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MARINE TRAFFIC DATA OF TAMPA, FLORIDA. (U)

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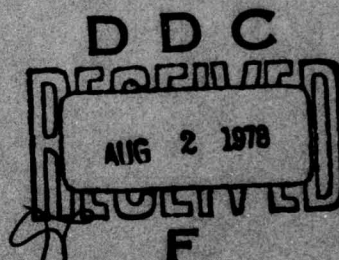
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**MARINE TRAFFIC DATA OF TAMPA, FLORIDA**

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U. S. Coast Guard Research and Development Center  
Avery Point, Groton, Connecticut 06340



April 1978



Final Report

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## Technical Report Documentation Page

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16. Abstract <p>Data was recorded on the marine traffic and VHF-FM marine communications channel usage at Tampa, Florida, during the period of 18 to 25 October 1976. The marine traffic data was recorded by means of time-lapse photography of a radar display at Gadsden Point (MacDill Air Force Base). Recordings were made of the communications on VHF-FM maritime mobile Channels 13 and 16 as received at the site.</p> <p>The daily average of the marine traffic, including large, medium, small, and tugs-in-tow, at Tampa Bay was 16.</p> <p>Approximately 150 hours of communications on VHF-FM Channels 13 and 16 were recorded and monitored to determine the channel efficiency and utilization. The Channel 13 efficiency at Tampa Bay was 43.98 percent, the utilization was 3.43 percent. The Channel 16 efficiency was 59.40 percent, the utilization was 6.79 percent.</p>			
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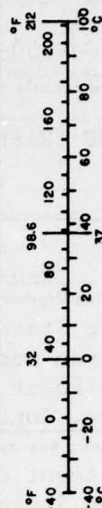
# METRIC CONVERSION FACTORS

## Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
<b>LENGTH</b>				
in	inches	2.5	centimeters	cm
ft	feet	30	meters	m
yd	yards	0.9	kilometers	km
mi	miles	1.6		
<b>AREA</b>				
in <sup>2</sup>	square inches	6.5	square centimeters	cm <sup>2</sup>
ft <sup>2</sup>	square feet	0.09	square meters	m <sup>2</sup>
yd <sup>2</sup>	square yards	0.8	square meters	m <sup>2</sup>
mi <sup>2</sup>	square miles	2.6	square kilometers	km <sup>2</sup>
	acres	0.4	hectares	ha
<b>MASS (weight)</b>				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
<b>VOLUME</b>				
tsp	teaspoons	5	milliliters	ml
Tabsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft <sup>3</sup>	cubic feet	0.03	cubic meters	m <sup>3</sup>
yd <sup>3</sup>	cubic yards	0.76	cubic meters	m <sup>3</sup>
<b>TEMPERATURE (exact)</b>				
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

\*1 in = 2.54 (exact). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price \$2.25, SD Catalog No. C13.10.286.

Symbol	When You Know	Multiply by	To Find	Symbol
<b>LENGTH</b>				
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
<b>AREA</b>				
cm <sup>2</sup>	square centimeters	0.16	square inches	in <sup>2</sup>
m <sup>2</sup>	square meters	1.2	square yards	yd <sup>2</sup>
km <sup>2</sup>	square kilometers	0.4	square miles	mi <sup>2</sup>
ha	hectares (10,000 m <sup>2</sup> )	2.5	acres	
<b>MASS (weight)</b>				
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
<b>VOLUME</b>				
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m <sup>3</sup>	cubic meters	35	cubic feet	ft <sup>3</sup>
m <sup>3</sup>	cubic meters	1.3	cubic yards	yd <sup>3</sup>
<b>TEMPERATURE (exact)</b>				
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F





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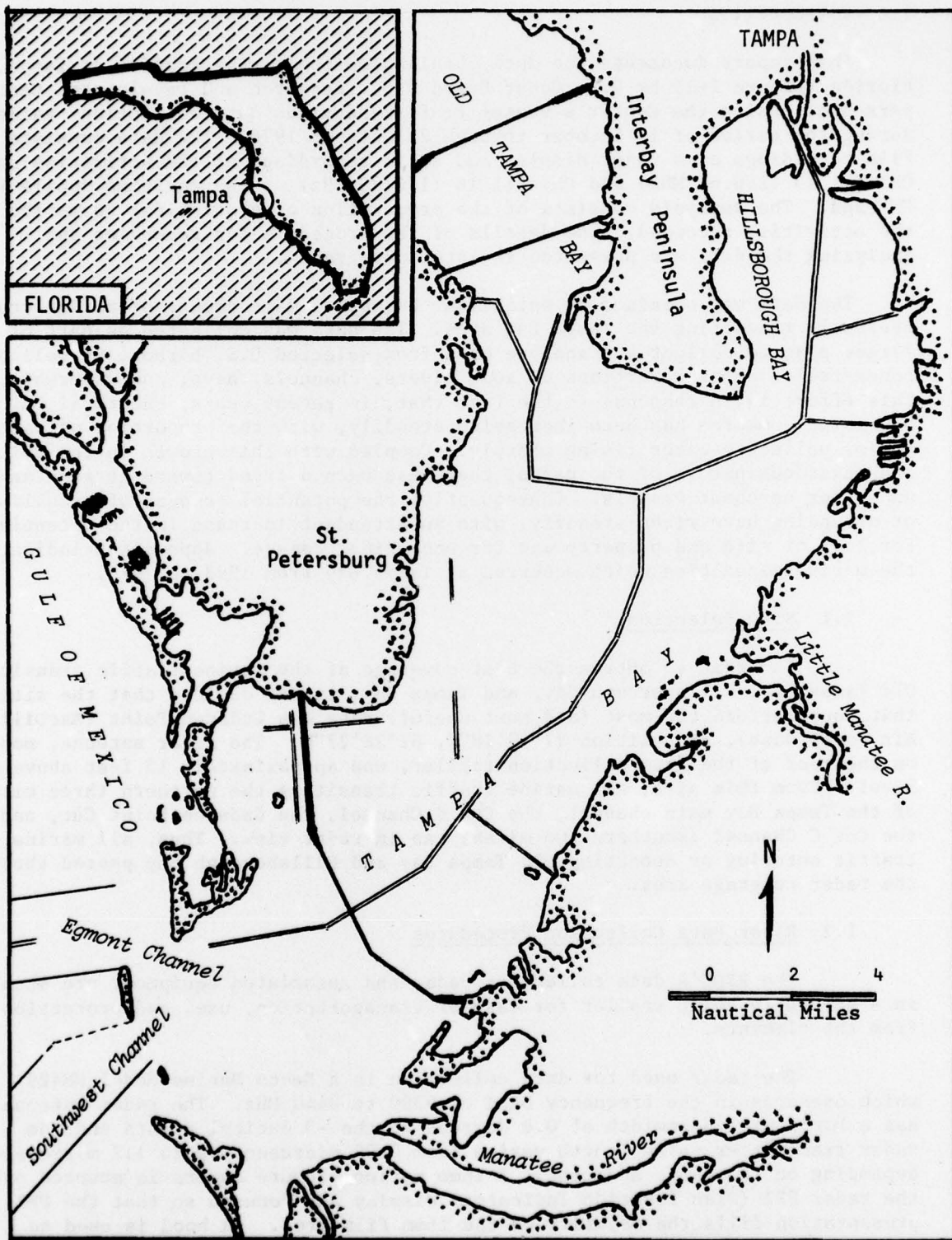


FIGURE 1-1: TAMPA BAY, FLORIDA

## 1.0 INTRODUCTION

This report documents the data obtained on the marine traffic at Tampa, Florida (Figure 1-1) by U.S. Coast Guard R&DC (Research and Development Center) personnel, using the Center's vessel traffic services data collection trailer, during the period of 18 October through 25 October 1976. The data consists of film recordings of a radar display and audio recordings of the activities on Channel 13 (156.65 MHz) and Channel 16 (156.80 MHz) of the maritime mobile VHF-FM band. The analysis consists of the preparation of statistical summaries of the activities recorded. The details of the procedure for recording and analyzing the data are presented in later paragraphs.

The data was obtained to establish the approximate amount of marine traffic presently transiting the Tampa Bay area. The data was collected as part of a larger plan to collect and analyze data from selected U.S. harbors as well as congested or complex portions of some rivers, channels, bays, and waterways. This effort is in response to the fact that, in recent years, the total volume of marine commerce has been increasing steadily, with the proportion of hazardous and/or polluting cargo rising sharply. Coupled with this growth in the volume and hazardous nature of the cargo, there has been a trend toward larger tankers and other merchant vessels. Consequently, the potential damages of a collision or grounding have risen steadily, with an attendant increase in the potential for loss of life and property and for ecological damage. Appendix D indicates the marine casualties which occurred at Tampa Bay from 1973 to 1976.

### 1.1 Site Selection

In order to obtain the best coverage of the marine traffic transiting Old Tampa Bay, Hillsborough Bay, and Tampa Bay, it was decided that the site that would afford the most (and most useful) data was Gadsden Point (MacDill Air Force Base), at position 27°49'18"N, 82°28'27"W. The radar antenna, mounted on the roof of the data collection trailer, was approximately 15 feet above sea level. From this site, all marine traffic transiting the northern three miles of the Tampa Bay main channel, the Cut G Channel, the Gadsden Point Cut, and the Cut C Channel (southern two miles) was in radar view. Thus, all marine traffic entering or departing Old Tampa Bay and Hillsborough Bay passed through the radar coverage area.

### 1.2 Radar Data Collection Procedures

The R&DC's data collection radar and associated equipment are mounted in a specially built trailer for ease of transportation, use, and protection from the elements.

The radar used for data collection is a Decca Marine Model RM429 which operates in the frequency band of 9380 to 9440 MHz. The radar antenna has a horizontal beamwidth of 0.8 degrees at the -3 decibel points and the radar transmitter pulse length varies from 0.05 microseconds to 1.2 microseconds, depending on the range selected. A 16mm motion picture camera is mounted over the radar PPI (Plan Position Indicator) display and focused so that the PPI presentation fills the majority of the 16mm film area. (A hood is used to

screen out ambient light.) The camera is operated in the single-frame, time-lapse mode with the shutter of the camera controlled by a solenoid. The solenoid is activated by the radar heading flasher switch so that the shutter is held open for one complete revolution of the radar antenna, then closed for the second revolution, open for the third revolution, and so on. As a result of this procedure, the film consists of "snapshots" of the entire sweep of the radar, which is pleasing to the eye and easier to interpret than a conventional motion picture.

Mounted above and below the PPI display, and within the field of view of the camera, are small, alpha-numeric display panels. Auxiliary circuitry is used to display, on these panels, the date and time and geographic name of the radar site. As a result, each frame of the 16mm film contains the time it was exposed and the location of the radar at that time. This information simplifies the task of determining vessel speeds or the time an observed event occurred.

The radar has the capability of orienting the PPI display in any direction. The display is set up with true North at the top of the 16mm film frame when viewed so that the alpha-numeric characters are properly oriented. However, due to various limitations, the orientation of the film image with respect to true north is only accurate to  $\pm 5$  degrees.

The radar has also the capability of offsetting the antenna location from the center of the PPI display. This capability allows the PPI display to be oriented so that a particular area of interest fills a greater portion of the 16mm film frame than would otherwise be possible.

Although the radar is equipped with the usual heading flasher, fixed and variable range rings, and bearing cursor, they are usually suppressed and do not appear on the film imagery.

After the radar data collection trailer is located at a given site, tested, and adjusted, data is usually recorded on a 24-hour-a-day basis for seven days with a frame of film being exposed approximately every five seconds during this period. However, a few minutes of data are lost every five hours when the film is changed.

### 1.3 Communications Collection Procedures and Equipment

The data collection trailer is equipped, in addition to the radar system mentioned previously, with VHF-FM receivers tuned to Channels 13 and 16 of the maritime mobile band. The audio output of these receivers and a time code are recorded on magnetic tape cassettes. In addition, the audio signal is sent to an automated channel utilization recording system, to be described in a later paragraph. The purpose of these recording systems is to document the present utilization and efficiency of these channels, both of which are important to the safe and orderly movement of marine traffic. Channel 16 is used to alert others to a distress or emergency situation, or to establish initial communications with another station (ship). Channel 13 is used in inland waters by the bridge personnel of vessels in meeting, crossing, or overtaking situations, to agree on the action they are each to take to avoid collision.



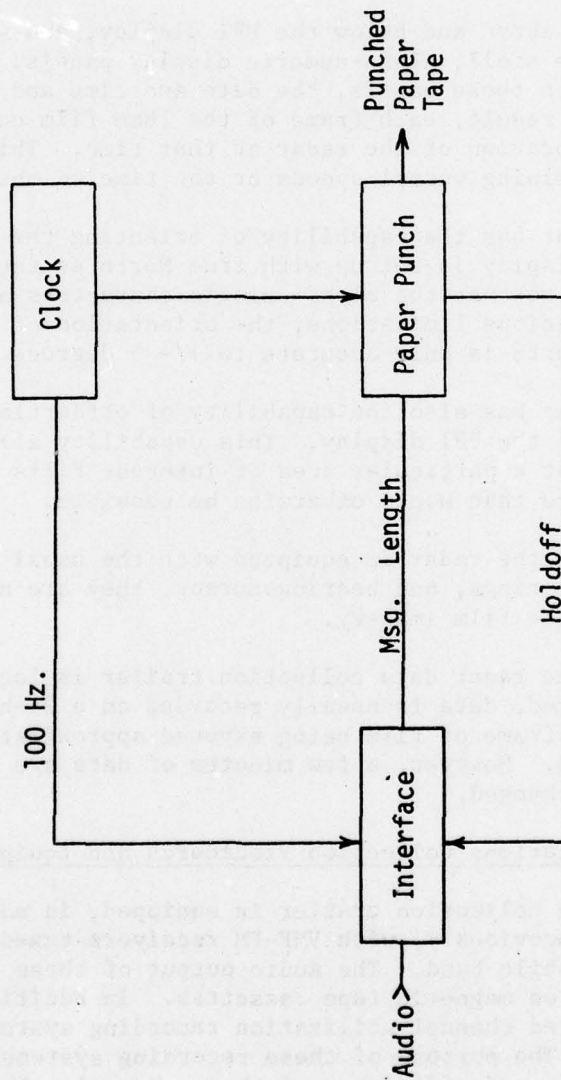


FIGURE 1-2: COMMUNICATIONS DATA COLLECTION

C U/W-FOCAL: VTS 09/14/77

```
01.01 C INITIALIZE THE PROGRAM
01.02 C THIS IS VERY SIMILAR TO THE 'FOCAL-69' ROUTINE
01.05 O 0;0 I;ASK "ENTER A ONE (1) IF YOU ARE AT A NEW SIGHT ",X,!!
01.07 I (X-1)1.10,,1.10;T "ENTER SIGHT NAME (MAX 40 CHARACTERS) END"
01.08 T " HEADER WITH A 'RETURN'";F I=1,40;S SI(I)=FIN();I (SI(I)-141),1.09,
01.09 B;S SI(0)=I-1
01.10 T "ENTER DATE OF RUN AS 'DD-MMM-YY' AND TERMINATE WITH A RETURN":
01.15 FOR I=1,40;S DA(I)=FIN();I (DA(I)-141),1.20,
01.20 B;S DA(0)=I-1;Z TIME,SH,PG,NT,TOTIME;F Z=1,21;Z A(Z)
01.22 A "ENTER THE CHANNEL TO BE DONE = ",CH,!!
01.24 T "THE HEADER IS: "!!
01.25 X FOUT(140);T !!;F I=1,,SI(0); X FOUT(SI(I))
01.26 T :35"VHF-FM CH",:2.00,CH
01.27 T :55;F I=1,DA(0);X FOUT(DA(I))
01.28 Y PG;T :70"PAGE":1.00,PG,!!
01.30 A "ENTER A ZERO OR A RETURN IF ALL IS 'OK' ",X,!!;I (X),1.35,,G
01.35 S TM=15;;Z PG
01.40 T "LOAD THE FIRST TAPE INTO THE READER. TYPE ANY CHARACTER WHEN READY":
01.45 O 0 LPT;;0 I HSR
01.50 D 1.25,1.26,1.27,1.28;T !"TRANSMISSION TIME HISTOGRAM",!!
01.60 T "PERIOD ENDING: NUMBER OF XMSNS: MINUTES: "
01.61 T " PERCENT:",!!

02.10 A X;I (FTRM()-154),2.15,,;I (3999-X)4.05,4.05,3.05
02.15 O 0;0 I;A "MORE DATA TO ENTER (1=YES) ",X,
02.20 I (X-1)2.25,,2.25;T "LOAD THE TAPE INTO THE READER";D 2.30;G 2.10
02.25 O R 0;S X=6401;G 4.05
02.30 O R 0;0 I HSR:

03.04 C HANDLE DATA
03.05 I (X-1000)3.06;S X-X-1000
03.06 I X-1),,3.10;Y SHORTONES;G 2.10
03.10 S TIME=TIME+(X/10),TOTIME=TOTIME+(X/10),X=FMIN((FTR(X*.199)+1,21)
03.20 Y A(X),NT,NR;G 2.10

04.04 C HANDLE TIME INFORMATION
04.05 I (X-4000-TM)2.10
04.15 T " ",:6.00,TM," ",NT," ",:4.02,TIME/60
04.20 T " ",:6.02,TIME/9,!!
04.25 I ((TM/100)-FTR(TM/100)-.40)4.30; S TM=TM+40
04.30 S TM=TM+15;Z TI,NT;I (TM-1215),4.45,,;I (TM-2400)4.05,,;I (X-6400)4.05,,;G 5.05
04.45 D 1.50,1.60,1.61;I (TM-2400)4.05,,;I (X-6400)4.05,,

05.04 C DATA SUMMARY
05.05 D 1.25,1.26,1.27,1.28
05.10 T !!,"TOTAL NUMBER OF TRANSMISSIONS" ",:5.00,NR,!!
05.15 T "AVE. NUM. OF TRANSMISSIONS PER HOUR: ",:4.01,NR/24,!!
05.20 T "TOTAL TRANSMISSION TIME:
05.21 T :5.03,TOTIME/3600," HOURS",!!
05.25 T "AVERAGE LENGTH OF TRANSMISSION: ",:5.02,TO/NR," SEC."!!
05.30 T "PERCENT CHANNEL UTILIZATION: ",TO/864,"%",!!!!
05.35 T "MESSAGE LENGTH HISTOGRAM",!!
05.40 T "LENGTH OF XMSNS NUMBER OF XMSNS PERCENT",!!
05.45 S #:4,F Z=1,1,20; D 6
05.50 T "LONGER THAN 10 SEC.: ",:4.00,A(21)," "
05.55 T :6.02,(A(21)/NR)*100,!!!!!!!!!!!!!!
05.58 T "THERE WERE",:5.00,SH," XMSNS OF 00.1 AND 00.0 DURATION":
05.60 O C;0 O;0 I;G

06.10 S TD=Z*.5; S PN=(A(Z)/NR)*100
06.15 T :3.01,TD-#, " -",TD," SEC. ",:6.00,A(Z)," "
06.16 T :6.02,PN,!!;S #=.5
```

FIGURE 1-3: COMPUTER PROGRAM TO ANALYZE RADIO COMMUNICATIONS DATA

#### DEFINITION OF VARIABLES FOR "VTS"

A(Z)	Length of transmission count for Message Length Histogram
DA(I)	Date of run, in special characters [DA(0)= number of characters in array]
CH	Channel being analyzed. Normally either 13 or 16
I	Loop counter used throughout program
NR	Total number of transmissions longer than 1 second
NT	Total number of transmissions in the 15 minute interval being analyzed. (Not including any of 00.1 duration)
PG	Page number
PN	Temporary variable used to establish percent of transmissions with specific message length
SI(I)	Sight Identification in special characters [SI(0)= number of characters in array]
SHORTONES	Transmissions having a coded duration of either 00.0 or 00.1. These DO NOT appear in 'NR'
TD	Temporary variable used to establish length of transmissions for Message Length Histograms
TIME	Total time of transmissions found in 15 minute interval being analyzed (Not including any of 00.1 duration)
TM	Upper limit of 15 minute interval being analyzed
TOTIME	Total time of all transmissions (Not including any of 00.1 duration)
X	Number read from data tape, dummy variable in "HANDLE DATA", and dummy variable throughout "INITIALIZE"

FIGURE 1-3 (Continued)



The contents of the tape cassettes are manually monitored and a statistical summary of the appropriateness of the communications is compiled. In addition, histograms of message activity versus time of day and other statistics are compiled during representative periods by means of an automated channel utilization recording system. In this system, an interface circuit accepts an audio input from the receivers and timing data from a digital clock. The output of the interface circuit causes a punch to record on paper tape the time (received from the digital clock) and the message length of each transmission. A block diagram of the system appears in Figure 1-2. The paper tape is then processed in a mini-computer to generate histograms of the number of transmissions versus time of day and message length. The computer program appears in Figure 1-3.

The receiver squelch settings are adjusted so that they open due to noise bursts relatively infrequently.

Personnel monitor the receivers frequently during the data punching process to ensure the system was operating properly and that the data was reasonable.

The tape recorder amplifier gain is reset as required to provide a proper signal to the remainder of the system. The speed of the tape recorders is checked by monitoring the IRIG-format time code recorded on the Channel 16 track of the tape recorder.

## 2.0 DISCUSSION OF DATA

The information contained in this chapter was collected at Gadsen Point, Tampa, Florida, during the period of 18 to 25 October 1976. During the data collection period, the radar was operated on the six nautical mile scale. Figure 2-1 indicates the area of radar coverage.

### 2.1 Vessel Density

In general, the following information can be extracted from the time-lapse radar film:

1. Vessel density
2. Vessel speed
3. Destination
4. Anchorage locations
5. Closest point of approach (CPA) to other vessels
6. Number and time of occurrence of meeting situations
7. Number and time of occurrence of overtaking situations
8. Number and time of occurrence of crossing situations

The vessel density within the radar coverage area is presented in Figures 2-2 through 2-9. Vessel density is defined as the count of all vessels present within the radar coverage area taken at 15-minute intervals. The interval between counts was chosen to be equal to or less than the average vessel transit time through the radar coverage area. The vessels counted were classified by type and size, such as large (larger than 300 feet), medium, small (less than 100 feet), tug-in-tow, etc., determination of size being evaluated from the size relationship of the radar image. The "small" category includes fishing vessels, pleasure craft, and tugs that were not recognized as such. The data is presented as a histogram with time of day as the abscissa.

The maximum number of simultaneous movements observed at Tampa was 34, occurring on Sunday, 24 October 1976. This number represents the presence of 1 large and 33 small vessels.

The average of daily vessel transits among the channels is presented in Figure 2-10. To better present the traffic volume by area, the channels were each designated a letter, Section A being that area of the main ship channel south of the intersection (Cut F); Section B is the channel from Cut F to Old Tampa Bay; Section C is the channel which leads to the power plant at Big Bend; Section D is the channel to East Tampa (Alafia River); and Section E is the channel (Cut C) which leads to Tampa. The daily average per section is as follows:

<u>VESSEL SIZE</u>	<u>SECTION A</u>	<u>SECTION B</u>	<u>SECTION C</u>	<u>SECTION D</u>	<u>SECTION E</u>
Large	8	1	1	0	6
Medium	3	1	1	0	5
Small	4	4	1	1	8
Tug-in-tow	1	0	0	0	1



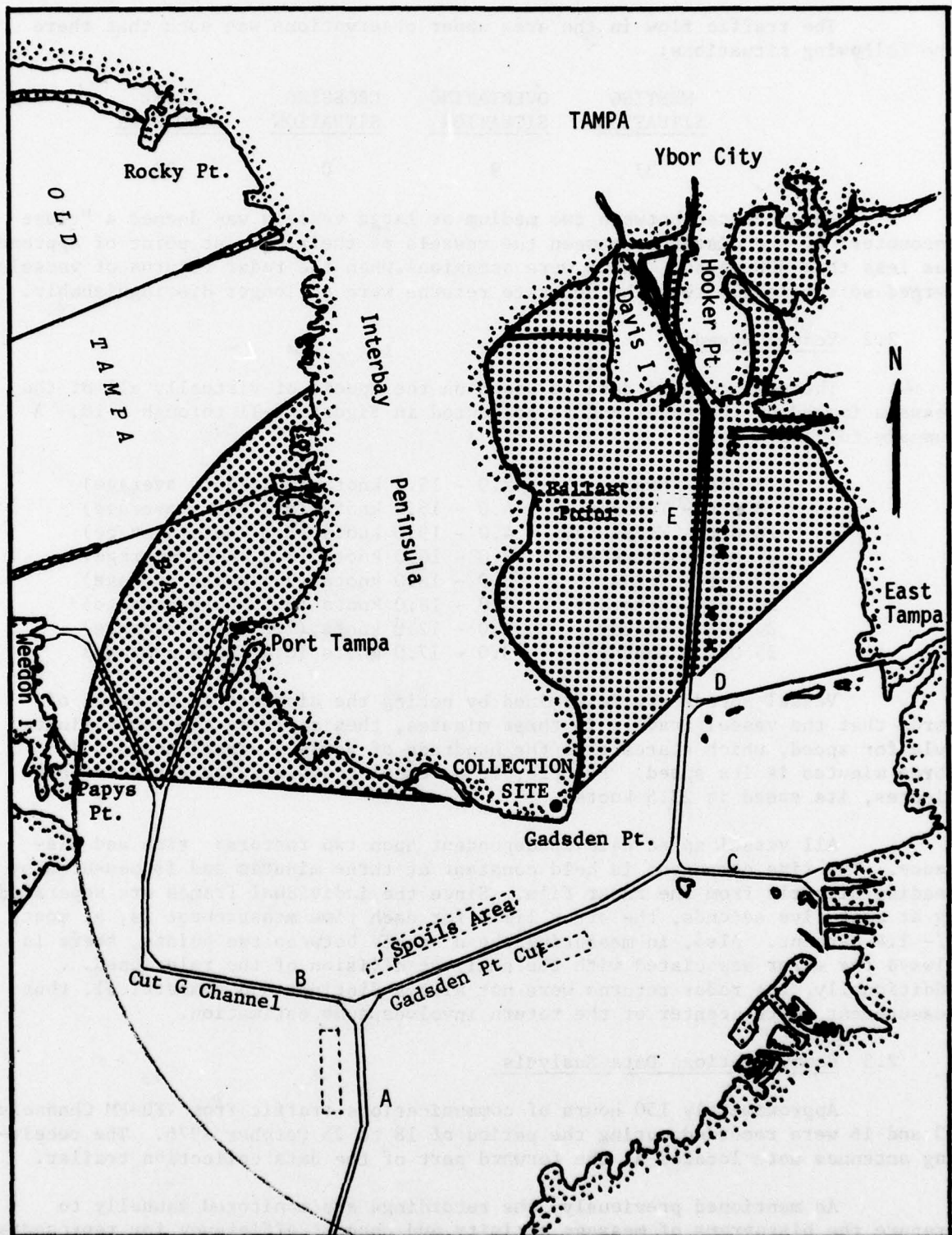


FIGURE 2-1: RADAR COVERAGE AREA

The traffic flow in the area under observations was such that there the following situations:

<u>MEETING SITUATION</u>	<u>OVERTAKING SITUATION</u>	<u>CROSSING SITUATION</u>	<u>CLOSE ENCOUNTER</u>
37	9	0	30

An encounter between two medium or large vessels was deemed a "close encounter" if the distance between the vessels at their closest point of approach was less than 300 yards. There were occasions when the radar returns of vessels merged so completely that the separate returns were no longer distinguishable.

## 2.2 Vessel Speeds

The vessel speed data is based on the speeds of virtually all of the vessels imaged by the radar and is presented in Figures 2-11 through 2-18. A summary follows:

18 Oct - Monday	2.0 - 15.0 knots (8.2 knots average)
19 Oct - Tuesday	4.0 - 16.0 knots (9.2 knots average)
20 Oct - Wednesday	4.0 - 19.0 knots (8.7 knots average)
21 Oct - Thursday	2.0 - 16.0 knots (8.3 knots average)
22 Oct - Friday	3.0 - 18.0 knots (9.5 knots average)
23 Oct - Saturday	3.0 - 18.0 knots (8.5 knots average)
24 Oct - Sunday	1.0 - 12.0 knots (7.8 knots average)
25 Oct - Monday	3.0 - 17.0 knots (8.4 knots average)

Vessel speeds are determined by noting the distance in hundreds of yards that the vessel travels in three minutes, then applying the three-minute rule for speed, which states that the hundreds of yards a vessel travels in three minutes is its speed. Example, if a vessel travels 2,350 yards in three minutes, its speed is 23.5 knots.

All vessel speed data is dependent upon two factors: time and distance. The time component is held constant at three minutes and is measured by reading directly from the radar film. Since the individual frames are separated by at most five seconds, the error limit for each time measurement is, at most, +/- 1.4 percent. Also, in measuring the distance between two points, there is always the error associated with the smallest division of the ruler used. Additionally, the radar returns were not always distinct and symmetrical, thus measurement to the center of the return involves some estimation.

## 2.3 Communications Data Analysis

Approximately 150 hours of communications traffic from VFH-FM Channels 13 and 16 were recorded during the period of 18 to 25 October 1976. The receiving antennas were located at the forward part of the data collection trailer.

As mentioned previously, the recordings are monitored manually to prepare the histograms of message activity and channel efficiency for representative intervals during the period.

With respect to the Communications Message Activity histograms (Figures 2-19 through 2-34), a "valid" message is one that is appropriate for the channel that was used, such as the exchange of navigational or maneuvering information on Channel 13, and calls to initially establish communications on Channel 16. The "other" messages are those with squelch or indistinguishable transmissions, including those not spoken in the English language.

The Communications Channel Efficiency histograms (Figures 2-35 through 2-50) indicate the percentage of messages transmitted that were appropriate for the particular channel that was used.

Regarding the computer-prepared histograms (Figures 2-51 through 2-55):

- Note that the figures in the column headed "PERIOD ENDING" are time intervals printed without the customary leading zeros. Thus, the time "0015" is shown as "15." The "MINUTES" column contains the total time occupied by transmissions during the period, while the "PERCENT" column indicates the percentage of the given period during which the channel was in use.
- It is probable that a number of the messages of less than 0.5 second in length are simply noise bursts. However, since it is common practice to acknowledge a transmission by briefly keying the transmitter (with no voice modulation), it did not seem desirable to ignore any usable signal. Thus, the figures for messages of less than 0.5 second should be used with caution.

The "number of messages" counts occasionally differ between the manually-reduced data and the machine-reduced data. This difference is apparently due to the machine detecting breaks in the signals being transmitted that were either not detected or were ignored by the personnel performing the manual analysis. The figures for duration of channel utilization obtained manually agreed well with those obtained by the automated equipment, indicating that the automated equipment is operating properly.

The channel efficiency (i.e., the percentage of valid messages) at Tampa is as follows:

<u>CHANNEL 13</u>	<u>CHANNEL 16</u>
43.98%	59.40%

The channel utilization exhibited the following peak and average values:

<u>CHANNEL 13</u>		<u>CHANNEL 16</u>	
<u>PEAK</u>	<u>AVERAGE</u>	<u>PEAK</u>	<u>AVERAGE</u>
54%	3.43%	80%	6.79%



## 2.4 Weather Data

Weather data, including the cloud coverage, wind direction and velocity, and visibility in nautical miles, is collected every hour. At Tampa, the winds were recorded with a westerly flow, with velocities not exceeding ten knots. The visibilities were in excess of five nautical miles during the data collection period.

