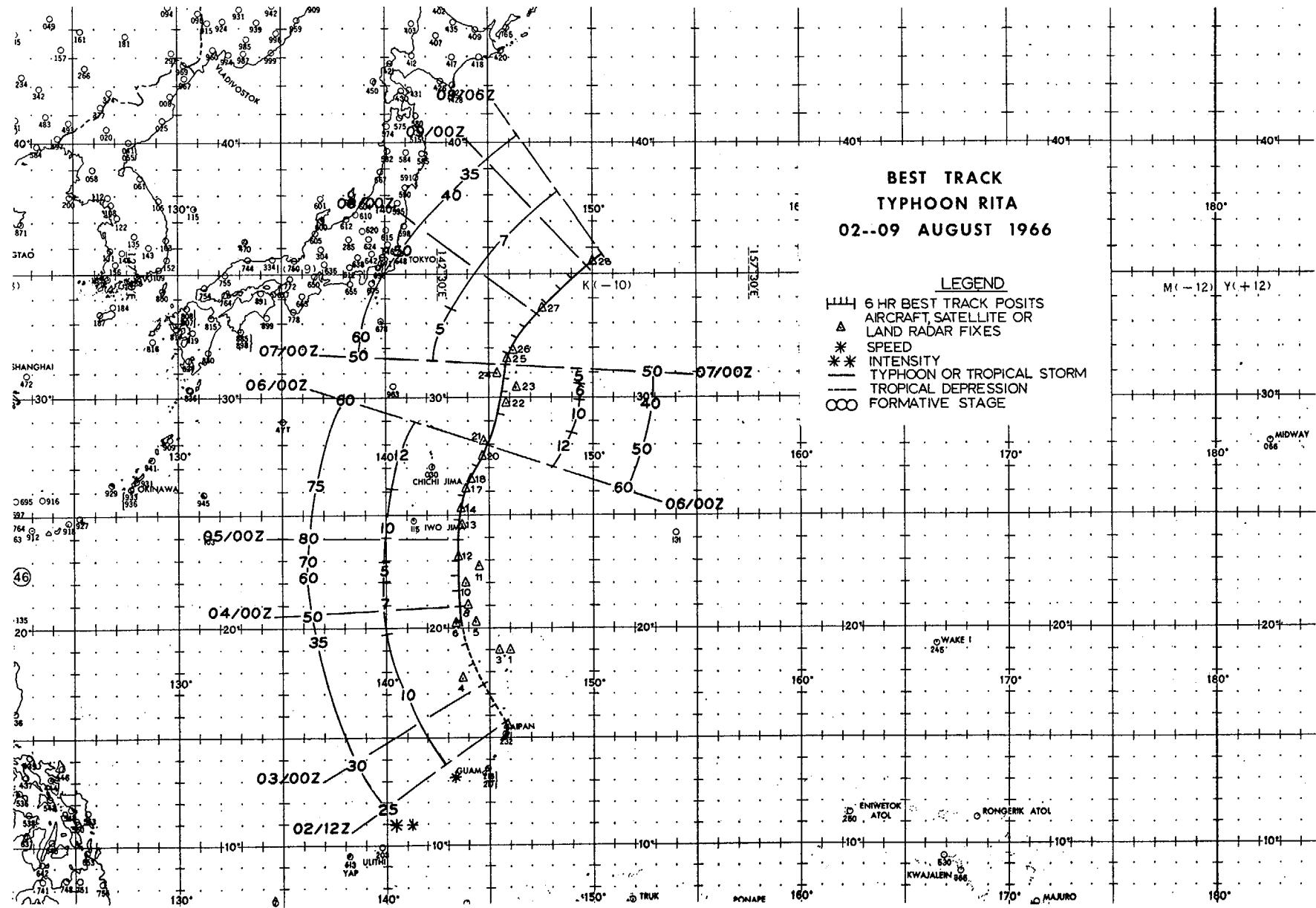
B. INITIAL SURFACE VORTEX

1. EMBEDDED VORTEX AT 020000Z
2. SURFACE PRESSURE LESS THAN 1006MB

C. 200MB FLOW ABOVE SURFACE VORTEX

1. INITIAL - SOUTHWEST
2. UPON REACHING TYPHOON INTENSITY - ANTYCLONIC

III. FINAL DISPOSITION - BECAME EXTRATROPICAL



125

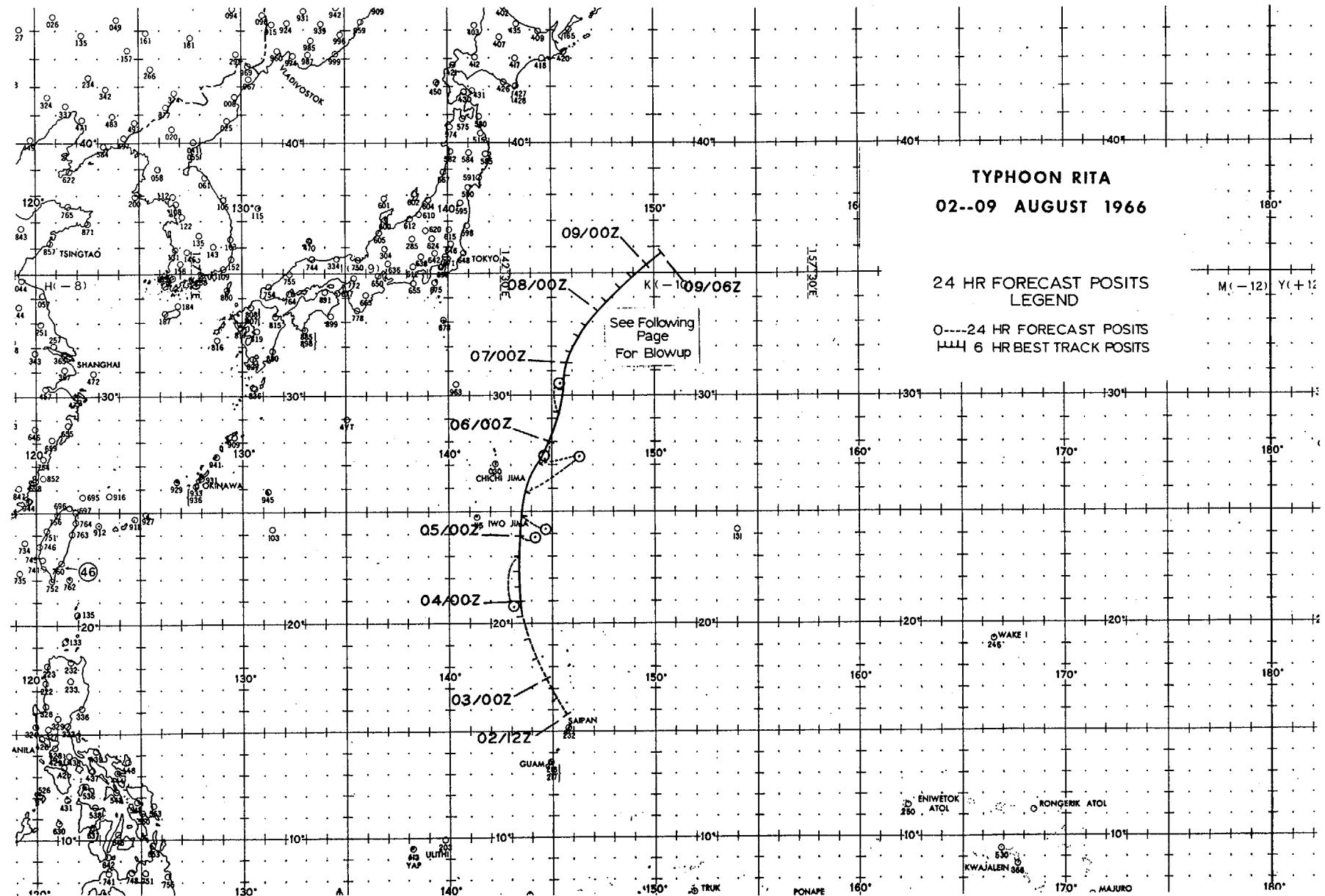
FIX NO.	TIME	PUSIT	EYE FIXES CYCLONE			10	MIN	700MB	FLT	LVL	TT/TD	EYE	ORIEN- TATION	EYE DIA	THKNS WALL CLOUD
			UNIT- METHOD -ACCY	FLT LVL	OBS SFC WND										
1	020329Z	19.0N 146.0E	TIROS	STG B	DIA --	BNDS -									
2	020755Z	15.5N 145.9E	54-P-P--	700MB	---	---	003	3079	08/--	CIRC	---	05	--		
3	030154Z	19.0N 145.5E	TIROS	STG C	DIA --	BNDS -									
4	030900Z	17.7N 143.8E	VW-P-F15	0300M	---	030	994	---	--/--	---				--	
5	031330Z	20.2N 144.3E	VW-UNK--		---	---	---	---	--/--	---				F.B.	
6	031445Z	20.3N 143.4E	VW-P-P05	700MB	065	---	---	3109	--/--	CIRC	---	45	F.B.		
7	032045Z	20.3N 143.6E	54-P-P03	700MB	040	035	992	3002	13/--	CIRC	---	05	F.B.		
8	032337Z	21.0N 144.0E	TIROS	STG C	DIA --	BNDS -									
9	040215Z	20.7N 143.9E	54-P-P03	700MB	060	050	993	3011	13/--	CIRC	---	10	F.B.		
10	040845Z	22.0N 143.9E	VW-P-P10	0340M	040	045	988	---	--/--	CIRC	---	20	F.B.		
11	041505Z	22.8N 144.5E	VW-P-P10	700MB	050	---	988	2981	14/12	CIRC	---	15	F.B.		
12	042040Z	23.2N 143.5E	54-P-P05	700MB	050	070	987	2969	15/--	CIRC	---	30	F.B.		
13	050300Z	24.6N 143.7E	54-P-P02	700MB	060	080	984	2941	15/--	ELIP	NW-SE	40X15	F.B.		
14	050918Z	25.3N 143.6E	VW-UNK15		---	---	---	---	--/--	---			--		
15	050930Z	25.3N 143.6E	VW-R-P05	0330M	030	060	---	---	--/--	ELIP	NE-SW	26X20	F.B.		
16	051021Z	25.2N 143.6E	VW-P-P02	0330M	---	065	977	---	--/--	---			--		
17	051300Z	26.1N 143.9E	VW-UNK--	0410M	---	---	---	---	--/--	---			--		
18	051326Z	26.4N 144.1E	VW-P-P02	0240M	---	070	977	---	--/--	---			--		
19	051430Z	26.6N 144.2E	VW-R-P05	0240M	030	070	---	---	--/--	ELIP	NW-SE	43X28	--		
20	052150Z	27.5N 144.7E	54-P-P03	700MB	060	050	977	2893	14/--	CIRC	---	10	F.B.		
21	060245Z	28.1N 144.8E	54-P-P03	700MB	045	050	977	2899	13/--	CIRC	---	10	--		
22	060915Z	29.8N 145.8E	VW-P-P05	0200M	040	040	977	---	--/--	CIRC	---	08	F.B.		
23	061415Z	30.4N 146.3E	VW-P-F02	0350M	040	035	979	---	--/--	CIRC	---	40	F.B.		
24	062100Z	31.0N 145.3E	54-P-F02	700MB	045	050	983	2926	13/--	----			--		

FIX NO.	TIME	POSIT	EYE FIXES CYCLONE			10	OBS	MIN	700MB	LVL	TT/TD	EYE	ORIEN-	EYE	THKNS												
			UNIT-	FLT	OBS											METHOD	FLT	LVL	SFC	MIN	SLP	HGT	TT/TD	FORM	TATION	DIA.	WALL
			-ACCY	LVL	WND											WND	WND	WND								CLOUD	
25	070347Z	31.4N 145.8E	54-P-P03	700MB	050	040	980	2926		12/-	CIRC	----	20	F.B.													
26	070909Z	31.9N 146.1E	54-P-P03	700MB	050	060	980	2929		13/11	----			F.B.													
27	080433Z	33.7N 147.5E	54-P-P03	700MB	040	050	986	---		13/-	CIRC	----	20	--													
28	090225Z	35.5N 150.0E	54-P-P03	700MB	030	025	988	2993		12/-	ELIP	NE-SW	40X20	--													

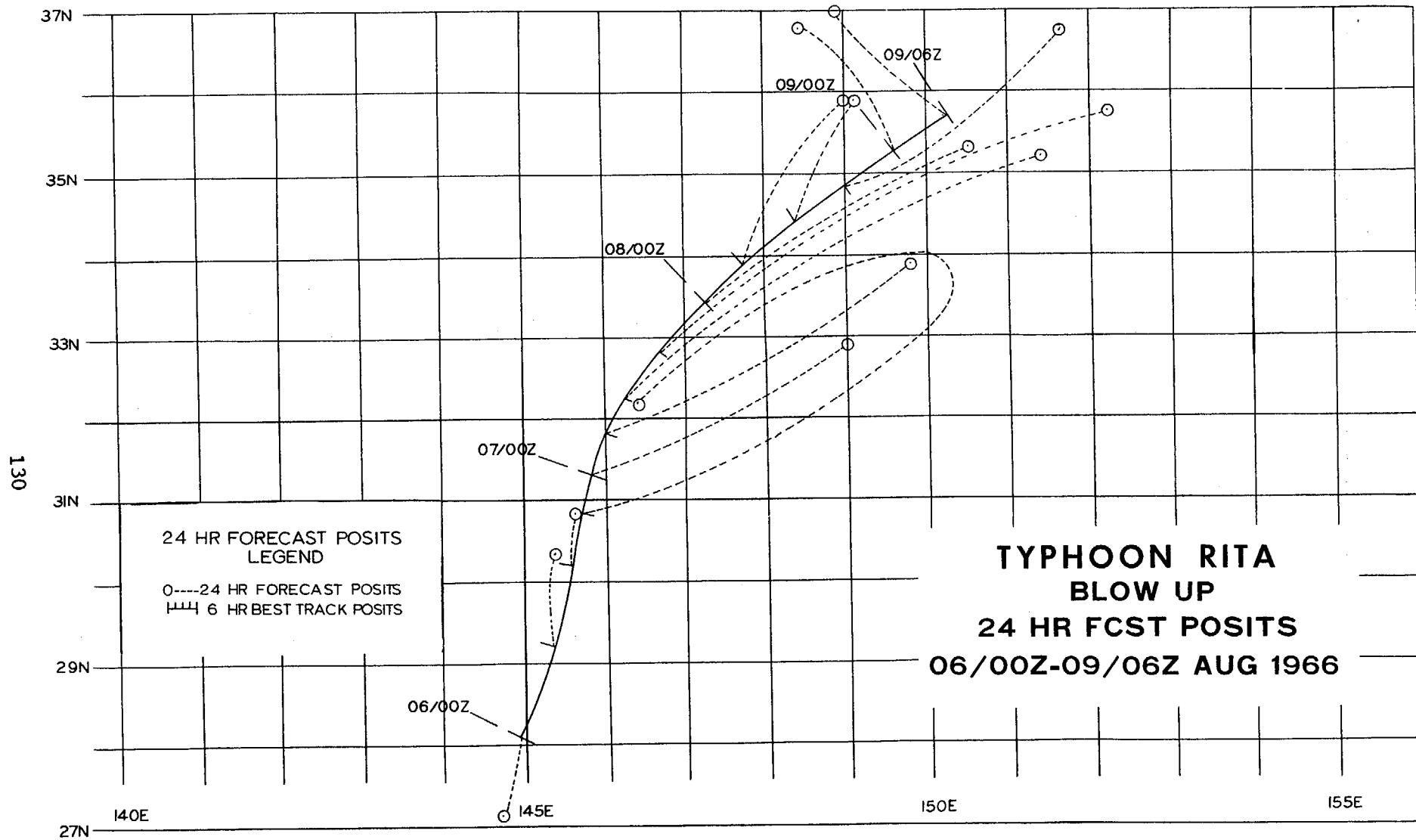
TROPICAL CYCLONE 10 - 08/02/1200Z TO 08/09/0600Z
 POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION LAT.	POSITION LONG.	24 HR. ERROR DEG. DIST.	48 HR. ERROR DEG. DIST.	72 HR. ERROR DEG. DIST.
031800Z	20.3N	143.6E	156-0204	-----	-----
040000Z	21.0N	143.5E	160-0234	-----	-----
040600Z	21.7N	143.5E	176-0192	-----	-----
041200Z	22.4N	143.4E	180-0252	-----	-----
041800Z	23.0N	143.5E	188-0138	-----	-----
050000Z	23.9N	143.4E	090-0036	-----	-----
050600Z	24.9N	143.6E	124-0072	-----	-----
051200Z	25.9N	143.9E	057-0150	-----	-----
051800Z	27.1N	144.4E	083-0096	-----	-----
060000Z	28.1N	144.9E	186-0060	-----	-----
060600Z	29.2N	145.3E	005-0072	115-0096	-----
061200Z	30.2N	145.6E	000-0036	060-0258	-----
061800Z	30.8N	145.7E	024-0090	068-0234	-----
070000Z	31.3N	145.8E	060-0186	062-0102	-----
070600Z	31.8N	146.0E	057-0228	038-0342	062-0336
071200Z	32.3N	146.3E	057-0306	039-0324	-----
071800Z	32.8N	146.7E	058-0324	040-0414	054-0576
080000Z	33.4N	147.2E	055-0198	058-0504	-----
080600Z	33.9N	147.7E	044-0162	-----	045-0816
081200Z	34.4N	148.4E	044-0120	-----	-----
081800Z	34.8N	149.0E	048-0168	-----	037-0852
090000Z	35.3N	149.6E	329-0102	-----	-----
090600Z	35.7N	150.3E	-----	-----	-----

AVERAGE 24 HOUR ERROR - 0155 MI.
 AVERAGE 48 HOUR ERROR - 0284 MI.
 AVERAGE 72 HOUR ERROR - 0645 MI.



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TROPICAL CYCLONE II - 08/12/0600Z TO 08/16/0600Z

I. DATA

A. STATISTICS

1. NUMBER OF WARNINGS ISSUED - 17
2. NUMBER OF WARNINGS WITH TYPHOON INTENSITY - 03
3. TOTAL DISTANCE TRAVELED DURING TROPICAL WARNING PERIOD - 0606 MI

B. CHARACTERISTICS AS A TYPHOON

1. MINIMUM OBSERVED SLP - 978MB AT 142230Z
2. MINIMUM OBSERVED 700MB HEIGHT - 2914M. AT 142230Z
3. MAXIMUM SURFACE WIND - 080 KTS (FROM BEST TRACK)
4. MAXIMUM RADIUS OF SURFACE CIRCULATION - 275 MI

II. DEVELOPMENT

A. INITIAL IMPETUS - MONSOONAL SURGE WITH SUBSEQUENT DEVELOPMENT OF 200MB DIVERGENCE

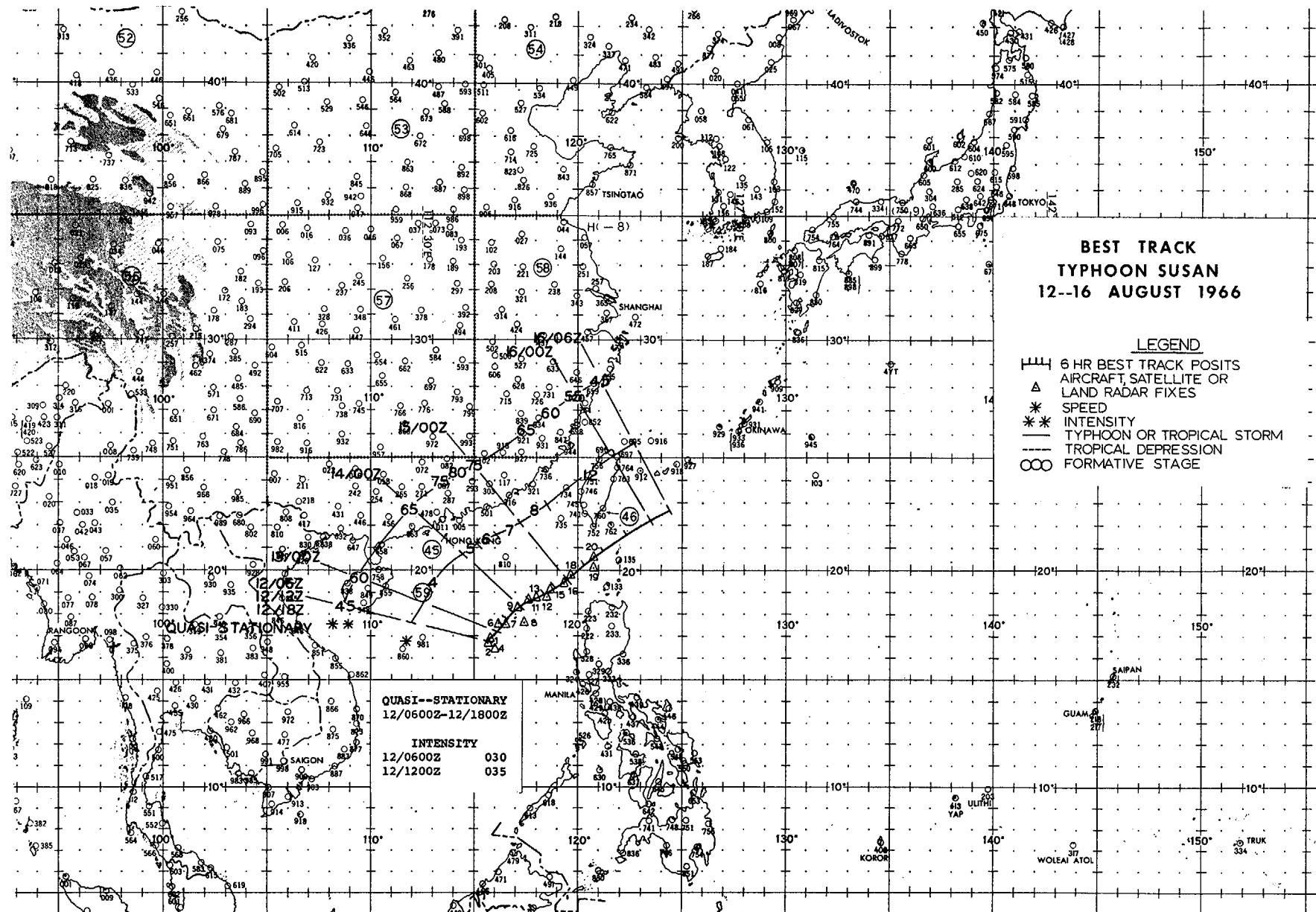
B. INITIAL SURFACE VORTEX

1. EMBEDDED VORTEX AT 120000Z
2. SURFACE PRESSURE LESS THAN 1004MB

C. 200MB FLOW ABOVE SURFACE VORTEX

1. INITIAL - EAST
2. UPON REACHING TYPHOON INTENSITY - ANTYCYCLONIC

III. FINAL DISPOSITION - ABSORBED BY CIRCULATION OF ANOTHER TROPICAL CYCLONE

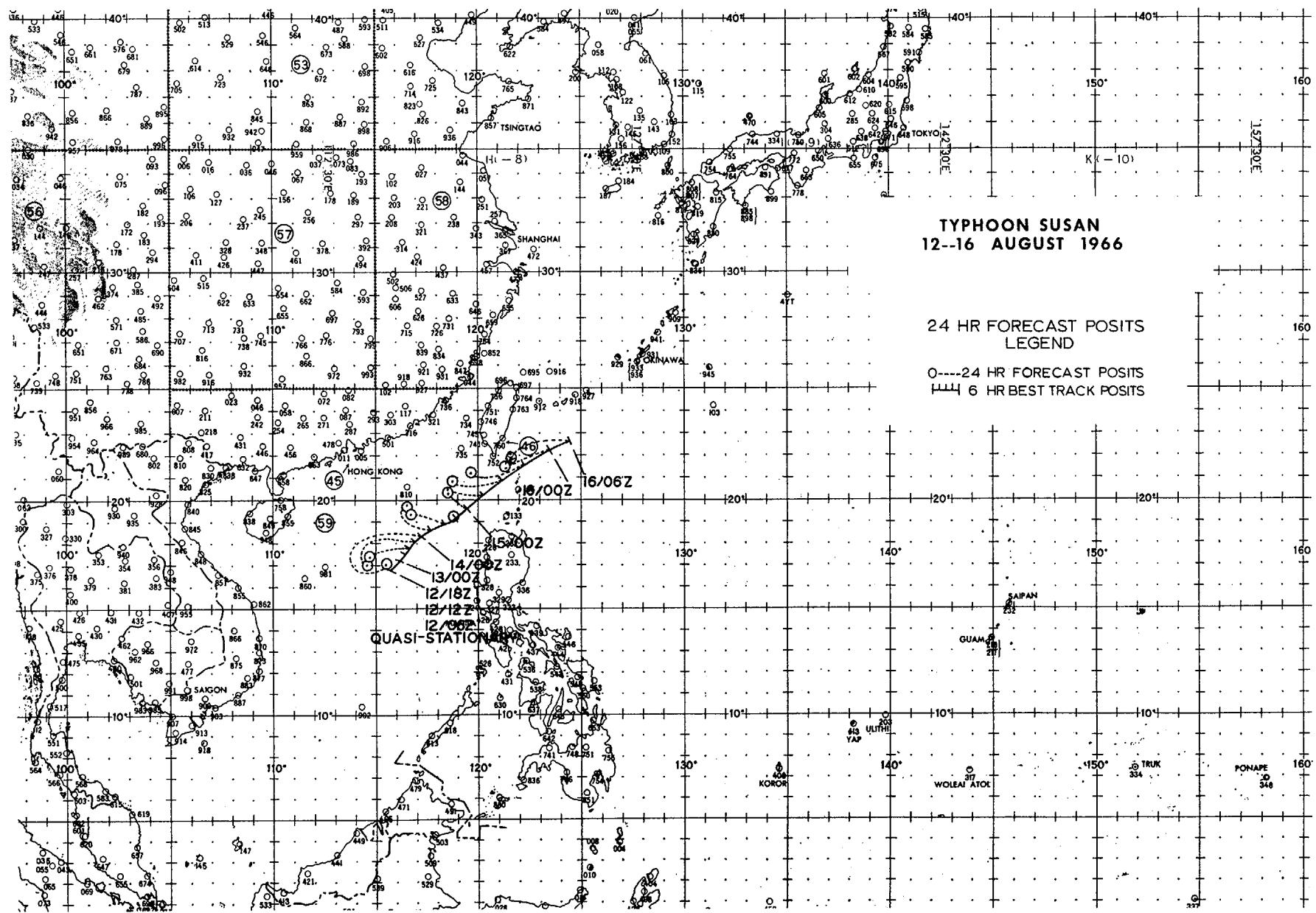


FIX NO.	TIME	PUSIT	EYE FIXES CYCLONE			OBS	MIN	700MB	FLT	LVL	TT/TD	EYE	ORIEN-	EYE	THKNS
			UNIT-	METHOD	FLT	SFC	SLP	WIND	ACCY	LVL	WND	FORM	TATION	DIA	WALL
1	120255Z	16.9N 115.8E	54-P-F03		0460M	025	035	002		--	--/-	ELIP	N-S	80X40	F.B.
2	121200Z	16.7N 115.6E	VW-UNK--			---	---	---		--	--/-				--
3	121245Z	16.5N 115.7E	VW-P-P10		0370M	020	---	999		--	--/-	CIRC	---	30	10
4	121400Z	16.6N 116.0E	SHIP RDR			---	---	---		--	--/-				--
5	130000Z	17.0N 116.1E	VW-R-P05		0290M	---	065	---		--	--/-	CIRC	---	10	--
6	130300Z	17.4N 116.3E	54-P-P03		700MB	045	065	990	3033	16/-	CIRC	---	20	10	
7	130835Z	17.5N 116.2E	VW-UNK05			---	---	---		--	--/-				--
8	130853Z	17.5N 116.5E	VW-P-P02		0380M	040	055	989		--	--/-	CIRC	---	08	10
9	131450Z	17.6N 117.4E	VW-P-P05		700MB	---	---	---	2999	--/-	ELIP	N-S	20X15	12	
10	132230Z	18.3N 117.2E	54-P-P05		700MB	055	065	988	2999	16/-	CIRC	---	30	--	
11	140230Z	18.4N 117.3E	54-P-P03		700MB	065	075	987	2993	17/-	ELIP	N-S	30X20	--	
12	140839Z	18.7N 118.0E	VW-P-P03		0390M	062	085	---	---	--/-	ELIP	N-S	15X10	20	
13	141030Z	18.8N 118.4E	VW-UNK--		700MB	---	---	---		--	--/-				--
14	141230Z	18.6N 117.7E	VW-UNK--			---	---	---		--	--/-				--
15	141230Z	18.9N 118.3E	VW-UNK--		700MB	---	---	---		--	--/-				--
16	141430Z	19.1N 118.7E	VW-P-P03		700MB	060	---	---		--	--/-	ELIP	N-S	15X10	10
17	142230Z	19.4N 119.4E	54-P-P01		700MB	050	050	978	2914	15/-	ELIP	N-S	45X15	10	
18	150138Z	19.0N 120.0E	TIROS	STG X	DIA --	BNDs -									
19	150230Z	19.8N 119.6E	54-P-P01		700MB	050	075	985	2957	16/-	CIRC	---	15	N.F.B.	
20	150830Z	20.1N 120.8E	VW-UNK--			---	---	---		--	--/-				--
21	150922Z	20.6N 120.7E	VW-P-P03		0430M	---	075	985		--	--/-	CIRC	---	15	15

TROPICAL CYCLONE II - 08/12/0600Z TO 08/16/0600Z
 POSITION AND FORECAST VERIFICATION DATA

UTG	STORM POSITION	24 HR. ERROR	48 HR. ERROR	72 HR. ERROR
	LAT. LUNG.	DEG. DIST.	DEG. DIST.	DEG. DIST.
121200Z	16.8N 115.8E	-----	-----	-----
121800Z	16.8N 115.8E	-----	-----	-----
130000Z	17.1N 116.1E	-----	-----	-----
130600Z	17.5N 116.4E	220-0042	-----	-----
131200Z	17.8N 116.6E	254-0102	-----	-----
131800Z	18.1N 116.9E	242-0132	-----	-----
140000Z	18.3N 117.2E	233-0126	-----	-----
140600Z	18.6N 117.7E	317-0096	-----	-----
141200Z	18.9N 118.3E	288-0090	-----	-----
141800Z	19.2N 118.9E	-----0000	-----	-----
150000Z	19.6N 119.5E	303-0060	-----	-----
150600Z	20.1N 120.1E	281-0090	282-0330	-----
151200Z	20.9N 121.1E	268-0126	272-0372	-----
151800Z	21.5N 122.2E	261-0138	274-0234	-----
160000Z	22.1N 123.3E	247-0114	270-0264	-----
160600Z	22.6N 124.4E	253-0156	267-0306	-----

AVERAGE 24 HOUR ERROR - 0097 MI.
 AVERAGE 48 HOUR ERROR - 0301 MI.
 AVERAGE 72 HOUR ERROR - ---- MI.



TROPICAL CYCLONE 12 - 08/12/1200Z TO 08/17/0000Z

I. DATA

A. STATISTICS

1. NUMBER OF WARNINGS ISSUED - 19
2. NUMBER OF WARNINGS WITH TYPHOON INTENSITY - 04
3. TOTAL DISTANCE TRAVELED DURING TROPICAL WARNING PERIOD - 0522 MI

B. CHARACTERISTICS AS A TYPHOON

1. MINIMUM OBSERVED SLP - 972MBS AT 152200Z
2. MINIMUM OBSERVED 700MB HEIGHT - 2880M. AT 152200Z
3. MAXIMUM SURFACE WIND - 090 KTS (FROM BEST TRACK)
4. MAXIMUM RADIUS OF SURFACE CIRCULATION - 400 MI

II. DEVELOPMENT

A. INITIAL IMPETUS - LOW LEVEL SURGE INTO CYCLONIC CIRCULATION FROM THE SOUTH WITH SUBSEQUENT DIVERGENCE AT 200MB LEVEL

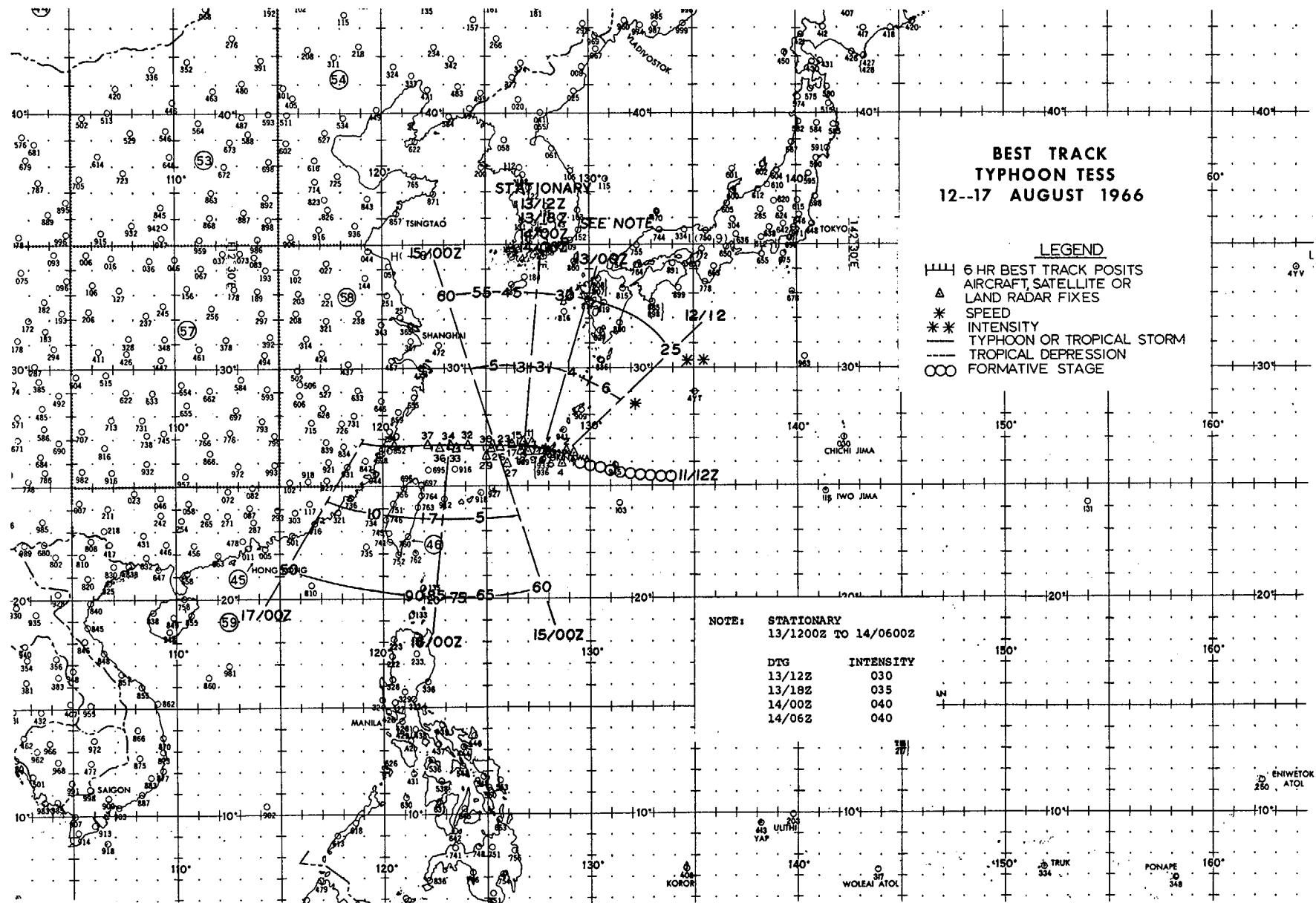
B. INITIAL SURFACE VORTEX

1. EMBEDDED VORTEX AT 111200Z
2. SURFACE PRESSURE LESS THAN 1004MB

C. 200MB FLOW ABOVE SURFACE VORTEX

1. INITIAL - EAST
2. UPON REACHING TYPHOON INTENSITY - SOUTHEAST

III. FINAL DISPOSITION - DISSIPATED OVER LAND



FIX NO.	TIME	POSIT	EYE FIXES CYCLONE			12	OBS	OBS	MIN	FLT	FLT	EYE	ORIEN-	EYE	THKNS	
			UNIT-	METHOD	FLT		LVL	SFC	MIN	700MB	LVL	TT/TO	EYE	DIA	WALL	CLOUD
-	-	-	-ACCY	-	-	WND	SLP	HGT	TT/TO	-	-	-	-	-	-	-
138	120830Z	26.3N 129.1E	54-R-P03		0460M	025	025	---	---	---	--/--	ELIP	NE-SW	15X08	--	
	121020Z	26.2N 128.8E	LND	RDR		---	---	---	---	---	--/--	---	---	---	--	
	121020Z	26.1N 129.0E	LND	RDR		---	---	---	---	---	--/--	---	---	---	--	
	121320Z	25.9N 128.6E	LND	RDR		---	---	---	---	---	--/--	---	---	---	--	
	121730Z	26.3N 128.1E	LND	RDR		---	---	---	---	---	--/--	---	---	---	--	
	122130Z	26.5N 127.8E	LND	RDR		---	---	---	---	---	--/--	---	---	---	--	
	122230Z	26.5N 127.8E	LND	RDR		---	---	---	---	---	--/--	---	---	---	--	
	130100Z	26.5N 127.7E	LND	RDR		---	---	---	---	---	--/--	---	---	---	--	
	130230Z	26.5N 127.5E	LND	RDR		---	---	---	---	---	--/--	---	---	---	--	
	130254Z	26.7N 127.9E	54-P-P00		700MB	020	030	993	3033	16/--	CIRC	----	15	F.B.		
	130630Z	26.8N 127.2E	LND	RDR		---	---	---	---	---	--/--	---	---	---	--	
	131115Z	26.5N 127.0E	VW-P-P05		700MB	---	---	---	3042	--/--	CIRC	----	30	---	--	
	131300Z	26.9N 127.0E	LND	RDR		---	---	---	---	---	--/--	---	---	---	--	
	131445Z	26.8N 127.0E	VW-P-F05		700MB	---	---	---	3024	--/--	CIRC	----	30	---	--	
	131600Z	26.9N 126.8E	LND	RDR		---	---	---	---	---	--/--	---	---	---	--	
	131930Z	27.0N 126.6E	LND	RDR		---	---	---	---	---	--/--	---	---	---	--	
	132130Z	26.6N 126.7E	54-P-P01		700MB	022	040	988	2999	14/--	CIRC	----	10	---	--	
	140200Z	26.4N 126.8E	54-P-P01		700MB	024	040	---	3011	14/--	CIRC	----	10	---	--	
	140505Z	26.4N 126.8E	LND	RDR		---	---	---	---	---	--/--	---	---	---	--	
	140700Z	26.4N 126.8E	LND	RDR		---	---	---	---	---	--/--	---	---	---	--	
	140800Z	26.5N 126.8E	LND	RDR		---	---	---	---	---	--/--	---	---	---	--	
	140900Z	26.6N 126.8E	LND	RDR		---	---	---	---	---	--/--	---	---	---	--	
	140955Z	26.8N 126.2E	LND	RDR		---	---	---	---	---	--/--	---	---	---	--	
	141015Z	26.6N 126.9E	VW-P-P02		0450M	---	055	---	---	---	--/--	CIRC	----	06	F.B.	

FIX NO.	TIME	POSIT	EYE FIXES CYCLONE			12			MIN 700MB	FLT LVL	TT/TD	EYE FORM	ORIEN- TATION	EYE DIA	THKNS WALL CLOUD
			UNIT- METHOD -ACCY	FLT LVL	LVL WND	OBS SFC WND	OBS SLP	MIN HGT							
25	141505Z	26.8N 126.4E	VW-P-P02	700MB	---	---	975	2960	--/--	CIRC	---	06	F.B.		
26	142153Z	26.7N 125.6E	54-P-P03	700MB	045	075	978	2914	15/--	CIRC	---	15	--		
27	150138Z	26.0N 126.0E	TIROS	STG X	DIA --	BNDS -									
28	150233Z	26.6N 125.3E	54-P-P03	700MB	050	085	976	2893	16/--	CIRC	---	10	--		
29	150805Z	26.3N 125.0E	VW-UNK15	0340M	---	---	---	---	--/--	---	---				
30	150920Z	26.6N 125.2E	VW-R-P05	0530M	---	060	---	---	--/--	CIRC	---	06	07		
31	150930Z	26.6N 124.8E	LND RDR		---	---	---	---	--/--	---	---				
139	151430Z	26.8N 124.1E	VW-R-P05	700MB	---	---	---	---	--/--	CIRC	---	08	15		
	151540Z	26.6N 123.5E	LND RDR		---	---	---	---	--/--	---	---				
	152200Z	26.7N 123.2E	54-P-P01	700MB	055	300	972	2880	19/--	CIRC	---	20	--		
	160230Z	26.7N 122.9E	54-P-P02	700MB	070	075	974	2892	17/--	CIRC	---	10	10		
	160230Z	26.6N 122.7E	LND RDR		---	---	---	---	--/--	---	---				
	160550Z	26.8N 122.1E	LND RDR		---	---	---	---	--/--	---	---				
	160800Z	26.7N 122.2E	VW-UNK--		---	---	---	---	--/--	---	---				
	160840Z	26.8N 122.1E	VW-R-P02	0270M	080	090	---	---	--/--	CIRC	---	10	05		
	161430Z	26.8N 120.5E	VW-R-P02	3250M	---	---	---	---	--/--	CIRC	---	30	--		

TROPICAL CYCLONE 12 - 08/12/1200Z TO 08/17/0000Z
 POSITION AND FORECAST VERIFICATION DATA

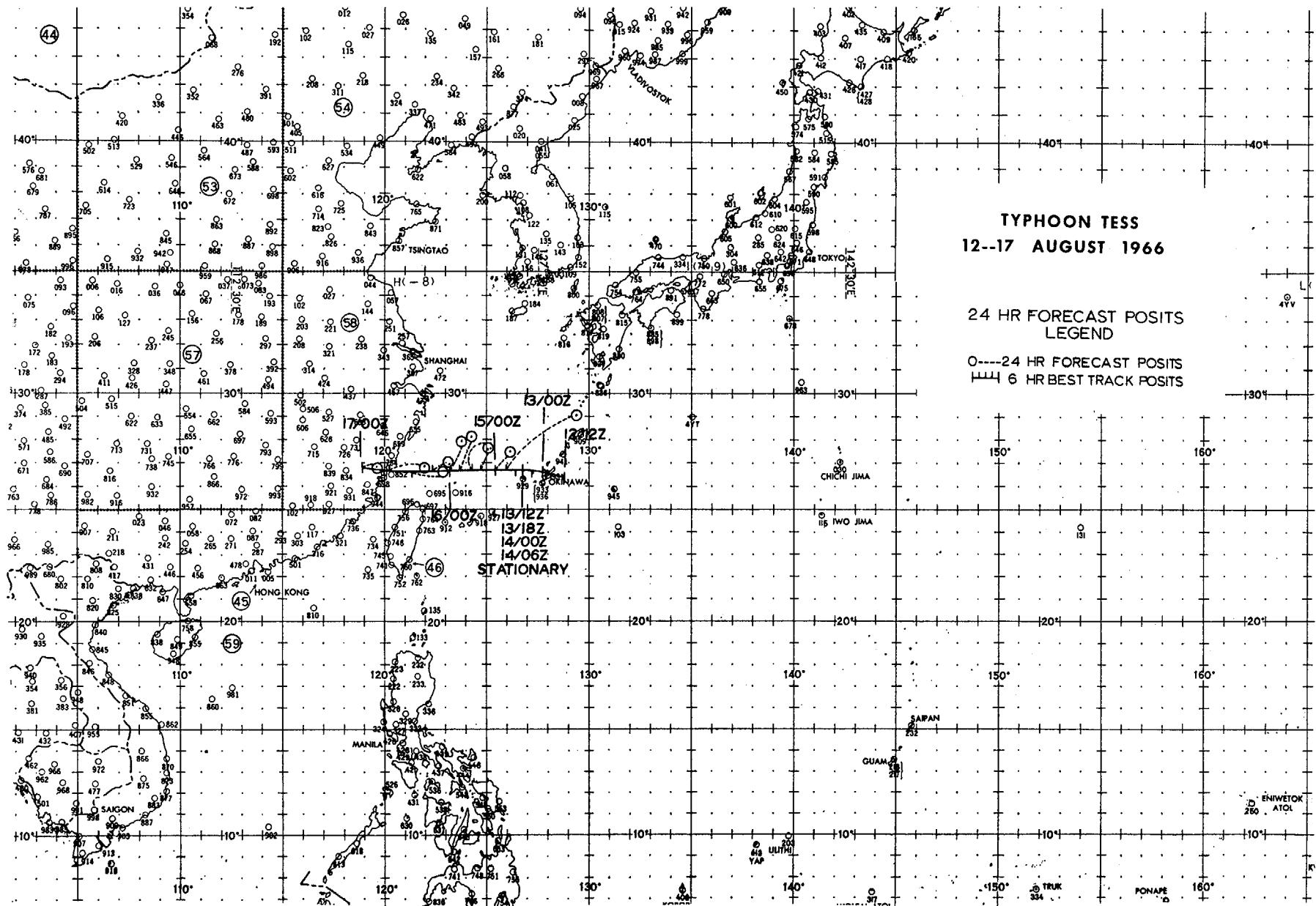
DTG	STORM POSITION LAT. LONG.	24 HR. ERROR DEG. DIST.	48 HR. ERROR	72 HR. ERROR
			DEG. DIST.	DEG. DIST.
131800Z	26.7N 126.8E	341-0072	-----	-----
140000Z	26.7N 126.8E	357-0156	-----	-----
140600Z	26.7N 126.8E	338-0126	-----	-----
141200Z	26.7N 126.5E	344-0156	-----	-----
141800Z	26.7N 126.0E	329-0162	-----	-----
150000Z	26.7N 125.4E	042-0060	-----	-----
150600Z	26.7N 124.8E	013-0054	-----	-----
151200Z	26.7N 124.3E	042-0072	-----	-----
151800Z	26.8N 123.7E	022-0078	-----	-----
160000Z	26.8N 123.2E	027-0078	040-0252	-----
160600Z	26.8N 122.4E	082-0042	026-0198	-----
161200Z	26.8N 121.3E	094-0078	044-0204	-----
161800Z	26.8N 120.1E	087-0102	047-0270	-----
170000Z	26.9N 119.0E	101-0030	049-0378	-----

AVERAGE 24 HOUR ERROR - 0090 MI.

