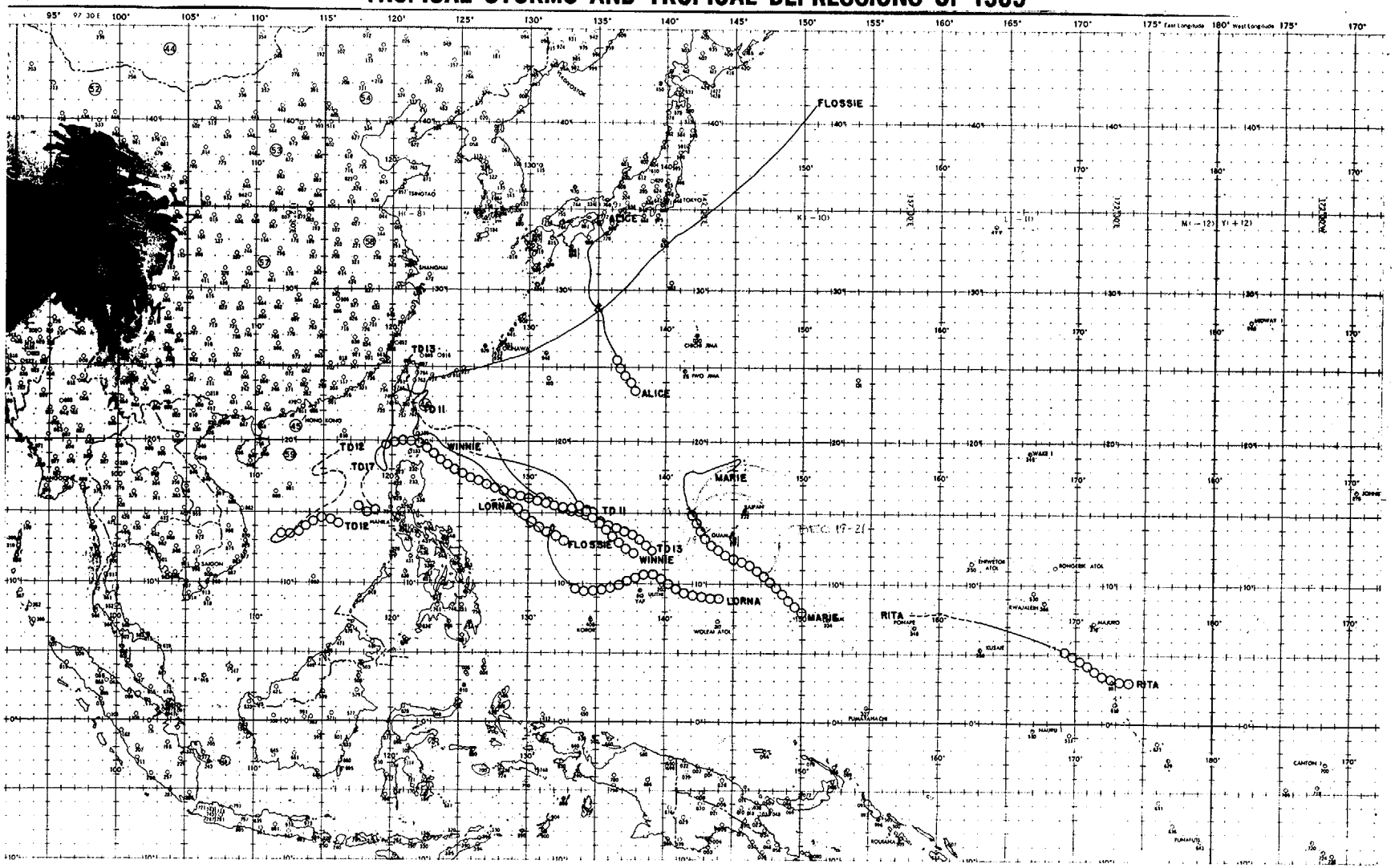
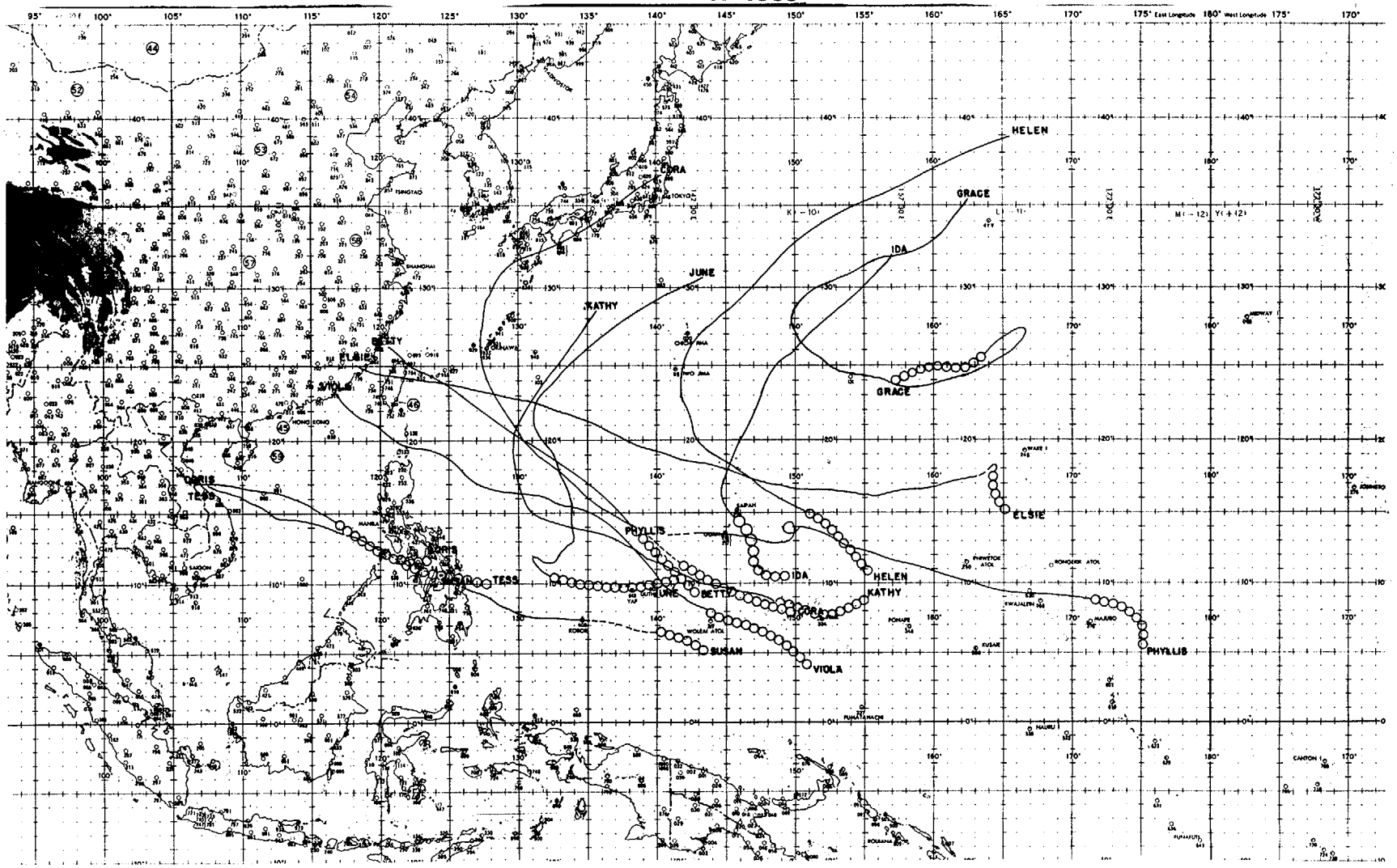
CHAPTER IV

