A Statistical Profile of MSAW Encounter Situations

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August 1987

MTR-87W57

SPONSOR:
Federal Aviation Administration
Advanced Automation Program Office
CONTRACT NO.:
DTFA01-84-C-00001
PROJECT:
1763A
DEPT.:
W-47

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Civil Systems Division
7525 Colshire Drive
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MITRE Department and Project Approval: ______________________

ABSTRACT

This report provides a statistical characterization of en route and terminal Minimum Safe Altitude Warning (MSAW) encounter situations. The characteristics were obtained by analyzing recorded Federal Aviation Administration (FAA) field data for MSAW encounters that occurred in Albuquerque, Fort Worth, and New York en route airspace and Houston, Los Angeles, and New York terminal airspace. Encounter parameters discussed in this report include aircraft velocity and track stability, position relative to the protected airspace, and position relative to the radar site. This information is intended for use by the FAA's Advanced Automation System (AAS) Acquisition Phase Contractor to generate scenarios representative of realistic aircraft-to-airspace encounters that will be used for performance analysis of the AAS MSAW function.

Suggested Keywords: Separation Assurance, Conflict Scenarios, Protected Airspace, EMSAW, NAS, AAS Requirements.

PREFACE

This document has been developed in support of the Acquisition Phase Request for Proposals for the Advanced Automation System (AAS). This report is highly specialized and readers are assumed to be familiar with the System Level Specification of the AAS. Readers not familiar with the AAS System Level Specification or the NAS MSAW function are urged to review the documents referenced in this report.

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ACKNOWLEDGEMENTS

The authors wish to acknowledge the contributions of numerous MITRE staff members who assisted in the development of this report. Our understanding of the en route/terminal MSAW algorithms and data collection process would not have been complete without technical guidance from Paul Ostwald, Roland Lejeune, Randy McGuire, Larry Newman, and James DeArmon. The authors also wish to thank William Roberts, David Edwards, and Leon Wishert for their technical assistance in the laborious task of collecting and formatting the aircraft-to-airspace warning messages. We would also like to thank Dr. Bradley Hargroves for his most helpful peer review. Finally, the authors wish to thank Tina Jolley, Judy Bradley, and Elva Markle for their patience and skill in typing this document.

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EXECUTIVE SUMMARY

INTRODUCTION

During the Acquisition Phase (AP) of the Federal Aviation Administration's (FAA) Advanced Automation System (AAS) procurement, the AP Contractor will be required to document the performance of the AAS Minimum Safe Altitude Warning (MSAW) function. The purpose of the MSAW function is to alert a controller to situations when an aircraft is below or predicted to be below a minimum safe altitude or predicted to violate an active Special Use Airspace (SUA). Performance evaluation will be based, in part, on a set of Contractor-developed aircraft to airspace scenarios that represent realistic traffic and encounter situations. The Contractor is required to develop these scenarios from a Government-provided characterization of realistic traffic and encounter situations. The purpose of this report is to provide this characterization for MSAW.

Since the current Air Traffic Control (ATC) system has been using MSAW functions for both the terminal and en route environments for several years, it was decided to analyze data from alerts generated by these functions to provide realistic values for parameters that the Contractor will use for construction of scenarios. This report does not provide information for all parameters required to generate scenarios, only for those that are considered important to performance analysis and for which adequate field data were available. This document is intended for those familiar with the NAS and AAS requirements. Readers not familiar with these topics may wish to review the documents referenced in this report.

Data recorded at three Air Route Traffic Control Centers (ARTCCs) and three Terminal Radar Approach Control Facilities (TRACONs) were analyzed. High Speed Printer (HSP) alert messages generated by the en route MSAW algorithm and MSAW messages that appeared on the Automated Radar Terminal System (ARTS) extractor tapes for the terminal data were used to select the aircraft/area pairs studied. Adaptation data along with the alert messages and track reports provided all the data used for this study. Although the current terminal MSAW function uses three types of processing (straight line prediction, projection of a five degree climb angle, and a check for violation of an approach path glide slope), sufficient alerts and adaptation data were available for only the alerts produced by straight line prediction to be included in this study.

Seventeen parameters describing the en route encounters and ten parameters for terminal encounters were chosen for analysis based on the importance of the parameter relative to MSAW performance and the availability of field data for that parameter. Statistics including the mean, maximum, minimum, and standard deviations for the non-discrete parameters and the mode for the discrete parameters were calculated for each encounter studied. Histograms providing graphical representation of the data were generated for each parameter. Frequency tables useful for random selection of parameter values used to construct scenarios were also generated for each parameter studied. Correlation coefficients were computed to indicate the degree to which each parameter is correlated with each other parameter. The Contractor should use these data while generating scenarios so the effects of all significant correlations are included.

BACKGROUND

Algorithms and adaptation for the current MSAW functions differ for the terminal and en route environments. The terminal MSAW function performs three types of processing: General Terrain Monitoring (GTM), Approach Path Monitoring (APM), and Satellite Airport Monitoring (SAM). GTM uses a grid centered at the radar site for adaptation. Each bin in the grid has an associated warning altitude. Three violation checks are performed: current violation, straight line prediction, and a projection using a five degree climb angle. APM at primary airports and SAM at other airports monitor the approach path of an aircraft and provide an alert if the aircraft is predicted to violate a glide slope which is adapted for each airport.

The current en route MSAW function checks for violations using a straight line prediction into airspace regions defined laterally by polygons and vertically by a high altitude limit called a minimum warning altitude, and a low altitude limit which is always at ground level. Each center is adapted by dividing the airspace into a maximum of 400 polygons, each with a limit of fifteen sides.

Like the current MSAW function, the AAS MSAW function will alert a controller to conflicts detected between an aircraft's projected flight path and adapted airspace regions. In the AAS, however, these regions can: 1) be checked as a local or strategic function, 2) be activated or deactivated as a function of time, and 3) have an associated low altitude limit that is not at ground level.

Three types of monitoring capabilities will be available in the AAS: General Terrain Monitoring, Approach Path Monitoring, and Airspace Monitoring. General Terrain and Approach Path Monitoring in the AAS will provide similar functionality as the en route and terminal MSAW functions do for the current ATC system. Airspace Monitoring will determine if the projected path of an aircraft will enter airspace regions that contain associated minimum and maximum safe altitudes.

EN ROUTE MSAW ENCOUNTERS

MSAW alert messages, track reports, and adaptation data were extracted from data collected at Albuquerque, Fort Worth, and New York ARTCCs. These Centers were chosen because they contain different types of terrain. A total of 576 first alerts were contained in the alert messages with track data available for 458. A first alert was defined as the first message in a series of consecutive (time between alerts was less than sixty seconds) alert messages for the same aircraft/area pair. If the alert messages were interrupted for sixty seconds or more, the next occurrence was considered to be a new first alert.

Alert messages are printed regardless of the display status of the alert. Algorithmically they are valid alerts (i.e., the track vector is projected to penetrate a protected airspace) and were used for this analysis regardless of display status. However, due to questionable altitude tracking data, only 276 of the alerts were used. The questionable data were found in the alert messages for aircraft flying between flight levels 150 and 200 and may have been due to military training maneuvers, overestimation of the altitude change rate for aircraft transitioning through the altitude at which Mode C pressure correction began, or incorrect Mode C reports. The majority of alerts that were omitted occurred in Albuquerque.

The statistics described previously were calculated for the following parameters that describe the en route encounters:

- Aircraft ground speed
- Aircraft altitude change rate
- MSAW area minimum warning altitude
- Vertical distance to the MSAW altitude
- Lateral distance to the MSAW area
- Lateral crossing angle
- Lateral span
- Critical lateral angle
- Distance from radar
- Bearing from radar

* Angle from radial heading (angle between aircraft heading and radial from radar)
* MSAW area approach pattern
* Heading stability
* Speed stability
* Vertical stability
* Total stability

These parameters were chosen for analysis on the basis of importance relative to the performance of the MSAW function. Other parameters (e.g., turn rate and turn magnitude) that may also affect performance results were not analyzed due to insufficient data.

TERMINAL MSAW ENCOUNTERS

MSAW alert messages and track reports were extracted from data collected at Houston, Los Angeles, and New York TRACONs. Due to insufficient alerts and adaptation data to study the alerts generated by the Approach Path Monitoring and the five degree climb angle projection, only the current or straight line prediction type alerts for the General Terrain Monitoring were analyzed. A total of 91 of these types of alerts were contained in the data.

Statistics were collected for the following parameters describing the terminal MSAW encounters:

* Aircraft ground speed
* Altitude change rate
* Vertical distance to MSAW altitude
* Minimum warning altitude
* Distance from radar
* Bearing from radar
* Angle from radial heading (angle between aircraft heading and radial from radar)
* Heading stability

- Vertical stability
- Total stability

Fewer parameters defining the position of the aircraft relative to the MSAW area were analyzed for the terminal encounters than for the en route encounters because the grid used for adaptation in the terminal area specifically defines the location and size of the areas.

DATA LIMITATIONS

The data analyzed for this study were collected using the current MSAW and tracking algorithms. This approach to data collection resulted in several limitations:

- Situations for which the current functions missed alerts were not reflected in the data set.
- The source data represent only actual alert situations; thus there may be difficulty in constructing near-violation scenarios to be used for performance evaluation of nuisance alerts.
- Geometries such as an aircraft ascending into the floor of an SUA were not available since the current MSAW functions do not check for such violations.
- The majority of encounters for aircraft flying in an altitude range that may be critical for Centers with mountainous terrain were omitted from the analysis due to questionable data that may have resulted from altitude tracking limitations.

Other limitations of this study that have been identified include:

- Insufficient data were available to analyze some parameters that affect MSAW performance such as aircraft turn rate, turn magnitude, and acceleration.
- No conclusion can be made regarding the degree to which the data is representative of the entire population of MSAW encounters due to the small sample size.
- Some possible encounter geometries were not found in the data set.
- Traffic, adaptation, and aircraft characteristics may be significantly different at the time the AAS is implemented.

PERFORMANCE MEASUREMENT

The information in this report is to be used by the AAS AP Contractor to construct a set of realistic MSAW alert scenarios. These scenarios are to be used as input to a Monte Carlo simulation model of the MSAW and related functions so that performance results can be obtained. Statistical distributions of the encounter parameters characterized in this document are to be computed by the Contractor for the scenario set in order to verify that they do not differ significantly (using a 95 percent confidence interval) from those of the realistic traffic mix presented in this report.

In order to provide a complete evaluation of the performance of the MSAW function, the Contractor will need to generate scenarios in addition to those based on the information provided by this study. These additional scenarios must address the limitations that have been identified in this study and include encounter situations not found in the data set that demonstrate unique features of the Contractor's design. Performance results for scenarios based on this document are to be distinguished from results involving the supplemental scenarios. In addition, result for the scenarios based on the en route data should be presented separately by Center as well as overall since terrain is an important factor relative to the MSAW function. The terminal area results should be presented as overall totals.

1.0 INTRODUCTION

During the Acquisition Phase (AP) of the Federal Aviation Administration's (FAA) Advanced Automation System (AAS) procurement, the AP Contractor will be required to document the performance of the AAS Minimum Safe Altitude Warning (MSAW) function. Performance evaluation will be based, in part, on a set of Contractor-developed aircraft to airspace scenarios that represent realistic traffic and encounter situations. The AAS Statement of Work (SOW) (FAA, August 1987[c]) requires the Contractor to develop scenarios from a Government-provided characterization of realistic traffic and encounter situations. This document provides this characterization for MSAW.

The purpose of the MSAW function is to provide an automated aid to the controller that alerts him to situations when a tracked aircraft is below or predicted to be below a specified minimum safe altitude or predicted to violate an active Special Use Airspace (SUA) in less than approximately two minutes for the en route environment and one minute for terminal areas. The minimum safe altitudes reflect topography, obstructions, traffic flow, and operational considerations for each control area.

1.1 Report Objective

The objective of this report is to detail characteristics of a realistic traffic mix to be used by the AAS AP Contractor to develop scenarios for performance analysis of his MSAW algorithm. The statistics provided herein are for parameters that may affect the performance of the AAS MSAW function and are based on data collected from actual MSAW encounters. This report does not provide information for all parameters required to generate scenarios, only for those that are considered important for performance analysis and for which adequate field data was available. The Contractor is responsible for developing the scenario set to be used for performance analysis and demonstrating that it corresponds to the characteristics contained in this report (FAA, August 1987[a]). The scope of this report includes a brief explanation of the MSAW function as implemented in the National Airspace System (NAS). This document is intended for those familiar with the NAS and AAS requirements. Readers not familiar with these topics may wish to review the documents referenced in this report.

1.2 Approach

In order to appropriately assess the performance of the Contractor's MSAW function, a traffic mix that is representative of the types of MSAW encounters that the function, when implemented, will be acting on is needed. Since the current ATC system has been using MSAW functions for both the terminal and en route environments for several years, it was decided to analyze data from alerts generated by these functions to provide realistic values for parameters that the Contractor will use for development of scenarios.

Data recorded at three Air Route Traffic Control Centers (ARTCCs) and three Terminal Radar Approach Control Facilities (TRACONs) were analyzed. High Speed Printer (HSP) alert messages generated by the NAS en route MSAW algorithm and MSAW messages that appeared on the Automated Radar Terminal System (ARTS) extractor tapes for the terminal data were used to select the aircraft to airspace pairs studied. Adaptation data along with the alert messages and track reports provided all of the data used for this analysis. Although the current terminal MSAW function uses three types of processing (straight line prediction, projection of a five degree climb angle, and a check for violation of an approach path glide slope), sufficient adaptation data were available for only the alerts produced by straight line prediction to be included in this study.

Performance of the MSAW function is dependent on the values of many parameters. For example, both the nuisance and missed alert rates are heavily dependent on the number of encounters that involve aircraft flying close to the edges and corners of MSAW areas. The magnitude and timing of aircraft maneuvers are also very important factors. Seventeen parameters describing the en route encounters and ten parameters for terminal encounters were chosen for analysis based on the importance of the parameter relative to MSAW performance and the availability of field data for that parameter. More parameters were required to describe the geometry of the encounters in the en route environment than in the terminal area because the size, shape, and orientation of the areas are non-uniform in en route adaptation, but are uniform in the terminal area.

Statistics for each parameter analyzed were calculated and are presented in this report. These include the mean, maximum, minimum, and standard deviation for each non-discrete parameter and the mode for the discrete parameters. Empirical and cumulative frequency distributions were also computed. These statistics should be used by the Contractor to generate parameter values for the set of scenarios used for performance analysis and as reference values for demonstration that the scenario set represents a realistic traffic mix.

1.3 Report Organization

Section 2 contains background information pertinent to this report including brief descriptions of the En Route and Terminal MSAW functions in use for the current Air Traffic Control (ATC) system and functional and performance requirements for the AAS MSAW function. The en route and terminal data collection efforts are described in detail in Sections 3 and 4 and include: data descriptions, criteria applied for omitting an alert from analysis, and descriptions and statistics for each encounter characteristic. The actual data, frequency tables, histograms, and correlation matrices are provided in Appendices A, B, C, and D for each Center/TRACON analyzed and for overall totals. Section 5 contains a discussion on the limitations of the study of NAS/ARTS MSAW data relative to performance evaluation of the AAS MSAW function. Lastly, Section 6 discusses how the performance results using scenarios created from the statistics contained in this report should be presented and the supplemental scenarios the Contractor should create to address the limitations discussed in Section 5.

2.0 BACKGROUND

The following sections provide brief overviews of the current MSAW functions and the functional and performance requirements for MSAW in the AAS.

2.1 Description of Current MSAW Functions

Definition of MSAW areas and MSAW processing are different for the en route and terminal environments in the current ATC system. Brief descriptions of the function for each environment follow. For detailed descriptions see the FAA MSAW documentation (FAA, April 1980 and FAA, February 1980).

2.1.1 En Route MSAW

For En Route MSAW (EMSAW) processing, a facility's airspace is divided into polygons, each of which is assigned a minimum altitude. The current capacity for each Center is a maximum of 400 polygons with a limit of 15 sides per polygon. These polygons are then mapped onto the Radar Sort Boxes (RSBs). An altitude is assigned to each RSB that is the maximum of the altitudes of all polygons that overlap the RSB and is called the Maximum Warning Altitude (MWA).

