2. RECONNAISSANCE AND FIXES

2.1 GENERAL

JTWC depends primarily on two reconnaissance platforms, satellite and radar, to provide necessary, accurate and timely meteorological information in support of advisories, alerts and warnings. When available, synoptic and aircraft reconnaissance data are also used to supplement the above. As in past years, optimal use of all available reconnaissance resources to support JTWC's products remains a primary concern. Weighing the specific capabilities and limitations of each reconnaissance platform and the tropical cyclone's threat to life and property both afloat and ashore continues to be an important factor in careful product preparation.

2.2 RECONNAISSANCE AVAILABILITY

2.2.1 SATELLITE — Interpretation of satellite imagery by analysts at Air Force/Navy tactical sites and on Navy ships yields tropical cyclone positions, estimates of the current intensity and 24-hr forecast intensity. Additional positioning and surface wind field estimation information are available for analysis from DMSP SSM/I data and the ERS-2 and NSCAT scatterometers.

2.2.2 RADAR — Interpretation of land-based radar, which remotely senses and maps precipitation within tropical cyclones, provides positions in the proximity (usually within 175 nm (325 km)) of radar sites in Kwajalein, Guam, Japan, South Korea, China, Taiwan, Philippine Islands, Hong Kong, Thailand and Australia. Where Doppler radars are located, such as the Weather Surveillance Radar-1988 Doppler (WSR-88D) on Guam and Okinawa, measurements of radial velocity are also available, and observations of the tropical cyclone's horizontal velocity field and wind structure integrated in the vertical are possible.

2.2.3 AIRCRAFT — No weather reconnaissance aircraft fixes were received at JTWC in 1996.

2.2.4 SYNOPTIC — JTWC also determines tropical cyclone positions based on analysis of conventional surface/gradient-level synoptic data. These positions are an important supplement to fixes derived from remote sensing platforms, and become most valuable in situations where satellite, radar, and aircraft fixes are unavailable or are considered unrepresentative.

2.3 SATELLITE RECONNAISSANCE SUMMARY

Per USCINCPAC INSTRUCTION 3140.1W , the Pacific Air Force (PACAF) has primary responsibility for providing tropical cyclone reconnaissance for the U.S. Pacific Command (USPACOM). The Commanding Officer, NAVPACMETOCCEN WEST/JTWC, tasks all reconnaissance requirements, and the Officer In Charge (OIC) of the USPACOM Satellite Reconnaissance Network (hereafter referred to as Network) is delegated the authority to manage Network support to JTWC. However, operational control of radar and satellite readout sites engaged in tropical cyclone reconnaissance remains in normal command channels. The OIC of the Network and the personnel of Satellite Operations (SATOPS) are members of the 36 OSS/OSJ, and are collocated with JTWC at Nimitz Hill, Guam. The network sites are listed in Table 2-1.

Direct readout Network sites provide coverage of the tropical western North Pacific, South China Sea, and south central Indian Ocean using DMSP and NOAA TIROS polar orbiting satellites. PACAF Instruction 15-102 requires each network site to perform a minimum of two fixes per tropical cyclone per day if the tropical cyclone is within a site's coverage. Network direct readout site coverage is augmented by other sources of satellite based reconnaissance.

Air Force Global Weather Central (AFGWC) provides AOR-wide coverage to

Table 2-1 USPACOM SATELLITE RECONNAISSANCE NETWORK SITES

UNIT	ICAO
15 OSS/OSW, Hickam AFB, Hawaii	PHIK
18 OSS/OSW, Kadena AB, Japan	RODN
607 COS/DOW, Yongsan Garrison Republic of Korea	RKSY
Air Force Global Weather Central, Offutt AFB, Nebraska	KGWC
NPMOD DGAR, Diego Garcia	FJDG

JTWC using recorded smooth DMSP and NOAA TIROS imagery. This imagery is recorded and stored on the satellites for later relay to a command readout site, which in turn passes the data via satellite to AFGWC. Civilian contractors for the Army at Kwajalein Atoll provide additional polar orbiting satellite based tropical cyclone surveillance in the Marshall Islands and east of 180°W as needed. The NOAA/NESDIS Satellite Applications Branch at Suitland, Maryland (ICAO identifier KWBC) also performs tropical cyclone fix and intensity analysis over the JTWC AOR using METEOSAT and GMS geostationary platforms.

