ANNEX

A

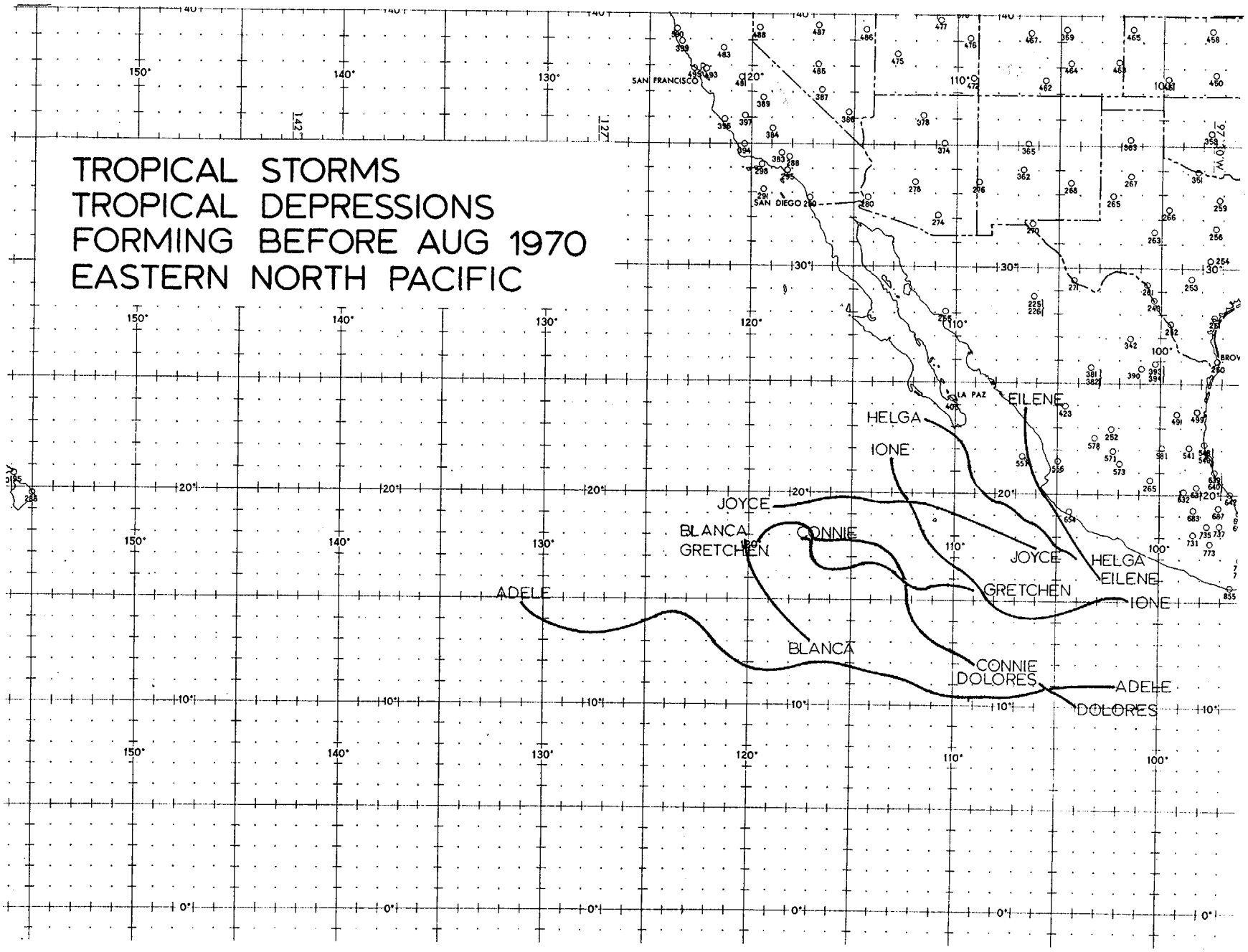
SUMMARY OF TROPICAL CYCLONES

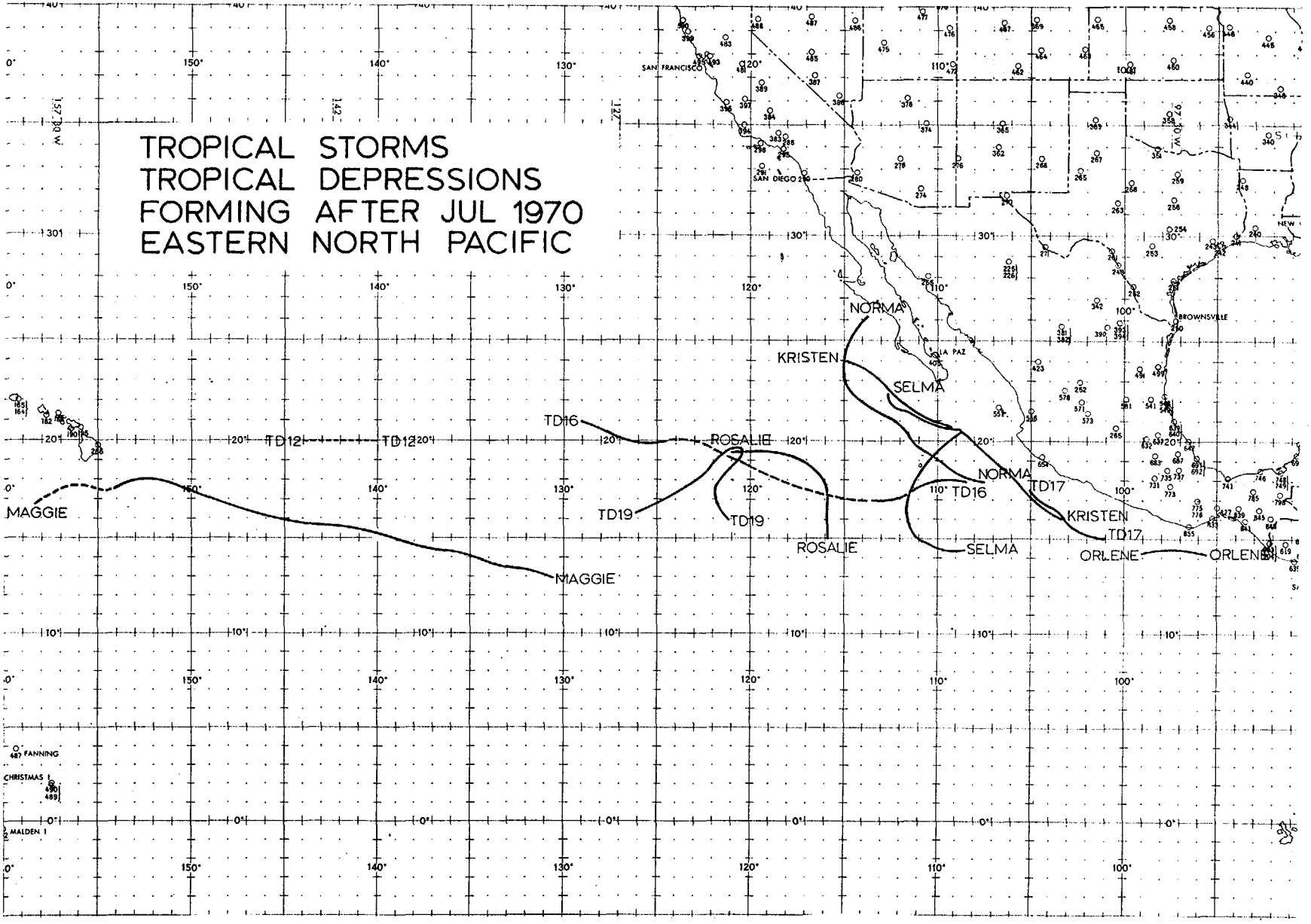
IN THE

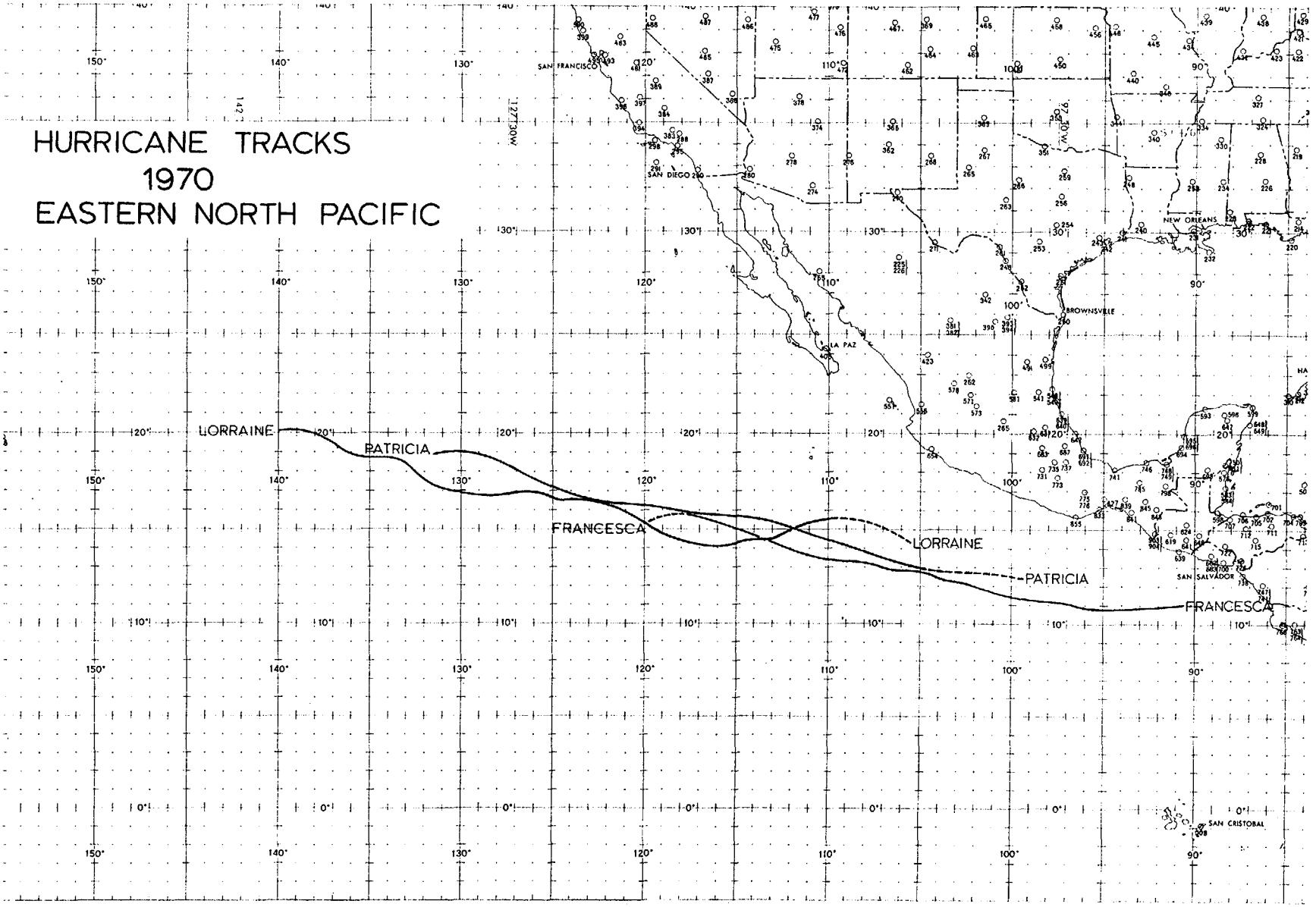
EASTERN NORTH PACIFIC OCEAN

FOR

1970


TROPICAL STORMS
TROPICAL DEPRESSIONS
FORMING BEFORE AUG 1970
EASTERN NORTH PACIFIC
SAN FRANCISCO
SAN DIEGO
LA PAZ
HELGA
IONE
EILENE
JOYCE
BLANCA
GRETCHEN
CONNIE
ADELE
DOLORES


TROPICAL STORMS
TROPICAL DEPRESSIONS
FORMING AFTER JUL 1970
EASTERN NORTH PACIFIC
MAGGIE
TD12
TD16
TD19
ROSALIE
KRISTEN
SELMA
NORMA
TD17
ORLENE
SAN FRANCISCO
SAN DIEGO
LA PAZ
BROWNSVILLE
FANNING
CHRISTMAS I
MALDEN I


HURRICANE TRACKS
1970
EASTERN NORTH PACIFIC
LORRAINE
PATRICIA
FRANCESCA
LORRAINE
PATRICIA
FRANCESCA
SAN FRANCISCO
SAN DIEGO
LA PAZ
BROWNSVILLE
NEW ORLEANS
SAN SALVADOR
SAN CRISTOBAL

During the 1970 EASTPAC Tropical Cyclone season, Fleet Weather Central, Alameda issued a total of 350 tropical warnings on three hurricanes, fifteen tropical storms and three tropical depressions. Two tropical cyclones, "Hurricane LORRAINE" and Tropical Storm "MAGGIE" moved out of Alameda's area of responsibility. The total of twenty-one tropical cyclones represents the second highest year of record, with only 1968, when 25 cyclones were reported, exceeding this season. No specific reason for this increase over 1969 exists, however it is felt that increased knowledge and use of the weather satellite pictures, the use of reconnaissance aircraft throughout the season, and more active participation by Maritime observers transiting the Eastern Pacific region were of significant aid in more accurately describing the existing situation in EASTPAC.

The following five year summary covering tropical cyclones originating in Fleet Weather Central, Alameda's area of responsibility is presented for comparison. Included are warnings for prior years issued by Fleet Weather Central, Pearl Harbor, when the tropical cyclone originated in the Alameda area.

	1966	1967	1968	1969	1970
TOTAL NUMBER OF WARNINGS	342	474	531	219	350
CALENDAR DAYS OF WARNINGS	70	119	126	67	98
TROPICAL DEPRESSIONS	6	2	6	5	3
TROPICAL STORMS	6	12	13	6	15
HURRICANES	7	6	6	4	3
TOTAL TROPICAL CYCLONES	19	20	25	15	21

FORECASTING TOOLS: Tools used for forecasting tropical cyclone progress included twice daily readouts of the Fleet Numerical Weather Central, Monterey's "HATRACK" steering program; twice daily readouts of Fleet Weather Central, Pearl Harbor's "TYRACK" steering program, as well as extrapolation and subjective reasoning. Some of the greatest assets to forecasting included APT satellite pictures received daily via FOFAX and the satellite bulletins from FWF Suitland, Md.

