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MARINE TRAFFIC DATA OF SOUTHERN CALIFORNIA

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

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16. Abstract

Data was recorded on the marine traffic and VHF-FM marine communications channel usage along the southern California coast during the period of 31 January 1977 to 13 March 1977. The marine traffic data was recorded by means of time-lapse photography of a radar display at Long Beach, Port Hueneme, Point Conception, and San Diego. Recordings were made of the communications on VHF-FM maritime mobile Channels 13 and 16 as received at the sites.

The daily average of the marine traffic, including large, medium, small, tugs-in-tow, and military vessels at Long Beach was 69, at Port Hueneme was 61, at Point Conception was 19, and at San Diego was 98 vessels. During the data collection period the majority of the vessels appeared to utilize the Traffic Separation Scheme where warranted.

Approximately 720 hours of communications on VHF-FM Channels 13 and 16 were recorded and monitored to determine channel efficiency and utilization. Channel 13 efficiency/utilization at Long Beach was 49.4%/3.68%, at Port Hueneme was 33.9%/0.79%, at San Diego was 90.1%/3.39%. Channel 16 efficiency and utilization at Long Beach was 61.6%/16.17%, at Port Hueneme was 64.9%/12.69%, at Point Conception was 66.5%/5.04%, at San Diego was 70.6%/8.62%.

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METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	*miles*	1.6	kilometers	km
	AREA			
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
	MASS (weight)			
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
	VOLUME			
tsp	teaspoons	5	milliliters	ml
Tbsp	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^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
	TEMPERATURE (exact)			
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). 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.



Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
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
	AREA			
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
	MASS (weight)			
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
	VOLUME			
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^3	cubic meters	35	cubic feet	ft^3
m^3	*cubic meters*	1.3	cubic yards	yd^3
	TEMPERATURE (exact)			
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F

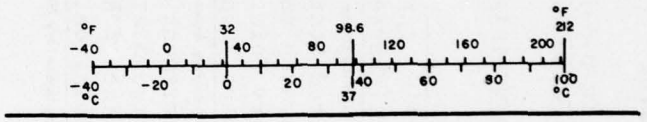


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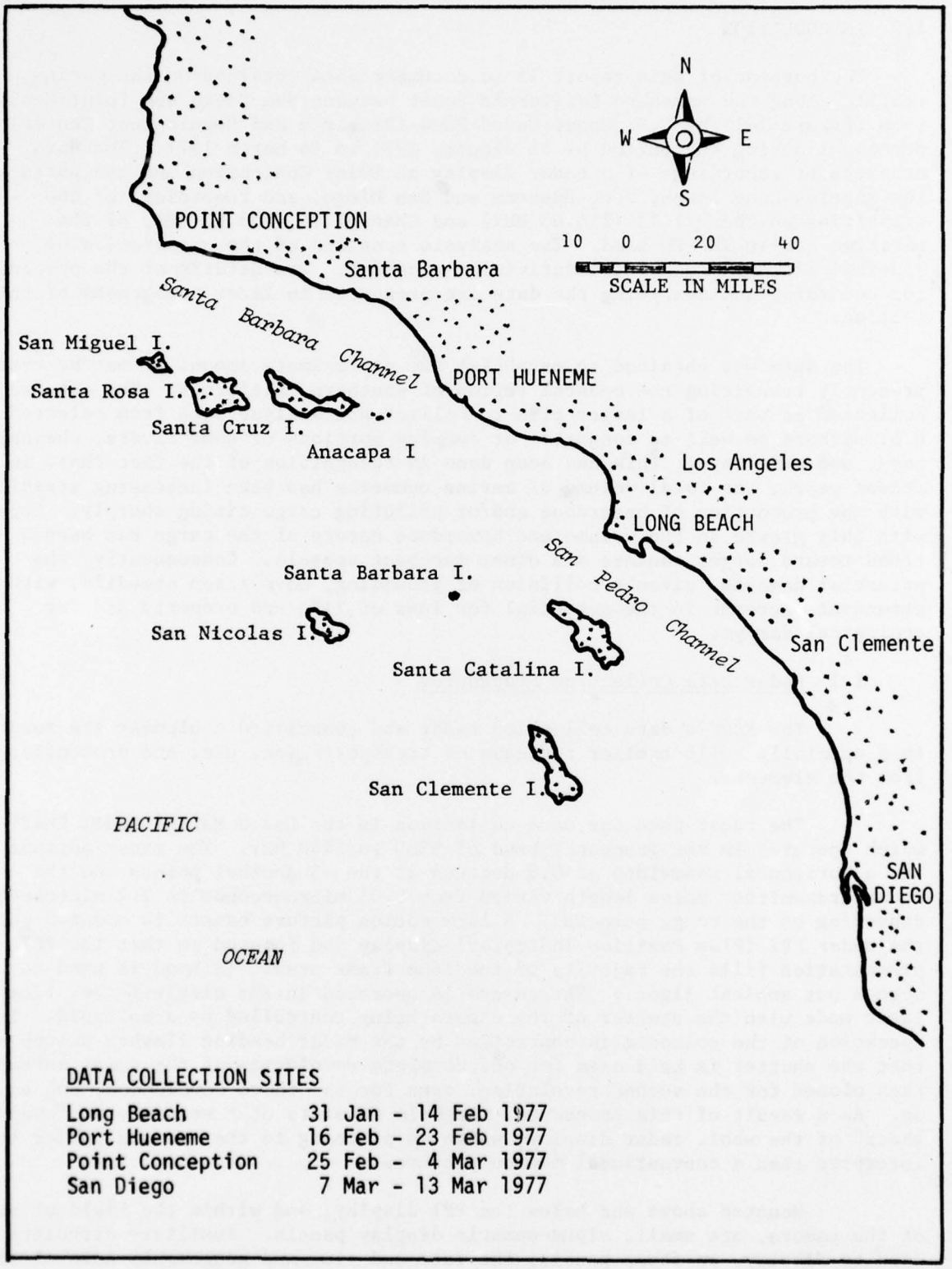


FIGURE 1-1: AREA OF DATA COLLECTION

1.0 INTRODUCTION

The purpose of this report is to document data obtained on the marine traffic along the southern California coast between San Diego and Point Conception (Figure 1-1) by U.S. Coast Guard R&DC (Research and Development Center) personnel during the period of 31 January 1977 to 14 March 1977. The data consists of recordings of a radar display at Point Conception and the ports of Los Angeles-Long Beach, Port Hueneme and San Diego, and 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 of this section.

The data was obtained to establish the approximate amount of marine traffic presently transiting the coastal region of southern California. 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 has been done in recognition of 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 has been a trend toward larger tankers and other merchant vessels. Consequently, the potential damages, given a collision or grounding, have risen steadily, with an attendant increase in the potential for loss of life and property and for ecological damage.

1.1 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 the 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 frame 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 being controlled by a solenoid. The operation of the solenoid is controlled 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 a sequence of "snap-shots" of the whole radar display, 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 practice has been adopted of orienting the display so that true North is 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 probably not accurate to better than ± 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 arranged 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 has been located at a given site, tested, and adjusted, data was usually recorded on a 24-hour-a-day basis for seven days. A few minutes of data are lost every five hours when the film is changed; otherwise, a frame is exposed approximately every five seconds during the 7-day period.

1.2 Site Selection

To afford the extended range of radar detection of offshore marine traffic, sites of higher elevation were desired.

At Long Beach, the vicinity of Point Fermin was anticipated; however, because the area is heavily populated and access to the water's edge hampered, it was decided that the site that would afford the most (and most useful) data was on the Fort MacArthur Upper Reservation (U.S. Army), adjacent to Building 803, at position 30°42'45"N, 118°17'35"W. The height of the radar antenna, mounted on the southern part of Structure 806 and connected to the data collection trailer via forty feet of waveguide, was approximately 200 feet above sea level. All marine traffic between Balboa, California, to the south, Santa Monica to the north, and traffic transiting between the harbor and Santa Catalina Island passed through the radar coverage area. Figure 3-1 indicates the data collection site at Long Beach.

The terrain near the water's edge at Port Hueneme is low. The site that would allow the desired coverage was at the Port Hueneme Light (34°08'42"N, 119°12'30"W), the data collection trailer being placed against the eastern side of the structure. The radar antenna, mounted on the light's lower roof and connected to the trailer using forty-feet of waveguide, was approximately twenty feet above sea level. From this location all marine traffic transiting the Santa Barbara Channel between Point Dume to the east, Rincon Point to the west, and Anacapa Island to the south were within the radar coverage area. Figure 4-1 indicates the data collection site at Port Hueneme.

To collect data on the marine traffic entering and departing the western terminus of the Santa Barbara Channel, the site most accessible, with electrical power for trailer operation, was the Coast Guard Reservation at Point Conception. The data collection trailer was placed adjacent to the west wall of the emergency generator building, at position 32°26'55"N, 120°28'15"W. The radar antenna, mounted to the roof of the trailer, was approximately 200 feet above sea level. This site offered radar coverage of all marine traffic between Carpinteria, California, to the east, the northern shores of the Channel Islands to the south, and the Pacific Ocean to the west. Figure 5-1 indicates the data collection site at Point Conception.

At San Diego, it was decided that the site that would afford the most (and most useful) data was at Point Loma (Battery Humphrey - NELC), a ridged peninsula on the west side of the entrance to San Diego Bay, adjacent to the Cabrillo National Monument, position 32°39'59"N, 117°14'20"W. The height of the radar antenna, mounted to the roof of the data collection trailer, was approximately 400 feet above sea level. From this site all marine traffic transiting between Encinitas, California, to the north and Punta Descanso, Mexico, to the south, and within twenty-four miles of the coast, passed through the radar coverage area. Figure 6-1 indicates the data collection site at San Diego.

1.3 Radar Data Reduction

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 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

Vessel density is defined as the count of all vessels present within the radar coverage area, taken at fifteen-minute intervals. The vessels counted were classified by type, 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 vessel density does not include those vessels inside the breakwater at Long Beach nor those vessels entering or departing the harbor at Port Hueneme and San Diego.

The vessel speed data is based on the speed of virtually all of the vessels imaged by the radar. Vessel speeds were determined by noting the distance in hundreds of yards that the vessel traveled 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.

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.

To identify routes within a given radar coverage area, a plot of all vessels present at regular time intervals was made on a chart for each site. The date and time periods were chosen because of their exhibiting high vessel density for that site.

1.4 Communications Collection Procedures and Equipment

The data collection trailer was equipped, in addition to the radar system mentioned previously, with VHF-FM receivers tuned to Channel 13 (156.65 MHz) and Channel 16 (156.80 MHz) of the maritime mobile band. The audio output of these receivers and a time code were recorded on magnetic tape cassettes. In addition, the audio signal was 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 of these channels, both of which are important to ensuring 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), while Channel 13 is used by the bridge personnel of vessels meeting, overtaking, or crossing, to agree on the action they are each to take to avoid collision while transiting those waters governed by the navigation rules for harbors, rivers, and inland waters.

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 paper tape punch to record the current time (received from the digital clock) and the message length on paper tape. A block diagram of the system appears in Figure 1-2. The paper tape is then processed in a mini-computer, which generates histograms for the time of transmission and for message length from the data. Figure 1-3 lists the computer program used to analyze the communications data.

The receiver squelch settings were adjusted so that they opened due to noise bursts infrequently. The receivers were monitored frequently during the data punching process to ensure the system was operating properly and that the data was reasonable.

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

1.5 Communications Data Analysis

Approximately 720 hours of communications traffic from VHF-FM Channels 13 and 16 were recorded during the period of 31 January 1977 to 13 March 1977. The receiving antennas were located at the forward part of the data collection trailer.