Each controlled track in the system is first subject to gross altitude filtering. If a track is between a High Gross Filter Altitude (HGFA) and a Middle Gross Filter Altitude (MGFA) and is descending or is below the MGFA then it is processed further.

After passing the gross altitude filter, a sort box filter is used. The RSBs penetrated during the look ahead time are determined and the projected track altitude is compared to the MWA for each RSB to be penetrated. If a track's altitude is projected to go below the MWA of an RSB then detailed processing is begun to determine if an area violation will occur.

The detailed violation detection procedure used on the tracks that have passed all of the filters is divided into three separate algorithms based on the geometry of the polygons within an RSB (i.e. whether the angles within an RSB are convex, concave, or a mixture). A violation is determined to exist if any portion of the projected track vector penetrates an EMSAW area within the confines of the RSB being examined.

Each track found to be in violation of an EMSAW area is then checked against alert eligibility and validation requirements before an alert is issued to the controller.

2.1.2 Terminal MSAW

The current terminal area MSAW function provides 3 types of monitoring capability: General Terrain Monitoring (GTM), Approach Path Monitoring (APM), and Satellite Airport Monitoring (SAM). The purpose of GTM is to check for conflicts with terrain or obstacles. APM and SAM check for deviations from normal runway approaches.

The minimum safe altitude information for GTM is provided by projecting a 16,384 square nautical mile grid (128 nautical miles per side) onto the area with the grid centered at the radar. Multiple radar facilities use two or more grids. The grids are divided into 4,096 square sections (i.e., bins) two nautical miles per side. The altitude corresponding to the highest terrain or obstacle found in the bin is the minimum safe altitude for that bin.

The program performs three checks every radar scan. These include:

- Current bin check to determine if a violation already exists,
- Prediction (a look ahead based on tracking data to determine if a violation will occur), and
- Projection (a look ahead based on a five degree climb angle).

Various altitude "pads" are added to bin altitudes when comparing aircraft altitude with bin height. Aircraft found to be near bin borders or predicted/projected to pass close to a bin's borders are compared to altitudes in all affected bins.

Arriving aircraft are processed by APM for a primary airport or by SAM, for other airport approaches. Eligible aircraft are monitored based on their current reported altitude as compared to: (1) a specific glide slope altitude minus a pad altitude when a precision ILS approach has been defined or (2) a minimum descent altitude minus a pad when a non-precision approach has been defined. If an aircraft is currently violating an altitude or is predicted to violate in approximately fifteen seconds, then an approach warning is declared.

2.2 AAS MSAW Functional Overview

Section 3.7.1.1.3.5.2 of the AAS System Level Specification (SLS) (FAA, August 1987[d]) contains the functional requirements for the AAS MSAW. Like the current MSAW functions, the AAS MSAW function will provide an alert to the controller of conflicts detected between an aircraft's projected flight path and adapted airspace regions. In the AAS, however, these regions are to include MSAW Airspace Regions (comprising areas that define low altitude limits or airport approach paths) and SUA Regions (comprising local and strategic airspace regions that may be permanently established or activated as a function of time).

Three types of monitoring capabilities will be available: General Terrain Monitoring, Approach Path Monitoring, and Airspace Monitoring. General Terrain Monitoring projects each track along its velocity vector and determines if, within the adapted look-ahead time, a violation of a minimum safe altitude occurs. Additionally, in defined terminal areas, the search for conflict will extend beyond the projected position sufficiently far into the future to permit escape from an encounter with terrain using a climb angle of five degrees. Approach Path Monitoring compares the projected paths of aircraft making terminal approaches to adapted descent profiles representing minimum descent altitudes or glide slopes. Airspace Monitoring determines if the projected path of an aircraft will enter SUAs that contain associated minimum and maximum safe altitudes.

Inclusion of Airspace Monitoring in the MSAW function requires capabilities beyond those in the current NAS design. MSAW is not currently used to check for SUA violations unless an ARTCC has decided to designate a particular SUA as an MSAW area. The current MSAW function assumes an area to be permanently defined as extending from the associated minimum safe altitude to the ground; SUAs are often defined in altitude strata and are not active at all times.

2.3 AAS AP SLS Performance Requirements

Section 3.2.1.1.3.2.1.4.2 in the AAS AP System Level Specification contains performance requirements for probability of MSAW conflict detection and nuisance alert rate. Conflict detection requirements are based on whether the aircraft is en route or in a terminal area and whether the aircraft has been accelerating prior to prediction of a violation. Aircraft that have been flying with constant velocity both in altitude and in the horizontal plane for 10 to 12 radar scans prior to a predicted violation are considered stable. Those that have been accelerating or decelerating are considered unstable. The performance requirements for aircraft in the en route environment are: 99 percent probability of detection of a violation with a warning time greater than 75 seconds for stable aircraft, and 75 percent probability of detecting a violation with the same warning time for unstable aircraft. For the terminal area, the probability of detection requirements are the same as for en route with the exception that the warning time must be 40 seconds or more.

The SLS defines a nuisance alert as one that would not have been declared if the sensor system provided perfect information concerning aircraft motion and if a perfect tracker were in place. A perfect tracker is one that has perfect knowledge of the true velocity vector and acceleration of the aircraft. The nuisance alert rate (defined as the ratio of nuisance alerts to total alerts) is to be no more than 6 percent with a goal of 2 percent for all aircraft.

3.0 EN ROUTE MSAW ENCOUNTERS

The data collection effort for the en route environment and the analysis of EMSAW encounter characteristics are discussed in the following two sections.

3.1 En Route Data Collection

Data Analysis Reduction Tool (DART) tapes made from ARTCC System Analysis Recordings (SAR) were used to obtain HSP MSAW alert messages and track reports for the en route environment. EMSAW adaptation data and stereographic projection constants were obtained from Adaptation Controlled Environment System (ACES) tapes. Table 3-1 contains information on sample dates and times, total number of HSP alerts generated, number of alerts for which track data were available, and the number of alerts used for the en route analysis.

The alert counts provided in Table 3-1 are for the first occurrence of consecutive HSP alert messages for an aircraft/area pair. For the current ATC system, HSP EMSAW alert messages are generated each processing cycle for which the EMSAW function detects an impending conflict with an EMSAW area and determines the alert to be eligible. An alert is eligible if it passes an alert validation criteria (generally a predicted conflict for two of the last three processing cycles) or if the warning time is smaller than an adapted warning time parameter. A situation when a conflict is not resolved for several radar scans will have multiple alert messages printed at the HSP. In some situations, however, the aircraft may be flying such that the alert messages are not printed every processing cycle. Analysis of the time between HSP messages for the same aircraft/area pair contained in the data studied, indicated a logical break point at 60 seconds for defining the alert as a new alert. Therefore, for this analysis, when the time between consecutive alert messages was less than 60 seconds only the first message was used. When the messages for the same aircraft/area pair were interrupted for 60 seconds or more, the next occurrence was considered to be a new alert.

HSP EMSAW alert messages are printed regardless of the display status of the alert and contain no indication of that status in the message. However, all of the alerts are algorithmically valid based on the tracking data used by the EMSAW function (i.e., the projection of the track vector does indicate a violation) and were used regardless of display status to choose the aircraft/area pairs studied.

Table 3-1 shows that only 60 percent of the alerts that had track data available were used in the analysis. Many of the alert messages for Albuquerque, with a smaller percentage for Fort Worth, indicated descent

TABLE 3-1
EN ROUTE DATA SAMPLES

Center	Date Sampled	Time (Local) Sampled	Total MSAW Alerts	Alerts With Tracks Available	Alerts Used in Analysis
Albuquerque	4/06/84	0600-1159	294	244	79
Fort Worth	8/26/83	0952-1110	63	48	31
New York	4/09/85	1453-1801	219	166	166
Total			576	458	276

rates that were unusually high (20,000 - 50,000 ft/min). After examination of the track data, it was considered inappropriate to use many of these alerts because they were generated on the basis of questionable data. These data are discussed later in this section.

Analysis was limited to the samples from the three Centers listed in Table 3-1 because inclusion of data from other Centers which use the MSAW function (all of which contain relatively flat terrain) would reduce the impact of scenarios developed from data sampled in mountainous areas for which the MSAW function was originally designed. A violation is more difficult to predict with sufficient warning time in mountainous areas because aircraft flight paths are generally closer to the terrain than in non-mountainous areas. Consequently, the MSAW function is stressed more for Centers with mountainous terrain such as Albuquerque than for Centers such as New York that are relatively flat.

The following data were extracted and used to analyze the encounter parameters discussed in Section 3.2:

- Alert Message
  - Aircraft x, y, and z positions at alert
  - Aircraft x, y, and z velocities at alert
  - EMSAW area minimum warning altitude
- Track Reports
  - Mode C reports prior to alert
  - Ground speed history prior to alert
  - Heading history prior to alert
- Adaptation
  - Coordinates of EMSAW area vertices
  - Point of tangency
  - Conformal radius
  - Radar locations

Examination of the Mode C reports for the two minutes prior to each alert indicated very erratic behavior in the 20,000 to 15,000 foot altitude range for aircraft with the unusually high descent rates listed in the alerts. The EMSAW function at Albuquerque center would be more sensitive to aircraft flying at these levels than at New York or Fort Worth because of Albuquerque's higher elevation. Albuquerque center contains many areas where military training activities occur which may account for many of the high vertical velocities that were seen. The aircraft may not actually be under control of the ATC System, but may nevertheless still be tracked. Another possible explanation for the extreme descent rates is a discontinuity that occurs with the current altitude tracker in the altitude range 18,000 to 21,000 feet where Mode C pressure correction begins. If the tracker receives an uncorrected Mode C report followed by a corrected report, the altitude change could be over-estimated, leading to computation of an excessively high velocity. Some of the erratic Mode C data may also have been the result of faulty transponders.

From examination of the Mode C data prior to the alerts, a criteria for eliminating an alert from the data set based on altitude and vertical stability was developed. In general, if an aircraft had not been vertically stable for 60 seconds or more prior to the alert and was flying above 18,000 feet (the minimum pressure correction altitude), it was deleted from the data set (vertical stability is discussed in more detail in Section 3.2.3.3). Other alerts that were obviously nuisance were also deleted. These included one case for which the data in the alert message indicated that the aircraft was flying away from the MSAW area. Examination of the track data indicated that the track had jumped approximately 300 nmi shortly before the alert. The other cases that were deleted involved aircraft whose track data showed them to be flying level at least 5000 feet above the EMSAW altitude, but were indicated to be below the minimum warning altitude by the track data shown in the alert message. The altitude used by the MSAW function in these cases may have been a controller-entered altitude.

3.2 En Route Encounter Characteristics

The following non-discrete parameters were selected for analysis of the en route MSAW encounters:

GRNDSPD:	Ground speed (knots)
ZDOT:	Altitude change rate (100 ft/min)
DVIN:	Vertical distance to EMSAW altitude (100 ft)
DLIN:	Lateral distance to EMSAW area (nmi)
DELTALIN:	Lateral distance in EMSAW area (nmi)
XANGLE:	Lateral crossing angle (degrees)
LATSPAN:	Lateral span (degrees)
MWA:	Minimum warning altitude (100 ft)
CRANGLE:	Critical lateral angle (degrees)
RDIS:	Distance from radar (nmi)
RBEAR:	Bearing from radar (degrees)
RANGLE:	Angle from radial heading (degrees)

The following discrete parameters were selected for analysis of the en route MSAW encounters:

APPROACH:	EMSAW area approach pattern (case number)
HDGSTAB:	Heading stability (seconds)
SPDSTAB:	Speed stability (seconds)
VRTSTAB:	Vertical stability (seconds)
STAB:	Total stability (seconds)

The following information is provided for every parameter:

- Parameter description
- Parameter data source
- Number of observations

The following information is provided for each non-discrete parameter:

- Mean Value
- Maximum and Minimum Values
- Standard Deviation
- D or W*

The statistical mode is provided for each discrete parameter.

Appendix A contains the empirical frequency distribution of each parameter in the form of a histogram. Appendix B contains the empirical cumulative distribution of each parameter in the form of tables with parameter values for percentiles 1-100. These tables are useful for the random generation of scenario parameters. Tables C-1 through C-4 in Appendix C contain matrices of correlation coefficients that indicate the degree to which each parameter is correlated with each other parameter. The contractor should use these data while generating scenarios so that the effects of all significant correlations are included. Table D-1 in Appendix D contains the data set from which the statistics provided in this report have been computed.

*D is the Kolmogorov-Smirnoff statistic that represents the maximum difference between the observed cumulative distribution and a theoretical normal distribution at each data point. It is used to test the hypothesis that the sample data originate from a normal distribution with the sample mean and standard deviation. W is the Shapiro-Wilk statistic and was provided when the number of observations was less than fifty-one.

3.2.1 Aircraft Motion

The following two parameters describe the aircraft motion at the time of the alarm.

3.2.1.1 Ground Speed (GRNDSPD). Statistics were collected describing the ground speed of the aircraft at the time of the alert. The ground speed, measured in knots, was computed for all first alert cases and derived from the x and y velocities in the high speed printer message. A summary of the statistics for GRNDSPD is provided in Table 3-2; Figures A-1 through A-4 and Tables B-1 through B-4 in Appendices A and B provide the empirical frequency and cumulative distributions.

3.2.1.2 Altitude Change Rate (ZDOT). ZDOT is the altitude tracker's estimate of the altitude change rate for an aircraft and was extracted directly from the HSP alert messages for this analysis. The statistics in Table 3-3 were computed for ZDOT; Figures A-5 through A-8 and Tables B-5 through B-8 in Appendices A and B provide the empirical frequency and cumulative distributions.

3.2.2 Aircraft Position and Direction

The following parameters describe the aircraft position and direction with respect to the EMSAW area. The aircraft position was derived from the high speed printer output message and the EMSAW coordinates were determined from adaptation data.

3.2.2.1 Distance to Vertical Entry (DVIN). DVIN is the vertical distance in hundreds of feet between the aircraft altitude at the time of the alert and the EMSAW minimum warning altitude (MWA). DVIN is positive if the aircraft is above the MWA. Summary statistics for DVIN are provided in Table 3-4; Figures A-9 through A-12 and Tables B-9 through B-12 in Appendices A and B provide the empirical frequency and cumulative distributions.

3.2.2.2 Distance to Lateral Entry (DLIN). DLIN is the lateral distance in nautical miles between the aircraft x, y position at the time of the alert and the x, y position where the aircraft first laterally enters the EMSAW area assuming the aircraft has constant heading and groundspeed. Table 3-5 provides summary statistics for DLIN; Figures A-13 through A-16 and Tables B-13 through B-16 in Appendices A and B provide the empirical frequency and cumulative distributions.

3.2.2.3 Distance Traveled While Laterally in EMSAW Area (DELTALIN). DELTALIN is the distance in nautical miles between the x, y position where the aircraft laterally enters the EMSAW area and the x, y position where the aircraft laterally exits the EMSAW area assuming the

TABLE 3-2
SUMMARY DATA FOR GRNDSPD

GRNDSPD (knots)	ZAB	ZFW	ZNY	All
N	79	31	166	276
Maximum	519	407	463	519
Minimum	36	36	139	36
Mean	196	244	256	238
Standard Deviation	114	87	49	82
D or (W)	0.103	(0.972)	0.068	0.083

TABLE 3-3
SUMMARY DATA FOR ZDOT

ZDOT (100 ft/min)	ZAB	ZFW	ZNY	All
N	79	31	166	176
Maximum	38	10	20	38
Minimum	-147	-228	-59	-228
Mean	-24	-39	-17	-22
Standard Deviation	32	49	9	26
D or (W)	0.128	(0.656)	0.136	0.202

TABLE 3-4
SUMMARY DATA FOR DVIN

DVIN (100 ft)	ZAB	ZFW	ZNY	All
N	79	31	166	276
Maximum	85.71	77.47	74.21	85.71
Minimum	-64.94	-23.00	-12.00	-64.94
Mean	14.62	34.50	24.15	22.58
Standard Deviation	31.15	22.56	12.33	21.39
D or (W)	0.100	(0.981)	0.074	0.090

TABLE 3-5
SUMMARY DATA FOR DLIN

DLIN (nmi)	ZAB	ZFW	ZNY	All
N	79	31	166	276
Maximum	11.21	7.53	7.70	11.21
Minimum	0	0	0	0
Mean	0.84	1.45	0.86	0.92
Standard Deviation	2.39	2.26	1.70	1.99
D or (W)	0.435	(0.692)	0.410	0.407

aircraft has constant heading and ground speed. The statistics in Table 3-6 were computed for DELTALIN; Figures A-17 through A-20 and Tables B-17 through B-20 in Appendices A and B provide the empirical frequency and cumulative distributions.