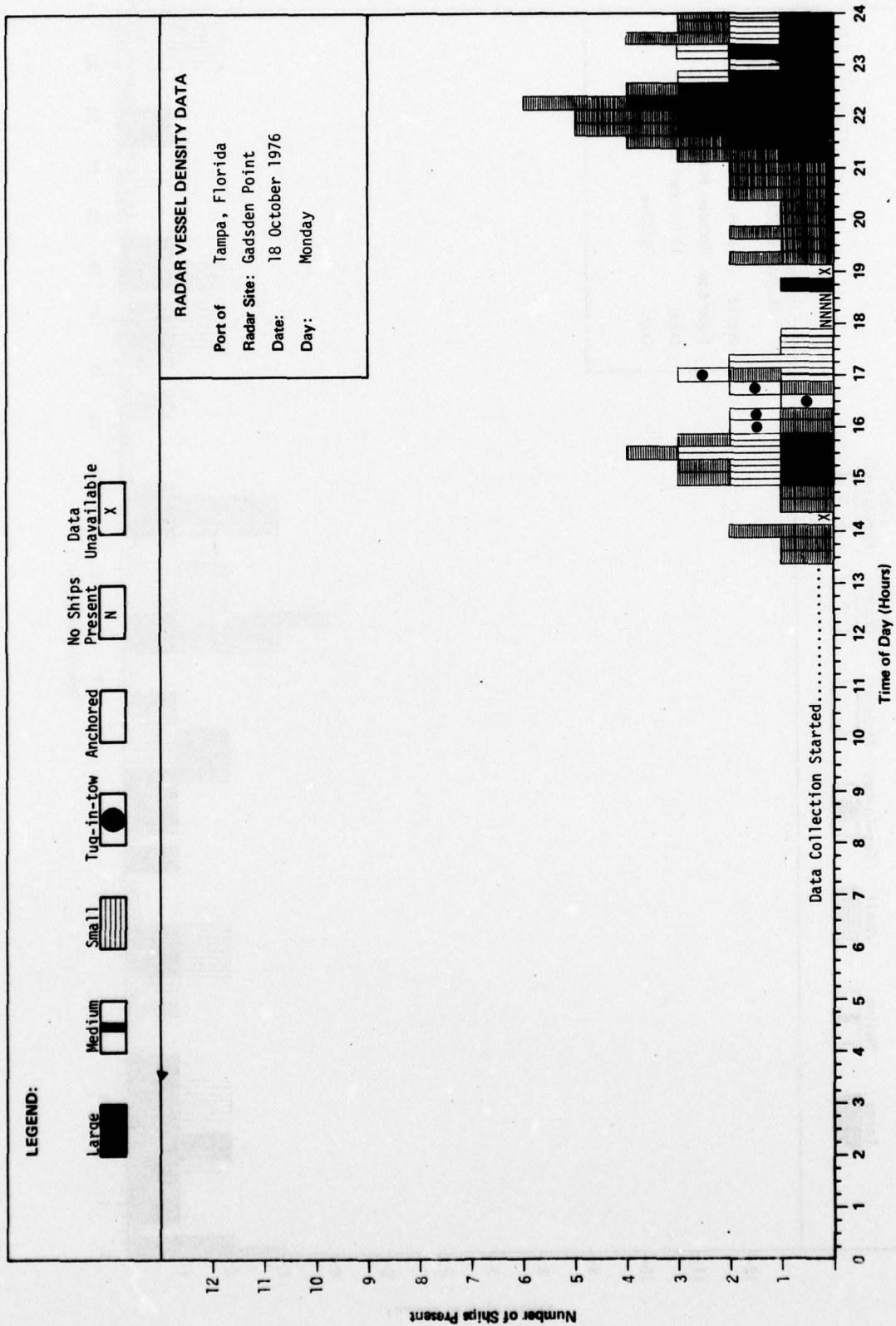


FIGURE 2-2

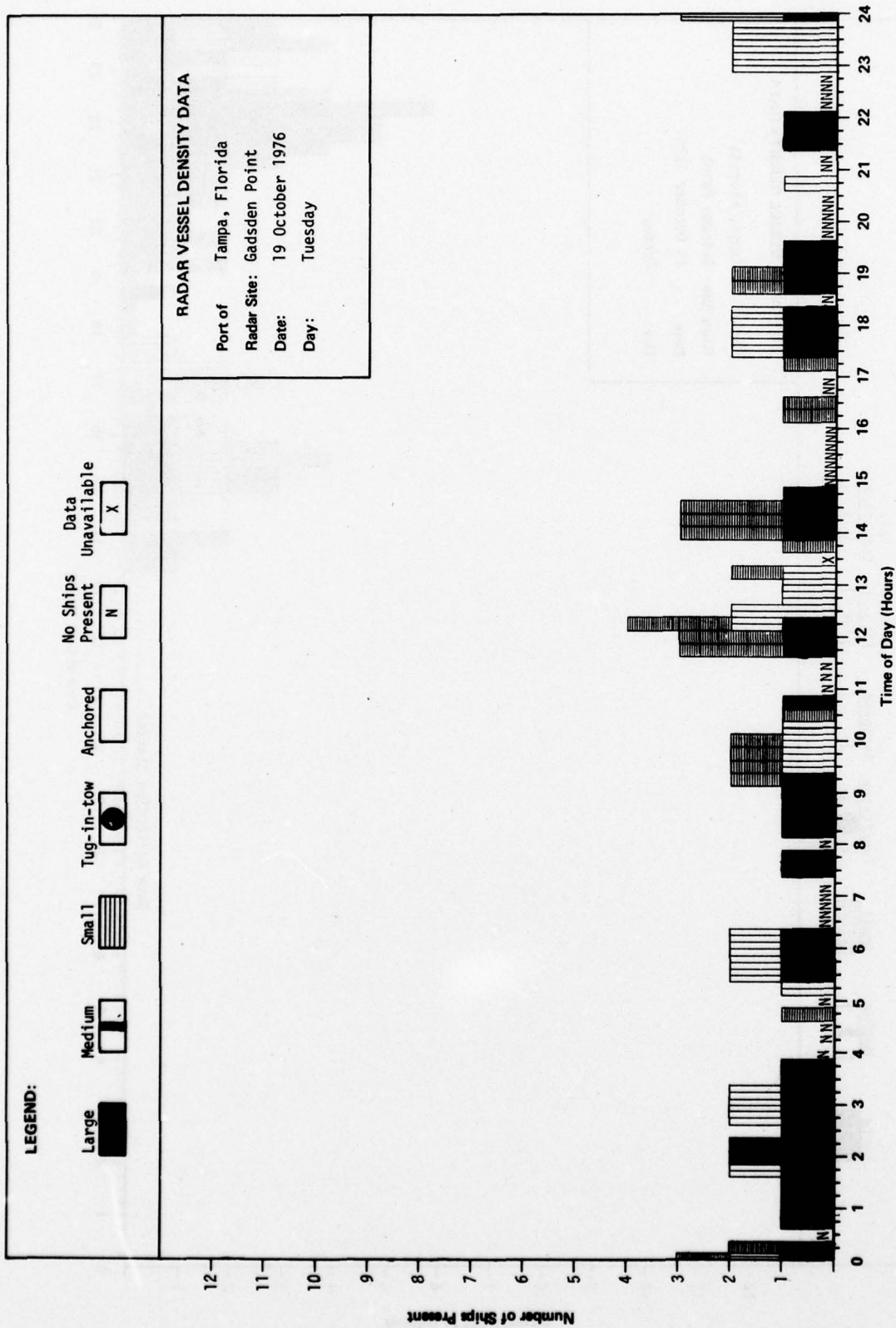


FIGURE 2-3



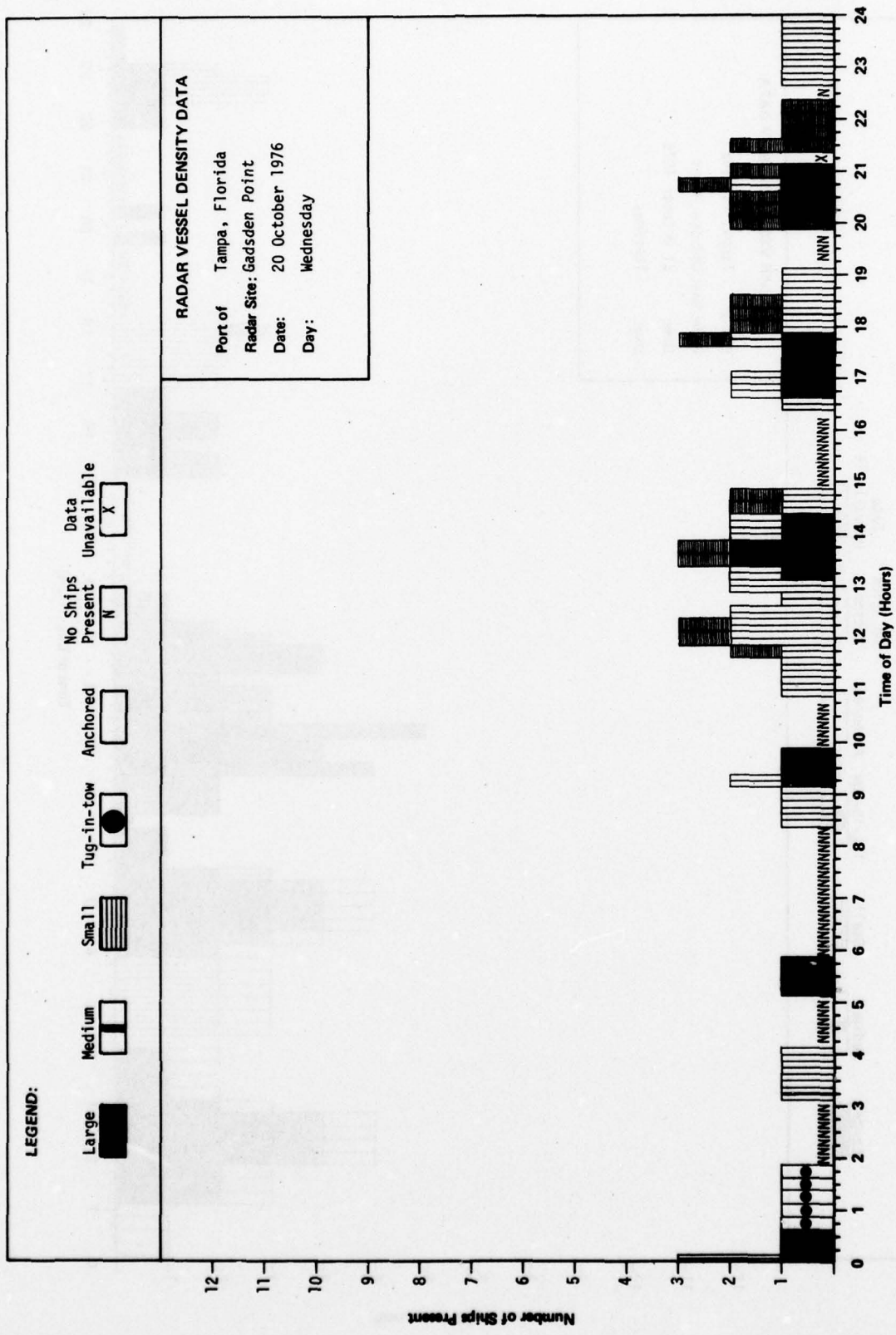


FIGURE 2-4

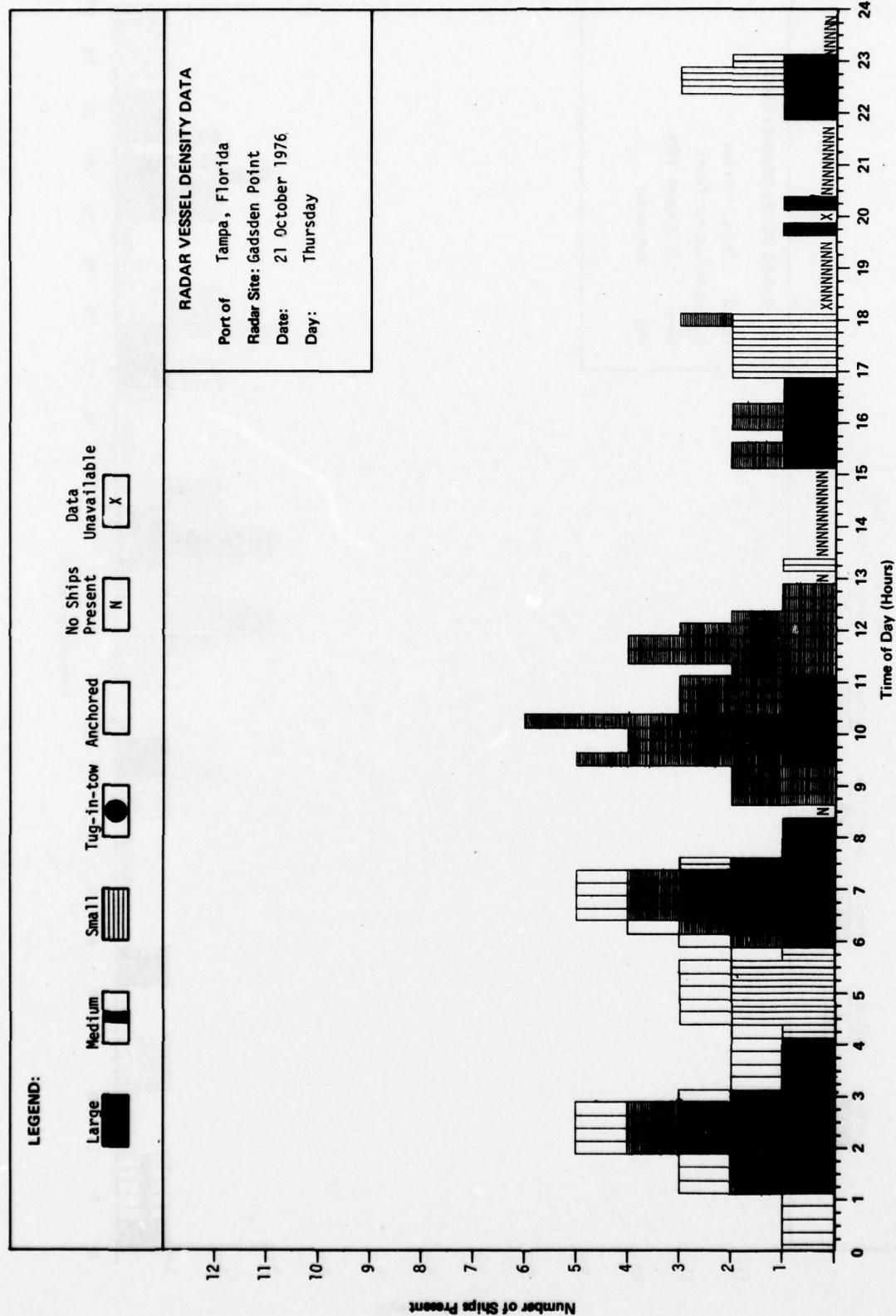


FIGURE 2-5

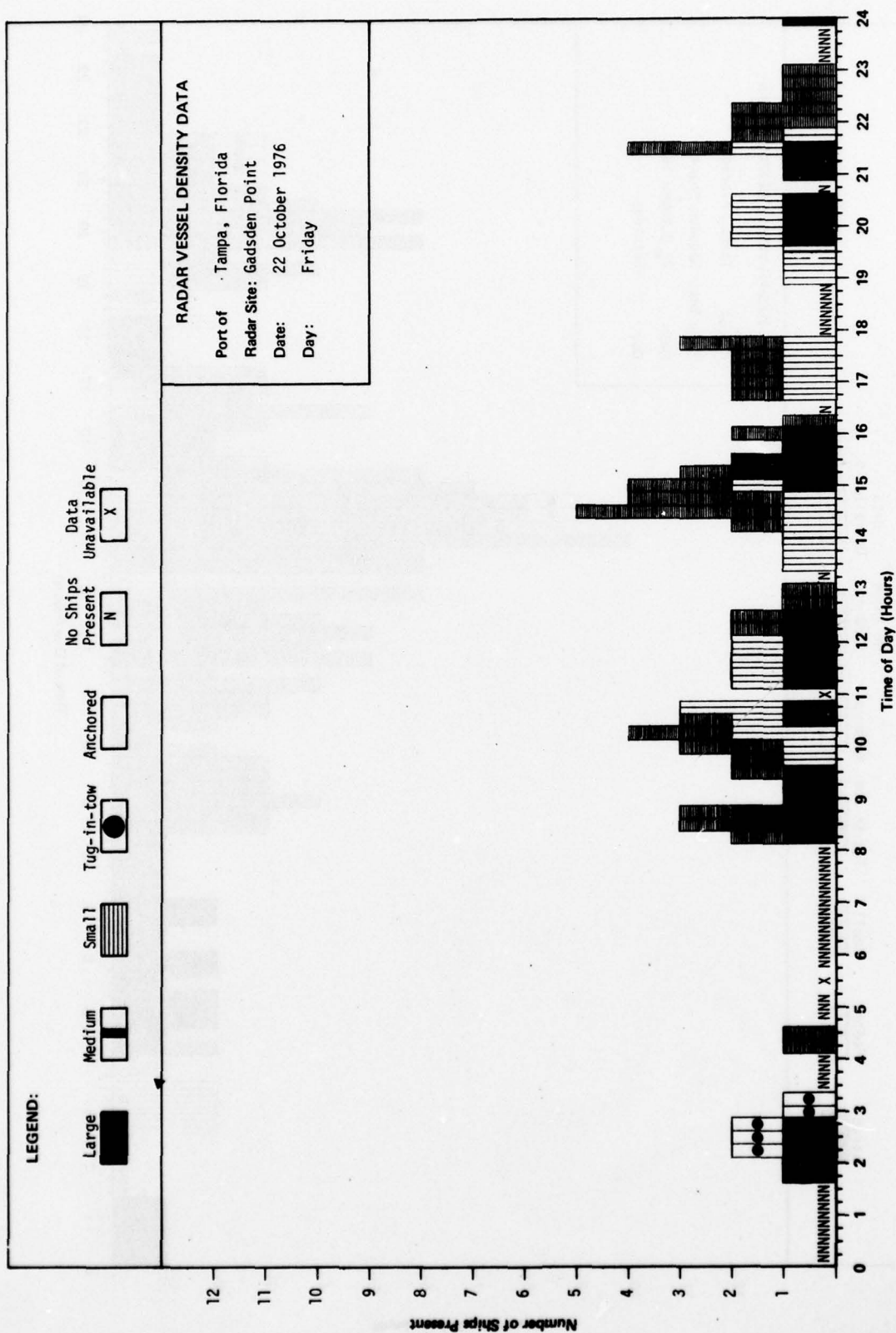


FIGURE 2-6



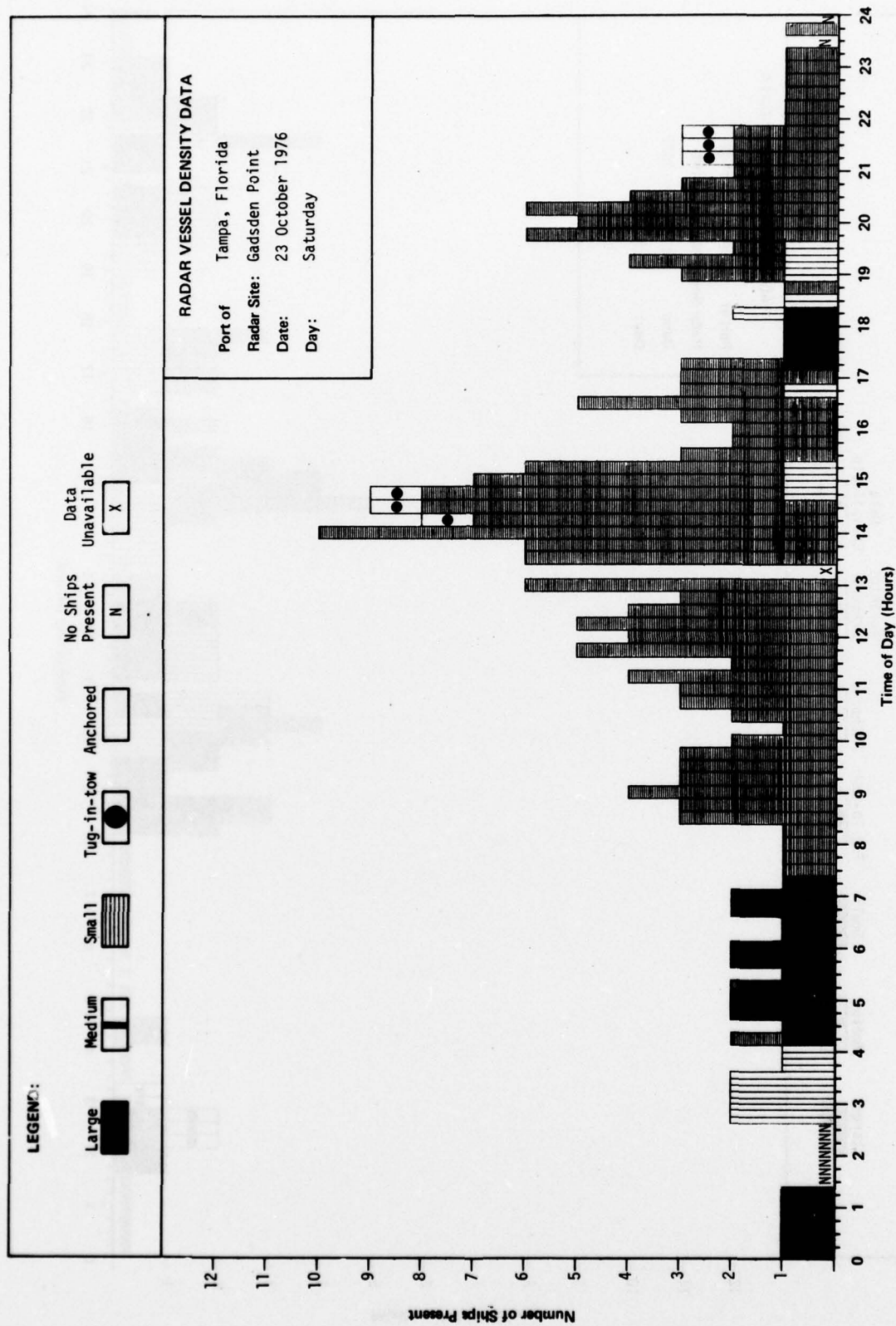


FIGURE 2-7

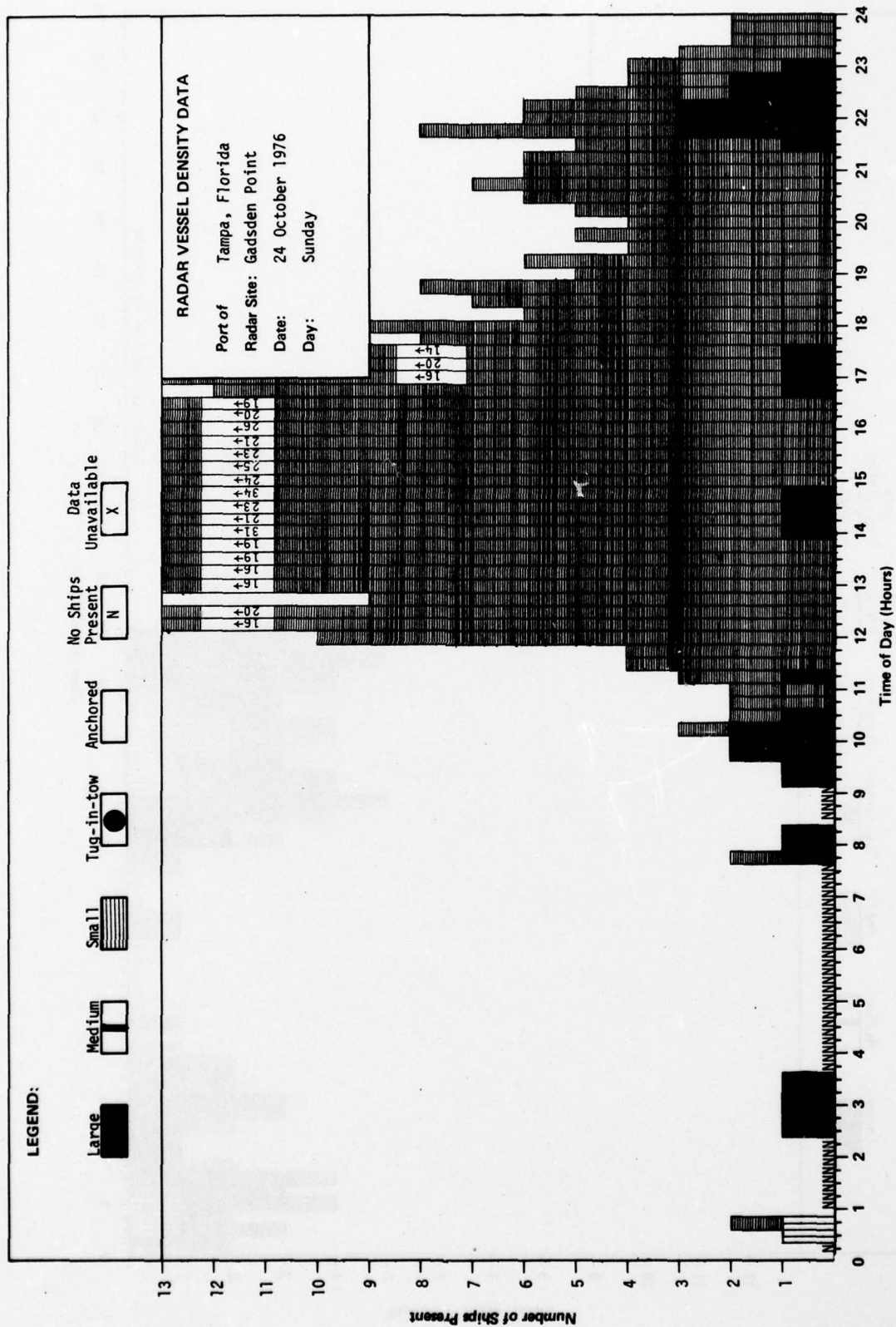


FIGURE 2-8

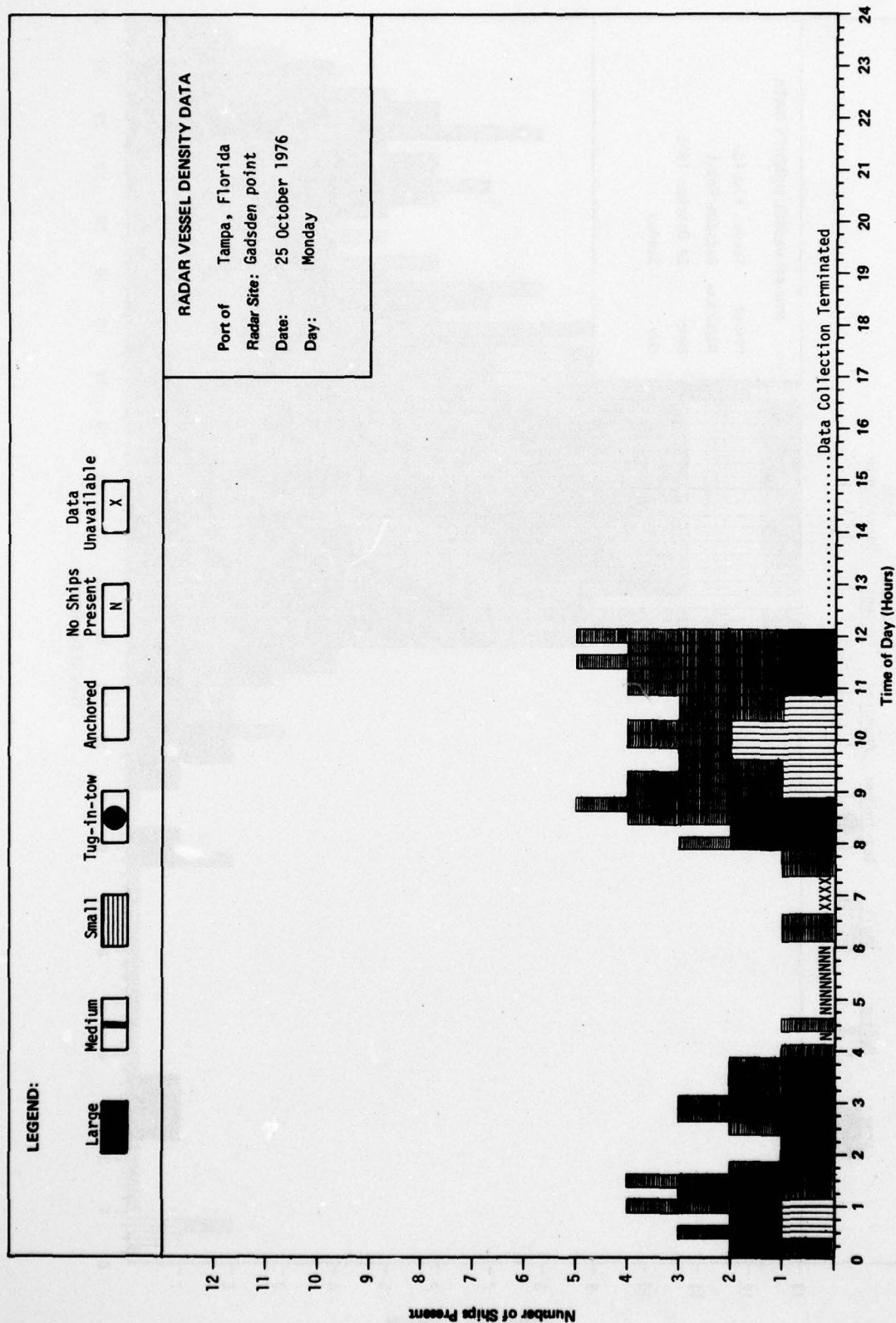


FIGURE 2-9



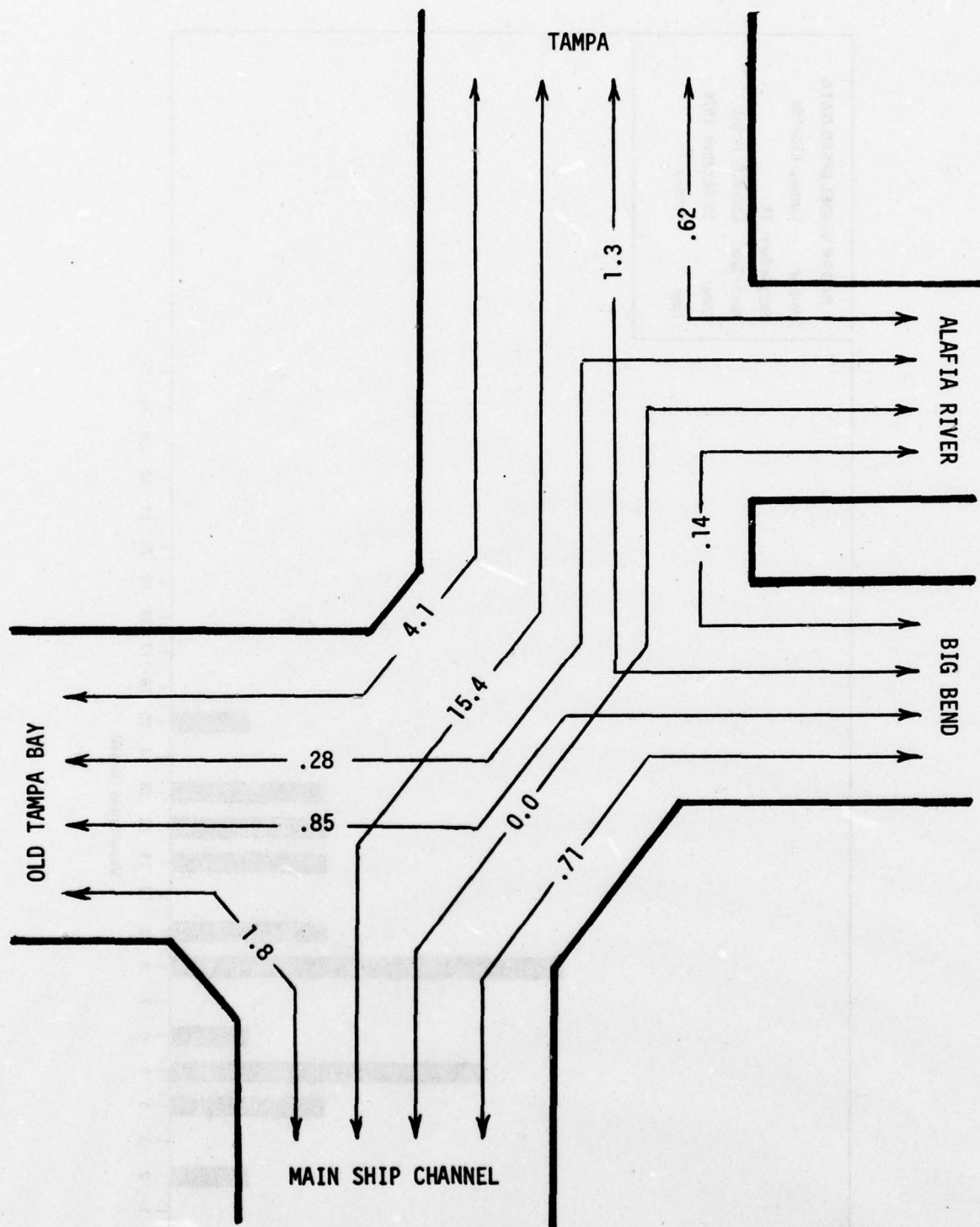


FIGURE 2-10: DAILY VESSEL AVERAGES AMONG THE CHANNELS AT TAMPA BAY, FLORIDA

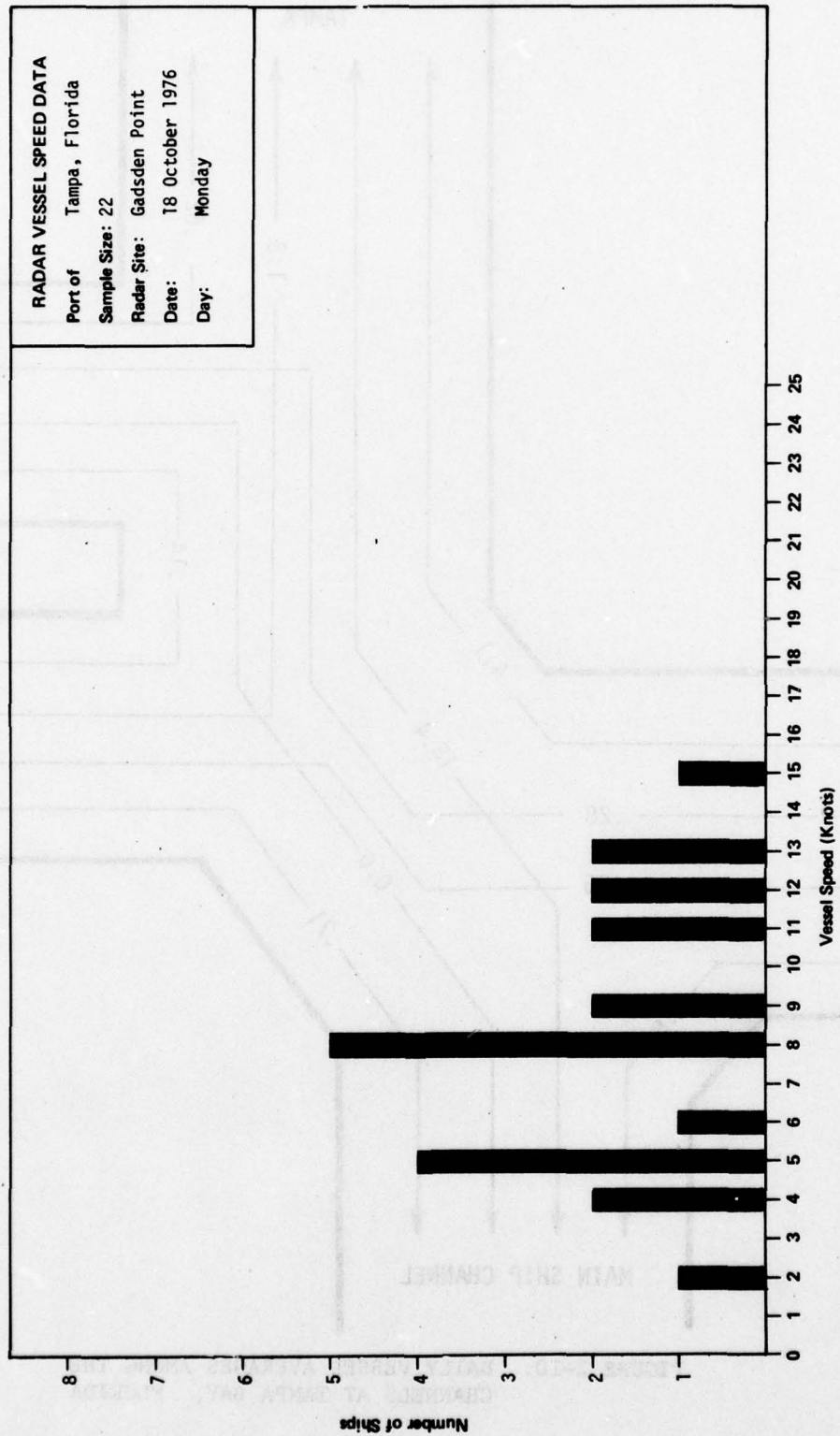


FIGURE 2-11

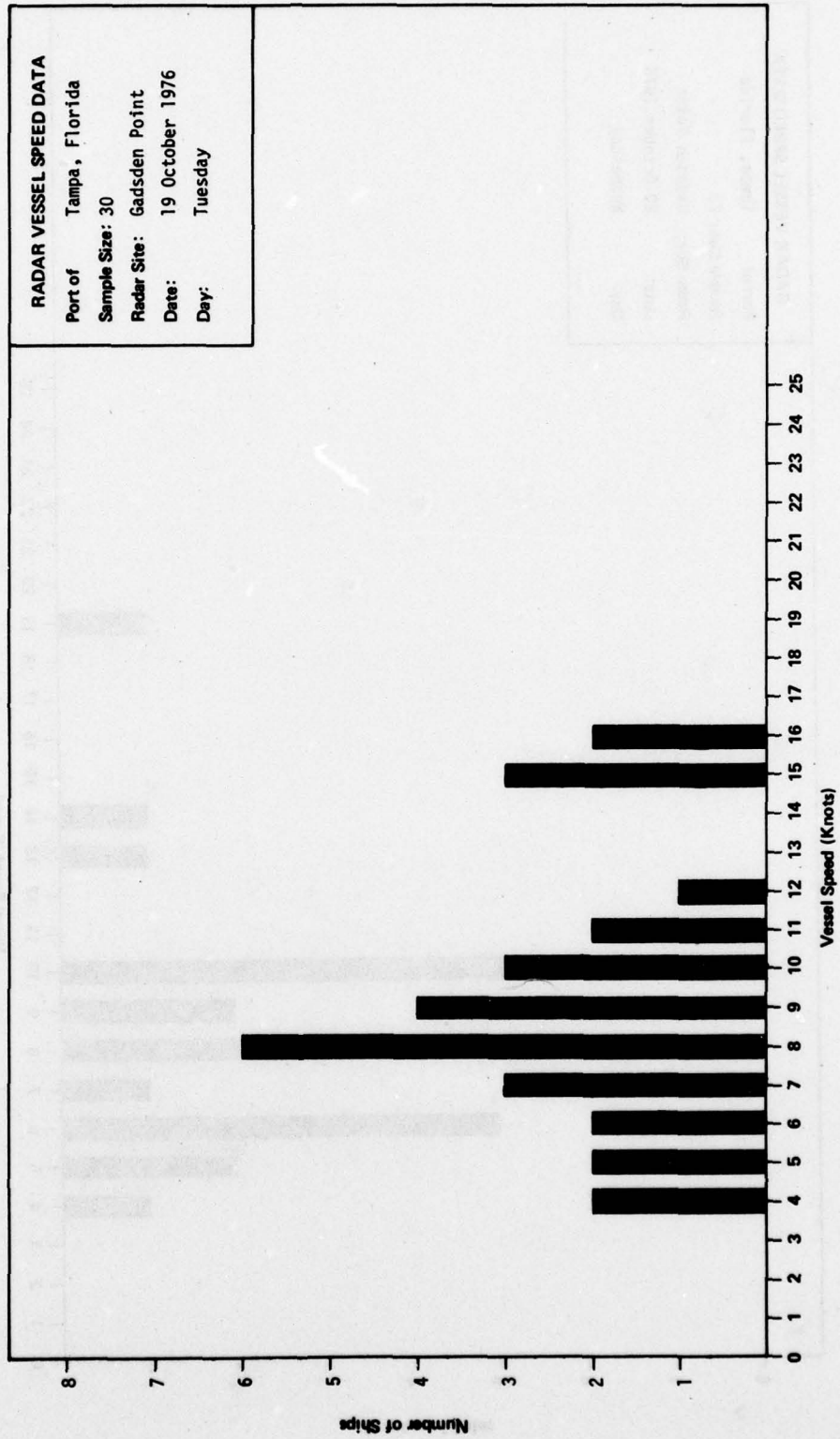


FIGURE 2-12



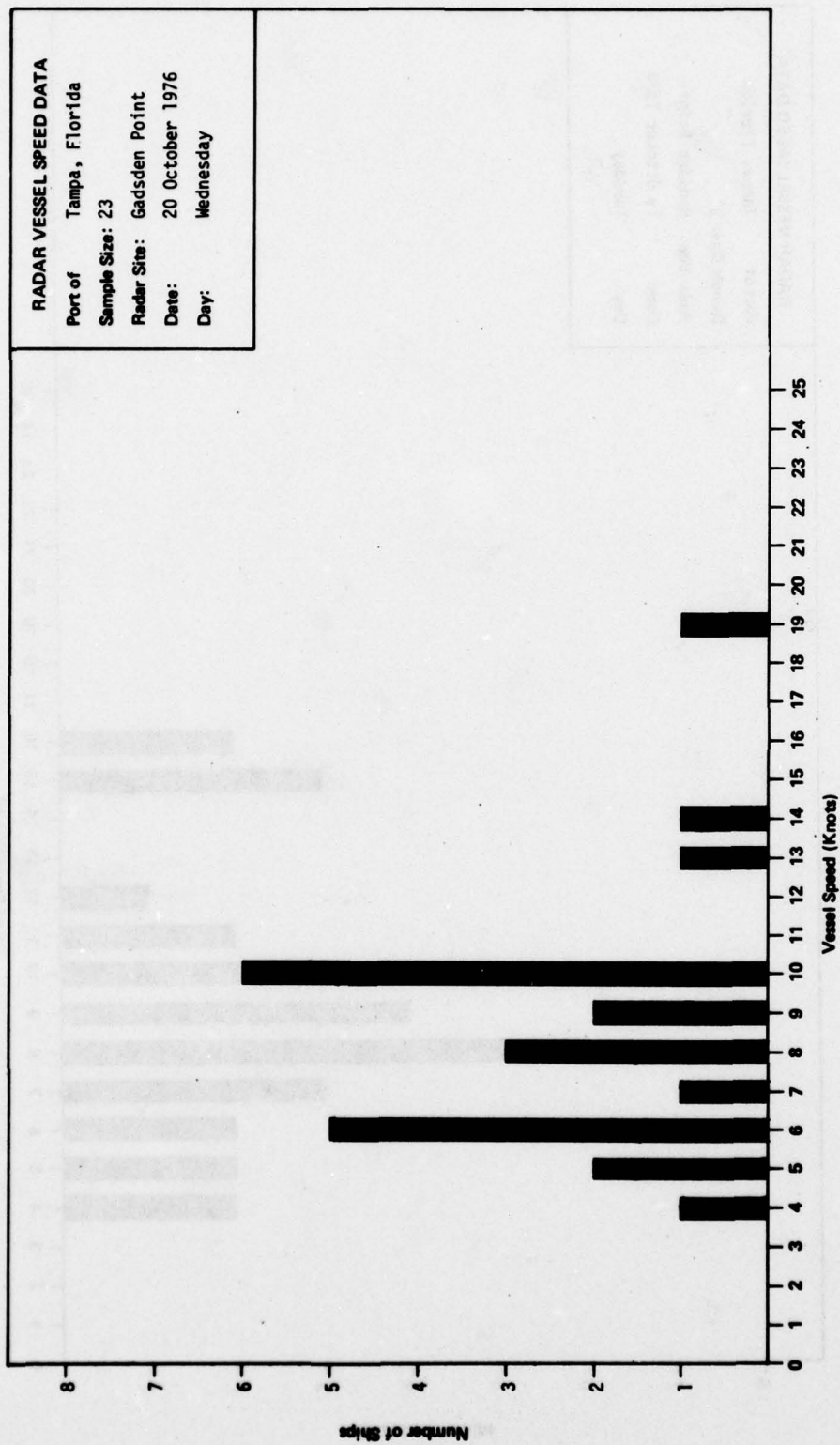


FIGURE 2-13

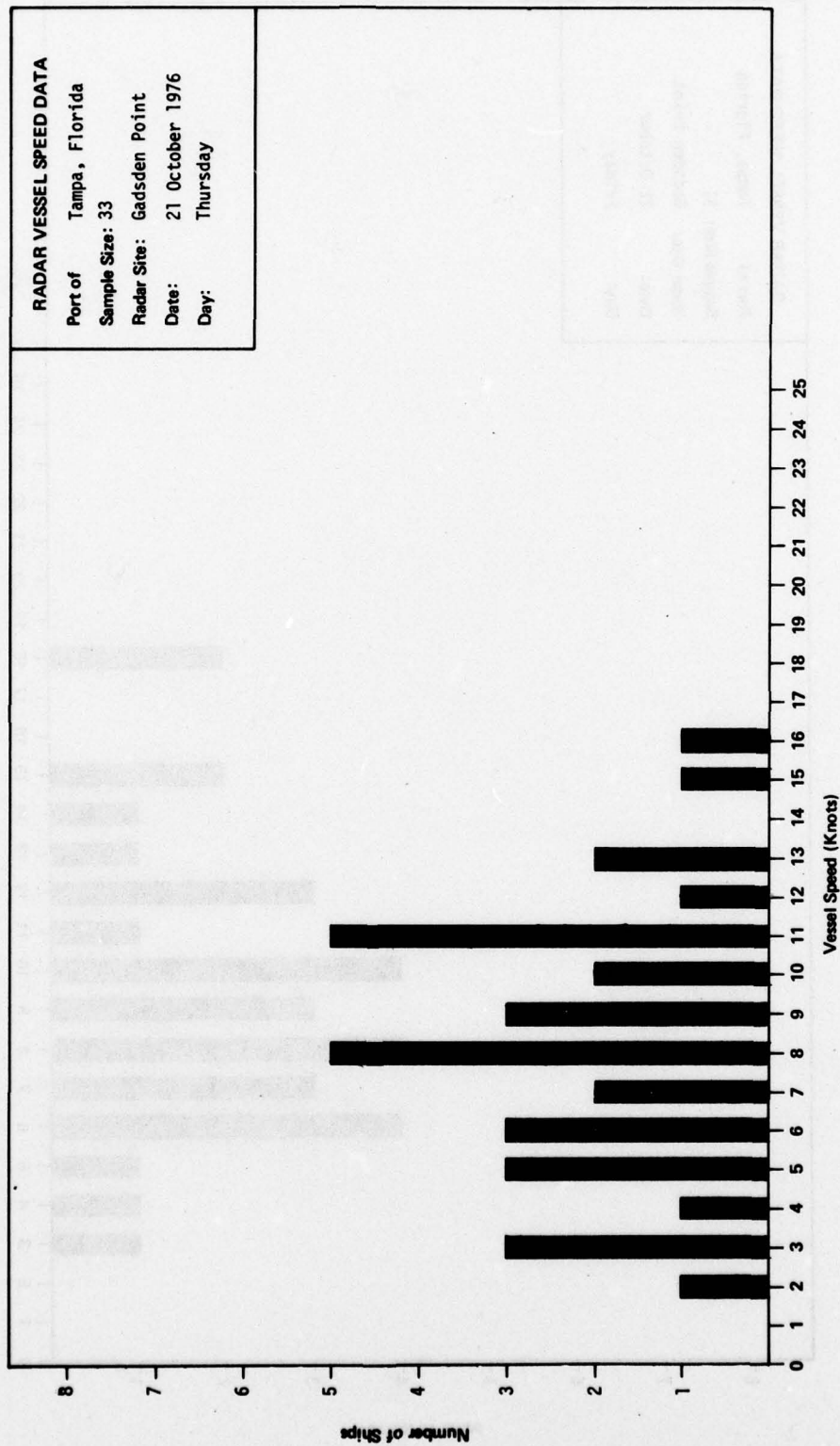


FIGURE 2-14

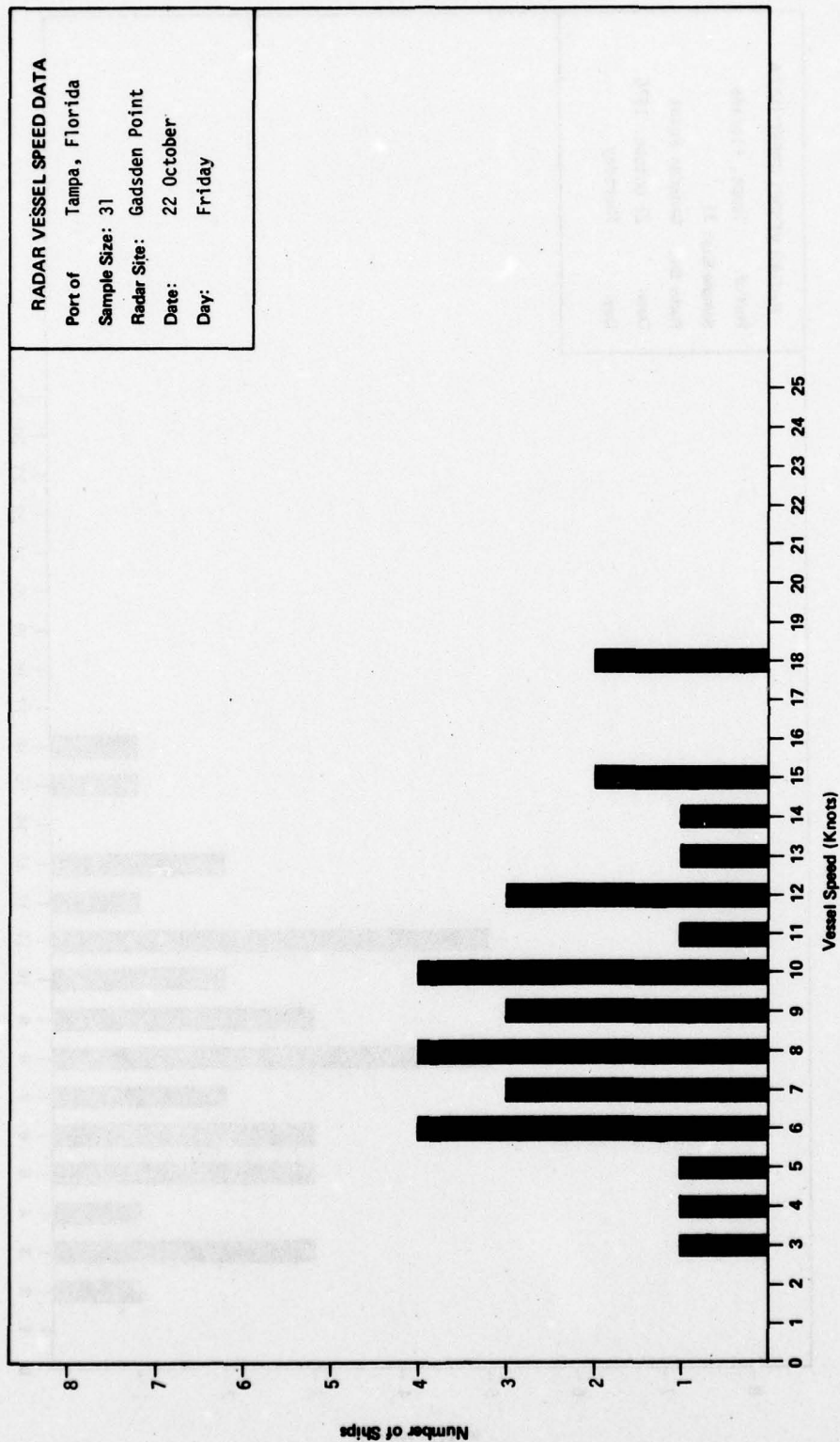


FIGURE 2-15



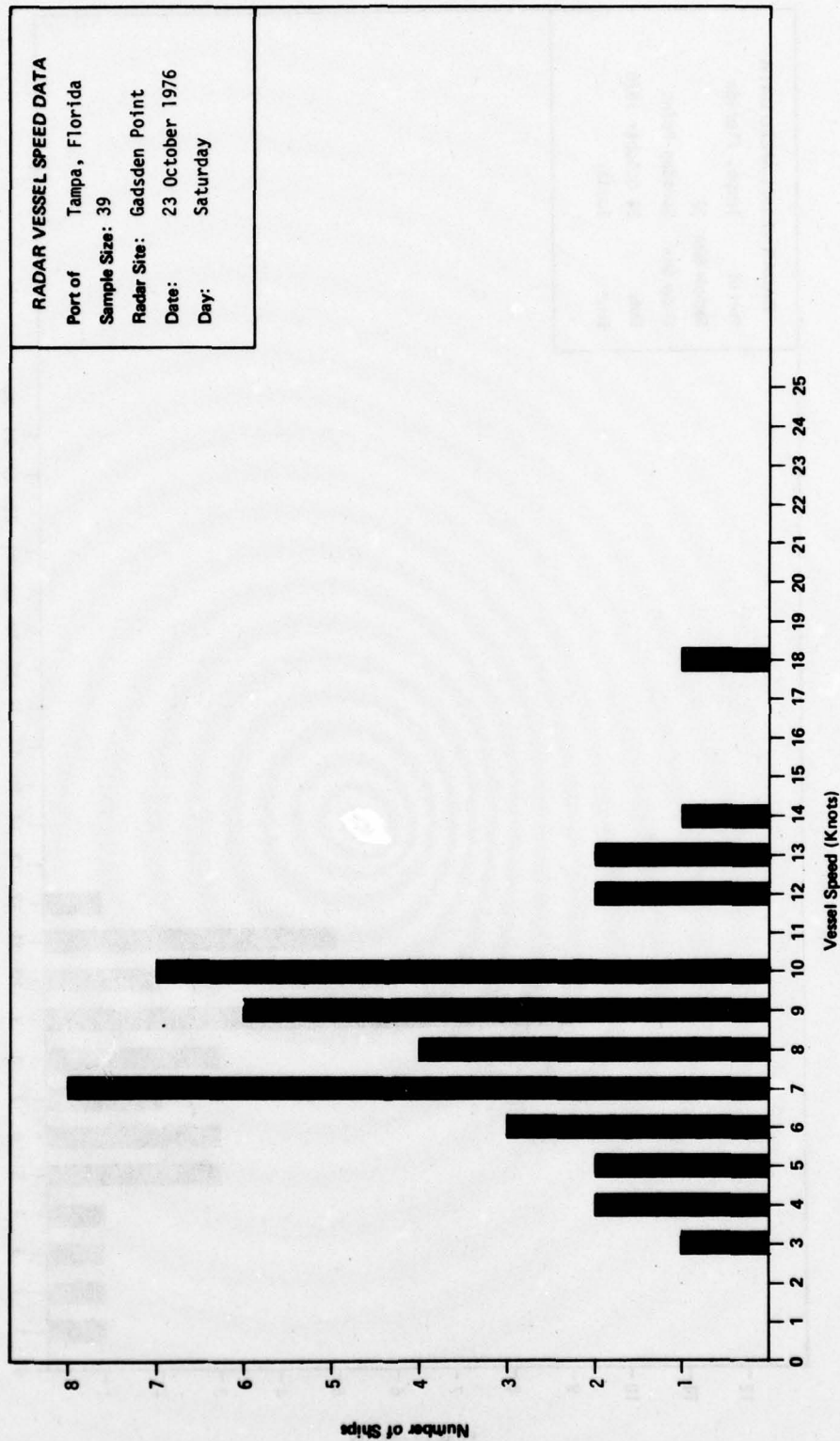


FIGURE 2-16

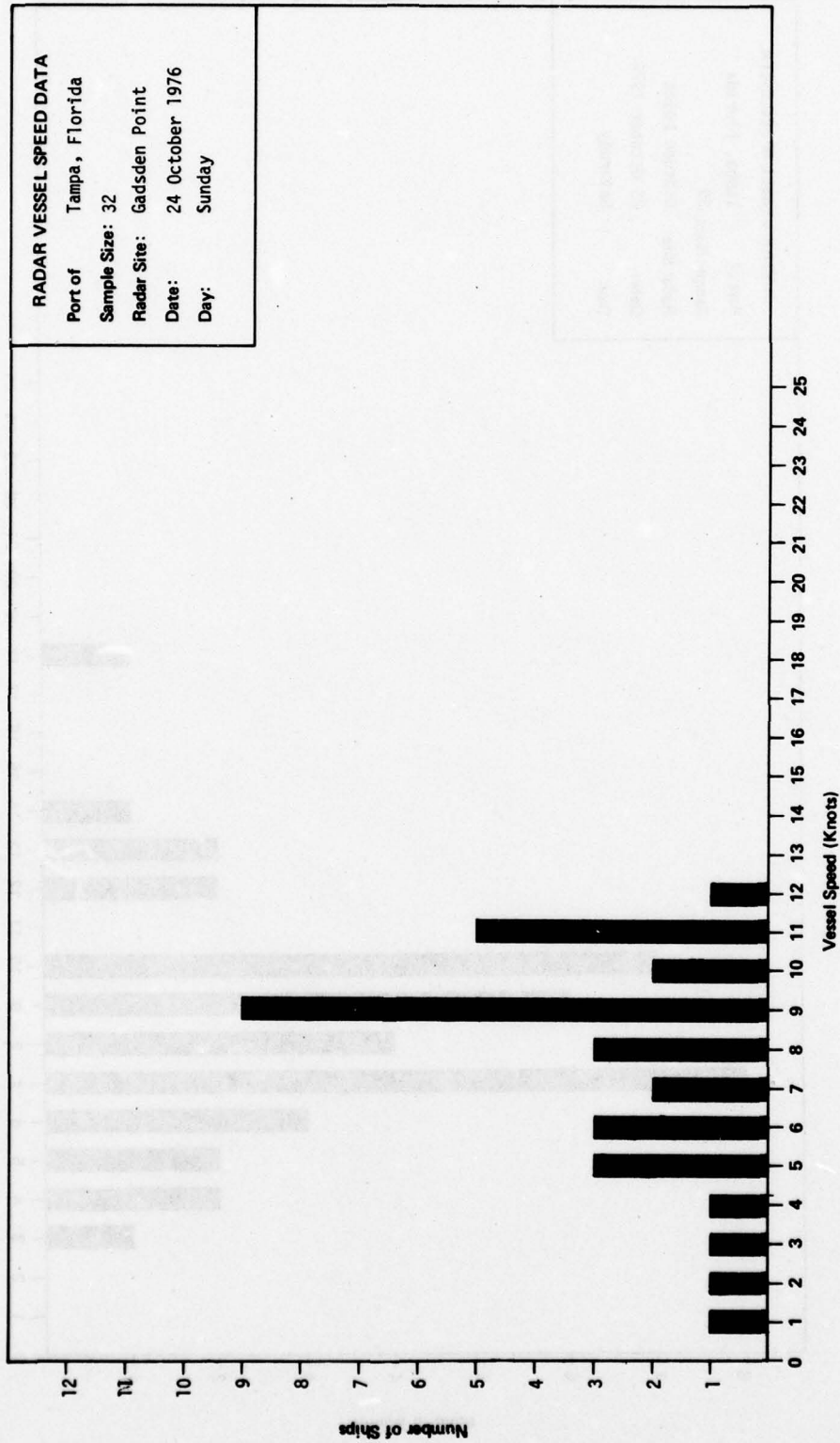


FIGURE 2-17