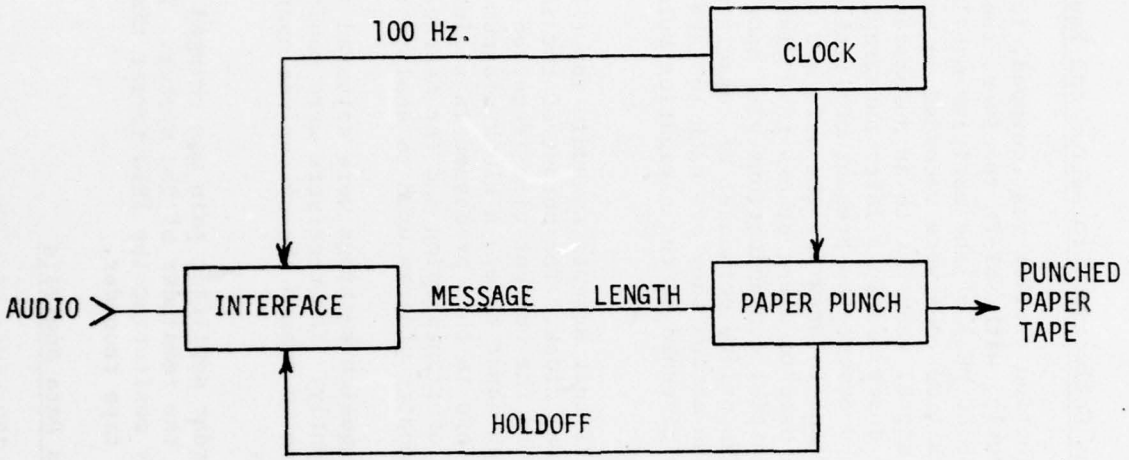


FIGURE 1-2: COMMUNICATIONS DATA COLLECTION

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

01.01 C INITILIZE THE PROGRAM
01.02 C THIS IS VERY SIMILAR TO THE 'FOCAL-69' ROUTINE
01.05 O 0;O 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 RETRUN"!
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,NR,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:;O 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;O 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;O 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((FITR(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)-FITR(TM/100)- 40)4.30;  S TM=TM+40
04.30 S TM=TM+15;Z T1,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;O 0;O 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
```

DEFINITIONS 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 analized. Normally either 13 or 16
I	Loop counter used throush out 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 duraton of either 00.0 or 00.1. These DO NOT appear in 'NR'.
TD	Temporary variable used to establish length of transmissions for Message Lensht Histogram.
TIME	Total time of transmissions found in 15 minute interval being analized (Not including any of 00.1 duration)
TM	Upper limit of 15 minute interval being analized.
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 "INITILIZE"

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

The reception of transmissions at Long Beach, Port Hueneme, and San Diego were from San Diego to Santa Barbara, with the majority of transmissions being from the local area. At Point Conception the majority of the transmissions received were from the Santa Barbara and Port Hueneme areas, with periodic reception from Long Beach.

The recordings were 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, a "valid" message is one that is appropriate for the channel that was used, including 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 indicate the percentage of messages transmitted that were appropriate for the particular channel that was used.

With respect to the computer-prepared histograms:

- 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 on duration of channel utilization obtained manually agreed well with those obtained by the automated equipment, indicating that the automated equipment is operating properly.

1.6 Weather Data

Weather data, including the cloud coverage, wind direction and velocity, and visibility in nautical miles, were collected every hour, on the hour, at each site during the data collection period.

At Long Beach, the following visibility percentages were recorded:

VISIBILITY	PERCENTAGE
>6 nautical miles	51%
4-6 nautical miles	31%
1-3 nautical miles	14%
<1 nautical mile	4%

The greatest period when visibilities were recorded at zero nautical miles was between 0400 and 0600 on Tuesday, 8 February 1977. There were times, however, when the visibility in the vicinity of the data collection trailer (elevation approximately 200 feet), which was recorded in the data, was significantly less than the visibility being experienced at sea level.

The following visibility percentages were recorded at Port Hueneme:

VISIBILITY	PERCENTAGE
>6 nautical miles	41%
4-6 nautical miles	30%
1-3 nautical miles	16%
<1 nautical mile	13%

The greatest period when visibilities were recorded at zero nautical miles was between 2300, Thursday, 17 February and 0200, Friday, 18 February 1977. On Friday, the visibilities remained at less than two nautical miles, with ground fog and haze, until 1400. The fog and haze remained, maintaining visibilities at three nautical miles or less until 1000, Saturday, 19 February 1977. During the period of 0100 to 0500, Sunday, 20 February 1977, visibilities were recorded at zero nautical miles, increasing to one nautical mile until 0900, when the visibility increased to five nautical miles. During the remainder of the data collection period, visibilities remained at greater than four nautical miles.

Visibilities at Point Conception remained at greater than six nautical miles during the data collection period. The winds, however, lived up to the name of "Cape Horn of the Pacific." In the evening, the wind would sometimes subside to calm; however, during daylight hours, winds had been recorded in excess of fifty knots. The primary direction of the winds was the west or northwest, but some winds were recorded from the east. The following velocity distribution was recorded:

VELOCITY	PERCENTAGE	VELOCITY	PERCENTAGE
0-10 knots	35%	31-40 knots	19%
11-20 knots	20%	41-50 knots	12%
21-30 knots	10%	51-60 knots	4%

The visibility at San Diego was greater than six nautical miles 88 percent of the data collection period, with four nautical miles being the minimum visibility recorded.

2.0 DISCUSSION OF DATA

The information contained in this chapter was collected at the various sites during the following periods:

Los Angeles-Long Beach	31 January to 14 February 1977
Port Hueneme	16 February to 23 February 1977
Point Conception	25 February to 4 March 1977
San Diego	7 March to 13 March 1977

The radar was operated on the twenty-four nautical mile scale at Los Angeles-Long Beach Harbors, Port Hueneme and San Diego. At Point Conception, the radar was operated on the forty-eight nautical mile scale. To better observe the marine traffic on its approach to and departure from the Los Angeles and Long Beach Harbors, the radar was operated on the twelve nautical mile scale during the period of 11 February to 14 February 1977. Figure 2-1 indicates the extent of the radar coverage at each site.

2.1 Vessel Activity

The vessel density within the radar coverage area at Los Angeles-Long Beach between 31 January and 7 February 1977 is presented in Figures 3-2 through 3-9, the data for the remainder of the data collection period is not presented because of its similarity to the data already presented. The maximum number of simultaneous movements observed at Long Beach was 149, occurring at 1300, Saturday, 13 February 1977. This number represents the presence of 2 large, 4 anchored, and 143 small vessels.

The vessel density at Port Hueneme is presented in Figures 4-2 through 4-9. The majority of the vessels present were of the medium classification, consisting of the vessels operating between the Port Hueneme Harbor and offshore platforms. The maximum number of simultaneous movements observed at Port Hueneme was 21, occurring at 1245, Saturday, 19 February 1977, representing the presence of one medium and twenty small vessels.

Figures 5-2 through 5-9 indicate the vessel density at Point Conception. It should be noted that the time interval between the vessel counts was increased from 15 minutes to 30 minutes because of the extended time which the vessel appeared on the radar image. The maximum number of simultaneous movements observed at Point Conception was 8, occurring five times during the collection period. The dates and times of occurrence are as follows: 0130, Sunday, 27 February (8 large); 0500, Monday, 28 February (7 large, 1 medium); 2230, Monday, 28 February (8 large); 0100 and 0130, Tuesday, 1 March (8 large).

The vessel density at San Diego is presented in Figures 6-2 through 6-8. It was not always possible to determine the identity of military vessels from non-military vessels, especially when the vessel's track did not specifically indicate its operation in naval maneuvers. For this reason, the vessel classification does not specifically indicate military vessels. The maximum number of simultaneous movements observed at San Diego was 40, occurring at 1645 on Saturday, 12 March 1977. This number represents the presence of 26 medium and 14 small vessels.

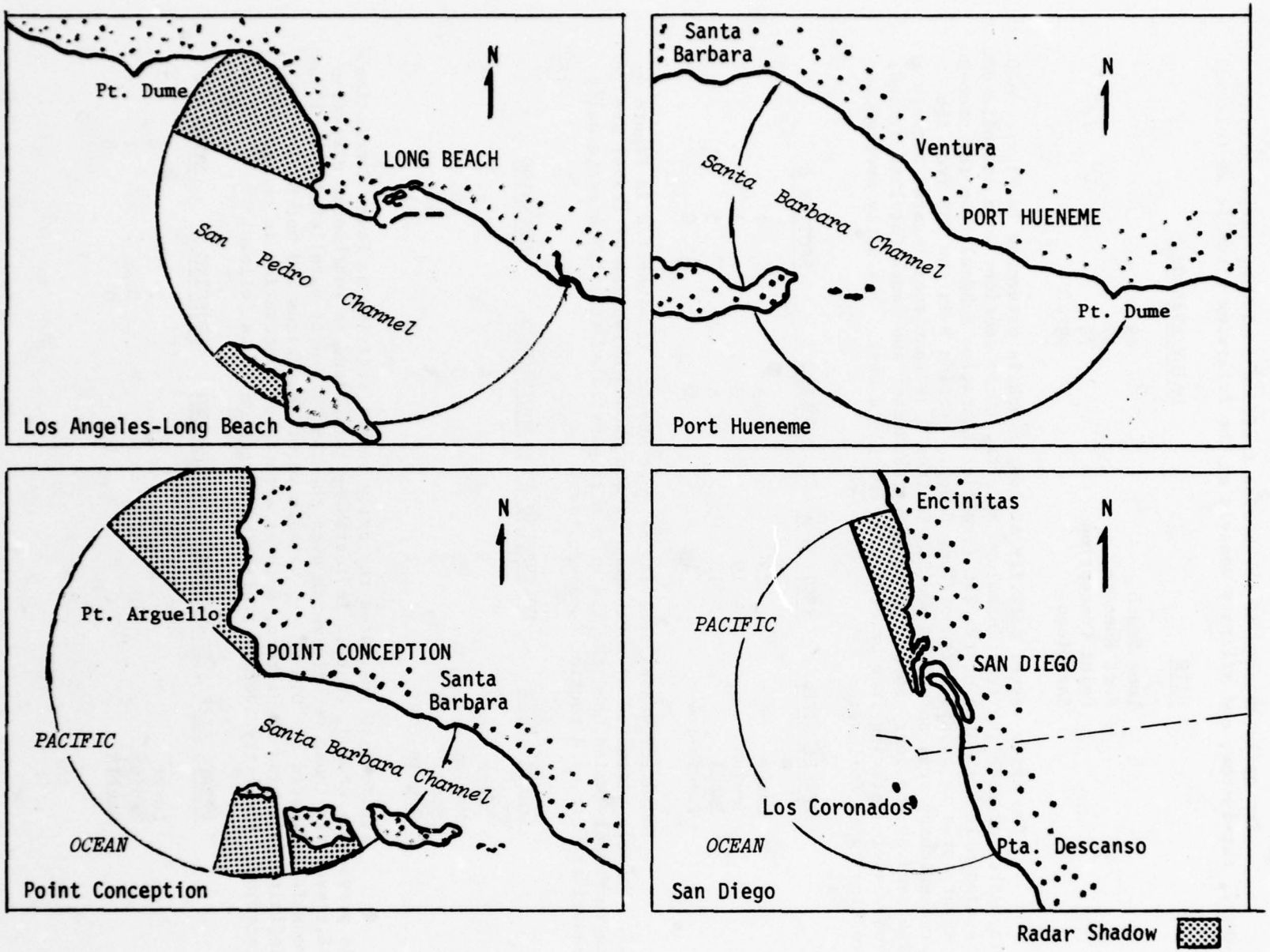


FIGURE 2-1: AREAS OF RADAR COVERAGE

The daily average of the marine traffic, including large, medium, small, tug-in-tow, and military vessels at the following sites is as follows:

SITE	DAILY AVERAGE
Long Beach	69
Port Hueneme	67
Point Conception	19
San Diego	98

The daily vessel activity at Long Beach is presented in Figure 3-10. To better present the traffic volume by area, three sections were established. Section A is that area of the TSS (Traffic Separation Scheme) from the precautionary area to points north of Long Beach. Section B is the TSS from the precautionary area to points south. Section C is that area located between the TSS used by the ferry operating between the harbor and Santa Catalina Island, and vessels entering from or departing to points west. The daily average per section is as follows:

VESSEL SIZE	SECTION A	SECTION B	SECTION C
Large	13	5	2
Medium	10	8	7
Small	10	8	5
Tug-in-tow	1	0	0

The daily vessel activity at Port Hueneme is presented in Figure 4-10. Vessels indicated by northbound or southbound direction of travel are those vessels which used the TSS or nearly paralleled it. The average daily vessel traffic by direction is as follows:

VESSEL SIZE	NORTHBOUND	SOUTHBOUND	CROSSING
Large	9	8	1
Medium	3	3	19
Small	3	4	11
Tug-in-tow	1	1	1

Figure 5-10 indicates the daily vessel activity at Point Conception. As previously stated, vessels indicated by northbound or southbound direction of travel are those vessels which used the TSS or nearly paralleled it. Those vessels indicated by "OTHER" are vessels whose tracklines did not follow a definite direction or pattern, such as erratic or maneuvering in one general location. The daily average traffic by direction is as follows:

VESSEL SIZE	NORTHBOUND	SOUTHBOUND	CROSSING	OTHER
Large	9	7	2	0
Medium	0	0	0	1
Small*	0	0	0	0

*Although the count of small vessels indicates zero, small vessels were visually observed operating near the coast during the data collection period. The possibility exists that they were beyond radar detection at their greater distance from the site and obscured by the bright center of the radar, in which individual ship returns cannot be distinguished.

The daily vessel activity at San Diego is indicated in Figure 6-9. To better present the positions of the vessels, an imaginary line was drawn in a westerly direction from Point Loma, dividing the area into two sections. The area north of this line was designated Section A, the area south of the line designated Section B. Because no definite direction, such as north or south, was always indicated by the vessels approaching or departing the harbor, direction is indicated of the vessel being either inbound or outbound from the harbor. The daily average per section is as follows:

VESSEL SIZE	SECTION A	SECTION B
Large	20	17
Medium	29	19
Small	9	3
Tug-in-tow	1	1

The possibility exists that vessels, primarily naval vessels, may have gone beyond the limits of the radar and later returned to within the coverage area. These vessels were counted as a new contact.

The traffic flow in the areas under observation was such that there were the following situations:

SITE	MEETING SITUATION	OVERTAKING SITUATION	CROSSING SITUATION	CLOSE ENCOUNTER
Long Beach	0	12	10	34
Port Hueneme	40	10	7	13
Point Conception	0	5	1	1
San Diego	0	11	2	28

2.2 Vessel Speeds

The vessel speed data is based on the speed of virtually all of the vessels imaged by the radar. At Long Beach, this data does not include those vessels operating inside the breakwaters, nor does it include those vessels operating in the harbor areas at Port Hueneme and San Diego. A summary follows:

Long Beach

31 Jan - Monday 3.0 - 20.0 knots (10.4 knots average)
1 Feb - Tuesday 3.0 - 18.0 knots (09.4 knots average)
2 Feb - Wednesday 3.0 - 29.0 knots (11.9 knots average)

3 Feb - Thursday	3.0 - 23.0 knots	(09.6 knots average)
4 Feb - Friday	2.0 - 24.0 knots	(10.4 knots average)
5 Feb - Saturday	5.0 - 18.0 knots	(10.1 knots average)
6 Feb - Sunday	4.0 - 20.0 knots	(10.5 knots average)
7 Feb - Monday	2.0 - 22.0 knots	(08.9 knots average)

Vessel speed data for Long Beach is indicated in Figures 3-11 through 3-18.

Port Hueneme

16 Feb - Wednesday	6.0 - 26.0 knots	(12.4 knots average)
17 Feb - Thursday	2.0 - 22.0 knots	(10.6 knots average)
18 Feb - Friday	2.0 - 26.0 knots	(12.2 knots average)
19 Feb - Saturday	2.0 - 22.0 knots	(10.9 knots average)
20 Feb - Sunday	2.0 - 23.0 knots	(12.2 knots average)
21 Feb - Monday	3.0 - 27.0 knots	(12.4 knots average)
22 Feb - Tuesday	4.0 - 27.0 knots	(14.1 knots average)
23 Feb - Wednesday	6.0 - 24.0 knots	(12.9 knots average)

Vessel speed data for Port Hueneme is presented in Figures 4-11 through 4-18.

Point Conception

25 Feb - Friday	6.0 - 24.0 knots	(13.9 knots average)
26 Feb - Saturday	8.0 - 32.0 knots	(16.2 knots average)
27 Feb - Sunday	6.0 - 26.0 knots	(15.6 knots average)
28 Feb - Monday	8.0 - 20.0 knots	(15.6 knots average)
1 Mar - Tuesday	11.0 - 24.0 knots	(15.2 knots average)
2 Mar - Wednesday	10.0 - 24.0 knots	(15.2 knots average)
3 Mar - Thursday	8.0 - 23.0 knots	(17.0 knots average)
4 Mar - Friday	10.0 - 26.0 knots	(15.3 knots average)

Vessel speed data for Point Conception is presented in Figures 5-11 through 5-18.

San Diego

7 Mar - Monday	2.0 - 20.0 knots	(09.11 knots average)
8 Mar - Tuesday	2.0 - 19.0 knots	(08.52 knots average)
9 Mar - Wednesday	2.0 - 25.0 knots	(08.99 knots average)
10 Mar - Thursday	2.0 - 20.0 knots	(09.85 knots average)
11 Mar - Friday	3.0 - 28.0 knots	(09.88 knots average)
12 Mar - Saturday	2.0 - 20.0 knots	(07.42 knots average)
13 Mar - Sunday	4.0 - 19.0 knots	(10.02 knots average)

Vessel speed data for San Diego is presented in Figures 6-10 through 6-16.

All vessel speed data are composed of two elements: 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. The radar returns were not always distinct and symmetrical, the placement at the center of the return involving some estimation.

2.3 Route Identification

A route identification of the marine traffic transiting the San Pedro Channel between 1300 and 2345 on Tuesday, 1 February 1977, is presented in Figure 3-19, showing the transits of ten large and four medium vessels, and two tugs-in-tow. Because of the chart's scale, it was not practical to plot the transits of the small vessels, primarily pleasure craft, that were operating near the entrance to the harbors.

The routes of eleven large, eleven medium, and four small vessels, and two tugs-in-tow that transited the Santa Barbara Channel between 1200 and 2400 on Friday, 18 February 1977, is presented in Figure 4-19.

The tracks of twenty large vessels transiting the western terminus of the Santa Barbara Channel at Point Conception from 0000 to 1200 on Thursday, 3 March 1977, is presented in Figure 5-19.

Figure 6-17 shows the transits of nineteen large, five medium, and four small vessels operating off the San Diego coast between 1200 and 1600 on Wednesday, 9 March 1977.

2.4 Communications Efficiency

Communications Message Activity and Channel Efficiency data for Long Beach from 31 January to 7 February 1977 are presented in Figures 3-20 through 3-51; for Port Hueneme in Figures 4-20 through 4-37; for Point Conception in Figures 5-20 through 5-23; and for San Diego in Figures 6-18 through 6-45.

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

SITE	CHANNEL 13	CHANNEL 16
Long Beach	49.4%	61.6%
Port Hueneme	33.9%	64.9%
Point Conc	---- *	66.5%
San Dieg	90.1%	70.6%

*Channel 13 was monitored and recorded at Point Conception; however, the transmissions received were insignificant and did not pertain to the area.

Computer-prepared histograms indicating channel utilization at Long Beach are presented in Figures 3-52 through 3-55; for Port Hueneme in Figures 3-38 through 4-40; for Point Conception in Figures 5-24 through 5-25; and for San Diego in Figures 6-46 through 6-49.

Channel utilization exhibited the following peak and average values at the various sites:

SITE	CHANNEL 13 PEAK	CHANNEL 13 AVERAGE	CHANNEL 16 PEAK	CHANNEL 16 AVERAGE
Long Beach	41%	3.68%	98%	16.17%
Port Hueneme	13%	0.79%	54%	12.69%
Point Conception	---	---- *	30%	5.04%
San Diego	34%	3.39%	57%	8.62%

*Channel 13 was monitored and recorded at Point Conception; however, the transmissions received were insignificant and did not pertain to the area.

3.0 LONG BEACH GRAPHS AND HISTOGRAMS

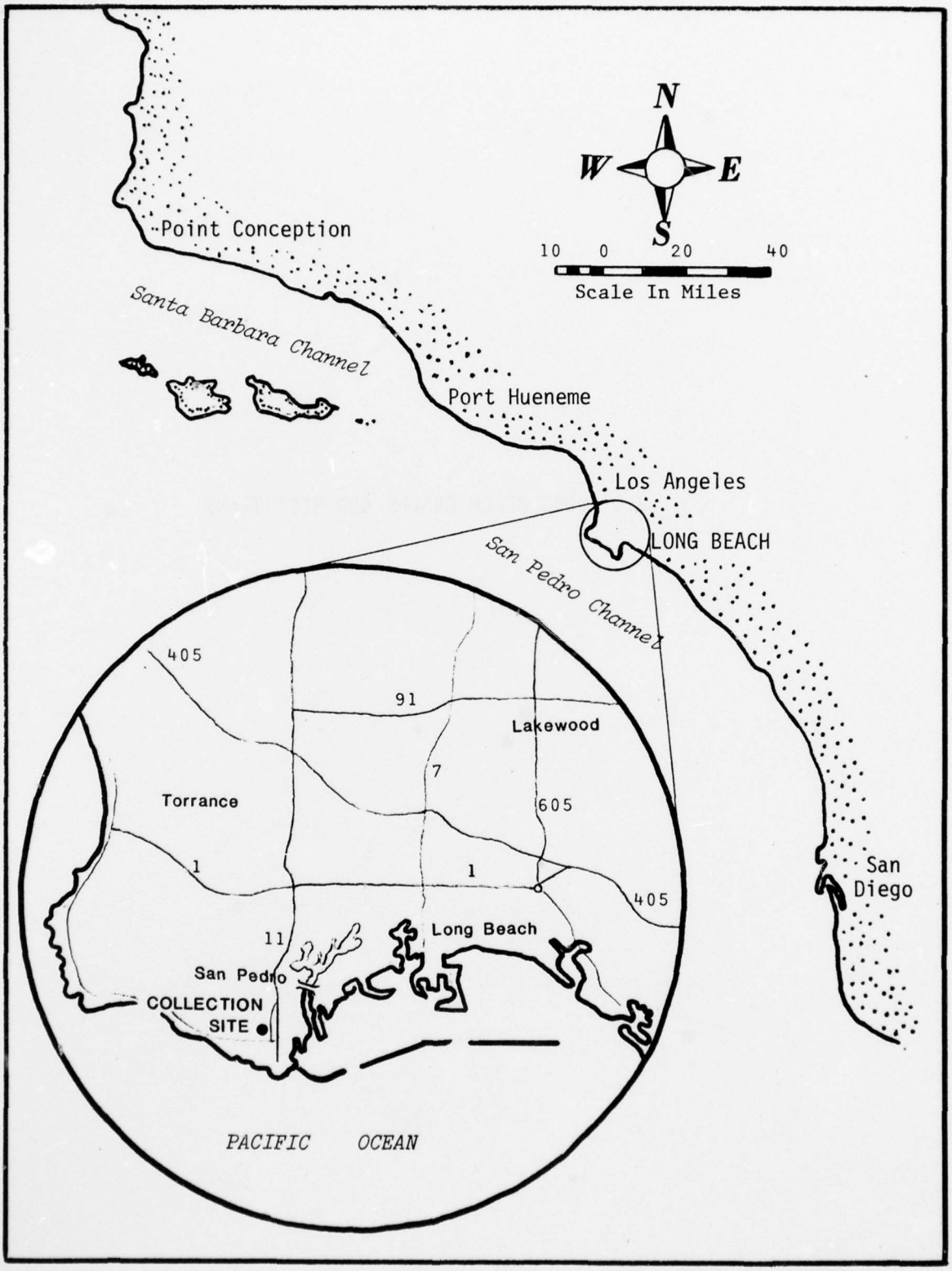


FIGURE 3-1: LONG BEACH, CALIFORNIA

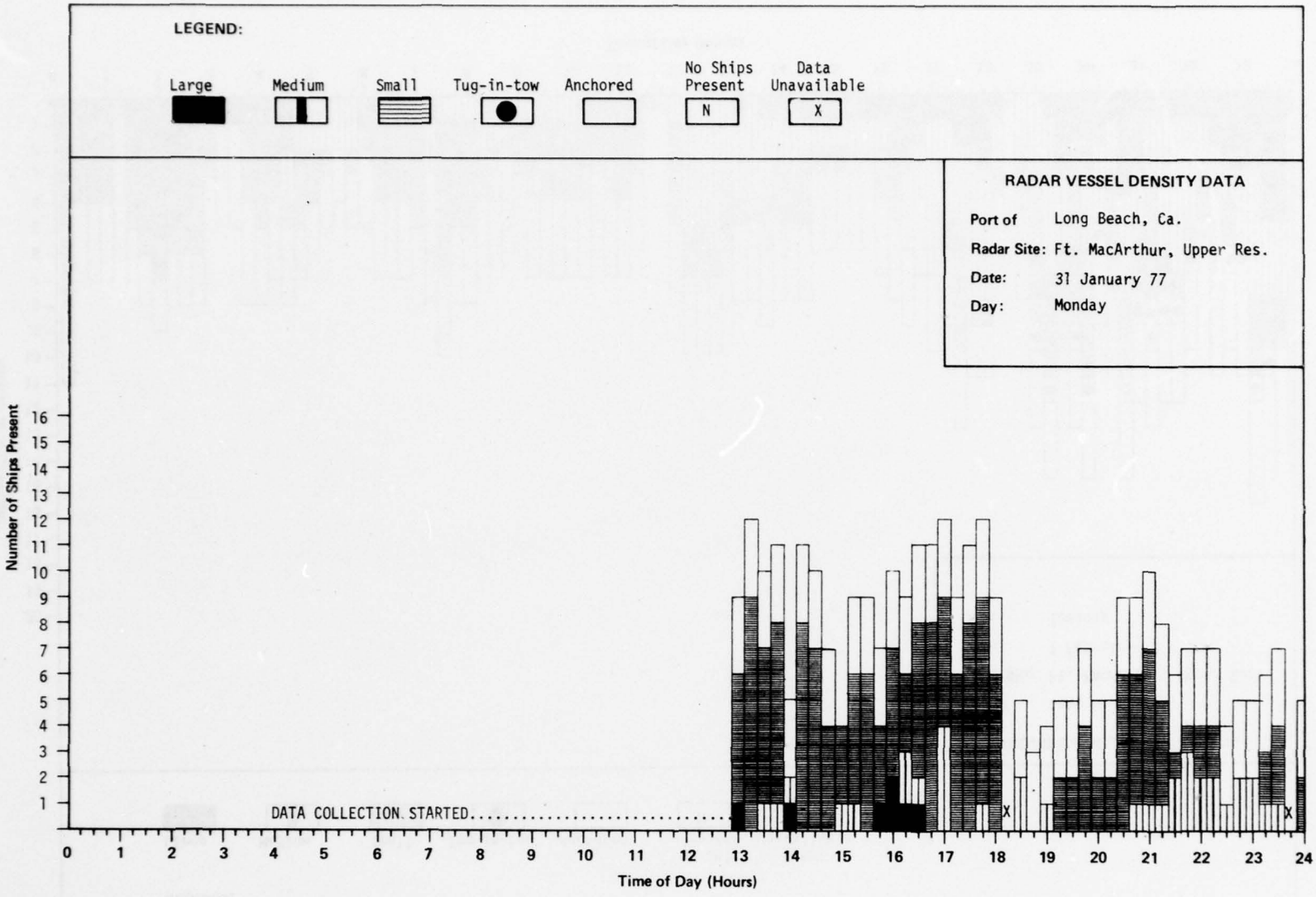

LEGEND:
Large
Medium
Small
Tug-in-tow
Anchored
No Ships Present
N
Data Unavailable
X
RADAR VESSEL DENSITY DATA
Port of Long Beach, Ca.
Radar Site: Ft. MacArthur, Upper Res.
Date: 31 January 77
Day: Monday
Number of Ships Present
DATA COLLECTION STARTED
Time of Day (Hours)

FIGURE 3-2

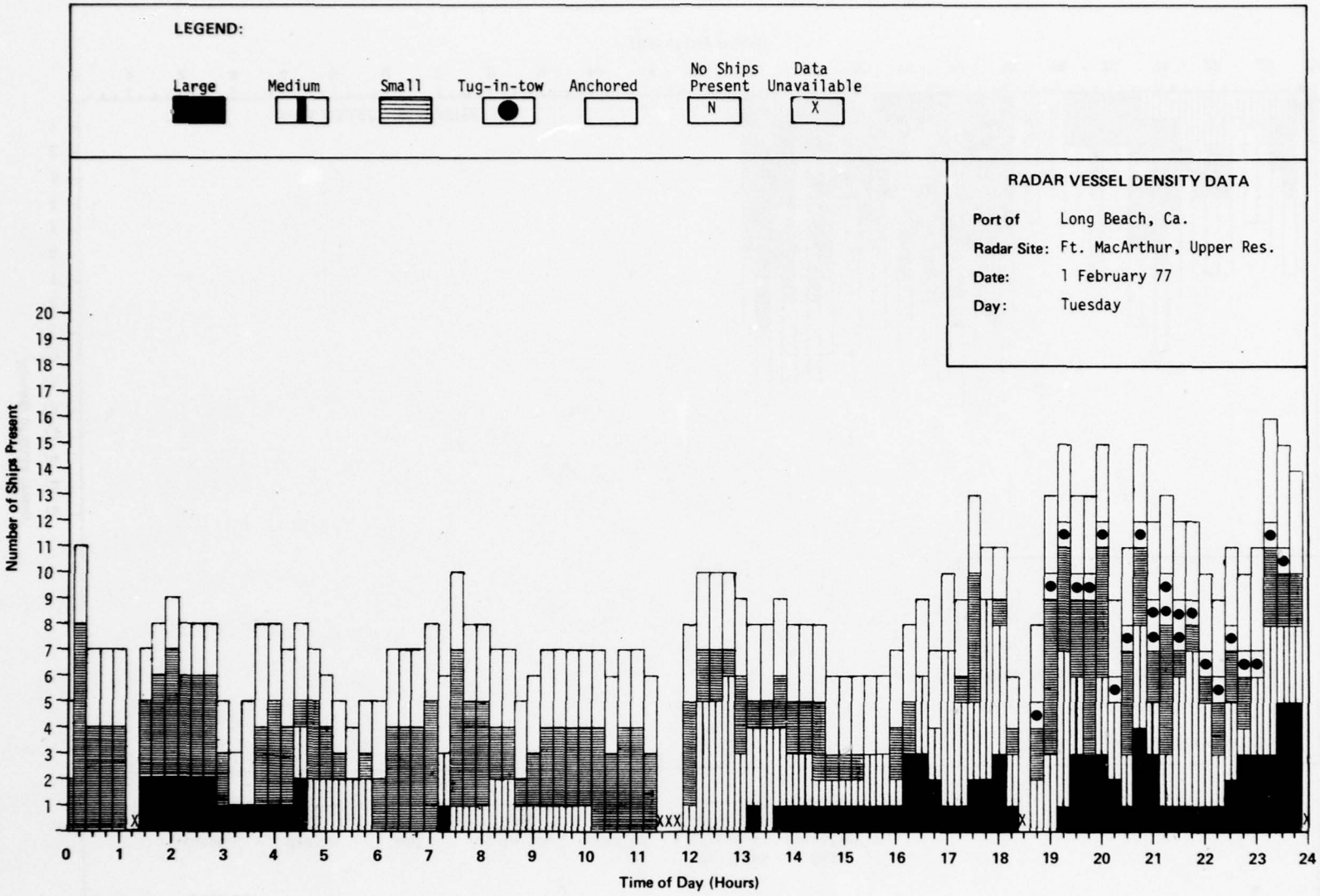

LEGEND:
Large
Medium
Small
Tug-in-tow
Anchored
No Ships Present
N
Data Unavailable
X
RADAR VESSEL DENSITY DATA
Port of Long Beach, Ca.
Radar Site: Ft. MacArthur, Upper Res.
Date: 1 February 77
Day: Tuesday
Number of Ships Present
Time of Day (Hours)

FIGURE 3-3

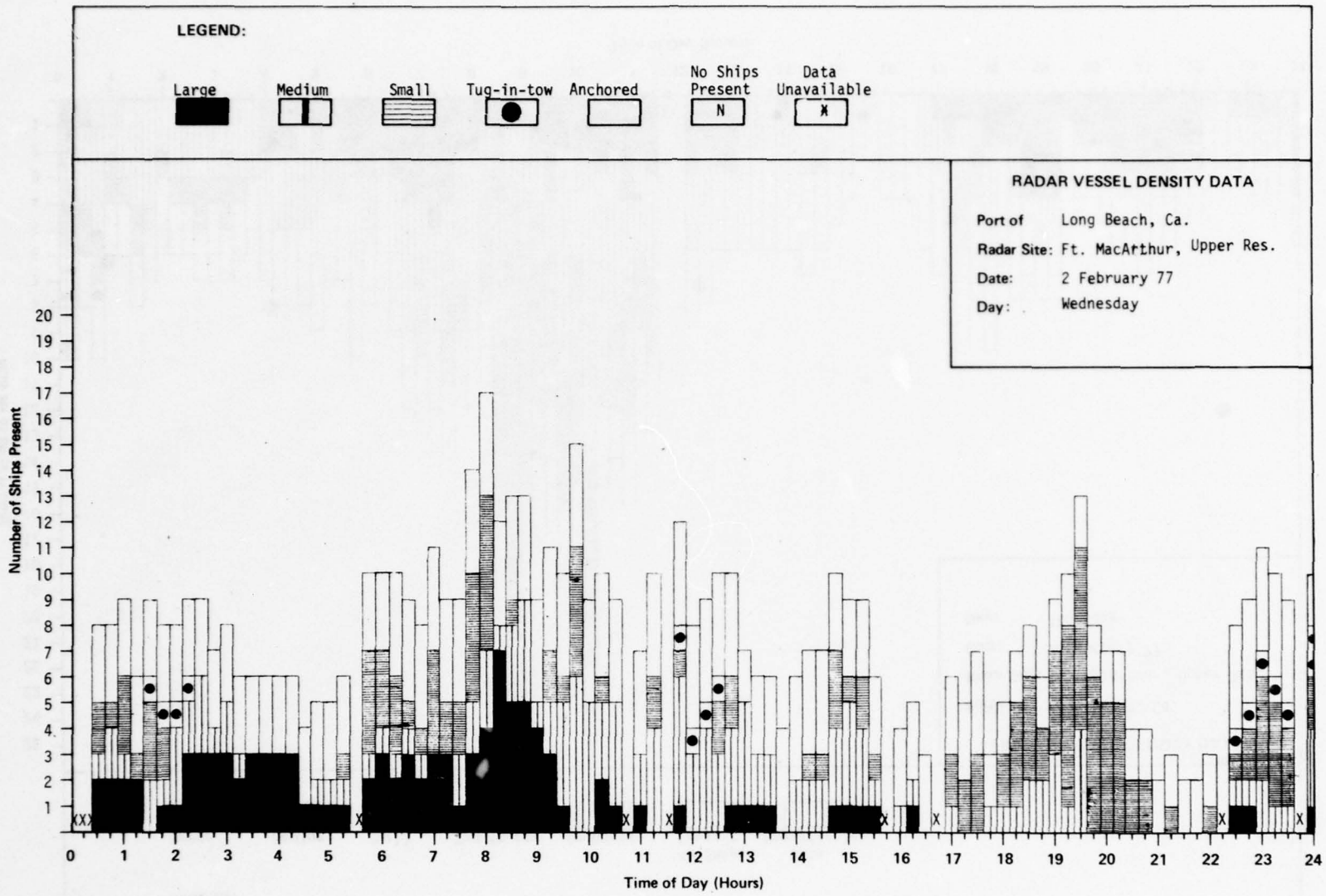

LEGEND:
Large
Medium
Small
Tug-in-tow
Anchored
No Ships Present
N
Data Unavailable
X
RADAR VESSEL DENSITY DATA
Port of Long Beach, Ca.