Eastern Pacific hurricane flights by the EASTPAC detachment of VW-1, as well as recon fixes by the 55th Weather Recon Squadron, 9th Weather Wing, were invaluable for accurately tracking positions and determining intensities of tropical cyclones and hurricanes.

A total of 53 missions were flown in support of the 1970 Eastern Pacific Hurricane Center's recon requirements. Most recon flights were launched to provide daylight penetration and center fixes of the tropical cyclones, and at a time as close as possible to the daily weather satellite pass for a cross check on the accuracy of the satellite location of tropical cyclones from pictures. At least one mission was flown on every tropical cyclone that occurred.

Due to the restricted range of the Navy aircraft, fixes over 1200 miles from Point Mugu were made by the Air Force. Data obtained from the Air Force aircraft flying at both 300 and 500 mb levels were helpful in accurately determining positions and intensities of the tropical cyclones.

DAMAGE: Three tropical storms, "EILEEN", "HELGA", and "NORMA" went ashore, or passed close to the west coast of Mexico during 1970. One tropical storm, "MAGGIE", passed about 80 miles south of the island of Hawaii, dumping copious amounts of rain on the windward side of the "Big Island". Local flooding was reported as a result of "MAGGIE". No reports of damage from any of the three storms which struck Mexico are available, however, rainfall in excess of 5 inches was reported along the Mogollon Rim and in the Bradshaw Mountains of Arizona with local flooding and crop damage as a result of tropical storm "NORMA" going inland to the south in Baja, California. No dollar estimates of crop losses from cyclones in the Eastern Pacific are available.

TROPICAL CYCLONES FOR THE 1970 SEASON
ORIGINATED BY FLEET WEATHER CENTRAL, ALAMEDA

	CYCLONE	PERIOD
01	TROPICAL STORM ADELE	31 MAY - 07 JUN 1970
02	TROPICAL STORM BLANCA	09 JUN - 13 JUN 1970
03	TROPICAL STORM CONNIE	17 JUN - 22 JUN 1970
04	TROPICAL STORM DOLORES	19 JUN - 20 JUN 1970
05	TROPICAL STORM EILEEN	27 JUN - 29 JUN 1970
06	HURRICANE FRANCESCA	02 JUL - 09 JUL 1970
07	TROPICAL STORM GRETCHEN	14 JUL - 20 JUL 1970
08	TROPICAL STORM HELGA	16 JUL - 20 JUL 1970
09	TROPICAL STORM IONE	22 JUL - 26 JUL 1970
10	TROPICAL STORM JOYCE	29 JUL - 02 AUG 1970
11	TROPICAL STORM KRISTEN	05 AUG - 08 AUG 1970
12	HURRICANE LORRAINE	17 AUG - 26 AUG 1970
13	TROPICAL STORM MAGGIE	20 AUG - 22 AUG 1970
14	TROPICAL STORM NORMA	01 SEP - 05 SEP 1970
15	TROPICAL STORM ORLENE	07 SEP - 08 SEP 1970
16	TROPICAL DEPRESSION SIXTEEN	15 SEP - 21 SEP 1970
17	TROPICAL DEPRESSION SEVENTEEN	25 SEP - 26 SEP 1970
18	HURRICANE PATRICIA	04 OCT - 11 OCT 1970
19	TROPICAL DEPRESSION NINETEEN	20 OCT - 23 OCT 1970
20	TROPICAL STORM ROSALIE	21 OCT - 24 OCT 1970
21	TROPICAL STORM SELMA	01 NOV - 07 NOV 1970