SUMMARY OF TROPICAL CYCLONES 1969

TROPICAL STORMS AND TROPICAL DEPRESSIONS OF 1969



TYPHOONS OF 1969



SUMMARY OF WESTERN PACIFIC TROPICAL CYCLONES OF 1969

During 1969, the Joint Typhoon Warning Center issued 430 warnings on 13 typhoons, 6 tropical storms and 4 tropical depressions while in a warning status for 108 days. When compared with previous years, it is evident that 1969 was an unusually inactive year.

There were no tropical cyclones passed to JTWC from outside its area of responsibility and JTWC passed no tropical cyclones to other agencies.

There were two "Super Typhoons" (maximum sustained surface wind of 130 knots or greater) during the 1969 season compared with five in 1968 and four in 1967. Typhoon Elsie registered a 890 MB center pressure which is one of the lowest ever recorded in the Western Pacific.

The following figures and tables are provided to present representative statistical data from the 1969 tropical cyclone season and provide a ready reference for comparison with previous years.

SUMMARY OF WESTERN PACIFIC
TROPICAL CYCLONES
OF 1969

	1960-1967 (AVE)	1968	1969
TOTAL NUMBER OF WARNINGS	781	822	430
CALENDAR DAYS OF WARNING	160	142	108
NUMBER OF WARNING DAYS WITH TWO OR MORE CYCLONES	59	68	15
NUMBER OF WARNING DAYS WITH THREE OR MORE CYCLONES	15	15	1
TROPICAL DEPRESSIONS	6	4	4
TROPICAL STORMS	11	7	6
TYPHOONS	21	20	13
TOTAL TROPICAL CYCLONES	38	31	23

TABLE 4-1

SUPER TYPHOONS DURING 1969*

CYCLONE NUMBER	NAME	INCLUSIVE DATES	MAX INTENSITY	MIN SLP	MIN 700 MB HT
05	VIOLA	21 - 28 JUL	130 KNOTS	897 MB	2137 m
14	ELSIE	19 - 27 SEP	150 KNOTS	890 MB	2140 m

* Typhoons with maximum sustained surface winds of 130 knots or greater.

TABLE 4-2

1969 TROPICAL CYCLONES

CYCLONE	TYPE	NAME	DATE*	CALENDAR DAYS OF WARNING	MAX SFC WND*	MIN OBS SLP	MAX RADIUS SFC CIRC	WARNINGS ISSUED TOTAL	WARNINGS ISSUED NO. AS TYPHOONS	DISTANCE TRAVELED*
01	T	PHYLLIS	17 JAN-22 JAN	6	85	966	240	24	15	1968
02	TS	RITA	07 MAR-09 MAR	3	40	993	300	12	0	684
03	T	SUSAN	18 APR-25 APR	8	105	943	240	29	12	882
04	T	TESS	08 JUL-11 JUL	4	70	974	300	13	3	906
05	T	VIOLA	21 JUL-28 JUL	8	130	897	420	26	18	1854
06	TS	WINNIE	29 JUL-31 JUL	3	45	984	240	07	0	480
07	TS	ALICE	02 AUG-04 AUG	3	45	982	300	10	0	678
08	T	BETTY	05 AUG-08 AUG	4	70	962	360	14	4	1242
09	T	CORA	14 AUG-23 AUG	10	85	948	330	34	15	2226
10	T	DORIS	31 AUG-02 SEP	3	65	973	240	9	3	612
11	TD		07 SEP-11 SEP	5	30	990	180	18	0	648
12	TD		07 SEP-08 SEP	2	25	996	120	05	0	174
13	TD		11 SEP-12 SEP	2	30	996	150	04	0	216
14	T	ELSIE	19 SEP-27 SEP	9	150	890	600	34	26	2760
15	TS	FLOSSIE	29 SEP-05 OCT 08 OCT-09 OCT	9	60	956	270	32	0	2598
16	T	GRACE	29 SEP-06 OCT	8	95	937	300	29	21	2172