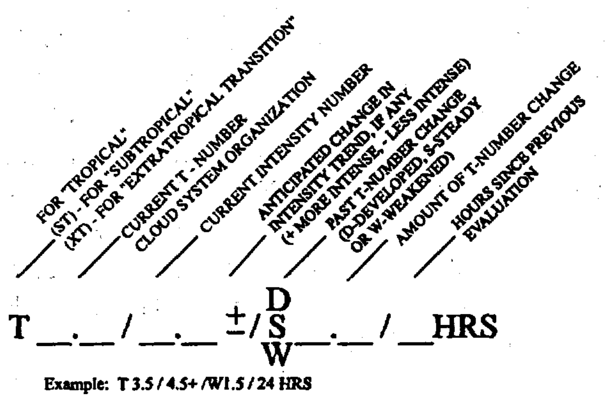

Figure 2-1 Dvorak code for communicating estimates of current and forecast intensity derived from satellite data. In the example, the current "T-number" is 3.5, but the current intensity is 4.5. The cloud system has weakened by 1.5 "T-numbers" since the evaluation conducted 24 hours earlier. The plus (+) symbol indicates an expected reversal of the weakening trend or very little further weakening of the tropical cyclone during the next 24-hour period.

The Network provides tropical cyclone positions and intensity estimates once JTWC issues either a TCFA or a warning. An example of the Dvorak code is shown in Figure 2-1. Each satellite-derived tropical cyclone position is assigned a Position Code Number (PCN) (Arnold and Olsen, 1974), which is a statistical estimate of fix position accuracy. The PCN is determined by 1) the availablility of visible landmarks in the image that can be used as references for precise gridding, and 2) the degree of organization of the tropical cyclone's cloud system (Table 2-2)

Once a tropical cyclone reaches an intensity of 50 kt (26 m/sec), AFGWC and Nimitz Hill SATOPS analyze the 35-kt (18-m/sec) wind distribution surrounding the tropical cyclone based on microwave satellite imagery.

Table 2-2 POSITION CODE NUMBER (PCN)

PCN	CENTER DETERMINATION/GRIDDING METHOD
1	EYE/GEOGRAPHY
2	EYE/EPHEMERIS
3	WELL DEFINED CIRCULATION CENTER/GEOGRAPHY
4	WELL DEFINED CIRCULATION CENTER/EPHEMERIS
5	POORLY DEFINED CIRCULATION CENTER/GEOGRAPHY
6	POORLY DEFINED CIRCULATION CENTER/EPHEMERIS

SATOPS provides three-hourly positions and six-hourly intensity estimates for all tropical cyclones in TCFA or warning status. Current intensity estimates are made using the Dvorak technique for both visible and enhanced infrared imagery. The standard relationship between tropical cyclone "T-number", maximum sustained surface wind speed, and minimum sea-level pressure (Atkinson and Holliday, 1977) for the Pacific is shown in Table 2-3. Subtropical cyclone intensity estimates are made using the Hebert and Poteat (1975) technique. Intensity estimates of tropical cyclones undergoing extratropical transition are made using the Miller and Lander (1997) technique described in section 2.3.3.

SATOPS at Nimitz Hill uses hourly full disk GMS imagery to observe 70% of the JTWC AOR from 80°E to 180°W (Figure 2-2). Images are remapped to a Mercator projection to enhance imagery limb coverage at 80°E - 100°E. Animated geostationary imagery is a valuable tool for determining the location and motion of tropical cyclones. Animated water vapor channel imagery is useful for observing environmental synoptic features that affect tropical cyclone development and movement.