Radar Site: Ft. MacArthur, Upper Res.
Date: 2 February 77
Day: Wednesday
Number of Ships Present
Time of Day (Hours)

FIGURE 3-4

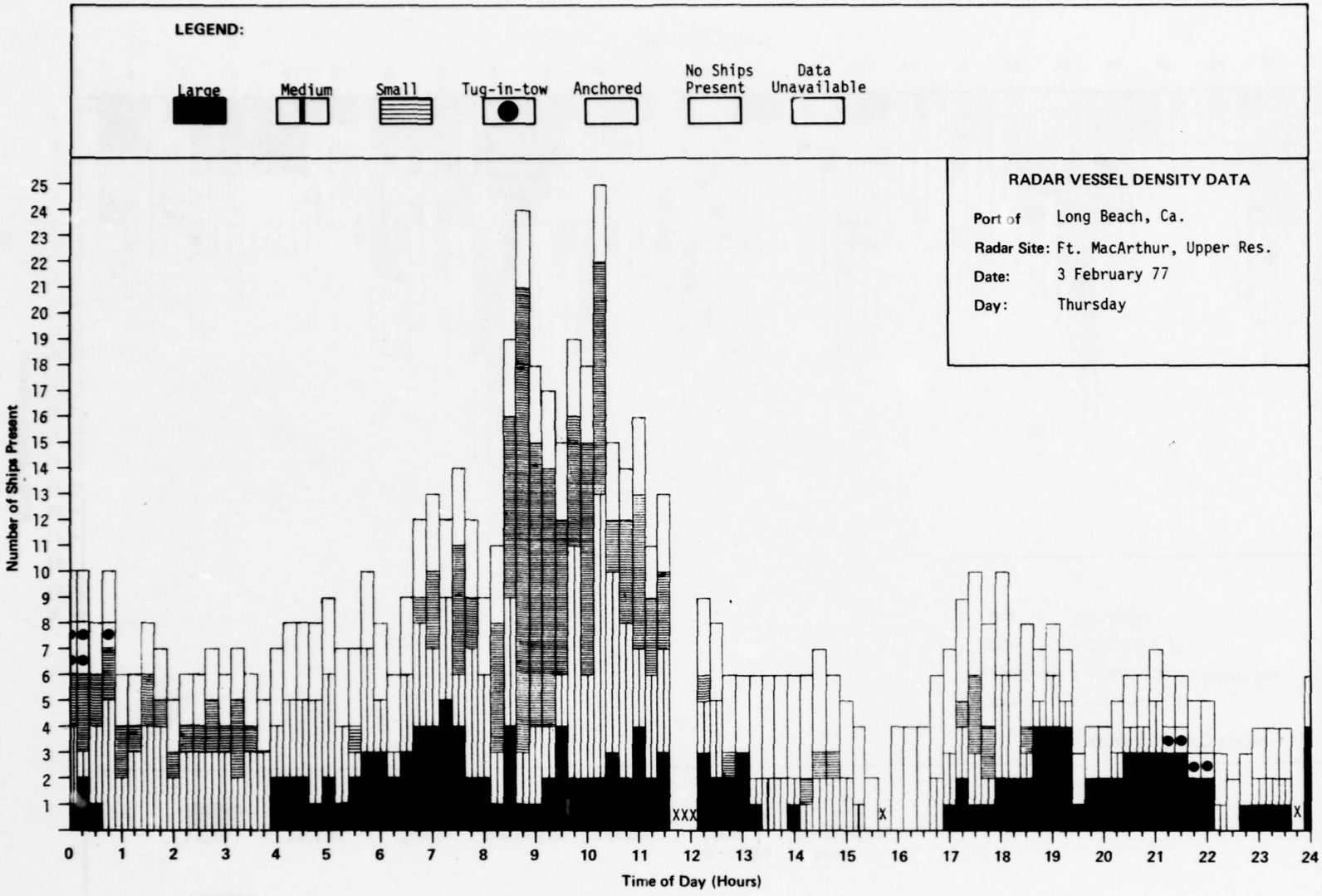

LEGEND:
Large
Medium
Small
Tug-in-tow
Anchored
No Ships Present
Data Unavailable
RADAR VESSEL DENSITY DATA
Port of Long Beach, Ca.
Radar Site: Ft. MacArthur, Upper Res.
Date: 3 February 77
Day: Thursday
Number of Ships Present
Time of Day (Hours)
XXX
X
X

FIGURE 3-5

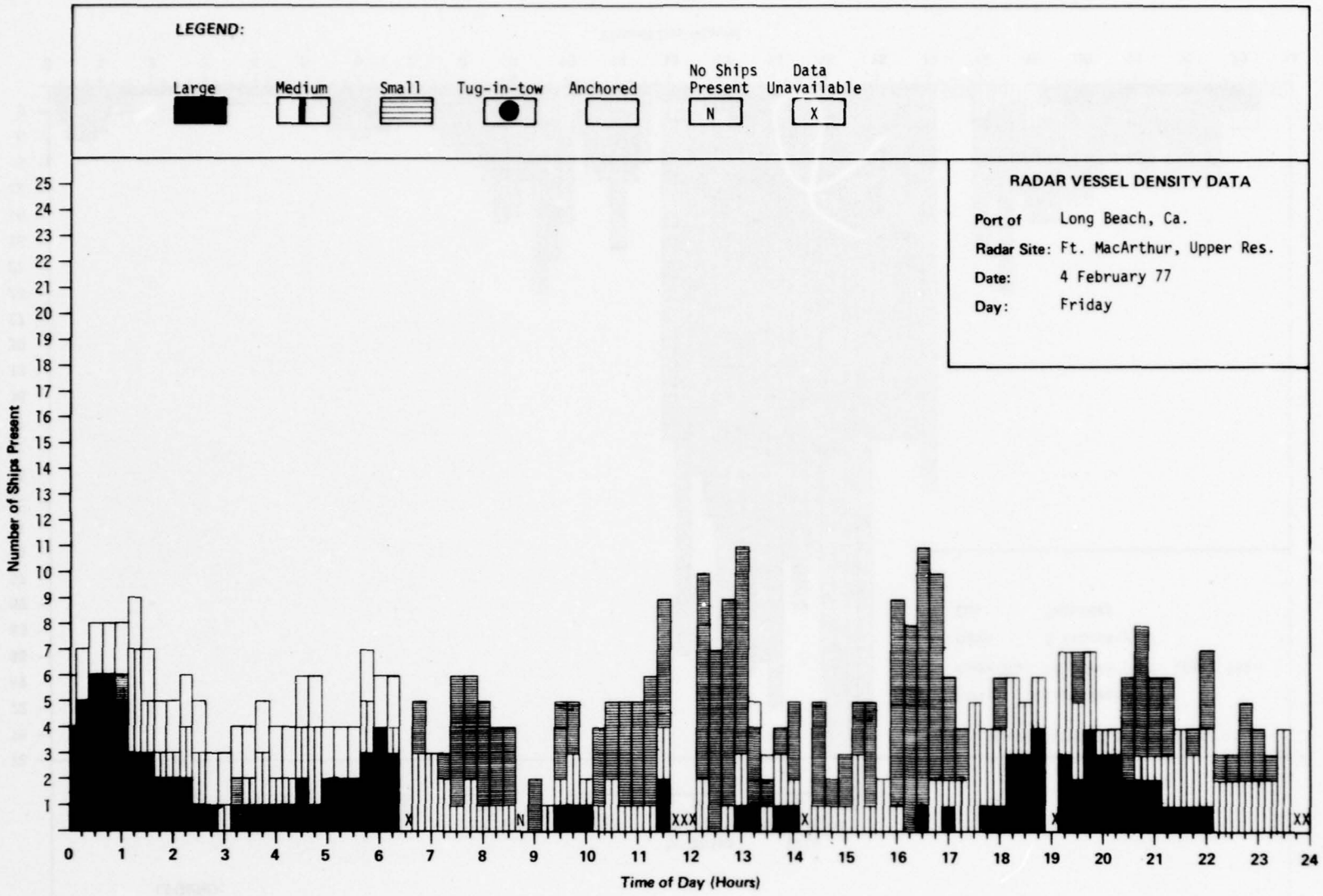

LEGEND:
Large
Medium
Small
Tug-in-tow
Anchored
No Ships Present
N
Data Unavailable
X
RADAR VESSEL DENSITY DATA
Port of Long Beach, Ca.
Radar Site: Ft. MacArthur, Upper Res.
Date: 4 February 77
Day: Friday
Number of Ships Present
Time of Day (Hours)

FIGURE 3-6

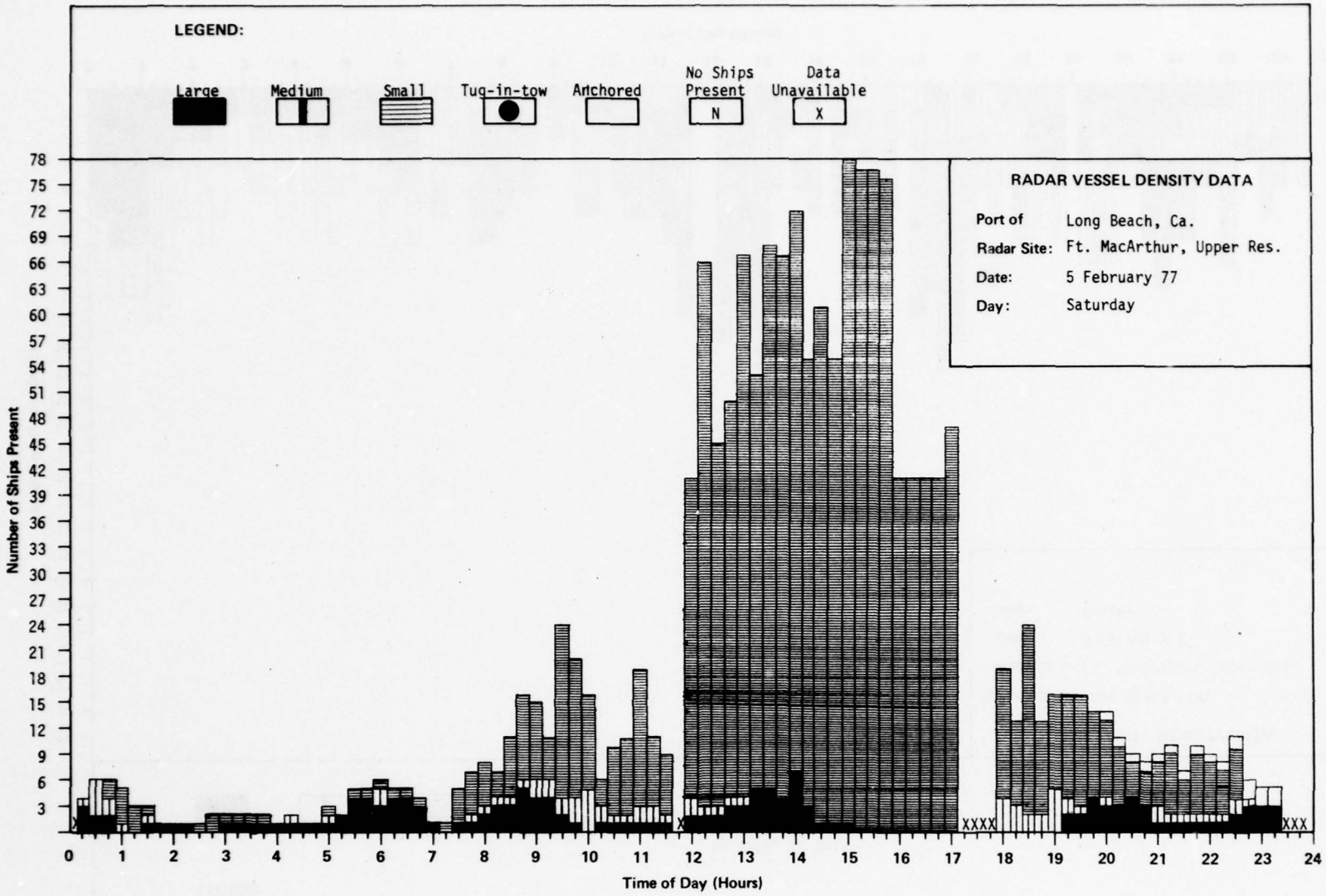

LEGEND:
Large
Medium
Small
Tug-in-tow
Anchored
No Ships Present
N
Data Unavailable
X
RADAR VESSEL DENSITY DATA
Port of Long Beach, Ca.
Radar Site: Ft. MacArthur, Upper Res.
Date: 5 February 77
Day: Saturday
Number of Ships Present
Time of Day (Hours)

FIGURE 3-7

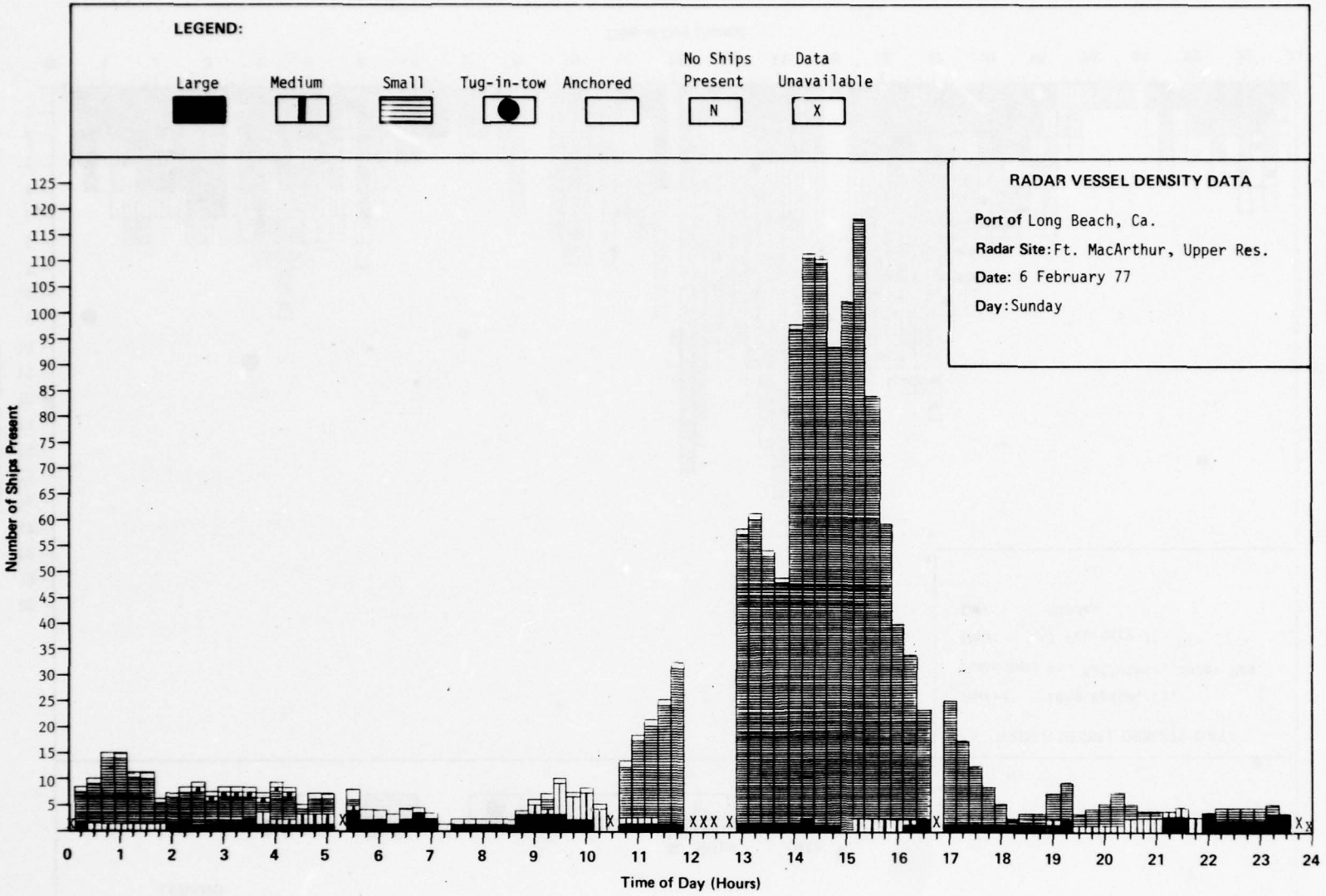

LEGEND:
Large
Medium
Small
Tug-in-tow
Anchored
No Ships Present
N
Data Unavailable
X
RADAR VESSEL DENSITY DATA
Port of Long Beach, Ca.
Radar Site: Ft. MacArthur, Upper Res.
Date: 6 February 77
Day: Sunday
Number of Ships Present
125
120
115
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
Time of Day (Hours)

FIGURE 3-8

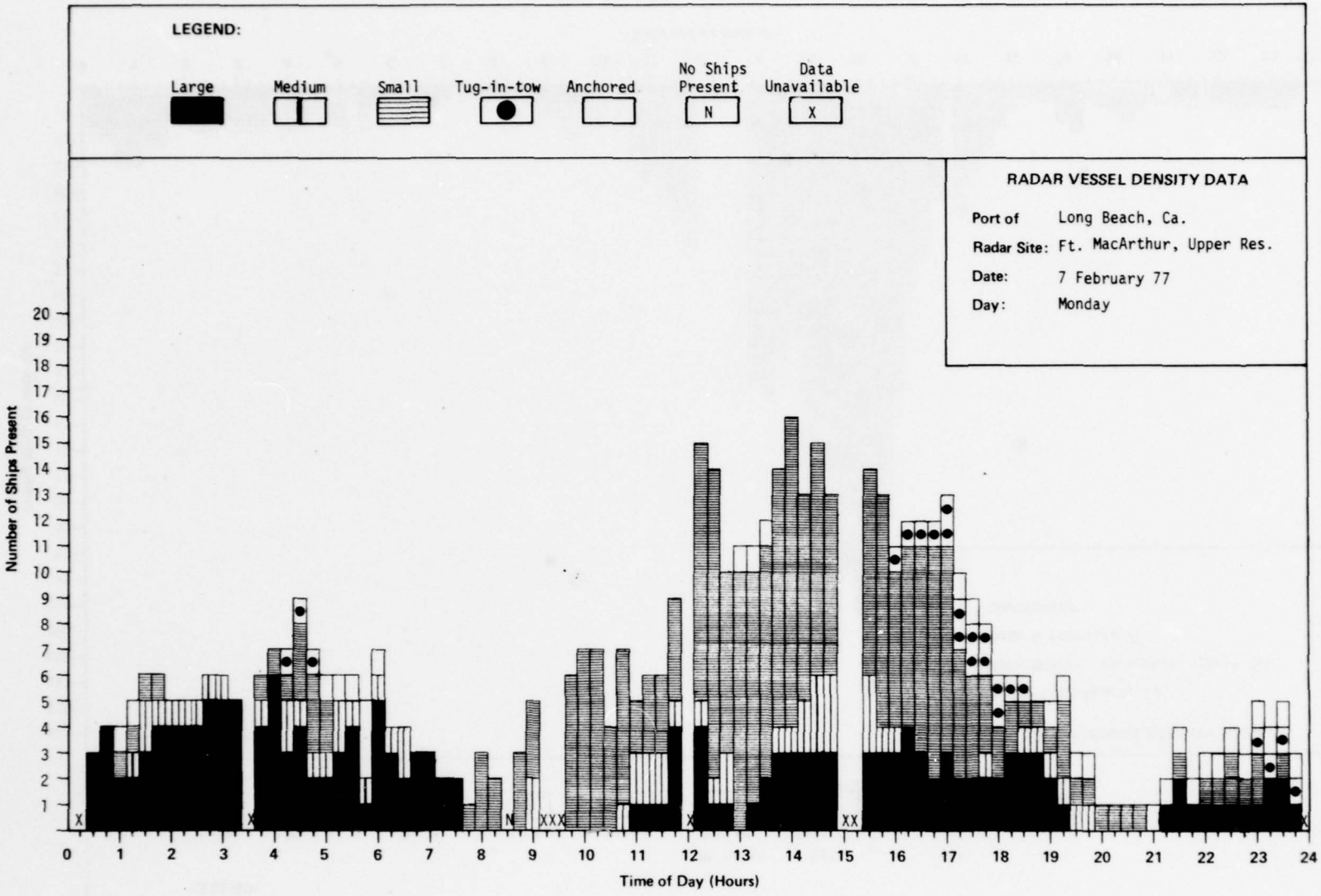

LEGEND:
Large
Medium
Small
Tug-in-tow
Anchored
No Ships Present
N
Data Unavailable
X
RADAR VESSEL DENSITY DATA
Port of Long Beach, Ca.
Radar Site: Ft. MacArthur, Upper Res.
Date: 7 February 77
Day: Monday
Number of Ships Present
Time of Day (Hours)

FIGURE 3-9

DATE	SECTION	DIRECTION	LARGE	MEDIUM	SMALL	TUG/TOW
31 Jan 1977	A	Northbound	2	2	6	0
(1200-2400)		Southbound	4	5	6	0
	B	Northbound	1	7	6	0
		Southbound	2	2	8	0
	C	Northbound	0	0	1	0
		Southbound	0	0	0	0
1 Feb 1977	A	Northbound	11	3	1	0
		Southbound	6	6	8	1
	B	Northbound	1	8	12	0
		Southbound	5	5	7	0
	C	Northbound	0	4	1	0
		Southbound	1	4	1	0

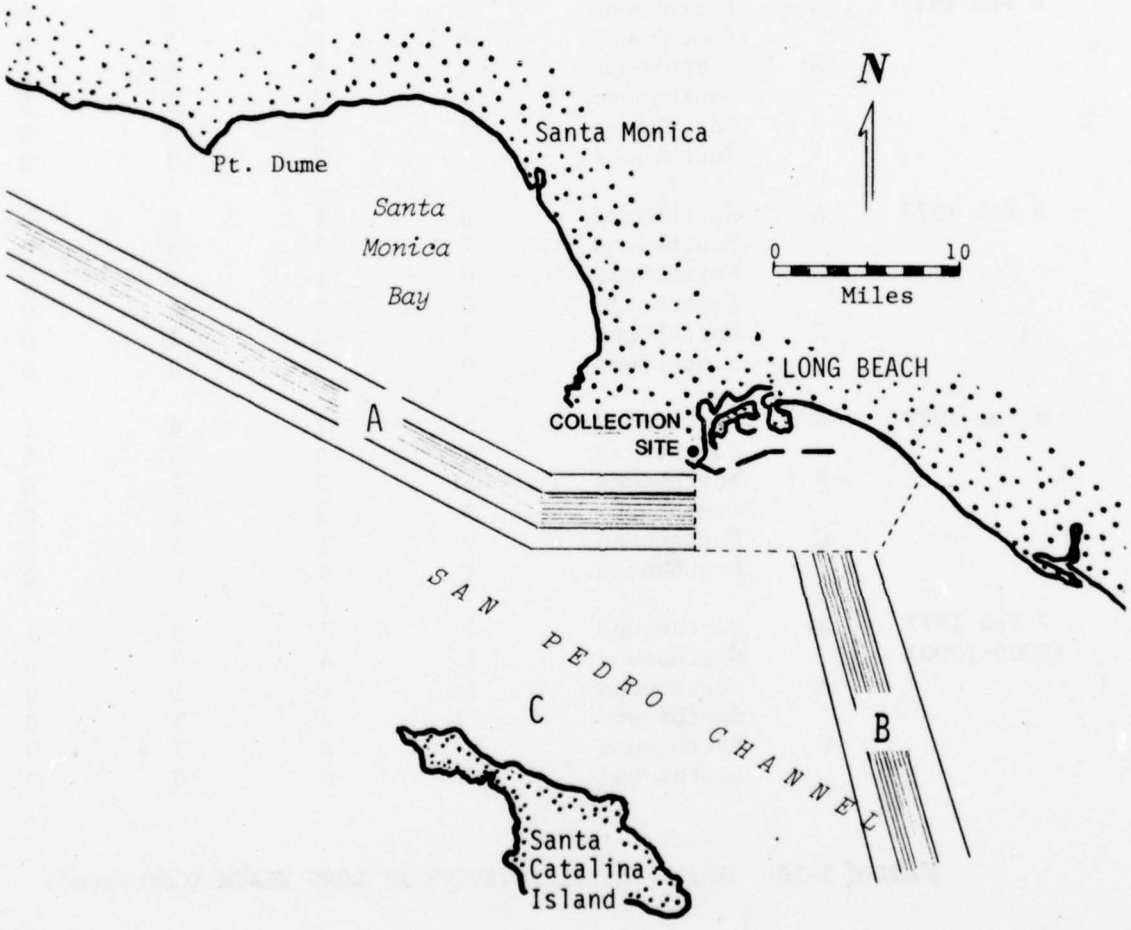


FIGURE 3-10: DAILY VESSEL ACTIVITY AT LONG BEACH

DATE	SECTION	DIRECTION	LARGE	MEDIUM	SMALL	TUG/TOW
2 Feb 1977	A	Northbound	4	12	5	1
		Southbound	6	7	2	3
	B	Northbound	3	3	4	0
		Southbound	1	6	1	0
	C	Northbound	1	1	3	0
		Southbound	5	7	0	0
3 Feb 1977	A	Northbound	7	4	9	1
		Southbound	6	3	0	0
	B	Northbound	2	3	1	0
		Southbound	3	4	1	0
	C	Northbound	0	1	4	0
		Southbound	3	8	3	0
4 Feb 1977	A	Northbound	5	6	2	0
		Southbound	4	3	5	0
	B	Northbound	3	6	2	0
		Southbound	1	3	2	0
	C	Northbound	2	5	0	0
		Southbound	2	7	3	0
5 Feb 1977	A	Northbound	6	1	9	0
		Southbound	7	3	3	0
	B	Northbound	0	1	2	0
		Southbound	4	1	4	0
	C	Northbound	2	2	2	0
		Southbound	0	4	3	0
6 Feb 1977	A	Northbound	6	3	4	1
		Southbound	8	4	5	0
	B	Northbound	5	0	2	0
		Southbound	3	3	1	0
	C	Northbound	0	1	4	0
		Southbound	1	4	0	0
7 Feb 1977 (0000-1200)	A	Northbound	4	1	3	1
		Southbound	5	4	2	0
	B	Northbound	1	1	1	0
		Southbound	3	2	3	0
	C	Northbound	0	0	7	0
		Southbound	0	0	0	0

FIGURE 3-10: DAILY VESSEL ACTIVITY AT LONG BEACH (Continued)

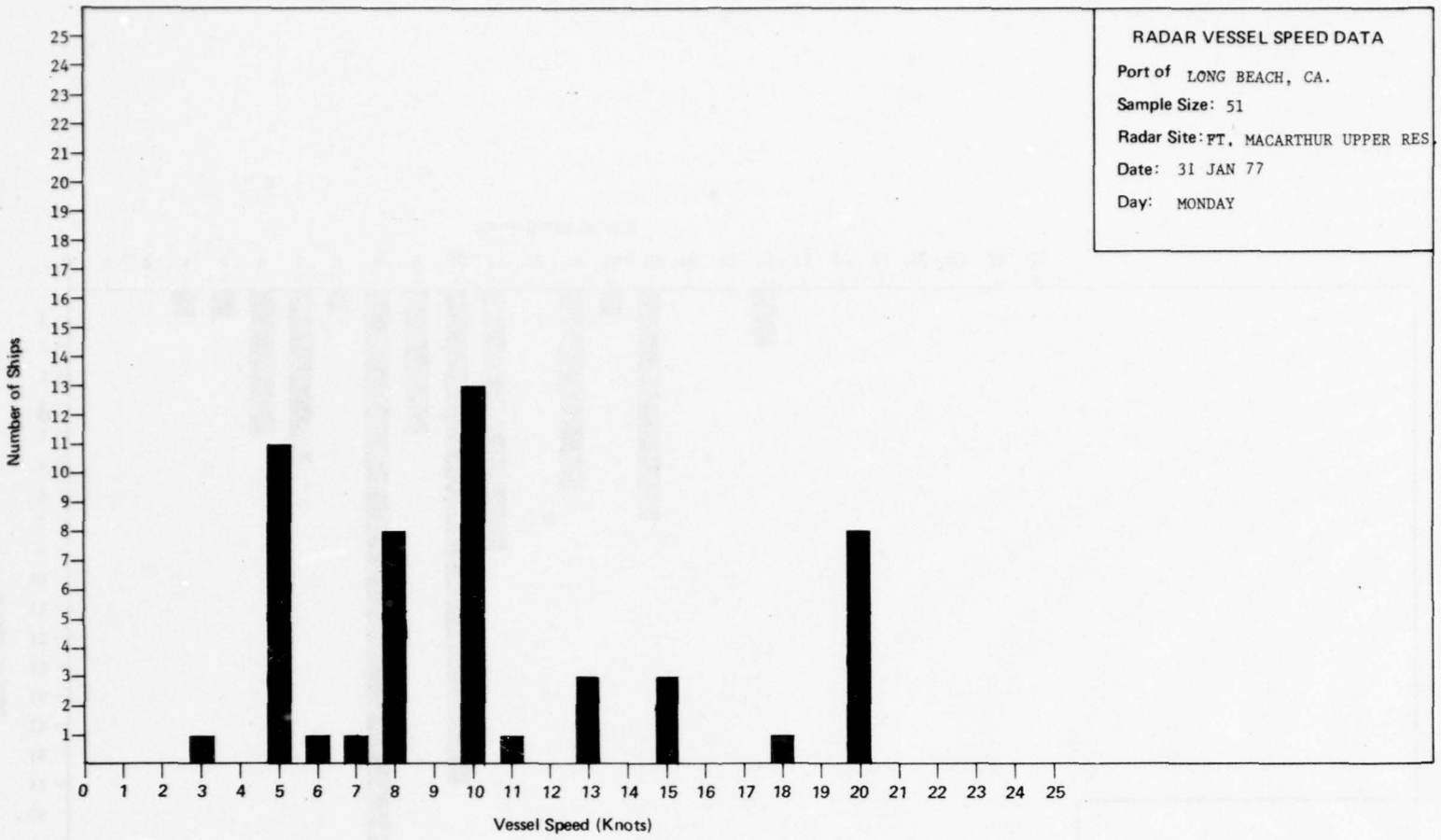

RADAR VESSEL SPEED DATA
Port of LONG BEACH, CA.
Sample Size: 51
Radar Site: PT. MACARTHUR UPPER RES.
Date: 31 JAN 77
Day: MONDAY
Number of Ships
Vessel Speed (Knots)

FIGURE 3-11

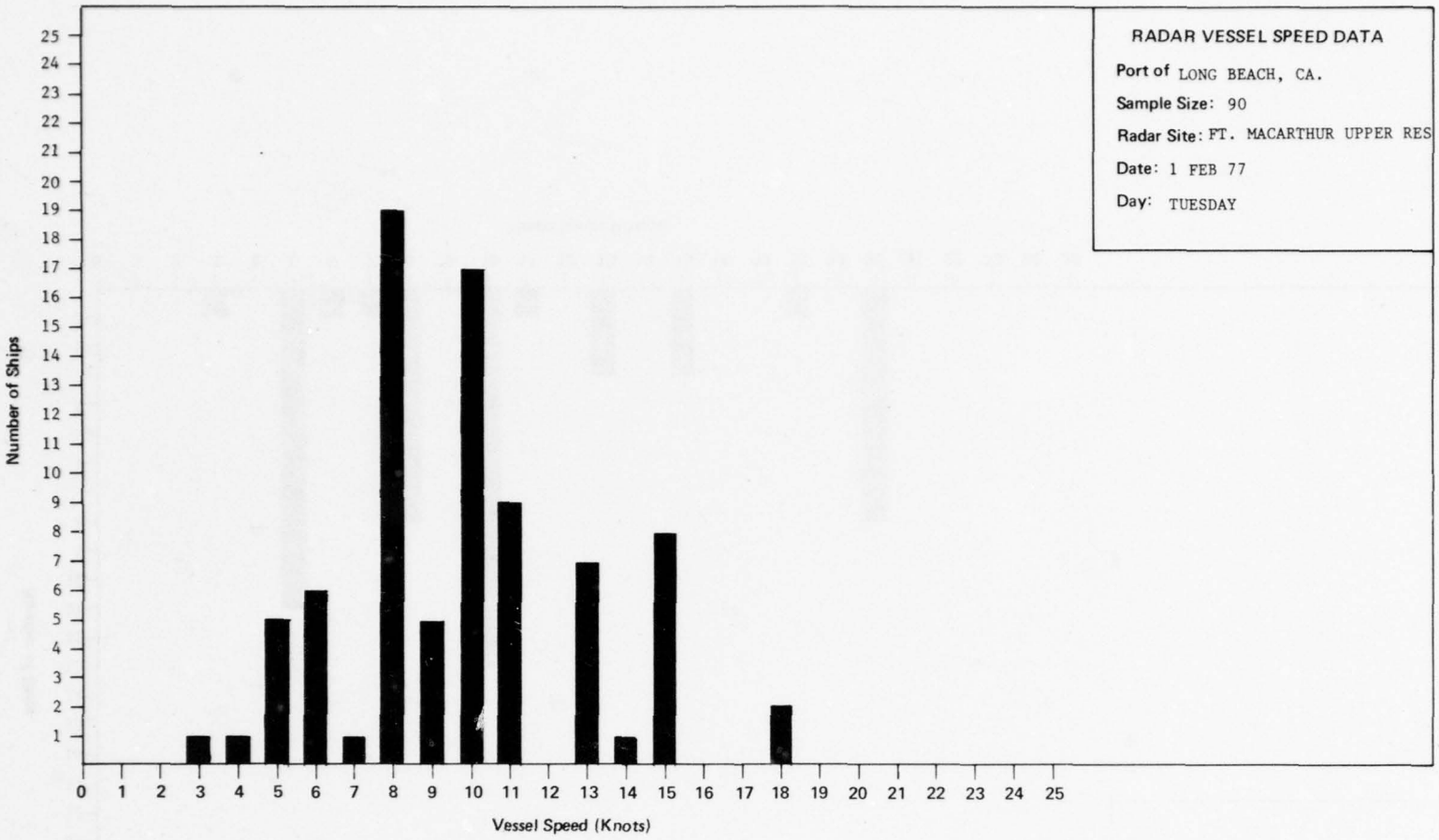

RADAR VESSEL SPEED DATA
Port of LONG BEACH, CA.
Sample Size: 90
Radar Site: FT. MACARTHUR UPPER RES
Date: 1 FEB 77
Day: TUESDAY
Number of Ships
Vessel Speed (Knots)

FIGURE 3-12

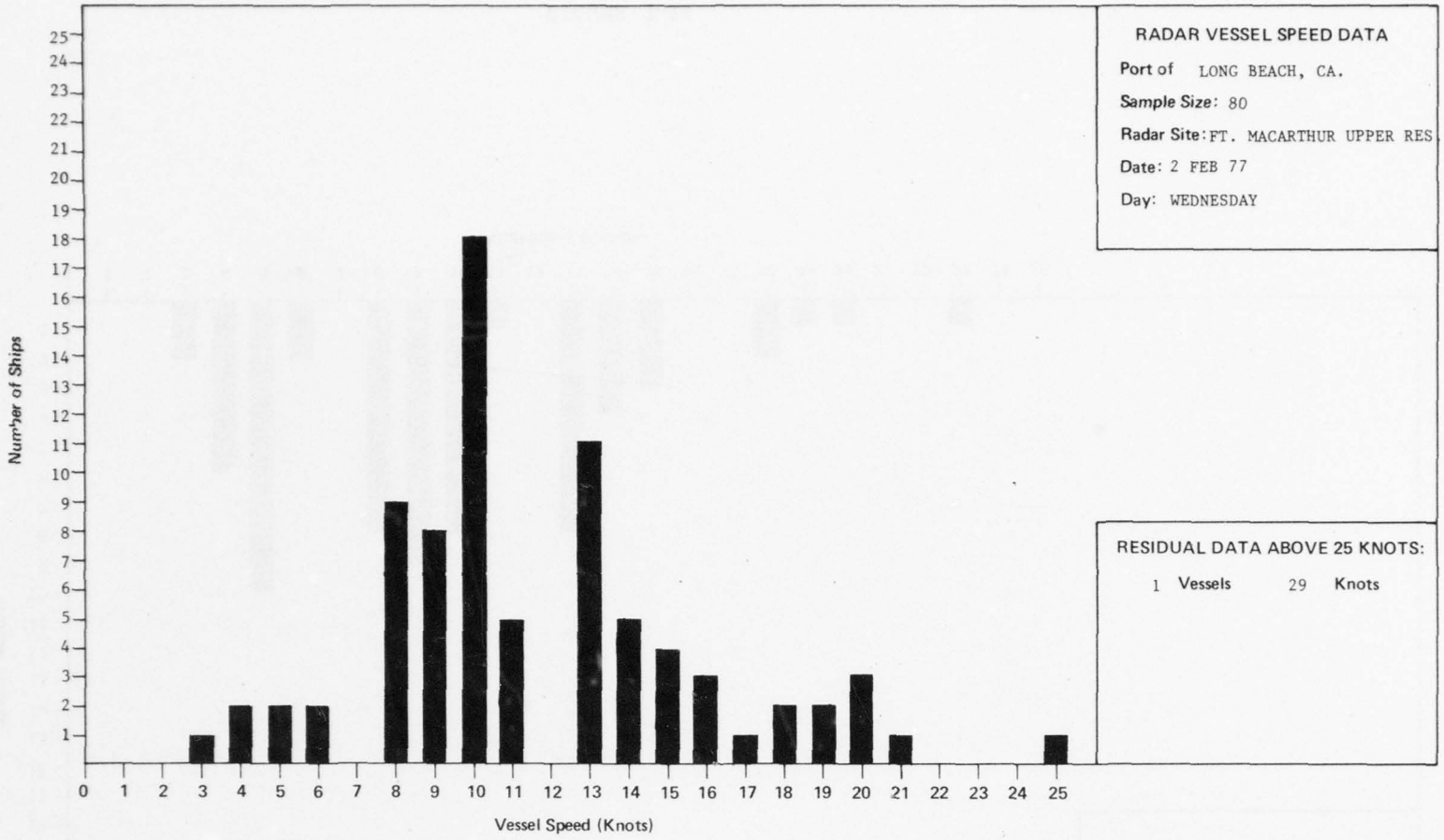

RADAR VESSEL SPEED DATA
Port of LONG BEACH, CA.
Sample Size: 80
Radar Site: FT. MACARTHUR UPPER RES.
Date: 2 FEB 77
Day: WEDNESDAY
RESIDUAL DATA ABOVE 25 KNOTS:
1 Vessels 29 Knots
Number of Ships
Vessel Speed (Knots)

FIGURE 3-13

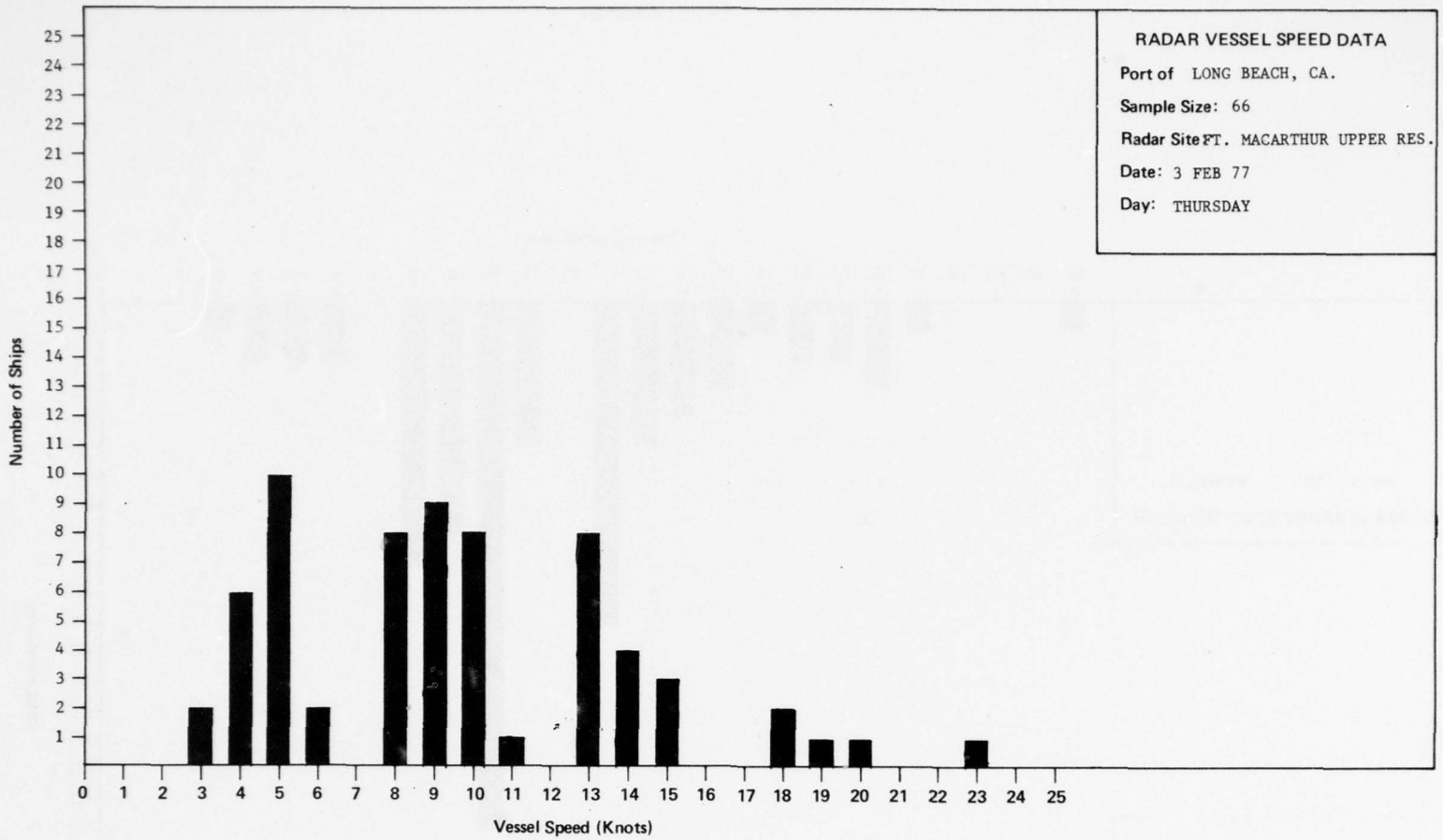

RADAR VESSEL SPEED DATA
Port of LONG BEACH, CA.
Sample Size: 66
Radar Site FT. MACARTHUR UPPER RES.
Date: 3 FEB 77
Day: THURSDAY
Number of Ships
Vessel Speed (Knots)

FIGURE 3-14

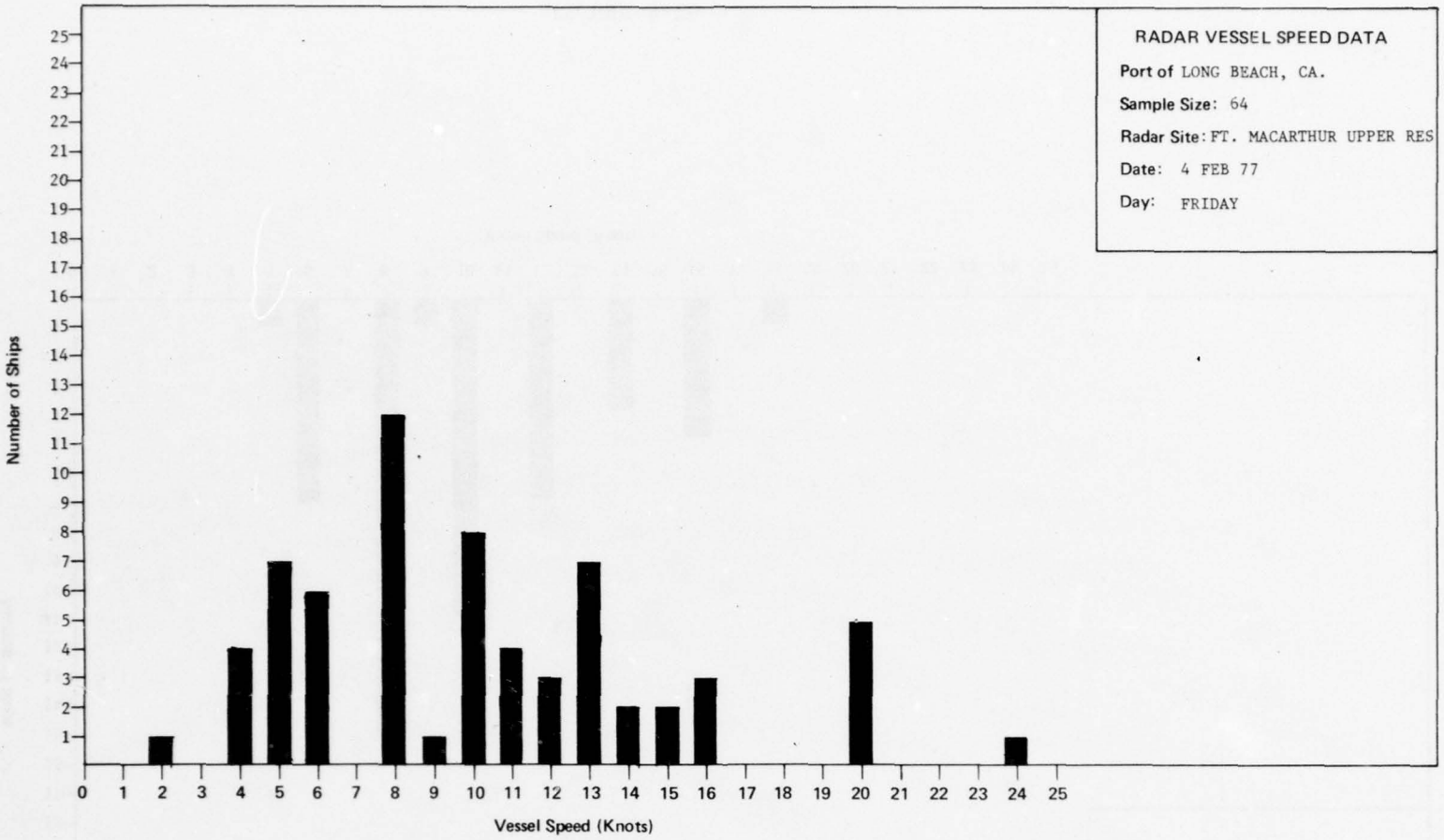

RADAR VESSEL SPEED DATA
Port of LONG BEACH, CA.
Sample Size: 64
Radar Site: FT. MACARTHUR UPPER RES
Date: 4 FEB 77
Day: FRIDAY
Number of Ships
Vessel Speed (Knots)

FIGURE 3-15

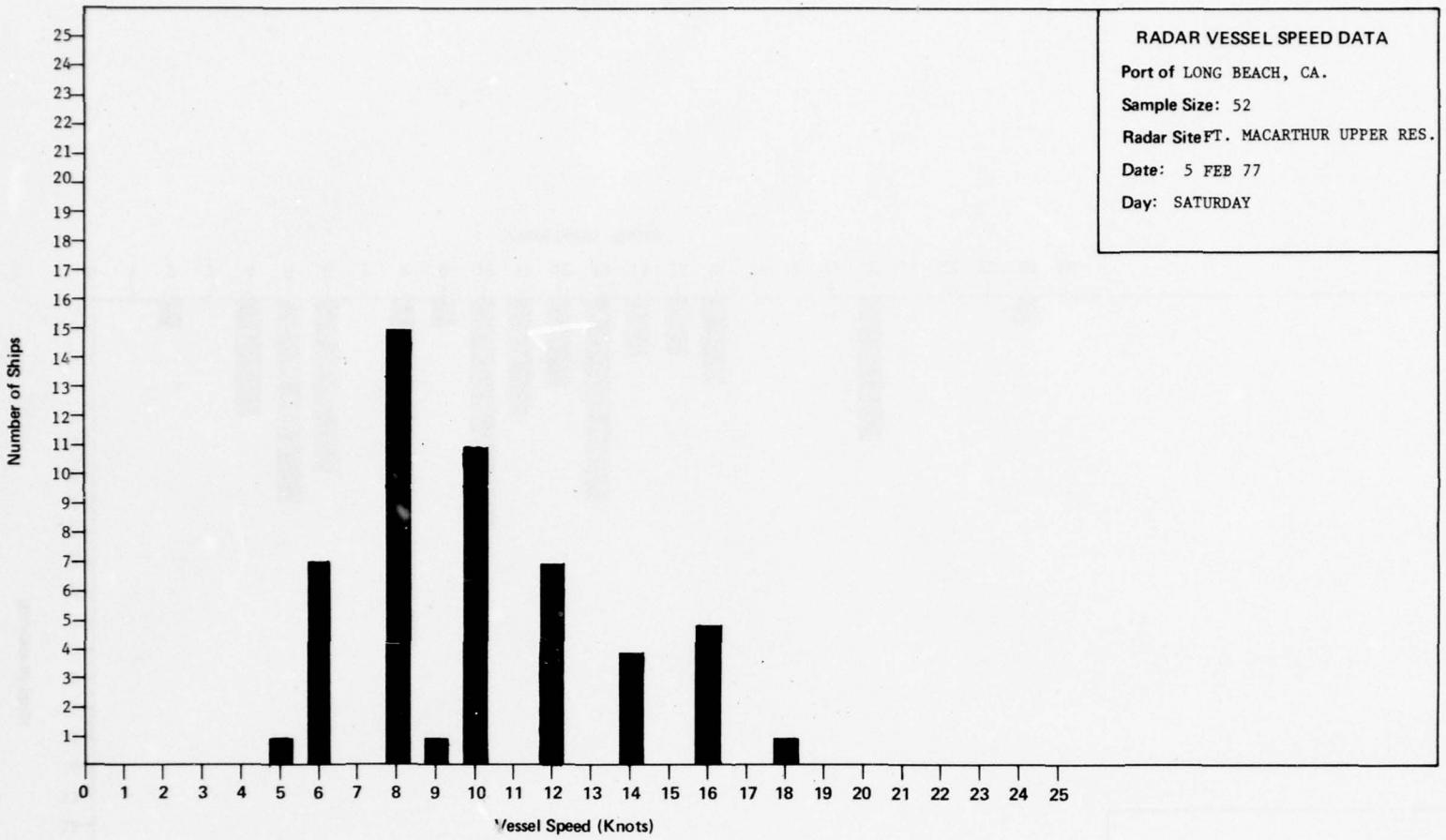

RADAR VESSEL SPEED DATA
Port of LONG BEACH, CA.
Sample Size: 52
Radar Site FT. MACARTHUR UPPER RES.
Date: 5 FEB 77
Day: SATURDAY
Number of Ships
Vessel Speed (Knots)

FIGURE 3-16

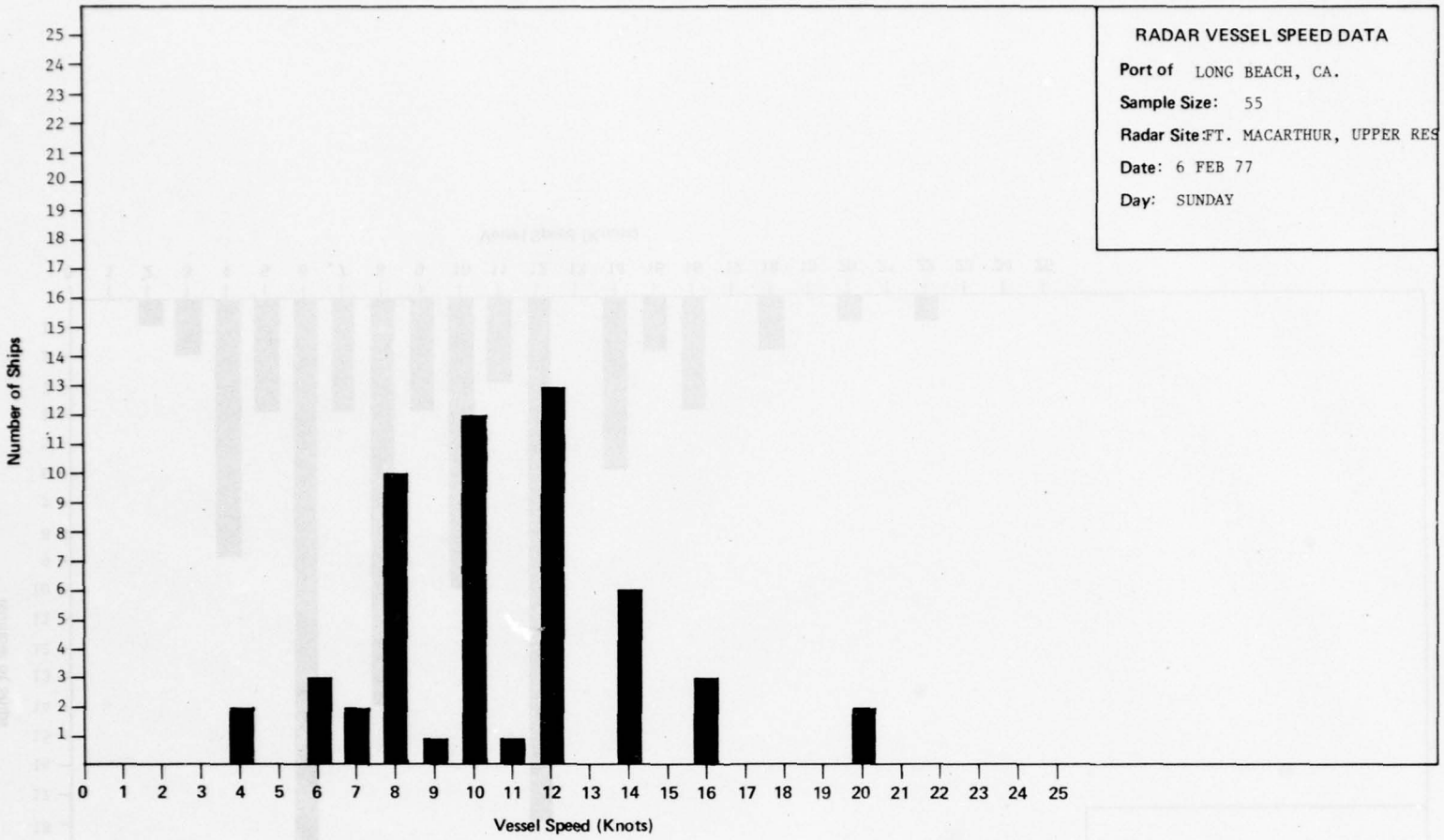

RADAR VESSEL SPEED DATA
Port of LONG BEACH, CA.
Sample Size: 55
Radar Site: FT. MACARTHUR, UPPER RES
Date: 6 FEB 77
Day: SUNDAY
Number of Ships
Vessel Speed (Knots)

FIGURE 3-17

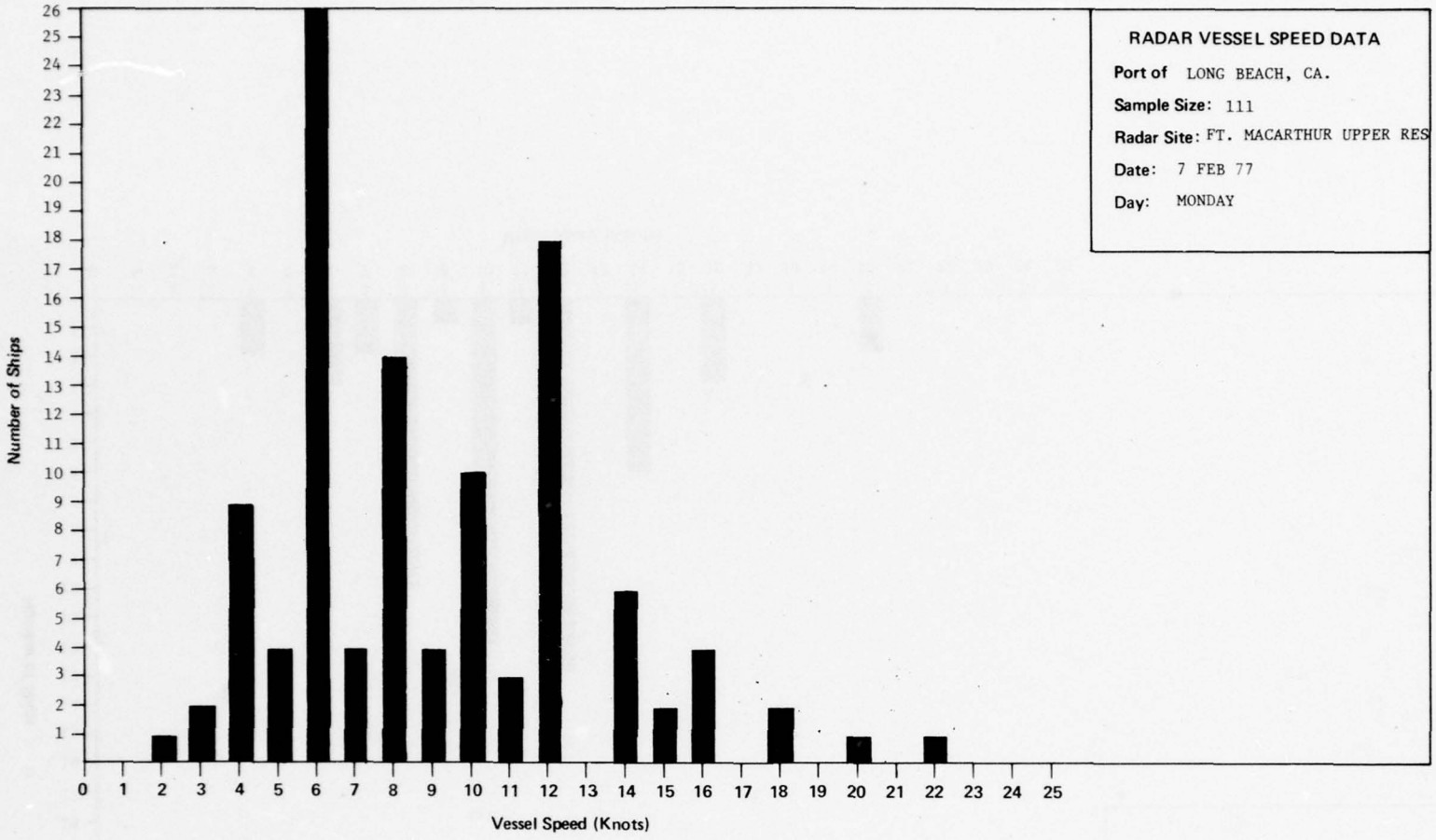

RADAR VESSEL SPEED DATA
Port of LONG BEACH, CA.
Sample Size: 111
Radar Site: FT. MACARTHUR UPPER RES
Date: 7 FEB 77
Day: MONDAY
Number of Ships
Vessel Speed (Knots)

FIGURE 3-18

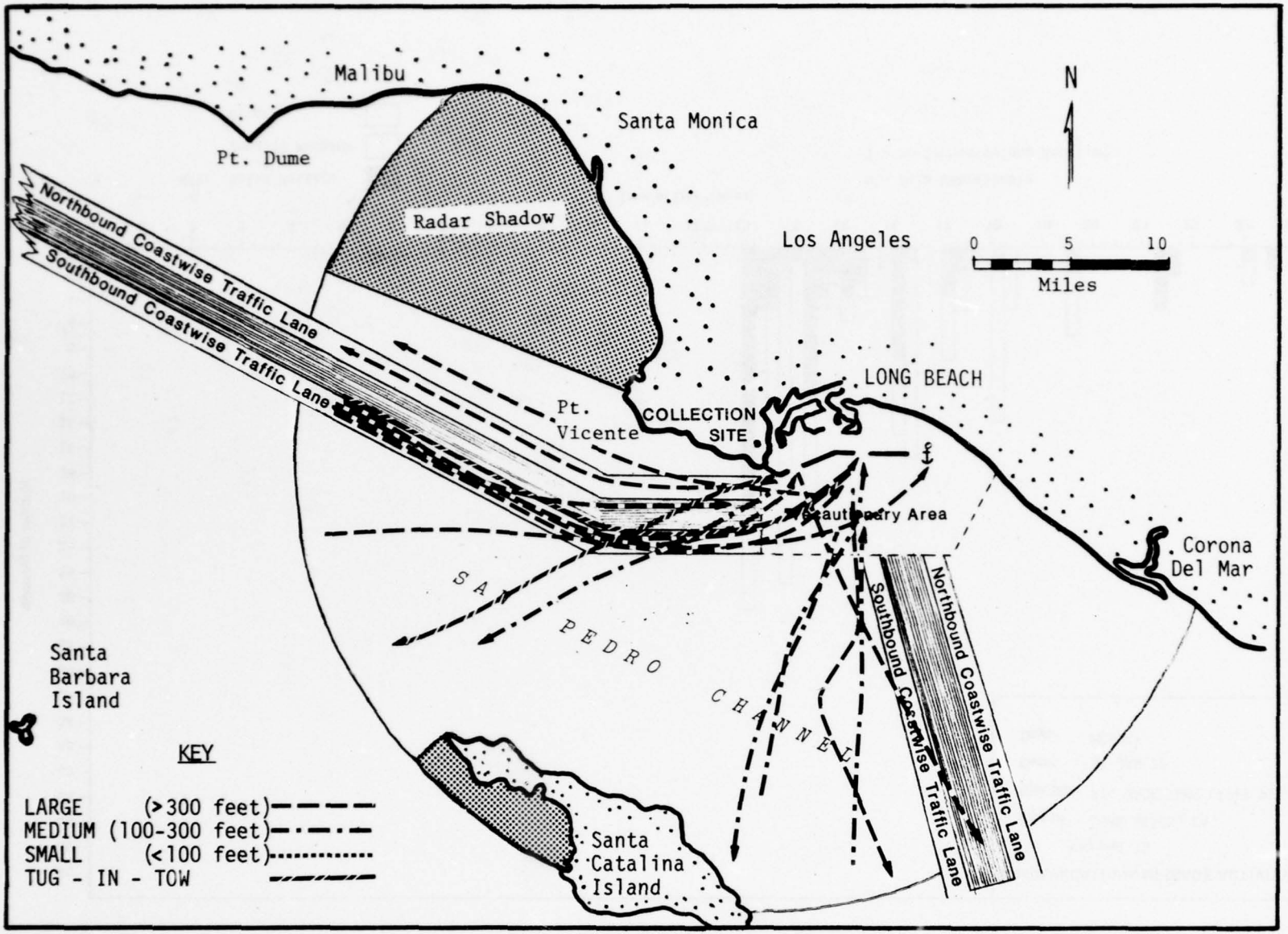


FIGURE 3-19: ROUTE IDENTIFICATION AT LONG BEACH, 1300-2345, TUESDAY, 1 FEBRUARY 1977

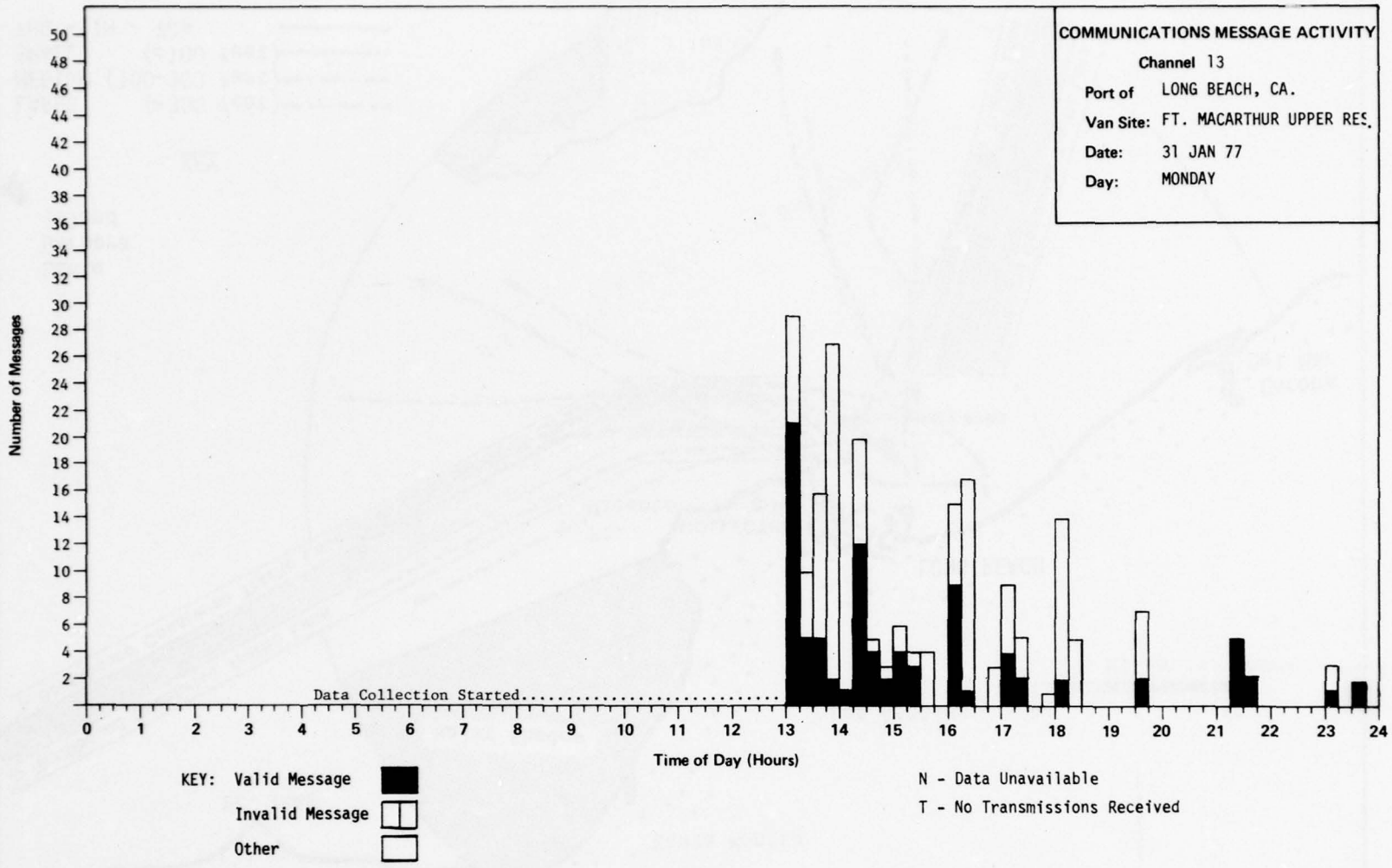

COMMUNICATIONS MESSAGE ACTIVITY
Channel 13
Port of LONG BEACH, CA.
Van Site: FT. MACARTHUR UPPER RES.
Date: 31 JAN 77
Day: MONDAY
Number of Messages
Time of Day (Hours)
Data Collection Started.....
KEY: Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 3-20

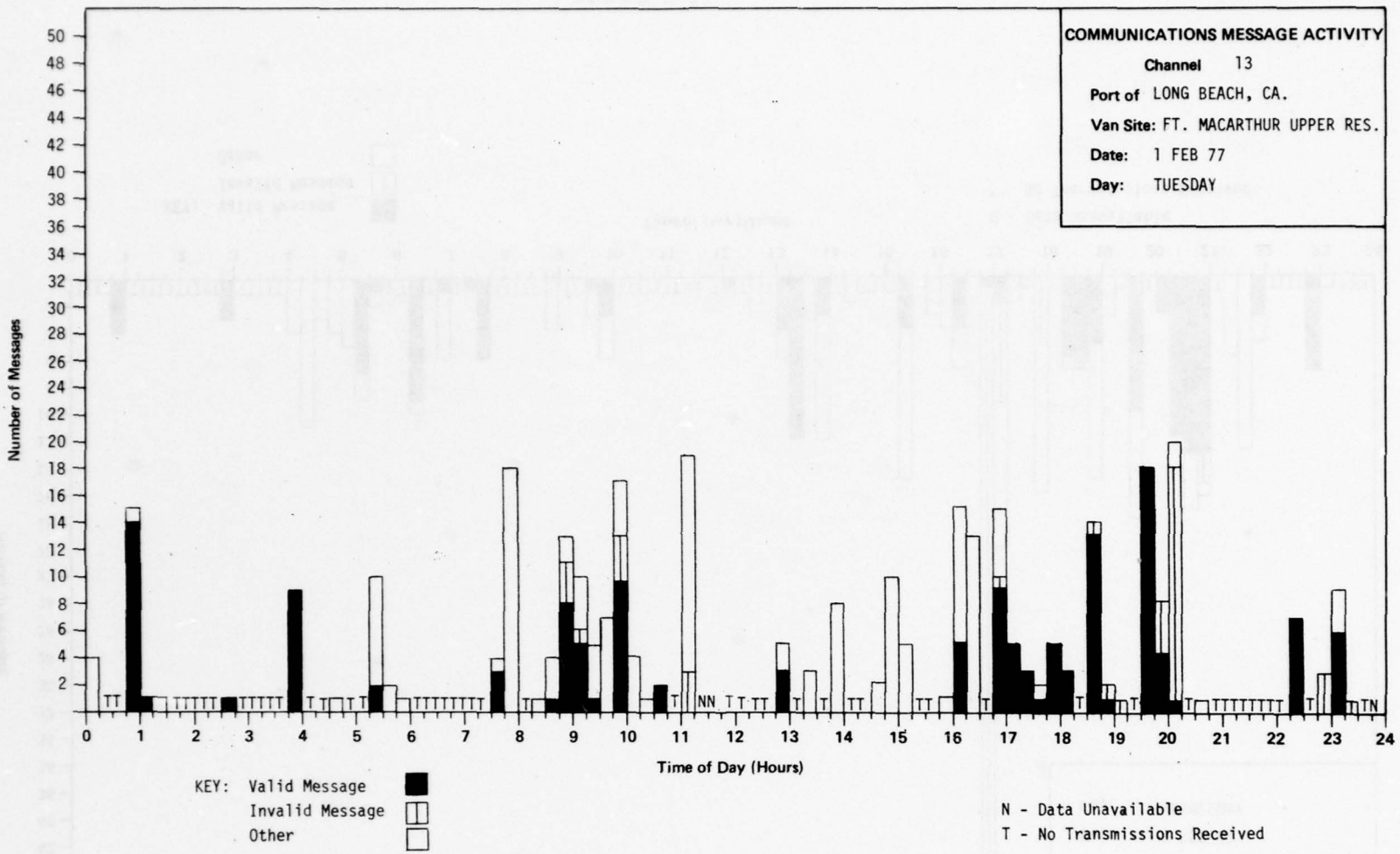

COMMUNICATIONS MESSAGE ACTIVITY
Channel 13
Port of LONG BEACH, CA.
Van Site: FT. MACARTHUR UPPER RES.
Date: 1 FEB 77
Day: TUESDAY
Number of Messages
Time of Day (Hours)
KEY: Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 3-21

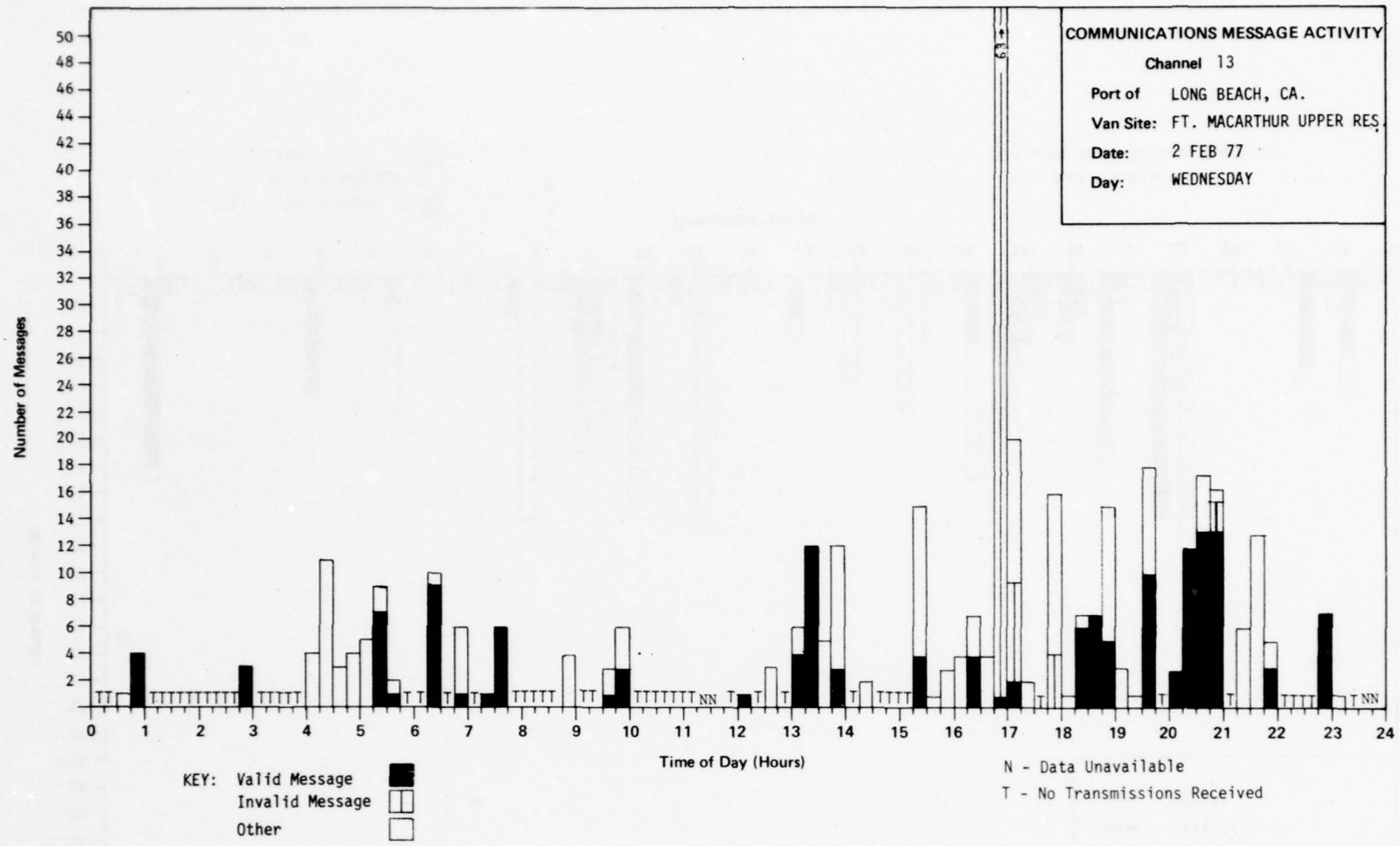

COMMUNICATIONS MESSAGE ACTIVITY
Channel 13
Port of LONG BEACH, CA.
Van Site: FT. MACARTHUR UPPER RES.
Date: 2 FEB 77
Day: WEDNESDAY
Number of Messages
Time of Day (Hours)
KEY: Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 3-22

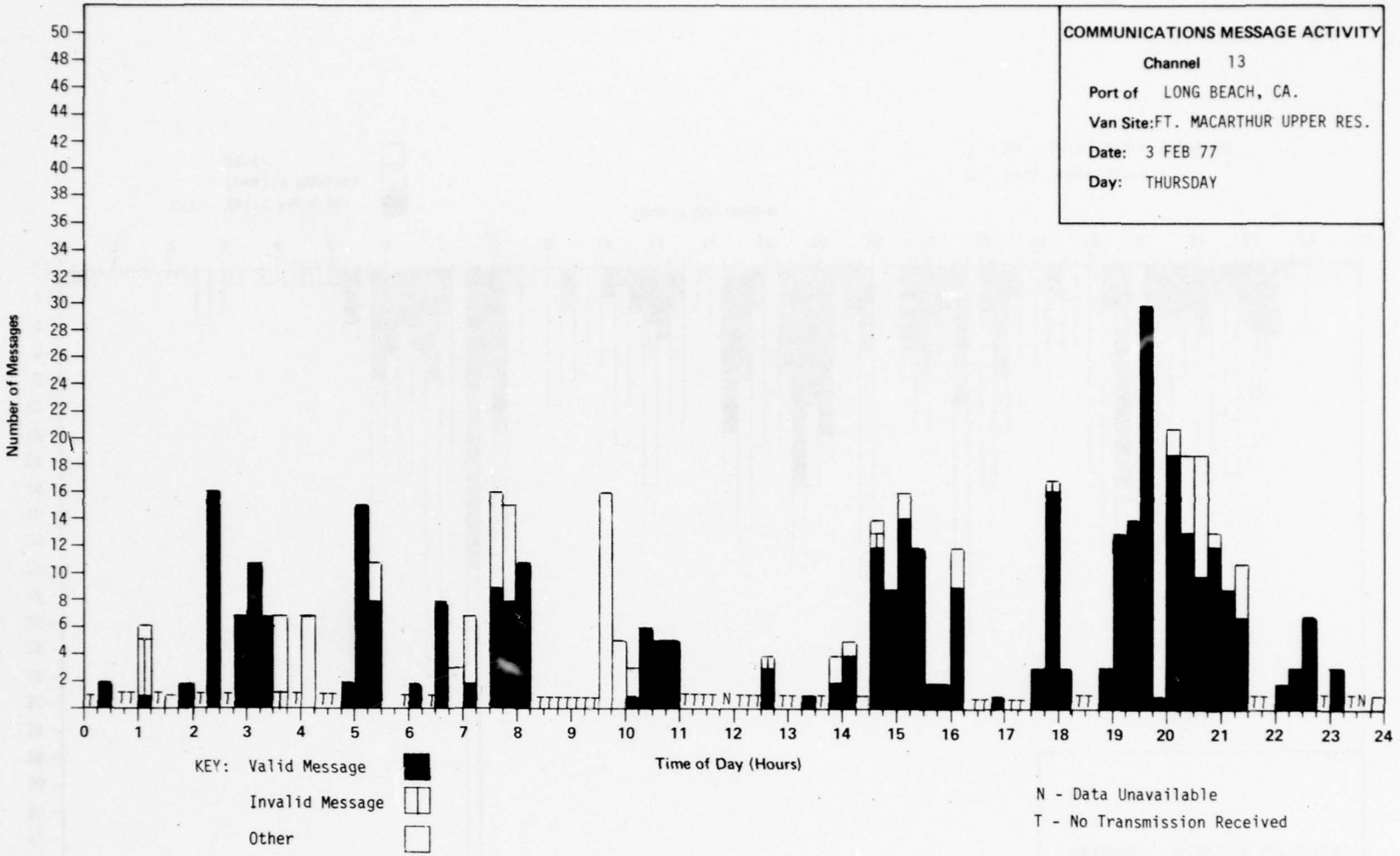

COMMUNICATIONS MESSAGE ACTIVITY
Channel 13
Port of LONG BEACH, CA.
Van Site: FT. MACARTHUR UPPER RES.
Date: 3 FEB 77
Day: THURSDAY
Number of Messages
Time of Day (Hours)
KEY: Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmission Received

FIGURE 3-23

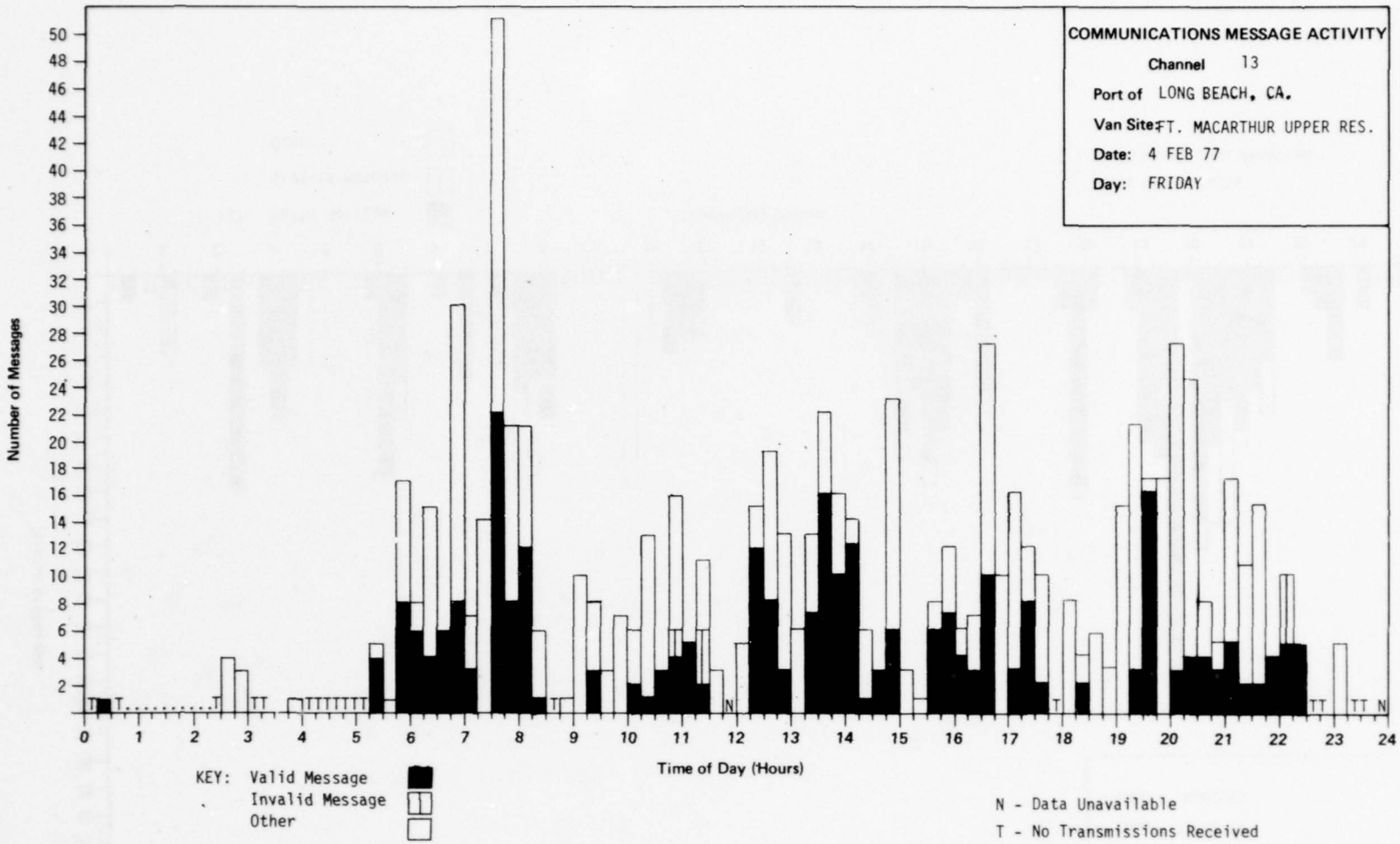

COMMUNICATIONS MESSAGE ACTIVITY
Channel 13
Port of LONG BEACH, CA.
Van Site: FT. MACARTHUR UPPER RES.
Date: 4 FEB 77
Day: FRIDAY
Number of Messages
Time of Day (Hours)
KEY: Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 3-24

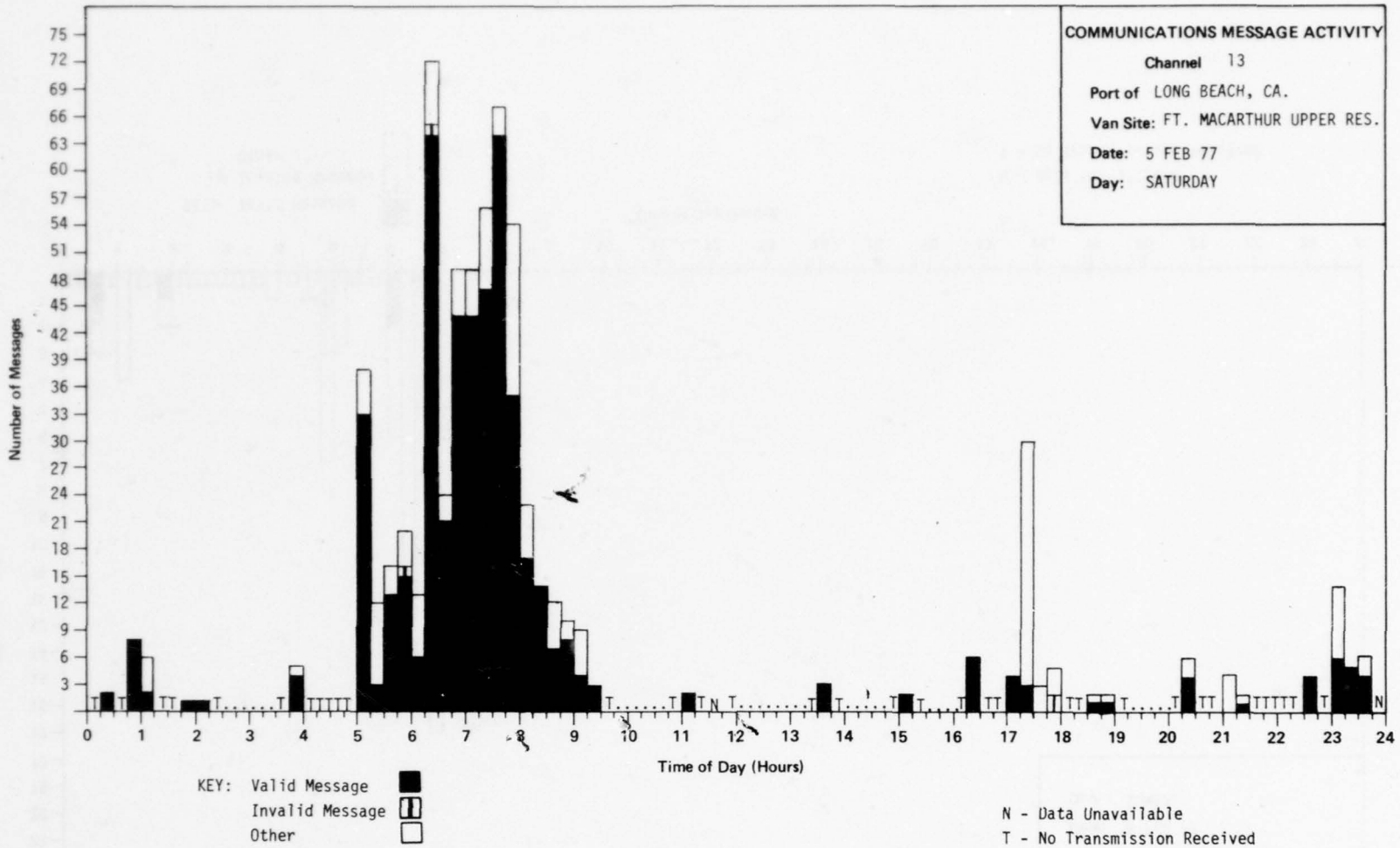

COMMUNICATIONS MESSAGE ACTIVITY
Channel 13
Port of LONG BEACH, CA.
Van Site: FT. MACARTHUR UPPER RES.
Date: 5 FEB 77
Day: SATURDAY
Number of Messages
Time of Day (Hours)
KEY: Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmission Received

FIGURE 3-25

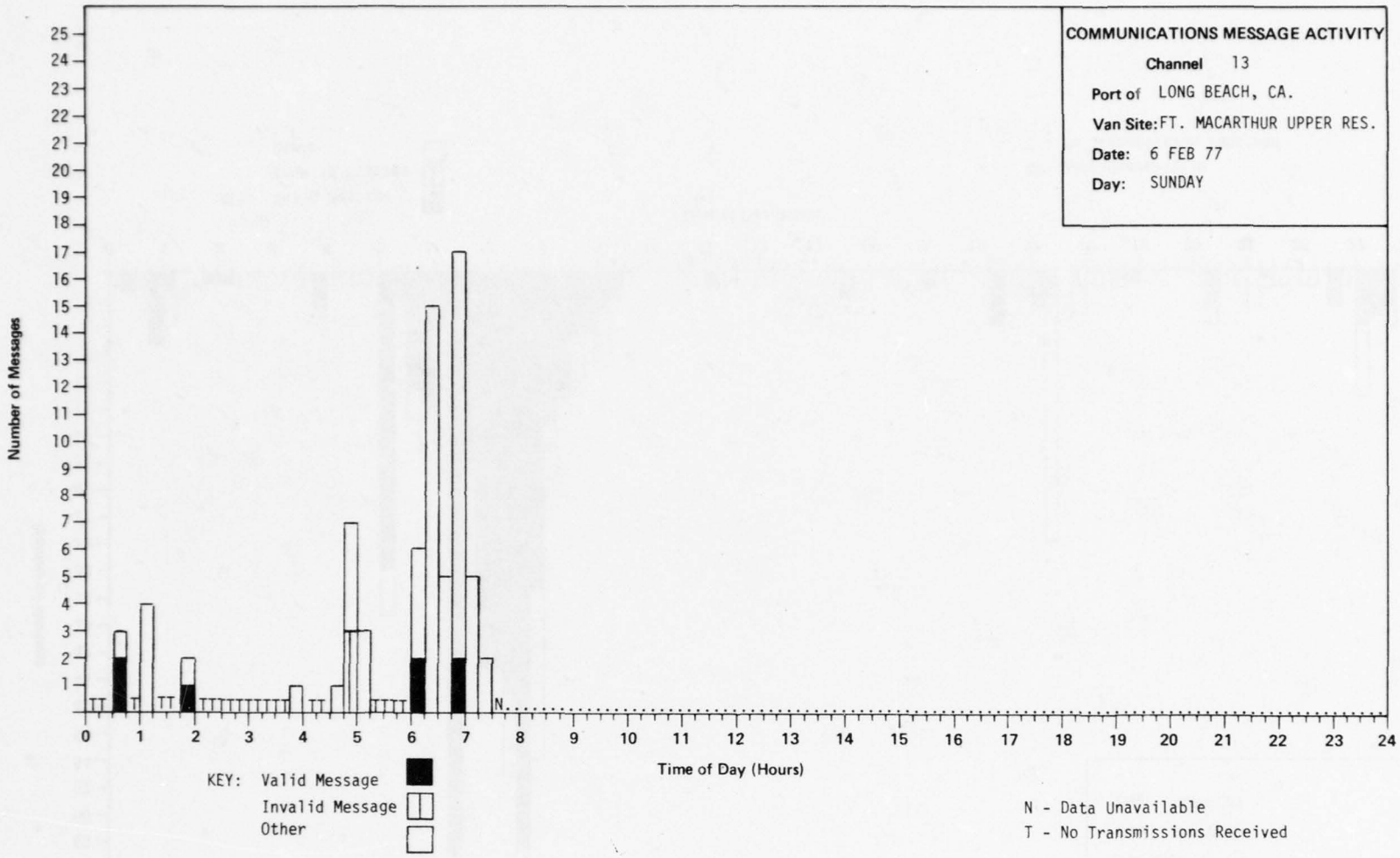

COMMUNICATIONS MESSAGE ACTIVITY
Channel 13
Port of LONG BEACH, CA.
Van Site: FT. MACARTHUR UPPER RES.
Date: 6 FEB 77
Day: SUNDAY
Number of Messages
Time of Day (Hours)
KEY: Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 3-26

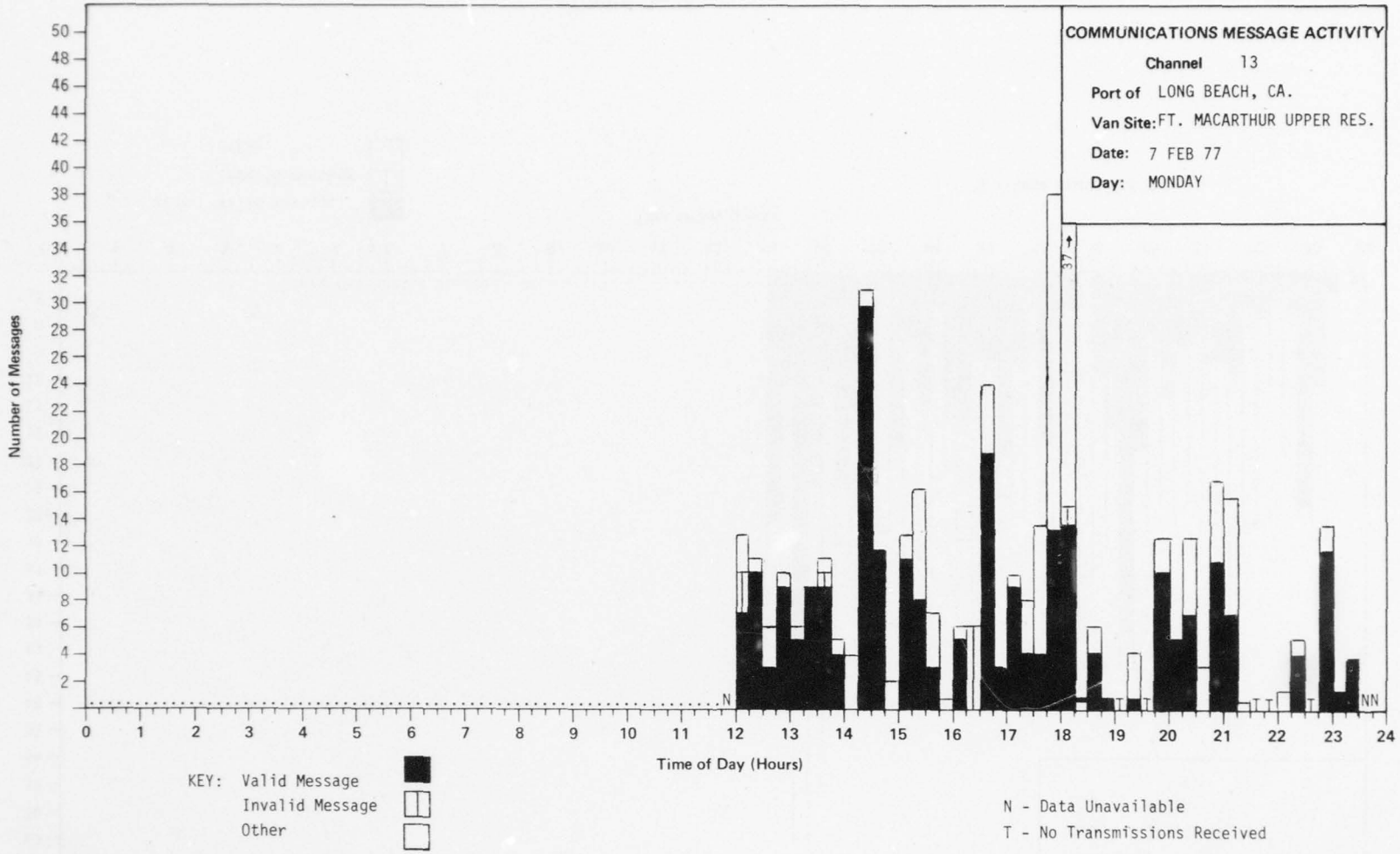

COMMUNICATIONS MESSAGE ACTIVITY
Channel 13
Port of LONG BEACH, CA.
Van Site: FT. MACARTHUR UPPER RES.
Date: 7 FEB 77
Day: MONDAY
Number of Messages
Time of Day (Hours)
37
N
NN
KEY: Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 3-27

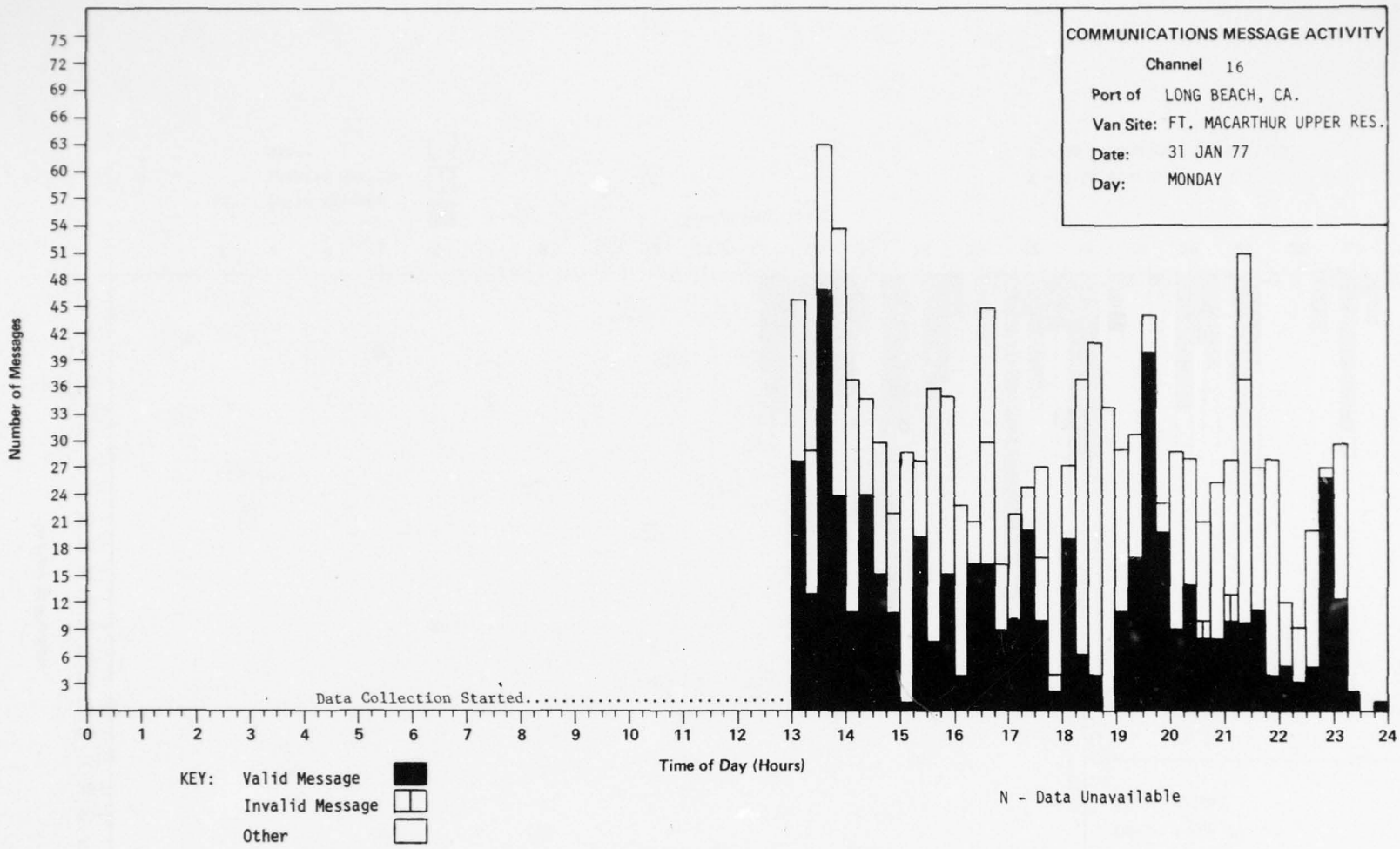

COMMUNICATIONS MESSAGE ACTIVITY
Channel 16
Port of LONG BEACH, CA.
Van Site: FT. MACARTHUR UPPER RES.
Date: 31 JAN 77
Day: MONDAY
Number of Messages
75
72
69
66
63
60
57
54
51
48
45
42
39
36
33
30
27
24
21
18
15
12
9
6
3
Data Collection Started
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time of Day (Hours)
KEY: Valid Message
Invalid Message
Other
N - Data Unavailable

FIGURE 3-28

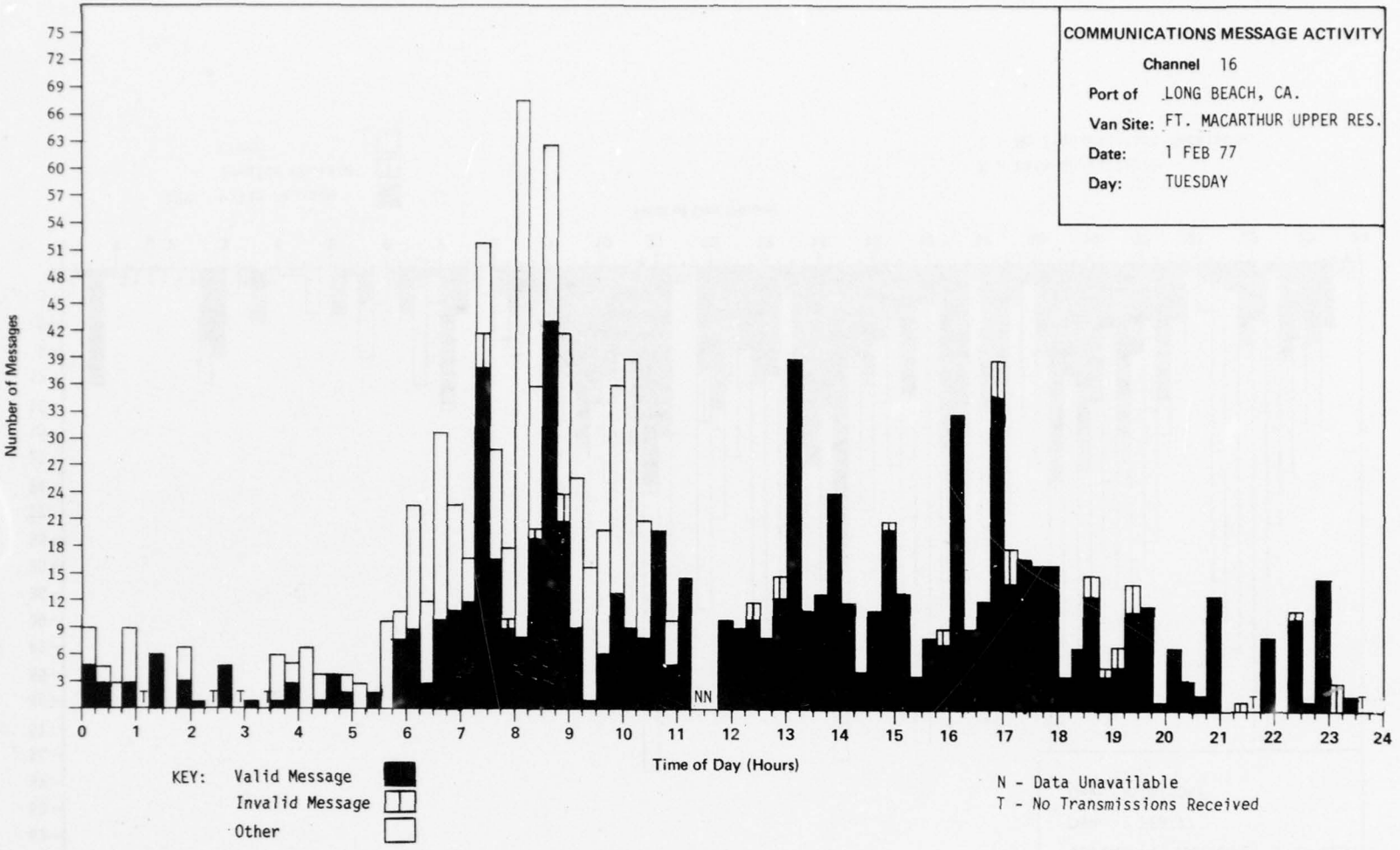

COMMUNICATIONS MESSAGE ACTIVITY
Channel 16
Port of LONG BEACH, CA.
Van Site: FT. MACARTHUR UPPER RES.
Date: 1 FEB 77
Day: TUESDAY
Number of Messages
Time of Day (Hours)
KEY: Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 3-29

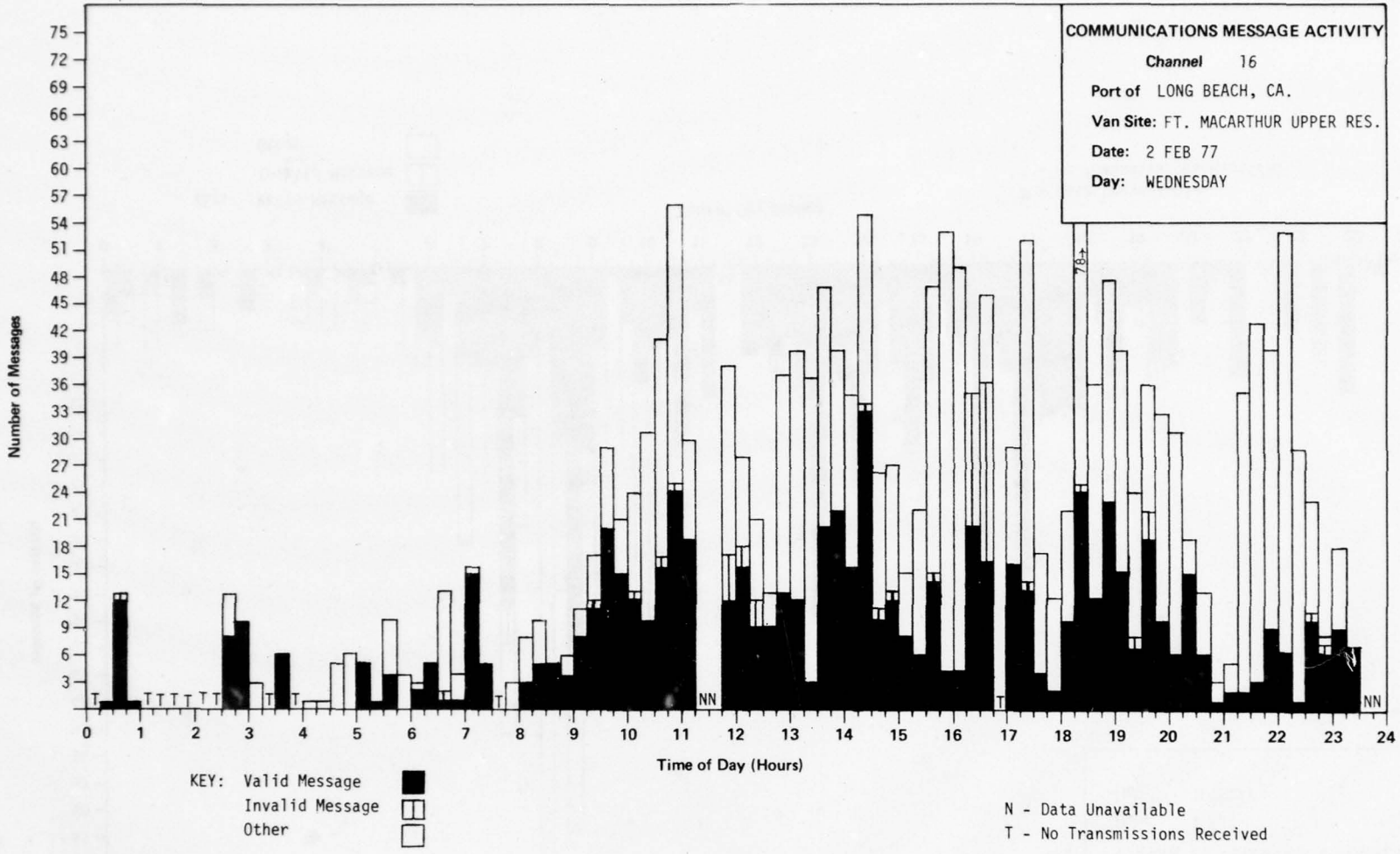

COMMUNICATIONS MESSAGE ACTIVITY
Channel 16
Port of LONG BEACH, CA.
Van Site: FT. MACARTHUR UPPER RES.
Date: 2 FEB 77
Day: WEDNESDAY
Number of Messages
Time of Day (Hours)
KEY: Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 3-30

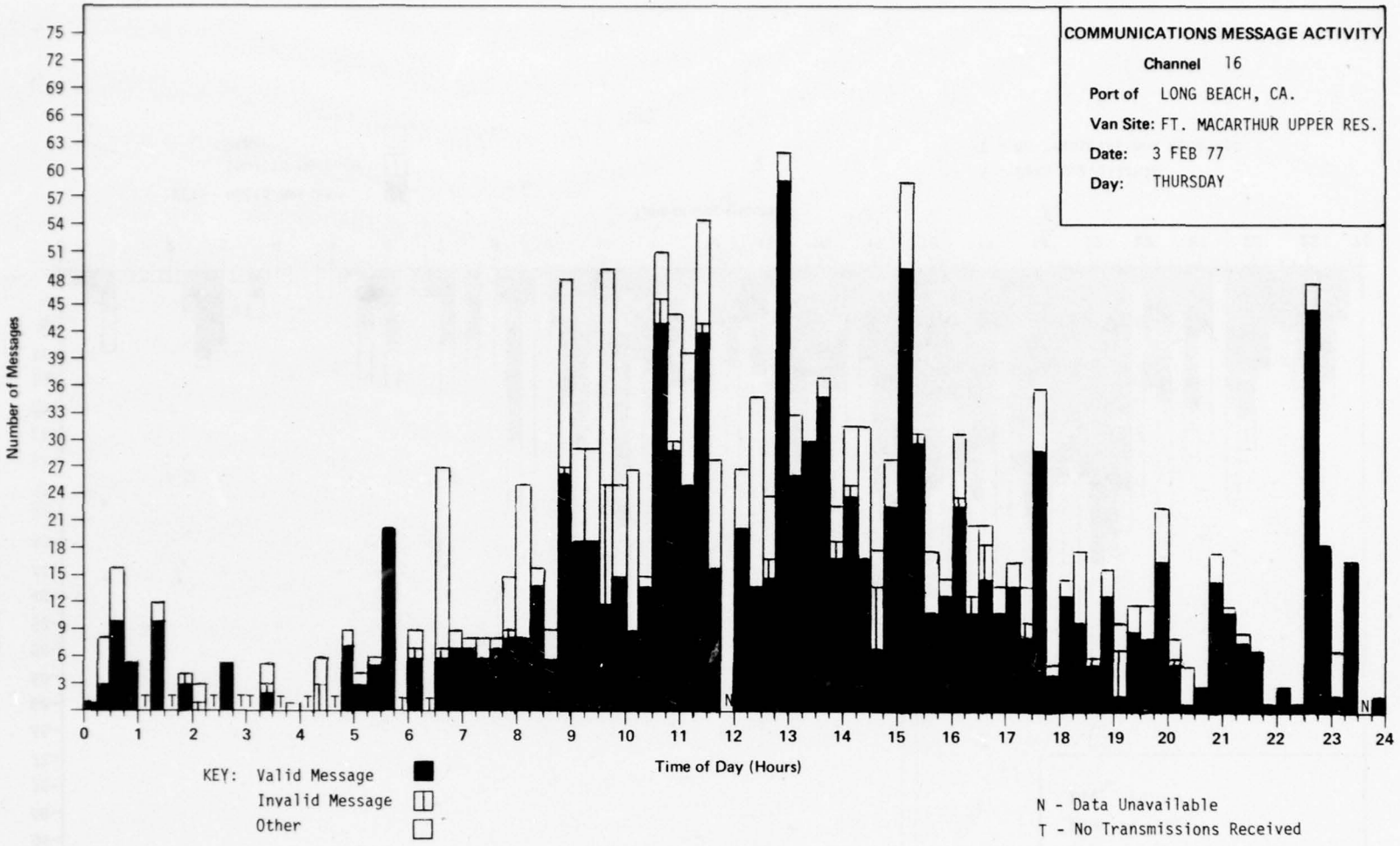

COMMUNICATIONS MESSAGE ACTIVITY
Channel 16
Port of LONG BEACH, CA.
Van Site: FT. MACARTHUR UPPER RES.
Date: 3 FEB 77
Day: THURSDAY
Number of Messages
Time of Day (Hours)
KEY: Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 3-31

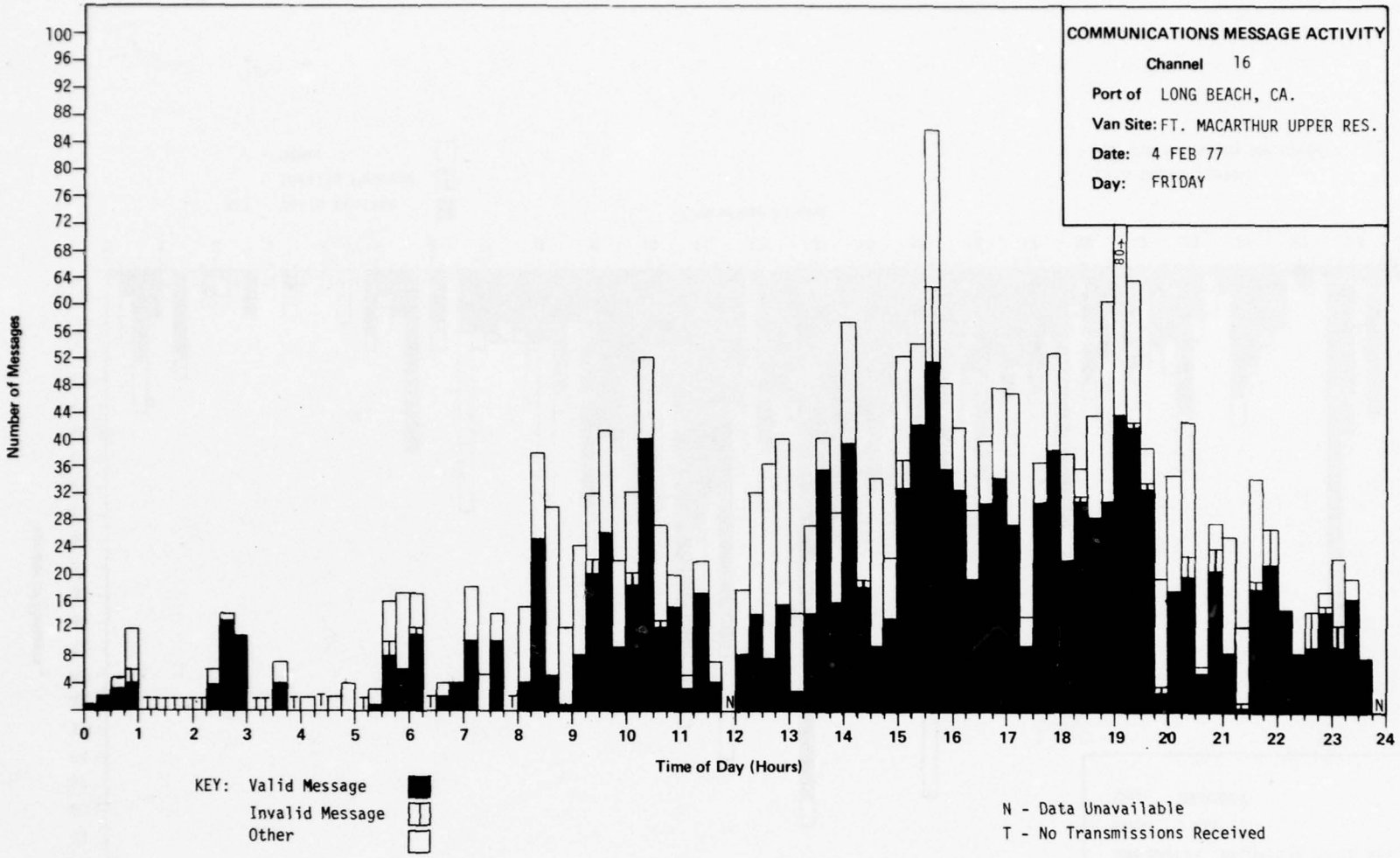

COMMUNICATIONS MESSAGE ACTIVITY
Channel 16
Port of LONG BEACH, CA.
Van Site: FT. MACARTHUR UPPER RES.
Date: 4 FEB 77
Day: FRIDAY
Number of Messages
Time of Day (Hours)
KEY: Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 3-32

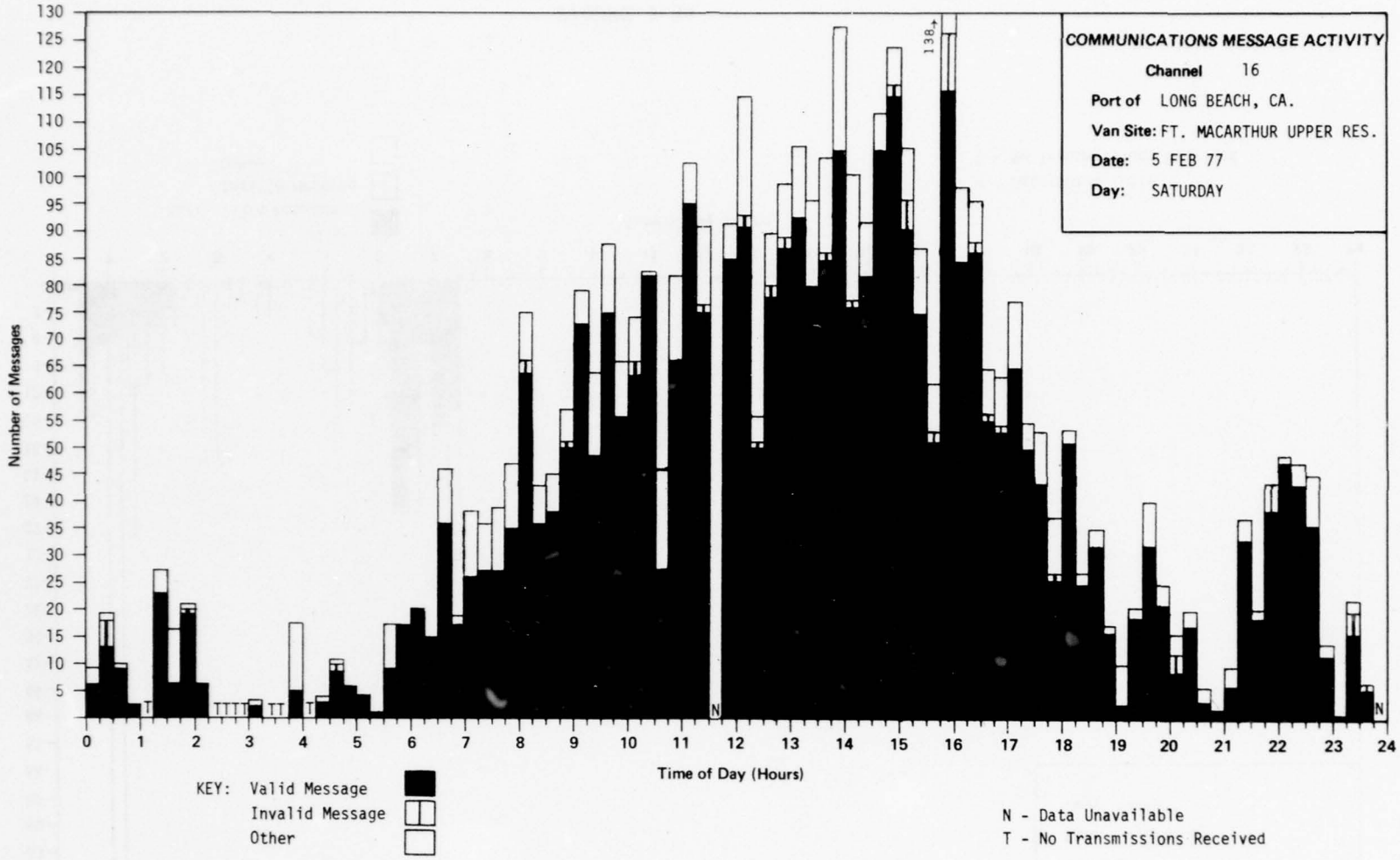

COMMUNICATIONS MESSAGE ACTIVITY
Channel 16
Port of LONG BEACH, CA.
Van Site: FT. MACARTHUR UPPER RES.
Date: 5 FEB 77
Day: SATURDAY
138+
Number of Messages
Time of Day (Hours)
KEY: Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 3-33

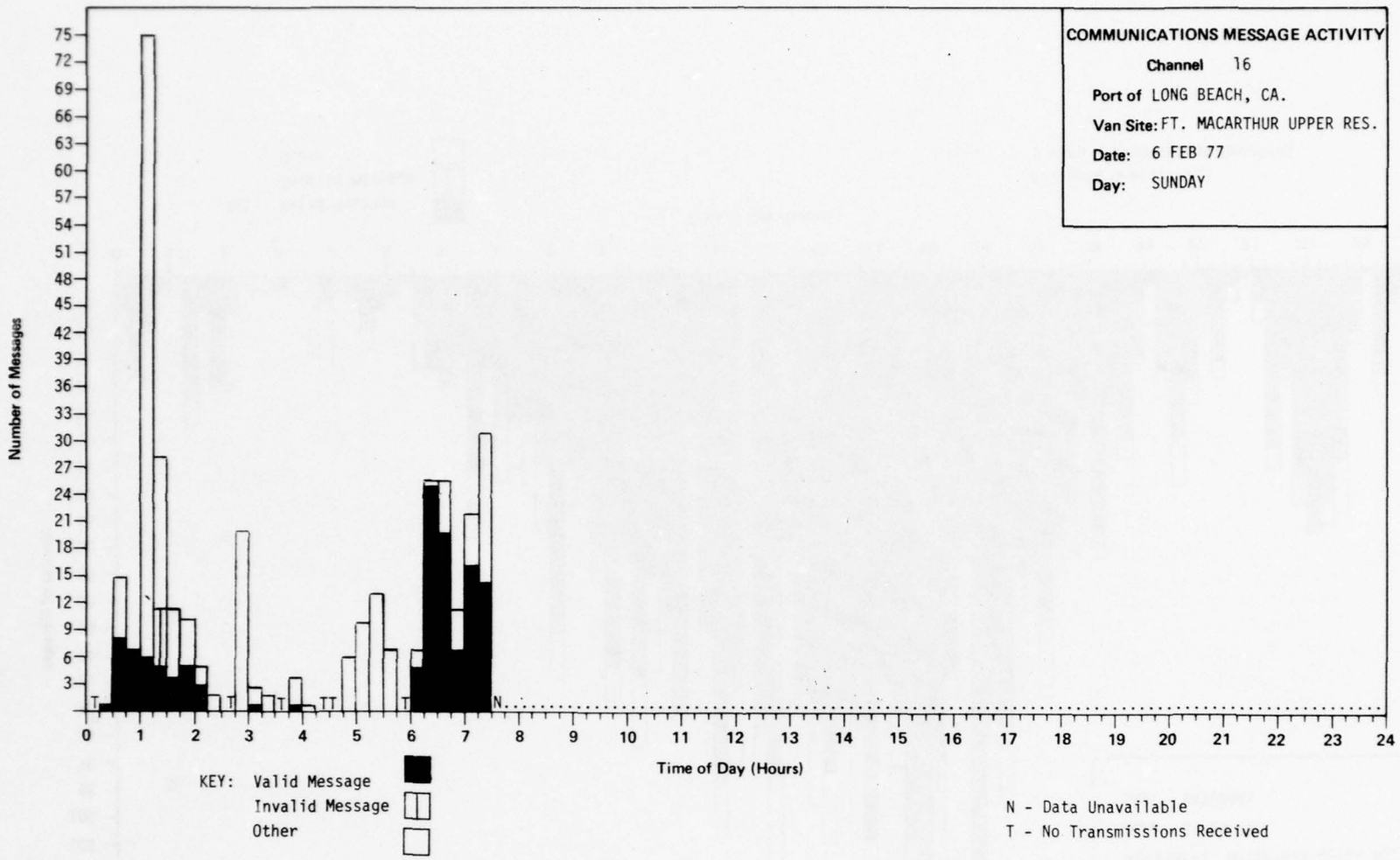

COMMUNICATIONS MESSAGE ACTIVITY
Channel 16
Port of LONG BEACH, CA.
Van Site: FT. MACARTHUR UPPER RES.
Date: 6 FEB 77
Day: SUNDAY
Number of Messages
Time of Day (Hours)
KEY: Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 3-34

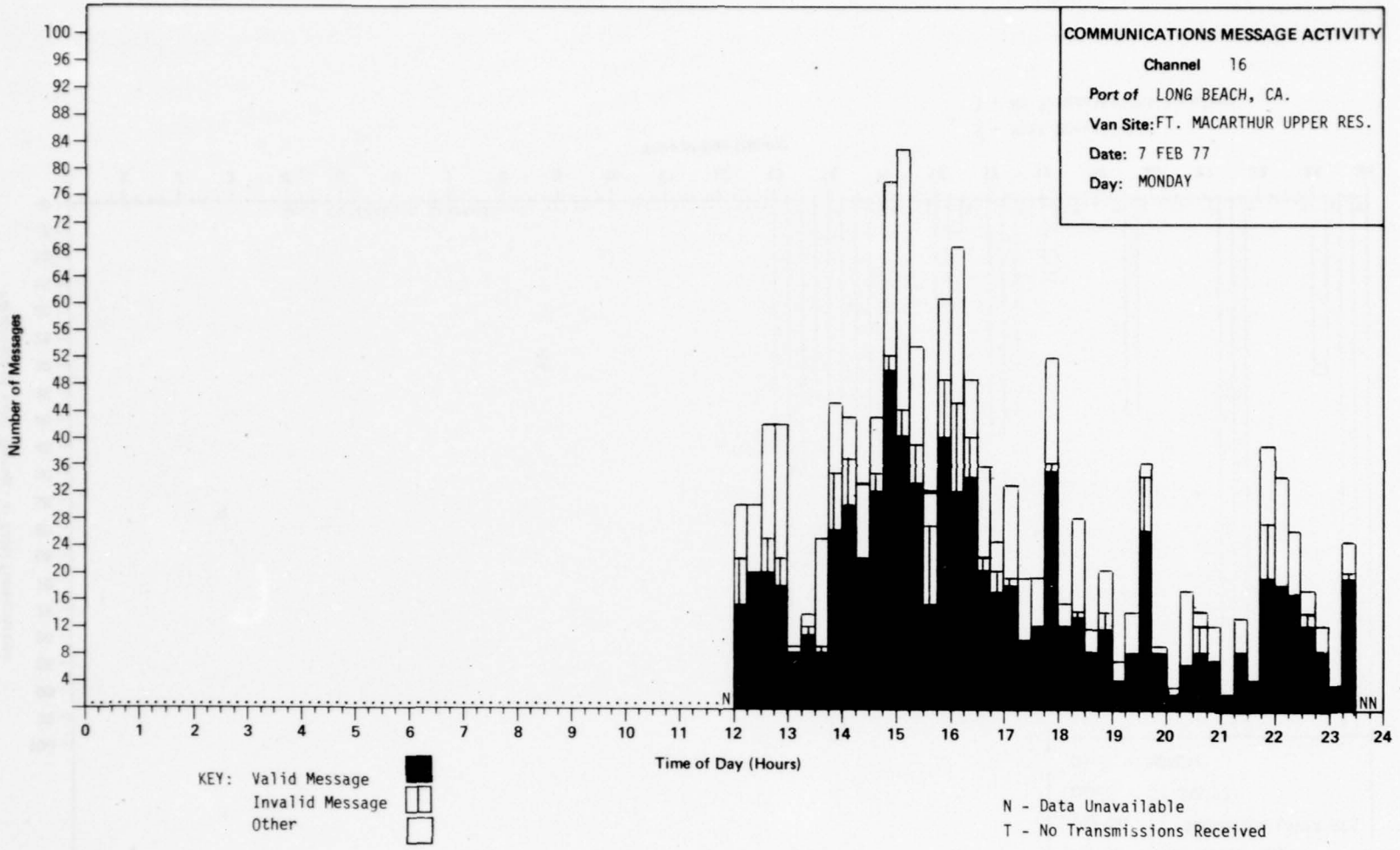

COMMUNICATIONS MESSAGE ACTIVITY
Channel 16
Port of LONG BEACH, CA.
Van Site: FT. MACARTHUR UPPER RES.
Date: 7 FEB 77
Day: MONDAY
Number of Messages
Time of Day (Hours)
KEY: Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 3-35

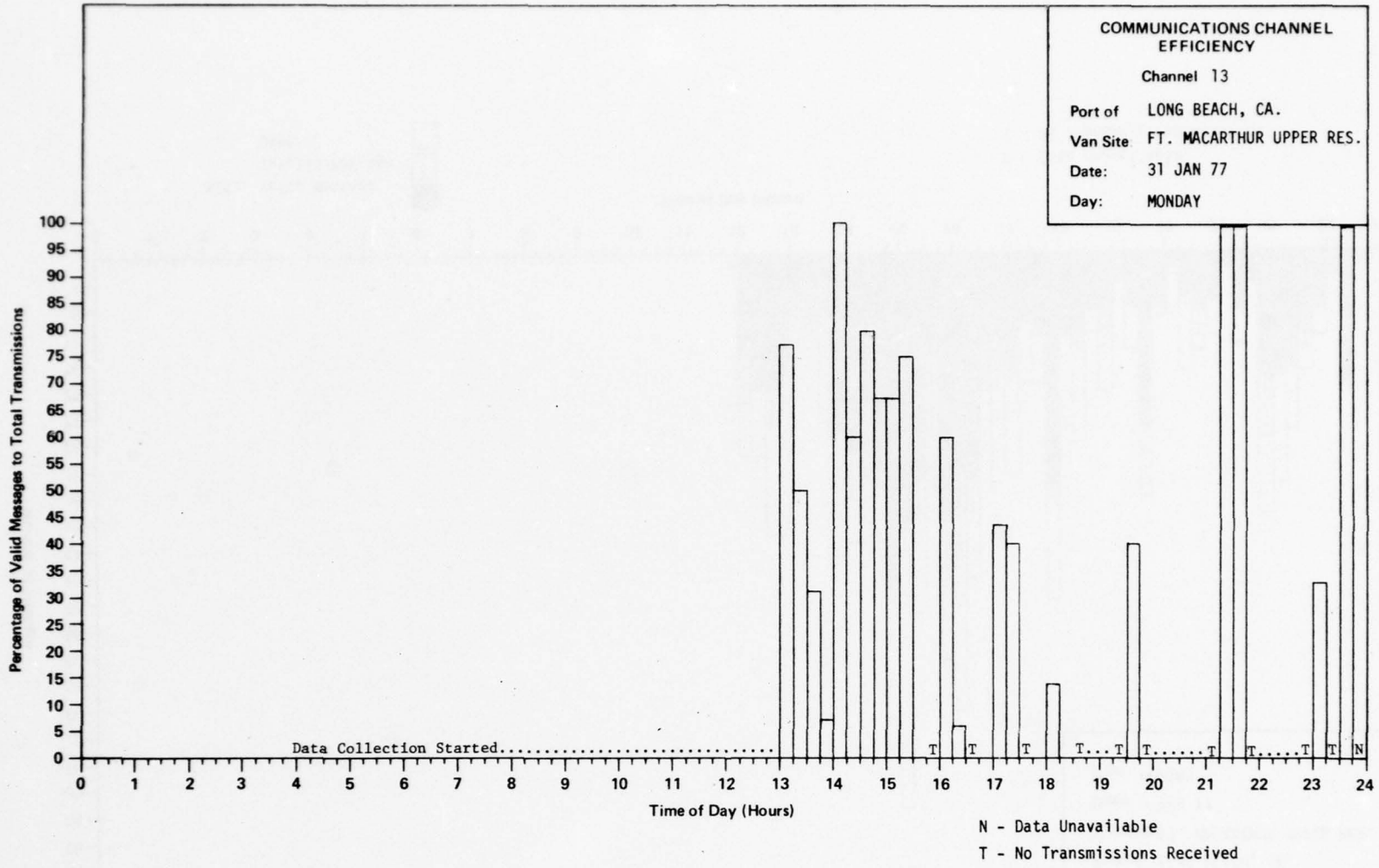

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 13
Port of LONG BEACH, CA.
Van Site FT. MACARTHUR UPPER RES.
Date: 31 JAN 77
Day: MONDAY
Percentage of Valid Messages to Total Transmissions
Data Collection Started.....
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 3-36

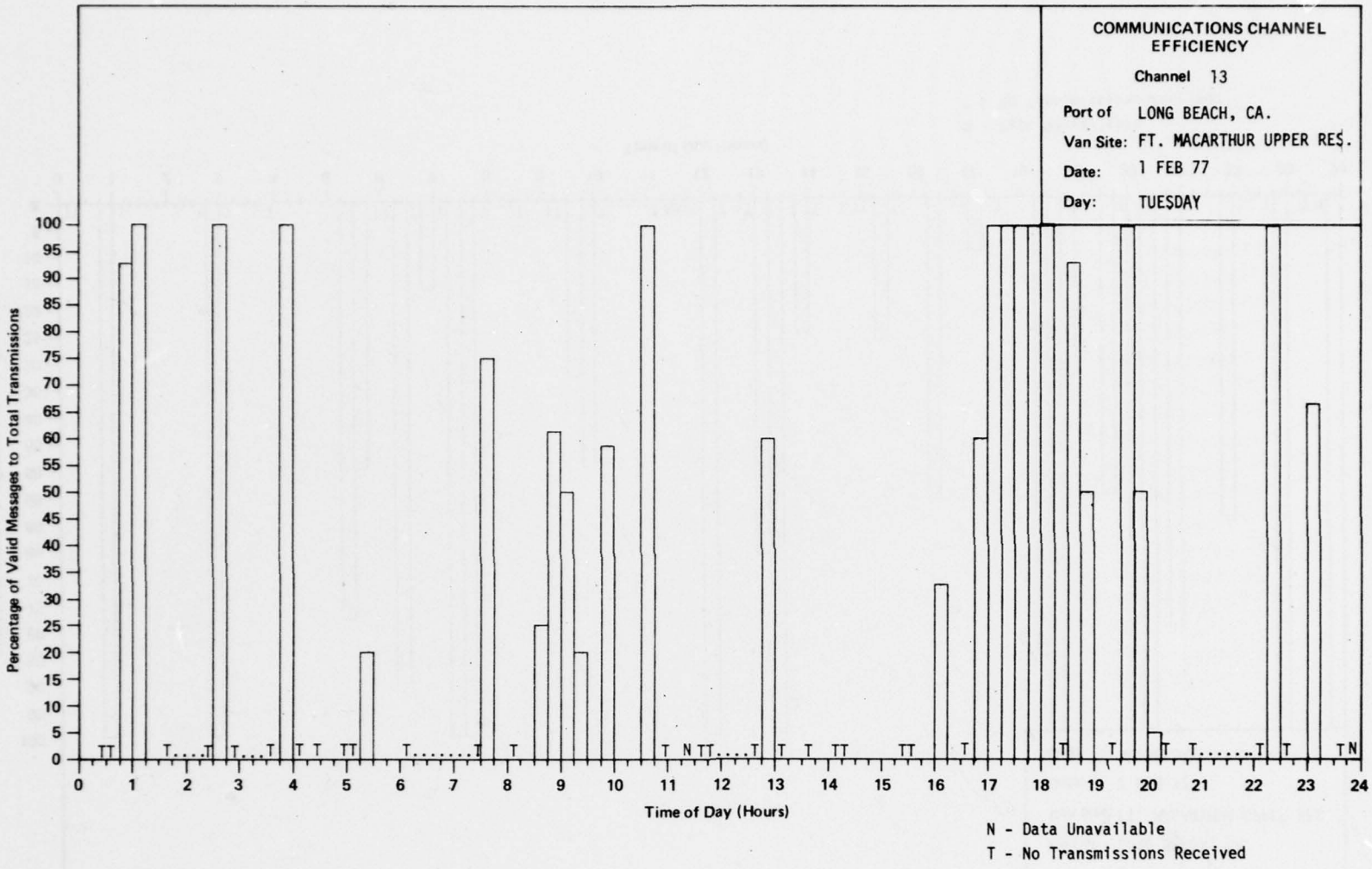

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 13
Port of LONG BEACH, CA.
Van Site: FT. MACARTHUR UPPER RES.
Date: 1 FEB 77
Day: TUESDAY
Percentage of Valid Messages to Total Transmissions
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 3-37

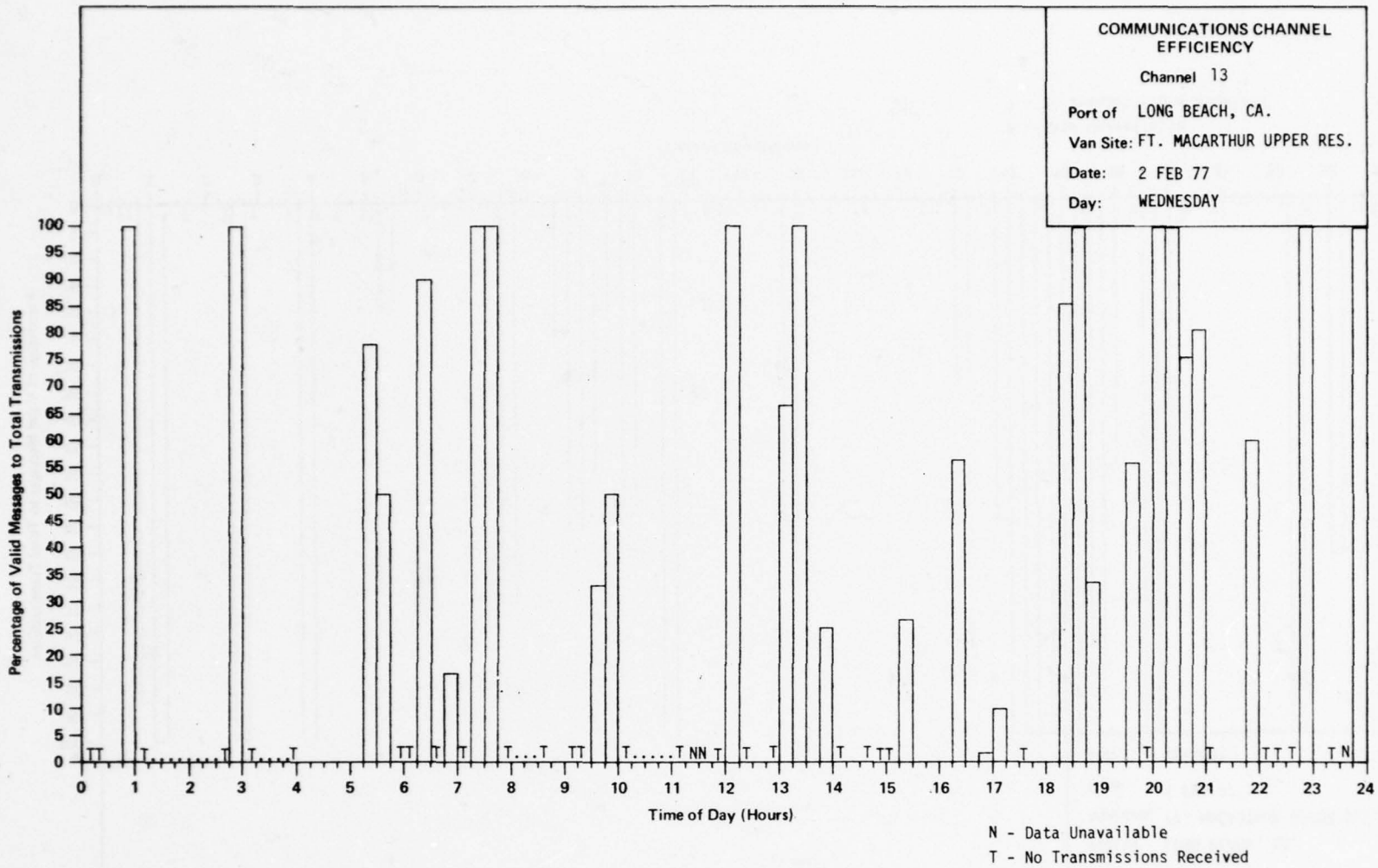

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 13
Port of LONG BEACH, CA.
Van Site: FT. MACARTHUR UPPER RES.
Date: 2 FEB 77
Day: WEDNESDAY
Percentage of Valid Messages to Total Transmissions
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 3-38

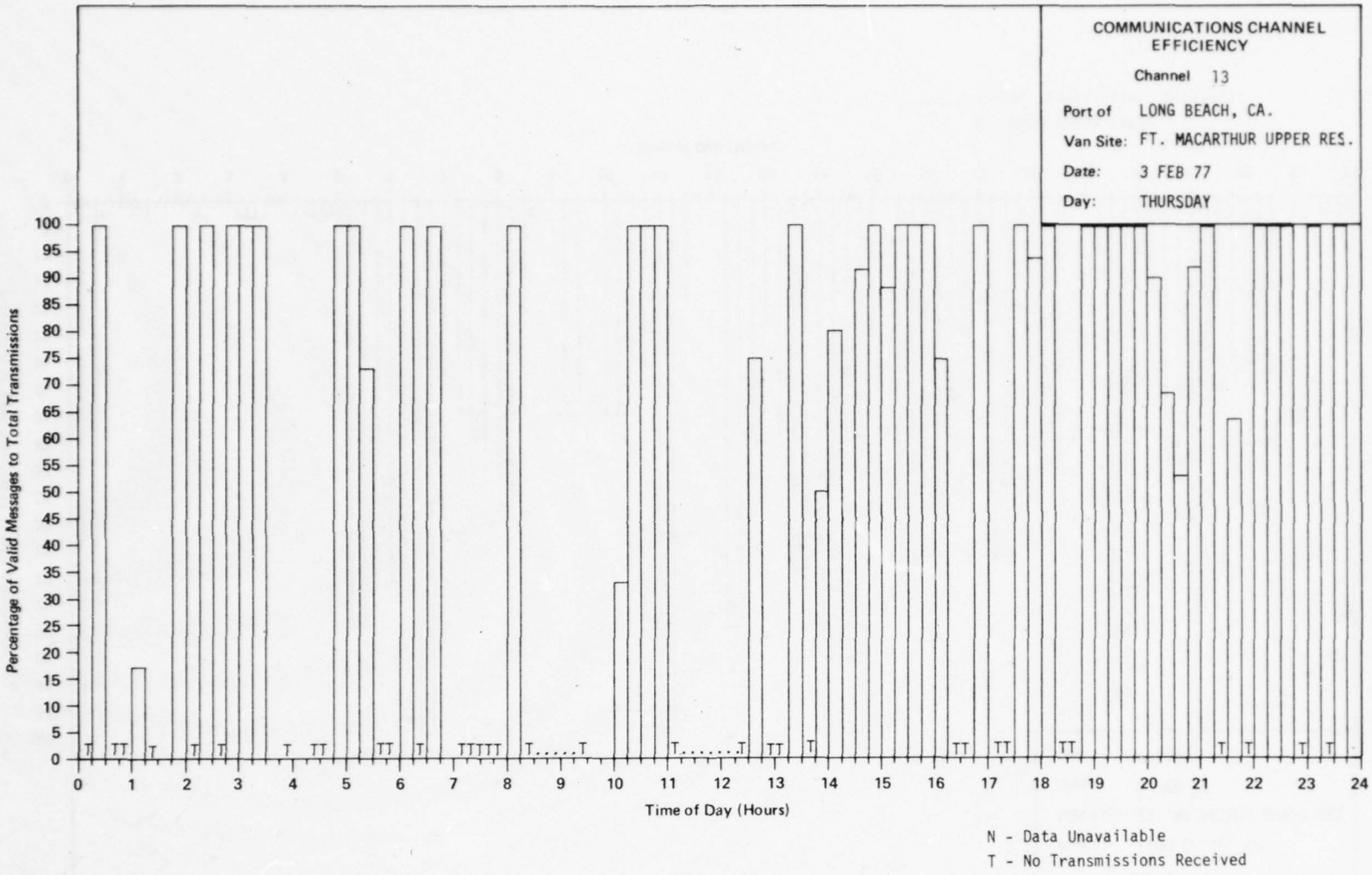

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 13
Port of LONG BEACH, CA.
Van Site: FT. MACARTHUR UPPER RES.
Date: 3 FEB 77
Day: THURSDAY
Percentage of Valid Messages to Total Transmissions
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 3-39

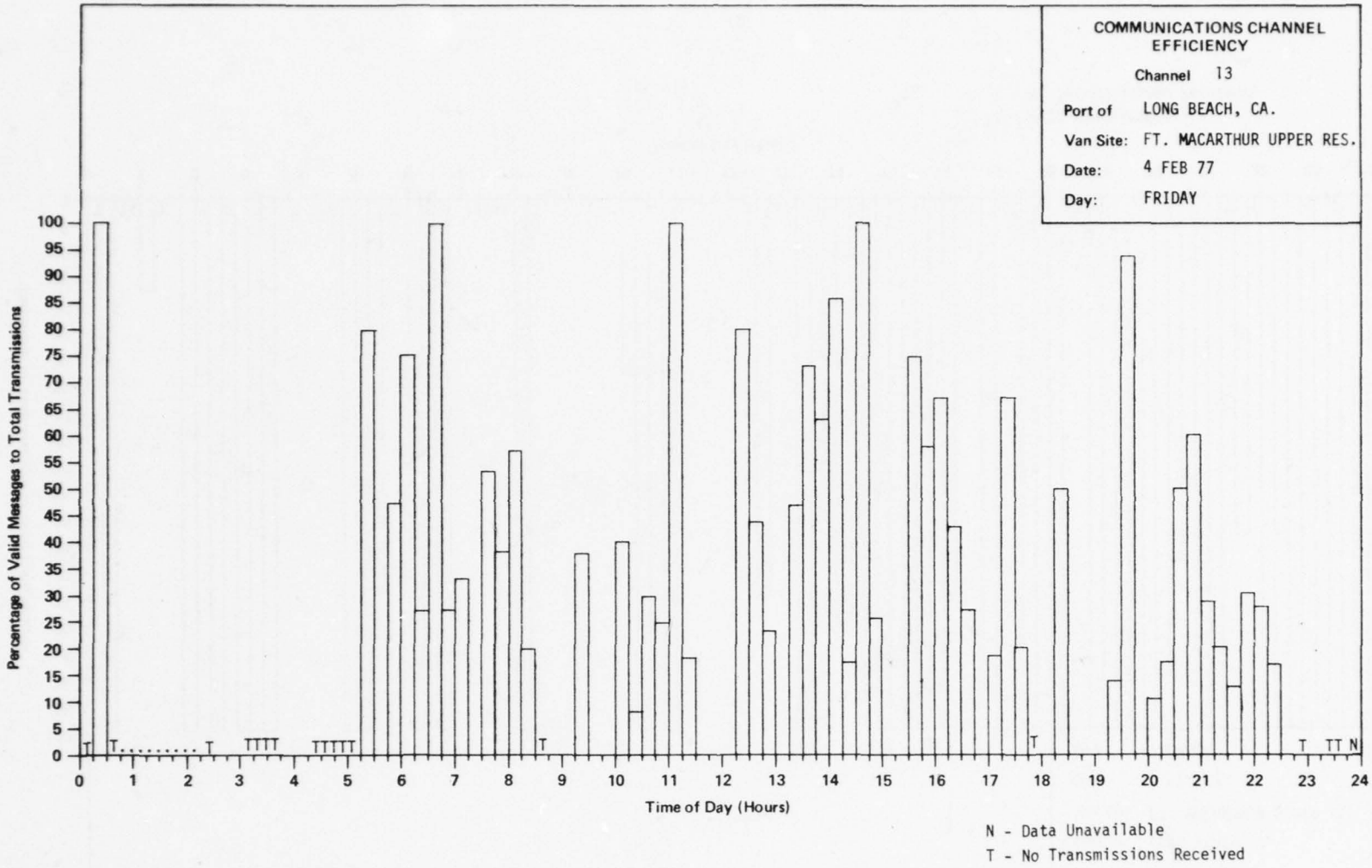

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 13
Port of LONG BEACH, CA.
Van Site: FT. MACARTHUR UPPER RES.
Date: 4 FEB 77
Day: FRIDAY
Percentage of Valid Messages to Total Transmissions
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 3-40

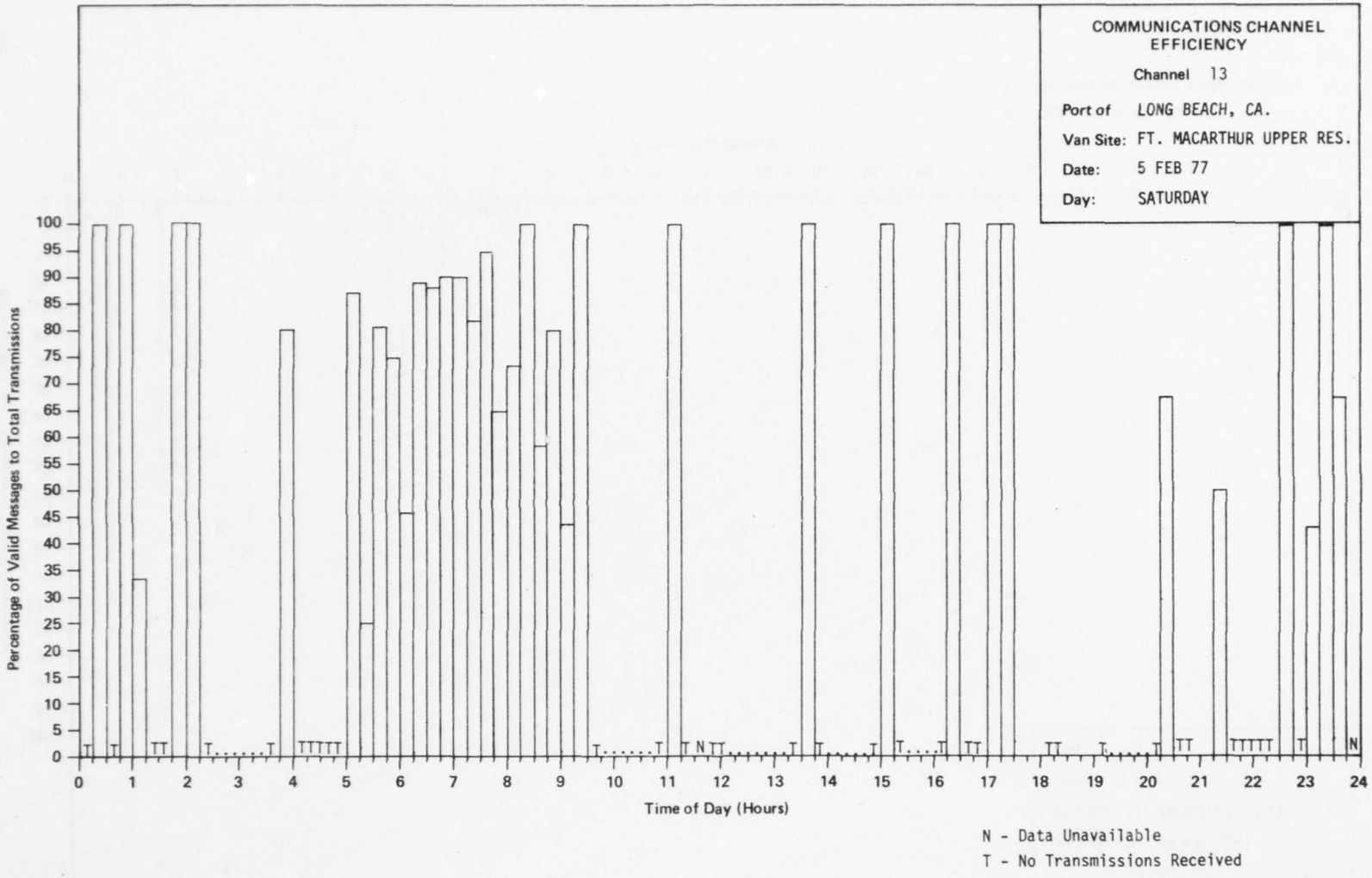

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 13
Port of LONG BEACH, CA.
Van Site: FT. MACARTHUR UPPER RES.
Date: 5 FEB 77
Day: SATURDAY
Percentage of Valid Messages to Total Transmissions
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 3-41

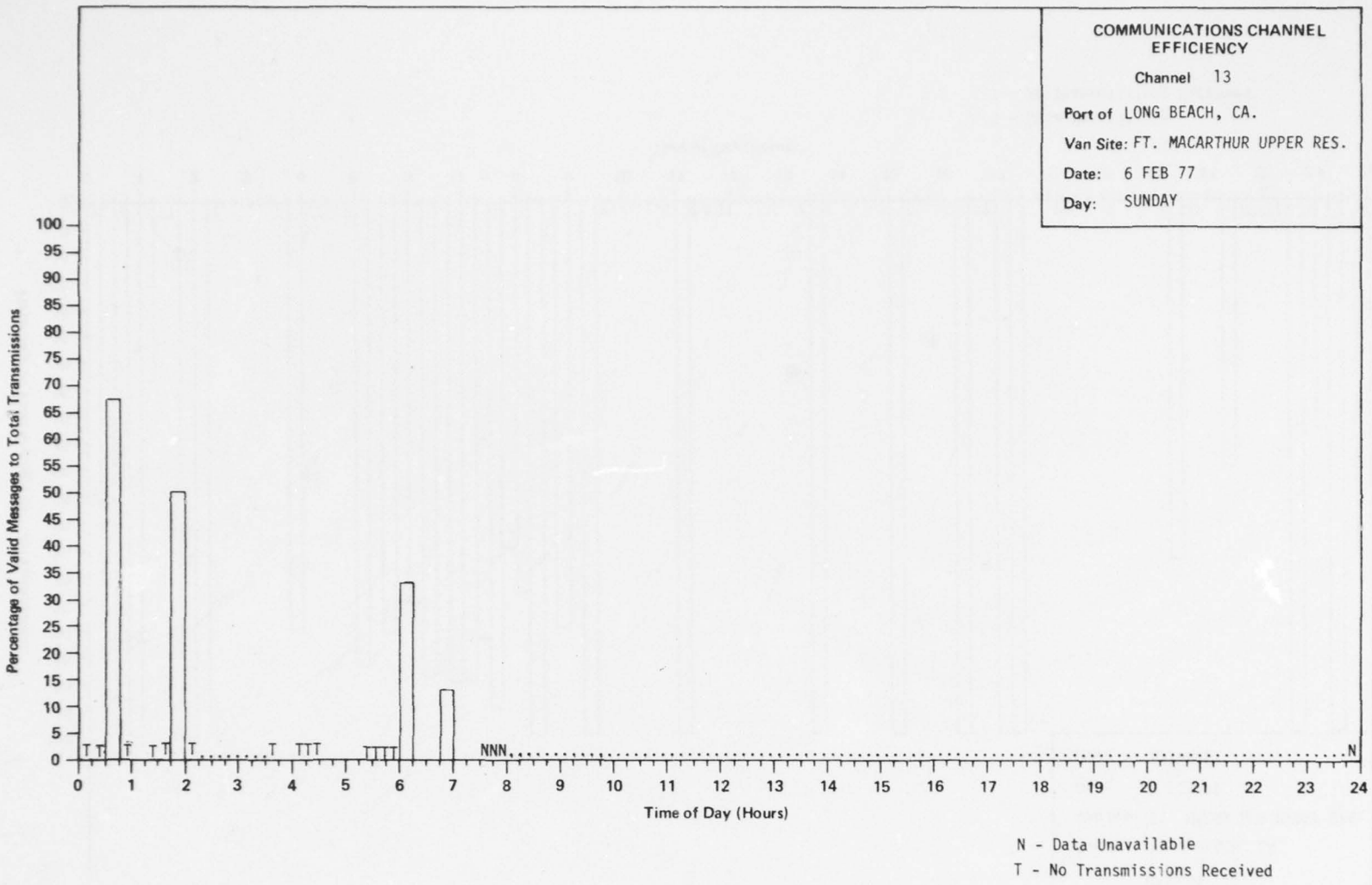

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 13
Port of LONG BEACH, CA.
Van Site: FT. MACARTHUR UPPER RES.
Date: 6 FEB 77
Day: SUNDAY
Percentage of Valid Messages to Total Transmissions
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 3-42

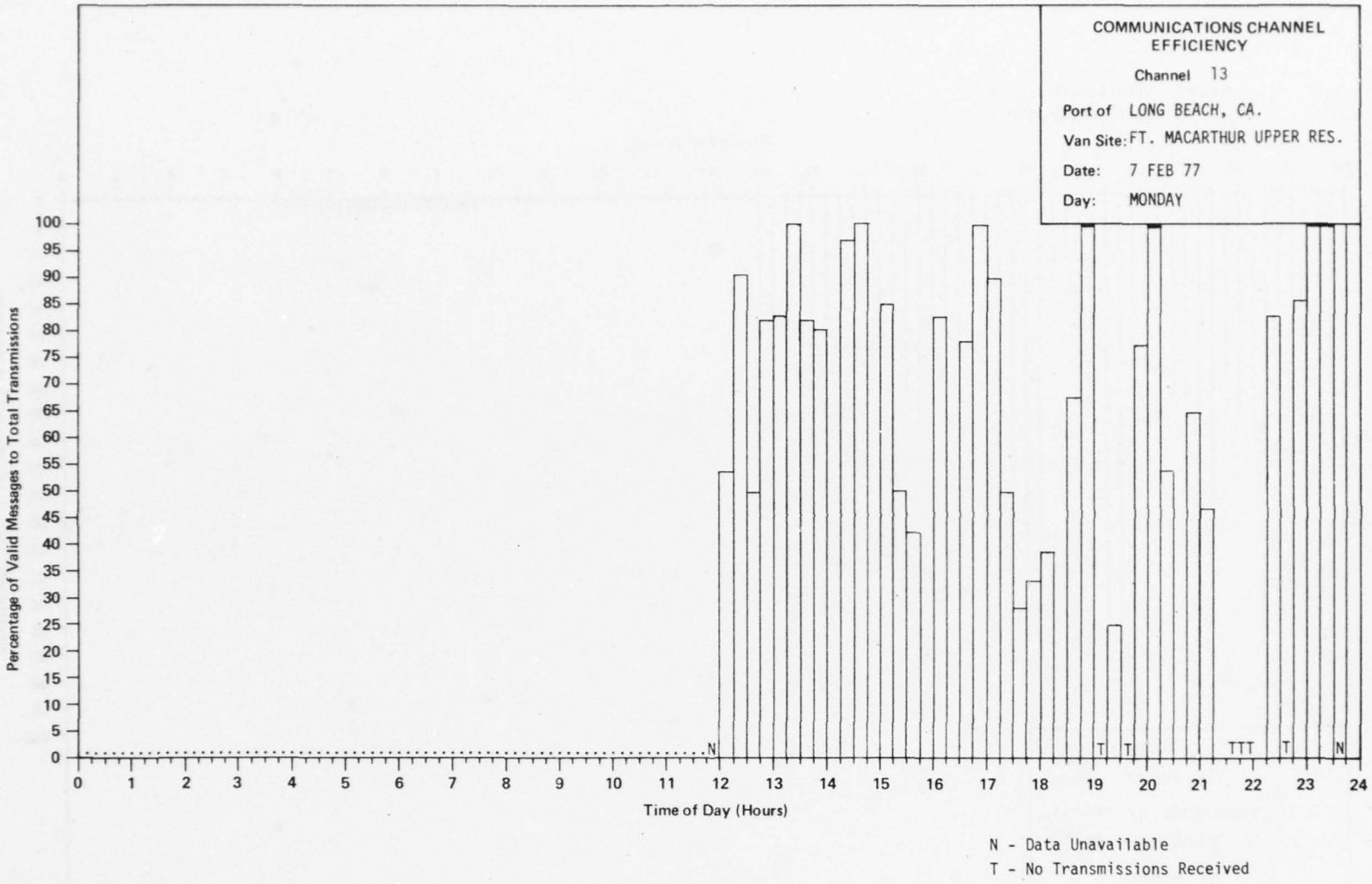

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 13
Port of LONG BEACH, CA.
Van Site: FT. MACARTHUR UPPER RES.
Date: 7 FEB 77
Day: MONDAY
Percentage of Valid Messages to Total Transmissions
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 3-43

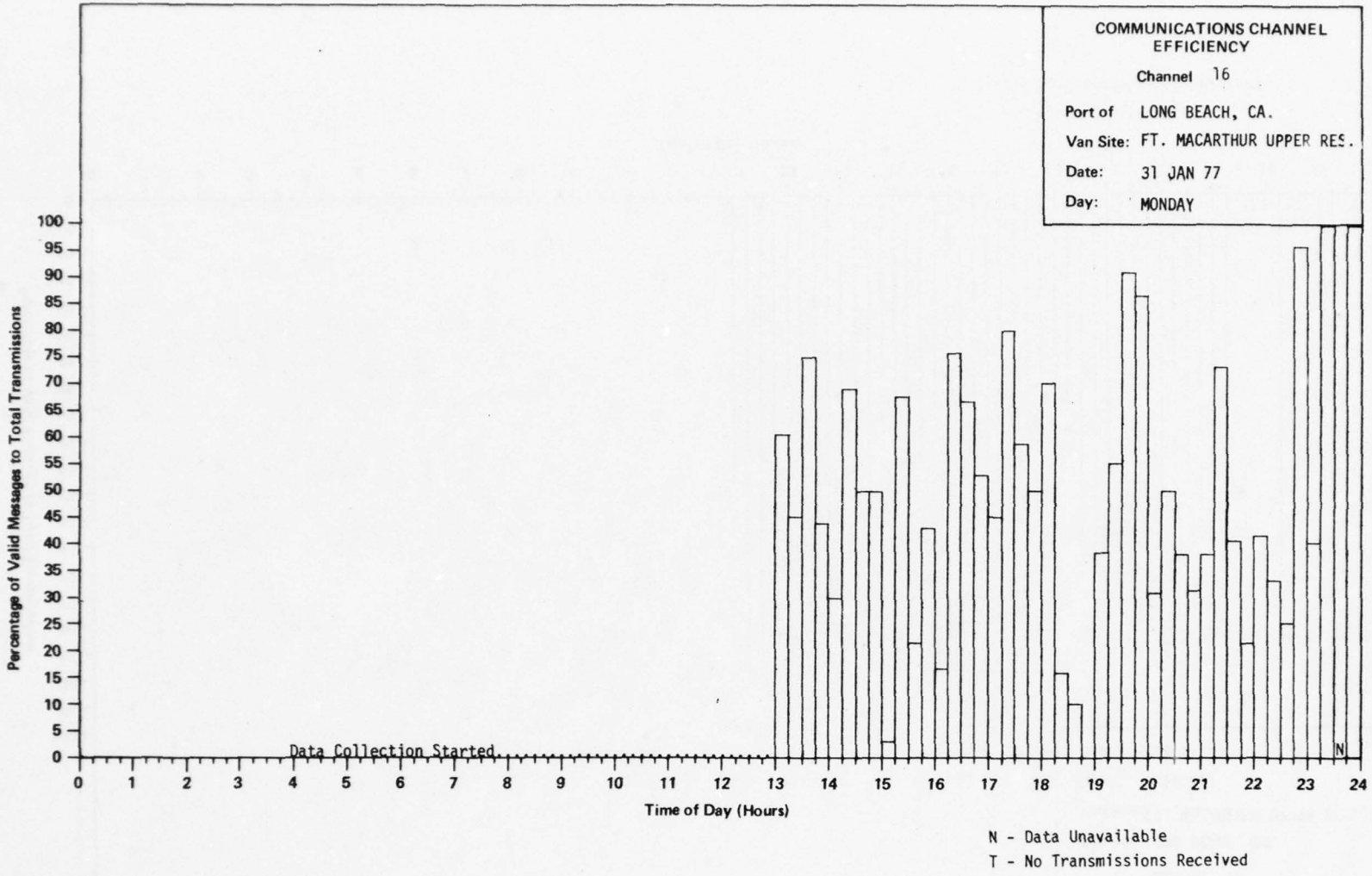

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 16
Port of LONG BEACH, CA.
Van Site: FT. MACARTHUR UPPER RES.
Date: 31 JAN 77
Day: MONDAY
Percentage of Valid Messages to Total Transmissions
Data Collection Started
N
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 3-44

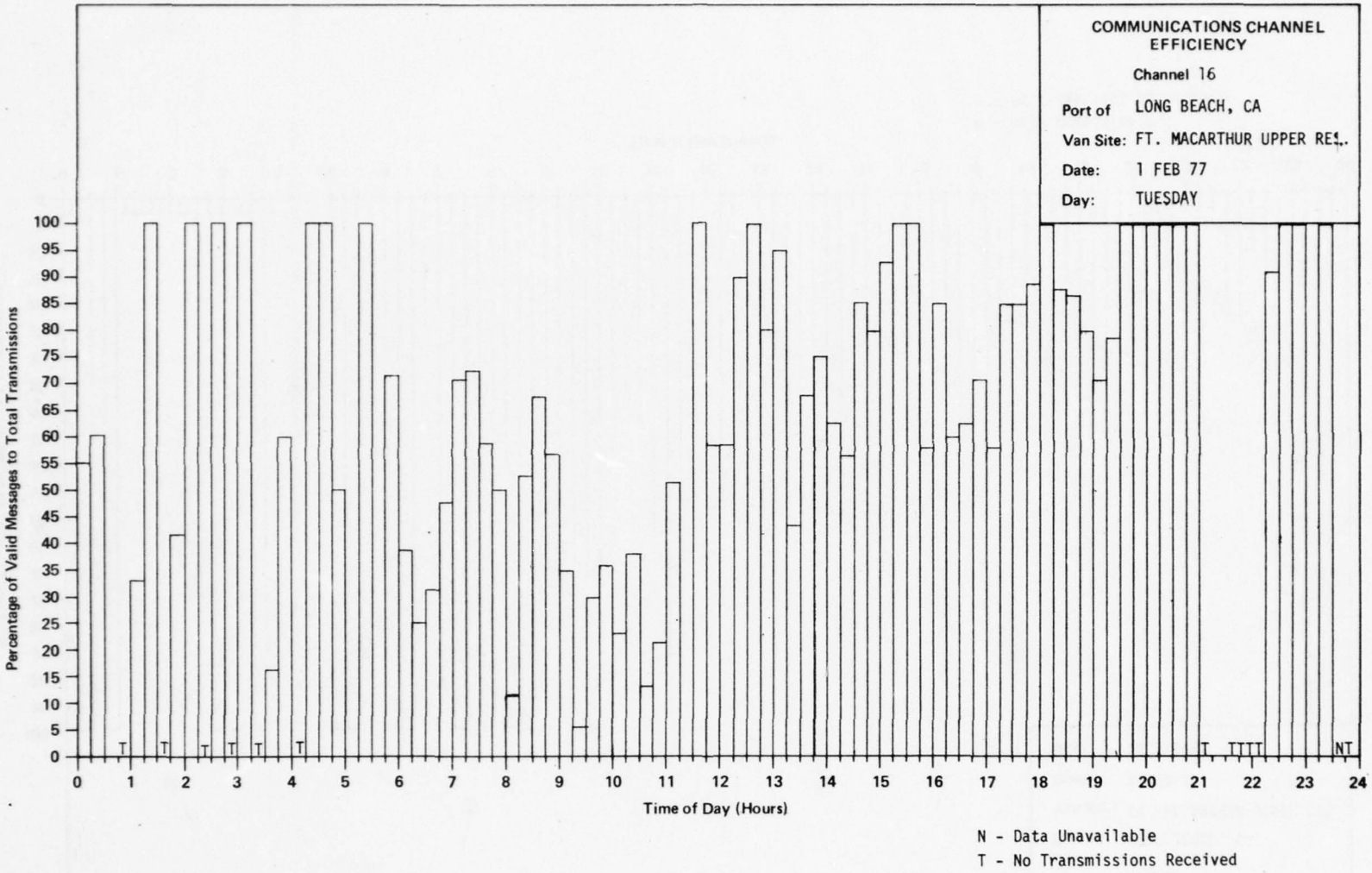

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 16
Port of LONG BEACH, CA
Van Site: FT. MACARTHUR UPPER RES.
Date: 1 FEB 77
Day: TUESDAY
Percentage of Valid Messages to Total Transmissions
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 3-45

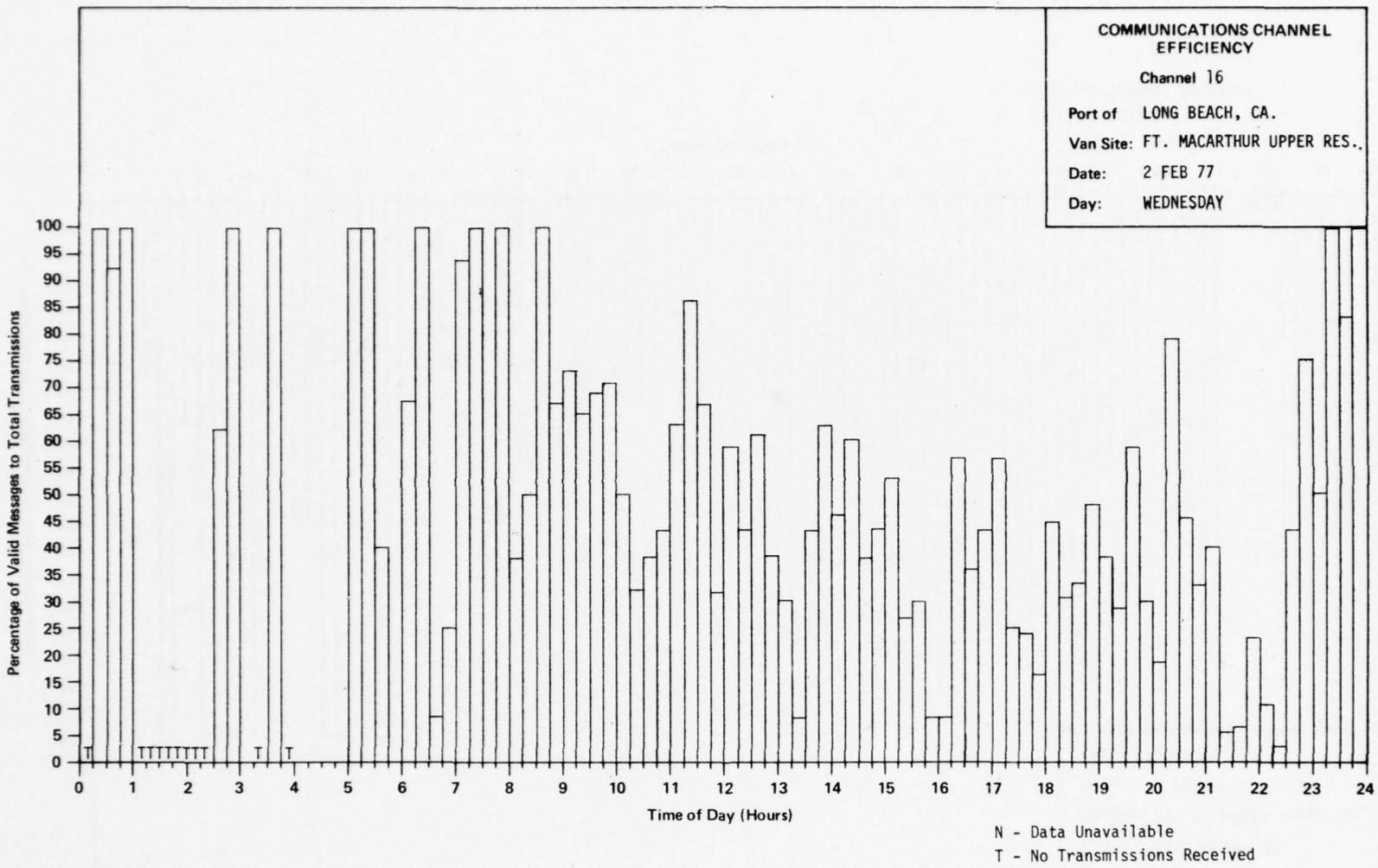

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 16
Port of LONG BEACH, CA.
Van Site: FT. MACARTHUR UPPER RES.
Date: 2 FEB 77
Day: WEDNESDAY
Percentage of Valid Messages to Total Transmissions
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 3-46

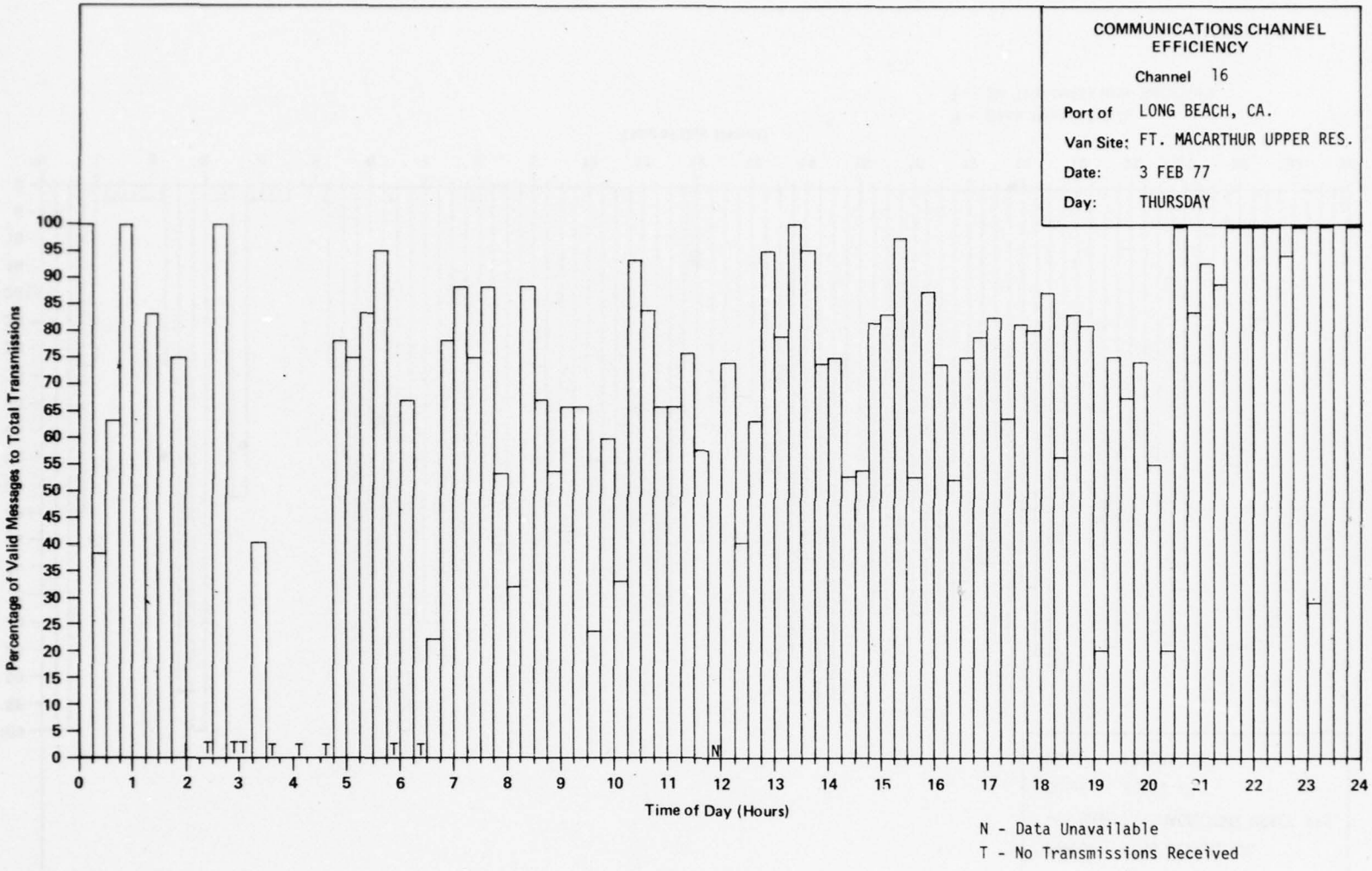

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 16
Port of LONG BEACH, CA.
Van Site: FT. MACARTHUR UPPER RES.
Date: 3 FEB 77
Day: THURSDAY
Percentage of Valid Messages to Total Transmissions
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 3-47

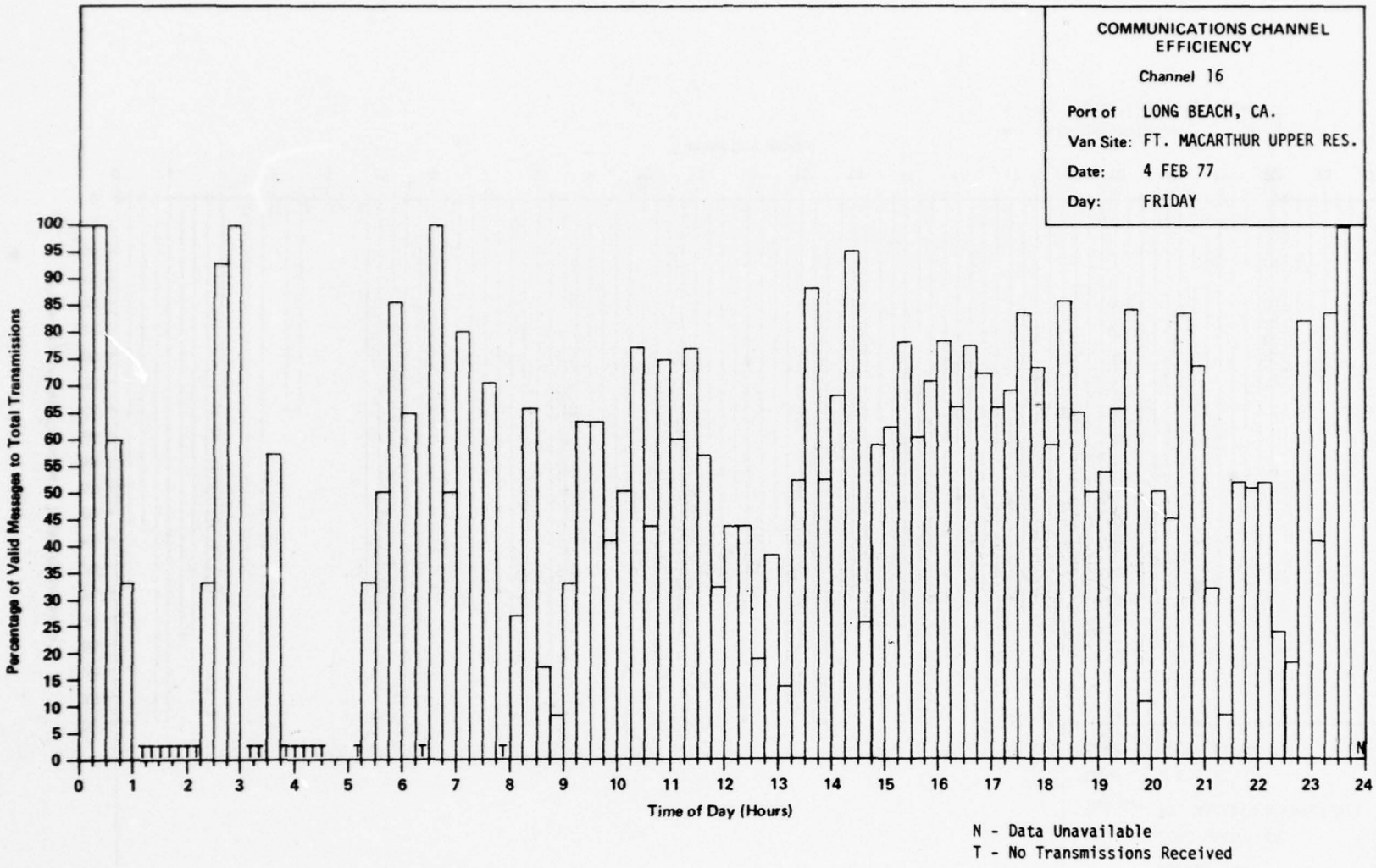

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 16
Port of LONG BEACH, CA.
Van Site: FT. MACARTHUR UPPER RES.
Date: 4 FEB 77
Day: FRIDAY
Percentage of Valid Messages to Total Transmissions
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 3-48

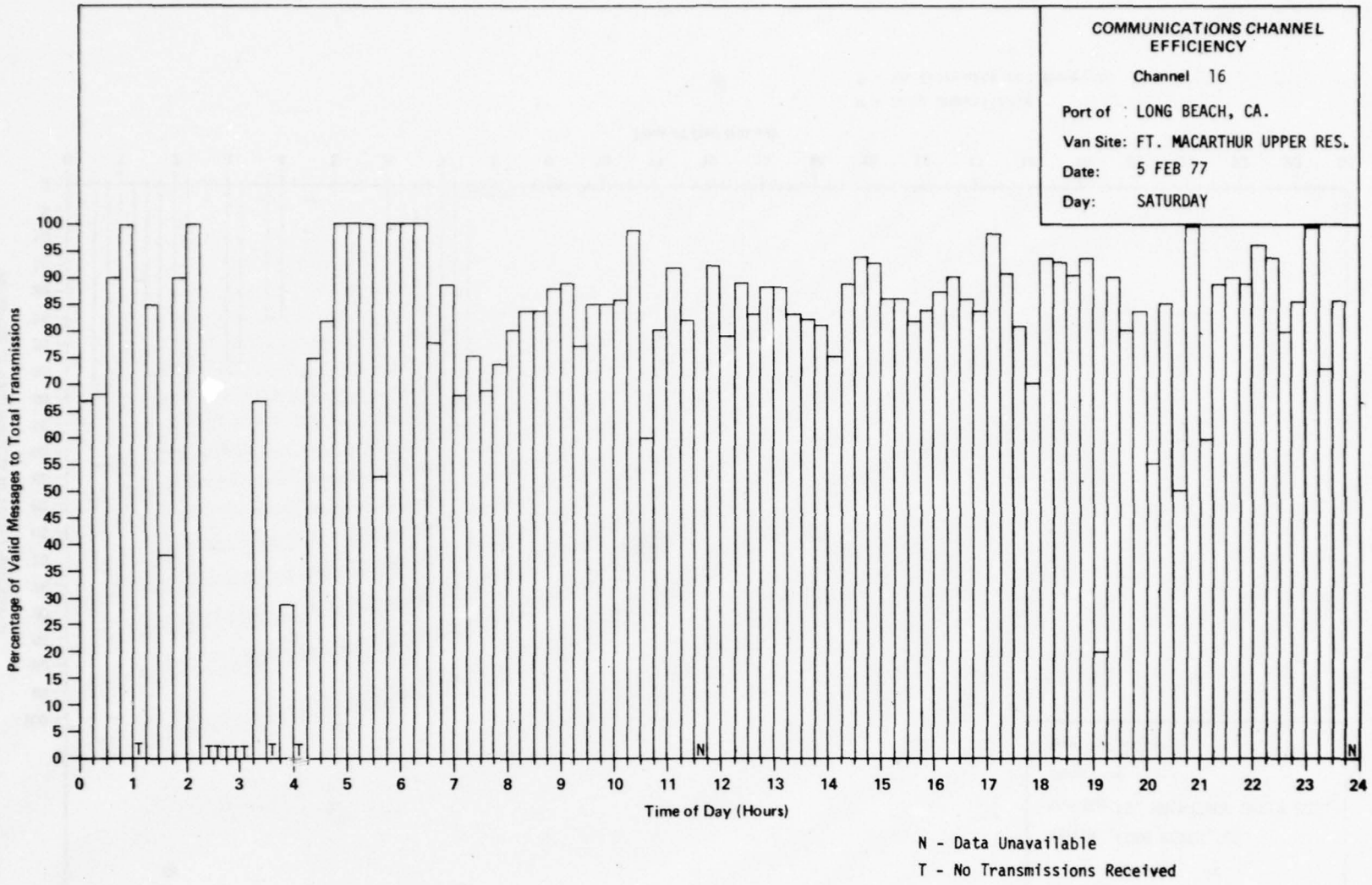

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 16
Port of : LONG BEACH, CA.
Van Site: FT. MACARTHUR UPPER RES.
Date: 5 FEB 77
Day: SATURDAY
Percentage of Valid Messages to Total Transmissions
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 3-49

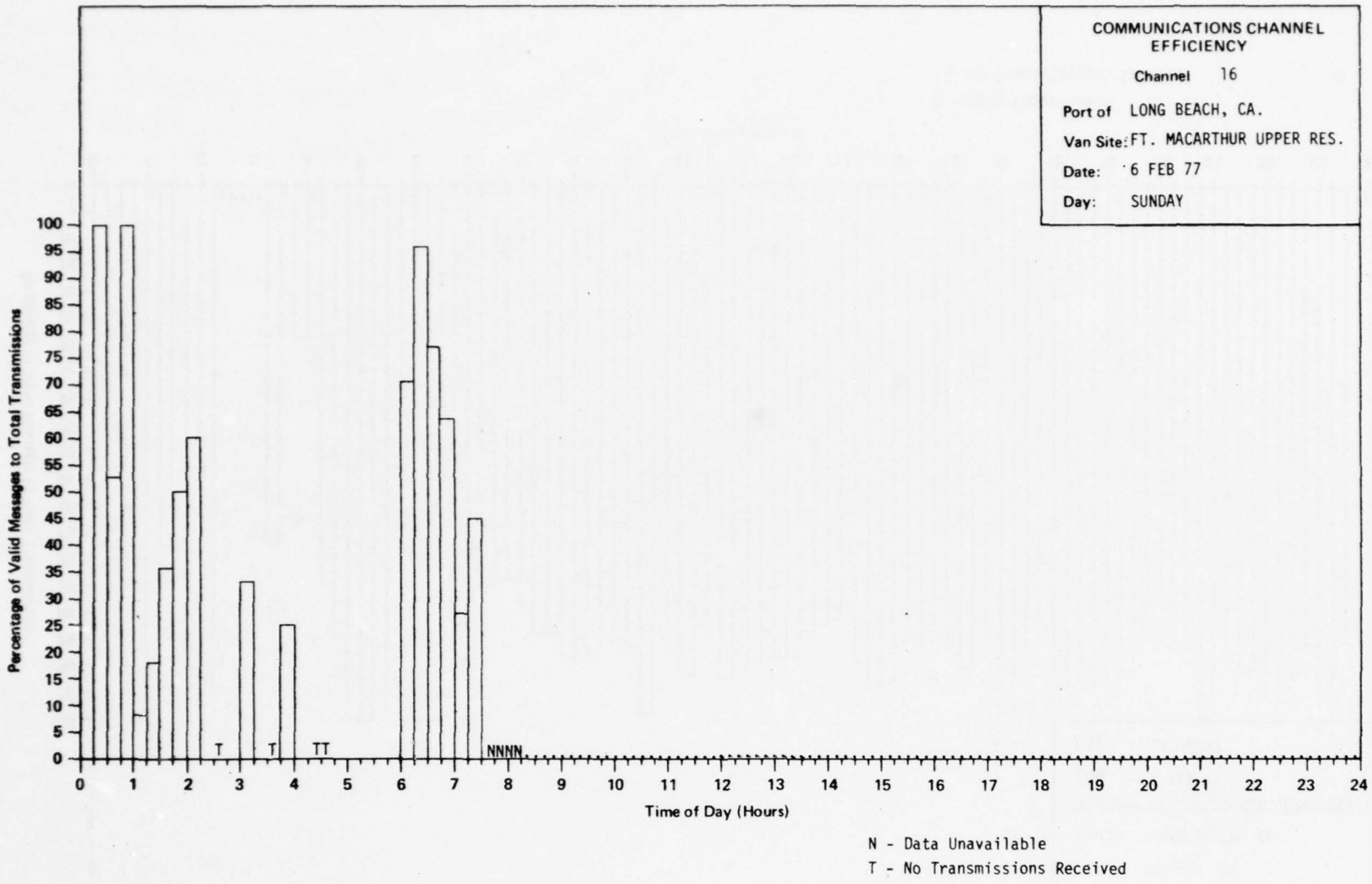

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 16
Port of LONG BEACH, CA.
Van Site: FT. MACARTHUR UPPER RES.
Date: 6 FEB 77
Day: SUNDAY
Percentage of Valid Messages to Total Transmissions
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
T
T
TT
NNNN
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 3-50

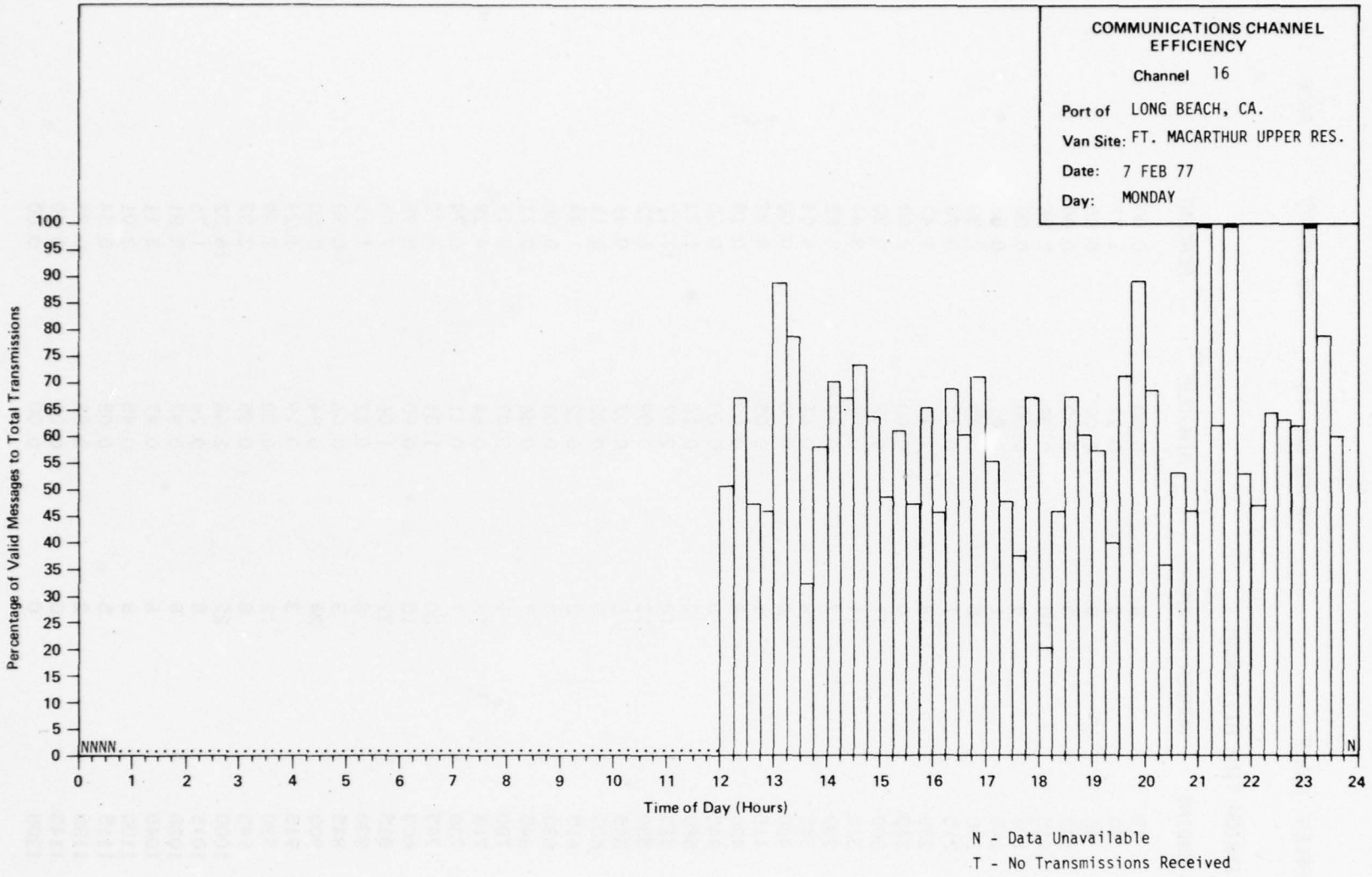

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 16
Port of LONG BEACH, CA.
Van Site: FT. MACARTHUR UPPER RES.
Date: 7 FEB 77
Day: MONDAY
Percentage of Valid Messages to Total Transmissions
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
NNNN
N
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 3-51

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TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
15	0	0.00	0.00
30	2	0.27	1.77
45	0	0.00	0.00
100	0	0.00	0.00
115	10	0.34	2.26
130	0	0.00	0.00
145	1	0.01	0.06
200	5	0.35	2.33
215	1	0.12	0.78
230	14	1.11	7.42
245	0	0.00	0.00
300	11	0.48	3.20
315	11	0.52	3.44
330	7	0.87	5.82
345	18	0.61	4.04
400	0	0.00	0.00
415	1	0.05	0.32
430	4	0.03	0.18
445	0	0.00	0.00
500	2	0.18	1.22
515	18	2.57	17.17
530	12	0.89	5.92
545	6	0.07	0.46
600	3	0.02	0.11
615	2	0.22	1.44
630	0	0.00	0.00
645	7	0.56	3.71
700	1	0.03	0.19
715	13	0.64	4.29
730	7	0.11	0.74
745	20	1.31	8.72
800	15	0.90	5.98
815	22	1.06	7.06
830	3	0.17	1.11
845	3	0.06	0.38
900	24	0.84	5.58
915	3	0.19	1.24
930	12	0.58	3.89
945	8	0.35	2.37
1000	22	2.48	16.52
1015	8	0.26	1.76
1030	8	0.87	5.81
1045	6	0.47	3.11
1100	8	0.45	3.01
1115	5	0.08	0.54
1130	2	0.06	0.39
1145	0	0.00	0.00
1200	0	0.00	0.00

FIGURE 3-52

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TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
1215	0	0.00	0.00
1230	1	0.05	0.36
1245	10	0.69	4.63
1300	6	0.09	0.61
1315	1	0.07	0.46
1330	2	0.05	0.34
1345	0	0.00	0.00
1400	5	0.17	1.11
1415	8	0.33	2.23
1430	12	0.30	2.01
1445	18	0.96	6.42
1500	15	1.06	7.04
1515	14	1.26	8.43
1530	18	1.04	6.96
1545	3	0.30	2.01
1600	21	0.48	3.22
1615	15	0.65	4.32
1630	2	0.03	0.22
1645	0	0.00	0.00
1700	1	0.07	0.44
1715	0	0.00	0.00
1730	0	0.00	0.00
1745	3	0.50	3.31
1800	21	1.29	8.61
1815	3	0.13	0.89
1830	0	0.00	0.00
1845	0	0.00	0.00
1900	7	0.31	2.09
1915	9	0.75	5.01
1930	29	2.53	16.90
1945	25	2.15	14.36
2000	7	0.49	3.30
2015	5	0.60	4.00
2030	24	2.13	14.20
2045	36	1.99	13.26
2100	37	2.80	18.64
2115	23	1.00	6.69
2130	16	0.92	6.11
2145	0	0.00	0.00
2200	14	0.78	5.20
2215	3	0.37	2.46
2230	10	0.35	2.36
2245	12	0.85	5.66
2300	1	0.00	0.02
2315	3	0.34	2.26
2330	0	0.00	0.00
2345	0	0.00	0.00
2400	6	0.30	2.03

FIGURE 3-52 (continued)

TOTAL NUMBER OF TRANSMISSIONS: 771
AVE. NUM. OF TRANSMISSIONS PER HOUR: 32.1
TOTAL TRANSMISSION TIME: 0.806 HOURS
AVERAGE LENGTH OF TRANSMISSION: 3.76 SEC.
PERCENT CHANNEL UTILIZATION: 3.36%

MESSAGE LENGTH HISTOGRAM

LENGTH OF XMSNS	NUMBER OF XMSNS	PERCENT
0.1 - 0.5 SEC.	123	15.95
0.5 - 1.0 SEC.	60	7.78
1.0 - 1.5 SEC.	56	7.26
1.5 - 2.0 SEC.	45	5.84
2.0 - 2.5 SEC.	52	6.74
2.5 - 3.0 SEC.	71	9.21
3.0 - 3.5 SEC.	45	5.84
3.5 - 4.0 SEC.	57	7.39
4.0 - 4.5 SEC.	48	6.23
4.5 - 5.0 SEC.	26	3.37
5.0 - 5.5 SEC.	24	3.11