TABLE 4-3

1969 TROPICAL CYCLONES (Cont'd)

CYCLONE	TYPE	NAME	DATE*	CALENDAR DAYS OF WARNING	MAX SFC WND*	MIN OBS SLP	MAX RADIUS SFC CIRC	WARNINGS ISSUED TOTAL	WARNINGS ISSUED NO. AS TYPHOONS	DISTANCE TRAVELED*
17	TD		30 SEP	1	30	997	120	02	0	42
18	T	HELEN	08 OCT-12 OCT	5	105	930	330	20	10	2340
19	T	IDA	15 OCT-22 OCT	8	115	917	360	26	17	1296
20	T	JUNE	28 OCT-05 NOV	9	105	936	500	33	21	1782
21	T	KATHY	03 NOV-08 NOV	6	110	930	420	24	19	2040
22	TS	LORNA	24 NOV-28 NOV	5	50	985	360	17	0	582
23	TS	MARIE	19 DEC-21 DEC	3	40	994	150	8	0	480
1969 TOTALS				108				430	184	

*DATA TAKEN FROM BEST TRACK

TABLE 4-3 (Cont'd)

1969 TROPICAL DEPRESSION POSITION DATA

TROPICAL DEPRESSION ELEVEN
07 SEP - 11 SEP

WARNING NO.	DTG	BEST TRACK POSIT LAT	BEST TRACK POSIT LONG	WARNING POSIT LAT	WARNING POSIT LONG	24 HOUR FORECAST POSIT LAT	24 HOUR FORECAST POSIT LONG
01	070500Z	19.7N	119.2E	20.5N	119.0E	19.7N	112.9E
02	071100Z	18.8N	118.8E	20.3N	117.5E	19.5N	111.3E
03	071700Z	18.2N	119.2E	19.0N	118.0E	18.5N	115.5E
04	072300Z	18.3N	119.6E	18.0N	118.3E	17.4N	117.4E
05	080500Z	18.8N	119.4E	18.5N	119.5E	18.5N	119.5E
06	081100Z	19.2N	119.3E	19.0N	119.0E	18.7N	118.0E
07	081700Z	20.0N	119.6E	19.6N	119.0E	19.1N	117.6E
08	082300Z	20.7N	119.9E	20.2N	120.4E	22.0N	121.3E
09	090500Z	21.5N	120.0E	21.4N	120.1E	23.4N	120.6E
10	091100Z	22.0N	119.9E	22.4N	120.1E	25.9N	121.9E
11	091700Z	22.4N	119.8E	22.8N	120.2E	25.8N	121.7E
12	092300Z	22.8N	119.8E	22.5N	119.5E	-	-
13	100500Z	23.3N	120.3E	23.0N	119.8E	24.5N	120.2E
14	101100Z	23.5N	121.0E	23.9N	121.3E	26.9N	125.3E
15	101700Z	23.2N	121.7E	23.9N	122.5E	27.7N	126.3E
16	102300Z	23.4N	122.4E	24.0N	123.0E	26.3N	126.6E
17	110500Z	23.1N	122.4E	23.5N	122.5E	23.5N	122.5E
18	111100Z	22.6N	122.2E	23.1N	122.4E	23.1N	122.4E

TROPICAL DEPRESSION TWELVE
07 SEP - 08 SEP

WARNING NO.	DTG	BEST TRACK POSIT LAT	BEST TRACK POSIT LONG	WARNING POSIT LAT	WARNING POSIT LONG	24 HOUR FORECAST POSIT LAT	24 HOUR FORECAST POSIT LONG
01	072300Z	13.5N	111.4E	13.6N	111.4E	13.2N	108.6E
02	080500Z	13.2N	111.0E	13.4N	110.9E	13.0N	108.9E
03	081100Z	12.9N	111.3E	13.3N	110.4E	13.0N	108.3E
04	081700Z	13.1N	112.1E	13.2N	109.9E	12.9N	107.9E
05	082300Z	13.8N	112.8E	14.5N	113.0E	-	-

TROPICAL DEPRESSION THIRTEEN
11 SEP - 12 SEP

WARNING NO.	DTG	BEST TRACK POSIT LAT	BEST TRACK POSIT LONG	WARNING POSIT LAT	WARNING POSIT LONG	24 HOUR FORECAST POSIT LAT	24 HOUR FORECAST POSIT LONG
01	111100Z	16.3N	130.6E	16.1N	130.8E	19.7N	127.4E
02	111700Z	17.0N	129.5E	16.8N	129.8E	20.9N	127.0E
03	112300Z	17.8N	128.7E	17.8N	129.0E	22.1N	126.8E
04	120500Z	18.8N	128.0E	18.7N	127.6E	22.9N	124.9E