Table 2-3 ESTIMATED MAXIMUM SUSTAINED WIND SPEED (KT) AS A FUNCTION OF DVORAK CURRENT AND FORECAST INTENSITY NUMBER AND MINIMUM SEA-LEVEL PRESSURE (MSLP)

T-NUMBER	ESTIMATED WIND SPEED-KT	(M/SEC)	MSLP (MB) (PACIFIC)
0.0	<25	<(13)	- - - -
0.5	25	(13)	- - - -
1.0	25	(13)	- - - -
1.5	25	(13)	- - - -
2.0	30	(15)	1000
2.5	35	(18)	997
3.0	45	(23)	991
3.5	55	(28)	984
4.0	65	(33)	976
4.5	77	(40)	966
5.0	90	(46)	954
5.5	102	(53)	941
6.0	115	(59)	927
6.5	127	(65)	914
7.0	140	(72)	898
7.5	155	(80)	879
8.0	170	(87)	858

SATOPS has access to polar and geostationary data on both the Air Force Mark IVB workstation and the MIDDAS. The MIDDAS consists of a network of three DEC Vax 3400s running advanced graphics software, with two large screen workstations. The Mark IVB is the SATOPS backup satellite data analysis system with the ability to ingest and process both polar and geostationary satellite data, and display imagery on one large screen workstation. The Mark IVB also acts as a front end for the MIDDAS which has no independent receiver/antenna. Both the MIDDAS and the Mark IVB can display NOAA Advanced Very High Resolution Radiometer (AVHRR), DMSP Operational Linescan System (OLS) and Special Sensor Microwave/Imager (SSM/I), and also geostationary visible, infrared and water vapor channel imagery. The MIDDAS can display NOAA TIROS Operational Vertical Sounder (TOVS) data, and the Mark IVB can display DMSP SSM/T1 and SSM/T2 sounder data.

NOAA TIROS AVHRR imagery provides five channels of imagery — visible, near and middle IR, and two in the far IR channels. DMSP OLS provides imagery in two channels — visible/near IR (commonly referred as broadband visible), and far IR. TOVS includes the High Resolution Infrared Radiation Sounder/2 (HIRS/2), the Microwave Sounding Unit (MSU), and the Stratospheric Sounding Unit (SSU).

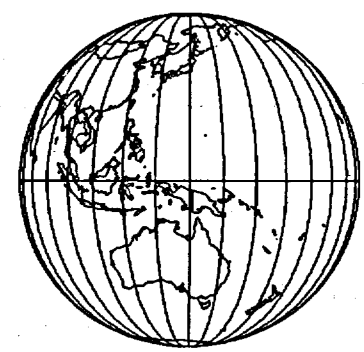

Figure 2-2 GMS Full Disk Coverage

2.3.1 SATELLITE PLATFORM SUMMARY— Figure 2-3 shows the operational status of polar orbiting spacecraft. Imagery was received from two DMSP and two NOAA satellites during 1996. Both of the F-10 and F-11 OLS imagers are in standby mode and only SSM/I imagery was provided, while F-12 provided only OLS imagery. Only F-13 provided both OLS and SSM/I imagery. NOAA-12 and NOAA-14 were operational throughout the year, with fully functional AVHRR imagers.

2.3.2 STATISTICAL SUMMARY—Satellite-based tropical cyclone positions and intensities were the primary input for JTWC's warnings, accounting for 91% of all fixes. The Network and other agencies provided JTWC with 10,360 fixes — 5,568 western North Pacific, 629 northern Indian Ocean, 2,539 Southern Hemisphere, and 1,624 for circulations which did not develop into significant tropical cyclones. JTWC SATOPS provided 7,601 of the fixes. A comparison of satellite fixes to corresponding best track positions is shown in Table 2-4.