TROPICAL DEPRESSIONS 1970
POSITION DATA

TROPICAL DEPRESSION ONE SIX
15 SEP - 21 SEP

DTG	LAT	LONG	DTG	LAT	LONG
151800Z	18.0N	108.3W	*201800Z	20.0N	124.5W
160000Z	18.0N	110.0W	210000Z	19.9N	125.2W
160600Z	17.7N	110.9W	210600Z	20.1N	126.5W
161200Z	17.3N	111.7W	211200Z	20.5N	127.8W
161800Z	17.0N	112.6W	211800Z	21.0N	129.0W

TROPICAL DEPRESSION ONE SEVEN
25 SEP - 26 SEP

DTG	LAT	LONG	DTG	LAT	LONG
251800Z	15.2N	101.0W	261200Z	17.0N	104.4W
260000Z	15.7N	102.7W	261800Z	17.5N	105.0W
260600Z	16.5N	103.6W			

TROPICAL DEPRESSION ONE NINE
20 OCT - 23 OCT

DTG	LAT	LONG	DTG	LAT	LONG
201800Z	16.0N	121.1W	221200Z	18.4N	122.6W
210000Z	16.8N	121.7W	221800Z	17.8N	123.3W
210600Z	17.9N	121.7W	230000Z	17.4N	124.0W
211200Z	18.6N	121.2W	230600Z	17.0N	124.7W
211800Z	19.5N	120.5W	231200Z	16.7N	125.3W
220000Z	19.4N	121.3W	231800Z	16.4N	126.1W
220600Z	18.9N	122.0W			

*REGENERATED

TROPICAL STORMS 1970
POSITION DATA

TROPICAL STORM ADELE
31 MAY - 07 JUN

DTG	LAT	LONG	DTG	LAT	LONG
310600Z	11.0N	102.1W	031800Z	11.7N	118.7W
311200Z	11.0N	102.9W	040000Z	11.8N	119.8W
311800Z	11.0N	103.7W	040600Z	12.2N	120.8W
010000Z	10.9N	104.4W	041200Z	12.8N	121.6W
010600Z	10.8N	105.5W	041800Z	13.7N	122.2W
011200Z	10.6N	106.5W	050000Z	14.2N	123.1W
011800Z	10.5N	107.6W	050600Z	14.3N	124.1W
020000Z	10.5N	108.7W	051200Z	14.0N	125.0W
020600Z	10.5N	110.0W	051800Z	13.7N	125.8W
021200Z	10.8N	111.3W	060000Z	13.5N	126.9W
021800Z	11.2N	112.6W	060600Z	13.5N	128.1W
030000Z	11.6N	113.9W	061200Z	13.7N	129.2W
030600Z	11.9N	115.4W	061800Z	14.1N	130.3W
031200Z	12.0N	117.0W	070000Z	14.8N	131.1W

TROPICAL STORM BLANCA
09 JUN - 13 JUN

DTG	LAT	LONG	DTG	LAT	LONG
091800Z	13.1N	117.0W	111800Z	14.9N	119.0W
100000Z	13.5N	117.5W	120000Z	15.1N	119.1W
100600Z	13.8N	117.9W	120600Z	15.3N	119.2W
101200Z	13.9N	118.0W	121200Z	15.8N	119.6W
101800Z	14.1N	118.2W	121800Z	16.3N	119.8W
110000Z	14.3N	118.4W	130000Z	16.9N	120.0W
110600Z	14.5N	118.6W	130600Z	17.4N	120.0W
111200Z	14.7N	118.7W	131200Z	17.8N	120.1W

TROPICAL STORM CONNIE
17 JUN - 22 JUN

DTG	LAT	LONG	DTG	LAT	LONG
171800Z	12.0N	109.0W	201200Z	17.0N	113.0W
180000Z	12.4N	109.7W	201800Z	17.3N	113.4W
180600Z	12.7N	110.4W	210000Z	17.5N	113.8W
181200Z	13.2N	111.1W	210600Z	17.7N	114.3W
181800Z	13.7N	111.7W	211200Z	17.8N	114.8W
190000Z	14.2N	112.0W	211800Z	17.8N	115.3W
190600Z	14.7N	112.2W	220000Z	17.8N	115.8W
191200Z	15.2N	112.2W	220600Z	17.8N	116.3W
191800Z	15.7N	112.3W	221200Z	17.8N	116.8W
200000Z	16.2N	112.4W	221800Z	17.9N	117.3W
200600Z	16.6N	112.7W			

TROPICAL STORM DOLORES
19 JUN - 20 JUN

DTG	LAT	LONG	DTG	LAT	LONG
191800Z	10.0N	104.0W	201200Z	10.8N	105.3W
200000Z	10.3N	104.4W	210000Z	11.1N	105.7W
200600Z	10.5N	104.8W			

TROPICAL STORM EILEEN
27 JUN - 29 JUN

DTG	LAT	LONG	DTG	LAT	LONG
271800Z	16.0N	102.9W	281800Z	20.2N	105.8W
280000Z	17.1N	103.7W	290000Z	21.3N	106.3W
280600Z	18.1N	104.4W	290600Z	22.5N	106.6W
281200Z	19.2N	105.1W	291200Z	23.8N	106.6W

TROPICAL STORM GRETCHEN
14 JUL - 20 JUL

DTG	LAT	LONG	DTG	LAT	LONG
141800Z	15.5N	109.0W	180000Z	17.8N	116.8W
150000Z	15.8N	110.3W	180600Z	17.9N	116.8W
150600Z	15.6N	111.6W	181200Z	17.9N	116.9W
151200Z	16.2N	112.7W	181800Z	18.0N	116.9W
151800Z	16.7N	113.8W	190000Z	18.2N	117.1W
160000Z	16.7N	114.3W	190600Z	18.3N	117.3W
160600Z	16.6N	114.8W	191200Z	18.4N	117.5W
161200Z	16.5N	115.3W	191800Z	18.5N	117.8W
161800Z	16.5N	115.8W	200000Z	18.5N	118.3W
170000Z	16.6N	116.3W	200600Z	18.3N	118.9W
170600Z	16.8N	116.7W	201200Z	18.0N	119.2W
171200Z	17.2N	117.0W	201800Z	17.7N	119.5W
171800Z	17.7N	116.8W			

TROPICAL STORM HELGA
16 JUL - 20 JUL

DTG	LAT	LONG	DTG	LAT	LONG
161800Z	17.0N	104.0W	181800Z	19.8N	108.2W
170000Z	17.3N	104.5W	190000Z	20.3N	108.7W
170600Z	17.6N	105.0W	190600Z	20.9N	109.1W
171200Z	18.0N	105.4W	191200Z	21.6N	109.3W
171800Z	18.3N	105.7W	191800Z	22.2N	109.7W
180000Z	18.7N	106.3W	200000Z	22.7N	110.2W
180600Z	19.1N	106.9W	200600Z	23.0N	110.8W
181200Z	19.5N	107.5W	201200Z	23.3N	111.5W

TROPICAL STORM IONE
22 JUL - 26 JUL

DTG	LAT	LONG	DTG	LAT	LONG
221800Z	15.0N	101.5W	250600Z	17.8N	111.2W
230000Z	15.2N	102.5W	251200Z	18.7N	111.7W
**240000Z	15.5N	108.6W	251800Z	19.7N	112.1W
240600Z	15.9N	109.1W	260000Z	20.0N	112.5W
241200Z	16.3N	109.6W	260600Z	20.5N	112.8W
241800Z	16.7N	110.1W	261200Z	21.0N	113.0W
250000Z	17.0N	110.5W	261800Z	21.5N	113.0W

TROPICAL STORM JOYCE
29 JUL - 02 AUG

DTG	LAT	LONG	DTG	LAT	LONG
291800Z	17.5N	106.0W	010000Z	19.6N	112.9W
300000Z	17.8N	106.8W	010600Z	19.7N	113.8W
300600Z	18.1N	107.5W	011200Z	19.8N	114.6W
301200Z	18.4N	108.2W	011800Z	19.8N	115.5W
301800Z	18.7N	108.9W	020000Z	19.7N	116.3W
310000Z	19.0N	109.7W	020600Z	19.6N	117.1W
310600Z	19.3N	110.5W	021200Z	19.5N	117.9W
311200Z	19.5N	111.3W	021800Z	19.3N	118.8W
311800Z	19.6N	112.2W			

TROPICAL STORM KRISTEN
05 AUG - 08 AUG

DTG	LAT	LONG	DTG	LAT	LONG
051800Z	16.0N	103.0W	071200Z	21.0N	110.0W
060000Z	16.4N	103.9W	071800Z	21.9N	111.8W
060600Z	17.0N	104.7W	080000Z	22.6N	112.4W
061200Z	17.7N	105.4W	080600Z	23.2N	113.1W
061800Z	18.4N	106.1W	081200Z	23.7N	113.9W
070000Z	19.5N	107.2W	081800Z	24.0N	115.0W
070600Z	20.5N	108.5W			