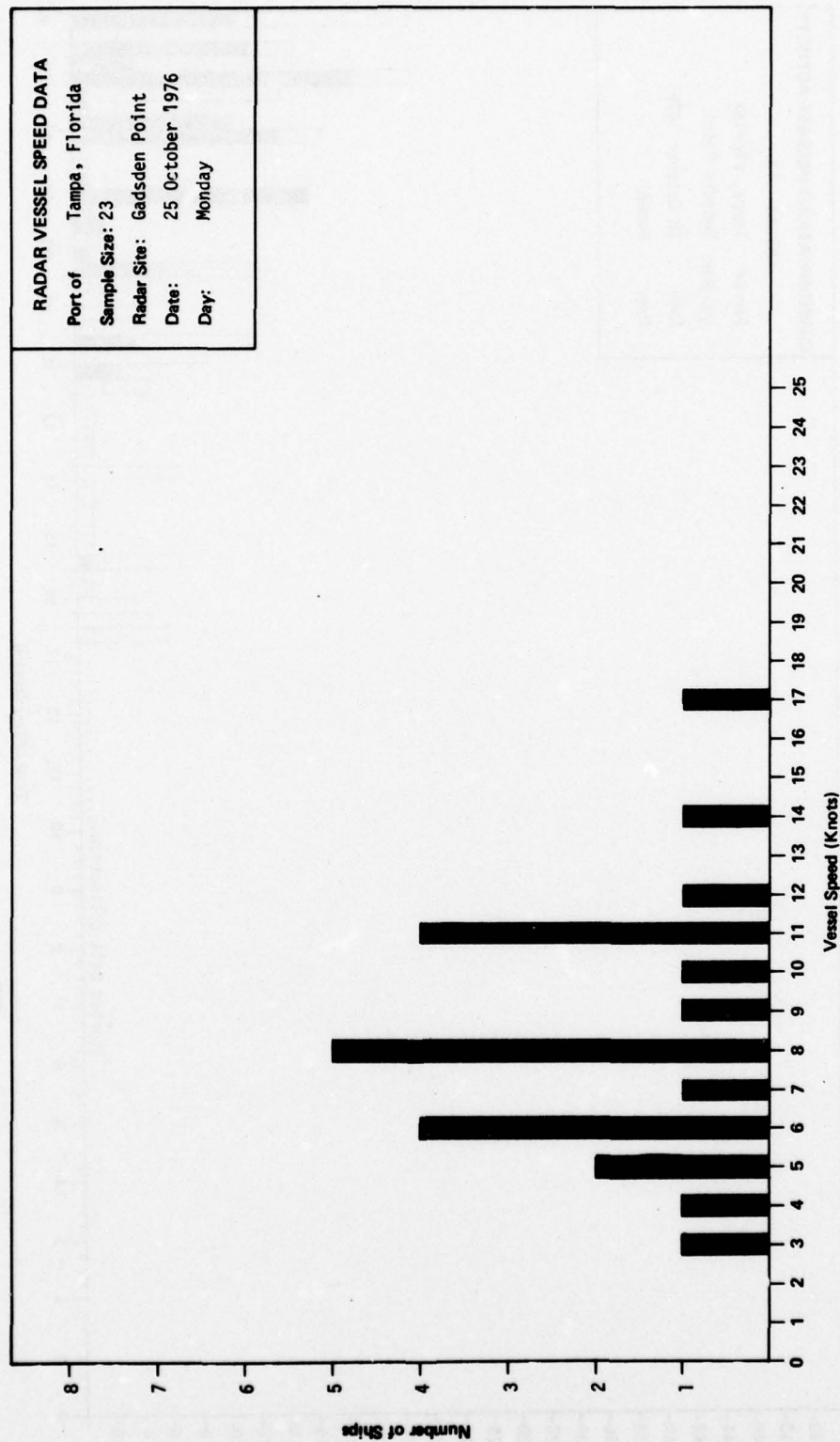


FIGURE 2-18



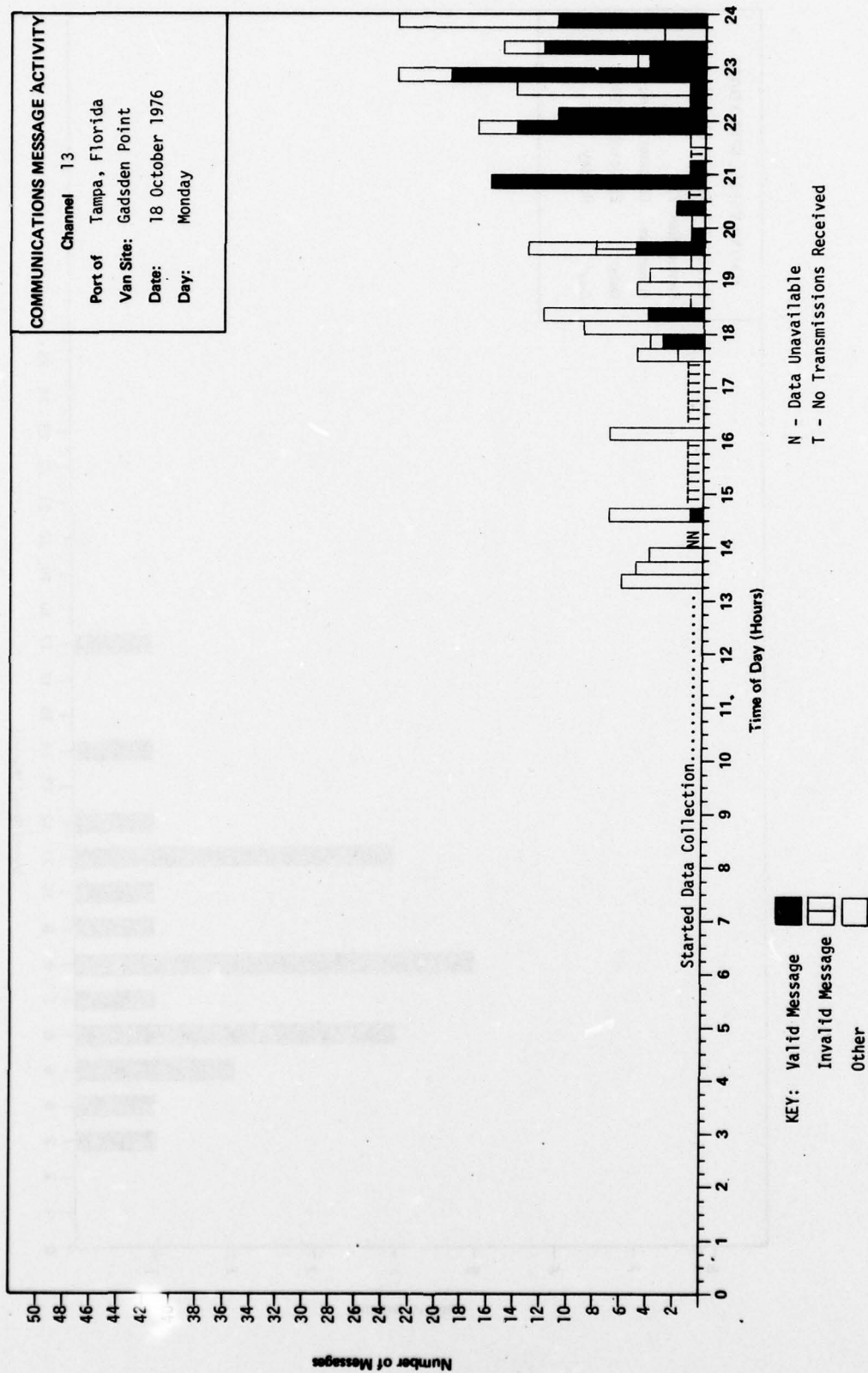


FIGURE 2-19

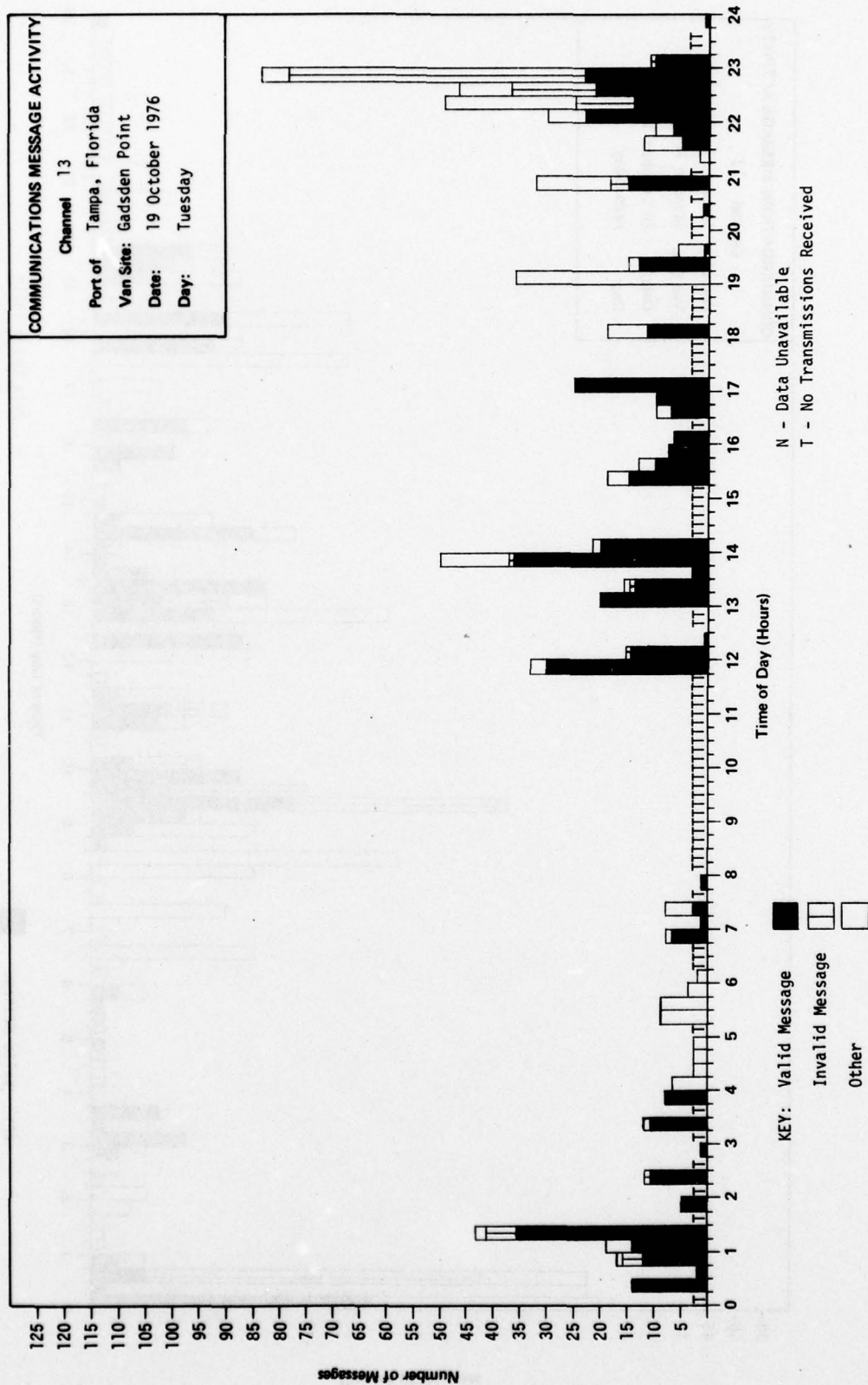


FIGURE 2-20

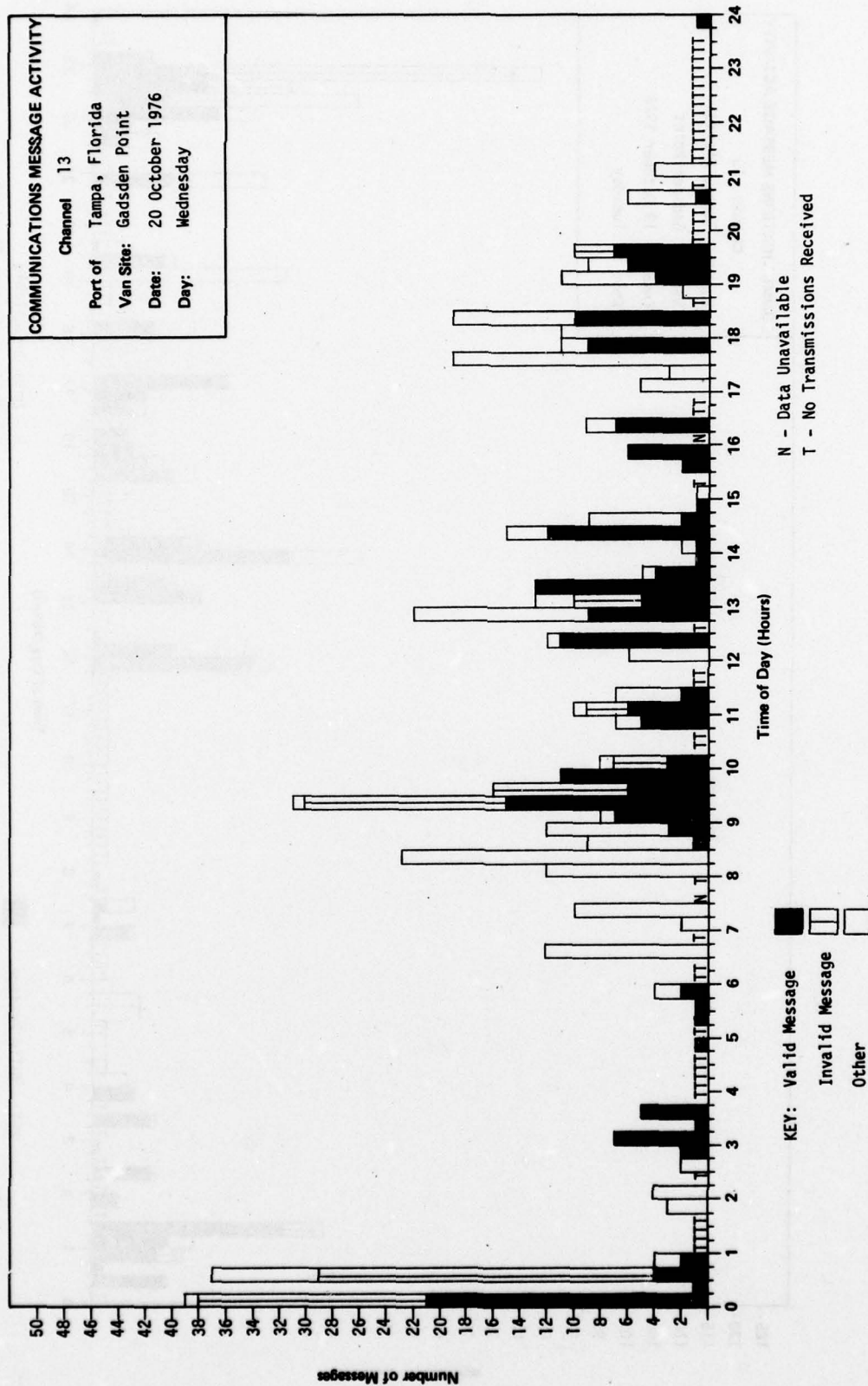


FIGURE 2-21



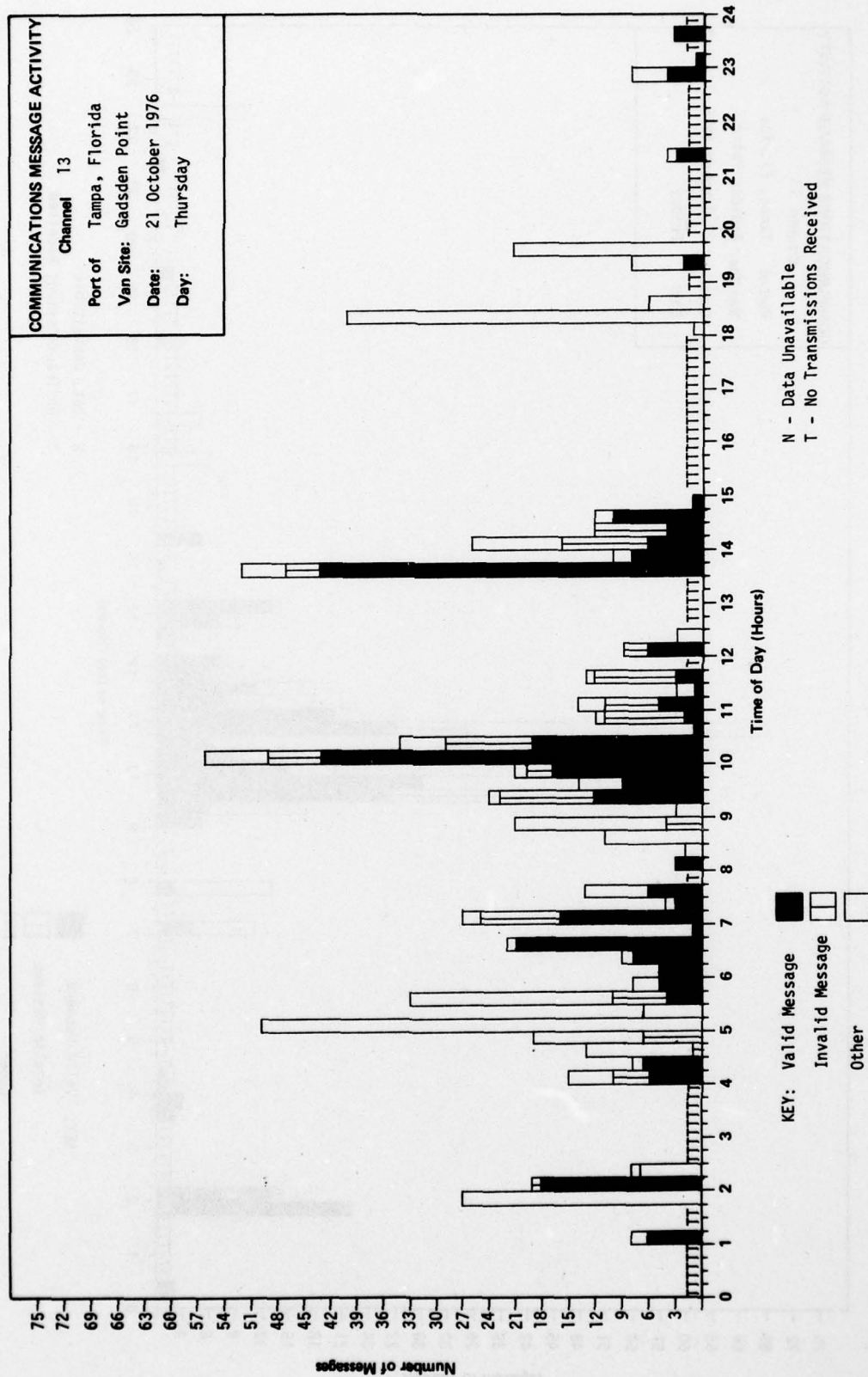


FIGURE 2-22

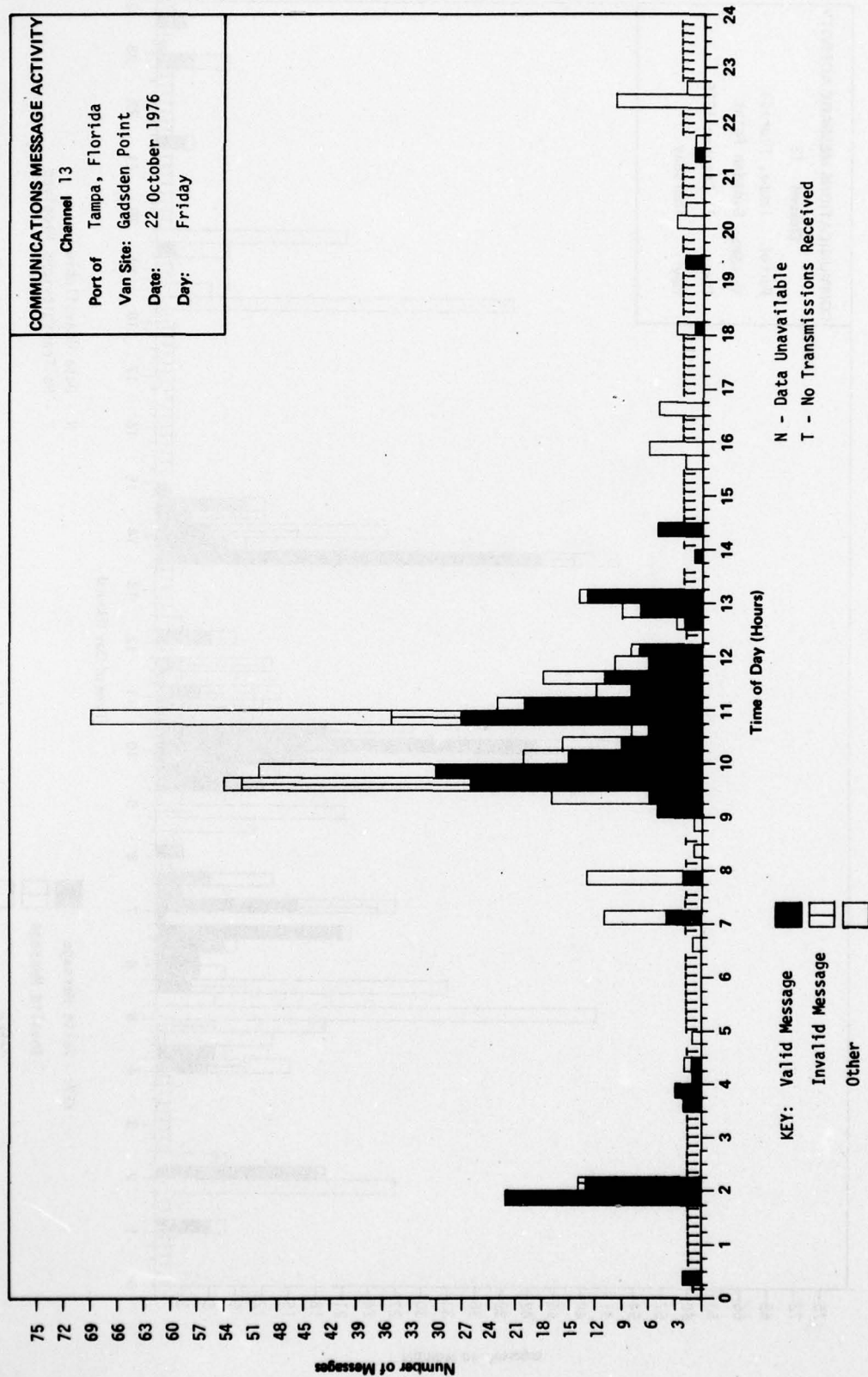


FIGURE 2-23

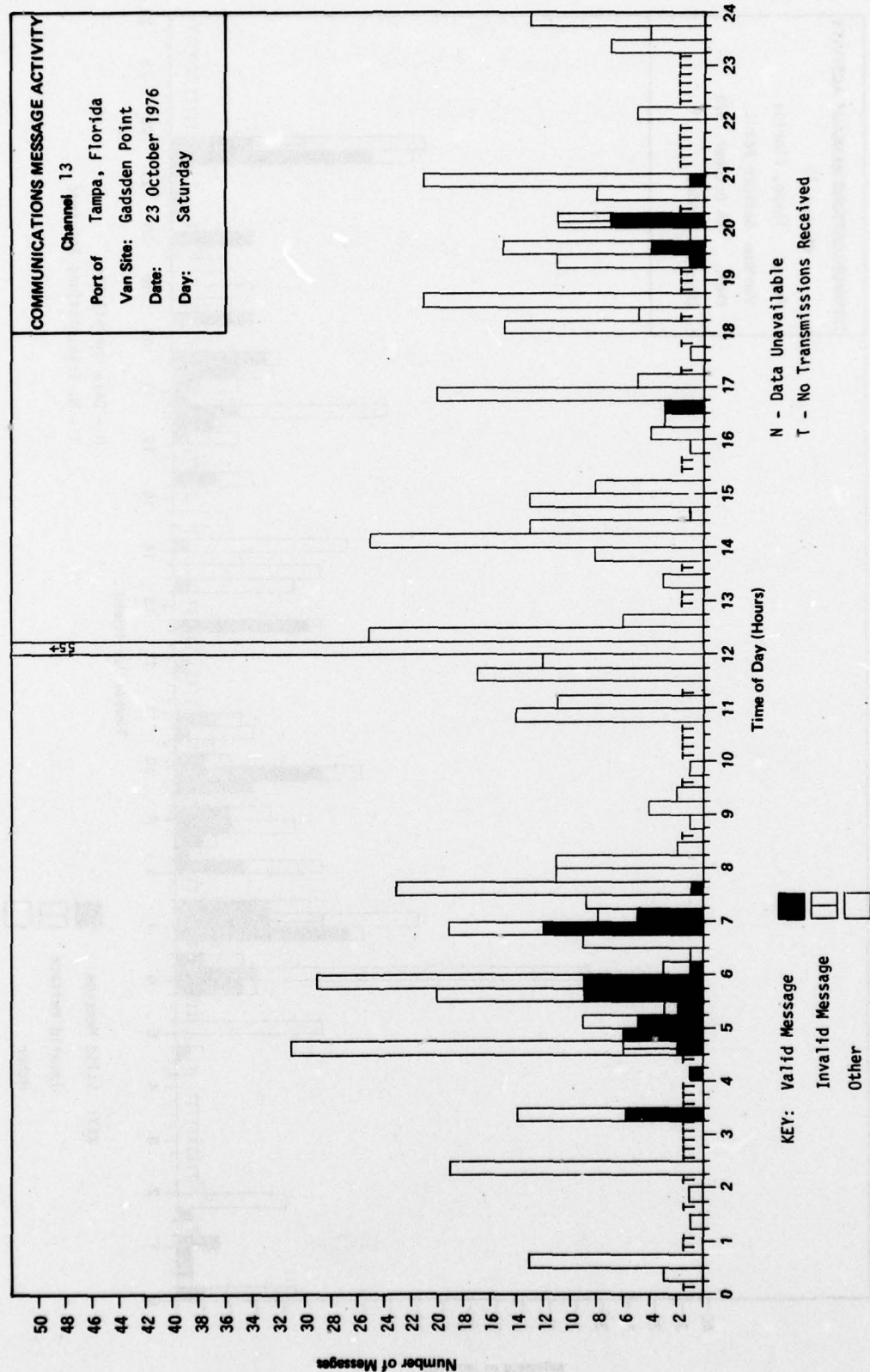


FIGURE 2-24



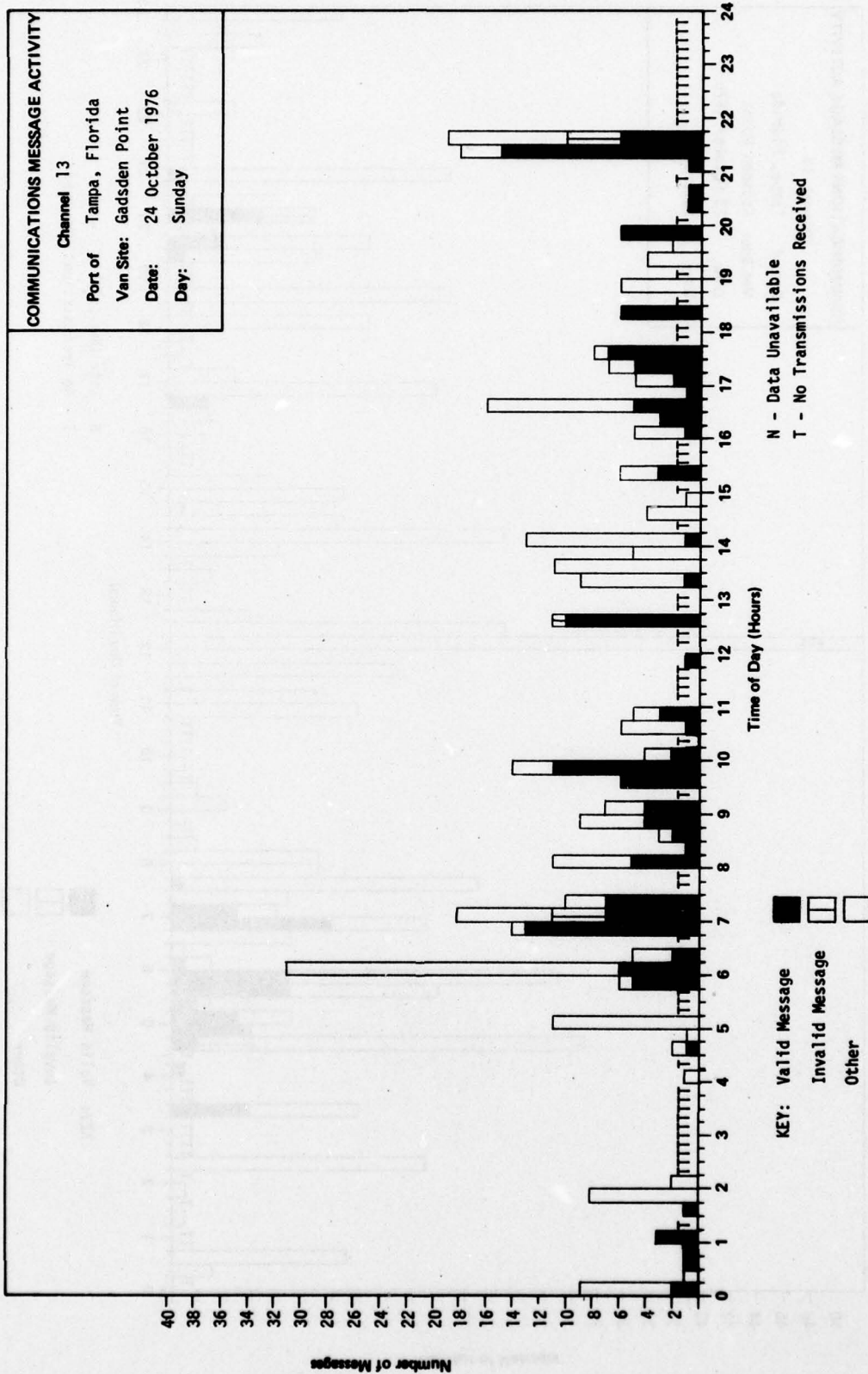


FIGURE 2-25

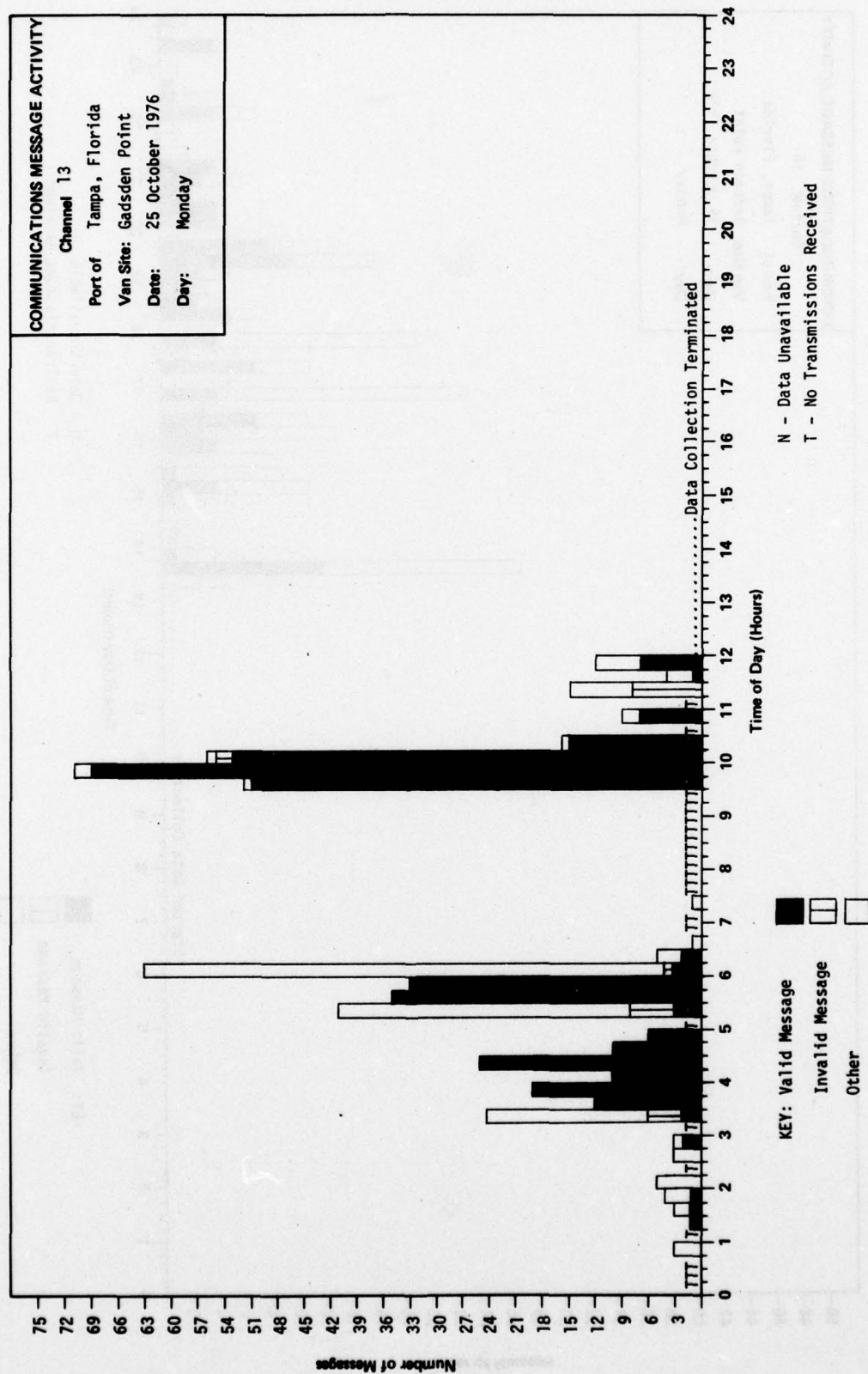


FIGURE 2-26

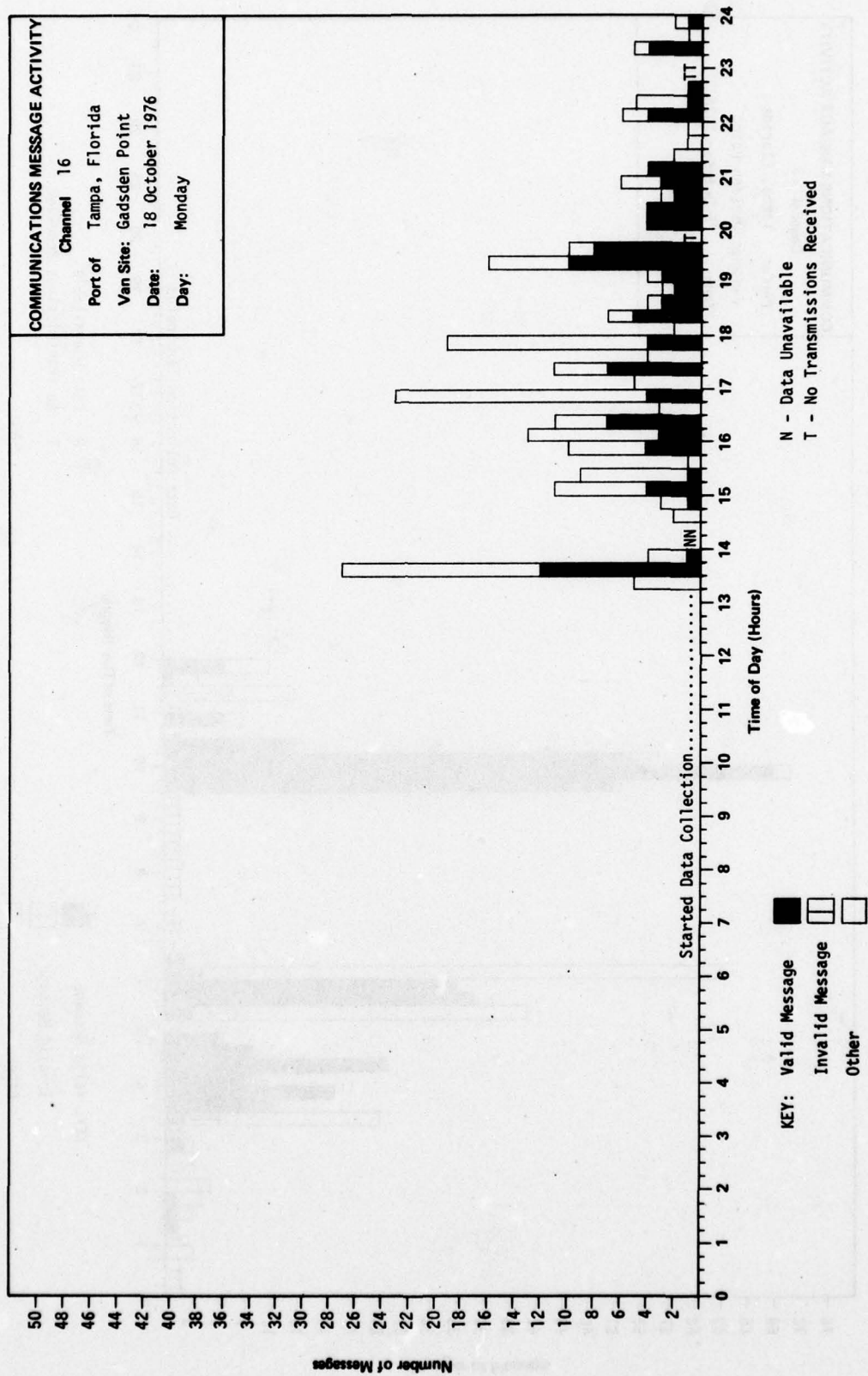


FIGURE 2-27



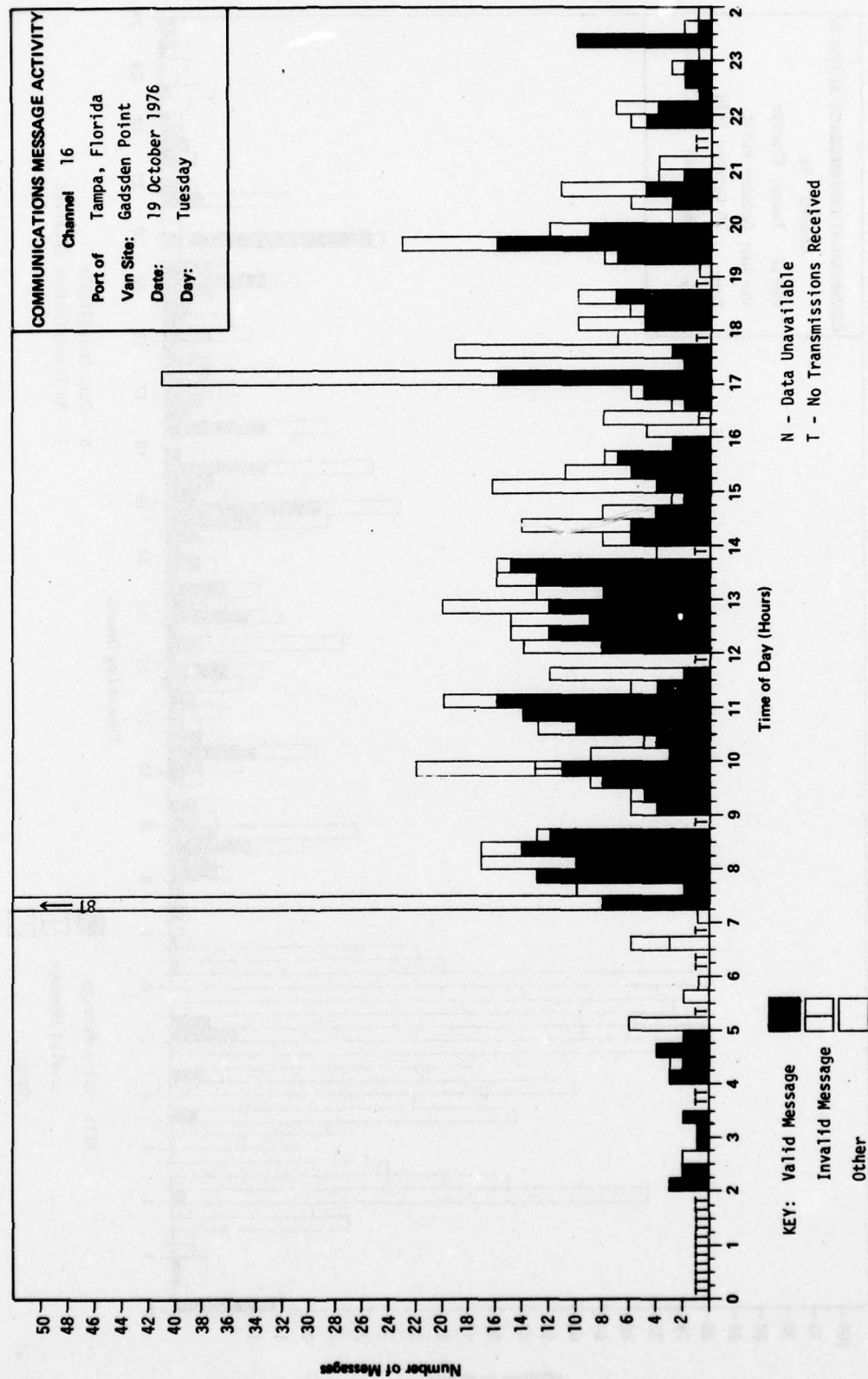


FIGURE 2-28

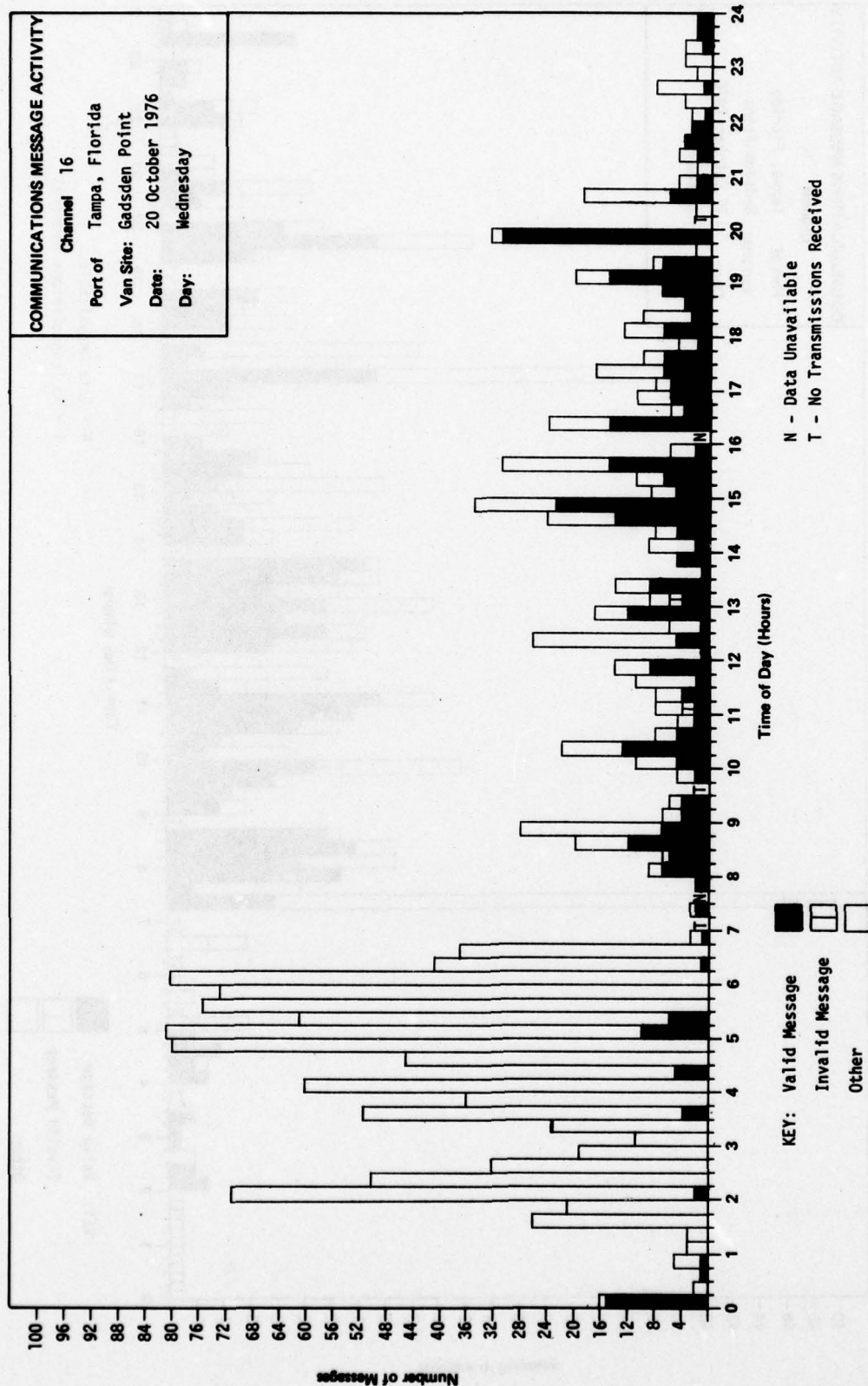


FIGURE 2-29

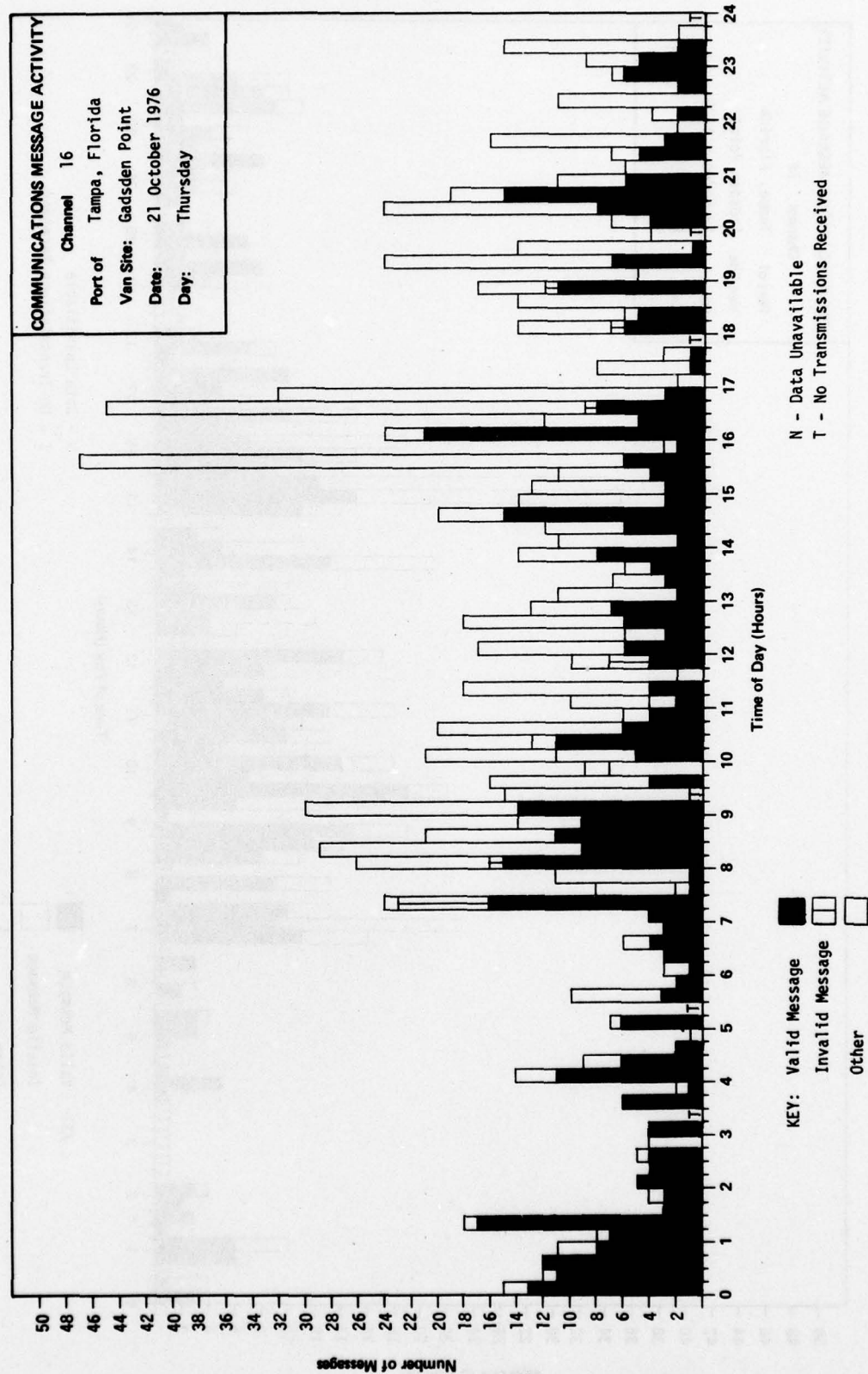


FIGURE 2-30



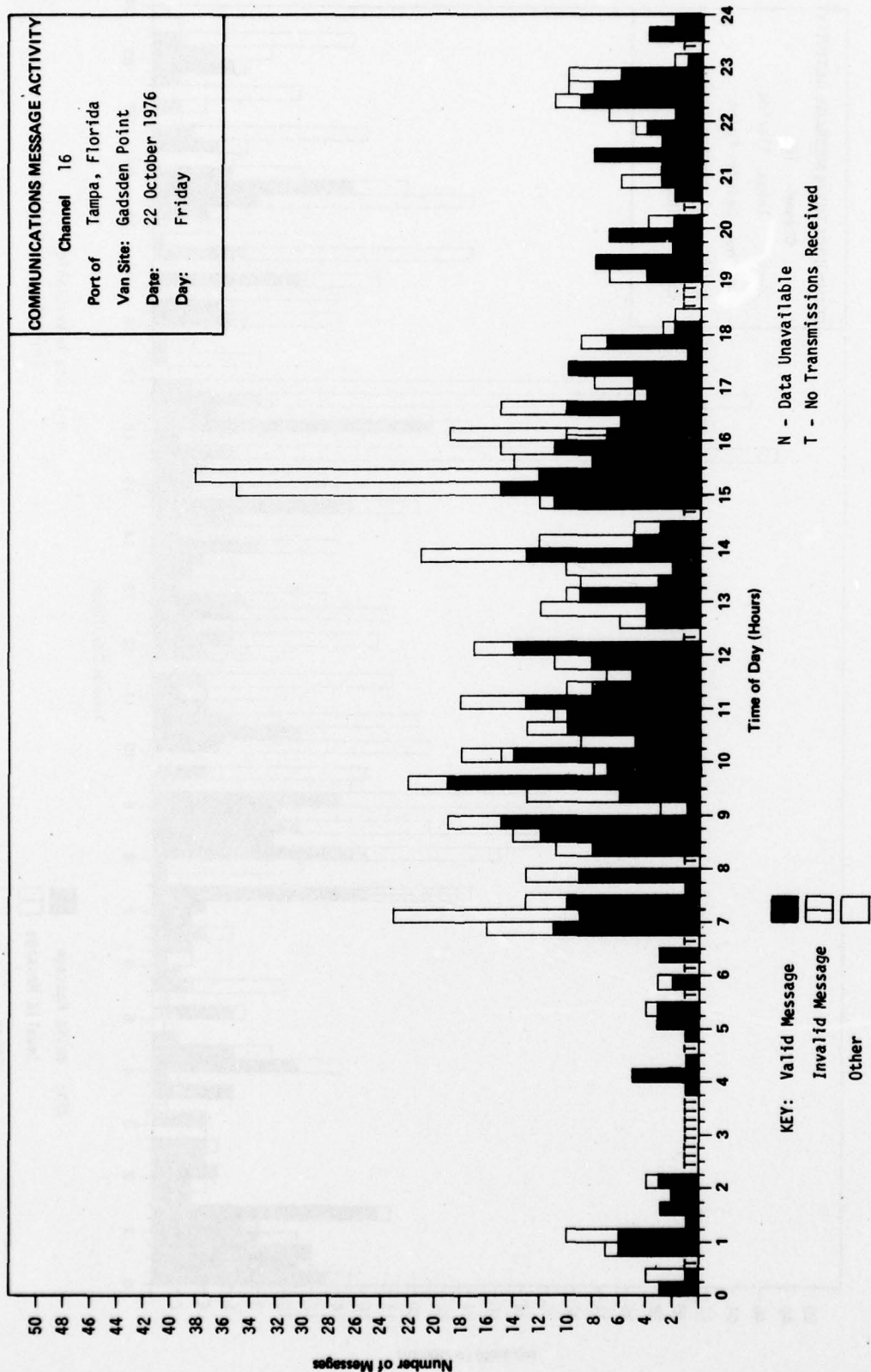


FIGURE 2-31

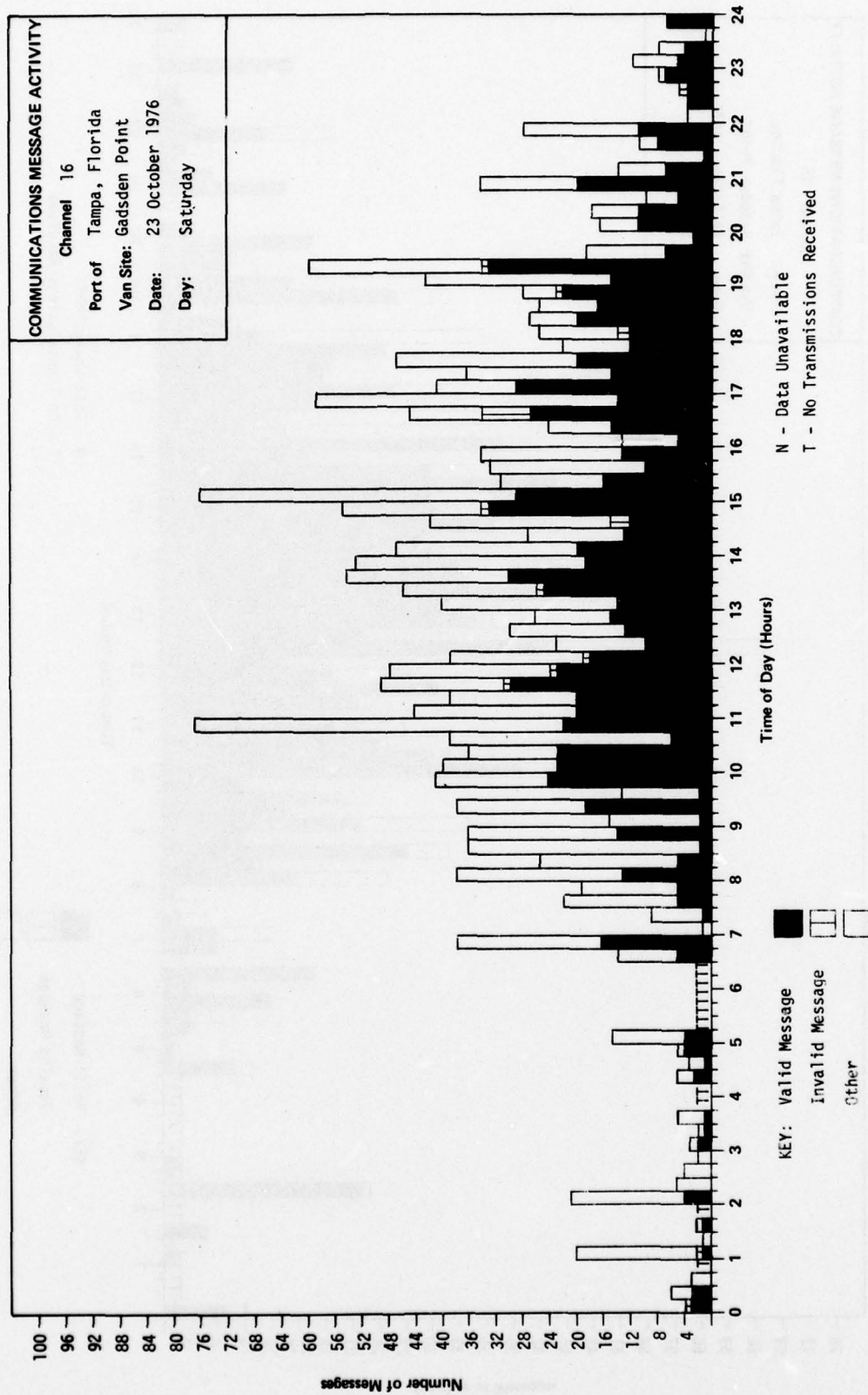


FIGURE 2-32

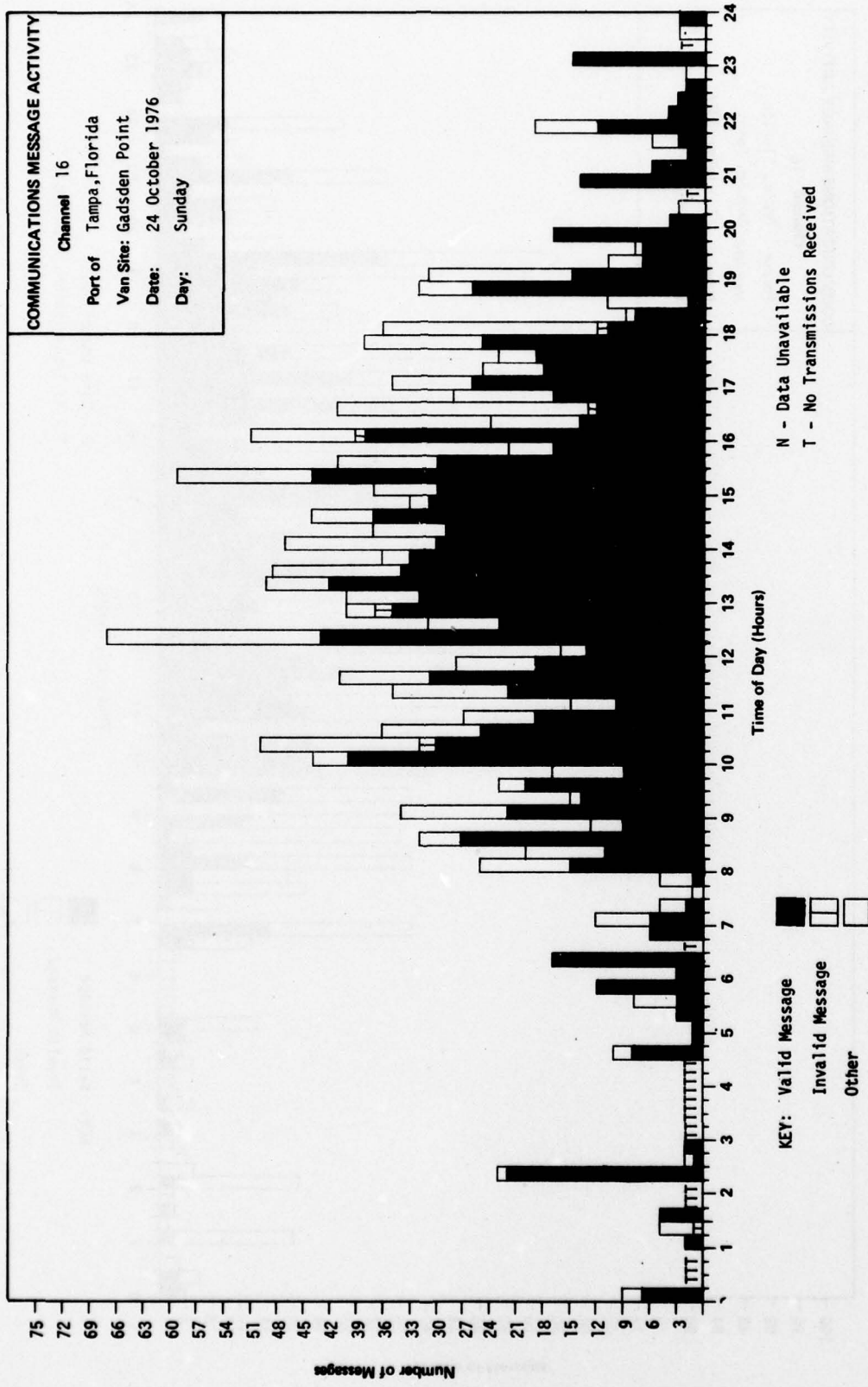


FIGURE 2-33



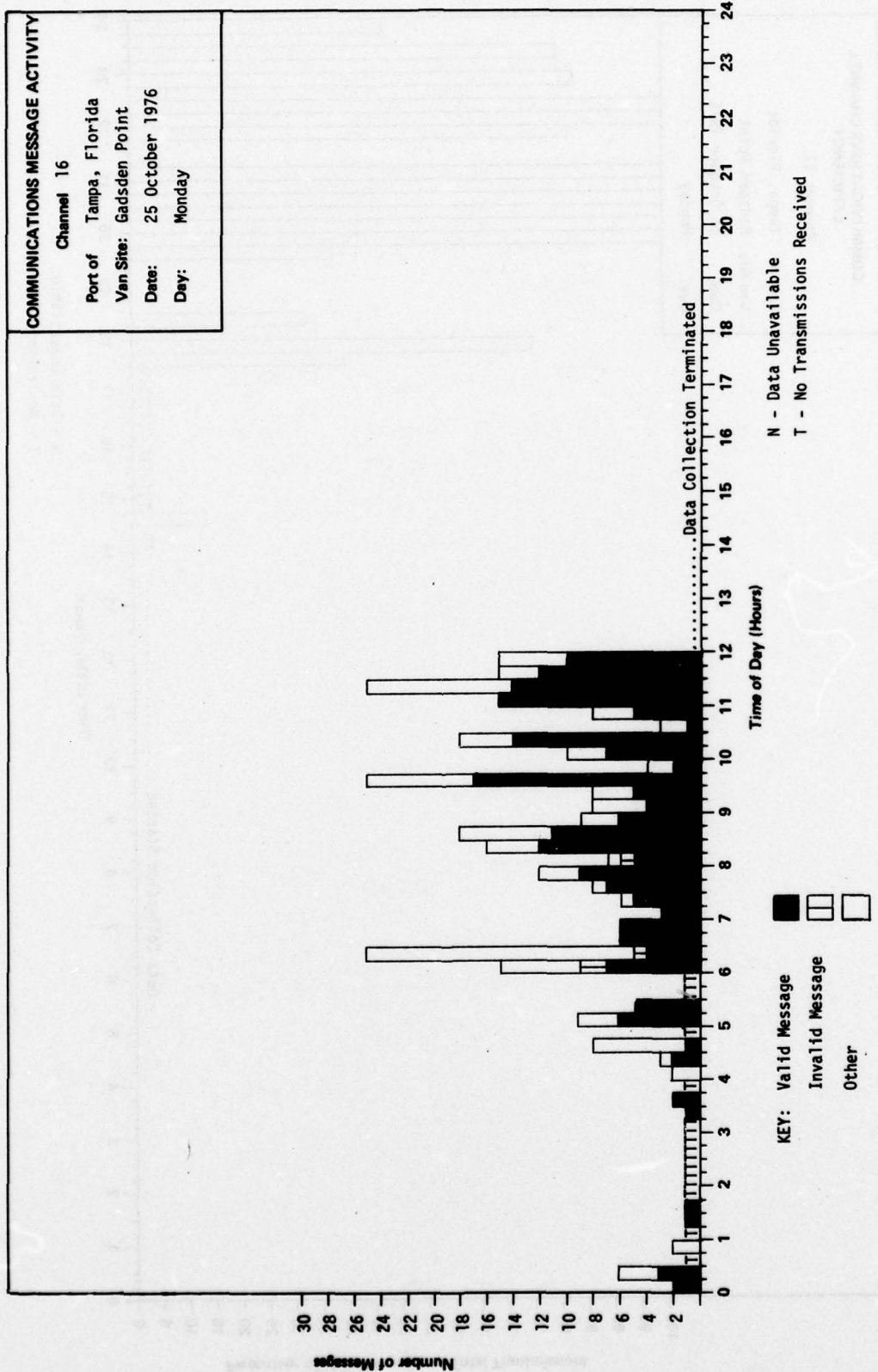


FIGURE 2-34