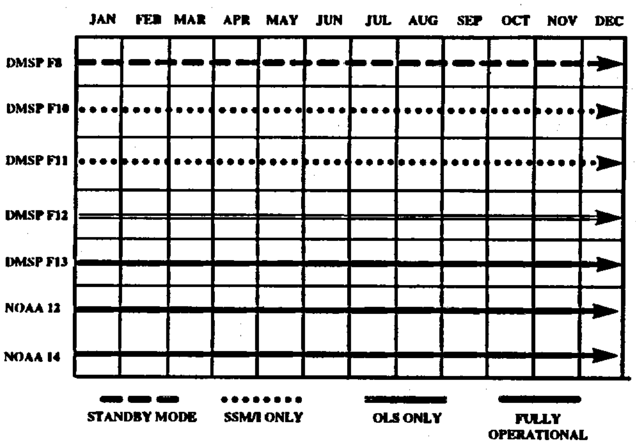

Figure 2-3 Polar orbiting spacecraft status for 1996

2.3.3 APPLICATION OF NEW TECHNIQUES AND TECHNOLOGY— SATOPS uses animated geostationary imagery, multispectral display capability, and microwave imagery to assign fix codes to each tropical cyclone pattern and sensor type (see Table 2-5) (Crume and Lander, 1997). These fix codes will be compared to best track positions to reexamine JTWC's use of the current PCNs after sufficient data are collected. The goal is to give the TDO a better statistical value for each satellite-derived fix position based on the use of current sensors. Many of our current sensors were not operational during the original PCN study.

In addition, SATOPS developed an XT technique (Miller and Lander, 1997a) to better estimate the intensity of tropical cyclones undergoing extratropical transition — a weakness in the current Dvorak technique. The Dvorak T numbers appear to drop too fast when such systems

Table 2-4 MEAN DEVIATION(NM) OF ALL DMSP NETWORK DERIVED TROPICAL CYCLONE POSITIONS FROM JTWC BEST TRACK POSITIONS (NUMBER OF CASES IN PARENTHESES)

WESTERN NORTH PACIFIC OCEAN

PCN	1986-1995 AVERAGE		1996 AVERAGE	
1&2	13.9	(7239)	11.4	(1,155)
3&4	23.7	(6714)	26.9	(813)
5&6	41.2	(16,793)	54.7	(2,698)
Totals	30.9	(30,746)	39.2	(4,666)

NORTH INDIAN OCEAN

PCN	1986-1995 AVERAGE		1996 AVERAGE	
1&2	12.8	(164)	15.3	(7)
3&4	31.9	(151)	25.3	(70)
5&6	39.2	(1,364)	53.9	(459)
Totals	36.0	(1,679)	49.7	(536)

WESTERN SOUTH PACIFIC AND SOUTH INDIAN OCEAN

PCN	1986-1995 AVERAGE		1996 AVERAGE	
1&2	15.7	(2,514)	11.2	(337)
3&4	25.9	(2,004)	24.7	(338)
5&6	36.5	(9,209)	35.9	(1,379)
Totals	31.1	(13,727)	30.0	(2,054)

lose their persistent central convection, while synoptic data indicate the low-level circulations still contain winds greater than what is indicated by the T numbers. The XT technique should be applied during intensity analysis when a tropical cyclone:

1) loses one half or more of its persistent central convection;

2) maintains its forward motion, or accelerates; or,

3) when it undergoes compound or complex transition.

The XT technique should be applied as soon as appropriate to avoid an artificial intensity minima and discontinued after extratropical transition is complete. Transition is defined as complete when the system has progressed poleward of the polar jet maximum or when water-vapor imagery clearly indicates the core of the system has become very dry. After extratropical transition is complete, the intensity estimation technique of Smigielski and Mogil (1992) for midlatitude cyclones is more appropriate.

Satellite imagery features measured with the XT technique are:

1) Arc length of the primary outer cloud band not connected with the circulation center.

2) organizational extent of the low-level circulation.