AVERAGE 48 HOUR ERROR - 0260 MI.

AVERAGE 72 HOUR ERROR - ---- MI.

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TROPICAL CYCLONE 14 - 08/19/0000Z TO 08/22/1800Z

I. DATA

A. STATISTICS

1. NUMBER OF WARNINGS ISSUED - 16
2. NUMBER OF WARNINGS WITH TYPHOON INTENSITY - 09
3. TOTAL DISTANCE TRAVELED DURING TROPICAL WARNING PERIOD - 1404 MI

B. CHARACTERISTICS AS A TYPHOON

1. MINIMUM OBSERVED SLP - 975MB AT 200304Z
2. MINIMUM OBSERVED 700MB HEIGHT - 2908M. AT 200304Z
3. MAXIMUM SURFACE WIND - 090 KTS (FROM BEST TRACK)
4. MAXIMUM RADIUS OF SURFACE CIRCULATION - 275 MI

II. DEVELOPMENT

A. INITIAL IMPETUS - FRACTURE OF A POLAR TROUGH AND AN EASTERLY WAVE

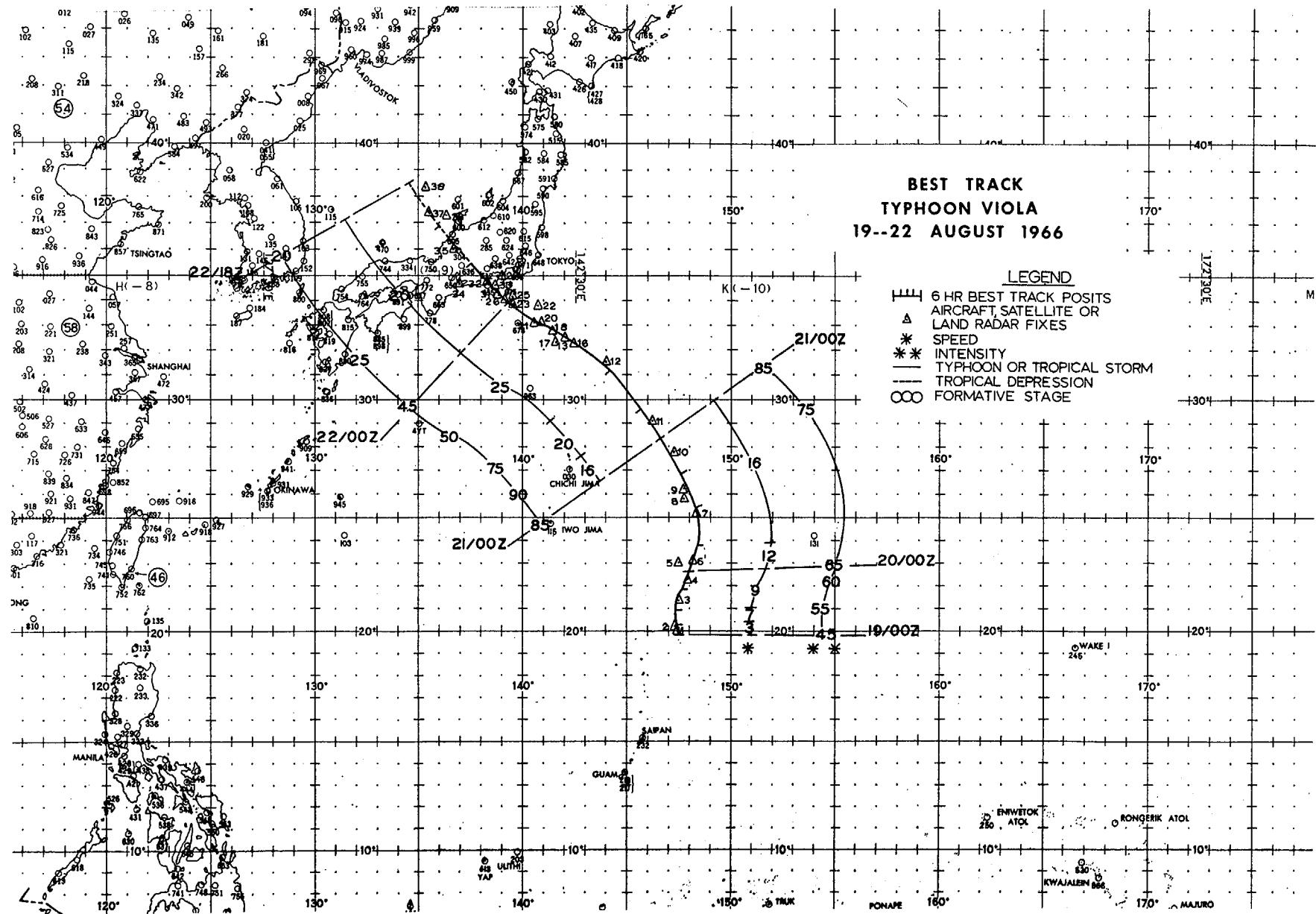
B. INITIAL SURFACE VORTEX

1. EMBEDDED VORTEX AT 181200Z
2. SURFACE PRESSURE LESS THAN 1006MB

C. 200MB FLOW ABOVE SURFACE VORTEX

1. INITIAL - NORTH
2. UPON REACHING TYPHOON INTENSITY - ANTICYCLONIC

III. FINAL DISPOSITION - BECAME EXTRATROPICAL



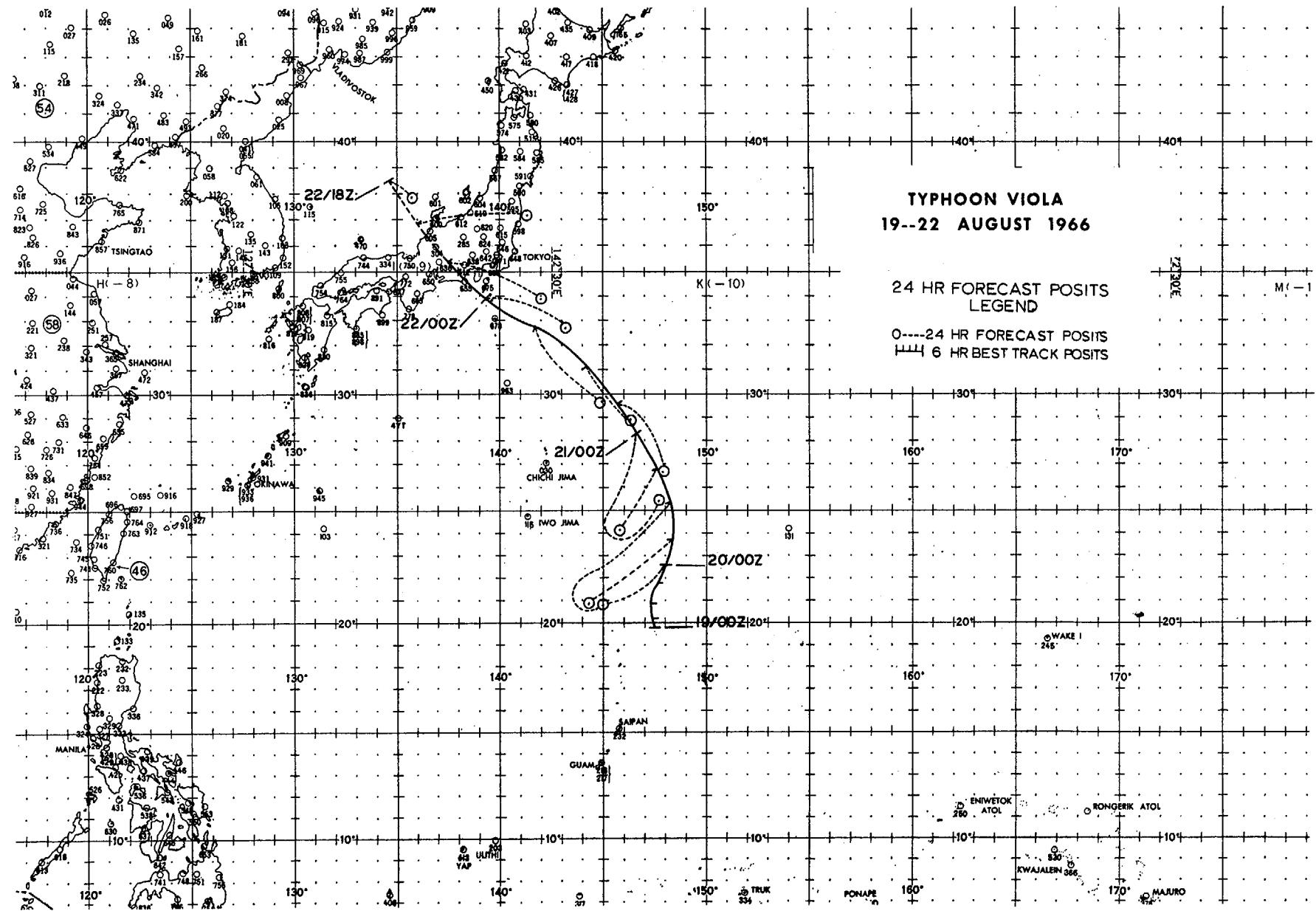
FIX NO.	TIME	PUSIT	EYE FIXES CYCLONE			14			MIN 700MB	FLT LVL	TT/TD	EYE FORM	ORIEN- TATION	EYE DIA	THKNS WALL CLOUD
			UNIT- METHOD -ACCY	FLT LVL	LVL WND	OBS SFC WND	OBS SLP	MIN HGT							
1	190045Z	20.0N 147.4E	54-P-P20	0460M	045	050	996	---	--/-	CIRC	----	05	F.B.		
2	190545Z	20.2N 147.3E	54-P-P07	700MB	040	055	986	2954	12/-	CIRC	----	05	10		
3	191541Z	21.4N 147.5E	VW-P-P05	0440M	030	---	990	---	--/-	CIRC	----	04	--		
4	192240Z	22.4N 147.9E	54-P-P03	700MB	050	065	988	3005	16/-	CIRC	----	10	F.B.		
5	192255Z	23.0N 147.5E	TIRUS	STG X	DIA 03	BNDS 2									
6	200304Z	23.1N 148.1E	54-P-P03	700MB	055	065	975	2908	17/-	CIRC	----	10	F.B.		
7	201024Z	25.2N 148.3E	VW-P-P05	0340M	037	060	988	---	--/-	CIRC	----	05	05		
8	201500Z	25.8N 147.8E	VW-UNK10		---	---	---	---	--/-	----			--		
9	201530Z	26.2N 147.8E	VW-P-P05	0370M	057	---	987	---	--/-	CIRC	----	15	08		
10	202130Z	27.8N 147.2E	54-P-P03	700MB	075	100	978	2954	18/03	CIRC	----	20	--		
11	210325Z	29.1N 146.2E	54-P-P03	700MB	080	125	978	2938	19/-	CIRC	----	20	15		
12	211115Z	31.5N 144.0E	VW-P-P05	3450M	---	---	986	3054	--/-	CIRC	----	15	--		
13	211458Z	32.3N 142.3E	VW-P-P05	700MB	045	---	---	3045	--/-	CIRC	----	20	--		
14	211500Z	32.1N 142.6E	LND RDR		---	---	---	---	--/-	----			--		
15	211645Z	32.3N 141.6E	VW-UNK--		---	---	---	---	--/-	----			--		
16	211700Z	32.5N 142.0E	LND RDR		---	---	---	---	--/-	----			--		
17	211800Z	32.4N 141.6E	LND RDR		---	---	---	---	--/-	----			--		
18	211900Z	32.7N 141.4E	LND RDR		---	---	---	---	--/-	----			--		
19	212000Z	32.9N 141.2E	LND RDR		---	---	---	---	--/-	----			--		
20	212100Z	33.2N 140.9E	LND RDR		---	---	---	---	--/-	----			--		
21	212141Z	33.1N 140.5E	54-P-P03	700MB	060	100	993	3021	12/-	CIRC	----	20	F.B.		
22	212200Z	33.7N 140.7E	LND RDR		---	---	---	---	--/-	----			--		
23	212315Z	33.8N 139.6E	LND RDR		---	---	---	---	--/-	----			--		
24	212330Z	33.7N 139.8E	LND RDR		---	---	---	---	--/-	----			--		

FIX NO.	TIME	POSIT	EYE FIXES CYCLONE			14			MIN 700MB	FLT LVL	TT/TD	EYE FORM	ORIEN- TATION	EYE DIA	THKNS WALL CLOUD
			UNIT- METHOD -ACCY	FLT LVL	FLT WND	OBS SFC	OBS MIN SLP	FLT LVL							
25	220000Z	34.2N 139.6E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	--
26	220030Z	34.0N 139.1E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	--
27	220032Z	35.0N 139.0E	TIROS	STG X	DIA 02	BNOS 2									
28	220100Z	34.2N 139.3E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	--
29	220130Z	34.1N 138.9E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	--
30	220145Z	34.3N 138.8E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	--
31	220205Z	34.2N 138.9E	54-P-POI	700MB	075	100	992	3042	13/--	CIRC	----	20	F.B.		
32	220330Z	34.7N 138.3E	LND RDR	---	---	---	---	---	---	---	---	---	---	--	
33	220400Z	34.5N 138.6E	LND RDR	---	---	---	---	---	---	---	ELIP	N-S	--X--	--	
34	220730Z	34.7N 137.0E	LND RDR	---	---	---	---	---	---	---	---	---	---	--	
35	220900Z	36.0N 136.8E	VW-P-L--	700MB	---	---	---	---	---	---	---	---		N.F.B.	
36	221130Z	37.4N 136.3E	VW-P-L--	700MB	---	---	---	3115	---	---	---	---	---	--	
37	221430Z	37.5N 135.4E	VW-P-L20	700MB	---	---	---	3151	12/--	---	---	---	---	--	
38	221500Z	38.4N 135.3E	VW-R-L--	700MB	---	---	---	---	---	---	---	CIRC	----	75	--

TRUPICAL CYCLONE 14 - 08/19/0000Z 10 08/22/1800Z
 POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION	24 HR. ERROR	48 HR. ERROR	72 HR. ERROR
	LAT. LONG.	DEG. DIST.	DEG. DIST.	DEG. DIST.
190000Z	19.9N 147.5E	-----	-----	-----
190600Z	20.2N 147.3E	-----	-----	-----
191200Z	20.9N 147.3E	-----	-----	-----
191800Z	21.7N 147.6E	-----	-----	-----
200000Z	22.6N 148.0E	235-0198	-----	-----
200600Z	23.8N 148.3E	231-0270	-----	-----
201200Z	25.4N 148.2E	212-0330	-----	-----
201800Z	26.9N 147.6E	209-0186	-----	-----
210000Z	28.3N 146.7E	165-0186	209-0432	-----
210600Z	29.6N 145.7E	149-0204	202-0468	-----
211200Z	31.1N 144.1E	142-0162	184-0570	-----
211800Z	32.6N 141.7E	136-0228	162-0420	-----
220000Z	33.9N 139.2E	110-0204	137-0492	-----
AVERAGE 24 HOUR ERROR - 0218 MI.				
AVERAGE 48 HOUR ERROR - 0476 MI.				
AVERAGE 72 HOUR ERROR - ---- MI.				

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TROPICAL CYCLONE 16 - 08/25/0000Z TO 09/03/1200Z

I. DATA

A. STATISTICS

1. NUMBER OF WARNINGS ISSUED - 39
2. NUMBER OF WARNINGS WITH TYPHOON INTENSITY - 18
3. TOTAL DISTANCE TRAVELED DURING TROPICAL WARNING PERIOD - 2238 MI

B. CHARACTERISTICS AS A TYPHOON

1. MINIMUM OBSERVED SLP - 937MB~~S~~ AT 312100Z
2. MINIMUM OBSERVED 700MB HEIGHT - 2548M. AT 312100Z
3. MAXIMUM SURFACE WIND - 130 KTS (FROM BEST TRACK)
4. MAXIMUM RADIUS OF SURFACE CIRCULATION - 350 MI

II. DEVELOPMENT

A. INITIAL IMPETUS - FRACTURE OF A POLAR TROUGH AND AN EASTERLY WAVE

B. INITIAL SURFACE VORTEX

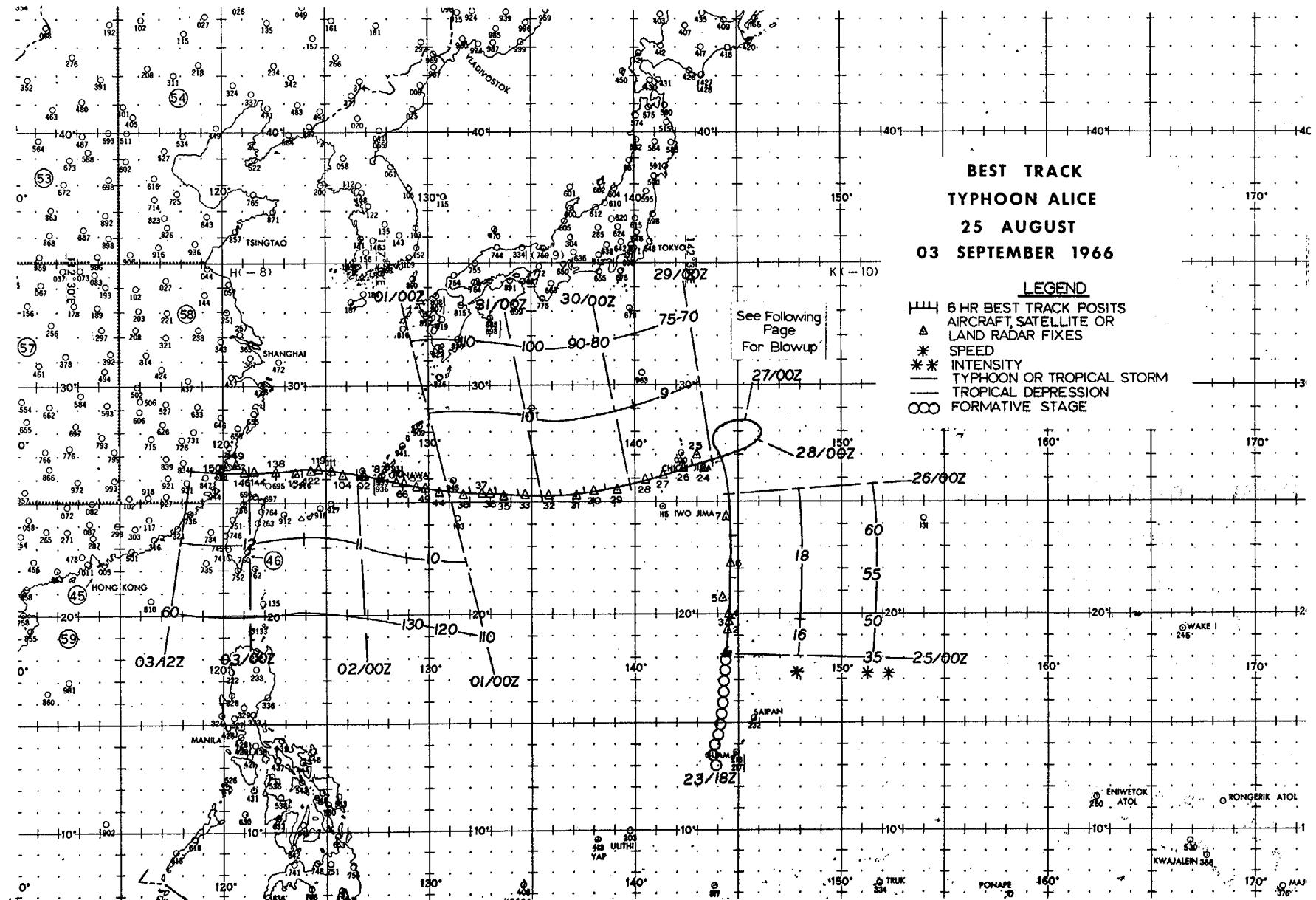
1. JUNCTION VORTEX AT 231800Z
2. SURFACE PRESSURE LESS THAN 1006MB

C. 200MB FLOW ABOVE SURFACE VORTEX

1. INITIAL - WEST
2. UPON REACHING TYPHOON INTENSITY - NORTH

III. FINAL DISPOSITION - DISSIPATED OVER LAND

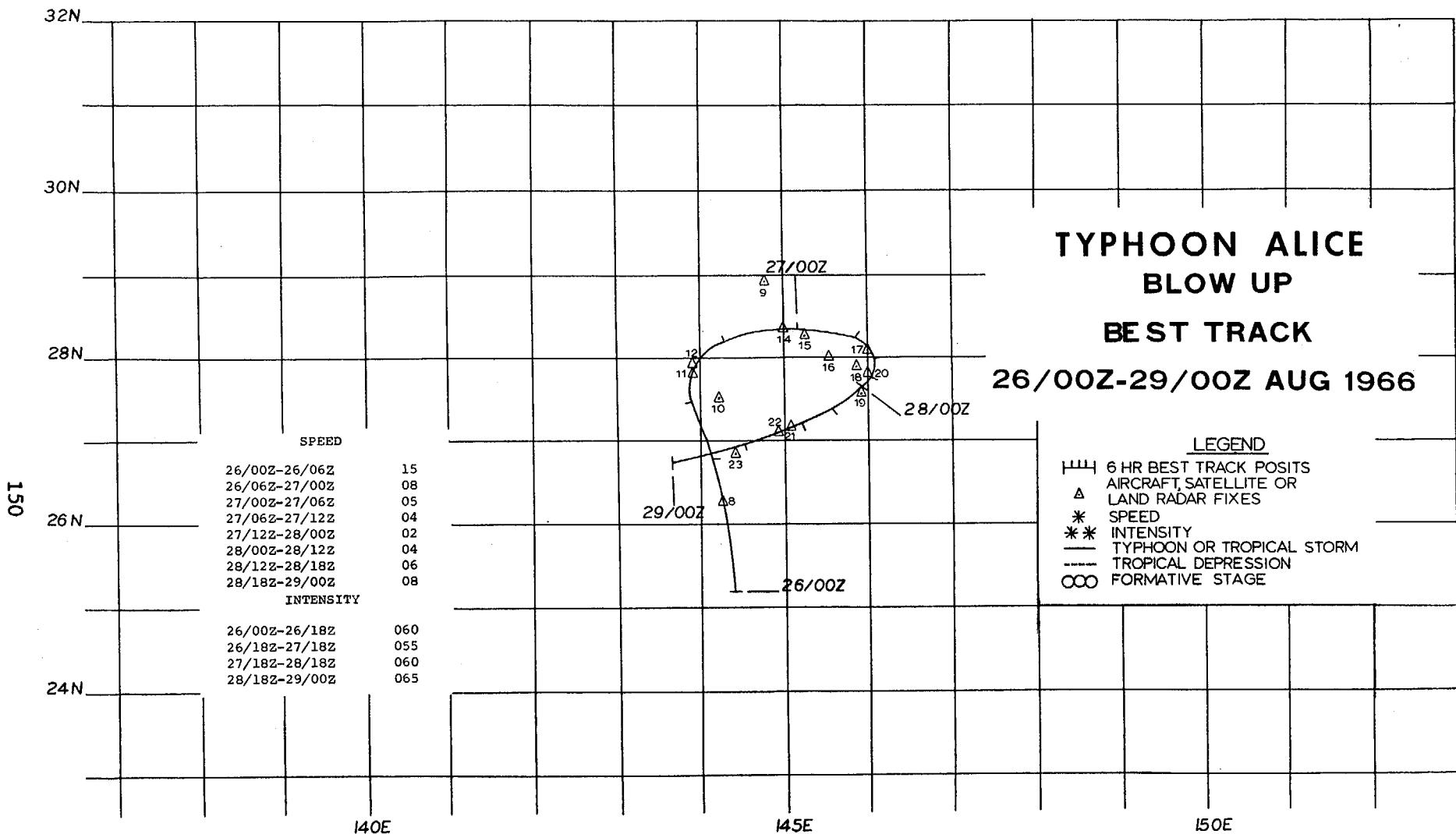
671



**BEST TRACK
TYPHOON ALICE
25 AUGUST
03 SEPTEMBER 1966**

LEGEND

- 111 6 HR BEST TRACK POSITS
 AIRCRAFT, SATELLITE OR
 ▲ LAND RADAR FIXES
 * SPEED
 ** INTENSITY
 — TYPHOON OR TROPICAL STORM
 --- TROPICAL DEPRESSION
 000 FORMATIVE STAGE



FIX NO.	TIME	PUSIT	EYE FIXES CYCLONE			16			FL1 LVL TT/TD	EYE FORM	ORIEN- TATION	EYE DIA	THKNS WALL CLOUD
			UNIT- METHOD -ACCY	FLT LVL	WND	OBS SFC WND	OBS MIN SLP	MIN 700MB HGT					
IGI	250000Z	18.2N 144.5E	54-P-P05	0440M	040	035	000	---	--/-	CIRC	----	05	F.B.
	250440Z	19.3N 144.5E	54-P-P05	0460M	060	050	993	3030	13/-	CIRC	----	05	F.B.
	250840Z	20.7N 144.5E	VW-UNK05	0500M	---	---	---	---	--/-	----	----	----	--
	250910Z	21.0N 144.5E	VW-P-P02	0590M	---	035	988	---	--/-	CIRC	----	06	05
	251200Z	21.7N 144.2E	VW-UNK--	2360M	---	---	---	---	--/-	----	----	----	--
	251435Z	22.3N 143.8E	VW-R-P05	700MB	---	---	---	---	--/-	CIRC	----	07	--
	252100Z	24.3N 144.4E	54-P-P02	700MB	060	065	978	2882	14/-	CIRC	----	30	10
	260330Z	26.3N 144.3E	54-P-P02	700MB	070	075	985	2953	15/-	CIRC	----	08	05
	260855Z	28.9N 144.8E	VW-UNK10	---	---	---	---	---	--/-	----	----	----	--
	260925Z	27.5N 144.2E	VW-R-P03	0460M	046	035	---	---	--/-	CIRC	----	12	08
	261300Z	27.8N 143.9E	VW-UNK--	3390M	---	---	---	---	--/-	----	----	----	--
	261400Z	27.9N 143.9E	VW-UNK--	---	---	---	---	---	--/-	----	----	----	--
	261430Z	27.9N 143.9E	VW-R-P03	700MB	047	---	---	---	--/-	CIRC	----	10	08
	262307Z	28.4N 145.0E	54-P-P05	700MB	055	050	987	2969	13/-	CIRC	----	15	10
	270300Z	28.3N 145.3E	54-P-P05	700MB	055	050	982	2967	16/15	----	----	----	--
	270352Z	28.0N 145.5E	TIROS	STG X	DIA 02	BNDS 4							
	271030Z	28.1N 146.0E	VW-R-F10	700MB	---	---	---	---	--/-	CIRC	----	16	08
	271507Z	27.9N 145.9E	VW-R-P05	700MB	052	---	---	---	--/-	CIRC	----	10	20
	280200Z	27.6N 145.9E	54-P-P05	700MB	060	060	981	2917	15/-	CIRC	----	15	12
	280317Z	27.8N 146.0E	TIROS	STG X	DIA 03	BNOS 2							
	281230Z	27.2N 145.1E	VW-R-P05	3370M	034	---	---	---	--/-	CIRC	----	15	12
	281430Z	27.1N 144.9E	VW-R-P02	700MB	048	---	---	---	--/-	CIRC	----	12	--
	282100Z	26.8N 144.4E	54-P-P03	700MB	058	045	966	2813	16/-	CIRC	----	15	30
	290245Z	26.5N 143.3E	54-P-P03	700MB	070	070	968	2819	15/-	CIRC	----	20	15

FIX NO.	TIME	PUSIT	EYE FIXES CYCLONE			16			MIN 700MB	FLT LVL TT/TD	EYE FORM	ORIEN- TATION	EYE DIA	THKNS WALL CLOUD
			UNIT- METHOD			FLT	OBS	OBS						
			-ACCY	FLT LVL	LVL WND	SFC WND	MIN SLP	HGT						
	25	290422Z	27.0N 143.0E	TIROS	STG -	DIA --	BNDS -							
	26	290910Z	26.4N 142.3E	VW-P-P25	0160M	686	075	989	---	--/-	CIRC	----	11	25
	27	291430Z	26.1N 141.2E	VW-R-P05	700MB	090	---	---	---	--/-	CIRC	----	10	25
	28	292015Z	25.9N 140.5E	54-P-P05	700MB	---	070	974	2871	15/-	CIRC	----	20	05
	29	300300Z	25.5N 139.1E	54-P-P05	700MB	---	080	972	2868	16/-	CIRC	----	20	05
	30	300859Z	25.4N 138.0E	VW-R-P10	0310M	090	090	966	---	--/-	CIRC	----	12	10
	31	301440Z	25.2N 137.1E	VW-R-P10	0400M	---	---	---	---	--/-	CIRC	----	20	--
	32	302055Z	25.2N 135.9E	54-P-P03	700MB	110	065	952	2673	14/-	CIRC	----	10	05
	33	310230Z	25.2N 134.8E	54-P-P03	700MB	120	080	945	2606	15/-	CIRC	----	20	10
	34	310452Z	25.0N 135.0E	TIROS	STG X	DIA 04	BNDS 3							
152	35	310900Z	25.2N 133.7E	VW-R-P10	0340M	050	050	---	---	--/-	CIRC	----	19	--
	36	311200Z	25.3N 133.0E	VW-R-P--	0380M	---	---	---	---	--/-	CIRC	----	15	10
	37	311415Z	25.3N 132.6E	VW-P-P10	700MB	092	---	942	2606	16/-	CIRC	----	17	10
	38	312100Z	25.3N 131.7E	54-P-P05	700MB	097	045	937	2548	19/-	CIRC	----	15	08
	39	010000Z	25.2N 130.8E	LND RDR	---	---	---	---	---	--/-	---			--
	40	010114Z	25.7N 130.6E	LND RDR	---	---	---	---	---	--/-	---			--
	41	010133Z	25.5N 130.6E	LND RDR	---	---	---	---	---	--/-	---			--
	42	010200Z	25.3N 130.4E	LND RDR	---	---	---	---	---	--/-	---			--
	43	010231Z	24.5N 130.5E	LNU RDR	---	---	---	---	---	--/-	---			--
	44	010300Z	25.4N 130.4E	54-P-P05	700MB	110	080	944	2600	16/-	CIRC	----	10	08
	45	010300Z	25.4N 130.-E	LND RDR	---	---	---	---	---	--/-	---			--
	46	010326Z	25.4N 130.4E	LND RDR	---	---	---	---	---	--/-	---			--
	47	010406Z	25.5N 130.3E	LNU RDR	---	---	---	---	---	--/-	CIRC	----	20	07
	48	010540Z	25.5N 129.9E	ACFT RDR	---	---	---	---	---	--/-	CIRC	----	15	--

FIX NO.	TIME	PUSIT	EYE FIXES CYCLONE			16	OBS SFC	OBS MIN	MIN 700MB	FLT LVL	FLT TT/TD	EYE FORM	ORIEN- TATION	EYE DIA	THKNS WALL CLOUD
			UNIT- METHOD -ACCY	FLT LVL	LVL WND										
49	010545Z	25.6N 129.9E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---
50	010624Z	25.7N 129.8E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---
51	010630Z	25.5N 129.5E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---
52	010700Z	25.7N 129.8E	LND RDR	---	---	---	---	---	---	---	---	CIRC	---	20	10
53	010730Z	25.6N 129.5E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---
54	010730Z	25.7N 129.7E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---
55	010800Z	25.8N 129.6E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---
56	010830Z	25.8N 129.5E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---
57	010900Z	25.8N 129.4E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---
58	010900Z	25.7N 129.4E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---
59	010930Z	25.8N 129.3E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---
60	011000Z	25.7N 129.1E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---
61	011000Z	25.8N 129.2E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---
62	011030Z	25.8N 129.1E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---
63	011100Z	25.8N 129.1E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---
64	011100Z	25.7N 128.9E	LND RDR	---	---	---	---	---	---	---	---	CIRC	---	--	--
65	011130Z	25.8N 128.9E	LNU RDR	---	---	---	---	---	---	---	---	---	---	04	
66	011137Z	25.8N 128.8E	VW-R-PO3	700MB	---	---	---	---	---	---	---	CIRC	---	16	05
67	011200Z	25.8N 128.8E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---
68	011200Z	25.7N 128.8E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---
69	011230Z	25.8N 128.7E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---
70	011230Z	25.8N 128.5E	VW-UNK--	700MB	---	---	---	---	---	---	---	---	---	---	---
71	011300Z	25.8N 128.6E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---
72	011300Z	25.7N 128.4E	VW-UNK--	700MB	---	---	---	---	---	---	---	---	---	---	---

FIX NO.	TIME	POSIT	EYE FIXES CYCLONE			16			FLT LVL TT/TO	EYE FORM	ORIEN- TATION	EYE DIA	THKNS WALL CLOUD
			UNIT- METHOD	LVL	FLT LVL WND	OBS SFC WND	OBS MIN SLP	MIN 700MB HGT					
			-ACCY	LVL	WND								
97	012330Z	26.1N 126.4E	LND	RDR	---	---	---	---	--/--	CIRC	----	19	--
98	020000Z	26.1N 126.3E	LND	RDR	---	---	---	---	--/--	----	----	----	--
99	020000Z	26.1N 126.3E	LND	RDR	---	---	---	---	--/--	CIRC	----	13	--
100	020030Z	26.1N 126.2E	LND	RDR	---	---	---	---	--/--	CIRC	----	19	--
101	020100Z	26.1N 126.1E	LND	RDR	---	---	---	---	--/--	----	----	----	--
102	020100Z	26.1N 126.2E	LND	RDR	---	---	---	---	--/--	----	----	----	--
103	020127Z	26.1N 126.0E	LND	RDR	---	---	---	---	--/--	CIRC	----	19	--
104	020205Z	26.1N 125.9E	54-P-P35	700MB	110	080	938	2554	18/--	CIRC	----	--	03
105	020227Z	26.2N 125.8E	LND	RDR	---	---	---	---	--/--	CIRC	----	22	--
106	020258Z	26.2N 125.7E	LND	RDR	---	---	---	---	--/--	----	----	----	--
107	020325Z	26.2N 125.5E	LND	RDR	---	---	---	---	--/--	CIRC	----	19	--
108	020427Z	26.2N 125.4E	LND	RDR	---	---	---	---	--/--	CIRC	----	19	--
109	020500Z	26.3N 125.3E	LND	RDR	---	---	---	---	--/--	----	----	----	--
110	020500Z	26.3N 125.4E	LND	RDR	---	---	---	---	--/--	CIRC	----	14	--
111	020527Z	26.3N 125.2E	LND	RDR	---	---	---	---	--/--	CIRC	----	19	--
112	020600Z	26.4N 125.2E	LND	RDR	---	---	---	---	--/--	CIRC	----	15	--
113	020600Z	26.3N 125.0E	LND	RDR	---	---	---	---	--/--	----	----	----	--
114	020600Z	26.4N 122.9E	LND	RDR	---	---	---	---	--/--	----	----	----	--
115	020628Z	26.3N 125.0E	LND	RDR	---	---	---	---	--/--	CIRC	----	19	--
116	020723Z	26.3N 124.9E	LND	RDR	---	---	---	---	--/--	CIRC	----	19	--
117	020747Z	26.5N 124.7E	VW-UNKOS		---	---	---	---	--/--	----	----	----	--
118	020755Z	26.4N 124.8E	LND	RDR	---	---	---	---	--/--	CIRC	----	16	--
119	020820Z	26.4N 124.6E	VW-R-POS	0450M	038	075	---	---	--/--	CIRC	----	10	--
120	020822Z	26.4N 124.6E	LND	RDR	---	---	---	---	--/--	CIRC	----	17	04

FIX NO.	TIME	PUSIT	EYE FIXES CYCLONE			16	OBS	OBS	MIN	700MB	FLT	LVL	TT/TD	EYE	ORIEN-	EYE	THKNS
			UNIT- METHOD	LVL	WND		SFC	MIN	SLP	HGT					FORM	TATION	DIA
121	020857Z	26.4N 124.5E	LND RDR	---	---	---	---	---	---	---	---	---	---	CIRC	---	15	05
122	020900Z	26.3N 124.2E	VW-UNK--	0530M	---	---	---	---	---	---	---	---	---	---	---	---	--
123	020900Z	26.3N 124.4E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	--
124	020923Z	26.4N 124.5E	LND RDR	---	---	---	---	---	---	---	---	---	---	CIRC	---	15	07
125	020958Z	26.4N 124.3E	LND RDR	---	---	---	---	---	---	---	---	---	---	CIRC	---	16	05
126	021000Z	26.2N 124.4E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	--
127	021000Z	26.4N 124.4E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	--
128	021100Z	26.4N 124.2E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	--
129	021125Z	26.4N 124.1E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	--
130	021200Z	26.3N 123.8E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	--
131	021200Z	26.2N 123.8E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	--
132	021300Z	26.3N 123.5E	LND RDR	---	---	---	---	---	---	---	---	---	---	CIRC	---	40	--
133	021400Z	26.3N 123.3E	LND RDR	---	---	---	---	---	---	---	---	---	---	CIRC	---	40	--
134	021419Z	26.2N 123.5E	VW-R-PIO	0530M	---	---	---	---	---	---	---	---	---	CIRC	---	34	10
135	021500Z	26.3N 123.1E	LND RDR	---	---	---	---	---	---	---	---	---	---	CIRC	---	40	--
136	021500Z	26.5N 123.3E	SHIP RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	--
137	021600Z	26.3N 122.9E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	--
138	021800Z	26.3N 122.5E	LND RDR	---	---	---	---	---	---	---	---	---	---	CIRC	---	35	--
139	021900Z	26.2N 122.3E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	--
140	022000Z	26.3N 122.2E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	--
141	022051Z	26.3N 121.6E	SHIP RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	--
142	022100Z	26.3N 121.8E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	--
143	022200Z	26.2N 121.5E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	--
144	022237Z	26.3N 121.5E	54-P-POS	700MB	095	---	954	2740	16/-	ELIP	N-S	20X12	---	---	---	---	--

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FIX NO.	TIME	POSIT	EYE FIXES CYCLONE				16	OBS	OBS	MIN	700MB	FLT	LVL	EYE	ORIEN-	EYE	WALL	THKNS
			UNIT- METHOD	LVL	FLT	LVL												
145	022300Z	26.2N 121.5E	LND	RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	
146	030000Z	26.2N 121.2E	LND	RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	
147	030100Z	26.2N 121.0E	LND	RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	
148	030104Z	26.3N 121.3E	54-R-P10	700MB	---	---	---	---	---	---	---	---	---	---	---	---	---	
149	030345Z	26.5N 120.5E	LND	RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	
150	030445Z	26.5N 120.2E	LND	RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	

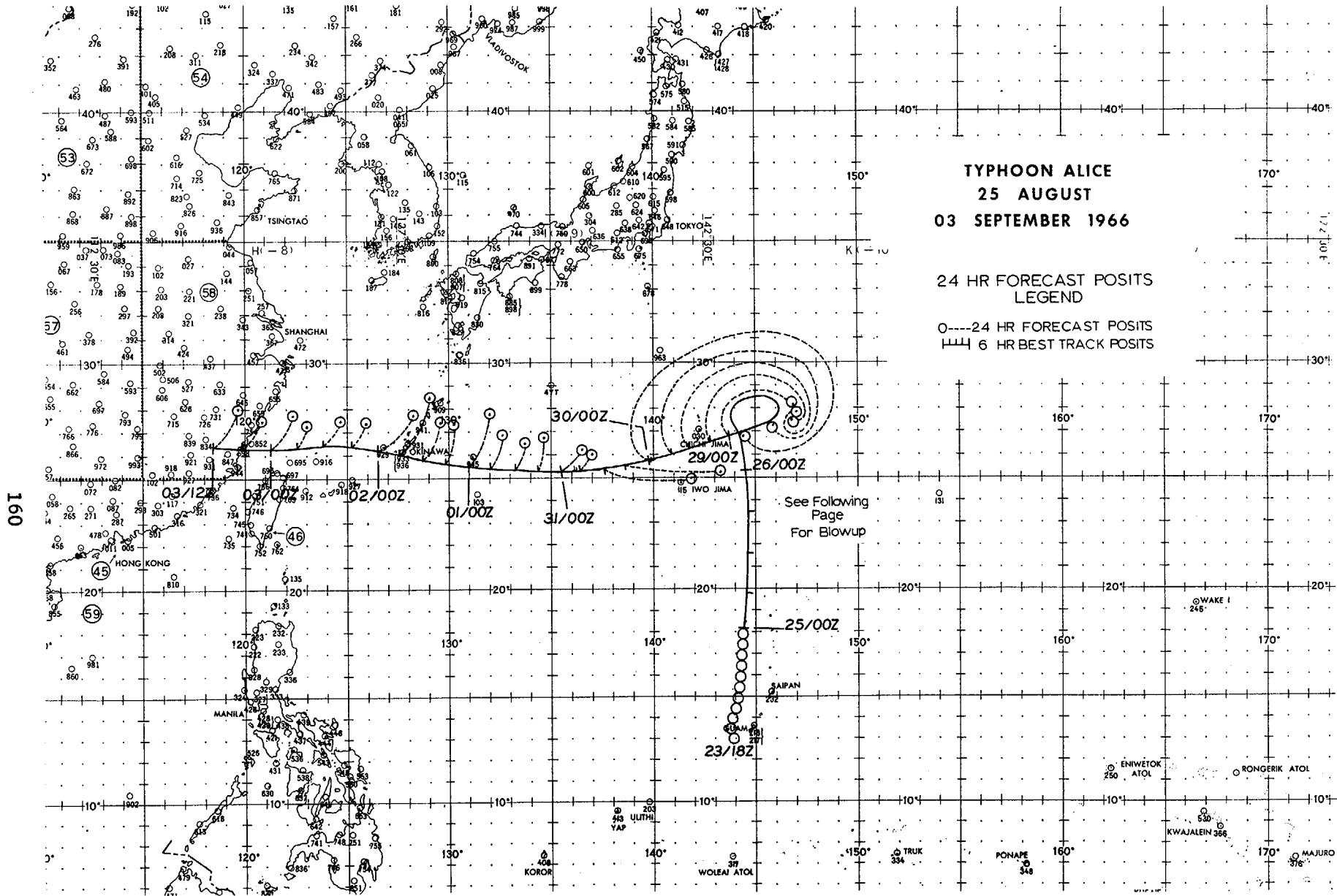
TROPICAL CYCLONE 16 - 08/25/0000Z TO 09/03/1200Z
 POSITION AND FORECAST VERIFICATION DATA

DTG	STORM	POSITION	24 HR. ERROR DEG. DIST.	48 HR. ERROR DEG. DIST.	72 HR. ERROR DEG. DIST.
	LAT.	LONG.			
250000Z	18.2N	144.4E	-----	-----	-----
250600Z	19.8N	144.5E	-----	-----	-----
251200Z	21.6N	144.5E	-----	-----	-----
251800Z	23.5N	144.4E	-----	-----	-----
260000Z	25.3N	144.4E	180-0228	-----	-----
260600Z	26.8N	144.1E	175-0144	-----	-----
261200Z	27.5N	143.9E	000-0096	-----	-----
261800Z	28.2N	144.3E	301-0144	-----	-----
270000Z	28.4N	145.2E	317-0210	-----	-----
270600Z	28.3N	145.8E	313-0366	282-0156	-----
271200Z	28.0N	146.1E	313-0354	323-0474	-----
271800Z	27.8N	146.0E	310-0342	316-0606	-----
280000Z	27.7N	145.9E	012-0246	313-0546	-----
280600Z	27.4N	145.5E	028-0222	316-0684	316-0444
281200Z	27.2N	145.1E	047-0138	317-0744	-----
281800Z	27.0N	144.5E	059-0156	314-0708	-----
290000Z	26.7N	143.6E	065-0192	035-0642	-----
290600Z	26.5N	142.7E	074-0222	-----	-----
291200Z	26.2N	141.7E	071-0294	-----	-----
291800Z	26.0N	140.8E	076-0276	-----	-----
300000Z	25.7N	139.7E	075-0252	-----	-----
300600Z	25.4N	138.5E	092-0252	-----	-----
301200Z	25.3N	137.5E	094-0234	-----	-----
301800Z	25.2N	136.4E	033-0054	-----	-----
310000Z	25.2N	135.3E	043-0084	080-0540	-----
310600Z	25.2N	134.2E	015-0090	-----	-----
311200Z	25.3N	133.1E	013-0132	-----	-----
311800Z	25.3N	132.0E	018-0096	038-0156	-----
010000Z	25.4N	130.9E	021-0150	041-0228	-----
010600Z	25.6N	129.8E	011-0102	025-0282	-----
011200Z	25.8N	128.7E	024-0102	028-0360	-----
011800Z	26.0N	127.5E	028-0168	033-0324	044-0294
020000Z	26.2N	126.3E	049-0132	037-0402	-----
020600Z	26.3N	125.1E	033-0078	047-0402	039-0570

TROPICAL CYCLONE 16 - 08/25/0000Z TO 09/03/1200Z
POSITION AND FORECAST VERIFICATION DATA (CONT)

UTG	STORM POSITION	24 HR. ERROR	48 HR. ERROR	72 HR. ERROR
	LAT. LONG.	DEG. DIST.	DEG. DIST.	DEG. DIST.
021200Z	26.4N 123.9E	033-0078	049-0438	-----
021800Z	26.3N 122.5E	024-0054	050-0642	046-0684
030000Z	26.3N 121.2E	033-0096	054-0546	-----
030600Z	26.3N 119.8E	034-0084	064-0090	058-0990
031200Z	26.3N 118.5E	031-0114	038-0156	-----

AVERAGE 24 HOUR ERROR - 0170 MI.
AVERAGE 48 HOUR ERROR - 0434 MI.
AVERAGE 72 HOUR ERROR - 0596 MI.