3.2.2.4 EMSAW Area Approach Pattern (APPROACH). Statistics were collected describing how the aircraft was approaching the EMSAW area at the time of the alert.

Figure 3-1 shows the altitude vs time plot for all the possible approach cases. For approach case 1: DVIN > = 0, DLIN > 0, ZDOT < 0 and penetration is predicted to be into the top of the EMSAW area. For approach case 2: DVIN > = 0, DLIN = 0, ZDOT < 0, and penetration is predicted to be into the top of the EMSAW area. For approach case 3: DVIN < 0, DLIN > 0, and ZDOT > 0, and penetration is predicted to be into the side of the EMSAW area. For approach case 4: DVIN < 0, DLIN = 0, and ZDOT > 0 (the aircraft has already penetrated the EMSAW area). For approach case 5: DVIN < 0, DLIN > 0 and ZDOT < = 0, and penetration is predicted to be into the side of the EMSAW area. For approach case 6: DVIN < 0, DLIN = 0 and ZDOT < = 0 (the aircraft has already penetrated the EMSAW area). For approach case 7: DVIN > = 0, DLIN > 0, ZDOT < 0, and penetration is predicted to be into the side of the EMSAW area. The most commonly observed approach for each center was case 2.

Figures A-21 through A-24 and Tables B-21 through B-24 in Appendices A and B provide the empirical frequency and cumulative distributions of APPROACH.

3.2.2.5 Lateral Crossing Angle (XANGLE). Statistics were collected describing the angle of intersection (0 < degrees < 90) between the aircraft lateral velocity vector at the time of the alert and the side of the EMSAW area that it intersects. The lateral crossing angle was computed for all first alert cases (as defined in Section 3.1) where the aircraft was laterally outside of the EMSAW area (predicted time to lateral penetration greater than zero seconds) regardless of (1) the predicted time to lateral exit, (2) the predicted time to vertical penetration, and (3) how, or if, the aircraft actually penetrated the EMSAW area.

The aircraft velocity vector at the time of the alert was derived from the x and y velocities in the high speed printer message. The EMSAW area configuration was determined using the Center's corresponding adaptation data. Table 3-7 summarizes the statistics computed for XANGLE; Figures A-25 through A-28 and Tables B-25 through B-28 in Appendices A and B provide the empirical frequency and cumulative distributions.

TABLE 3-6
SUMMARY DATA FOR DELTALIN

DELTALIN (nmi)	ZAB	ZFW	ZNY	All
N	79	31	166	276
Maximum	50.27	84.35	61.66	84.35
Minimum	0.19	2.79	1.98	0.19
Mean	16.39	33.91	21.80	21.61
Standard Deviation	12.55	22.55	14.16	15.66
D or (W)	0.153	(0.909)	0.180	0.160

TABLE 3-7
SUMMARY DATA FOR XANGLE

XANGLE	ZAB	ZFW	ZNY	All
N	16	12	47	75
Maximum	89	81	89	89
Minimum	3	6	16	3
Mean	60	45	62	59
Standard Deviation	26	27	20	23
D or (W)	0.870	(0.926)	(0.914)	0.126

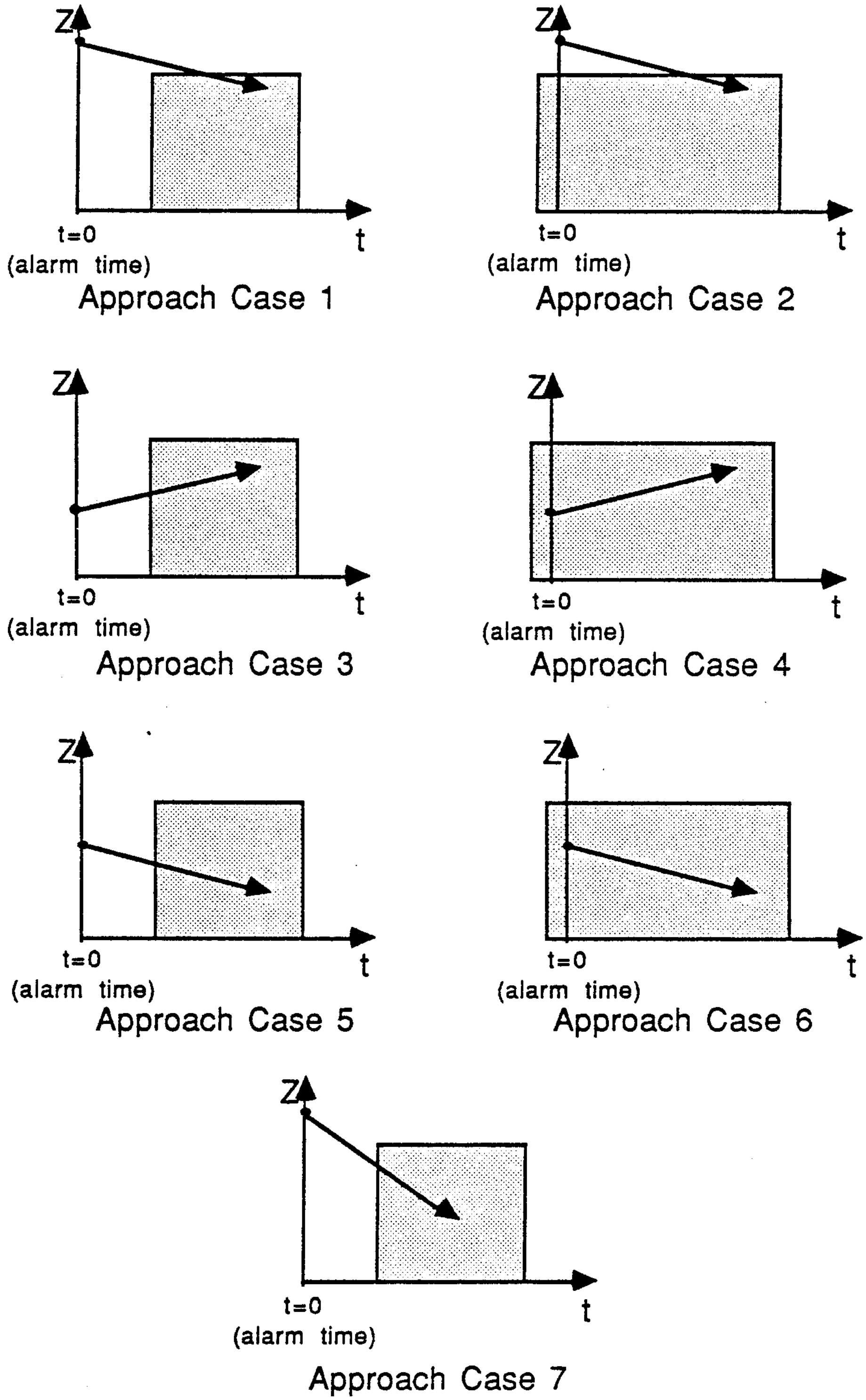


FIGURE 3-1
EMSAW APPROACH CASES

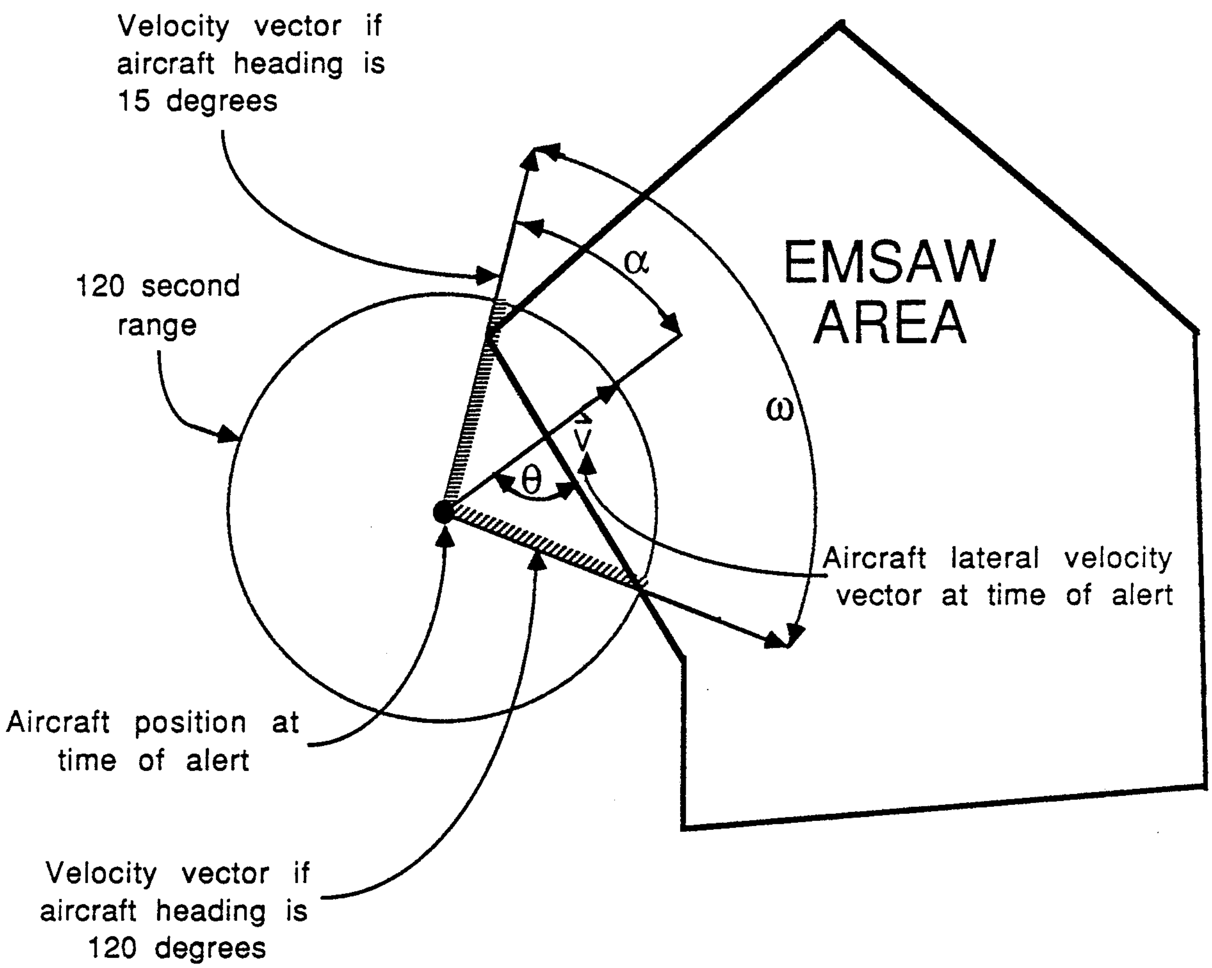
3.2.2.6 Lateral Span (LATSPAN). Statistics were collected describing the possible span of angles that the aircraft could be heading and still be predicted to laterally penetrate the EMSAW area within 120 seconds. Figure 3-2 illustrates the definition of lateral span. In the illustration, the aircraft can have a heading variation from 15 degrees to 120 degrees in order to laterally penetrate the area within 120 seconds (assuming no acceleration). The lateral span in this case is 105 degrees (120 - 15). The lateral span was computed for all first alert cases where the aircraft was laterally outside of the EMSAW area (predicted time to lateral penetration greater than zero seconds) regardless of (1) the predicted time to lateral exit, (2) the predicted time to vertical penetration, and (3) how or if the aircraft actually penetrated the EMSAW area.

The aircraft velocity vector at the time of the alert was derived from the x and y velocities in the high speed printer message. The sides of the EMSAW area that are penetrable within 120 seconds were determined using the adaptation data. Table 3-8 provides summary statistics for LATSPAN; Figures A-29 through A-32 and Tables B-29 through B-32 in Appendices A and B provide the empirical frequency and cumulative distributions.

3.2.2.7 Critical Lateral Angle (CRANGLE). Statistics were collected describing the shortest possible change in heading that the aircraft could make so as not to laterally penetrate the EMSAW area. Figure 3-2 also illustrates the definition of critical lateral angle. In the illustration, the aircraft can have a heading variation from 15 degrees to 120 degrees in order to laterally penetrate the area within 120 seconds. Its actual heading at the time of the alarm, as specified in the high speed printer output, was 45 degrees which is closest to the 15 degree side of the span; therefore the magnitude of the critical lateral angle is 30 degrees (45-15). A sign convention was chosen such that a positive critical lateral angle indicates that the critical lateral angle and the lateral crossing angle are part of the same triangle. For the case illustrated however, the sign is negative.

The critical lateral angle was computed for all first alert cases where the aircraft was laterally outside of the EMSAW area (predicted time to lateral penetration greater than zero seconds) regardless of (1) the predicted time to lateral exit, (2) the predicted time to vertical penetration, and (3) how, or if, the aircraft actually penetrated the EMSAW area.

The aircraft velocity vector at the time of the alert was derived from the x and y velocities in the high speed printer message. The EMSAW sides that were penetrable within 120 seconds were determined using the adaptation data. Table 3-9 provides summary statistics for CRANGLE; Figures A-33 through A-36 and Tables B-33 through B-36 in Appendices A and B provide the empirical frequency and cumulative distributions.



ω : Lateral Span (LATSPAN)
θ : Lateral Crossing Angle (XANGLE)
α : Critical Lateral Angle (CRANGLE)

FIGURE 3-2
EMSAW PARAMETER DEFINITIONS

TABLE 3-8
SUMMARY DATA FOR LATSPAN

LATSPAN (degrees)	ZAB	ZFW	ZNY	All
N	16	12	47	75
Maximum	180	238	208	238
Minimum	71	154	60	60
Mean	147	185	151	156
Standard Deviation	36	27	34	36
D or (W)	(0.829)	(0.880)	(0.869)	0.157

TABLE 3-9
SUMMARY DATA FOR CRANGLE

CRANGLE (degrees)	ZAB	ZFW	ZNY	All
N	16	12	47	75
Maximum	84	87	61	87
Minimum	-77	-61	-99	-99
Mean	-11	-26	-40	-32
Standard Deviation	49	41	35	41
D or (W)	(0.893)	(0.759)	(0.867)	0.160

3.2.3 Aircraft Stability

Detection of an imminent MSAW violation is essentially trivial for stable tracks, i.e., tracks that have little or no acceleration in the x, y, and z dimensions. However, stable tracks that bring an aircraft very close to the boundaries of an area are non-trivial cases as a result of sensor and tracker inaccuracies. Detection of a violation for a flight that is maneuvering (turning, beginning a climb or descent, or leveling off) is much more difficult and is dependent on the timing and magnitude of the maneuver. Since the MSAW function will be operating on both stable and maneuvering aircraft, it should be tested with scenarios containing both types of tracks.

Statistics were collected describing the aircraft's ground speed stability, heading stability, and vertical stability from the time of the first alert to 180 seconds prior to the time of the first alert. The data is presented in units of thirty second intervals prior to the alert; therefore a heading stability measurement of 30 indicates that the aircraft was stable in heading for the previous 30-59 second time interval. The stability parameters were determined by examining the track reports spanning the 180 seconds prior to the time of the alert.

3.2.3.1 Heading Stability (HDGSTAB). Statistics were collected describing heading stability. An aircraft is considered to be stable in heading if two successive radar reports indicate a deviation in heading by no more than five degrees. For the combined Centers, most aircraft (40 percent) were only stable for the interval zero to 29 seconds prior to the alert. Figures A-37 through A-40 and Tables B-37 through B-40 provide the empirical frequency and cumulative distributions of HDGSTAB.