3) existence of deep convection between the outer cloud band and the circulation center.

4) translational speed of the system. (Refer also to Figure 2-4.)

Table 2-6 shows the wind intensities associated with each XT number, which are on the same wind scale as Atkinson and Holliday (1977).

Work is underway at SATOPS to establish methodology for determining tropical cyclone center positions from SSM/I imagery (Miller and Lander, 1997b). SATOPS produced 511 SSM/I-based fixes in 1996 with the MISTIC. Timeliness and number of SSM/I-based fixes should continue to improve with the network

Table 2-5 POSITION CODE NIMBER (PCN) CRITERIA AND FIX CODES FOR TC LOW-LEVEL CIRCULATION CENTERS (CCs) FROM SATELLITE (NOTE 1)

PCN	PCN	Definitions	Sensor /technique type and fix code					
Grid by Geography (note 2)	Grid by Ephemeris (note 2)		IR	Vis	Both	SSM/I only (note 3)	Vis/IR & SSM/I (note 3)	Anmtn (note 4)
1	2	**EYE**						
		Eye within CDO, geometric center (regular/round, any diameter) (note 5)	1	2	3	4	S	A
		Small eye (irregular/ragged, diameter < 30 nm on long axis) (note 5)	5	6	7	8	S	A
3	4	**WELL DEFINED**						
		Eye(ragged/irregular, diameter > 30 nm center more than 1/2 enclosed by wall cloud) (note 5)	9	10	11	12	S	A
		Tightly curved band/banding type eye (band curves at least 1/2 distance around center, diameter ≤ 90 nm)	13	14	15	16	S	A
		Exposed low-level CC	17	18	19	20	S	A
		Small CDO (round with well defined edges, positioned near geometric center, diameter ≤ 80 nm)		21	22	23	S	A
		Small embedded center (diameter ≤ 80 nm)	24		25	26	S	A
		Large CDO (with clear indications of shearing, low-level cloud lines, or overshooting tops, that bias low-level center position away from the geometric center, diameter > 80 nm)		27	28	29	S	A
		Any CDO or Embedded Center with low-level CC clearly visible on co-registered SSM/I (note 6)	30	31	32	33	S	

Table 2-5 (CONTINUED)

5	6	POORLY DEFINED CC						
		Large eye (ragged/irregular, diameter > 30 nm on long axis, more than 1/2 enclosed by wall cloud)	34	35	36	37	S	A
		Spiral banding systems (convective curvature) not classifiable as banding eye or tightly curved band	38	39	40	41	S	A
		Large CDO	42	43	44	45	S	A
		Embedded center positioned with IR	46					A
		Partially exposed low-level centers with CC less than 1/2 exposed	47	48	49	50	S	A
		Cloud minimum wedge/cold comma	51	52	53	54	S	A
		Central cold cover	55	56	57	58	S	A
		Cirrus outflow (upper-level outflow provides the only circulation parameters)	59	60	61	62	S	A
		Poorly organized low-level center evident only in high resolution animation (Vis/IR or both)	63					
		All others	64	65	66	67	S	A
		Monsoon depressions or multiple cloud clusters, positioned using any of the following methods:	Any combination of Vis , IR/EIR, and SSM/I					
		Circle method	68					
		Conservative feature	69					
		Animation	70					
		Extrapolation	71					

Note 1: Use the following steps to determine the PCN and Fix Code:

a. Based on the analysis of the circulation parameters, determine a TC low-level CC position.

b. Go to Table 2-5, then to the definitions column. Choose a PCN based on the cloud pattern, discrete measurements, as necessary, and/or technique used to determine the position.

c. Move across to the Fix Code columns, and based on the sensor(s) used, select a fix code.

Note 2: Odd PCNs (1, 3, 5) are gridded with geography, the low-level CC being within 10 degrees (600 nm) of the geographic feature used for gridding. Even PCNs (2, 4, 6) are gridded with ephemeris, or the low-level CC is not within 10 degrees (600 nm) of the geographic feature used for gridding.