TROPICAL STORM MAGGIE
20 AUG - 22 AUG

DTG	LAT	LONG	DTG	LAT	LONG
201800Z	13.0N	130.5W	220000Z	14.2N	135.4W
210000Z	13.3N	131.5W	220600Z	14.4N	136.5W
210600Z	13.5N	132.5W	221200Z	14.6N	137.5W
211200Z	13.6N	133.5W	*221800Z	14.8N	138.6W
211800Z	13.9N	134.4W			

*PASSED TO FWC HAWAII
**REGENERATED

TROPICAL STORM NORMA
01 SEP - 05 SEP

DTG	LAT	LONG	DTG	LAT	LONG
010000Z	18.0N	107.5W	031200Z	21.9N	113.9W
010600Z	18.1N	108.1W	031800Z	22.4N	114.5W
011200Z	18.3N	108.6W	040000Z	22.6N	114.7W
011800Z	18.6N	109.2W	040600Z	22.9N	114.9W
020000Z	19.0N	109.8W	041200Z	23.1N	114.9W
020600Z	19.4N	110.5W	041800Z	23.4N	114.9W
021200Z	19.9N	111.2W	050000Z	23.8N	115.0W
021800Z	20.5N	111.6W	050600Z	24.4N	115.0W
030000Z	21.1N	112.3W	051200Z	25.0N	114.7W
030600Z	21.4N	113.1W	051800Z	26.2N	113.8W

TROPICAL STORM ORLENE
07 SEP - 08 SEP

DTG	LAT	LONG	DTG	LAT	LONG
072100Z	14.3N	95.5W	081200Z	14.6N	98.0W
080000Z	14.4N	96.0W	081800Z	14.3N	99.0W
080600Z	14.6N	97.0W			

TROPICAL STORM ROSALIE
21 OCT - 24 OCT

DTG	LAT	LONG	DTG	LAT	LONG
211800Z	15.0N	115.9W	230600Z	19.4N	118.2W
220000Z	15.9N	115.9W	231200Z	19.5N	119.1W
220600Z	16.8N	115.9W	231800Z	19.5N	120.0W
221200Z	17.7N	116.1W	240000Z	19.5N	120.5W
221800Z	18.6N	116.6W	240600Z	19.5N	121.0W
230000Z	19.1N	117.3W			

TROPICAL STORM SELMA
01 NOV - 07 NOV

DTG	LAT	LONG	DTG	LAT	LONG
011800Z	14.5N	108.5W	041200Z	19.8N	109.7W
020000Z	14.5N	109.2W	041800Z	20.2N	109.2W
020600Z	14.6N	109.8W	050000Z	20.5N	108.8W
021200Z	14.8N	110.4W	050600Z	20.7N	109.4W
021800Z	15.0N	111.0W	051200Z	20.8N	110.0W
030000Z	15.8N	111.5W	051800Z	21.0N	110.6W
030600Z	16.7N	111.6W	060000Z	21.2N	111.1W
031200Z	17.5N	111.4W	060600Z	21.4N	111.6W
031800Z	18.3N	111.0W	061200Z	21.6N	112.0W
040000Z	18.8N	110.6W	061800Z	21.9N	112.4W
040600Z	19.3N	110.2W	070000Z	22.3N	112.7W

INDIVIDUAL HURRICANE TRACKS

FOR 1970

IN THE EASTERN NORTH PACIFIC OCEAN

HURRICANE FRANCESCA
021600Z JUL TO 090000Z JUL 1970

I. DATA

A. STATISTICS

1. NUMBER OF WARNINGS ISSUED - 27
2. NUMBER OF WARNINGS WITH HURRICANE INTENSITY - 9
3. TOTAL DISTANCE TRAVELED DURING TROPICAL WARNING PERIOD - 1780NM.

B. CHARACTERISTICS

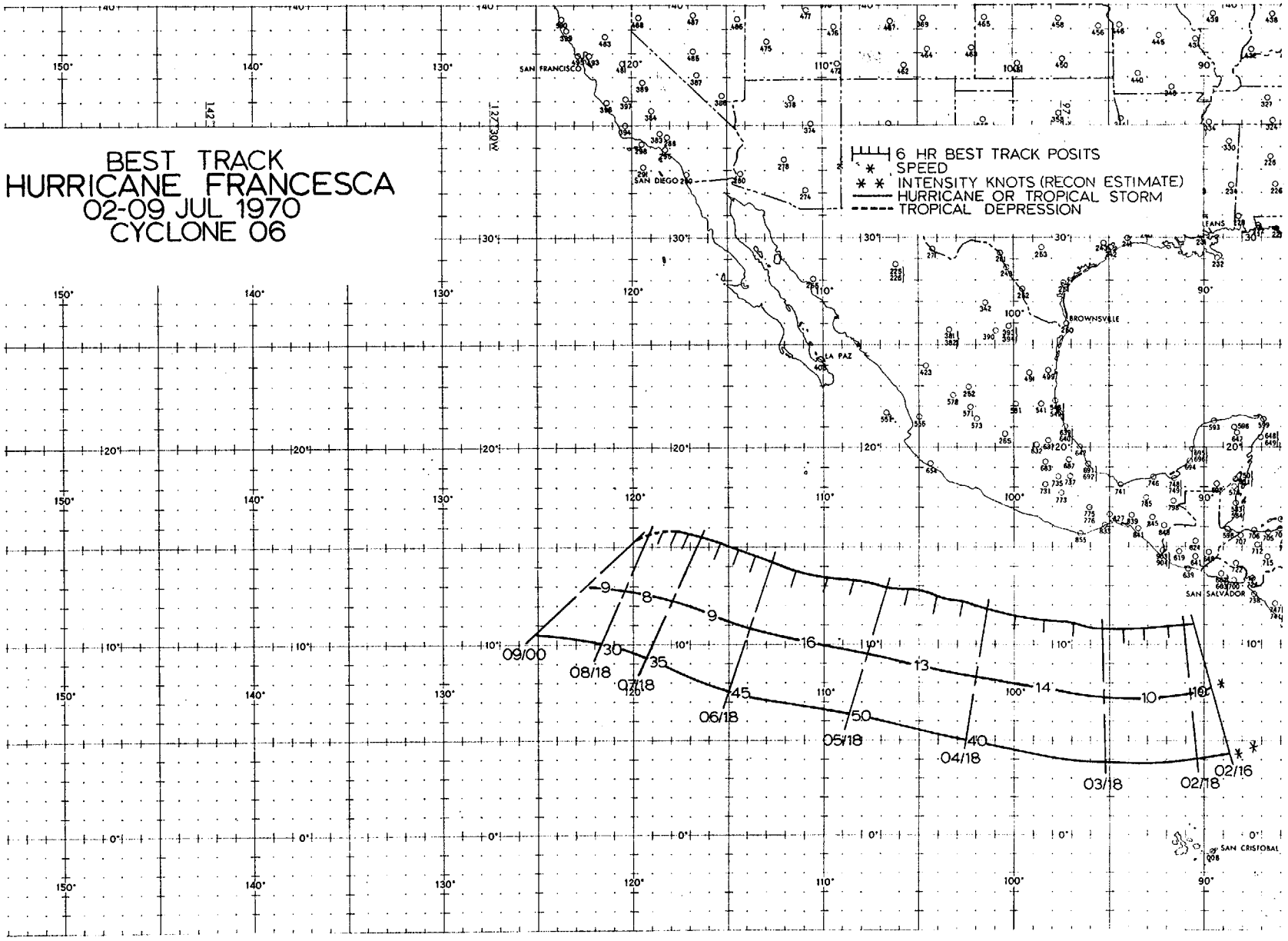
1. MINIMUM OBSERVED SLP - 991.0MB
2. MINIMUM OBSERVED 700MB HEIGHT - NOT OBSERVED
3. MAXIMUM SURFACE WIND - 80 KTS (EST.)
4. MAXIMUM RADIUS OF SURFACE CIRCULATION - 360 MI.