3.2.3.2 Speed Stability (SPDSTAB). Statistics were collected describing the ground speed stability. An aircraft is considered to be stable in ground speed if two successive radar reports indicate a deviation in ground speed by no more than twenty knots. Most aircraft at ZAB (44 percent) and ZFW (39 percent) were stable for the interval zero to 29 seconds prior to the alert. Most aircraft observed at ZNY (26 percent) were stable for three minutes or more. Figures A-41 through A-44 and Tables B-41 through B-44 provide the empirical frequency and cumulative distributions of SPDSTAB.

3.2.3.3 Vertical Stability (VRTSTAB). Vertical Stability (VRTSTAB) is the time interval immediately prior to the alert for which the vertical acceleration of the aircraft was zero. Since altitude tracker information was not available for the ARTCC data, VSTAB was determined by: 1) extracting the Mode C reports from the track files for 180 seconds prior to the alert; 2) curve fitting a line to the data for the 60, 90, 120, 150, and 180 second time intervals prior to the alert using least squares regression; 3) and finally, applying a Chi-square goodness of fit test to determine the linearity of the data. If the Chi-square test indicated with 99 percent confidence that the Mode C reports changed linearly, the aircraft was considered stable for that time period. For the combined centers, most aircraft (74 percent) were vertically stable for three minutes or more. Figures A-45 through A-48 and Tables B-45 through B-48 in Appendices A and B provide empirical frequency and cumulative distributions of VRTSTAB.

3.2.3.4 Overall Stability (STAB). STAB, overall stability, represents the time interval for which the aircraft was stable in heading, speed, and altitude prior to the alert. The time interval was determined by the lesser of HDGSTAB, SPDSTAB, and VRTSTAB for each alert. For each center most aircraft were stable for the interval zero to 29 seconds prior to the alert. Figures A-49 through A-52 and Tables B-49 through B-52 in Appendices A and B indicate the empirical frequency and cumulative distributions for STAB.

3.2.4 Environment

Environmental parameters include MSAW area characteristics, sensor locations, and sensor performance characteristics. For performance measurement, the encounter characteristics previously discussed define the critical attributes of an MSAW area to be used for each scenario with the exception of altitude. Due to the inconsistencies found in the field data for altitudes above 15,000 feet, the altitude distribution of the scenarios is considered to be important. Statistics for the minimum warning altitude (MWA) of each MSAW area involved in a conflict as well as for the entire set of areas in each center are provided in Section 3.2.4.1.

Data regarding sensor performance characteristics were not collected for this analysis. For the scenarios, the Contractor should select appropriate sensors and apply the sensor performance values that are specified in Table 3.2-11 of the AAS SLS (FAA, August 1987[d]). If the design of the MSAW function utilizes reports from multiple radars, the Contractor's simulation capability should allow for the specification of different radar sites so that multiple radar data processing may be performed when executing the scenarios.

Sensor and possibly MSAW performance may vary with the orientation of an aircraft's flight path to the radar. In order to specify the orientation of an MSAW encounter to the sensor of interest, three attributes were examined:

- Distance from the radar (RDIS),
- Bearing from the radar (RBEAR), and
- Angle from a radial heading (RANGLE).

These attributes are illustrated in Figure 3-3 and are discussed in Sections 3.2.4.2 through 3.2.4.4.

3.2.4.1 Minimum Warning Altitude (MWA). The statistics in Table 3-10 were computed for the Minimum Warning Altitude (MWA) associated with each MSAW area involved in a conflict; empirical frequency and cumulative distributions are provided in Figures A-53 through A-56 and Tables B-53 through B-56 in Appendices A and B.

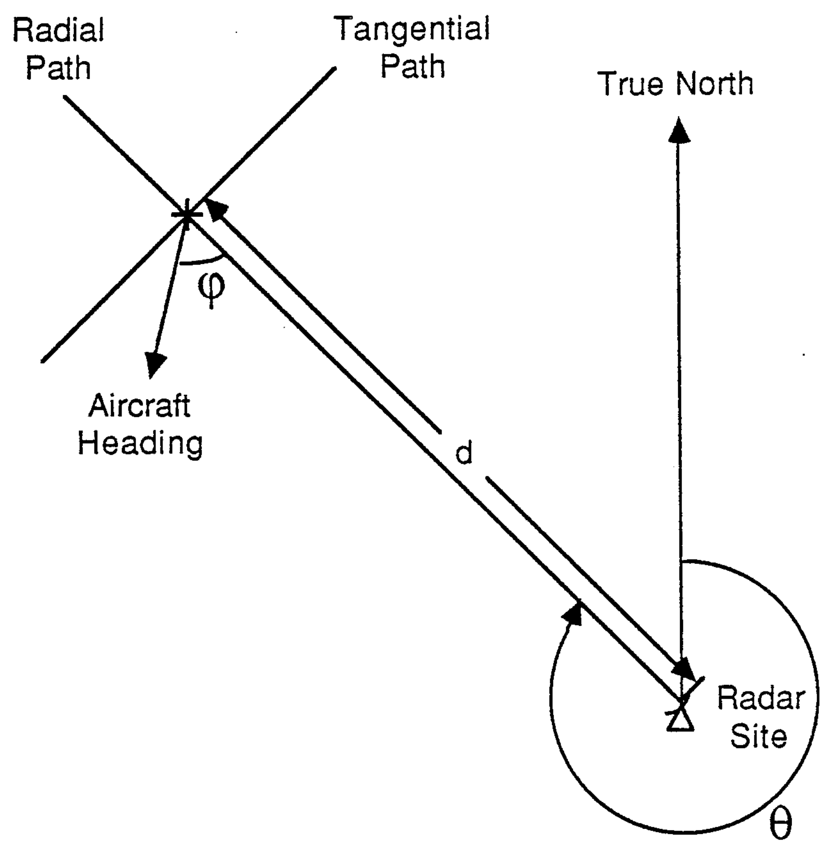
The statistics in Table 3-11 are for the MWAs associated with all EMSAW areas in each center; Figures A-69 through A-72 and Tables B-69 through B-72 illustrate the empirical frequency and cumulative distributions of the altitudes.

3.2.4.2 Distance from Radar (RDIS). The horizontal distance from the closest radar (RDIS) was computed for the aircraft position given in the alert message. In general, azimuth errors will increase as the distance from the radar increases and is therefore a critical parameter. The statistics in Table 3-12 were computed for RDIS. Tables A-57 through A-60 and Figures B-57 through B-60 illustrate the empirical frequency and cumulative distributions of RDIS in Appendices A and B.

3.2.4.3 Bearing from Radar (RBEAR). Taken alone, the bearing of an aircraft to the sensor (RBEAR) is an insignificant parameter. However, when combined with the distance and radial heading parameters the orientation of an MSAW encounter with respect to the sensor can be accurately determined. The statistics in Table 3-13 were computed for RBEAR; Tables A-61 through A-64 and Figures B-61 through B-64 provide empirical cumulative and frequency distributions.

3.2.4.4 Angle from Radial Heading (RANGLE). The orientation of a flight path to the sensor is a critical factor in the performance of the horizontal tracker and thus the MSAW function. Tracker heading errors dominate speed errors when the tracked aircraft flies radially with respect to the sensor (toward or away from the sensor). Track speed errors dominate heading errors when the tracked aircraft flies tangentially with respect to the sensor (perpendicular to the sensor radial). Figure 3-4 illustrates how RANGLE was defined for this analysis. The direction of travel (away from or towards the sensor) is not a critical parameter. Thus, RANGLE defined symmetrically about the sensor radial, is the angle from 0° to 90° between the aircraft's heading and the line between the aircraft's position and the sensor of interest.

Summary statistics for RANGLE are provided in Table 3-14; empirical frequency and cumulative distributions are provided in Figures A-65 through A-68 and Tables B-65 through B-68 in Appendices A and B.



$+$: Aircraft position

d : Distance from radar (RDIS)

θ : Bearing from radar (RBEAR)

φ : Angle from radial heading (RANGLE)

FIGURE 3-3
AIRCRAFT/RADAR ORIENTATION

TABLE 3-10
SUMMARY DATA FOR MWA
FOR AREAS INVOLVED IN CONFLICTS

MWA for areas involved in conflicted (100 ft)	ZAB	ZFW	ZNY	All
N	79	31	166	276
Maximum	160	70	57	160
Minimum	40	30	17	17
Mean	94	37	26	47
Standard Deviation	25	8	7	34
D or (W)	0.116	(0.724)	0.285	0.258

TABLE 3-11
SUMMARY DATA FOR MWA
FOR ALL CENTER AREAS

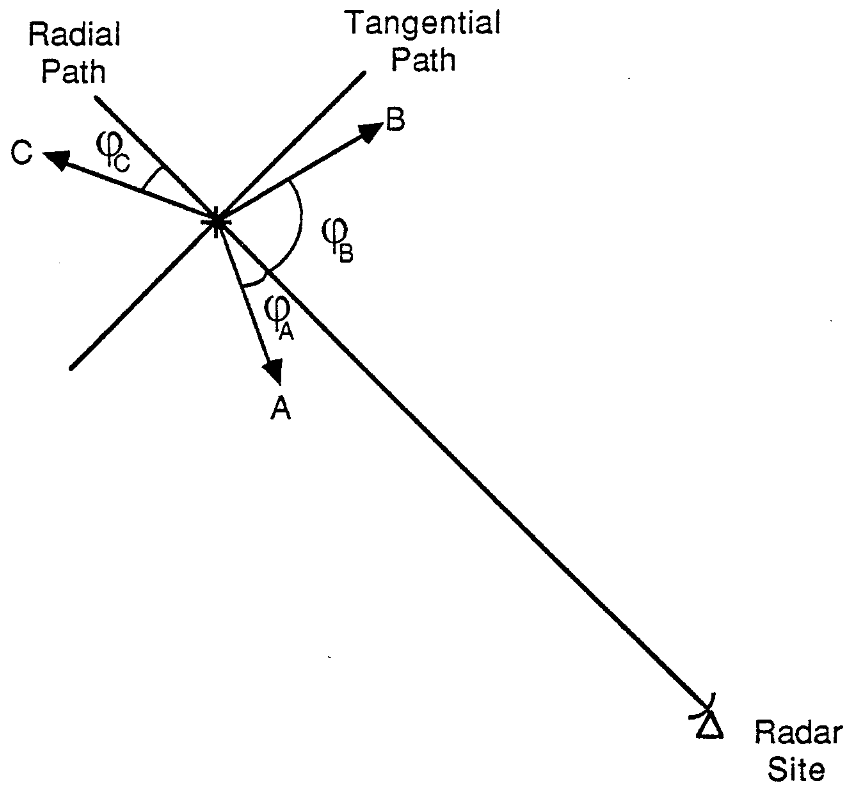
MWA (100 ft)	ZAB	ZFW	ZNY	All
N	189	69	71	329
Maximum	160	100	62	160
Minimum	38	20	17	17
Mean	90.6	42.69	36.41	68.86
Standard Deviation	24.89	18.96	11.60	33.21
D or (W)	0.093	0.194	0.124	0.116

TABLE 3-12
SUMMARY DATA FOR RDIS

RDIS (nmi)	ZAB	ZFW	ZNY	All
N	79	31	166	276
Maximum	124.3	97.1	79.0	124.3
Minimum	9.4	21.3	1.7	1.7
Mean	64.5	49.0	49.9	54.0
Standard Deviation	19.4	21.16	15.8	18.7
D or (W)	0.127	(0.902)	0.129	0.079

TABLE 3-13
SUMMARY DATA FOR RBEAR

RBEAR (degrees)	ZAB	ZFW	ZNY	All
N	79	31	166	276
Maximum	352	343	340	352
Minimum	20	11	0	0
Mean	201	141	145	161
Standard Deviation	78	115	115	108
D or (W)	0.095	(0.844)	0.213	0.149



+ : Aircraft position

φ_A : RANGLE for heading A

φ_B : RANGLE for heading B

φ_C : RANGLE for heading C

FIGURE 3-4
RANGLE DEFINITION

TABLE 3-14
SUMMARY DATA FOR RANGLE

RANGLE (degrees)	ZAB	ZFW	ZNY	All
N	79	31	166	276
Maximum	88	89	90	90
Minimum	2	3	0	0
Mean	40	39	44	43
Standard Deviation	24	23	28	26
D or (W)	0.099	(0.959)	0.119	0.097

4.0 TERMINAL MSAW ENCOUNTERS

An overview of the current terminal MSAW function and AAS AP performance requirements is provided in Section 2. The data collection effort and characteristics of terminal area MSAW encounters are described in the following sections.

4.1 Terminal Data Collection

ARTS extractor tapes from the three TRACONs listed in Table 4-1 were used to obtain MSAW alert messages and track data. Statistics were collected for only the current and predicted types of General Terrain Warnings (GTWs). Insufficient GTWs based on projection of a 5 degree climb and Approach Path Warnings (APWs) were found in the source data to allow characterization of those types of encounters. Adaptation data for the sample periods were also unavailable; however, the encounter geometries for the GTW current and predicted violations may be reconstructed using the data provided. Since the grid used for GTW adaptation is centered at the radar and each bin is 2 nmi X 2 nmi, only the orientation of the aircraft with respect to the radar is required to define the encounter geometry.

Like the en route analysis, the alert messages were used to determine the aircraft/area pairs studied. A first alert was defined, as it was in the en route environment, as the first occurrence of a message for the same aircraft/area pair. Since there were no interruptions longer than one processing cycle of alert messages in the terminal data for the same aircraft/area pairs, only the first alert for each pair was analyzed. The alert messages themselves contained very little information. Only the aircraft's altitude and the altitude at which the violation would occur were extracted from the messages. Other characteristics were extracted from track reports.

4.2 Terminal Area Encounter Characteristics

Statistics for the following characteristics are provided for the terminal area encounters studied:

- Non-discrete

  TGRNDSPD: Ground speed (Knots)
  TZDOT: Altitude change rate (100 ft/min)
  TDVIN: Vertical distance to MSAW altitude (100 ft)
  TMWA: Minimum warning altitude (100 ft)
  TRDIS: Distance from radar (nmi)
  TRBEAR: Bearing from radar (nmi)
  TRANGLE: Angle from radial heading (degrees)

TABLE 4-1
TERMINAL DATA SAMPLES

TRACON	Date Sampled	Duration	GTW Alerts Used For Analysis
Houston	5/9/86	3:35	53
Los Angeles	1/15/87	3:59	10
New York	5/1/86	1:40	28
Total			91

- Discrete

  THDGSTAB: Heading stability (seconds)
  TVRTSTAB: Vertical stability (seconds)
  TSTAB: Total stability (seconds)

The characteristic's description, data source, and number of observations are provided for each MSAW encounter characteristic analyzed. The statistical mode is provided for each discrete characteristic and the following information is provided for each non-discrete characteristic:

- Mean Value
- Maximum and Minimum Values
- Standard Deviation
- D or W

Appendix A contains the empirical frequency distribution of each parameter in the form of a histogram. Appendix B contains the empirical cumulative distribution of each parameter in the form of tables with values for percentiles 1-100. Table C-5 through C-8 in Appendix C contain matrices of correlation coefficients that indicate the degree to which each parameter is correlated with each other parameter. Table D-2 in Appendix D contains the data set from which the statistics provided in this report have been computed.

4.2.1 Aircraft Motion

The following two parameters describe the aircraft motion at the time of the alarm.

4.2.1.1 Ground Speed (TGRNDSPD). The ground speed of the aircraft measured in knots, was computed for all first alert cases and was derived from the x and y velocities found in the track data immediately prior to the alert. Table 4-2 summarizes the statistics computed for TGRNDSPD; Figures A-73 through A-76 and Tables B-73 through B-76 in Appendices A and B provide the empirical frequency and cumulative distributions.

4.2.1.2 Altitude Change Rate (TZDOT). TZDOT is the altitude tracker's estimate of the altitude change rate for an aircraft in 100 ft/min and was extracted from the altitude tracking messages for this analysis. The statistics in Table 4-3 were computed for TZDOT; Figures A-77 through A-80 and Tables B-77 through B-80 in Appendices A and B provide the empirical frequency and cumulative distributions.