5.5 - 6.0 SEC.	25	3.24
6.0 - 6.5 SEC.	18	2.33
6.5 - 7.0 SEC.	23	2.98
7.0 - 7.5 SEC.	13	1.69
7.5 - 8.0 SEC.	5	0.65
8.0 - 8.5 SEC.	5	0.65
8.5 - 9.0 SEC.	13	1.69
9.0 - 9.5 SEC.	6	0.78
9.5 - 10.0 SEC.	9	1.17
LONGER THAN 10 SEC. :	47	6.10

THERE WERE 99 XMSNS OF 00.1 AND 00.0 DURATION

FIGURE 3-52 (continued)

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TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
15	1	0.07	0.47
30	15	0.28	1.88
45	28	1.26	8.42
100	6	0.72	4.82
115	0	0.00	0.00
130	20	1.58	10.56
145	0	0.00	0.00
200	6	0.29	1.92
215	7	0.48	3.21
230	4	0.18	1.23
245	6	0.85	5.67
300	0	0.00	0.00
315	0	0.00	0.00
330	5	0.38	2.51
345	0	0.00	0.00
400	2	0.02	0.16
415	0	0.00	0.00
430	6	0.03	0.19
445	3	0.14	0.91
500	10	1.15	7.64
515	4	0.76	5.04
530	5	0.39	2.63
545	23	3.54	23.62
600	1	0.00	0.02
615	9	0.70	4.64
630	1	0.03	0.20
645	55	2.22	14.83
700	71	3.35	22.32
715	12	0.90	6.03
730	15	1.27	8.50
745	6	0.58	3.88
800	18	1.07	7.12
815	24	1.16	7.71
830	35	1.36	9.06
845	19	0.95	6.32
900	65	3.91	26.07
915	53	2.84	18.94
930	31	3.25	21.64
945	48	2.69	17.94
1000	75	4.22	28.11
1015	42	1.15	7.66
1030	43	2.15	14.37
1045	53	2.55	17.01
1100	142	5.46	36.42
1115	96	3.45	23.00
1130	123	4.80	31.99
1145	110	2.00	13.31
1200	0	0.00	0.00

FIGURE 3-53

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TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
1215	38	2. 24	14. 97
1230	89	1. 85	12. 34
1245	107	2. 30	18. 68
1300	89	6. 56	43. 74
1315	41	2. 30	15. 36
1330	31	1. 97	13. 17
1345	65	4. 47	29. 79
1400	72	2. 43	16. 20
1415	41	2. 20	14. 70
1430	64	2. 62	17. 47
1445	38	3. 77	25. 16
1500	51	3. 72	24. 81
1515	65	2. 96	19. 76
1530	52	4. 43	29. 52
1545	28	1. 31	8. 72
1600	34	2. 56	17. 04
1615	39	2. 51	16. 71
1630	29	1. 85	12. 36
1645	47	2. 09	13. 96
1700	27	1. 21	8. 07
1715	46	1. 96	13. 07
1730	47	1. 60	10. 70
1745	50	2. 75	18. 33
1800	14	0. 68	4. 57
1815	38	1. 96	13. 06
1830	38	2. 43	16. 19
1845	25	0. 78	5. 20
1900	30	1. 69	11. 29
1915	21	1. 06	7. 07
1930	24	1. 44	9. 60
1945	9	1. 27	8. 46
2000	14	1. 16	7. 73
2015	74	1. 78	11. 87
2030	12	0. 15	1. 01
2045	15	1. 50	9. 99
2100	2	0. 49	3. 23
2115	29	1. 54	10. 30
2130	33	1. 30	8. 69
2145	16	1. 06	7. 08
2200	11	0. 86	5. 73
2215	5	0. 32	2. 14
2230	1	0. 23	1. 53
2245	69	5. 20	34. 64
2300	20	2. 00	13. 32
2315	20	0. 75	4. 98
2330	38	2. 91	19. 38
2345	0	0. 00	0. 00

FIGURE 3-53 (continued)

TOTAL NUMBER OF TRANSMISSIONS: 3046
AVE. NUM. OF TRANSMISSIONS PER HOUR: 126.9
TOTAL TRANSMISSION TIME: 2.649 HOURS
AVERAGE LENGTH OF TRANSMISSION: 3.13 SEC.
PERCENT CHANNEL UTILIZATION: 11.04%

MESSAGE LENGTH HISTOGRAM

LENGTH OF XMSNS	NUMBER OF XMSNS	PERCENT
0.1 - 0.5 SEC.	1061	34.83
0.5 - 1.0 SEC.	399	13.10
1.0 - 1.5 SEC.	234	7.68
1.5 - 2.0 SEC.	157	5.15
2.0 - 2.5 SEC.	116	3.81
2.5 - 3.0 SEC.	106	3.48
3.0 - 3.5 SEC.	112	3.68
3.5 - 4.0 SEC.	76	2.50
4.0 - 4.5 SEC.	86	2.82
4.5 - 5.0 SEC.	77	2.53
5.0 - 5.5 SEC.	66	2.17
5.5 - 6.0 SEC.	54	1.77
6.0 - 6.5 SEC.	60	1.97
6.5 - 7.0 SEC.	60	1.97
7.0 - 7.5 SEC.	48	1.58
7.5 - 8.0 SEC.	41	1.35
8.0 - 8.5 SEC.	36	1.18
8.5 - 9.0 SEC.	29	0.95
9.0 - 9.5 SEC.	21	0.69
9.5 - 10.0 SEC.	21	0.69
LONGER THAN 10 SEC.:	186	6.11

THERE WERE 999 XMSNS OF 00.1 AND 00.0 DURATION

FIGURE 3-53 (continued)

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TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
15	0	0.00	0.00
30	2	0.19	1.24
45	0	0.00	0.00
100	10	0.78	5.18
115	0	0.00	0.00
130	0	0.00	0.00
145	4	0.05	0.30
200	1	0.21	1.43
215	1	0.22	1.49
230	2	0.02	0.12
245	0	0.00	0.00
300	0	0.00	0.00
315	0	0.00	0.00
330	0	0.00	0.00
345	0	0.00	0.00
400	11	0.47	3.11
415	0	0.00	0.00
430	0	0.00	0.00
445	0	0.00	0.00
500	1	0.10	0.69
515	37	3.19	21.29
530	2	0.18	1.20
545	34	2.61	17.43
600	26	1.42	9.50
615	31	2.71	18.10
630	68	4.11	27.39
645	41	2.26	15.08
700	59	6.20	41.36
715	51	6.02	40.17
730	70	5.33	35.54
745	64	5.76	38.40
800	58	3.71	24.77
815	54	3.47	23.14
830	55	2.58	17.20
845	35	2.12	14.13
900	26	1.48	9.90
915	28	1.55	10.36
930	19	0.48	3.18
945	3	0.20	1.37
1000	3	0.04	0.28
1015	0	0.00	0.00
1030	4	0.07	0.46
1045	9	0.47	3.12
1100	18	0.62	4.17
1115	19	3.36	22.39
1130	0	0.00	0.00
1145	0	0.00	0.00
1200	9	0.30	1.98

FIGURE 3-54

TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
1215	1	0.01	0.07
1230	5	0.31	2.10
1245	3	0.05	0.36
1300	1	0.00	0.02
1315	4	0.16	1.07
1330	10	1.35	9.02
1345	12	0.35	2.34
1400	10	0.53	3.53
1415	0	0.00	0.00
1430	1	0.02	0.16
1445	13	0.60	4.03
1500	6	0.14	0.96
1515	17	0.71	4.73
1530	2	0.02	0.11
1545	0	0.00	0.00
1600	0	0.00	0.00
1615	3	0.05	0.32
1630	32	2.43	16.21
1645	0	0.00	0.00
1700	1	0.01	0.07
1715	8	0.46	3.04
1730	26	6.16	41.10
1745	5	2.34	15.62
1800	5	0.43	2.83
1815	2	0.04	0.24
1830	8	0.89	5.96
1845	3	0.20	1.34
1900	2	0.01	0.04
1915	1	0.01	0.03
1930	1	0.01	0.03
1945	0	0.00	0.00
2000	0	0.00	0.00
2015	0	0.00	0.00
2030	5	0.45	3.03
2045	1	0.14	0.94
2100	0	0.00	0.00
2115	5	0.35	2.34
2130	4	0.16	1.10
2145	0	0.00	0.00
2200	0	0.00	0.00
2215	1	0.00	0.02
2230	0	0.00	0.00
2245	0	0.00	0.00
2300	0	0.00	0.00
2315	10	0.92	6.16
2330	1	0.03	0.17
2345	6	0.28	1.88

FIGURE 3-54 (continued)

TOTAL NUMBER OF TRANSMISSIONS: 1070
AVE. NUM. OF TRANSMISSIONS PER HOUR: 44.6
TOTAL TRANSMISSION TIME: 1.366 HOURS
AVERAGE LENGTH OF TRANSMISSION: 4.60 SEC.
PERCENT CHANNEL UTILIZATION: 5.69%

MESSAGE LENGTH HISTOGRAM

LENGTH OF XMSNS	NUMBER OF XMSNS	PERCENT
0.1 - 0.5 SEC.	114	10.65
0.5 - 1.0 SEC.	75	7.01
1.0 - 1.5 SEC.	77	7.20
1.5 - 2.0 SEC.	110	10.28
2.0 - 2.5 SEC.	86	8.04
2.5 - 3.0 SEC.	111	10.37
3.0 - 3.5 SEC.	74	6.92
3.5 - 4.0 SEC.	56	5.23
4.0 - 4.5 SEC.	41	3.83
4.5 - 5.0 SEC.	39	3.64
5.0 - 5.5 SEC.	31	2.90
5.5 - 6.0 SEC.	36	3.36
6.0 - 6.5 SEC.	22	2.06
6.5 - 7.0 SEC.	24	2.24
7.0 - 7.5 SEC.	15	1.40
7.5 - 8.0 SEC.	17	1.59
8.0 - 8.5 SEC.	14	1.31
8.5 - 9.0 SEC.	8	0.75
9.0 - 9.5 SEC.	13	1.21
9.5 - 10.0 SEC.	14	1.31
LONGER THAN 10 SEC. :	93	8.69

THERE WERE 156 XMSNS OF 00.1 AND 00.0 DURATION

FIGURE 3-54 (continued)

LOS ANGELES, CALIF. VHF-FM CH 16 05-FEB-77 PAGE 1

TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
15	14	1.07	7.13
30	23	1.44	9.60
45	12	1.38	9.18
100	0	0.00	0.00
115	9	1.59	10.58
130	44	2.05	13.67
145	29	0.44	2.91
200	22	2.35	15.70
215	7	0.52	3.49
230	0	0.00	0.00
245	0	0.00	0.00
300	1	0.01	0.04
315	3	0.23	1.57
330	0	0.00	0.00
345	0	0.00	0.00
400	15	1.24	8.27
415	0	0.00	0.00
430	5	0.39	2.58
445	12	0.68	4.56
500	15	2.09	13.94
515	6	0.98	6.56
530	1	0.05	0.30
545	26	0.92	6.11
600	26	2.11	14.04
615	23	2.02	13.49
630	18	1.03	6.90
645	54	4.99	33.27
700	32	4.35	28.99
715	114	4.52	30.12
730	75	4.31	28.77
745	70	3.90	25.98
800	58	4.48	29.88
815	93	7.11	47.42
830	45	4.20	27.99
845	67	5.31	35.38
900	61	8.22	54.80
915	106	6.27	41.80
930	82	5.21	34.72
945	86	5.90	39.34
1000	100	9.61	64.09
1015	128	7.08	47.19
1030	97	7.21	48.06
1045	119	5.56	37.06
1100	146	8.19	54.63
1115	117	8.20	54.70
1130	104	7.16	47.74
1145	2	0.25	1.67
1200	89	9.87	65.80

FIGURE 3-55

LOS ANGELES, CALIF. VHF-FM CH 16 05-FEB-77 PAGE 2

TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
1215	157	8.63	57.52
1230	117	7.00	46.68
1245	132	8.96	59.74
1300	117	9.05	60.36
1315	156	9.11	60.77
1330	167	12.90	86.01
1345	147	11.35	75.70
1400	131	9.23	61.57
1415	140	11.39	75.96
1430	141	11.35	75.68
1445	130	8.79	58.63
1500	118	12.63	84.22
1515	114	10.19	67.96
1530	141	7.35	48.99
1545	48	2.25	14.98
1600	24	2.03	13.53
1615	163	12.19	81.28
1630	140	11.41	76.04
1645	139	13.58	90.52
1700	192	14.71	98.09
1715	126	7.13	47.51
1730	94	5.82	38.82
1745	68	5.20	34.70
1800	67	5.65	37.67
1815	57	6.14	40.97
1830	61	5.12	34.13
1845	83	8.20	54.70
1900	81	7.12	47.48
1915	55	2.94	19.58
1930	36	4.40	29.31
1945	106	3.71	24.71
2000	111	10.20	68.01
2015	47	1.43	9.51
2030	22	0.83	5.53
2045	18	0.40	2.68
2100	20	0.30	2.02
2115	33	0.71	4.72
2130	132	3.19	21.24
2145	73	3.02	20.16
2200	85	2.20	14.67
2215	239	5.45	36.36
2230	80	2.98	19.87
2245	83	3.34	22.28
2300	93	3.39	22.61
2315	13	0.68	4.53
2330	35	1.01	6.72
2345	39	1.68	11.18

FIGURE 3-55 (continued)

TOTAL NUMBER OF TRANSMISSIONS: 6727
AVE. NUM. OF TRANSMISSIONS PER HOUR: 280.3
TOTAL TRANSMISSION TIME: 7.515 HOURS
AVERAGE LENGTH OF TRANSMISSION: 4.02 SEC.
PERCENT CHANNEL UTILIZATION: 31.31%

MESSAGE LENGTH HISTOGRAM

LENGTH OF XMSNS	NUMBER OF XMSNS	PERCENT
0.1 - 0.5 SEC.	1673	24.87
0.5 - 1.0 SEC.	831	12.35
1.0 - 1.5 SEC.	507	7.54
1.5 - 2.0 SEC.	416	6.18
2.0 - 2.5 SEC.	351	5.22
2.5 - 3.0 SEC.	308	4.58
3.0 - 3.5 SEC.	260	3.87
3.5 - 4.0 SEC.	262	3.89
4.0 - 4.5 SEC.	260	3.87
4.5 - 5.0 SEC.	184	2.74
5.0 - 5.5 SEC.	200	2.97
5.5 - 6.0 SEC.	199	2.96
6.0 - 6.5 SEC.	176	2.62
6.5 - 7.0 SEC.	116	1.72
7.0 - 7.5 SEC.	102	1.52
7.5 - 8.0 SEC.	105	1.56
8.0 - 8.5 SEC.	88	1.31
8.5 - 9.0 SEC.	88	1.31
9.0 - 9.5 SEC.	71	1.06
9.5 - 10.0 SEC.	66	0.98
LONGER THAN 10 SEC.:	464	6.90

THERE WERE 1509 XMSNS OF 00.1 AND 00.0 DURATION

FIGURE 3-55 (continued)

4.0 PORT HUENEME GRAPHS AND HISTOGRAMS

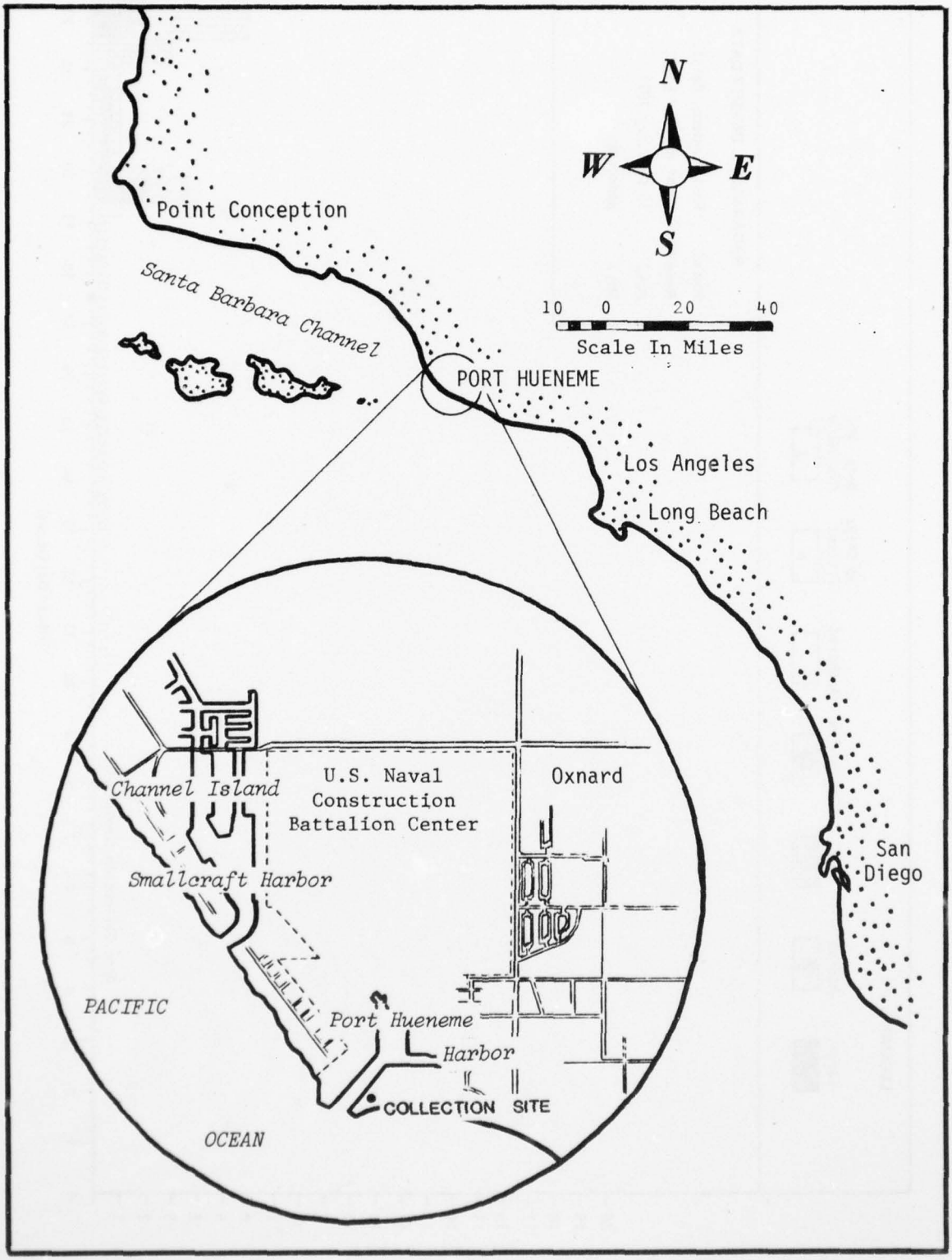


FIGURE 4-1: PORT HUENEME, CALIFORNIA

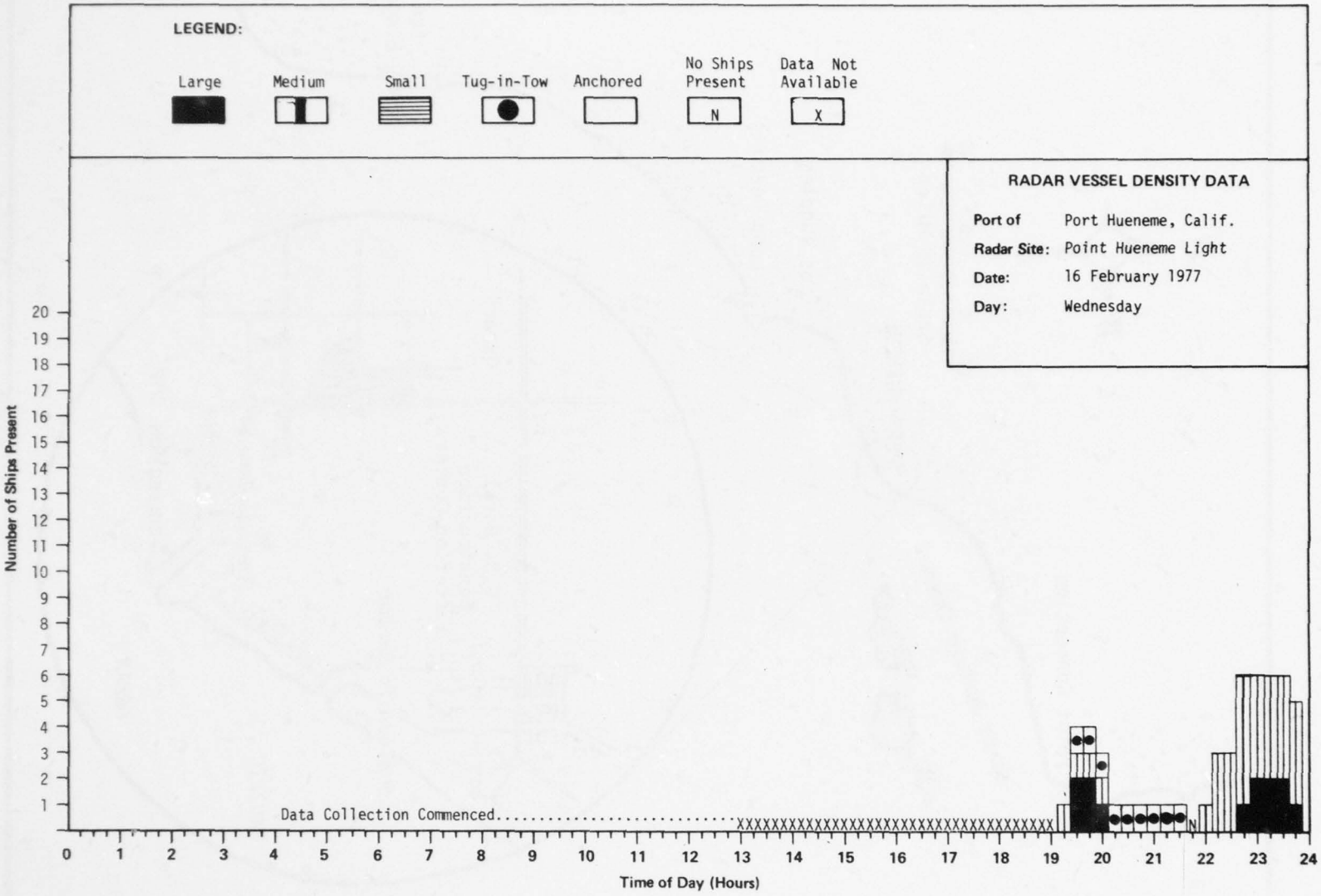

LEGEND:
Large
Medium
Small
Tug-in-Tow
Anchored
No Ships Present
N
Data Not Available
X
RADAR VESSEL DENSITY DATA
Port of Port Hueneme, Calif.
Radar Site: Point Hueneme Light
Date: 16 February 1977
Day: Wednesday
Number of Ships Present
Data Collection Commenced
Time of Day (Hours)

FIGURE 4-2

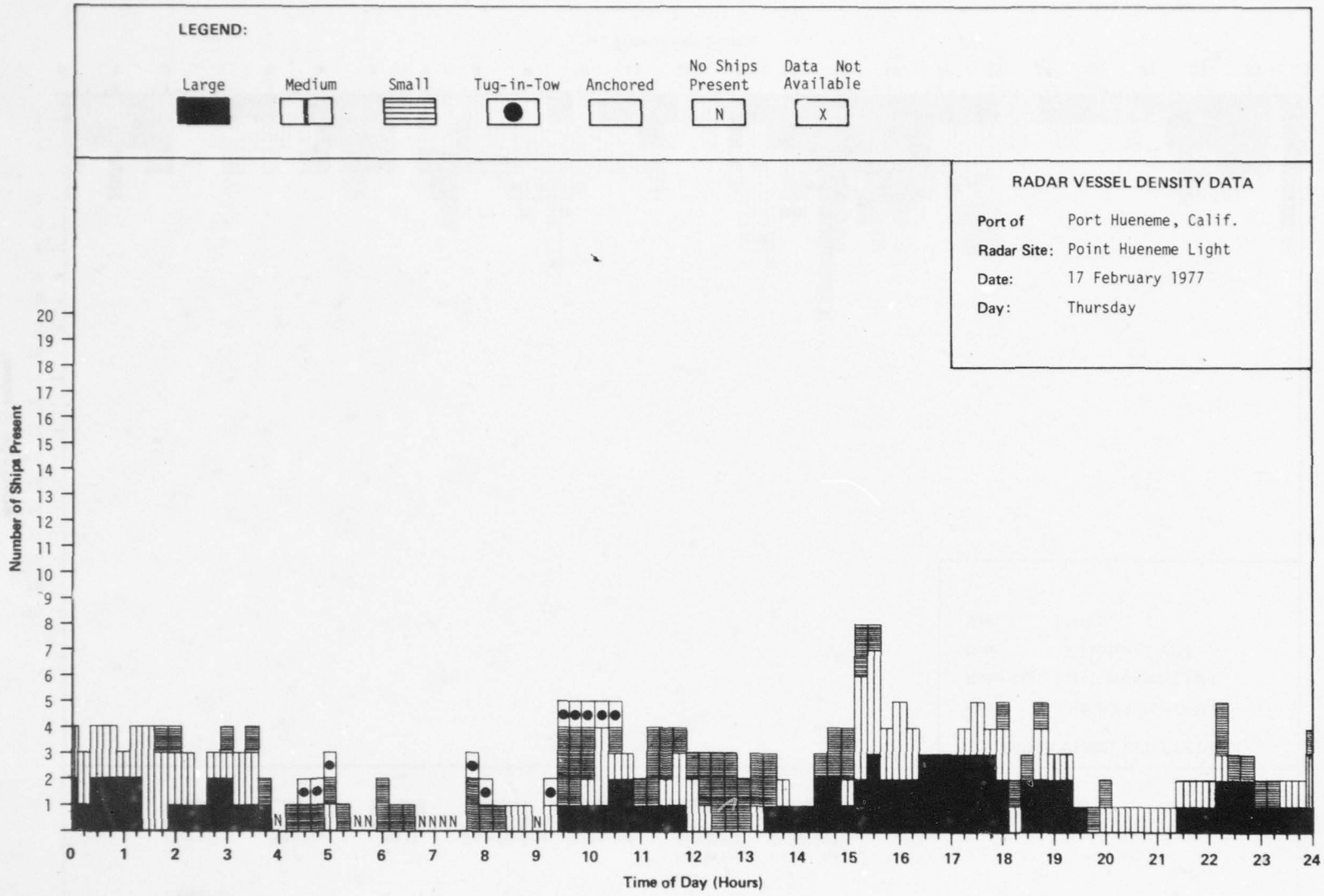

LEGEND:
Large
Medium
Small
Tug-in-Tow
Anchored
No Ships Present
N
Data Not Available
X
RADAR VESSEL DENSITY DATA
Port of Port Hueneme, Calif.
Radar Site: Point Hueneme Light
Date: 17 February 1977
Day: Thursday
Number of Ships Present
Time of Day (Hours)
N
NN
NNNN
N

FIGURE 4-3

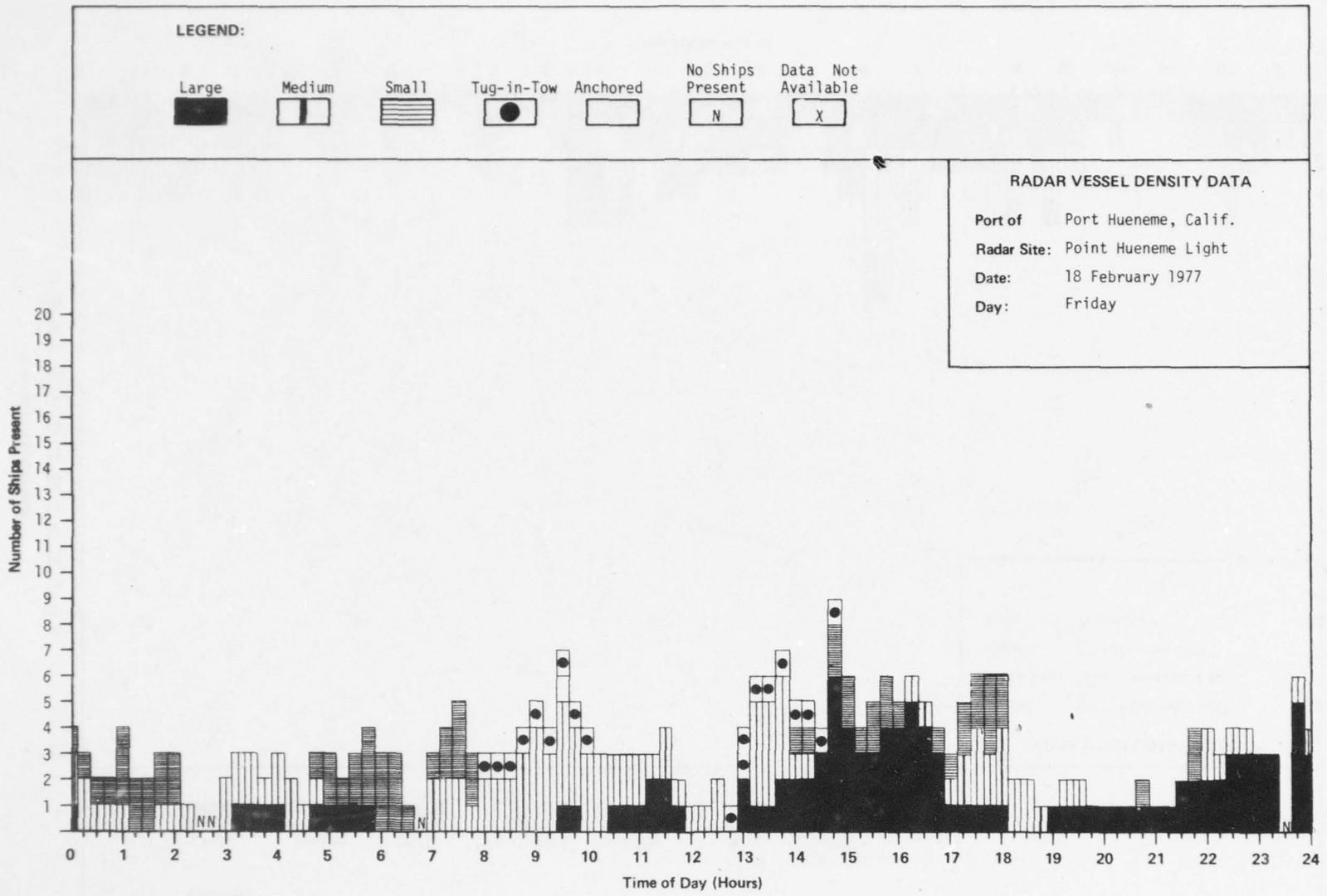

LEGEND:
Large
Medium
Small
Tug-in-Tow
Anchored
No Ships Present
N
Data Not Available
X
RADAR VESSEL DENSITY DATA
Port of Port Hueneme, Calif.
Radar Site: Point Hueneme Light
Date: 18 February 1977
Day: Friday
Number of Ships Present
Time of Day (Hours)
NN
N
N

FIGURE 4-4

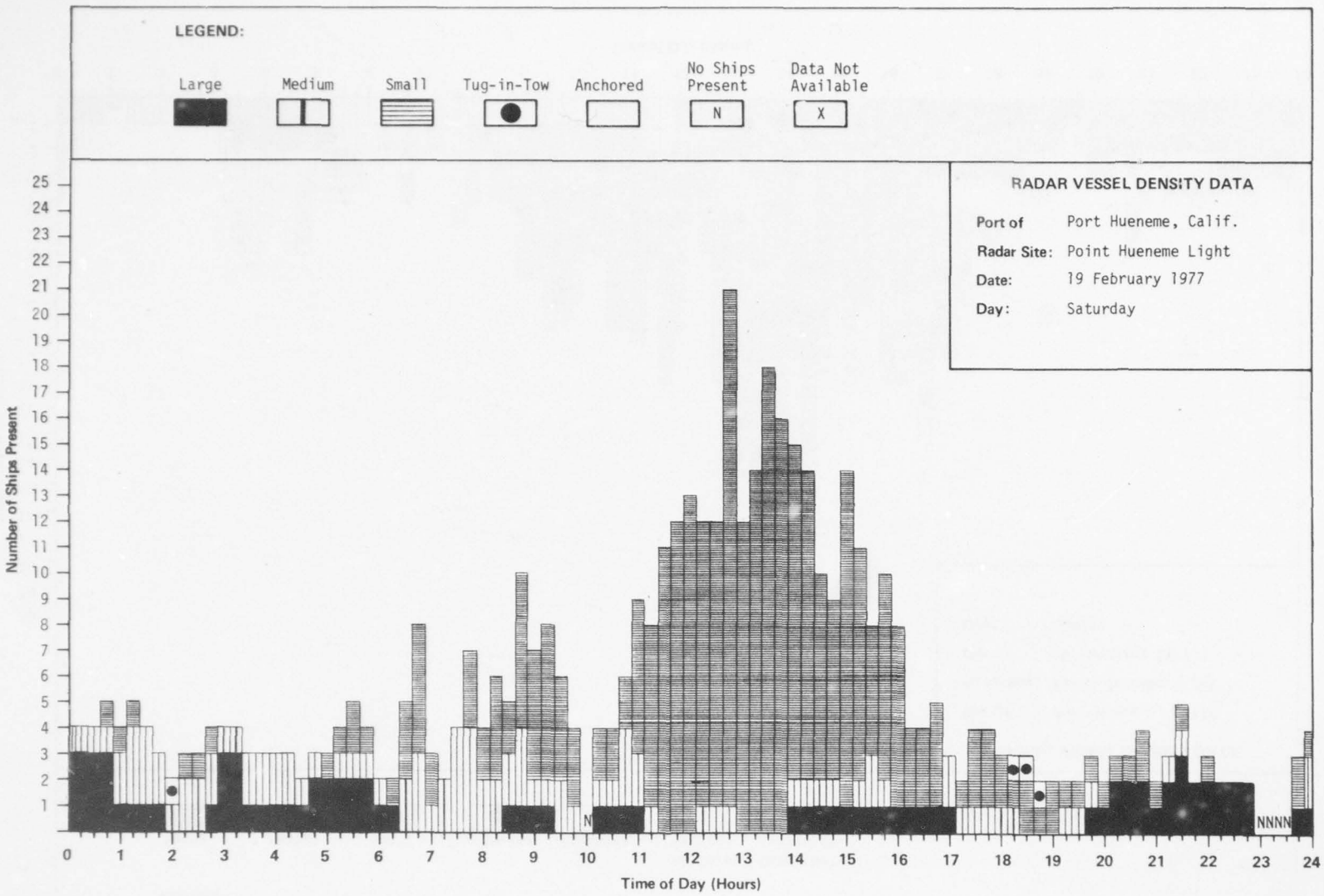
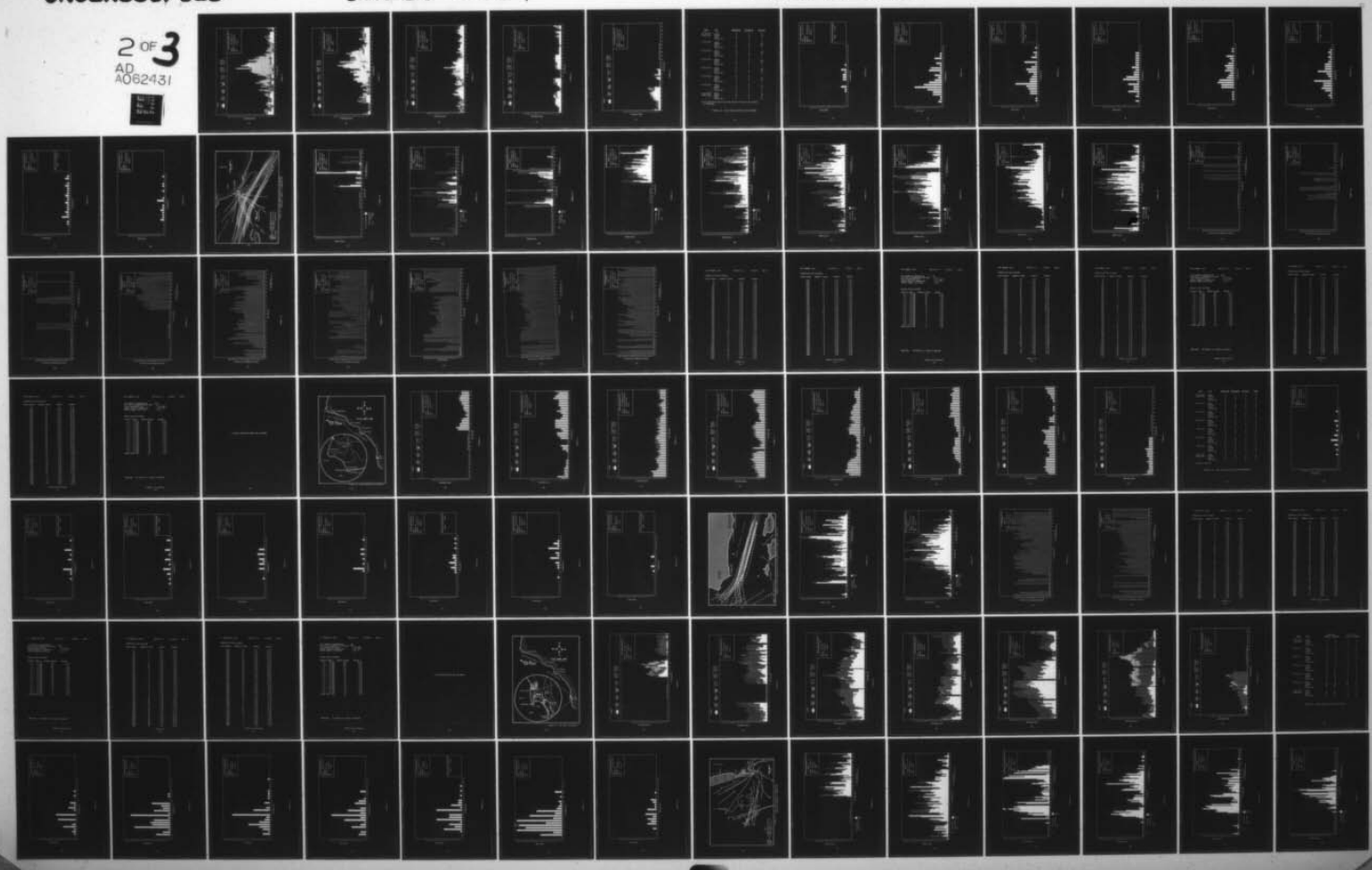

LEGEND:
Large
Medium
Small
Tug-in-Tow
Anchored
No Ships Present
N
Data Not Available
X
RADAR VESSEL DENSITY DATA
Port of Port Hueneme, Calif.
Radar Site: Point Hueneme Light
Date: 19 February 1977
Day: Saturday
Number of Ships Present
Time of Day (Hours)
N
NNNN

FIGURE 4-5

AD-A062 431 COAST GUARD RESEARCH AND DEVELOPMENT CENTER GROTON CONN F/G 13/10
MARINE TRAFFIC DATA OF SOUTHERN CALIFORNIA.(U)
FEB 78 J J CHERNY, D E WATSON, R A SILVA

UNCLASSIFIED CGR/DC-4/78 USCG-D-6-78 NL

2 OF 3
AD A062431



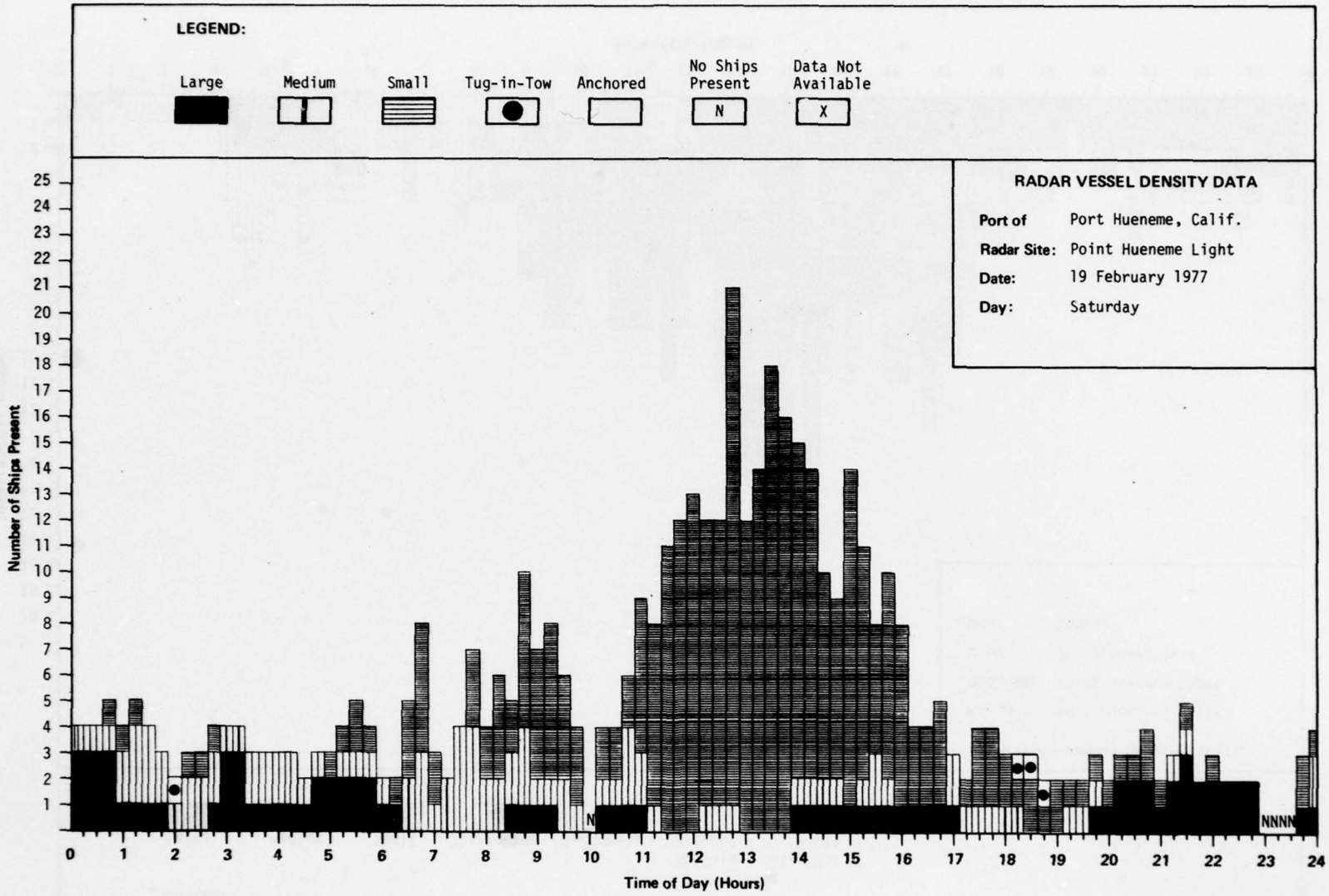

LEGEND:
Large
Medium
Small
Tug-in-Tow
Anchored
No Ships Present
N
Data Not Available
X
RADAR VESSEL DENSITY DATA
Port of Port Hueneme, Calif.
Radar Site: Point Hueneme Light
Date: 19 February 1977
Day: Saturday
Number of Ships Present
Time of Day (Hours)
NNNN

FIGURE 4-5

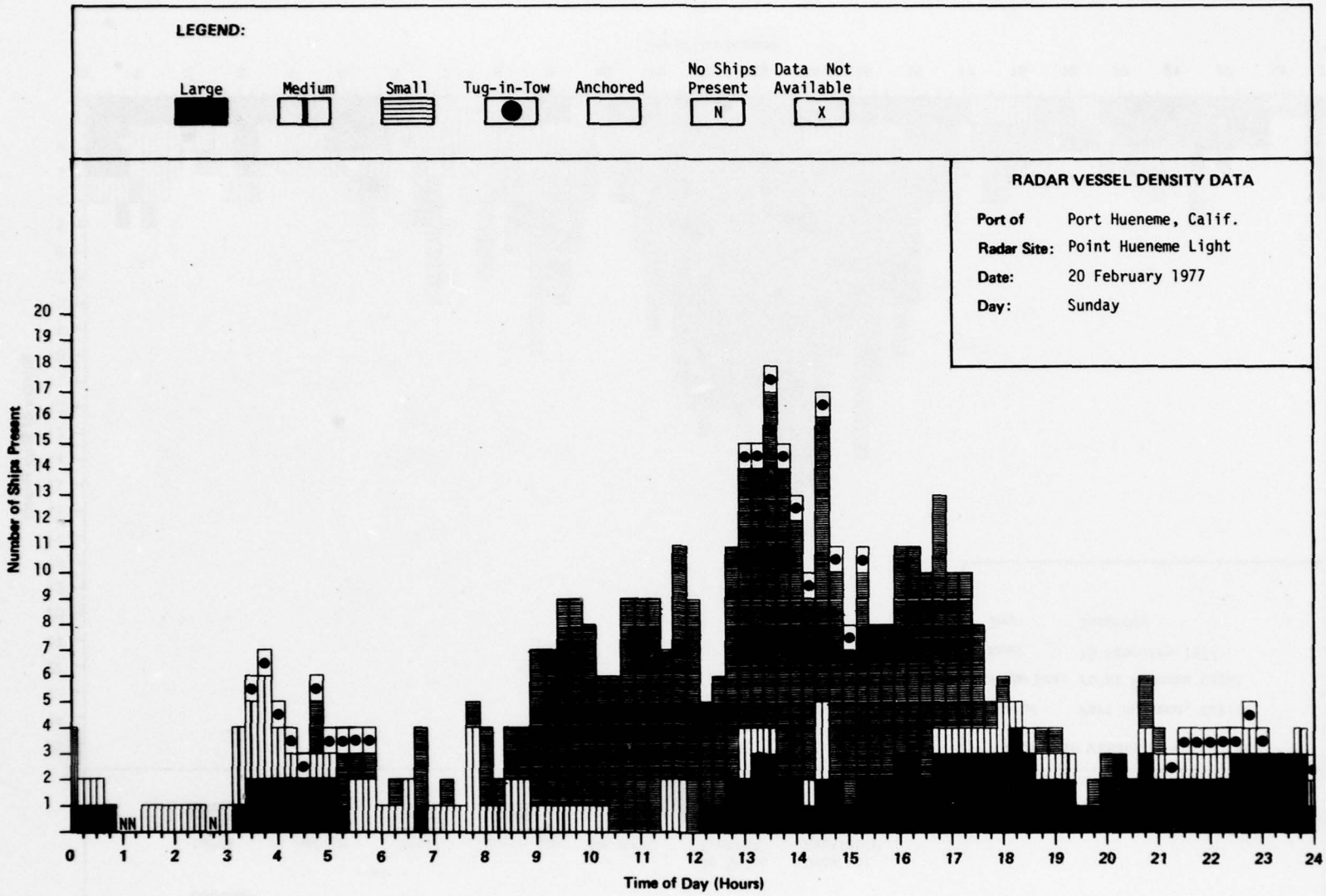

LEGEND:
Large
Medium
Small
Tug-in-Tow
Anchored
No Ships Present
N
Data Not Available
X
RADAR VESSEL DENSITY DATA
Port of
Port Hueneme, Calif.
Radar Site:
Point Hueneme Light
Date:
20 February 1977
Day:
Sunday
Number of Ships Present
Time of Day (Hours)
NN
N

FIGURE 4-6

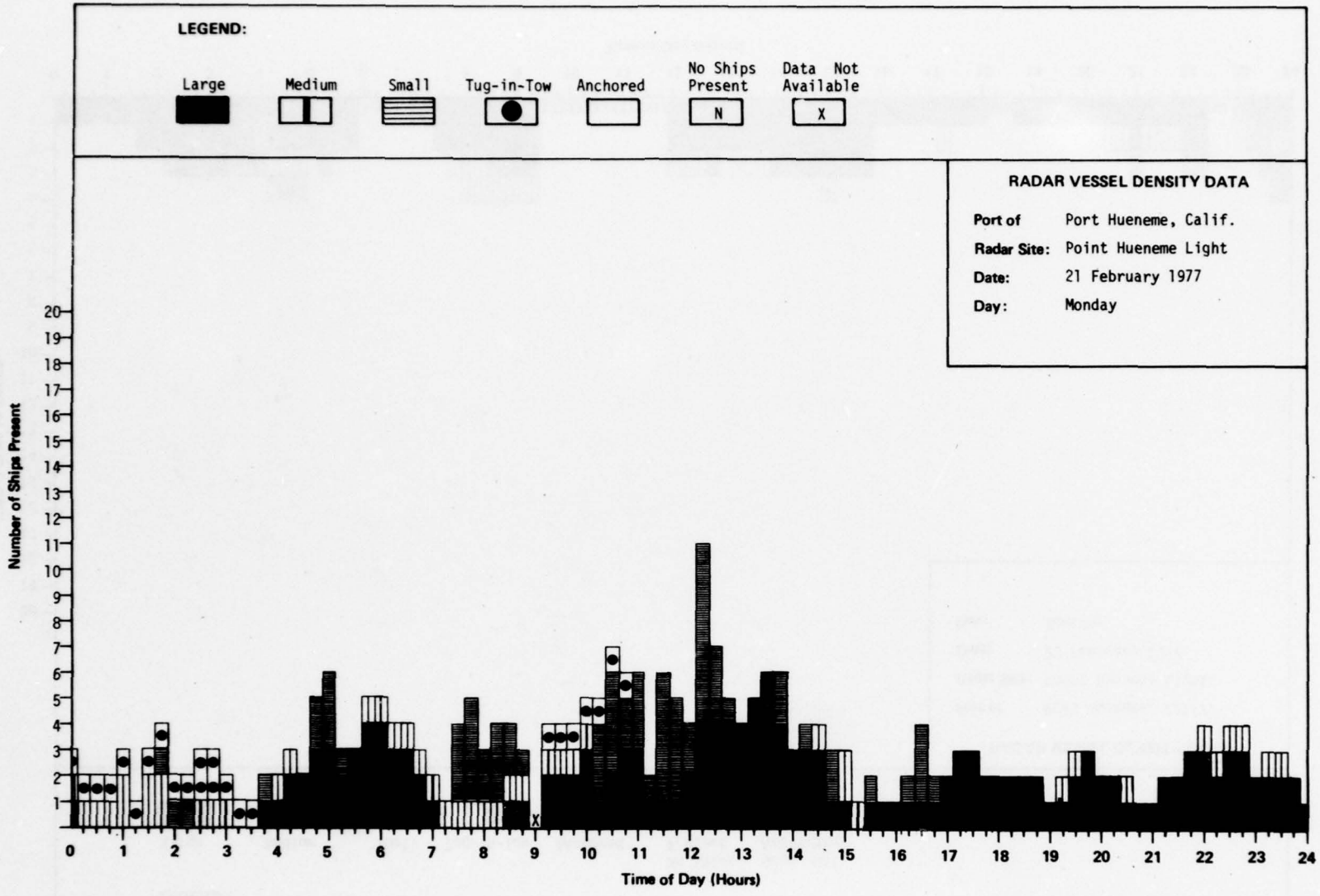

LEGEND:
Large
Medium
Small
Tug-in-Tow
Anchored
No Ships Present
N
Data Not Available
X
RADAR VESSEL DENSITY DATA
Port of Port Hueneme, Calif.
Radar Site: Point Hueneme Light
Date: 21 February 1977
Day: Monday
Number of Ships Present
Time of Day (Hours)

FIGURE 4-7

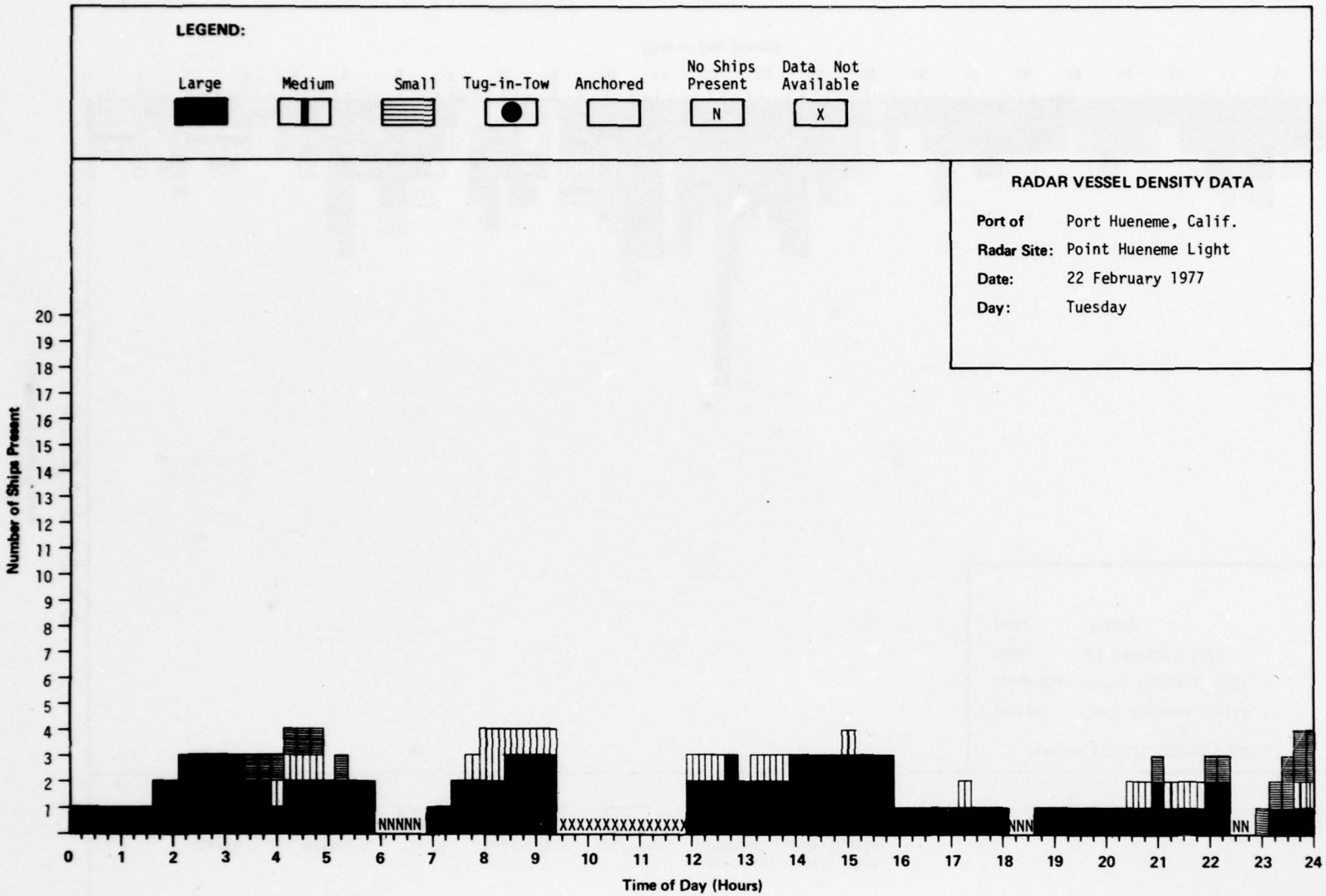

LEGEND:
Large
Medium
Small
Tug-in-Tow
Anchored
No Ships Present
N
Data Not Available
X
RADAR VESSEL DENSITY DATA
Port of Port Hueneme, Calif.
Radar Site: Point Hueneme Light
Date: 22 February 1977
Day: Tuesday
Number of Ships Present
Time of Day (Hours)
NNNNN
XXXXXXXXXXXXXX
NNN
NN

FIGURE 4-8

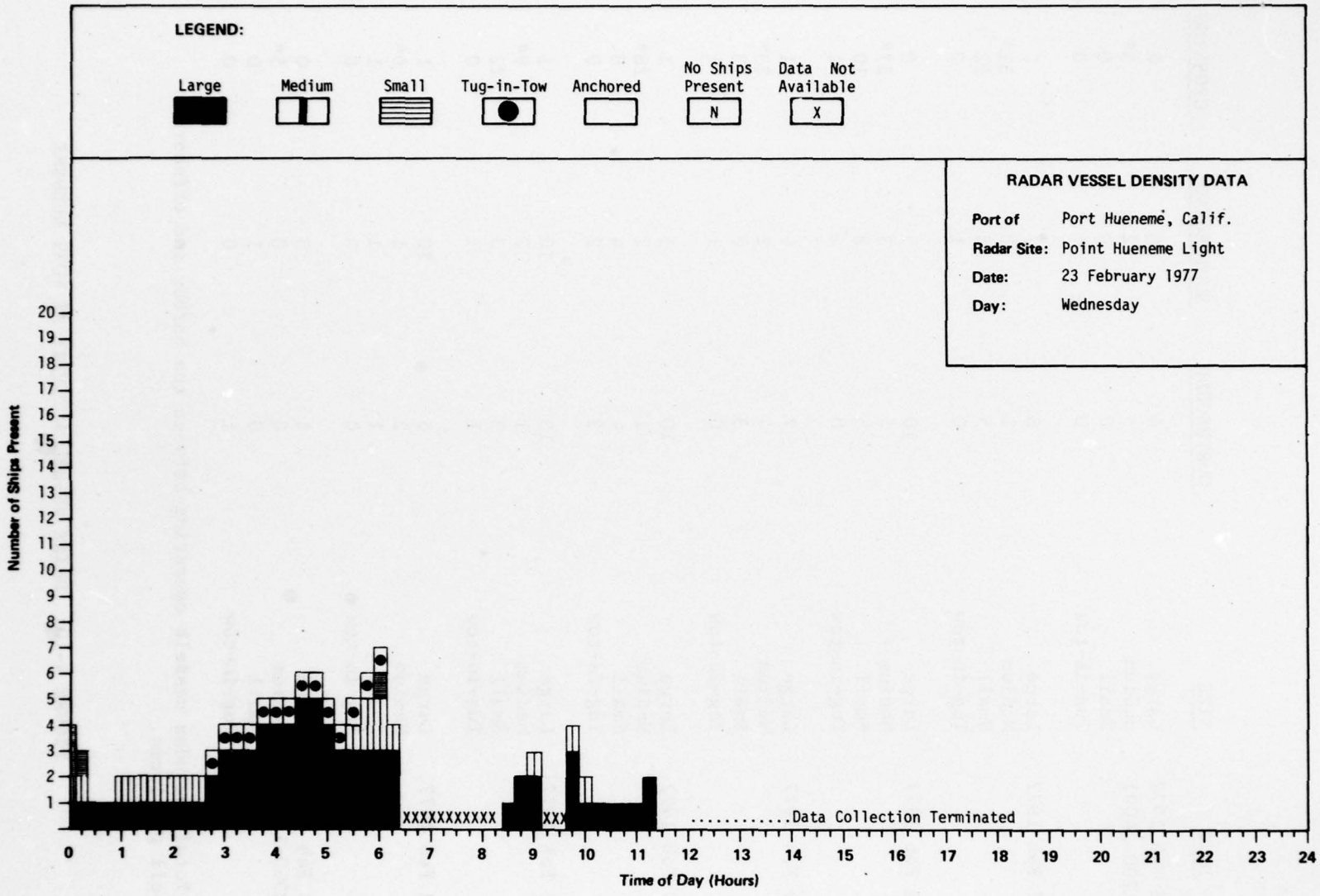

LEGEND:
Large
Medium
Small
Tug-in-Tow
Anchored
No Ships Present
N
Data Not Available
X
RADAR VESSEL DENSITY DATA
Port of Port Hueneme, Calif.
Radar Site: Point Hueneme Light
Date: 23 February 1977
Day: Wednesday
Number of Ships Present
Time of Day (Hours)
XXXXXXXXXXX
XXX
.....Data Collection Terminated

FIGURE 4-9

DATE	SIZE	NORTHBOUND	SOUTHBOUND	CROSSING
16 Feb 1977	Large	4	3	0
(1200-2400)	Medium	5	2	3*
	Small	0	0	0
	Tug-in-tow	0	1	0
17 Feb 1977	Large	8	7	0
	Medium	1	3	31*
	Small	5	8	22
	Tug-in-tow	0	1	2
18 Feb 1977	Large	10	5	0
	Medium	5	3	27*
	Small	5	8	10
	Tug-in-tow	0	2	1
19 Feb 1977	Large	7	9	1
	Medium	4	2	23*
	Small	3	0	13
	Tug-in-tow	0	1	1
20 Feb 1977	Large	10	5	1
	Medium	1	2	28*
	Small	4	4	8
	Tug-in-tow	3	2	0
21 Feb 1977	Large	13	10	1
	Medium	1	7	9*
	Small	3	3	22
	Tug-in-tow	1	1	0
22 Feb 1977	Large	5	10	1
	Medium	2	1	6*
	Small	1	1	1
	Tug-in-tow	0	0	0
23 Feb 1977	Large	6	5	0
(0000-1200)	Medium	0	0	5*
	Small	0	1	0
	Tug-in-tow	1	0	0

* Total includes vessels operating between the harbor and offshore oil platforms.

FIGURE 4-10: DAILY VESSEL ACTIVITY AT PORT HUENEME

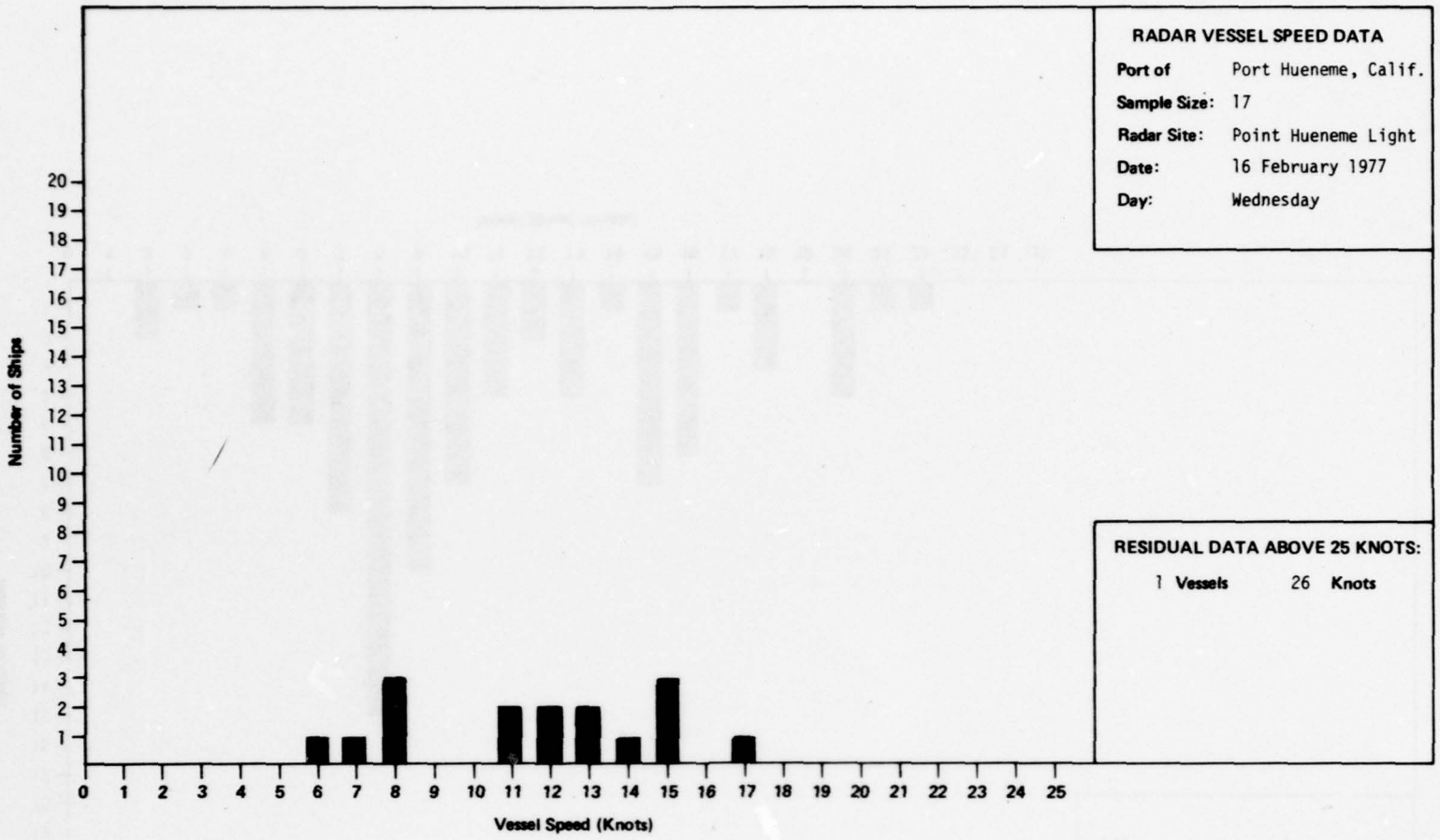

RADAR VESSEL SPEED DATA
Port of Port Hueneme, Calif.
Sample Size: 17
Radar Site: Point Hueneme Light
Date: 16 February 1977
Day: Wednesday
RESIDUAL DATA ABOVE 25 KNOTS:
1 Vessels 26 Knots
Number of Ships
Vessel Speed (Knots)

FIGURE 4-11

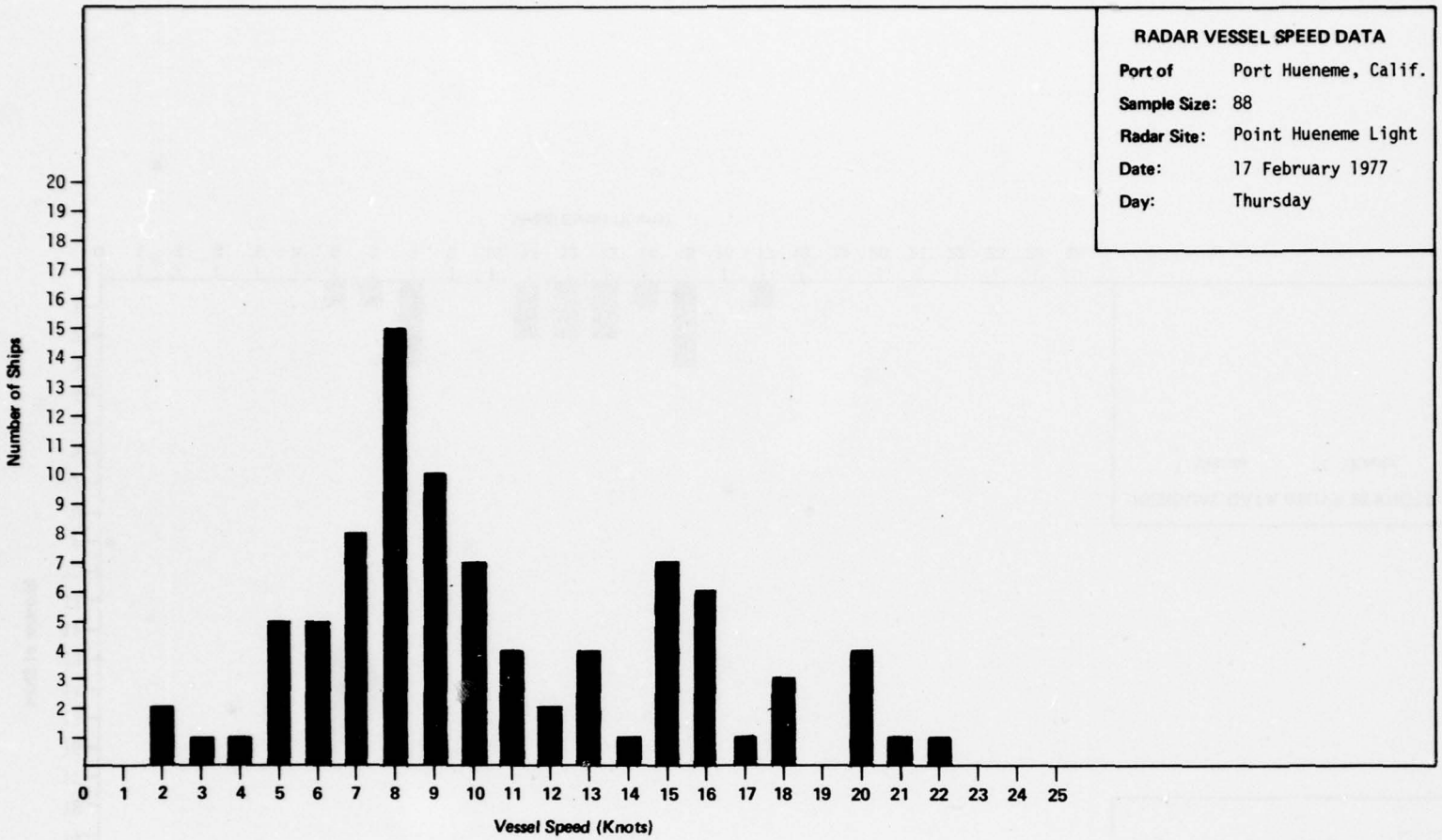

RADAR VESSEL SPEED DATA
Port of Port Hueneme, Calif.
Sample Size: 88
Radar Site: Point Hueneme Light
Date: 17 February 1977
Day: Thursday
Number of Ships
Vessel Speed (Knots)

FIGURE 4-12

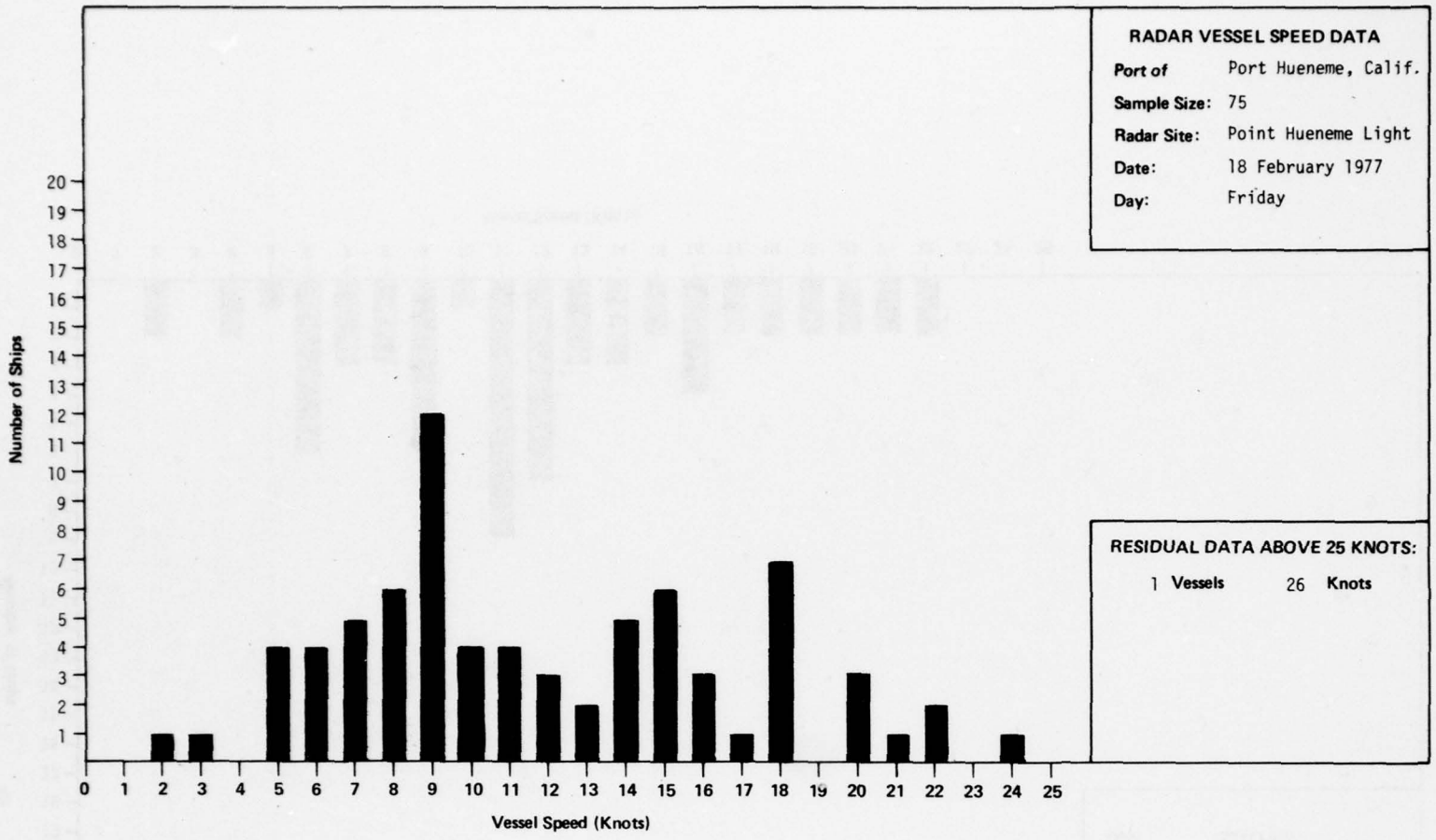

RADAR VESSEL SPEED DATA
Port of Port Hueneme, Calif.
Sample Size: 75
Radar Site: Point Hueneme Light
Date: 18 February 1977
Day: Friday
RESIDUAL DATA ABOVE 25 KNOTS:
1 Vessels 26 Knots
Number of Ships
Vessel Speed (Knots)

FIGURE 4-13

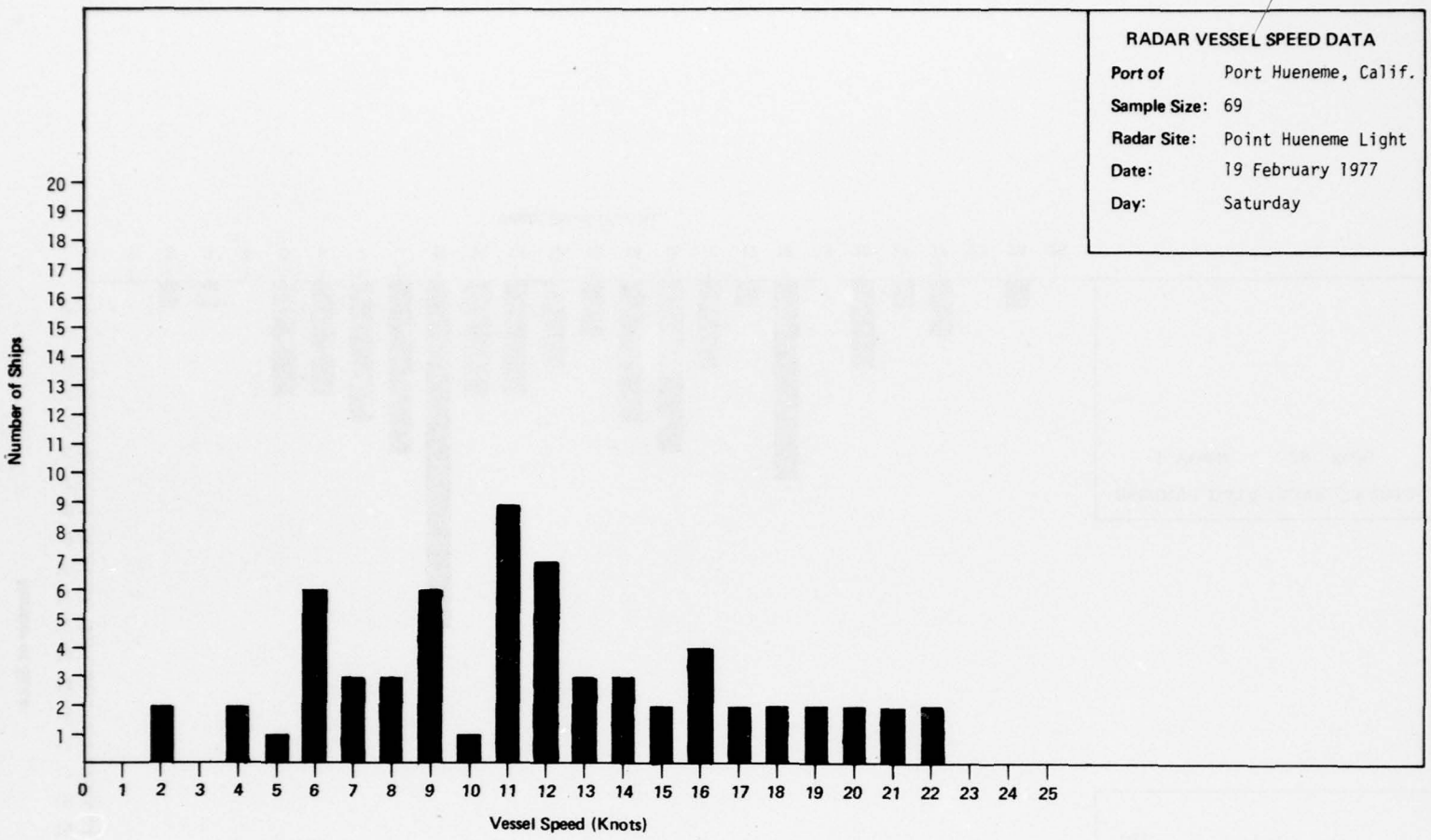

RADAR VESSEL SPEED DATA
Port of Port Hueneme, Calif.
Sample Size: 69
Radar Site: Point Hueneme Light
Date: 19 February 1977
Day: Saturday
Number of Ships
Vessel Speed (Knots)

FIGURE 4-14

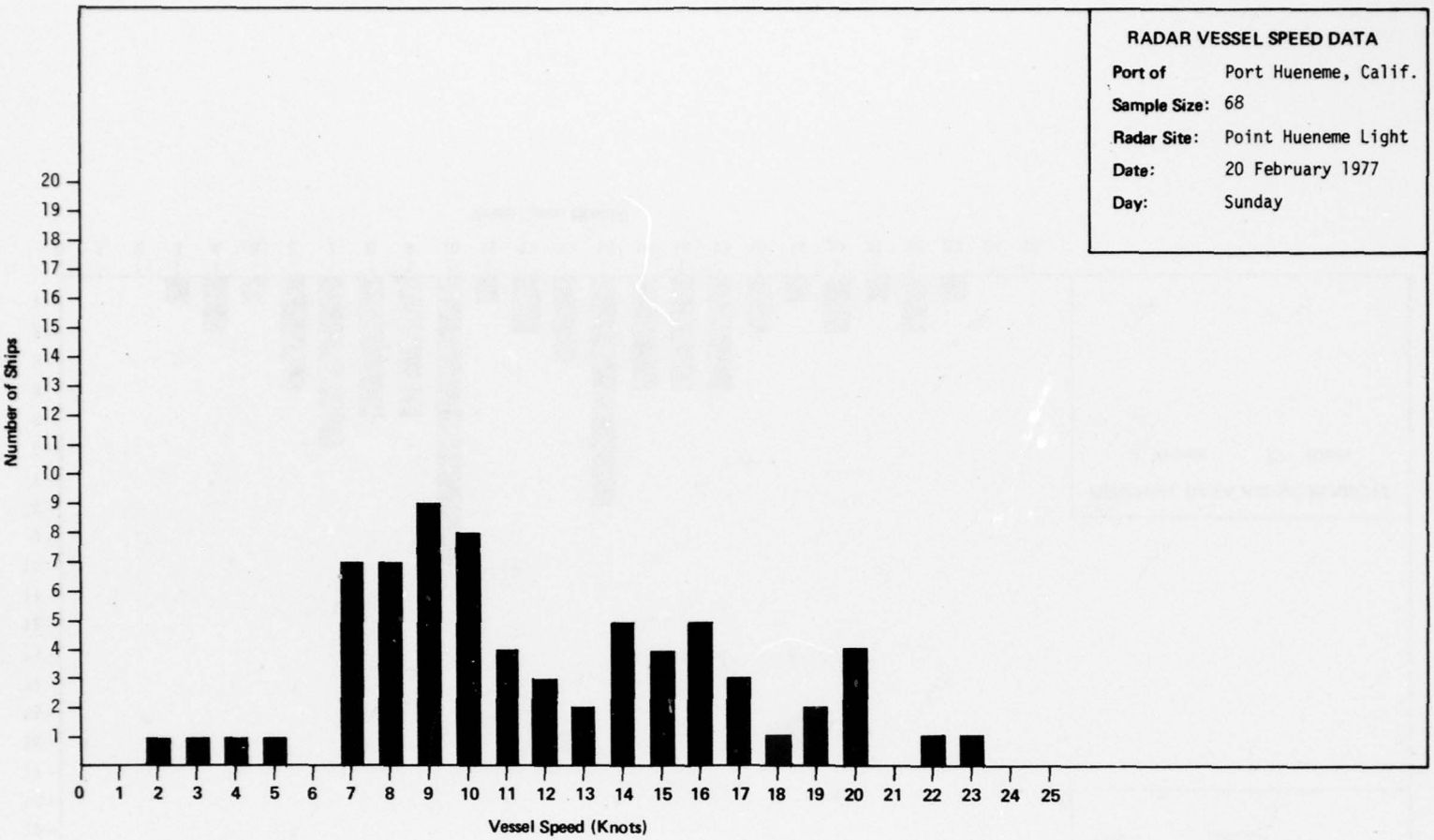

RADAR VESSEL SPEED DATA
Port of Port Hueneme, Calif.
Sample Size: 68
Radar Site: Point Hueneme Light
Date: 20 February 1977
Day: Sunday
Number of Ships
Vessel Speed (Knots)

FIGURE 4-15

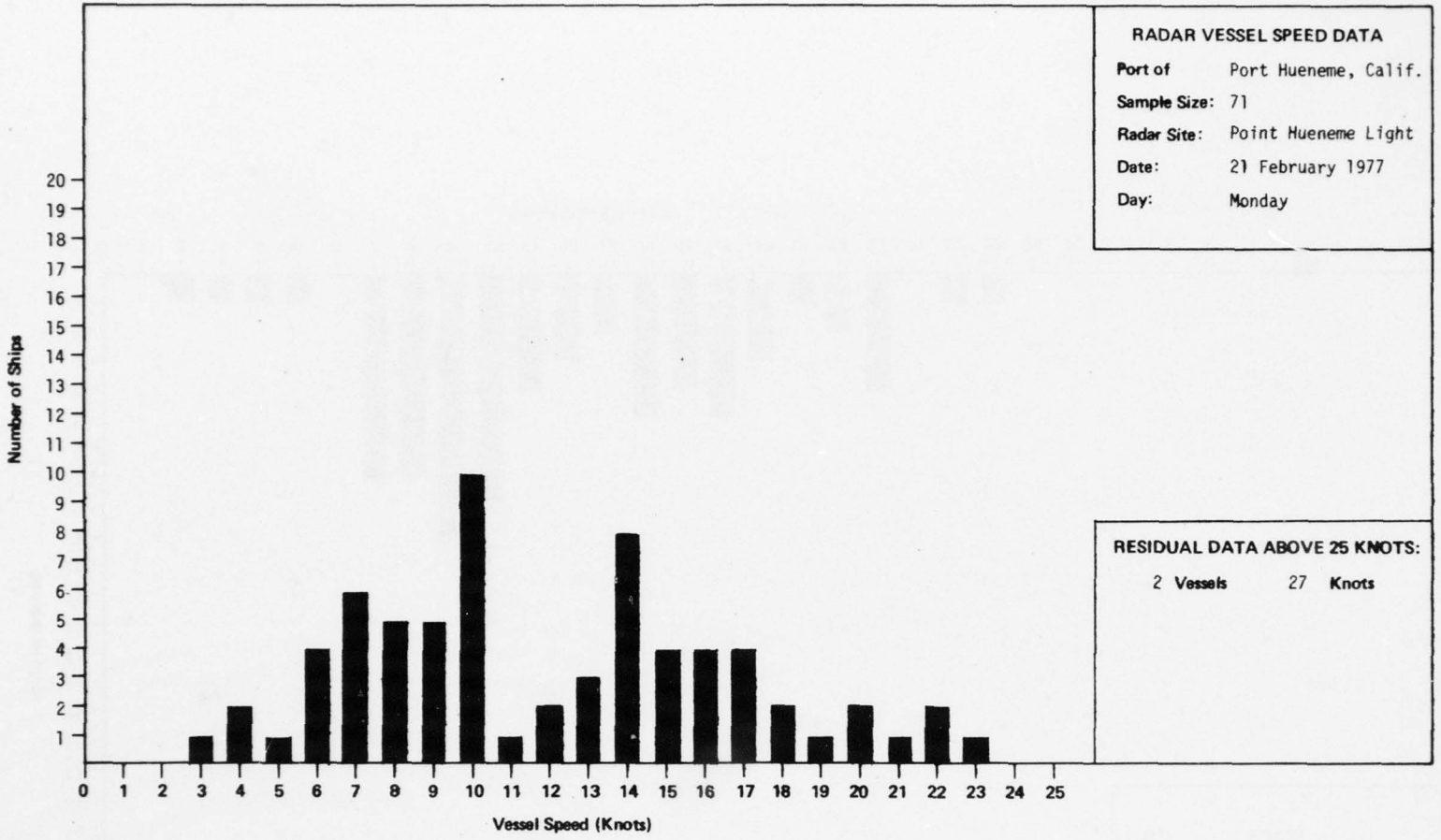

RADAR VESSEL SPEED DATA
Port of Port Hueneme, Calif.
Sample Size: 71
Radar Site: Point Hueneme Light
Date: 21 February 1977
Day: Monday
RESIDUAL DATA ABOVE 25 KNOTS:
2 Vessels 27 Knots
Number of Ships
Vessel Speed (Knots)

FIGURE 4-16

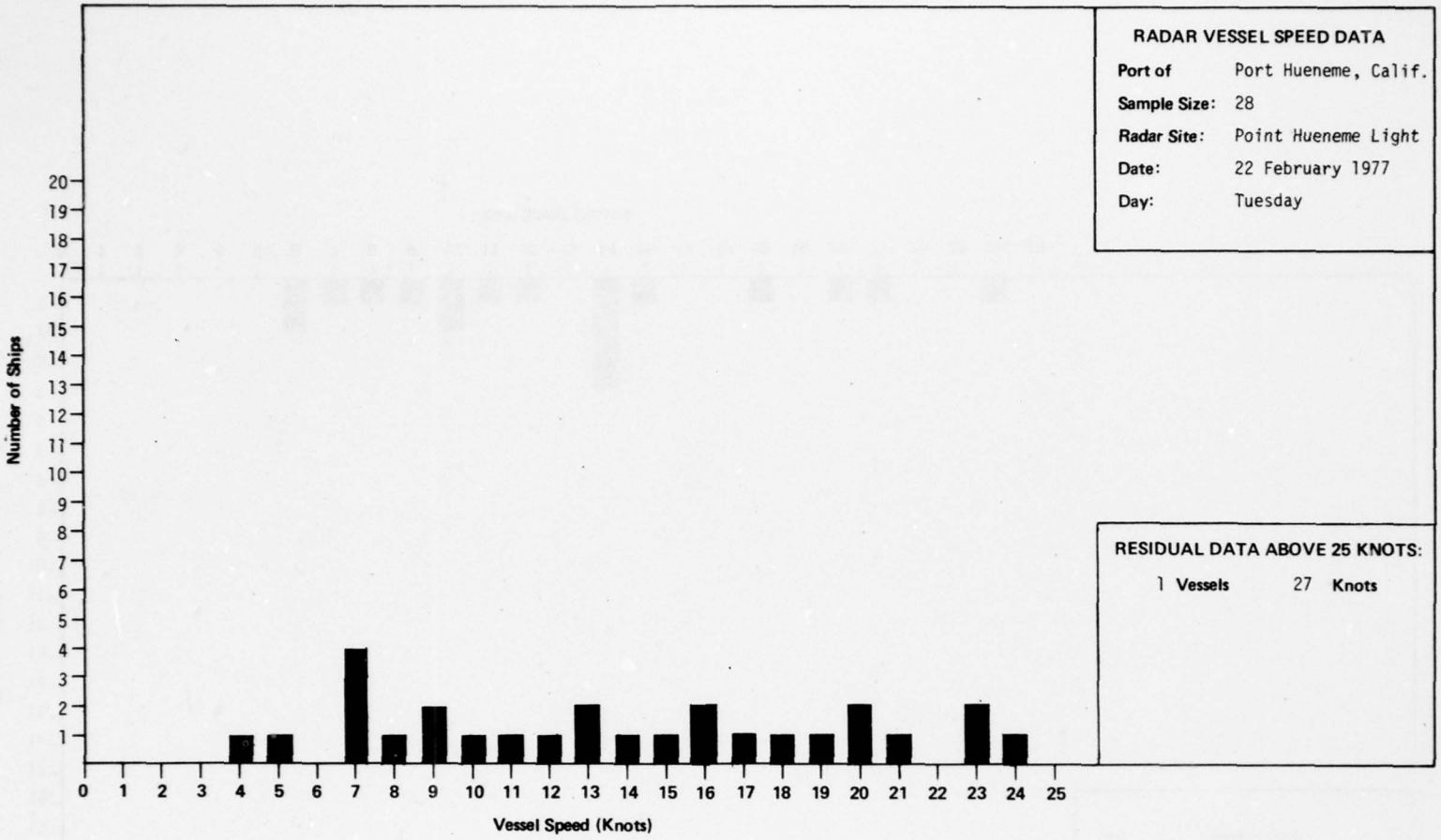

RADAR VESSEL SPEED DATA
Port of Port Hueneme, Calif.
Sample Size: 28
Radar Site: Point Hueneme Light
Date: 22 February 1977
Day: Tuesday
RESIDUAL DATA ABOVE 25 KNOTS:
1 Vessels 27 Knots
Number of Ships
Vessel Speed (Knots)

FIGURE 4-17

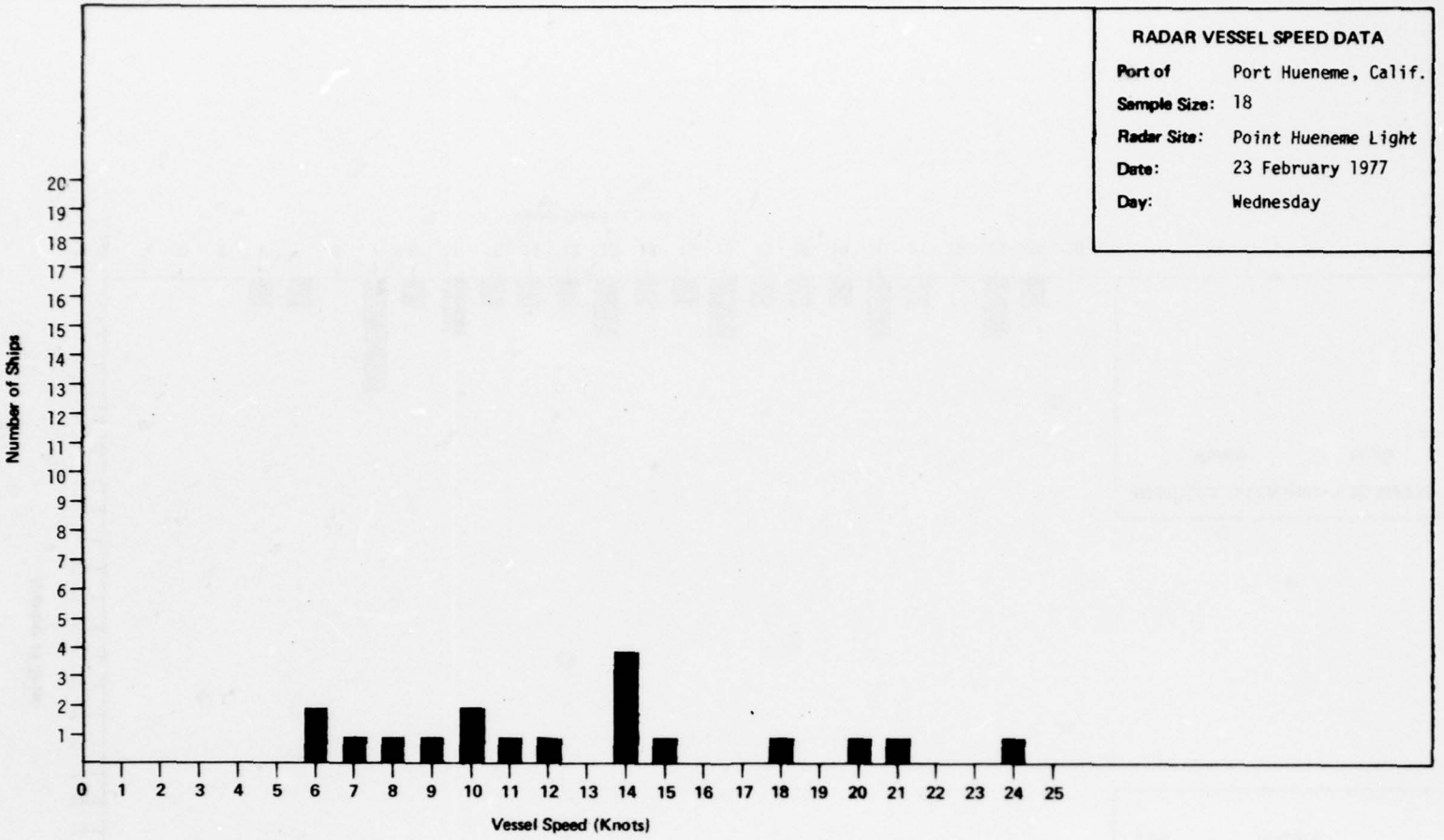

RADAR VESSEL SPEED DATA
Port of Port Hueneme, Calif.
Sample Size: 18
Radar Site: Point Hueneme Light
Date: 23 February 1977
Day: Wednesday
Number of Ships
Vessel Speed (Knots)

FIGURE 4-18

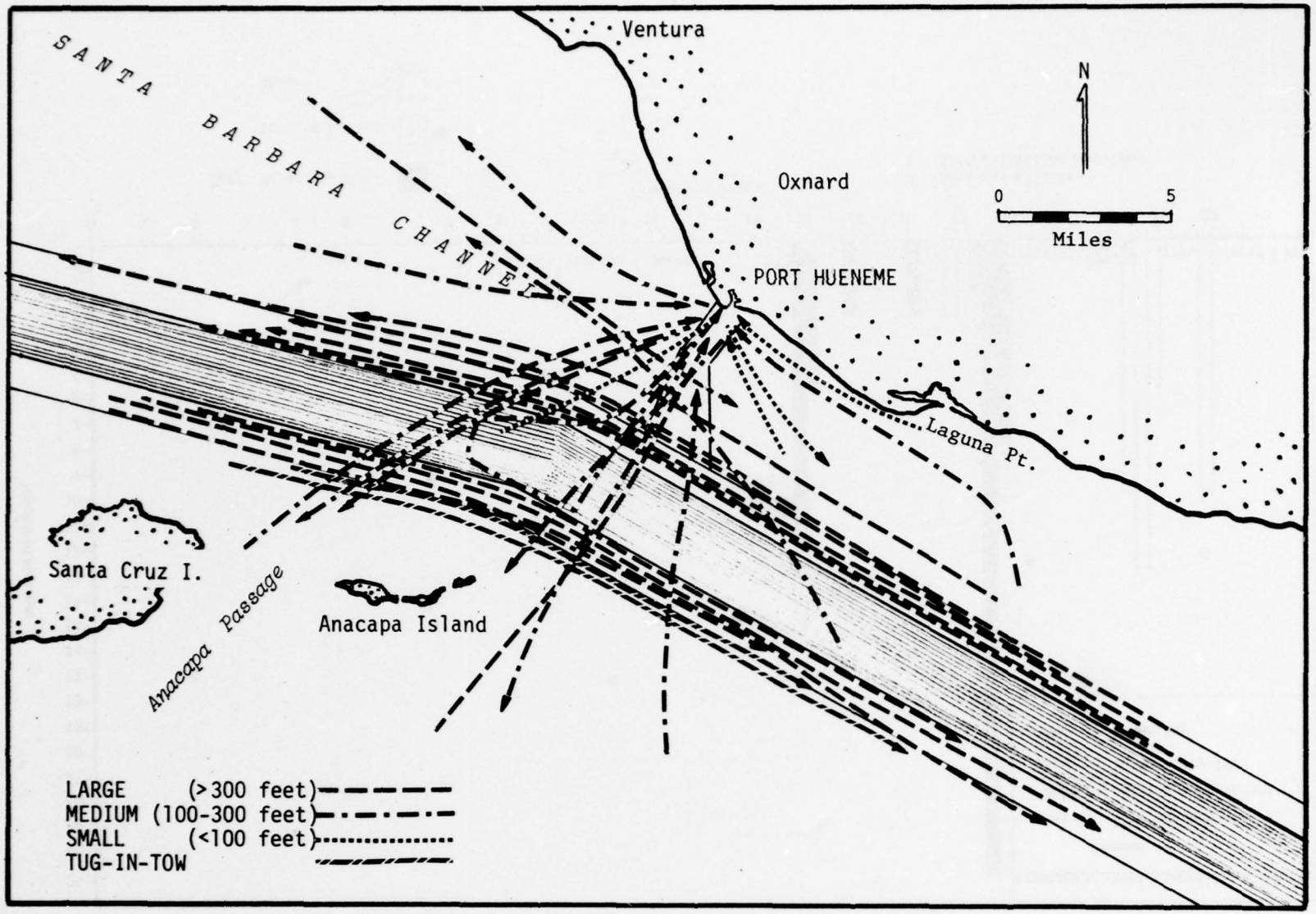


FIGURE 4-19: ROUTE IDENTIFICATION AT PORT HUENEME,
1200-2400, FRIDAY, 18 FEBRUARY 1977

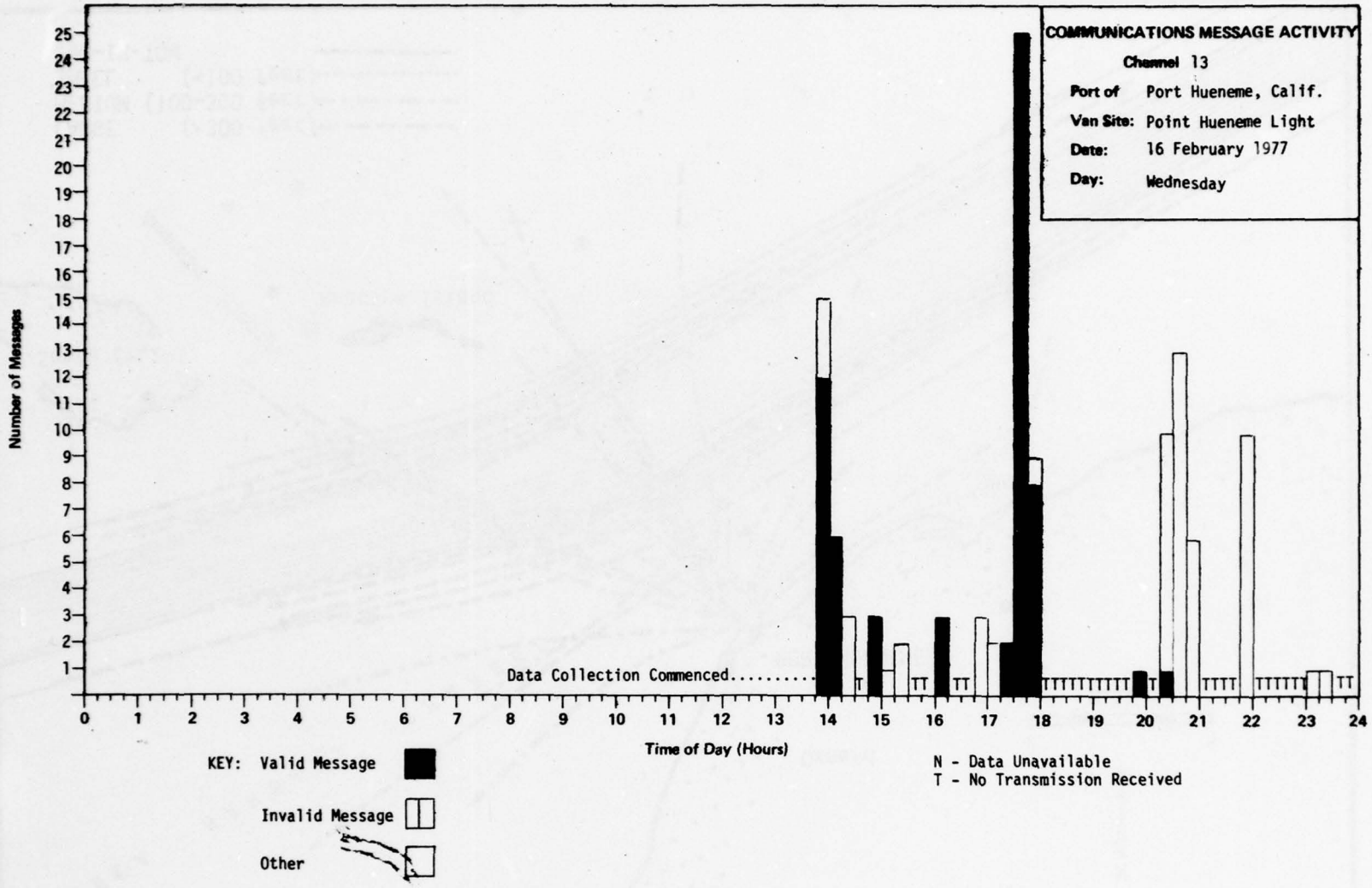

COMMUNICATIONS MESSAGE ACTIVITY
Channel 13
Port of Port Hueneme, Calif.
Van Site: Point Hueneme Light
Date: 16 February 1977
Day: Wednesday
Number of Messages
Data Collection Commenced.....
Time of Day (Hours)
KEY: Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmission Received

FIGURE 4-20

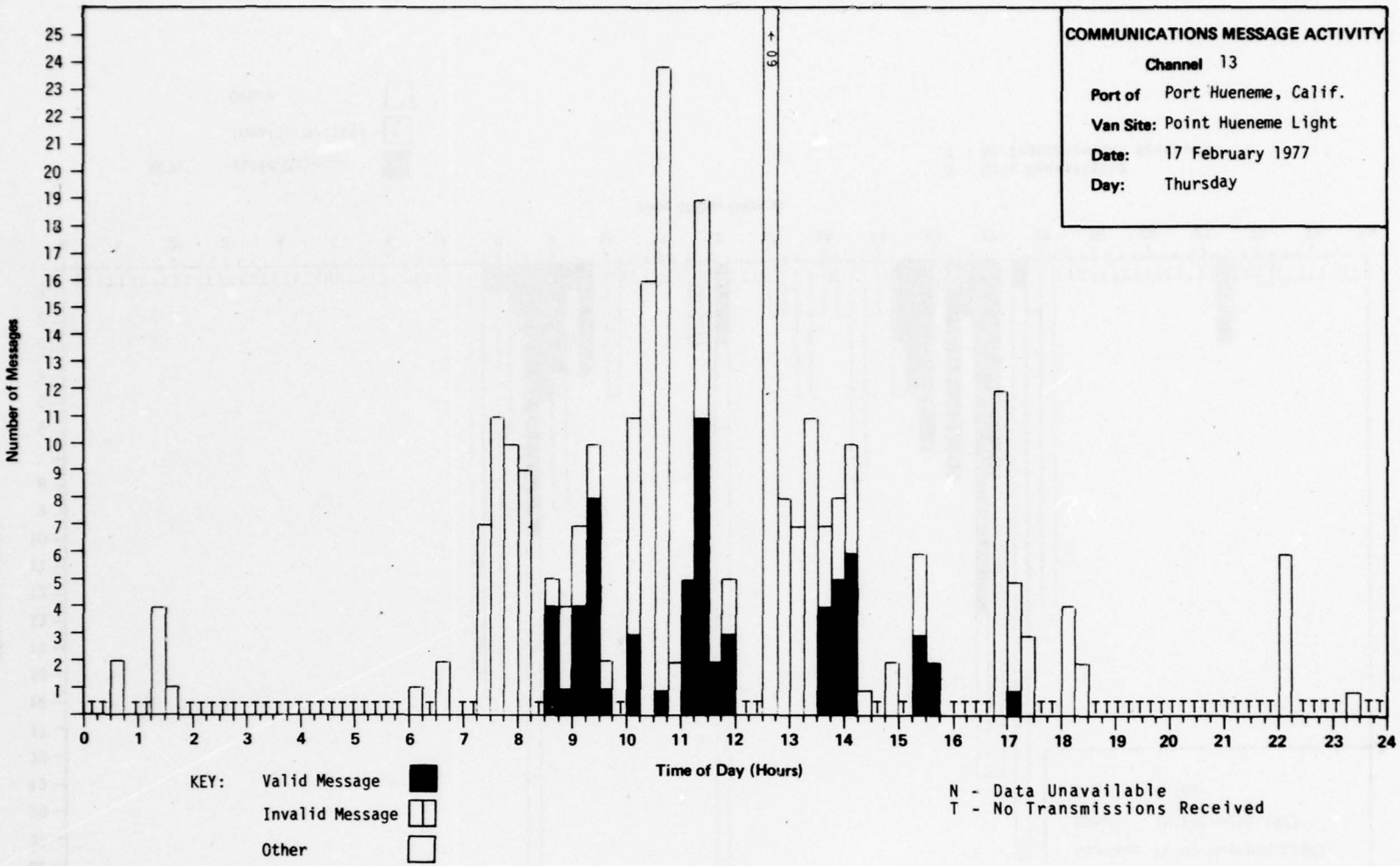

COMMUNICATIONS MESSAGE ACTIVITY
Channel 13
Port of Port Hueneme, Calif.
Van Site: Point Hueneme Light
Date: 17 February 1977
Day: Thursday
Number of Messages
Time of Day (Hours)
KEY:
Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 4-21

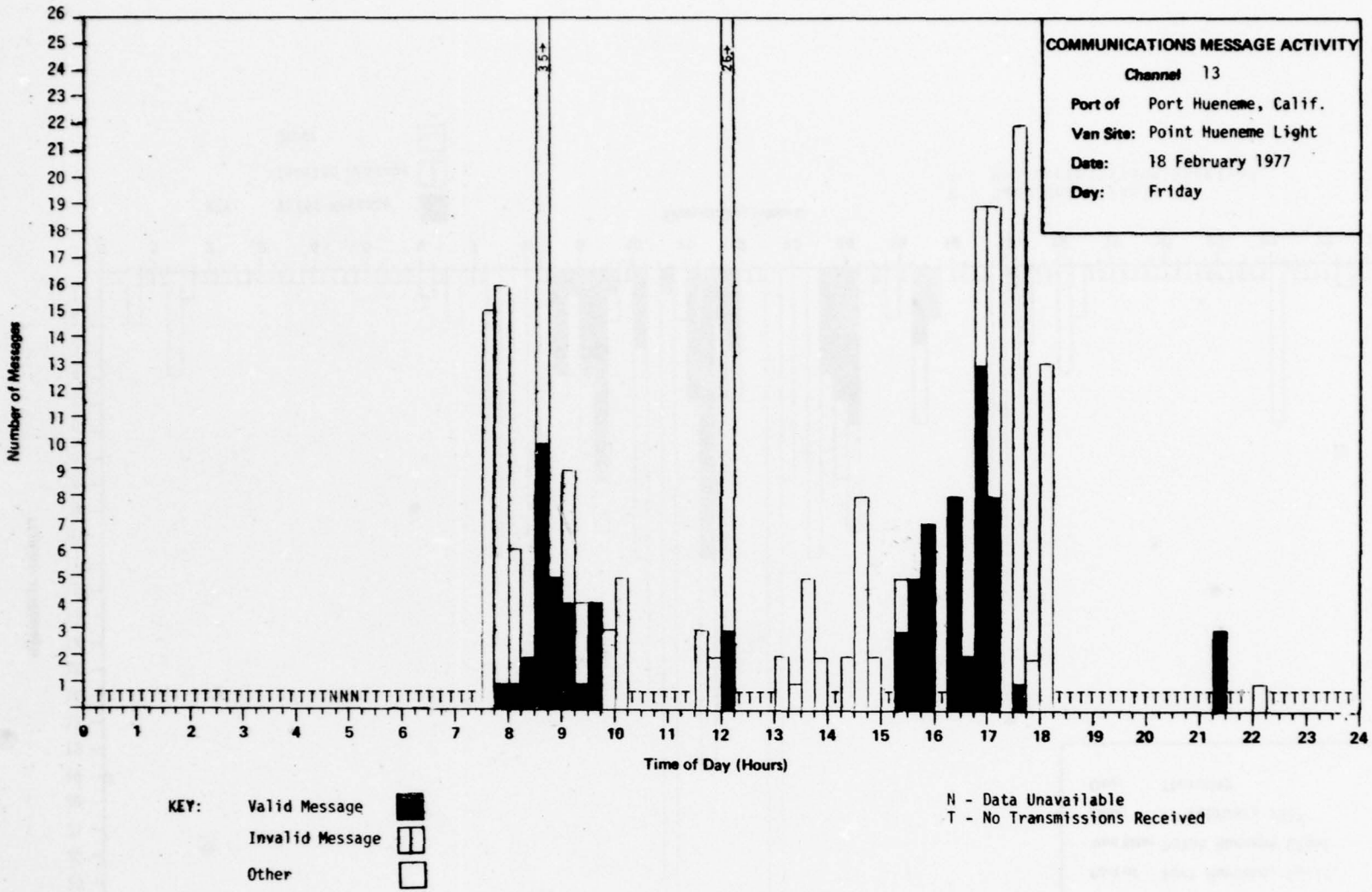

COMMUNICATIONS MESSAGE ACTIVITY
Channel 13
Port of Port Hueneme, Calif.
Van Site: Point Hueneme Light
Date: 18 February 1977
Day: Friday
Number of Messages
Time of Day (Hours)
35+
26+
KEY:
Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 4-22

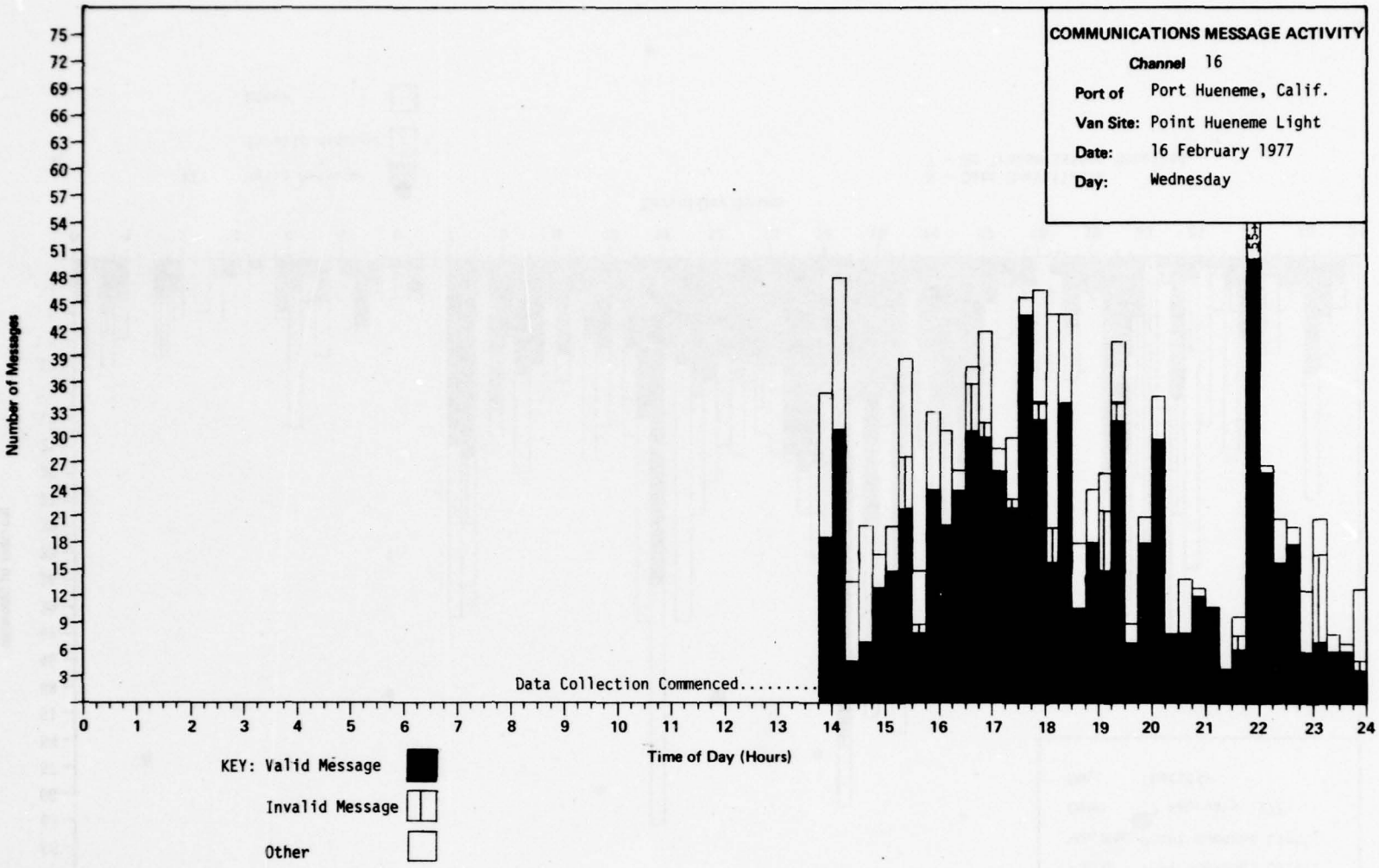

COMMUNICATIONS MESSAGE ACTIVITY
Channel 16
Port of Port Hueneme, Calif.
Van Site: Point Hueneme Light
Date: 16 February 1977
Day: Wednesday
Number of Messages
75
72
69
66
63
60
57
54
51
48
45
42
39
36
33
30
27
24
21
18
15
12
9
6
3
Data Collection Commenced.....
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time of Day (Hours)
KEY: Valid Message
Invalid Message
Other

FIGURE 4-23

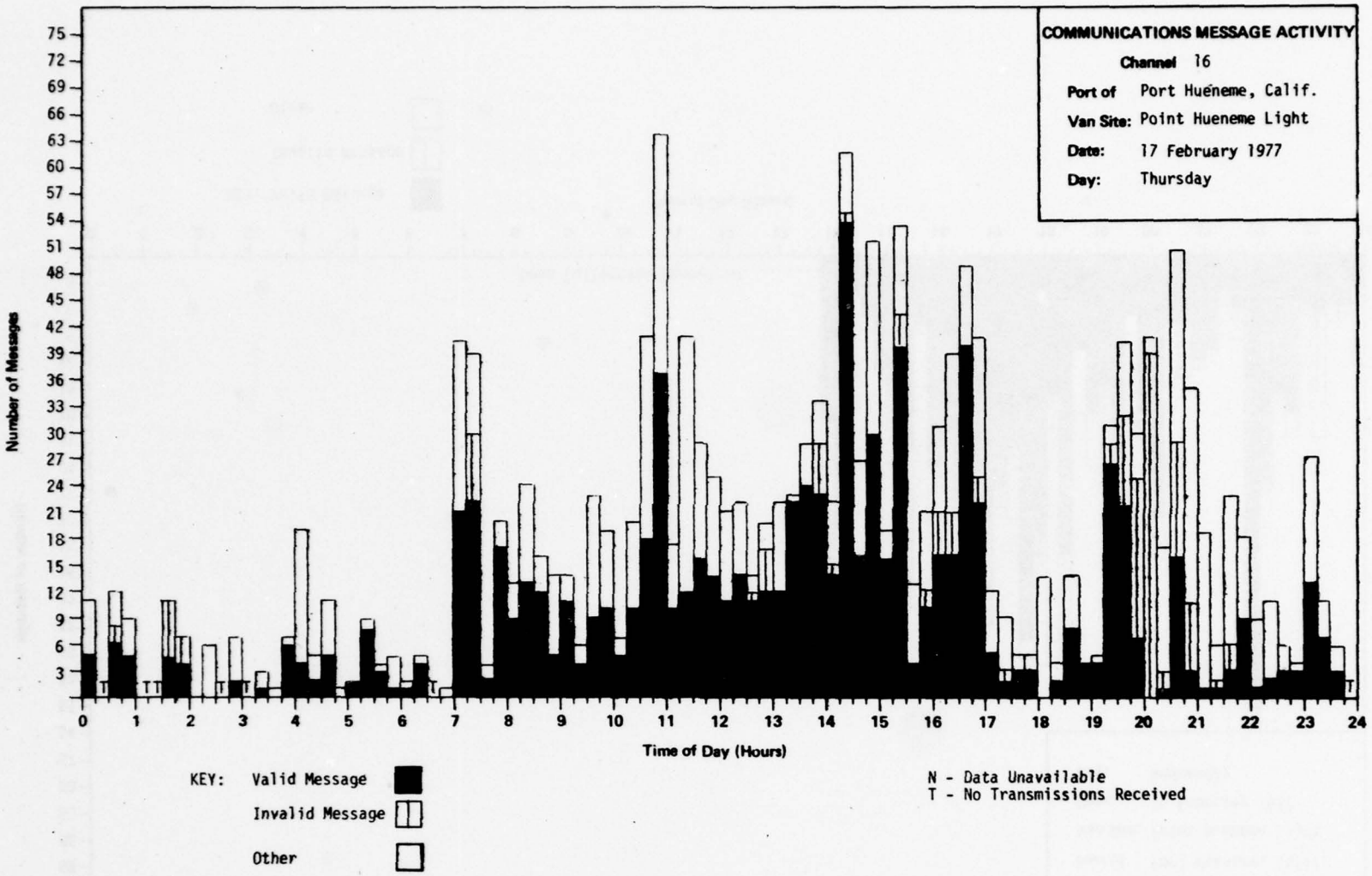

COMMUNICATIONS MESSAGE ACTIVITY
Channel 16
Port of Port Hueneme, Calif.
Van Site: Point Hueneme Light
Date: 17 February 1977
Day: Thursday
Number of Messages
75
72
69
66
63
60
57
54
51
48
45
42
39
36
33
30
27
24
21
18
15
12
9
6
3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time of Day (Hours)
KEY: Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 4-24

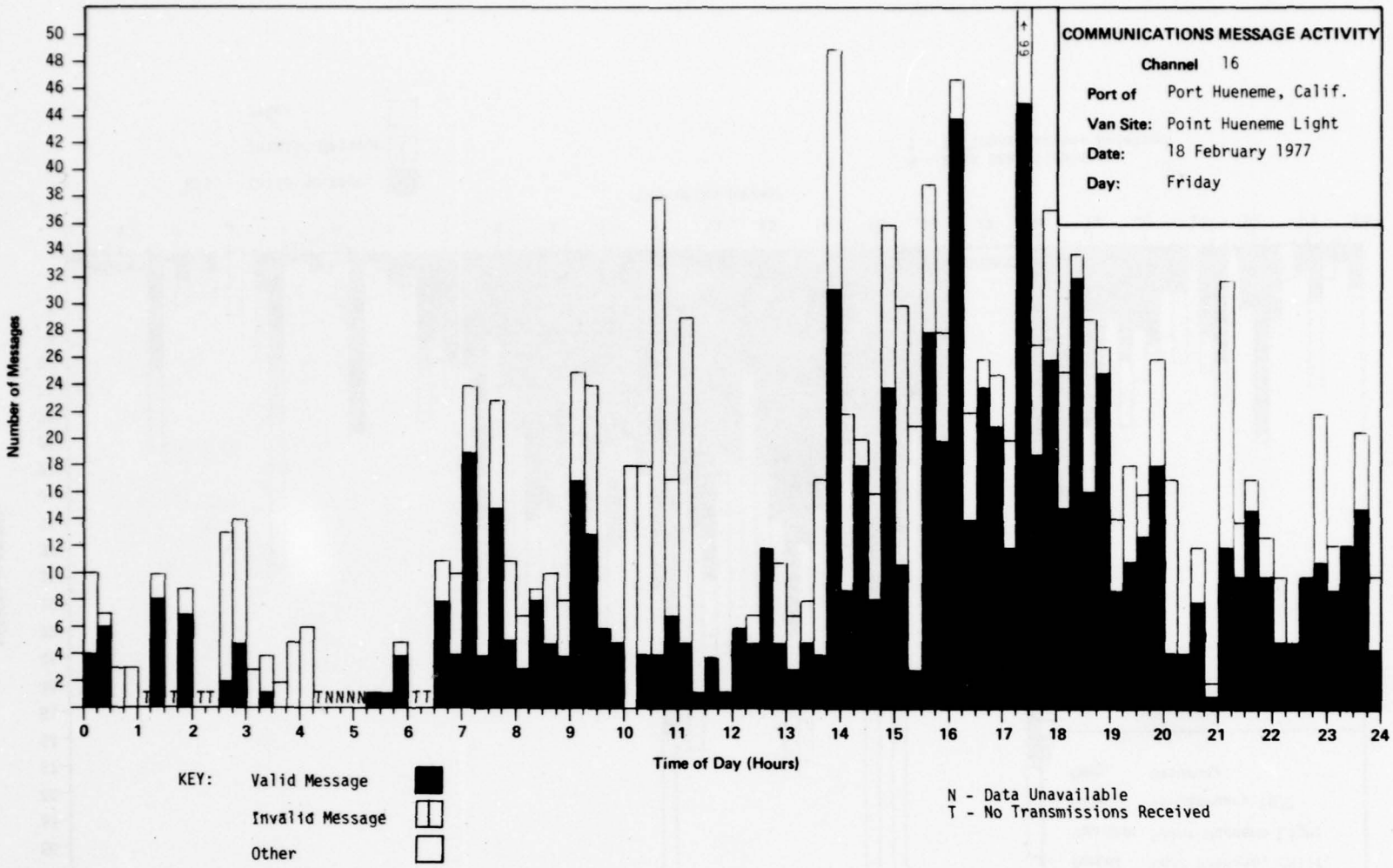

COMMUNICATIONS MESSAGE ACTIVITY
Channel 16
Port of Port Hueneme, Calif.
Van Site: Point Hueneme Light
Date: 18 February 1977
Day: Friday
Number of Messages
Time of Day (Hours)
KEY: Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 4-25

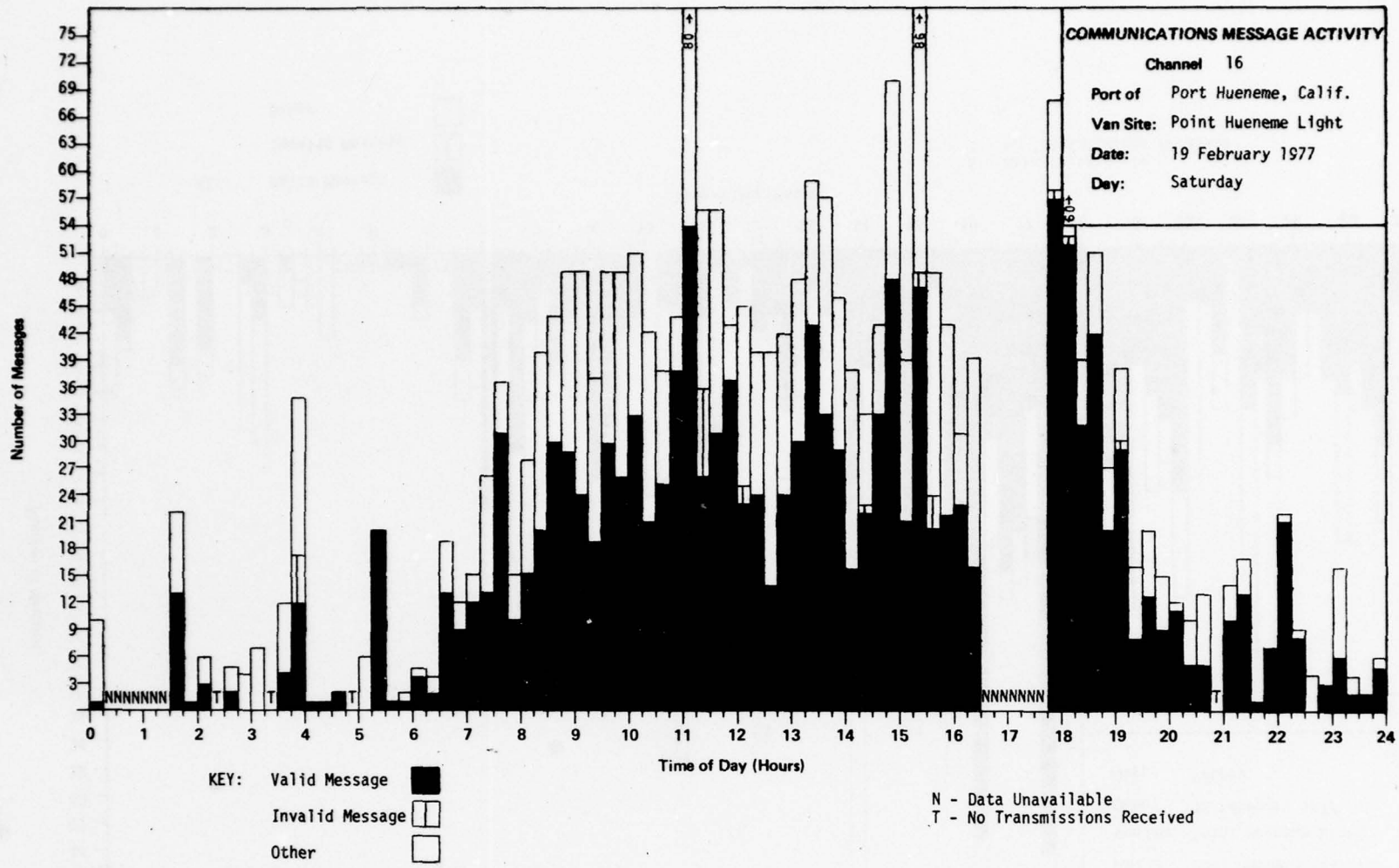

COMMUNICATIONS MESSAGE ACTIVITY
Channel 16