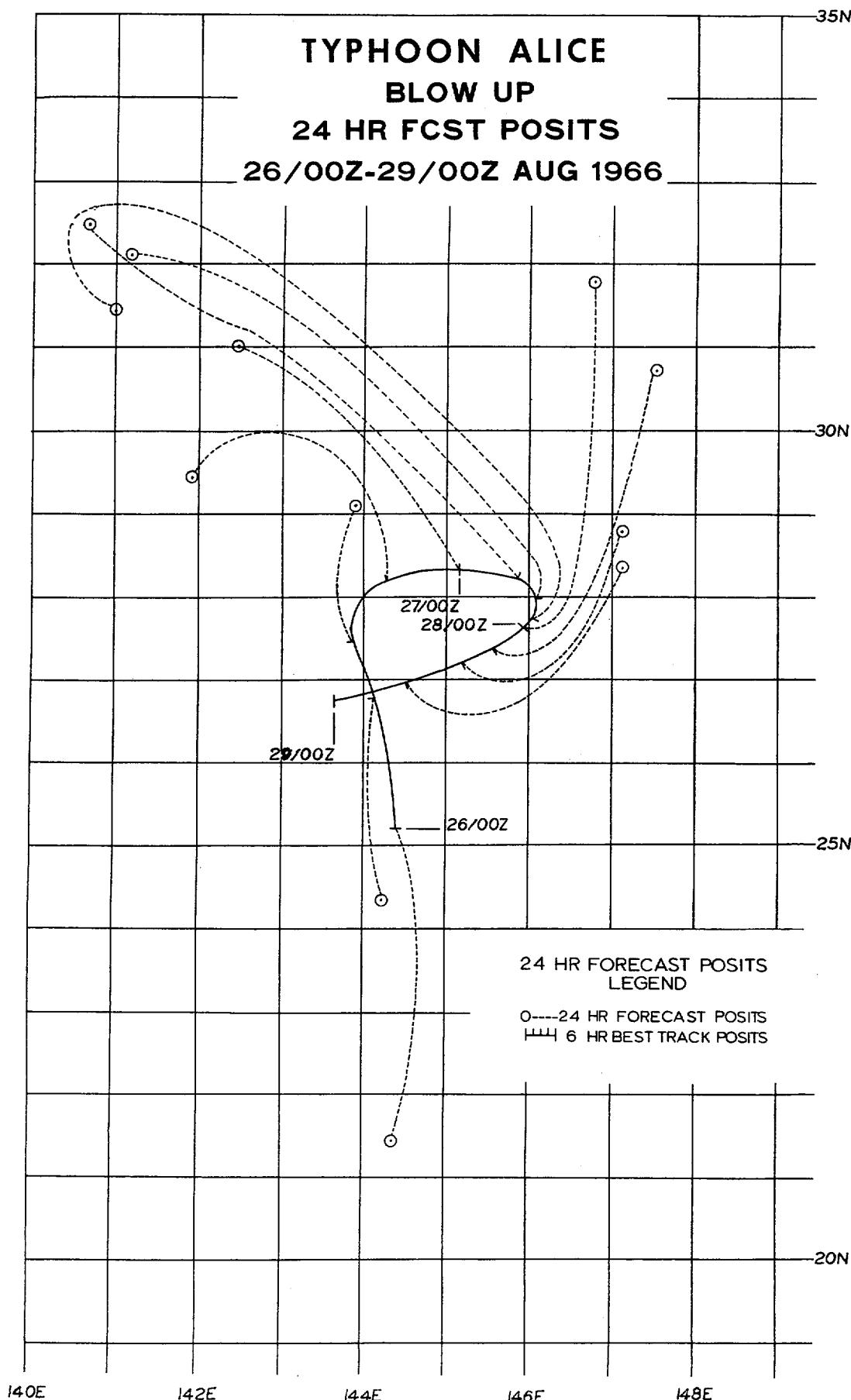


TYPHOON ALICE

BLOW UP

24 HR FCST POSITS

26/00Z-29/00Z AUG 1966



TROPICAL CYCLONE 18 - 08/30/0600Z TO 09/09/0000Z

I. DATA

A. STATISTICS

1. NUMBER OF WARNINGS ISSUED - 39
2. NUMBER OF WARNINGS WITH TYPHOON INTENSITY - 24
3. TOTAL DISTANCE TRAVELED DURING TROPICAL WARNING PERIOD - 2358 MI

B. CHARACTERISTICS AS A TYPHOON

1. MINIMUM OBSERVED SLP - 917MBs AT 042200Z
2. MINIMUM OBSERVED 700MB HEIGHT - 2353M. AT 042200Z
3. MAXIMUM SURFACE WIND - 150 KTS (FROM BEST TRACK)
4. MAXIMUM RADIUS OF SURFACE CIRCULATION - 600 MI

II. DEVELOPMENT

A. INITIAL IMPETUS - UNSTABLE EASTERLY WAVE UNDER 200MB DIVERGENCE

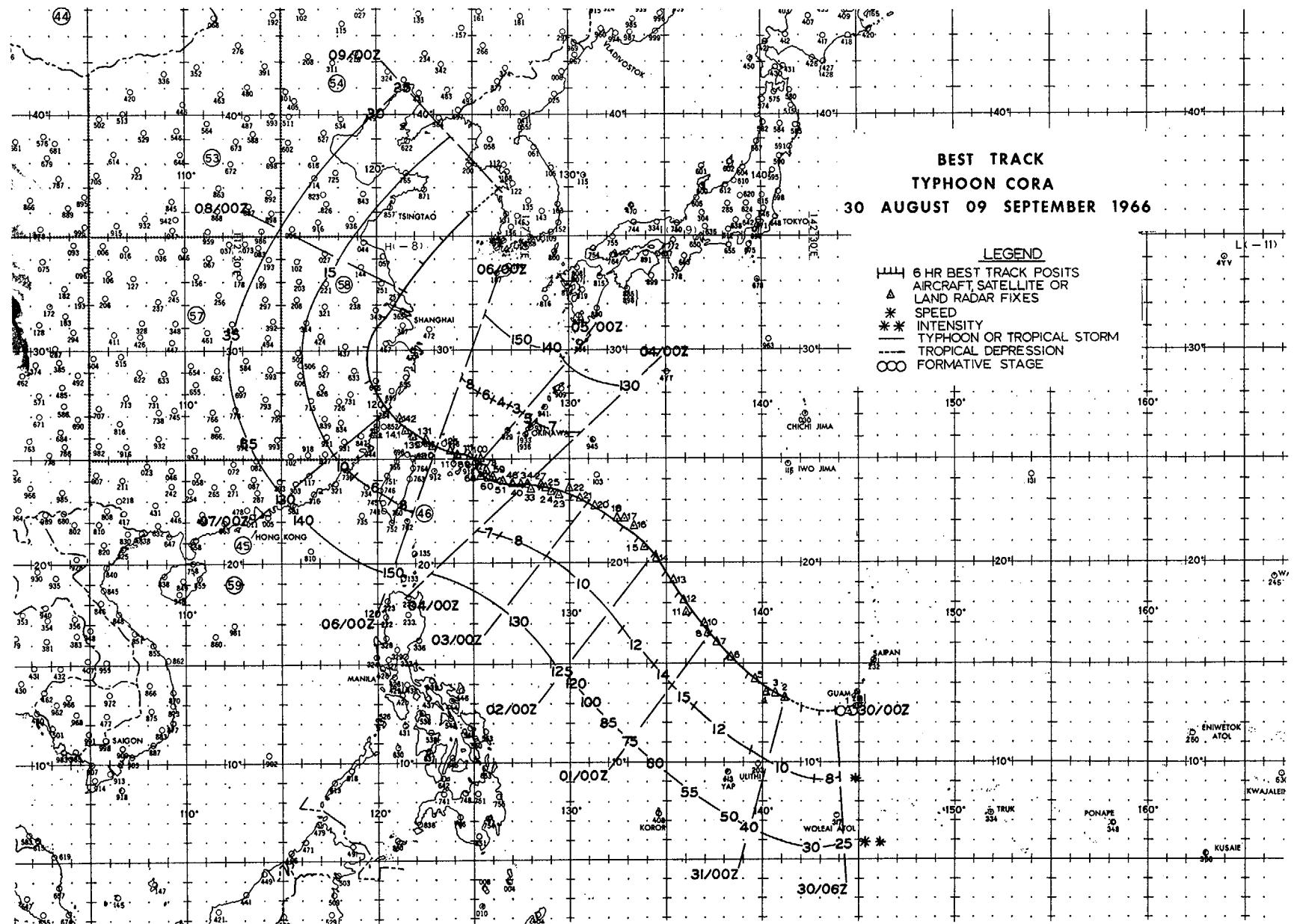
B. INITIAL SURFACE VORTEX

1. JUNCTION VORTEX AT 300000Z
2. SURFACE PRESSURE LESS THAN 1007MB

C. 200MB FLOW ABOVE SURFACE VORTEX

1. INITIAL - SOUTH
2. UPON REACHING TYPHOON INTENSITY - ANTICYCLONIC

III. FINAL DISPOSITION - BECAME EXTRATROPICAL



FIX NO.	TIME	POSIT	EYE FIXES CYCLONE			18	OBS	OBS	MIN	FLT	FLT	EYE	ORIEN-	EYE	THKNS	
			UNIT- METHOD	LVL	WND		SFC	SLP	700MB							
-	-	-	-ACCY	LVL	WND	-	-	-	-	-	-	-	-	-	-	-
1	300030Z	12.6N 144.5E	54-P-P--	0460M	---	020	003	---	---	---	---	---	---	---	---	---
2	302330Z	13.2N 141.1E	54-P-P--	0460M	045	040	997	---	---	---	---	CIRC	---	30	---	---
3	310300Z	13.5N 140.6E	54-P-P03	0460M	050	045	994	---	---	---	---	CIRC	---	30	F.B.	---
4	310730Z	13.6N 140.1E	VW-R-P10	0390M	---	---	---	---	---	---	---	---	---	---	---	---
5	380900Z	14.3N 139.6E	VW-P-P05	0280M	---	045	983	3040	18/11	CIRC	---	---	15	---	---	---
6	311750Z	15.3N 138.3E	VW-P-P10	700MB	050	---	990	2987	12/03	ELIP	NW-SE	36X25	03	---	---	---
7	312130Z	16.0N 137.6E	54-P-P02	700MB	050	050	974	2881	16/--	ELIP	NW-SE	30X15	---	---	---	---
8	312330Z	16.5N 137.1E	54-R-P--	700MB	---	---	---	---	---	---	---	---	---	---	---	---
9	010226Z	16.7N 137.0E	54-P-P01	700MB	065	060	965	2812	17/10	CIRC	---	---	25	10	---	---
10	010415Z	17.0N 137.0E	TIROS	STG X	DIA 04	BNDS 2										
11	010813Z	17.5N 136.0E	ACFT RDR	---	---	---	---	---	---	---	---	---	---	---	---	---
12	010857Z	18.1N 135.9E	VW-P-P02	0230M	055	125	951	---	---	---	---	CIRC	---	14	---	---
13	011500Z	19.1N 135.3E	VW-R-P06	700MB	078	---	---	---	---	---	---	CIRC	---	19	07	---
14	012130Z	20.2N 134.6E	54-P-P03	700MB	133	100	927	2448	21/--	CIRC	---	---	20	05	---	---
15	020300Z	20.8N 133.9E	54-P-P03	700MB	100	100	920	2457	16/--	CIRC	---	---	15	05	---	---
16	021000Z	21.8N 133.3E	VW-UNK15	---	---	---	---	---	---	---	---	---	---	---	---	---
17	021044Z	22.1N 132.9E	VW-R-P03	0490M	045	045	---	---	---	---	---	CIRC	---	16	08	---
18	021307Z	22.1N 132.5E	VW-UNK--	---	---	---	---	---	---	---	---	---	---	---	---	---
19	021430Z	22.2N 132.1E	VW-R-P02	700MB	045	---	---	---	---	---	---	CIRC	---	12	07	---
20	022100Z	22.8N 131.3E	54-P-P02	700MB	120	080	938	2548	17/--	CIRC	---	---	30	05	---	---
21	030210Z	23.1N 130.5E	54-P-P02	700MB	100	065	934	2512	19/--	CIRC	---	---	15	05	---	---
22	030444Z	23.5N 130.0E	TIROS	STG X	DIA 04	BNDS 4										
23	030907Z	23.3N 129.5E	VW-R-P05	0320M	---	090	---	---	---	---	---	CIRC	---	28	07	---
24	031400Z	23.8N 129.0E	VW-R-P05	3460M	045	---	---	---	---	---	---	CIRC	---	20	10	---

FIX NO.	TIME	POSIT	EYE FIXES CYCLONE			18	OBS SFC WND	OBS MIN SLP	MIN 700MB HGT	FLT LVL TT/TD	EYE FORM	ORIEN- TATION	EYE DIA	THKNS WALL CLOUD
			UNIT- METHOD -ACCY	FLT LVL	LVL WND									
25	031434Z	23.5N 129.0E	LND RDR	---	---	---	---	---	---	---	---	---	---	--
26	031527Z	23.7N 128.8E	LND RDR	---	---	---	---	---	---	---	---	---	---	09
27	031615Z	23.7N 128.5E	LND RDR	---	---	---	---	---	---	---	CIRC	---	21	09
28	031729Z	23.7N 128.5E	LND RDR	---	---	---	---	---	---	---	CIRC	---	21	09
29	031801Z	23.7N 128.4E	LND RDR	---	---	---	---	---	---	---	---	---	---	--
30	031830Z	23.8N 128.3E	LND RDR	---	---	---	---	---	---	---	---	---	---	--
31	031858Z	23.8N 128.3E	LND RDR	---	---	---	---	---	---	---	---	---	---	--
32	031926Z	23.7N 128.3E	LND RDR	---	---	---	---	---	---	---	---	---	---	--
33	032000Z	23.6N 128.0E	LND RDR	---	---	---	---	---	---	---	---	---	---	--
34	032120Z	23.8N 127.9E	54-P-P03	700MB	060	120	924	2417	19/--	CIRC	---	28	05	
35	032124Z	23.8N 128.1E	LND RDR	---	---	---	---	---	---	---	---	---	---	--
36	032200Z	23.8N 127.9E	LND RDR	---	---	---	---	---	---	---	---	---	---	--
37	032227Z	23.8N 127.8E	LND RDR	---	---	---	---	---	---	---	---	---	---	--
38	032258Z	23.8N 127.8E	LND RDR	---	---	---	---	---	---	---	CIRC	---	39	05
39	040032Z	23.0N 128.0E	TIROS	STG X	DIA 05	BNDS 4								
40	040058Z	23.8N 127.5E	LND RDR	---	---	---	---	---	---	---	CIRC	---	35	05
41	040205Z	23.8N 127.4E	54-P-P03	700MB	120	130	920	2371	18/--	CIRC	---	30	05	
42	040225Z	23.8N 127.3E	LND RDR	---	---	---	---	---	---	---	CIRC	---	33	08
43	040225Z	23.8N 127.3E	LND RDR	---	---	---	---	---	---	---	CIRC	---	30	08
44	040256Z	23.8N 127.3E	LND RDR	---	---	---	---	---	---	---	CIRC	---	30	07
45	040300Z	23.9N 127.2E	LND RDR	---	---	---	---	---	---	---	---	---	---	--
46	040330Z	23.8N 127.0E	LND RDR	---	---	---	---	---	---	---	---	---	---	--
47	040355Z	23.8N 127.2E	LND RDR	---	---	---	---	---	---	---	CIRC	---	35	08
48	040500Z	23.9N 126.8E	LND RDR	---	---	---	---	---	---	---	---	---	---	--

166

FIX NO.	TIME	PUSIT	EYE FIXES CYCLONE			18	OBS	OBS	MIN	700MB	FLT	LVL	EYE	ORIEN-	EYE	THKNS	
			UNIT-	METHOD	FLT		LVL	SFC	MIN	SLP							
73	042000Z	24.4N 125.6E	LND	RDR	---	---	---	---	---	---	---	---	---	---	---	---	--
74	042000Z	24.3N 125.6E	LND	RDR	---	---	---	---	---	---	---	---	---	---	---	---	--
75	042000Z	25.2N 125.5E	LND	RDR	---	---	---	---	---	---	---	---	---	---	---	---	--
76	042026Z	24.4N 125.6E	LND	RDR	---	---	---	---	---	---	---	---	---	---	---	05	
77	042100Z	24.3N 125.6E	LND	RDR	---	---	---	---	---	---	---	---	---	---	---	---	--
78	042100Z	24.4N 125.5E	LND	RDR	---	---	---	---	---	---	---	---	---	---	---	---	--
79	042159Z	24.4N 125.1E	LND	RDR	---	---	---	---	---	---	---	---	---	---	---	---	--
80	042200Z	24.6N 125.2E	54-P-P02	700MB	120	080	917	2353	16	--	ELIP	NW-SE	30X20	05			
81	042215Z	24.5N 125.3E	LND	RDR	---	---	---	---	---	---	---	---	CIRC	----	--	--	--
82	042227Z	24.4N 125.4E	LND	RDR	---	---	---	---	---	---	---	---	---	---	---	---	--
83	042321Z	24.5N 125.3E	LND	RDR	---	---	---	---	---	---	---	---	---	---	---	---	--
84	042325Z	24.4N 125.2E	LND	RDR	---	---	---	---	---	---	---	---	---	---	---	---	--
85	050000Z	24.4N 125.2E	LND	RDR	---	---	---	---	---	---	---	---	---	---	---	---	--
86	050028Z	24.4N 125.2E	LND	RDR	---	---	---	---	---	---	---	---	---	---	---	---	--
87	050059Z	24.4N 125.2E	LND	RDR	---	---	---	---	---	---	---	---	---	---	---	---	--
88	050110Z	24.7N 125.2E	LND	RDR	---	---	---	---	---	---	---	---	---	---	---	---	--
89	050127Z	24.5N 125.2E	LND	RDR	---	---	---	---	---	---	---	---	---	---	---	---	--
90	050200Z	24.8N 125.1E	54-P-P05	700MB	120	080	916	2377	16	--	ELIP	NE-SW	30X20	05			
91	050200Z	24.8N 124.9E	LND	RDR	---	---	---	---	---	---	---	---	---	---	---	---	--
92	050207Z	24.5N 125.2E	LND	RDR	---	---	---	---	---	---	---	---	---	---	---	---	--
93	050225Z	24.6N 125.2E	LND	RDR	---	---	---	---	---	---	---	---	---	---	---	---	--
94	050258Z	24.8N 125.3E	LND	RDR	---	---	---	---	---	---	---	---	---	---	---	---	--
95	050300Z	24.8N 124.9E	LND	RDR	---	---	---	---	---	---	---	---	---	---	---	---	--
96	050332Z	24.9N 125.3E	LND	RDR	---	---	---	---	---	---	---	---	---	---	---	---	--

FIX NO.	TIME	PUSIT	EYE FIXES CYCLONE			18			MIN 700MB	FLT LVL	TT/TD	EYE FORM	ORIEN- TATION	EYE DIA	THKNS WALL CLOUD
			UNIT- METHOD -ACCY	FLT LVL	FLT WND	OBS SFC	OBS WND	SLP							
97	050340Z	24.6N 125.0E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	--
98	050402Z	25.0N 125.3E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	--
99	050430Z	24.8N 124.8E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	--
100	050430Z	24.8N 124.7E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	--
101	050431Z	25.0N 125.3E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	--
102	050514Z	24.5N 124.5E	TIROS	STG X	DIA 04	BANDS 4									
103	050532Z	24.9N 125.1E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	--
104	050600Z	24.9N 124.8E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	--
105	050602Z	24.9N 125.2E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	--
106	050720Z	25.0N 125.0E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	--
107	050730Z	25.1N 124.6E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	--
108	050800Z	24.9N 125.1E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	--
109	050800Z	25.1N 124.6E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	--
110	050824Z	25.1N 125.0E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	--
111	050830Z	25.1N 124.1E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	--
112	050840Z	25.1N 124.9E	VW-R-P10	0370M	---	---	---	---	---	---	---	---	---	---	--
113	050856Z	25.0N 125.0E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	--
114	050900Z	25.0N 124.8E	VW-R-P01	0370M	035	055	---	---	---	---	---	ELIP	NW-SE	37X26	10
115	050900Z	25.2N 124.6E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	28
116	050930Z	25.1N 124.6E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	--
117	051000Z	25.2N 124.6E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	--
118	051020Z	25.2N 124.7E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	--
119	051100Z	25.1N 124.6E	VW-P-P--	700MB	---	---	---	---	---	---	---	---	---	---	--
120	051100Z	25.2N 124.5E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	--

FIX NO.	TIME	POSIT	EYE FIXES CYCLONE				18	OBS SFC	OBS MIN SLP	MIN 700MB HGT	FLT LVL	TT/TD	EYE FORM	ORIEN- TATION	EYE DIA	THKNS WALL CLOUD	
			UNIT- METHOD	LVL	FLT	LVL											
			-ACCV	WND	WND	---											
121	051200Z	25.3N 124.4E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	--
122	051400Z	25.2N 124.2E	VW-R-P01	700MB	---	---	---	---	---	---	---	---	ELIP	NW-SE	40X28	05	
123	051630Z	25.3N 124.2E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	
124	051651Z	25.2N 123.9E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	
125	051730Z	25.2N 123.8E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	
126	051753Z	25.4N 123.8E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	
127	051800Z	25.4N 123.9E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	
128	052134Z	25.5N 123.6E	54-P-P03	0300M	086	---	936	2551	16/--	ELIP	NE-SW	35X20	20	---	---	---	
129	060202Z	25.6N 122.9E	54-P-P02	700MB	100	070	936	2548	19/--	ELIP	N-S	30X25	15	---	---	---	
130	060425Z	25.6N 122.9E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	
131	060600Z	25.9N 122.5E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	
132	060700Z	25.9N 122.4E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	
133	060755Z	26.1N 122.4E	VW-R-P05	---	---	---	---	---	---	---	---	---	---	---	---	---	
134	060825Z	26.2N 122.3E	VW-R-P05	0660M	035	035	---	---	---	---	---	---	ELIP	N-S	36X30	--	
135	060840Z	26.0N 122.1E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	
136	060840Z	26.0N 122.2E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	
137	060940Z	26.0N 122.0E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	
138	061040Z	26.0N 122.0E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	
139	061100Z	26.2N 121.9E	VW-UNK--	700MB	---	---	---	---	---	---	---	---	---	---	---	---	
140	061100Z	26.0N 121.9E	LND RDR	---	---	---	---	---	---	---	---	---	---	---	---	---	
141	061430Z	26.3N 121.4E	VW-R-P05	700MB	---	---	---	---	---	---	---	---	ELIP	N-S	--X--	--	
142	062122Z	26.8N 121.1E	54-R-P02	700MB	085	040	---	---	---	---	---	---	CIRC	----	20	--	

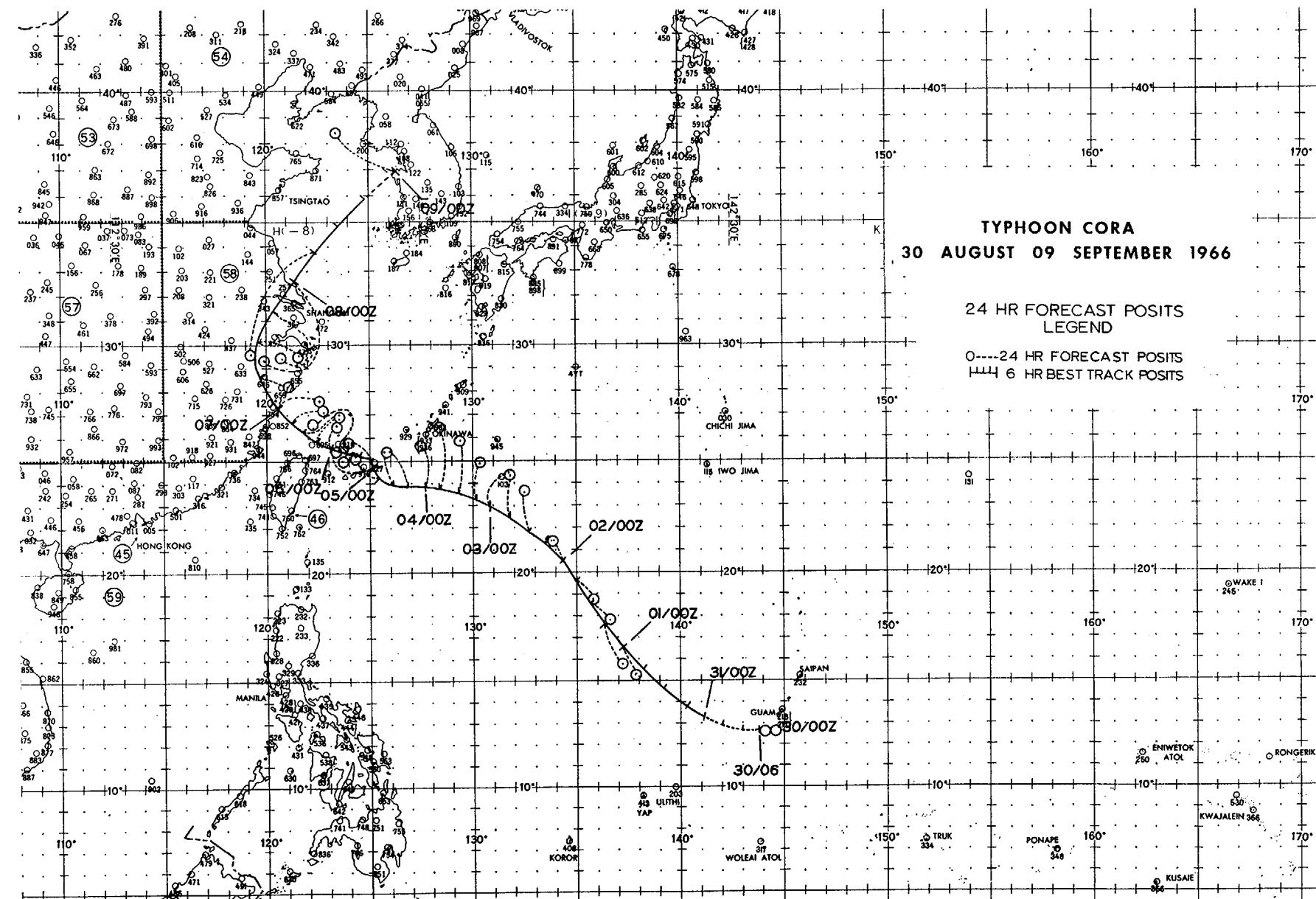
691

TROPICAL CYCLONE 18 - 08/30/0600Z 10 09/09/0000Z
 POSITION AND FORECAST VERIFICATION DATA

DTG	STORM	POSITION	24 HR. ERROR	48 HR. ERROR	72 HR. ERROR
		LAT.	LONG.	DEG. DIST.	DEG. DIST.
310000Z	13.2N	141.1E	-----	-----	-----
310600Z	13.8N	140.2E	075-0108	-----	-----
311200Z	14.6N	139.2E	059-0126	-----	-----
311800Z	15.4N	138.2E	067-0162	-----	-----
010000Z	16.5N	137.2E	160-0084	-----	-----
010600Z	17.6N	136.3E	157-0120	-----	-----
011200Z	18.6N	135.7E	142-0066	-----	-----
011800Z	19.6N	135.0E	146-0060	-----	-----
020000Z	20.4N	134.3E	341-0054	161-0168	-----
020600Z	21.2N	133.6E	064-0012	160-0174	-----
021200Z	21.8N	132.8E	353-0102	090-0054	-----
021800Z	22.5N	131.9E	360-0114	072-0072	-----
030000Z	22.9N	130.9E	024-0102	026-0192	-----
030600Z	23.2N	130.1E	007-0102	026-0138	129-0168
031200Z	23.5N	129.3E	000-0144	358-0282	-----
031800Z	23.7N	128.4E	000-0162	003-0336	050-0288
040000Z	23.8N	127.7E	349-0102	014-0276	-----
040600Z	23.8N	126.9E	333-0102	003-0270	018-0330
041200Z	23.9N	126.1E	345-0090	001-0354	-----
041800Z	24.2N	125.4E	314-0084	004-0384	017-0558
050000Z	24.7N	125.1E	295-0094	311-0150	-----
050600Z	25.0N	125.0E	303-0060	290-0186	009-0468
051200Z	25.1N	124.5E	262-0042	293-0174	-----
051800Z	25.2N	123.9E	306-0120	290-0204	021-0630
060000Z	25.5N	123.1E	013-0054	287-0216	-----
060600Z	25.9N	122.3E	046-0084	330-0120	-----
061200Z	26.2N	121.8E	061-0096	336-0114	-----
061800Z	26.6N	121.3E	073-0078	334-0204	-----
070000Z	27.3N	120.5E	087-0102	049-0198	-----
070600Z	28.6N	119.6E	106-0072	073-0216	-----
071200Z	30.1N	119.4E	108-0108	094-0222	-----
071800Z	31.4N	120.3E	168-0120	121-0160	-----
080000Z	32.6N	121.3E	198-0210	120-0174	-----
080600Z	33.7N	122.4E	212-0288	157-0138	092-0258

TROPICAL CYCLONE 18 - 08/30/0600Z TO 09/09/0000Z
POSITION AND FORECAST VERIFICATION DATA (CONT)

OTG	STORM POSITION	24 HR. ERROR	48 HR. ERROR	72 HR. ERROR
	LAT. LUNG.	DEG. DIST.	DEG. DIST.	DEG. DIST.
081200Z	34.9N 123.5E	-----	128-0162	-----
	AVERAGE 24 HOUR ERROR - 0103 MI.			
	AVERAGE 48 HOUR ERROR - 0198 MI.			
	AVERAGE 72 HOUR ERROR - 0385 MI.			



TROPICAL CYCLONE 23 - 09/11/1800Z TO 09/18/0000Z

I. DATA

A. STATISTICS

1. NUMBER OF WARNINGS ISSUED - 26
2. NUMBER OF WARNINGS WITH TYPHOON INTENSITY - 16
3. TOTAL DISTANCE TRAVELED DURING TROPICAL WARNING PERIOD - 1134 MI

B. CHARACTERISTICS AS A TYPHOON

1. MINIMUM OBSERVED SLP - 943MB AT 150330Z
2. MINIMUM OBSERVED 700MB HEIGHT - 2594M. AT 150815Z
3. MAXIMUM SURFACE WIND - 115 KTS (FROM BEST TRACK)
4. MAXIMUM RADIUS OF SURFACE CIRCULATION - 400 MI

II. DEVELOPMENT

A. INITIAL IMPETUS - LOW LEVEL SURGE INTO CYCLONIC CIRCULATION FROM THE SOUTH WITH SUBSEQUENT DIVERGENCE AT 200MB LEVEL

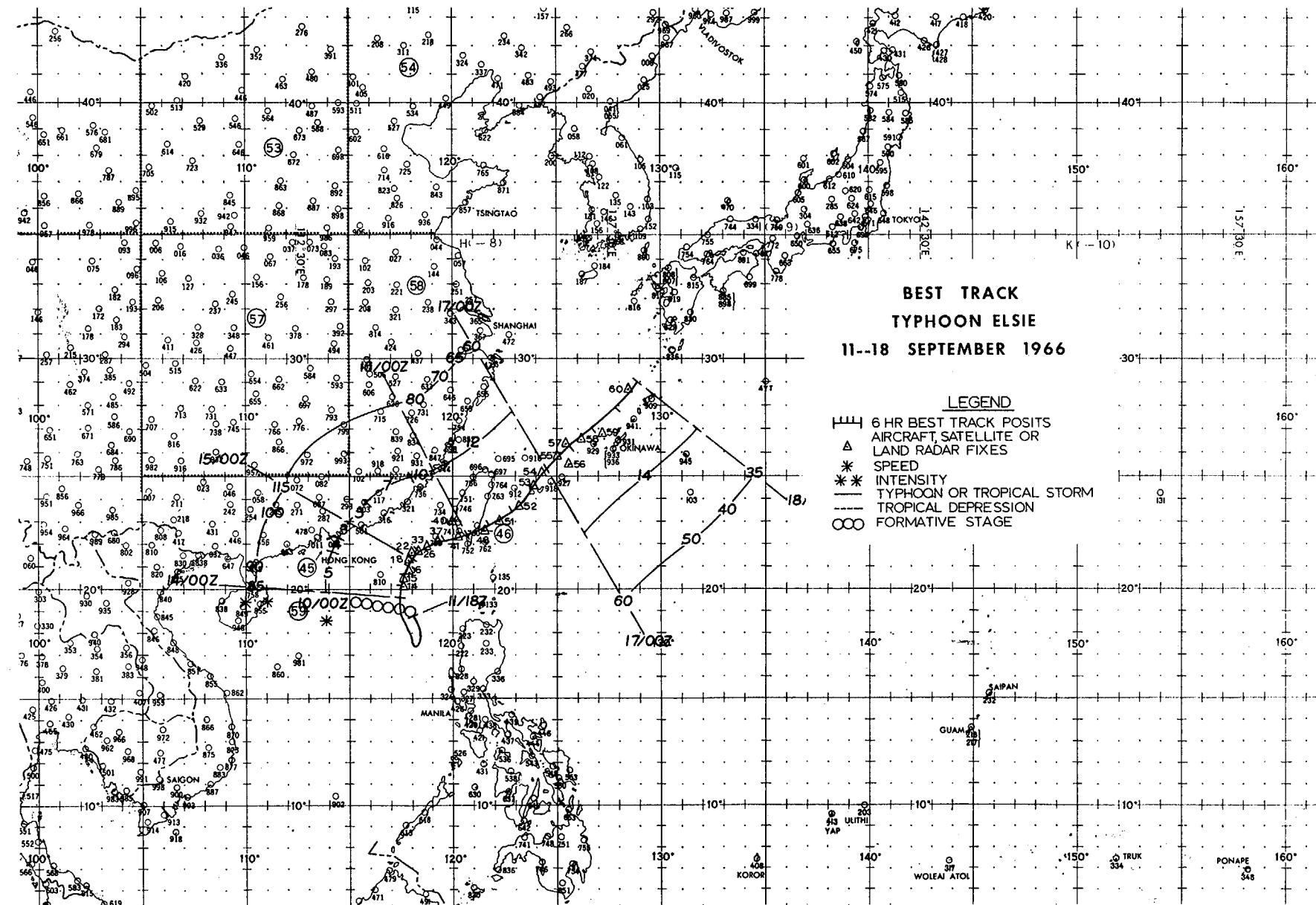
B. INITIAL SURFACE VORTEX

1. JUNCTION VORTEX AT 100000Z
2. SURFACE PRESSURE LESS THAN 1006MB

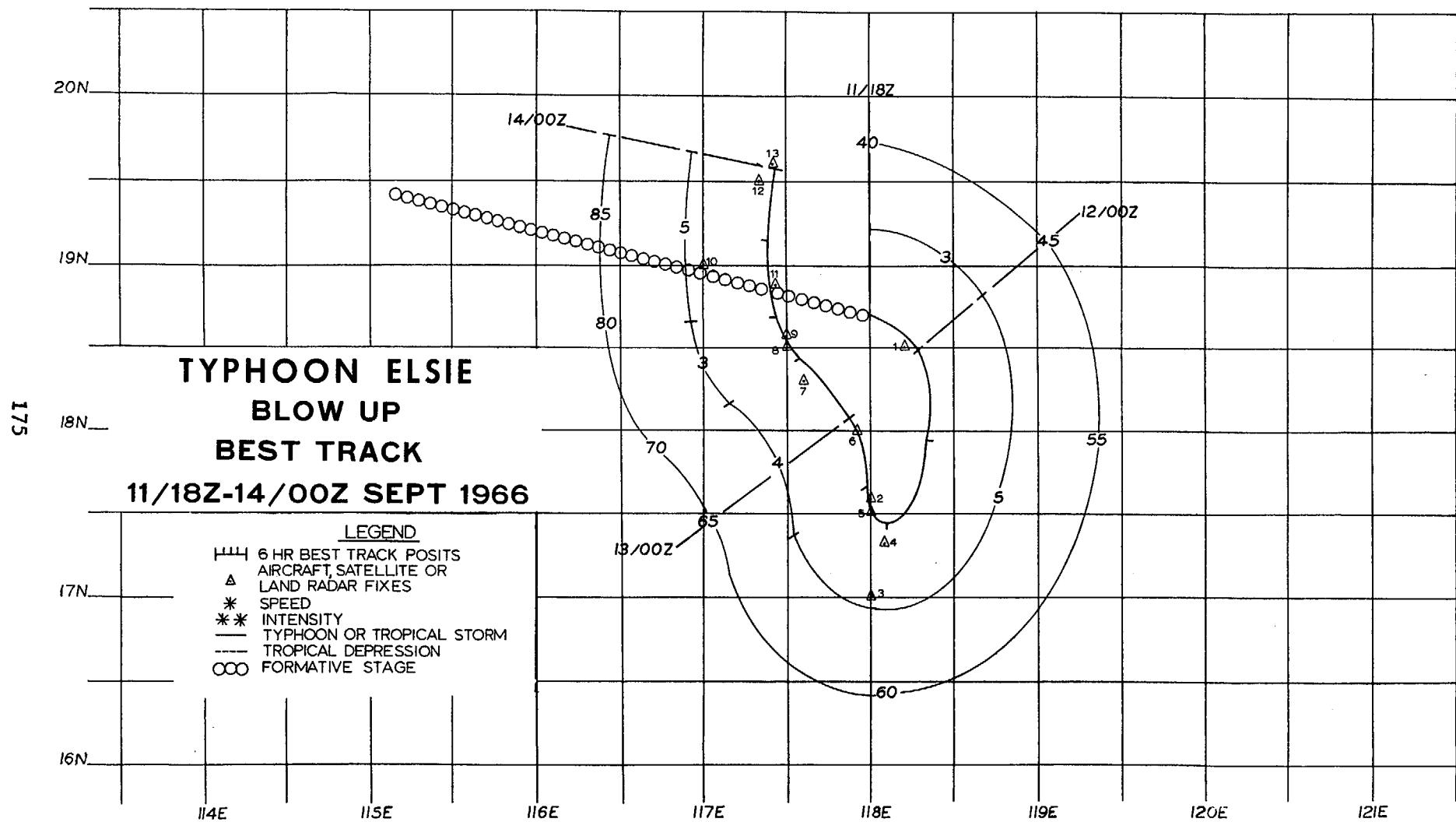
C. 200MB FLOW ABOVE SURFACE VORTEX

1. INITIAL - SOUTHEAST
2. UPON REACHING TYPHOON INTENSITY - EAST

III. FINAL DISPOSITION - BECAME EXTRATROPICAL



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FIX NO.	TIME	PUSIT	EYE FIXES CYCLONE			23		OBS SFC	OBS MIN	MIN 700MB	FLT LVL	TT/TD	EYE FORM	ORIEN- TATION	EYE DIA	WALL CLOUD	THKNS
			UNIT- METHOD -ACCY	FLT LVL	LVL WND	WND	SLP										
1	120000Z	18.5N 118.2E	VW-R-P--			---	045	---	---	---	--/--	ELIP	NW-SE	38X23	F.B.		
2	121029Z	17.6N 118.0E	54-P-P05	700MB	070	060	978	2920	19/--	CIRC	----	30	--				
3	121606Z	17.0N 118.0E	TIROS	STG C.	DIA --	BNDs -											
4	121650Z	17.3N 118.1E	VW-UNK--		---	---	---	---	---	--/--	----						--
5	121710Z	17.5N 118.0E	VW-R-P05	700MB	030	---	---	---	---	--/--	CIRC	----	20	10			
6	122105Z	18.0N 117.9E	VW-R-P05	700MB	025	---	---	---	---	--/--	CIRC	----	35	--			
7	130300Z	18.3N 117.6E	54-P-P03	700MB	065	070	979	2927	12/--	CIRC	----	40	--				
8	130534Z	18.5N 117.5E	TIROS	STG X	DIA 04	BNDs 3											
9	130800Z	18.6N 117.5E	54-P-P03	700MB	060	080	979	2917	17/--	CIRC	----	40	--				
10	131357Z	19.0N 117.0E	TIROS	STG X	DIA 05	BNDs -											
11	131515Z	18.8N 117.4E	VW-R-P03	700MB	056	---	---	---	---	--/--	CIRC	----	20	08			
12	132150Z	19.5N 117.3E	VW-UNK02		---	---	---	---	---	--/--	----						--
13	132228Z	19.6N 117.4E	VW-P-P02	1380M	045	045	973	---	--/--	CIRC	----	25	F.B.				
14	140325Z	20.1N 117.6E	54-P-P03	700MB	055	080	969	2841	19/--	CIRC	----	30	10				
15	140821Z	20.4N 117.6E	54-P-P03	700MB	080	085	966	2807	17/--	CIRC	----	30	08				
16	141455Z	20.7N 117.9E	VW-R-P02	1700M	045	---	---	---	---	--/--	CIRC	----	25	05			
17	141600Z	20.9N 117.6E	VW-UNK02	1700M	---	---	---	---	---	--/--	----						--
18	142135Z	21.3N 117.7E	VW-R-P02	1400M	085	---	---	---	---	--/--	CIRC	----	17	08			
19	142300Z	21.4N 117.7E	LND RDR		---	---	---	---	---	--/--	----						--
20	150200Z	21.5N 117.8E	LND RDR		---	---	---	---	---	--/--	----						--
21	150300Z	21.5N 117.9E	LND RDR		---	---	---	---	---	--/--	----						--
22	150300Z	21.6N 118.0E	LND RDR		---	---	---	---	---	--/--	----						--
23	150330Z	21.4N 117.8E	54-P-P03	700MB	100	050	943	2603	22/--	CIRC	----	17	05				
24	150400Z	21.5N 118.0E	LND RDR		---	---	---	---	---	--/--	----						--

179

FIX NO.	TIME	POSIT	EYE FIXES CYCLONE				23		MIN 700MB HGT	FLT LVL TT/TD	EYE FORM	ORIEN- TATION	EYE DIA	THKNS WALL CLOUD
			UNIT- METHOD	FLT		OBS	OBS							
				-ACCY	FLT LVL	LVL WND	SFC WND	MIN SLP						
25	150500Z	21.6N 118.2E	LND RDR	---	---	---	---	---	---	---	---	---	---	--
26	150600Z	21.7N 118.3E	LND RDR	---	---	---	---	---	---	---	---	---	---	--
27	150700Z	21.7N 118.5E	LND RDR	---	---	---	---	---	---	---	CIRC	---	18	--
28	150800Z	21.8N 118.4E	LND RDR	---	---	---	---	---	---	---	CIRC	---	18	--
29	150815Z	21.7N 118.4E	54-P-P03	700MB	100	110	943	2594	20/-	CIRC	---	20	05	
30	150900Z	21.8N 118.6E	LND RDR	---	---	---	---	---	---	---	CIRC	---	19	--
31	151000Z	21.8N 118.7E	LND RDR	---	---	---	---	---	---	---	---	---	---	--
32	151020Z	21.8N 118.7E	ACFT RDR	---	---	---	---	---	---	---	---	---	---	--
33	151100Z	21.9N 118.8E	LND RDR	---	---	---	---	---	---	---	---	---	---	--
34	151200Z	21.9N 119.0E	LND RDR	---	---	---	---	---	---	---	---	---	---	--
35	151300Z	22.0N 119.1E	LND RDR	---	---	---	---	---	---	---	---	---	---	--
36	151400Z	22.0N 119.2E	LND RDR	---	---	---	---	---	---	---	---	---	---	--
37	151500Z	22.1N 119.3E	LND RDR	---	---	---	---	---	---	---	---	---	---	--
38	151500Z	22.0N 118.5E	VW-R-P05	1460M	035	---	---	---	---	---	CIRC	---	15	05
39	151600Z	22.1N 119.4E	LND RDR	---	---	---	---	---	---	---	---	---	---	--
40	151611Z	23.0N 120.0E	TIROS	STG X	DIA 04	BNDS -								
41	151700Z	22.2N 122.2E	LND RDR	---	---	---	---	---	---	---	---	---	---	--
42	151800Z	19.4N 119.5E	LND RDR	---	---	---	---	---	---	---	---	---	---	--
43	151900Z	22.2N 119.5E	LND RDR	---	---	---	---	---	---	---	---	---	---	--
44	152000Z	22.3N 119.6E	LND RDR	---	---	---	---	---	---	---	---	---	---	--
45	152200Z	22.0N 120.0E	LND RDR	---	---	---	---	---	---	---	---	---	---	--
46	152205Z	22.2N 119.7E	VW-R-P02	700MB	080	065	---	---	13/11	CIRC	---	13	05	
47	152300Z	22.0N 120.1E	LND RDR	---	---	---	---	---	---	---	---	---	---	--
48	160330Z	22.7N 120.1E	54-R-P05	5180M	060	060	---	---	---	---	CIRC	---	20	--

FIX NO.	TIME	POSIT	EYE FIXES CYCLONE			23			MIN 700MB	FLT LVL TT/TD	EYE FORM	ORIEN- TATION	EYE DIA	THKNS WALL CLOUD
			UNIT- METHOD	FLT	OBS	OBS	MIN							
			-ACCY	FLT LVL	LVL WND	SFC WND	SLP							
49	160442Z	22.6N 121.5E	54-P-P03	700MB	040	065	---	2923	19/-	CIRC	----	15	F.B.	
50	160528Z	22.5N 120.5E	TIRUS	STG X	DIA 02	BNDs 1								
51	160820Z	23.0N 122.1E	54-P-P03	700MB	060	070	979	2920	19/-	CIRC	----	20	10	
52	161508Z	23.6N 123.1E	VW-P-P03	3240M	---	---	---	---	--/-	CIRC	----	28	F.B.	
53	162145Z	24.7N 123.9E	VW-P-P02	700MB	---	045	983	---	--/-	CIRC	----	15	F.B.	
54	162230Z	25.2N 124.2E	LND RDR		---	---	---	---	--/-	----			--	
55	170320Z	25.9N 125.0E	54-P-P05	700MB	035	060	990	3030	17/-	----			--	
56	170455Z	25.5N 125.5E	TIROS	STG C	DIA --	BNDs -								
57	170610Z	26.4N 125.4E	54-P-P05	700MB	040	075	989	---	--/-	----			F.B.	
58	170855Z	26.6N 126.1E	54-P-F03	700MB	---	075	990	---	--/-	----			F.B.	
59	171440Z	26.8N 127.1E	VW-P-F10	0520M	065	055	995	---	--/-	----			F.B.	
60	172209Z	28.6N 128.4E	54-P-P03	0460M	035	035	998	---	--/-	CIRC	----	06	N,F.B.	