TROPICAL DEPRESSION SEVENTEEN
30 SEP - 01 OCT

WARNING NO.	DTG	BEST TRACK POSIT LAT	BEST TRACK POSIT LONG	WARNING POSIT LAT	WARNING POSIT LONG	24 HOUR FORECAST POSIT LAT	24 HOUR FORECAST POSIT LONG
01	302300Z	15.4N	118.5E	17.3N	118.0E	19.0N	117.0E
02	010500Z	15.9N	118.1E	16.5N	118.5E	-	-

1969 TROPICAL STORM POSITION DATA

TROPICAL STORM RITA
07 MAR - 09 MAR

WARNING NO.	DTG	BEST TRACK POSIT LAT	BEST TRACK POSIT LONG	WARNING POSIT LAT	WARNING POSIT LONG	24 HOUR FORECAST POSIT LAT	24 HOUR FORECAST POSIT LONG
01	070500Z	05.3N	168.9E	05.4N	168.6E	06.4N	162.7E
02	071100Z	05.6N	168.2E	05.7N	167.4E	06.4N	161.5E
03	071700Z	05.9N	167.4E	06.0N	165.9E	06.5N	160.0E
04	072300Z	06.2N	166.4E	06.0N	166.0E	06.5N	160.9E
05	080500Z	06.5N	165.4E	06.4N	165.6E	07.0N	161.3E
06	081100Z	06.8N	164.5E	07.1N	164.5E	07.5N	159.5E
07	081700Z	07.1N	163.5E	06.9N	163.0E	07.5N	157.9E
08	082300Z	07.3N	162.5E	07.3N	162.8E	08.0N	158.6E
09	090500Z	07.5N	161.5E	07.5N	161.6E	08.0N	157.0E
10	091100Z	07.7N	160.3E	07.7N	160.4E	08.1N	155.7E
11	091700Z	07.7N	159.1E	07.8N	159.4E	08.1N	154.6E
12	092300Z	07.7N	157.9E	07.8N	157.7E	08.1N	152.8E

TROPICAL STORM WINNIE
29 JUL - 31 JUL

WARNING NO.	DTG	BEST TRACK POSIT LAT	BEST TRACK POSIT LONG	WARNING POSIT LAT	WARNING POSIT LONG	24 HOUR FORECAST POSIT LAT	24 HOUR FORECAST POSIT LONG
01	292300Z	16.0N	133.4E	16.0N	133.5E	18.8N	129.7E
02	300500Z	17.2N	132.3E	16.6N	132.6E	19.3N	129.2E
03	3001100Z	17.9N	131.1E	18.0N	131.0E	21.2N	127.2E
04	301700Z	18.4N	129.6E	18.9N	129.6E	22.3N	126.2E
05	302300Z	18.7N	128.1E	19.0N	127.9E	22.7N	123.6E
06	310500Z	19.0N	126.8E	19.0N	126.7E	20.1N	123.3E
07	311100Z	19.3N	125.8E	19.0N	126.1E	17.7N	123.5E

TROPICAL STORM ALICE
02 AUG - 04 AUG

WARNING NO.	DTG	BEST TRACK POSIT LAT	BEST TRACK POSIT LONG	WARNING POSIT LAT	WARNING POSIT LONG	24 HOUR FORECAST POSIT LAT	24 HOUR FORECAST POSIT LONG
01	020500Z	23.7N	137.8E	23.4N	137.6E	25.6N	133.4E
02	021100Z	24.7N	137.0E	24.0N	136.5E	26.0N	132.4E
03	021700Z	25.9N	136.3E	26.7N	135.8E	32.4N	137.5E
04	022300Z	27.0N	135.6E	27.1N	135.5E	30.9N	135.0E
05	030500Z	28.0N	135.2E	28.0N	135.1E	32.1N	134.9E
06	031100Z	29.2N	134.6E	29.0N	134.7E	33.8N	135.5E
07	031700Z	30.3N	134.4E	30.2N	134.3E	34.7N	135.9E
08	032300Z	31.3N	134.5E	31.2N	134.6E	37.0N	137.6E
09	040500Z	32.5N	134.3E	32.5N	134.5E	-	-
10	041100Z	33.6N	135.8E	33.8N	135.8E	-	-