TABLE 4-2
SUMMARY DATA FOR TGRNDSPD

TGRNDSPD (knots)	HOU	LA	NY	All
N	53	10	28	91
Maximum	342	234	295.2	342
Minimum	93.6	75.6	86.7	75.6
Mean	161.3	124.2	171.8	160.5
Standard Deviation	51.3	57.3	48.2	52.3
D or (W)	0.169	(0.793)	(0.959)	0.086

TABLE 4-3
SUMMARY DATA FOR TZDOT

TZDOT (100 ft/min)	HOU	LA	NY	All
N	53	10	28	91
Maximum	14.1	28.4	4.87	28.4
Minimum	-33	-76.5	-63.22	-76.5
Mean	-12.37	-9.5	-14.08	-12.5
Standard Deviation	9.24	29.63	11.88	13.46
D or (W)	0.080	(0.906)	(0.760)	0.119

4.2.2 Aircraft Position

The following parameters describe the aircraft position relative to the alert MWA and the radar tracking the aircraft. The aircraft altitudes and MWAs used to compute the distance to vertical entry were taken directly from the alert messages. Position relative to the sensor was derived from track data. Note that orientation to the sensor is based on magnetic north for the terminal area versus true north for the en route environment.

4.2.2.1 Distance to Vertical Entry (TDVIN). TDVIN is the vertical distance in hundreds of feet between the aircraft altitude at the time of alert and the MWA. TDVIN is positive if the aircraft was above the MWA. The statistics in Table 4-4 were compiled for TDVIN; Figures A-81 through A-84 and Tables B-81 through B-84 in Appendices A and B provide the empirical frequency and cumulative distributions.

4.2.2.2 Minimum Warning Altitude (TMWA). TMWA is the minimum warning altitude in hundreds of feet associated with the grid bin that was predicted to be violated. TMWA was extracted directly from the MSAW alert messages. Table 4-5 provides a summary of the statistics computed for TMWA; Figures A-85 through A-88 and Tables B-85 through B-88 in Appendices A and B provide the empirical frequency and cumulative distributions.

4.2.2.3 Distance from Radar (TRDIS). The distance from the radar that was tracking the aircraft at the time of alert was extracted directly from the track reports. The statistics in Table 4-6 were computed for TRDIS; Figures A-89 through A-92 and Tables B-89 through B-92 in Appendices A and B provide the empirical frequency and cumulative distributions.

4.2.2.4 Bearing from Radar (TRBEAR). TRBEAR was also extracted directly from the track reports for each aircraft. The statistics in Table 4-7 were computed for TRBEAR; Figures A-93 through A-96 and Tables B-93 through B-96 in Appendices A and B provide the empirical frequency and cumulative distributions.

4.2.2.5 Angle from Radial Heading (TRANGLE). TRANGLE for the terminal area is defined the same as RANGLE for the en route environment (see Section 3) and was computed from data extracted from the track reports. The statistics in Table 4-8 were compiled for TRANGLE; Figures A-97 through A-100 and Tables B-97 through B-100 in Appendices A and B provide the empirical frequency and cumulative distributions.

TABLE 4-4
SUMMARY DATA FOR TDVIN

TDVIN (100 ft)	HOU	LA	NY	All
N	53	10	28	91
Maximum	-0.012	-0.475	21	21
Minimum	-4.775	-9.36	-4.76	-9.36
Mean	-1.043	-2.36	3.91	0.336
Standard Deviation	-1.088	2.67	5.46	4.03
D or (W)	0.187	(0.698)	(0.934)	0.325

TABLE 4-5
SUMMARY DATA FOR TMWA

TMWA (100 ft)	HOU	LA	NY	All
N	53	10	28	91
Maximum	14	29	23	29
Minimum	4	6	4	4
Mean	6.5	15.8	9.5	8.4
Standard Deviation	3.30	9.40	4.13	5.36
D or (W)	0.266	(0.839)	(0.780)	0.203

TABLE 4-6
SUMMARY DATA FOR TRDIS

TRDIS (nmi)	HOU	LA	NY	All
N	53	10	28	91
Maximum	29	24.1	21	29
Minimum	3.3	2.9	1.7	1.7
Mean	8.76	9.57	6.68	8.21
Standard Deviation	5.11	5.95	5.64	5.41
D or (W)	0.229	(0.843)	(0.789)	0.197

TABLE 4-7
SUMMARY DATE FOR TRBEAR

TRBEAR (degrees)	HOU	LA	NY	All
N	53	10	28	91
Maximum	344.4	337.2	357.6	357.6
Minimum	64.2	18.5	3.16	3.16
Mean	247.56	231.1	164.8	220.3
Standard Deviation	110.2	132.8	130.94	123.8
D or (W)	0.391	(0.709)	(0.806)	0.343

TABLE 4-8
SUMMARY DATA FOR TRANGLE

TRANGLE (degrees)	HOU	LA	NY	All
N	53	10	28	91
Maximum	83.57	76.3	84.04	84.04
Minimum	1.05	1.5	3.95	1.05
Mean	26.19	28.5	36.38	29.59
Standard Deviation	21.72	27.7	28.36	24.74
D or (W)	0.261	(0.870)	(0.857)	0.219

4.2.3 Aircraft Stability

Statistics were collected describing the heading and vertical stability of the aircraft from the time of the alert to 105 seconds prior to the time of the alert. Speed stability measurements were not included as part of the terminal area study. The stability data is presented in units of fifteen second intervals prior to the alert. For example, a vertical stability measurement of 30 indicates that the aircraft had been climbing/descending at a constant rate for at least 30 seconds prior to the alert but less than 45 seconds. The parameters used to determine stability were extracted from the aircraft track reports.

4.2.3.1 Heading Stability (THDGSTAB). THDGSTAB is the time interval immediately prior to the alert for which the aircraft's heading remained constant. The distributions for heading stability were obtained by comparing an estimate of the aircraft's heading at various times before the time of the MSAW alert message and an estimate of the aircraft's heading at the time of the message. Given the accuracy of the heading estimates which were based on several successive track headings, a difference in heading of more than five degrees was considered a statistically significant indication that the hypothesis of straight line motion (stability) could be rejected. The statistical mode of THDGSTAB for the entire set of terminal encounters studied was observed to be the 0-14 second interval for 30 percent of the encounters.

Figures A-101 through A-104 and Tables B-101 through B-104 in Appendices A and B provide empirical frequency and cumulative distributions of THDGSTAB.

4.2.3.2 Vertical Stability (TVRTSTAB). VRTSTAB is the time interval immediately prior to the alert for which the vertical acceleration of the aircraft was essentially zero. The distributions for vertical stability were obtained by comparing an estimate of aircraft climb/descent rates at various times before the time of the MSAW alert message and an estimate of climb/descent rate at the time of the message. These climb/descent rates were estimated from several successive Mode C reports which had been previously filtered through several non-causal smoothing filters. Given the accuracy of the climb/descent rate estimates, a difference in rate of more than 300 ft/min was considered a statistically significant indication that the hypothesis of constant rate should be rejected. The statistical mode for TVRTSTAB for the entire set of terminal encounters was observed to be the time interval of 105 seconds and greater for 38 percent of the encounters.

Figures A-105 through A-108 and Tables B-105 though B-108 in Appendices A and B provide empirical frequency and cumulative distributions of TVRTSTAB.

4.2.3.3 Overall Stability (TSTAB). TSTAB, overall stability for terminal area aircraft, represents the time interval for which the aircraft was stable in both heading and altitude change rate prior to the alert. The time interval was determined by the lesser of THDGSTAB and TVRTSTAB for each encounter. The statistical mode for the entire set of terminal encounters was observed to be the 0-14 second interval for 28 percent of the encounters.

Figures A-109 through A-112 and Tables B-109 through B-112 in Appendices A and B provide the empirical and frequency distributions for TSTAB.

5.0 DATA LIMITATIONS

In order to appropriately assess the performance of the Contractor's MSAW function, a realistic traffic mix that represents with accurate proportions the entire spectrum of possible MSAW encounter situations is needed. The data collection approach and analysis performed for this study are limited in several areas relative to this goal. The purpose of this section is to identify these limitations; Section 6 discusses how the Contractor is to address them in order to fully assess the MSAW algorithm designed for the AAS.

The sample size used for this analysis was small, largely due to the attempt to draw a sample that was representative of different environments. Because of the small sample size, no conclusion can be made regarding the degree to which the sample is representative of the entire population of MSAW encounters.

Although the data is from actual reported MSAW encounters, it was generated using the NAS and ARTS MSAW and tracking algorithms which have documented limitations (Hauser, November 1979 and Lefferts, May 1980). The most questionable data used were the altitude and altitude change rate data from the alert messages. However they had to be used since the output of the NAS altitude tracker was not available, limiting investigation into the accuracy of the data. Three factors were identified in Section 3.1 as possible causes of these questionable data: altitude pressure correction discontinuity, faulty altitude reports, and military high performance aircraft. Any data that was considered to be affected by one or more of these factors was omitted from the analysis. Particularly for ZAB, these omissions involved an altitude range that may be critical relative to MSAW.

The source data represent only actual alert situations; thus there may be difficulty in the construction of near-violation scenarios to be used for performance evaluation of nuisance alerts. Scenarios generated based on the statistics provided may include some that could result in a nuisance alert, but the majority of the scenarios will involve situations where an alert should be generated.

Some possible encounter geometries were not in the source data. For example, an encounter in which the aircraft is predicted to ascend into the side of an area was not observed. Other geometries such as an aircraft ascending into the floor of an SUA were not available because the current MSAW functions do not check for such violations. Additionally, since the aircraft/area pairs studied were chosen by use of the current ATC MSAW functions, situations for which the current functions missed alerts are not reflected.

Insufficient data were available to analyze some parameters that affect MSAW performance. These include turn rate, turn magnitude, acceleration, and glide slope adaptation used for approach path warnings.

Lastly, the data collected was from the 1980's, yet the AAS will not be implemented until the 1990's. Traffic, adaptation, and aircraft characteristics may change, leading to different statistical distributions than have been provided. Higher MSAW area and aircraft densities will probably create more difficult MSAW encounter situations (in terms of decision to call an alert) than currently exist.

6.0 PERFORMANCE MEASUREMENT

The information contained in this report provides characteristics of a realistic traffic mix referenced in the Data Item Description UDI-AAP-158 (FAA, August 1987[a]) to be used by the AAS AP Contractor to construct a set of realistic MSAW alert scenarios. These scenarios are to be used as input to a Monte Carlo simulation model of the MSAW alert and related functions so that performance results can be obtained. Statistical distributions of the encounter characteristics provided in this document are to be computed by the Contractor for the scenario set in order to verify that they do not significantly differ (using a 95 percent confidence interval) from those of the realistic traffic mix presented here. To the extent that other parameters are necessary to define the encounter scenarios, the Contractor should assume and justify statistical distributions and provide documentation as part of the scenario descriptions.

In order to provide a complete evaluation of the performance of the MSAW function, the Contractor will need to generate scenarios in addition to those based on the information contained in this study. However, the performance results for scenarios based on this document are to be distinguished from results involving the supplemental scenarios. A sufficient number of violation and near-violation scenarios should be constructed so that the AAS performance requirements are met to at least a 95 percent level of confidence. Since terrain is an important factor relative to the MSAW function, statistical verification and results for the scenarios based on the en route data should be presented separately by Center as well as overall. The terminal area results should be presented as overall totals.

The scenarios added by the Contractor should address the limitations of this study identified in Section 5 and should include encounter situations not found in the Government provided traffic mix that demonstrate unique features of the Contractor's design. Paragraphs 10.1.1 and 10.4 in the Data Item Description (DID) UDI-S-FAA-268 (FAA, August 1987[b]) from the AAS AP RFP specifically require that performance issues relative to altitude pressure correction, altitude data validity checking, and tracking and separation assurance for high performance military aircraft be addressed. These factors are considered important relative to the en route data that was omitted from this study. The Contractor should generate scenarios that specifically address these factors and demonstrate the performance and sensitivity of the MSAW function relative to each. The data that was omitted from this study will be available to the Contractor to aid in construction of realistic scenarios involving those factors. Other supplemental scenarios should include encounters with SUAs, violations of terminal area approach paths, and a set of scenarios to be used for evaluation of the nuisance alert rate.

APPENDIX A

FREQUENCY DISTRIBUTIONS

This Appendix provides histograms of the observed distributions for the encounter characteristics identified in Sections 3 and 4. Figures A-1 through A-72 are for the en route parameters; Figures A-73 through A-100 are for the terminal characteristics. These figures are provided for informational purposes only; the tables in Appendices B through D should be used for creating the scenarios and verifying that the set is representative of a realistic traffic mix as presented in this paper.

In all figures, the X-axis denotes the midpoint of the interval for which the histogram has been developed. For example, two consecutive midpoints of .25 and .75 imply that the first interval spans the range (0 - .50) and the second interval spans the range (.50 - 1.00). The choice of midpoints for these figures is not significant.