II. DEVELOPMENT

A. INITIAL IMPETUS - ITCZ (TROPICAL CYCLONE #6)
B. INITIAL SURFACE VORTEX: 021600Z (ESSA 8)
C. TIME STORM REACHED HURRICANE INTENSITY: 031800Z

III. FINAL DISPOSITION

A. DISSIPATED OVER WATER


BEST TRACK
HURRICANE FRANCESCA
02-09 JUL 1970
CYCLONE 06
6 HR BEST TRACK POSITS
SPEED
INTENSITY KNOTS (RECON ESTIMATE)
HURRICANE OR TROPICAL STORM
TROPICAL DEPRESSION
SAN FRANCISCO
SAN DIEGO
LA PAZ
BROWNSVILLE
SAN SALVADOR
SAN CRISTOBAL
09/00
08/18
07/18
06/18
05/18
04/18
03/18
02/18
02/16

POSITION FROM BEST TRACK AND VERIFICATION DATA

	STORM POSIT		24 HR ERROR	48 HR ERROR	72 HR ERROR
TIME	LAT	LONG	DEG/DIST	DEG/DIST	DEG/DIST
021600Z	11.0N	90.6W	-	-	-
021800Z	11.0N	91.0W	-	-	-
030000Z	10.9N	91.9W	-	-	-
030600Z	10.9N	93.1W	-	-	-
031200Z	10.8N	94.2W	-	-	-
031800Z	10.8N	95.3W	035/100	-	-
040000Z	11.0N	96.9W	050/135	-	-
040600Z	11.2N	98.4W	060/156	-	-
041200Z	11.4N	99.9W	055/102	-	-
041800Z	11.8N	101.3W	090/125	-	-
050000Z	12.2N	102.7W	120/174	070/270	-
050600Z	12.6N	104.0W	115/246	075/275	-
051200Z	12.9N	105.4W	100/246	075/246	-
051800Z	13.0N	106.7W	340/048	085/268	-
060000Z	13.3N	108.3W	125/063	115/220	075/405
060600Z	13.5N	109.8W	115/080	110/359	-
061200Z	13.8N	111.3W	265/055	095/366	080/435
061800Z	14.3N	112.7W	080/090	050/097	-
070000Z	14.6N	113.6W	330/047	130/105	115/266
070600Z	14.9N	114.4W	310/085	145/096	-
071200Z	15.2N	115.3W	340/031	250/172	090/379
071800Z	15.5N	116.3W	295/108	040/054	-
080000Z	15.7N	117.0W	285/140	305/189	198/098
080600Z	15.9N	117.7W	290/182	300/237	-
081200Z	15.9N	118.4W	290/216	315/128	260/336
081800Z	15.8N	119.1W	-	315/235	-
090000Z	15.6N	119.8W	-	-	-

24 HOUR FORECAST ERROR = 121 MI
48 HOUR FORECAST ERROR = 207 MI
72 HOUR FORECAST ERROR = 320 MI

EYE FIXES TROPICAL CYCLONE #6 (HURRICANE FRANCESCA)

FIX NO.	TIME	POSIT	UNIT/ACCURACY		FLT LVL	OBS. SFC WND	OBS. SLP	MIN 700 HT	FLT LVL TT/TO	EYE FORM	ORIEN TATION	DIAM EYE
1	041800Z	11.6N 101.3W	9th AF	20nm	500/300mb	40KTS	991.0	-	- -	E	01/20	15
2	051815Z	13.0N 106.7W	9th AF	20nm	500/300mb	50KTS	988.0	-	- -	C		30
3	061740Z	14.2N 112.6W	9th AF	10nm	500/300mb	45KTS	-	-	- -	C		35
4	071735Z	15.4N 116.3W	VW-1	15nm	700mb	35KTS	-	-	- -	C		15
5	081737Z	15.7N 119.1W	VW-1	20nm	700mb	30KTS	1006.0	-	- -	C		10

HURRICANE LORRAINE
172200Z AUG TO 261800Z AUG 1970

I. DATA

A. STATISTICS

1. NUMBER OF WARNINGS ISSUED - 37
2. NUMBER OF WARNINGS WITH HURRICANE INTENSITY - 11
3. TOTAL DISTANCE TRAVELED DURING TROPICAL WARNING PERIOD - 2070NM.

B. CHARACTERISTICS

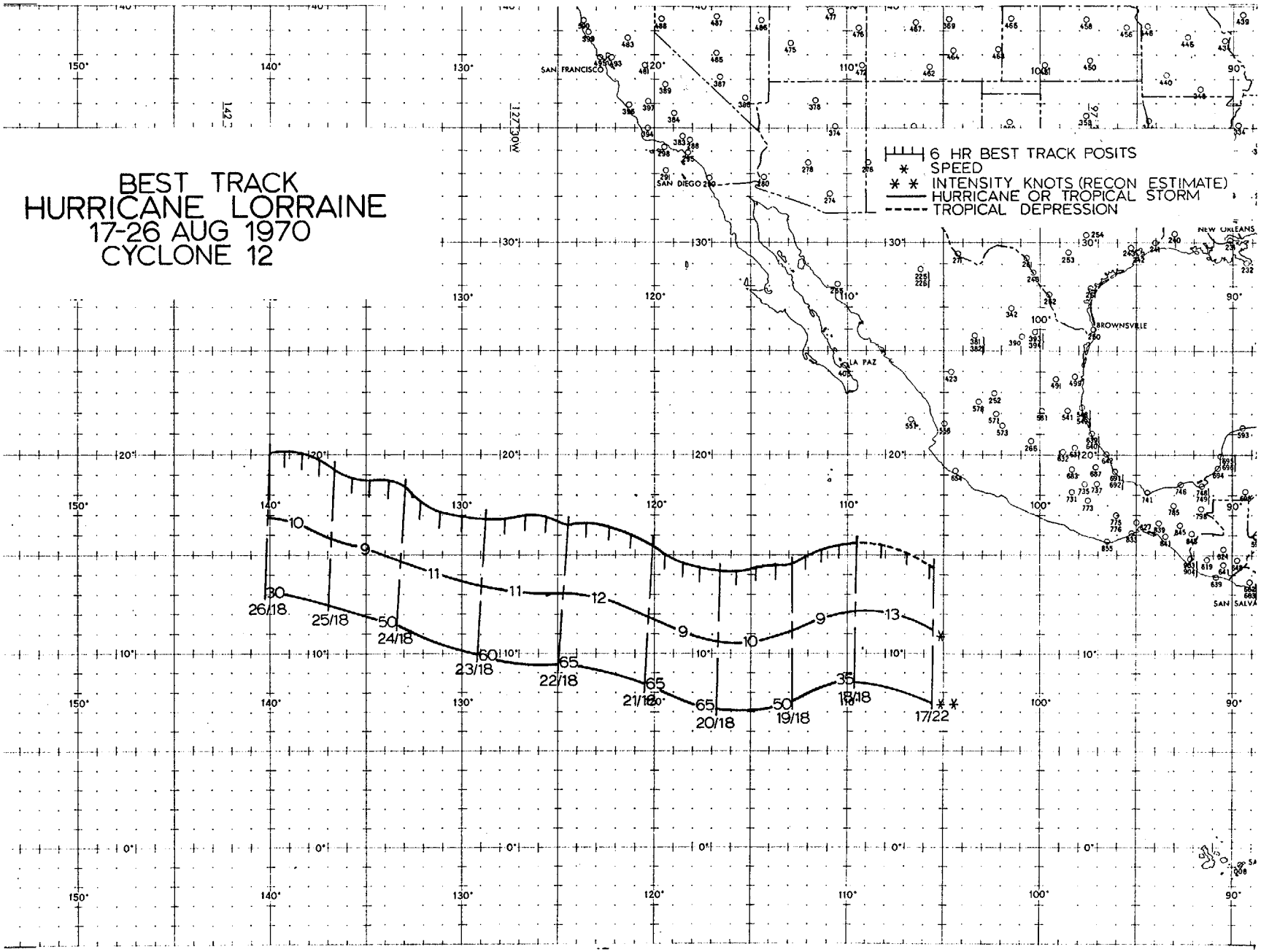
1. MINIMUM OBSERVED SLP - 963MB
2. MINIMUM OBSERVED 700MB HEIGHT - NOT OBSERVED
3. MAXIMUM SURFACE WIND - 85 KTS
4. MAXIMUM RADIUS OF SURFACE CIRCULATION - 330 MI.