TROPICAL CYCLONE 23 - 09/11/1800Z TO 09/18/0000Z

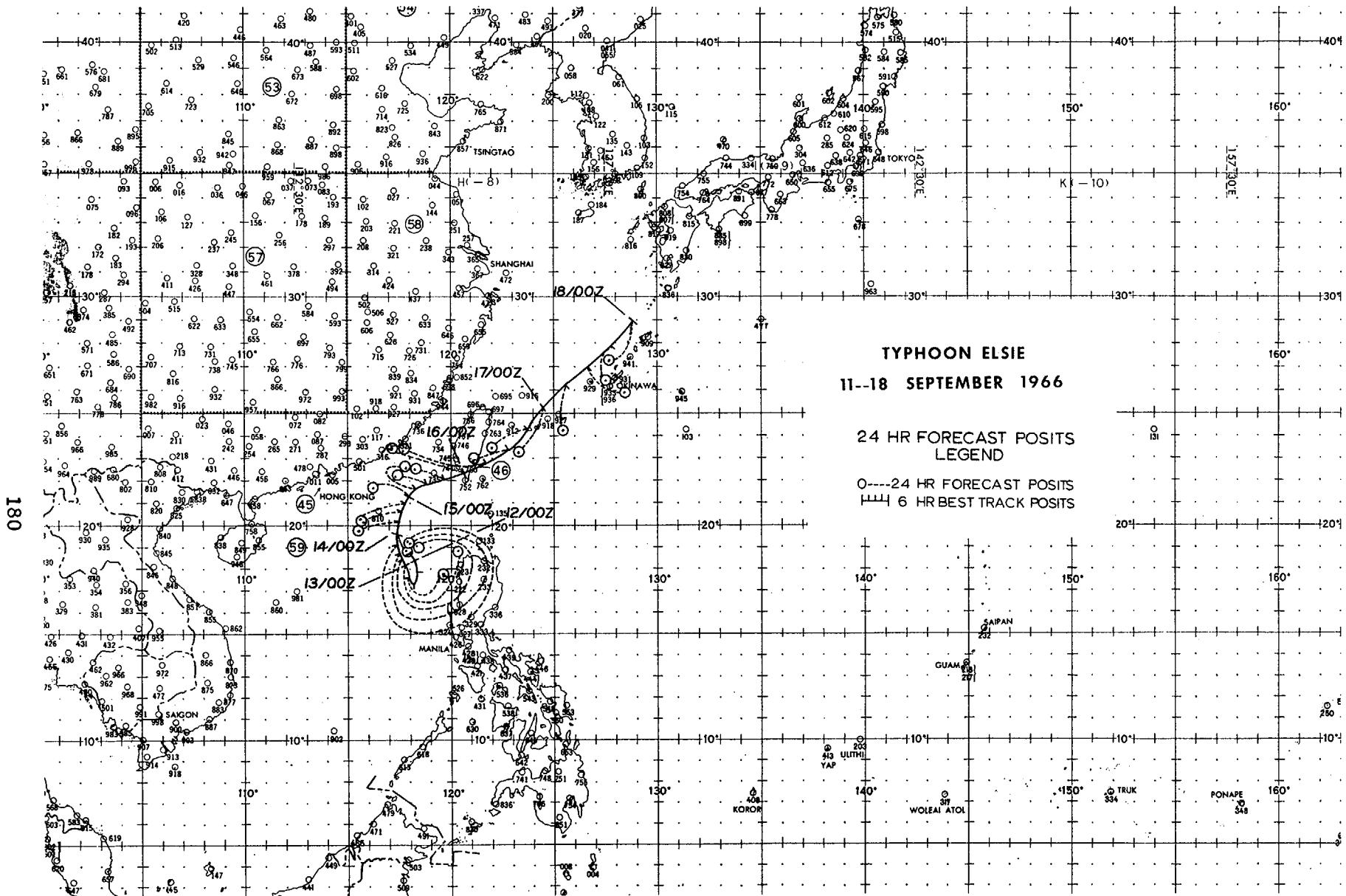
POSITION AND FORECAST VERIFICATION DATA

DTG	STORM LAT.	POSITION LONG.	24 HR. ERROR DEG. DIST.	48 HR. ERROR DEG. DIST.	72 HR. ERROR DEG. DIST.
111800Z	18.7N	118.0E	-----	-----	-----
120000Z	18.5N	118.3E	-----	-----	-----
120600Z	17.9N	118.3E	-----	-----	-----
121200Z	17.4N	118.1E	-----	-----	-----
121800Z	17.7N	118.0E	087-0090	-----	-----
130000Z	18.1N	117.8E	071-0144	-----	-----
130600Z	18.4N	117.6E	036-0048	-----	-----
131200Z	18.7N	117.4E	046-0042	-----	-----
131800Z	19.2N	117.4E	076-0024	-----	-----
140000Z	19.6N	117.4E	159-0048	-----	-----
140600Z	20.2N	117.5E	258-0108	238-0054	-----
141200Z	20.6N	117.6E	253-0096	237-0060	-----
141800Z	21.0N	117.7E	248-0120	245-0126	-----
150000Z	21.3N	117.8E	285-0084	230-0114	-----
150600Z	21.6N	118.2E	348-0060	256-0282	237-0204
151200Z	21.9N	118.8E	287-0078	261-0294	-----
151800Z	22.1N	119.6E	288-0072	263-0342	252-0426
160000Z	22.3N	120.6E	291-0198	282-0390	-----
160600Z	22.7N	121.8E	264-0222	315-0264	263-0606
161200Z	23.4N	122.9E	253-0096	274-0330	-----
161800Z	24.3N	123.7E	242-0102	265-0342	260-0702
170000Z	25.3N	124.4E	206-0138	-----	-----
170600Z	26.3N	125.4E	180-0120	253-0462	-----
171200Z	27.0N	126.7E	128-0102	212-0216	-----
171800Z	27.9N	127.9E	192-0090	203-0156	-----
180000Z	29.0N	128.9E	211-0114	184-0180	-----

AVERAGE 24 HOUR ERROR - 0099 MI.

AVERAGE 48 HOUR ERROR - 0240 MI.

AVERAGE 72 HOUR ERROR - 0484 MI.



TROPICAL CYCLONE 24 - 09/12/0600Z TO 09/18/0000Z

I. DATA

A. STATISTICS

1. NUMBER OF WARNINGS ISSUED - 21
2. NUMBER OF WARNINGS WITH TYPHOON INTENSITY - 04
3. TOTAL DISTANCE TRAVELED DURING TROPICAL WARNING PERIOD - 1122 MI

B. CHARACTERISTICS AS A TYPHOON

1. MINIMUM OBSERVED SLP - 963MB AT 162107Z
2. MINIMUM OBSERVED 700MB HEIGHT - 2765M. AT 162107Z
3. MAXIMUM SURFACE WIND - 075 KTS (FROM BEST TRACK)
4. MAXIMUM RADIUS OF SURFACE CIRCULATION - 350 MI

II. DEVELOPMENT

A. INITIAL IMPETUS - LOW LEVEL SURGE INTO CYCLONIC CIRCULATION FROM THE SOUTH WITH SUBSEQUENT DIVERGENCE AT 200MB LEVEL

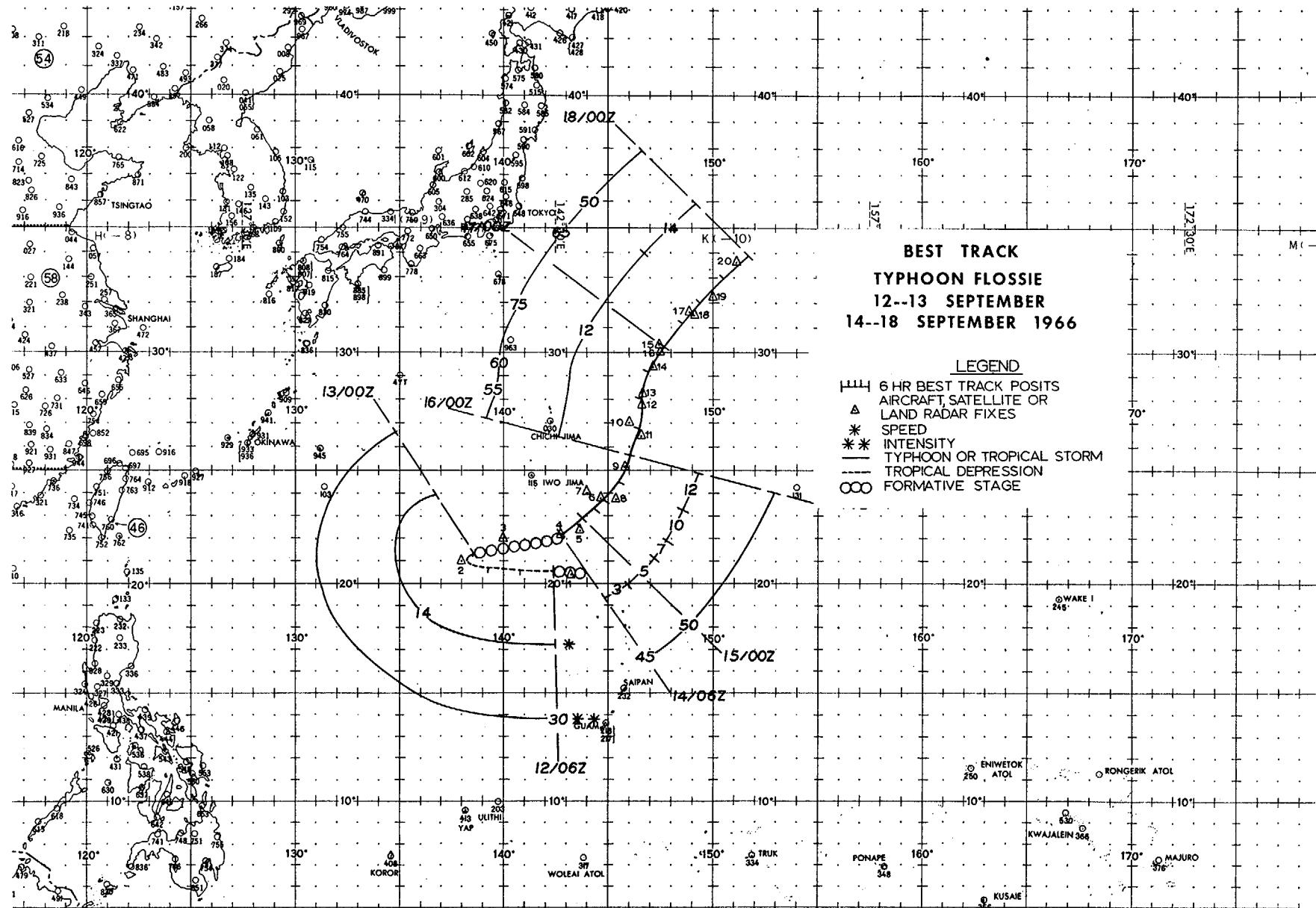
B. INITIAL SURFACE VORTEX

1. JUNCTION VORTEX AT 120000Z
2. SURFACE PRESSURE LESS THAN 1004MB

C. 200MB FLOW ABOVE SURFACE VORTEX

1. INITIAL - NORTHEAST
2. UPON REACHING TYPHOON INTENSITY - ANTYCLONIC

III. FINAL DISPOSITION - BECAME EXTRATROPICAL

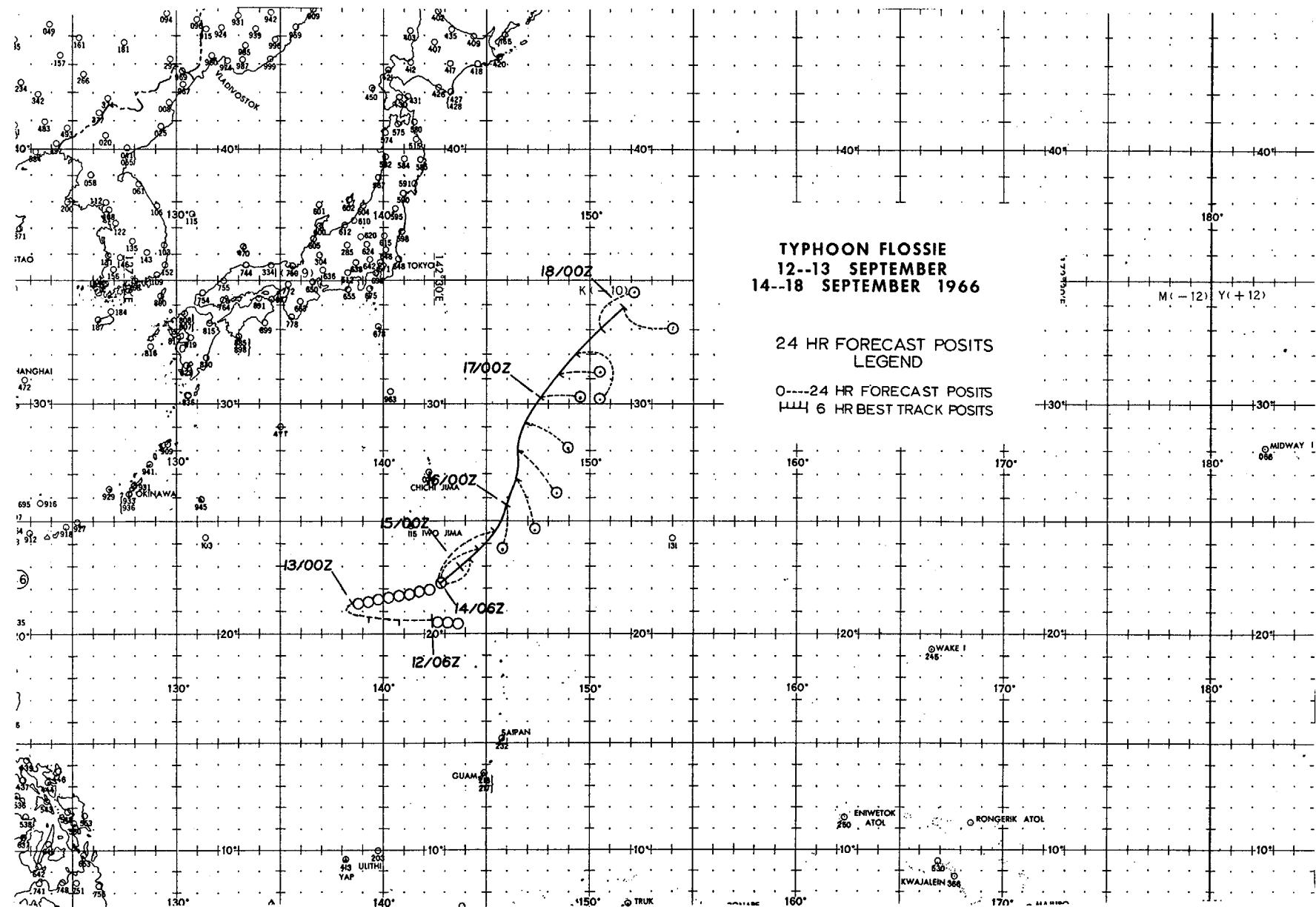


FIX NO.	TIME	PUSIT	EYE FIXES CYCLONE			24			FLT LVL	OBS SFC	OBS MIN	MIN 700MB	HGT	TT/TD	EYE FORM	ORIEN- TATION	EYE DIA	THKNS WALL CLOUD
			UNIT- METHOD	FLT	LVL	SLP	WIND											
			-ACCY	LVL	WND	WIND												
1	120240Z	20.4N 143.2E	VW-P-P05	0260M	---	040	999	---	---	---	---	---	---	---	CIRC	----	05	N.F.B.
2	122230Z	21.0N 138.0E	54-UNK--		---	---	---	---	---	---	---	---	---	---	---	---	---	N.F.B.
3	130353Z	22.0N 140.0E	TIROS	STG B	DIA	--	BNDS	-										
4	140500Z	22.2N 142.8E	54-P-P03	0310M	050	045	988	---	---	---	---	---	---	---	CIRC	----	10	F.B.
5	142250Z	22.4N 143.6E	54-P-P03	700MB	---	045	995	3075	17/-	CIRC	----	30	N.F.B.					
6	151200Z	23.7N 144.7E	VW-P-P10	700MB	035	---	---	---	---	---	---	---	---	---	CIRC	----	20	05
7	151421Z	24.0N 144.0E	TIROS	STG X	DIA	--	BNDS	-										
8	151630Z	23.8N 145.3E	VW-R-P10		---	---	---	---	---	---	---	---	---	---	CIRC	----	50	10
9	152056Z	25.2N 145.7E	54-P-P05	700MB	075	050	975	2883	16/10	CIRC	----	20	05					
10	160350Z	27.0N 146.0E	TIROS	STG X	DIA	02	BNDS	3										
11	160850Z	26.5N 146.5E	VW-R-F05	0300M	055	035	---	---	---	---	---	---	---	---	CIRC	----	15	F.B.
12	161122Z	27.8N 146.5E	VW-UNK--	700MB	055	---	---	---	---	---	---	---	---	---	---	---	---	--
13	161330Z	28.3N 146.6E	VW-R-P03	700MB	060	---	---	---	---	---	---	---	---	---	ELIP	N-S	20X10	10
14	162107Z	29.4N 147.1E	54-P-P05	700MB	075	075	963	2765	21/-	CIRC	----	20	08					
15	170228Z	30.4N 147.4E	54-P-P05	700MB	055	075	---	2882	18/-	CIRC	----	20	--					
16	170315Z	30.0N 147.5E	TIROS	STG X	DIA	03	BNDS	3										
17	170929Z	31.7N 148.9E	VW-P-P02	0470M	060	045	987	---	---	---	---	---	---	---	---	---	---	F.B.
18	171200Z	31.5N 149.1E	VW-UNK--	2420M	---	---	---	---	---	---	---	---	---	---	---	---	---	--
19	171400Z	32.2N 150.0E	VW-R-F10	700MB	045	---	005	---	---	---	---	---	---	---	---	---	---	F.B.
20	172125Z	33.6N 151.1E	54-P-P05	700MB	040	050	---	3021	15/-	CIRC	----	30	F.B.					

TROPICAL CYCLONE 24 - 09/12/0600Z TO 09/18/0000Z
 POSITION AND FORECAST VERIFICATION DATA

DTG	STORM LAI.	POSITION LONG.	24 HR. ERROR DEG. DIST.	48 HR. ERROR DEG. DIST.	72 HR. ERROR DEG. DIST.
140600Z	22.2N	142.9E	168-0060	-----	-----
141200Z	22.4N	143.2E	180-0060	-----	-----
141800Z	22.6N	143.4E	245-0174	-----	-----
150000Z	22.8N	143.9E	248-0252	-----	-----
150600Z	23.2N	144.3E	233-0096	-----	-----
151200Z	23.7N	144.8E	231-0138	-----	-----
151800Z	24.5N	145.4E	226-0192	-----	-----
160000Z	25.7N	146.0E	180-0114	-----	-----
160600Z	26.8N	146.3E	160-0138	227-0252	-----
161200Z	28.0N	146.6E	141-0144	219-0312	-----
161800Z	29.1N	146.9E	107-0216	214-0372	-----
170000Z	30.2N	147.5E	090-0102	167-0252	-----
170600Z	31.2N	148.3E	090-0102	144-0276	219-0432
171200Z	32.0N	149.2E	149-0126	123-0234	-----
171800Z	33.0N	150.4E	044-0120	083-0186	220-0582
180000Z	33.9N	151.7E	115-0126	044-0270	-----

AVERAGE 24 HOUR ERROR - 0135 MI.
 AVERAGE 48 HOUR ERROR - 0269 MI.
 AVERAGE 72 HOUR ERROR - 0507 MI.



TROPICAL CYCLONE 27 - 09/22/0000Z TO 09/25/0600Z

I. DATA

A. STATISTICS

1. NUMBER OF WARNINGS ISSUED - 14
2. NUMBER OF WARNINGS WITH TYPHOON INTENSITY - 08
3. TOTAL DISTANCE TRAVELED DURING TROPICAL WARNING PERIOD - 2112 MI

B. CHARACTERISTICS AS A TYPHOON

1. MINIMUM OBSERVED SLP - 961MB^S AT 240207Z
2. MINIMUM OBSERVED 700MB HEIGHT - 2752M. AT 240207Z
3. MAXIMUM SURFACE WIND - 100 KTS (FROM BEST TRACK)
4. MAXIMUM RADIUS OF SURFACE CIRCULATION - 225 MI

II. DEVELOPMENT

A. INITIAL IMPETUS - LOW LEVEL SURGE INTO CYCLONIC CIRCULATION FROM THE SOUTH WITH SUBSEQUENT DIVERGENCE AT 200MB LEVEL

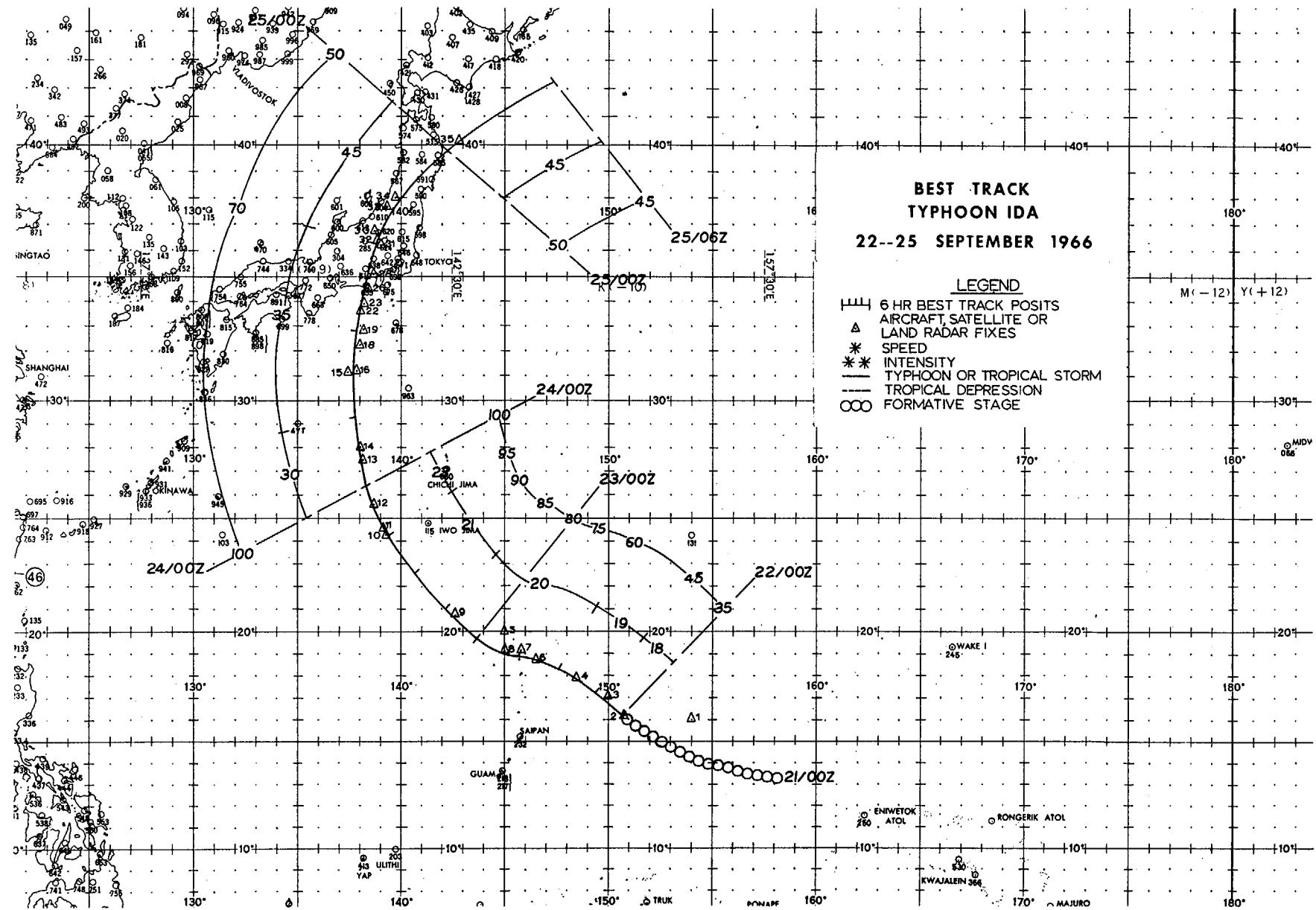
B. INITIAL SURFACE VORTEX

1. JUNCTION VORTEX AT 210000Z
2. SURFACE PRESSURE LESS THAN 1004MB

C. 200MB FLOW ABOVE SURFACE VORTEX

1. INITIAL - NORTHEAST
2. UPON REACHING TYPHOON INTENSITY - NOPTHEAST

III. FINAL DISPOSITION - BECAME EXTRATROPICAL



FIX NO.	TIME	PUSIT	EYE FIXES CYCLONE			27		OBS SFC	OBS MIN	MIN 700MB	FLT LVL	TT/TD	EYE FORM	ORIEN- TATION	EYE DIA	THKNS WALL CLOUD
			UNIT- METHOD -ACCY	FLT LVL	LVL WND	WND	SLP									
1	211250Z	16.0N 154.0E	TIROS	STG X	DIA 05	BNDS 2										
2	212355Z	16.1N 150.8E	54-P-POS	0470M	040	035	992		---	--/--						N.F.B.
3	220334Z	17.0N 150.0E	TIROS	STG -	DIA --	BNDS -										
4	220923Z	17.9N 148.4E	VW-R-P03		---	---	---		---	--/--	CIRC	---		30		--
5	221404Z	19.5N 145.5E	TIROS	STG X	DIA 05	BNDS 2										
6	221430Z	18.7N 146.5E	VW-P-POS	700MB	050	---	982	2941	14/06	CIRC	---		36		07	
7	221600Z	19.2N 145.8E	VW-UNK--		---	---	---		---	--/--						--
8	222000Z	19.1N 145.0E	54-P-P10	700MB	075	---	976	2896	16/-	ELIP	NE-SW	45X35		35		
9	230330Z	20.6N 142.6E	54-P-F04	700MB	060	050	974	2897	15/-	CIRC	---		--		--	
10	231734Z	24.3N 139.3E	VW-UNK15		---	---	---		---	--/--						--
11	231815Z	24.5N 139.2E	VW-R-P05	700MB	---	---	---		---	--/--	CIRC	---		25		--
12	232120Z	25.5N 138.7E	54-P-P03	700MB	074	065	965	2792	15/-	CIRC	---		30		10	
13	240207Z	27.5N 138.1E	54-P-P03	700MB	100	080	961	2752	17/-	CIRC	---		50		--	
14	240409Z	28.0N 138.0E	TIROS	STG X	DIA 04	BNDS 3										
15	240845Z	31.1N 137.4E	VW-UNK12		---	---	---		---	--/--						--
16	240900Z	31.2N 137.9E	LND RDR		---	---	---		---	--/--						--
17	240917Z	31.2N 137.6E	VW-R-P03	700MB	080	045	---		15/07	CIRC	---		40		10	
18	241100Z	32.3N 138.0E	LND RDR		---	---	---		---	--/--						--
19	241200Z	32.9N 138.1E	LND RDR		---	---	---		---	--/--						--
20	241200Z	32.9N 138.0E	LND RDR		---	---	---		---	--/--						--
21	241300Z	33.0N 138.1E	LND RDR		---	---	---		---	--/--						--
22	241305Z	33.6N 138.0E	VW-UNK05	700MB	---	---	---		---	--/--	CIRC	---		55		--
23	241400Z	33.9N 138.1E	LND RDR		---	---	---		---	--/--						--
24	241400Z	34.0N 138.2E	LND RDR		---	---	---		---	--/--						--

68T

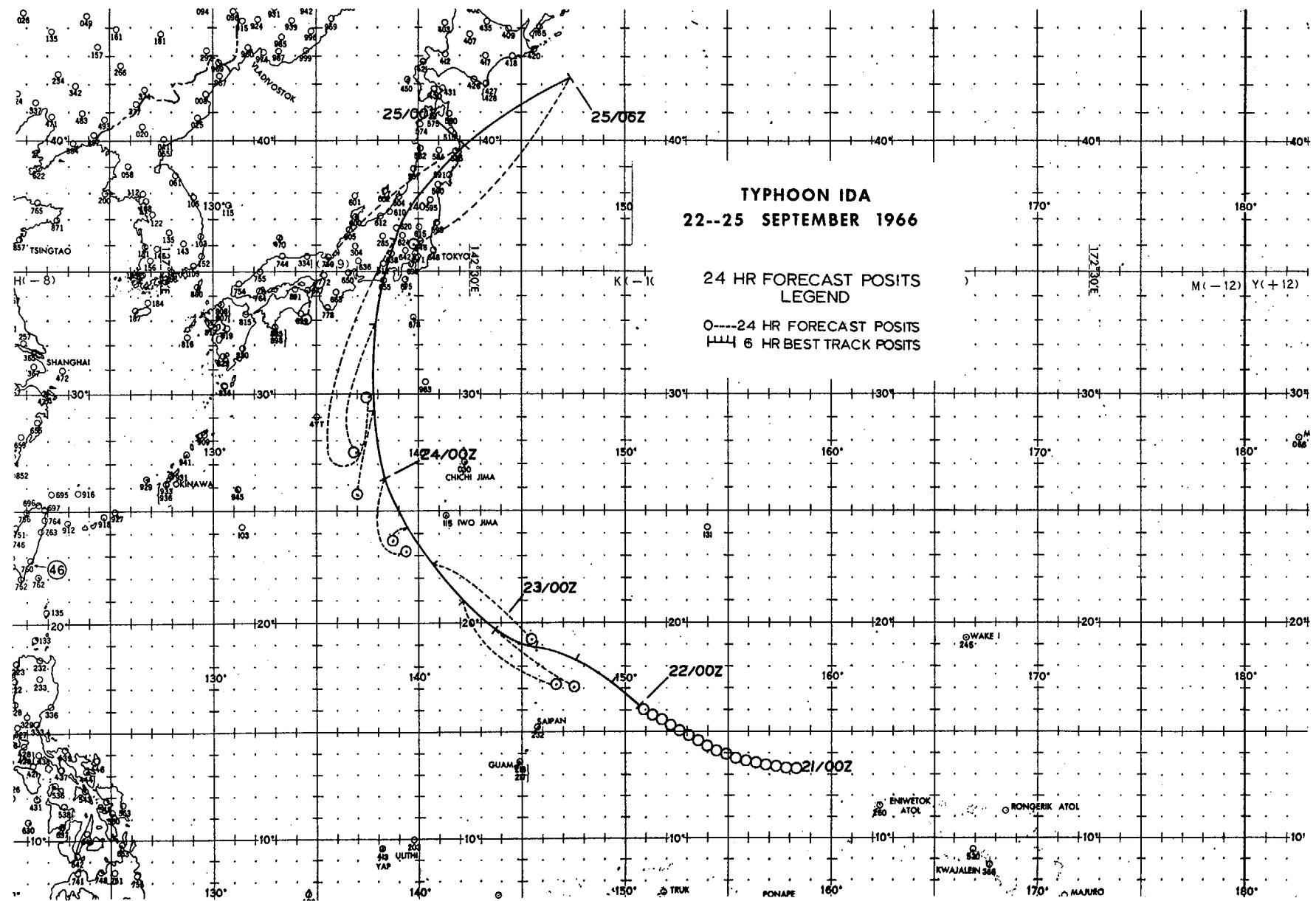
FIX NO.	TIME	POSIT	EYE FIXES CYCLONE			27	OBS	OBS	MIN	FLT	LVL	EYE	ORIEN-	EYE	THKNS
			UNIT- METHOD	LVL	WND		SFC	MIN	700MB	IT/TD	FORM				
-ACCY			WND				WND	SLP	HGT						CLOUD
25	241405Z	34.0N 138.0E	VW-R-POS	---	---	---	---	---	---	---	CIRC	---	45	10	
26	241500Z	34.6N 138.4E	LND RDR	---	---	---	---	---	---	---	---	---	---	--	
27	241500Z	34.5N 138.3E	LND RDR	---	---	---	---	---	---	---	---	---	---	--	
28	241600Z	35.1N 138.6E	LND RDR	---	---	---	---	---	---	---	---	---	---	--	
29	241600Z	35.0N 138.5E	LND RDR	---	---	---	---	---	---	---	---	---	---	--	
30	241700Z	36.7N 138.7E	LND RDR	---	---	---	---	---	---	---	---	---	---	--	
31	241730Z	36.2N 139.0E	LND RDR	---	---	---	---	---	---	---	---	---	---	--	
32	241800Z	36.4N 138.9E	LND RDR	---	---	---	---	---	---	---	---	---	---	--	
33	241930Z	37.7N 139.3E	LND RDR	---	---	---	---	---	---	---	---	---	---	--	
34	242030Z	38.0N 139.8E	LND RDR	---	---	---	---	---	---	---	---	---	---	--	
35	250025Z	40.2N 142.8E	54-P-LOO	700MB	100	---	006	3073	08/--	CIRC	---	03	---	--	

TROPICAL CYCLONE 27 - 09/22/0000Z TU 09/25/0600Z
 POSITION AND FORECAST VERIFICATION DATA

DTG	STORM	POSITION		24 HR. ERROR	48 HR. ERROR	72 HR. ERROR
		LAT.	LONG.	DEG. DIST.	DEG. DIST.	DEG. DIST.
220000Z	16.2N	150.7E	-----	-----	-----	-----
220600Z	17.3N	149.4E	-----	-----	-----	-----
221200Z	18.3N	147.6E	-----	-----	-----	-----
221800Z	18.9N	145.6E	-----	-----	-----	-----
230000Z	19.7N	143.7E	127-0264	-----	-----	-----
230600Z	21.0N	142.1E	132-0330	-----	-----	-----
231200Z	22.5N	140.5E	126-0330	-----	-----	-----
231800Z	24.3N	139.3E	216-0048	-----	-----	-----
240000Z	26.5N	138.3E	166-0204	-----	-----	-----
240600Z	29.4N	137.8E	190-0222	-----	-----	-----
241200Z	32.9N	137.9E	189-0324	-----	-----	-----
241800Z	36.3N	138.8E	189-0384	195-0492	-----	-----
250000Z	39.9N	142.3E	222-0552	202-0768	-----	-----
250600Z	42.2N	147.2E	222-0492	217-0714	-----	-----

AVERAGE 24 HOUR ERROR - 0315 MI.
 AVERAGE 48 HOUR ERROR - 0658 MI.
 AVERAGE 72 HOUR ERROR - ---- MI.