Port of Port Hueneme, Calif.
Van Site: Point Hueneme Light
Date: 19 February 1977
Day: Saturday
Number of Messages
Time of Day (Hours)
KEY: Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 4-26

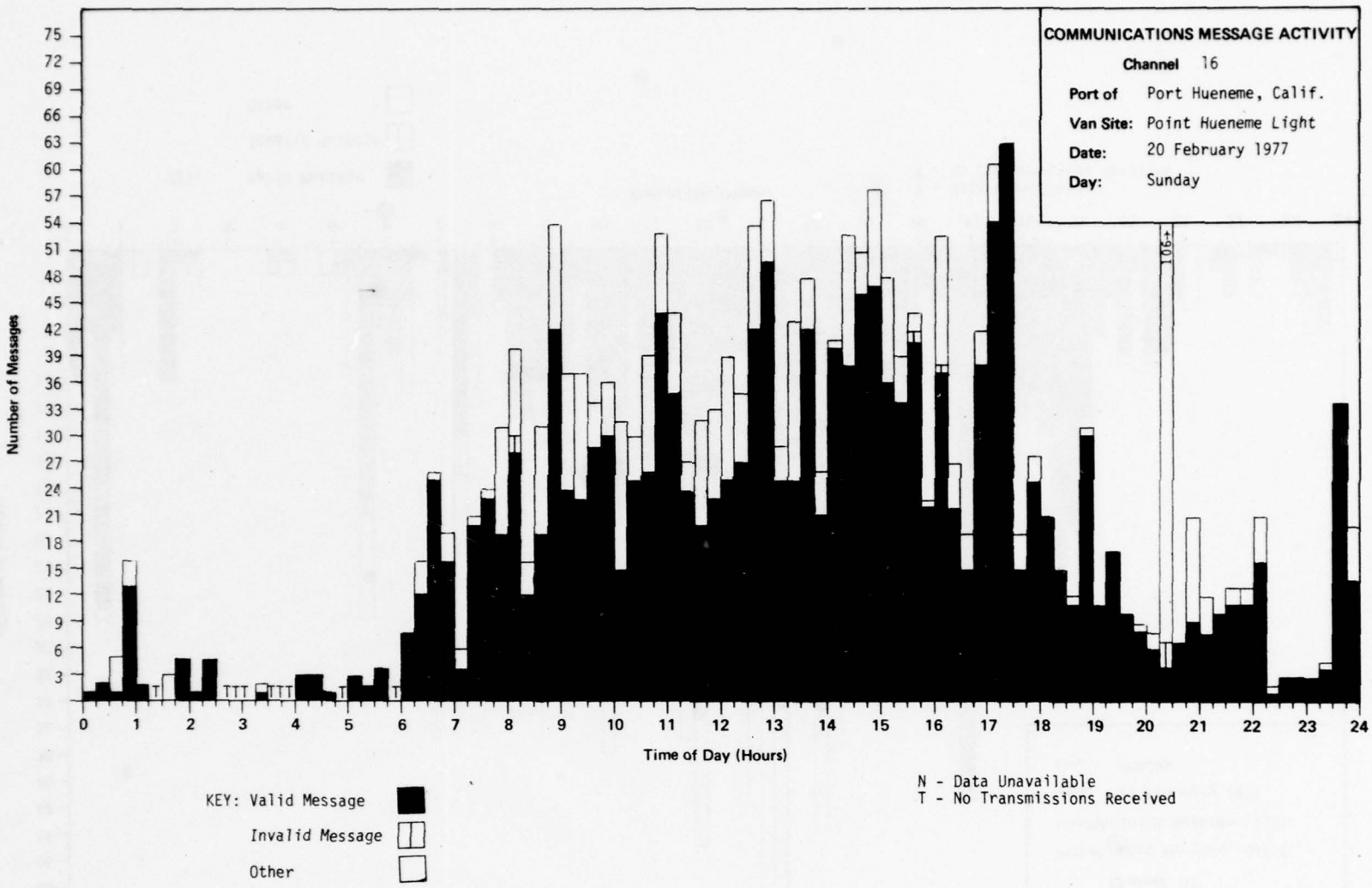

COMMUNICATIONS MESSAGE ACTIVITY
Channel 16
Port of Port Hueneme, Calif.
Van Site: Point Hueneme Light
Date: 20 February 1977
Day: Sunday
Number of Messages
Time of Day (Hours)
KEY: Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 4-27

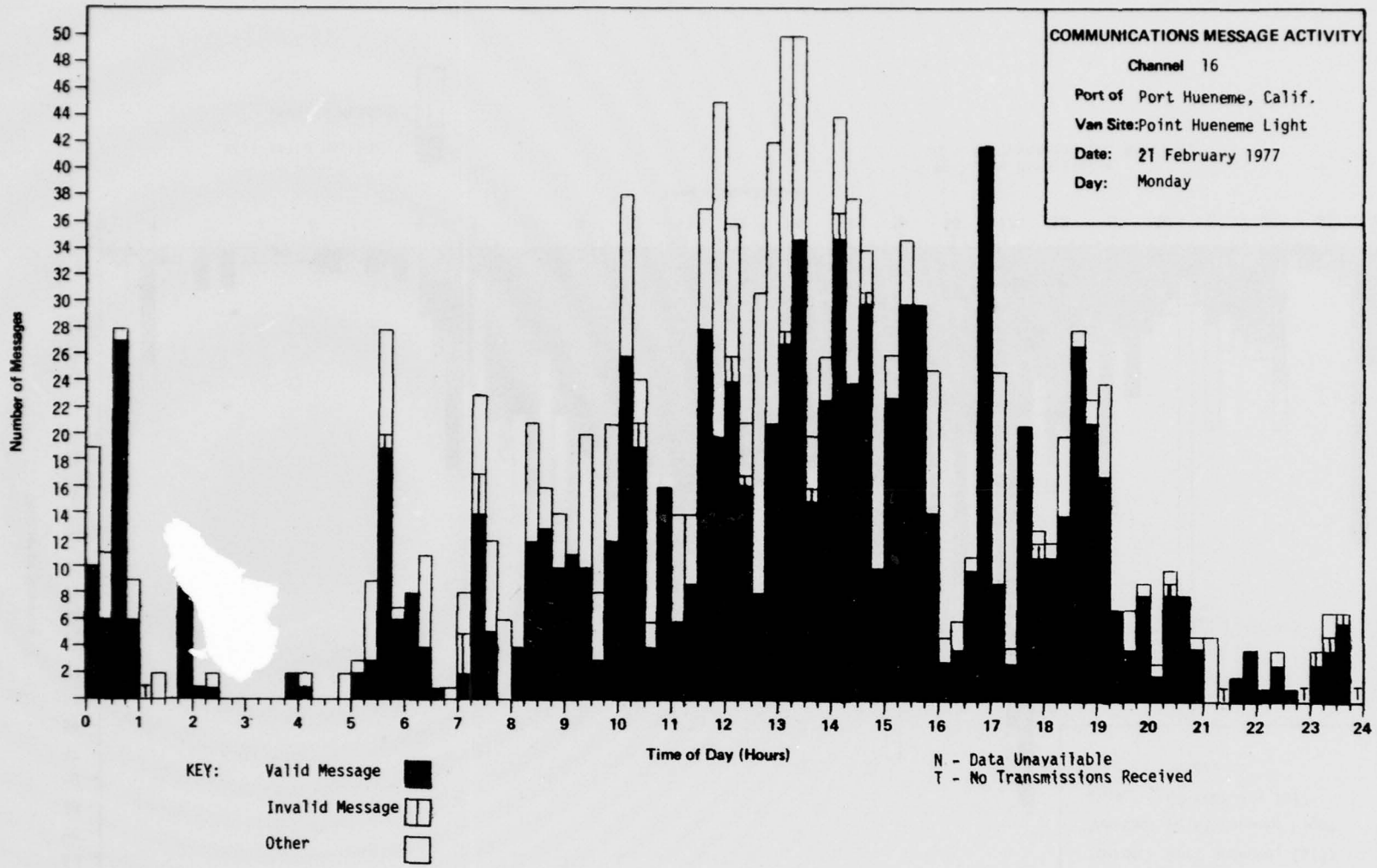

COMMUNICATIONS MESSAGE ACTIVITY
Channel 16
Port of Port Hueneme, Calif.
Van Site: Point Hueneme Light
Date: 21 February 1977
Day: Monday
Number of Messages
Time of Day (Hours)
KEY:
Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 4-28

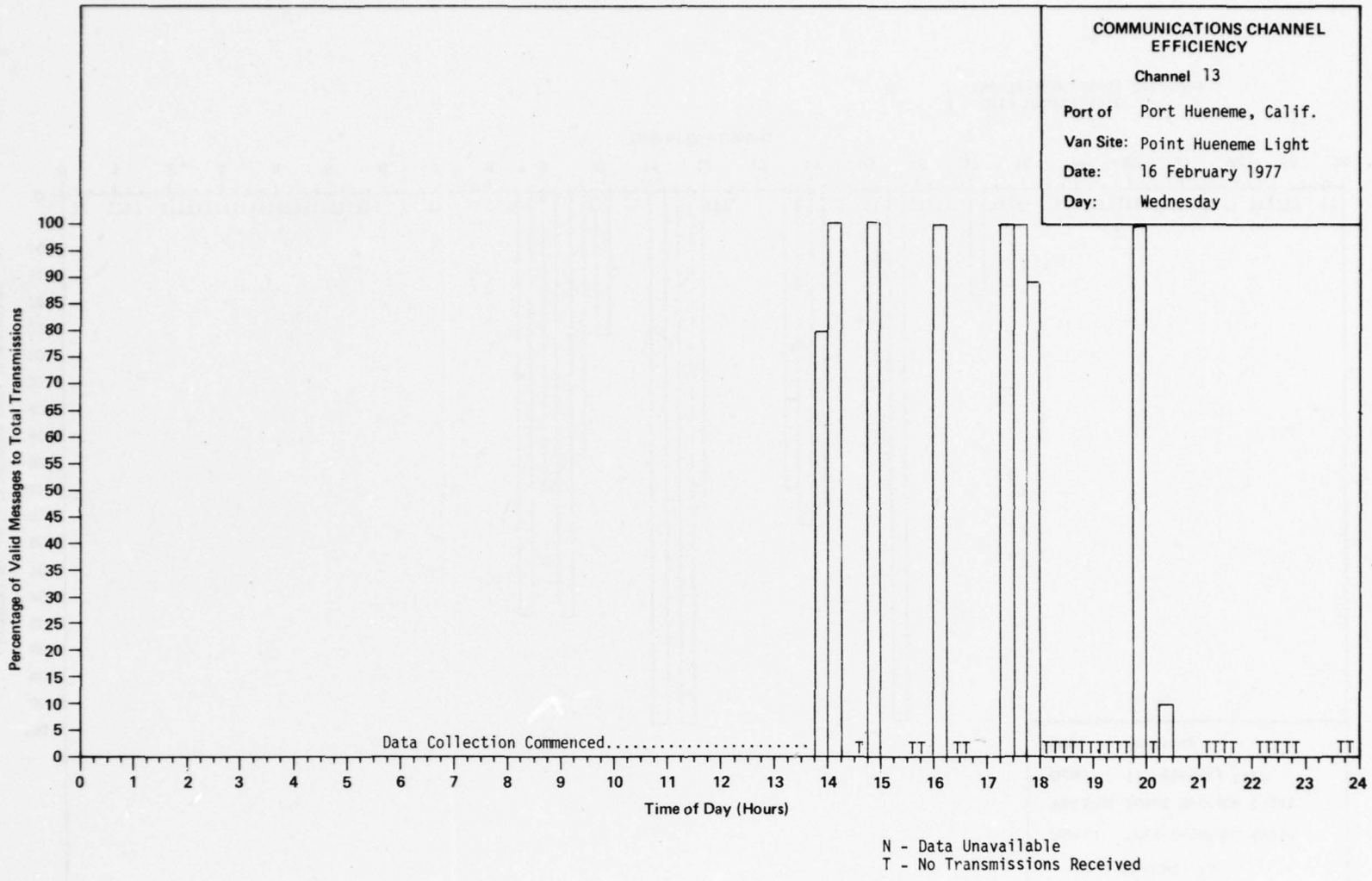

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 13
Port of Port Hueneme, Calif.
Van Site: Point Hueneme Light
Date: 16 February 1977
Day: Wednesday
Percentage of Valid Messages to Total Transmissions
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
Data Collection Commenced.....
T
TT
TT
TTTTTTTTT
T
TTTT
TTTTT
TT
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 4-29

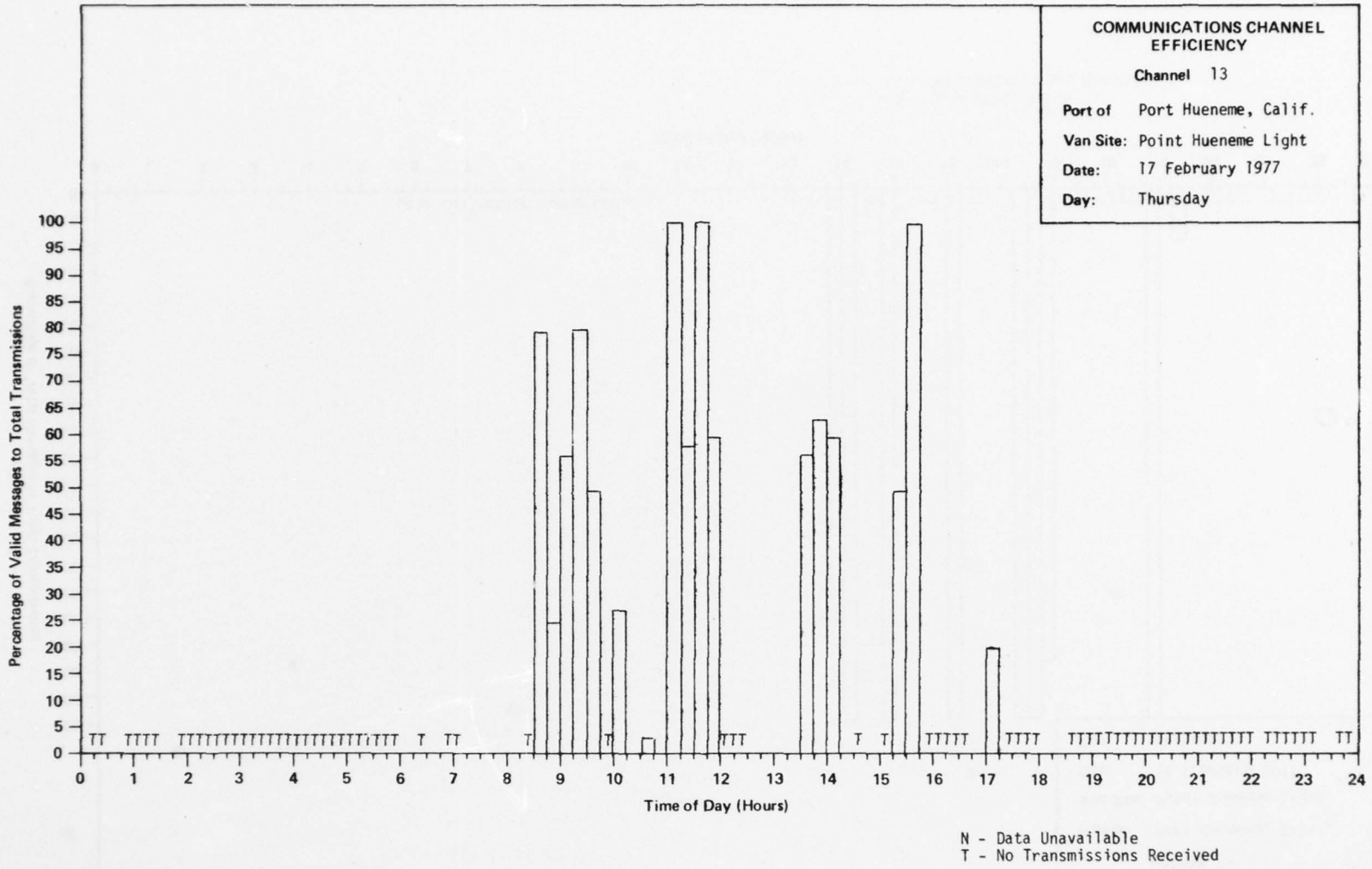

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 13
Port of Port Hueneme, Calif.
Van Site: Point Hueneme Light
Date: 17 February 1977
Day: Thursday
Percentage of Valid Messages to Total Transmissions
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 4-30

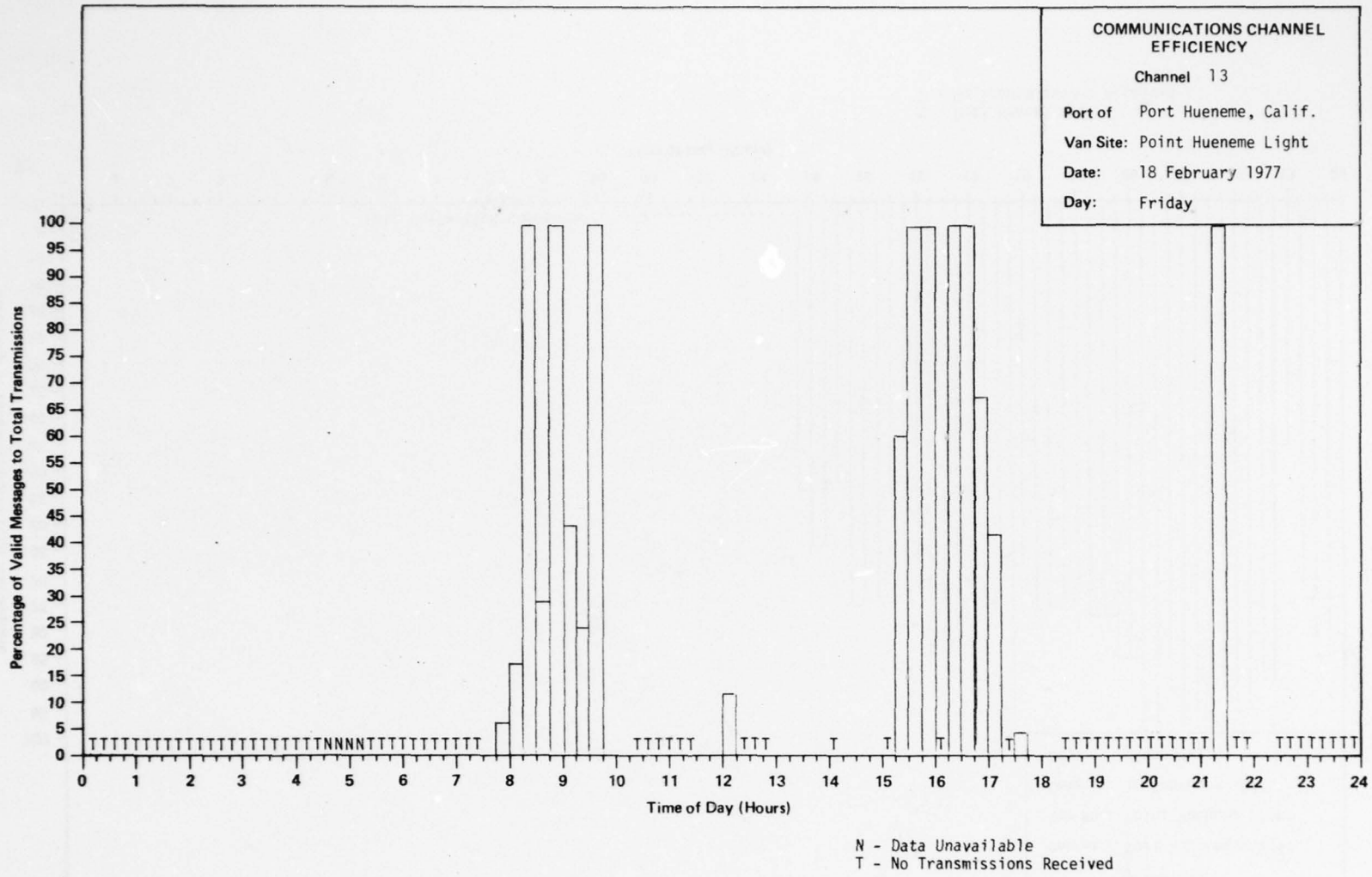

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 13
Port of Port Hueneme, Calif.
Van Site: Point Hueneme Light
Date: 18 February 1977
Day: Friday
Percentage of Valid Messages to Total Transmissions
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 4-31

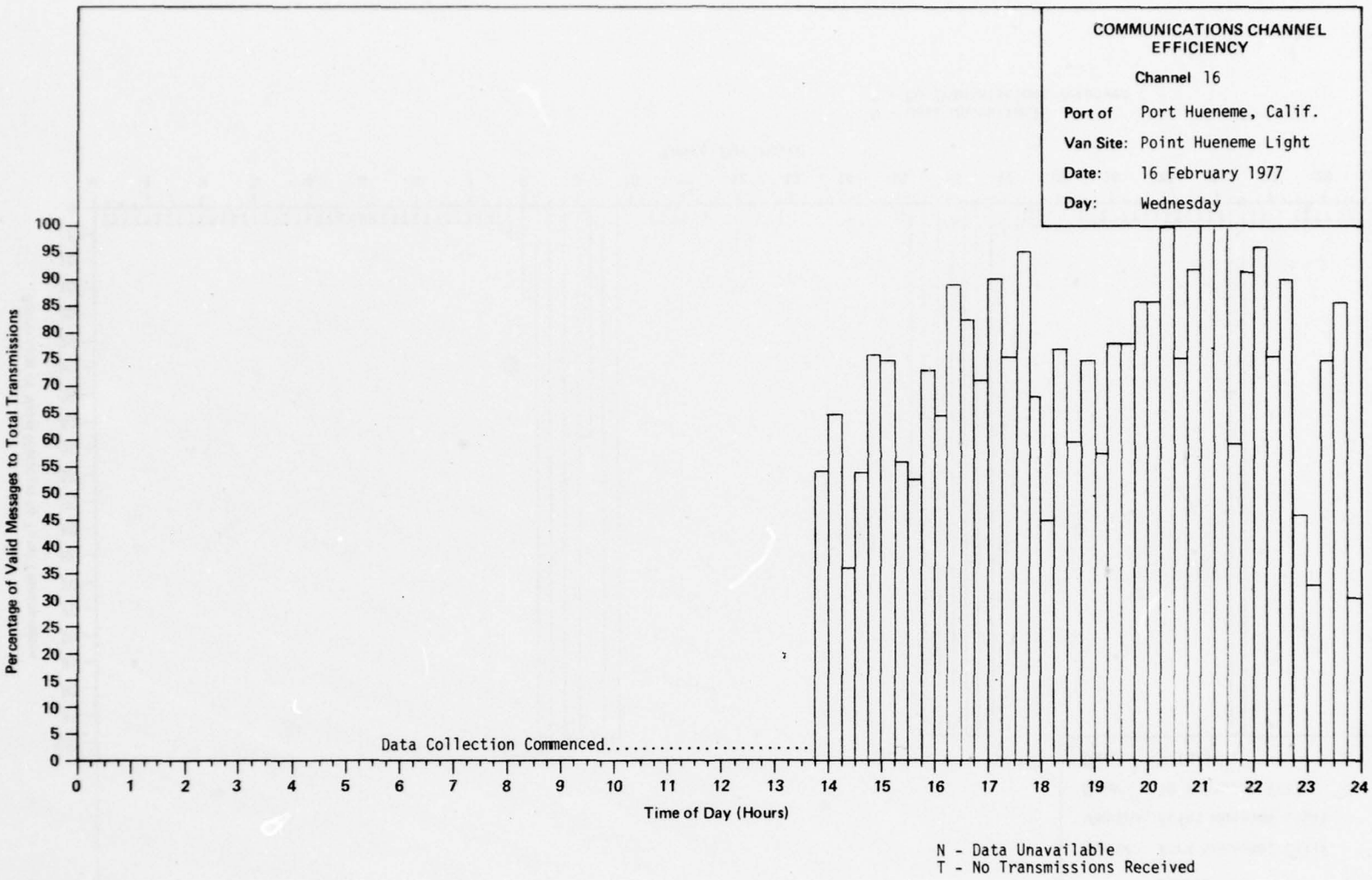

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 16
Port of Port Hueneme, Calif.
Van Site: Point Hueneme Light
Date: 16 February 1977
Day: Wednesday
Percentage of Valid Messages to Total Transmissions
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
Data Collection Commenced.....
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 4-32

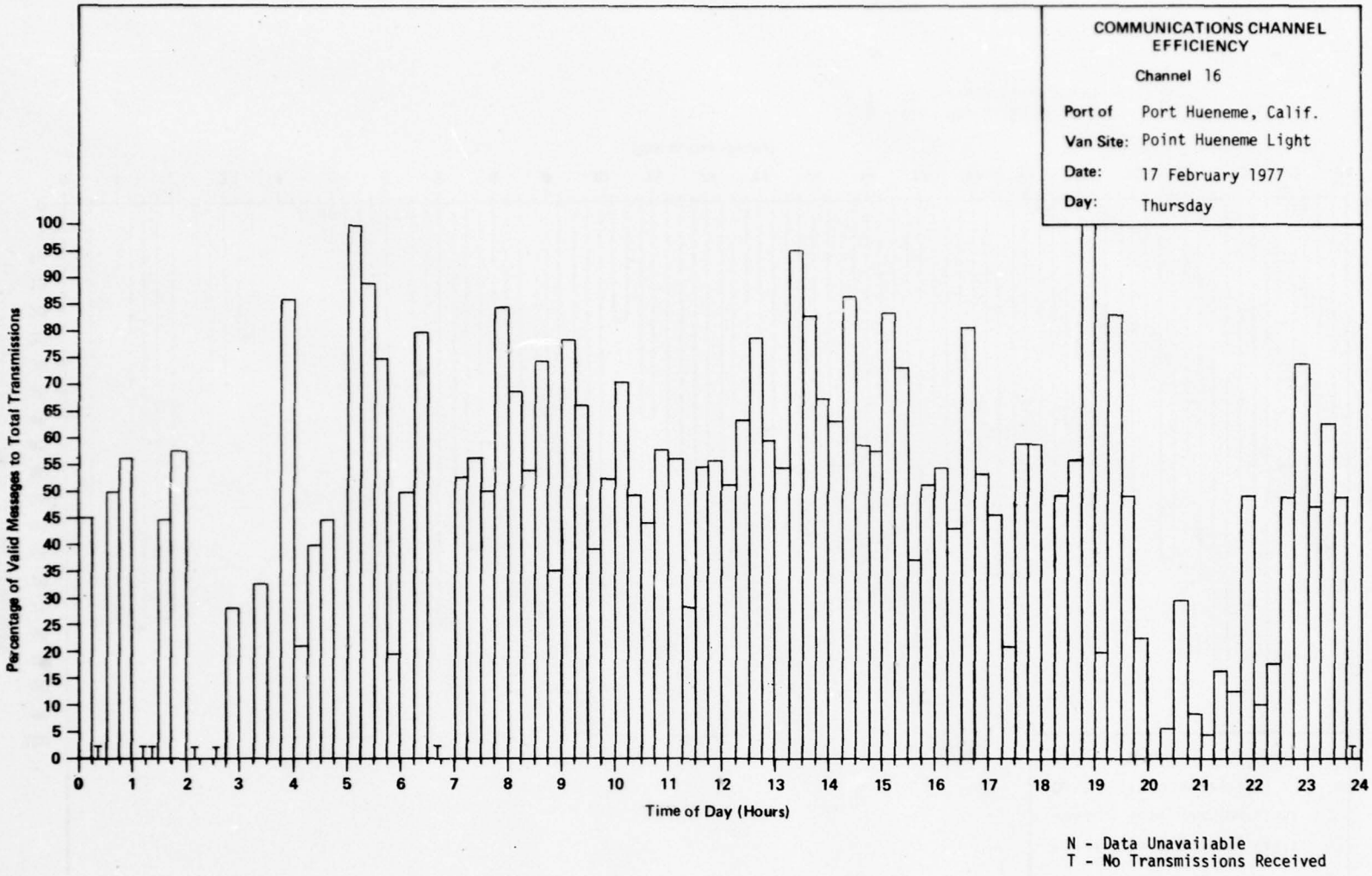

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 16
Port of Port Hueneme, Calif.
Van Site: Point Hueneme Light
Date: 17 February 1977
Day: Thursday
Percentage of Valid Messages to Total Transmissions
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 4-33

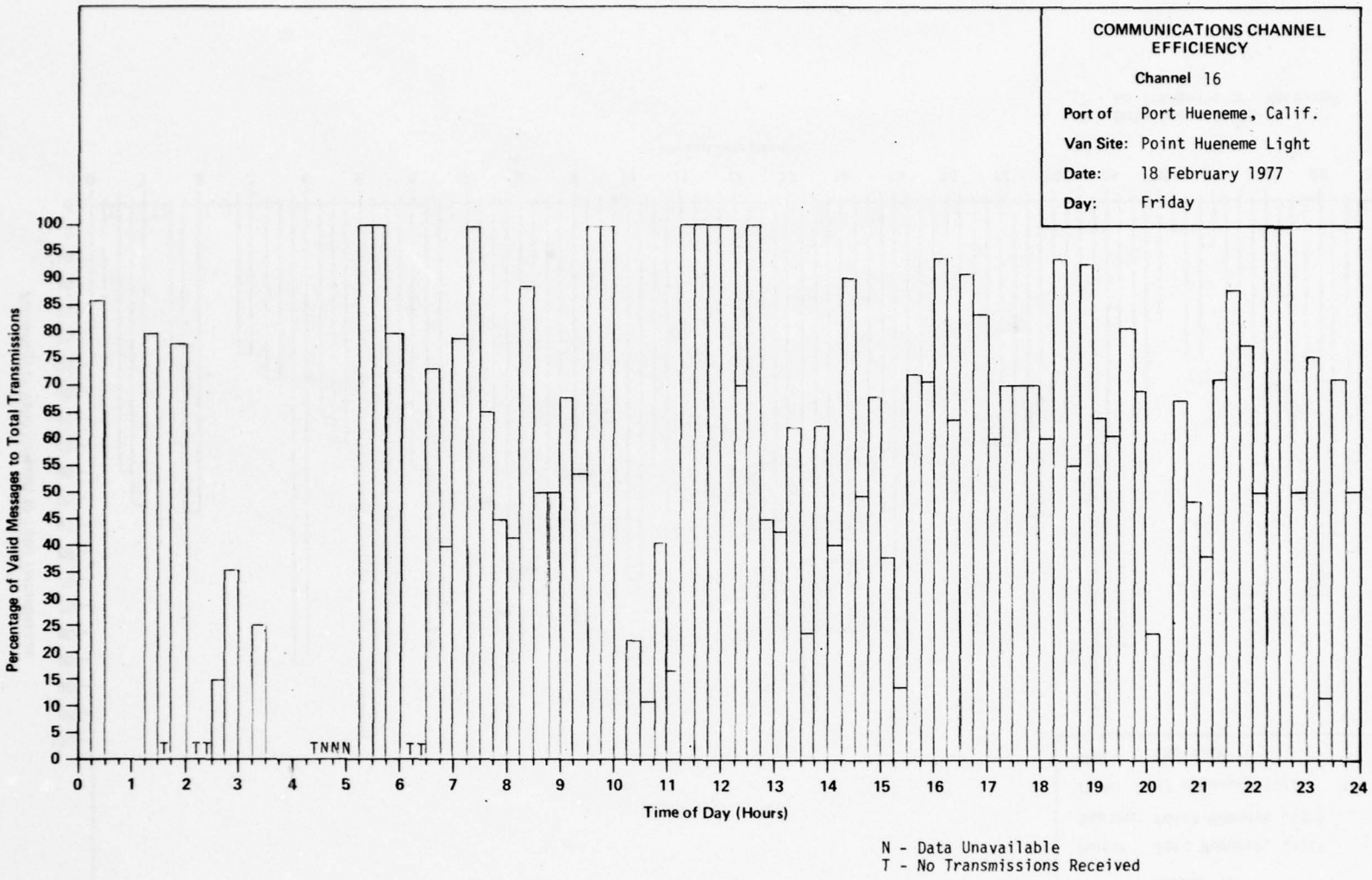

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 16
Port of Port Hueneme, Calif.
Van Site: Point Hueneme Light
Date: 18 February 1977
Day: Friday
Percentage of Valid Messages to Total Transmissions
Time of Day (Hours)
T
TT
TNNN
TT
N - Data Unavailable
T - No Transmissions Received

FIGURE 4-34

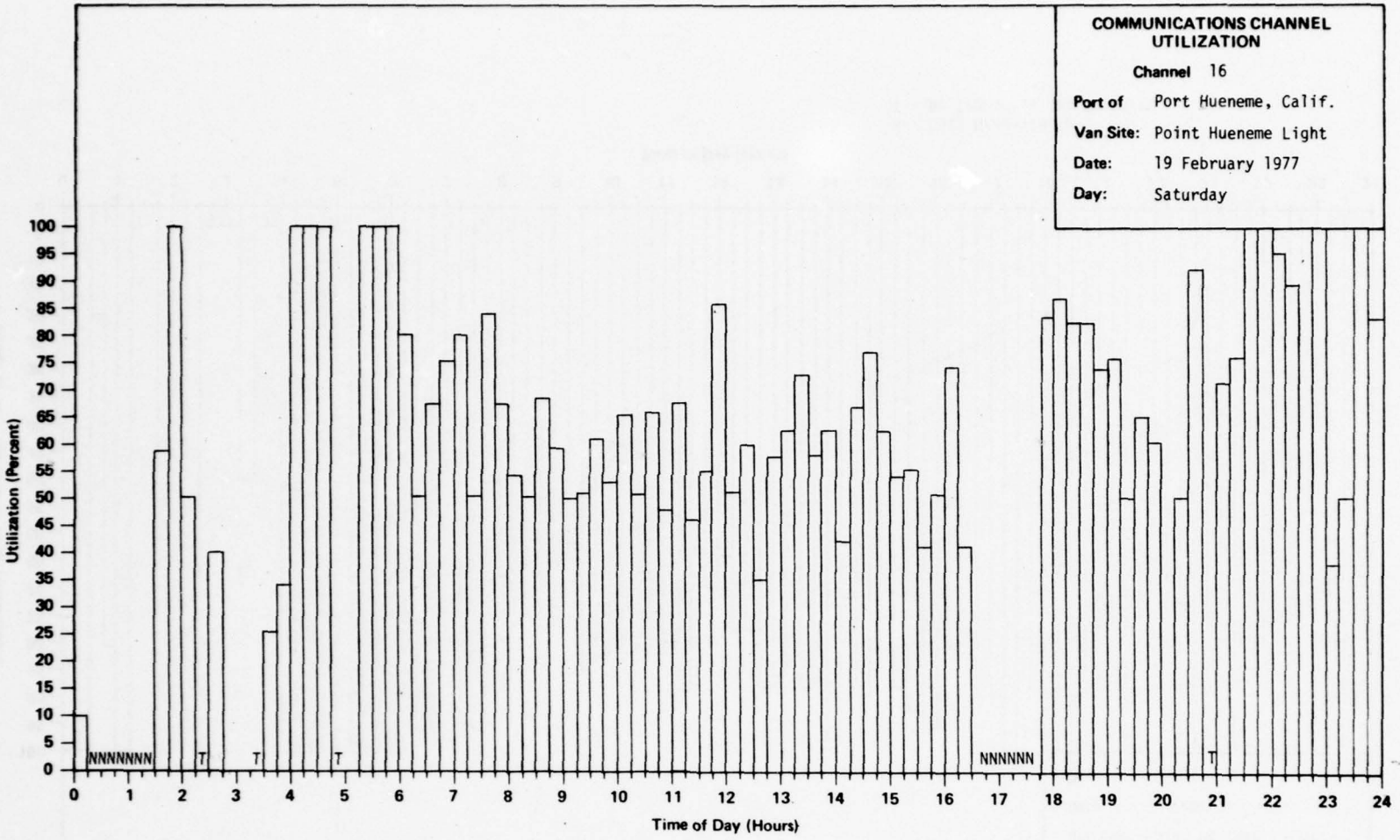

COMMUNICATIONS CHANNEL UTILIZATION
Channel 16
Port of Port Hueneme, Calif.
Van Site: Point Hueneme Light
Date: 19 February 1977
Day: Saturday
Utilization (Percent)
Time of Day (Hours)
NNNNNNN
T
T
T
NNNNNN
T
N - Data Unavailable
T - No Transmissions Received

FIGURE 4-35

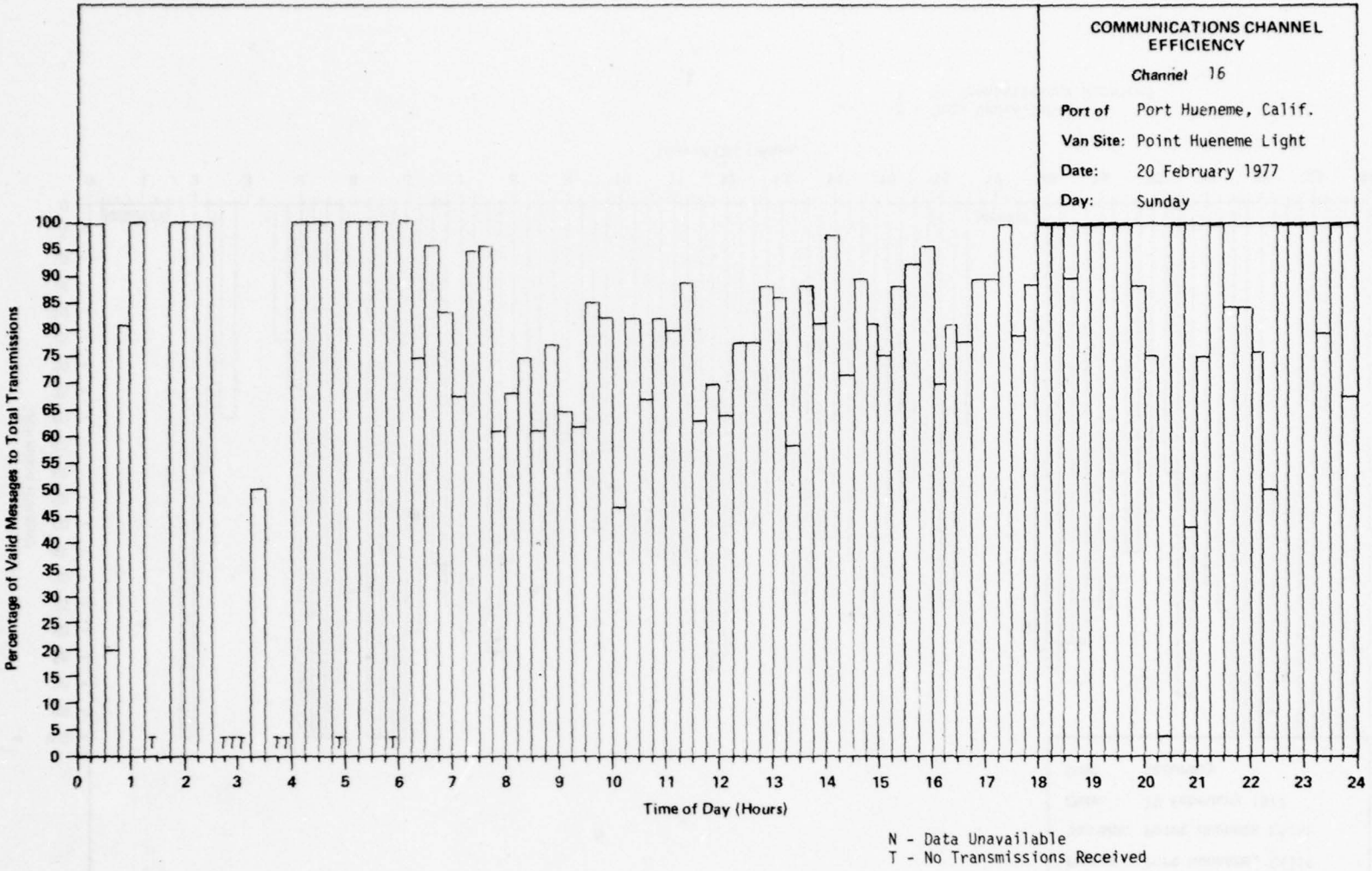

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 16
Port of Port Hueneme, Calif.
Van Site: Point Hueneme Light
Date: 20 February 1977
Day: Sunday
Percentage of Valid Messages to Total Transmissions
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 4-36

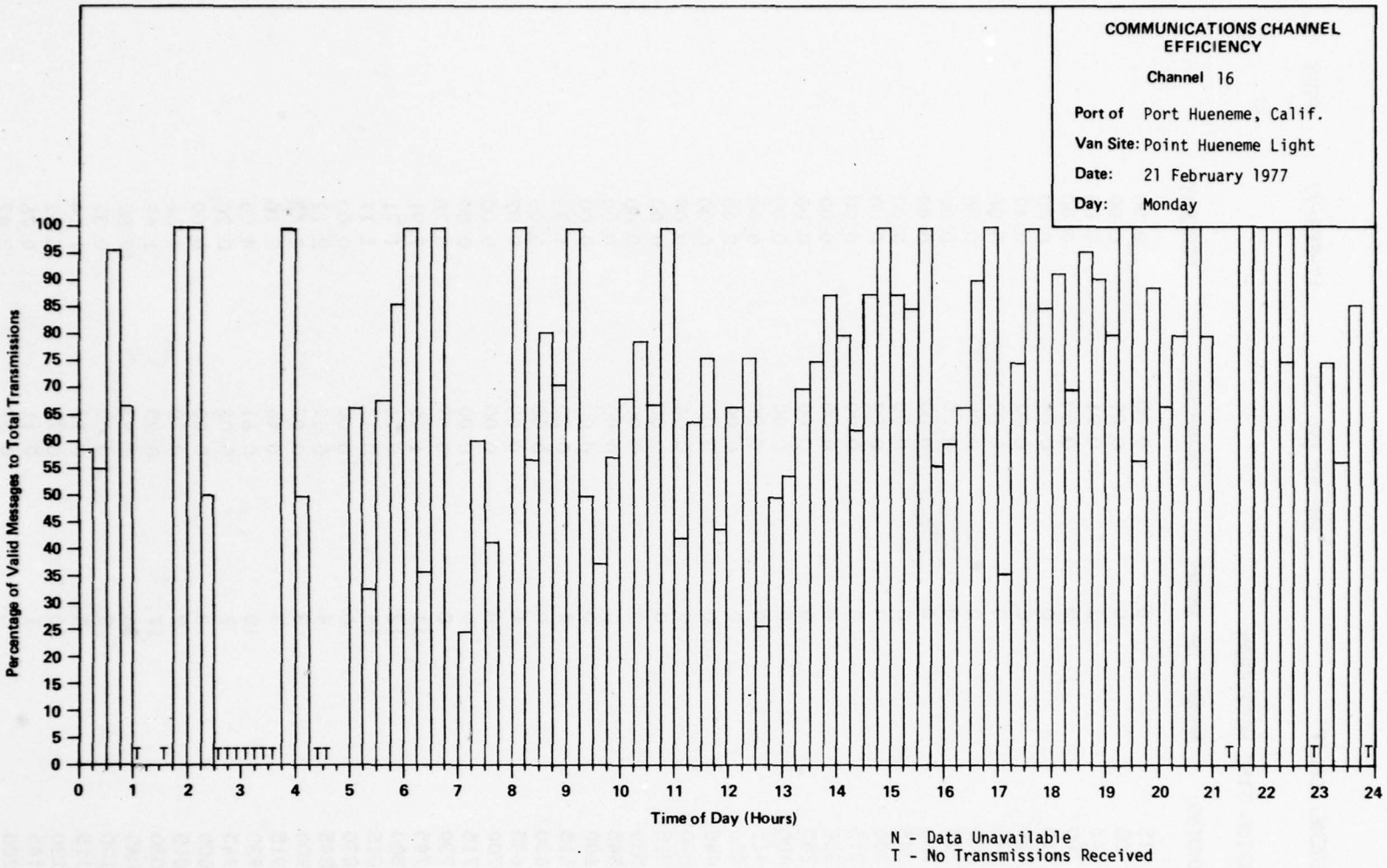

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 16
Port of Port Hueneme, Calif.
Van Site: Point Hueneme Light
Date: 21 February 1977
Day: Monday
Percentage of Valid Messages to Total Transmissions
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 4-37

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TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
15	0	0.00	0.00
30	0	0.00	0.00
45	2	0.01	0.04
100	0	0.00	0.00
115	0	0.00	0.00
130	3	0.02	0.17
145	0	0.00	0.00
200	0	0.00	0.00
215	0	0.00	0.00
230	0	0.00	0.00
245	0	0.00	0.00
300	0	0.00	0.00
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	0	0.00	0.00
500	0	0.00	0.00
515	0	0.00	0.00
530	0	0.00	0.00
545	0	0.00	0.00
600	0	0.00	0.00
615	4	0.20	1.32
630	0	0.00	0.00
645	1	0.00	0.02
700	0	0.00	0.00
715	0	0.00	0.00
730	8	0.57	3.78
745	11	1.19	7.91
800	12	0.26	1.71
815	14	0.17	1.17
830	0	0.00	0.00
845	4	0.32	2.12
900	3	0.07	0.48
915	7	0.46	3.10
930	10	0.61	4.08
945	2	0.03	0.20
1000	0	0.00	0.00
1015	9	0.70	4.66
1030	17	0.25	1.68
1045	36	1.93	12.87
1100	3	0.05	0.32
1115	5	0.17	1.14
1130	20	0.75	5.02
1145	1	0.11	0.76
1200	6	0.37	2.47

FIGURE 4-38

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TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
1215	0	0.00	0.00
1230	0	0.00	0.00
1245	74	1.97	13.12
1300	11	0.25	1.68
1315	7	0.21	1.43
1330	17	0.50	3.32
1345	11	0.45	3.02
1400	5	0.21	1.38
1415	20	0.64	4.24
1430	1	0.01	0.08
1445	0	0.00	0.00
1500	3	0.18	1.18
1515	3	0.10	0.66
1530	3	0.15	0.98
1545	2	0.14	0.96
1600	0	0.00	0.00
1615	0	0.00	0.00
1630	0	0.00	0.00
1645	0	0.00	0.00
1700	18	0.54	3.60
1715	11	0.19	1.24
1730	4	0.06	0.38
1745	0	0.00	0.00
1800	0	0.00	0.00
1815	6	0.13	0.89
1830	2	0.04	0.24
1845	0	0.00	0.00
1900	0	0.00	0.00
1915	0	0.00	0.00
1930	9	0.34	2.26
1945	1	0.01	0.04
2000	0	0.00	0.00
2015	0	0.00	0.00
2030	0	0.00	0.00
2045	0	0.00	0.00
2100	0	0.00	0.00
2115	0	0.00	0.00
2130	0	0.00	0.00
2145	0	0.00	0.00
2200	0	0.00	0.00
2215	6	0.47	3.14
2230	0	0.00	0.00
2245	0	0.00	0.00
2300	0	0.00	0.00
2315	0	0.00	0.00
2330	1	0.01	0.06
2345	0	0.00	0.00

FIGURE 4-38 (continued)

TOTAL NUMBER OF TRANSMISSIONS: 393
AVE. NUM. OF TRANSMISSIONS PER HOUR: 16.4
TOTAL TRANSMISSION TIME: 0.247 HOURS
AVERAGE LENGTH OF TRANSMISSION: 2.27 SEC.
PERCENT CHANNEL UTILIZATION: 1.03%

MESSAGE LENGTH HISTOGRAM

LENGTH OF XMSNS	NUMBER OF XMSNS	PERCENT
0.1 - 0.5 SEC.	142	36.13
0.5 - 1.0 SEC.	49	12.47
1.0 - 1.5 SEC.	30	7.63
1.5 - 2.0 SEC.	29	7.38
2.0 - 2.5 SEC.	28	7.12
2.5 - 3.0 SEC.	22	5.60
3.0 - 3.5 SEC.	20	5.09
3.5 - 4.0 SEC.	10	2.54
4.0 - 4.5 SEC.	6	1.53
4.5 - 5.0 SEC.	13	3.31
5.0 - 5.5 SEC.	8	2.04
5.5 - 6.0 SEC.	5	1.27
6.0 - 6.5 SEC.	9	2.29
6.5 - 7.0 SEC.	4	1.02
7.0 - 7.5 SEC.	1	0.25
7.5 - 8.0 SEC.	1	0.25
8.0 - 8.5 SEC.	2	0.51
8.5 - 9.0 SEC.	2	0.51
9.0 - 9.5 SEC.	1	0.25
9.5 - 10.0 SEC.	0	0.00
LONGER THAN 10 SEC.:	11	2.80

THERE WERE 95 XMSNS OF 00.1 AND 00.0 DURATION

FIGURE 4-38 (continued)

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TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
1215	25	1.33	8.89
1230	31	1.12	7.47
1245	16	0.99	6.60
1300	23	1.76	11.71
1315	26	1.31	8.71
1330	27	2.42	16.14
1345	30	2.00	13.32
1400	31	3.34	22.28
1415	25	1.65	11.03
1430	65	4.98	33.18
1445	46	1.65	11.00
1500	91	3.80	25.34
1515	16	1.16	7.77
1530	53	3.56	23.77
1545	22	1.25	8.37
1600	28	1.50	10.02
1615	41	2.12	14.17
1630	61	3.77	25.13
1645	64	4.31	28.76
1700	48	4.06	27.04
1715	12	0.93	6.19
1730	14	0.32	2.13
1745	5	0.24	1.60
1800	6	0.62	4.12
1815	25	0.66	4.41
1830	3	0.21	1.42
1845	12	1.18	7.89
1900	3	0.52	3.49
1915	5	0.91	6.08
1930	28	1.75	11.66
1945	32	3.13	20.86
2000	32	0.98	6.52
2015	41	1.30	8.69
2030	26	1.14	7.62
2045	60	2.04	13.59
2100	57	1.18	7.90
2115	29	0.58	3.88
2130	4	0.07	0.48
2145	35	1.43	9.54
2200	22	1.33	8.88
2215	20	0.84	5.58
2230	22	0.74	4.97
2245	7	0.61	4.09
2300	8	0.56	3.71
2315	65	2.12	14.17
2330	14	1.05	7.00
2345	0	0.00	0.00

FIGURE 4-39

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TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
15	7	0.28	1.89
30	4	0.11	0.73
45	18	1.53	10.22
100	8	0.92	6.11
115	2	0.02	0.16
130	0	0.00	0.00
145	11	2.06	13.74
200	7	0.73	4.84
215	0	0.00	0.00
230	25	0.38	2.53
245	0	0.00	0.00
300	7	0.60	4.01
315	0	0.00	0.00
330	3	0.07	0.50
345	0	0.00	0.00
400	7	1.44	9.59
415	40	1.41	9.42
430	4	0.37	2.44
445	11	1.64	10.93
500	0	0.00	0.00
515	3	0.23	1.54
530	9	0.78	5.20
545	1	0.14	0.93
600	3	0.30	2.03
615	7	0.88	5.86
630	5	0.35	2.34
645	0	0.00	0.00
700	1	0.02	0.10
715	53	4.64	30.92
730	50	4.44	29.60
745	9	0.73	4.88
800	20	1.32	8.82
815	23	1.31	8.74
830	32	1.34	8.92
845	6	0.42	2.79
900	44	1.24	8.30
915	22	1.20	7.98
930	7	0.71	4.71
945	25	1.49	9.91
1000	22	1.09	7.29
1015	15	1.02	6.81
1030	28	1.34	8.92
1045	82	3.40	22.68
1100	89	3.97	26.50
1115	29	0.71	4.73
1130	58	2.11	14.06
1145	45	2.25	15.01
1200	44	1.92	12.82

FIGURE 4-39 (continued)

TOTAL NUMBER OF TRANSMISSIONS: 2242
AVE. NUM. OF TRANSMISSIONS PER HOUR: 93.4
TOTAL TRANSMISSION TIME: 2.092 HOURS
AVERAGE LENGTH OF TRANSMISSION: 3.36 SEC.
PERCENT CHANNEL UTILIZATION: 8.72%

MESSAGE LENGTH HISTOGRAM

LENGTH OF XMSNS	NUMBER OF XMSNS	PERCENT
0.1 - 0.5 SEC.	588	26.23
0.5 - 1.0 SEC.	257	11.46
1.0 - 1.5 SEC.	184	8.21
1.5 - 2.0 SEC.	156	6.96
2.0 - 2.5 SEC.	153	6.82
2.5 - 3.0 SEC.	112	5.00
3.0 - 3.5 SEC.	115	5.13
3.5 - 4.0 SEC.	106	4.73
4.0 - 4.5 SEC.	78	3.48
4.5 - 5.0 SEC.	70	3.12
5.0 - 5.5 SEC.	45	2.01
5.5 - 6.0 SEC.	41	1.83
6.0 - 6.5 SEC.	37	1.65
6.5 - 7.0 SEC.	23	1.03
7.0 - 7.5 SEC.	21	0.94
7.5 - 8.0 SEC.	22	0.98
8.0 - 8.5 SEC.	15	0.67
8.5 - 9.0 SEC.	21	0.94
9.0 - 9.5 SEC.	17	0.76
9.5 - 10.0 SEC.	18	0.80
LONGER THAN 10 SEC.:	163	7.27

THERE WERE 456 XMSNS OF 00.1 AND 00.0 DURATION

FIGURE 4-39 (continued)

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TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
15	1	0.18	1.19
30	2	0.63	4.19
45	13	1.12	7.47
100	17	1.31	8.76
115	3	0.15	1.00
130	0	0.00	0.00
145	6	0.33	2.19
200	5	0.67	4.48
215	0	0.00	0.00
230	6	0.35	2.32
245	0	0.00	0.00
300	0	0.00	0.00
315	0	0.00	0.00
330	2	0.10	0.64
345	0	0.00	0.00
400	0	0.00	0.00
415	3	0.14	0.93
430	2	0.19	1.27
445	2	0.15	0.98
500	0	0.00	0.00
515	2	0.06	0.41
530	4	0.18	1.17
545	4	0.38	2.56
600	1	0.00	0.02
615	10	1.04	6.93
630	20	0.99	6.63
645	25	2.18	14.52
700	28	1.76	11.74
715	33	1.49	9.92
730	27	1.66	11.08
745	22	1.93	12.88
800	76	3.69	24.59
815	63	5.76	38.38
830	43	5.02	33.46
845	49	1.84	12.30
900	84	5.26	35.07
915	60	8.05	53.64
930	52	4.94	32.94
945	37	5.21	34.71
1000	105	7.95	52.99
1015	80	2.33	15.54
1030	58	3.74	24.96
1045	75	4.33	28.89
1100	120	8.02	53.48
1115	72	5.84	38.94
1130	56	3.69	24.63
1145	56	4.02	26.79
1200	85	3.62	24.17

FIGURE 4-40

TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
1215	81	4.41	29.40
1230	64	4.45	29.70
1245	69	3.81	25.38
1300	83	6.43	42.84
1315	38	3.02	20.14
1330	82	6.33	42.19
1345	44	5.21	34.77
1400	74	3.61	24.04
1415	57	4.41	29.41
1430	56	3.45	23.02
1445	57	3.67	24.49
1500	83	7.72	51.44
1515	44	3.97	26.44
1530	45	2.63	17.57
1545	49	3.27	21.80
1600	48	3.78	25.23
1615	61	4.23	28.19
1630	36	2.78	18.53
1645	37	4.76	31.77
1700	44	2.10	14.00
1715	45	3.30	21.98
1730	45	1.75	11.67
1745	42	3.11	20.76
1800	54	4.19	27.93
1815	60	7.29	48.61
1830	79	5.76	38.42
1845	28	1.78	11.88
1900	24	4.63	30.90
1915	33	3.42	22.83
1930	17	1.47	9.78
1945	15	2.70	17.99
2000	8	0.75	4.98
2015	12	2.00	13.34
2030	32	1.53	10.18
2045	54	2.62	17.44
2100	18	2.29	15.27
2115	18	0.84	5.58
2130	23	1.86	12.40
2145	25	1.85	12.36
2200	23	1.58	10.51
2215	28	2.58	17.21
2230	6	0.17	1.13
2245	1	0.14	0.96
2300	4	0.41	2.71
2315	4	0.39	2.61
2330	5	0.68	4.52
2345	23	2.03	13.53
2400	15	2.28	15.21

FIGURE 4-40 (continued)

TOTAL NUMBER OF TRANSMISSIONS: 3302
AVE. NUM. OF TRANSMISSIONS PER HOUR: 137.6
TOTAL TRANSMISSION TIME: 4.130 HOURS
AVERAGE LENGTH OF TRANSMISSION: 4.50 SEC.
PERCENT CHANNEL UTILIZATION: 17.21%

MESSAGE LENGTH HISTOGRAM

LENGTH OF XMSNS	NUMBER OF XMSNS	PERCENT
0.1 - 0.5 SEC.	756	22.90
0.5 - 1.0 SEC.	345	10.45
1.0 - 1.5 SEC.	224	6.78
1.5 - 2.0 SEC.	174	5.27
2.0 - 2.5 SEC.	175	5.30
2.5 - 3.0 SEC.	154	4.66
3.0 - 3.5 SEC.	139	4.21
3.5 - 4.0 SEC.	159	4.82
4.0 - 4.5 SEC.	155	4.69
4.5 - 5.0 SEC.	111	3.36
5.0 - 5.5 SEC.	104	3.15
5.5 - 6.0 SEC.	94	2.85
6.0 - 6.5 SEC.	89	2.70
6.5 - 7.0 SEC.	72	2.18
7.0 - 7.5 SEC.	56	1.70
7.5 - 8.0 SEC.	55	1.67
8.0 - 8.5 SEC.	33	1.00
8.5 - 9.0 SEC.	33	1.00
9.0 - 9.5 SEC.	33	1.00
9.5 - 10.0 SEC.	41	1.24
LONGER THAN 10 SEC.:	300	9.09

THERE WERE 601 XMSNS OF 00.1 AND 00.0 DURATION

FIGURE 4-40 (continued)

5.0 POINT CONCEPTION GRAPHS AND HISTOGRAMS

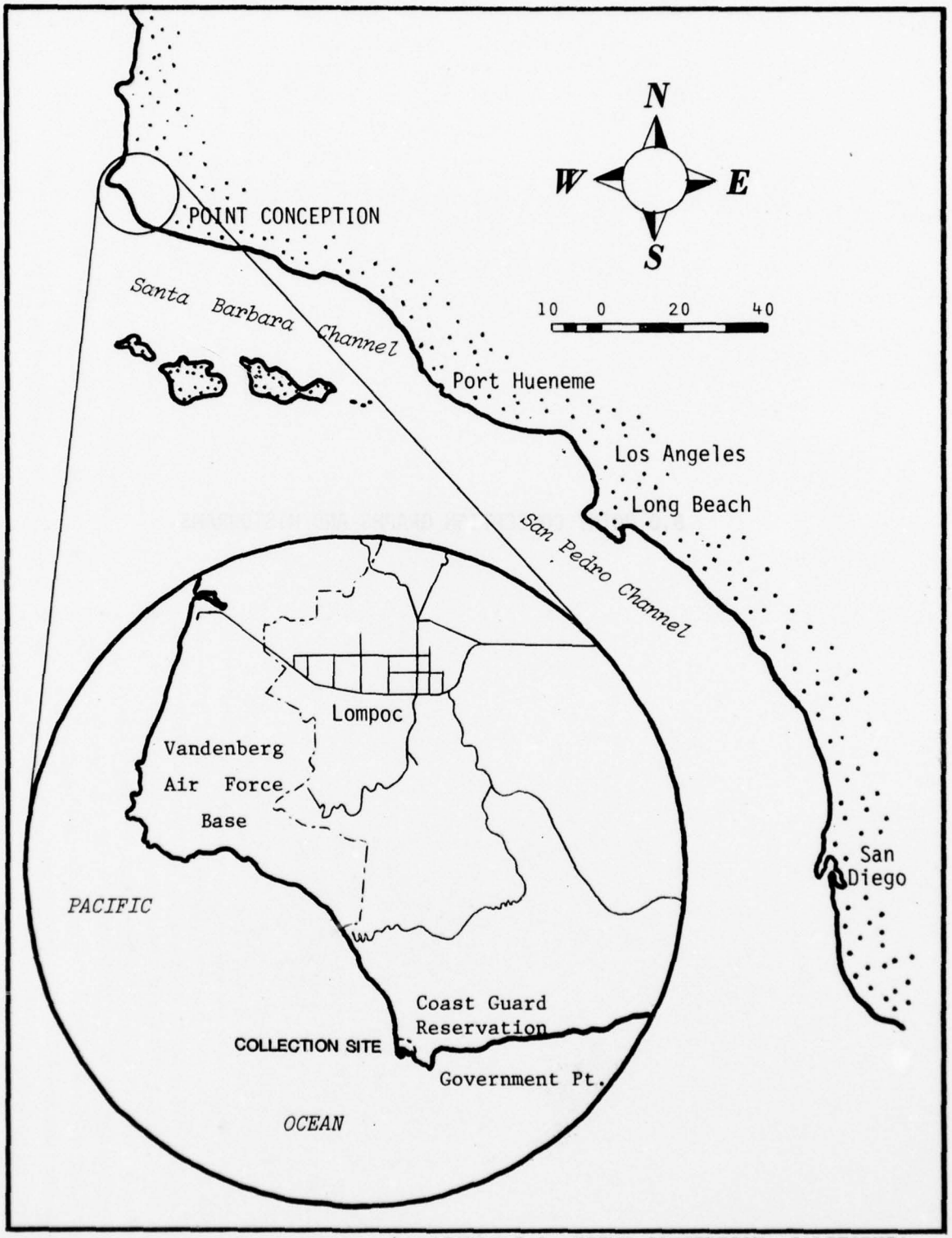


FIGURE 5-1: POINT CONCEPTION, CALIFORNIA

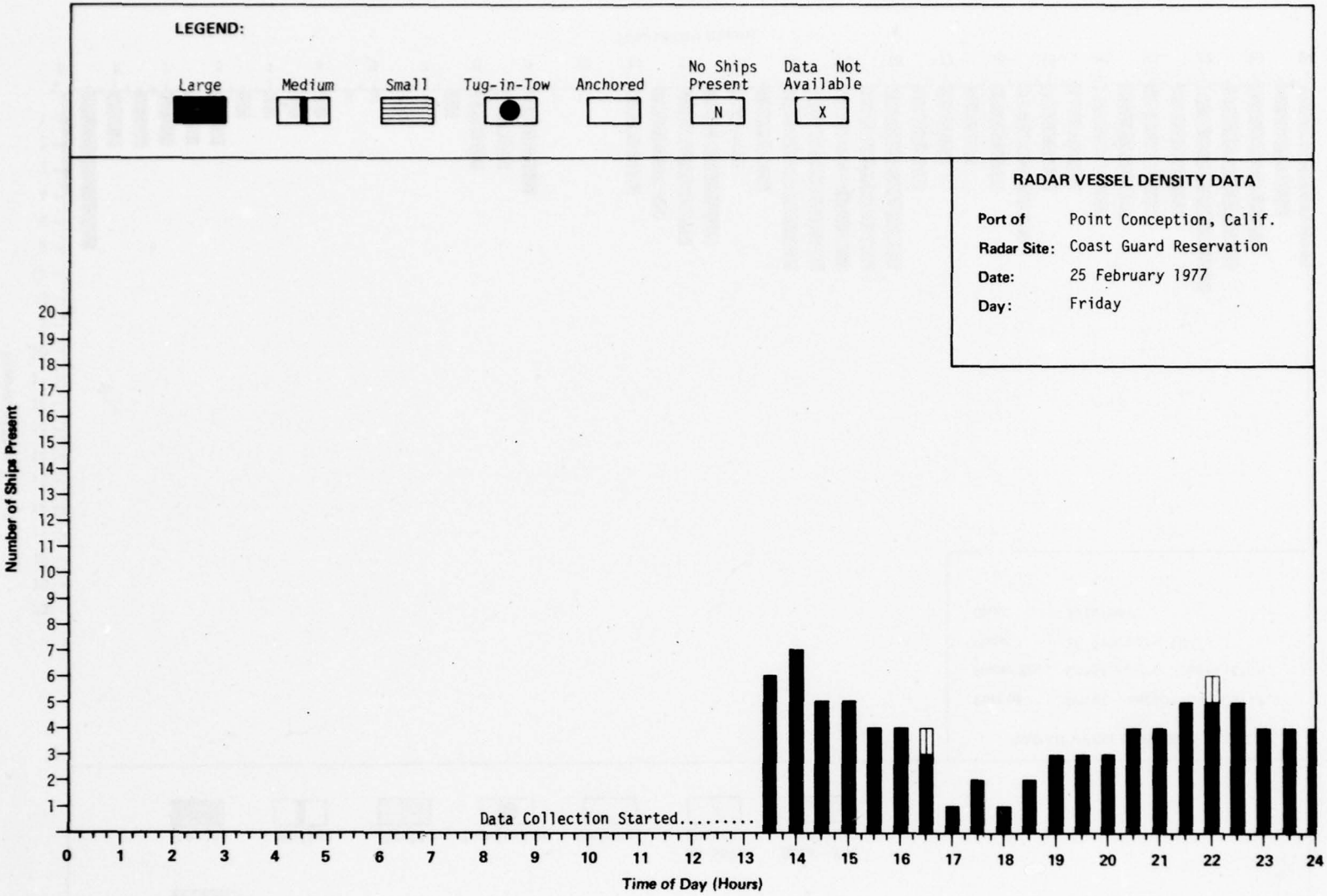

LEGEND:
Large
Medium
Small
Tug-in-Tow
Anchored
No Ships Present
N
Data Not Available
X
RADAR VESSEL DENSITY DATA
Port of Point Conception, Calif.
Radar Site: Coast Guard Reservation
Date: 25 February 1977
Day: Friday
Number of Ships Present
Data Collection Started.....
Time of Day (Hours)

FIGURE 5-2

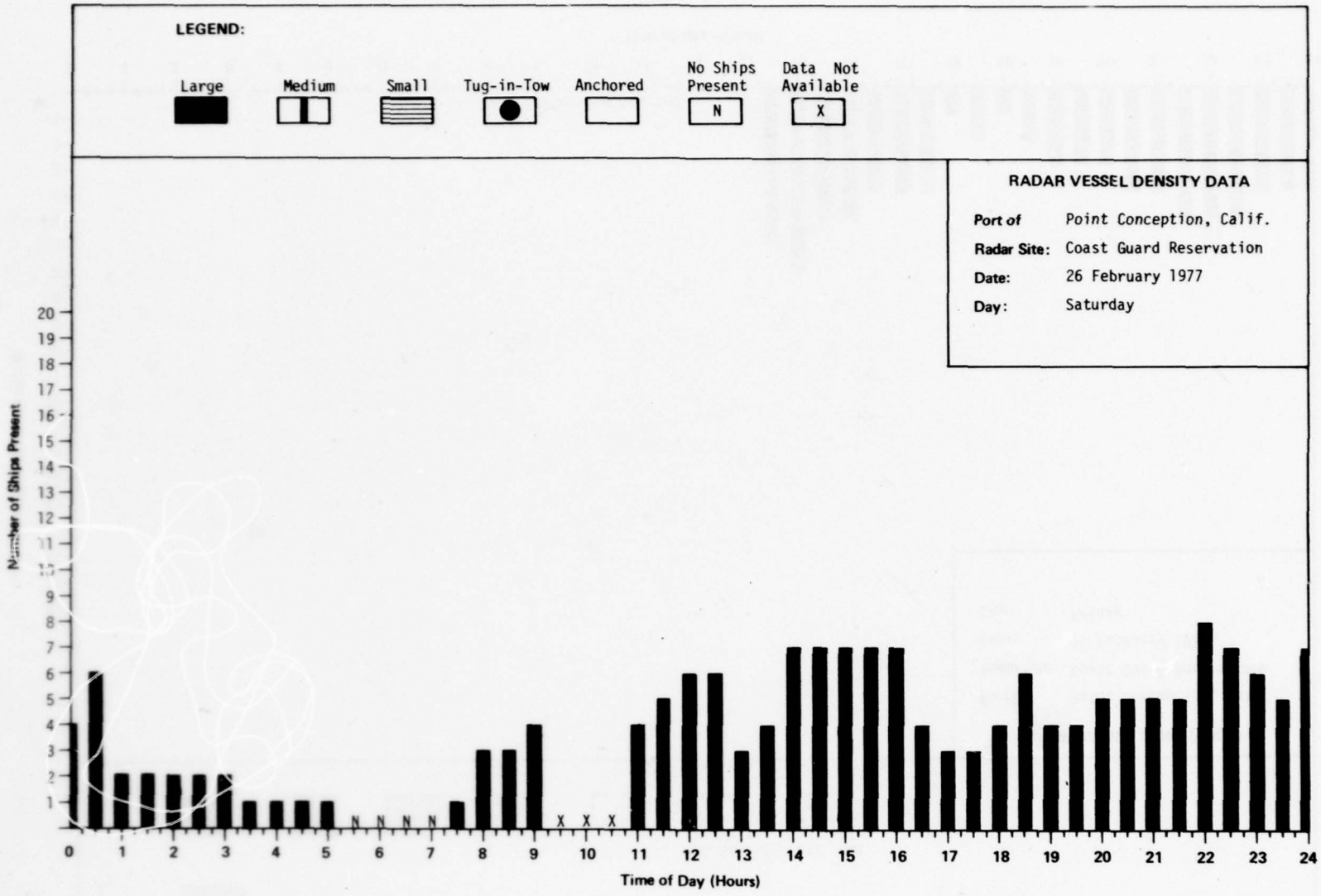

LEGEND:
Large
Medium
Small
Tug-in-Tow
Anchored
No Ships Present
N
Data Not Available
X
RADAR VESSEL DENSITY DATA
Port of Point Conception, Calif.
Radar Site: Coast Guard Reservation
Date: 26 February 1977
Day: Saturday
Number of Ships Present
Time of Day (Hours)
N N N N
X X X

FIGURE 5-3

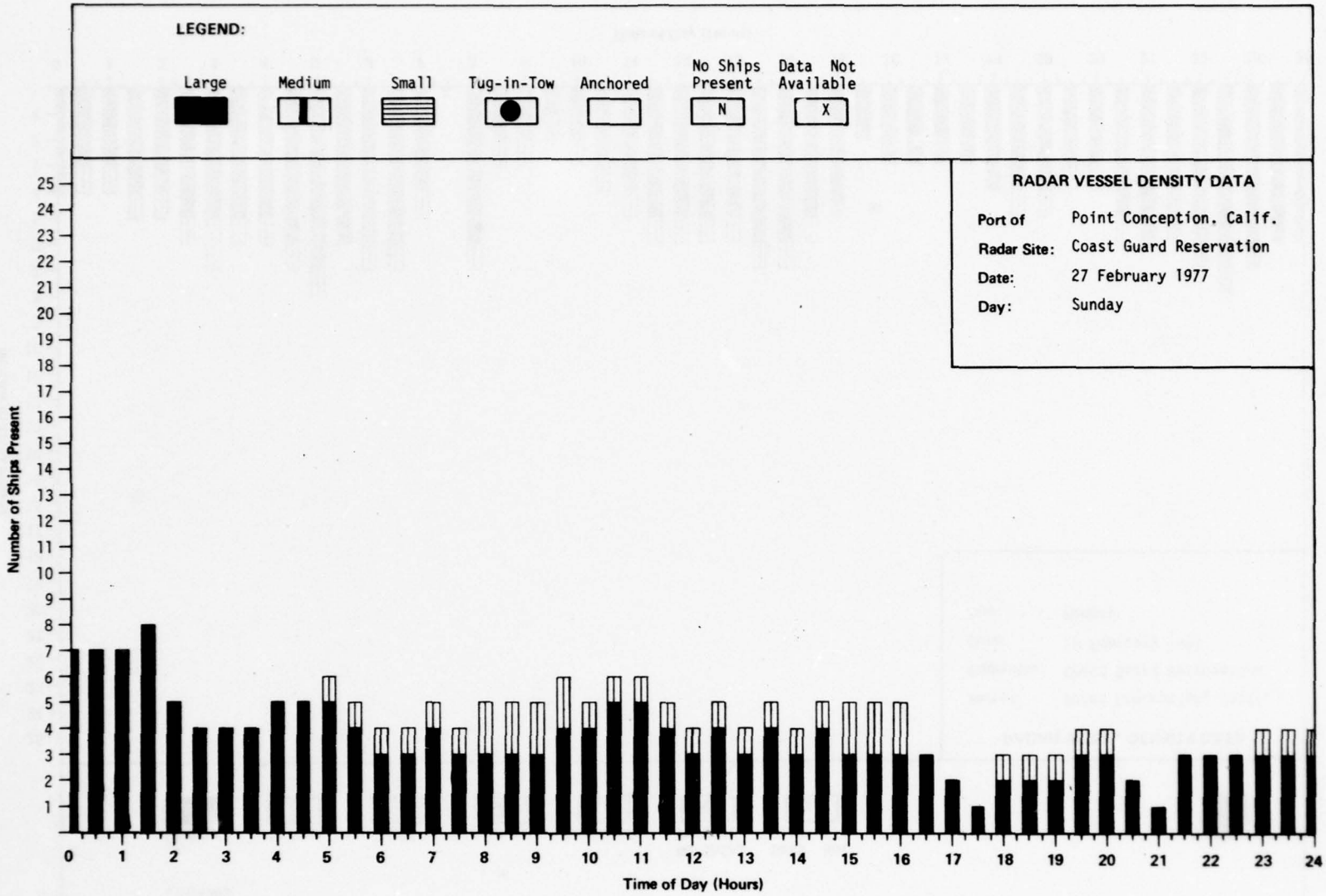

LEGEND:
Large
Medium
Small
Tug-in-Tow
Anchored
No Ships Present
N
Data Not Available
X
RADAR VESSEL DENSITY DATA
Port of Point Conception, Calif.
Radar Site: Coast Guard Reservation
Date: 27 February 1977
Day: Sunday
Number of Ships Present
Time of Day (Hours)

FIGURE 5-4

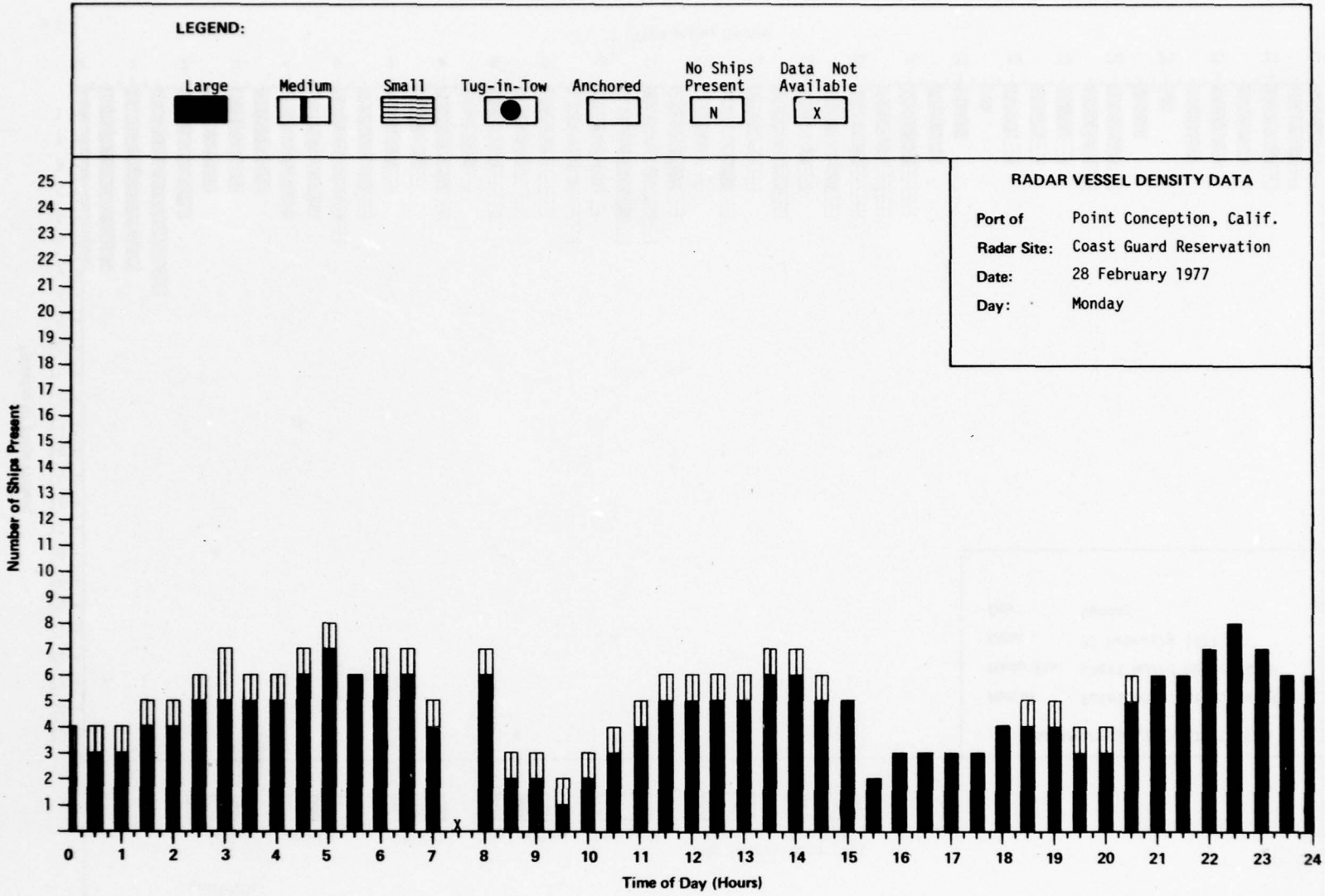

LEGEND:
Large
Medium
Small
Tug-in-Tow
Anchored
No Ships Present
N
Data Not Available
X
RADAR VESSEL DENSITY DATA
Port of Point Conception, Calif.
Radar Site: Coast Guard Reservation
Date: 28 February 1977
Day: Monday
Number of Ships Present
Time of Day (Hours)

FIGURE 5-5

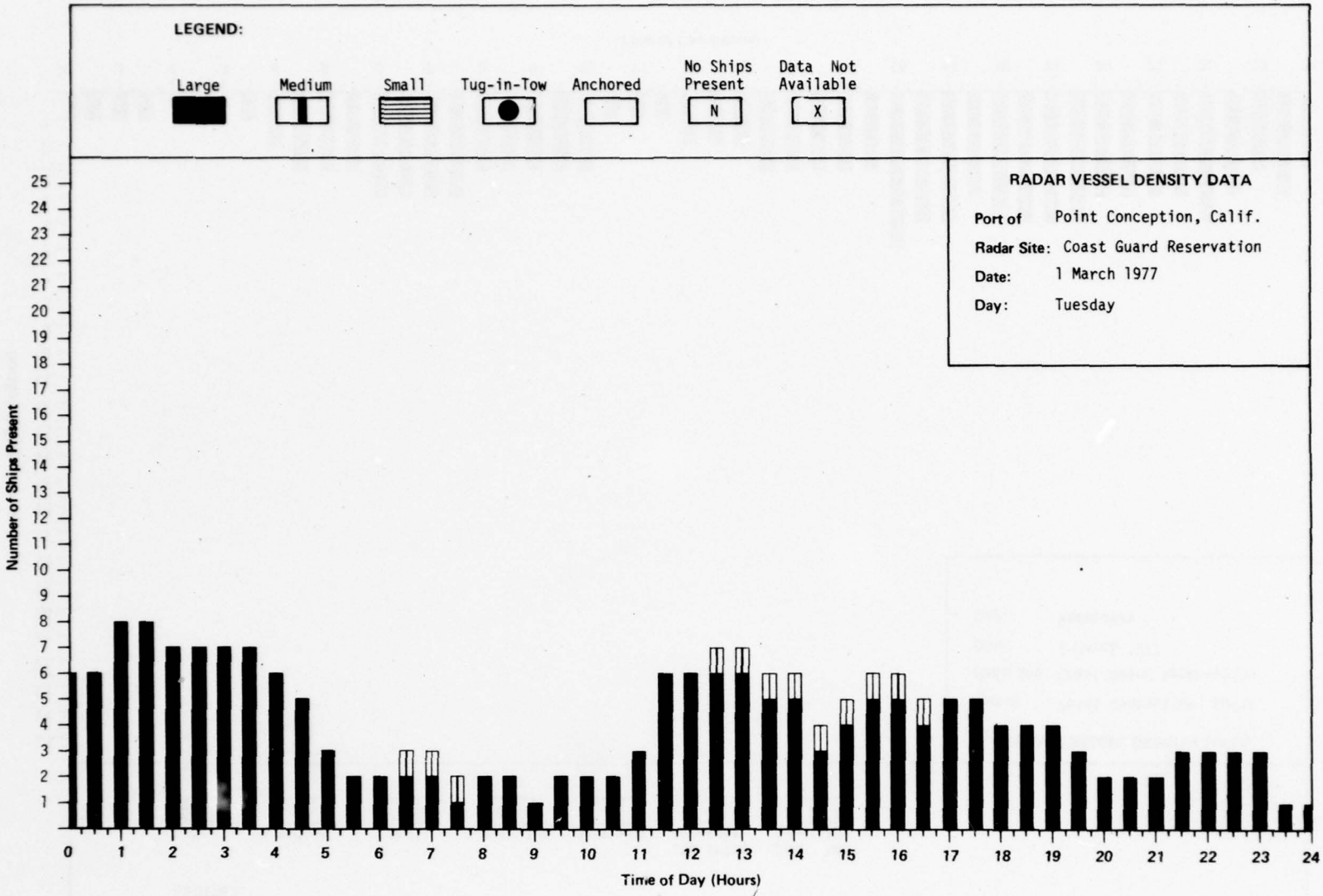

LEGEND:
Large
Medium
Small
Tug-in-Tow
Anchored
No Ships Present
N
Data Not Available
X
RADAR VESSEL DENSITY DATA
Port of Point Conception, Calif.
Radar Site: Coast Guard Reservation
Date: 1 March 1977
Day: Tuesday
Number of Ships Present
Time of Day (Hours)

FIGURE 5-6

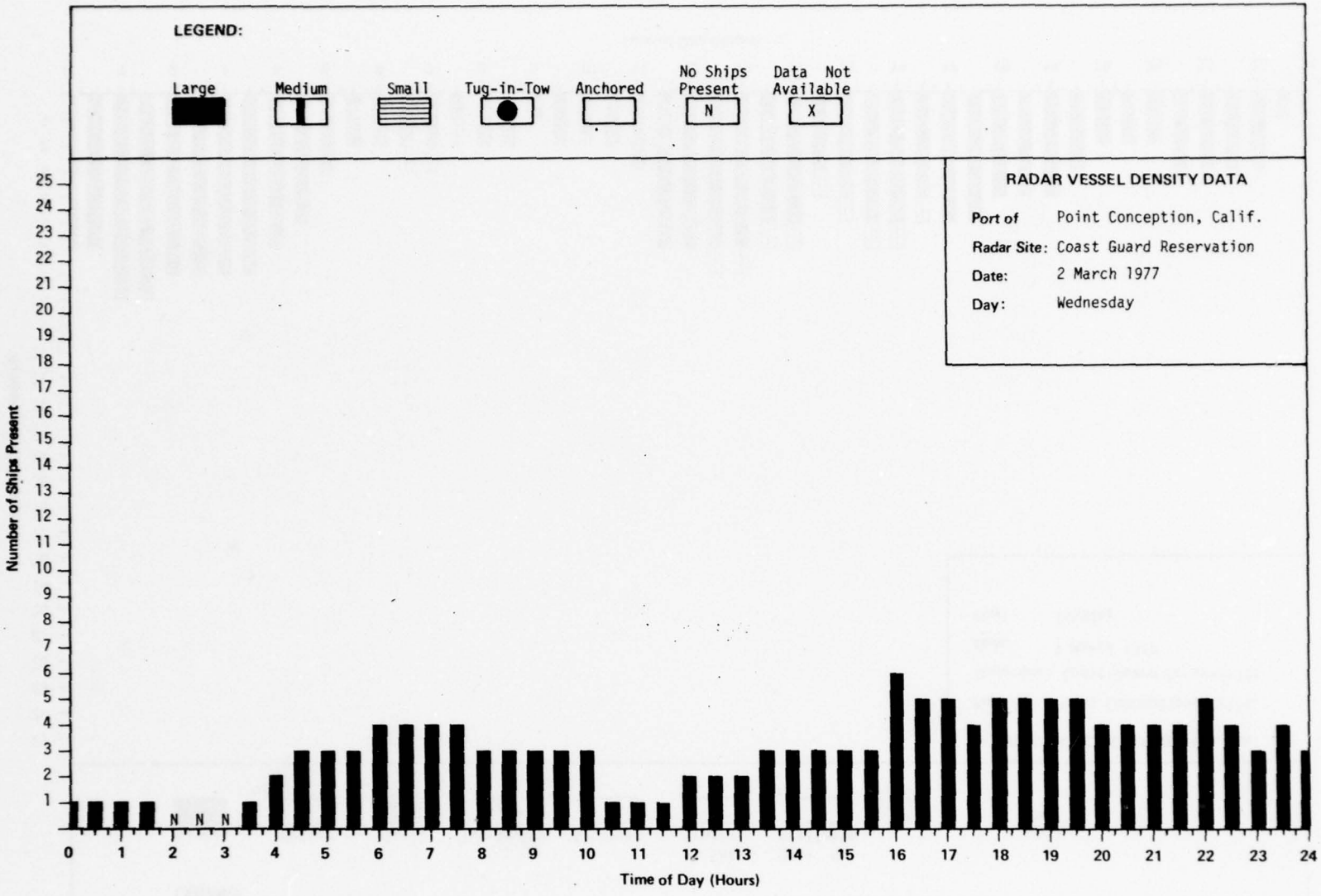

LEGEND:
Large
Medium
Small
Tug-in-Tow
Anchored
No Ships Present
N
Data Not Available
X
RADAR VESSEL DENSITY DATA
Port of Point Conception, Calif.
Radar Site: Coast Guard Reservation
Date: 2 March 1977
Day: Wednesday
Number of Ships Present
Time of Day (Hours)
N N N

FIGURE 5-7

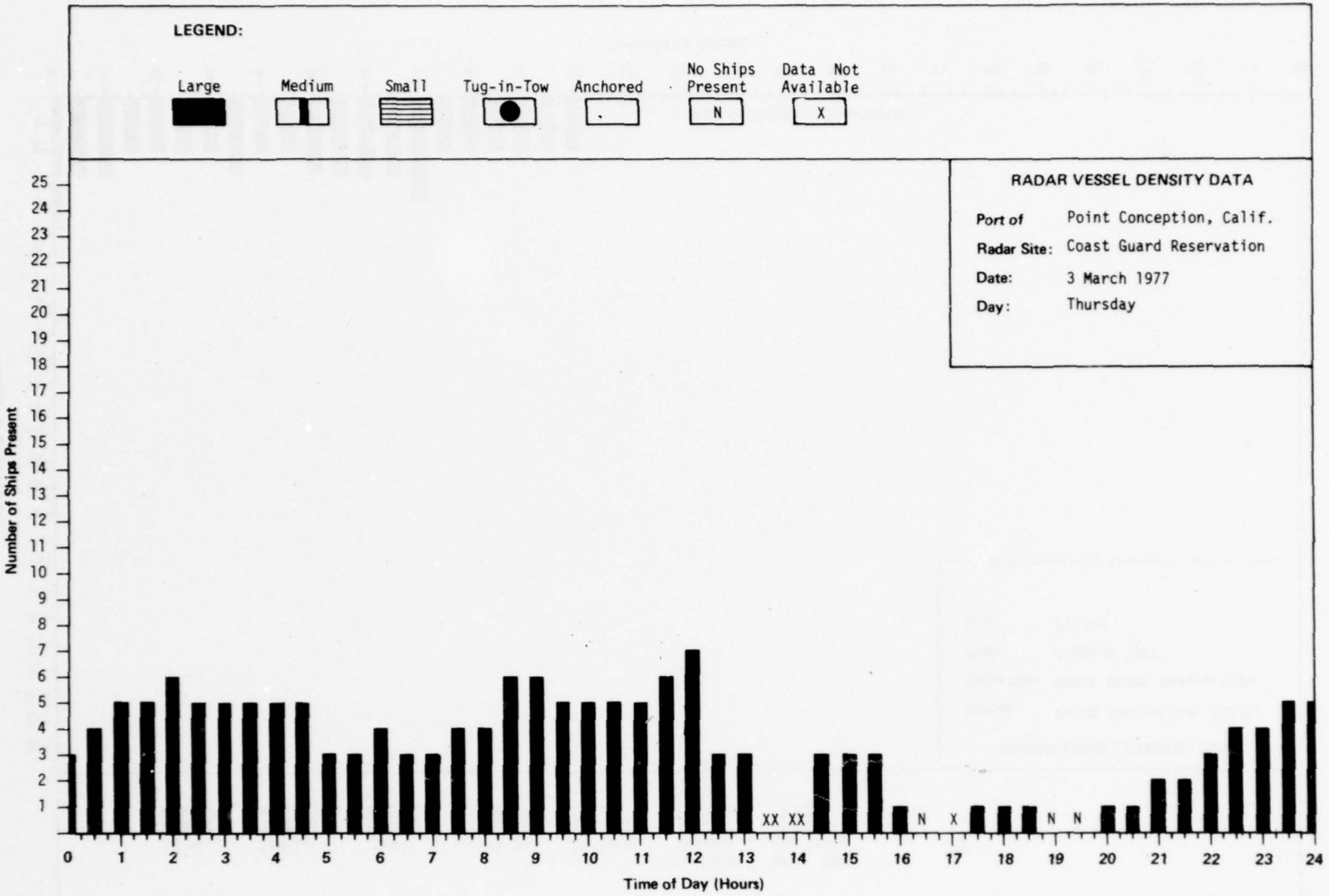

LEGEND:
Large
Medium
Small
Tug-in-Tow
Anchored
No Ships Present
N
Data Not Available
X
RADAR VESSEL DENSITY DATA
Port of Point Conception, Calif.
Radar Site: Coast Guard Reservation
Date: 3 March 1977
Day: Thursday
Number of Ships Present
Time of Day (Hours)
XX XX
N X N N

FIGURE 5-8

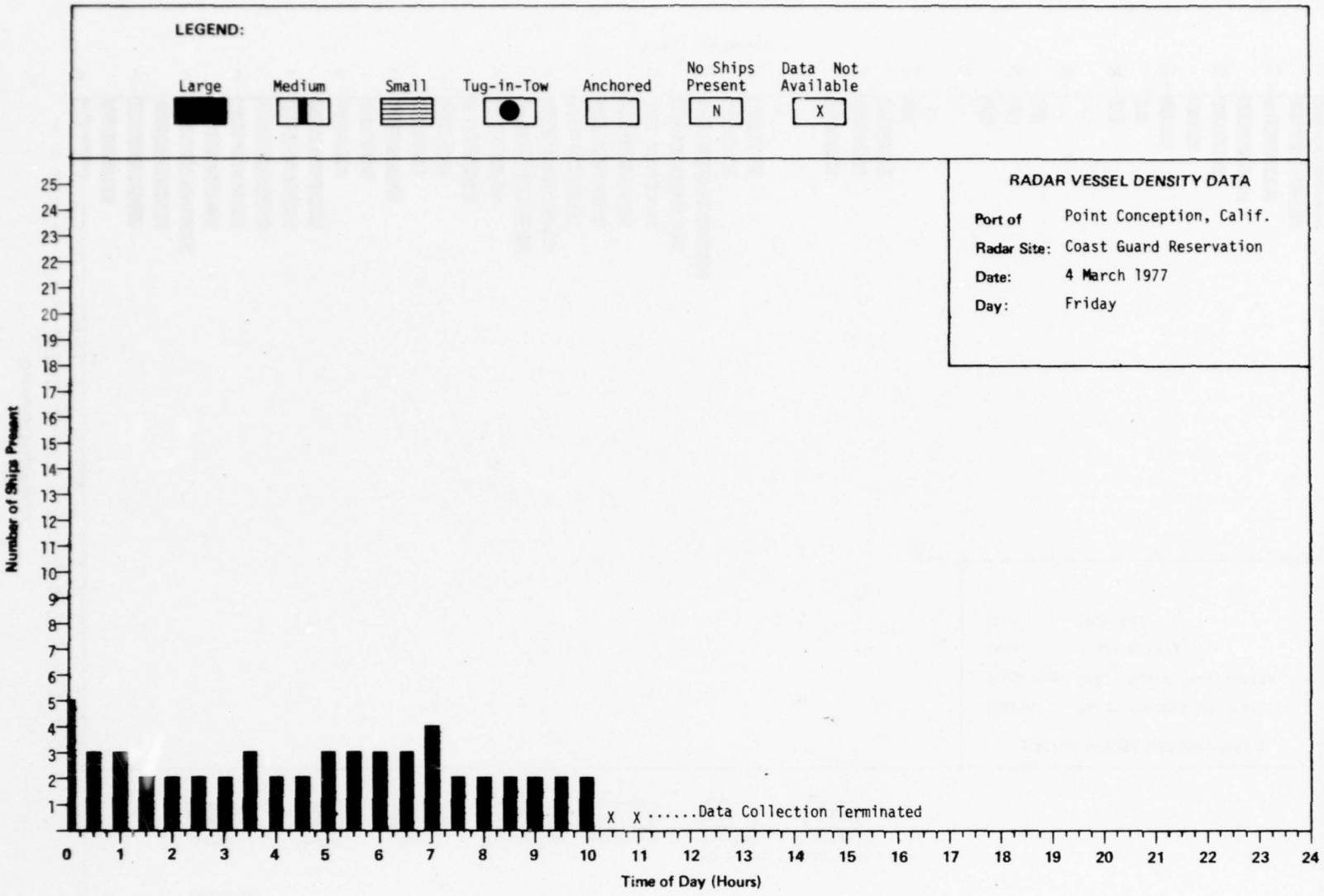

LEGEND:
Large
Medium
Small
Tug-in-Tow
Anchored
No Ships Present
N
Data Not Available
X
RADAR VESSEL DENSITY DATA
Port of Point Conception, Calif.
Radar Site: Coast Guard Reservation
Date: 4 March 1977
Day: Friday
Number of Ships Present
Time of Day (Hours)
X X .....Data Collection Terminated

FIGURE 5-9

DATE	SIZE	NORTHBOUND	SOUTHBOUND	CROSSING	OTHER
25 Feb 1977	Large	4	7	3	0
(1200-2400)	Medium	0	0	0	1
	Small*	0	0	0	0
	Tug-in-tow	0	0	0	0
26 Feb 1977	Large	9	4	4	0
	Medium	0	0	0	0
	Small*	0	0	0	0
	Tug-in-tow	0	0	0	0
27 Feb 1977	Large	12	6	0	0
	Medium	0	1	0	0
	Small*	0	0	0	0
	Tug-in-tow	0	0	0	0
28 Feb 1977	Large	7	10	0	0
	Medium	0	0	1	0
	Small*	0	0	0	0
	Tug-in-tow	0	0	0	0
1 Mar 1977	Large	9	4	0	0
	Medium	1	0	0	1
	Small*	0	0	0	0
	Tug-in-tow	0	0	0	0
2 Mar 1977	Large	6	9	2	0
	Medium	0	0	0	1
	Small*	0	0	0	0
	Tug-in-tow	0	0	0	0
3 Mar 1977	Large	11	8	4	0
	Medium	0	0	0	1
	Small*	0	0	0	0
	Tug-in-tow	0	0	0	0
4 Mar 1977	Large	2	3	1	0
(0000-1200)	Medium	0	0	0	0
	Small*	0	0	0	0
	Tug-in-tow	0	0	0	0

* Refer to page 13

FIGURE 5-10: DAILY VESSEL ACTIVITY AT POINT CONCEPTION

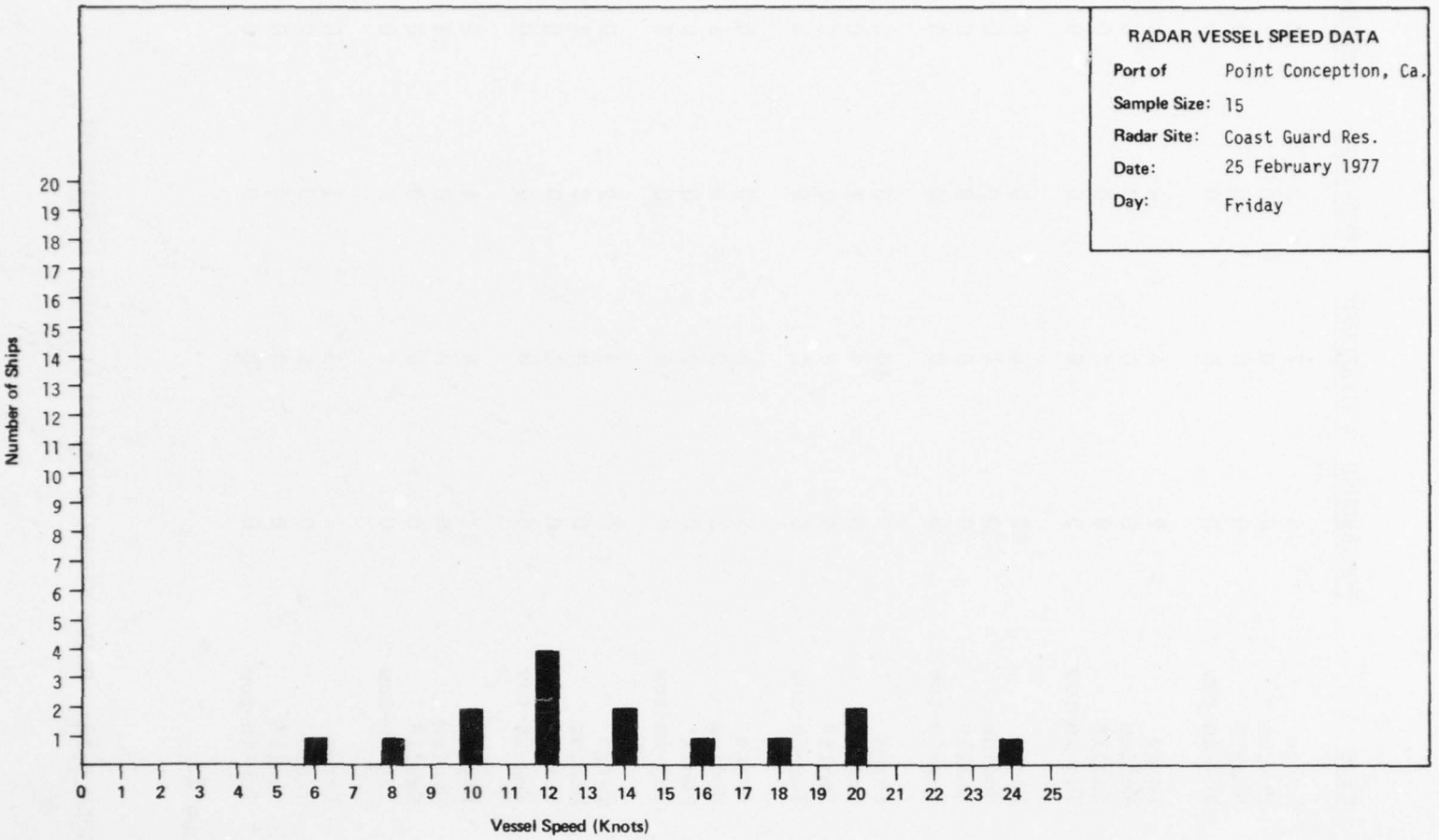

RADAR VESSEL SPEED DATA
Port of Point Conception, Ca.
Sample Size: 15
Radar Site: Coast Guard Res.
Date: 25 February 1977
Day: Friday
Number of Ships
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Vessel Speed (Knots)

FIGURE 5-11

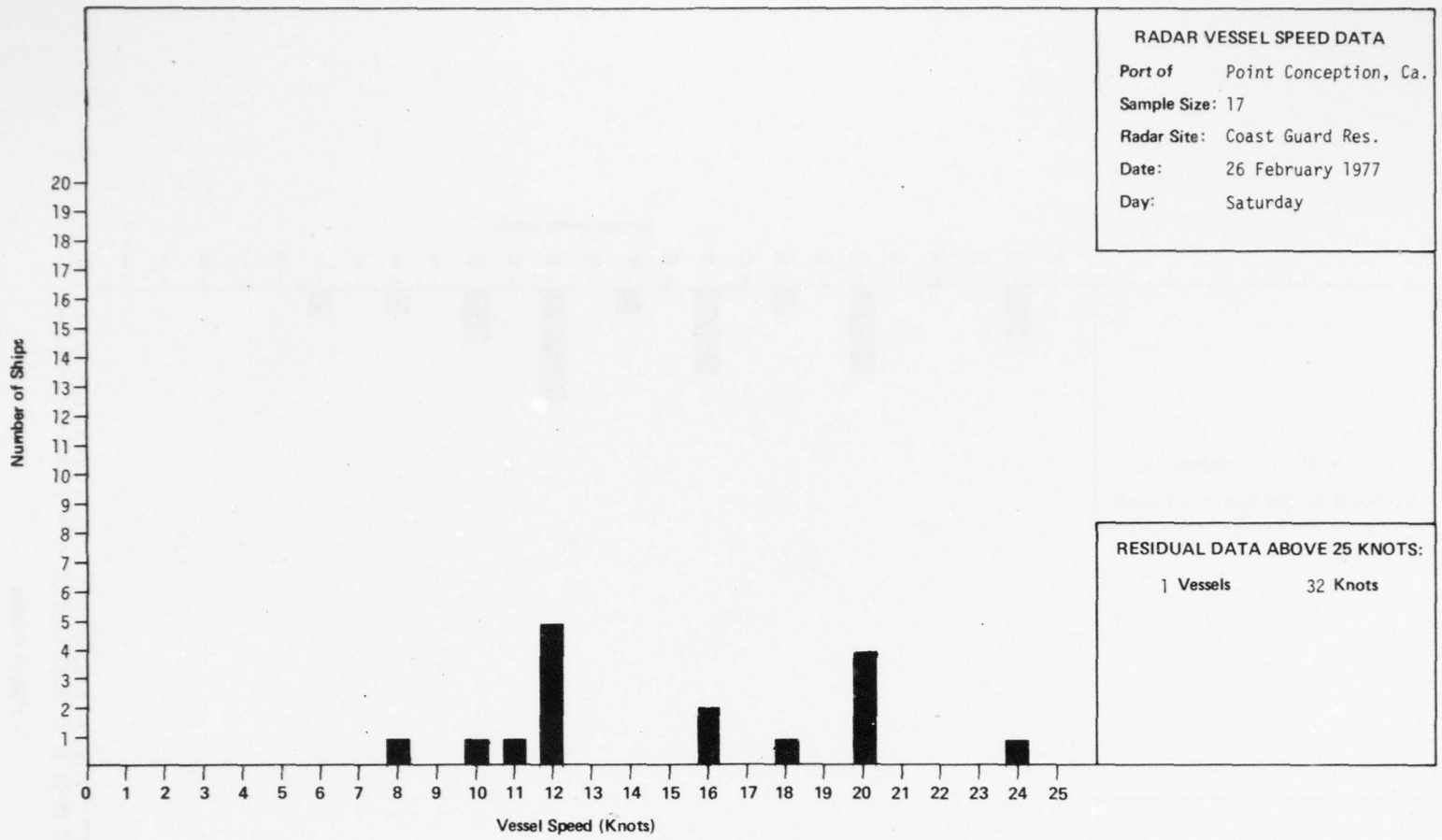

RADAR VESSEL SPEED DATA
Port of Point Conception, Ca.
Sample Size: 17
Radar Site: Coast Guard Res.
Date: 26 February 1977
Day: Saturday
RESIDUAL DATA ABOVE 25 KNOTS:
1 Vessels 32 Knots
Number of Ships
Vessel Speed (Knots)

FIGURE 5-12

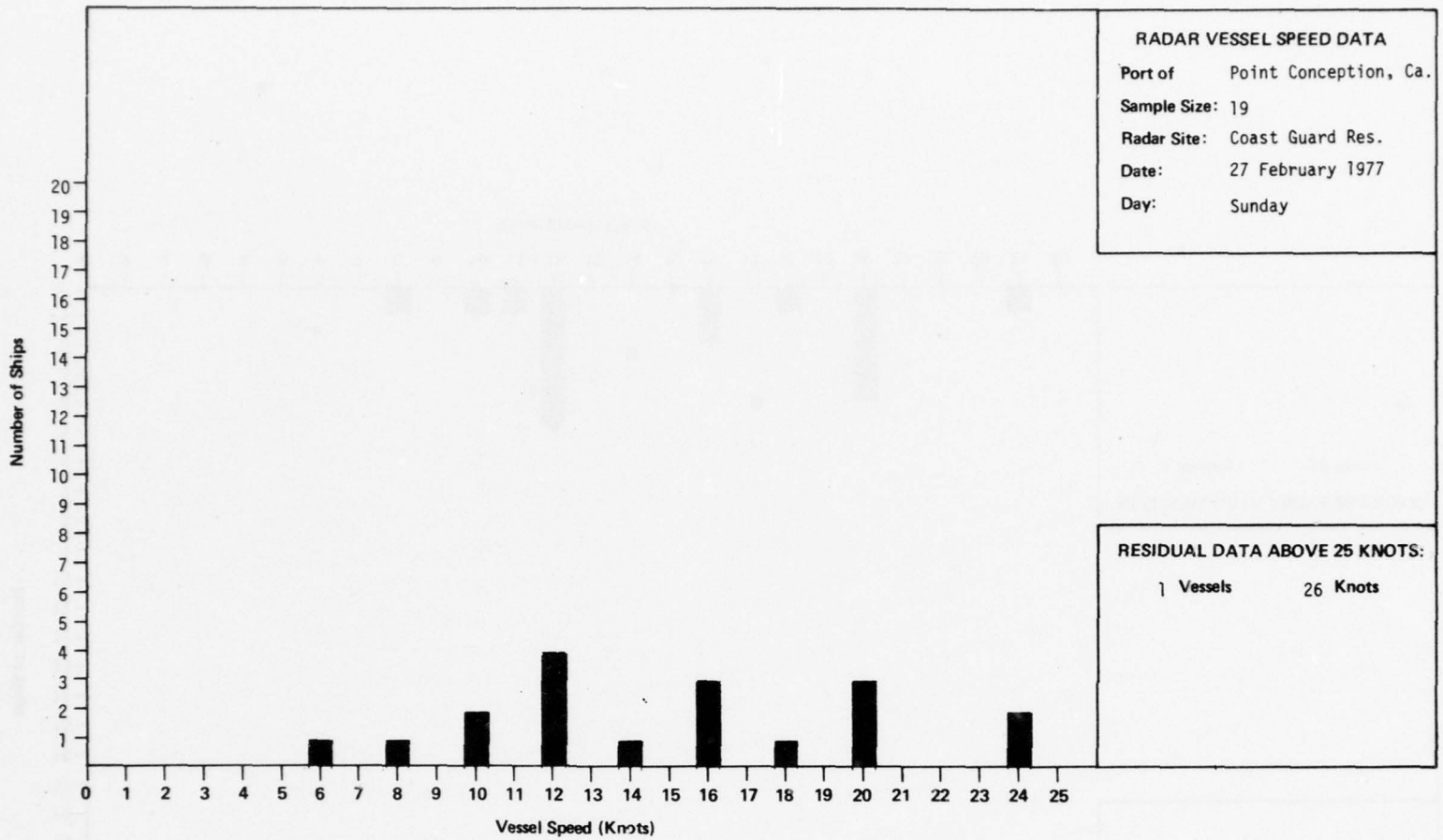

RADAR VESSEL SPEED DATA
Port of Point Conception, Ca.
Sample Size: 19
Radar Site: Coast Guard Res.
Date: 27 February 1977
Day: Sunday
RESIDUAL DATA ABOVE 25 KNOTS:
1 Vessels 26 Knots
Number of Ships
Vessel Speed (Knots)

FIGURE 5-13

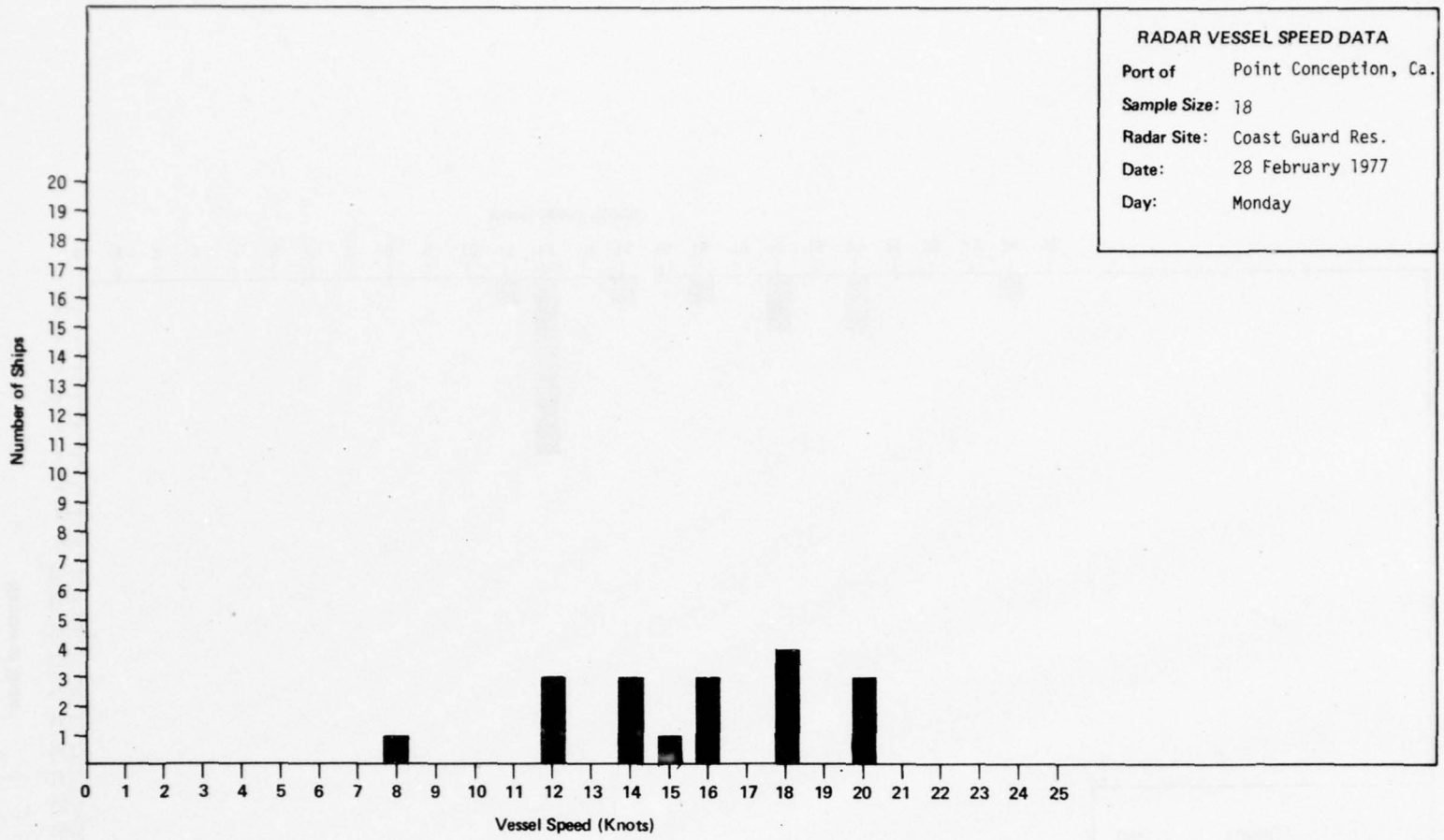

RADAR VESSEL SPEED DATA
Port of Point Conception, Ca.
Sample Size: 18
Radar Site: Coast Guard Res.
Date: 28 February 1977
Day: Monday
Number of Ships
Vessel Speed (Knots)

FIGURE 5-14

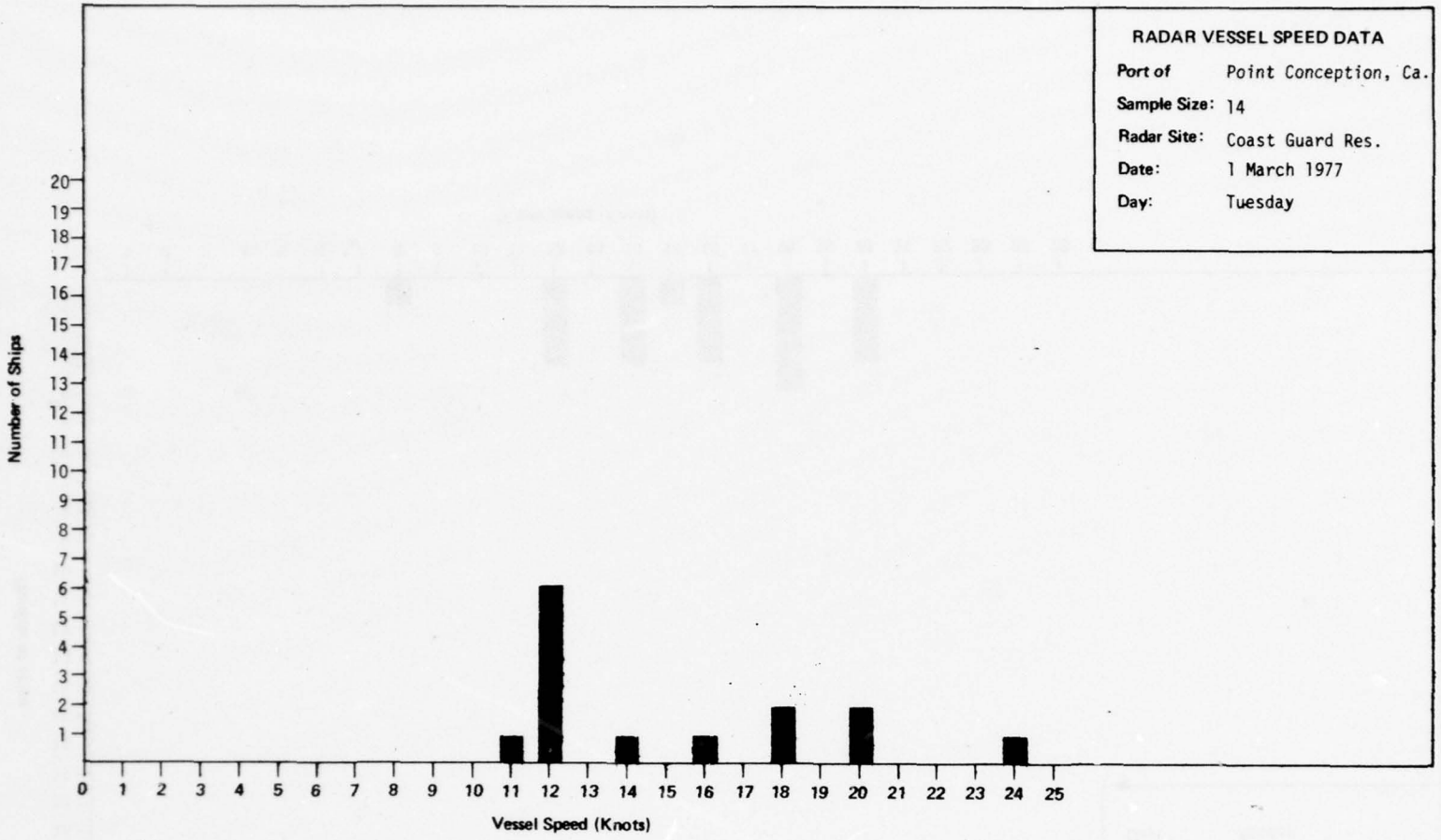

RADAR VESSEL SPEED DATA
Port of Point Conception, Ca.
Sample Size: 14
Radar Site: Coast Guard Res.
Date: 1 March 1977
Day: Tuesday
Number of Ships
Vessel Speed (Knots)

FIGURE 5-15

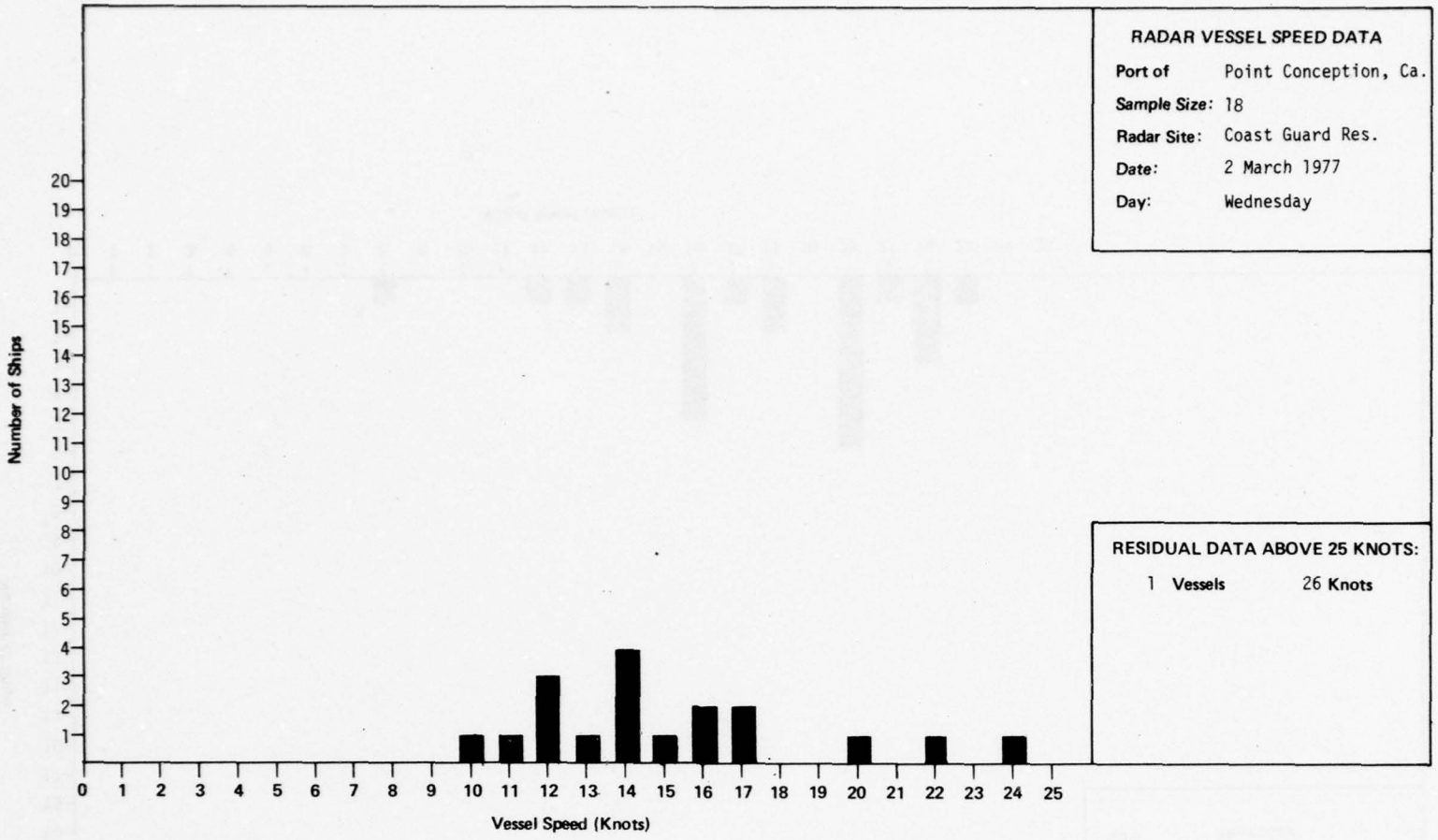

RADAR VESSEL SPEED DATA
Port of Point Conception, Ca.
Sample Size: 18
Radar Site: Coast Guard Res.
Date: 2 March 1977
Day: Wednesday
RESIDUAL DATA ABOVE 25 KNOTS:
1 Vessels 26 Knots
Number of Ships
Vessel Speed (Knots)

FIGURE 5-16

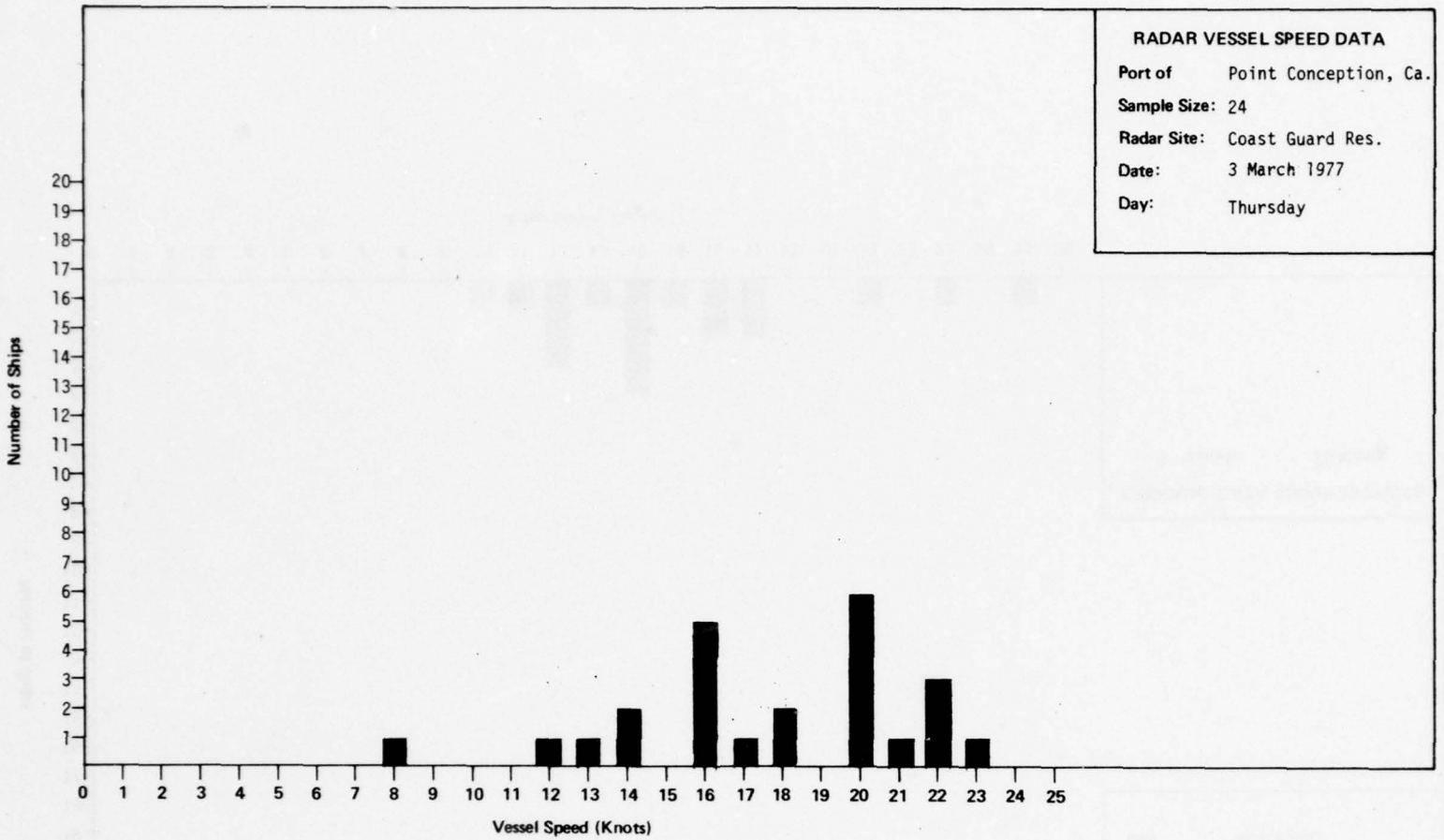

RADAR VESSEL SPEED DATA
Port of Point Conception, Ca.