II. DEVELOPMENT

A. INITIAL IMPETUS - ITCZ (TROPICAL CYCLONE #12)
B. INITIAL SURFACE VORTEX: 172200Z (ITOS - 1)
C. TIME STORM REACHED HURRICANE INTENSITY - 201800Z

III. FINAL DISPOSITION

A. DISSIPATED OVER WATER (PASSED TO HAWAII)


BEST TRACK
HURRICANE LORRAINE
17-26 AUG 1970
CYCLONE 12
6 HR BEST TRACK POSITS
SPEED
INTENSITY KNOTS (RECON ESTIMATE)
HURRICANE OR TROPICAL STORM
TROPICAL DEPRESSION
SAN FRANCISCO
SAN DIEGO
LA PAZ
BROWNSVILLE
NEW ORLEANS
SAN SALVA
26/18
25/18
24/18
23/18
22/18
21/18
20/18
19/18
18/18
17/22

POSITION FROM BEST TRACK AND VERIFICATION DATA

	STORM POSIT		24 HR ERROR	48 HR ERROR	72 HR ERROR
TIME	LAT	LONG	DEG/DIST	DEG/DIST	DEG/DIST
172200Z	14.3N	105.5W	-	-	-
180000Z	14.4N	105.7W	-	-	-
180600Z	15.0N	106.9W	-	-	-
181200Z	15.4N	108.2W	-	-	-
181800Z	15.5N	109.5W	-	-	-
190000Z	15.4N	110.4W	045/074	-	-
190600Z	15.2N	111.3W	040/123	-	-
191200Z	14.9N	112.1W	025/164	-	-
191800Z	14.5N	112.8W	345/147	-	-
200000Z	14.4N	113.7W	350/172	-	-
200600Z	14.3N	114.7W	350/200	-	-
201200Z	14.2N	115.7W	355/225	-	-
201800Z	14.2N	116.6W	060/039	350/250	-
210000Z	14.3N	117.6W	160/068	350/258	-
210600Z	14.6N	118.5W	180/078	350/260	-
211200Z	15.0N	119.4W	200/032	350/260	-
211800Z	15.4N	120.1W	185/070	135/075	-
220000Z	15.9N	121.2W	165/105	180/162	350/252
220600Z	16.3N	122.3W	160/132	180/180	-
221200Z	16.6N	123.5W	155/156	140/076	-
221800Z	16.4N	124.5W	100/087	135/123	-
230000Z	16.9N	125.6W	095/101	150/188	175/222
230600Z	16.9N	126.7W	085/120	145/198	-
231200Z	16.8N	127.8W	070/150	140/200	090/131
231800Z	16.8N	128.8W	010/084	075/155	-
240000Z	16.9N	130.0W	010/103	075/198	135/224
240600Z	17.1N	131.1W	010/109	075/218	-
241200Z	17.6N	132.1W	010/066	080/232	135/282
241800Z	18.3N	132.9W	185/110	005/078	-
250000Z	18.6N	133.8W	200/102	355/087	090/246
250600Z	18.6N	134.8W	205/101	350/096	-
251200Z	18.8N	135.7W	200/114	260/042	080/273
251800Z	19.2N	136.6W	260/035	190/213	-
260000Z	19.7N	137.4W	240/054	218/184	340/108
260600Z	20.0N	138.3W	245/060	205/204	-
261200Z	20.1N	139.2W	060/152	205/210	220/124
261800Z	20.0N	140.0W	095/073	270/090	-

PASSED TO FLEET WEATHER CENTRAL, PEARL HARBOR

24 HR FORECAST ERROR = 106 MI
48 HR FORECAST ERROR = 169 MI
72 HR FORECAST ERROR = 203.9 MI

EYE FIXES TROPICAL CYCLONE #12 (HURRICANE LORRAINE)

FIX NO.	TIME	POSIT		UNIT/ACCURACY		FLT LVL	OBS. SFC WND	OBS. SLP	MIN 700 HT	FLT LVL TT/TO	EYE FORM	ORIEN-TATION	DIAM EYE
1	181806Z	15.4N	109.6W	9th AF	10nm	500mb	35KTS	-	3136M	- -	C		10
2	191845Z	14.5N	112.8W	VW-1	10nm	700mb	50KTS	-	-	26/22	E	09/20	10
3	201830Z	14.2N	116.6W	9th AF	10nm	500mb	65KTS	988(c)	2969M	- -	E	10/30	20
4	211720Z	15.4N	120.1W	9th AF	10nm	300mb	65KTS	978	2838M	- -	C		20
5	221730Z	16.7N	124.4W	9th AF	15nm	300mb	65KTS	963	-	- -	C		17
6	231750Z	16.8N	128.7W	9th AF	25nm	300mb	60KTS	986	-	25/31	C		20
7	241830Z	18.3N	133.1W	9th AF	10nm	300mb	50KTS	994	-	29/33	C		20
8	261830Z	20.0N	140.0W	9th AF	10nm	300mb	30KTS	-	-	- -	C		40

HURRICANE PATRICIA
042100Z OCT TO 111800Z OCT 1970

I. DATA

A. STATISTICS

1. NUMBER OF WARNINGS ISSUED - 29
2. NUMBER OF WARNINGS WITH HURRICANE INTENSITY - 13
3. TOTAL DISTANCE TRAVELED DURING TROPICAL WARNING PERIOD - 1860NM.

B. CHARACTERISTICS

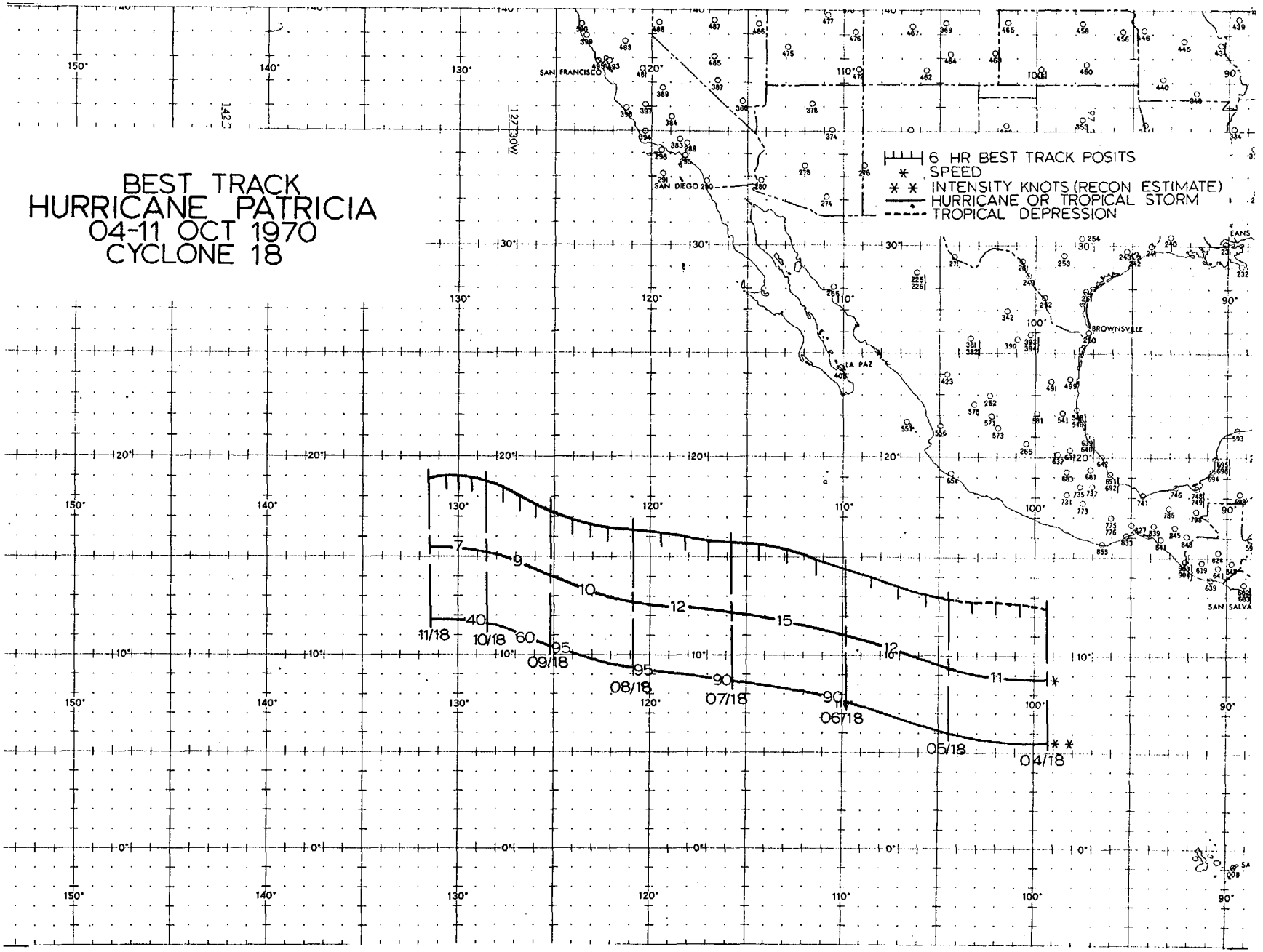
1. MINIMUM OBSERVED SLP - 976 MB
2. MINIMUM OBSERVED 700 MB HEIGHT - NOT OBSERVED
3. MAXIMUM SURFACE WIND - 95 KTS
4. MAXIMUM RADIUS OF SURFACE CIRCULATION - 360 MI.