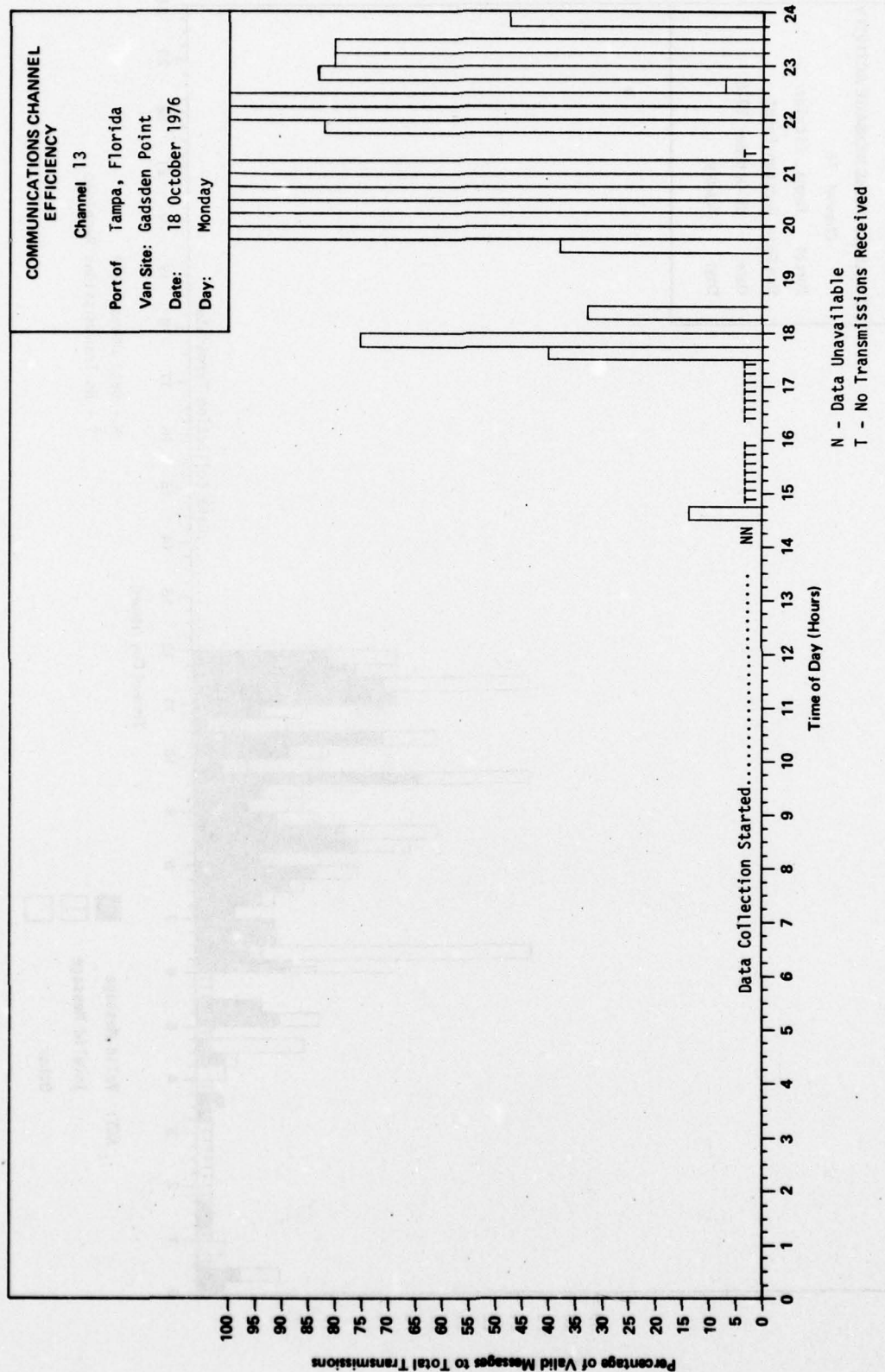


FIGURE 2-35

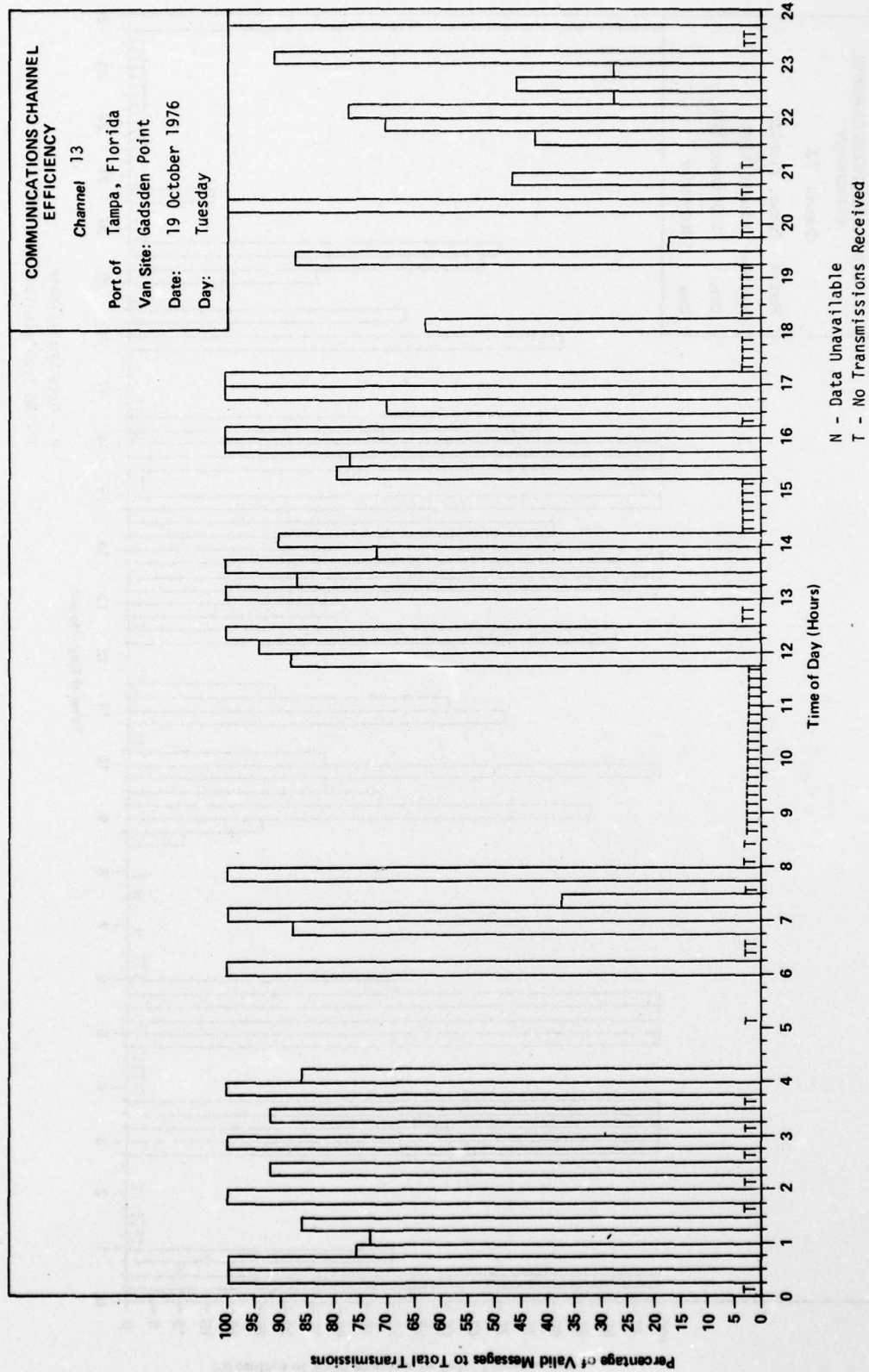


FIGURE 2-36



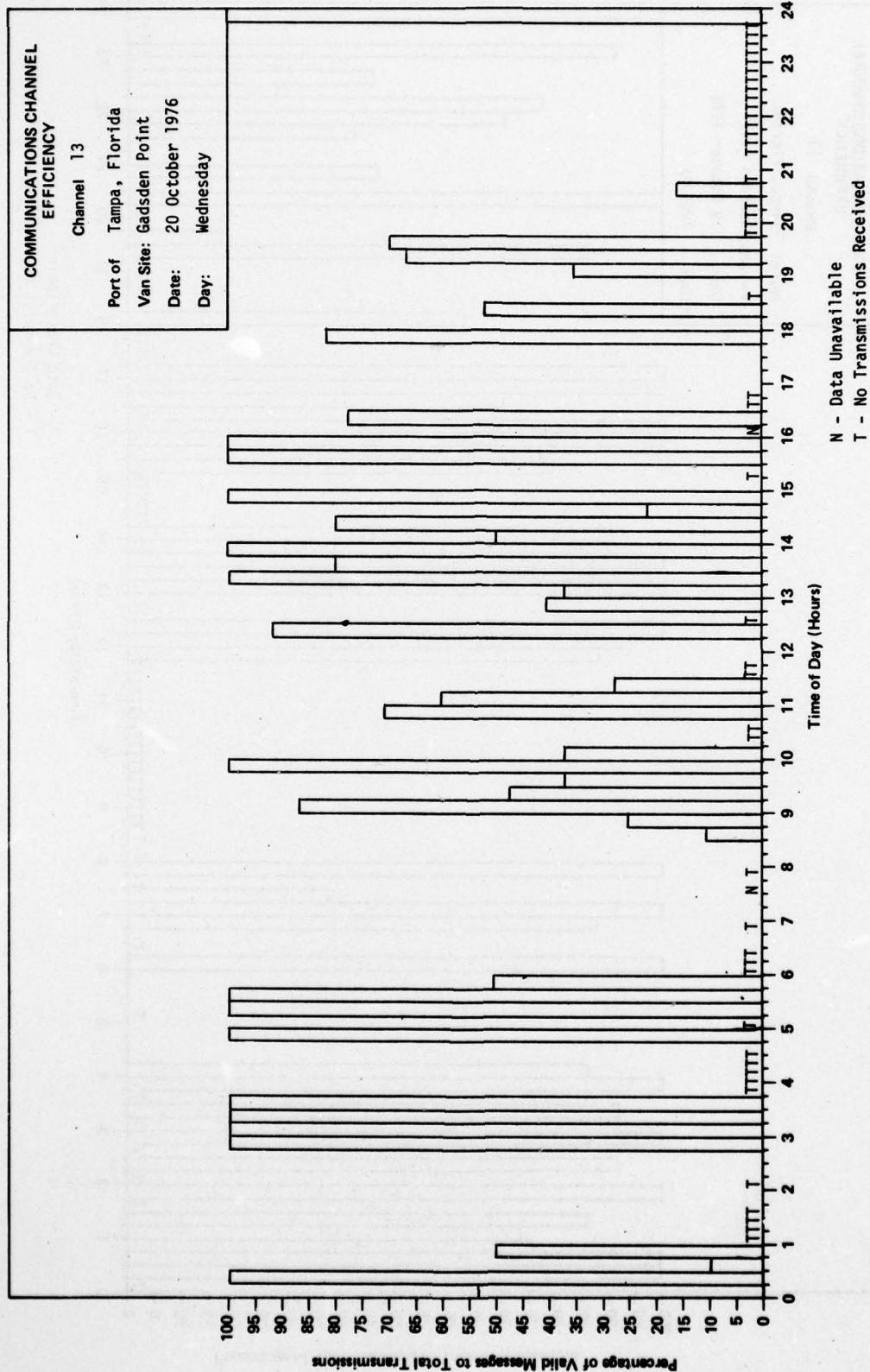


FIGURE 2-37

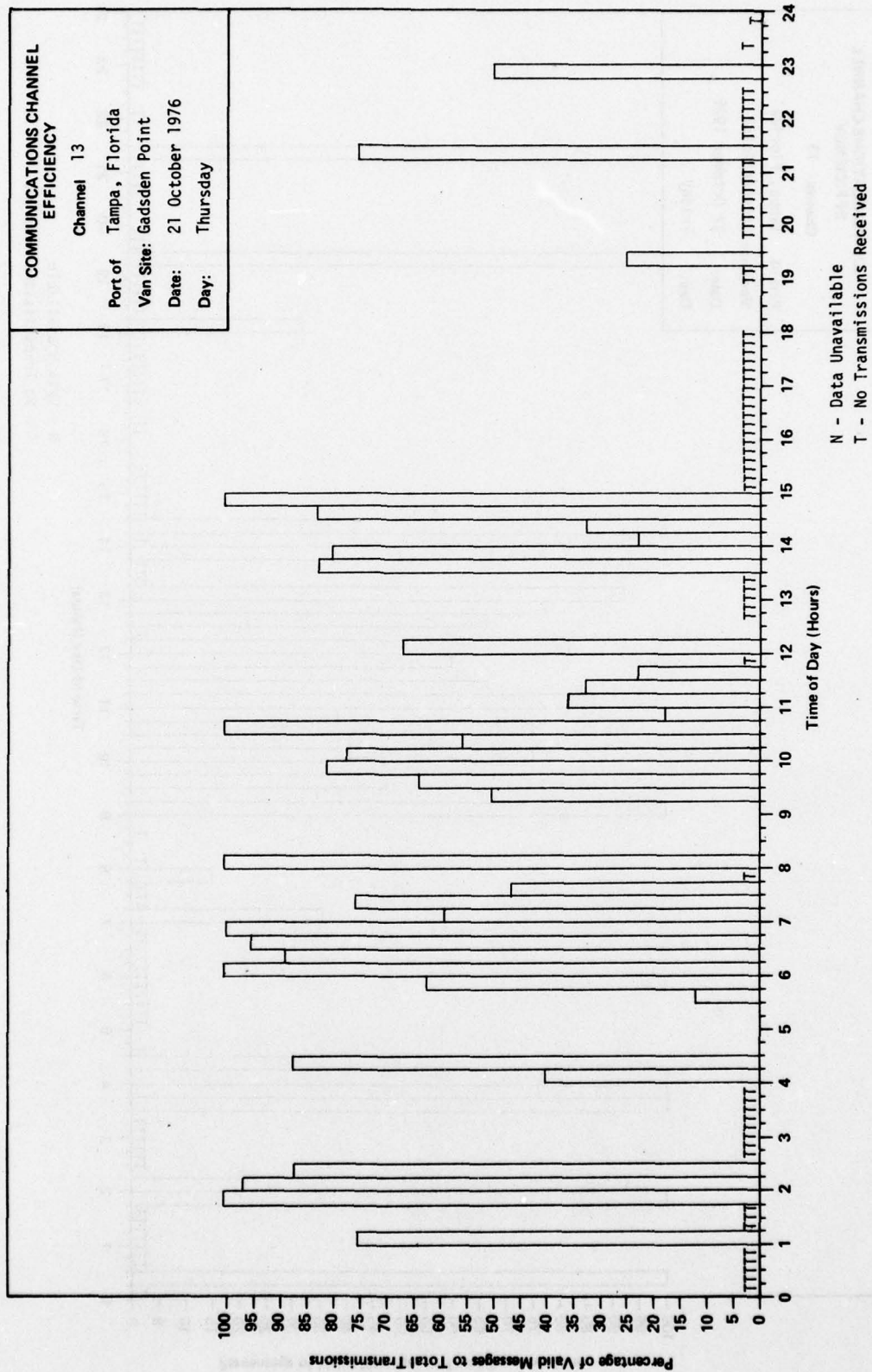


FIGURE 2-38

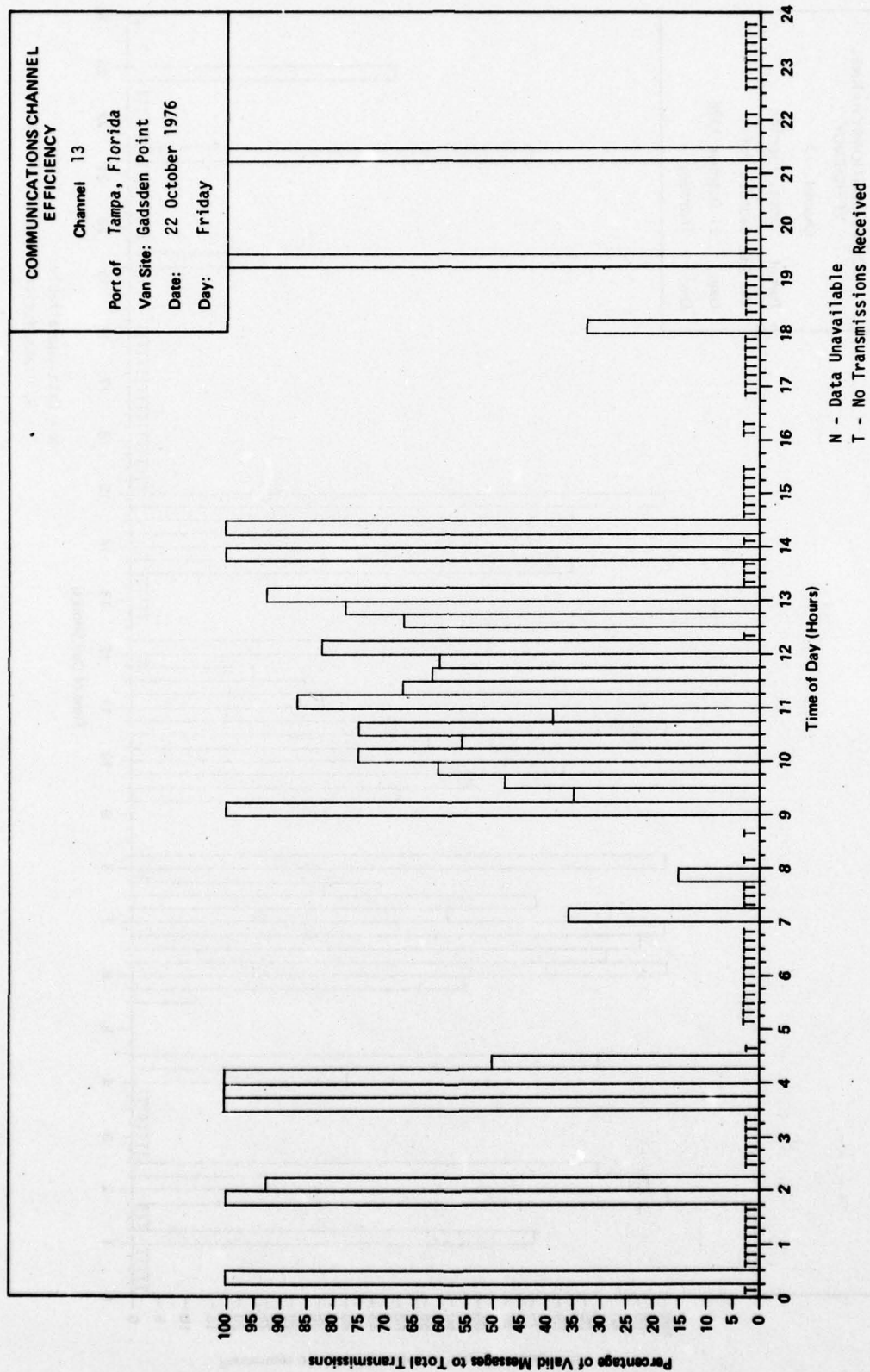


FIGURE 2-39



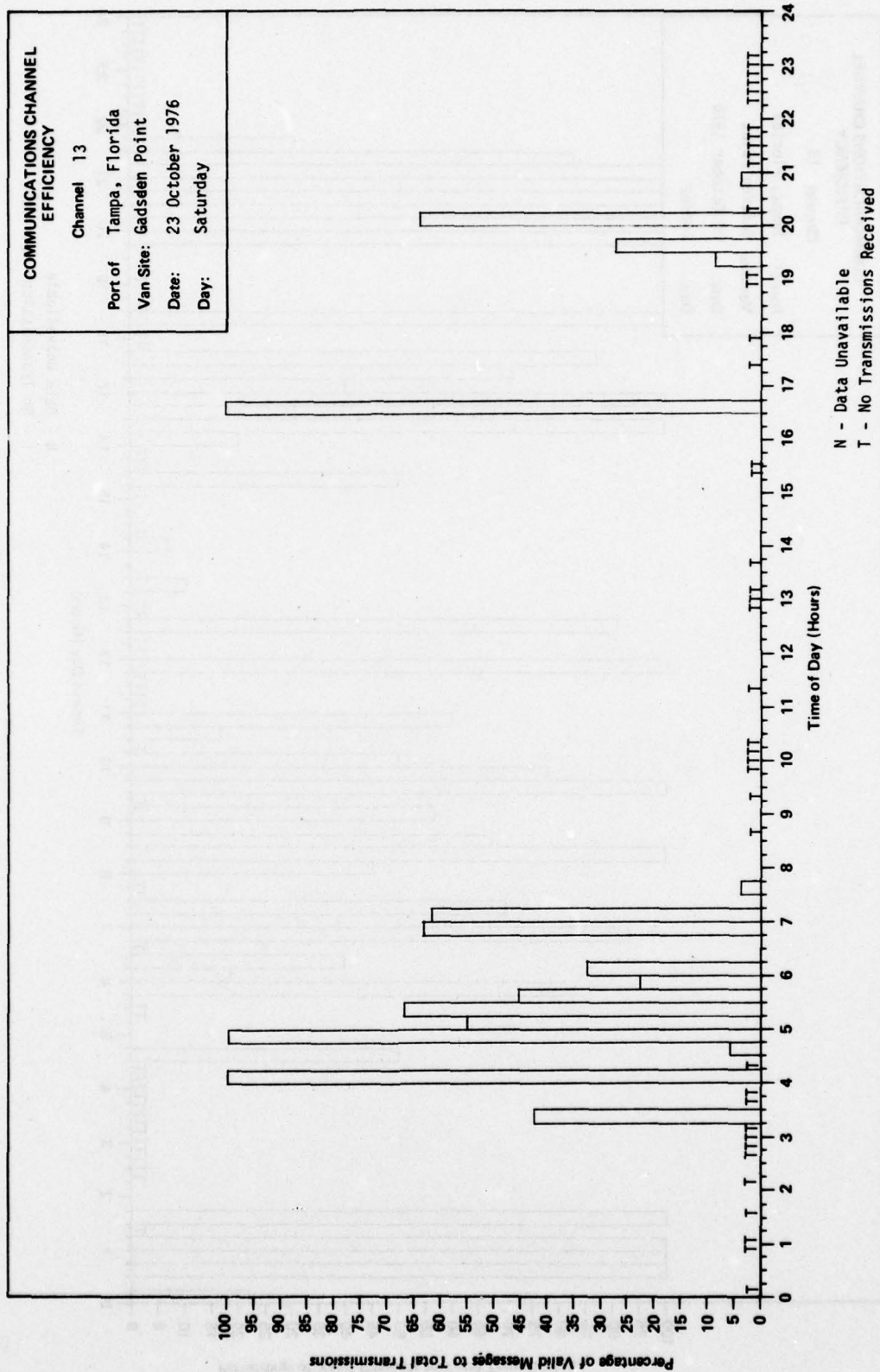


FIGURE 2-40

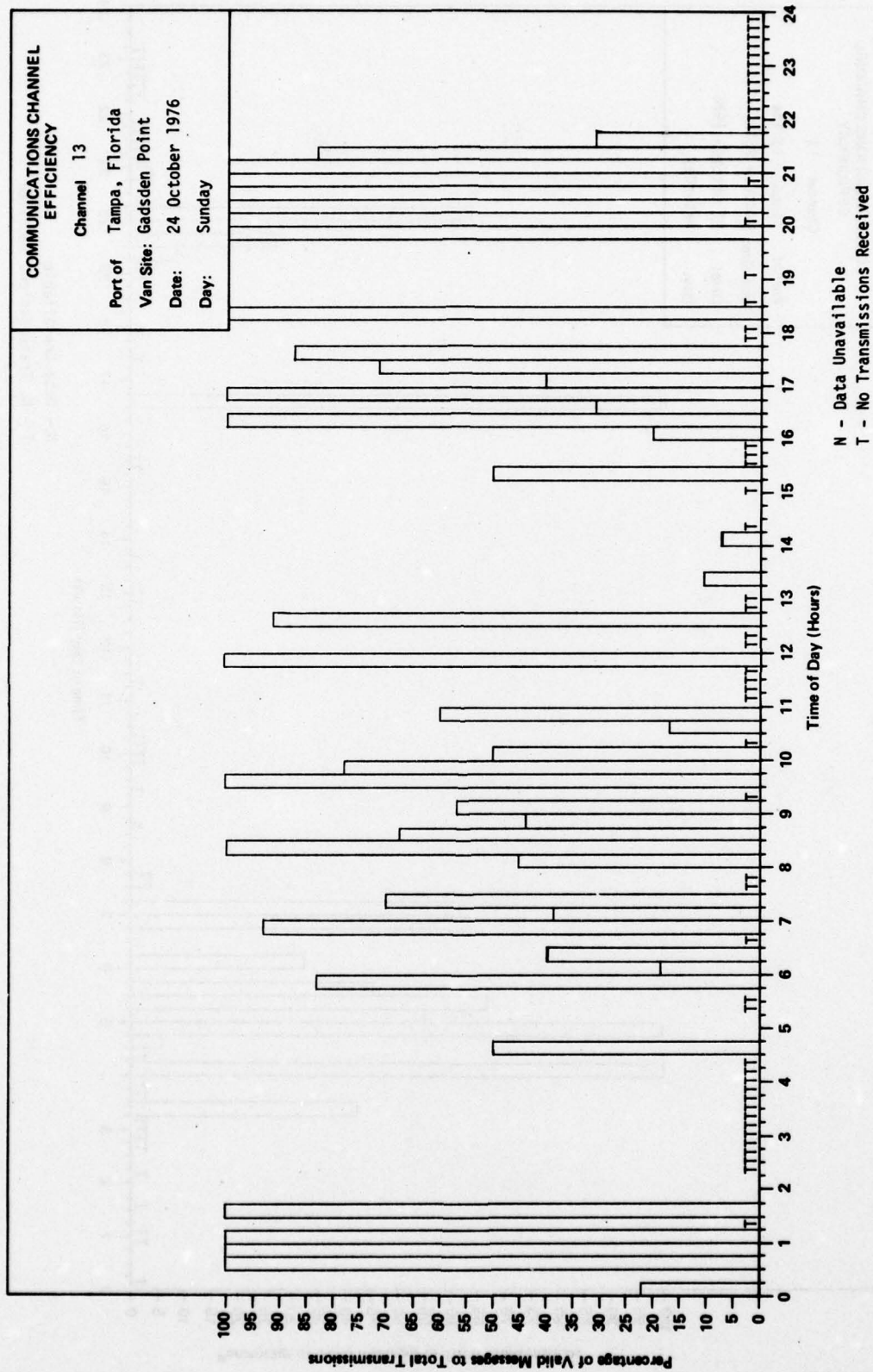


FIGURE 2-41

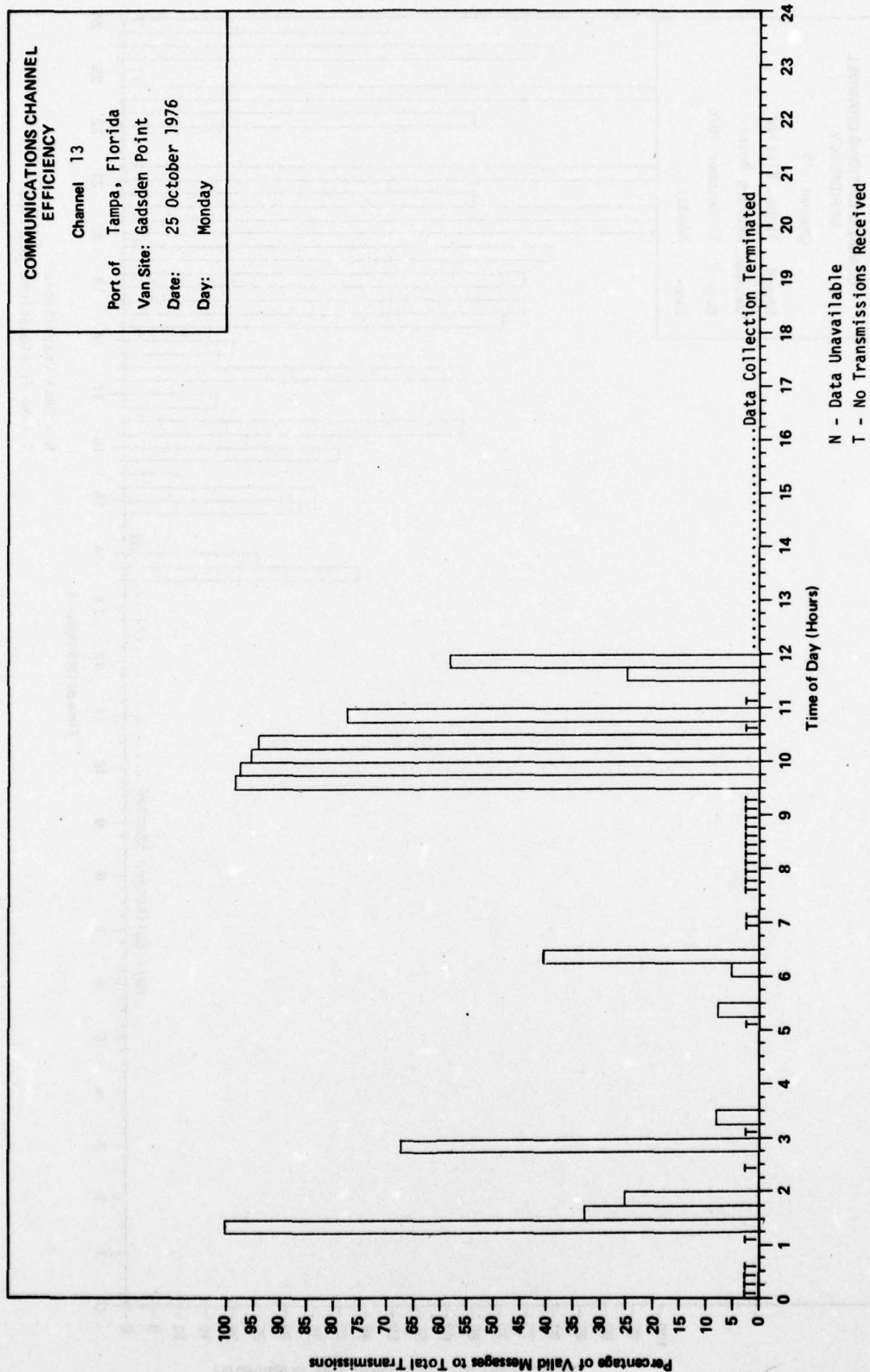


FIGURE 2-42



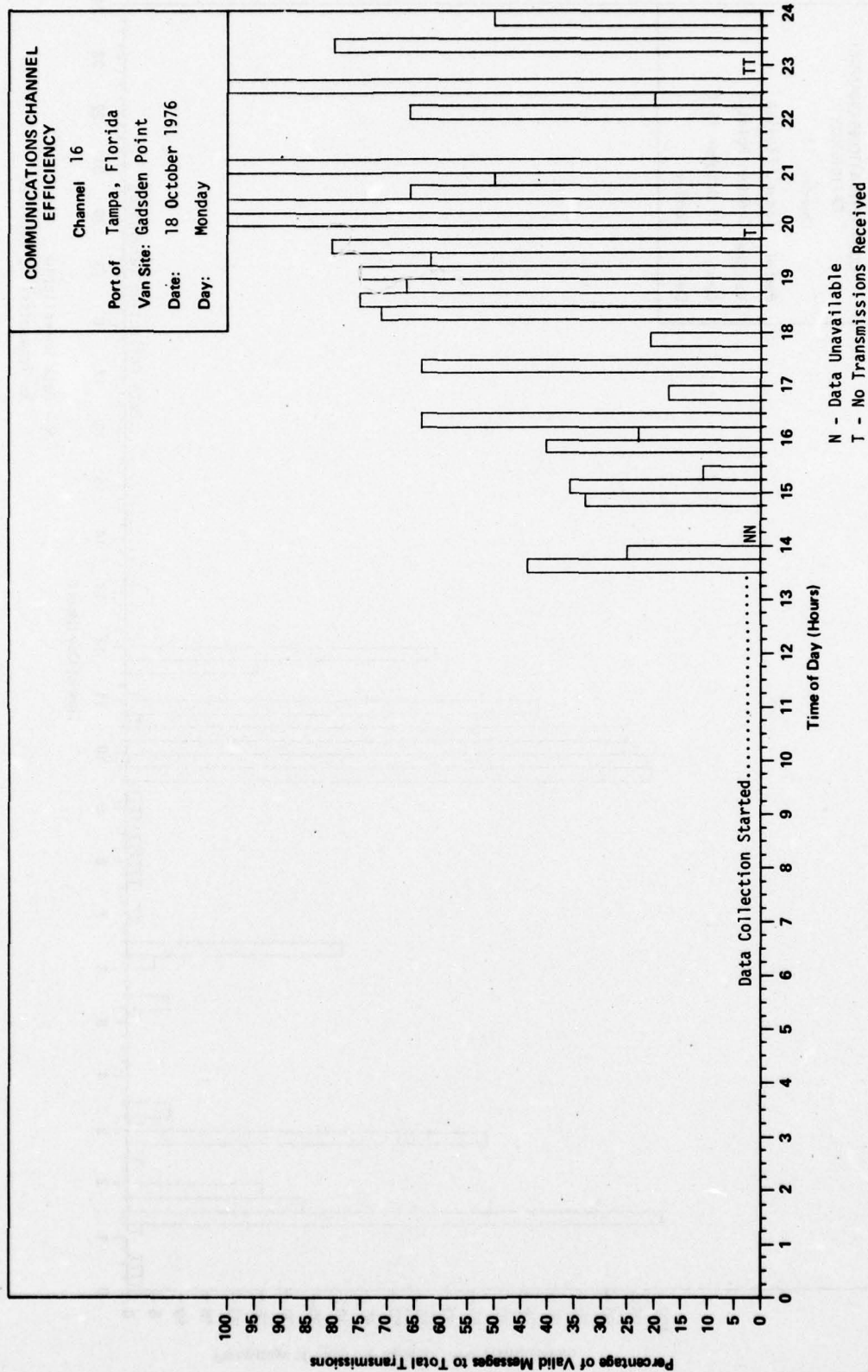


FIGURE 2-43

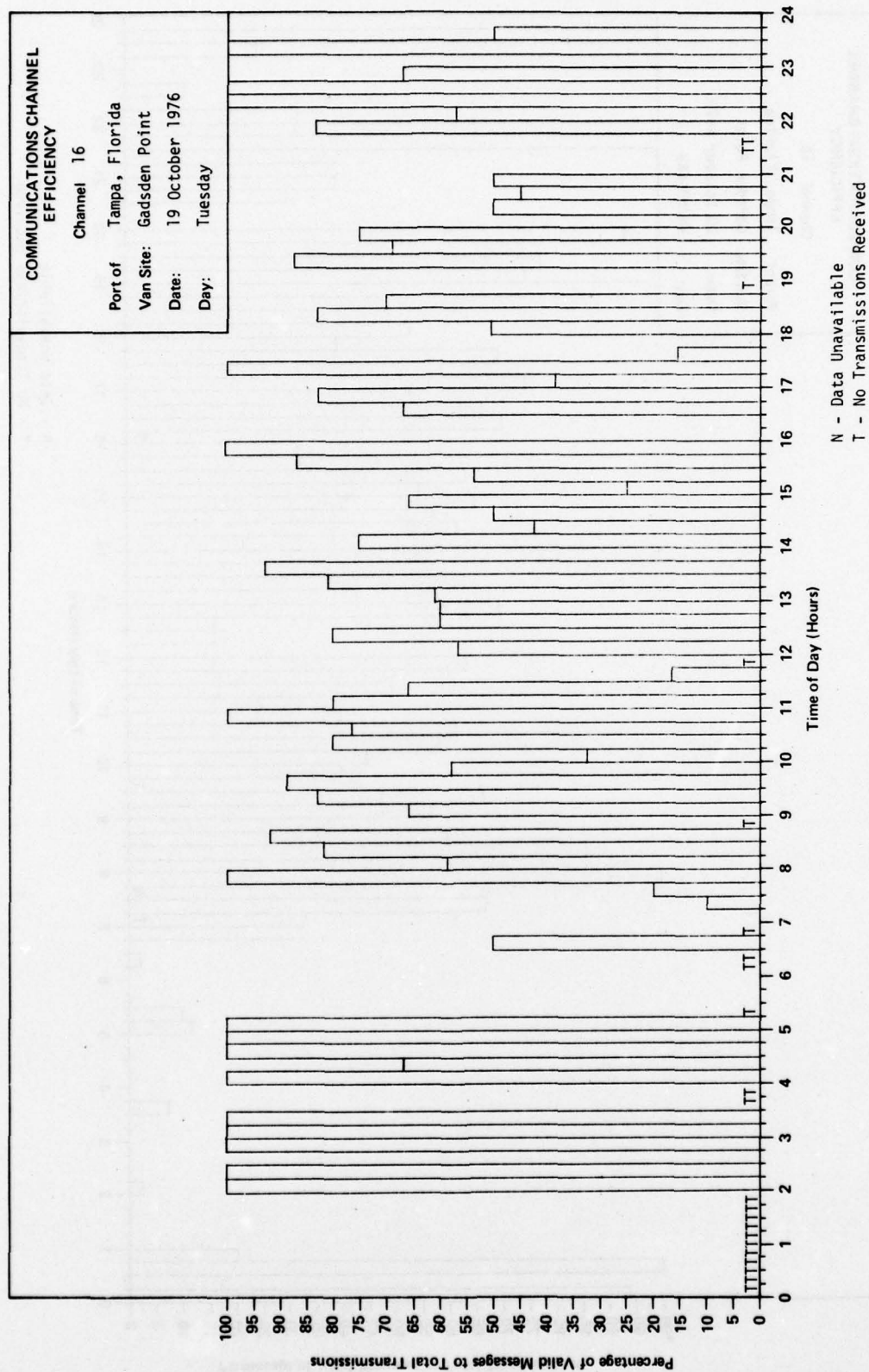


FIGURE 2-44

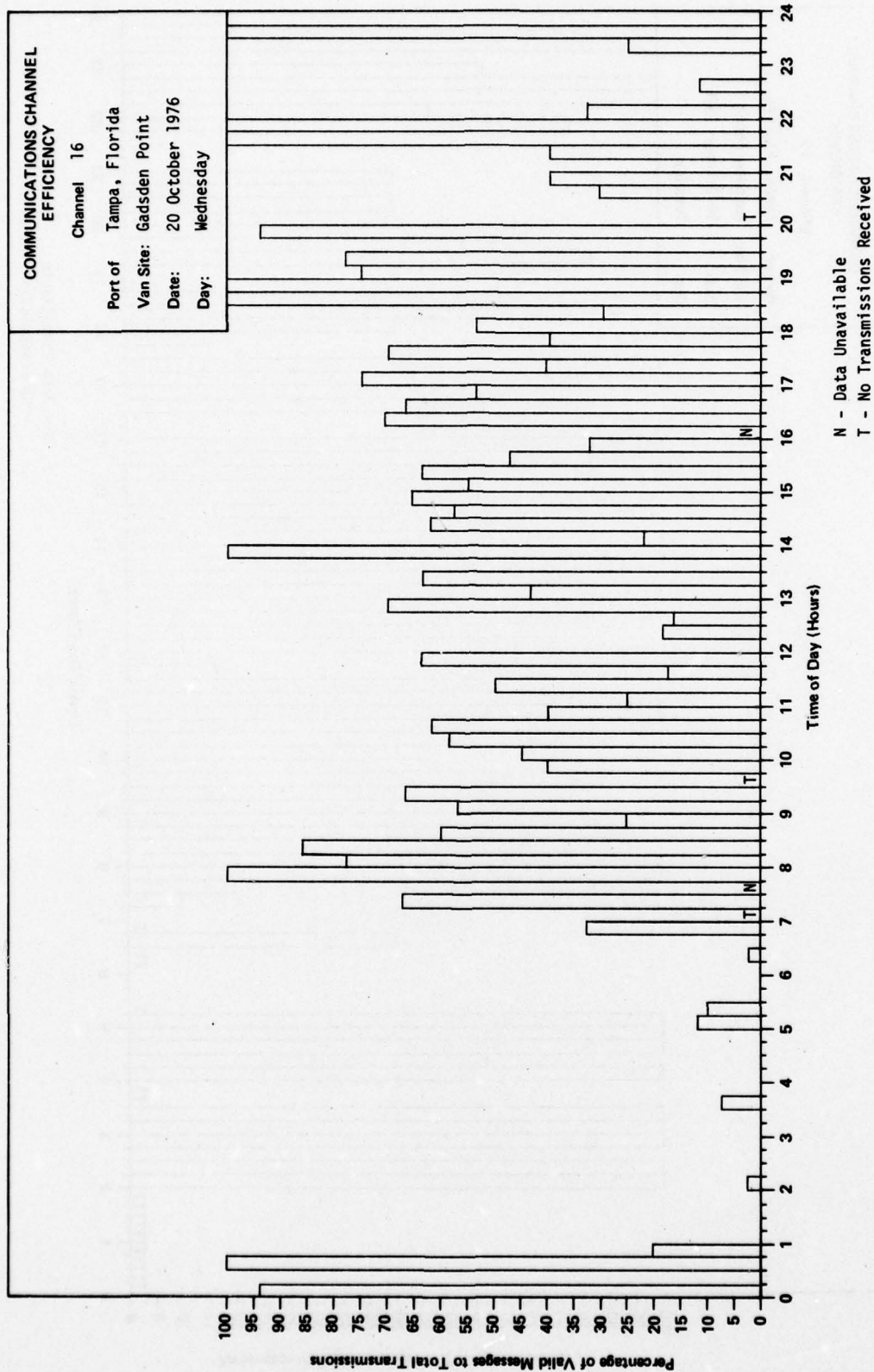


FIGURE 2-45



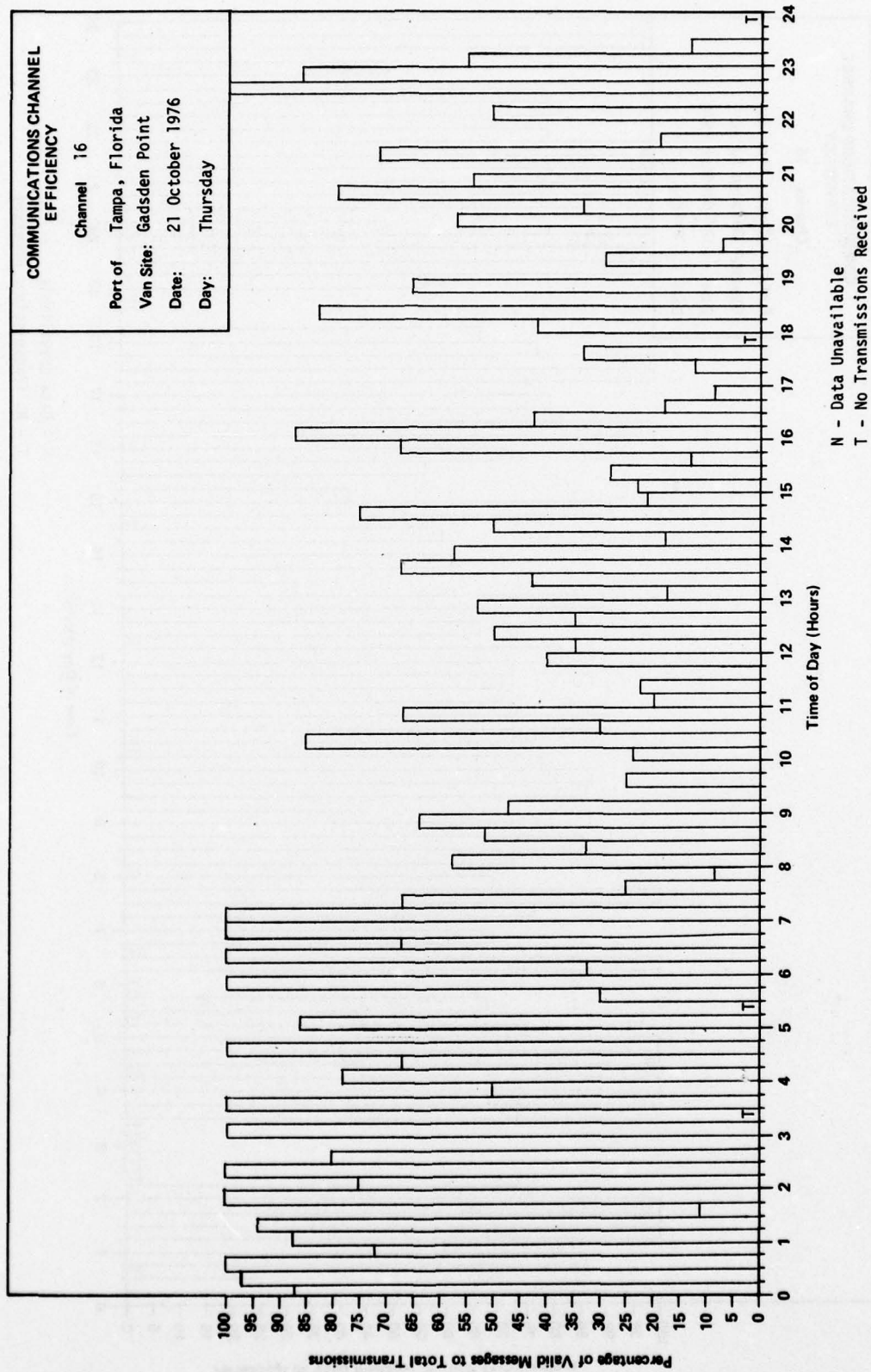


FIGURE 2-46

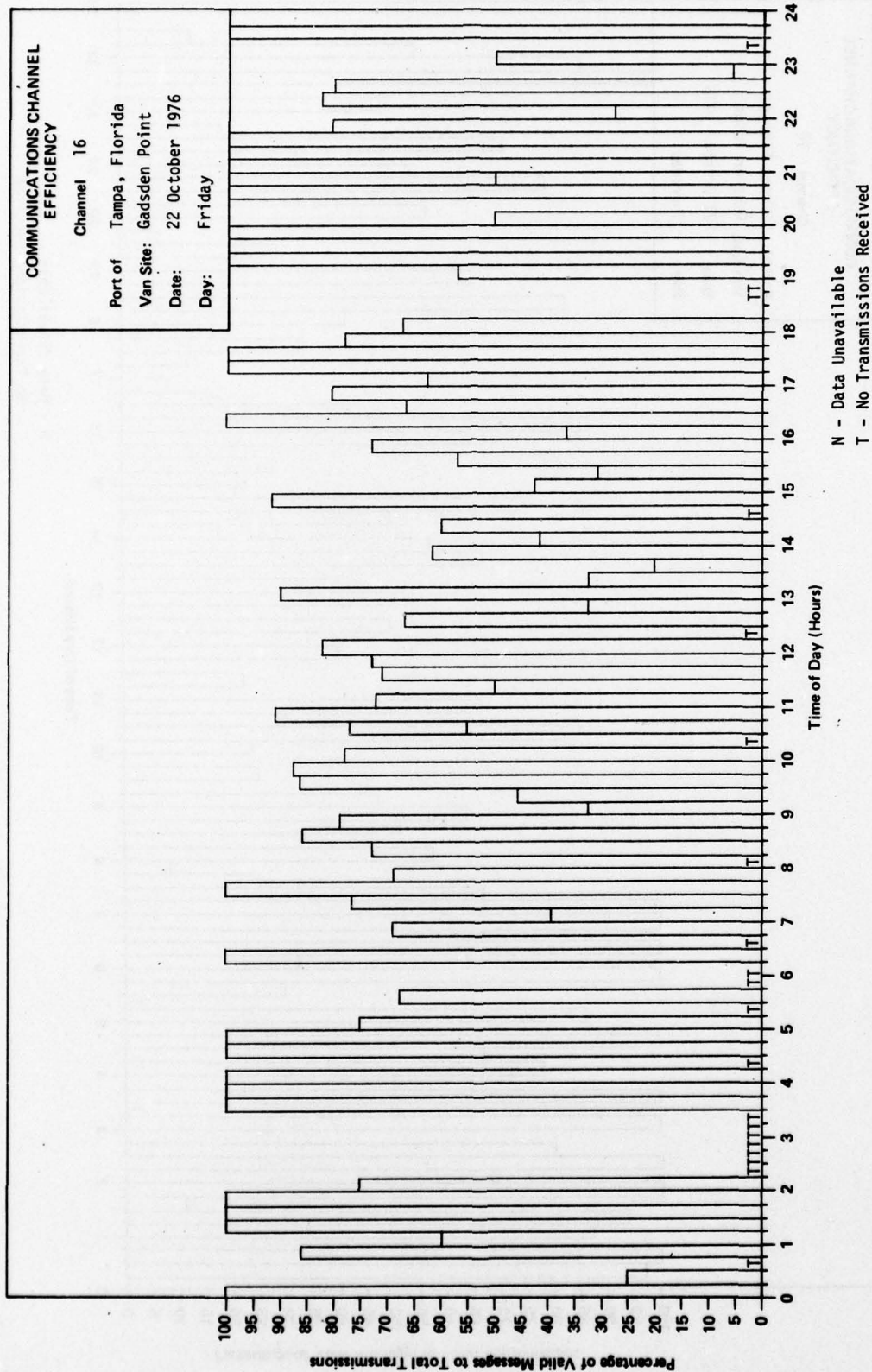


FIGURE 2-47

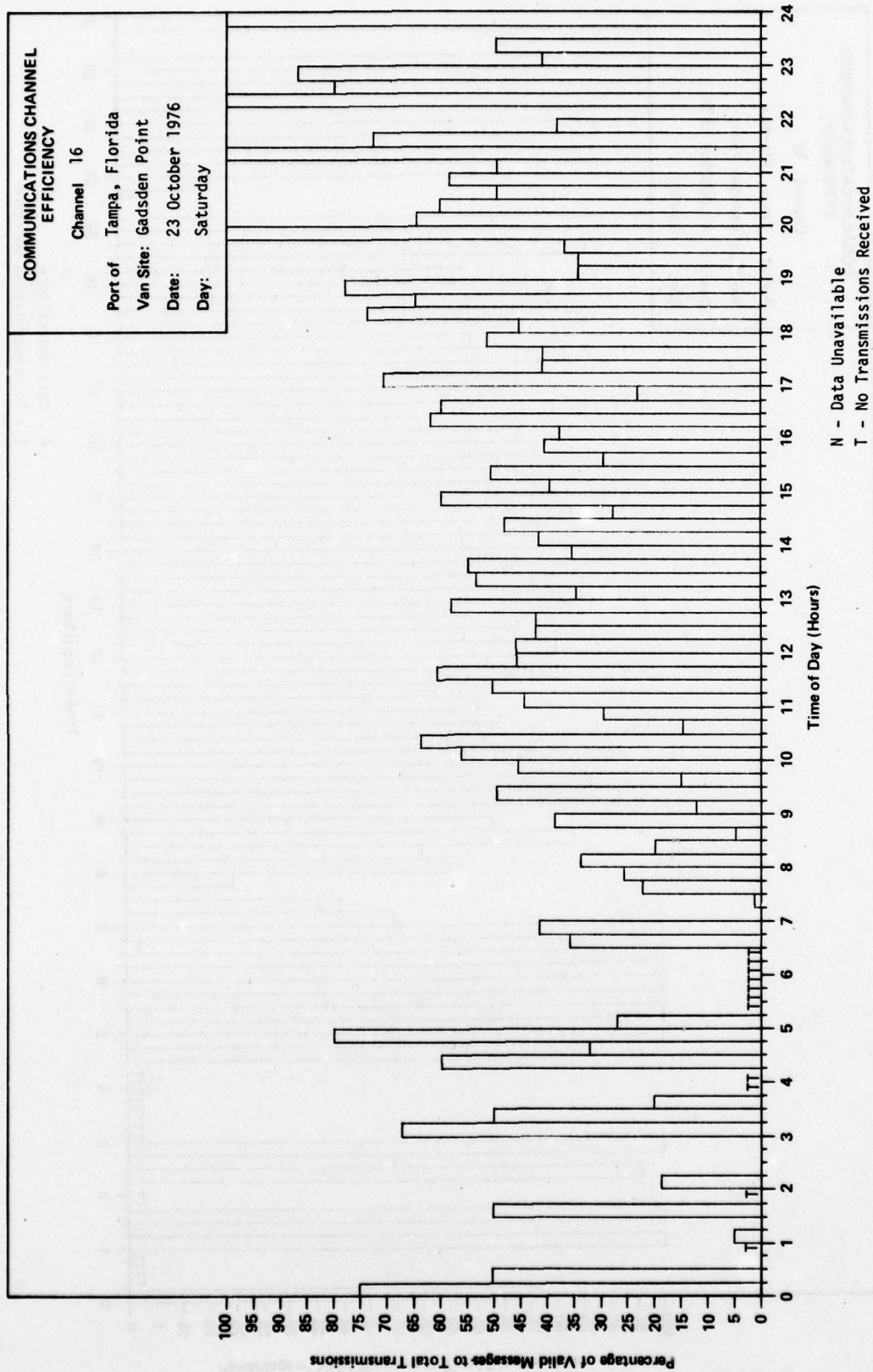


FIGURE 2-48



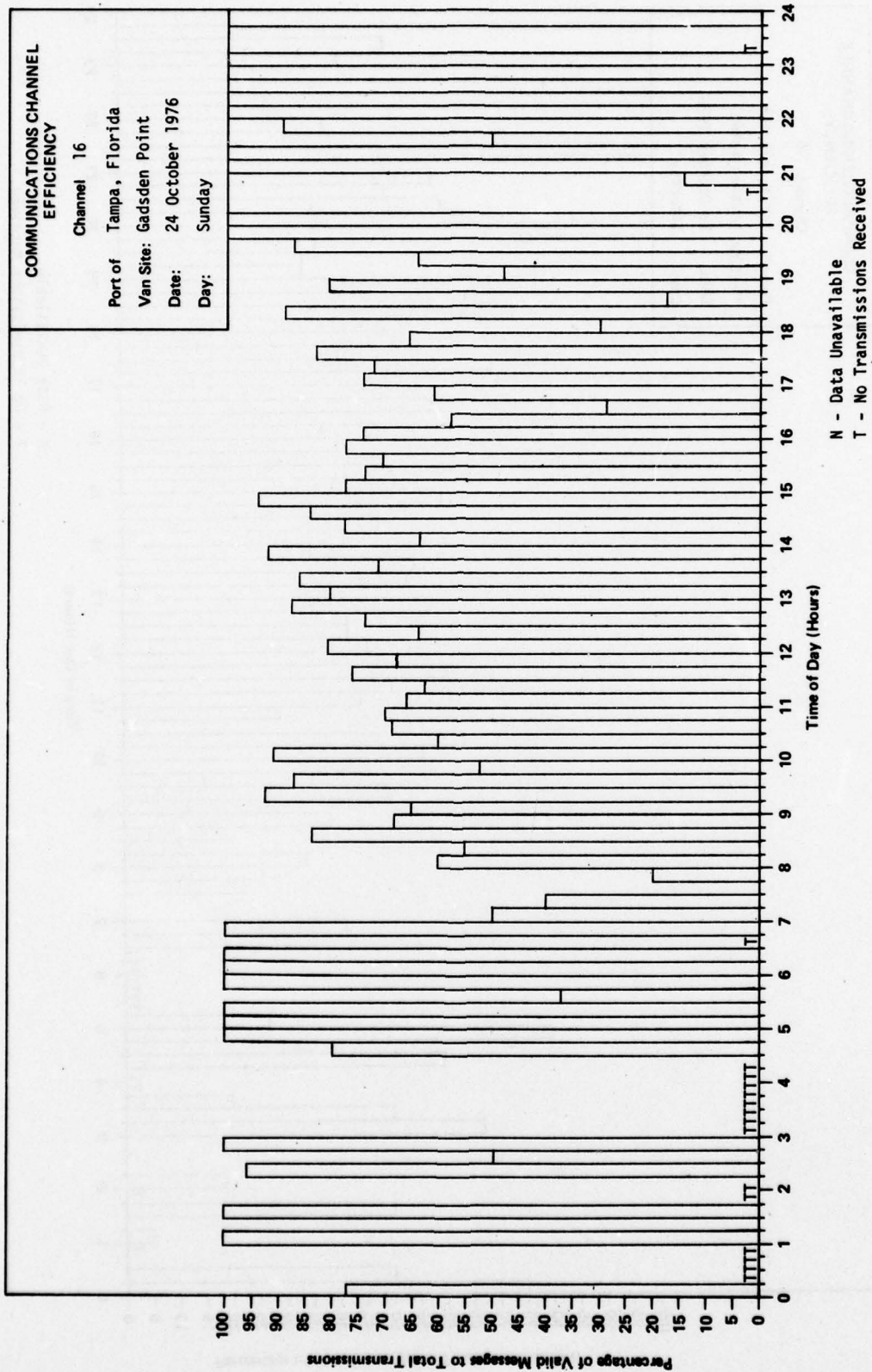


FIGURE 2-49

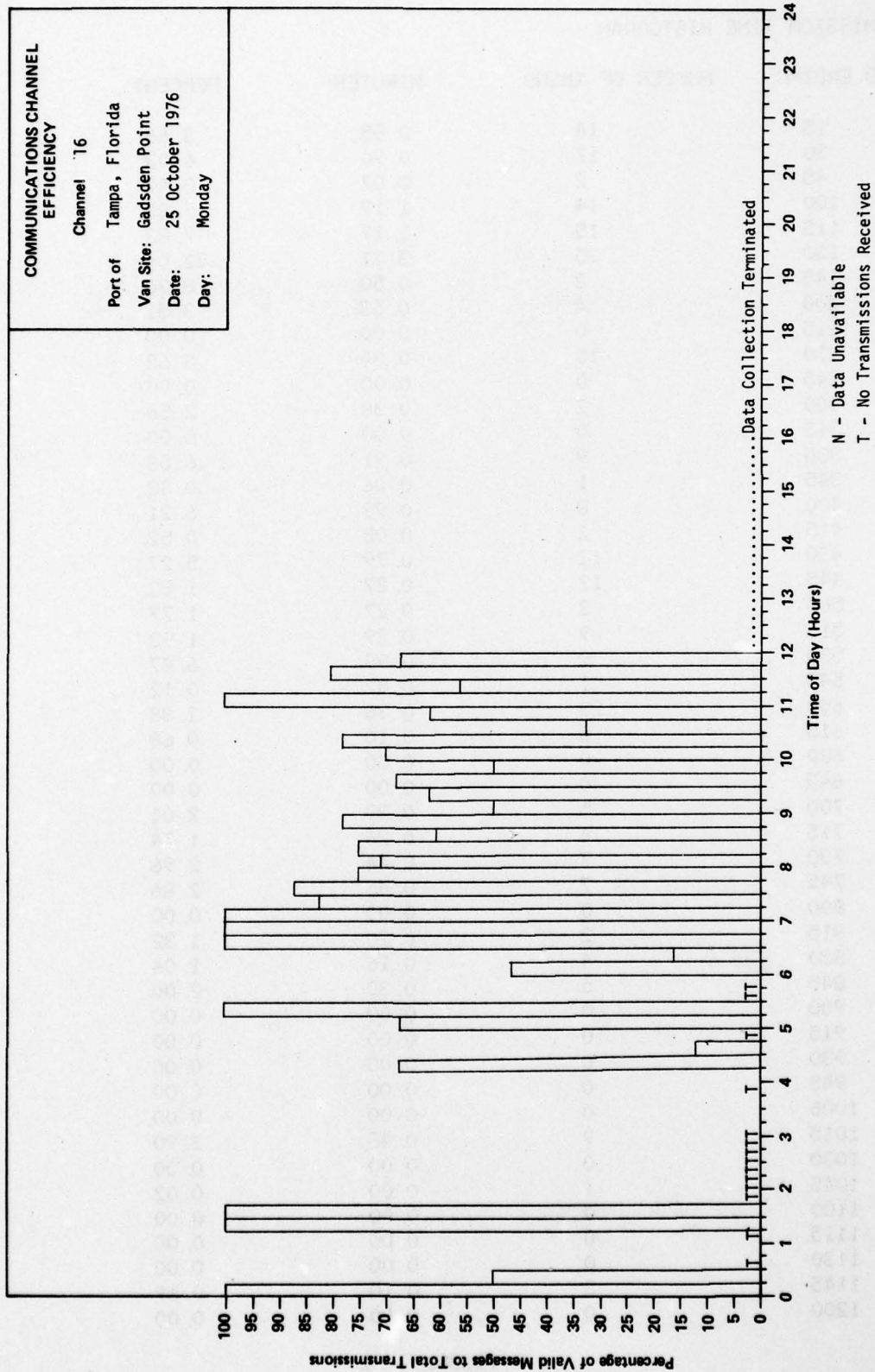


FIGURE 2-50

## TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
15	14	0.55	3.66