Note 3: Append "S" to the numerical fix code entry to indicate Special Sensor Microwave Imager (SSM/I) and visible and/or IR data was used in determining the low-level CC (i.e. 18S). (DMSP) fixes only. For the purposes of this fix code, SSM/I (S) and Animation (A) are mutually exclusive.

Note 4: Append "A" to the numerical fix code entry to indicate animation was used in determining the low-level CC (e.g. 11A). Geostationary fixes only. For the purposes of this fix code, SSM/I (S) and Animation (A) are mutually exclusive.

Note 5: For fix code entries 1-9, encode 01-09.

Note 6: In order to use SSM/I data to position low-level CCs, you must be able to correct the navigation/gridding and interrogate the SSM/I imagery directly for latitude/longitude (DMSP fixes only).

using DMSPs F10 and F11 (SSM/I-only) on the Mark IVB. The recently successful F14 launch should also enhance JTWC's use of the microwave products during 1997.

Mark IVB Network sites received the new software Build 7 during 1996. Also installed

Table 2-6 XT - INTENSITIES

77 KT = XT 4.5	T 4.5
65 KT = XT 4.0	T 4.0
55 KT = XT 3.5	T 3.5
45 KT = XT 3.0	T 3.0
35 KT = XT 2.5	T 2.5
30 KT = XT 2.0	T 2.0
25 KT = XT 1.0	T 1.5
20 KT = XT 0.0	T 1.0

was a patch which allows navigation of SSM/I imagery and the ability to overlay SSM/I and OLS imagery. In addition, installation of the Mark IVB Satellite Imagery Dissemination System (SIDS) was completed at Kadena AB and Nimitz Hill SATOPS. SIDS generates satellite imagery products from the Mark IVB, and makes them available to geographically separated units via modem dial-up or LAN/Server connections.

2.3.4 FUTURE OF SATELLITE RECONNAISSANCE — SATOPS remains committed to improving the support provided to JTWC and the USPACOM tropical cyclone warning system. The most significant METSAT improvement anticipated in 1997 is the summer launch of the Chinese geostationary satellite, Feng Yun. With a subpoint at 105°E, this satellite will offer a field of view over the Indian Ocean extending to the east coast of Africa (Figure 2-5). Network sites in the western Pacific should be able to access real time imagery from both GMS-5 and Feng Yun-2B. This opportunity will also provide JTWC with total geostationary satellite coverage of its AOR for the first time.

HQ PACAF/DOW and the Mark IVB depot-support team are exploring a means to send

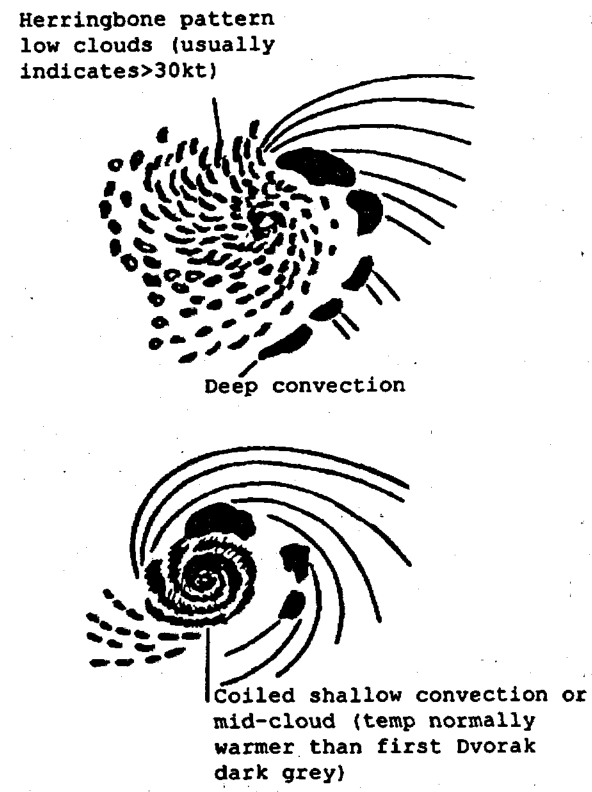

Figure 2-4 Two examples of cloud features analyzed with the XT Technique.