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TYPHOON IDA
22--25 SEPTEMBER 1966

TROPICAL CYCLONE 28 - 09/22/0600Z TO 09/29/1200Z

I. DATA

A. STATISTICS

1. NUMBER OF WARNINGS ISSUED - 30
2. NUMBER OF WARNINGS WITH TYPHOON INTENSITY - 08
3. TOTAL DISTANCE TRAVELED DURING TROPICAL WARNING PERIOD - 2898 MI

B. CHARACTERISTICS AS A TYPHOON

1. MINIMUM OBSERVED SLP - 962MB AT 231700Z
2. MINIMUM OBSERVED 700MB HEIGHT - 2905M. AT 270210Z
3. MAXIMUM SURFACE WIND - 095 KTS (FROM BEST TRACK)
4. MAXIMUM RADIUS OF SURFACE CIRCULATION - 475 MI

II. DEVELOPMENT

- A. INITIAL IMPETUS - LOW LEVEL SURGE INTO CYCLONIC CIRCULATION FROM THE SOUTH WITH SUBSEQUENT DIVERGENCE AT 200MB LEVEL

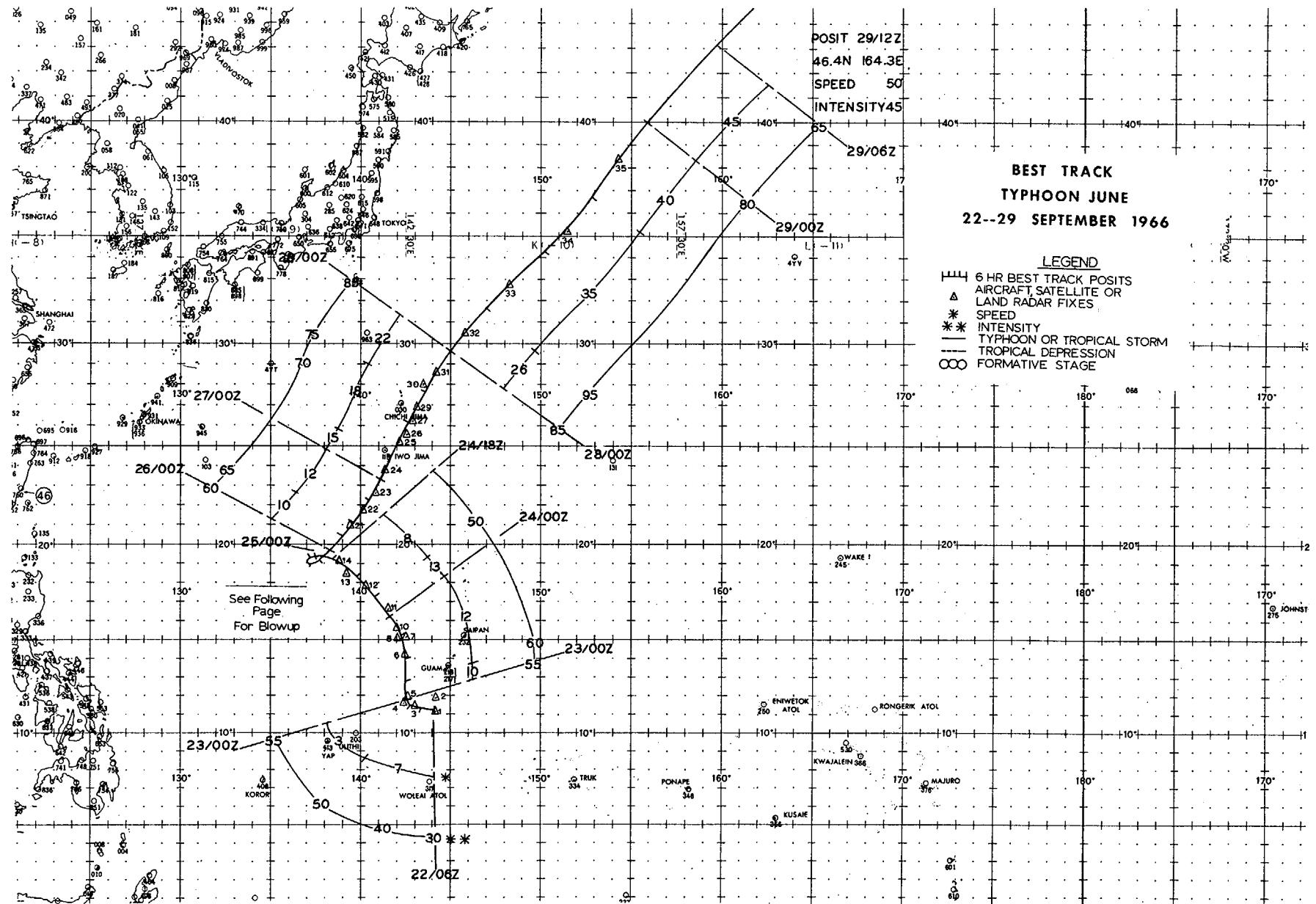
B. INITIAL SURFACE VORTEX

1. JUNCTION VORTEX AT 220000Z
2. SURFACE PRESSURE LESS THAN 1004MB

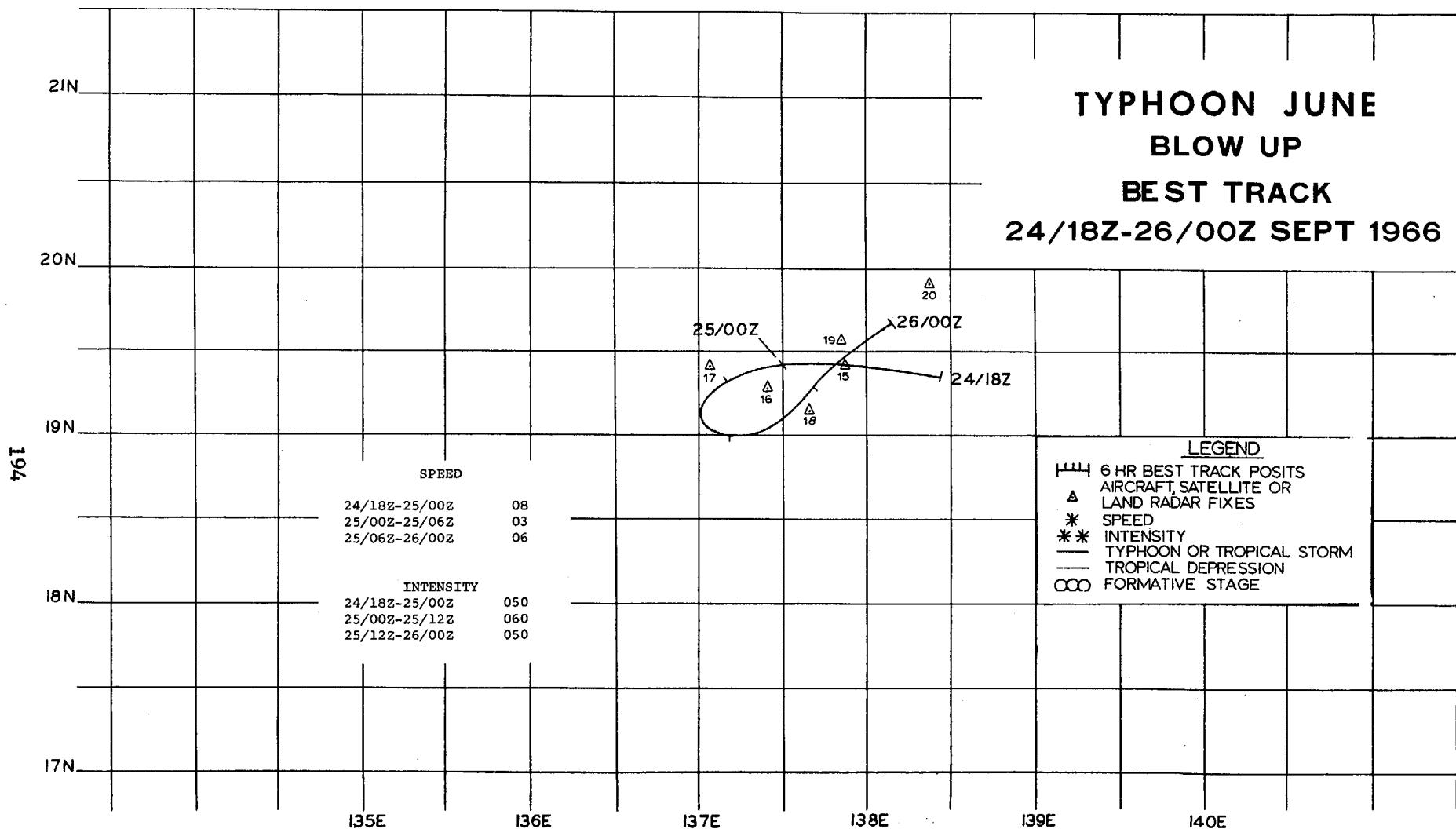
C. 200MB FLOW ABOVE SURFACE VORTEX

1. INITIAL - NORTHEAST
2. UPON REACHING TYPHOON INTENSITY - NORTHEAST

III. FINAL DISPOSITION - BECAME EXTRATROPICAL



16



FIX NO.	TIME	PUSIT	EYE FIXES CYCLONE			28	OBS SFC	OBS MIN SLP	MIN 700MB HGT	FLT LVL TT/TD	EYE FORM	ORIEN- TATION	EYE DIA	THKNS WALL CLOUD
			UNIT- METHOD -ACCY	FLT LVL	LVL WND									
1	220354Z	11.2N 144.3E	54-P-P10	0470M	035	035	998	---	--/--	----	----	----	----	F.B.
2	220734Z	11.9N 144.2E	VW-P-P02	0170M	020	025	996	---	--/--	----	----	----	----	--
3	221525Z	11.5N 143.0E	54-P-P03	0460M	067	---	997	---	--/--	CIRC	----	30	----	--
4	222224Z	11.6N 142.4E	54-P-P10	700MB	070	065	992	3021	15/15	ELIP	NE-SW	30X15	10	
5	230328Z	12.0N 142.6E	54-P-P02	700MB	065	075	988	2987	17/-	CIRC	----	10	F.B.	
6	231300Z	14.2N 142.4E	VW-P-P05	700MB	036	---	---	3032	--/--	CIRC	----	10	----	--
7	231600Z	15.1N 142.5E	VW-UNK--	700MB	---	---	---	---	--/--	----	----	----	----	--
8	231610Z	15.0N 142.0E	ACFT RDR	---	---	---	---	---	--/--	----	----	----	----	--
9	231700Z	15.1N 142.3E	VW-P-P02	700MB	---	---	962	3071	18/06	ELIP	NW-SE	28X18	--	
10	232045Z	15.6N 142.0E	54-P-F03	700MB	050	070	---	3069	13/-	CIRC	----	03	----	--
11	240205Z	16.6N 141.5E	54-P-F05	700MB	040	045	001	3049	13/-	CIRC	----	16	N.F.B.	
12	240905Z	17.9N 140.2E	VW-P-P03	0320M	040	045	992	---	--/--	CIRC	----	15	N.F.B.	
13	241222Z	18.5N 139.2E	VW-UNK--	---	---	---	---	---	--/--	----	----	----	----	--
14	241420Z	19.1N 138.9E	VW-P-P05	0960M	060	050	988	3036	15/-	CIRC	----	12	F.B.	
15	242123Z	19.4N 137.8E	54-P-P03	700MB	---	050	988	---	--/--	----	----	----	F.B.	
16	250201Z	19.3N 137.4E	54-P-P03	0460M	055	060	993	3033	15/-	----	----	----	--	
17	250830Z	19.4N 137.1E	VW-P-P05	0320M	050	055	984	2987	16/07	ELIP	NE-SW	60X40	--	
18	251521Z	19.2N 137.7E	VW-P-P03	700MB	040	---	990	3004	15/03	CIRC	----	19	F.B.	
19	252040Z	19.6N 137.8E	54-P-P03	700MB	040	040	983	2963	17/-	CIRC	----	15	F.B.	
20	260240Z	19.9N 138.4E	54-P-P03	700MB	055	060	983	2951	16/-	CIRC	----	20	F.B.	
21	260924Z	21.0N 139.4E	VW-P-P06	0270M	065	045	981	---	--/--	CIRC	----	15	09	
22	261455Z	21.7N 140.1E	VW-P-P10	700MB	080	---	984	2930	14/08	CIRC	----	20	--	
23	262100Z	22.6N 140.8E	54-P-P03	700MB	050	050	981	2920	15/-	CIRC	----	25	10	
24	270210Z	23.8N 141.3E	54-P-P03	700MB	080	080	985	2905	20/-	CIRC	----	20	10	

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EYE FIXES CYCLONE 28

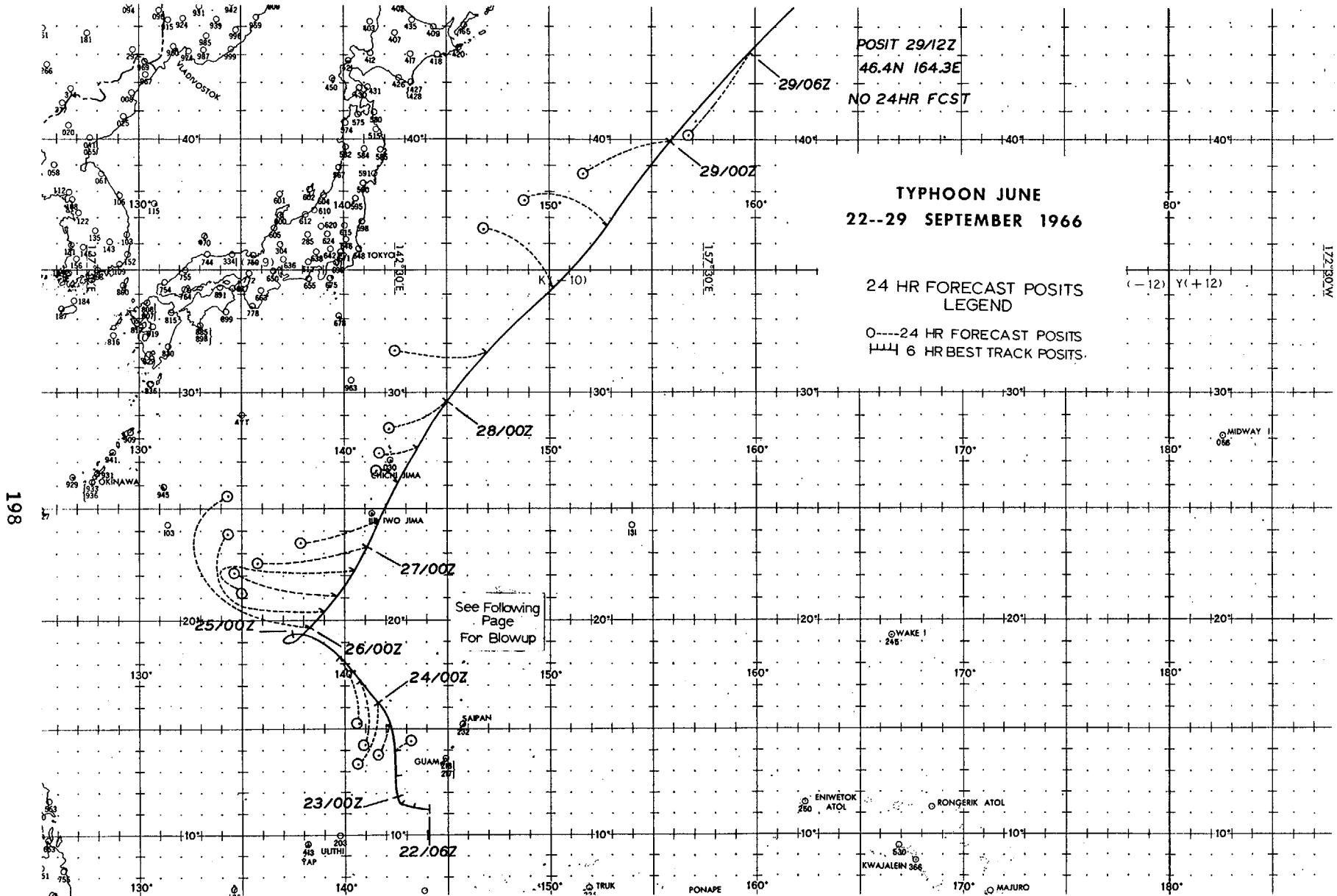
FIX NO.	TIME	POSIT	UNIT- METHOD -ACCY	FLT			OBS	OBS	MIN	FLT	EYE	ORIEN- TATION	EYE DIA	THKNS WALL CLOUD
				FLT	LVL	WND	SFC	MIN	700MB	LVL				

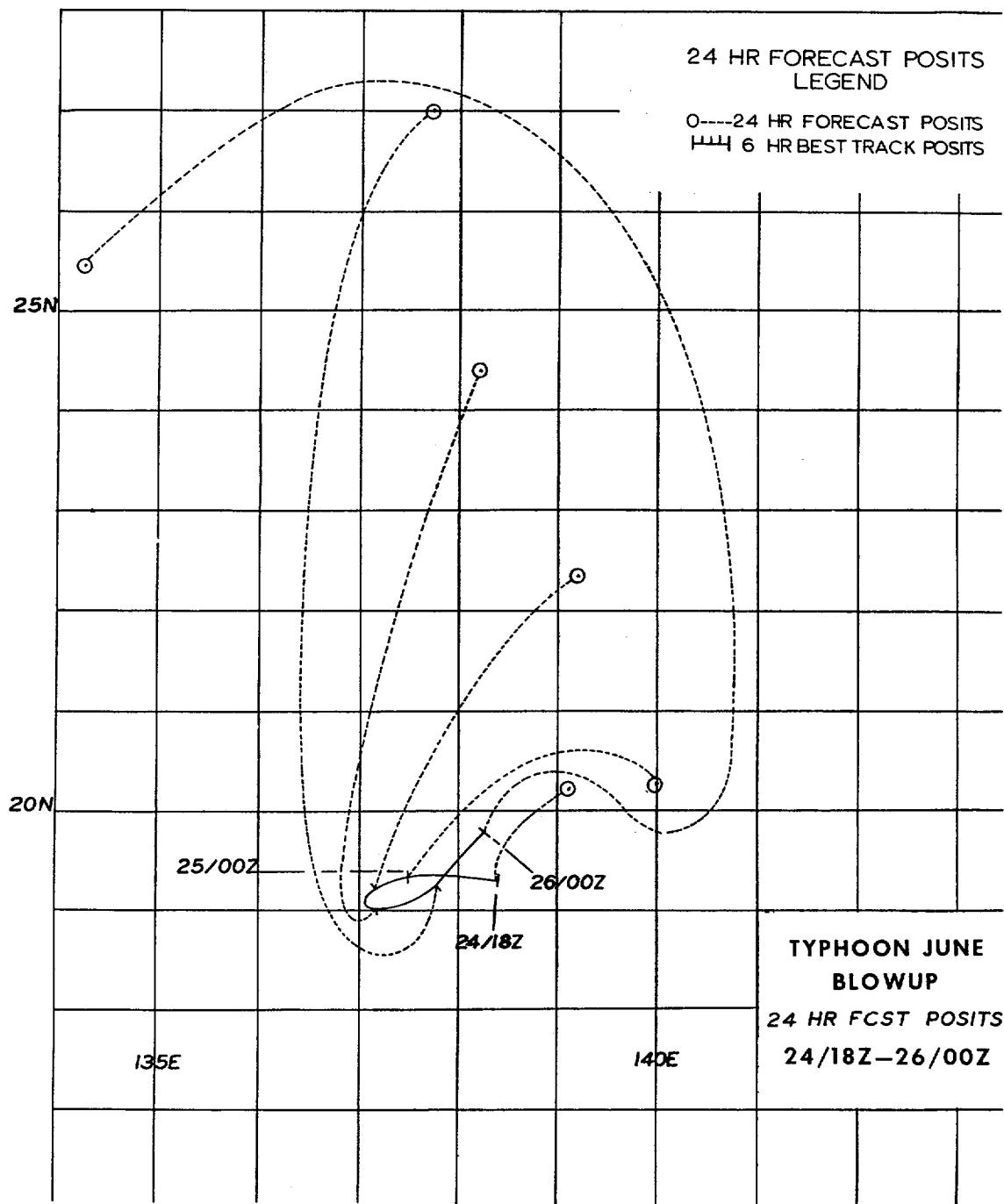
25	270730Z	25.1N 142.1E	VW-UNK15	---	---	---	---	---	---	---	---	---	---	--
26	270831Z	25.4N 142.5E	VW-R-P02	0320M	024	025	---	---	---	---	CIRC	---	25	F.B.
27	271131Z	26.2N 142.9E	VW-UNK--	0460M	---	---	---	---	---	---	---	---	---	--
28	271301Z	26.4N 143.2E	VW-UNK--	0460M	030	---	---	---	---	---	---	---	---	--
29	271435Z	26.8N 143.4E	VW-R-P02	0460M	030	---	---	---	---	---	CIRC	---	40	F.B.
30	271458Z	28.0N 143.5E	TIROS	STG X	DIA 03	BNDS 2								
31	272041Z	28.6N 144.3E	54-P-P03	700MB	065	070	975	2926	18/--	CIRC	---	--	--	F.B.
32	280215Z	30.5N 145.7E	54-P-P03	700MB	070	080	976	2905	14/--	CIRC	---	10	05	
33	280830Z	32.7N 148.2E	VW-R-P05	0240M	111	105	966	---	---	CIRC	---	10	10	
34	281415Z	35.2N 151.4E	VW-R-P10	700MB	050	---	---	---	---	CIRC	---	28	14	
35	282155Z	38.3N 154.3E	54-P-P03	700MB	090	110	977	2923	21/--	CIRC	---	10	--	

TROPICAL CYCLONE 28 - 09/22/0600Z TO 09/29/1200Z
POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION LAT.	POSITION LONG.	24 HR. ERROR DEG. DIST.	48 HR. ERROR DEG. DIST.	72 HR. ERROR DEG. DIST.
221200Z	11.4N	143.4E	-----	-----	-----
221800Z	11.5N	142.7E	-----	-----	-----
230000Z	11.8N	142.6E	-----	-----	-----
230600Z	12.8N	142.5E	133-0138	-----	-----
231200Z	14.0N	142.5E	051-0042	-----	-----
231800Z	15.2N	142.2E	195-0090	-----	-----
240000Z	16.2N	141.6E	198-0174	-----	-----
240600Z	17.3N	140.8E	176-0186	-----	-----
241200Z	18.4N	139.8E	167-0186	-----	-----
241800Z	19.3N	138.4E	034-0060	163-0150	-----
250000Z	19.4N	137.5E	052-0174	157-0264	-----
250600Z	19.3N	137.2E	031-0204	140-0234	-----
251200Z	19.0N	137.2E	010-0324	064-0090	-----
251800Z	19.3N	137.7E	000-0462	360-0360	340-0108
260000Z	19.7N	138.2E	328-0408	009-0510	-----
260600Z	20.5N	139.0E	307-0330	004-0462	177-0120
261200Z	21.2N	139.6E	281-0270	002-0540	-----
261800Z	22.2N	140.5E	259-0300	004-0678	354-0522
270000Z	23.3N	141.1E	262-0288	353-0660	-----
270600Z	24.6N	141.8E	253-0216	342-0558	009-0588
271200Z	26.1N	142.9E	292-0078	291-0450	-----
271800Z	27.7N	143.9E	262-0114	271-0486	-----
280000Z	29.7N	145.0E	243-0168	269-0450	-----
280600Z	31.7N	147.0E	270-0234	261-0432	035-0534
281200Z	34.1N	150.1E	312-0216	295-0300	-----
281800Z	36.7N	152.9E	286-0204	271-0378	263-0546
290000Z	40.0N	155.8E	248-0198	253-0468	-----
290600Z	43.2N	159.7E	213-0216	242-0372	241-0630
291200Z	46.4N	164.3E	-----	-----	-----

AVERAGE 24 HOUR ERROR - 0211 MI.
AVERAGE 48 HOUR ERROR - 0412 MI.
AVERAGE 72 HOUR ERROR - 0435 MI.





TROPICAL CYCLONE 29 - 10/08/0600Z TO 10/20/0600Z

I. DATA

A. STATISTICS

1. NUMBER OF WARNINGS ISSUED - 49
2. NUMBER OF WARNINGS WITH TYPHOON INTENSITY - 41
3. TOTAL DISTANCE TRAVELED DURING TROPICAL WARNING PERIOD - 2466 MI

B. CHARACTERISTICS AS A TYPHOON

1. MINIMUM OBSERVED SLP - 947MB AT 140220Z
2. MINIMUM OBSERVED 700MB HEIGHT - 2661M. AT 132110Z
3. MAXIMUM SURFACE WIND - 100 KTS (FROM BEST TRACK)
4. MAXIMUM RADIUS OF SURFACE CIRCULATION - 500 MI

II. DEVELOPMENT

A. INITIAL IMPETUS - 200MB ANTYCYCLONE OVER THE SURFACE CYCLONE

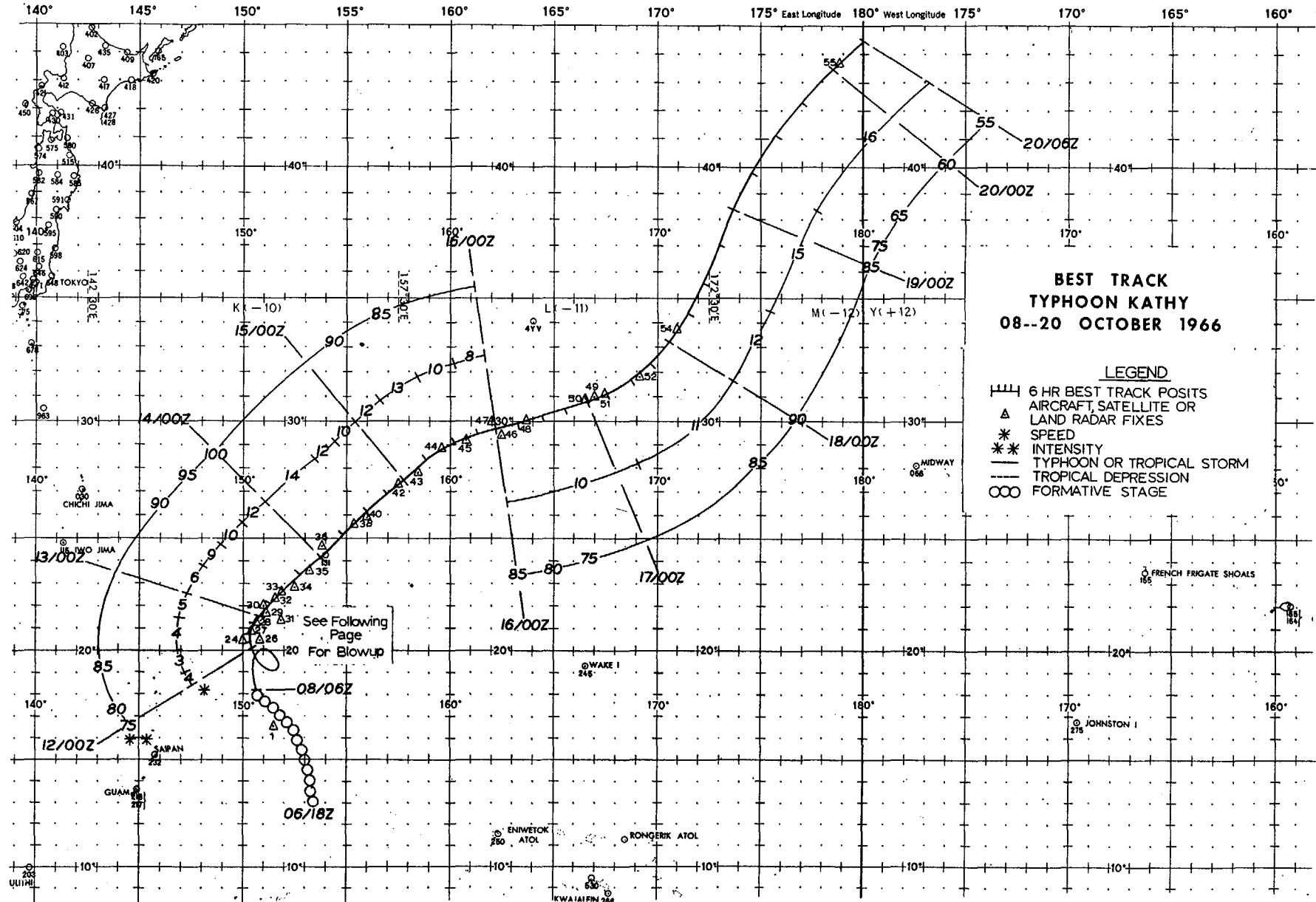
B. INITIAL SURFACE VORTEX

1. JUNCTION VORTEX AT 061800Z
2. SURFACE PRESSURE LESS THAN 1007MB

C. 200MB FLOW ABOVE SURFACE VORTEX

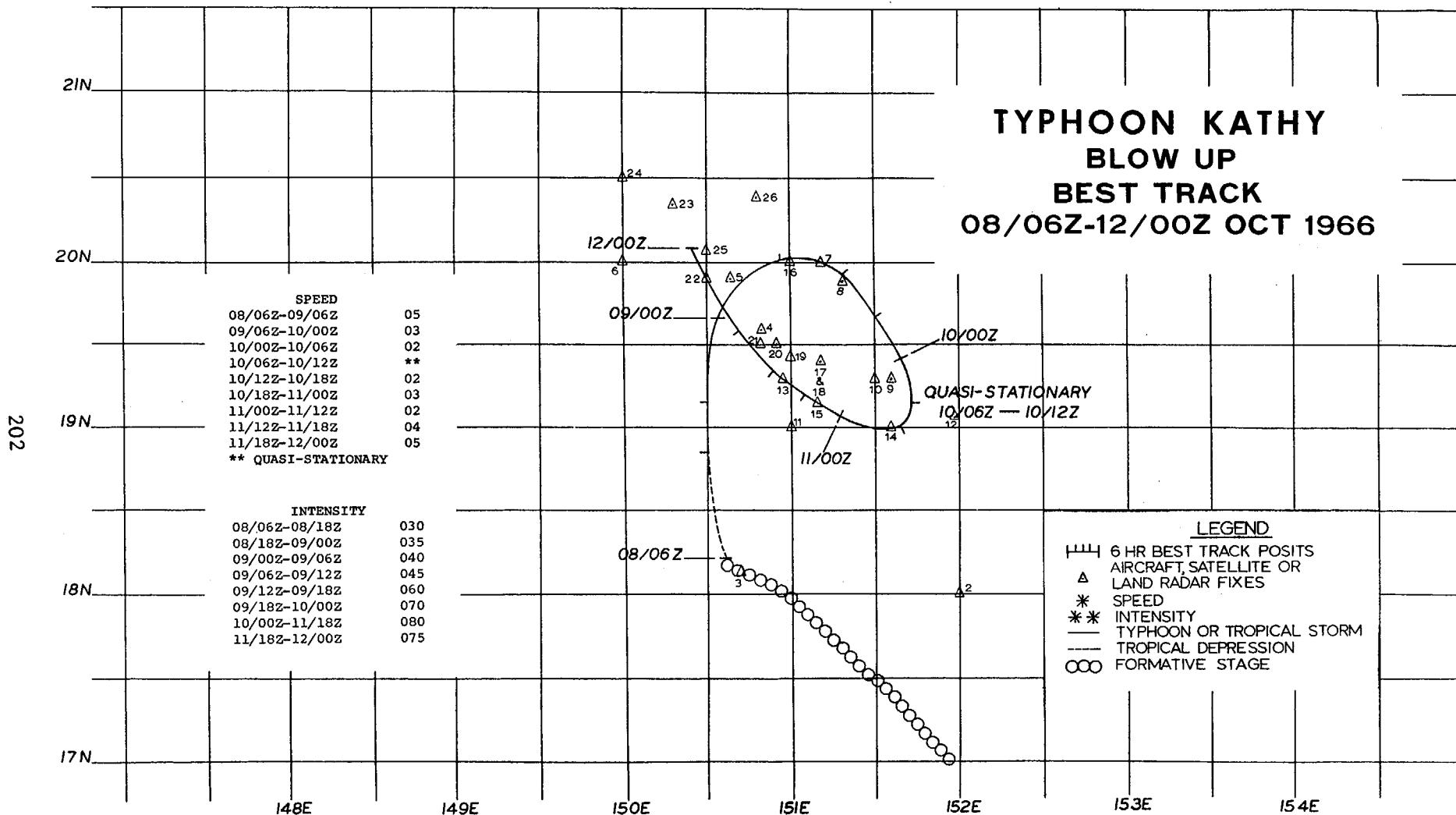
1. INITIAL - NORTHEAST
2. UPON REACHING TYPHOON INTENSITY - ANTYCYCLONIC

III. FINAL DISPOSITION - BECAME EXTRATROPICAL



**TYPHOON KATHY
BLOW UP
BEST TRACK**

08/06Z-12/00Z OCT 1966



24

FIX NO.	TIME	PUSIT	EYE FIXES CYCLONE			29		MIN SLP	700MB HGT	FLT TT/TD	EYE FORM	ORIEN- TATION	EYE DIA	THKNS WALL CLOUD
			UNIT- METHOD -ACCY	FLT LVL	LVL WND	OBS SFC	OBS WND							
25	120827Z	20.1N 150.5E	VW-UNK10	---	---	---	---	---	---	--/--	----	----	----	--
26	120926Z	20.4N 150.8E	VW-P-P03	700MB	047	---	---	2878	14/12	CIRC	----	26	----	--
27	121458Z	20.8N 150.4E	VW-P-P03	700MB	085	---	978	2881	14/11	CIRC	----	36	----	--
28	122051Z	21.3N 150.6E	54-P-P03	700MB	---	075	971	2835	14/--	CIRC	----	30	----	--
29	130250Z	21.7N 151.1E	54-P-P07	700MB	060	054	966	2795	15/--	CIRC	----	40	10	
30	130404Z	22.0N 151.0E	TIROS	STG X	DIA 04	BNDS 4								
31	130756Z	21.4N 151.9E	VW-UNK10	---	---	---	---	---	---	--/--	----	----	----	--
32	130836Z	22.3N 151.5E	VW-P-P05	0290M	090	070	960	2804	17/16	CIRC	----	40	08	
33	131153Z	22.7N 151.9E	VW-UNK10	---	---	---	---	---	---	--/--	----	----	----	--
34	131413Z	22.8N 152.4E	VW-R-P10	700MB	060	---	---	---	---	--/--	CIRC	----	30	12
35	132110Z	23.6N 153.1E	54-P-P05	700MB	113	090	950	2661	20/--	CIRC	----	30	--	
36	140220Z	24.7N 153.9E	54-P-P05	700MB	125	100	947	2661	20/--	CIRC	----	30	15	
37	140305Z	25.0N 154.0E	TIROS	STG X	DIA 04	BNDS 4								
38	140843Z	25.5N 155.3E	VW-UNK--	---	---	---	---	---	---	--/--	----	----	----	--
39	140915Z	25.5N 155.6E	VW-P-P02	0450M	---	075	955	---	---	--/--	CIRC	----	30	--
40	141200Z	25.9N 156.0E	VW-UNK--	1570M	---	---	---	---	---	--/--	----	----	----	--
41	141405Z	26.1N 156.6E	VW-R-P05	700MB	028	---	---	---	---	--/--	CIRC	----	35	15
42	142030Z	27.3N 157.4E	54-P-P02	700MB	070	080	962	2740	15/--	ELIP	NE-SW	45X35	30	
43	150300Z	27.8N 158.3E	54-P-P05	700MB	075	070	955	2688	15/--	CIRC	----	30	10	
44	150900Z	28.8N 159.7E	VW-P-P02	3250M	060	---	965	2784	14/12	CIRC	----	40	15	
45	151425Z	29.2N 160.7E	VW-P-P05	3220M	064	---	965	2793	15/13	CIRC	----	55	10	
46	160200Z	29.4N 162.4E	54-P-P05	700MB	080	080	954	2679	16/--	----	----	----	F.B.	
47	160251Z	30.0N 162.0E	TIROS	STG X	DIA 05	BNDS 3								
48	160914Z	30.0N 163.7E	VW-P-P05	3250M	060	---	966	2782	14/13	ELIP	NW-SE	70X43	N.F.B.	

EYE FIXES CYCLONE 29

FIX NO.	TIME	POSIT	UNI- METHOD		FLT LVL	OBS SFC WND	OBS MIN SLP	MIN 700MB HGT	FLT LVL TT/TD	EYE FORM	ORIEN- IATION	EYE DIA	THKNS WALL CLOUD
			-ACCV	LVL									
49	170147Z	31.0N 167.0E	TIROS	STG -	DIA 04	BNDs 3							
50	170200Z	30.9N 166.6E	54-P-POS	700MB	080	075	957	2710	16/-	----			F.B.
51	170430Z	31.1N 167.4E	54-P-POS	700MB	070	070	961	2743	16/-	----			N.F.B.
52	171400Z	31.8N 169.1E	VW-UNK--	---	---	---	---	---	--/--	----			--
205	171500Z	31.9N 169.4E	VW-P-P10	3300M	055	---	971	2818	13/12	CIRC	----	60	N.F.B.
54	180145Z	33.6N 170.9E	54-P-POS	700MB	070	070	964	2752	13/-	----			N.F.B.
55	200040Z	43.6N 178.7E	54-P-POS	700MB	065	055	958	2652	10/-	----			N.F.B.

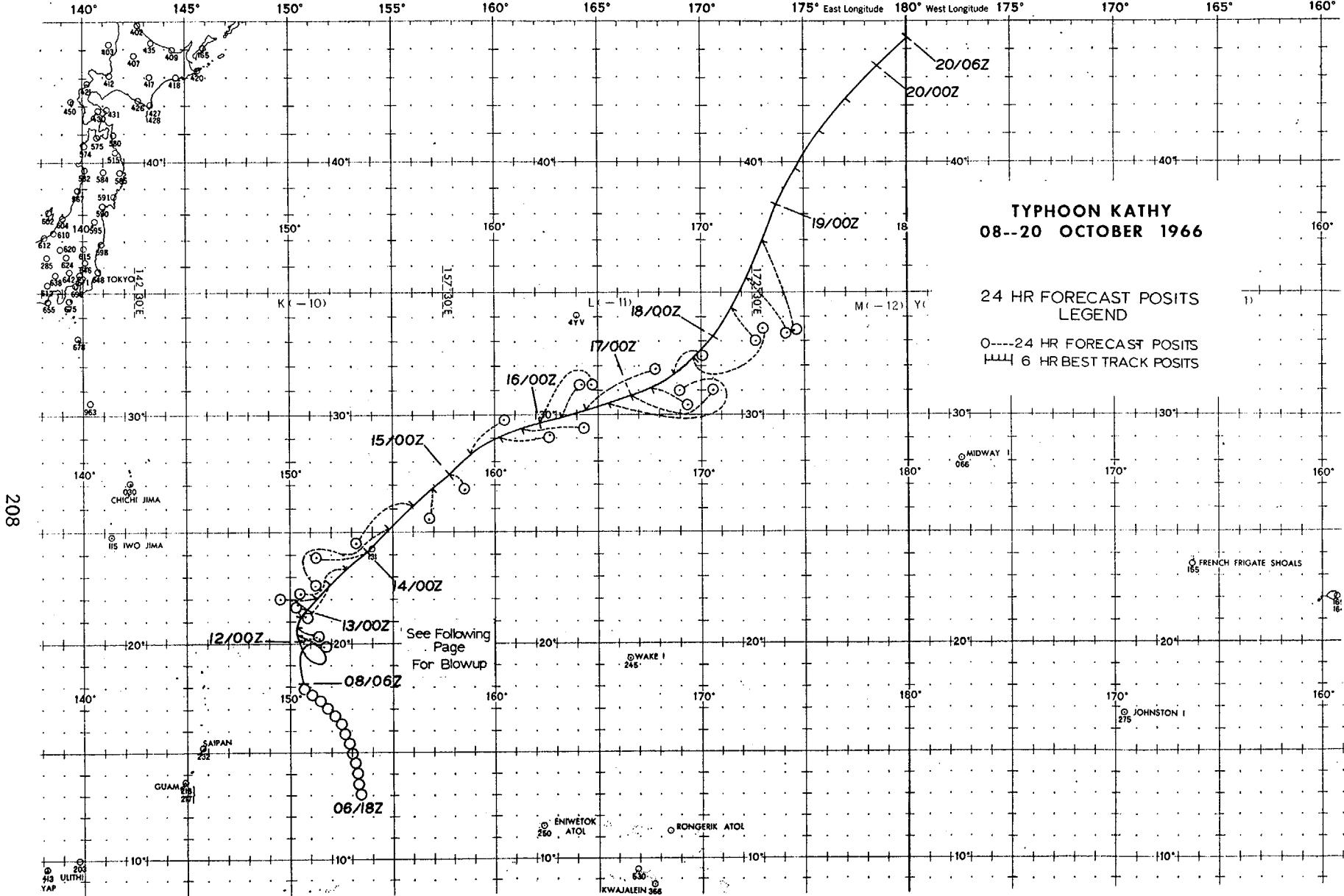
TROPICAL CYCLONE 29 - 10/08/0600Z TO 10/20/0600Z
 POSITION AND FORECAST VERIFICATION DATA

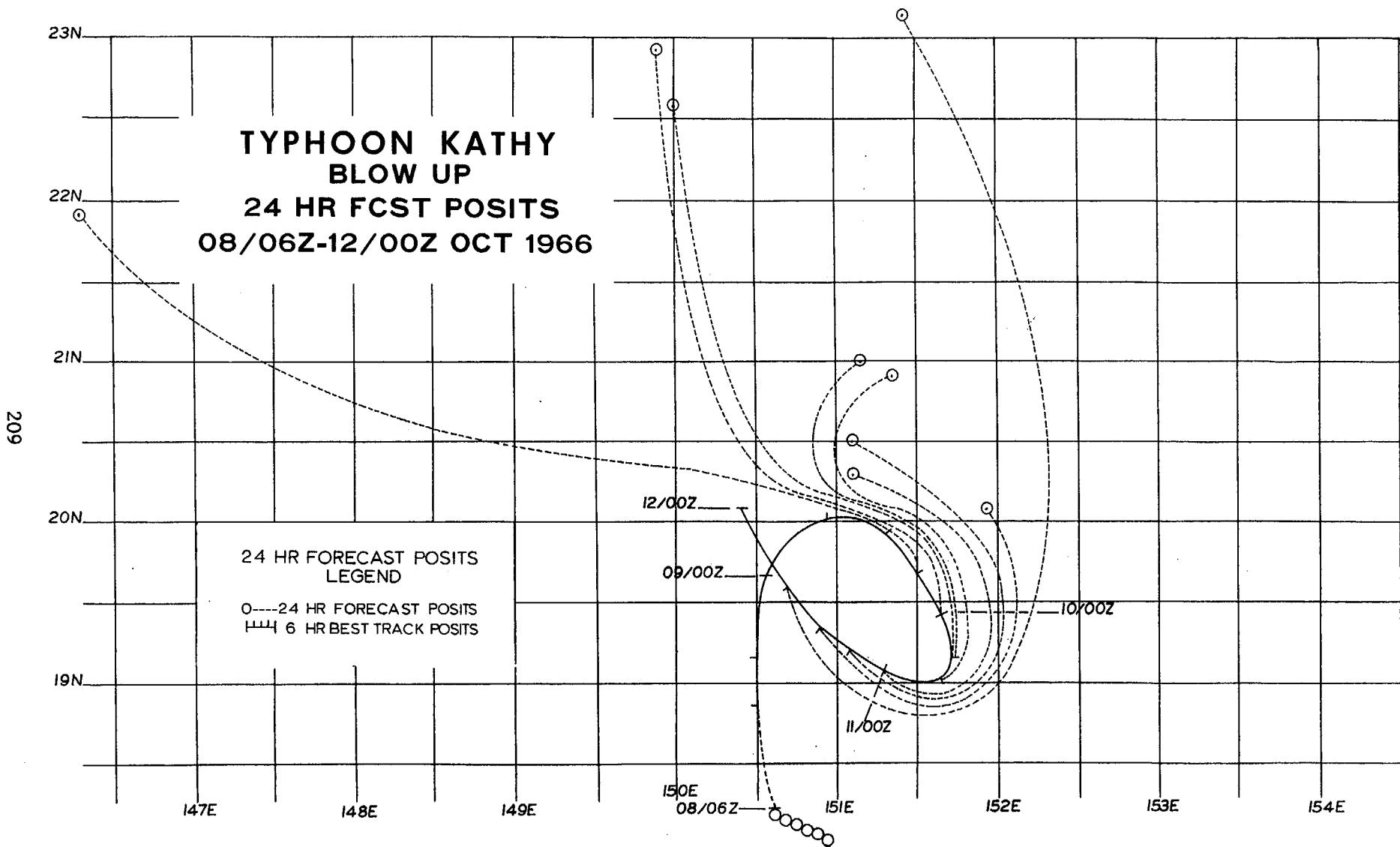
DTG	STORM LAT.	POSITION LONG.	24 HR. ERROR	48 HR. ERROR	72 HR. ERROR
			DEG. DIST.	DEG. DIST.	DEG. DIST.
081800Z	19.2N	150.5E	-----	-----	-----
090000Z	19.7N	150.6E	-----	-----	-----
090600Z	20.0N	150.9E	277-0144	-----	-----
091200Z	19.9N	151.3E	284-0192	-----	-----
091800Z	19.7N	151.5E	294-0318	-----	-----
100000Z	19.4N	151.7E	334-0228	-----	-----
100600Z	19.2N	151.7E	334-0222	-----	-----
101200Z	19.2N	151.7E	347-0108	-----	-----
101800Z	19.0N	151.7E	350-0108	-----	-----
110000Z	19.1N	151.3E	355-0072	-----	-----
110600Z	19.2N	151.1E	000-0078	352-0390	-----
111200Z	19.4N	150.9E	053-0066	004-0216	-----
111800Z	19.6N	150.7E	010-0216	009-0192	-----
120000Z	20.1N	150.4E	105-0066	016-0132	-----
120600Z	20.4N	150.3E	108-0054	016-0150	002-0540
121200Z	20.8N	150.3E	126-0060	030-0180	011-0252
121800Z	21.1N	150.5E	350-0036	038-0480	011-0222
130000Z	21.5N	150.8E	296-0024	024-0102	-----
130600Z	22.0N	151.3E	270-0090	000-0078	000-0360
131200Z	22.7N	152.0E	221-0108	319-0054	013-0504
131800Z	23.4N	152.8E	242-0150	311-0132	056-0906
140000Z	24.2N	153.8E	263-0138	276-0168	-----
140600Z	25.1N	154.9E	231-0246	267-0264	330-0180
141200Z	26.1N	156.0E	238-0174	242-0318	-----
141800Z	26.9N	157.0E	185-0084	249-0372	316-0144
150000Z	27.5N	157.8E	139-0054	270-0240	-----
150600Z	28.3N	158.9E	041-0114	239-0414	272-0240
151200Z	29.0N	160.2E	088-0132	250-0234	-----
151800Z	29.4N	161.2E	086-0162	111-0144	257-0456
160000Z	29.6N	162.1E	053-0162	085-0252	-----
160600Z	29.9N	163.3E	025-0084	085-0258	253-0504
161200Z	30.2N	164.4E	061-0204	072-0378	-----
161800Z	30.5N	165.5E	081-0180	072-0402	-----
170000Z	30.8N	166.6E	087-0198	060-0390	-----

TROPICAL CYCLONE 29 - 10/08/0600Z TO 10/20/0600Z
 POSITION AND FORECAST VERIFICATION DATA (CONT)

DTG	STORM	POSITION	24 HR. ERROR	48 HR. ERROR	72 HR. ERROR
		LAT.	LONG.	DEG. DIST.	DEG. DIST.
170600Z	31.2N	167.6E	119-0096	-----	-----
171200Z	31.6N	168.8E	052-0072	-----	-----
171800Z	32.2N	169.8E	063-0180	-----	-----
180000Z	33.1N	170.6E	-----	-----	-----
180600Z	34.4N	171.3E	141-0102	-----	-----
181200Z	35.5N	172.2E	145-0156	-----	-----
181800Z	37.0N	173.0E	163-0222	-----	-----
190000Z	38.3N	173.8E	-----	-----	-----
190600Z	39.8N	174.7E	-----	-----	-----
191200Z	41.1N	175.8E	-----	-----	-----
191800Z	42.3N	177.0E	-----	-----	-----
200000Z	43.4N	178.5E	-----	-----	-----
200600Z	44.4N	180.0E	-----	-----	-----

AVERAGE 24 HOUR ERROR - 0134 MI.
 AVERAGE 48 HOUR ERROR - 0247 MI.
 AVERAGE 72 HOUR ERROR - 0391 MI.