30	17	0.90	6.03
45	2	0.07	0.47
100	14	1.17	7.83
115	15	1.17	7.83
130	35	3.31	22.04
145	8	0.50	3.30
200	4	0.53	3.51
215	0	0.00	0.00
230	13	0.84	5.62
245	0	0.00	0.00
300	2	0.38	2.56
315	0	0.00	0.00
330	9	0.91	6.08
345	1	0.06	0.38
400	8	0.93	6.21
415	2	0.08	0.52
430	12	0.79	5.27
445	12	0.27	1.82
500	3	0.27	1.77
515	9	0.29	1.93
530	9	0.97	6.47
545	1	0.02	0.12
600	23	0.36	2.38
615	5	0.10	0.68
630	0	0.00	0.00
645	0	0.00	0.00
700	5	0.30	2.01
715	4	0.26	1.74
730	7	0.44	2.96
745	7	0.43	2.86
800	0	0.00	0.00
815	2	0.20	1.32
830	4	0.16	1.04
845	5	0.30	2.00
900	0	0.00	0.00
915	0	0.00	0.00
930	0	0.00	0.00
945	0	0.00	0.00
1000	0	0.00	0.00
1015	9	0.43	2.90
1030	0	0.00	0.00
1045	1	0.00	0.02
1100	0	0.00	0.00
1115	0	0.00	0.00
1130	0	0.00	0.00
1145	3	0.10	0.69
1200	0	0.00	0.00

FIGURE 2-51



## TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
1215	26	1.79	11.96
1230	17	1.41	9.40
1245	4	0.37	2.50
1300	2	0.02	0.17
1315	0	0.00	0.00
1330	1	0.03	0.17