DMSP high resolution and SSM/I imagery to JTWC after the Base Realignment and Closure (BRAC) mandated relocation to Pearl Harbor, Hawaii (planned for January, 1999). Transmission of Feng Yun 2 geostationary data to Pearl Harbor is being addressed since this satellite will orbit below the horizon at Hawaii preventing line of sight communication.

Figure 2-5 Geostationary coverage from 105°E

Mark IVB software Build 8 will introduce a more user-friendly menu and the ability to generate common image files, such as bitmaps, GIF or TIFF files, from received satellite imagery. Installation of the DMSP Image Generating System (DIGS) on the MISTIC II workstation allows SATOPS to save SSM/I imagery in TIFF files.

AFGWC recently implemented a new capability to use geostationary data from METEOSAT, GMS, and GOES to provide additional fix support. In addition, DMSP F-14 was launched in April 1997 in anticipation of DMSP F-12's failure and should provide valuable data. A Dvorak-like technique is under development to determine tropical cyclone intensity from SSM/I imagery.

2.4 RADAR RECONNAISSANCE SUMMARY

Of the 43 significant tropical cyclones in the western North Pacific during 1996, 17 passed within range of land-based radar with sufficient precipitation and organization to be fixed. A total of 691 land-based radar fixes were logged at JTWC. As defined by the World Meteorological Organization (WMO), the accuracy of these fixes falls within three categories: good [within 10 km (5 nm)], fair [within 10 - 30 km (5 - 16 nm)], and poor [within 30 - 50 km (16 - 27 nm)]. Of the 691 radar fixes encoded in this manner, 182 were good, 239 fair, and 270 poor. The radar network provided timely and accurate fixes which allowed JTWC to better track and forecast tropical cyclone movement. In addition to fixes, the Guam and Okinawa WSR-88D radars supplied meteorologists with a look into the vertical and horizontal structure of precipitation and winds in tropical cyclones passing nearby.

In the Southern Hemisphere, 50 radar reports were logged for tropical cyclones. No radar fixes were received for the North Indian Ocean.

2.5 TROPICAL CYCLONE FIX DATA

Table 2-7a delineates the number of fixes per platform for each individual tropical cyclone for the western North Pacific. Totals and percentages are also indicated. Similar information is provided for the North Indian Ocean in Table 2-7b, and for the South Pacific and South Indian Ocean in Table 2-7c.