Sample Size: 24
Radar Site: Coast Guard Res.
Date: 3 March 1977
Day: Thursday
Number of Ships
Vessel Speed (Knots)

FIGURE 5-17

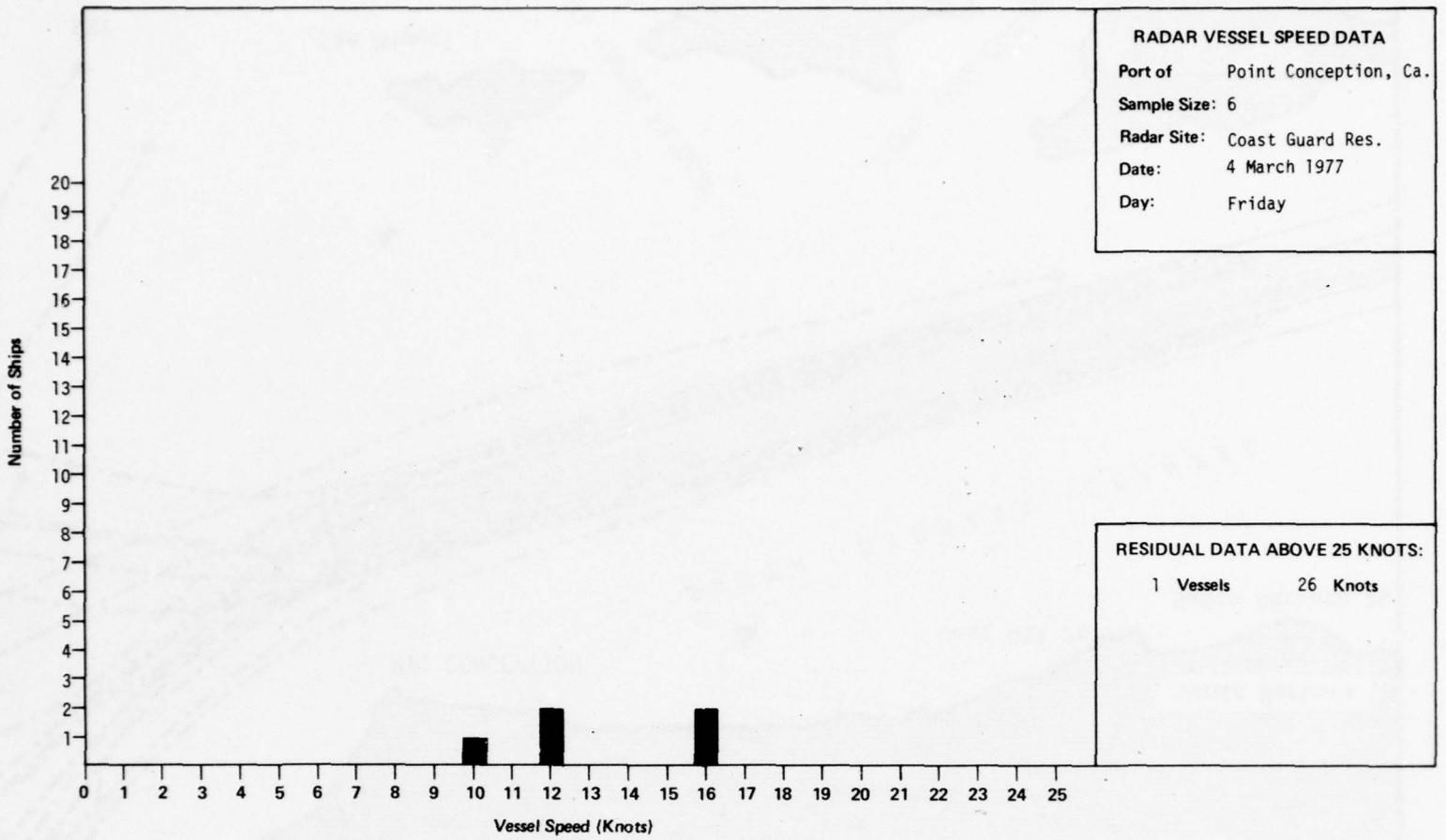

RADAR VESSEL SPEED DATA
Port of Point Conception, Ca.
Sample Size: 6
Radar Site: Coast Guard Res.
Date: 4 March 1977
Day: Friday
RESIDUAL DATA ABOVE 25 KNOTS:
1 Vessels 26 Knots
Number of Ships
Vessel Speed (Knots)

FIGURE 5-18

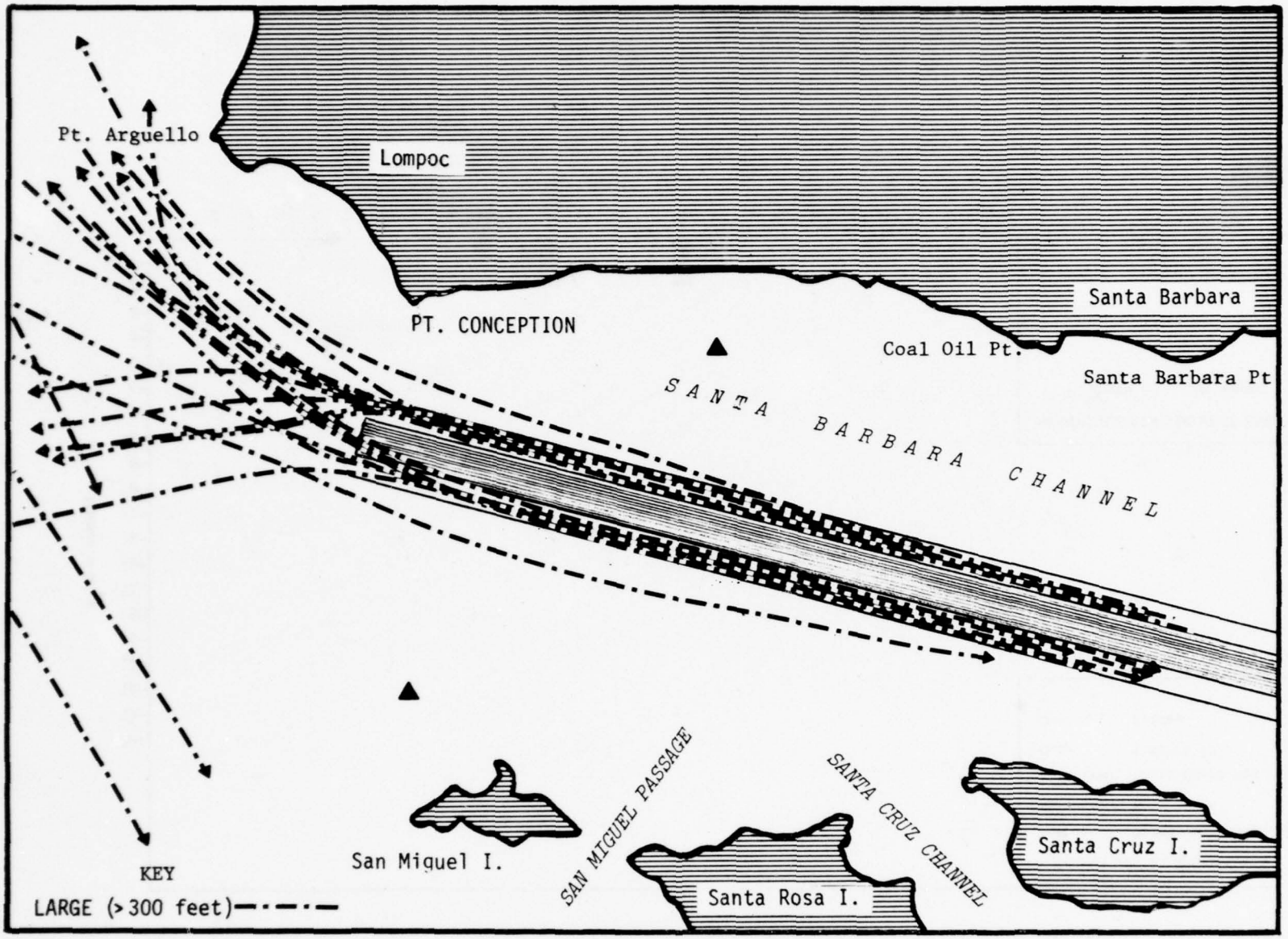


FIGURE 5-19: ROUTE IDENTIFICATION AT POINT CONCEPTION, 0000-1200, 3 MARCH 1977

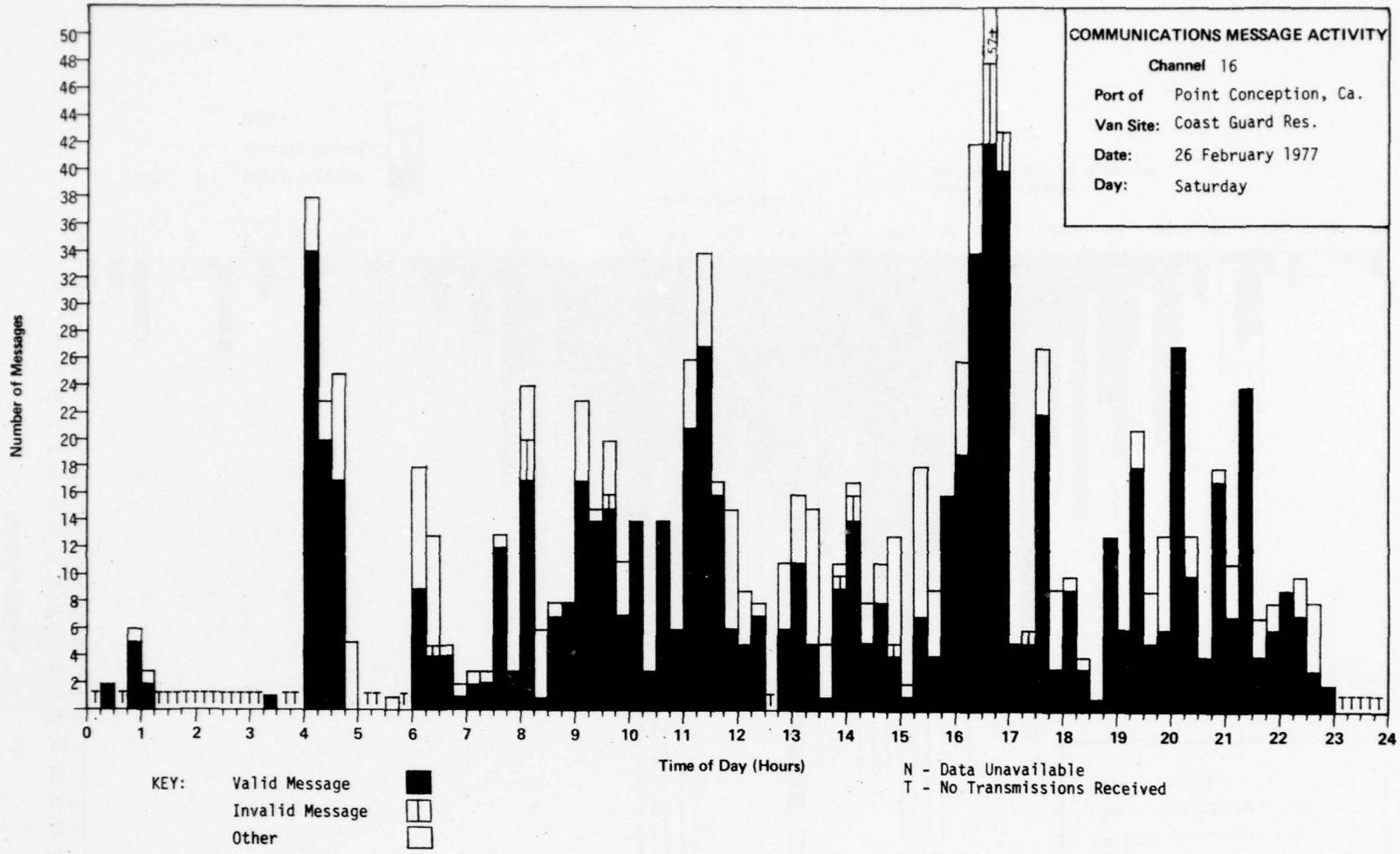

COMMUNICATIONS MESSAGE ACTIVITY
Channel 16
Port of Point Conception, Ca.
Van Site: Coast Guard Res.
Date: 26 February 1977
Day: Saturday
572
Number of Messages
Time of Day (Hours)
KEY:
Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 5-20

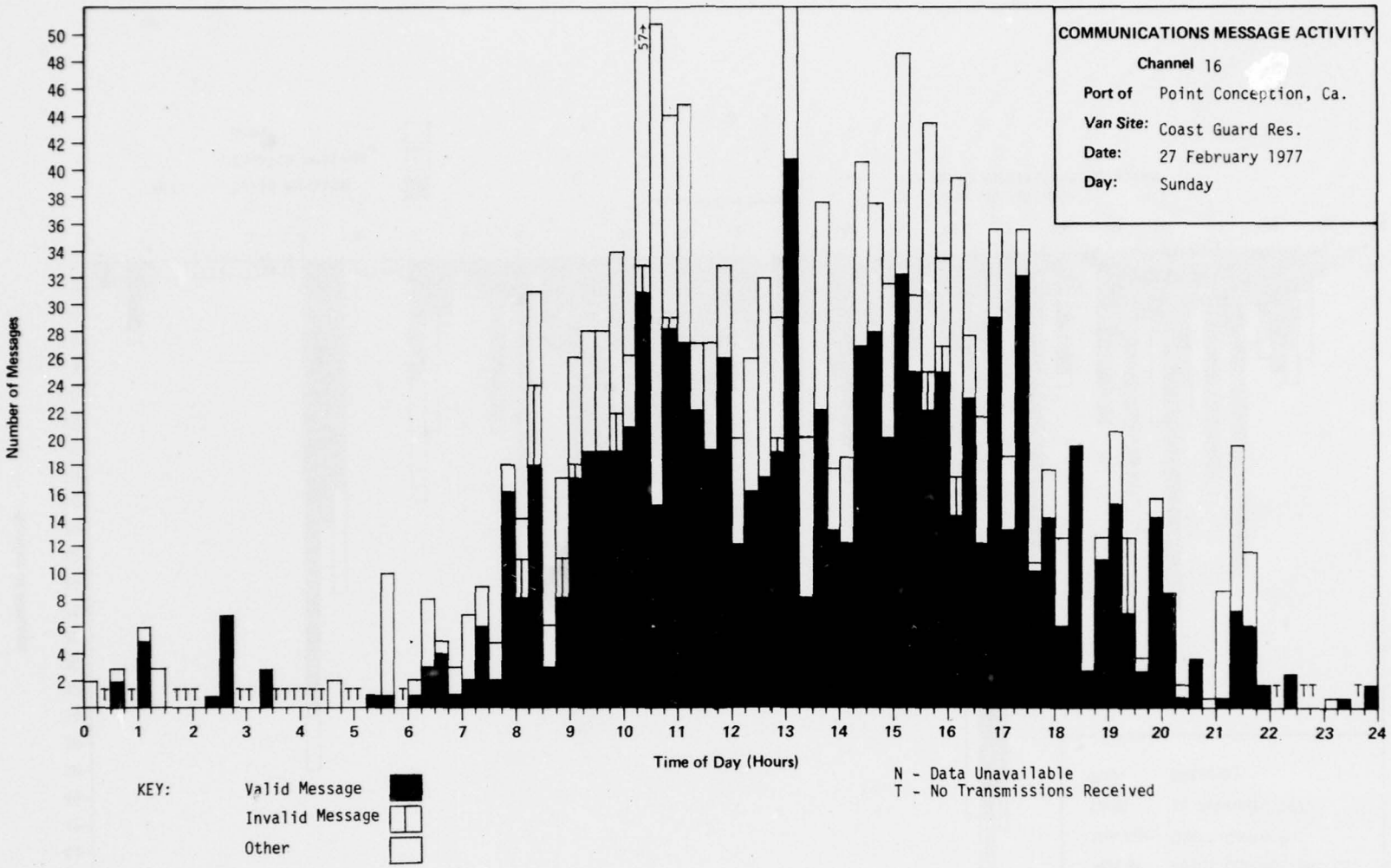

COMMUNICATIONS MESSAGE ACTIVITY
Channel 16
Port of Point Conception, Ca.
Van Site: Coast Guard Res.
Date: 27 February 1977
Day: Sunday
57→
Number of Messages
Time of Day (Hours)
KEY:
Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 5-21

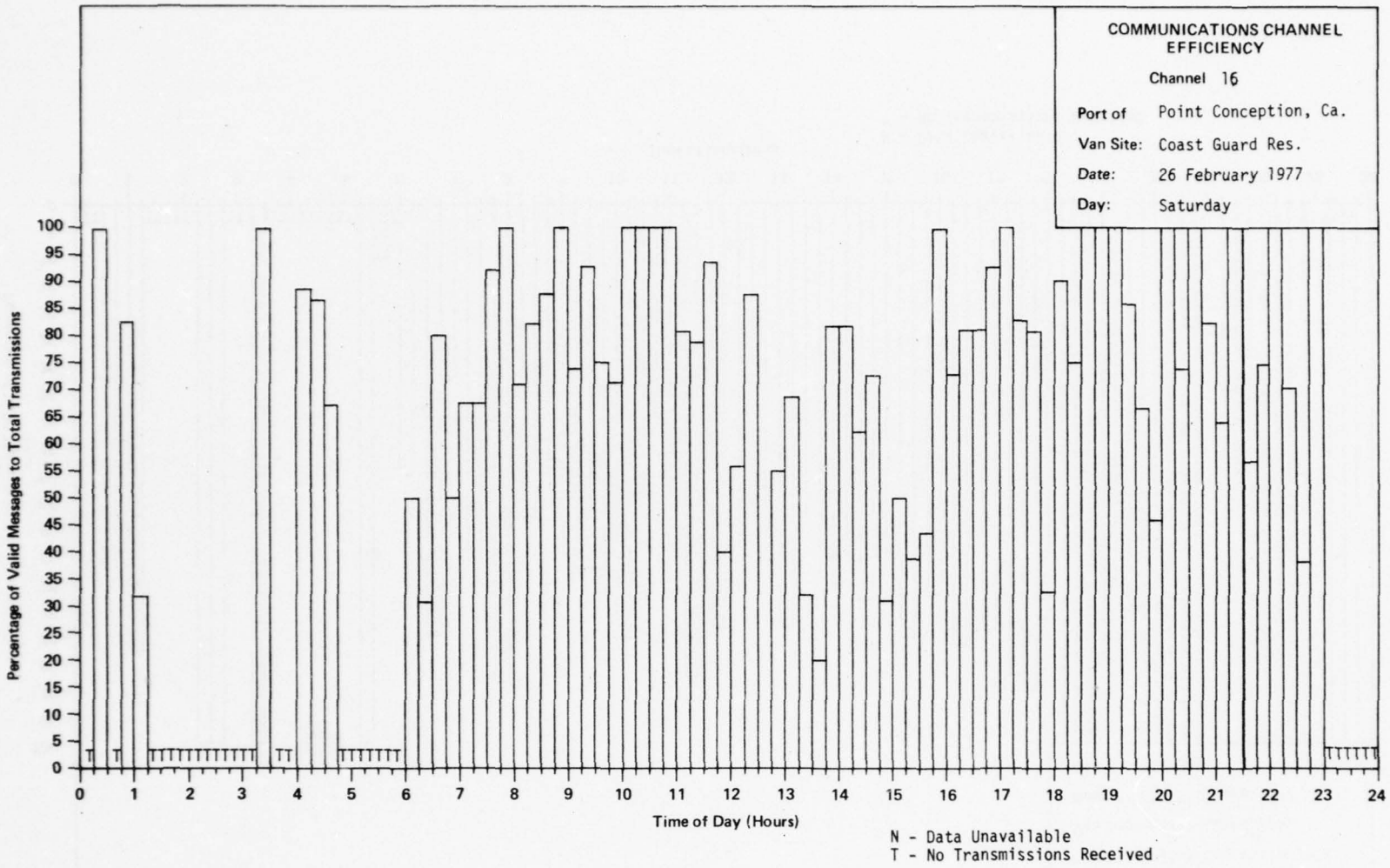

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 16
Port of Point Conception, Ca.
Van Site: Coast Guard Res.
Date: 26 February 1977
Day: Saturday
Percentage of Valid Messages to Total Transmissions
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 5-22

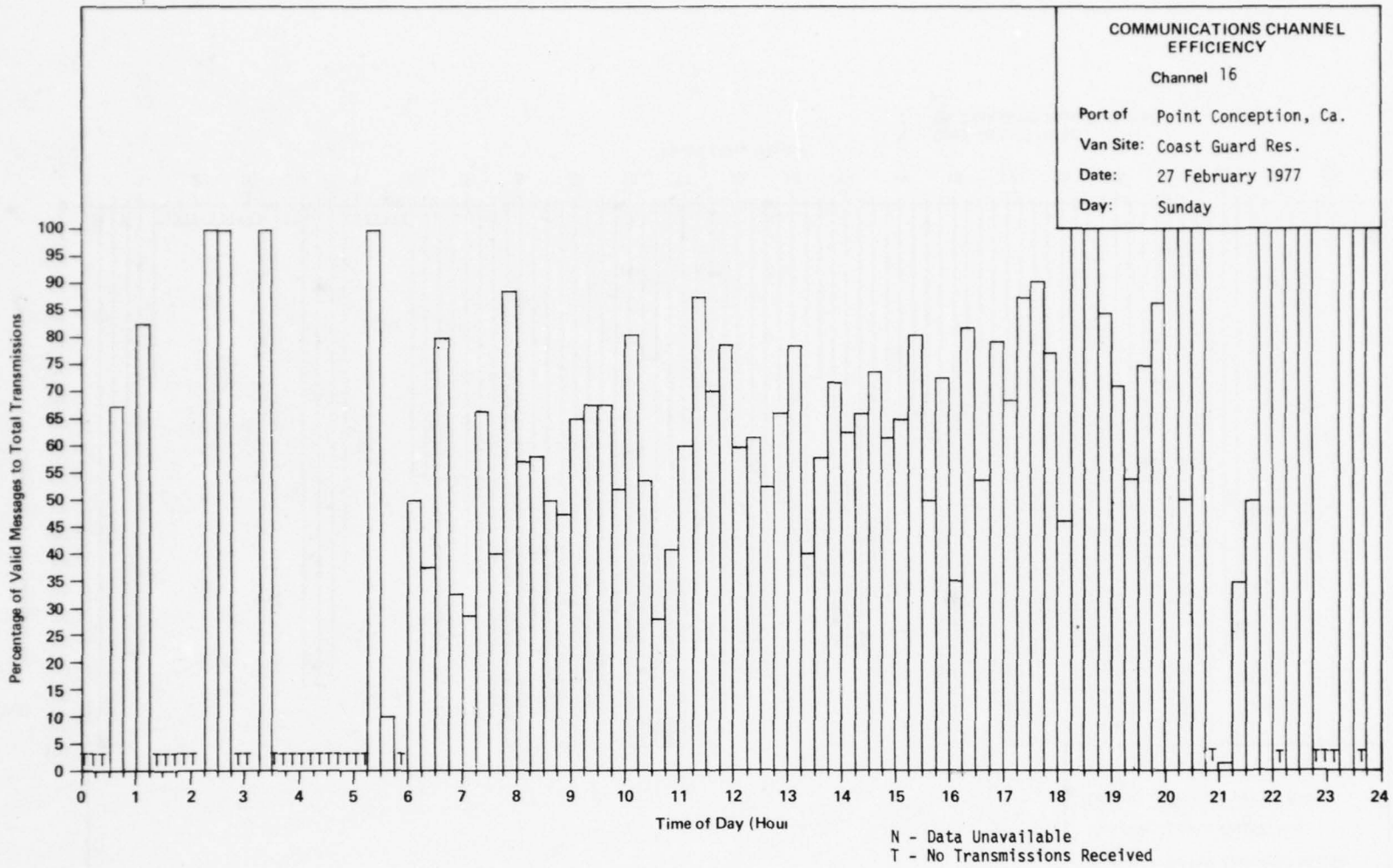

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 16
Port of Point Conception, Ca.
Van Site: Coast Guard Res.
Date: 27 February 1977
Day: Sunday
Percentage of Valid Messages to Total Transmissions
Time of Day (Hour
N - Data Unavailable
T - No Transmissions Received

FIGURE 5-23

PT. CONCEPTION, CALIF. VHF-FM CH 16 26-FEB-77 PAGE 1

TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
15	0	0. 00	0. 00
30	0	0. 00	0. 00
45	0	0. 00	0. 00
100	6	0. 79	5. 27
115	3	0. 20	1. 36
130	0	0. 00	0. 00
145	0	0. 00	0. 00
200	0	0. 00	0. 00
215	0	0. 00	0. 00
230	0	0. 00	0. 00
245	0	0. 00	0. 00
300	0	0. 00	0. 00
315	0	0. 00	0. 00
330	3	0. 05	0. 34
345	0	0. 00	0. 00
400	0	0. 00	0. 00
415	42	2. 41	16. 09
430	34	1. 69	11. 26
445	28	0. 87	5. 82
500	0	0. 00	0. 00
515	0	0. 00	0. 00
530	3	0. 01	0. 08
545	3	0. 01	0. 07
600	3	0. 03	0. 21
615	33	1. 75	11. 64
630	22	0. 79	5. 27
645	6	0. 60	4. 03
700	2	0. 20	1. 36
715	5	0. 20	1. 36
730	10	0. 32	2. 11
745	16	1. 30	8. 69
800	3	0. 37	2. 50
815	26	1. 88	12. 54
830	20	0. 32	2. 17
845	8	0. 41	2. 72
900	11	1. 00	6. 66
915	28	1. 35	9. 00
930	19	1. 64	10. 93
945	30	1. 32	8. 82
1000	32	0. 87	5. 78
1015	23	2. 73	18. 22
1030	8	0. 83	5. 51
1045	19	1. 98	13. 19
1100	10	1. 24	8. 29
1115	36	2. 06	13. 71
1130	48	3. 25	21. 67
1145	18	1. 43	9. 54
1200	40	0. 92	6. 17

FIGURE 5-24

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TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
1215	15	0.72	4.82
1230	8	0.46	3.06
1245	0	0.00	0.00
1300	15	0.64	4.24
1315	22	1.40	9.36
1330	25	0.77	5.14
1345	10	0.28	1.90
1400	11	1.52	10.13
1415	39	2.48	16.53
1430	32	0.53	3.57
1445	42	0.81	5.38
1500	26	0.49	3.28
1515	3	0.22	1.46
1530	29	0.63	4.19
1545	14	0.52	3.49
1600	16	1.49	9.92
1615	44	1.99	13.29
1630	53	2.74	18.30
1645	71	4.21	28.09
1700	42	4.11	27.38
1715	5	0.29	1.93
1730	6	0.67	4.46
1745	31	1.98	13.21
1800	11	0.24	1.60
1815	20	0.96	6.42
1830	5	0.32	2.12
1845	1	0.29	1.92
1900	14	0.93	6.22
1915	14	0.66	4.42
1930	49	2.30	15.32
1945	30	0.74	4.91
2000	31	0.67	4.46
2015	27	1.75	11.69
2030	20	0.92	6.14
2045	4	0.41	2.72
2100	31	1.27	8.48
2115	13	0.44	2.91
2130	42	2.41	16.04
2145	9	0.59	3.93
2200	9	0.95	6.34
2215	18	1.04	6.94
2230	33	1.19	7.92
2245	27	0.83	5.54
2300	5	0.27	1.81
2315	0	0.00	0.00
2330	0	0.00	0.00
2345	0	0.00	0.00

FIGURE 5-24 (continued)

TOTAL NUMBER OF TRANSMISSIONS:	1570
AVE. NUM. OF TRANSMISSIONS PER HOUR:	65.4
TOTAL TRANSMISSION TIME:	1.383 HOURS
AVERAGE LENGTH OF TRANSMISSION:	3.17 SEC.
PERCENT CHANNEL UTILIZATION:	5.76%

MESSAGE LENGTH HISTOGRAM

LENGTH OF XMSNS	NUMBER OF XMSNS	PERCENT
0.1 - 0.5 SEC.	426	27.13
0.5 - 1.0 SEC.	190	12.10
1.0 - 1.5 SEC.	120	7.64
1.5 - 2.0 SEC.	102	6.50
2.0 - 2.5 SEC.	91	5.80
2.5 - 3.0 SEC.	86	5.48
3.0 - 3.5 SEC.	71	4.52
3.5 - 4.0 SEC.	62	3.95
4.0 - 4.5 SEC.	49	3.12
4.5 - 5.0 SEC.	48	3.06
5.0 - 5.5 SEC.	42	2.68
5.5 - 6.0 SEC.	43	2.74
6.0 - 6.5 SEC.	28	1.78
6.5 - 7.0 SEC.	27	1.72
7.0 - 7.5 SEC.	34	2.17
7.5 - 8.0 SEC.	19	1.21
8.0 - 8.5 SEC.	15	0.96
8.5 - 9.0 SEC.	9	0.57
9.0 - 9.5 SEC.	13	0.83
9.5 - 10.0 SEC.	6	0.38
LONGER THAN 10 SEC.:	89	5.67

THERE WERE 504 XMSNS OF 00.1 AND 00.0 DURATION

FIGURE 5-24 (continued)

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TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
15	5	0. 46	3. 06
30	2	0. 02	0. 10
45	0	0. 00	0. 00
100	2	0. 14	0. 94
115	6	0. 53	3. 57
130	3	0. 10	0. 66
145	1	0. 00	0. 02
200	0	0. 00	0. 00
215	0	0. 00	0. 00
230	0	0. 00	0. 00
245	15	0. 20	1. 32
300	57	0. 84	5. 63
315	0	0. 00	0. 00
330	0	0. 00	0. 00
345	4	0. 13	0. 84
400	0	0. 00	0. 00
415	0	0. 00	0. 00
430	0	0. 00	0. 00
445	2	0. 10	0. 67
500	5	0. 55	3. 68
515	0	0. 00	0. 00
530	1	0. 04	0. 29
545	24	0. 47	3. 11
600	0	0. 00	0. 00
615	1	0. 11	0. 71
630	9	0. 12	0. 78
645	5	0. 62	4. 11
700	5	0. 22	1. 49
715	9	0. 29	1. 96
730	13	0. 49	3. 30
745	8	0. 38	2. 50
800	46	1. 94	12. 96
815	53	1. 52	10. 13
830	54	2. 08	13. 86
845	9	0. 33	2. 23
900	36	1. 18	7. 90
915	60	1. 94	12. 91
930	38	1. 67	11. 13
945	69	2. 17	14. 49
1000	69	2. 10	14. 02
1015	46	2. 31	15. 40
1030	76	3. 30	22. 03
1045	70	2. 72	18. 17
1100	57	3. 14	20. 94
1115	59	3. 70	24. 70
1130	40	2. 89	19. 27
1145	48	2. 71	18. 09
1200	40	2. 36	15. 76

FIGURE 5-2

TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
1215	23	0.91	6.09
1230	41	2.31	15.38
1245	42	2.12	14.12
1300	42	2.60	17.36
1315	61	4.01	26.73
1330	21	1.64	10.92
1345	49	2.09	13.97
1400	28	1.88	12.52
1415	30	1.69	11.27
1430	51	3.74	24.97
1445	38	2.15	14.34
1500	44	3.89	25.91
1515	63	4.44	29.62
1530	49	3.12	20.81
1545	94	3.71	24.72
1600	60	3.64	24.28
1615	78	2.90	19.37
1630	33	2.08	13.88
1645	26	1.29	8.59
1700	62	3.11	20.73
1715	24	1.76	11.73
1730	45	3.39	22.62
1745	12	1.47	9.81
1800	31	1.32	8.78
1815	24	0.88	5.89
1830	26	2.38	15.89
1845	6	0.50	3.32
1900	15	0.74	4.94
1915	32	1.90	12.70
1930	12	1.10	7.32
1945	5	0.27	1.80
2000	21	1.35	9.03
2015	6	0.45	2.99
2030	17	0.80	5.34
2045	0	0.00	0.00
2100	5	0.63	4.19
2115	21	0.35	2.36
2130	52	1.78	11.89
2145	52	1.66	11.06
2200	3	0.13	0.84
2215	0	0.00	0.00
2230	3	0.30	2.02
2245	1	0.08	0.51
2300	0	0.00	0.00
2315	1	0.01	0.04
2330	2	0.09	0.61
2345	0	0.00	0.00
2400	4	0.16	1.08

FIGURE 5-25 (continued)

TOTAL NUMBER OF TRANSMISSIONS:	2402
AVE. NUM. OF TRANSMISSIONS PER HOUR:	100.1
TOTAL TRANSMISSION TIME:	2.013 HOURS
AVERAGE LENGTH OF TRANSMISSION:	3.02 SEC.
PERCENT CHANNEL UTILIZATION:	8.39%

MESSAGE LENGTH HISTOGRAM

LENGTH OF XMSNS	NUMBER OF XMSNS	PERCENT
0.1 - 0.5 SEC.	708	29.48
0.5 - 1.0 SEC.	290	12.07
1.0 - 1.5 SEC.	190	7.91
1.5 - 2.0 SEC.	137	5.70
2.0 - 2.5 SEC.	110	4.58
2.5 - 3.0 SEC.	109	4.54
3.0 - 3.5 SEC.	87	3.62
3.5 - 4.0 SEC.	88	3.66
4.0 - 4.5 SEC.	92	3.83
4.5 - 5.0 SEC.	91	3.79
5.0 - 5.5 SEC.	71	2.96
5.5 - 6.0 SEC.	66	2.75
6.0 - 6.5 SEC.	60	2.50
6.5 - 7.0 SEC.	56	2.33
7.0 - 7.5 SEC.	33	1.37
7.5 - 8.0 SEC.	21	0.87
8.0 - 8.5 SEC.	21	0.87
8.5 - 9.0 SEC.	23	0.96
9.0 - 9.5 SEC.	23	0.96
9.5 - 10.0 SEC.	14	0.58
LONGER THAN 10 SEC. :	112	4.66

THERE WERE 713 XMSNS OF 00.1 AND 00.0 DURATION

FIGURE 5-25 (continued)

6.0 SAN DIEGO GRAPHS AND HISTOGRAMS

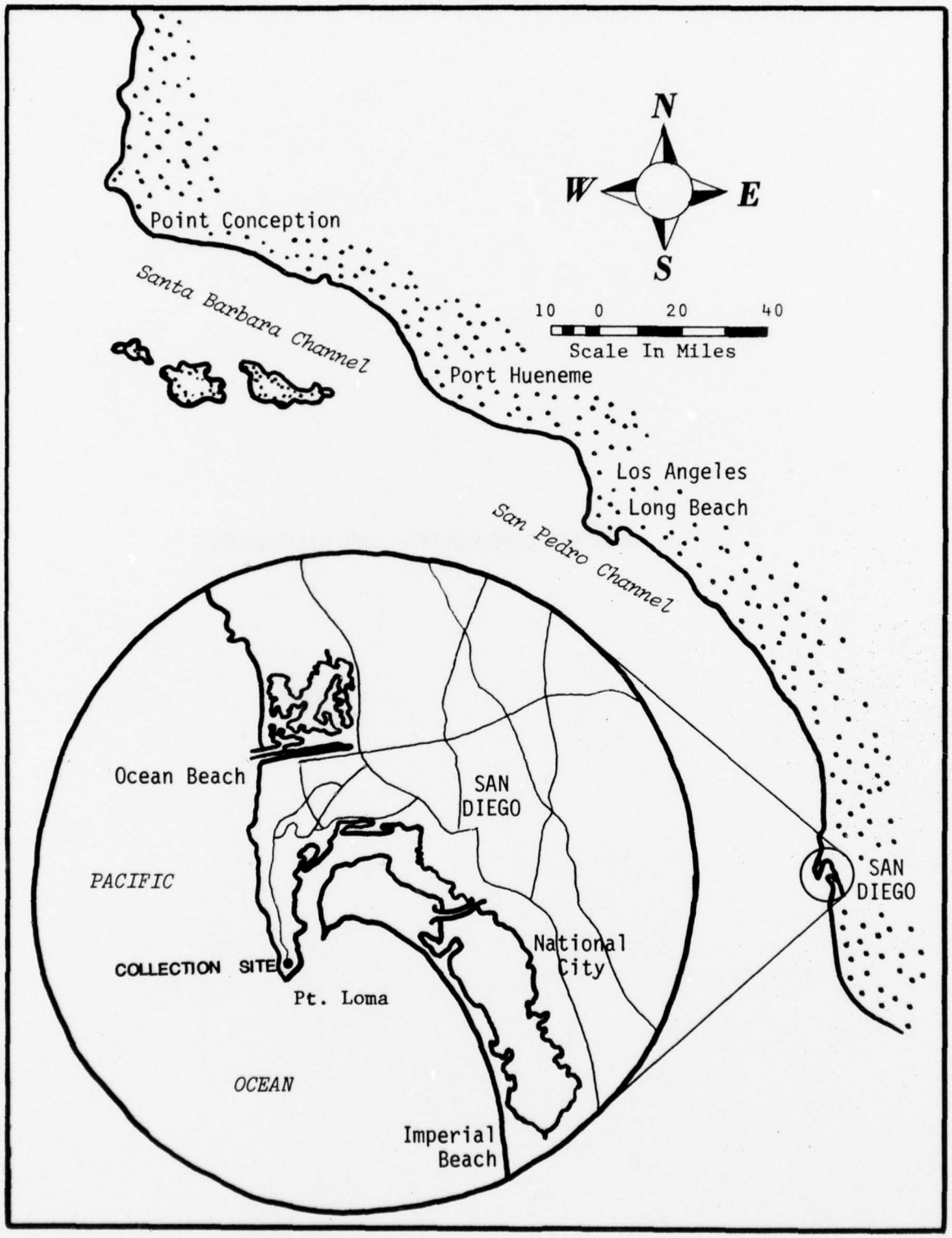


FIGURE 6-1: SAN DIEGO, CALIFORNIA

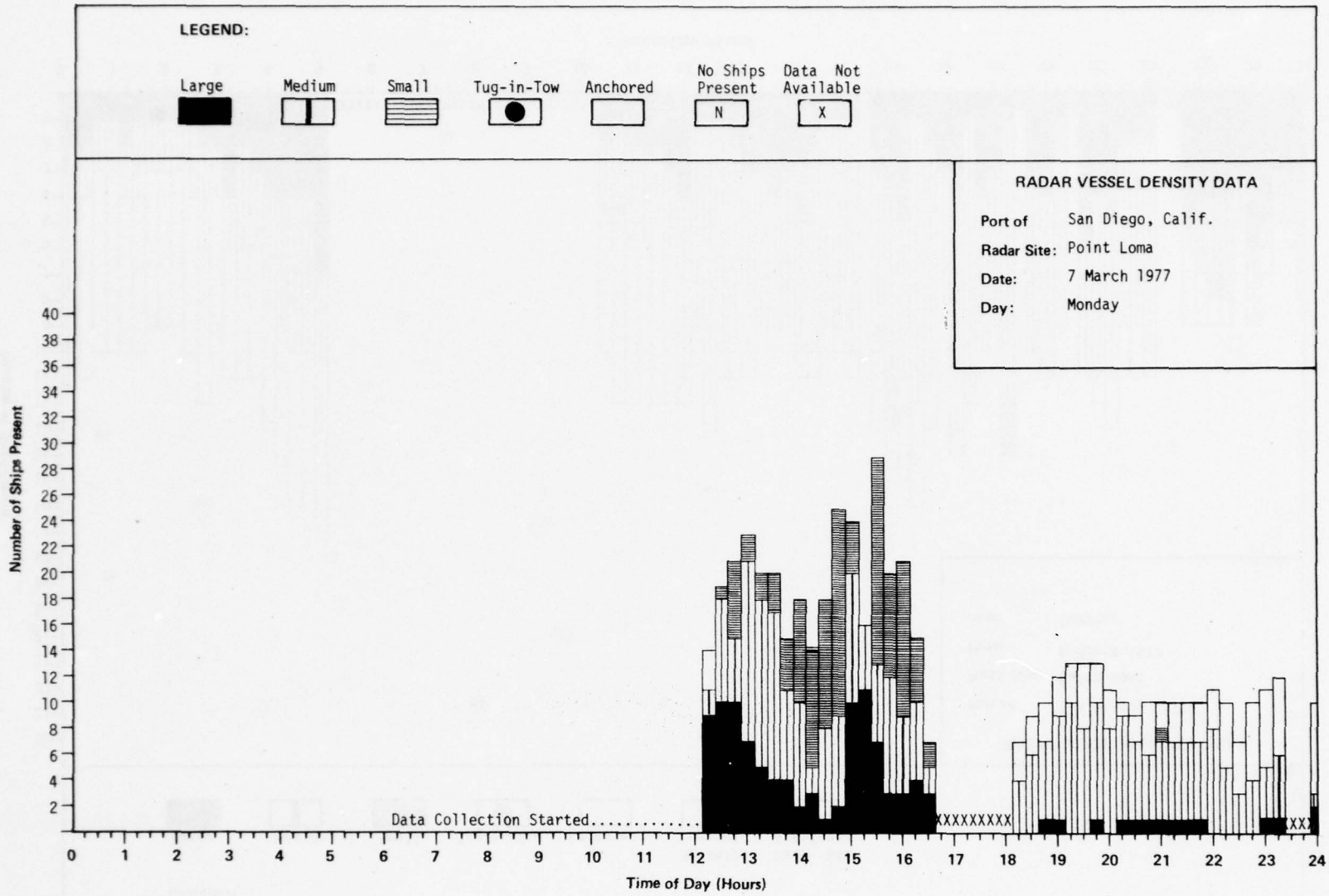

LEGEND:
Large
Medium
Small
Tug-in-Tow
Anchored
No Ships Present
N
Data Not Available
X
RADAR VESSEL DENSITY DATA
Port of San Diego, Calif.
Radar Site: Point Loma
Date: 7 March 1977
Day: Monday
Number of Ships Present
Data Collection Started.....
XXXXXXXXX
Time of Day (Hours)

FIGURE 6-2

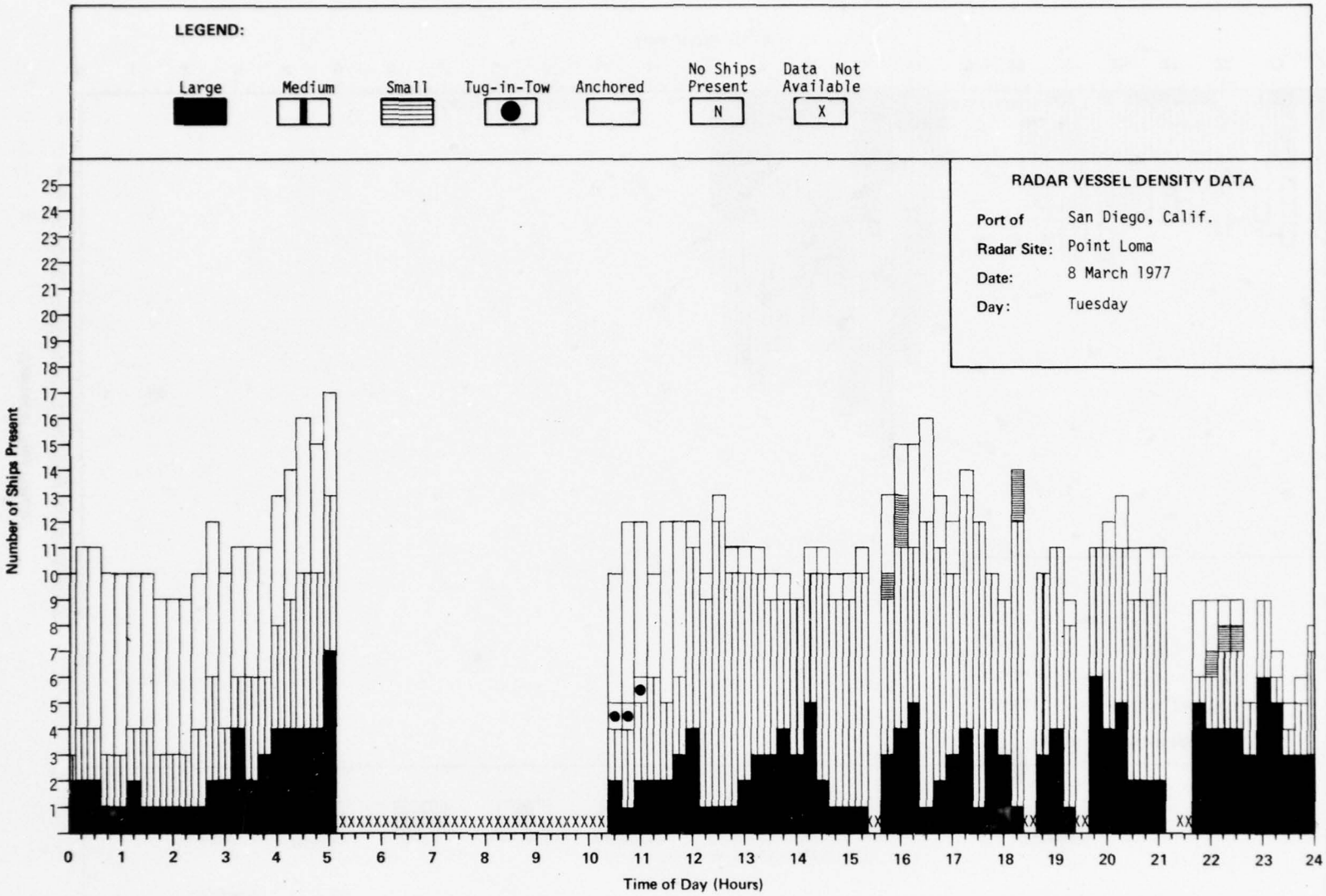

LEGEND:
Large
Medium
Small
Tug-in-Tow
Anchored
No Ships Present
N
Data Not Available
X
RADAR VESSEL DENSITY DATA
Port of San Diego, Calif.
Radar Site: Point Loma
Date: 8 March 1977
Day: Tuesday
Number of Ships Present
Time of Day (Hours)

FIGURE 6-3

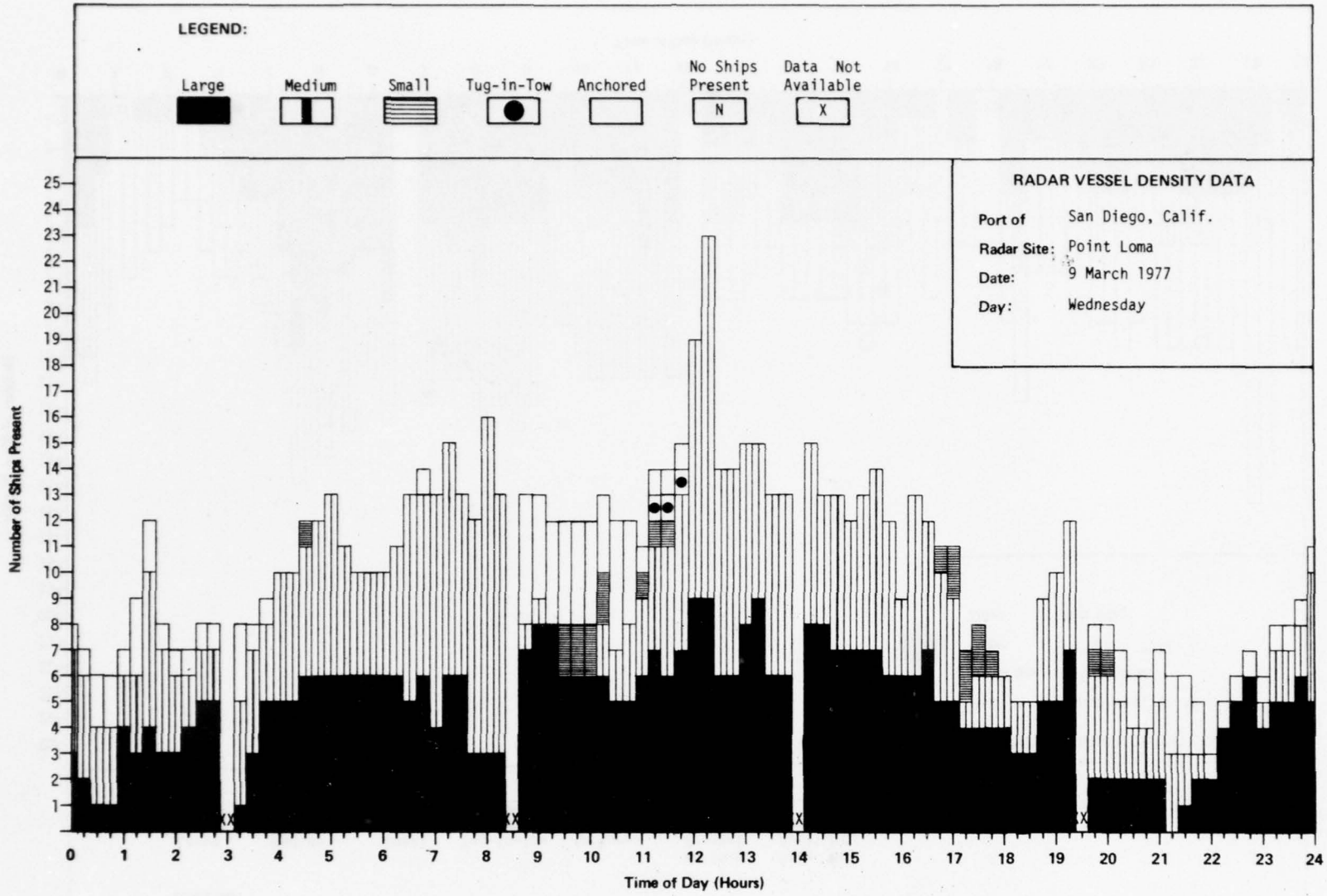

LEGEND:
Large
Medium
Small
Tug-in-Tow
Anchored
No Ships Present
N
Data Not Available
X
RADAR VESSEL DENSITY DATA
Port of San Diego, Calif.
Radar Site: Point Loma
Date: 9 March 1977
Day: Wednesday
Number of Ships Present
Time of Day (Hours)

FIGURE 6-4

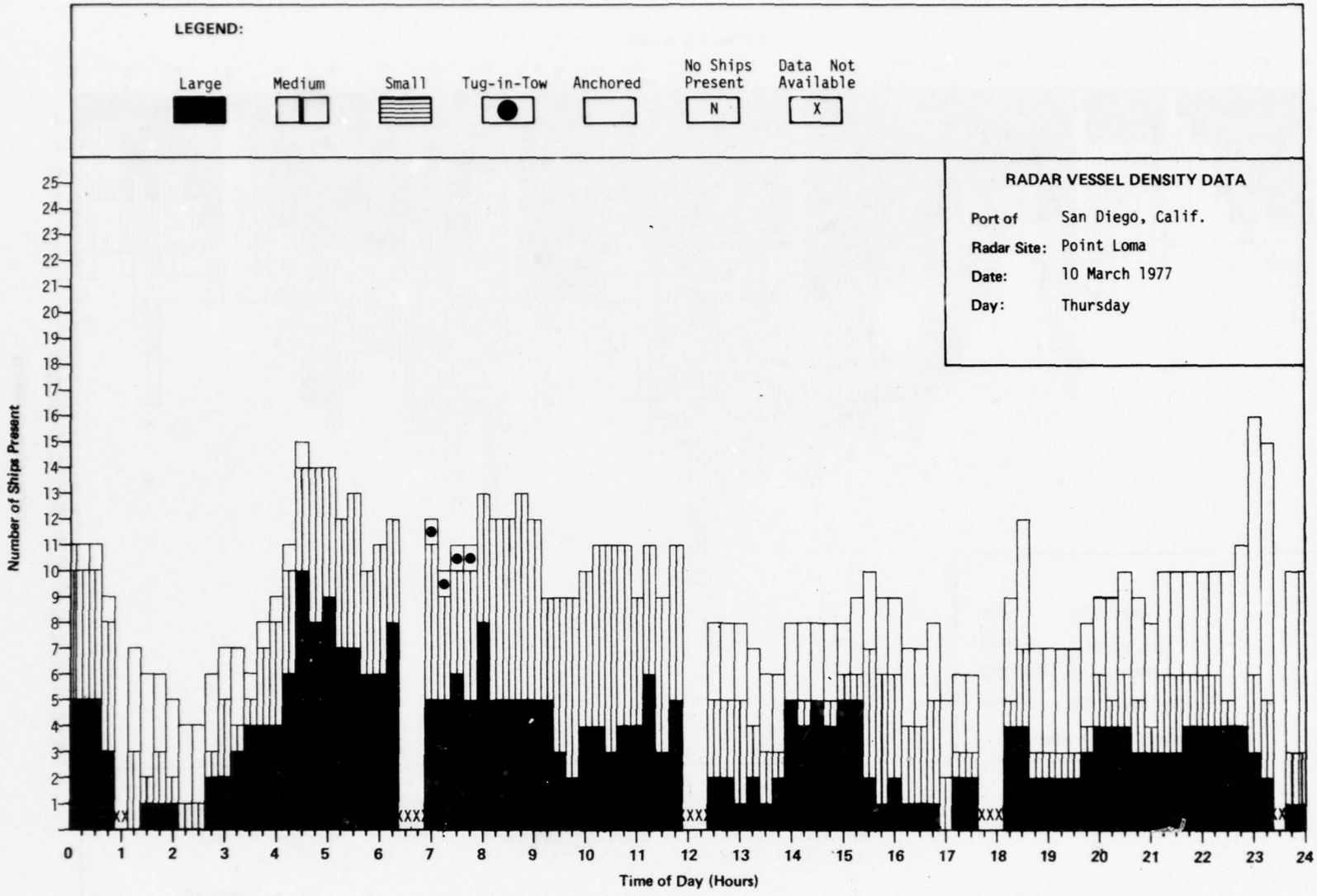

LEGEND:
Large
Medium
Small
Tug-in-Tow
Anchored
No Ships Present
N
Data Not Available
X
RADAR VESSEL DENSITY DATA
Port of San Diego, Calif.
Radar Site: Point Loma
Date: 10 March 1977
Day: Thursday
Number of Ships Present
Time of Day (Hours)

FIGURE 6-5

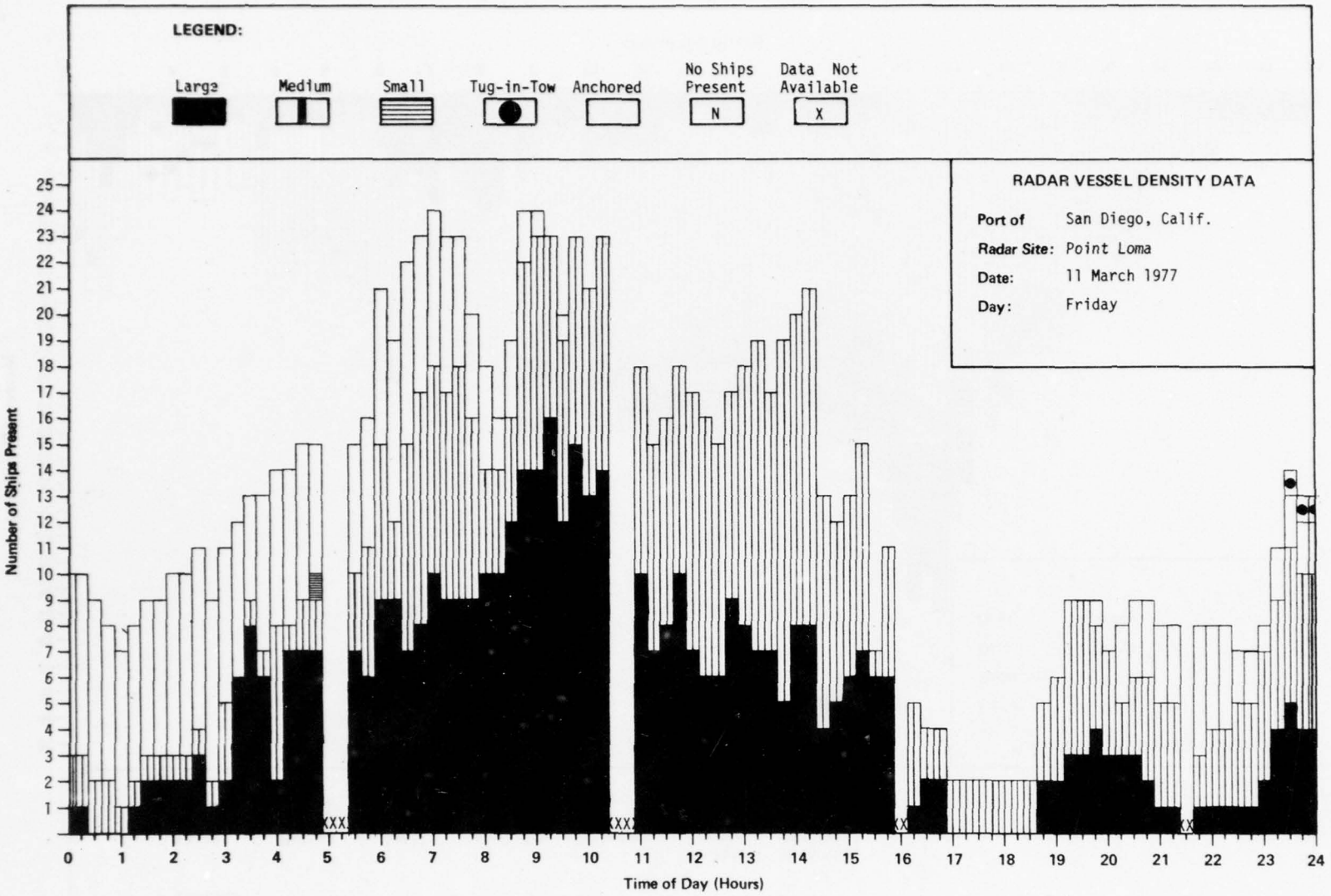

LEGEND:
Large
Medium
Small
Tug-in-Tow
Anchored
No Ships Present
N
Data Not Available
X
RADAR VESSEL DENSITY DATA
Port of San Diego, Calif.
Radar Site: Point Loma
Date: 11 March 1977
Day: Friday
Number of Ships Present
Time of Day (Hours)

FIGURE 6-6

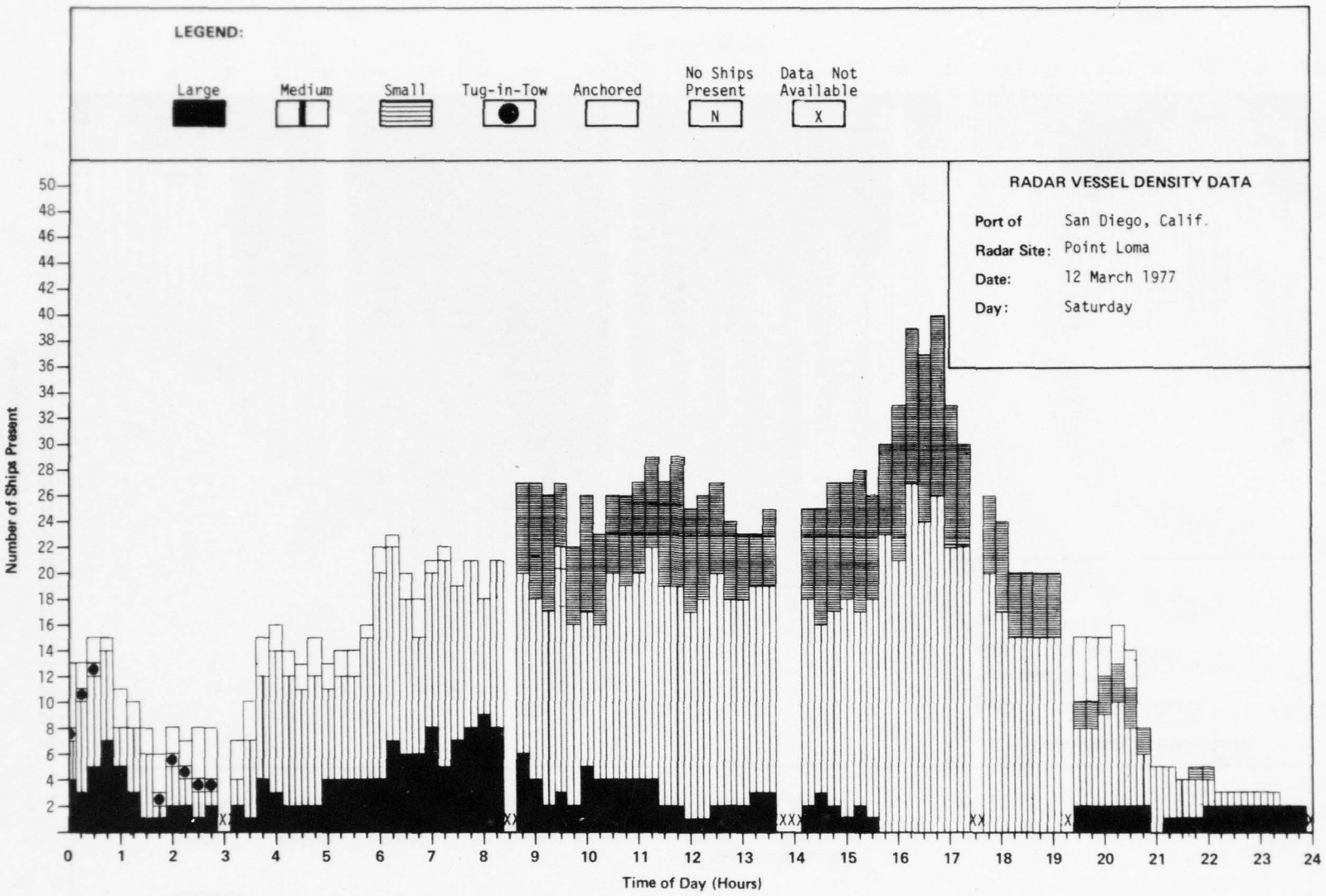

LEGEND:
Large
Medium
Small
Tug-in-Tow
Anchored
No Ships Present
N
Data Not Available
X
RADAR VESSEL DENSITY DATA
Port of San Diego, Calif.
Radar Site: Point Loma
Date: 12 March 1977
Day: Saturday
Number of Ships Present
Time of Day (Hours)

FIGURE 6-7

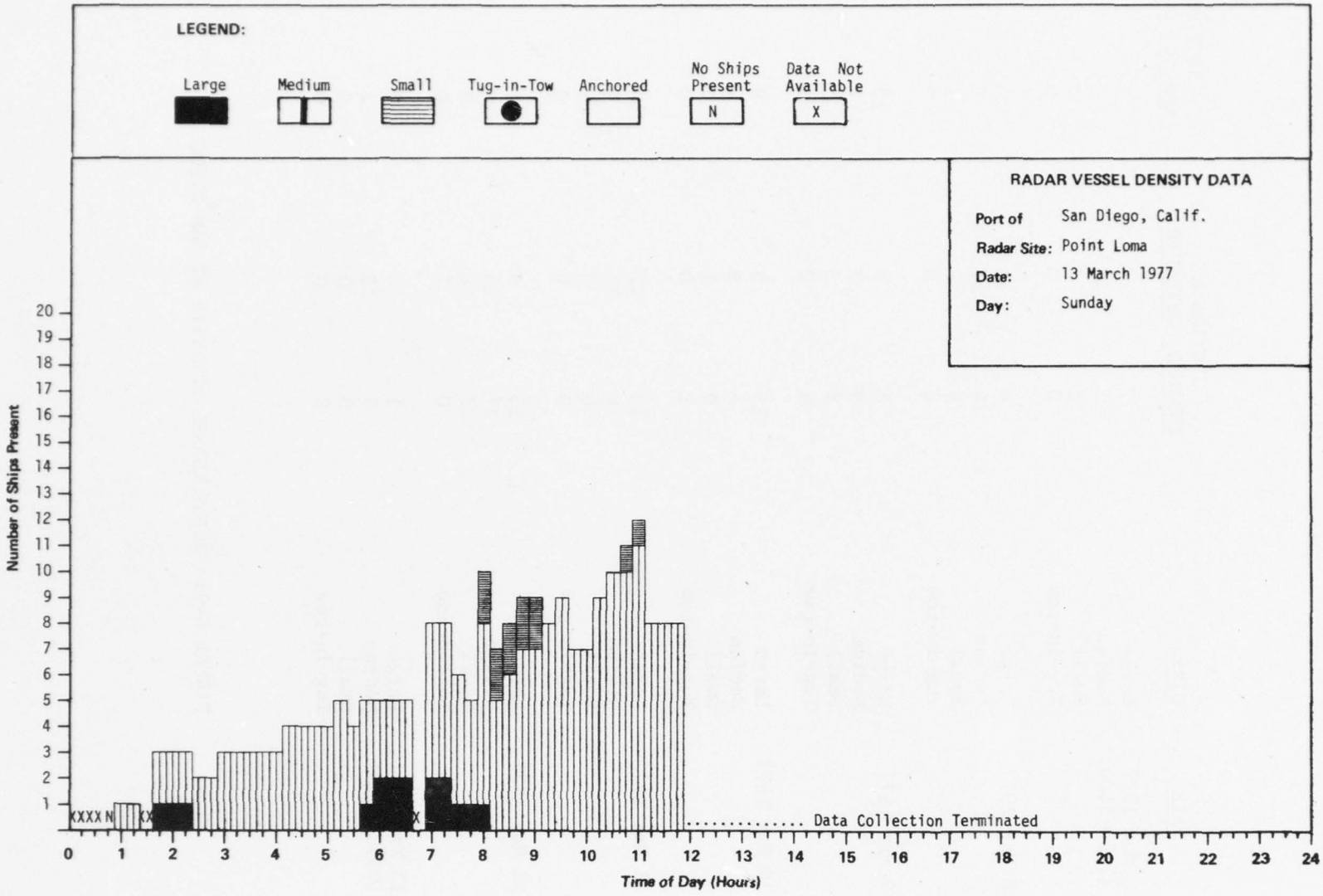

LEGEND:
Large
Medium
Small
Tug-in-Tow
Anchored
No Ships Present
N
Data Not Available
X
RADAR VESSEL DENSITY DATA
Port of San Diego, Calif.
Radar Site: Point Loma
Date: 13 March 1977
Day: Sunday
Number of Ships Present
Time of Day (Hours)
XXXX N
XX
X
..... Data Collection Terminated

FIGURE 6-8

DATE	SIZE	SECTION A INBOUND	SECTION A OUTBOUND	SECTION B INBOUND	SECTION B OUTBOUND
7 Mar 1977 (1200-2400)	Large	2	5	3	4
	Medium	7	14	2	4
	Small	3	1	0	0
	Tug-in-tow	0	0	0	0
8 Mar 1977	Large	8	11	14	10
	Medium	14	17	9	19
	Small	6	4	1	2
	Tug-in-tow	0	0	0	1
9 Mar 1977	Large	8	8	12	8
	Medium	5	9	7	9
	Small	2	3	3	1
	Tug-in-tow	0	0	0	1
10 Mar 1977	Large	15	5	8	3
	Medium	5	9	3	6
	Small	0	1	2	0
	Tug-in-tow	1	0	0	0
11 Mar 1977	Large	13	17	13	6
	Medium	6	13	9	3
	Small	0	0	1	0
	Tug-in-tow	0	0	0	0
12 Mar 1977	Large	15	9	11	7
	Medium	27	28	16	18
	Small	27	8	0	5
	Tug-in-tow	0	2	0	1
13 Mar 1977 (0000-1200)	Large	1	4	2	0
	Medium	8	13	2	6
	Small	0	0	0	0
	Tug-in-tow	0	0	0	0

FIGURE 6-9: DAILY VESSEL ACTIVITY AT SAN DIEGO

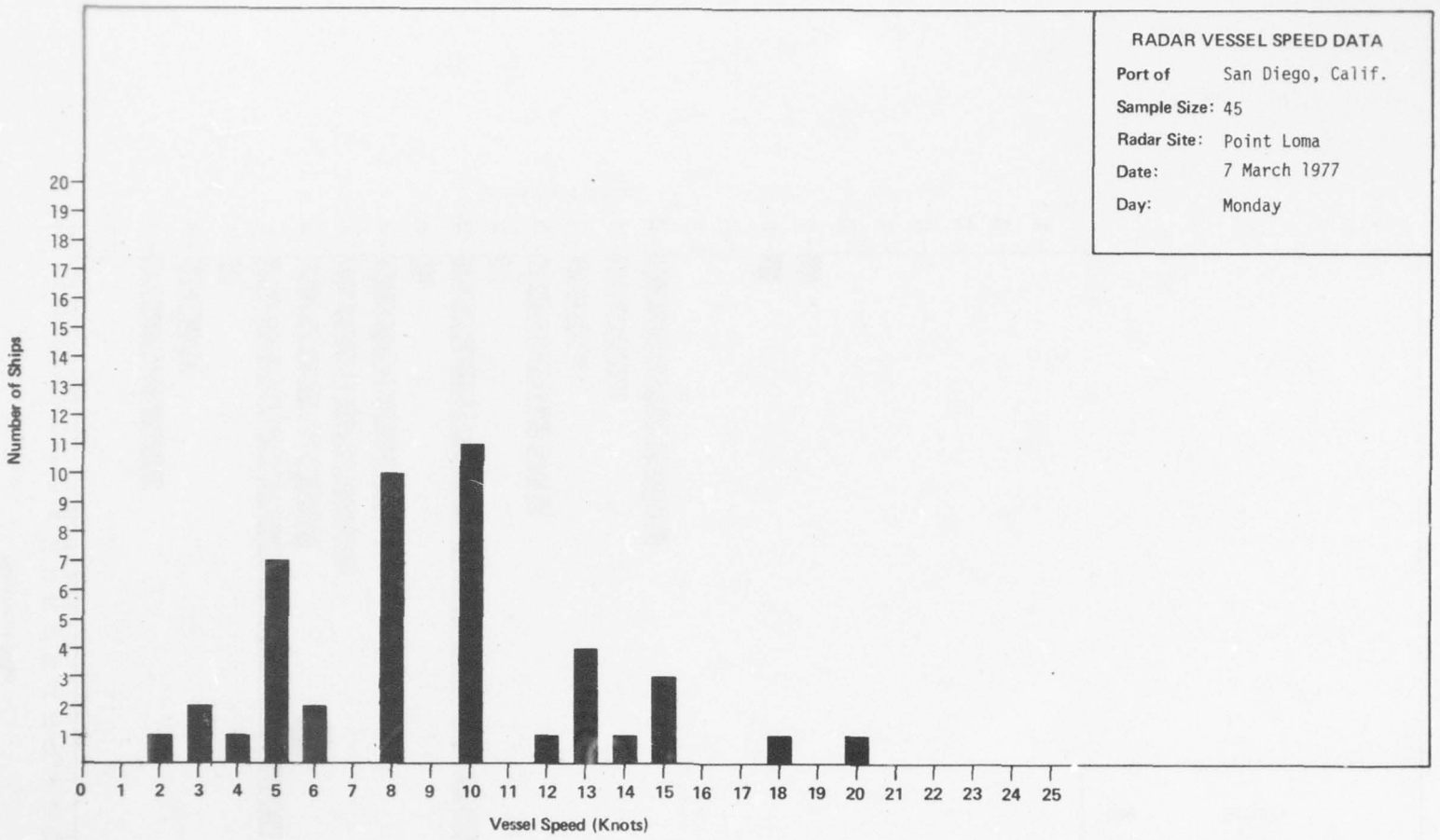

RADAR VESSEL SPEED DATA
Port of San Diego, Calif.
Sample Size: 45
Radar Site: Point Loma
Date: 7 March 1977
Day: Monday
Number of Ships
Vessel Speed (Knots)

FIGURE 6-10

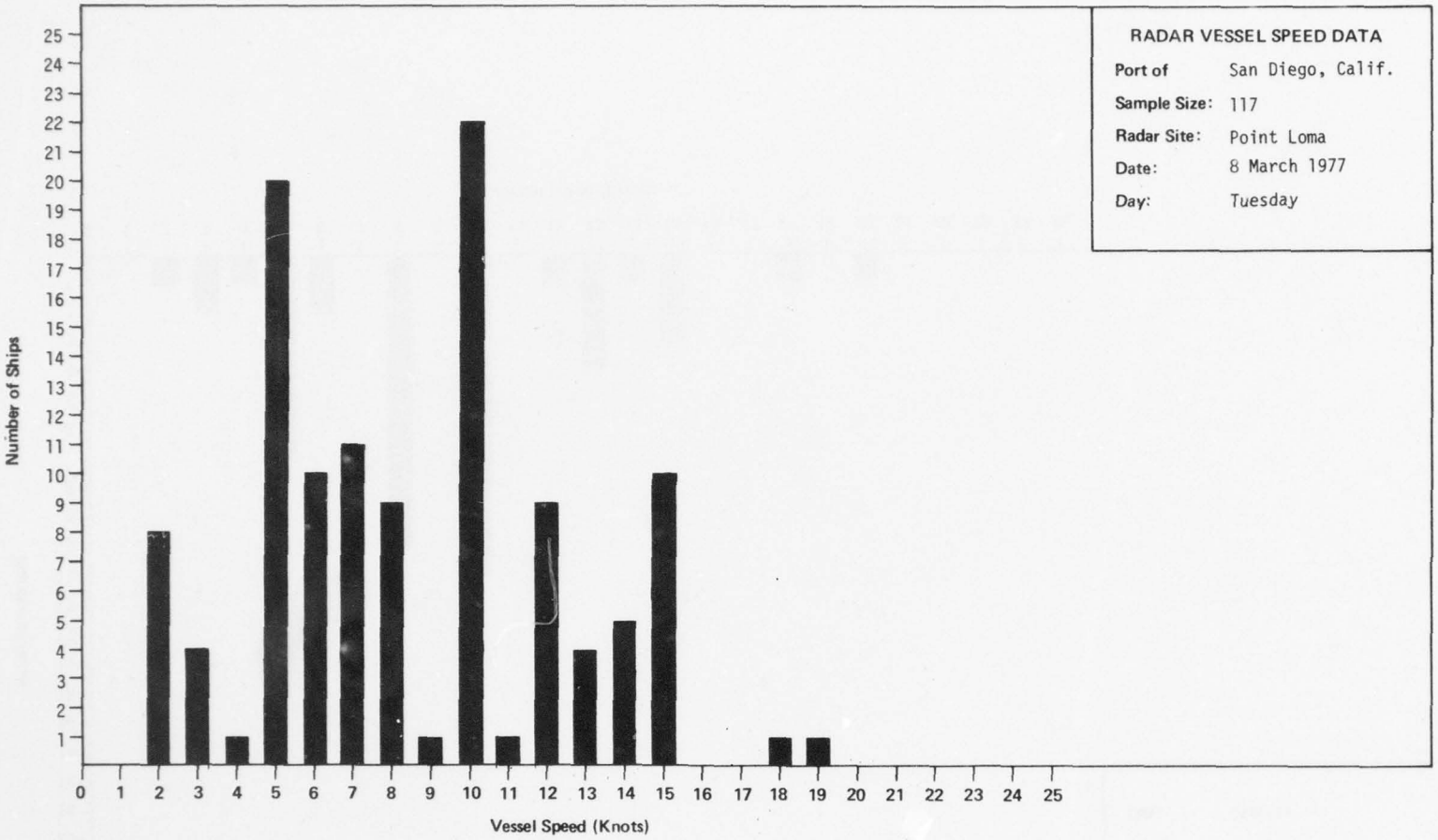

RADAR VESSEL SPEED DATA
Port of San Diego, Calif.
Sample Size: 117
Radar Site: Point Loma
Date: 8 March 1977
Day: Tuesday
Number of Ships
Vessel Speed (Knots)

FIGURE 6-11

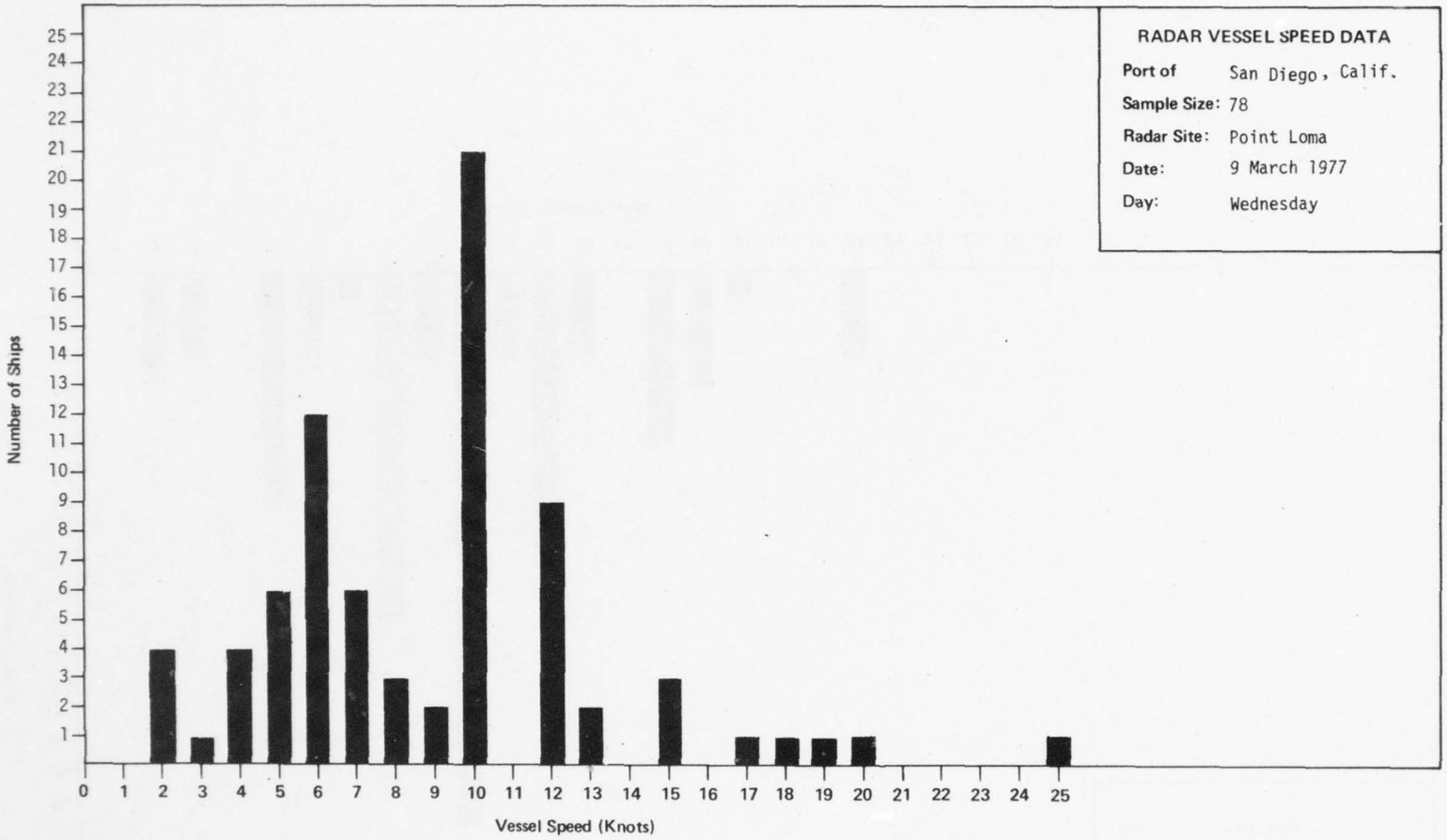

RADAR VESSEL SPEED DATA
Port of San Diego, Calif.
Sample Size: 78
Radar Site: Point Loma
Date: 9 March 1977
Day: Wednesday
Number of Ships
Vessel Speed (Knots)

FIGURE 6-12

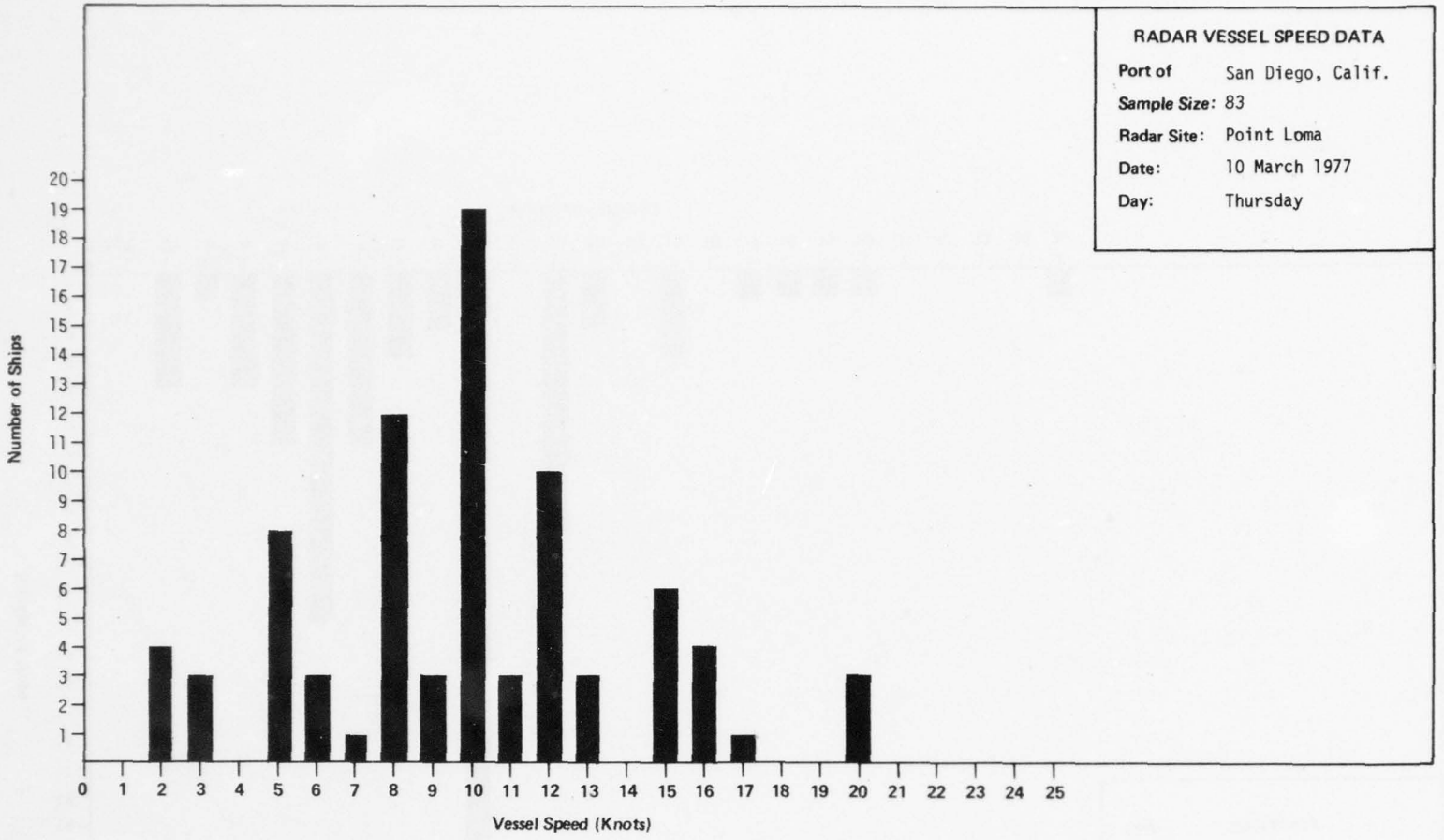

RADAR VESSEL SPEED DATA
Port of San Diego, Calif.
Sample Size: 83
Radar Site: Point Loma
Date: 10 March 1977
Day: Thursday
Number of Ships
Vessel Speed (Knots)

FIGURE 6-13

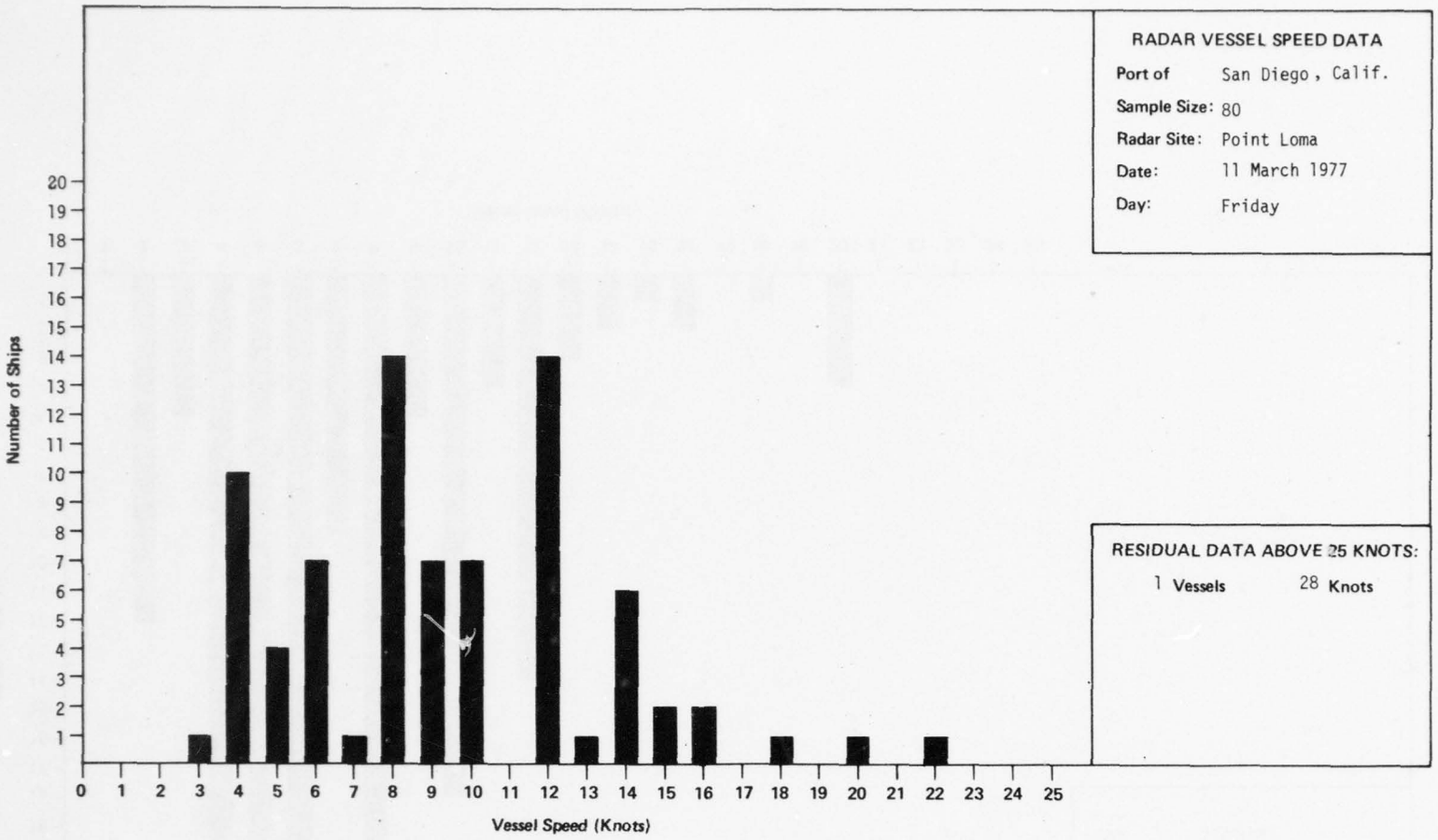

RADAR VESSEL SPEED DATA
Port of San Diego, Calif.
Sample Size: 80
Radar Site: Point Loma
Date: 11 March 1977
Day: Friday
RESIDUAL DATA ABOVE 25 KNOTS:
1 Vessels 28 Knots
Number of Ships
Vessel Speed (Knots)

FIGURE 6-14

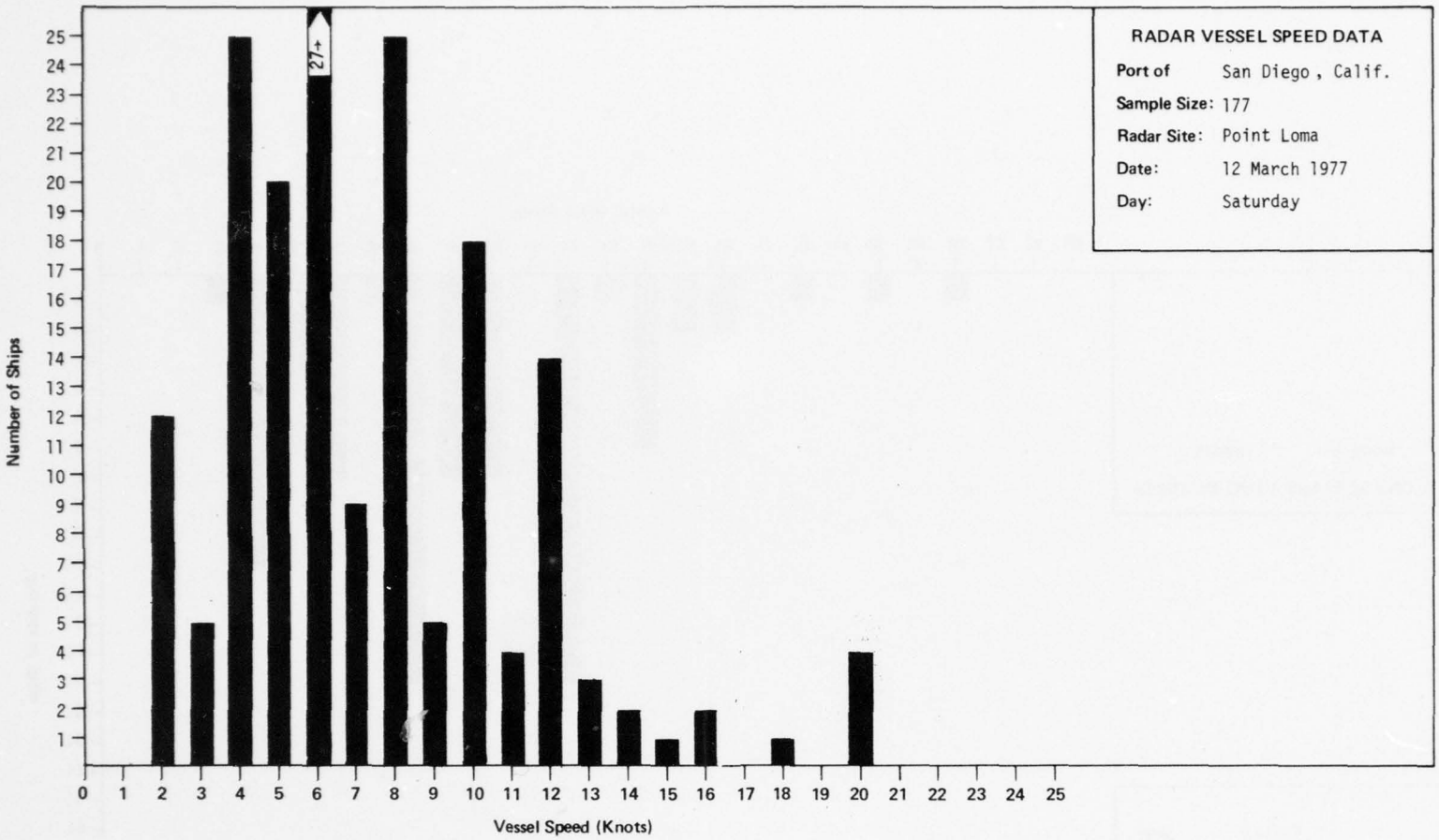

RADAR VESSEL SPEED DATA
Port of San Diego, Calif.
Sample Size: 177
Radar Site: Point Loma
Date: 12 March 1977
Day: Saturday
Number of Ships
Vessel Speed (Knots)
27+

FIGURE 6-15

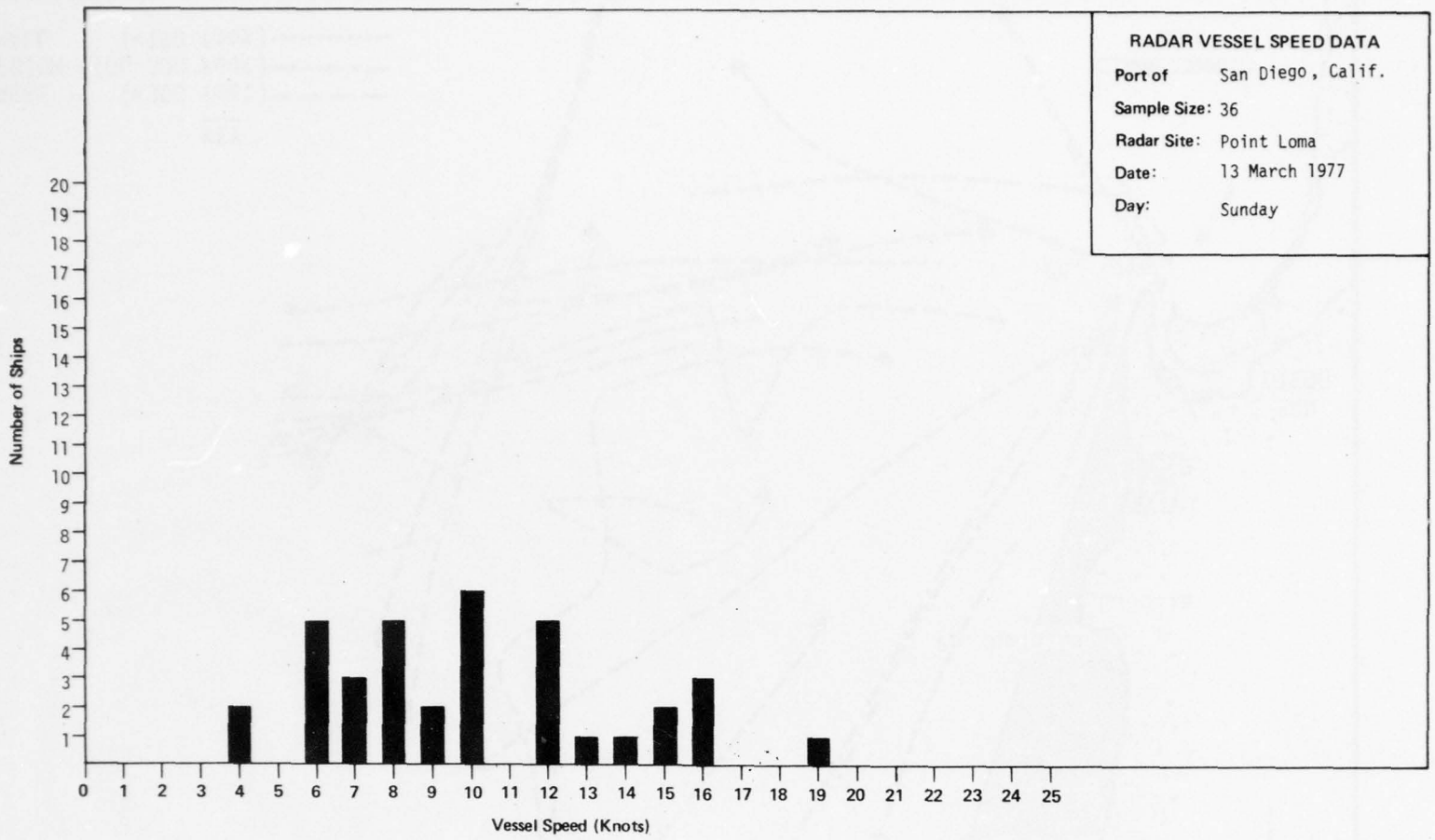

RADAR VESSEL SPEED DATA
Port of San Diego, Calif.
Sample Size: 36
Radar Site: Point Loma
Date: 13 March 1977
Day: Sunday
Number of Ships
Vessel Speed (Knots)

FIGURE 6-16

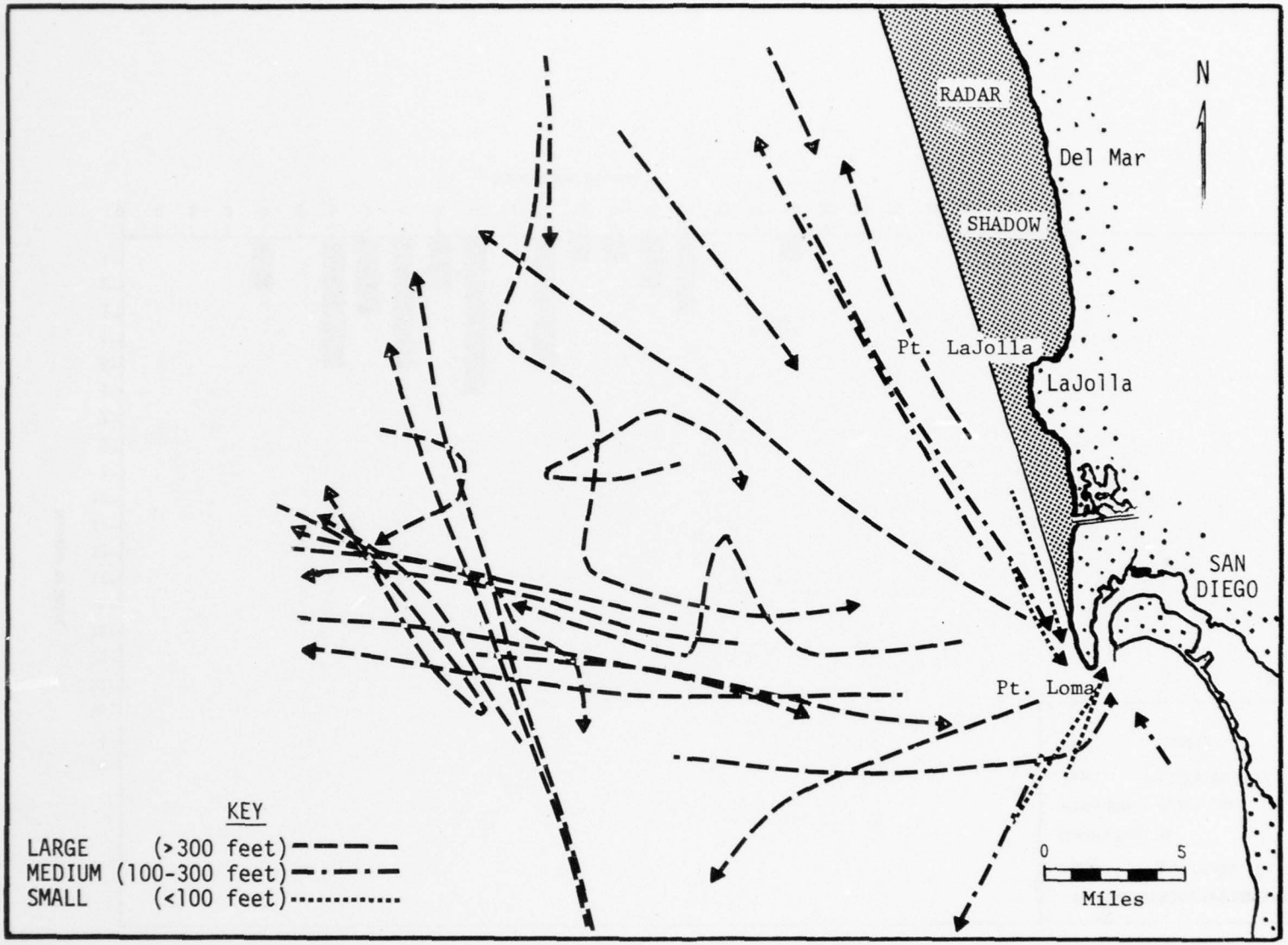


FIGURE 6-17: ROUTE IDENTIFICATION AT SAN DIEGO
1200-1600, WEDNESDAY, 9 MARCH 1977

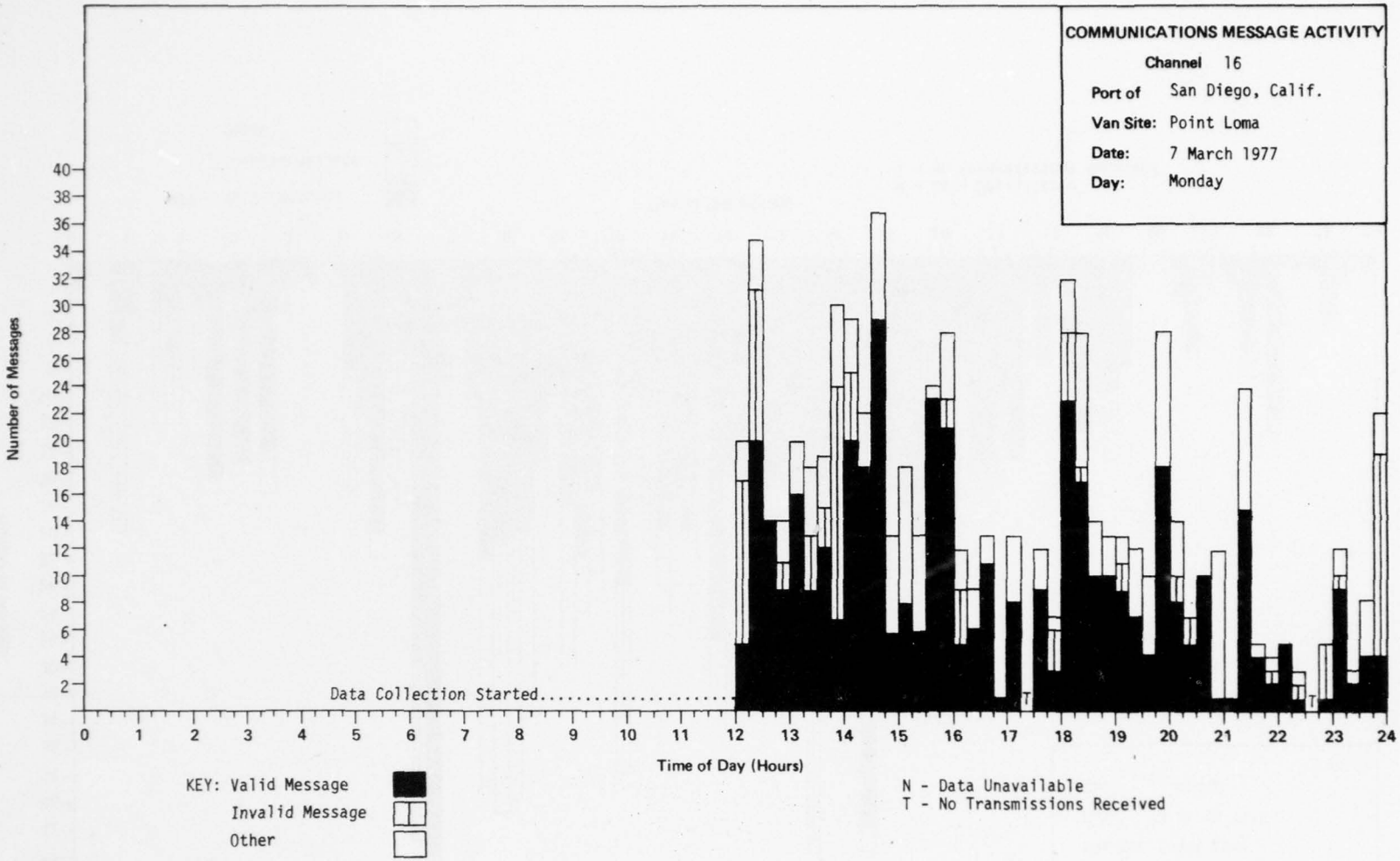

COMMUNICATIONS MESSAGE ACTIVITY
Channel 16
Port of San Diego, Calif.
Van Site: Point Loma
Date: 7 March 1977
Day: Monday
Number of Messages
Data Collection Started.....
Time of Day (Hours)
KEY: Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 6-18

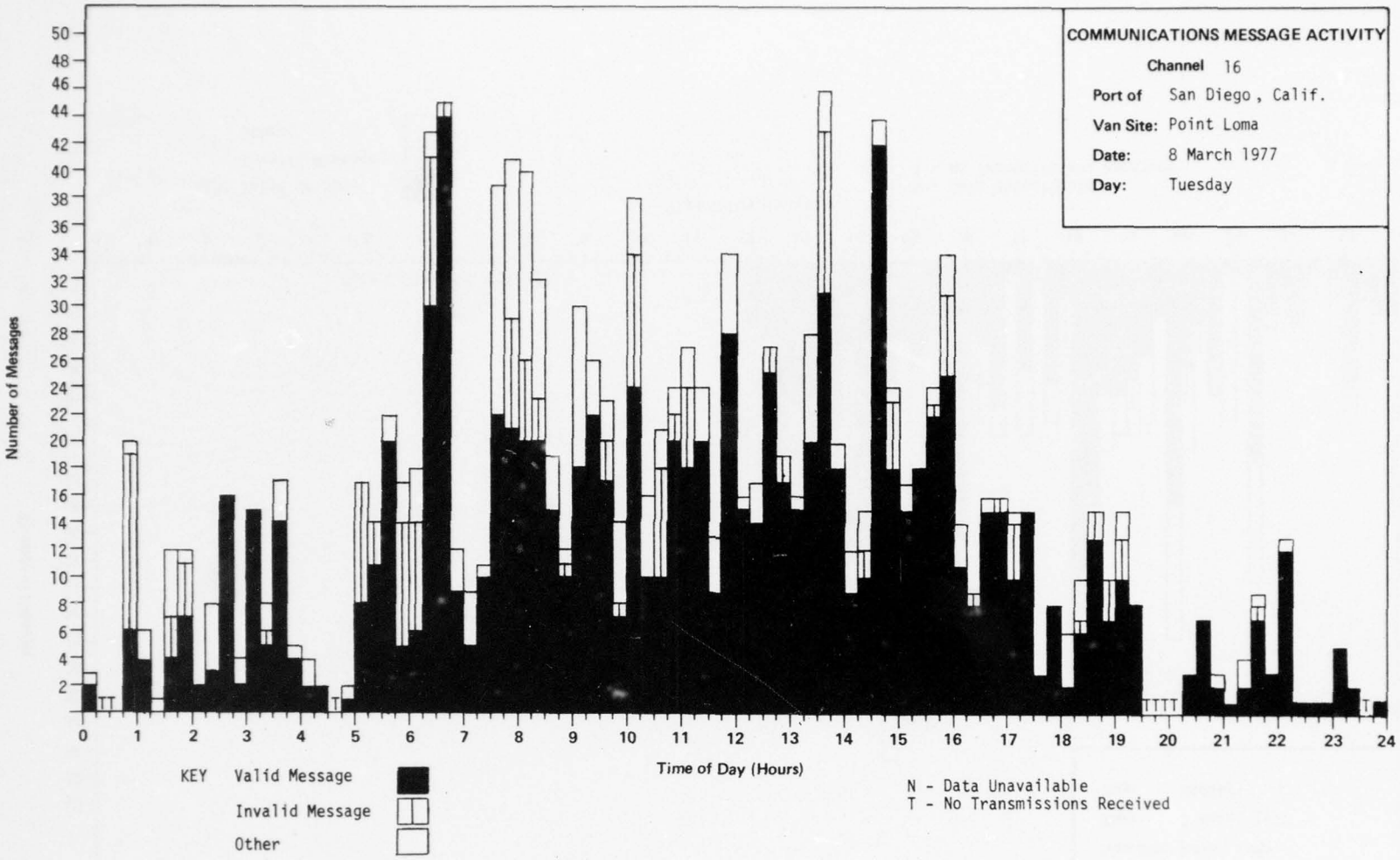

COMMUNICATIONS MESSAGE ACTIVITY
Channel 16
Port of San Diego, Calif.
Van Site: Point Loma
Date: 8 March 1977
Day: Tuesday
Number of Messages
Time of Day (Hours)
KEY Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 6-19

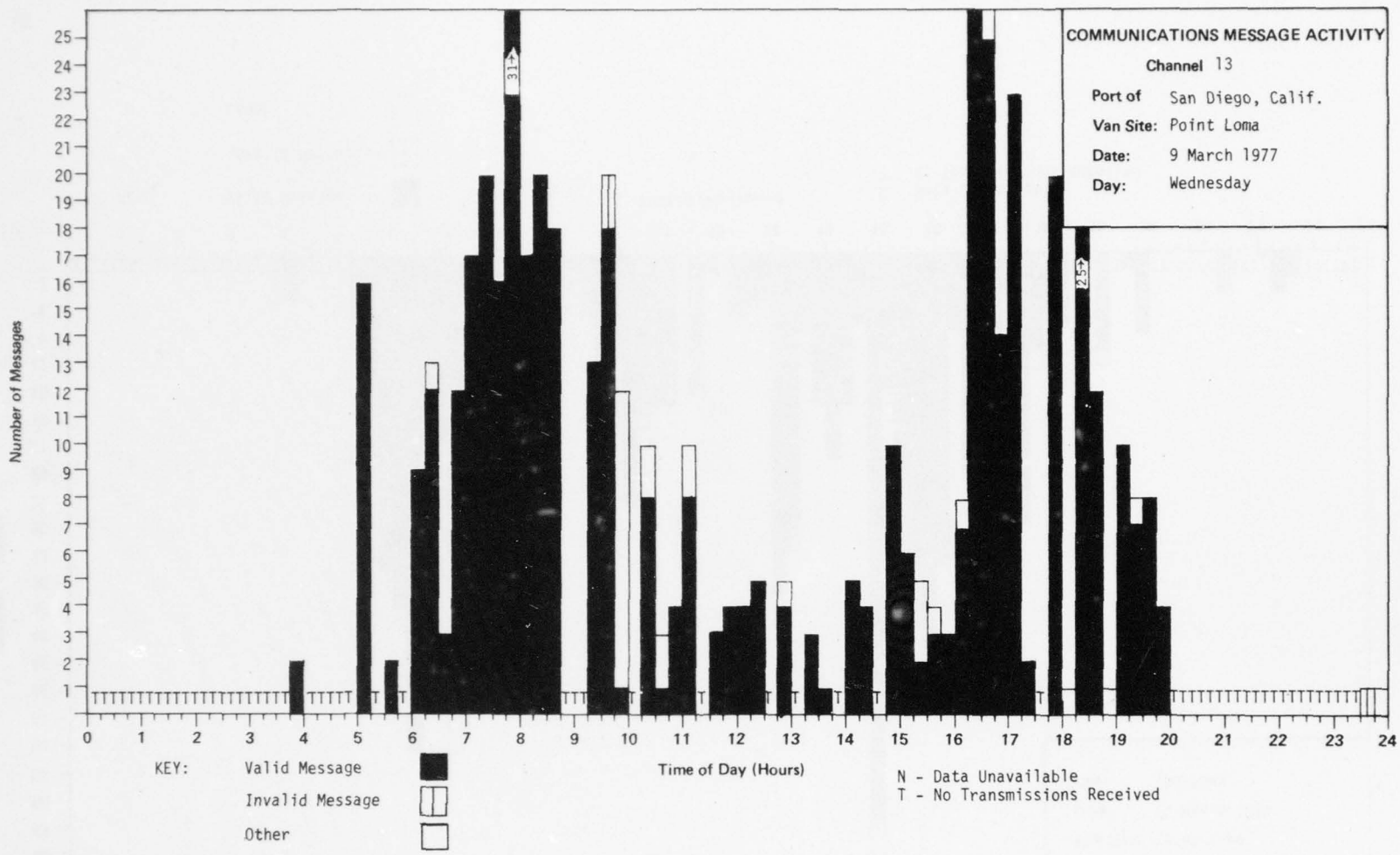

COMMUNICATIONS MESSAGE ACTIVITY
Channel 13
Port of San Diego, Calif.
Van Site: Point Loma
Date: 9 March 1977
Day: Wednesday
Number of Messages
Time of Day (Hours)
31
25
KEY:
Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 6-20

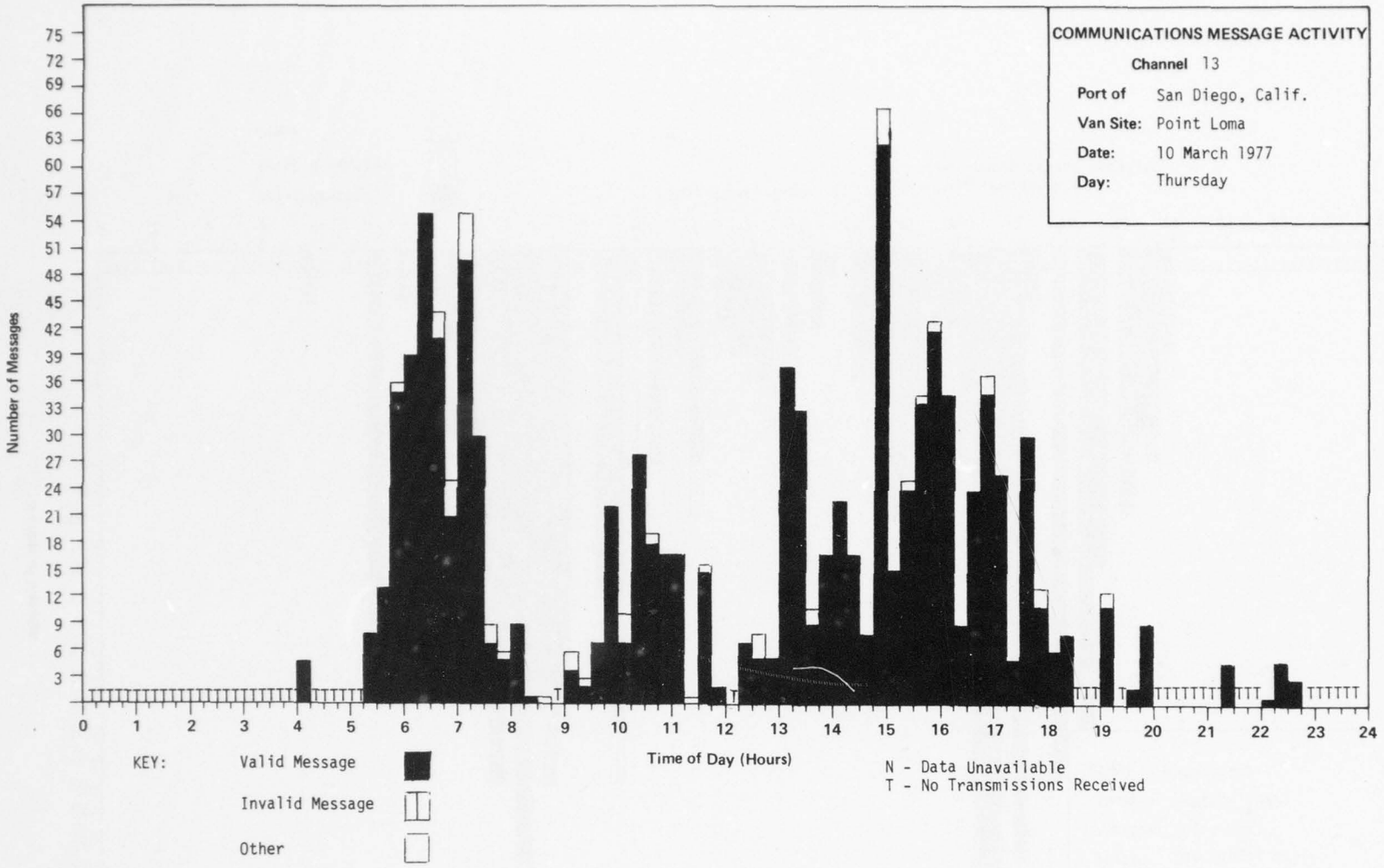

COMMUNICATIONS MESSAGE ACTIVITY
Channel 13
Port of San Diego, Calif.
Van Site: Point Loma
Date: 10 March 1977
Day: Thursday
Number of Messages
75
72
69
66
63
60
57
54
51
48
45
42
39
36
33
30
27
24
21
18
15
12
9
6
3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time of Day (Hours)
KEY:
Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 6-21

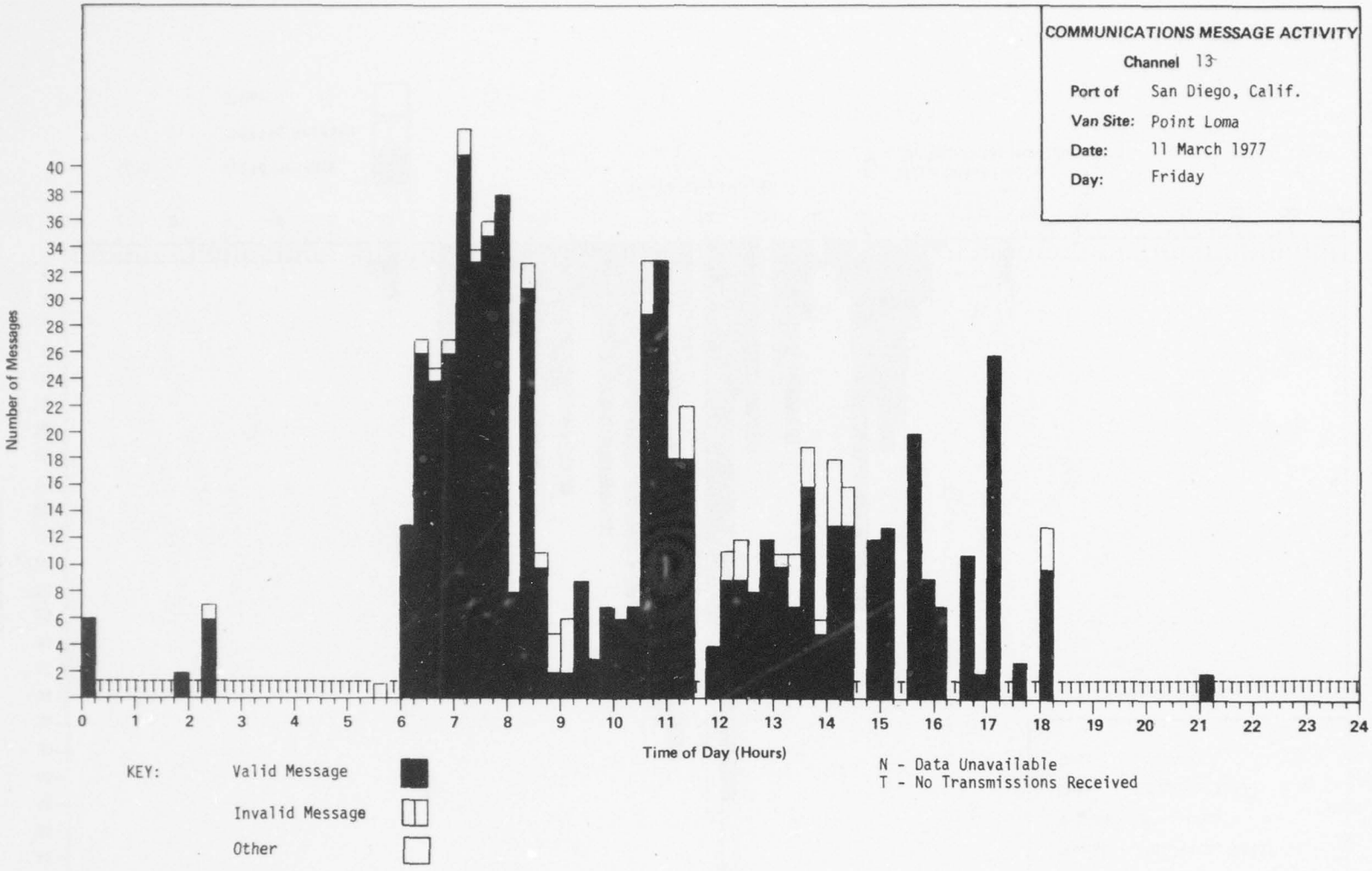

COMMUNICATIONS MESSAGE ACTIVITY
Channel 13
Port of San Diego, Calif.
Van Site: Point Loma
Date: 11 March 1977
Day: Friday
Number of Messages
Time of Day (Hours)
KEY:
Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 6-22

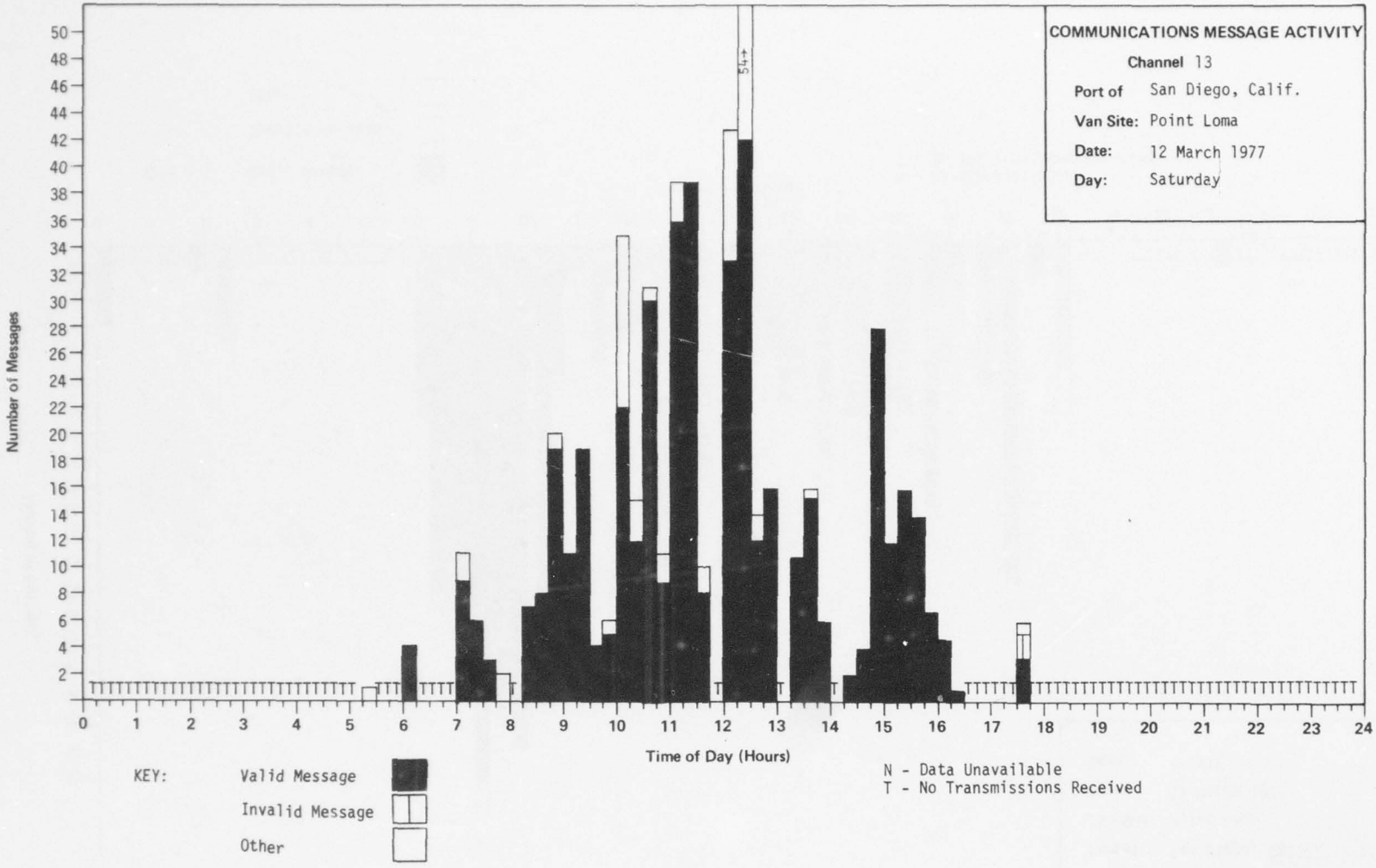
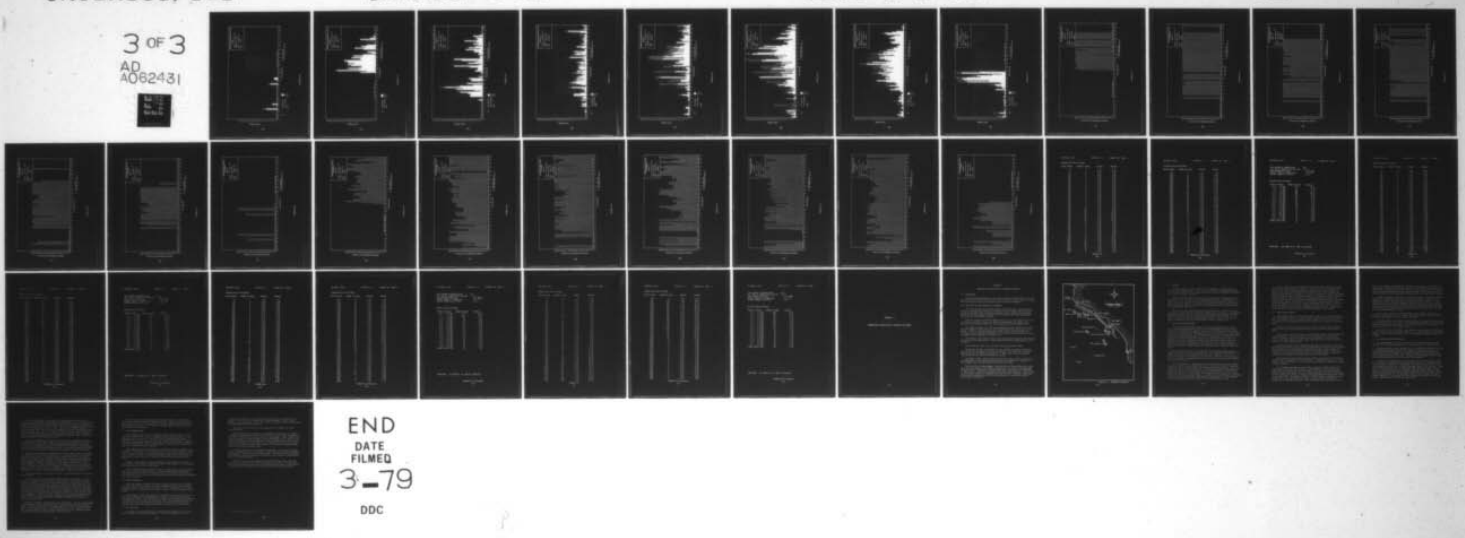

COMMUNICATIONS MESSAGE ACTIVITY
Channel 13
Port of San Diego, Calif.
Van Site: Point Loma
Date: 12 March 1977
Day: Saturday
Number of Messages
Time of Day (Hours)
544
KEY:
Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 6-23

AD-A062 431 COAST GUARD RESEARCH AND DEVELOPMENT CENTER GROTON CONN F/G 13/10
MARINE TRAFFIC DATA OF SOUTHERN CALIFORNIA.(U)
FEB 78 J J CHERNY, D E WATSON, R A SILVA

UNCLASSIFIED CGR/DC-4/78 USCG-D-6-78 NL

3 OF 3
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3-79
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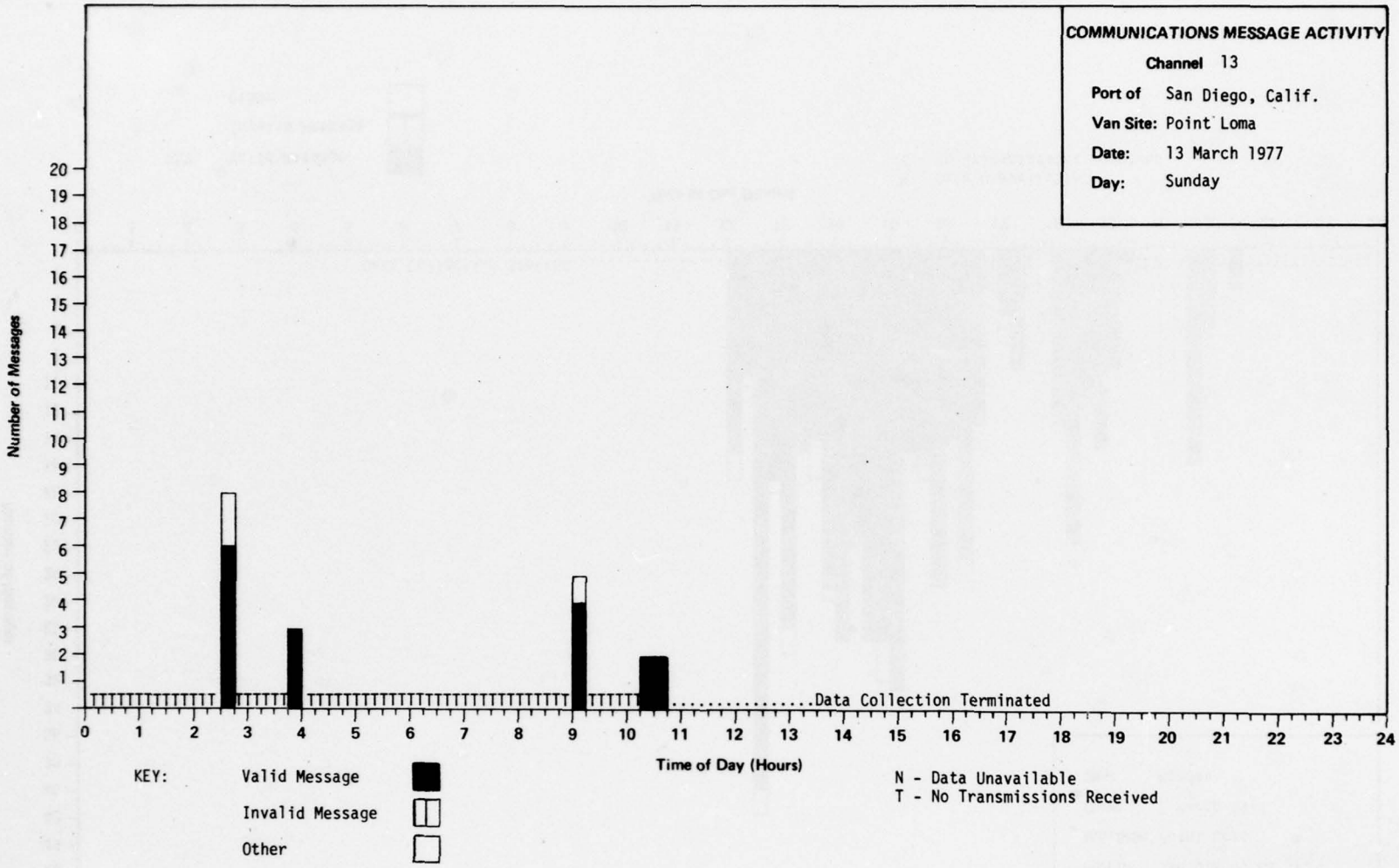

COMMUNICATIONS MESSAGE ACTIVITY
Channel 13
Port of San Diego, Calif.
Van Site: Point Loma
Date: 13 March 1977
Day: Sunday
Number of Messages
Time of Day (Hours)
Data Collection Terminated
KEY:
Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 6-24

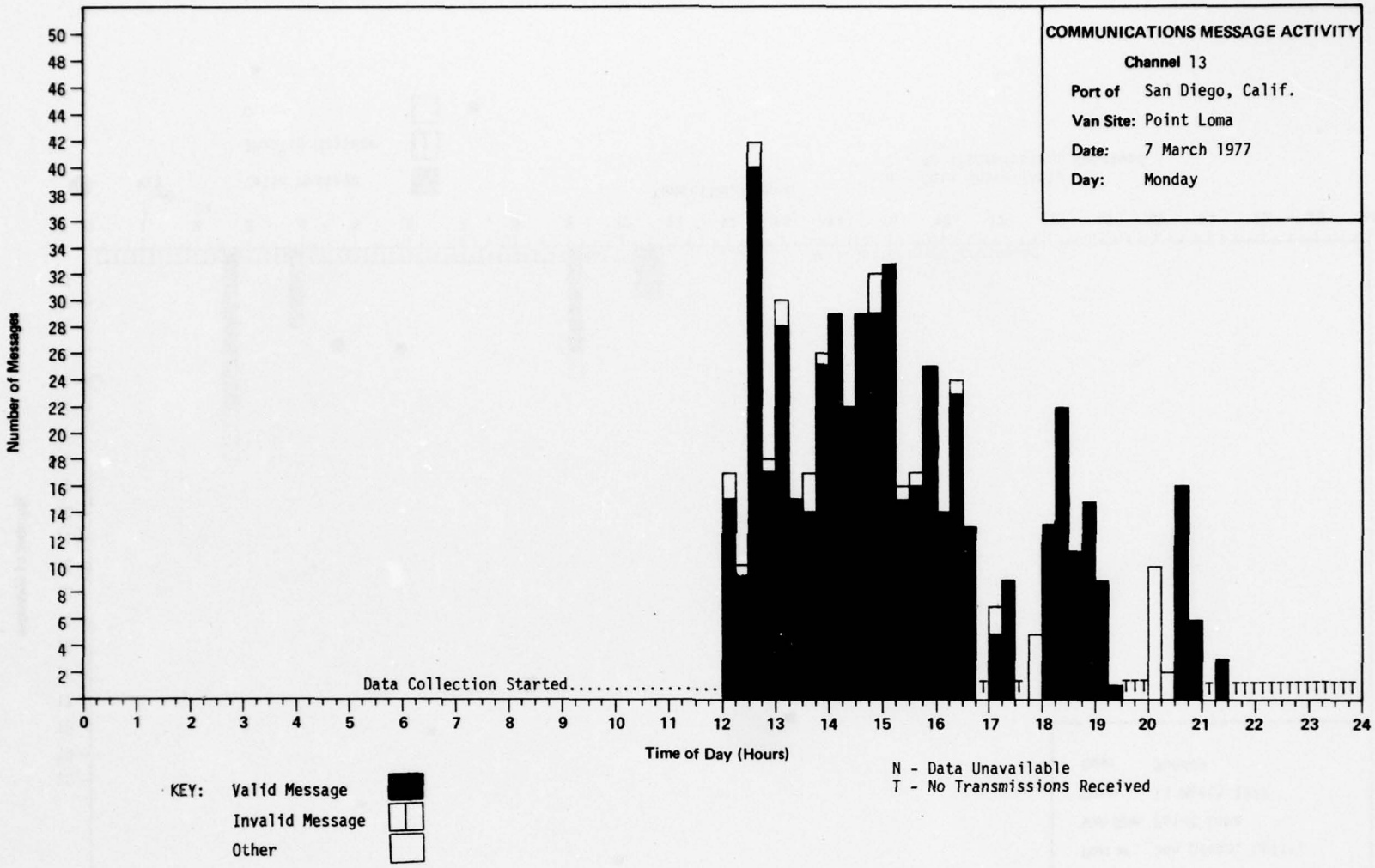

COMMUNICATIONS MESSAGE ACTIVITY
Channel 13
Port of San Diego, Calif.
Van Site: Point Loma
Date: 7 March 1977
Day: Monday
Number of Messages
Time of Day (Hours)
Data Collection Started.....
KEY: Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 6-25

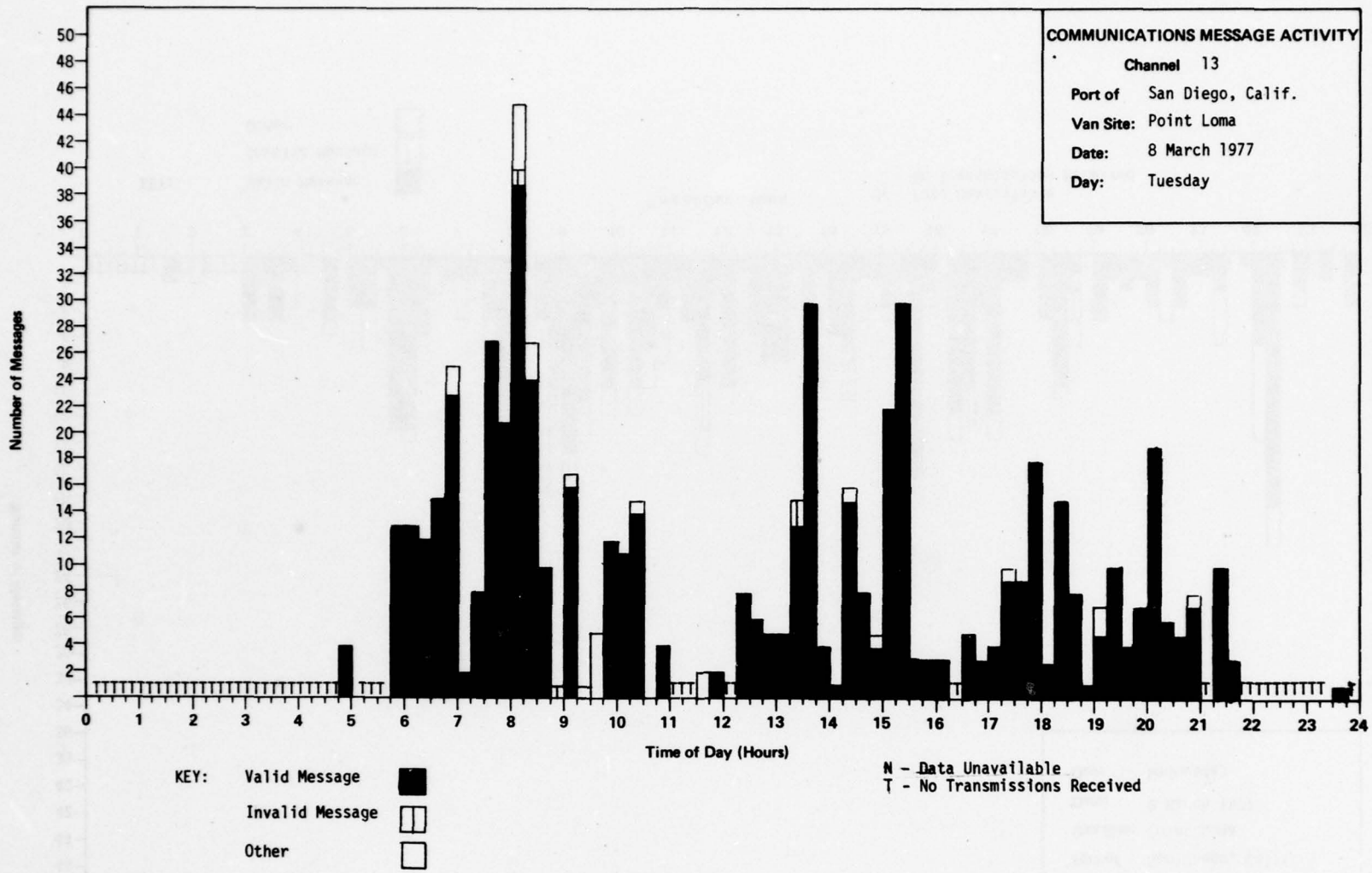

COMMUNICATIONS MESSAGE ACTIVITY
Channel 13
Port of San Diego, Calif.
Van Site: Point Loma
Date: 8 March 1977
Day: Tuesday
Number of Messages
Time of Day (Hours)
KEY: Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 6-26

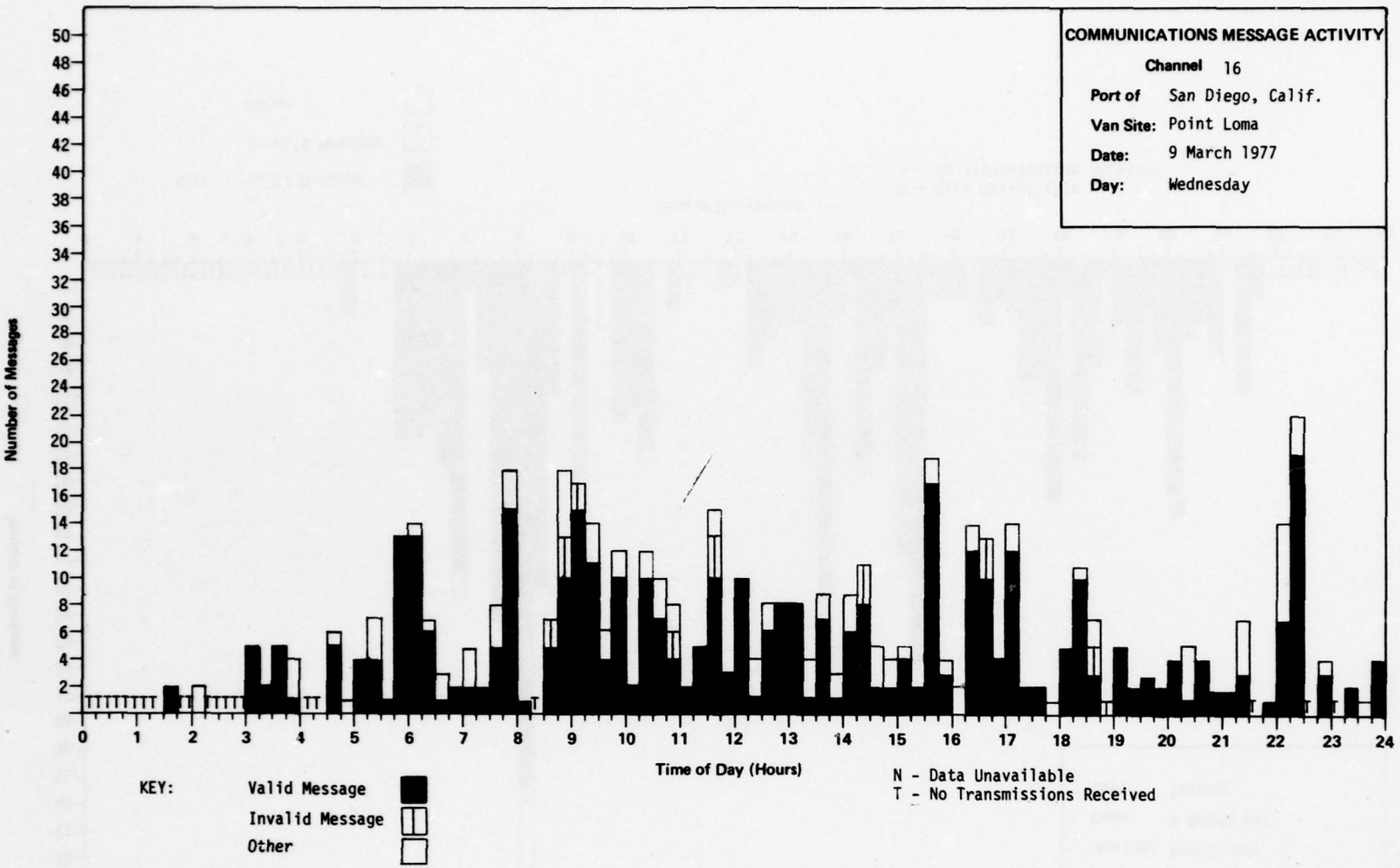

COMMUNICATIONS MESSAGE ACTIVITY
Channel 16
Port of San Diego, Calif.
Van Site: Point Loma
Date: 9 March 1977
Day: Wednesday
Number of Messages
Time of Day (Hours)
KEY:
Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 6-27

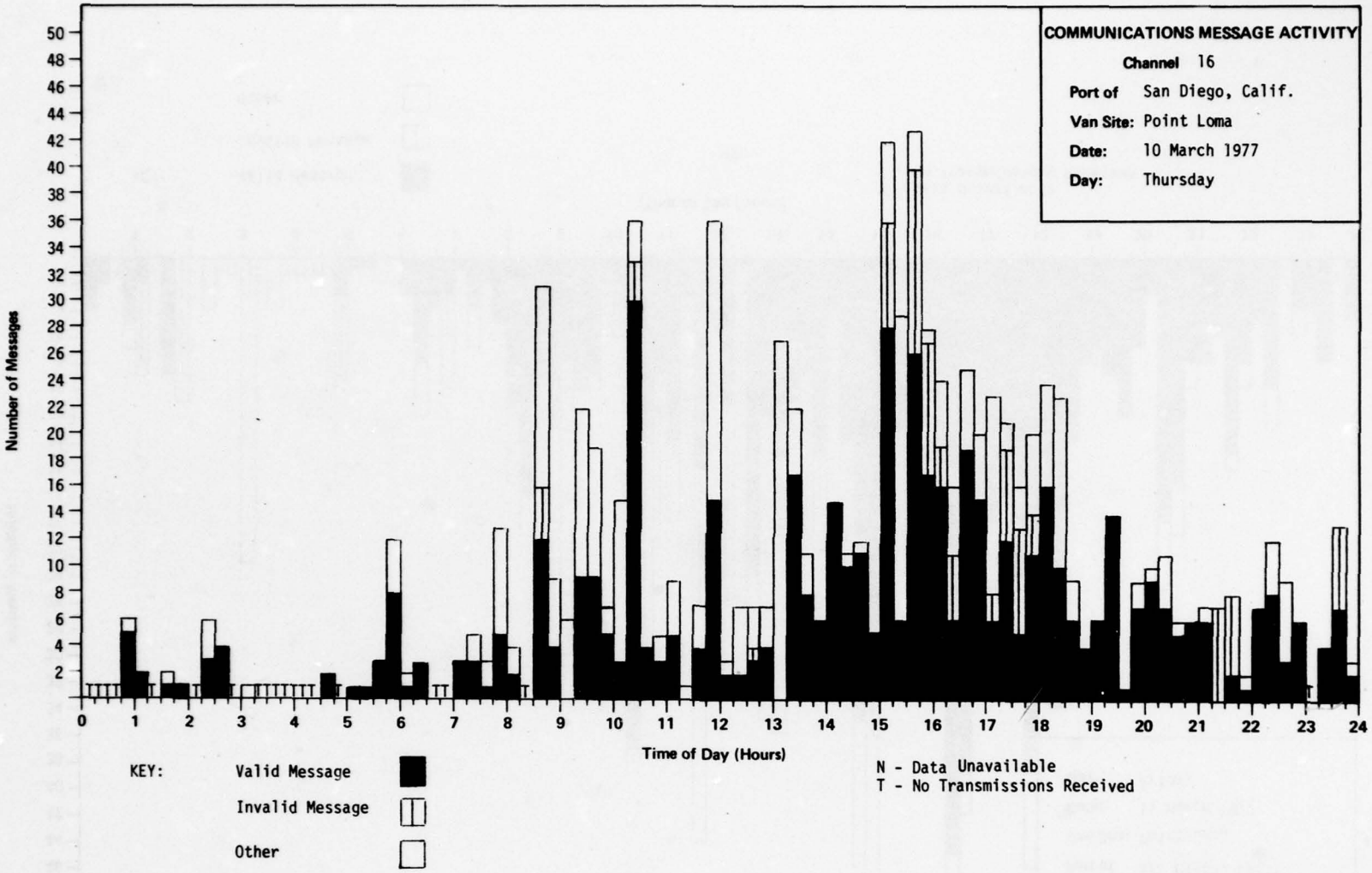

COMMUNICATIONS MESSAGE ACTIVITY
Channel 16
Port of San Diego, Calif.
Van Site: Point Loma
Date: 10 March 1977
Day: Thursday
Number of Messages
Time of Day (Hours)
KEY:
Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 6-28

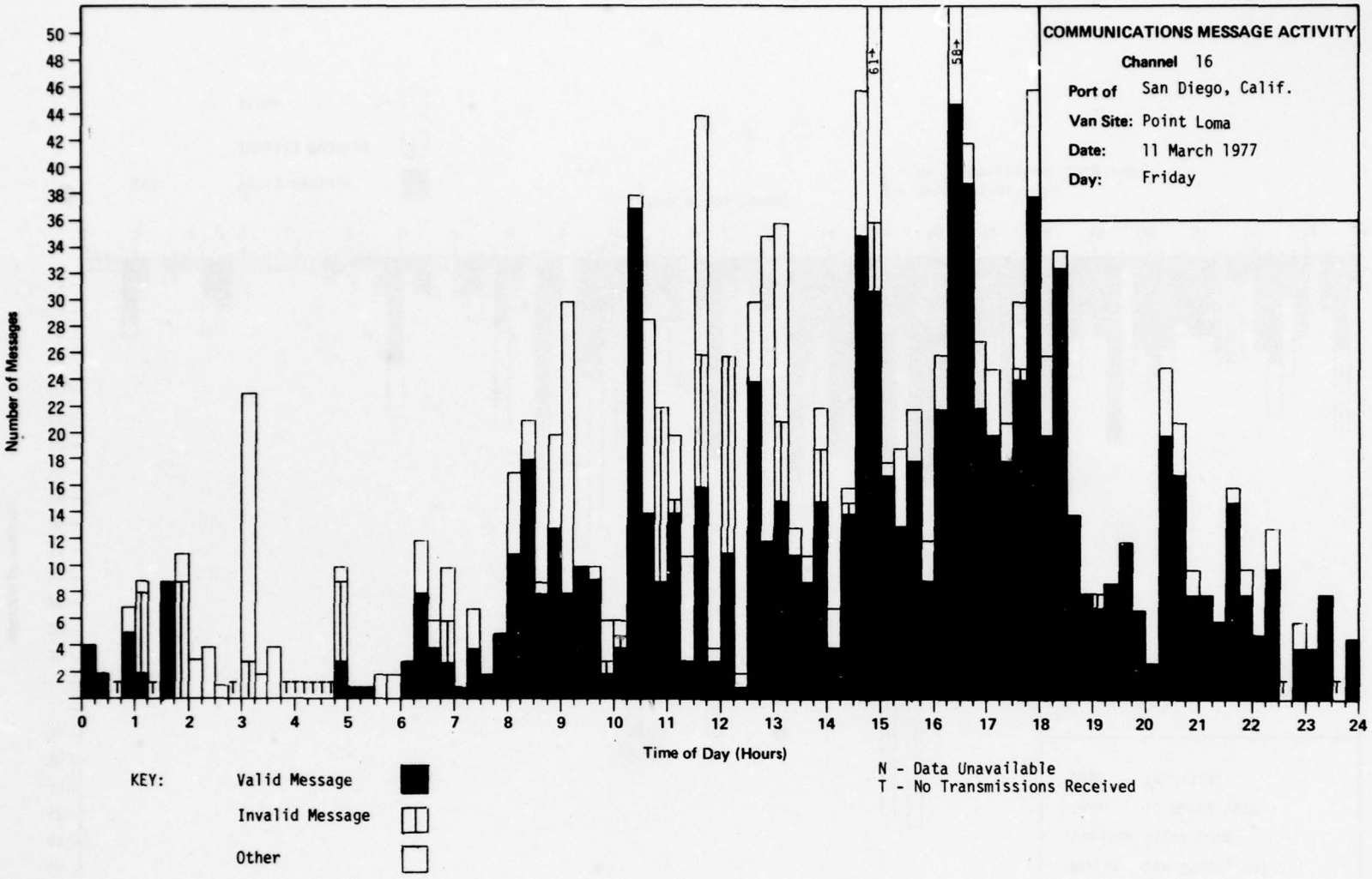

COMMUNICATIONS MESSAGE ACTIVITY
Channel 16
Port of San Diego, Calif.
Van Site: Point Loma
Date: 11 March 1977
Day: Friday
Number of Messages
Time of Day (Hours)
KEY:
Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 6-29

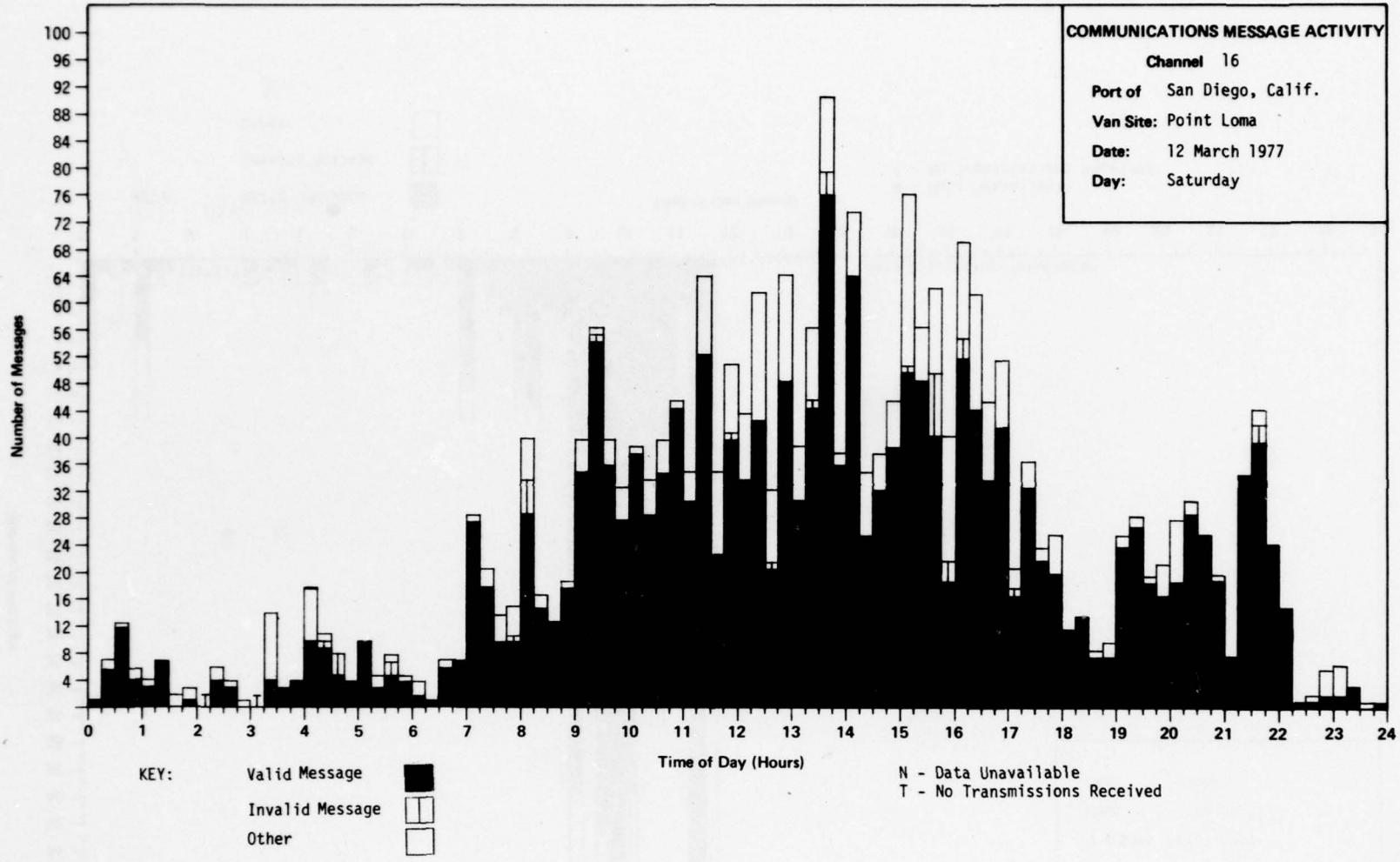

COMMUNICATIONS MESSAGE ACTIVITY
Channel 16
Port of San Diego, Calif.
Van Site: Point Loma
Date: 12 March 1977
Day: Saturday
Number of Messages
Time of Day (Hours)
KEY:
Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 6-30

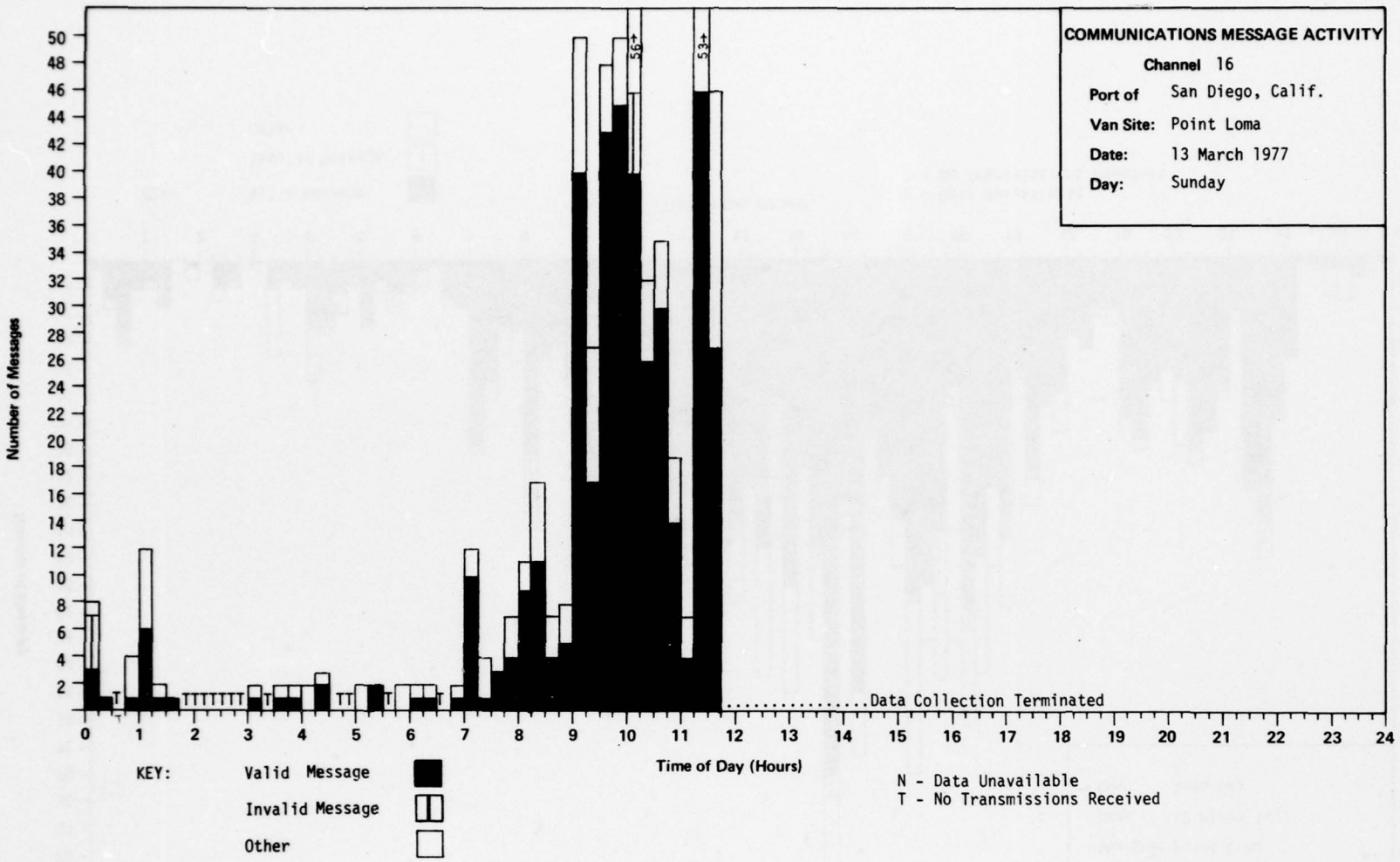

COMMUNICATIONS MESSAGE ACTIVITY
Channel 16
Port of San Diego, Calif.
Van Site: Point Loma
Date: 13 March 1977
Day: Sunday
Number of Messages
Time of Day (Hours)
56
53
Data Collection Terminated
KEY:
Valid Message
Invalid Message
Other
N - Data Unavailable
T - No Transmissions Received

FIGURE 6-31

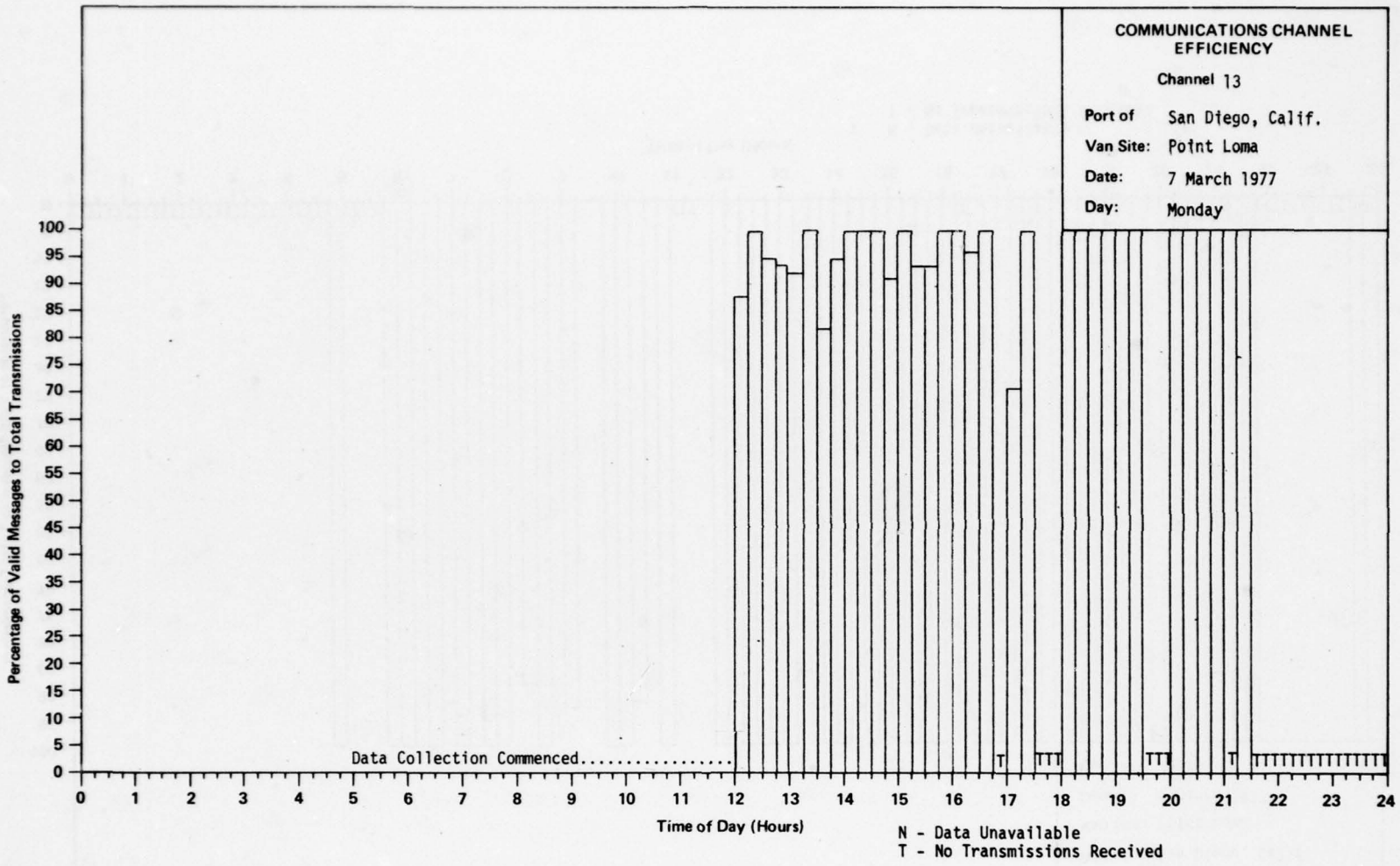

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 13
Port of San Diego, Calif.
Van Site: Point Loma
Date: 7 March 1977
Day: Monday
Percentage of Valid Messages to Total Transmissions
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
Data Collection Commenced.....
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 6-32

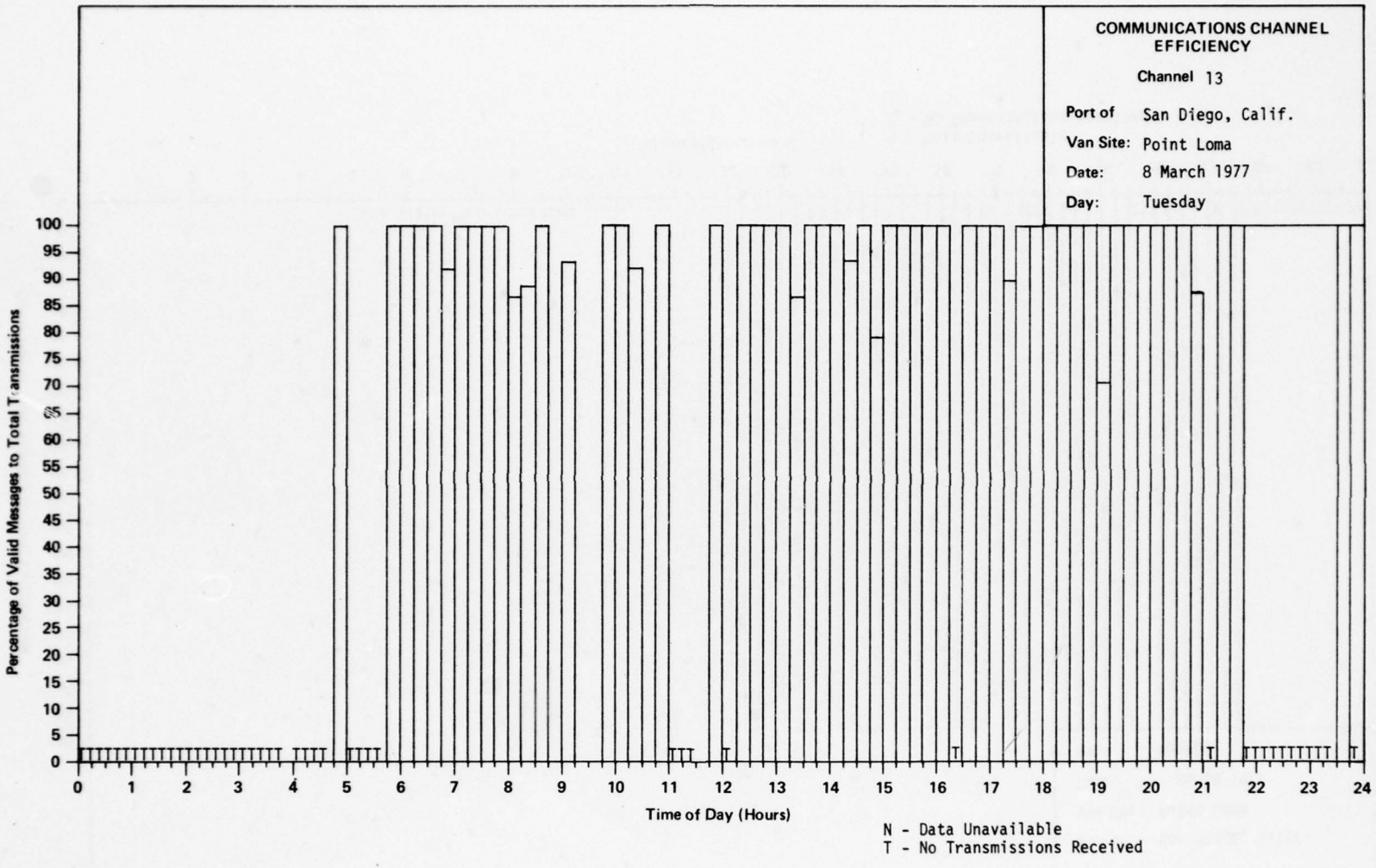

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 13
Port of San Diego, Calif.
Van Site: Point Loma
Date: 8 March 1977
Day: Tuesday
Percentage of Valid Messages to Total Transmissions
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 6-33