1345	20	2.58	17.22
1400	16	2.02	13.46
1415	29	2.25	15.03
1430	28	1.96	13.06
1445	6	0.41	2.74
1500	15	0.16	1.09
1515	22	0.30	2.01
1530	42	1.38	9.21
1545	17	0.98	6.52
1600	14	0.64	4.30
1615	10	0.91	6.04
1630	3	0.34	2.30
1645	9	0.46	3.08
1700	5	0.06	0.38
1715	12	1.24	8.30
1730	25	2.56	17.10
1745	0	0.00	0.00
1800	0	0.00	0.00
1815	0	0.00	0.00
1830	23	1.38	9.21
1845	0	0.00	0.00
1900	3	0.01	0.07
1915	41	0.93	6.20
1930	23	1.33	8.89
1945	10	0.65	4.31
2000	0	0.00	0.00
2015	3	0.03	0.22
2030	0	0.00	0.00
2045	1	0.32	2.16
2100	23	1.16	7.72
2115	10	0.85	5.66
2130	3	0.04	0.28
2145	7	0.71	4.77
2200	1	0.09	0.62
2215	42	3.57	23.79
2230	28	2.99	19.93
2245	26	1.73	11.57
2300	90	8.21	54.77
2315	35	3.73	24.89
2330	19	1.56	10.39
2345	0	0.00	0.00
2400	2	0.06	0.42

FIGURE 2-51 (continued)

TOTAL NUMBER OF TRANSMISSIONS:	978
AVE. NUM. OF TRANSMISSIONS PER HOUR:	40.8
TOTAL TRANSMISSION TIME:	1.140 HOURS
AVERAGE LENGTH OF TRANSMISSION:	4.20 SEC.
PERCENT CHANNEL UTILIZATION:	4.75%