TROPICAL STORM FLOSSIE
29 SEP - 05 OCT
08 OCT - 09 OCT

WARNING NO.	DTG	BEST TRACK POSIT LAT	BEST TRACK POSIT LONG	WARNING POSIT LAT	WARNING POSIT LONG	24 HOUR FORECAST POSIT LAT	24 HOUR FORECAST POSIT LONG
01	292300Z	15.7N	129.0E	15.7N	128.9E	17.7N	125.3E
02	300500Z	16.8N	127.9E	16.8N	128.0E	20.8N	126.1E
03	301100Z	18.1N	126.8E	18.2N	126.8E	22.5N	125.2E
04	301700Z	18.9N	125.3E	19.1N	125.8E	23.5N	124.8E
05	302300Z	19.8N	123.8E	19.6N	123.4E	20.4N	116.3E
06	010500Z	20.5N	122.9E	21.2N	122.9E	25.0N	122.7E
07	011100Z	20.3N	122.1E	20.5N	122.4E	21.4N	122.1E
08	011700Z	20.8N	121.8E	20.7N	121.6E	21.7N	120.7E
09	012300Z	21.5N	122.0E	21.2N	122.0E	21.2N	122.0E
10	020500Z	22.2N	121.7E	22.1N	121.8E	24.1N	122.3E
11	021100Z	22.8N	121.7E	23.1N	121.8E	25.4N	122.8E
12	021700Z	23.2N	122.1E	23.3N	121.8E	24.8N	122.3E
13	022300Z	23.6N	122.4E	23.6N	122.4E	25.0N	123.3E
14	030500Z	24.1N	122.6E	24.1N	122.6E	25.9N	123.9E
15	031100Z	24.2N	122.8E	24.3N	122.7E	25.5N	123.4E
16	031700Z	24.2N	123.0E	24.0N	122.5E	25.1N	122.8E
17	032300Z	24.3N	123.2E	24.5N	123.2E	25.2N	123.9E
18	040500Z	24.3N	123.4E	24.2N	122.9E	24.2N	122.9E
19	041100Z	24.3N	123.6E	24.2N	123.2E	24.2N	123.2E
20	041700Z	24.3N	123.8E	24.2N	123.3E	24.2N	123.3E
21	042300Z	24.5N	124.2E	24.3N	123.9E	24.3N	124.1E
22	050500Z	24.8N	124.6E	24.8N	124.7E	25.9N	127.7E
23	051100Z	24.8N	125.0E	24.9N	125.1E	25.0N	126.2E
24	051700Z	24.9N	125.4E	24.8N	125.4E	25.0N	126.7E
25	052300Z	25.0N	124.9E	24.8N	125.6E	-	-
26	080500Z	26.8N	131.9E	26.9N	131.4E	28.9N	135.3E
27	081100Z	27.6N	133.5E	27.6N	133.3E	33.1N	139.8E

TROPICAL STORM FLOSSIE (Cont'd)
29 SEP - 05 OCT
08 OCT - 09 OCT

WARNING NO.	DTG	BEST TRACK POSIT LAT	BEST TRACK POSIT LONG	WARNING POSIT LAT	WARNING POSIT LONG	24 HOUR FORECAST POSIT LAT	24 HOUR FORECAST POSIT LONG
28	081700Z	28.9N	135.5E	29.0N	135.4E	36.4N	142.0E
29	082300Z	31.1N	137.8E	30.8N	137.6E	41.0N	143.3E
30	090500Z	34.0N	141.8E	34.7N	140.8E	-	-
31	091100Z	37.3N	146.5E	37.4N	146.3E	-	-
32	091700Z	41.0N	151.0E	41.3N	150.2E	-	-

TROPICAL STORM LORNA
24 NOV - 28 NOV

WARNING NO.	DTG	BEST TRACK POSIT LAT	BEST TRACK POSIT LONG	WARNING POSIT LAT	WARNING POSIT LONG	24 HOUR FORECAST POSIT LAT	24 HOUR FORECAST POSIT LONG
01	241100Z	09.9N	133.1E	09.8N	132.9E	11.2N	129.1E
02	241700Z	10.4N	132.6E	10.3N	132.6E	11.9N	129.6E
03	242300Z	10.9N	132.1E	10.8N	132.1E	12.8N	129.4E
04	250500Z	11.6N	131.7E	11.5N	131.7E	13.5N	129.7E
05	251100	12.2N	131.3E	12.4N	131.2E	15.4N	130.2E
06	251700Z	12.9N	131.3E	12.6N	131.0E	15.2N	130.2E
07	252300Z	13.5N	131.5E	13.4N	131.5E	16.2N	131.9E
08	260500Z	14.3N	131.6E	14.5N	131.5E	18.2N	132.3E
09	261100Z	13.7N	131.7E	14.2N	131.8E	15.5N	132.7E
10	261700Z	13.5N	131.3E	13.3N	130.7E	14.8N	131.3E
11	262300Z	13.7N	130.9E	13.9N	131.1E	13.9N	131.1E
12	270500Z	14.1N	130.6E	13.9N	130.7E	13.9N	130.7E
13	271100Z	14.4N	130.1E	14.4N	129.5E	16.1N	128.1E
14	271700Z	14.5N	129.6E	15.5N	128.6E	19.8N	128.4E
15	272300Z	14.8N	129.2E	16.4N	128.2E	20.2N	128.6E
16	280500Z	15.3N	128.9E	14.8N	129.5E	16.5N	128.5E
17	281100Z	15.7N	128.6E	16.3N	128.5E	-	-

TROPICAL STORM MARIE
19 DEC - 21 DEC

WARNING NO.	DTG	BEST TRACK POSIT LAT	BEST TRACK POSIT LONG	WARNING POSIT LAT	WARNING POSIT LONG	24 HOUR FORECAST POSIT LAT	24 HOUR FORECAST POSIT LONG
01	191100Z	15.2N	141.7E	15.3N	141.7E	19.2N	140.3E
02	191700Z	16.2N	141.4E	16.3N	141.1E	20.3N	140.9E
03	192300Z	17.1N	141.2E	17.1N	141.3E	19.9N	141.3E
04	200500Z	17.9N	141.3E	18.5N	141.0E	22.7N	143.7E
05	201100Z	17.8N	142.3E	17.8N	141.6E	20.1N	142.7E
06	201700Z	18.3N	143.6E	18.3N	143.3E	21.2N	146.7E
07	202300Z	18.9N	145.1E	19.0N	145.2E	-	-
08	210500Z	18.0N	144.4E	17.8N	143.0E	-	-

Forecast positions for the 24, 48 and 72 hour forecasts are verified only as long as the best track analysis estimates winds in excess of 33 knots for tropical cyclones which reach typhoon intensity.