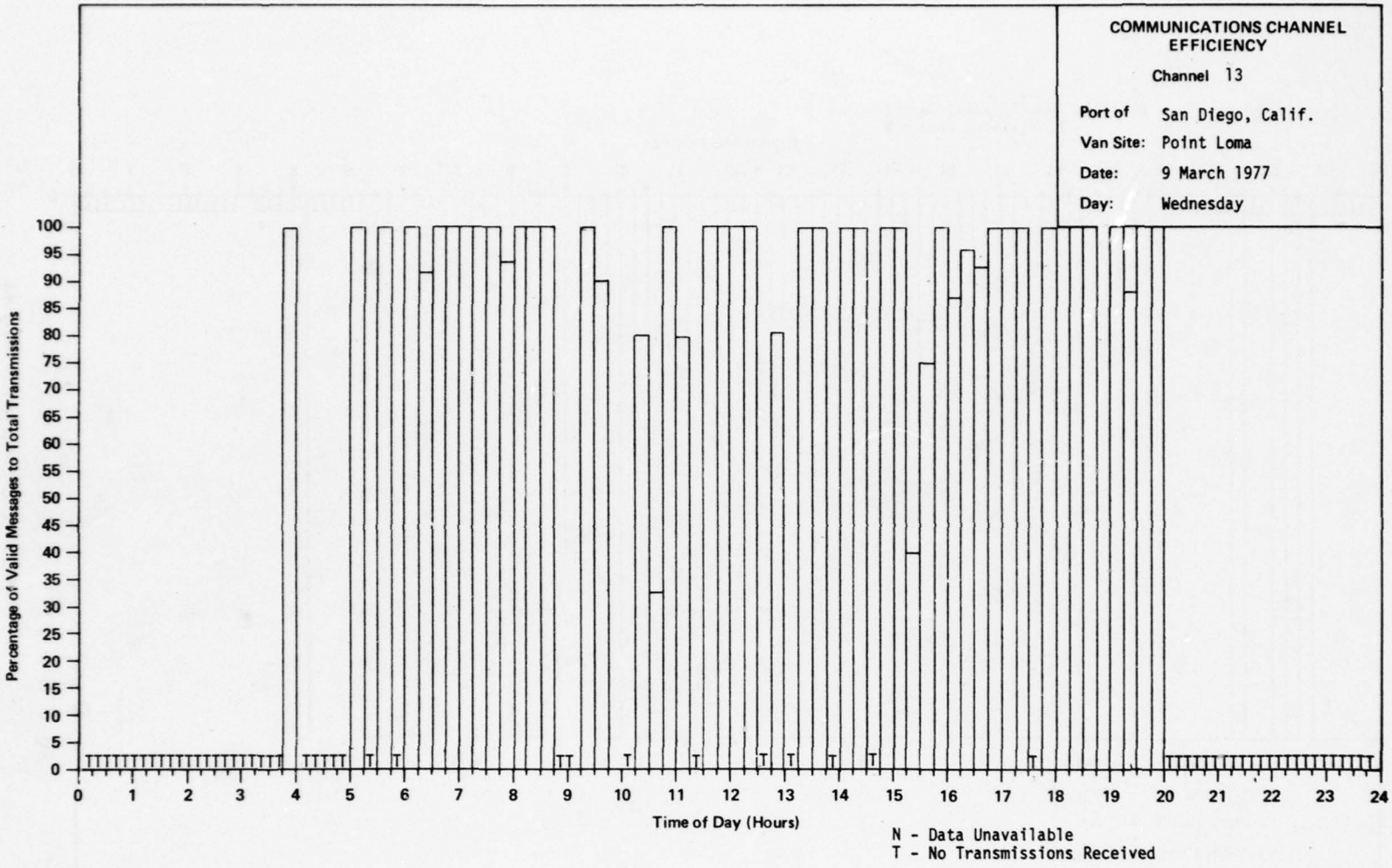

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 13
Port of San Diego, Calif.
Van Site: Point Loma
Date: 9 March 1977
Day: Wednesday
Percentage of Valid Messages to Total Transmissions
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 6-34

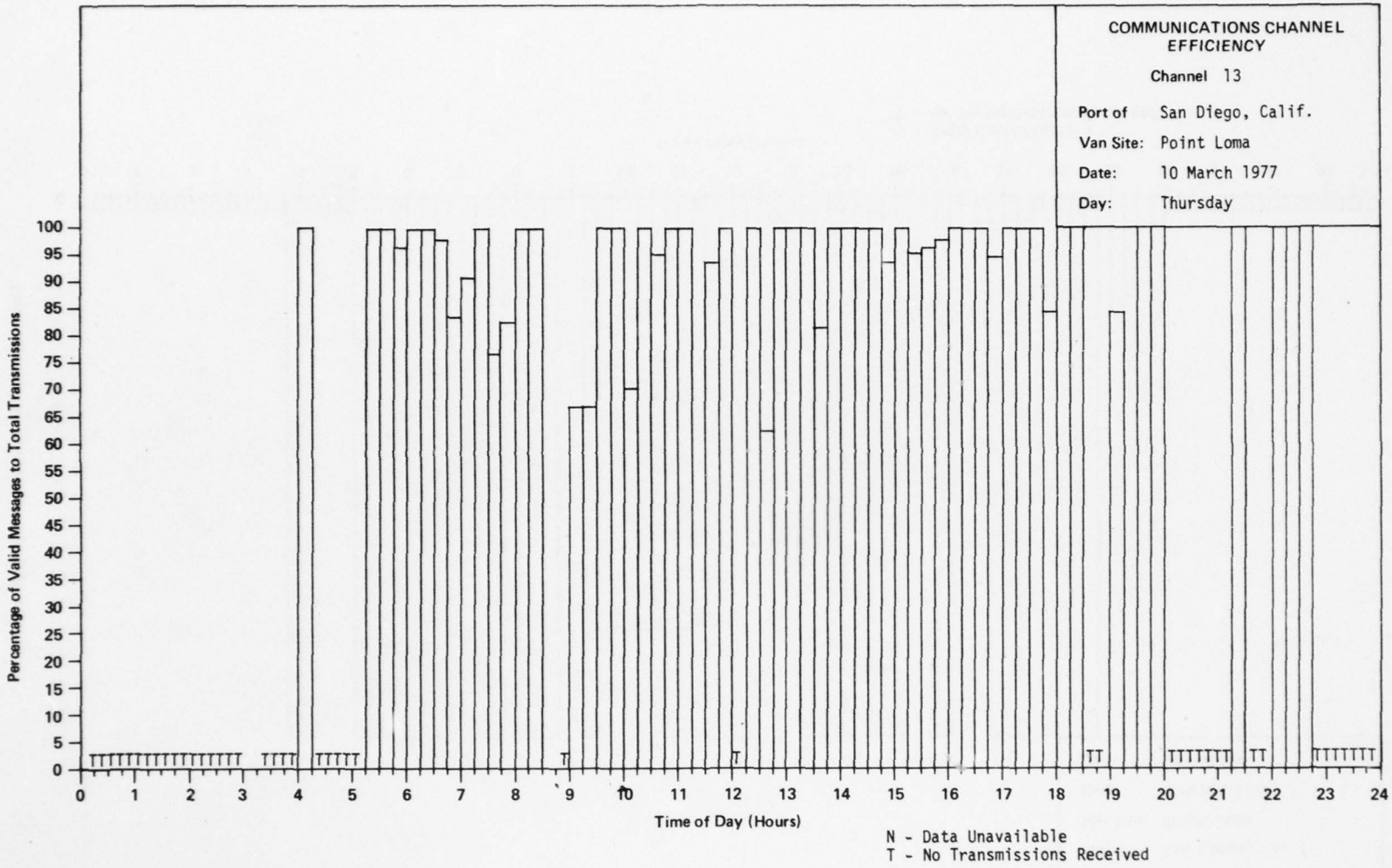

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 13
Port of San Diego, Calif.
Van Site: Point Loma
Date: 10 March 1977
Day: Thursday
Percentage of Valid Messages to Total Transmissions
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 6-35

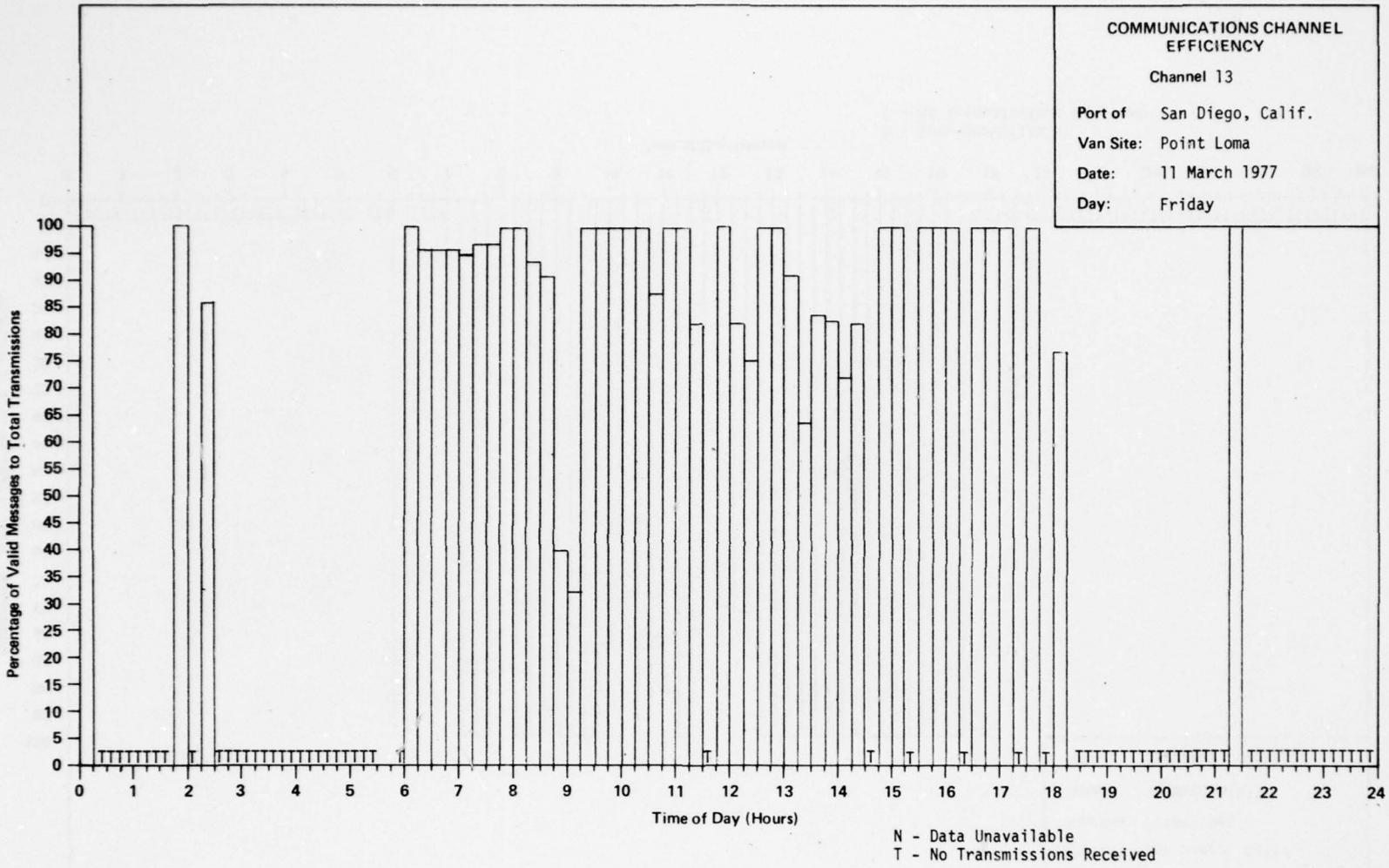

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 13
Port of San Diego, Calif.
Van Site: Point Loma
Date: 11 March 1977
Day: Friday
Percentage of Valid Messages to Total Transmissions
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 6-36

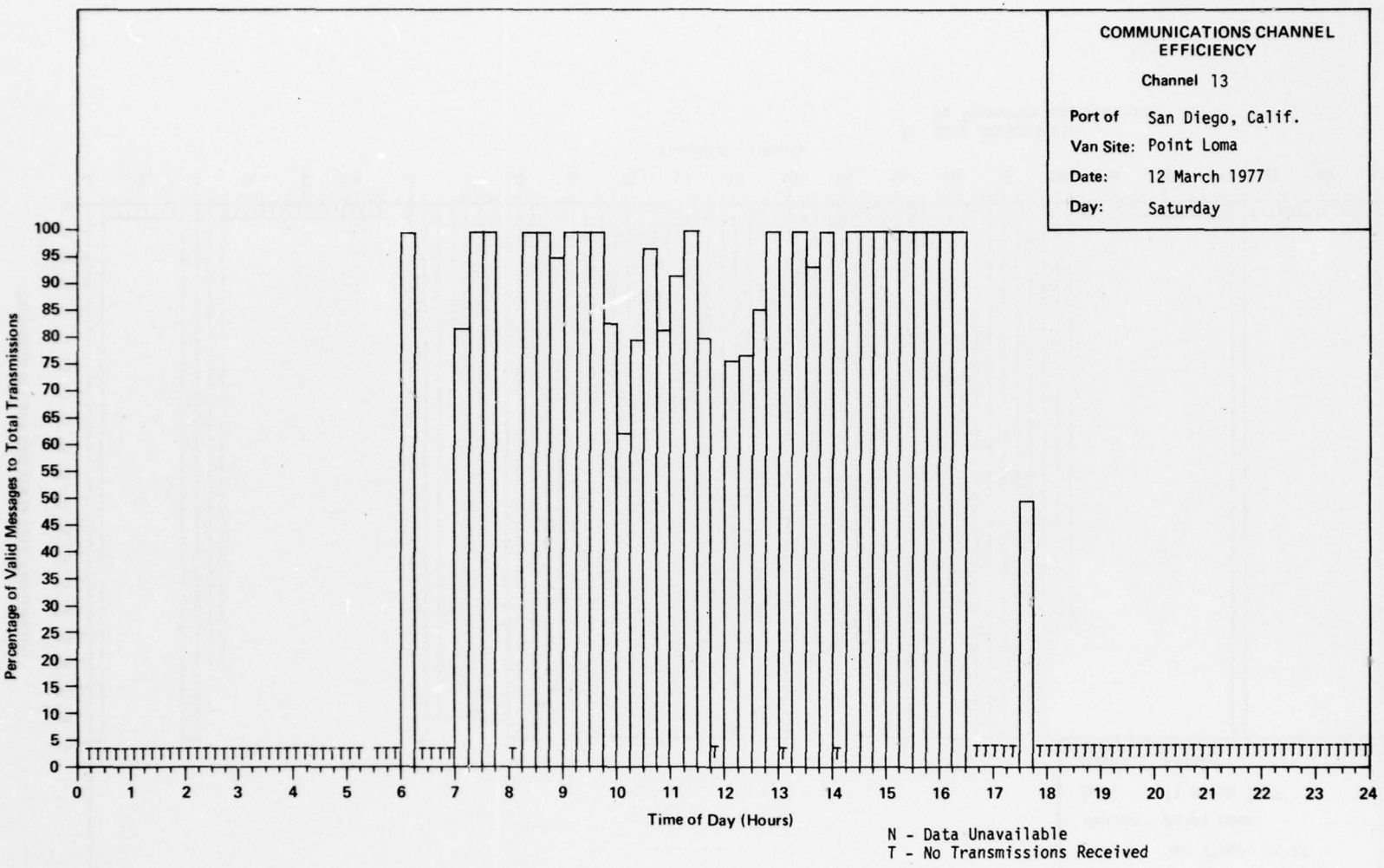
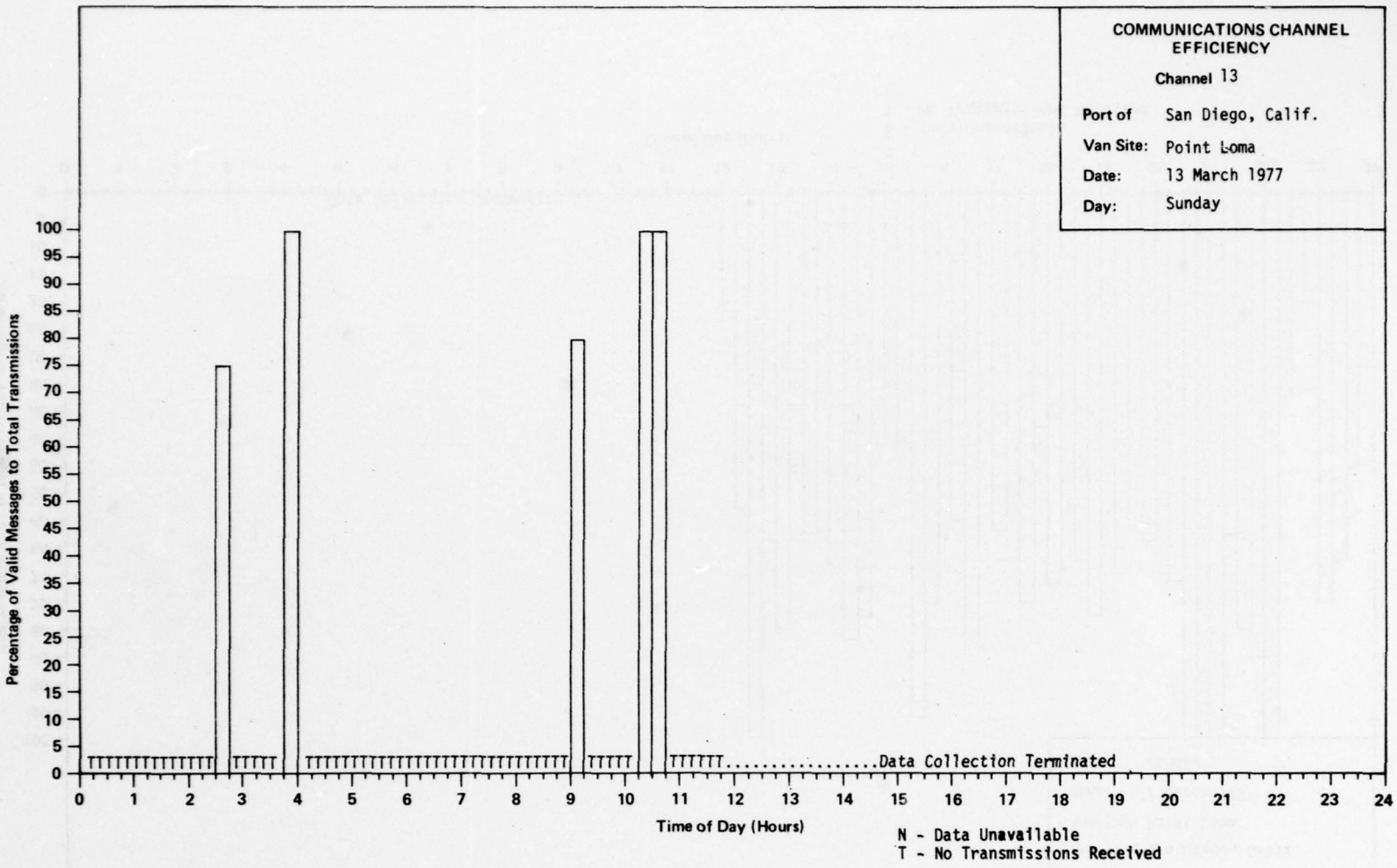

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 13
Port of San Diego, Calif.
Van Site: Point Loma
Date: 12 March 1977
Day: Saturday
Percentage of Valid Messages to Total Transmissions
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 6-37


COMMUNICATIONS CHANNEL EFFICIENCY
Channel 13
Port of San Diego, Calif.
Van Site: Point Loma
Date: 13 March 1977
Day: Sunday
Percentage of Valid Messages to Total Transmissions
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
TTTTTTTTTTTTTTT
TTTTT
TTTTTTTTTTTTTT

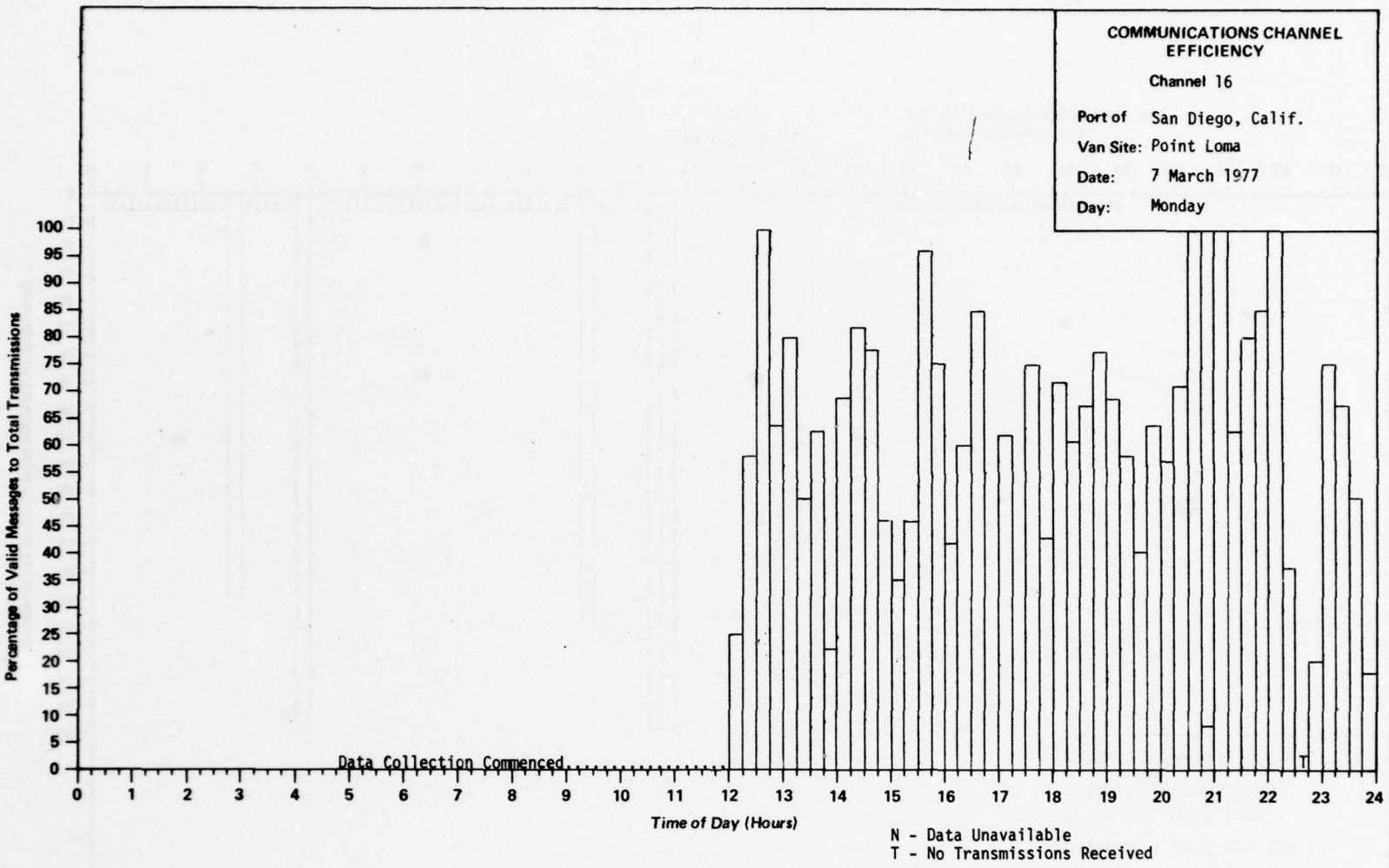

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 16
Port of San Diego, Calif.
Van Site: Point Loma
Date: 7 March 1977
Day: Monday
Percentage of Valid Messages to Total Transmissions
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
Data Collection Commenced
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 6-39

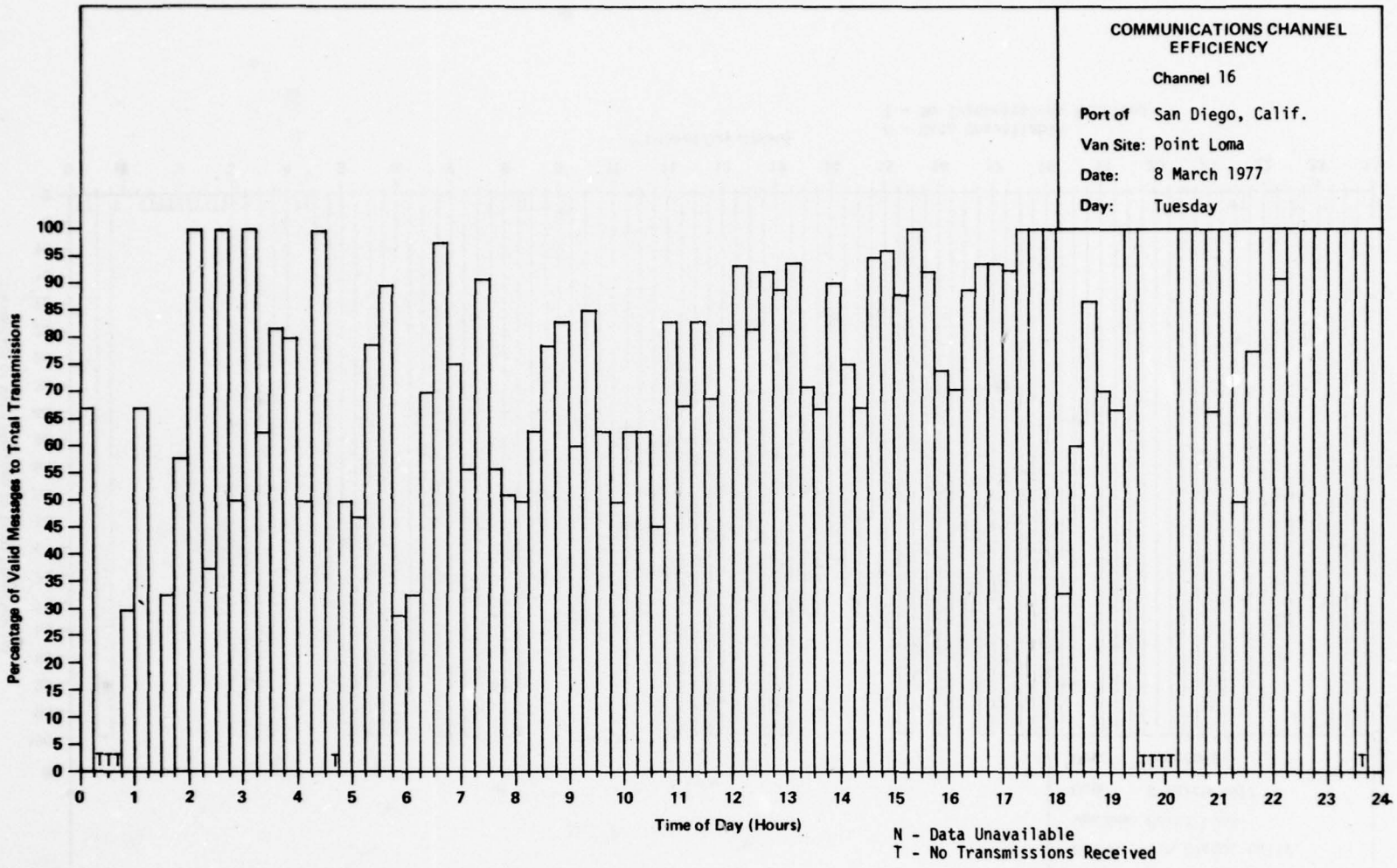

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 16
Port of San Diego, Calif.
Van Site: Point Loma
Date: 8 March 1977
Day: Tuesday
Percentage of Valid Messages to Total Transmissions
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 6-40

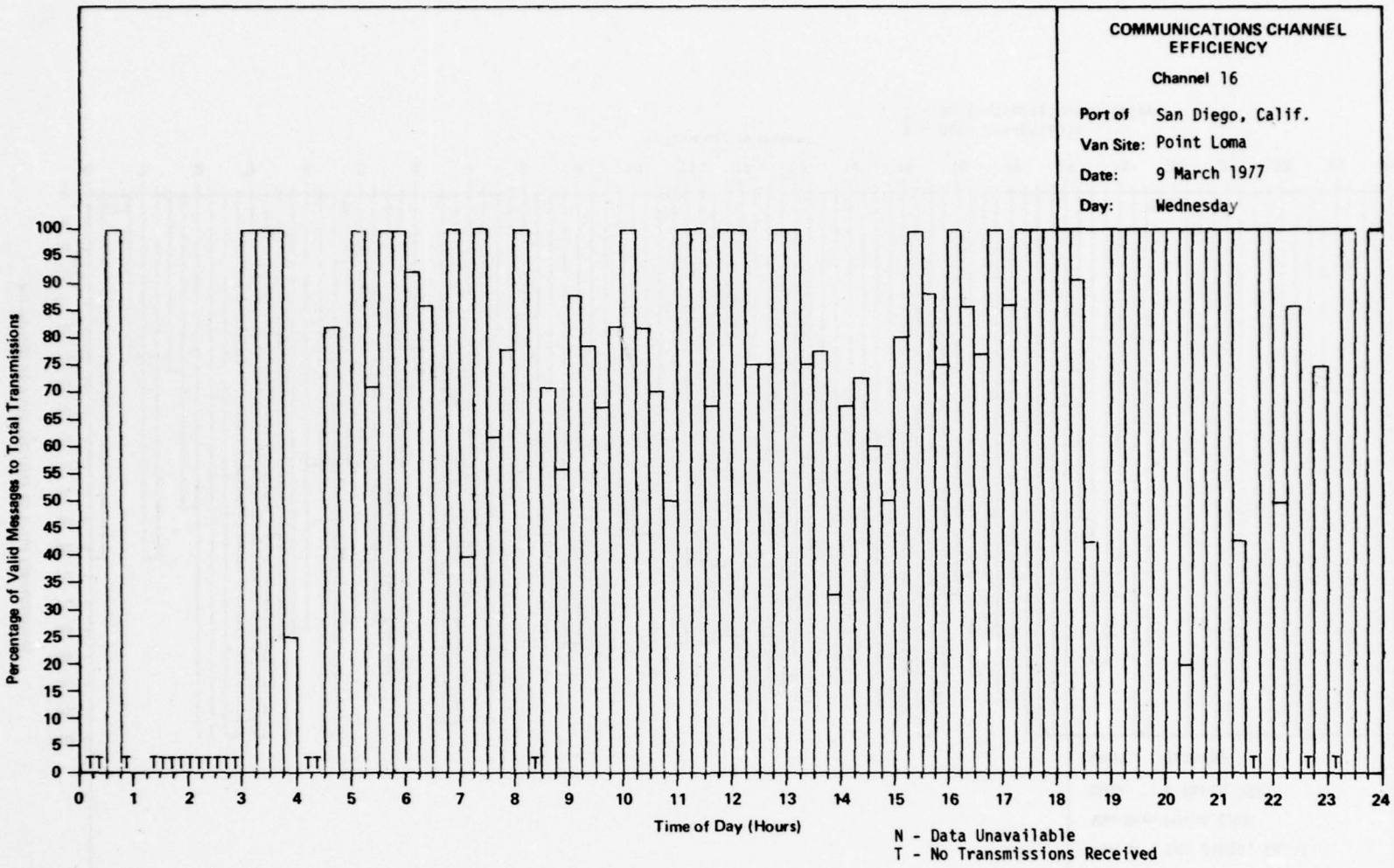

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 16
Port of San Diego, Calif.
Van Site: Point Loma
Date: 9 March 1977
Day: Wednesday
Percentage of Valid Messages to Total Transmissions
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 6-41

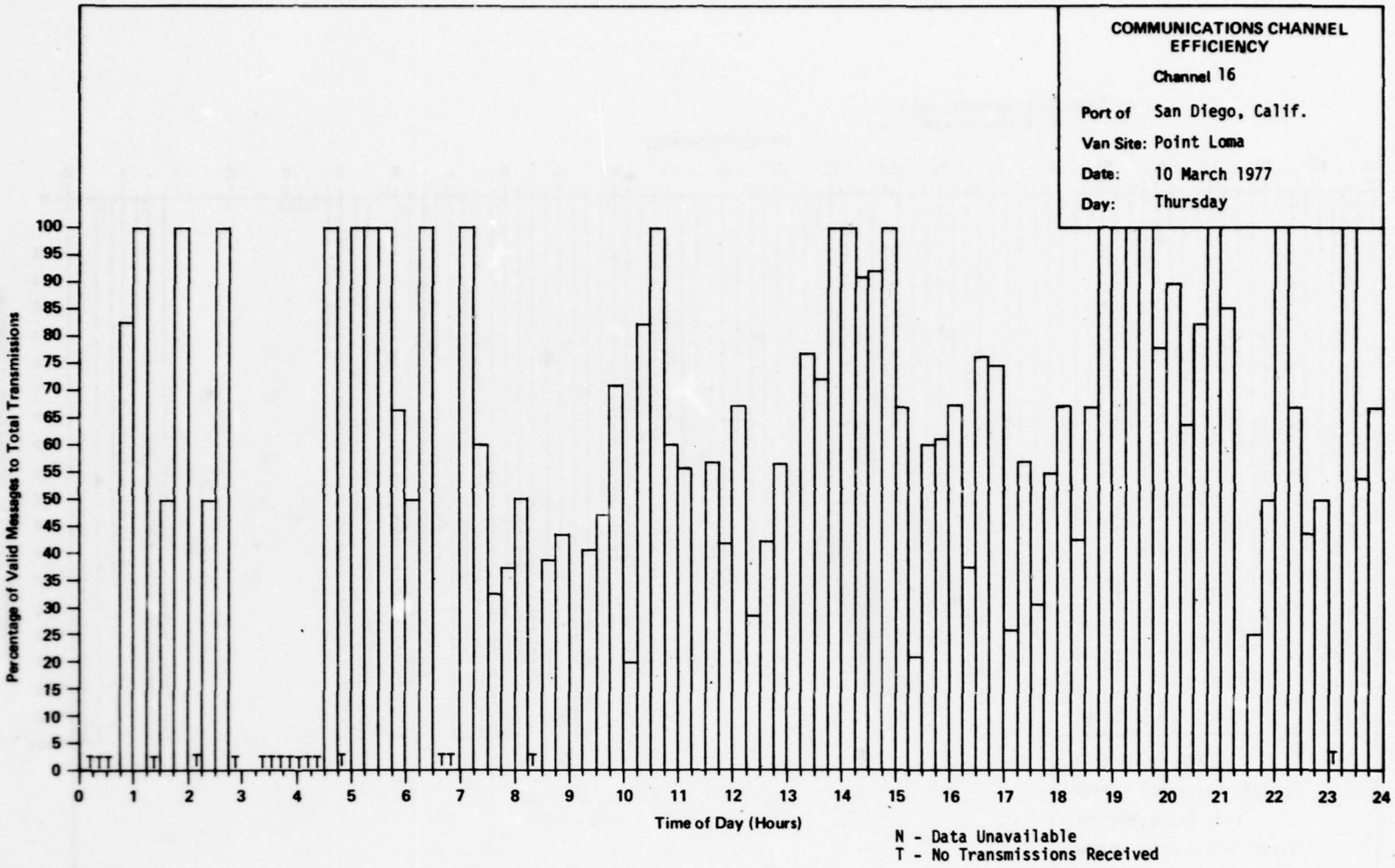

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 16
Port of San Diego, Calif.
Van Site: Point Loma
Date: 10 March 1977
Day: Thursday
Percentage of Valid Messages to Total Transmissions
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 6-42

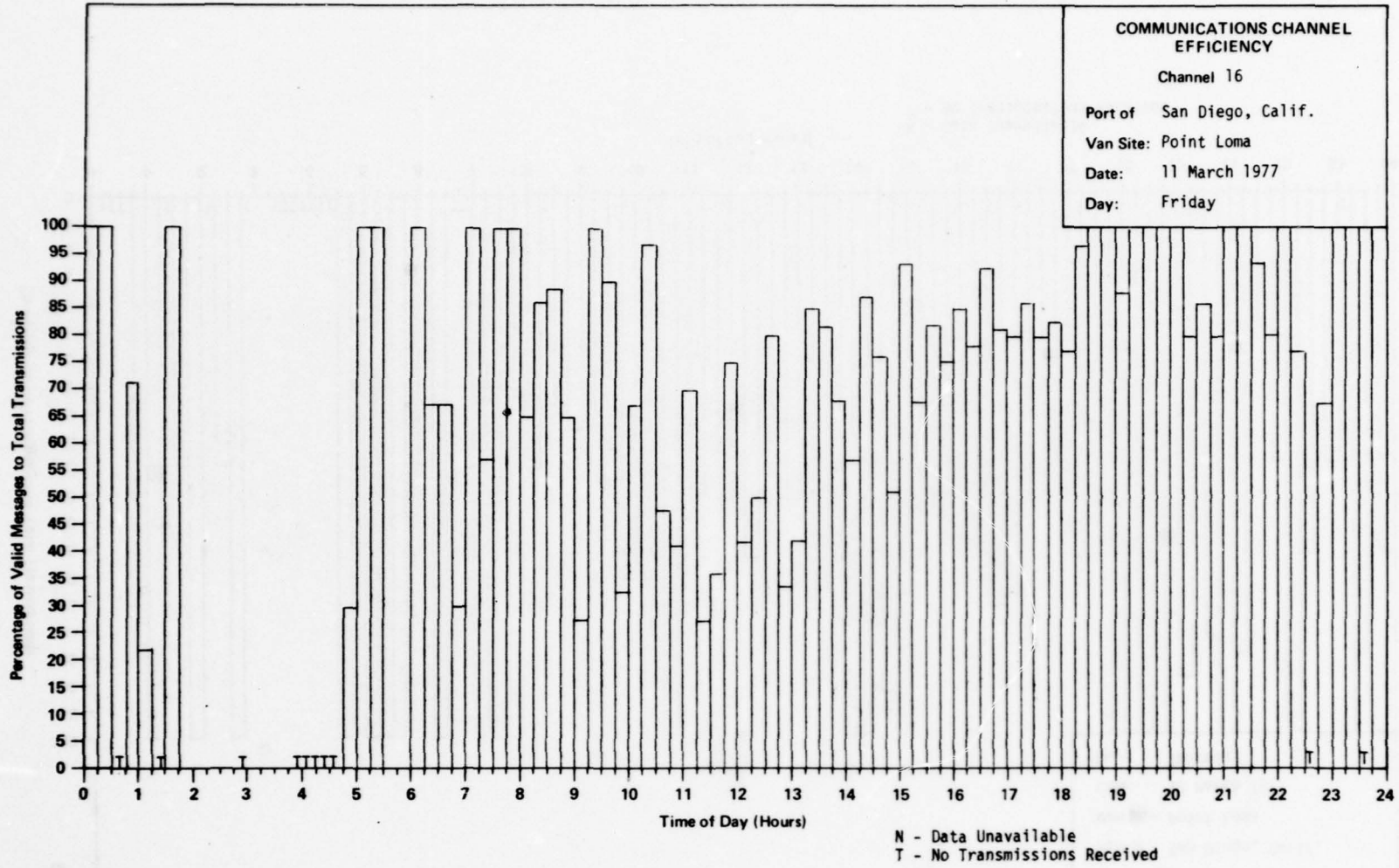

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 16
Port of San Diego, Calif.
Van Site: Point Loma
Date: 11 March 1977
Day: Friday
Percentage of Valid Messages to Total Transmissions
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 6-43

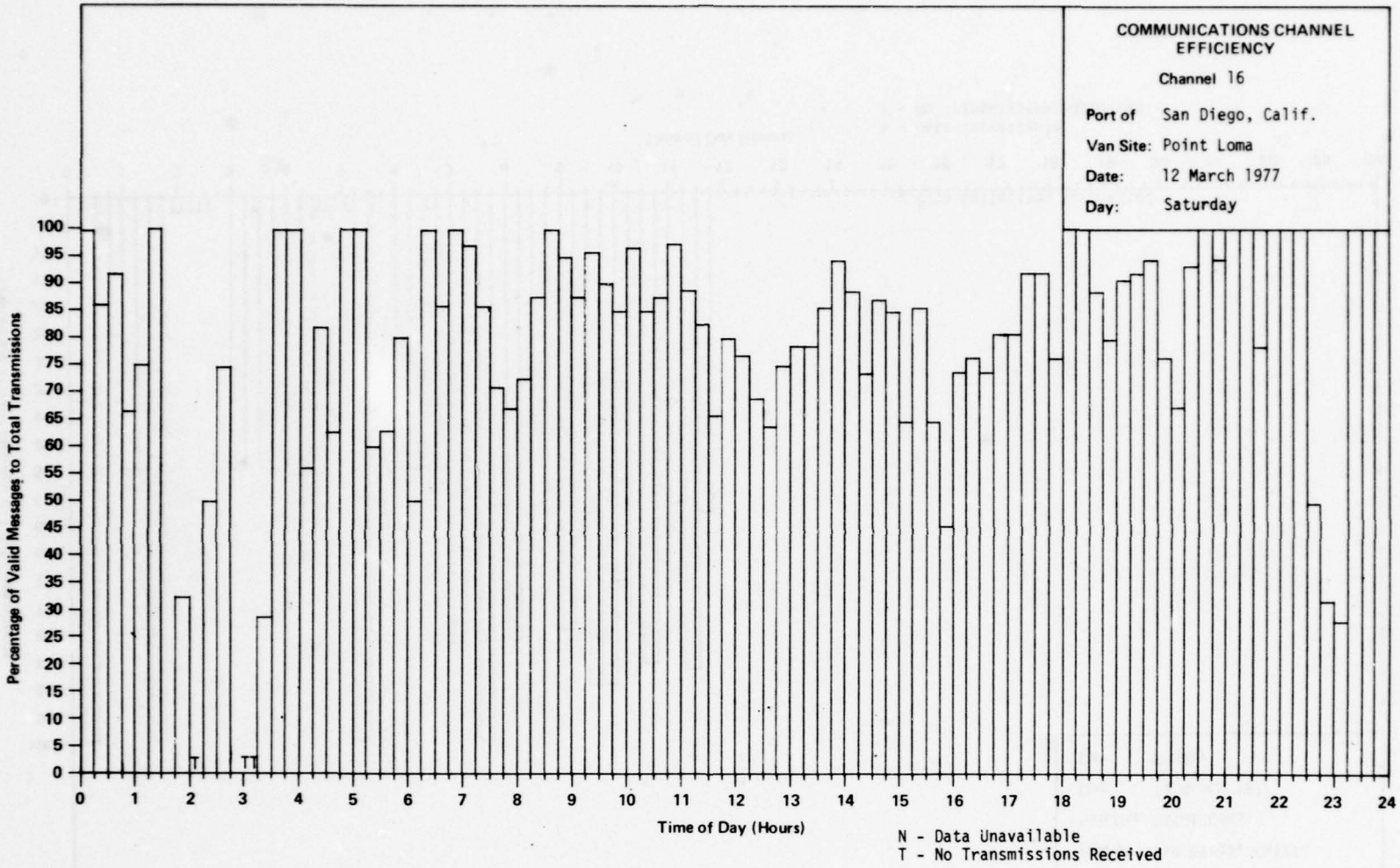

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 16
Port of San Diego, Calif.
Van Site: Point Loma
Date: 12 March 1977
Day: Saturday
Percentage of Valid Messages to Total Transmissions
Time of Day (Hours)
N - Data Unavailable
T - No Transmissions Received

FIGURE 6-44

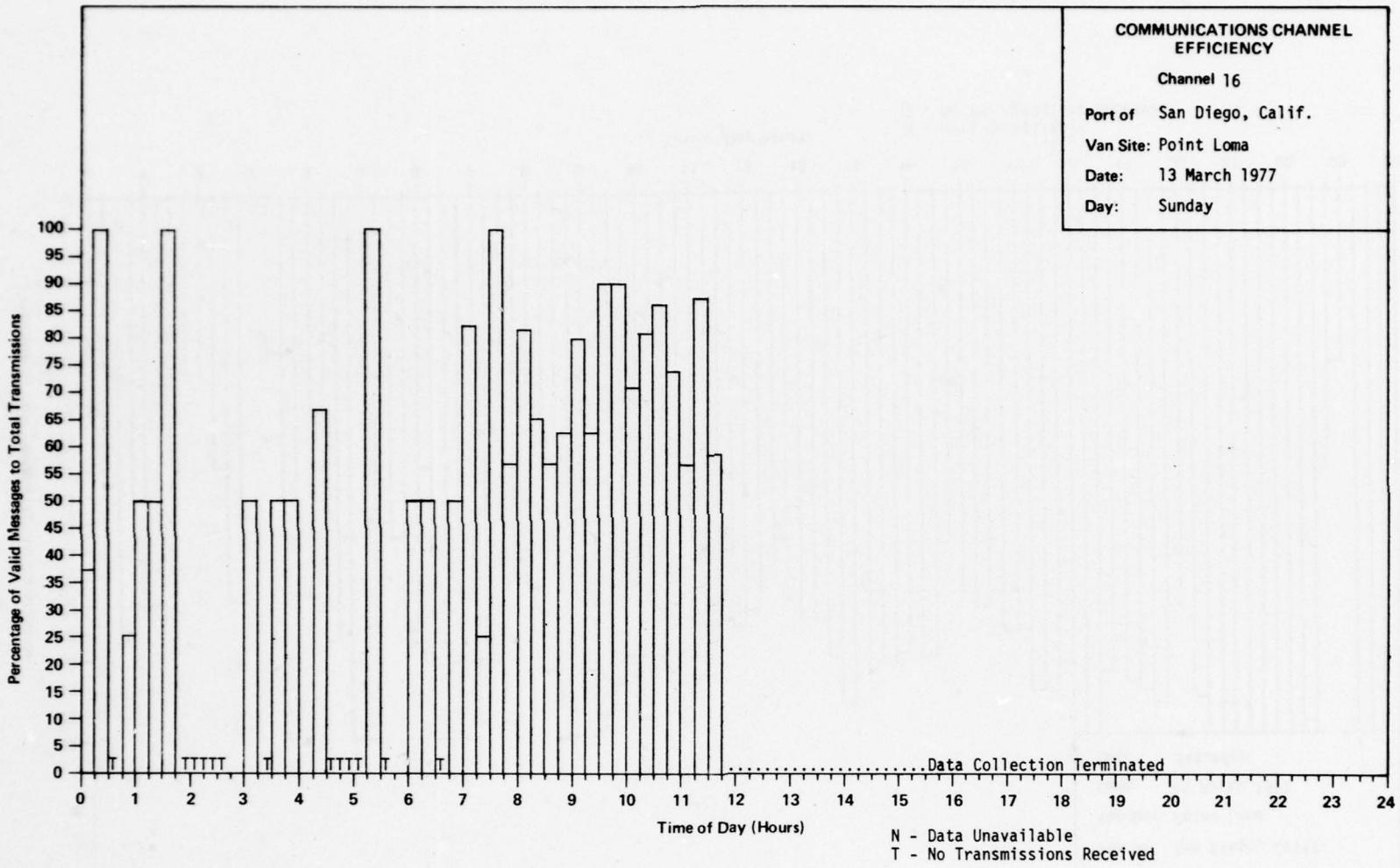

COMMUNICATIONS CHANNEL EFFICIENCY
Channel 16
Port of San Diego, Calif.
Van Site: Point Loma
Date: 13 March 1977
Day: Sunday
Percentage of Valid Messages to Total Transmissions
Time of Day (Hours)
Data Collection Terminated
N - Data Unavailable
T - No Transmissions Received

FIGURE 6-45

SAN DIEGO, CALIF. VHF-FM CH 13 10 MARCH 1977 PAGE 1

TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
15	0	0.00	0.00
30	0	0.00	0.00
45	0	0.00	0.00
100	0	0.00	0.00
115	0	0.00	0.00
130	0	0.00	0.00
145	0	0.00	0.00
200	0	0.00	0.00
215	0	0.00	0.00
230	0	0.00	0.00
245	2	0.01	0.07
300	0	0.00	0.00
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	6	0.32	2.16
445	0	0.00	0.00
500	0	0.00	0.00
515	0	0.00	0.00
530	7	0.37	2.49
545	13	0.76	5.06
600	25	1.27	8.50
615	59	4,10	27.33
630	38	2.33	15.53
645	51	2.32	15.50
700	55	3.01	20.04
715	70	3.18	21.22
730	47	2.22	14.80
745	16	0.52	3.44
800	1	0.00	0.02
815	20	0.99	6.59
830	1	0.05	0.33
845	2	0.04	0.23
900	0	0.00	0.00
915	7	0.38	2.56
930	9	0.13	0.86
945	9	0.41	2.72
1000	25	1.52	10.12
1015	17	0.55	3.68
1030	30	2.13	14.23
1045	26	1.29	8.58
1100	28	1.77	11.81
1115	18	1.04	6.92
1130	9	0.24	1.63
1145	32	1.46	9.72
1200	7	0.33	2.23

FIGURE 6-46

SAN DIEGO, CALIF. VHF-FM CH 13 10 MARCH 1977 PAGE 2

TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
1215	0	0.00	0.00
1230	11	0.73	4.88
1245	35	0.56	3.74
1300	5	0.36	2.42
1315	64	2.07	13.81
1330	47	2.29	15.24
1345	19	0.51	3.40
1400	24	0.80	5.37
1415	39	1.99	13.28
1430	26	1.53	10.20
1445	9	0.33	2.22
1500	116	5.08	33.89
1515	16	0.92	6.12
1530	29	1.38	9.23
1545	47	2.78	18.54
1600	54	3.52	23.46
1615	36	2.11	14.07
1630	13	0.90	6.01
1645	22	1.24	8.30
1700	48	2.82	18.80
1715	26	1.41	9.43
1730	10	0.46	3.06
1745	45	2.15	14.34
1800	21	0.92	6.13
1815	6	0.49	3.23
1830	10	0.96	6.40
1845	1	0.02	0.16
1900	0	0.00	0.00
1915	17	0.95	6.33
1930	2	0.18	1.21
1945	1	0.00	0.02
2000	10	0.72	4.81
2015	3	06	0.38
2030	0	0	0.00
2045	0	00	0.00
2100	0	0.00	0.00
2115	0	0.00	0.00
2130	5	0.39	2.59
2145	0	0.00	0.00
2200	0	0.00	0.00
2215	1	0.21	1.43
2230	4	0.28	1.86
2245	3	0.16	1.04
2300	0	0.00	0.00
2315	0	0.00	0.00
2330	0	0.00	0.00
2345	0	0.00	0.00

FIGURE 6-46 (continued)

TOTAL NUMBER OF TRANSMISSIONS: 1455
AVE. NUM. OF TRANSMISSIONS PER HOUR: 60.6
TOTAL TRANSMISSION TIME: 1.235 HOURS
AVERAGE LENGTH OF TRANSMISSION: 3.05 SEC.
PERCENT CHANNEL UTILIZATION: 5.14%

MESSAGE LENGTH HISTOGRAM

LENGTH OF XMSNS	NUMBER OF XMSNS	PERCENT
0.1 - 0.5 SEC.	210	14.43
0.5 - 1.0 SEC.	130	8.93
1.0 - 1.5 SEC.	123	8.45
1.5 - 2.0 SEC.	148	10.17
2.0 - 2.5 SEC.	154	10.58
2.5 - 3.0 SEC.	147	10.10
3.0 - 3.5 SEC.	95	6.53
3.5 - 4.0 SEC.	99	6.80
4.0 - 4.5 SEC.	83	5.70
4.5 - 5.0 SEC.	54	3.71
5.0 - 5.5 SEC.	36	2.47
5.5 - 6.0 SEC.	27	1.86
6.0 - 6.5 SEC.	28	1.92
6.5 - 7.0 SEC.	12	0.82
7.0 - 7.5 SEC.	8	0.55
7.5 - 8.0 SEC.	15	1.03
8.0 - 8.5 SEC.	8	0.55
8.5 - 9.0 SEC.	14	0.96
9.0 - 9.5 SEC.	8	0.55
9.5 - 10.0 SEC.	8	0.55
LONGER THAN 10 SEC. :	48	3.30

THERE WERE 208 XMSNS OF 00.1 AND 00.0 DURATION

FIGURE 6-46 (continued)

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TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
15	0	0.00	0.00
30	0	0.00	0.00
45	0	0.00	0.00
100	0	0.00	0.00
115	1	0.01	0.06
130	0	0.00	0.00
145	0	0.00	0.00
200	0	0.00	0.00
215	0	0.00	0.00
230	0	0.00	0.00
245	0	0.00	0.00
300	0	0.00	0.00
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	0	0.00	0.00
500	0	0.00	0.00
515	0	0.00	0.00
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	0	0.00	0.00
700	0	0.00	0.00
715	0	0.00	0.00
730	0	0.00	0.00
745	0	0.00	0.00
800	0	0.00	0.00
815	0	0.00	0.00
830	0	0.00	0.00
845	14	0.71	4.71
900	37	1.20	8.01
915	14	0.72	4.82
930	26	1.20	8.00
945	2	0.05	0.33
1000	10	0.25	1.66
1015	32	1.54	10.29
1030	17	0.41	2.71
1045	3	0.11	0.71
1100	0	0.00	0.00
1115	41	1.33	8.87
1130	128	4.23	28.22
1145	27	0.59	3.97
1200	18	0.27	1.83

FIGURE 6-47

TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
1215	54	2.25	15.01
1230	4	0.24	1.60
1245	28	1.13	7.57
1300	23	1.74	11.58
1315	6	0.23	1.56
1330	23	1.17	7.82
1345	29	1.39	9.26
1400	10	0.58	3.86
1415	14	0.56	3.73
1430	3	0.10	0.66
1445	0	0.00	0.00
1500	41	2.89	19.30
1515	15	0.83	5.54
1530	18	1.05	6.98
1545	14	1.05	7.01
1600	13	0.59	3.97
1615	6	0.29	1.96
1630	3	0.09	0.62
1645	0	0.00	0.00
1700	0	0.00	0.00
1715	0	0.00	0.00
1730	0	0.00	0.00
1745	8	0.29	1.97
1800	0	0.00	0.00
1815	0	0.00	0.00
1830	0	0.00	0.00
1845	0	0.00	0.00
1900	0	0.00	0.00
1915	0	0.00	0.00
1930	0	0.00	0.00
1945	0	0.00	0.00
2000	0	0.00	0.00
2015	0	0.00	0.00
2030	0	0.00	0.00
2045	0	0.00	0.00
2100	0	0.00	0.00
2115	0	0.00	0.00
2130	0	0.00	0.00
2145	1	0.01	0.03
2200	3	0.06	0.39
2215	0	0.00	0.00
2230	0	0.00	0.00
2245	0	0.00	0.00
2300	0	0.00	0.00
2315	0	0.00	0.00
2330	0	0.00	0.00
2345	0	0.00	0.00

FIGURE 6-47 (continued)

TOTAL NUMBER OF TRANSMISSIONS: 686
AVE. NUM. OF TRANSMISSIONS PER HOUR: 28.6
TOTAL TRANSMISSION TIME: 0.486 HOURS
AVERAGE LENGTH OF TRANSMISSION: 2.55 SEC
PERCENT CHANNEL UTILIZATION: 2.03%

MESSAGE LENGTH HISTOGRAM

LENGTH OF XMSNS	NUMBER OF XMSNS	PERCENT
0.1 - 0.5 SEC.	111	16.18
0.5 - 1.0 SEC.	69	10.06
1.0 - 1.5 SEC.	76	11.08
1.5 - 2.0 SEC.	70	10.20
2.0 - 2.5 SEC.	136	19.83
2.5 - 3.0 SEC.	45	6.56
3.0 - 3.5 SEC.	39	5.69
3.5 - 4.0 SEC.	29	4.23
4.0 - 4.5 SEC.	25	3.64
4.5 - 5.0 SEC.	18	2.62
5.0 - 5.5 SEC.	7	1.02
5.5 - 6.0 SEC.	6	0.87
6.0 - 6.5 SEC.	12	1.75
6.5 - 7.0 SEC.	8	1.17
7.0 - 7.5 SEC.	2	0.29
7.5 - 8.0 SEC.	4	0.58
8.0 - 8.5 SEC.	4	0.58
8.5 - 9.0 SEC.	1	0.15
9.0 - 9.5 SEC.	4	0.58
9.5 - 10.0 SEC.	2	0.29
LONGER THAN 10 SEC. :	18	2.62

THERE WERE 2725 XMSNS OF 00.1 AND 00.0 DURATION

FIGURE 6-47 (continued)

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TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
15	2	0. 28	1. 90
30	0	0. 00	0. 00
45	0	0. 00	0. 00
100	2	0. 34	2. 27
115	7	0. 82	5. 50
130	0	0. 00	0. 00
145	0	0. 00	0. 00
200	3	0. 37	2. 47
215	0	0. 00	0. 00
230	2	0. 02	0. 14
245	8	0. 47	3. 14
300	5	0. 16	1. 07
315	2	0. 01	0. 04
330	2	0. 03	0. 22
345	1	0. 00	0. 02
400	2	0. 01	0. 04
415	0	0. 00	0. 00
430	1	0. 00	0. 02
445	3	0. 06	0. 43
500	0	0. 00	0. 00
515	0	0. 00	0. 00
530	4	0. 43	2. 87
545	1	0. 05	0. 31
600	6	0. 56	3. 72
615	20	0. 95	6. 34
630	3	0. 30	1. 99
645	7	0. 29	1. 96
700	1	0. 01	0. 08
715	3	0. 29	1. 93
730	4	0. 27	1. 82
745	8	0. 54	3. 62
800	14	0. 88	5. 86
815	7	0. 43	2. 89
830	0	0. 00	0. 00
845	48	2. 16	14. 43
900	19	1. 00	6. 64
915	9	0. 22	1. 44
930	44	1. 62	10. 81
945	34	1. 47	9. 79
1000	18	1. 48	9. 90
1015	31	1. 30	8. 68
1030	50	2. 91	19. 41
1045	5	0. 43	2. 84
1100	18	0. 96	6. 41
1115	20	0. 87	5. 83
1130	3	0. 01	0. 07
1145	20	0. 94	6. 28
1200	61	4. 16	27. 74

FIGURE 6-48

TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
1215	10	0.08	0.53
1230	16	0.60	3.98
1245	12	0.67	4.44
1300	10	0.39	2.63
1315	51	2.83	18.87
1330	47	1.63	10.86
1345	20	0.73	4.90
1400	12	0.54	3.62
1415	21	1.54	10.29
1430	30	1.81	12.06
1445	20	1.68	11.21
1500	22	0.55	3.64
1515	74	4.39	29.30
1530	41	2.22	14.79
1545	65	5.99	39.97
1600	56	2.98	19.89
1615	44	3.37	22.50
1630	33	1.48	9.90
1645	48	2.37	15.83
1700	53	1.70	11.32
1715	49	2.11	14.07
1730	51	1.54	10.30
1745	56	1.61	10.74
1800	43	1.78	11.87
1815	37	2.38	15.84
1830	38	1.77	11.81
1845	35	1.41	9.42
1900	10	0.76	5.06
1915	10	0.62	4.17
1930	20	2.00	13.34
1945	4	0.30	1.98
2000	4	0.16	1.03
2015	0	0.00	0.00
2030	6	0.45	3.01
2045	0	0.00	0.00
2100	0	0.00	0.00
2115	6	0.65	4.31
2130	14	0.48	3.19
2145	5	0.31	2.06
2200	9	0.34	2.26
2215	13	0.39	2.58
2230	21	0.69	4.63
2245	29	0.46	3.06
2300	31	0.43	2.89
2315	0	0.00	0.00
2330	9	0.41	2.77
2345	17	0.76	5.09
2400	1	0.00	0.02

FIGURE 6-48 (continued)

TOTAL NUMBER OF TRANSMISSIONS: 1701
AVE. NUM. OF TRANSMISSIONS PER HOUR: 70.9
TOTAL TRANSMISSION TIME: 1.442 HOURS
AVERAGE LENGTH OF TRANSMISSION: 3.05 SEC.
PERCENT CHANNEL UTILIZATION: 6.01%

MESSAGE LENGTH HISTOGRAM

LENGTH OF XMSNS	NUMBER OF XMSNS	PERCENT
0.1 - 0.5 SEC.	419	24.63
0.5 - 1.0 SEC.	232	13.64
1.0 - 1.5 SEC.	160	9.41
1.5 - 2.0 SEC.	92	5.41
2.0 - 2.5 SEC.	98	5.76
2.5 - 3.0 SEC.	95	5.58
3.0 - 3.5 SEC.	93	5.47
3.5 - 4.0 SEC.	62	3.64
4.0 - 4.5 SEC.	87	5.11
4.5 - 5.0 SEC.	36	2.12
5.0 - 5.5 SEC.	38	2.23
5.5 - 6.0 SEC.	37	2.18
6.0 - 6.5 SEC.	29	1.70
6.5 - 7.0 SEC.	39	2.29
7.0 - 7.5 SEC.	25	1.47
7.5 - 8.0 SEC.	14	0.82
8.0 - 8.5 SEC.	19	1.12
8.5 - 9.0 SEC.	18	1.06
9.0 - 9.5 SEC.	14	0.82
9.5 - 10.0 SEC.	12	0.71
LONGER THAN 10 SEC. :	82	4.82

THERE WERE 517 XMSNS OF 00.1 AND 00.0 DURATION

FIGURE 6-48 (continued)

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TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
15	33	0.75	5.03
30	12	0.45	3.00
45	2	0.01	0.08
100	47	1.78	11.84
115	7	0.11	0.73
130	17	0.56	3.76
145	3	0.07	0.47
200	25	0.43	2.88
215	0	0.00	0.00
230	12	0.38	2.53
245	14	0.38	2.54
300	21	0.59	3.94
315	6	0.20	1.31
330	34	1.46	9.74
345	29	0.43	2.87
400	13	0.45	2.99
415	15	1.12	7.49
430	30	0.94	6.29
445	24	0.99	6.63
500	17	1.25	8.37
515	14	0.96	6.41
530	30	1.78	11.87
545	9	0.45	3.01
600	11	0.38	2.56
615	11	1.42	9.44
630	8	0.30	2.02
645	12	0.70	4.68
700	14	0.47	3.14
715	34	3.26	21.72
730	45	4.02	26.80
745	7	1.80	12.00
800	0	0.00	0.00
815	38	2.03	13.54
830	51	2.18	14.57
845	61	7.34	48.94
900	44	3.54	23.59
915	53	5.18	34.54
930	129	8.58	57.22
945	85	3.31	22.10
1000	4	0.10	0.66
1015	118	4.31	28.77
1030	136	4.87	32.44
1045	113	4.37	29.16
1100	107	6.14	40.93
1115	41	1.82	12.13
1130	190	7.75	51.68
1145	125	3.77	25.16
1200	50	2.91	19.40

FIGURE 6-49

TRANSMISSION TIME HISTOGRAM

PERIOD ENDING:	NUMBER OF XMSNS:	MINUTES:	PERCENT:
1215	0	0.00	0.00
1230	116	6.62	44.12
1245	224	7.45	49.66
1300	201	6.16	41.10
1315	137	5.31	35.39
1330	155	6.08	40.54
1345	181	7.74	51.58
1400	141	7.10	47.34
1415	172	7.60	50.69
1430	124	5.41	36.06
1445	115	3.91	26.06
1500	132	4.78	31.90
1515	100	4.71	31.42
1530	95	4.42	29.46
1545	142	6.20	41.36
1600	133	4.39	29.28
1615	147	5.49	36.60
1630	125	5.19	34.56
1645	103	3.64	24.27
1700	101	4.89	32.58
1715	37	1.81	12.07
1730	77	3.90	25.99
1745	97	3.20	21.33
1800	54	2.89	19.24
1815	15	2.69	17.92
1830	3	0.23	1.52
1845	0	0.00	0.00
1900	0	0.00	0.00
1915	0	0.00	0.00
1930	0	0.00	0.00
1945	0	0.00	0.00
2000	0	0.00	0.00
2015	0	0.00	0.00
2030	0	0.00	0.00
2045	0	0.00	0.00
2100	0	0.00	0.00
2115	0	0.00	0.00
2130	0	0.00	0.00
2145	0	0.00	0.00
2200	0	0.00	0.00
2215	0	0.00	0.00
2230	0	0.00	0.00
2245	0	0.00	0.00
2300	0	0.00	0.00
2315	0	0.00	0.00
2330	0	0.00	0.00
2345	0	0.00	0.00

FIGURE 6-49 (continued)

TOTAL NUMBER OF TRANSMISSIONS:	4828
AVE. NUM. OF TRANSMISSIONS PER HOUR:	201.2
TOTAL TRANSMISSION TIME:	3.633 HOURS
AVERAGE LENGTH OF TRANSMISSION:	2.71 SEC.
PERCENT CHANNEL UTILIZATION:	15.14%

MESSAGE LENGTH HISTOGRAM

LENGTH OF XMSNS	NUMBER OF XMSNS	PERCENT
0.1 - 0.5 SEC.	1453	30.10
0.5 - 1.0 SEC.	691	14.31
1.0 - 1.5 SEC.	432	8.95
1.5 - 2.0 SEC.	324	6.71
2.0 - 2.5 SEC.	371	7.68
2.5 - 3.0 SEC.	236	4.89
3.0 - 3.5 SEC.	188	3.89
3.5 - 4.0 SEC.	150	3.11
4.0 - 4.5 SEC.	229	4.74
4.5 - 5.0 SEC.	96	1.99
5.0 - 5.5 SEC.	99	2.05
5.5 - 6.0 SEC.	70	1.45
6.0 - 6.5 SEC.	58	1.20
6.5 - 7.0 SEC.	71	1.47
7.0 - 7.5 SEC.	48	0.99
7.5 - 8.0 SEC.	36	0.75
8.0 - 8.5 SEC.	36	0.75
8.5 - 9.0 SEC.	39	0.81
9.0 - 9.5 SEC.	20	0.41
9.5 - 10.0 SEC.	25	0.52
LONGER THAN 10 SEC.:	156	3.23

THERE WERE 1913 XMSNS OF 00.1 AND 00.0 DURATION

FIGURE 6-49 (continued)

APPENDIX A

GEOGRAPHICAL DESCRIPTION OF SOUTHERN CALIFORNIA

APPENDIX A

GEOGRAPHICAL DESCRIPTION OF SOUTHERN CALIFORNIA

A.1 BACKGROUND

The following description of the southern California area (Figure A-1) was excerpted from the United States Coast Pilot, Volume 7, for 1977 and is included here to make this report more complete and readily understandable.

A.2 *SAN DIEGO TO POINT ARGUELLO, CALIFORNIA*

The coast extends in a general northwest direction and includes the major ports of San Diego, Long Beach, Los Angeles and Port Hueneme, and the recreational and fishing ports of Oceanside, Newport Beach, Ventura, Santa Barbara, and many other recreational boating ports on San Pedro and Santa Monica Bays and along the Santa Barbara Channel.

There are several islands and dangers from seven to one hundred miles off the southern California coast, the Channel Islands being the largest, most prominent and farthest offshore of any islands along the California coast.

San Clemente Island, 43 miles south-southwest of Point Fermin and 57 miles west-northwest off Point Loma, is a U.S. Naval Reservation and closed to the public. Vessels, including yachts and fishing craft, are warned that the vicinity of the island may be dangerous at any time because of naval activities, including gunfire, bombing, and rocket fire.

Santa Barbara and Anacapa Islands form the Channel Islands National Monument and are under the supervision of the National Park Service, Department of the Interior.

Santa Catalina, Santa Cruz, and Santa Rosa are privately owned.

San Nicolas Island, the outermost of the islands off southern California, is 53 miles off the nearest point of the mainland. The island is a military reservation and off limits to the public. A naval restricted area extends three miles from the shoreline around the island.

San Miguel Island, twenty-three miles south by east of Point Conception is the westernmost of the Channel Islands and the most dangerous to approach. A naval danger zone has been established around the island.

There are few outlying dangers, the principal one being Bishop Rock, about forty miles southwest of San Clemente Island, and the farthest outlying danger along the coast. Offshore drilling and exploration operations are increasing in the waters off California, especially in Santa Barbara Channel. Obstructions in these waters consist of submerged wells and oil well structures (platforms), including apurtenances thereto, such as mooring piles, anchor and mooring buoys, pipes, and stakes.

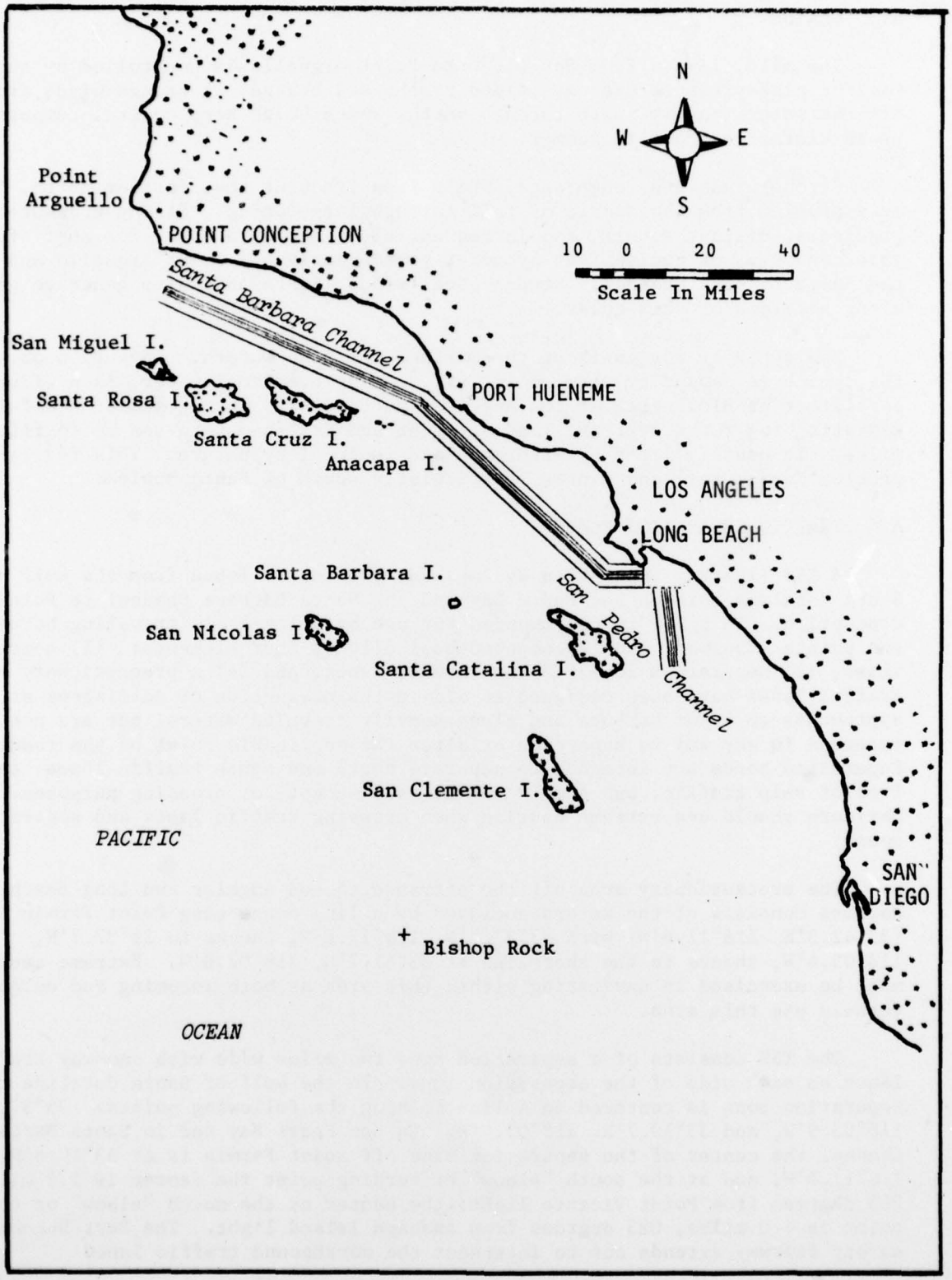