II. DEVELOPMENT

A. INITIAL IMPETUS - ITCZ (TROPICAL CYCLONE #18)
B. INITIAL SURFACE VORTEX: 042100Z (ITOS - 1)
C. TIME STORM REACHED HURRICANE INTENSITY - 061800Z

III. FINAL DISPOSITION

A. DISSIPATED OVER WATER


BEST TRACK
HURRICANE PATRICIA
04-11 OCT 1970
CYCLONE 18
6 HR BEST TRACK POSITS
SPEED
INTENSITY KNOTS (RECON ESTIMATE)
HURRICANE OR TROPICAL STORM
TROPICAL DEPRESSION
SAN FRANCISCO
SAN DIEGO
LA PAZ
BROWNSVILLE
SAN SALVA
127°30'W
11/18
10/18
09/18
08/18
07/18
06/18
05/18
04/18

POSITION FROM BEST TRACK AND VERIFICATION DATA

	STORM POSIT		24 HR ERROR	48 HR ERROR	72 HR ERROR
TIME	LAT	LONG	DEG/DIST	DEG/DIST	DEG/DIST
041800Z	12.4N	99.6W	-	-	-
050000Z	12.6N	100.8W	-	-	-
050600Z	12.7N	102.0W	-	-	-
051200Z	12.8N	103.2W	-	-	-
051800Z	12.9N	104.4W	085/173	-	-
060000Z	13.1N	105.6W	160/100	-	-
060600Z	13.5N	107.0W	155/132	-	-
061200Z	14.0N	108.4W	125/144	-	-
061800Z	14.5N	109.8W	130/072	-	-
070000Z	14.9N	111.3W	135/096	-	-
070600Z	15.4N	112.8W	130/145	-	-
071200Z	15.7N	114.3W	120/177	-	-
071800Z	15.8N	115.7W	050/037	125/143	-
080000Z	15.9N	116.9W	020/069	105/181	-
080600Z	16.1N	118.1W	020/090	100/190	-
081200Z	16.3N	119.4W	055/188	095/205	-
081800Z	16.5N	120.8W	290/036	110/039	-
090000Z	16.6N	122.2W	300/028	060/048	080/252
090600Z	16.8N	123.0W	090/066	050/357	-
091200Z	17.0N	124.0W	270/107	055/378	075/247
091800Z	17.4N	125.1W	295/039	230/067	-
100000Z	17.7N	125.9W	270/066	230/105	220/055
100600Z	18.1N	126.8W	290/050	225/146	-
101200Z	18.4N	127.6W	310/075	240/216	050/495
101800Z	18.7N	128.5W	270/084	350/104	-
110000Z	18.9N	129.2W	015/348	330/097	220/235
110600Z	18.9N	129.9W	045/450	295/147	-
111200Z	18.9N	130.6W	020/455	330/180	245/345
111800Z	18.9N	131.4W	290/084	330/177	-

24 HR FORECAST ERROR = 132 MI
48 HR FORECAST ERROR = 163.5 MI
72 HR FORECAST ERROR = 271.5 MI

EYE FIXES TROPICAL CYCLONE #18 (HURRICANE PATRICIA)

FIX NO.	TIME	POSIT		UNIT/ACCURACY		FLT LVL	OBS. SFC WND	OBS. SLP	MIN 700 HT	FLT LVL TT/TO	EYE FORM	ORIEN-TATION	DIAM EYE	
1	061829Z	14.5N	109.9W	9th AF	10nm	500mb	90KTS	979	-	15/10	C		15	*
2	071825Z	15.8N	115.7W	VW-1	10nm	700mb	90KTS	976	2801M	22/14	C		15	*
3	081750Z	16.5N	120.8W	9th AF	10nm	500mb	95KTS	-	-	- -	C		15	
4	091745Z	17.4N	125.1W	VW-1	20nm	700mb	95KTS	980	-	25/23	C		15	*
5	100000Z	18.7N	125.7W	9th AF(FAN)	20nm	300mb	60KTS	-	-	- -	C		15	
6	101830Z	18.7N	128.5W	VW-1	15nm	700mb	40KTS	-	-	23/22	C		20	

* CLOSED WALL CLOUD AT 061829Z WALL CLOUD 12 MILES THICK AT 071825Z

WALL CLOUD 10 MILES THICK AT 091745Z

Fleet Weather Central, Pearl Harbor issued warnings on three tropical cyclones in 1970. Only one of these systems, Hurricane Dot, originated in the Central Pacific. Tropical Storm Maggie developed in the Fleet Weather Central, Alameda area of responsibility. Tropical Depression One Two, previously Hurricane Lorraine in the Eastern Pacific, existed only as a tropical depression in the Central Pacific.

Total Number of Warnings	27
Calendar Days of Warnings	8
Tropical Depressions	1
Tropical Storms	1
Hurricanes	1
Total Tropical Cyclones	3

No damage resulting from tropical cyclone activity was reported during 1970. In its formative stages Hurricane Dot passed near Midway Island causing increased precipitation and winds. Tropical Storm Maggie passed south of the Island of Hawaii where above normal cloudiness and precipitation were reported. Post analysis of data indicated that Hurricane Dot was possibly a regeneration of Tropical Storm Maggie. The distance between the position in the final warning on Maggie and the first warning on Dot was 1550 miles. The elapsed time indicates an average speed of 9 knots during this period. The connection was supported mainly by satellite pictures.

All warnings were coordinated with the Central Pacific Hurricane Center, Honolulu in accordance with the National Hurricane Operations Plan. The main forecasting tool used by Fleet Weather Central, Pearl Harbor was TYRACK, a computerized forecasting system based on tropical wind fields.

TROPICAL CYCLONES FOR THE 1970 SEASON

CYCLONE	PERIOD
TROPICAL STORM MAGGIE	23 AUG - 27 AUG 1970
TROPICAL DEPRESSION ONE TWO	26 AUG - 27 AUG 1970
HURRICANE DOT	2 SEP - 4 SEP 1970

TROPICAL STORMS 1970
POSITION DATA

TROPICAL STORM MAGGIE
23 AUG - 27 AUG

DTG	LAT	LONG	DTG	LAT	LONG
230000Z	14.8N	139.0W	250600Z	17.7N	151.4W
230600Z	15.0N	139.9W	251200Z	18.1N	152.9W
231200Z	15.1N	140.7W	251800Z	17.3N	154.0W
231800Z	15.3N	142.0W	260000Z	17.5N	155.5W
240000Z	15.5N	143.0W	260600Z	17.5N	156.6W
240600Z	15.8N	144.7W	261200Z	17.5N	157.7W
241200Z	15.9N	145.8W	261800Z	17.2N	157.0W
241800Z	17.0N	149.0W	270000Z	17.2N	157.8W
250000Z	17.4N	150.1W			

TROPICAL DEPRESSIONS 1970
POSITION DATA

TROPICAL DEPRESSION ONE TWO
26 AUG - 27 AUG

DTG	LAT	LONG	DTG	LAT	LONG
270000Z	20.0N	141.0W	271200Z	20.0N	143.0W
270600Z	20.0N	142.0W	271800Z	20.0N	144.0W

HURRICANE DOT

021800Z SEP TO 040600Z SEPTEMBER 1970

I. DATA

A. STATISTICS

1. NUMBER OF WARNINGS ISSUED - 8
2. NUMBER OF WARNINGS WITH HURRICANE INTENSITY - 2
3. TOTAL DISTANCE TRAVELED DURING WARNING PERIOD - 665 MI.