In addition to this method of verifying absolute error distance, a computation of closest distance to the best track (right angle error) has been included to indicate the demonstrated ability to forecast the path of motion without regard to speed.

The following tables and figures are presented to graphically depict the distribution of forecasting error in JTWC forecasts.

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
1967	125	276	414
1968	105	229	337
1969	111	237	349

*FORECAST POSITIONS NORTH OF 35N WERE NOT VERIFIED.

TABLE 4-4

JTWC OFFICIAL FORECAST ACCURACY

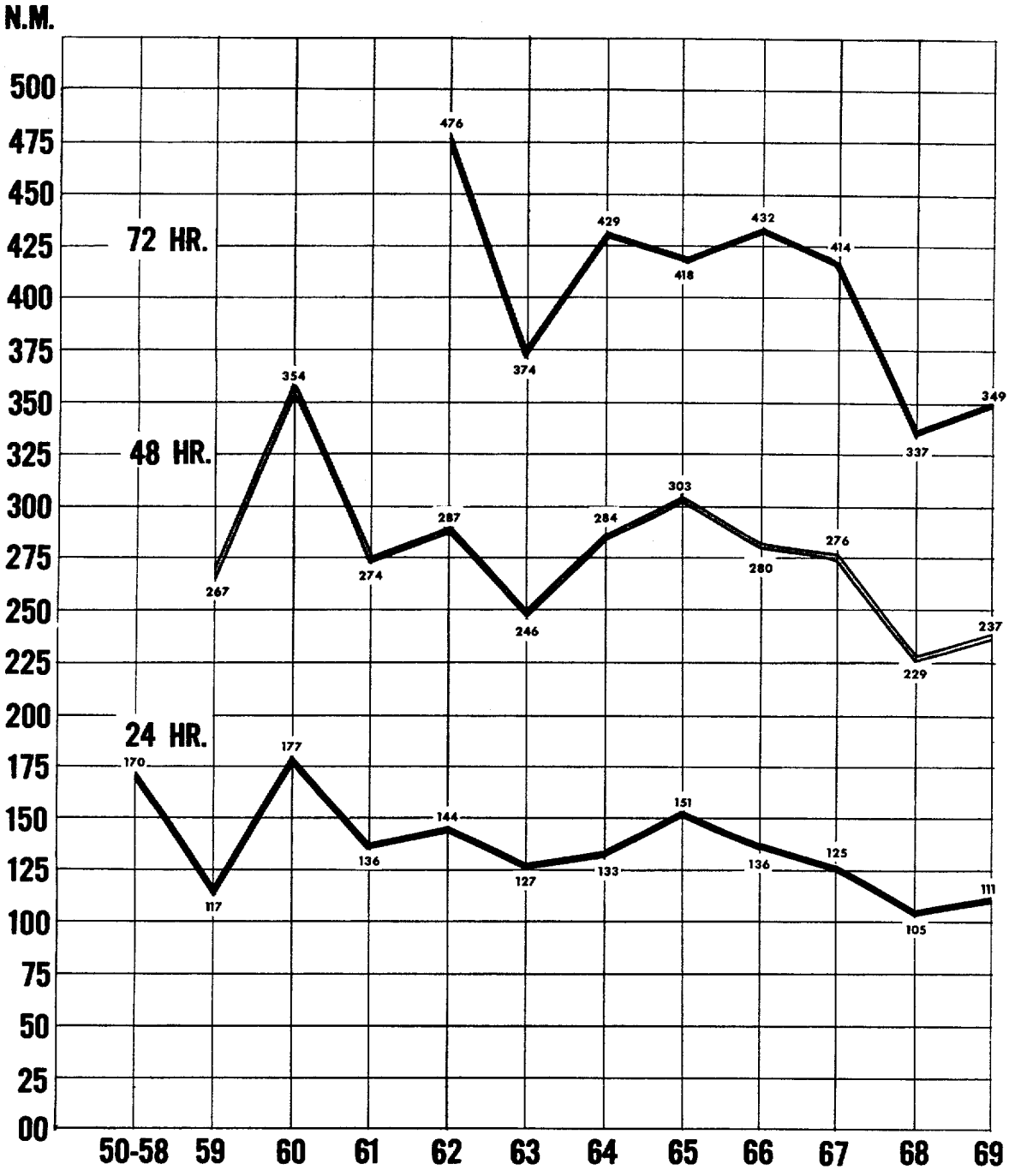


FIG 4-1

FORECAST ERROR TABULATION - 1969

	CASES	MEAN ERROR (N.M.)
24 Hour		
Whole Sample	248	111
Below 20N	132	103
20N - 30N	96	117
Below 30N	228	109
Above 30N	20	134
48 Hour		
Whole Sample	166	237
Below 20N	63	202
20N - 30N	82	240
Below 30N	145	224
Above 30N	21	330
72 Hour		
Whole Sample	57	349
Below 20N	16	305
20N - 30N	31	346
Below 30N	47	332
Above 30N	10	429