Figure A-1: SOUTHERN CALIFORNIA

A.3 WEATHER

The mild climate from San Diego to Point Arguello is controlled by the Pacific high-pressure system. Aided by the sea breeze, it brings winds from off the water, mainly south through north, which helps keep coastal temperatures up in winter and down in summer.

Strong winds and rough seas, while less frequent than farther north, can be a problem from the middle of fall through late spring. Strong pressure gradients, distant storms, and infrequent close storms account for most of the gales and seas of twelve feet or more, particularly off Point Arguello and in the Santa Barbara Channel. Strong local winds (Santa Ana) also generate gales along sections of this coast.

Two types of fog confront the mariner in these waters. Advection or sea fog, which is caused by warm, moist air flowing over cool water, is a widespread, persistent problem north of Los Angeles, particularly during summer and fall. Radiation fog forms over the land at night and drifts out to sea up to fifty miles. It usually lifts by afternoon and is local by nature. This fog is a problem during fall and winter, particularly south of Santa Monica.

A.4 TRAFFIC SEPARATION SCHEME

A TSS (Traffic Separation Scheme) has been established from the Gulf of Santa Catalina through San Pedro Bay and the Santa Barbara Channel to Point Conception. This TSS is recommended for use by all vessels traveling between the points involved, and is composed basically of four elements: (1) northbound lanes, (2) separation zone, (3) southbound lanes, and (4) a precautionary area. Traffic lanes have been designed to aid in the prevention of collisions at the approaches to major harbors and along heavily traveled waters, but are not intended in any way to supercede or alter the applicable rules of the road. Separation zones are intended to separate north and south traffic lanes, to be free of ship traffic, and should not be used except for crossing purposes. Mariners should use extreme caution when crossing traffic lanes and separation zones.

The precautionary area off the entrance to Los Angeles and Long Beach Harbors consists of the waters enclosed by a line connecting Point Fermin light (33°42.3'N, 118°17.6'W) with 33°37.7'N, 118°17.6'W, thence to 33°37.7'N, 118°05.4'W, thence to the shoreline at 33°41.7'N, 118°02.8'W. Extreme caution must be exercised in navigating within this area as both incoming and outgoing vessels use this area.

The TSS consists of a separation zone two miles wide with one-way traffic lanes on each side of the separation zone. In the Gulf of Santa Catalina the separation zone is centered on a line joining the following points: 33°37.7'N, 118°08.9'W, and 33°19.7'N, 118°03.4'W. In San Pedro Bay and in Santa Barbara Channel the center of the separation zone off Point Fermin is at 33°19.6'N, 118°17.5'W, and at the south "elbow" or turning point the center is 5.2 miles, 205 degrees from Point Vicente light; the center at the north "elbow" or turning point is 4.0 miles, 023 degrees from Anacapa Island light. The Port Hueneme safety fairway extends out to intersect the northbound traffic lane.

From the south end of the scheme in the Gulf of Santa Catalina the northbound traffic lane course is 345 degrees for 18.5 miles to the precautionary area, thence in the northbound (inshore) traffic lane off Point Fermin the traffic lane course is 270 degrees for 8.0 miles to the south turning point. Thence 300 degrees for 50.0 miles to the north turning point, thence 285 degrees for 61.0 miles through Santa Barbara Channel to the north end of the scheme off Point Conception. From the north, the southbound (offshore) traffic lane course is 105 degrees for 61.0 miles through Santa Barbara Channel to the north turning point, thence 120 degrees for 50.0 miles to the south turning point, thence 090 degrees for 8.0 miles to the precautionary area, thence in the Gulf of Santa Catalina a course of 167 degrees for 18.5 miles to the end of the scheme off Santa Catalina Island. Lighted buoys mark the south turning point of the scheme 7.5 miles west and 9.5 miles southwest of Point Fermin.

A.5 SANTA BARBARA CHANNEL

Santa Barbara Channel is sixty-three miles long and increases gradually in width from eleven miles at the eastern end to twenty-three miles at the western end. The channel is free of dangers and has depths of 40 to more than 300 fathoms along the recommended track from San Diego and Los Angeles to northern ports.

Offshore drilling platforms, privately marked by lights and fog signals, extend as much as six miles offshore between Rincon Point and Santa Barbara Point.

On the north side of the channel is the mainland between Point Hueneme and Point Conception. On the south side is the northern group of the Channel Islands - Anacapa, Santa Cruz, Santa Rosa, and San Miguel - which break the force of the heavy westerly Pacific swell and afford a lee in winter from the full force of the southeast gales.

The east entrance to Santa Barbara Channel has a clear width of two miles between the 100-fathom curves, and lies between Anacapa Island and Point Hueneme. On the north side of the entrance is deep Hueneme Canyon, which extends from Point Hueneme in a south-southwest direction across the channel. The west entrance to the channel has a clear width of ten miles between the 100-fathom curves, and lies between Richardson Rock and Point Conception.

The prevailing winds in Santa Barbara Channel are westerly and are present nearly every day, especially in the afternoon. Southeast storms occur in the winter, and at times the sea is too rough for several days to permit the passage of small vessels.

In the summer the winds in the channel are wholly different from those outside the islands and off the coast to the northwest. Under the northern shore, which is protected by the bold range of the Santa Ynez Mountains, the westerly winds do not reach far east of Point Conception with much strength but are felt toward the islands, a strong northwesterly wind and heavy swell coming in from the ocean. The climate, because of this blocking of the wind, is much milder than to the north along the coast. However, during northwesterly weather boats crossing the channel from the mainland usually encounter heavier

seas as the islands are approached. The belt of rough seas, locally known as "windy lane," lies along the northern shores of the islands and is about six miles wide. This sea condition is opposite to that experienced in the crossing from Los Angeles-Long Beach to Santa Catalina Island. These westerly winds usually begin about late morning and grow progressively stronger until sundown.

During the summer, heavy fogs are a common occurrence in the Santa Barbara Channel and envelope the main shore, channel, and islands. Sometimes the mainland and channel are clear while the islands alone are hidden. At other times all are clear during the day, but wrapped in dense, wet fog at night. This condition, the fog lying offshore during the day and enveloping the land at night, is characteristic of the whole southern California coast. The fogs occur mostly during calm weather and light winds and are generally dissipated by the strong northwesterly winds.

The currents in the Santa Barbara Channel are variable, depending to a great extent upon the wind. It appears that a weak nontidal flow sets east in the spring and summer, and west in fall and winter.

The tidal current sets along the north shore of Santa Barbara Channel with the velocities of 0.5 to 1.0 knot. In heavy northwest weather, the current and heavy swells make into the south side of the west entrance to the channel and along the north shore of San Miguel Island.

The currents in the vicinity of the Channel Islands frequently follow the direction of the wind, with eddies under the lee of the islands and projecting points. Tidal currents of about one knot set through the passages between the islands.

A.6 LOS ANGELES-LONG BEACH HARBORS

Los Angeles Harbor, at the western end of San Pedro Bay, includes the districts of San Pedro, Wilmington, and a major portion of Terminal Island.

Long Beach Harbor, in the eastern part of San Pedro Bay, includes the city of Long Beach and a portion of Terminal Island on which is located the U.S. Naval Shipyard and Naval Station. Los Angeles and Long Beach Harbors are connected by Cerritos Channel. The distance between the seaward entrance to the two harbors is about four miles. Long Beach Inner Harbors, Middle Harbor, and Southeast Basin are protected by three curving moles.

The Port of Los Angeles, one of the largest ports on the Pacific coast, has a history of leading the Pacific coast ports in terms of tonnage handled. It has extensive facilities to accommodate all types of traffic, and is the only southern California port at which passenger vessels call regularly. Some of the principal exports are crude minerals, iron and steel scrap, coal and coke, iron ore and concentrates, inorganic chemicals, animal feeds, cotton, hides and skins, manufactured fertilizers, and fresh fruits and nuts. Some of the principal imports are iron and steel products, motor vehicles and parts, organic chemicals, fresh fruits and nuts, paper and paperboard, molasses and syrups, sugar, glass, and fresh and frozen fish.

The Port of Long Beach, also one of the largest ports on the Pacific coast, has the reputation of being America's most modern port. It has extensive foreign and domestic traffic with modern facilities for the largest vessels. It has a major container cargo port with several of the largest and most efficient container terminals on the Pacific coast. Some of the principal exports are bulk petroleum, bulk coke, iron ore and pellets, steel and steel products, bulk potash, grains, scrap steel, fresh fruits, animal feed, and copper concentrate. Some of the principal imports are crude petroleum, steel and steel products, motor vehicles and parts, machinery, bulk gypsum, newsprint, lumber, bulk salt, plywood, bananas, bulk molasses, and copra.

The San Pedro Breakwater extends about 0.9 mile in a southeast direction from the eastern side of Point Fermin, then turns east-northeast for another 0.9 mile to Los Angeles light. Middle Breakwater extends east-northeast for 2.1 miles from Los Angeles entrance, thence east for 1.0 mile to the Long Beach entrance, and is marked at both ends by lights. Long Beach Breakwater extends east 2.2 miles from Long Beach entrance and is marked by lights at both ends.

Outside the breakwaters, the approach to the Los Angeles channel is marked by a lighted bell buoy and the approach to the Long Beach channel is marked by a lighted whistle buoy. All inbound and outbound vessels are to leave these buoys to port, shape their courses to about north or south before passing the buoys, and should proceed at speeds no greater than is necessary for steerage while making the entrance. Adhering to these safety procedures is of the utmost importance. Vessels that approach the entrance close in and attempt to turn at or near the entrance are in danger of collision with outbound vessels, especially with smaller craft at night when their lights are not easily distinguishable at low tide or against the background of lights in the harbor.

Vessels awaiting a pilot should stay well to seaward and east of the outer fairway buoys.

Fog is most likely from September though January and in April. Out over the bay, it drops visibility below 0.5 mile on about 7 to 10 days per month during this period. It is mostly land (radiation) fog that drifts out and is worst in the late night and early morning. Smoke from nearby industrial areas often adds to the thickness and persistence of the fog. There are times when it will hang over the inner channels for several days and along the coast can be very local in occurrence. For example, at Long Beach, which is particularly susceptible to cold air drainage, fog reduces visibility to less than 0.5 mile on the average of eighteen more days annually than at nearby Los Angeles International Airport. Along the shores, visibilities drop to less than 0.5 mile about three to eight days per month from August through April; December is usually the worst month.

Winds are variable particularly in fall and winter. They are also strongest during this period when the Santa Ana wind can blow which, though infrequent, may be violent. These winds have reached speeds of 50 knots or more along the coast. It diminishes little in intensity immediately after passing over the bay, and some reports credit it with blowing far out to sea. However, beyond fifty miles from shore, Santa Ana are of little concern.

Winter storms are also responsible for strong winds over San Pedro Bay, particularly from the southwest through northwest. Winds of seventeen knots or greater occur about one to two percent of the time from November through May. Winter winds often have an east component, although west-northwest winds are most frequent at Long Beach.

A.7 PORT HUENEME HARBOR

Port Hueneme Harbor is an inland basin, about 1,300 feet long by 1,200 feet wide, located at the head of a submarine canyon, Hueneme Canyon. It is under the control of the U.S. Navy, Naval Construction Battalion Center. The southeast part of the basin is leased to the Oxnard Harbor District and is operated as a deep-draft commercial terminal, used by cargo vessels, commercial and sport-fishing craft, and oil company support vessels, which operate from here to the offshore drilling platforms.

The dredged channel leads between two jetties and through a land cut into the basin. In 1973, the controlling depths were 36 feet in the entrance channel and 31 feet in the basin. The narrowest width of the entrance channel is 330 feet. However, because of the prevailing fresh winds, only one-way traffic is permitted for large vessels, the traffic direction being controlled by the pilots.

Channel Island Harbor, one mile northwest of Port Hueneme, is a small-craft harbor. It is used by pleasure and sport-fishing vessels and has existing berthing facilities for over 1,600 boats.

In the coastal waters from Point Hueneme to Santa Barbara, sea fog hampers most often from July through October. It is generally more widespread and often more persistent than land (radiation) fog. Visibilities fall below 0.5 mile on about five to ten days per month during these months; August and September are usually the worst.

A.8 POINT CONCEPTION

Point Conception, 118 miles northwest of Point Fermin and at the western end of the Santa Barbara Channel, is a bold headland 220 feet high that marks an abrupt change in the trend of the coast. There is comparatively low land behind it and, at a distance from the north or east, it usually appears like an island.

Point Conception has been called the "Cape Horn of the Pacific" because of the heavy northwest gales encountered off it during the passage through the Santa Barbara Channel. A marked change of climatic and meteorological conditions is experienced off the point, the transition often being remarkably sudden and well defined. When the northwesterly winds are strong, they blow down the canyons between Point Conception and Capitan and cause heavy offshore gusts.

A.9 SAN DIEGO BAY

San Diego Bay, where California's maritime history began in 1542, is ten miles northwest of the Mexican boundary. The bay is considered one of the

finest natural harbors in the world and affords excellent protection in any weather. It is free of excessive tidal current movements. A low, narrow sandspit, which expands to a width of 1.6 miles at North Island on its northwest end, separates the bay from the ocean.

The waters off the entrance to San Diego Bay are included in a naval restricted area.

Numerous small craft facilities are available in San Diego Bay. Shelter Island, the most important small-boat area in San Diego Bay, can accommodate more than 1,945 boats at its piers, floats, and moorings. Harbor Island, about 0.5 mile northeast of Shelter Island in the northernmost part of the bay, is a small-craft facility with berthing and mooring accommodation for nearly 1,000 craft. Glorietta Bay, on the south side of Coronado, is a small-craft harbor occupied by a yacht club and a small marina, the facilities including berths for over 215 yachts and small craft.

In the San Diego area, visibilities are reduced to less than 0.5 mile, mostly by radiation fog, on about three to seven days per month from September through April. December is the foggiest month. This fog is worst during the late night and early morning hours. Dense fog is as frequent at North Island as it is at Imperial Beach.

Winds in the area are strongest from November through April, when they blow seventeen knots or more about two percent of the time. Gales are rare. Wind gusts have reached fifty knots or more during this season. Strong winds often have a south component, but they also blow from the west and east.

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