B. CHARACTERISTICS

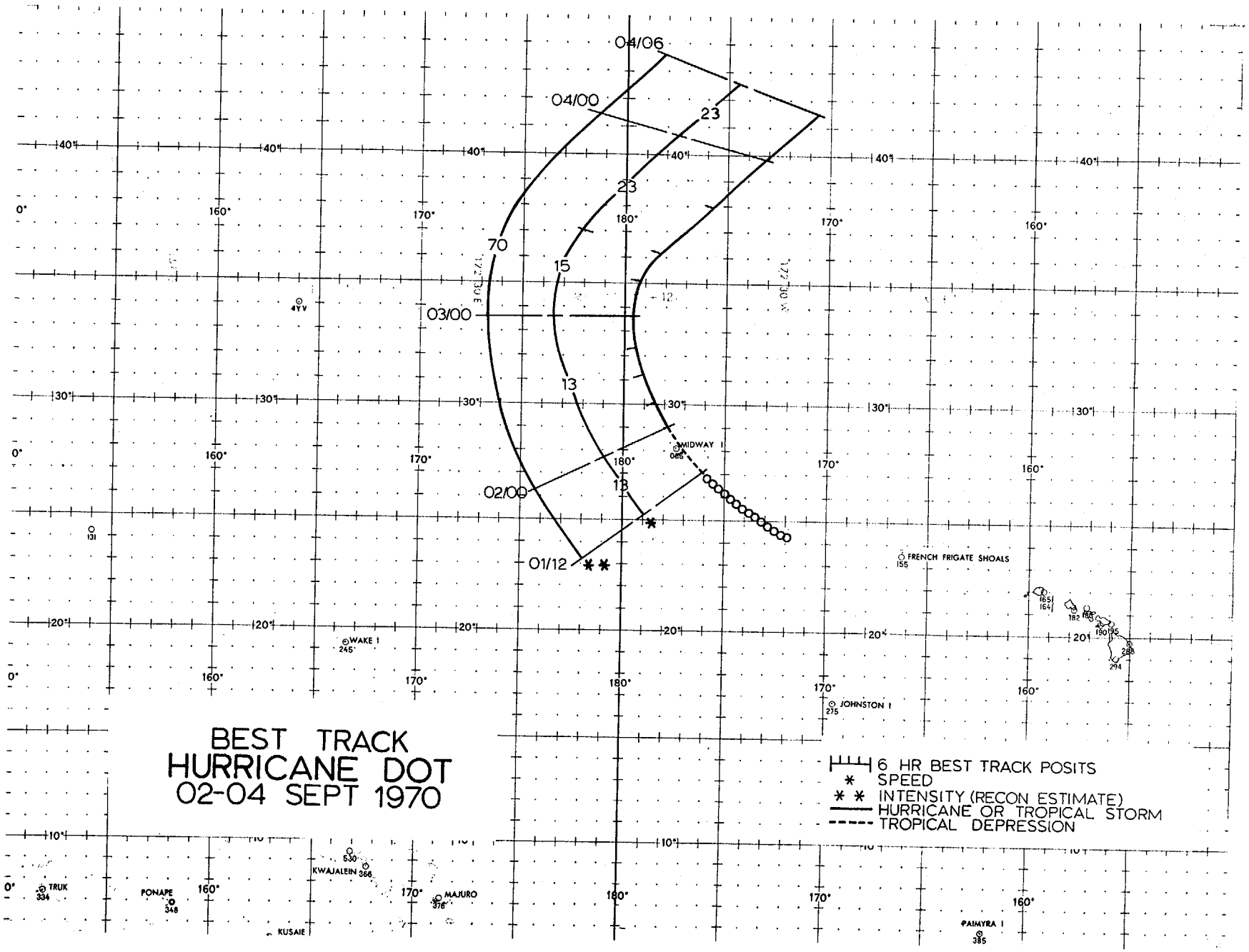
1. MINIMUM OBSERVED SLP - 993 MB.
2. MINIMUM OBSERVED 700 MB HEIGHT - 3015M.
3. MAXIMUM SURFACE WIND - 70 KTS.
4. MAXIMUM RADIUS OF SURFACE CIRCULATION - 200 MI.

II. DEVELOPMENT

A. INITIAL IMPETUS - INDUCED FROM UPPER LEVEL LOW
B. INITIAL SURFACE VORTEX - 012130Z ESSA VIII
C. TIME STORM REACHED HURRICANE INTENSITY - 030710Z

III. FINAL DISPOSITION

A. BECAME EXTRATROPICAL


BEST TRACK
HURRICANE DOT
02-04 SEPT 1970
04/06
04/00
03/00
02/00
01/12
23
23
70
15
13
13
MIDWAY I
FRENCH FRIGATE SHOALS
WAKE I
JOHNSTON I
TRUK
PONAPE
KWAJALEIN
MAJURO
KUSAIE
PALMYRA I
6 HR BEST TRACK POSITS
SPEED
INTENSITY (RECON ESTIMATE)
HURRICANE OR TROPICAL STORM
TROPICAL DEPRESSION

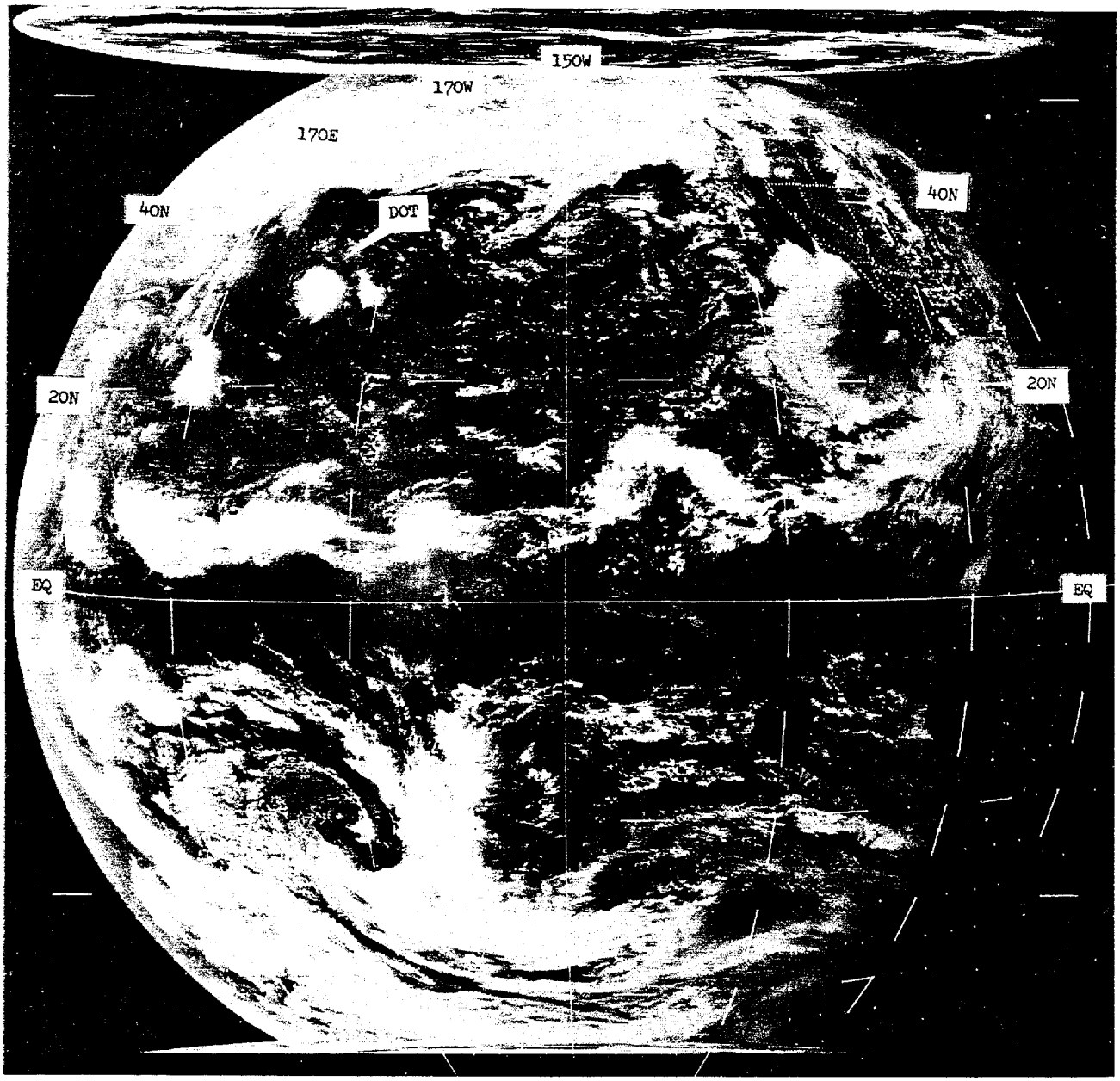


FIGURE AN-1

VIEW OF PACIFIC FROM GEOSTATIONARY SATELLITE ATS-1
DEPICTING TROPICAL STORM DOT
NORTH OF MIDWAY ISLAND

HURRICANE DOT

POSITION FROM BEST TRACK AND VERIFICATION DATA

	STORM POSIT		24 HR ERROR	48 HR ERROR	72 HR ERROR
TIME	LAT	LONG	DEG/DIST	DEG/DIST	DEG/DIST
021800Z	33.3N	179.7W	-	-	-
022300Z	33.4N	179.4W	-	-	-
030600Z	35.5N	179.0W	-	-	-
031200Z	36.6N	177.6W	-	-	-
031800Z	38.1N	175.5W	250/250	-	-
040000Z	39.8N	173.0W	230/400	-	-
040600Z	41.4N	170.5W	250/240	-	-

24 HOUR FORECAST ERROR = 297 MI
48 HOUR FORECAST ERROR = NOT APPLICABLE
72 HOUR FORECAST ERROR = NOT APPLICABLE

EYE FIXES HURRICANE DOT

FIX NO.	TIME	POSIT		UNIT-METHOD-ACCY	FLT LVL	FLT LVL WND	OBS SFC WND	OBS MIN SLP	MIN 700MB HGT	FLT LVL TT/TO	EYE FORM	EYE DIA
1	020244Z	29.5N	178.0W	SLTLS STG C+								
2	021835Z	33.4N	179.8W	VW-RDR-X-10		---	065	---	----	-- --	ELIP	14X24
3	022300Z	33.4N	179.4W	AF-X-X-X		---	040	999	3033	11/09	CIR	25
4	030146Z	33.0N	179.5W	SLTLS STG C+								
5	030700Z	35.3N	179.0W	AF-P--08	700MB	051	070	993	3015	12/10	CIR	20
6	031335Z	36.7N	177.6W	VW-P--05	700MB	067	---	---	----	14/09	CIR	25
7	040242Z	39.0N	173.0W	SLTLS STG C+								
8	040600Z	41.4N	170.5W	AF-X-X-X		(RECD VIA PHONE)						