TROPICAL CYCLONE 33 - 10/29/1800Z TO 11/04/0000Z

I. DATA

A. STATISTICS

1. NUMBER OF WARNINGS ISSUED - 22
2. NUMBER OF WARNINGS WITH TYPHOON INTENSITY - 17
3. TOTAL DISTANCE TRAVELED DURING TROPICAL WARNING PERIOD - 2196 MI

B. CHARACTERISTICS AS A TYPHOON

1. MINIMUM OBSERVED SLP - 946MBAS AT 030855Z
2. MINIMUM OBSERVED 700MB HEIGHT - 2649M. AT 030200Z
3. MAXIMUM SURFACE WIND - 100 KTS (FROM BEST TRACK)
4. MAXIMUM RADIUS OF SURFACE CIRCULATION - 550 MI

II. DEVELOPMENT

A. INITIAL IMPETUS - LOW LEVEL SURGE INTO CYCLONIC CIRCULATION FROM THE SOUTH WITH SUBSEQUENT DIVERGENCE AT 200MB LEVEL

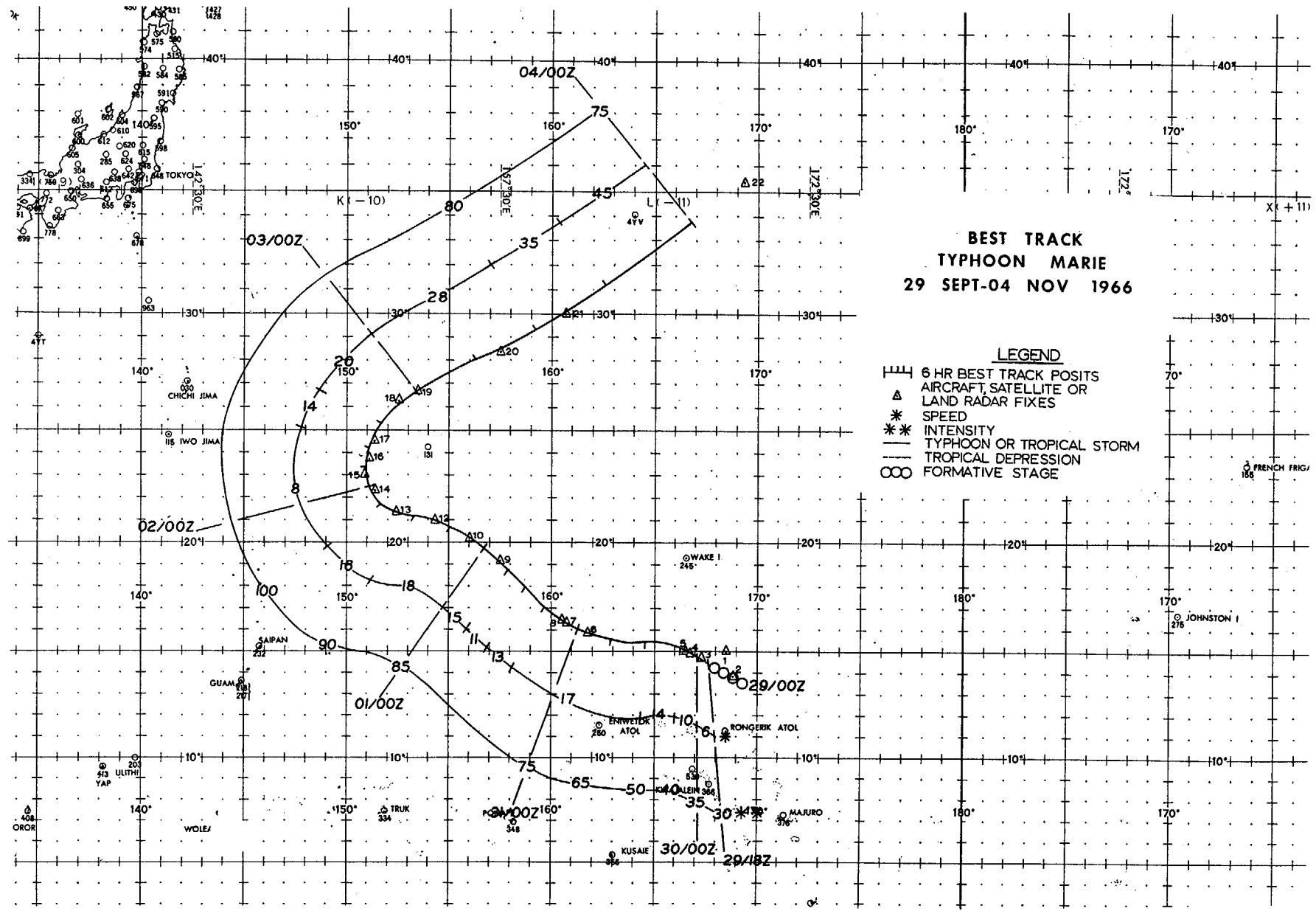
B. INITIAL SURFACE VORTEX

1. EMBEDDED VORTEX AT 290000Z
2. SURFACE PRESSURE LESS THAN 1002MB

C. 200MB FLOW ABOVE SURFACE VORTEX

1. INITIAL - NORTHEAST
2. UPON REACHING TYPHOON INTENSITY - SOUTHEAST

III. FINAL DISPOSITION - BECAME EXTRATROPICAL

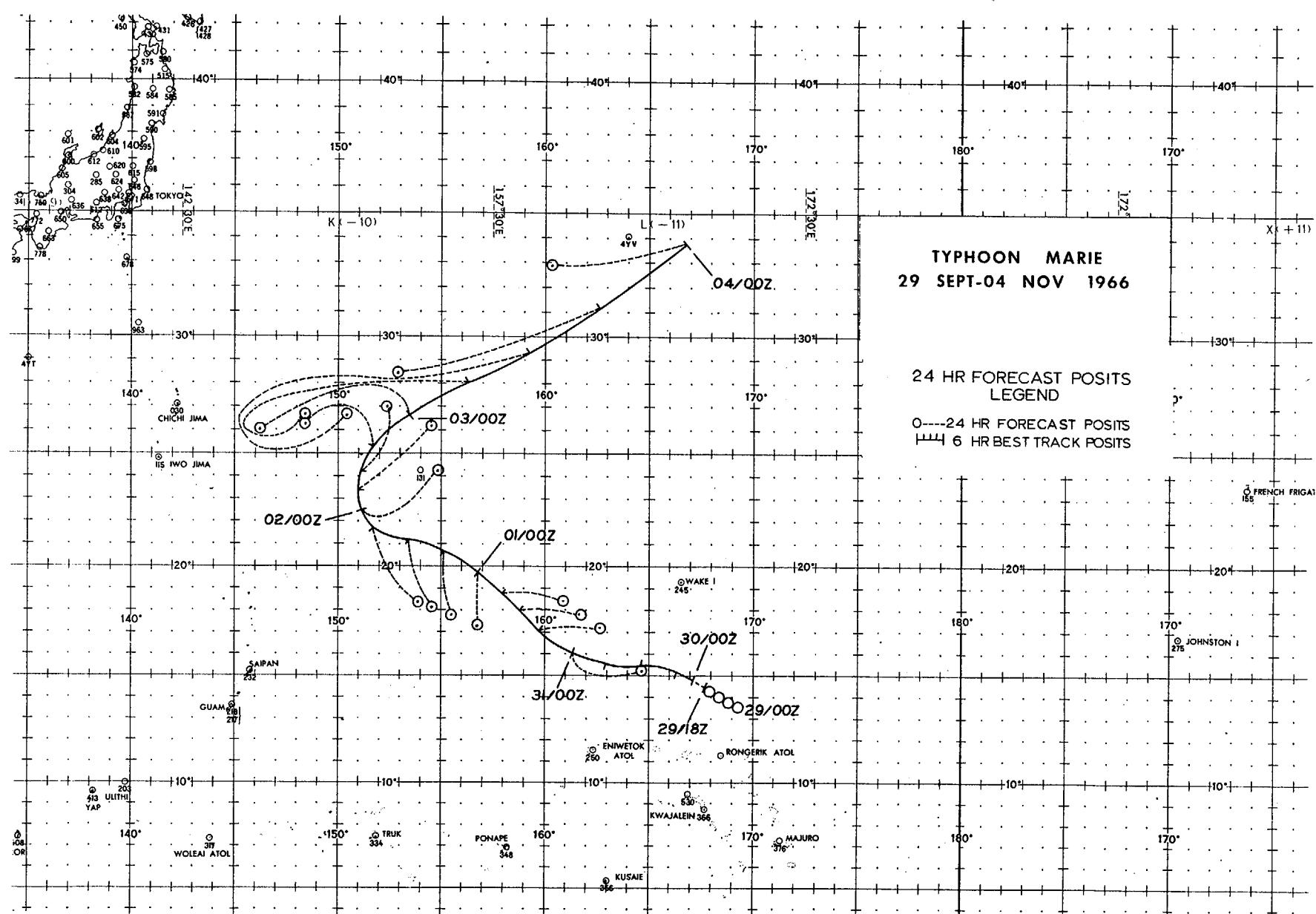


FIX NO.	TIME	POSIT	EYE FIXES CYCLONE			33	OBS	OBS	MIN	FLI	THKNS	
			UNIT- METHOD	LVL	FLT		SFC	MIN	700MB	LVL	EYE	WALL
-ACCY	LVL	WND	WND	SLP	HGT	TT/TD	FORM	DIA	CLOUD			
1	290220Z	15.0N 168.5E	TIROS	STG C	DIA --	BNDs -						
2	290335Z	13.8N 168.8E	54-UNK--	0460M	---	---	000	---	--/--	---		--
3	292223Z	14.7N 167.3E	54-P-P30	0460M	044	035	998	---	--/--	---		F.B.
4	300145Z	14.9N 166.8E	54-P-P03	0460M	050	040	995	---	--/--	CIRC	---	35
5	300302Z	15.0N 166.5E	TIROS	STG C	DIA --	BNDs -						
6	302128Z	15.9N 161.8E	54-P-P03	0400M	065	070	983	---	--/--	CIRC	---	20
7	310202Z	16.4N 160.6E	54-P-P03	0300M	075	070	981	---	--/--	CIRC	---	20
8	310352Z	16.5N 160.5E	TIRUS	STG -	DIA 03	BNDs 0						
9	312100Z	19.2N 157.5E	54-P-P02	700MB	---	065	974	2890	16/--	CIRC	---	15
10	010200Z	20.2N 156.0E	54-P-P02	700MB	---	075	974	2890	16/--	CIRC	---	20
11	010242Z	21.0N 155.0E	TIROS	STG X	DIA 05	BNDs 4						
12	010835Z	20.9N 154.3E	VW-R-P--	0370M	060	---	974	---	--/--	CIRC	---	10
13	011445Z	21.4N 152.3E	VW-R-P10	700MB	080	---	---	---	--/--	CIRC	---	14
14	012125Z	22.3N 151.3E	54-P-P10	700MB	---	075	960	2749	21/--	CIRC	---	20
15	020300Z	23.0N 150.9E	54-P-P20	700MB	---	090	949	2661	24/--	CIRC	---	20
16	021100Z	23.8N 151.1E	VW-UNK--	0700M	---	---	---	---	--/--	CIRC	---	08
17	021430Z	24.6N 151.4E	VW-R-P05	700MB	070	---	---	---	--/--	CIRC	---	10
18	022130Z	26.3N 152.5E	54-P-P03	700MB	090	060	952	2682	16/--	CIRC	---	08
19	030200Z	26.7N 153.4E	54-P-P07	700MB	---	070	948	2649	16/--	CIRC	---	10
20	030855Z	28.4N 157.5E	VW-P-P02	0310M	085	080	946	---	--/--	ELIP	N-S	16XII
21	031445Z	30.0N 160.6E	VW-R-P02	700MB	075	---	---	---	10/02	CIRC	---	15
22	040245Z	35.4N 169.3E	54-P-P30	700MB	085	075	972	2853	21/--	CIRC	---	40

TROPICAL CYCLONE 33 - 10/29/1800Z 10 11/04/0000Z
 POSITION AND FORECAST VERIFICATION DATA

DTG	STORM LAT.	POSITION LONG.	24 HR. ERROR DEG. DIST.	48 HR. ERROR DEG. DIST.	72 HR. ERROR DEG. DIST.
300000Z	14.8N	167.1E	-----	-----	-----
300600Z	15.2N	166.1E	-----	-----	-----
301200Z	15.5N	164.7E	-----	-----	-----
301800Z	15.6N	162.9E	126-0150	-----	-----
310000Z	16.1N	161.2E	105-0204	-----	-----
310600Z	17.0N	159.7E	086-0168	-----	-----
311200Z	18.0N	158.8E	094-0162	-----	-----
311800Z	18.8N	157.9E	098-0168	-----	-----
010000Z	19.8N	156.7E	177-0156	-----	-----
010600Z	20.7N	155.0E	174-0174	105-0246	-----
011200Z	21.1N	153.1E	156-0192	097-0300	-----
011800Z	21.8N	151.6E	148-0234	099-0354	-----
020000Z	22.5N	151.1E	065-0228	154-0246	-----
020600Z	23.3N	150.9E	049-0258	161-0252	104-0336
021200Z	24.1N	151.1E	020-0180	173-0264	-----
021800Z	25.3N	151.8E	288-0186	187-0300	118-0252
030000Z	26.8N	153.3E	263-0378	044-0312	-----
030600Z	28.0N	156.1E	259-0408	023-0168	220-0498
031200Z	29.2N	159.1E	252-0480	342-0258	-----
031800Z	31.1N	162.5E	252-0516	279-0432	233-0828
040000Z	33.8N	166.8E	261-0330	260-0990	-----
AVERAGE 24 HOUR ERROR - 0254 MI.					
AVERAGE 48 HOUR ERROR - 0343 MI.					
AVERAGE 72 HUUR ERROR - 0478 MI.					

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TROPICAL CYCLONE 39 - 12/25/1200Z TO 12/31/0000Z

I. DATA

A. STATISTICS

1. NUMBER OF WARNINGS ISSUED - 23
2. NUMBER OF WARNINGS WITH TYPHOON INTENSITY - 10
3. TOTAL DISTANCE TRAVELED DURING TROPICAL WARNING PERIOD - 1224 MI

B. CHARACTERISTICS AS A TYPHOON

1. MINIMUM OBSERVED SLP - 967MBS AT 260830Z
2. MINIMUM OBSERVED 700MB HEIGHT - 3063M, AT 280308Z
3. MAXIMUM SURFACE WIND - 090 KTS (FROM BEST TRACK)
4. MAXIMUM RADIUS OF SURFACE CIRCULATION - 275 MI

II. DEVELOPMENT

A. INITIAL IMPETUS - DEVELOPMENT OF DIVERGENCE AT 200MB LEVEL OVER SURFACE CYCLONIC CIRCULATION

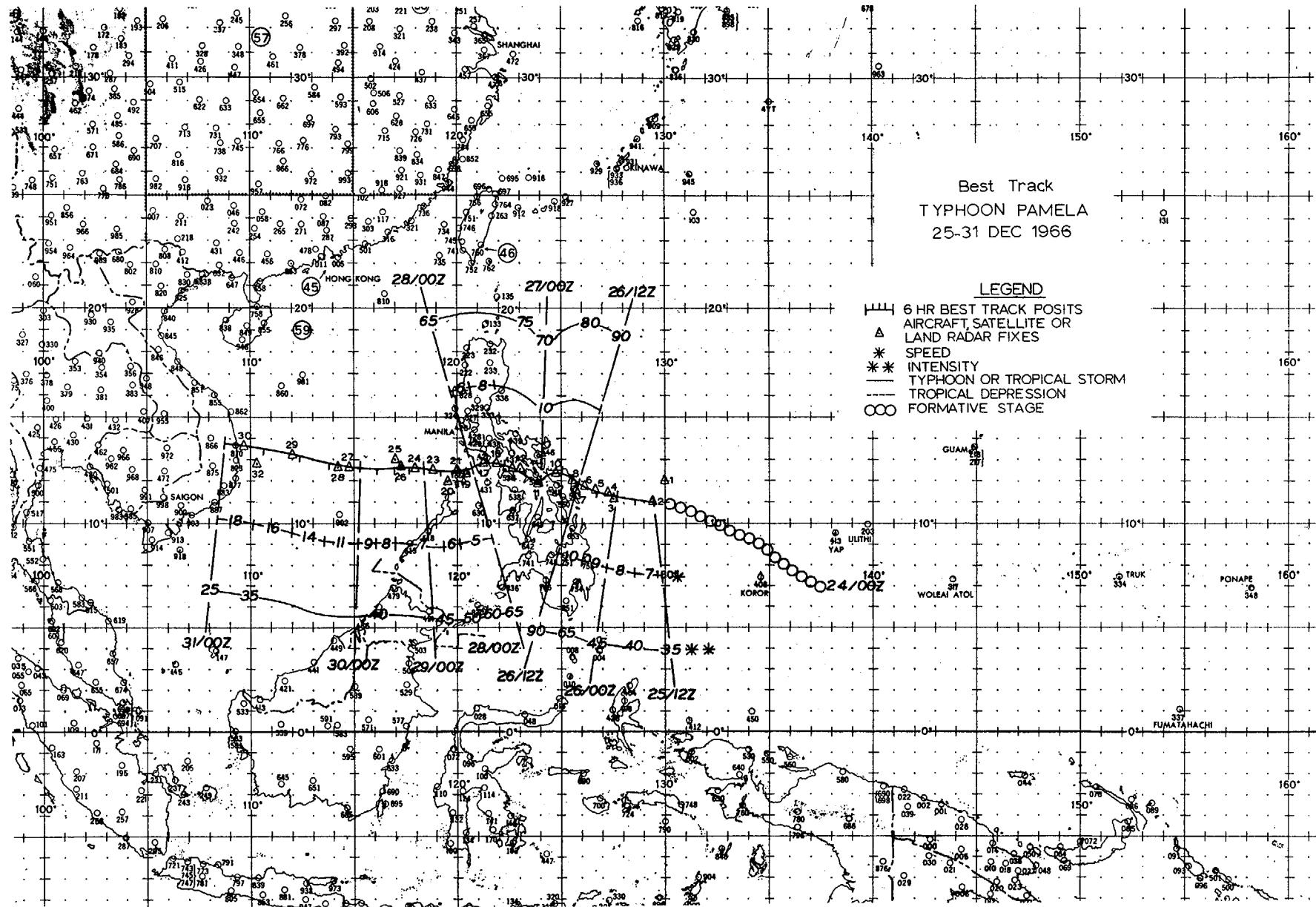
B. INITIAL SURFACE VORTEX

1. JUNCTION VORTEX AT 240600Z
2. SURFACE PRESSURE LESS THAN 1004MB

C. 200MB FLOW ABOVE SURFACE VORTEX

1. INITIAL - EAST
2. UPON REACHING TYPHOON INTENSITY - NORTHEAST

III. FINAL DISPOSITION - DISSIPATED OVER LAND



FIX NO.	TIME	PUSIT	EYE FIXES CYCLONE			39	FLT	OBS	OBS	MIN	700MB	FLT	LVL	EYE	ORIEN-	EYE	THKNS	
			UNIT-	METHOD	FLT													
			-	-ACCY	LVL	WND	WND	SLP										CLOUD
1	250606Z	12.0N 130.0E	TIROS	STG X	DIA 05	BNDS 2												
2	251230Z	11.0N 129.4E	VW-R-P03	2910M	---	---	---	---	---	---	---	---	---	CIRC	----	18	08	
3	260115Z	11.2N 127.5E	54-P-P10	0460M	075	040	977	---	---	---	---	---	---	CIRC	----	20	--	
4	260250Z	11.4N 127.3E	54-P-P00	0460M	055	050	974	---	---	---	---	---	---	CIRC	----	20	--	
5	260830Z	11.6N 126.6E	VW-P-P05		---	100	967	---	---	---	---	---	---	CIRC	----	15	--	
6	261030Z	11.8N 126.1E	VW-UNK--	700MB	---	---	---	---	---	---	---	---	---	---			--	
7	261230Z	11.5N 125.7E	VW-UNK--	700MB	---	---	---	---	---	---	---	---	---	---			--	
8	261330Z	12.0N 125.5E	VW-UNK--	700MB	---	---	---	---	---	---	---	---	---	---			--	
9	261440Z	12.1N 125.3E	VW-R-P02	700MB	085	---	---	---	---	---	---	---	---	CIRC	----	16	--	
10	262220Z	12.4N 124.7E	54-R-F04	700MB	060	050	---	---	---	---	---	---	---			F.B.		
11	270200Z	11.8N 123.8E	54-UNK--	700MB	050	050	---	---	---	---	---	---	---	---			--	
12	270553Z	12.5N 123.0E	TIROS	STG X	DIA 05	BNDS 3												
13	270740Z	12.4N 122.7E	VW-R-P03		---	---	---	---	---	---	---	---	---	---			--	
14	270905Z	12.5N 122.6E	VW-P-P02	700MB	060	075	---	---	---	15/05	---	---	---	CIRC	----	20	07	
15	271100Z	12.7N 122.3E	VW-UNK--	700MB	---	---	---	---	---	---	---	---	---	---			--	
16	271425Z	12.8N 121.8E	VW-R-P03	700MB	060	---	---	---	---	12/10	---	---	---	CIRC	----	20	--	
17	272030Z	12.8N 121.3E	VW-UNK--		---	---	---	---	---	---	---	---	---	---			--	
18	272115Z	12.8N 121.1E	VW-R-P05	700MB	053	---	---	---	---	---	---	---	---	---		F.B.		
19	280308Z	12.3N 120.3E	54-P-P00	700MB	060	050	999	3063	14/--	---						F.B.		
20	280817Z	12.0N 119.6E	54-P-P00	700MB	045	045	002	3072	12/--	---						F.B.		
21	281040Z	12.5N 120.0E	VW-UNK--		---	---	---	---	---	---	---	---	---	---			--	
22	281437Z	12.5N 119.6E	VW-P-P05	700MB	042	---	999	3065	12/05	---	---	---	---	CIRC	----	35	--	
23	282057Z	12.4N 118.8E	VW-P-P10	700MB	025	---	003	3078	13/10	---						F.B.		
24	290230Z	12.6N 117.9E	54-P-P02	2200M	030	035	002	---	---	---	---	---	---	---		F.B.		

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EYE FIXES CYCLONE 39

FIX NO.	TIME	POSIT	UNIT- METHOD -ACCY	EYE FIXES CYCLONE 39			MIN	700MB	FLT	LVL	TT/TD	EYE FORM	ORIEN- TATION	EYE DIA	THKNS WALL CLOUD
				FLT	LVL	SFC	OBS	MIN	SLP						
25	290542Z	13.0N 117.0E	TIROS	STG X	DIA 03	BANDS 2									
26	290830Z	12.7N 117.4E	54-P-P02	0460M	040	040	999	3088	14/-	---					F.B.
27	300120Z	12.8N 114.9E	54-P-P00	0460M	030	030	004	---	--/-	---					F.B.
28	300350Z	12.8N 114.3E	54-P-P00	0460M	025	030	003	---	--/-	---					N,F,B.
29	301242Z	13.2N 112.0E	VW-R-F10	0460M	026	030	---	---	--/-	---					F,B.
218	302030Z	13.7N 109.7E	VW-R-P--		---	---	---	---	--/-	---					--
	302100Z	13.6N 103.7E	VW-R-P02		---	---	---	---	--/-	CIRC	----	20			--
	310230Z	12.9N 110.2E	54-P-P--	0460M	020	020	010	---	--/-	---					--

TROPICAL CYCLONE 39 - 12/25/1200Z TO 12/31/0000Z
 POSITION AND FORECAST VERIFICATION DATA

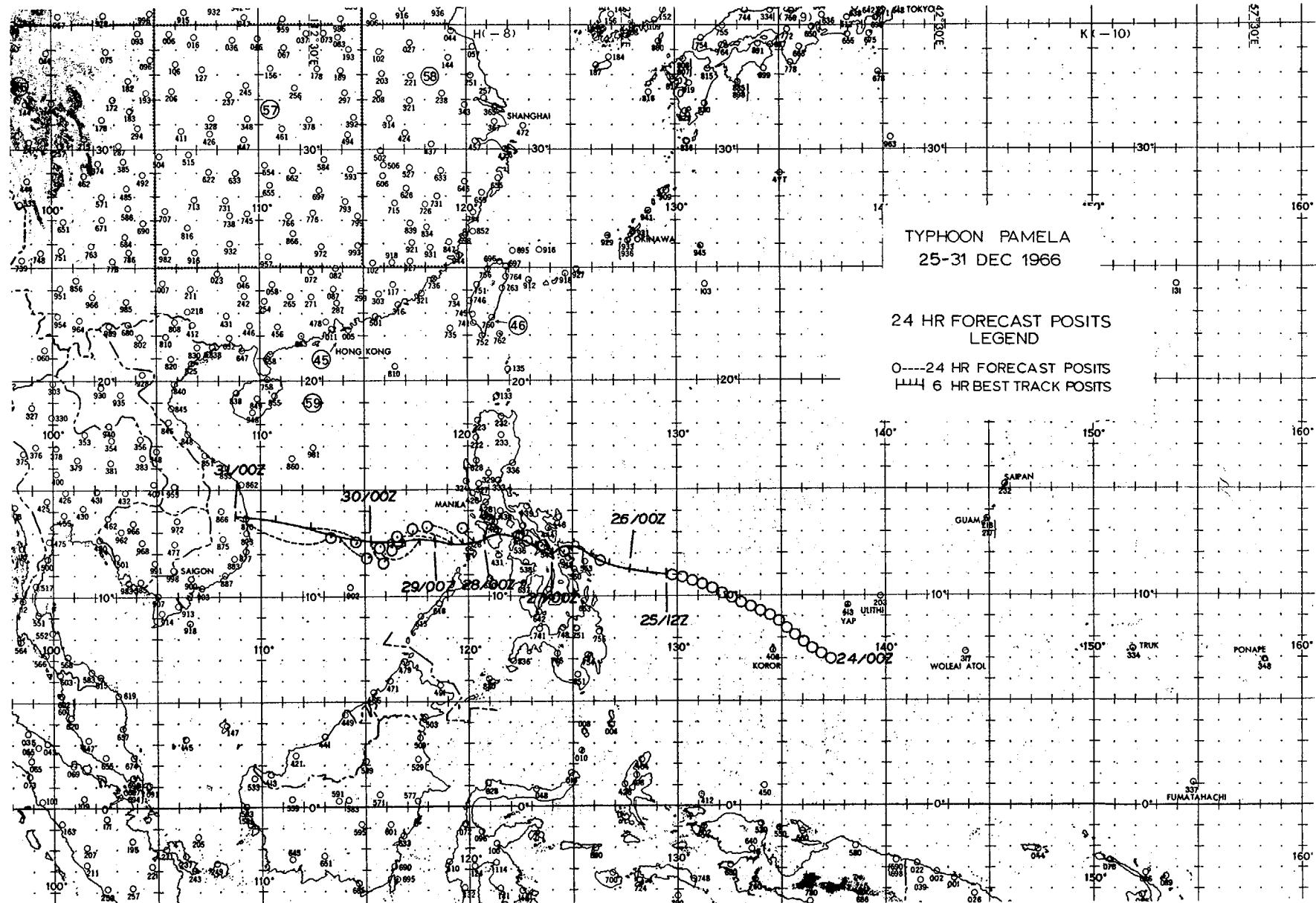
DTG	STORM POSITION	24 HR. ERROR	48 HR. ERROR	72 HR. ERROR
	LAT. LONG.	DEG. DIST.	DEG. DIST.	DEG. DIST.
251200Z	11.0N 129.5E	-----	-----	-----
251800Z	11.1N 128.6E	-----	-----	-----
260000Z	11.3N 127.7E	-----	-----	-----
260600Z	11.5N 126.8E	-----	-----	-----
261200Z	11.9N 125.9E	116-0024	-----	-----
261800Z	12.3N 125.0E	237-0018	-----	-----
270000Z	11.9N 124.1E	308-0036	-----	-----
270600Z	12.3N 123.1E	333-0012	-----	-----
271200Z	12.7N 122.2E	090-0006	-----	-----
271800Z	12.8N 121.4E	336-0042	-----	-----
280000Z	12.6N 120.8E	013-0054	289-0066	-----
280600Z	12.5N 120.3E	324-0048	296-0078	-----
281200Z	12.5N 119.8E	289-0108	307-0096	-----
281800Z	12.5N 119.2E	284-0114	302-0156	-----
290000Z	12.6N 118.4E	276-0102	314-0108	-----
290600Z	12.6N 117.7E	264-0114	290-0102	285-0156
291200Z	12.7N 117.0E	237-0042	271-0186	-----
291800Z	12.7N 116.1E	108-0036	271-0174	290-0204
300000Z	12.7N 115.2E	142-0066	272-0156	-----
300600Z	12.8N 113.9E	126-0090	260-0132	235-0132
301200Z	13.1N 112.4E	105-0132	188-0048	-----
301800Z	13.5N 110.6E	-----	116-0132	-----

AVERAGE 24 HOUR ERROR - 0061 MI.

AVERAGE 48 HOUR ERROR - 0119 MI.

AVERAGE 72 HUUR ERROR - 0164 MI.

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TYPHOON PAMELA
25-31 DEC 1966

24 HR FORECAST POSITS
LEGEND

O---24 HR FORECAST POSITS
△---6 HR BEST TRACK POSITS

ANNEX
A

SUMMARY OF TROPICAL CYCLONES
IN THE
EASTERN NORTH PACIFIC OCEAN
(180 DEGREES TO NORTH AMERICAN COAST)
FOR
1966

Fleet Weather Central Alameda and Fleet Weather Central Pearl Harbor issued a record total of 342 tropical warnings on 7 hurricanes, 6 tropical storms and 6 tropical depressions in the Eastern North Pacific during 1966.

The following five year summary covering the Fleet Weather Central Alameda/Fleet Weather Central Pearl Harbor areas is presented for comparison:

SUMMARY OF EASTERN PACIFIC TROPICAL CYCLONE DATA

	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>
TOTAL NUMBER OF WARNINGS*	122	80	60	244	342
CALENDAR DAYS OF WARNINGS*	35	26	21	73	70
TROPICAL DEPRESSIONS*				2	6
TROPICAL STORMS	6	5	4	9	6
HURRICANES	2	4	2	1	7
TOTAL TROPICAL CYCLONES*	8	9	6	12	19

*Tropical Depression information not available 1962-1964.

A record number of hurricanes (7) traversed FLEWEACEN Alameda's area of responsibility during 1966. Again aiding in the location and tracking of these storms was the APT satellite readout as is evidenced below.

	<u>SATELLITE FIX</u>	<u>RECON FIX</u>
ADELE	4	0
BLANCA	6	3
CONNIE	7	0
DOLORES	11	3
EILEEN	6	2
FRANCESCA	12	2
HELGA	5	0

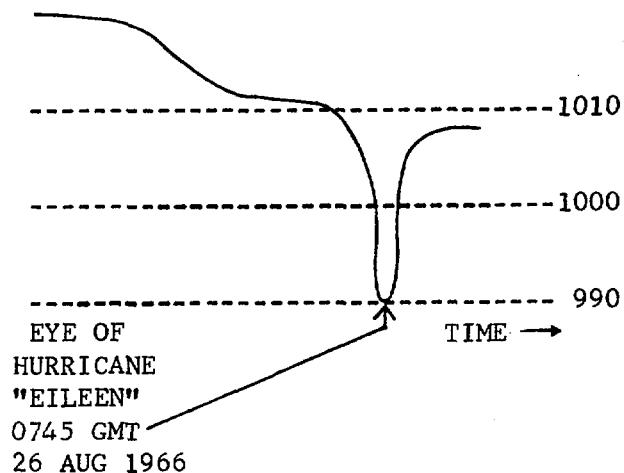
Extensive property damage and loss of life was caused by Tropical Storm KIRSTEN and Hurricanes ADELE and HELGA as they crossed land into lower Mexico and Baja California. There were no "super" hurricanes reported, however, CONNIE generated winds in excess of 85 knots. ADELE had the distinction of being the shortest lived hurricane (about 3 days) while FRANCESCA was active for almost eleven days.

An interesting letter was received from the ROBERT D. CONRAD, an oceanographic research vessel operated by Columbia University, which passed through the eye of hurricane EILEEN on 26 August 1966. A portion of their letter is duplicated below.

"In less than two hours before entering the eye, northerly winds increased from 40 knots to 60-70 knots, with gusts to 80 (measured), but these high winds of hurricane intensity were sustained for only about 15 minutes before and after the eye passed. (The ship and storm were heading in nearly opposite directions making the relative speed of advance throughout the passage about 20 knots.) Torrential rain with zero visibility was encountered only about one-half hour on either side of the center. Seas were close to 25-30 feet at their maximum height in the leading edge, and with the passage of the eye, they decreased down to only about a few feet in four hours.

Excellent radar presentation depicted the eye to be elliptical in shape, about 12 miles by 8 miles in diameter. During our 25 minutes inside the eye, we noted atop the confused seas numerous luminescent jelly fish which had not been seen previously (or subsequently) on this 10 month cruise of the Pacific.

I've enclosed a tracing of the barograph trace."



The mean forecast error listed below was computed by two methods.
 a) standard mean vector forecast error and b) closest distance error from
best track. Positions used in these determinations were based on very limit-
 ed surface data modified by "Recon" and Satellite as listed below.

1966 FORECAST VECTOR ERRORS*

HURRICANE	12 HOUR MEAN ERROR (MI)	24 HOUR MEAN ERROR (MI)	48 HOUR MEAN ERROR (MI)
ADELE	81	181	---
BLANCA	115	204	463
CONNIE (Alameda)	45	76	177
CONNIE (Pearl Harbor)	57	101	217
DOLORES	86	162	278
EILEEN	40	72	128
FRANCESCA	75	175	329
HELGA	51	109	327

1966 FORECAST ERRORS*
 (IN TERMS OF CLOSEST DISTANCE TO BEST TRACK)

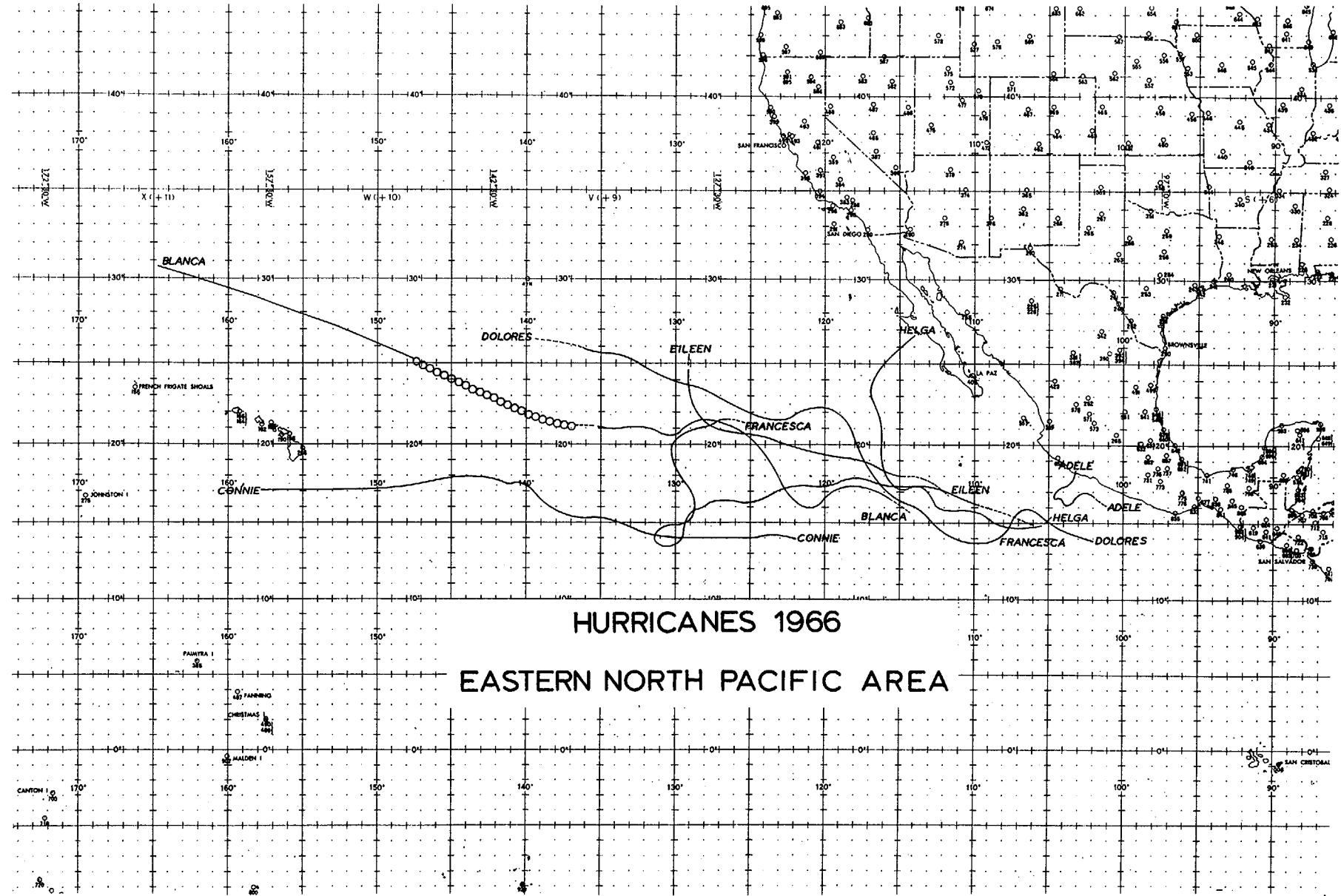
HURRICANE	12 HOUR MEAN ERROR (MI)	24 HOUR MEAN ERROR (MI)	48 HOUR MEAN ERROR (MI)
ADELE	53	168	**
BLANCA	111	204	397
CONNIE (Alameda)	39	71	163
CONNIE (Pearl Harbor)	37	63	128
DOLORES	79	157	276
EILEEN	34	66	109
FRANCESCA	78	157	317
HELGA	62	91	277

*Includes forecast errors during tropical storm intensity as well as hurricane.
 **No 48 hour forecast made during "depression" stage.