Table 2-7a WESTERN NORTH PACIFIC OCEAN FIX PLATFORM SUMMARY FOR 1996

TROPICAL CYCLONE		SATELLITE	SCATTEROMETER	RADAR	SYNOPTIC	AIRCRAFT	TOTAL
01W	TD	53	0	0	0	0	53
02W	TS ANN	162	0	5	3	0	170
03W	TD	11	0	0	0	0	11
04W	TY BART	241	8	7	0	0	256
05W	TS CAM	90	2	0	1	0	93
06W	TY DAN	174	3	9	0	0	186
07W	STY EVE	253	1	88	11	0	353
08W	TY FRANKIE	85	0	0	5	0	90
09W	TY GLORIA	122	0	37	8	0	167
10W	STY HERB	268	1	25	8	0	302
11W	TS IAN	53	0	0	0	0	53
12W	TY JOY	183	1	0	0	0	184
13W	TY KIRK	348	2	220	5	0	575
14W	TS LISA	48	0	9	2	0	59
15W	TD	57	1	0	0	0	58
16W	TS MARTY	20	1	0	6	0	27
17W	TD	16	0	0	0	0	16
18W	TY NIKI	142	1	3	4	0	150
19W	TY ORSON	321	3	0	0	0	324
20W	TY PIPER	97	2	0	0	0	99
21W	TD	26	0	0	0	0	26
22W	TS RICK	68	2	0	0	0	70
23W	STY SALLY	148	1	16	1	0	166
24W	TS	68	0	0	3	0	71
25W	TY TOM	165	3	0	3	0	171
26W	STY VIOLET	222	5	21	1	0	249
27W	TY WILLIE	81	0	13	5	0	99
28W	STY YATES	230	1	46	0	0	277
29W	TY ZANE	243	2	153	1	0	399
30W	TS ABEL	153	4	0	5	0	162
31W	TD	91	0	0	0	0	91
32W	TY BETH	209	3	10	2	0	224
33W	TY CARLO	171	3	0	1	0	175
34W	TD	19	2	0	3	0	24
35W	TS	31	1	0	4	0	36
36W	STY DALE	189	7	23	0	0	219
37W	TS ERNIE	234	1	6	8	0	249
38W	TS	50	0	0	0	0	50
39W	TD	18	2	0	5	0	25
40W	TD	83	4	0	2	0	89
41W	TD	57	1	0	0	0	58
42W	TY FERN	216	4	0	6	0	226
43W	TS GREG	52	1	0	0	0	53
Totals		5,568	73	691	103	0	6,435
Percentage of Total		87%	1%	11%	1%	0%	100%

Table 2-7b NORTH INDIAN OCEAN FIX PLATFORM SUMMARY FOR 1996

TROPICAL CYCLONE	SATELLITE	SCATTEROMETER	RADAR	SYNOPTIC	AIRCRAFT	TOTAL
01B	54	1	0	0	0	55
02A	10	1	0	0	0	11
03B	96	0	0	6	0	102
04A	25	0	0	0	0	25
05A	85	3	0	16	0	104
06B	114	1	0	2	0	117
07B	87	0	0	1	0	88
08B	158	2	0	1	0	161
Totals	629	8	0	26	0	663
Percentage of Total	95%	1%	0%	4%	0%	100%

Table 2-7c SOUTH PACIFIC AND SOUTH INDIAN OCEAN FIX PLATFORM SUMMARY FOR 1996

TROPICAL CYCLONE	SATELLITE	SCATTEROMETER	RADAR	SYNOPTIC	AIRCRAFT	TOTAL
01S DARYL/AGNIELLE	185	1	0	0	0	186
02S EMMA	168	2	0	0	0	170
03S FRANK	144	1	13	1	0	159
04S GERTIE	97	1	5	1	0	104
05P BARRY	76	0	2	0	0	78
06S BONITA	81	1	0	3	0	85
07S HUBERT/CORYNA	71	1	0	0	0	72
08P YASI	33	0	0	0	0	33
09P CELESTE	76	0	5	2	0	83
10P JACOB	175	0	0	4	0	179
11S ISOBEL	66	1	0	0	0	67
12S ----	64	0	0	0	0	64
13P DENNIS	128	1	2	0	0	131
14S DOLORESSE	44	3	0	0	0	47
15S ----	28	1	2	0	0	31
16S EDWIDGE	61	1	0	0	0	62
17S FLOSSY	47	0	0	0	0	47
18S KIRSTY	98	0	11	1	0	110
19P ETHEL	93	1	9	1	0	104
20P ZAKA	13	0	0	0	0	13
21P ATU	57	1	1	2	0	61
22S GUYLIANNE	47	2	0	0	0	49
23P BETI	144	4	0	9	0	157
24S HANSELLA	56	4	0	0	0	60
25S OLIVIA	138	2	0	0	0	140
26S ITELLE	118	3	0	0	0	121
27S ----	110	0	0	0	0	110
28S JENNA	121	0	0	0	0	121
Totals	2,539	31	50	24	0	2,644
Percentage of Total	96%	1%	2%	1%	0%	100%