TABLE 4-5

DISTANCE BETWEEN OPERATIONAL WARNING
POSITIONS AND BEST TRACK POSITIONS

CYCLONE	NUMBER OF WARNINGS	AVERAGE DISTANCE (NM)	MAXIMUM DISTANCE (NM)	MINIMUM DISTANCE (NM)
1. T. PHYLLIS	24	16	45	01
2. T.S. RITA	12	26	87	08
3. T. SUSAN	29	14	39	03
4. T. TESS	13	29	150	00
5. T. VIOLA	26	16	42	02
6. T.S. WINNIE	07	20	37	08
7. T.S. ALICE	10	19	55	06
8. T. BETTY	14	15	45	05
9. T. CORA	34	14	52	05
10. T. DORIS	09	11	19	03
11. T.D.	18	42	118	06
12. T.D.	05	50	128	05
13. T.D.	04	20	27	17
14. T. ELSIE	34	17	61	04
15. T.S. FLOSSIE	32	19	60	04
16. T. GRACE	29	35	128	03
17. T.D.	02	82	118	45
18. T. HELEN	20	20	88	05
19. T. IDA	26	15	59	03
20. T. JUNE	33	17	71	03
21. T. KATHY	24	19	80	04
22. T.S. LORNA	17	29	104	06
23. T.S. MARIE	08	28	82	05
1969 SEASON	430	20.7	150	00

TABLE 4-6

1969 AVERAGE FORECAST ERRORS (MI)*

TYPHOON	24 HR FORECASTS CASES	24 HR FORECASTS ERROR	48 HR FORECASTS CASES	48 HR FORECASTS ERROR	72 HR FORECASTS CASES	72 HR FORECASTS ERROR
PHYLLIS	16	91	12	140	04	220
SUSAN	21	61	13	110	04	184
TESS	08	168	01	360	-	-
VIOLA	22	99	16	181	06	167
BETTY	10	107	06	243	01	330
CORA	29	77	22	203	08	405
DORIS	05	63	01	48	-	-
ELSIE	29	92	22	176	09	316
GRACE	25	186	17	429	05	715
HELEN	14	123	08	438	02	420
IDA	22	87	16	176	06	288
JUNE	27	139	18	267	07	319
KATHY	20	145	14	338	05	498
TOTAL CASES	248		166		57	
MEAN ERROR		111		237		349

* INCLUDES FORECAST ERRORS DURING TROPICAL STORM INTENSITY.