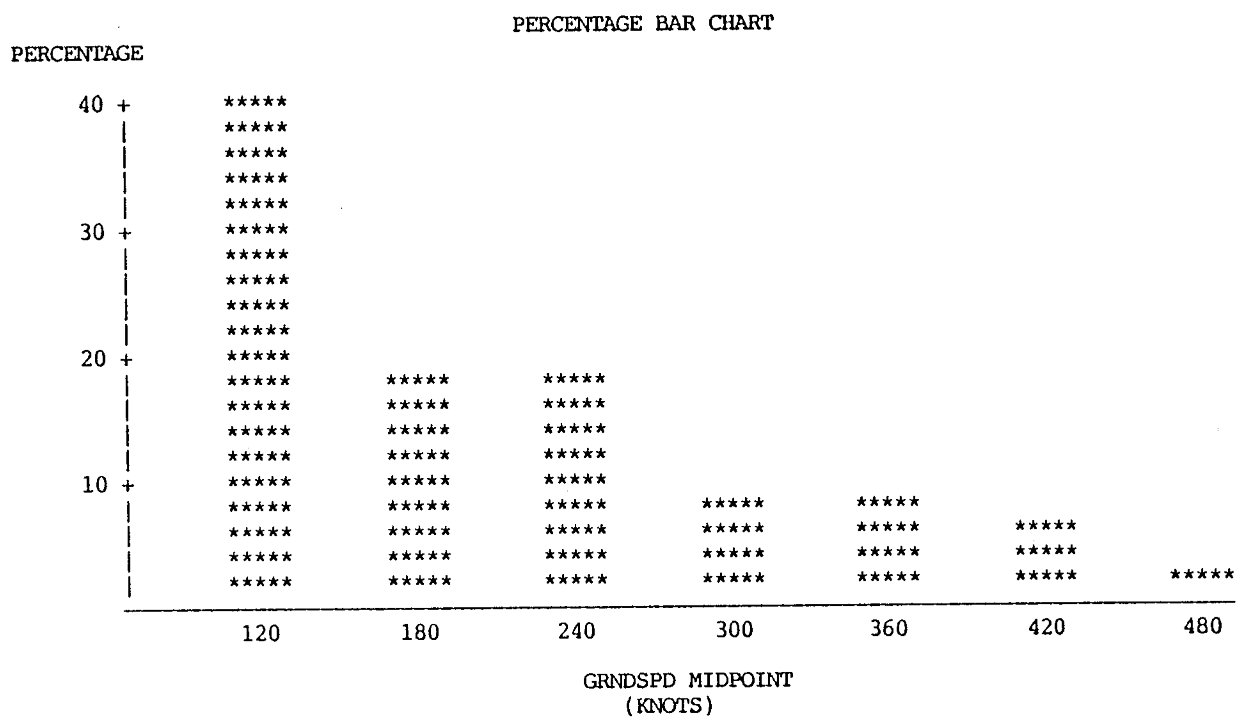


FIGURE A-1
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
GROUND SPEED

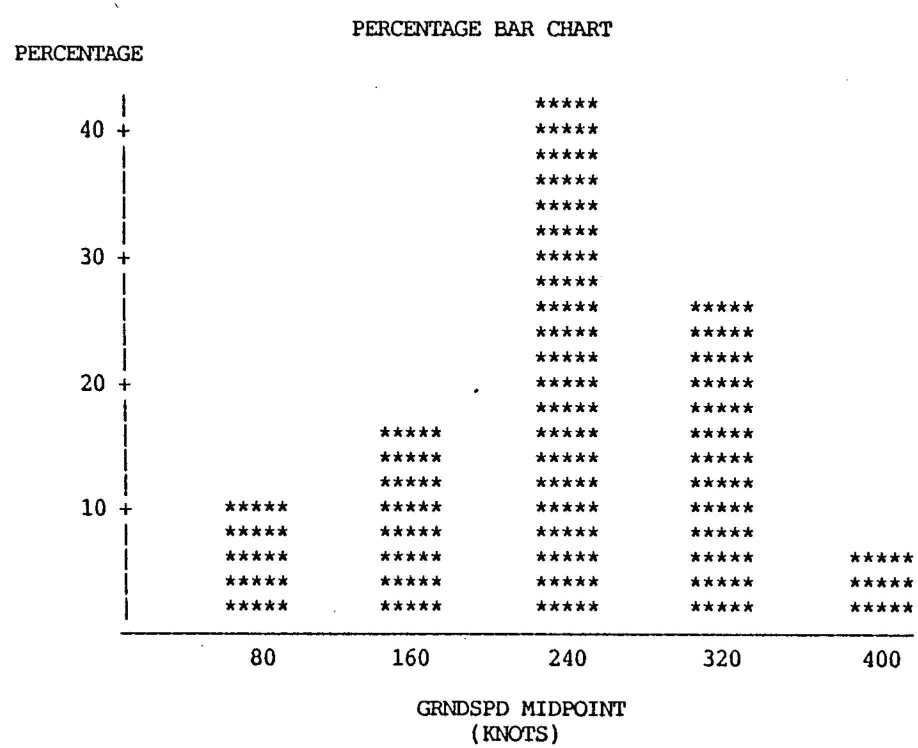


FIGURE A-2
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
GROUND SPEED

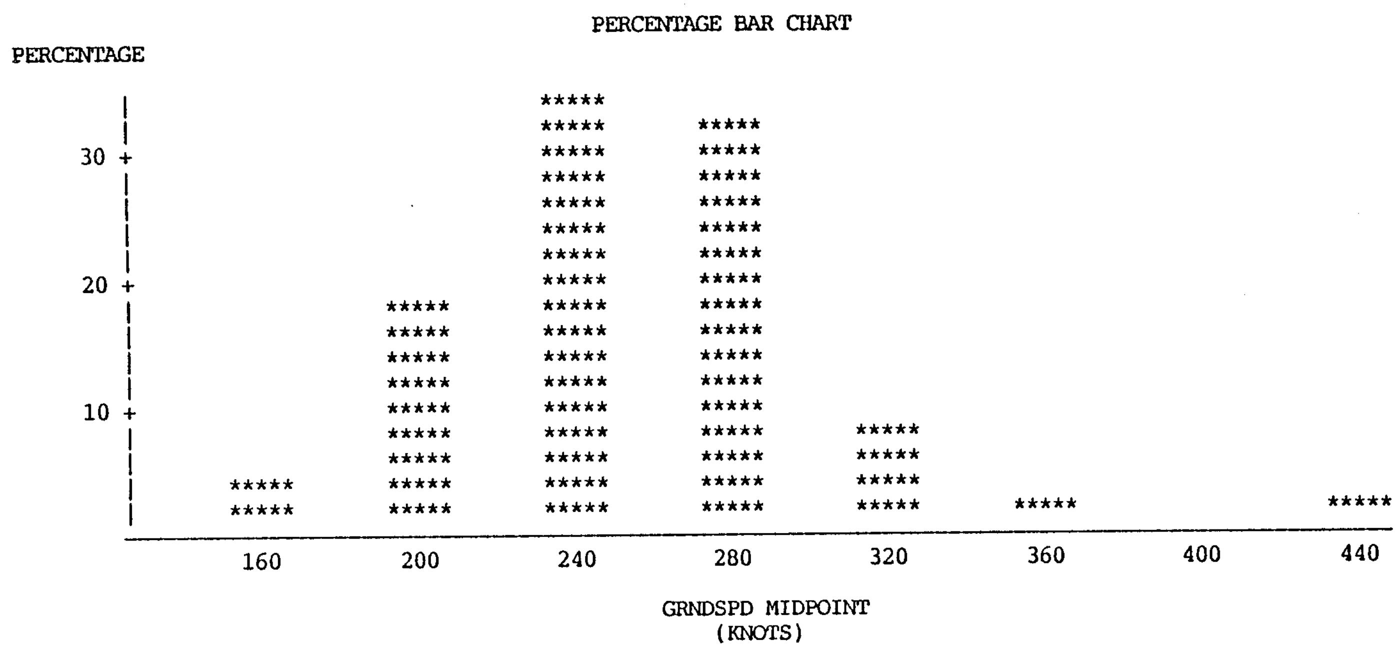


FIGURE A-3
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
GROUND SPEED

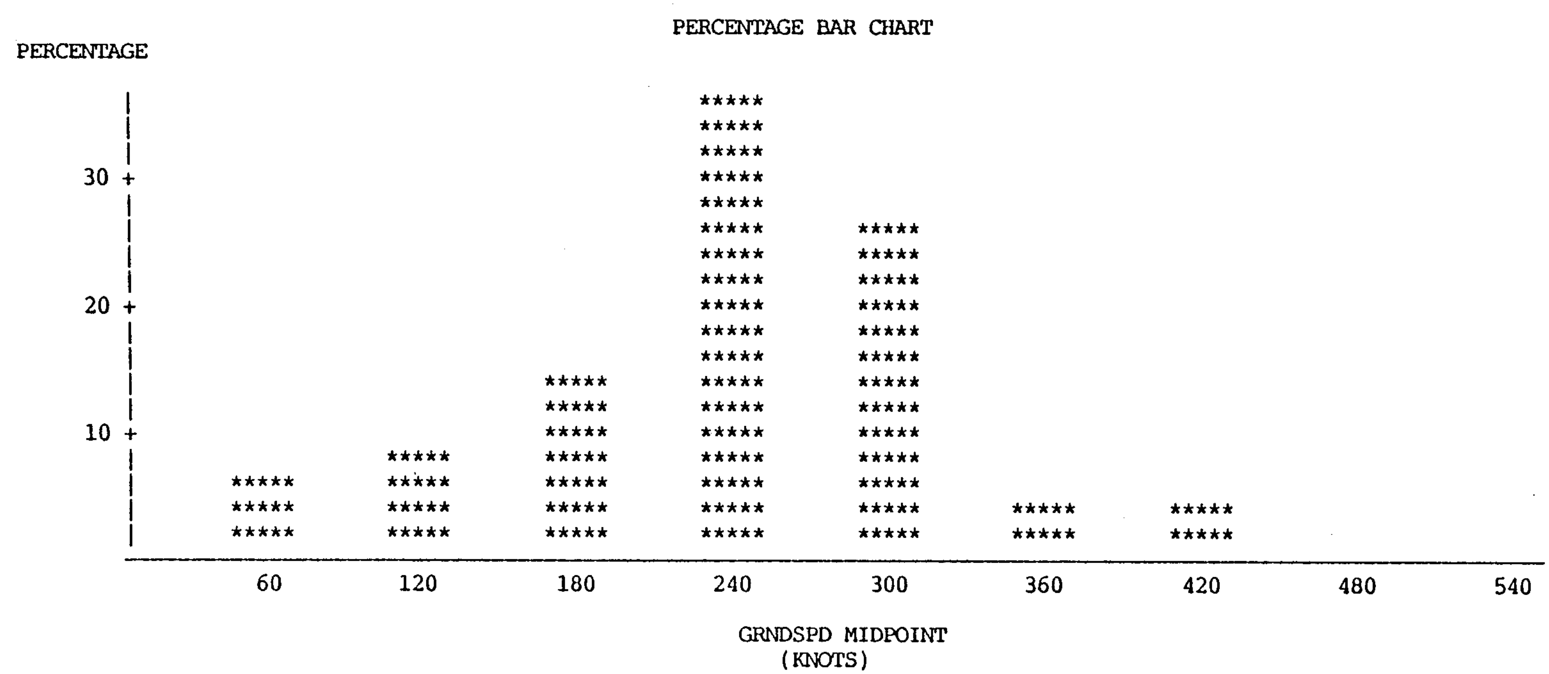


FIGURE A-4
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
GROUND SPEED

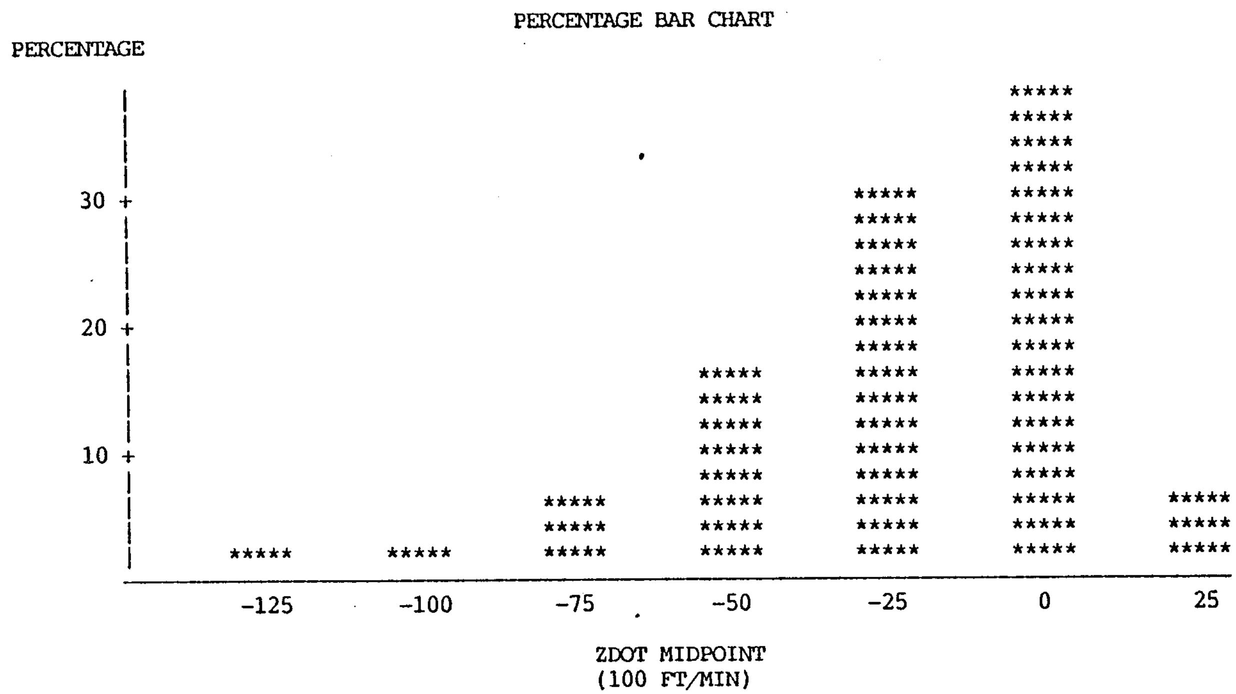


FIGURE A-5
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB ALTITUDE CHANGE RATE

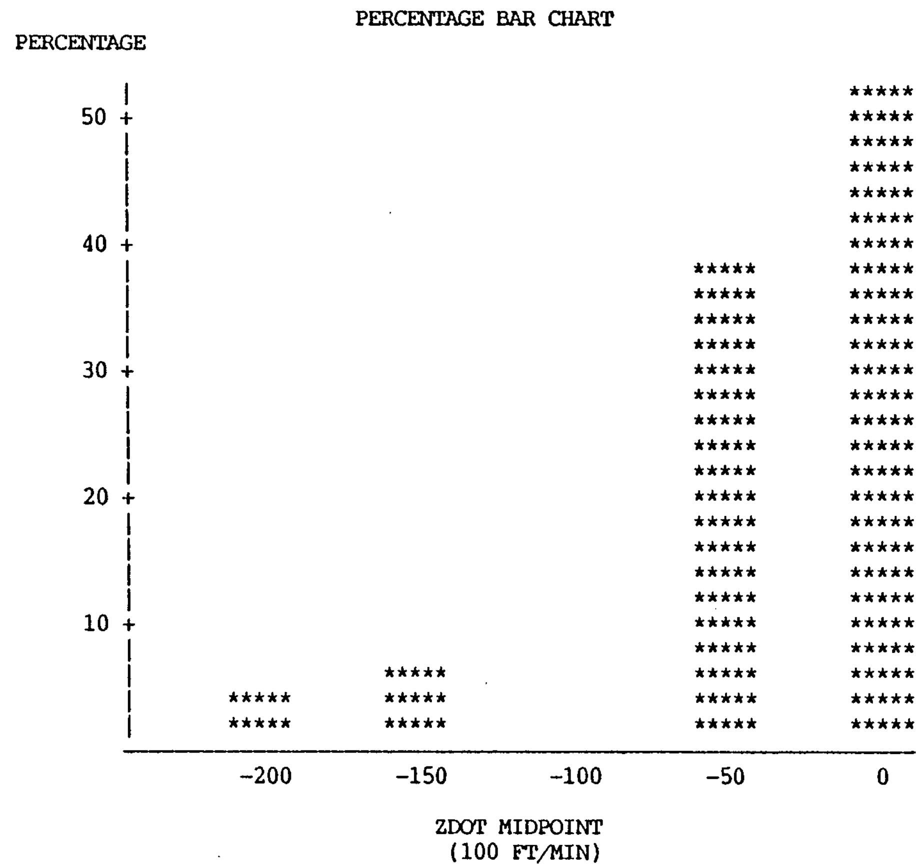


FIGURE A-6
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
ALTITUDE CHANGE RATE

PERCENTAGE BAR CHART

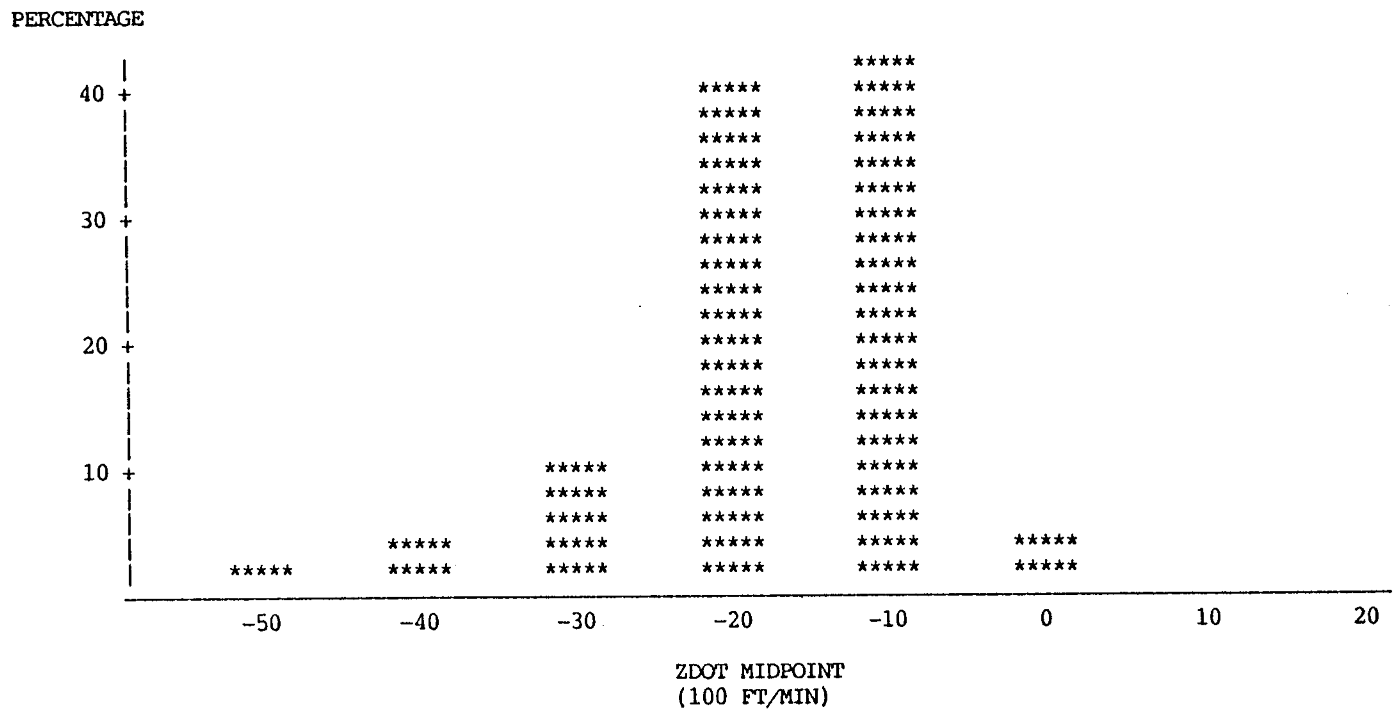


FIGURE A-7
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
ALTITUDE CHANGE RATE