## MESSAGE LENGTH HISTOGRAM

LENGTH OF XMSNS	NUMBER OF XMSNS	PERCENT
0.1 - 0.5 SEC.	80	8.18
0.5 - 1.0 SEC.	105	10.74
1.0 - 1.5 SEC.	120	12.27
1.5 - 2.0 SEC.	76	7.77
2.0 - 2.5 SEC.	66	6.75
2.5 - 3.0 SEC.	67	6.85
3.0 - 3.5 SEC.	56	5.73
3.5 - 4.0 SEC.	48	4.91
4.0 - 4.5 SEC.	38	3.89
4.5 - 5.0 SEC.	41	4.19
5.0 - 5.5 SEC.	41	4.19
5.5 - 6.0 SEC.	27	2.76
6.0 - 6.5 SEC.	21	2.15
6.5 - 7.0 SEC.	17	1.74
7.0 - 7.5 SEC.	29	2.97
7.5 - 8.0 SEC.	14	1.43
8.0 - 8.5 SEC.	14	1.43
8.5 - 9.0 SEC.	13	1.33
9.0 - 9.5 SEC.	13	1.33
9.5 - 10.0 SEC.	7	0.72
LONGER THAN 10 SEC.	85	8.69

THERE WERE 39 XMSNS OF 00.1 AND 00.0 DURATION

FIGURE 2-51 (continued)

## TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
15	19	0.59	3.92
30	1	0.06	0.37
45	12	0.35	2.36
100	1	0.35	2.37
115	7	0.18	1.21
130	0	0.00	0.00
145	0	0.00	0.00
200	7	0.52	3.50
215	0	0.00	0.00
230	2	0.08	0.56
245	0	0.00	0.00
300	0	0.00	0.00
315	0	0.00	0.00
330	5	0.11	0.77
345	0	0.00	0.00
400	0	0.00	0.00
415	1	0.02	0.14
430	0	0.00	0.00
445	1	0.20	1.30
500	2	0.08	0.56
515	11	0.81	5.41
530	0	0.00	0.00
545	0	0.00	0.00
600	5	0.31	2.08
615	41	3.46	23.10
630	14	0.58	3.84
645	0	0.00	0.00
700	17	0.80	5.32
715	27	1.00	6.70
730	4	0.29	1.96
745	5	0.34	2.26
800	0	0.00	0.00
815	39	1.56	10.41
830	0	0.00	0.00
845	3	0.28	1.86
900	8	0.48	3.22
915	12	0.48	3.22
930	0	0.00	0.00
945	8	0.63	4.20
1000	35	1.16	7.72
1015	5	0.18	1.17
1030	0	0.00	0.00
1045	10	0.86	5.73
1100	0	0.00	0.00
1115	5	0.26	1.70
1130	0	0.00	0.00
1145	11	0.25	1.68
1200	0	0.00	0.00

FIGURE 2-52



## TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
1215	2	0.18	1.18
1230	0	0.00	0.00
1245	9	0.77	5.12
1300	0	0.00	0.00
1315	0	0.00	0.00
1330	0	0.00	0.00
1345	28	1.52	10.11
1400	10	0.34	2.24
1415	15	0.83	5.57
1430	0	0.00	0.00
1445	4	0.13	0.89
1500	9	0.18	1.23
1515	0	0.00	0.00
1530	6	0.29	1.96
1545	0	0.00	0.00
1600	0	0.00	0.00
1615	5	0.29	1.92
1630	6	0.22	1.44
1645	12	0.62	4.16
1700	5	0.27	1.81
1715	1	0.02	0.14
1730	14	1.18	7.89
1745	13	0.81	5.41
1800	0	0.00	0.00
1815	0	0.00	0.00
1830	6	0.38	2.51
1845	0	0.00	0.00
1900	7	0.44	2.92
1915	0	0.00	0.00
1930	4	0.26	1.73
1945	8	0.26	1.71
2000	1	0.02	0.14
2015	0	0.00	0.00
2030	1	0.01	0.06
2045	1	0.06	0.37
2100	0	0.00	0.00
2115	1	0.16	1.03
2130	10	0.45	3.00
2145	25	1.23	8.23
2200	10	1.27	8.47
2215	29	1.23	8.19
2230	0	0.00	0.00
2245	0	0.00	0.00
2300	2	0.04	0.29
2315	0	0.00	0.00
2330	28	0.63	4.18
2345	0	0.00	0.00

FIGURE 2-52 (continued)

TOTAL NUMBER OF TRANSMISSIONS: 590  
 AVE. NUM. OF TRANSMISSIONS PER HOUR: 24.6  
 TOTAL TRANSMISSION TIME: 0.506 HOURS  
 AVERAGE LENGTH OF TRANSMISSION: 3.09 SEC.  
 PERCENT CHANNEL UTILIZATION: 2.11%

## MESSAGE LENGTH HISTOGRAM

LENGTH OF XMSNS	NUMBER OF XMSNS	PERCENT
0.1 - 0.5 SEC.	35	5.93
0.5 - 1.0 SEC.	8	1.36
1.0 - 1.5 SEC.	206	34.92
1.5 - 2.0 SEC.	98	16.61
2.0 - 2.5 SEC.	1	0.17
2.5 - 3.0 SEC.	0	0.00
3.0 - 3.5 SEC.	78	13.22
3.5 - 4.0 SEC.	51	8.64
4.0 - 4.5 SEC.	0	0.00
4.5 - 5.0 SEC.	0	0.00
5.0 - 5.5 SEC.	25	4.24
5.5 - 6.0 SEC.	20	3.39
6.0 - 6.5 SEC.	0	0.00
6.5 - 7.0 SEC.	0	0.00
7.0 - 7.5 SEC.	16	2.71
7.5 - 8.0 SEC.	18	3.05
8.0 - 8.5 SEC.	0	0.00
8.5 - 9.0 SEC.	0	0.00
9.0 - 9.5 SEC.	7	1.19
9.5 - 10.0 SEC.	5	0.85
LONGER THAN 10 SEC	22	3.73

THERE WERE 52 XMSNS OF 00.1 AND 00.0 DURATION

FIGURE 2-52 (continued)

## TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
15	19	0.31	2.10
30	0	0.00	0.00
45	0	0.00	0.00
100	3	0.26	1.73
115	9	0.05	0.30
130	0	0.00	0.00
145	1	0.00	0.02
200	0	0.00	0.00
215	4	0.23	1.56
230	2	0.14	0.94
245	2	0.02	0.13
300	0	0.00	0.00
315	2	0.16	1.08
330	7	0.18	1.22
345	0	0.00	0.00
400	0	0.00	0.00
415	5	0.15	1.02
430	8	0.08	0.53
445	6	0.36	2.39
500	4	0.02	0.11
515	3	0.18	1.20
530	1	0.01	0.06
545	4	0.03	0.21
600	0	0.00	0.00
615	0	0.00	0.00
630	4	0.05	0.30
645	9	0.35	2.33
700	2	0.05	0.30
715	1	0.01	0.03
730	152	2.44	16.29
745	490	5.86	39.10
800	62	2.56	17.10
815	0	0.00	0.00
830	33	1.37	9.16
845	7	0.38	2.57
900	9	0.57	3.82
915	2	0.02	0.12
930	13	0.67	4.50
945	9	1.04	6.92
1000	13	0.58	3.87
1015	22	0.44	2.96
1030	19	0.47	3.12
1045	11	0.29	1.91
1100	28	0.97	6.50
1115	22	1.09	7.29
1130	14	0.79	5.24
1145	5	0.13	0.89
1200	16	0.63	4.22

FIGURE 2-53



## TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
1215	36	0.33	2.21
1230	35	0.36	2.43
1245	37	1.44	9.60
1300	24	0.60	4.00
1315	18	1.00	6.69
1330	22	0.91	6.06
1345	29	1.37	9.17
1400	31	1.26	8.41
1415	7	0.36	2.38
1430	20	0.24	1.62
1445	13	0.93	6.19
1500	32	1.24	8.24
1515	36	0.66	4.38
1530	6	0.06	0.41
1545	18	1.09	7.30
1600	3	0.63	4.18
1615	13	0.19	1.30
1630	48	0.39	2.60
1645	7	0.13	0.86
1700	7	0.22	1.44
1715	11	0.57	3.82
1730	70	1.26	8.38
1745	7	0.48	3.18
1800	34	0.31	2.06
1815	43	0.29	1.91
1830	5	0.05	0.33
1845	21	0.50	3.33
1900	5	0.39	2.61
1915	11	0.79	5.29
1930	15	0.68	4.56
1945	35	1.46	9.77
2000	6	0.34	2.29
2015	20	1.12	7.50
2030	7	0.09	0.61
2045	24	0.71	4.71
2100	23	0.27	1.82
2115	5	0.02	0.17
2130	5	0.02	0.16
2145	6	0.03	0.23
2200	9	0.32	2.14
2215	8	0.37	2.44
2230	5	0.02	0.12
2245	2	0.10	0.64
2300	3	0.41	2.72
2315	5	0.15	1.00
2330	7	0.03	0.22
2345	10	0.26	1.73
2400	6	0.03	0.22

FIGURE 2-53 (continued)

TOTAL NUMBER OF TRANSMISSIONS: 1873  
AVE. NUM. OF TRANSMISSIONS PER HOUR: 78.0  
TOTAL TRANSMISSION TIME: 0.791 HOURS  
AVERAGE LENGTH OF TRANSMISSION: 1.52 SEC.  
PERCENT CHANNEL UTILIZATION: 3.30%

## MESSAGE LENGTH HISTOGRAM

LENGTH OF XMSNS	NUMBER OF XMSNS	PERCENT
0.1 - 0.5 SEC.	1004	53.60
0.5 - 1.0 SEC.	301	16.07
1.0 - 1.5 SEC.	112	5.98
1.5 - 2.0 SEC.	80	4.27
2.0 - 2.5 SEC.	48	2.56
2.5 - 3.0 SEC.	40	2.14
3.0 - 3.5 SEC.	46	2.46
3.5 - 4.0 SEC.	32	1.71
4.0 - 4.5 SEC.	27	1.44
4.5 - 5.0 SEC.	29	1.55
5.0 - 5.5 SEC.	22	1.17
5.5 - 6.0 SEC.	26	1.39
6.0 - 6.5 SEC.	20	1.07
6.5 - 7.0 SEC.	16	0.85
7.0 - 7.5 SEC.	7	0.37
7.5 - 8.0 SEC.	14	0.75
8.0 - 8.5 SEC.	7	0.37
8.5 - 9.0 SEC.	10	0.53
9.0 - 9.5 SEC.	6	0.32
9.5 - 10.0 SEC.	5	0.27
LONGER THAN 10 SEC.	21	1.12

THERE WERE 777 XMSNS OF 00.1 AND 00.0 DURATION

FIGURE 2-53 (continued)

## TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
15	20	1.84	12.28
30	12	1.23	8.21
45	12	0.74	4.96
100	14	0.34	2.27
115	15	0.81	5.43
130	23	1.62	10.78
145	16	0.62	4.17
200	3	0.23	1.51
215	5	0.33	2.18
230	6	0.53	3.51
245	6	0.31	2.08
300	5	0.10	0.70
315	7	0.34	2.29
330	1	0.06	0.42
345	6	0.60	3.98
400	9	0.42	2.83
415	13	0.78	5.19
430	9	1.42	9.50
445	3	0.43	2.83
500	1	0.02	0.12
515	9	0.52	3.44
530	0	0.00	0.00
545	3	0.20	1.33
600	3	0.10	0.69
615	4	0.11	0.77
630	3	0.31	2.06
645	7	0.37	2.50
700	2	0.20	1.34
715	6	0.30	2.01
730	25	1.42	9.46
745	10	0.52	3.49
800	20	0.48	3.19
815	37	1.39	9.28
830	36	1.17	7.83
845	26	1.31	8.77
900	21	0.69	4.60
915	33	1.37	9.17
930	19	0.90	6.00
945	27	0.69	4.62
1000	9	0.07	0.49
1015	29	0.74	4.93
1030	18	0.73	4.86
1045	42	0.70	4.68
1100	6	0.52	3.44
1115	10	0.31	2.06
1130	30	1.46	9.72
1145	2	0.05	0.32
1200	21	0.46	3.04

FIGURE 2-54



## TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
1215	29	0.78	5.18
1230	7	0.28	1.89
1245	22	0.75	5.02
1300	13	0.95	6.33
1315	16	0.37	2.48
1330	8	0.49	3.28
1345	8	0.28	1.84
1400	16	0.69	4.59
1415	11	0.26	1.71
1430	13	0.65	4.36
1445	19	1.27	8.46
1500	18	0.43	2.90
1515	20	0.36	2.38
1530	17	0.51	3.43
1545	56	0.91	6.04
1600	4	0.14	0.92
1615	29	1.18	7.88
1630	22	0.79	5.24
1645	61	1.18	7.86
1700	50	0.62	4.16
1715	3	0.02	0.16
1730	12	0.43	2.84
1745	5	0.17	1.11
1800	0	0.00	0.00
1815	14	1.06	7.04
1830	6	0.48	3.18
1845	10	0.11	0.71
1900	20	1.03	6.89
1915	7	0.26	1.76
1930	35	1.03	6.89
1945	44	0.72	4.83
2000	10	0.07	0.48
2015	7	0.24	1.61
2030	34	0.87	5.79
2045	20	1.79	11.93
2100	10	0.92	6.12
2115	9	0.36	2.40
2130	9	0.58	3.90
2145	29	0.51	3.42
2200	5	0.12	0.79
2215	4	0.41	2.74
2230	26	0.39	2.63
2245	7	0.49	3.26
2300	0	0.00	0.00
2315	15	0.49	3.29
2330	21	0.43	2.86
2345	8	0.04	0.24

FIGURE 2-54 (continued)

TOTAL NUMBER OF TRANSMISSIONS: 1453  
 AVE. NUM. OF TRANSMISSIONS PER HOUR: 60.5  
 TOTAL TRANSMISSION TIME: 0.930 HOURS  
 AVERAGE LENGTH OF TRANSMISSION: 2.31 SEC.  
 PERCENT CHANNEL UTILIZATION: 3.88%

## MESSAGE LENGTH HISTOGRAM

LENGTH OF XMSNS	NUMBER OF XMSNS	PERCENT
0.1 - 0.5 SEC.	544	37.44
0.5 - 1.0 SEC.	210	14.45
1.0 - 1.5 SEC.	103	7.09
1.5 - 2.0 SEC.	66	4.54
2.0 - 2.5 SEC.	61	4.20
2.5 - 3.0 SEC.	62	4.27
3.0 - 3.5 SEC.	59	4.06
3.5 - 4.0 SEC.	52	3.58
4.0 - 4.5 SEC.	51	3.51
4.5 - 5.0 SEC.	40	2.75
5.0 - 5.5 SEC.	38	2.62
5.5 - 6.0 SEC.	30	2.06
6.0 - 6.5 SEC.	21	1.45
6.5 - 7.0 SEC.	21	1.45
7.0 - 7.5 SEC.	19	1.31
7.5 - 8.0 SEC.	12	0.83
8.0 - 8.5 SEC.	14	0.96
8.5 - 9.0 SEC.	8	0.55
9.0 - 9.5 SEC.	6	0.41
9.5 - 10.0 SEC.	0	0.00
LONGER THAN 10 SEC.	36	2.48

THERE WERE 479 XMSNS OF 00.1 AND 00.0 DURATION

FIGURE 2-54 (continued)

## TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
15	4	0.31	2.07
30	6	0.47	3.16
45	6	1.04	6.91
100	0	0.00	0.00
115	22	3.70	24.66
130	1	0.01	0.03
145	3	0.35	2.31
200	0	0.00	0.00
215	26	0.45	3.01
230	7	0.08	0.53
245	5	0.02	0.17
300	5	0.05	0.30
315	3	0.16	1.03
330	2	0.06	0.43
345	4	0.10	0.66
400	0	0.00	0.00
415	0	0.00	0.00
430	5	0.39	2.59
445	5	0.06	0.38
500	5	0.36	2.38
515	26	0.73	4.88
530	0	0.00	0.00
545	0	0.00	0.00
600	0	0.00	0.00
615	0	0.00	0.00
630	0	0.00	0.00
645	16	0.81	5.39
700	82	2.71	18.10
715	0	0.00	0.00
730	25	0.42	2.81
745	40	1.33	8.84
800	30	0.81	5.39
815	39	1.94	12.96
830	32	0.86	5.76
845	49	2.30	15.36
900	57	3.91	26.07
915	21	1.09	7.26
930	73	3.35	22.37
945	29	1.65	11.00
1000	62	6.48	43.18
1015	68	11.14	74.27
1030	73	3.14	20.91
1045	72	6.38	42.57
1100	85	7.75	51.70
1115	62	8.84	58.91
1130	50	2.06	13.76
1145	79	3.64	24.27
1200	0	0.00	0.00

FIGURE 2-55



## TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
1215	51	2.47	16.44
1230	31	1.31	8.77
1245	29	1.12	7.50
1300	41	1.94	12.97
1315	57	1.93	12.88
1330	62	3.21	21.41
1345	59	2.87	19.12
1400	74	3.39	22.59
1415	64	3.24	21.61
1430	31	1.76	11.74
1445	53	2.63	17.52
1500	59	4.15	27.68
1515	80	3.58	23.84
1530	47	2.03	13.52
1545	41	1.40	9.37
1600	53	1.66	11.08
1615	23	0.99	6.61
1630	32	2.28	15.19
1645	49	2.56	17.06
1700	73	2.94	19.63
1715	44	2.79	18.62
1730	51	1.90	12.70
1745	58	2.07	13.79
1800	22	1.12	7.46
1815	23	1.27	8.47
1830	25	1.51	10.09
1845	24	1.11	7.43
1900	40	1.89	12.63
1915	44	1.97	13.16
1930	81	4.48	29.84
1945	18	0.85	5.66
2000	8	0.37	2.44
2015	23	0.99	6.60
2030	17	1.13	7.52
2045	21	0.64	4.27
2100	40	1.80	11.98
2115	20	0.83	5.53
2130	1	0.06	0.38
2145	16	0.65	4.36
2200	35	1.43	9.54
2215	5	0.15	1.01
2230	5	0.41	2.77
2245	6	0.53	3.53
2300	8	0.73	4.87
2315	12	0.63	4.23
2330	6	0.34	2.28
2345	2	0.17	1.16
2400	8	0.73	4.84

FIGURE 2-55 (continued)

TOTAL NUMBER OF TRANSMISSIONS: 2851  
 AVE. NUM. OF TRANSMISSIONS PER HOUR: 118.8  
 TOTAL TRANSMISSION TIME: 2.650 HOURS  
 AVERAGE LENGTH OF TRANSMISSION: 3.35 SEC.  
 PERCENT CHANNEL UTILIZATION: 11.04%

## MESSAGE LENGTH HISTOGRAM

LENGTH OF XMSNS	NUMBER OF XMSNS	PERCENT
0.1 - 0.5 SEC.	865	30.34
0.5 - 1.0 SEC.	358	12.56
1.0 - 1.5 SEC.	182	6.38
1.5 - 2.0 SEC.	124	4.35
2.0 - 2.5 SEC.	114	4.00
2.5 - 3.0 SEC.	113	3.96
3.0 - 3.5 SEC.	120	4.21
3.5 - 4.0 SEC.	121	4.24
4.0 - 4.5 SEC.	112	3.93
4.5 - 5.0 SEC.	141	4.95
5.0 - 5.5 SEC.	108	3.79
5.5 - 6.0 SEC.	73	2.56
6.0 - 6.5 SEC.	76	2.67
6.5 - 7.0 SEC.	66	2.31
7.0 - 7.5 SEC.	40	1.40
7.5 - 8.0 SEC.	26	0.91
8.0 - 8.5 SEC.	22	0.77
8.5 - 9.0 SEC.	8	0.28
9.0 - 9.5 SEC.	8	0.28
9.5 - 10.0 SEC.	84	2.95
LONGER THAN 10 SEC	90	3.16

THERE WERE 787 XMSNS OF 00.1 AND 00.0 DURATION

FIGURE 2-55 (continued)

## TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
15	7	1.31	8.72
30	0	0.00	0.00
45	0	0.00	0.00
100	0	0.00	0.00
115	2	0.13	0.90
130	3	0.33	2.21
145	7	0.39	2.62
200	0	0.00	0.00
215	0	0.00	0.00
230	23	2.64	17.59
245	2	0.17	1.14
300	3	0.27	1.79
315	0	0.00	0.00
330	0	0.00	0.00
345	0	0.00	0.00
400	0	0.00	0.00
415	0	0.00	0.00
430	0	0.00	0.00
445	23	1.22	8.17
500	1	0.25	1.66
515	1	0.18	1.19
530	5	0.35	2.37
545	9	0.53	3.53
600	15	1.40	9.37
615	3	0.12	0.83
630	17	0.89	5.91
645	11	1.13	7.52
700	12	0.54	3.63
715	19	0.89	5.97
730	12	0.67	4.44
745	3	0.03	0.19
800	15	0.24	1.58
815	37	2.41	16.10
830	25	1.25	8.32
845	53	2.87	19.12
900	25	0.79	5.27
915	54	2.37	15.80
930	18	1.19	7.91
945	55	1.93	12.84
1000	34	0.90	6.00
1015	62	4.11	27.42
1030	42	2.42	16.13
1045	72	3.43	22.88
1100	43	1.52	10.17
1115	34	1.89	12.62
1130	52	2.19	14.59
1145	68	3.20	21.36
1200	60	1.64	10.94

FIGURE 2-56



## TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
1215	72	1.81	12.04
1230	104	3.44	22.97
1245	117	4.09	27.26
1300	66	2.50	16.68
1315	84	3.50	23.36
1330	133	4.82	32.17
1345	98	3.93	26.19
1400	71	2.25	14.98
1415	111	4.32	28.78
1430	62	1.74	11.60
1445	102	3.02	20.11
1500	149	4.32	28.78
1515	74	2.91	19.38
1530	97	3.88	25.86
1545	86	2.56	17.09
1600	79	2.01	13.38
1615	82	3.28	21.87
1630	75	1.75	11.68
1645	164	2.17	14.46
1700	82	2.20	14.66
1715	116	3.54	23.63
1730	46	2.41	16.07
1745	40	1.73	11.54
1800	114	2.53	16.87
1815	12	1.69	11.30
1830	21	0.54	3.61
1845	48	0.64	4.30
1900	69	2.61	17.42
1915	112	2.04	13.63
1930	19	0.98	6.52
1945	20	1.14	7.63
2000	12	0.84	5.58
2015	4	0.22	1.44
2030	7	0.10	0.67
2045	0	0.00	0.00
2100	24	1.38	9.18
2115	10	0.55	3.69
2130	2	0.11	0.74
2145	15	0.32	2.12
2200	17	0.92	6.17
2215	8	0.65	4.34
2230	5	0.52	3.47
2245	0	0.00	0.00
2300	3	0.14	0.94
2315	18	1.32	8.83
2330	0	0.00	0.00
2345	5	0.20	1.32
2400	2	0.08	0.52

FIGURE 2-56 (continued)

TOTAL NUMBER OF TRANSMISSIONS: 3584  
AVE. NUM. OF TRANSMISSIONS PER HOUR: 149.3  
TOTAL TRANSMISSION TIME: 2.259 HOURS  
AVERAGE LENGTH OF TRANSMISSION: 2.27 SEC.  
PERCENT CHANNEL UTILIZATION: 9.41%

## MESSAGE LENGTH HISTOGRAM

LENGTH OF XMSNS	NUMBER OF XMSNS	PERCENT
0.1 - 0.5 SEC.	1446	40.35
0.5 - 1.0 SEC.	475	13.25
1.0 - 1.5 SEC.	252	7.03
1.5 - 2.0 SEC.	144	4.02
2.0 - 2.5 SEC.	145	4.05
2.5 - 3.0 SEC.	125	3.49
3.0 - 3.5 SEC.	135	3.77
3.5 - 4.0 SEC.	93	2.59
4.0 - 4.5 SEC.	114	3.18
4.5 - 5.0 SEC.	111	3.10
5.0 - 5.5 SEC.	91	2.54
5.5 - 6.0 SEC.	80	2.23
6.0 - 6.5 SEC.	77	2.15
6.5 - 7.0 SEC.	61	1.70
7.0 - 7.5 SEC.	55	1.53
7.5 - 8.0 SEC.	33	0.92
8.0 - 8.5 SEC.	29	0.81
8.5 - 9.0 SEC.	18	0.50
9.0 - 9.5 SEC.	17	0.47
9.5 - 10.0 SEC.	16	0.45
LONGER THAN 10 SEC. :	67	1.87

THERE WERE 1271 XMSNS OF 00.1 AND 00.0 DURATION

FIGURE 2-56 (continued)

## APPENDIX A

### GEOGRAPHIC DESCRIPTION

The following description of the Tampa Bay area (Figure A-1) was excerpted from the United States Coast Pilot, Volume 5, ninth edition (1976), and is included here to make this report more complete and readily understandable.

#### A.1 TAMPA BAY

Tampa Bay, a large natural indentation about midway along the western coast of Florida, is one of the most important harbors of the Gulf coast and is easily accessible day or night. The bay extends northeast for about twenty miles and is six to seven miles wide. It is the approach to Manatee River, Boca Ceiga Bay, Old Tampa Bay, and Hillsborough Bay, and to the cities of St. Petersburg, Port Tampa, East Tampa, Bradenton, Port Manatee, and Tampa.

The entrance to Tampa Bay, between Mullet Key on the north and Anna Marie Key on the south, is 4.5 miles wide. Egmont Channel, the main deep-water ship channel, has been dredged through shoals that extend about six miles west of the entrance. Tampa Bay light whistle buoy, nine miles west of Egmont Key, marks the approach to the bay.

#### A.2 CHANNELS

A Federal project provides for a main channel with depths of 36 feet in the entrance from the Gulf, thence 34 feet to Tampa and Port Tampa. In 1972-74, shoaling to less than the charted depths was reported in the approach to Egmont Channel between the area extending east from the 10-fathom curve in the Gulf to the Egmont Channel entrance buoys. Vessels drawing in excess of 34 feet are urged to use caution when navigating through the area.

Egmont Channel, the main ship channel, extends between Mullet Key and Egmont Key and is used by all deep-draft vessels entering Tampa Bay. A lighted range and lighted and unlighted buoys mark the dredged cut over the bar. The main ship channel continues through Mullet Key Channel and dredged cuts leading up the bay through Tampa Bay, Hillsborough Bay, and Old Tampa Bay to Port Manatee, Big Bend, Alafia River, Port Sutton, Tampa, Port Tampa, and Weedon Island. The channels are marked by lighted ranges, and lighted and unlighted buoys.

Southwest Channel, a natural passage on the south side of Egmont Key, has a controlling depth of about 16 feet, but is subject to shoaling. The approach is marked by a lighted bell buoy and the channel by a lighted buoy and a day-beacon. Passage Key, on the south side of the Southwest Channel, is a low sand island about 0.3 mile long and showing about four feet above high water, used as a bird refuge.

Passage Key Inlet, between Passage Key and Anna Maria Key, has a controlling depth of about nine feet in an unmarked shifting channel; it is used only by small local craft.



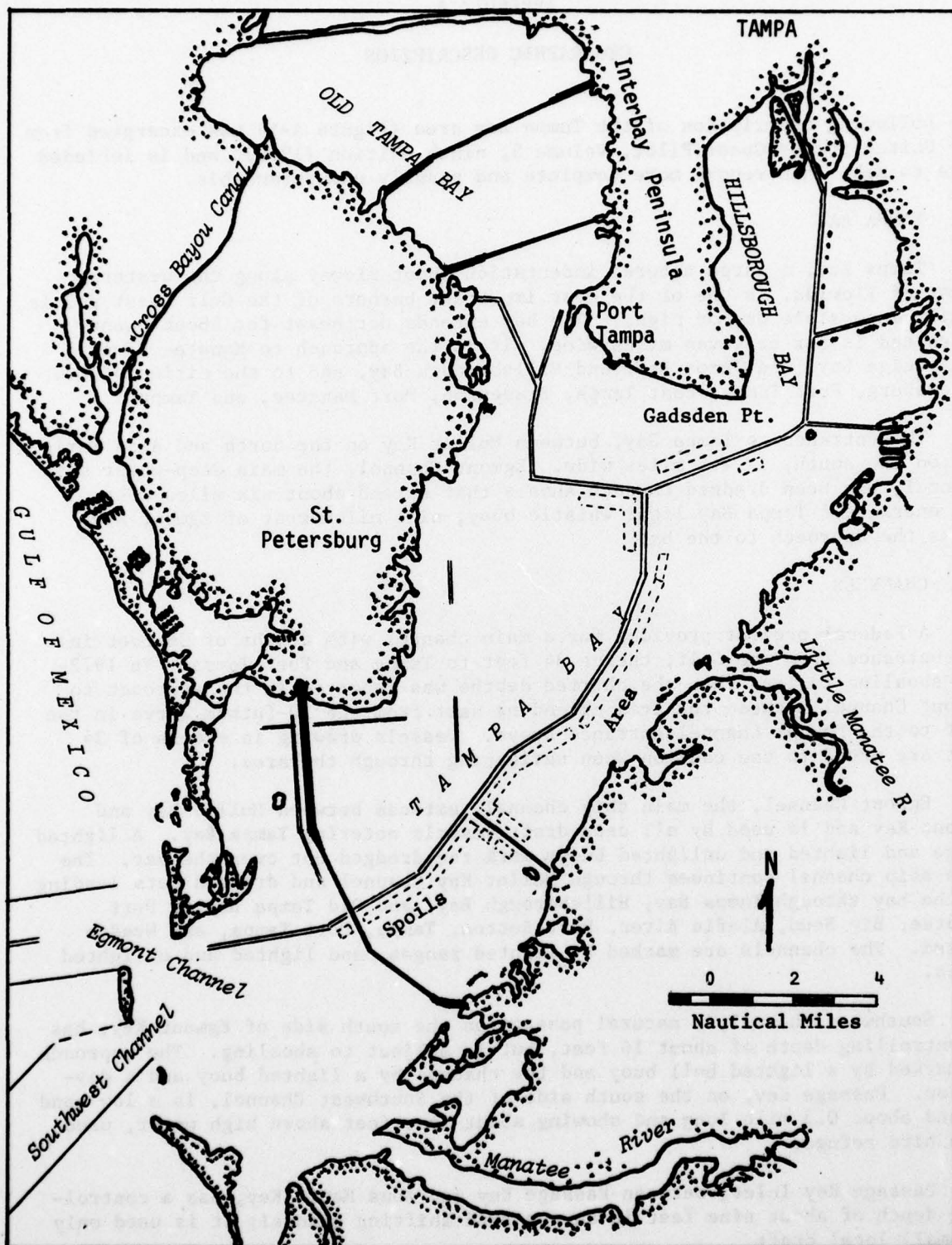


FIGURE A-1: TAMPA BAY AREA

### A.3 ANCHORAGES

Vessels with good ground tackle can anchor anywhere outside Egmont Bar in depths of 35 to 50 feet and ride out any gale short of a hurricane. The usual inside anchorages are south of Mullet Key in depths of 29 to 32 feet.

Explosives and quarantine anchorages are east of Mullet Key, northeast of Paps Point and south of Interbay Peninsula.

### A.4 DANGERS

Shoal areas extend seaward from Egmont Key as far as Palantine Shoal, which is five miles west of the key and on the south side of Egmont Channel entrance. Palantine Shoal consists of several small lumps with depths of 19 to 22 feet over them. Spoil areas, for the most part unmarked and of undetermined depth, border the dredged cuts of the main ship channel in Tampa Bay and the channels in Old Tampa Bay.

The Sunshine Skyway crosses lower Tampa Bay from Maximo Point to Terra Ceia Island. It is a landfilled causeway for the greater part of its length with bridge spans over the channels which it crosses. The high-level 800-foot twin fixed spans over the main ship channel in the middle of the bay have clearances of 149 feet at the center and 140 feet at the fenders.

### A.5 TIDES AND CURRENTS

The diurnal range of tide in Tampa Bay is about 2.3 feet. A strong off-shore wind sometimes lowers the water surface at Tampa and in the dredged channels as much as 4 feet, and retards the time of high water by as much as 3 hours. A continued southwest wind raises the water by nearly the same amount and advances the time of high water by as much as one hour.

There is a large daily inequality in the ebb, and velocities of 3 knots or more may be expected at the strength of the greater ebb of the day in Egmont Channel, Passage Key Inlet, and off Port Tampa. Flood velocities seldom exceed 2 knots. Winds have considerable effect in modifying the tidal current.

At a location 6.7 miles west of Egmont Key Light, the tidal current is rotary, turning clockwise, and has considerable daily inequality. The strength of the greater floods and ebbs set north and south, respectively. Four days of current observation at this location during a period of moderate northerly winds indicated a resultant nontidal current of 0.4 knot setting south.

### A.6 WEATHER

An outstanding feature of Tampa's climate is the summer thundershower season. On the average, Tampa has 91 days with thundershowers occurring mostly in the late afternoons of June, July, August, and September. The resulting sudden drop in temperature from about 90°F (32.2°C) to 70°F (21.1°C) induces an agreeable physiological reaction. Between a dry spring and a dry fall, some thirty inches (about sixty percent of the annual) of rain falls during the four summer months.

Because of the flat terrain, night ground fogs occur frequently during the cool-weather season. Temperature throughout the year is modified by the waters of the Gulf and bays.

The risk of a hurricane moving in from the Gulf of Mexico has been greatest in June and October.

#### A.7 PILOTAGE

Pilotage is compulsory for all foreign vessels and U.S. vessels under register in the foreign trade. Pilotage is optional for U.S. coastwise vessels drawing over six feet, that have on board a pilot licensed by the Federal government. Pilots board vessels day or night. Vessels entering by Egmont Channel are boarded between the Tampa Bay Lighted Whistle Buoy and Egmont Channel Lighted Bell Buoy. Vessels entering by Southwest Channel are usually boarded between Southwest Channel Buoy 2 and Lighted Buoy 5, or if desired, at the lighted bell buoy off the entrance to the channel.

The pilots maintain a lookout station on Egmont Key and board vessels from black-hulled launches with the word PILOT on either side of the white deckhouse. The pilot station monitors 2182 KHz and 2738 KHz, and VHF-FM Channels 12 (156.60 MHz) and 16 (156.80 MHz) continuously. The pilot boats are equipped with VHF-FM Channels 12 and 16. The pilot boats fly the international code flag "H" and display a white light over a red light at night. Vessels are requested to give a 24-hour and a 12-hour advance notice of their time of arrival. Vessels are normally not moved in dense fog, and during strong northwest winds, vessels are boarded inside Egmont Key.

#### A.8 TOWAGE

The Port of Tampa area has several towing companies with radio-equipped tugs with up to 2,400 horsepower. Tugs are equipped for firefighting. Vessel are met at Buoy 4B, about three miles above the Sunshine Skyway Bridge. Large vessels usually require at least two tugs. Arrangements are usually made in advance by ship's agents.

The Port of Tampa is a customs port of entry. Customs, quarantine, immigration, and agricultural quarantine officials are stationed in Tampa.

#### A.9 HILLSBOROUGH BAY

Hillsborough Bay, the northeast arm of Tampa Bay, is eight miles long and four to five miles wide. The main ship channel follows a dredged cut up the middle of the bay to Tampa. Spoil banks border the east side of the channel for most of its length. Good anchorage is available for shallow-draft vessels in the central part of the bay west of the main channel.

At the turn in the main ship channel southeast of Gadsden Point, a privately maintained channel leads east to a turning basin, thence south to a power plant wharf at Big Bend. In May 1973, the reported controlling depths were 30 feet at midchannel from the main ship channel to the turning basin, thence 30 feet to and alongside the power plant wharf. The channel is privately



marked by a lighted range and lighted and unlighted buoys. Coal for power plant consumption is unloaded from barges at the power plant wharf.

Two miles north from the sharp turn in the main channel, a dredged channel leads east to Alafia River. Federal project depth for the channel is 30 feet from the ship channel in Hillsborough Bay to and including the turning basin at East Tampa, the site of a large chemical plant, on the north side of Alafia River 0.5 mile above the mouth. The channel is well marked.

Deep-draft facilities on the Alafia River are described in Appendix B.1.

#### A.10 OLD TAMPA BAY

Old Tampa Bay, the northwest arm of Tampa Bay, is separated from Hillsborough Bay by Interbay Peninsula. Old Tampa Bay is 12 miles long and ranges in width from 2.5 miles at the entrance to six miles; about three-fourths of the bay area has depths ranging from 6 to 17 feet. A branch of the main ship channel leads through the shoals at the entrance to Old Tampa Bay to the wharves and turning basin at Port Tampa. A Federal project provides for a depth of 34 feet to and including the turning basin. The channel is well marked by buoys and lighted ranges. Spoil banks border the east side of the north and south reaches of the channel; several spoil islands five to ten feet high are just south of Port Tampa.