TABLE 4-7

INDIVIDUAL TYPHOONS OF 1969

24 HOUR VERIFICATION ERROR

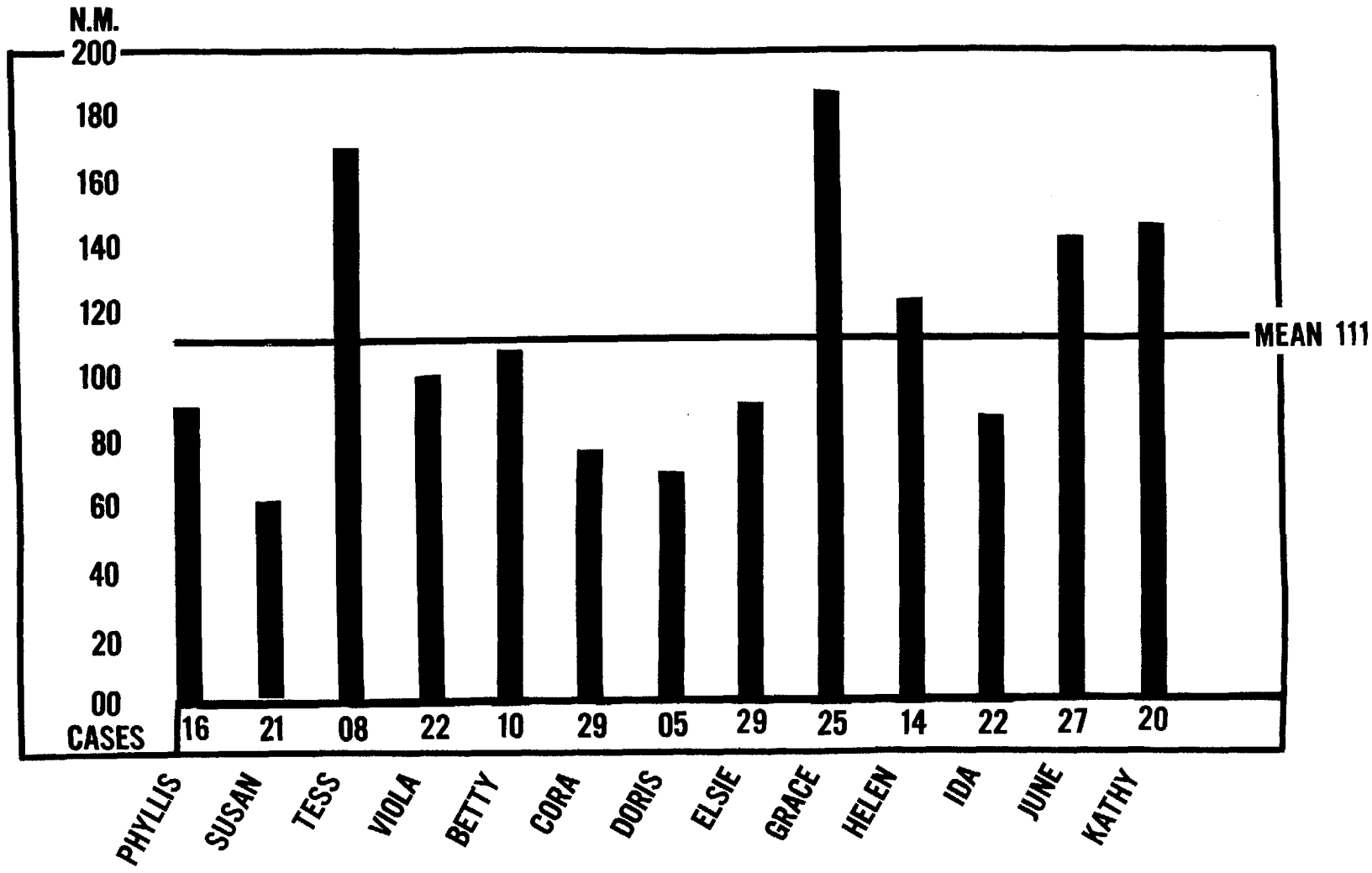


FIG 4-2

1969 RIGHT ANGLE FORECAST ERRORS
(CLOSEST DISTANCE (N.M.) TO BEST TRACK)

TYPHOON	24 HR FORECASTS CASES	24 HR FORECASTS ERROR	48 HR FORECASTS CASES	48 HR FORECASTS ERROR	72 HR FORECASTS CASES	72 HR FORECASTS ERROR
PHYLLIS	16	52	12	88	04	129
SUSAN	21	46	13	91	04	178
TESS	08	94	01	268	-	-
VIOLA	22	63	16	109	06	111
BETTY	10	45	06	97	01	33
CORA	29	58	22	180	08	349
DORIS	05	54	01	48	-	-
ELSIE	29	46	22	102	09	151
GRACE	25	117	17	188	05	265
HELEN	14	54	08	18	02	65
IDA	22	72	16	132	06	200
JUNE	27	58	18	123	07	173
KATHY	20	79	14	209	05	409
TOTAL CASES	248		166		57	
MEAN ERROR		65		130		209

* INCLUDES FORECAST ERRORS DURING TROPICAL STORM INTENSITY.

TABLE 4-8

RIGHT ANGLE ERROR

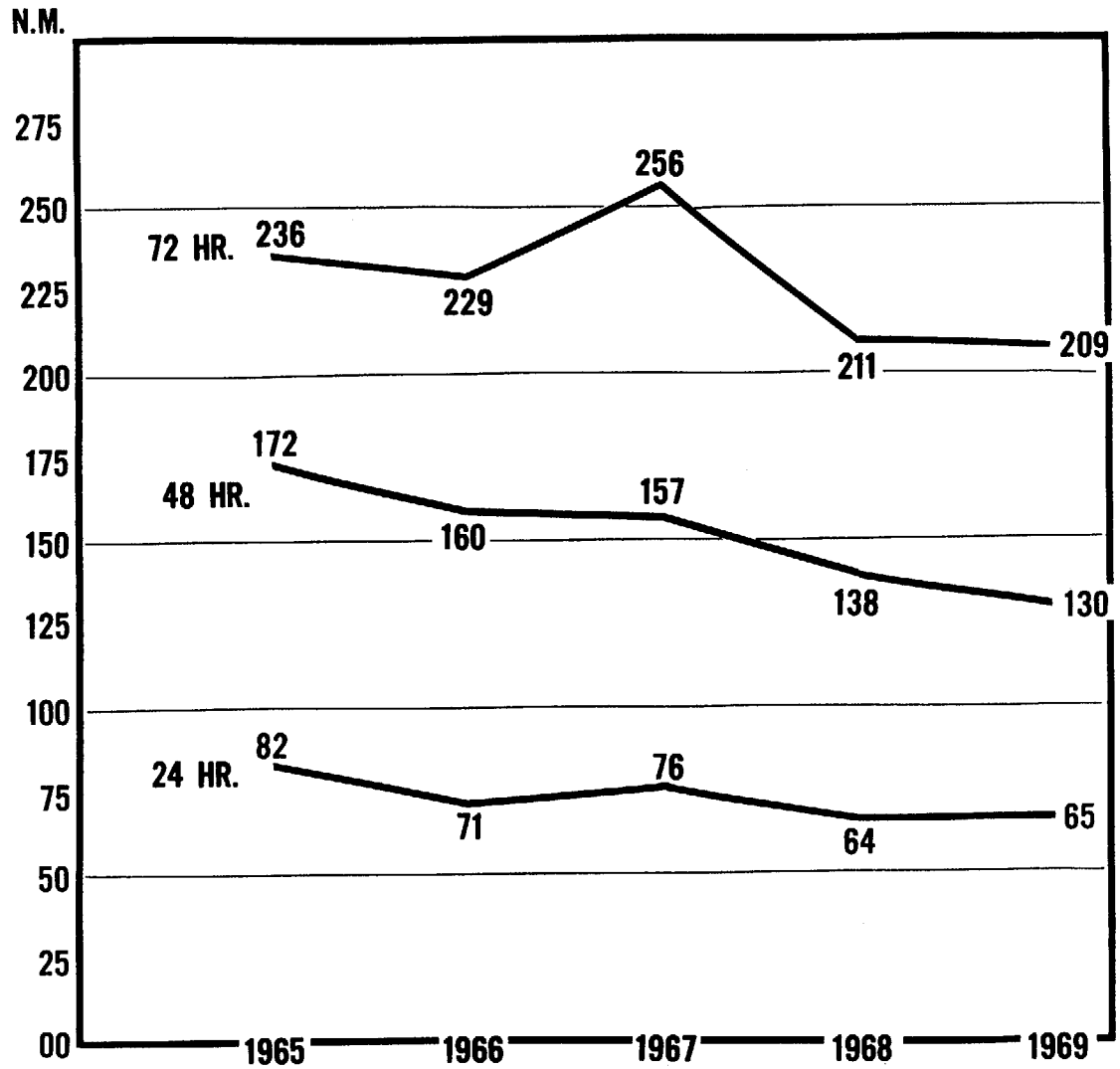


FIG 4-3