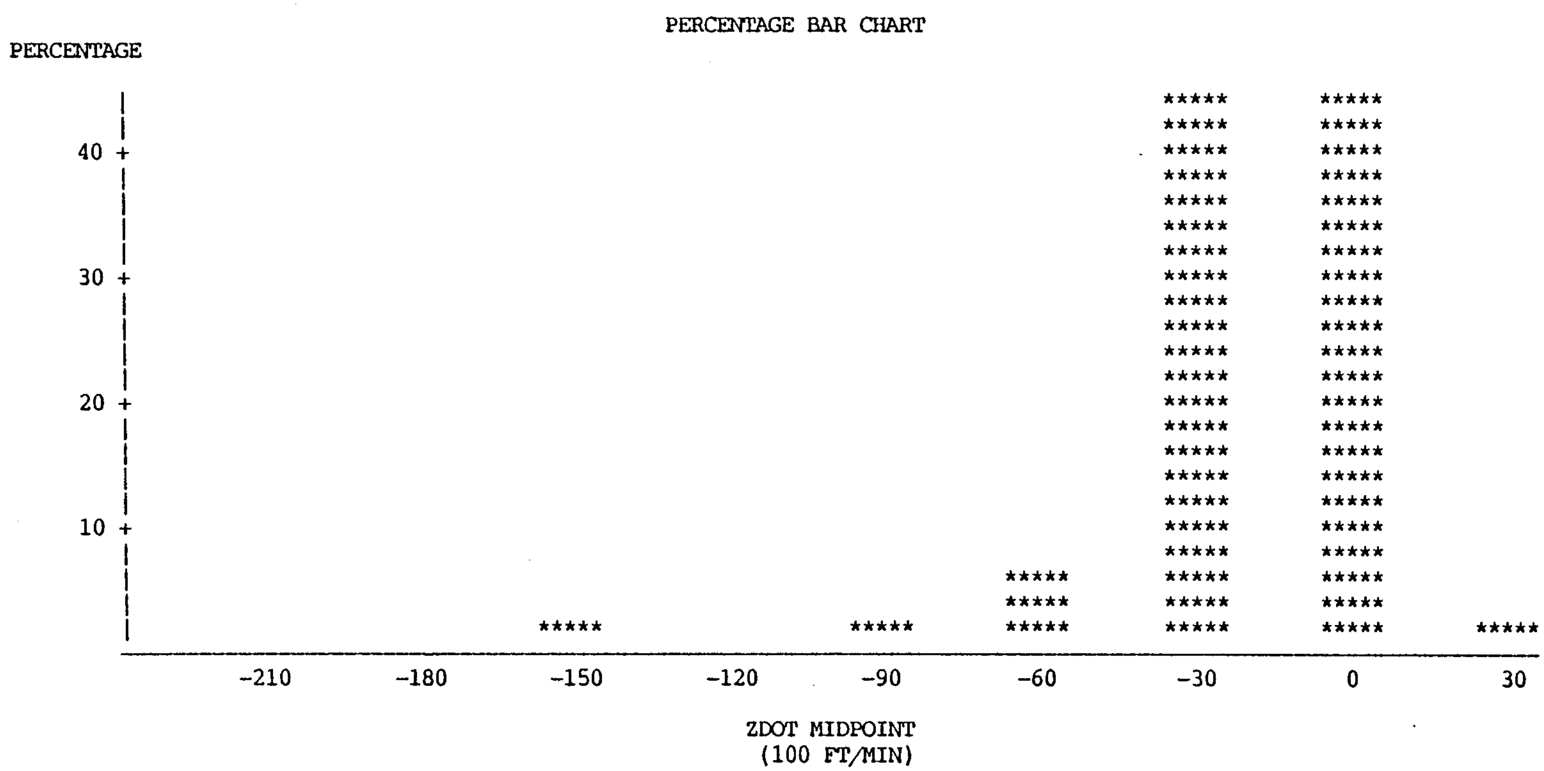


FIGURE A-8
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
ALTITUDE CHANGE RATE

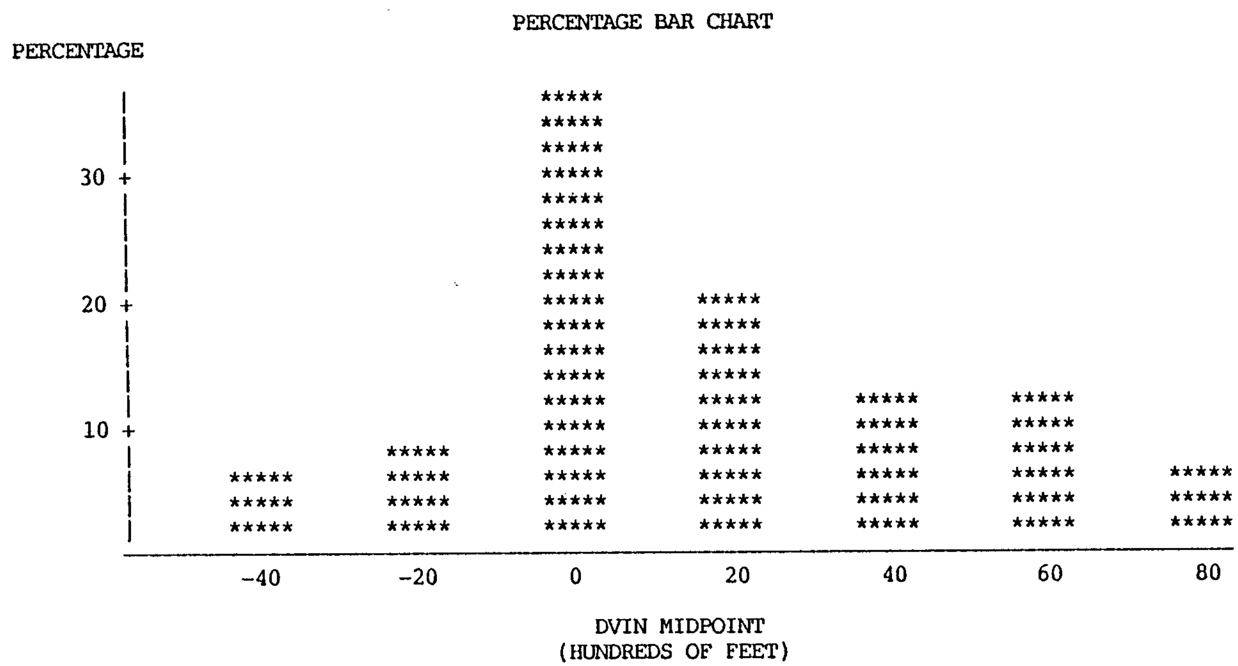


FIGURE A-9
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
DISTANCE TO VERTICAL ENTRY

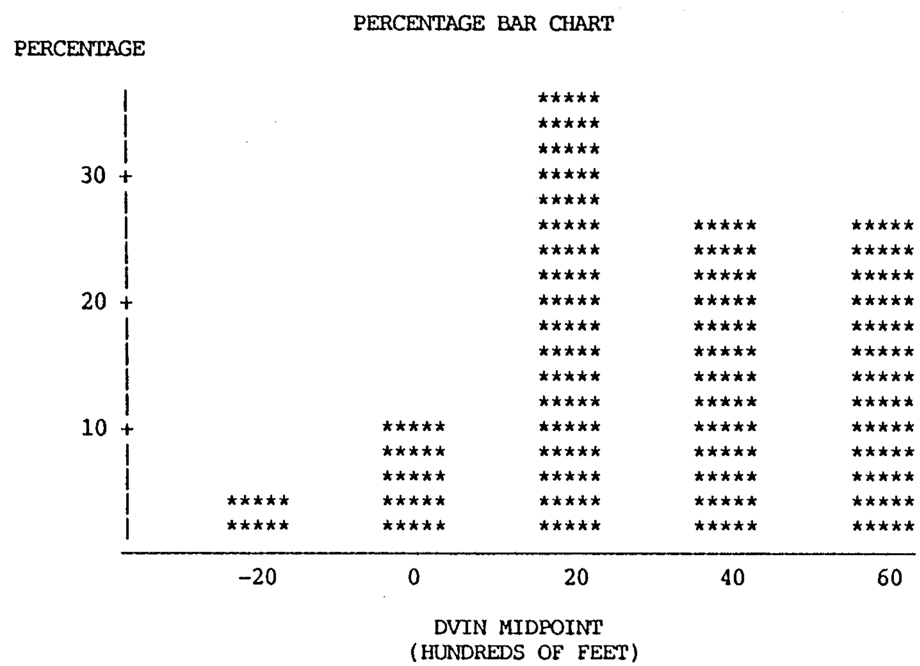


FIGURE A-10
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
DISTANCE TO VERTICAL ENTRY

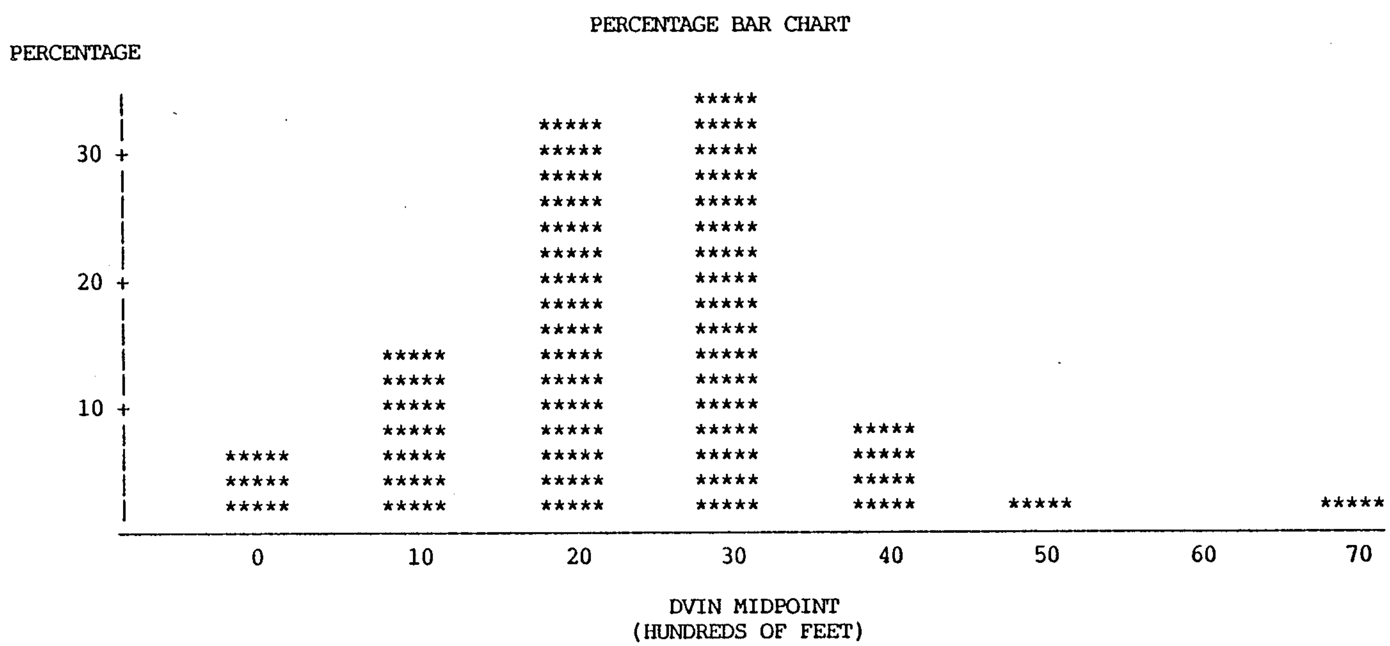


FIGURE A-11
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
DISTANCE TO VERTICAL ENTRY

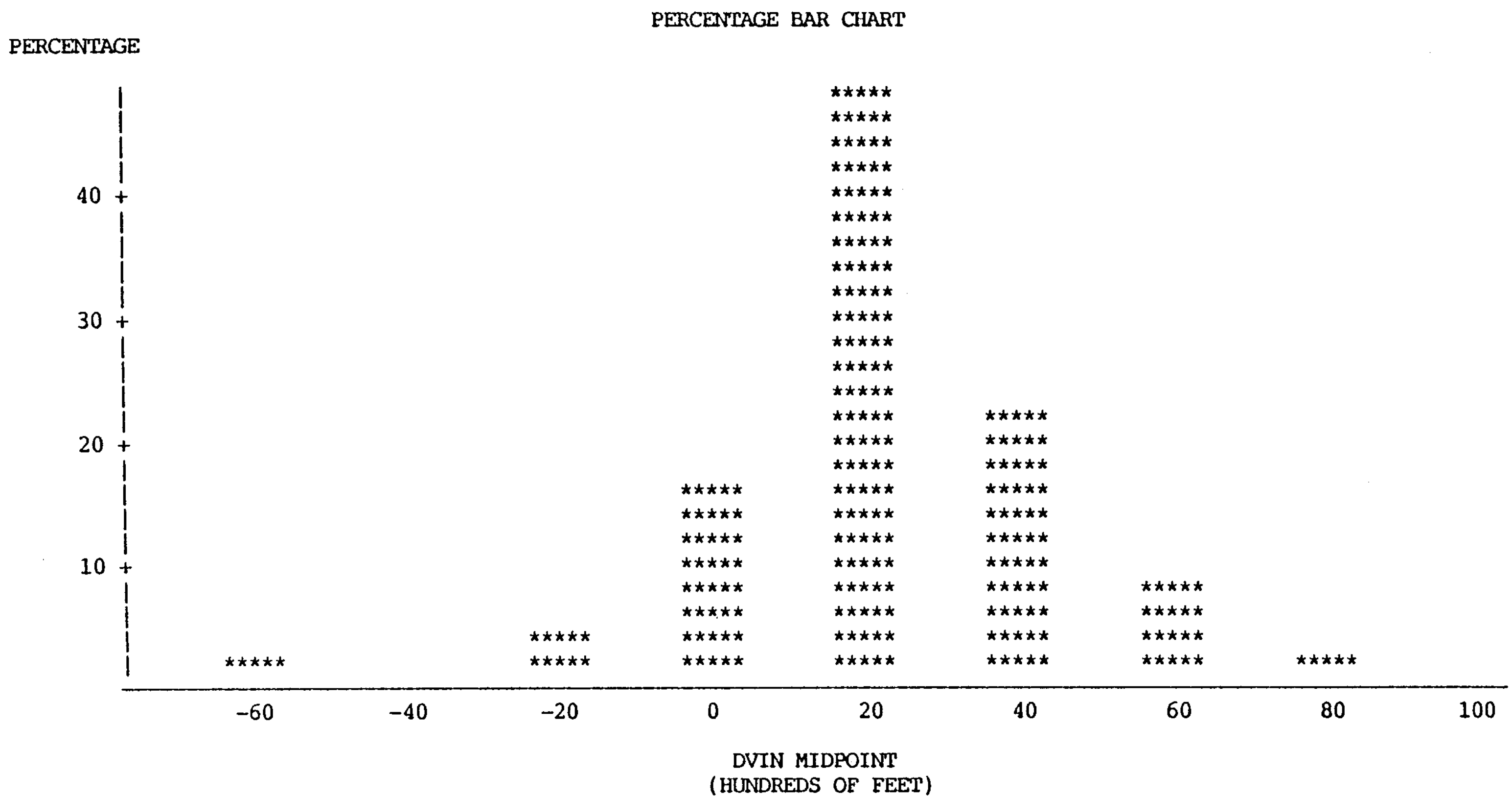


FIGURE A-12
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
DISTANCE TO VERTICAL ENTRY