A swash channel from Port Tampa parallels the southwest shore of Interbay Peninsula at a distance of about 0.6 mile. The channel is marked by daybeacons and has a controlling depth of seven to eight feet.

Port Tampa is an important shipping terminus on the east shore of Old Tampa Bay just inside the entrance. The elevators, oil tanks, and the long slip are conspicuous from Tampa Bay as are two high radio towers near the west end of Gandy Bridge Causeway and the stacks of the power plant on Weedon Island. The terminal facilities at Port Tampa are at the entrance and along both sides of a long dredge slip. These facilities are described in Appendix B.9.

## APPENDIX B

### WHARVES

Deep-draft facilities at Tampa are located at East Tampa (Alafia River), Port Sutton, Port Tampa, and Tampa proper. Most of the facilities have railroad and highway connections, and water and electrical shore power connections. A total of over 3.5 million cubic feet of freezer and cooler space is available at the port.

#### B.1 FACILITIES AT EAST TAMPA (ALAFIA RIVER)

Cities Service Company Slip: deck heights, 8 feet; east side 448 feet long, 23 feet alongside; west side, 448-foot and 500-foot sections, 23 to 30 feet alongside; loading tower-conveyor belt systems, 100- and 450-ton per hour capacities; receipt of salt and shell; shipment of superphosphates; owned and operated by Cities Service Company.

Cities Service Company Liquid Sulfur Wharf: immediately southwest of Cities Service Company Slip; offshore wharf, 1,000 feet usable with dolphins and west side of Cities Service Company Slip; 30 feet alongside; deck height, 8 feet; receipt of liquid sulphur; owned and operated by Cities Service Company.

#### B.2 FACILITIES AT PORT SUTTON

All facilities at Port Sutton are owned by Port Sutton, Incorporated.

Duval Corporation Wharf: about 300 yards west of head of slip; offshore platform, 250 feet usable with dolphins; 34 feet alongside; deck height, about 10 feet; receipt of liquid sulphur; operated by Duval Corporation.

River-Gulf Terminal, Incorporated, Wharf: about 800 yards west of head of slip; offshore platform, 700 feet usable with dolphins; 34 feet alongside; receipt of potash; operated by River-Gulf Terminal, Incorporated.

I.M.C. Corporation Potash Wharf: about 0.5 mile west of head of slip; 460-foot offshore wharf; 34 feet alongside; deck height, 6 feet; receiving hopper-conveyor belt system; receipt of potash from self-unloading vessels; operated by I.M.C. Corporation.

I.M.C. Phosphate Terminal: about 0.7 mile west of head of slip; 414-foot offshore wharf; 34 feet alongside; deck height, 10 feet; loading tower, 1,800 tons per hour capacity; shipment of phosphate rock and superphosphate; operated by I.M.C. Corporation.

W.R. Grace and Company Wharf: about 0.9 mile west of head of slip; offshore wharf, 200 feet usable with dolphins; 30 feet alongside; deck height, 7 feet; receipt of anhydrous ammonia; operated by W.R. Grace and Company.

Ideal Cement Company Wharf: 27-foot offshore wharf, 517 feet usable with in-line bulkhead; 30 feet alongside; deck height, 7.5 feet; receipt of bulk cement; operated by Ideal Cement Company.

Pasco Terminals, Incorporated, Wharf: 500-foot wharf; 30 feet alongside; deck height, 7.5 feet; receipt of liquid sulphur; operated by Pasco Terminals.

Commercial Metals Company Wharf: 530-foot marginal wharf; 30 feet alongside; deck height, 7.5 feet; diesel cranes with electromagnets; shipment of scrap metal; operated by Commercial Metals Company.

### B.3 FACILITIES AT ROCKPORT

Seaboard Coast Line Railroad Phosphate Terminal: offshore wharf; 800 feet usable; 34 feet alongside; deck height about 8 feet; gantry crane; 3,000 metric tons per hour loading rate; shipment of phosphate; owned and operated by Seaboard Coast Line Railroad.

Eastern Associated Terminals, Incorporated: about 0.4 mile northeast of Seaboard Coast Line Railroad Phosphate Terminal; offshore dolphins; 540 feet usable; 34 feet alongside; height of dolphins, 8 feet; conveyor belt-loader system, 3,500 tons per hour capacity; shipment of phosphates; owned and operated by Eastern Associated Terminals, Incorporated.

### B.4 FACILITIES ALONG THE WEST SIDE OF HOOKER POINT

Kreher Terminal: southwest side of slip; 1,120 feet long, 18 to 34 feet alongside; deck height, 8 feet; receipt of automobiles and lumber; owned and operated by Tampa Port Authority.

Richard E. Knight Pier: immediately northwest of Kreher Terminal; southwest and northwest sides 880 feet long; deck heights, 8 feet; 31 to 16 feet along southeast side; 30 to 22 feet along northwest side; receipt of petroleum products and phosphoric acid; owned and operated by Tampa Port Authority.

Tampa Port Authority Cattle Loading Wharf: about 0.3 mile northwest of Kreher Terminal; 140-foot offshore wharf, 245 feet usable with dolphins; 29 feet alongside; deck height, 6 feet; cattle-loading chute and ramp; shipment of cattle; owned and operated by Tampa Port Authority.

### B.5 FACILITIES ALONG EAST SIDE OF SPARKMAN CHANNEL

Sulfur Terminal Company Wharf: offshore wharf, 306 feet usable with dolphins; 34 feet alongside; deck height, 8 feet; receipt of liquid sulfur; owned by MTR Terminals Corporation and operated by Sulfur Terminals Company, Incorporated.

American Oil Company Wharf: about 0.1 mile north of Sulfur Terminal Company Wharf; 100-foot offshore wharf, 275 feet usable with dolphins; 33 feet alongside; deck height, 7 feet; receipt and shipment of petroleum products, bunkering vessels; owned and operated by American Oil Company.

B.P. Oil Wharf: about 0.3 mile north of Sulfur Terminal Company Wharf; 240-foot marginal wharf, 270 feet usable with dolphins, 32 feet alongside; deck height, 10 feet; receipt of petroleum products; owned and operated by B.P. Oil Corporation.



Florida Portland Cement Wharf: about 0.4 mile north of Sulfur Terminal Company Wharf; 820-foot marginal wharf; 34 feet alongside; deck height, 6 feet; cranes up to 30 tons with grab buckets; receipt of gypsum, aragonite, cement, and fuel oil; owned and operated by Florida Portland Cement.

Tampa Electric Company, Hooker Point Plant Wharf: about 0.55 mile north of Sulfur Terminal Company Wharf; marginal wharf, 550 feet usable; 30 feet alongside; deck height, 8 feet; receipt of fuel oil; owned and operated by Tampa Electric Company.

Sparkman Channel Terminal, South Slip Wharf: about 0.65 mile north of Sulfur Terminal Company Wharf; north side of slip, 700 feet long; 34 feet alongside; deck height, 5 feet; 24,000 square feet covered storage; 40-ton cranes equipped with electromagnets; shipment of scrap metal; owned by Tampa Port Authority and operated by Sparkman Channel Terminal.

#### B.6 FACILITIES ALONG YBOR CHANNEL AND TURNING BASIN, EAST SIDE

George B. Howell Maritime Center Wharf: 1,200-foot marginal wharf; 34 feet alongside; deck height, 5 feet; 39,000 square feet covered storage; three 45-ton mobile cranes; receipt and shipment of general cargo; owned by Tampa Port Authority and operated by Southport Terminals, Incorporated.

Texaco Wharf: about 0.3 mile north of George B. Howell Maritime Center Wharf; 170-foot marginal wharf, 278 feet usable with dolphins; 33 feet alongside; deck height, 6 feet; receipt of petroleum products; owned and operated by Texaco, Incorporated.

Phillips Petroleum Company Wharf: about 0.6 mile north of George B. Howell Maritime Center Wharf; L-shaped wharf, 300 feet usable with dolphins; 34 feet alongside; deck height, 9.5 feet; receipt of petroleum products; owned and operated by Phillips Petroleum Company.

Detsco Terminal: at head of Ybor Channel; 540-foot marginal wharf; 30 feet alongside; deck height 10 feet; receipt of liquid sulfur; owned and operated by Detsco Terminal.

#### B.7 FACILITIES ALONG YBOR CHANNEL, WEST SIDE

Detsco Terminal Phosphate Wharf: at head of Ybor Channel; 380-foot marginal wharf; 32 feet alongside; loading tower, 1,200 tons per hour capacity; shipment of phosphate and receipt of liquid sulfur; owned and operated by Detsco Terminal.

Metroport Terminal, North Wharf: immediately south of Detsco Terminal Phosphate Wharf; channel side (at north side of entrance to slip) 200 feet long; 27 feet alongside; north side of slip 680 feet long; 27 to 25 feet alongside; head of slip 350 feet long; 25 feet alongside; deck height, 10 feet; receipt of bananas; owned and operated by Tampa Port Authority.

Metroport Terminal, South Wharf: channel side (at south entrance to slip) 275 feet long; 30 feet alongside; south side of slip 750 feet long; 27 feet alongside; deck heights, 10 feet; 48,000 square feet covered storage; open

storage area; 20-ton crane, forklift trucks; receipt and shipment of general cargo; owned by Tampa Port Authority; various operators.

Gulf Florida Terminal Company Wharf: about 0.35 mile below head of Ybor Channel; 1,200-foot marginal wharf; 30 feet alongside; deck height, 8 feet; 51,000 square feet covered storage; 10 acres open storage; forklift trucks up to 4 tons, straddlelumber carriers, tractors, and trailers; receipt and shipment of general and containerized cargo, shipment of fruit, lumber, and frozen meat; owned and operated by Gulf-Florida Terminal Corporation.

Garrison Terminals Wharves: north side of Ybor Turning Basin; 540-and 1,277-foot marginal wharves; 30 feet alongside; deck heights, 7 and 8 feet; more than 260,000 square feet covered storage; crawler cranes equipped with 4-cubic yard buckets; forklift trucks up to 11 tons; portable receiving hoppers and belt conveyors for bulk chemical handling; receipt and shipment of general and containerized cargo, receipt of bulk nitrate and potash, shipment of fertilizer; owned by Tampa Sand and Material Company, Incorporated and Garrison Terminals, Incorporated, and operated by Garrison Terminals, Incorporated.

#### B.8 FACILITIES ALONG THE NORTH SIDE OF GARRISON CHANNEL

Sun Oil Company Wharf: just east of Seaboard Coast Line Railroad Bridge; 43-foot offshore wharf, 200 feet usable with dolphins; 30 feet alongside; deck height, 8 feet; receipt of petroleum products; owned and operated by Sun Oil Company.

Tampa Import and Export Terminal Wharf: about 0.3 mile west of Seaboard Coast Line Railroad Bridge; 950-foot marginal wharf; 30 feet alongside; deck height, 10 feet; 143,000 square feet covered storage; mobile cranes with 2.5 cubic yard buckets, forklift trucks up to 5 tons, front-end loaders, portable hoppers serve belt conveyor system; shipment of fertilizer; owned by Tampa Import and Export Terminal, Incorporated; various operators.

Luckenbach Steamship Company Wharf; about 0.35 mile west of Seaboard Coast Line Railroad Bridge; marginal wharf with 536- and 707-foot sections; 30 to 25 feet alongside; deck height, 10 feet; 138,000 square feet covered storage; open storage area; forklift trucks up to 25 tons; receipt and shipment of general and containerized cargo, shipment of fertilizers; owned and operated by Luckenbach Steamship Company, Incorporated.

#### B.9 FACILITIES AT PORT TAMPA DOCK

National Gypsum Company Wharf: south side of slip at entrance; wharf with offshore dolphins; 1,000 feet usable when used with dolphins and Shell Oil Company Wharf to the east; 34 feet alongside; deck heights, 6 feet; open storage area; hopper and belt conveyor system, unloading rate 2,000 tons per hour; receipt of gypsum rock by self-unloading vessels; owned and operated by National Gypsum Company.

Shell Oil Company Wharf: south side of slip about 400 yards east of entrance; wharf with offshore dolphins, 850 feet usable in conjunction with National Gypsum Company Wharf to the west, plus an additional 250 feet usable

with dolphins to the east; 34 feet alongside; deck height, 6 feet; receipt of petroleum products, bunkering vessels; owned by Atlantic Land and Improvement Company and operated by Shell Oil Company.

Gulf Oil Corporation West and East Wharves: south side of slip about 650 yards east of entrance; wharf with offshore dolphins, 650 feet usable, 32 to 34 feet alongside; deck height, 6 feet; receipt and shipment of petroleum products, bunkering vessels; owned by Atlantic Land and Improvement Company and operated by Gulf Oil Corporation.

Standard Oil Company Wharf: south side of slip about 850 feet south of the entrance; wharf with offshore dolphins, 880 feet usable with dolphins and part of Gulf Oil Corporation Wharf to the east; 30 to 34 feet alongside, deck height, 6 feet; receipt of petroleum products; owned by Atlantic Land and Improvement Company and operated by Standard Oil Company of Kentucky.

I.S. Joseph Company Wharf: north side of slip about 300 yards east of entrance; 1,250 feet usable with dolphins; 32 feet alongside; deck height, 7 feet; conveyor loading system, 500 tons per hour loading rate; shipment of citrus pellets; owned by Atlantic Land and Improvement Company and operated by I.S. Joseph Company.

#### B.10 PORT MANATEE TERMINAL

Port Manatee Terminal, owned and operated by the Manatee County Port Authority, is a deep-water facility on the southeast side of Tampa Bay, about eleven miles above Egmont Key. The facility is reached through a privately dredged and marked channel that leads southeast from the main ship channel about four miles northeast of the Sunshine Skybridge Bridge. The channel is marked by a lighted range, lights, buoys, and a daybeacon. In August 1970, controlling depths of 40 feet were reported in the channel, in the turning basin off the terminal, and alongside the terminal berths.

Tankers, general cargo vessels, and barges are handled at the terminal. About 1,500 feet of berthing space is available on the north side of the terminal basin and about 1,250 feet on the south side. In 1972, 250 feet of additional berthing space was under construction along the eastern side of the basin.

Also available at the terminal are more than 82,000 square feet of covered storage, a bulk storage silo with a capacity of 7,200 tons, a conveyor system for handling bulk cargo, and electrical shore power and water connections at each berth.

Imports are petroleum products, bulk minerals, and general cargo; exports include citrus pellets, plywood, and general cargo.



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COAST GUARD RESEARCH AND DEVELOPMENT CENTER GROTON CONN

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MARINE TRAFFIC DATA OF TAMPA, FLORIDA. (U)

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# APPENDIX C

## SUMMARY OF COAST GUARD MARINE INSPECTION OFFICE, TAMPA, RECORDS RELATING TO COMMERCIAL VESSEL MOVEMENT

The Coast Guard Marine Inspection Office in Tampa has kept brief records of the arrival and destination of the commercial vessels using the Port of Tampa. A summary for the months of January through September 1976 is listed below.

<u>DESTINATION</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>
Alafia River (E. Tampa)	0	1	0	3	2	5	5	2	1
Port Sutton	12	15	15	16	13	17	18	18	20
Hookers Point	31	27	23	29	22	23	23	24	24
Sparkman Channel	1	2	10	1	2	4	7	2	1
Ybor Channel	49	34	44	37	42	29	32	44	35
Garrison Channel	1	1	0	1	1	0	2	0	0
Port Tampa	5	4	3	9	3	4	1	2	3
Port Manatee	8	11	10	8	11	6	7	8	9
Big Bend	0	1	1	2	2	1	2	4	1
Rockport	32	26	31	30	30	22	22	26	30
Weedon Isl. (Bartow)	5	5	4	4	5	4	3	7	5
Braden River	0	0	1	1	1	2	0	0	2

## APPENDIX D

U. S. COAST GUARD  
GROUNDINGS IN TAMPA BAY CHANNELS  
January 1974 through July 1976

<u>USCG File No.</u>	<u>Vessel</u>	<u>Date</u>	<u>Draft</u>
2636	*SS "TEXACO MONTANA"	01-10-74	33'11"
2647	MV "AL CENAC" (tug)	01-08-74	6'00"
2650	MV "EBERHARDT ESSBERGER"	02-08-74	35'06"
2677	*Barge "OCEAN 255"	03-25-74	32'00"
2687	MV "ADENY"	04-10-74	24'00"
2702	MV "EN N BELCHER" (tug)	03-30-74	6'06"
2717	Barge "MANILA"	05-19-74	20'04"
2732	MV "HILLA"	06-20-74	33'00"
2735	*Barge "NEW YORK"	03-21-74	33'01"
2738	*Barge "ELIZABETH S"	06-26-74	23'00"
2744	Barge "MANILA"	07-10-74	20'04"
2745	MV "MARY ST. PHILIP" (tug)	07-05-74	8'00"
2746	MV "AZTECA"	07-15-74	34'06"
2748	SS "MARINE DUVAL"	07-26-74	32'08"
2759	Barge "MANILA"	08-21-74	20'04"
2761	Barge "OCEAN 115"	08-21-74	22'00"
2767	MV "BUCKEYE"	09-04-74	40'04"
2791	Barge "POSEIDON"	10-29-74	27'00"
2795	Barge "KATHLEEN SHERIDAN"	11-05-74	23'05"
2797	Barge "CHOTIN 4890"	10-29-74	20'00"
2805	MV "PRIAM"	04-12-74	28'09"
2807	MV "BONANZA"	10-10-74	34'08"
2822	MV "GOLDEN TRINITY"	08-23-74	26'02"
2825	MV "STAR BAY"	01-11-75	34'04"
2826	MV "CHOCANO"	01-19-75	31'02"
2831	Barge "LOUISE KIRKPATRICK"	12-04-74	25'02"
2835	Barge "BARBARA VAUGHT"	12-20-74	25'02"
2836	SS "LOUISIANA BRIMSTONE"	12-30-74	33'04"
2847	*SS "MARYLAND TRADER"	03-13-75	31'01"
2872	*USNS "YUKON"	03-31-75	41'09"
2895	SS "MARINE DUVAL"	06-03-75	32'08"
2898	*MV "ATHENIAN VICTORY II"	04-10-75	34'04"
2909	SS "FLORIDA STATE"	12-13-74	28'06"
2913?	Barge "AIPLE 50"	06-15-75	13'00"
2930	Barge "UBL 4801"	06-24-75	9'03"
2934	Barge "B-1"	08-07-75	6'09"
2938	Barge "WANDA WHELOCK"	08-16-75	25'02"
2944	*Barge "EXXON PORT EVERGLADES"	09-10-75	32'00"
2975	MV "BORWA"	11-15-75	36'01"
2978	MV "TACOMA CITY"	11-21-75	32'08"
2995	SS "MARINE DUVAL"	01-03-76	32'08"
2996	Barge "FAUSTINA"	12-03-75	34'04"
3004	Barge "FAUSTINA"	12-11-75	34'04"
3011	Barge "IOS 3302"	01-13-76	37'03"
3014	MV "MARITIME PIONEER"	12-26-75	31'04"
3032	Barge "FAUSTINA"	02-21-76	34'04"
3116	MV "LILI BILNER"	07-11-76	43'00"
3126	MV "ESCHERSHEIM"	07-10-76	34'07"

\* Petroleum vessels

Source: CG MSO, Tampa file



## APPENDIX E

## COMMERCIAL VESSEL CASUALTIES TAMPA, FLORIDA

Source: Form CGHQ-4095 of May 1976

CASE NO.	DATE	TOD	TYPE OF VESSEL	GROSS TONNAGE	LENGTH (FT.)	NATURE OF CASUALTY
40279	04-73	Day	Fishing Fishing	15-100 15-100	65-100 65-100	Collision with vessel anchored or moored
40980	10-73	Day	Cargo barge Freighter	5,000-10,000 over 15,000	400-500 over 700	Collision with vessel, overtaking situation
41721	01-74	Day	Cargo barge Tug	5,000-10,000 15-100	300-400 65-100	Collision with vessel while docking or undocking
42225	10-73	Nite	Freighter Tank barge Tug	5,000-10,000 5,000-10,000 100-300	400-500 400-500 100-200	Collision with vessel, meeting situation
42739	11-73	Nite	Fishing Fishing Fishing	100-300 15-100 15-100	65-100 65-100 65-100	Collision with vessel anchored or moored
40026	04-73	Nite	Cargo barge Cargo barge Tug	500-1,000 500-1,000 15-100	200-300 200-300 65-100	Collision with floating or submerged object (other than ground)
41664	01-74	Nite	Passenger	15-100	under 65	Collision with floating or submerged object
41882	03-74	Day	Passenger	15-100	65-100	Collision with floating or submerged object
42625	05-74	Day	Fishing	under 15	under 65	Collision with floating or submerged object
40025	05-73	Day	Tankship Tug Tug	10,000-15,000 100-300 100-300	600-700 100-200 100-200	Collision with fixed objects, piers, bridges, etc.
40393	08-73	Day	Cargo barge	100-300	100-200	Collision with fixed objects
40443	08-73	Day	Tank barge	500-1,000	100-200	Collision with fixed objects
41404	11-74	Day	Cargo barge Tug	300-500 15-100	100-200 under 65	Collision with fixed objects, piers, bridges, etc.

<u>CASE NO.</u>	<u>DATE</u>	<u>TOD</u>	<u>TYPE OF VESSEL</u>	<u>GROSS TONNAGE</u>	<u>LENGTH (FT.)</u>	<u>NATURE OF CASUALTY</u>
41492	12-74	Nite	Tug Tanker (1)	100-300 5,000-10,000	65-100 400-500	Collision with fixed objects, piers, bridges, etc.
41622	11-73	Day	Construction Tug	500-1,000 15-100	100-200 under 65	Collision with fixed objects, piers, bridges, etc.
41624	12-74	Day	Cargo barge Cargo barge Tug	300-500 300-500 15-100	100-200 100-200 under 65	Collision with fixed objects, piers, bridges, etc.
41880	03-74	Day	Dredge Tug	300-500 15-100	100-200 under 65	Collision with fixed objects, piers, bridges, etc.
42605	05-74	Nite	Other (2) Fishing	15-100 15-100	under 65 under 65	Collision with fixed objects, piers, bridges, etc.
42983	05-74	Day	Construction Tug	300-500 15-100	100-200 under 65	Collision with fixed objects, piers, bridges, etc.
41407	11-74	Day	Other (2)	15-100	under 65	Explosion and/or fire
41343	01-74	Nite	Passenger	15-100	under 65	Fire, vessel's structure
41102	11-73	Nite	Fishing	15-100	65-100	Fire, vessel's structure
41245	12-74	Day	Passenger	15-100	under 65	Fire, vessel equipment
43025	03-74	Day	Tug	300-500	100-200	Grounding with damage
40806	07-74	Nite	Cargo barge Tug	500-1,000 100-300	100-200 65-100	Grounding with damage
42628	04-74	Nite	Cargo barge Tug	300-500 15-100	100-200 under 65	Grounding with damage
43029	06-74	Day	Fishing	15-100	under 65	Grounding with damage
41532	12-74	Day	Cargo barge Tug	100-300 15-100	100-200 under 65	Grounding with damage
42395	03-74	Nite	Tug	100-300	65-100	Grounding with damage

(1) Foreign vessel

(2) Other U.S. vessels and crafts such as pleasure, research, cableships, or those not otherwise classified.

<u>CASE NO.</u>	<u>DATE</u>	<u>TOD</u>	<u>TYPE OF VESSEL</u>	<u>GROSS TONNAGE</u>	<u>LENGTH (FT.)</u>	<u>NATURE OF CASUALTY</u>
41410	01-74	Day	Tank barge Tug	5,000-10,000 15-100	400-500 65-100	Grounding with damage
43026	06-74	Day	Tank barge Tug	1,000-5,000 100-300	200-300 100-200	Grounding with damage
42465	01-73	Nite	Fishing	15-100	under 65	Grounding with damage
41531	12-73	Nite	Fishing	100-300	65-100	Grounding with damage
40806	07-73	Nite	Cargo barge Tug	500-1,000 100-300	100-200 65-100	Grounding with damage
42883	05-74	Day	Cargo barge Tug	1,000-5,000 100-300	300-400 65-100	Grounding with damage
41536	12-74	Nite	Fishing	100-300	65-100	Grounding with damage
42627	04-74	Nite	Tankship Tug Tug	over 15,000 100-300 100-300	600-700 65-100 65-100	Grounding with damage
41625	01-74	Day	Passenger	15-100	65-100	Grounding with damage
42077	03-74	Day	Other (2)	15-100	under 65	Grounding with damage
40511	08-73	Day	Passenger	under 15	under 65	Grounding without damage
43025	06-74	Day	Cargo barge Tug	5,000-10,000 100-300	400-500 100-200	Grounding without damage
41409	01-74	Nite	Tankship	over 15,000	600-700	Grounding without damage
41424	12-74	Day	Tanker (1) Tug Tug	over 15,000 100-300 100-300	600-700 65-100 65-100	Grounding without damage
42000	08-73	Day	Cargo barge Tug	500-1,000 15-100	100-200 under 65	Grounding without damage
40807	10-74	Day	Tankship Tug	over 15,000 100-300	600-700 65-100	Grounding without damage

(1) Foreign vessel

(2) Other U.S. vessels and crafts such as pleasure, research, cableships, or those not otherwise classified.



<u>CASE NO.</u>	<u>DATE</u>	<u>TOD</u>	<u>TYPE OF VESSEL</u>	<u>GROSS TONNAGE</u>	<u>LENGTH (FT.)</u>	<u>NATURE OF CASUALTY</u>
42994	06-74	Day	Freighter (1)	10,000-15,000	500-600	Grounding without damage
40664	08-73	Day	Tank barge Tug	over 15,000 100-300	500-600 100-200	Grounding without damage
42113	03-74	Nite	Tank barge Tug	10,000-15,000 100-300	500-600 100-200	Grounding without damage
42631	05-74	Nite	Tank barge	1,000-5,000	200-300	Grounding without damage
40663	08-73	Nite	Tanker (1)	10,000-15,000	500-600	Grounding without damage
42186	04-74	Nite	Freighter (1)	1,000-5,000	100-200	Grounding without damage
40425	07-73	Day	Tanker (1)	over 15,000	600-700	Grounding without damage
41885	02-74	Nite	Freighter (1)	1,000-5,000	600-700	Grounding without damage
40409	06-73	Day	Freighter (1) Tug Tug	over 15,000 100-300 100-300	600-700 65-100 65-100	Grounding without damage
42026	01-74	Nite	Fishing	15-100	under 65	Grounding without damage
42371	05-74	Day	Tank barge	over 15,000	600-700	Grounding without damage
40337	08-73	Day	Freighter Tug	5,000-10,000 100-300	400-500 100-200	Grounding without damage
42095	01-74	Day	Other (2)	15-100	under 65	Grounding without damage
40318	06-73	Nite	Freighter Tug	5,000-10,000 100-300	300-400 100-200	Grounding without damage
41150	12-74	Nite	Freighter (1)	5,000-10,000	500-600	Grounding without damage
40956	08-73	Day	Cargo barge	100-300	100-200	Grounding without damage
41627	02-74	Day	Tanker (1)	over 15,000	over 700	Grounding without damage
41529	12-74	Day	Freighter (1)	1,000-5,000	300-400	Grounding without damage

(1) Foreign vessel

(2) Other U.S. vessels and crafts such as pleasure, research, cableships, or those not otherwise classified.

CASE NO.	DATE	TOD	TYPE OF VESSEL	GROSS TONNAGE	LENGTH (FT.)	NATURE OF CASUALTY
41408	01-74	Nite	Cargo barge Tug	500-1,000 15-100	100-200 under 65	Grounding without damage
41623	12-74	Day	Tug	100-300	65-100	Grounding without damage
40117	06-73	Nite	Cargo barge Tug	5,000-10,000 100-300	300-400 65-100	Grounding without damage
40118	06-73	Day	Cargo barge Cargo barge Tug	100-300 100-300 15-100	100-200 100-200 under 65	Grounding without damage
43027	05-74	Day	Other (2)	under 15	under 65	Foundering
41705	09-73	Nite	Fishing	100-300	65-100	Foundering
42738	06-74	Day	Passenger	under 15	under 65	Foundering
43235	09-73	Nite	Tug	15-100	under 65	Foundering
42651	10-74	Nite	Fishing	15-100	65-100	Foundering
41423	01-74	Day	Dredge	300-500	100-200	Material failure, structure
40116	09-73	Day	Tug	15-100	under 65	Material failure, structure
40024	06-73	Day	Fishing	15-100	under 65	Material failure, structure
40947	10-73	Nite	Cargo barge Tug	unknown 15-100	100-200 under 65	Material failure, machinery and associated equipment
51562	11-74	Nite	Tank barge Tank barge Tug Tug	over 15,000 1,000-5,000 100-300 500-1,000	500-600 unknown 65-100 100-200	Collision, meeting situation
52682	05-75	Day	Tank barge Tug	1,000-5,000 100-300	200-300 65-100	Collision, meeting situation
52945	05-75	Nite	Foreign vessel (3) Other (2)	15-100 15-100	under 65 under 65	Collision, crossing situation

(1) Foreign vessel

(2) Other U.S. vessels and crafts such as pleasure, research, cableships, or those not otherwise classified

(3) Type of vessel not identified

CASE NO.	DATE	TOD	TYPE OF VESSEL	GROSS TONNAGE	LENGTH (FT.)	NATURE OF CASUALTY
51494	12-74	Day	Freighter (1) Cargo barge Tug	10,000-15,000 5,000-10,000 100-300	400-500 400-500 100-200	Collision, overtaking situation
53084	03-75	Day	Freighter (1) Tank barge Tug Tug	over 15,000 5,000-10,000 100-300 100-300	over 700 400-500 65-100 65-100	Collision with vessel anchored or moored
50175	05-74	Day	Passenger Other (2)	15-100 unknown	under 65 unknown	Collision with vessel while docking or undocking
51293	11-74	Day	Freighter Tank barge Tug Tug Tug	5,000-10,000 10,000-15,000 300-500 100-300 100-300	unknown 500-600 100-200 65-100 65-100	Collision with vessel while docking or undocking
52164	04-75	Nite	Tank barge Tug	1,000-5,000 100-300	200-300 100-200	Collision with vessel not under command
52133	01-75	Nite	Fishing	15-100	under 65	Collision with vessel NOC
51776	01-75	Day	Cargo barge Tug Cargo barge	1,000-5,000 100-300 1,000-5,000	100-200 65-100 100-200	Collision with vessel not under command
50293	08-74	Nite	Tank barge Construction Tug	15-100 15-100 under 15	65-100 65-100 under 65	Collision with vessel not under command
52957	03-75	Nite	Tankship Tug	10,000-15,000 100-300	600-700 65-100	Collision with fixed objects, piers, bridges, etc.
52163	01-75	Day	Fishing Fishing	100-300 15-100	65-100 under 65	Collision with fixed objects, piers, bridges, etc.
52057	03-75	Nite	Tanker (1) Tug	1,000-5,000 100-300	300-400 65-100	Collision with fixed objects, piers, bridges, etc.

(1) Foreign vessel

(2) Other U.S. vessels and crafts such as pleasure, research, cables, ships, or those not otherwise classified



CASE NO.	DATE	TOD	TYPE OF VESSEL	GROSS TONNAGE	LENGTH (FT.)	NATURE OF CASUALTY
52953	04-75	Day	Fishing	15-100	under 65	Collision with fixed objects, piers, bridges, etc.
52957	03-75	Nite	Tug	100-300	65-100	Collision with fixed objects, piers, bridges, etc.
51432	11-74	Day	Fishing	15-100	65-100	Explosion and/or fire involving vessel's fuel
50595	07-74	Day	Cargo barge Dredge	500-1,000 500-1,000	100-200 100-200	Fire, vessel structure
50399	08-74	Nite	Fishing	15-100	under 65	Fire, vessel structure
51240	10-74	Nite	Tankship	10,000-15,000	500-600	Explosion, boiler
50442	03-74	Day	Tank barge Tug	10,000-15,000 300-500	500-600 100-200	Grounding with damage
52058	02-75	Day	Fishing	15-100	65-100	Grounding with damage
51364	12-74	Day	Passenger	15-100	under 65	Grounding with damage
52128	03-75	Day	Tankship	10,000-15,000	500-600	Grounding with damage
51233	12-74	Nite	Freighter (1)	under 15	500-600	Grounding with damage
52954	04-75	Nite	Fishing	under 15	under 65	Grounding with damage
51560	01-75	Day	Freighter (1)	10,000-15,000	500-600	Grounding with damage
51878	06-74	Day	Construction Tug	100-300 15-100	100-200 under 65	Grounding with damage
51054	11-74	Nite	Fishing	15-100	under 65	Grounding with damage
50618	09-74	Day	Freighter (1)	over 15,000	600-700	Grounding without damage
52677	05-75	Day	Tankship	10,000-15,000	600-700	Grounding without damage
50620	08-74	Day	Tank barge Tug	5,000-10,000 100-300	400-500 65-100	Grounding without damage
51565	07-74	Day	Freighter (1)	over 15,000	600-700	Grounding without damage

- (1) Foreign vessel  
(2) Other U.S. vessels and crafts such as pleasure, research, cbaleships, or those not otherwise classified.

<u>CASE NO.</u>	<u>DATE</u>	<u>TOD</u>	<u>TYPE OF VESSEL</u>	<u>GROSS TONNAGE</u>	<u>LENGTH (FT.)</u>	<u>NATURE OF CASUALTY</u>
50185	07-74	Day	Tankship	10,000-15,000	500-600	Grounding without damage
52131	03-75	Day	Other (2)	under 15	under 65	Grounding without damage
50324	07-74	Nite	Tank barge Tug	1,000-5,000 100-300	300-400 100-200	Grounding without damage
51497	12-74	Day	Passenger	15-100	65-100	Grounding without damage
50122	07-74	Day	Cargo barge Tug	1,000-5,000 100-300	300-400 65-100	Grounding without damage
51398	12-74	Day	Tankship	10,000-15,000	600-700	Grounding without damage
52397	05-75	Nite	Tankship	10,000-15,000	600-700	Grounding without damage
50619	08-74	Nite	Cargo barge Tug	1,000-5,000 100-300	300-400 65-100	Grounding without damage
52165	03-75	Day	Tankship	over 15,000	600-700	Grounding without damage
50038	05-74	Day	Fishing	15-100	under 65	Grounding without damage
51879	10-74	Nite	Tank barge Tug	5,000-10,000 15-100	400-500 100-200	Grounding without damage
52478	04-75	Nite	Tanker (1)	over 15,000	600-700	Grounding without damage
51532	12-74	Day	Cargo barge Tug	5,000-10,000 100-300	400-500 100-200	Grounding without damage
52949	06-75	Nite	Tank barge Tug	10,000-15,000 300-500	500-600 100-200	Grounding without damage
51109	11-74	Nite	Cargo barge Tug	5,000-10,000 100-300	300-400 100-200	Grounding without damage
52946	06-75	Nite	Freighter (1)	1,000-5,000	300-400	Grounding without damage
51378	12-74	Nite	Cargo barge Tug	5,000-10,000 300-500	400-500 100-200	Grounding without damage
52171	01-75	Nite	Freighter (1)	5,000-10,000	400-500	Grounding without damage
51234	04-74	Day	Freighter (1)	10,000-15,000	500-600	Grounding without damage

(1) Foreign vessel

(2) Other U.S. vessels and crafts such as pleasure, research, cablesheps, or those not otherwise classified.

<u>CASE NO.</u>	<u>DATE</u>	<u>TO D</u>	<u>TYPE OF VESSEL</u>	<u>GROSS TONNAGE</u>	<u>LENGTH (FT.)</u>	<u>NATURE OF CASUALTY</u>
51236	12-74	Day	Passenger	15-100	under 65	Grounding without damage
52958	12-74	Nite	Freighter (1)	5,000-10,000	400-500	Grounding without damage
51235	08-74	Day	Freighter (1)	5,000-10,000	500-600	Grounding without damage
51484	11-74	Nite	Fishing	15-100	65-100	Grounding without damage
50973	10-74	Day	Freighter (1)	1,000-5,000	500-600	Grounding without damage
51055	10-74	Day	Tank barge Tug	1,000-5,000 15-100	200-300 65-100	Grounding without damage
50494	06-74	Nite	Dredge	15-100	under 65	Foundering
52948	06-75	Nite	Tug	15-100	under 65	Foundering
50594	09-74	Nite	Tug	100-300	65-100	Foundering
51238	12-74	Nite	Fishing	under 15	under 65	Foundering
52950	06-75	Day	Cargo barge Tug	300-500 15-100	100-200 under 65	Foundering
52955	03-75	Day	Fishing	15-100	under 65	Foundering

(1) Foreign vessel