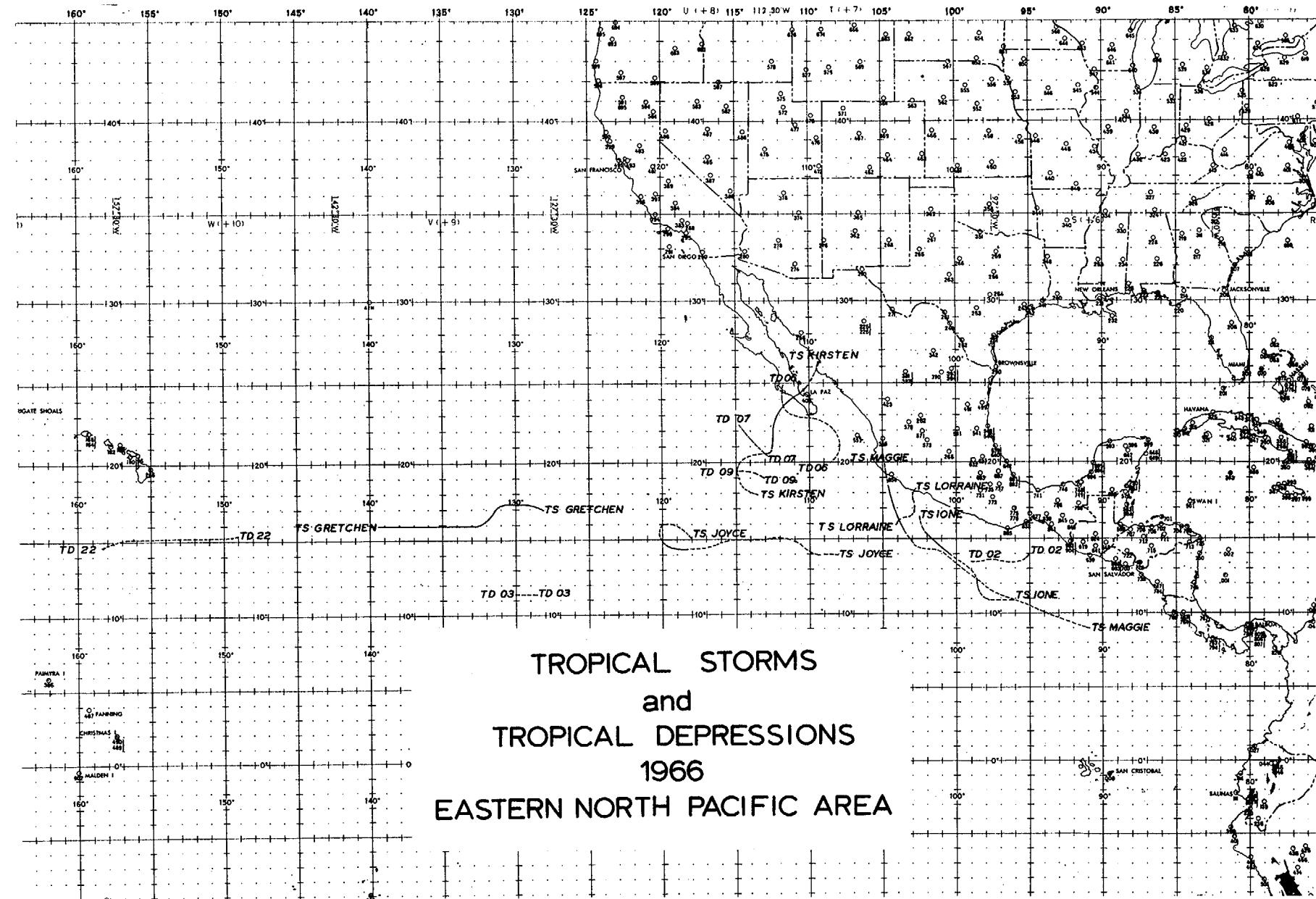
TROPICAL CYCLONES FOR THE 1966 SEASON

	<u>CYCLONE</u>	<u>PERIOD</u>
01.	Hurricane ADELE	21 JUN - 24 JUN
02.	Tropical Depression	28 JUN - 30 JUN
03.	Tropical Depression	11 JUL - 11 JUL
04.	Hurricane BLANCA	02 AUG - 12 AUG
05.	Hurricane CONNIE	07 AUG - 17 AUG
06.	Tropical Depression	11 AUG - 13 AUG
07.	Tropical Depression	15 AUG - 16 AUG
08.	Hurricane DOLORES	16 AUG - 26 AUG
09.	Tropical Depression	17 AUG - 17 AUG
10.	Hurricane EILEEN	23 AUG - 29 AUG
11.	Hurricane FRANCESCA	05 SEP - 16 SEP
12.	Tropical Storm GRETCHEN	08 SEP - 11 SEP
13.	Hurricane HELGA	09 SEP - 15 SEP
14.	Tropical Storm IONE	11 SEP - 13 SEP
15.	Tropical Storm JOYCE	14 SEP - 20 SEP
16.	Tropical Storm KIRSTEN	25 SEP - 29 SEP
17.	Tropical Storm LORRAINE	04 OCT - 05 OCT
18.	Tropical Storm MAGGIE	16 OCT - 19 OCT
22.	Tropical Depression*	10 SEP - 12 SEP

*See Chapter V for statistics



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TROPICAL STORMS
and
TROPICAL DEPRESSIONS
1966
EASTERN NORTH PACIFIC AREA

TROPICAL STORMS 1966
POSITIONS DATA

TROPICAL STORM GRETCHEN
08 SEP-12 SEP

DTG	LAT	LONG	DTG	LAT	LONG
080000Z	17.0N	128.0W	100600Z	16.0N	137.4W
080600Z	17.3N	128.8W	101200Z	16.0N	138.6W
081200Z	17.4N	130.0W	101800Z	16.0N	139.5W
081800Z	17.3N	131.2W	110000Z	16.0N	139.5W
090000Z	16.5N	131.8W	110600Z	16.0N	139.5W
090600Z	16.0N	132.5W	111200Z	16.0N	139.5W
091200Z	16.0N	133.5W	111800Z	16.0N	139.5W
091800Z	16.0N	135.0W	112115Z	16.0N	139.5W
100000Z	16.0N	136.2W			

TROPICAL STORM IONE
11 SEP-13 SEP

DTG	LAT	LONG	DTG	LAT	LONG
110000Z	11.0N	096.0W	121800Z	14.0N	100.5W
110600Z	11.0N	097.0W	130000Z	14.5N	101.1W
111200Z	11.0N	098.0W	130600Z	15.0N	101.7W
111800Z	11.6N	098.5W	131200Z	15.5N	102.2W
120000Z	12.5N	098.7W	131800Z	16.5N	102.5W
120600Z	13.1N	099.2W			
121200Z	13.6N	099.8W			

TROPICAL STORM JOYCE
14 SEP-20 SEP

DTG	LAT	LONG	DTG	LAT	LONG
141800Z	14.0N	108.0W	180000Z	14.5N	117.7W
150000Z	14.0N	108.0W	180600Z	14.4N	118.2W
150600Z	14.1N	108.4W	181200Z	14.4N	118.8W
151200Z	14.0N	108.9W	181800Z	14.5N	119.4W
151800Z	14.0N	109.5W	190000Z	14.7N	119.7W
160000Z	14.2N	110.0W	190600Z	15.0N	120.0W
160600Z	14.8N	110.8W	191200Z	15.4N	120.2W
161200Z	15.2N	112.0W	191800Z	15.9N	120.1W
161800Z	15.0N	113.5W	200000Z	16.1N	119.7W
170000Z	15.0N	114.9W	200600Z	16.0N	119.0W
170600Z	15.0N	115.5W	201200Z	15.7N	118.6W
171200Z	14.8N	116.1W	201800Z	15.2N	118.1W
171800Z	14.6N	116.8W			

TROPICAL STORM KIRSTEN
25 SEP-29 SEP

DTG	LAT	LONG	DTG	LAT	LONG
252100Z	18.0N	114.5W	271200Z	20.5N	113.1W
260000Z	18.5N	114.7W	271800Z	20.8N	112.6W
260600Z	19.0N	114.8W	280000Z	21.5N	112.5W
261200Z	19.5N	114.9W	280600Z	22.8N	112.3W
261800Z	20.2N	114.6W	281200Z	24.0N	111.3W
270000Z	20.5N	114.1W	281800Z	25.0N	110.0W
270600Z	20.5N	113.5W	290000Z	26.3N	109.3W

TROPICAL STORM LORRAINE
04 OCT-05 OCT

DTG	LAT	LONG	DTG	LAT	LONG
040000Z	16.0N	104.0W	041800Z	17.2N	102.8W
040600Z	16.5N	103.6W	050000Z	17.8N	103.0W
041200Z	16.5N	103.0W	050600Z	18.3N	102.8W

TROPICAL STORM MAGGIE
16 OCT-19 OCT

DTG	LAT	LONG	DTG	LAT	LONG
160300Z	09.0N	091.0W	171800Z	13.6N	100.1W
160600Z	09.3N	091.8W	180000Z	14.2N	101.1W
161200Z	10.0N	093.4W	180600Z	14.4N	102.5W
161800Z	10.6N	094.9W	181200Z	15.7N	103.6W
170000Z	11.2N	096.6W	181800Z	17.3N	104.3W
170600Z	11.8N	098.0W	190000Z	18.6N	104.7W
171200Z	12.7N	099.0W	190600Z	20.0N	104.8W

TROPICAL DEPRESSIONS 1966
POSITION DATA

TROPICAL DEPRESSION 02
28 JUN-30 JUN

DTG	LAT	LONG	DTG	LAT	LONG
281200Z	14.0N	095.0W	291800Z	13.6N	097.0W
281800Z	13.6N	095.3W	300000Z	13.7N	097.6W
290000Z	13.5N	095.8W	300600Z	13.5N	098.2W
290600Z	13.5N	096.3W	301200Z	13.5N	098.7W
291200Z	13.5N	096.7W	301800Z	13.6N	099.1W

TROPICAL DEPRESSION 03
11 JUL

DTG	LAT	LONG	DTG	LAT	LONG
110000Z	11.5N	128.5W	111200Z	11.5N	129.5W
110600Z	11.5N	129.0W	111800Z	115.N	130.0W

TROPICAL DEPRESSION 06
11 AUG-13 AUG

DTG	LAT	LONG	DTG	LAT	LONG
111800Z	20.0N	108.5W	130000Z	22.9N	110.2W
120000Z	20.5N	108.0W	130600Z	23.1N	111.2W
120600Z	21.4N	107.9W	131200Z	24.0N	111.8W
121200Z	22.3N	108.5W	131800Z	25.0N	111.7W
121800Z	22.7N	109.4W			

TROPICAL DEPRESSION 07
15 AUG-16 AUG

DTG	LAT	LONG	DTG	LAT	LONG
151800Z	20.5N	113.0W	160600Z	21.6N	114.1W
160000Z	21.0N	113.5W	161200Z	22.3N	114.8W

TROPICAL DEPRESSION 09
17 AUG

DTG	LAT	LONG	DTG	LAT	LONG
170000Z	19.0N	113.0W	171200Z	19.5N	114.2W
170600Z	19.3N	113.5W	17.800Z	19.5N	115.0W

HURRICANE ADELE - 211800Z TO 241200Z JUNE

I. DATA

A. Statistics

1. Number of warnings issued - 21
2. Number of warnings with hurricane intensity - 6
3. Total distance traveled during tropical warning period - 372 mi

B. Characteristics

1. Minimum observed SLP - 982 mbs at 240300Z
2. Minimum observed 700mb height - 3090 m. at 240000Z
3. Maximum surface wind - 64 kts
4. Maximum radius of surface circulation - 580 mi

II. DEVELOPMENT

A. Initial impetus - ITCZ

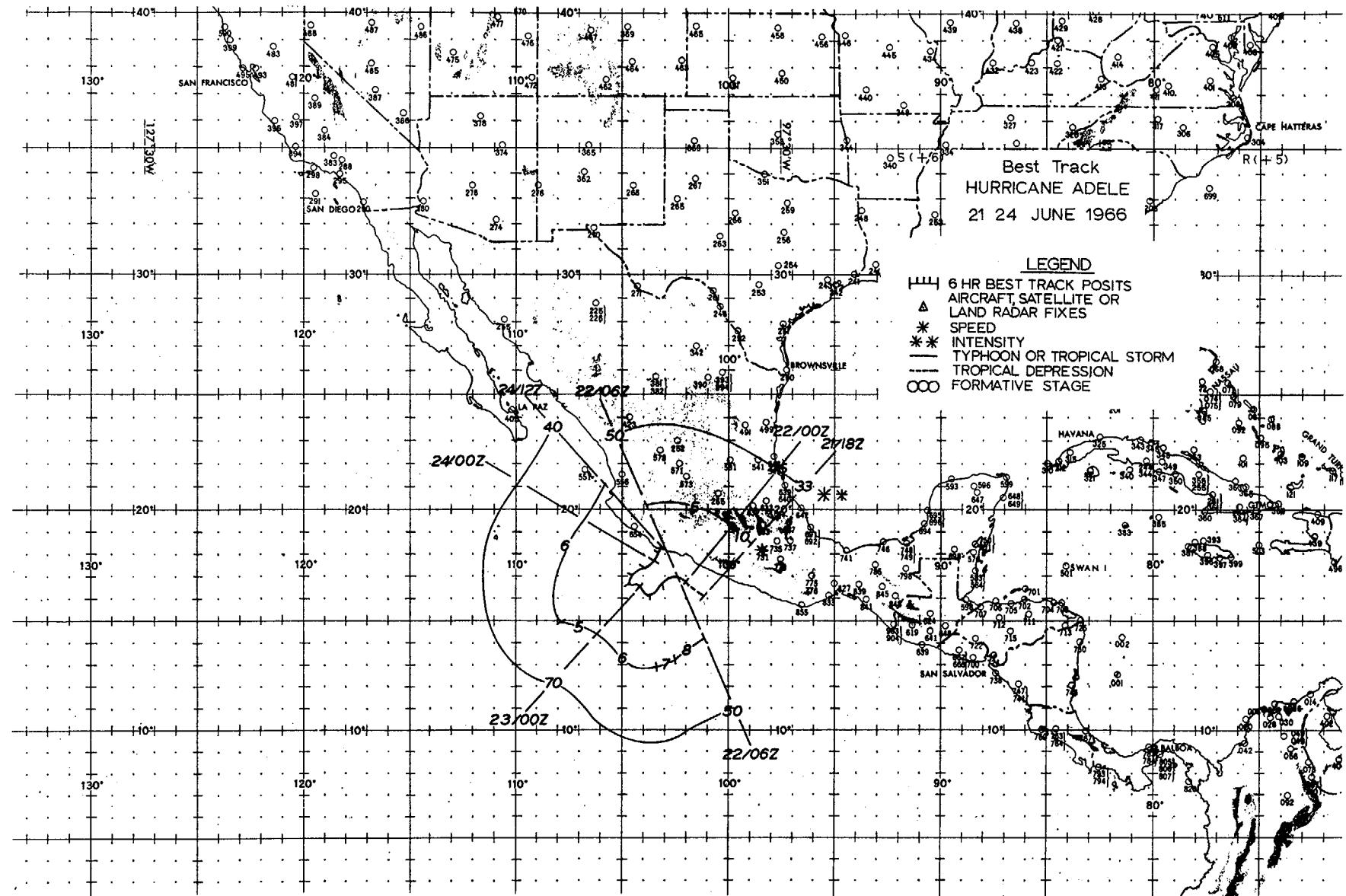
B. Initial surface vortex

1. 211800Z
2. Surface pressure less than 1008 mbs

C. Time storm reached hurricane intensity - 230000Z

III. FINAL DISPOSITION

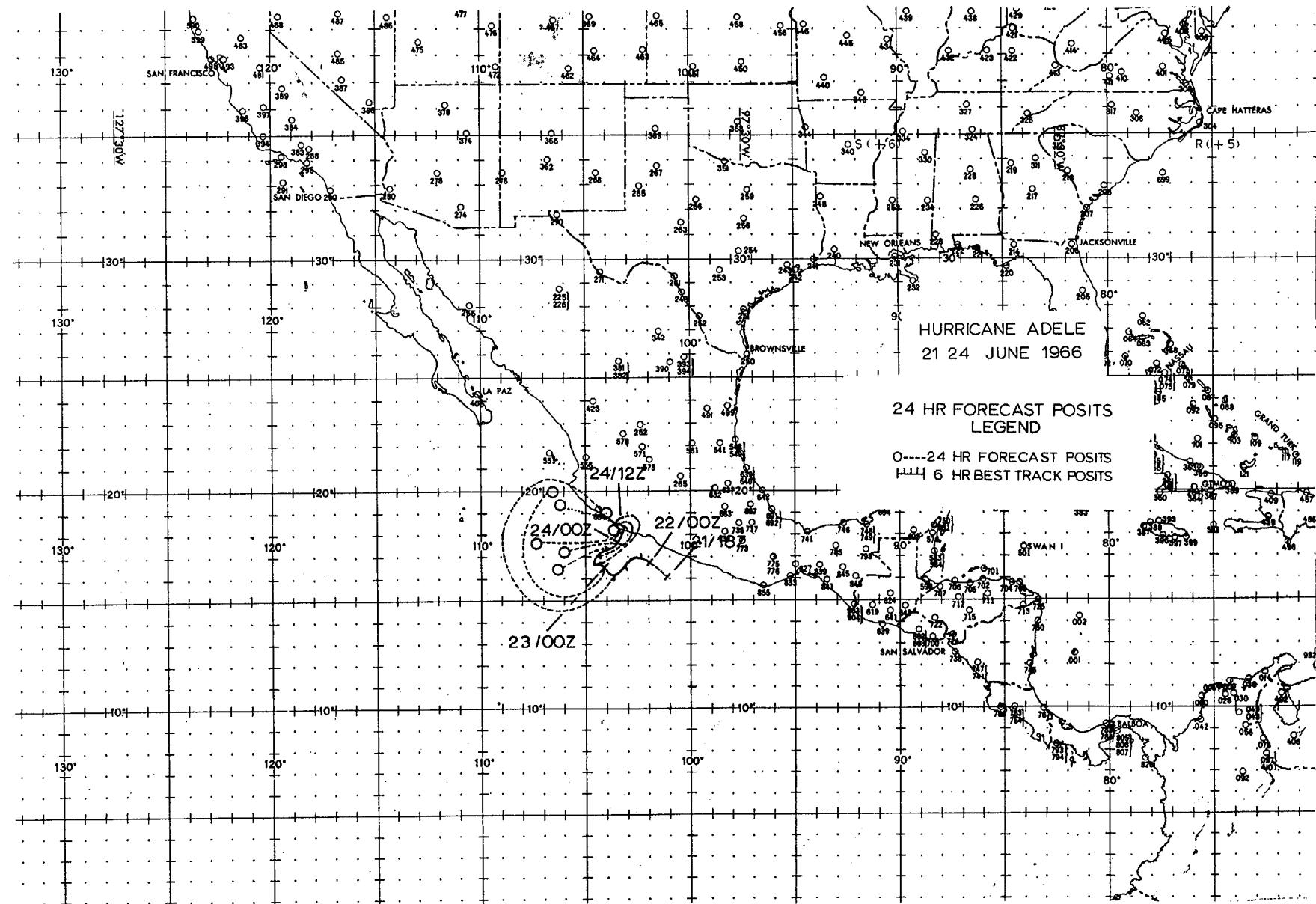
A. Dissipated over land



HURRICANE ADELE 21 JUN-24 JUN 1966
 POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION		24 HOUR ERROR	48 HOUR ERROR
	LAT.	LONG.	DEG. DISTANCE	DEG. DISTANCE
211800Z	16.1N	101.2W	-----	-----
220000Z	16.8N	102.0W	-----	-----
220600Z	17.0N	102.5W	-----	-----
221200Z	16.6N	102.5W	-----	-----
221800Z	16.0N	103.9W	343-177	-----
230000Z	16.4N	104.1W	326-261	-----
230600Z	16.5N	104.6W	028-099	-----
231200Z	16.9N	104.5W	041-085	-----
231800Z	17.2N	104.0W	255-141	-----
240000Z	17.6N	103.5W	263-148	-----
240600Z	18.0N	103.3W	266-248	-----
241200Z	18.5N	103.2W	291-189	-----

AVERAGE 24 HOUR ERROR 181 MI



HURRICANE BLANCA - 021800Z TO 120000Z AUG

I. DATA

A. Statistics

1. Number of warnings issued - 30
2. Number of warnings with hurricane intensity - 3
3. Total distance traveled during tropical warning period - 2574 mi

B. Characteristics

1. Minimum observed SLP - 990mb at 031600Z
2. Minimum observed 700mb height - 3170m. at 030000Z
3. Maximum surface wind - 70 kts
4. Maximum radius of surface circulation - 250 mi

II. DEVELOPMENT

A. Initial impetus - ITCZ

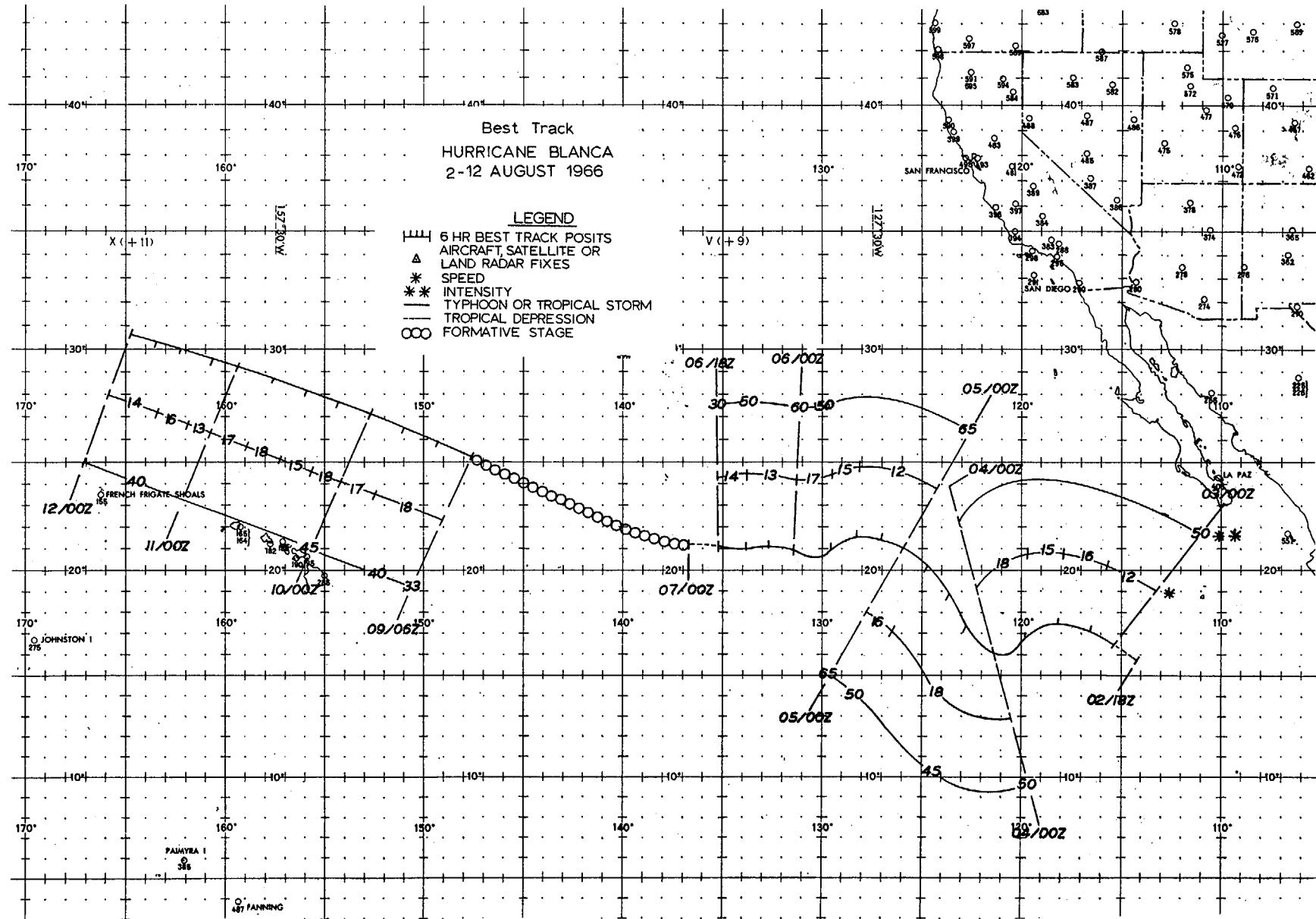
B. Initial surface vortex

1. 020000Z
2. Surface pressure less than 1006mb

C. Time storm reached hurricane intensity - 050000Z

III. FINAL DISPOSITION

A. Dissipated over water



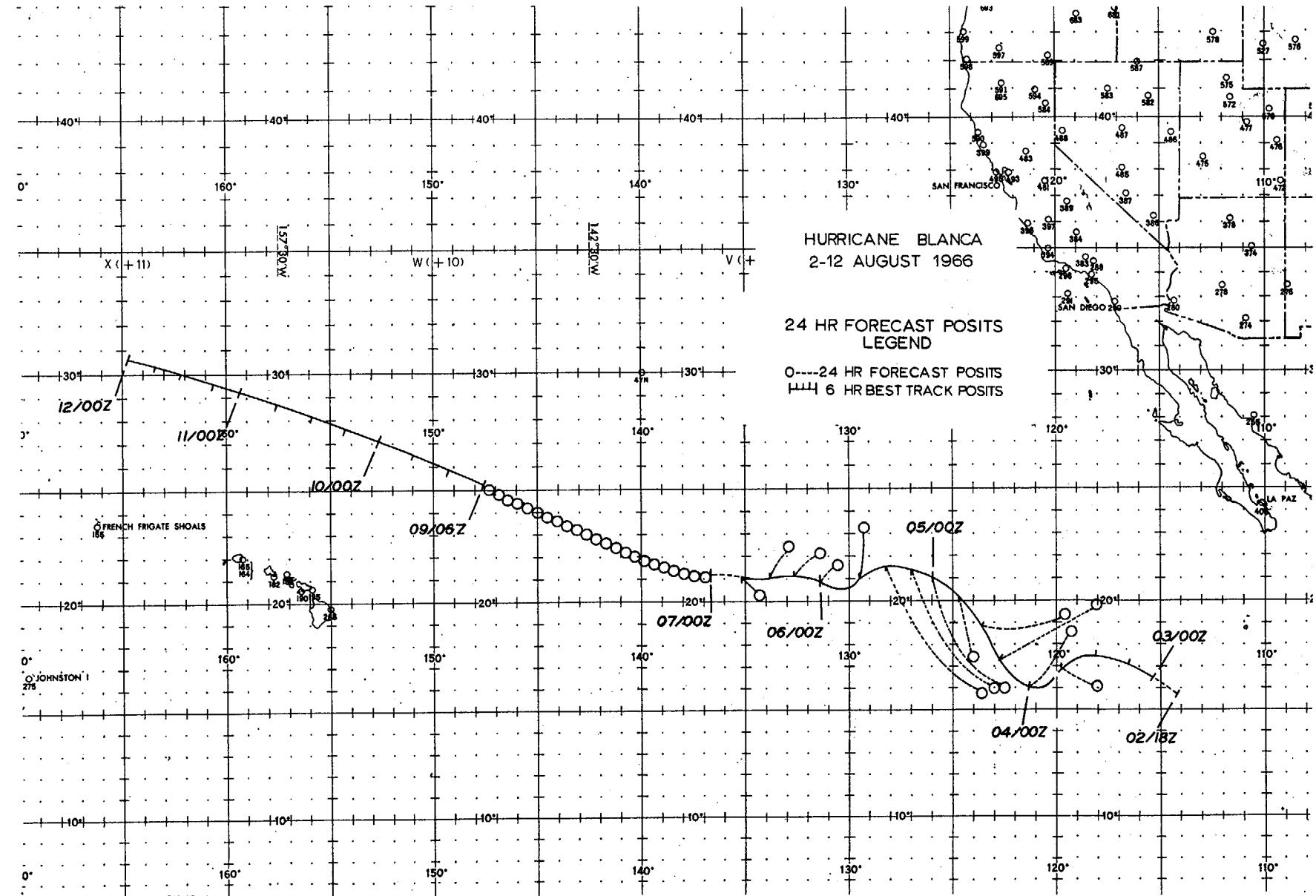
HURRICANE BLANCA 02 AUG-12 AUG 1966
 POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION		24 HOUR ERROR	48 HOUR ERROR
	LAT.	LONG.	DEG. DISTANCE	DEG. DISTANCE
021800Z	15.9N	114.0W	-----	-----
030000Z	16.3N	115.2W	-----	-----
030600Z	17.0N	116.8W	-----	-----
031200Z	17.6N	118.2W	-----	-----
031800Z	16.7N	119.8W	106-112	-----
040000Z	16.1N	121.3W	040-178	-----
040600Z	17.4N	122.5W	045-314	-----
041200Z	18.8N	123.6W	069-267	-----
041800Z	20.2N	124.7W	163-172	-----
050000Z	21.0N	126.0W	144-366	104-240
050600Z	21.3N	127.2W	141-405	083-688
051200Z	21.5N	128.4W	140-464	083-420
051800Z	20.8N	129.7W	014-156	150-229
060000Z	21.0N	131.5W	056-085	127-518
060600Z	21.0N	132.7W	049-103	126-570
061200Z	21.0N	133.9W	032-105	125-616
061800Z	21.2N	135.3W	123-078	024-198
070000Z	21.2N	136.8W	105-055	032-094
090600Z	25.3N	147.6W	-----	-----
091200Z	25.9N	149.3W	-----	-----
091800Z	26.6N	151.0W	-----	-----
100000Z	27.3N	152.7W	-----	-----
100600Z	27.7N	154.3W	-----	-----
101200Z	28.3N	155.9W	-----	-----
101800Z	28.8N	157.7W	-----	-----
110000Z	29.4N	159.4W	-----	-----
110600Z	29.7N	160.7W	-----	-----
111200Z	30.0N	162.1W	-----	-----
111800Z	30.4N	163.5W	-----	-----
120000Z	30.7N	164.9W	-----	-----

AVERAGE 24 HOUR ERROR 204 MI

AVERAGE 48 HOUR ERROR 463 MI

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HURRICANE CONNIE - 072200Z TO 171800Z AUG

I. DATA

A. Statistics

1. Number of warnings issued - 41
2. Number of warnings with hurricane intensity - 8
3. Total distance traveled during tropical warning period - 1948 mi

B. Characteristics as a hurricane

1. Minimum observed SLP - 1004mb 140000Z through 151200Z
2. Minimum observed 700mb height - 2996m. at 150000Z
3. Maximum surface wind - 86 kts
4. Maximum radius of surface circulation - 330 mi

II. DEVELOPMENT

A. Initial impetus - ITCZ

B. Initial surface vortex

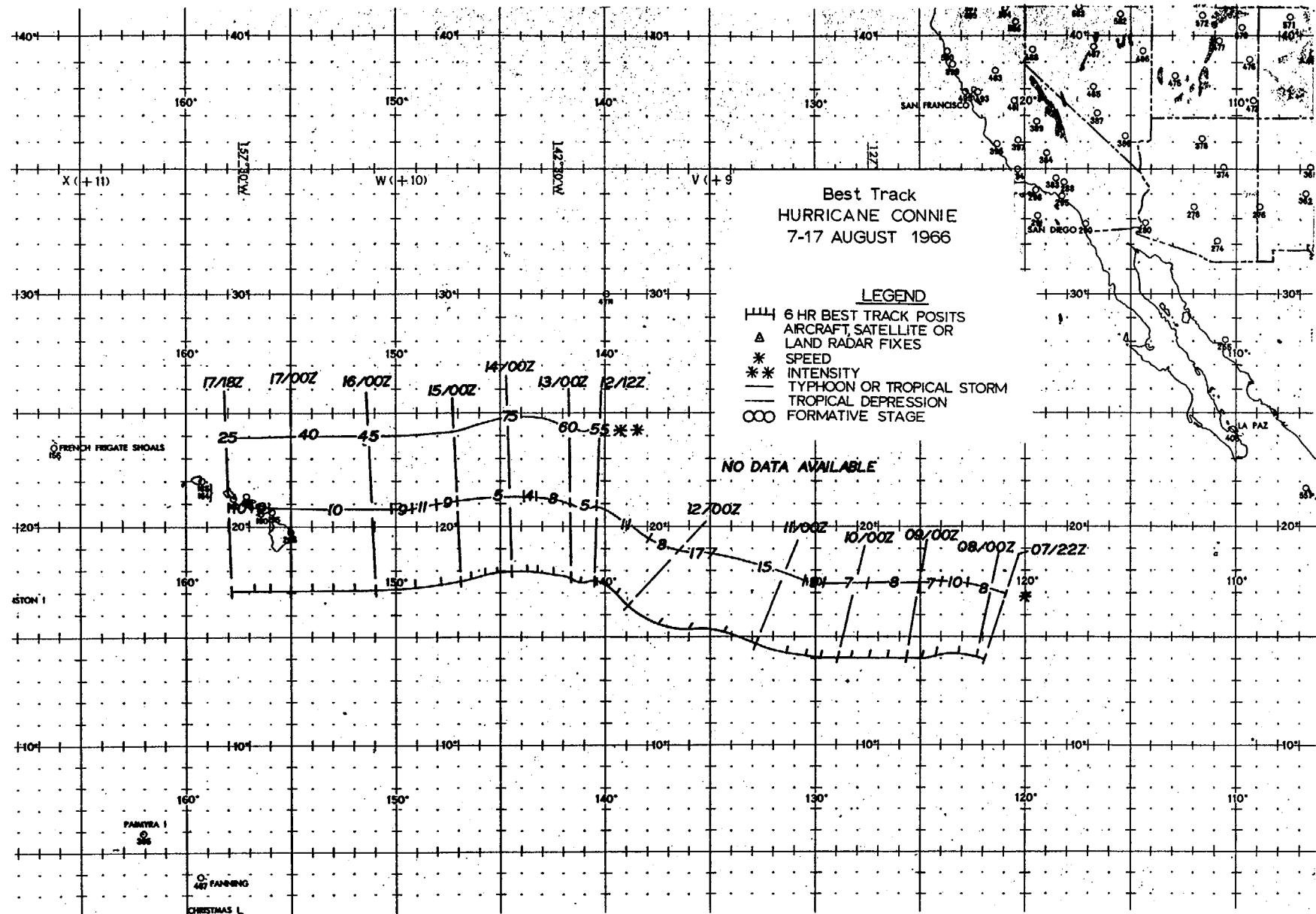
1. 140000Z
2. Surface pressure 1004mb

C. Time storm reached hurricane intensity - 140000Z

III. FINAL DISPOSITION

A. Dissipated over water

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HURRICANE CONNIE 07 AUG-17 AUG 1966
POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION		24 HOUR ERROR	48 HOUR ERROR
	LAT.	LONG.	DEG. DISTANCE	DEG. DISTANCE
072200Z	14.0N	122.0W	-----	-----
080000Z	14.1N	122.3W	-----	-----
080600Z	14.2N	123.2W	-----	-----
081200Z	14.1N	124.2W	-----	-----
081800Z	14.0N	125.0W	-----	-----
090000Z	14.0N	125.8W	-----	-----
090600Z	14.0N	126.6W	-----	-----
091200Z	14.0N	127.4W	-----	-----
091800Z	14.0N	128.2W	-----	-----
100000Z	14.0N	129.0W	-----	-----
100600Z	14.0N	129.8W	-----	-----
101200Z	14.1N	130.5W	-----	-----
101800Z	14.3N	131.4W	-----	-----
110000Z	14.8N	132.9W	-----	-----
110600Z	15.2N	134.4W	-----	-----
111200Z	15.4N	136.0W	-----	-----
111800Z	15.6N	137.5W	-----	-----
120000Z	16.2N	139.0W	-----	-----
120600Z	17.0N	139.5W	-----	-----
121200Z	17.5N	140.5W	-----	-----
121800Z	17.5N	141.2W	-----	-----
130000Z	17.8N	141.7W	-----	-----
130600Z	17.9N	142.5W	-----	-----
131200Z	18.0N	143.1W	305-118	-----
131800Z	18.0N	143.7W	285-185	-----
140000Z	18.0N	144.5W	317-135	-----
140600Z	18.0N	145.1W	318-165	-----
141200Z	17.8N	145.7W	323-190	313-230
141800Z	17.7N	146.4W	320-225	290-330
150000Z	17.5N	146.9W	316-045	321-270
150600Z	17.4N	147.9W	025-048	326-285
151200Z	17.3N	149.1W	050-075	330-315
151800Z	17.2N	150.0W	057-095	332-335

HURRICANE CONNIE 07 AUG-17 AUG 1966
 POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION		24 HOUR ERROR	48 HOUR ERROR
	LAT.	LONG.	DEG. DISTANCE	DEG. DISTANCE
160000Z	17.2N	151.0W	077-090	101-070
160600Z	17.1N	152.0W	080-105	060-125
161200Z	17.1N	153.0W	080-120	064-150
161800Z	17.1N	154.0W	077-120	068-165
170000Z	17.1N	155.0W	307-025	079-165
170600Z	17.1N	156.0W	302-032	082-185
171200Z	17.1N	156.8W	325-045	084-150
171800Z	17.1N	157.8W	000-000	080-148
AVERAGE 24 HOUR ERROR	FWC ALAMEDA		76 MI	
	FWC PEARL HARBOR		101 MI	
AVERAGE 48 HOUR ERROR	FWC ALAMEDA		177 MI	
	FWC PEARL HARBOR		217 MI	

HURRICANE DOLORES - 161800Z TO 260000Z AUGUST

I. DATA

A. Statistics

1. Number of warnings issued - 38
2. Number of warnings with hurricane intensity - 4
3. Total distance traveled during tropical warning period - 2580 mi

B. Characteristics

1. Minimum observed SLP - 981 mbs at 210600Z
2. Minimum observed 700mb height - 3140m. at 191200Z
3. Maximum surface wind - 75 kts
4. Maximum radius of surface circulation - 650 mi

II. DEVELOPMENT

A. Initial impetus - ITCZ

B. Initial surface vortex

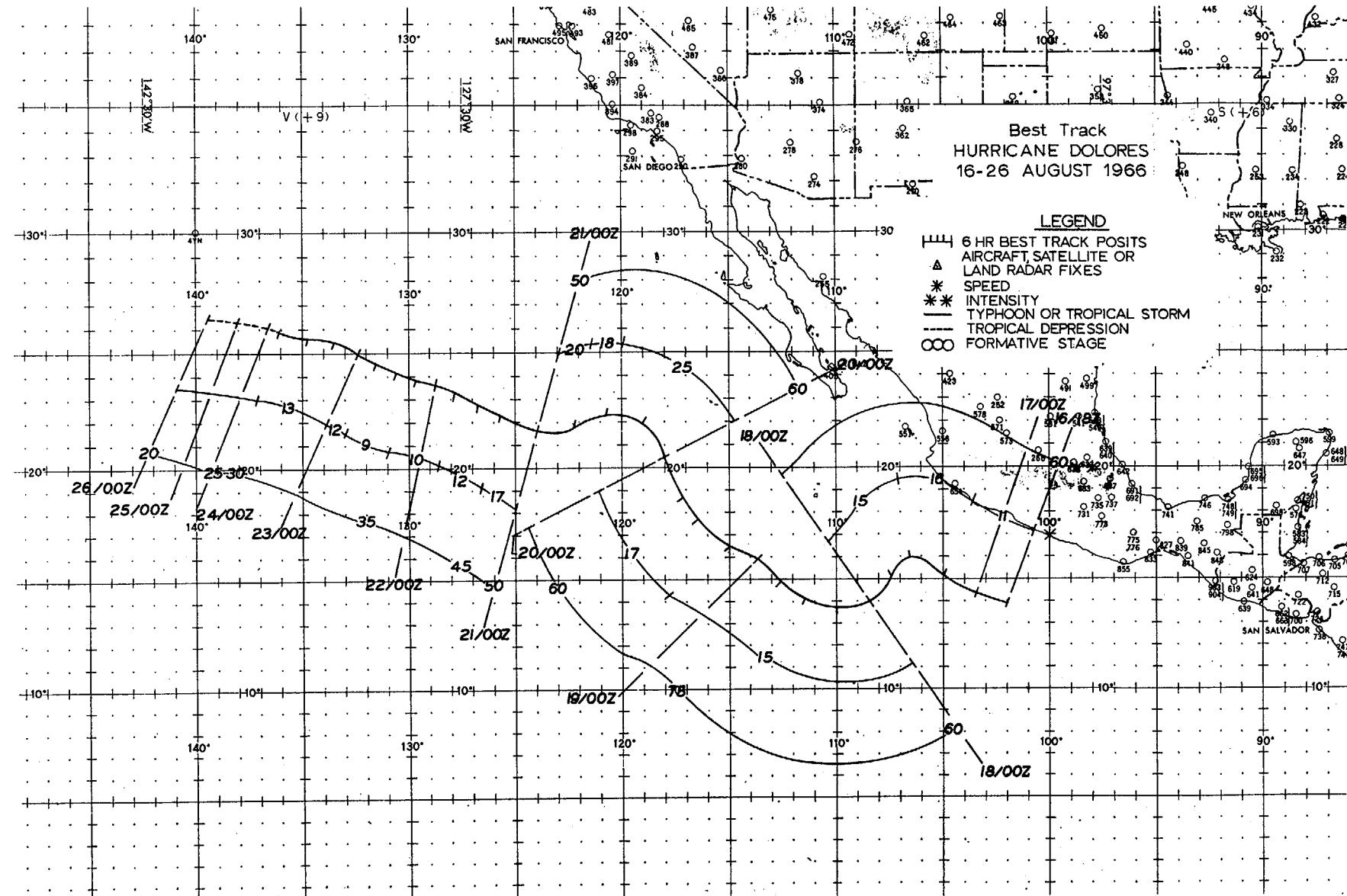
1. 160000Z
2. Surface pressure less than 1008 mbs

C. Time storm reached hurricane intensity - 181800Z

III. FINAL DISPOSITION

A. Dissipated over water

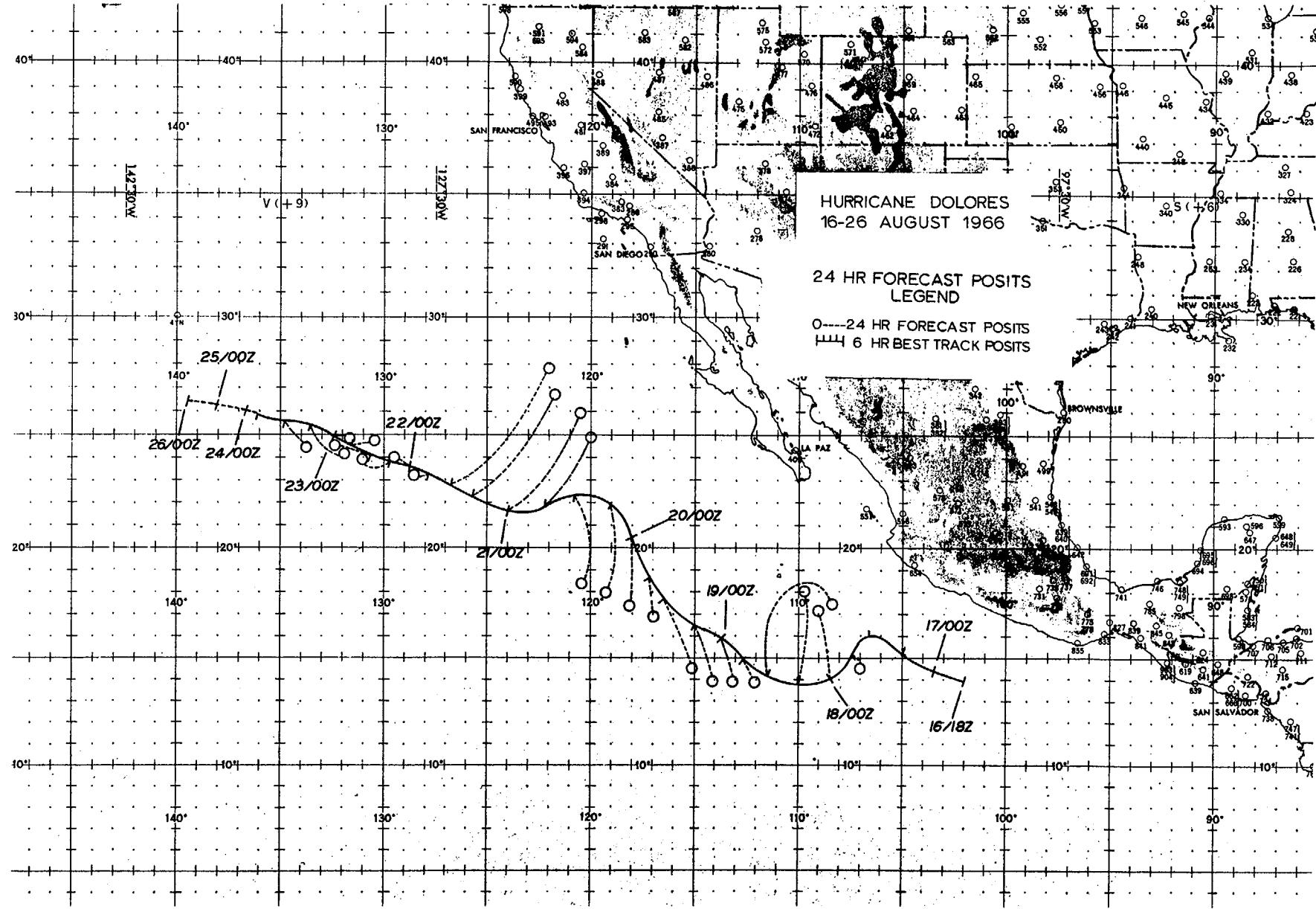
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HURRICANE DOLORES 16 AUG-26 AUG 1966
 POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION		24 HOUR ERROR	48 HOUR ERROR
	LAT.	LONG.	DEG. DISTANCE	DEG. DISTANCE
161800Z	14.0N	102.0W	-----	-----
170000Z	14.5N	103.5W	-----	-----
170600Z	15.2N	105.0W	-----	-----
171200Z	16.0N	106.6W	-----	-----
171800Z	15.1N	107.4W	138-030	-----
180000Z	13.9N	108.3W	348-202	-----
180600Z	13.8N	109.9W	342-255	-----
181200Z	14.3N	111.3W	043-250	-----
181800Z	15.1N	112.4W	163-068	073-116
190000Z	15.9N	113.6W	162-118	008-249
190600Z	16.5N	115.0W	162-159	023-245
191200Z	17.7N	116.3W	158-193	078-366
191800Z	18.9N	117.1W	173-112	149-247
200000Z	20.4N	118.0W	182-172	165-313
200600Z	21.9N	118.9W	186-235	171-396
201200Z	22.3N	120.7W	175-235	164-384
201800Z	21.6N	122.2W	033-245	150-267
210000Z	21.8N	124.2W	045-335	134-225
210600Z	22.4N	125.7W	044-354	133-185
211200Z	22.8N	126.8W	044-418	145-205
211800Z	23.4N	127.8W	270-038	043-530
220000Z	23.6N	128.8W	282-055	040-585
220600Z	23.8N	129.8W	279-074	033-516
221200Z	24.2N	130.6W	287-107	032-568
221800Z	24.5N	131.3W	075-047	288-096
230000Z	25.0N	132.4W	103-058	287-162
230600Z	25.4N	133.6W	125-126	287-658
231200Z	25.6N	134.7W	138-090	048-037
231800Z	26.0N	136.0W	102-062	075-050
240000Z	26.1N	136.6W	275-092	132-125
250000Z	26.3N	138.1W	264-066	156-074
260000Z	26.4N	139.5W	097-192	067-030

AVERAGE 24 HOUR ERROR 162 MI
 AVERAGE 48 HOUR ERROR 278 MI



HURRICANE EILEEN - 230000Z TO 290600Z AUGUST

I. DATA

A. Statistics

1. Number of warnings issued - 26
2. Number of warnings with hurricane intensity - 5
3. Total distance traveled during tropical warning period - 1290 mi

B. Characteristics

1. Minimum observed SLP - 990 mbs at 260745Z
2. Minimum observed 700mb height - 3150 m. at 270000Z
3. Maximum surface wind - 70 kts
4. Maximum radius of surface circulation - 420 mi

II. DEVELOPMENT

A. Initial impetus - ITCZ

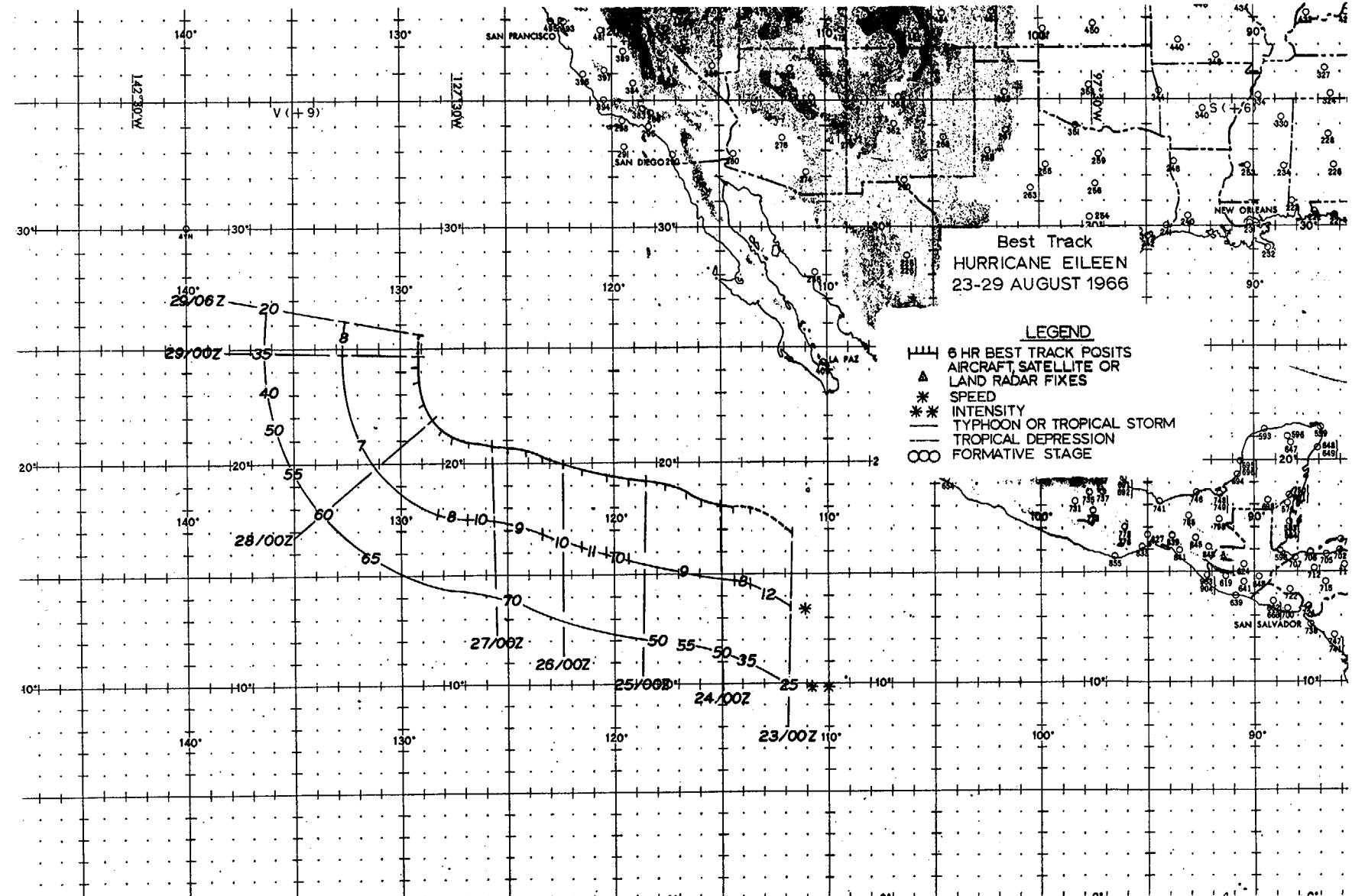
B. Initial surface vortex

1. 230000Z
2. Surface pressure less than 1010 mbs

C. Time storm reached hurricane intensity - 261800Z

III. FINAL DISPOSITION

A. Dissipated over water



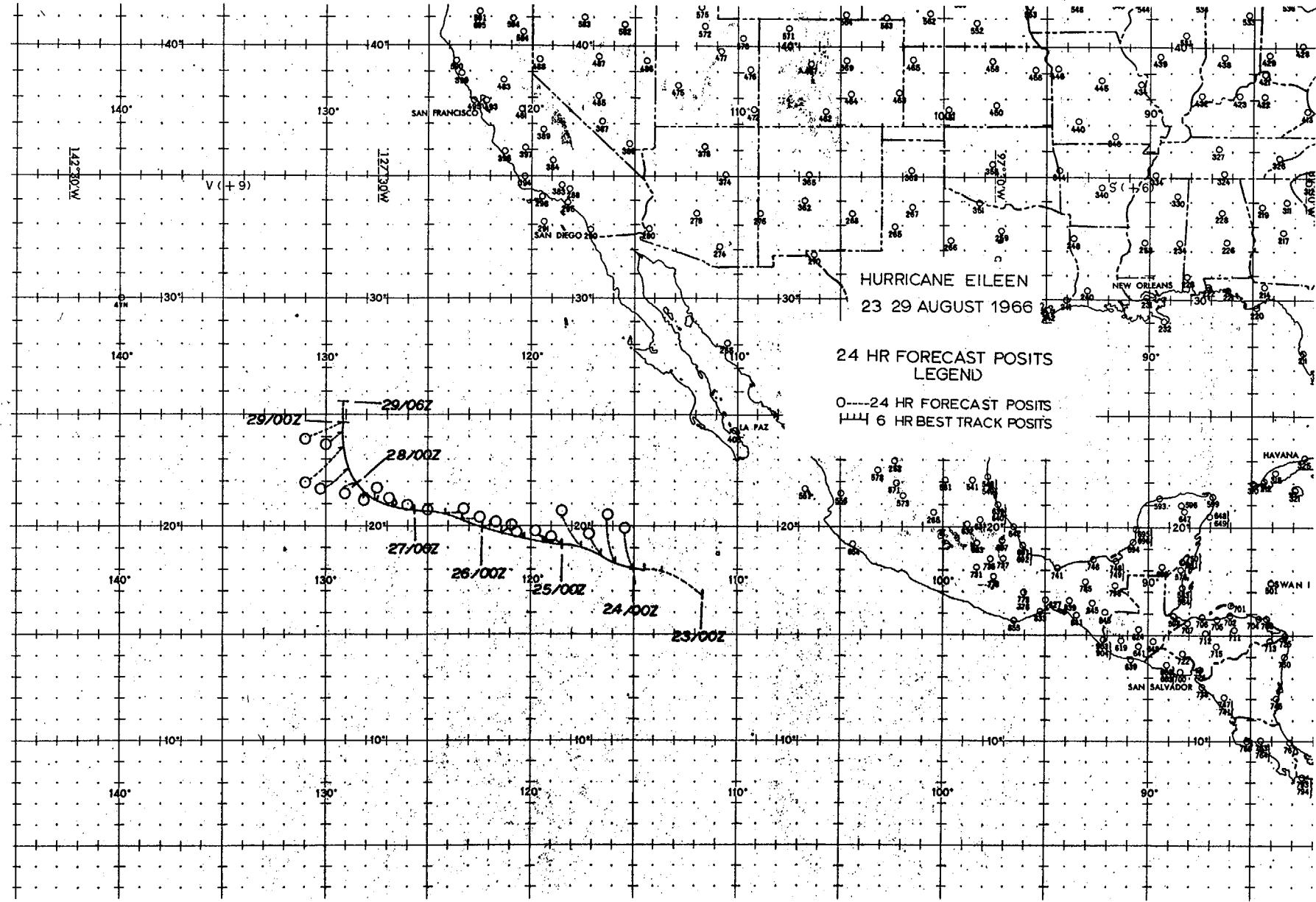
HURRICANE EILEEN 23 AUG-29 AUG 1966
POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION		24 HOUR ERROR	48 HOUR ERROR
	LAT.	LONG.	DEG. DISTANCE	DEG. DISTANCE
230000Z	16.7N	111.7W	-----	-----
230600Z	17.6N	112.5W	-----	-----
231200Z	18.0N	113.6W	-----	-----
231800Z	18.0N	114.3W	-----	-----
240000Z	18.1N	115.2W	351-110	-----
240600Z	18.5N	116.0W	352-115	-----
241200Z	18.7N	116.8W	307-102	-----
241800Z	19.0N	117.7W	332-115	-----
250000Z	19.2N	118.5W	302-049	-----
250600Z	19.3N	119.4W	322-036	-----
251200Z	19.5N	120.4W	285-012	-----
251800Z	19.8N	121.5W	064-039	325-189
260000Z	20.0N	122.4W	083-054	321-084
260600Z	20.3N	123.3W	090-054	329-069
261200Z	20.5N	124.1W	079-055	330-038
261800Z	20.5N	125.0W	360-012	051-076
270000Z	20.7N	125.8W	349-020	071-096
270600Z	20.8N	126.7W	326-021	072-097
271200Z	21.1N	127.5W	335-023	063-081
271800Z	21.6N	128.0W	182-014	082-106
280000Z	22.1N	128.4W	239-055	190-024
280600Z	22.7N	128.8W	236-103	216-055
281200Z	23.3N	129.0W	237-140	235-114
281800Z	23.9N	129.1W	250-054	230-144

AVERAGE 24 HOUR ERROR 72 MI

AVERAGE 48 HOUR ERROR 128 MI

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HURRICANE FRANCESCA - 052028Z TO 160600Z SEPTEMBER

I. DATA

A. Statistics

1. Number of warnings issued - 44
2. Number of warnings with hurricane intensity - 12
3. Total distance traveled during tropical warning period - 2400 mi

B. Characteristics

1. Minimum observed SLP - 992 mbs at 120000Z
2. Minimum observed 700mb height - 3150 m. at 121200Z
3. Maximum surface wind - 68 kts
4. Maximum radius of surface circulation - 450 mi

II. DEVELOPMENT

A. Initial impetus - ITCZ

B. Initial surface vortex

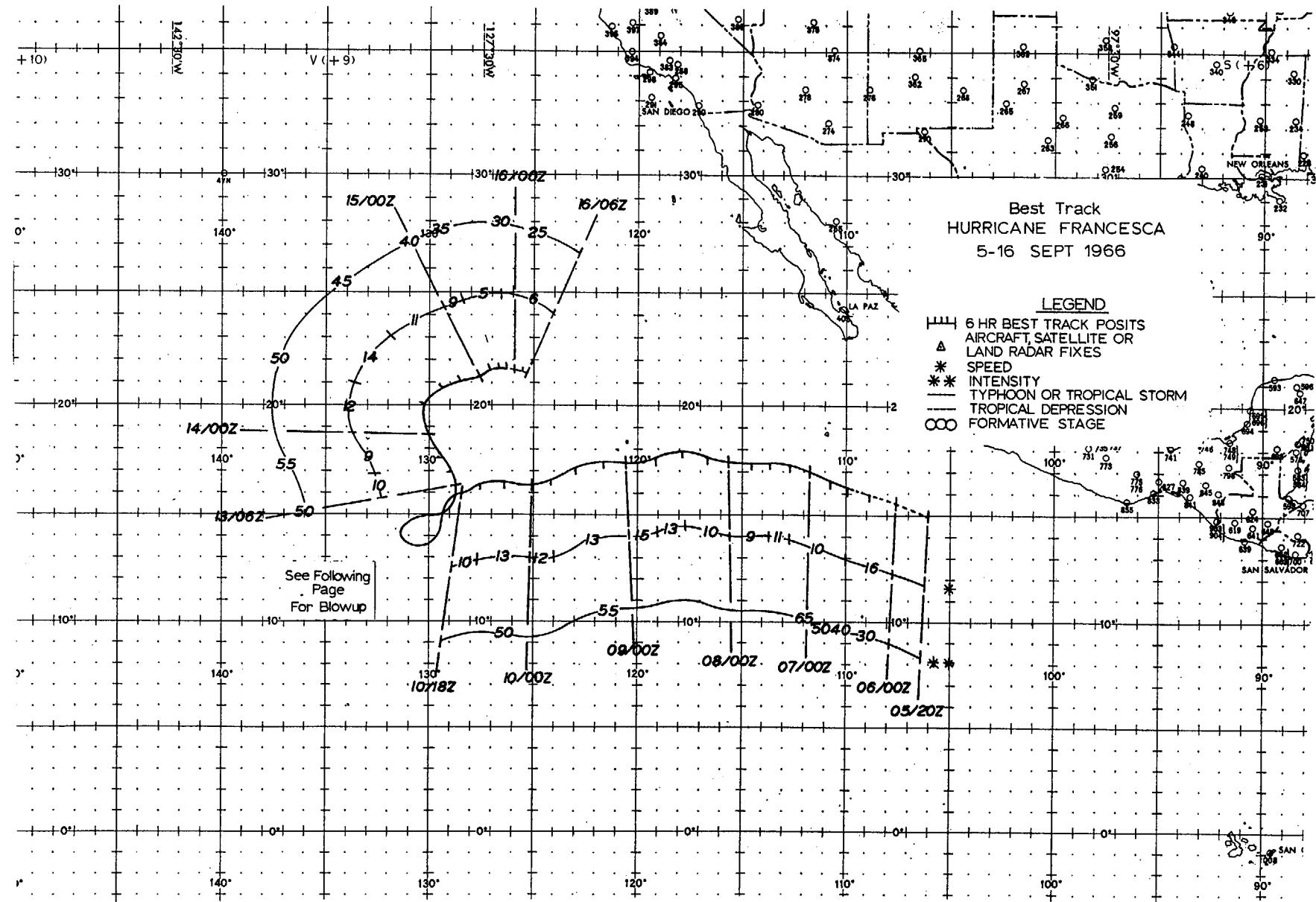
1. 051800Z
2. Surface pressure less than 1008 mbs

C. Time storm reached hurricane intensity - 061800Z

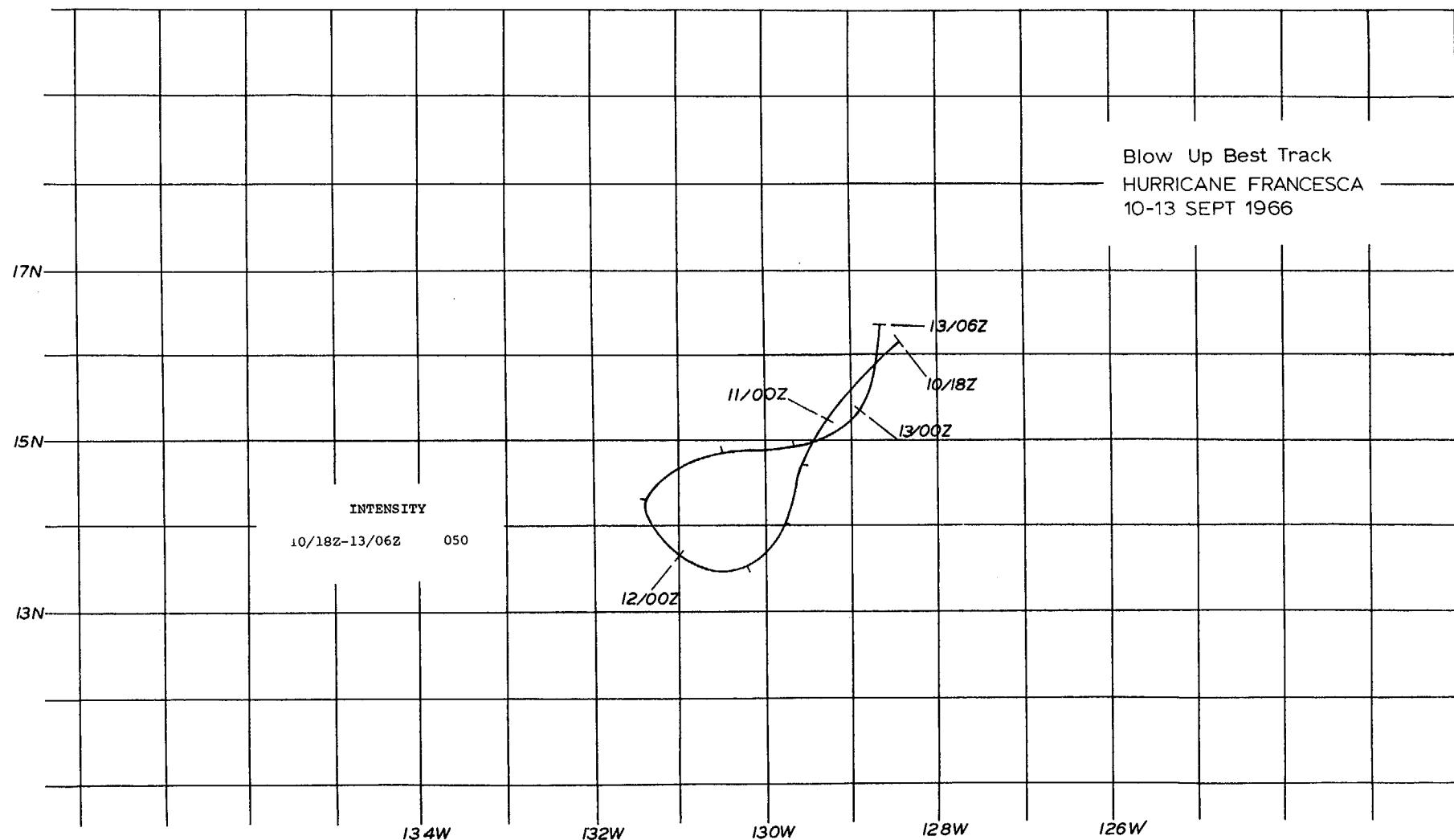
III. FINAL DISPOSITION

A. Dissipated over water

452



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HURRICANE FRANCESCA 05 SEP-16 SEP 1966
 POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION		24 HOUR ERROR	48 HOUR ERROR
	LAT.	LONG.	DEG. DISTANCE	DEG. DISTANCE
052000Z	15.0N	106.0W	-----	-----
060000Z	15.7N	107.4W	-----	-----
060600Z	16.0N	108.9W	-----	-----
061200Z	16.2N	109.7W	-----	-----
061800Z	16.6N	110.7W	053-106	-----
070000Z	16.9N	111.6W	052-130	-----
070600Z	17.2N	112.6W	294-105	-----
071200Z	17.4N	113.7W	356-096	-----
071800Z	17.3N	114.5W	339-050	-----
080000Z	17.5N	115.5W	332-074	-----
080600Z	17.7N	116.5W	331-087	-----
081200Z	17.9N	117.8W	342-095	359-209
081800Z	17.6N	119.0W	053-048	347-136
090000Z	17.5N	120.5W	056-078	357-163
090600Z	17.5N	121.6W	056-084	360-186
091200Z	17.2N	123.0W	038-163	004-226
091800Z	16.5N	124.0W	360-062	036-168
100000Z	16.3N	125.1W	350-072	034-187
100600Z	16.5N	126.3W	349-062	036-193
101200Z	16.4N	127.5W	291-015	029-282
101800Z	16.1N	128.4W	255-068	327-160
110000Z	15.3N	129.3W	327-077	350-136
110600Z	14.6N	129.6W	318-144	347-174
111200Z	14.0N	129.7W	313-212	328-241
111800Z	13.6N	130.2W	305-174	289-241
120000Z	13.7N	131.0W	310-150	289-278
120600Z	14.3N	131.4W	289-153	282-302
121200Z	14.9N	130.5W	270-265	281-348
121800Z	14.9N	129.7W	246-284	267-424
130000Z	15.3N	128.9W	244-361	263-477
130600Z	16.3N	128.6W	241-472	258-565
131200Z	17.0N	129.0W	235-516	254-612
131800Z	17.6N	129.7W	274-290	230-592

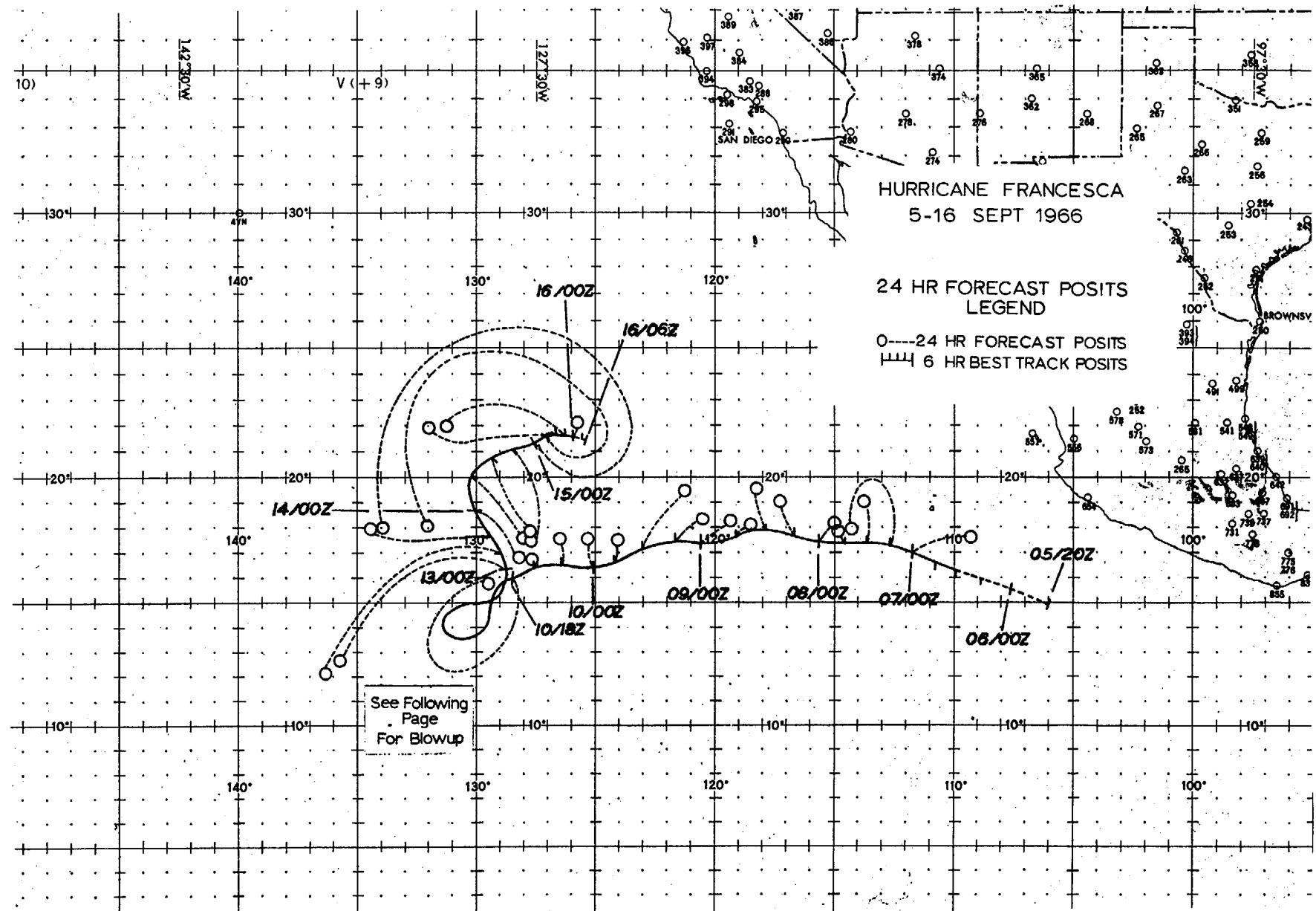
HURRICANE FRANCESCA 05 SEP-16 SEP 1966
 POSITION AND FORECAST VERIFICATION DATA

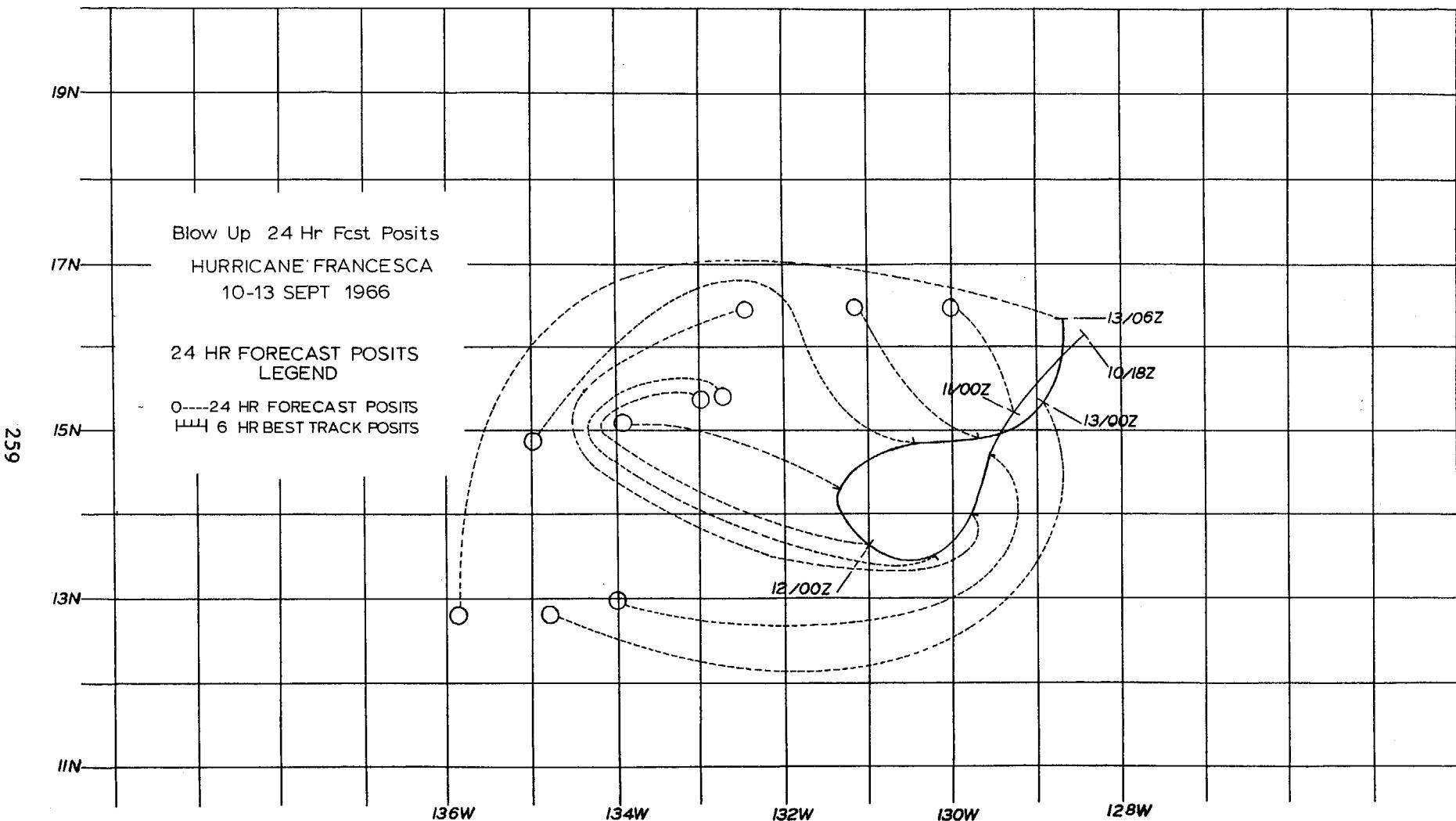
DTG	STORM POSITION		24 HOUR ERROR	48 HOUR ERROR
	LAT.	LONG.	DEG. DISTANCE	DEG. DISTANCE
140000Z	18.8N	130.1W	137-160	231-645
140600Z	20.1N	130.2W	140-207	235-735
141200Z	20.8N	129.4W	157-207	231-803
141800Z	21.1N	128.4W	175-216	269-527
150000Z	21.3N	127.5W	243-424	184-162
150600Z	21.5N	127.1W	233-366	189-152
151200Z	21.5N	126.7W	278-324	198-121
151800Z	21.5N	126.3W	275-308	202-258
160000Z	21.5N	126.0W	007-097	212-238
160600Z	21.5N	125.5W	360-042	188-213

AVERAGE 24 HOUR ERROR 157 MI

AVERAGE 48 HOUR ERROR 329 MI

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HURRICANE HELGA - 091200Z TO 150600 SEPTEMBER

I. DATA

A. Statistics

1. Number of warnings issued - 24
2. Number of warnings with hurricane intensity - 5
3. Total distance traveled during tropical warning period - 1365 mi

B. Characteristics

1. Minimum observed SLP - 992 mbs at 141800Z
2. Minimum observed 700mb height - 3150 m. at 121200Z
3. Maximum surface wind - 68 kts
4. Maximum radius of surface circulation - 600 mi

II. DEVELOPMENT

A. Initial impetus - ITCZ

B. Initial surface vortex

1. 091200Z
2. Surface pressure less than 1008 mbs

C. Time storm reached hurricane intensity - 121800Z

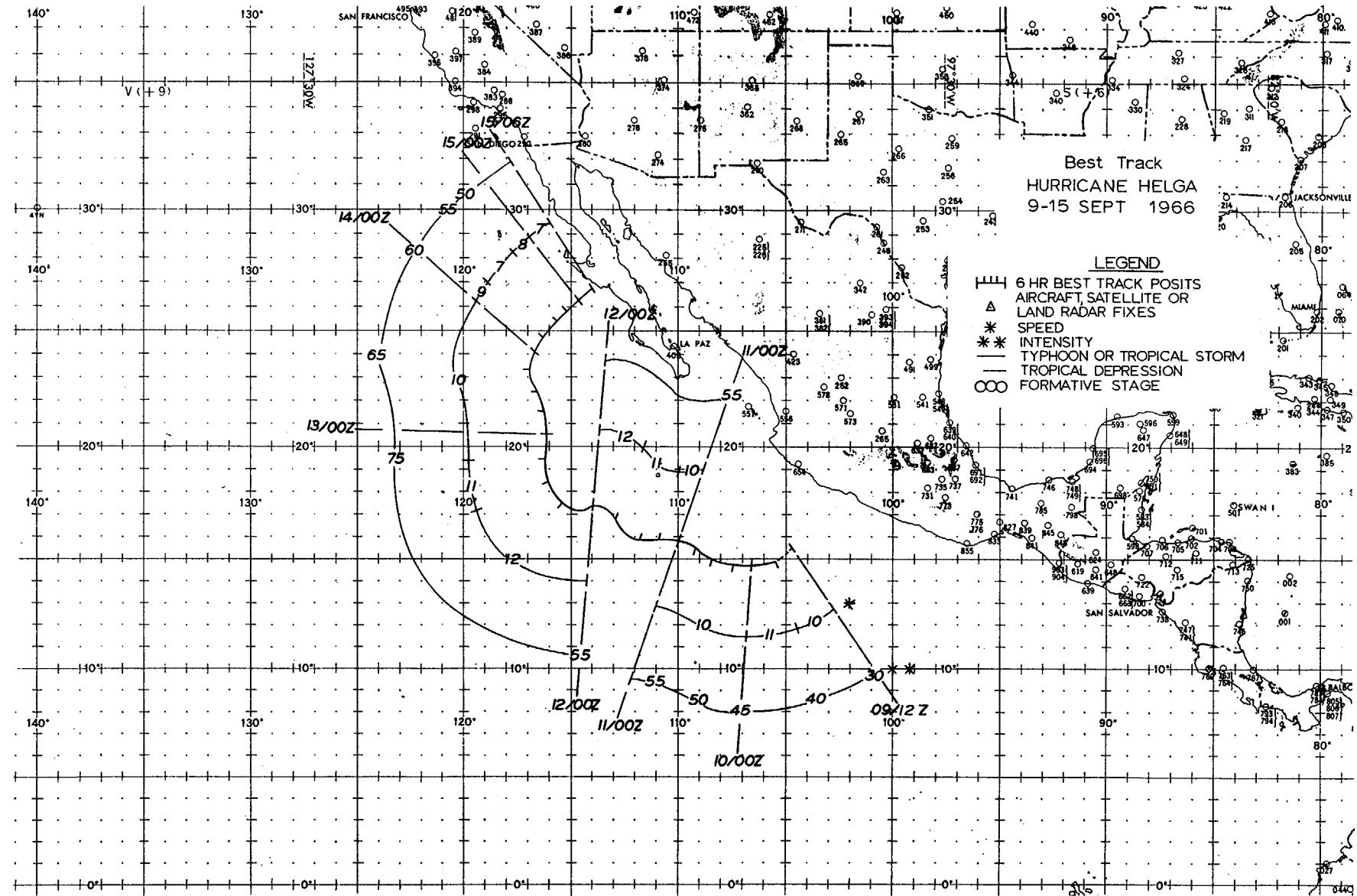
III. FINAL DISPOSITION

A. Dissipated over land

Best Track
HURRICANE HELGA
9-15 SEPT 1966

LEGEND

- ||||| 6 HR BEST TRACK POSITS
- △ AIRCRAFT, SATELLITE OR LAND RADAR FIXES
- * SPEED
- ** INTENSITY
- TYPHOON OR TROPICAL STORM
- TROPICAL DEPRESSION
- FORMATIVE STAGE

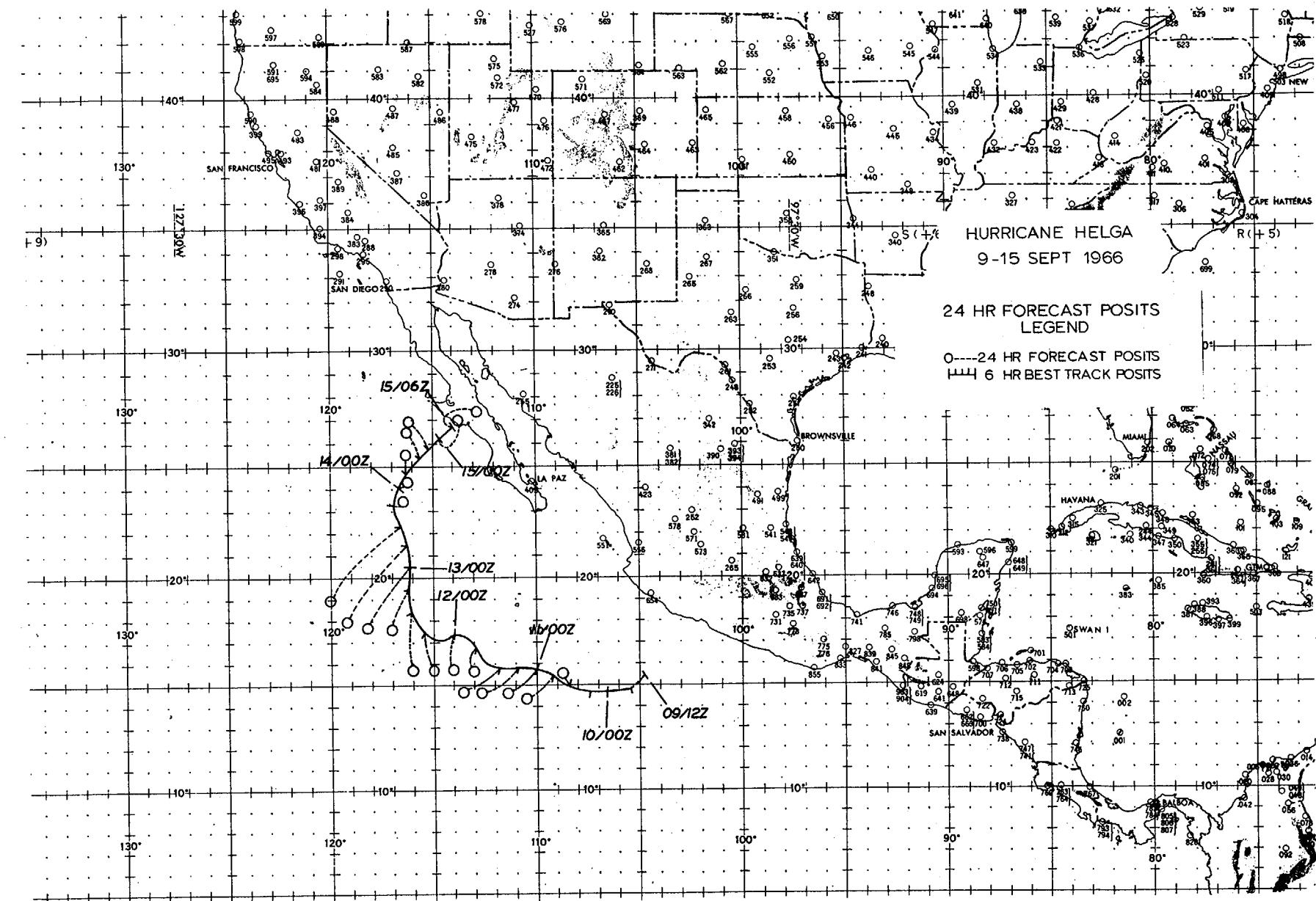


HURRICANE HELGA 09 SEP-15 SEP 1966
POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION		24 HOUR ERROR DEG. DISTANCE	48 HOUR ERROR DEG. DISTANCE
	LAT.	LONG.		
091200Z	15.5N	104.8W	-----	-----
091800Z	14.8N	105.4W	-----	-----
100000Z	14.8N	106.6W	-----	-----
100600Z	14.8N	107.5W	-----	-----
101200Z	14.9N	108.5W	329-037	-----
101800Z	15.5N	109.1W	229-117	-----
110000Z	15.8N	110.0W	323-099	-----
110600Z	15.8N	111.0W	238-112	-----
111200Z	16.0N	112.2W	238-106	-----
111800Z	16.9N	112.9W	180-072	210-265
120000Z	17.2N	114.1W	178-078	230-219
120600Z	17.5N	115.4W	166-103	228-236
121200Z	18.4N	116.1W	178-156	211-254
121800Z	19.5N	116.2W	203-118	192-238
130000Z	20.5N	116.2W	218-196	200-300
130600Z	21.5N	116.2W	221-273	206-380
131200Z	22.3N	116.6W	226-282	207-444
131800Z	23.2N	117.0W	064-040	220-378
140000Z	24.0N	116.6W	039-039	228-466
140600Z	24.7N	116.2W	360-035	228-546
141200Z	25.3N	115.7W	338-079	242-533
141800Z	25.8N	115.2W	324-085	046-097
150000Z	26.2N	114.6W	042-064	053-295
150600Z	26.6N	114.1W	058-093	046-295

AVERAGE 24 HOUR ERROR 91 MI

AVERAGE 48 HOUR ERROR 277 MI



APPENDIX A

ABBREVIATIONS AND DEFINITIONS

1. Certain words and phrases that appear frequently in this report are abbreviated as follows:

ACFT	Aircraft
APPR(S)	Appear(s)
APPROX	Approximately
BND(S) (G)	Band, Bands, Banding
BRK(S)	Break(s)
BRKN	Broken
CINCPAC	Commander in Chief, Pacific
CINCPACAF	Commander in Chief, Pacific Air Force
CIRC	Circular
CIRCN	Circulation
CLD(S)	Cloud(s)
CLR	Clear
CLSD	Closed
CNTR(S) (D)	Center(s)(ed)
DEF	Definite
DEG	Degree
DVLP(G)	Develop(ing)
DFUS	Diffuse
DIA	Diameter
DSPTG	Dissipating
DSPTN	Dissipation
E	East
ELIP	Elliptical
ELONG	Elongated
EST	Estimated
F.B.	Feeder bands
FAFWC	Fuchu Air Force Weather Central, Fuchu Air Station, Japan
FDR	Feeder
54WRS	54th Weather Reconnaissance Squadron, Andersen Air Force Base, Guam
FM	From
FNWF	Fleet Numerical Weather Facility, Monterey, California
FWC/JTWC	Fleet Weather Central/Joint Typhoon Warning Center, Guam, M. I.
INDEF	Indefinite
ITCZ	Intertropical convergence zone
JMA	Japan Meteorological Agency

JMG PACOM	Joint Meteorological Group, Pacific Command
K (KILO) Time	Mariana Islands local time
KM	Kilometer(s)
KT	Knot(s)
LGT	Light
LND	Land
M	Meter(s)
MAX	Maximum
MB	Millibar(s)
MI	Nautical Mile(s)
MIN	Minimum
MISC	Miscellaneous
MOD	Moderate
MPT	Mid-Pacific Trough
N	North
NA	Not Applicable
N.F.B.	No feeder bands
NMC	National Meteorological Center
OVC	Overcast
POS	Positive
POSIT(S)(D)	Position(s)(ed)
PRES	Pressure
PROB	Probable
PSBL	Possible
QUAD(S)	Quadrant(s)
RDR	Radar
RPT	Report
S	South
SEMI	Semicircle
SFC	Surface
SLP	Sea level pressure
SML	Small
STA	Station
STG	Strong
STM	Storm
TEMP	Temperature
THK	Thick
UNK	Unknown
VSBL	Visible
VW-1	Airborne Early Warning Squadron ONE, NAS Agana, Guam, M.I.
W	West
WESTPAC	Western North Pacific Area
WK	Weak
WND(S)	Wind(s)
WX	Weather
XTNSV	Extensive

2. The following define and clarify certain words and phrases that appear in the Eye Fix Summaries in Chapter V. Several definitions in this section have special meanings with regard to the Eye Fix Summaries and may not necessarily have the same meaning as used throughout the rest of the report. These definitions are explained below.

a. FIX NO. - This number corresponds to the number of the fix plotted on the "Best Track Chart".

b. TIME - The date-time of the fix.

c. POSIT - Latitude and longitude of the fix.

d. UNIT, METHOD & ACCY:

(1) UNIT - The unit that made the fix; 54-54WRS, VW-VW1

(2) METHOD - The method used to make the fix; P-penetration, R-radar, LND RDR-land radar, SHP RDR-ship radar, TIROS- TIROS satellite, ACFT-aircraft penetration or radar fix by aircraft other than recon squadrons.

(3) ACCY - Center determination and estimated accuracy of the fix: P-positive, F-fair, L-poor/distance in nautical miles.

Supplementary examples used in Chapter V:

54-E-- Fix made by 54WRS; Estimated; Center determination and accuracy not given.

VW-R-P4 Fix made by VW1; Radar; Center determination positive; and navigational accuracy given as 4 miles.

54-P-P6 Fix made by 54WRS; Penetration; Center determination positive and navigational accuracy 6 miles.

e. FLT LVL - Altitude of aircraft at time of fix in meters above msl or millibars.

f. FLT LVL WND - Maximum observed flight level wind in knots.

g. OBS,SFC WND - Maximum observed surface wind in knots (Maximum flight level wind and maximum surface wind may not be coincident).

h. OBS MIN SLP - Minimum observed sea level pressure in MBS (reported on penetration flights only).

- i. MIN 700MB HGT - Minimum observed 700mb height in meters.
 - j. FLT LVL TT/TD - Flight level temperature/dew point at the fix location. (When flight level is near 700mb level the 700mb temperature/dew point is recorded in place of the actual flight level data.)
 - k. EYE FORM - Description of cloud eye (circular or elliptical).
 - l. ORIENTATION - Direction of orientation of an elliptical cloud eye to an eight point compass.
 - m. EYE DIA - Eye diameter in nautical miles.
 - n. THKNS WALL CLOUD - Thickness of wall cloud in nautical miles. If no wall cloud is observed, F.B. or N.F.B. may be entered to indicate the presence or absence of feeder bands.
3. An investigation is the traverse of a reconnaissance aircraft over an area containing a suspected circulation.
4. A fix is the determination of the position of a tropical cyclone at a precise time. Generally, the term "fix" is used when the position of the cyclone has been determined by a reconnaissance aircraft penetration or by airborne, land or ship radar. In the case of a reconnaissance aircraft penetration, the actual fix may be based on one or more of the following: visual observation, radar, surface pressure, surface or upper level winds, constant pressure height, and temperature/dew point.
5. The term "tropical cyclone" or "cyclone" as used in this publication has two definitions dependent upon usage.
- a. "Tropical cyclone" or "cyclone" is used to describe a suspected tropical cyclonic circulation which appears capable of intensification.
 - b. "Tropical cyclone" or "cyclone" is used in the general sense, e.g., "Typhoon JOAN was the most intense tropical cyclone of 1959," or "Tropical cyclones most frequently develop during August and September."
 - (1) A "Tropical Depression" (TD) as used by JTWC is a tropical cyclone in which the maximum sustained surface wind is 33 knots or less and whose winds are expected to increase to 34 knots or more within 48 hours.
 - (2) A "Tropical Storm" (TS) is a tropical cyclone in which the maximum sustained surface wind is no more than 63 knots, but greater than 33 knots. Tropical storms are named.

(3) A "Typhoon/Hurricane" is a tropical cyclone in which the maximum sustained surface wind speeds are 64 knots or greater (west of 180 longitude they are called typhoons and east of 180 longitude they are called hurricanes). All references to typhoons apply equally to hurricanes.

6. VORTICES:

- a. Embedded vortex of easterly wave - closed cyclonic circulation along an easterly wave and separated from the ITCZ.
- b. Junction vortex - closed cyclonic circulation at the junction of an easterly wave and the ITCZ.

7. Recurvature - That point at which the cyclone ceases movement to the west of north and commences moving to the east of north.