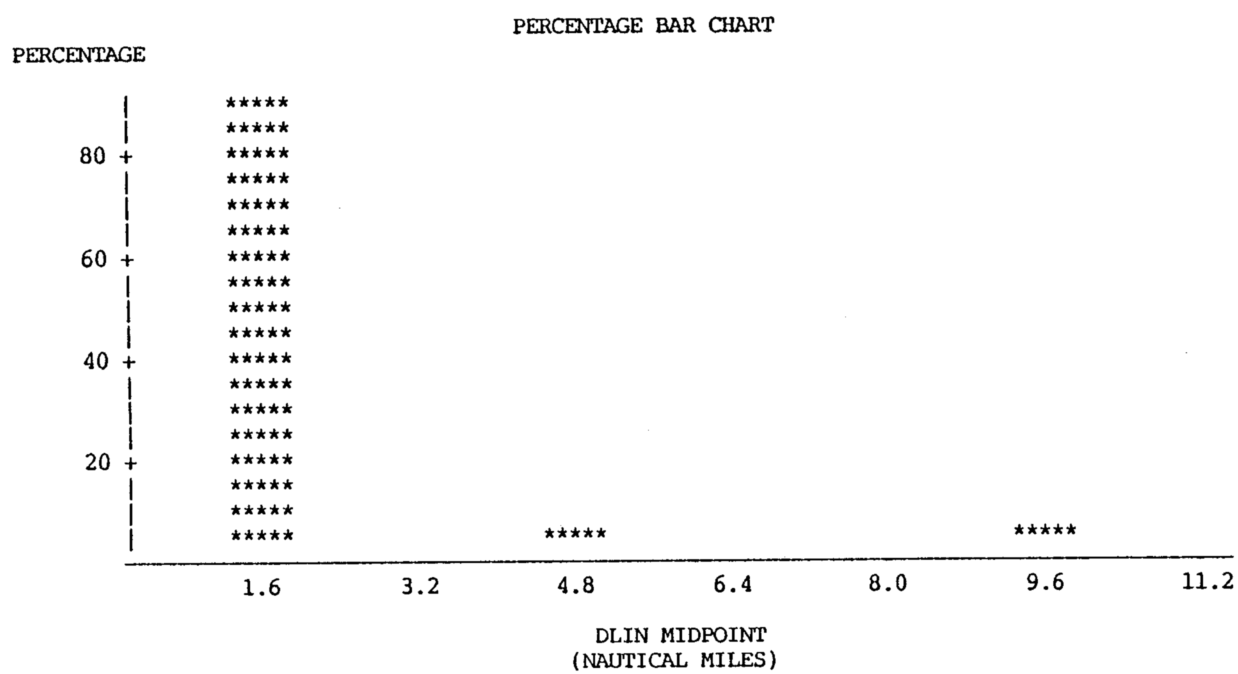


FIGURE A-13
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
DISTANCE TO LATERAL ENTRY

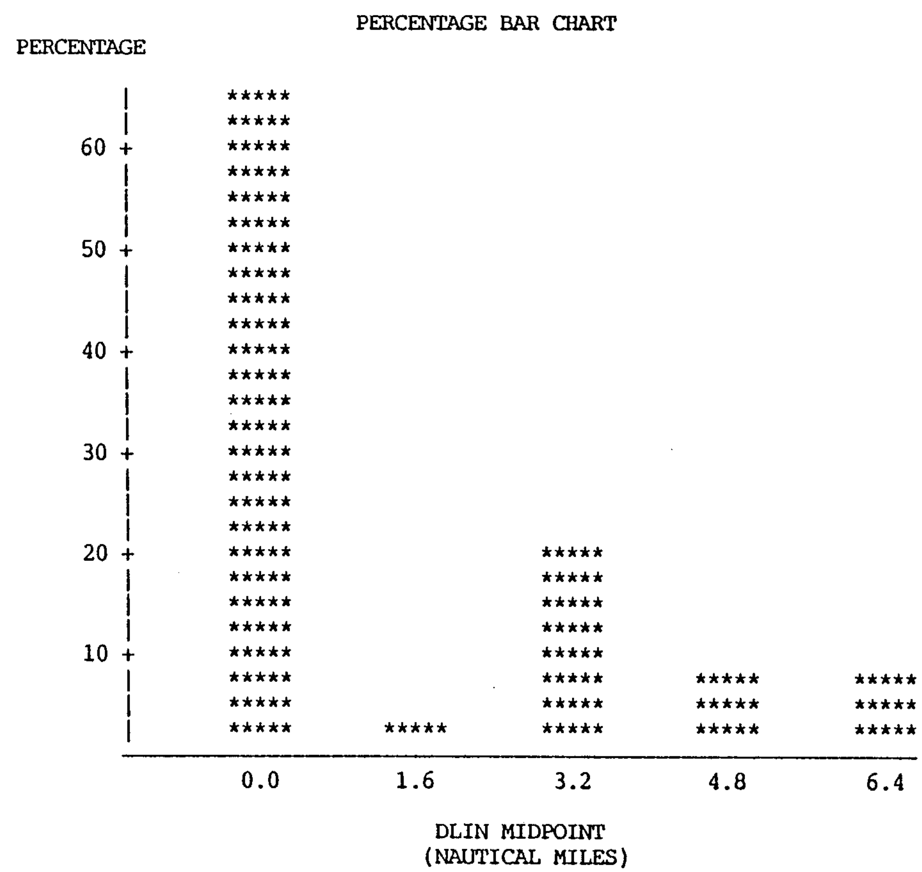


FIGURE A-14
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
DISTANCE TO LATERAL ENTRY

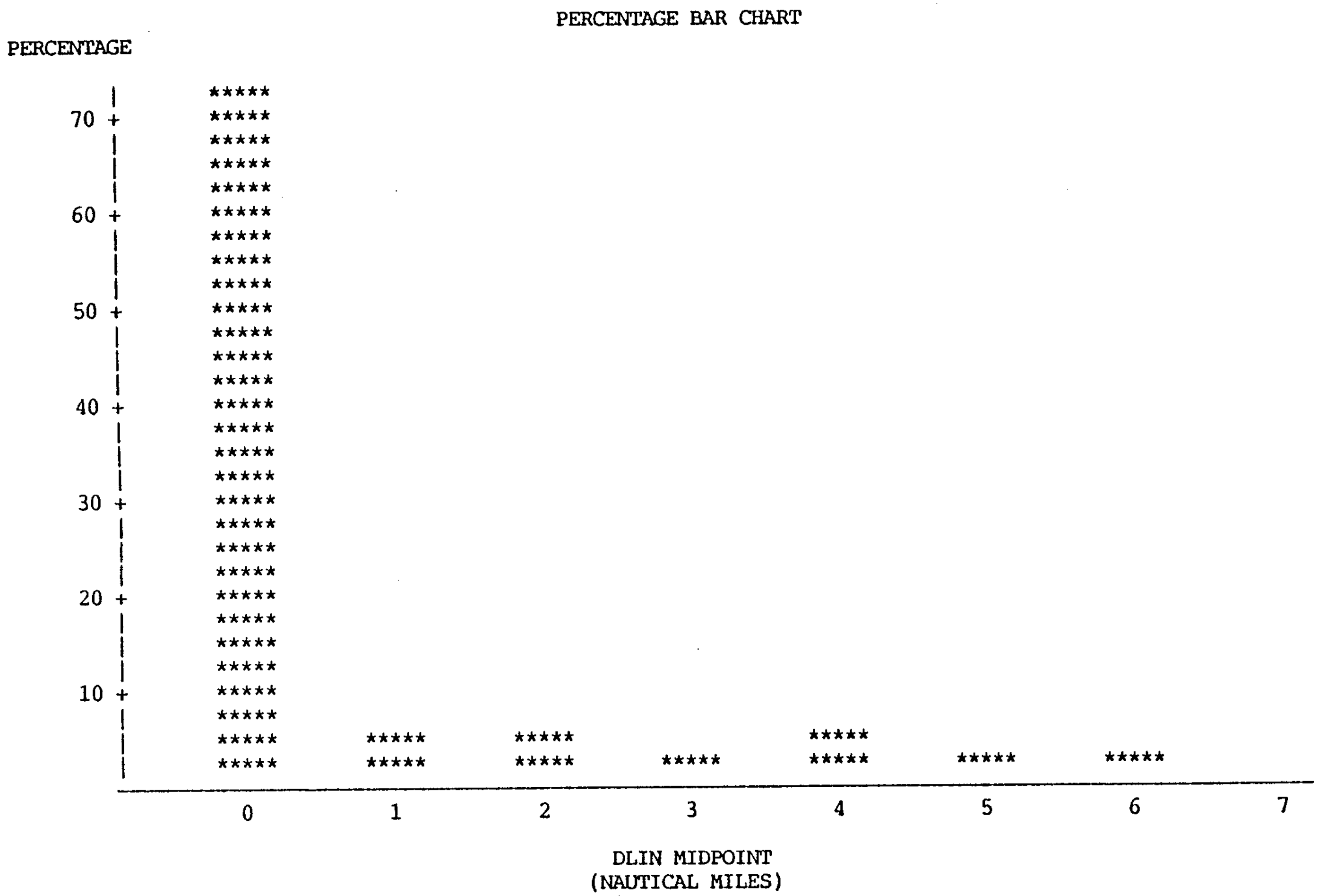


FIGURE A-15
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
DISTANCE TO LATERAL ENTRY

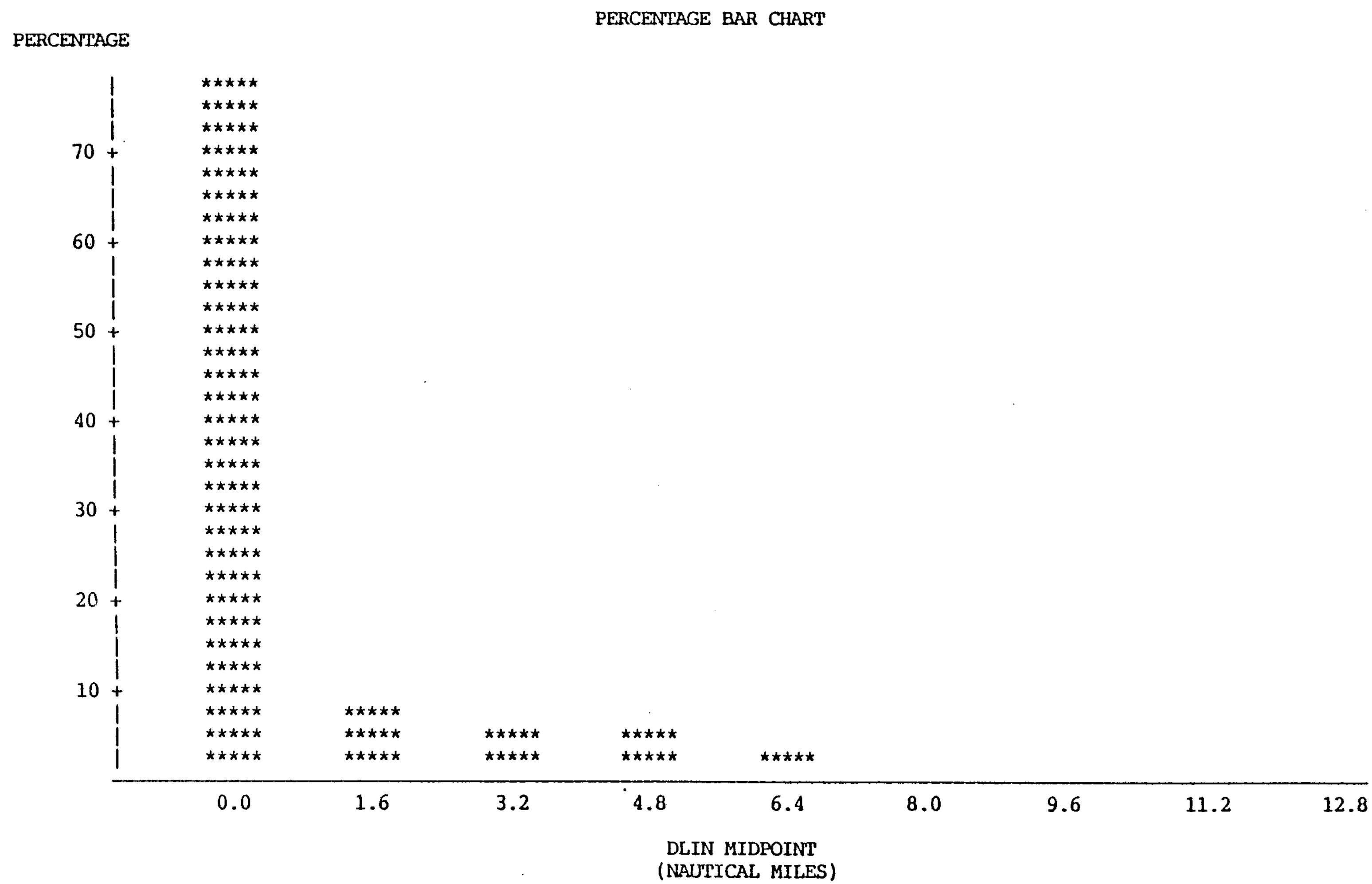


FIGURE A-16
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
DISTANCE TO LATERAL ENTRY

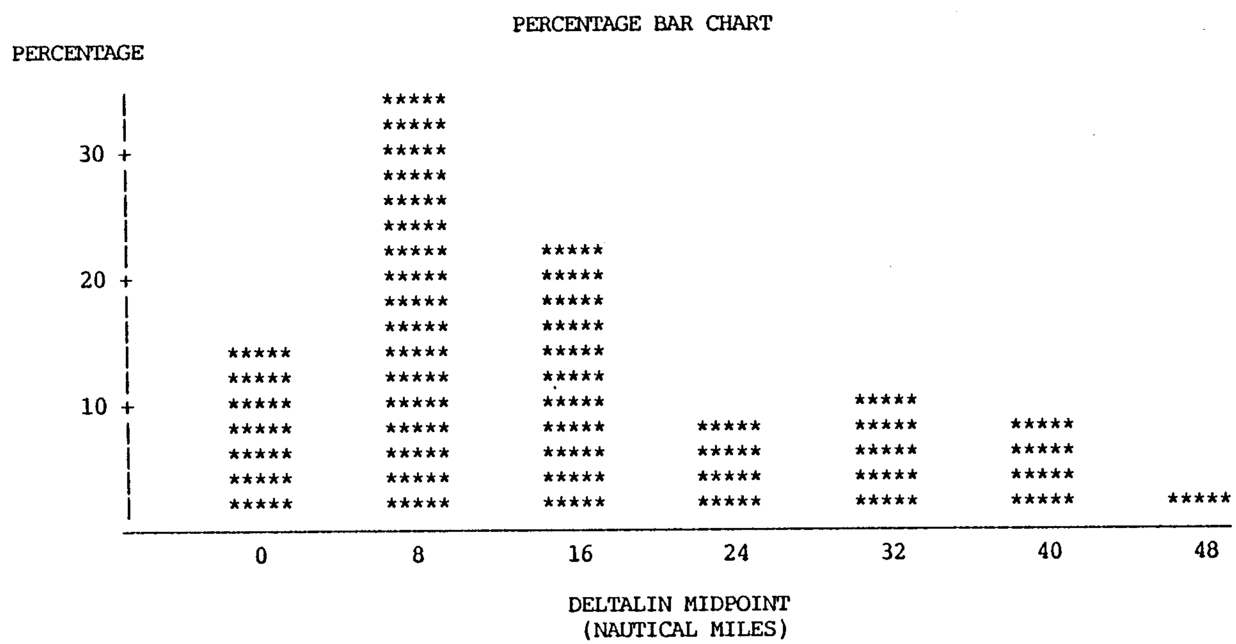


FIGURE A-17
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
DISTANCE BETWEEN LATERAL ENTRY AND LATERAL EXIT

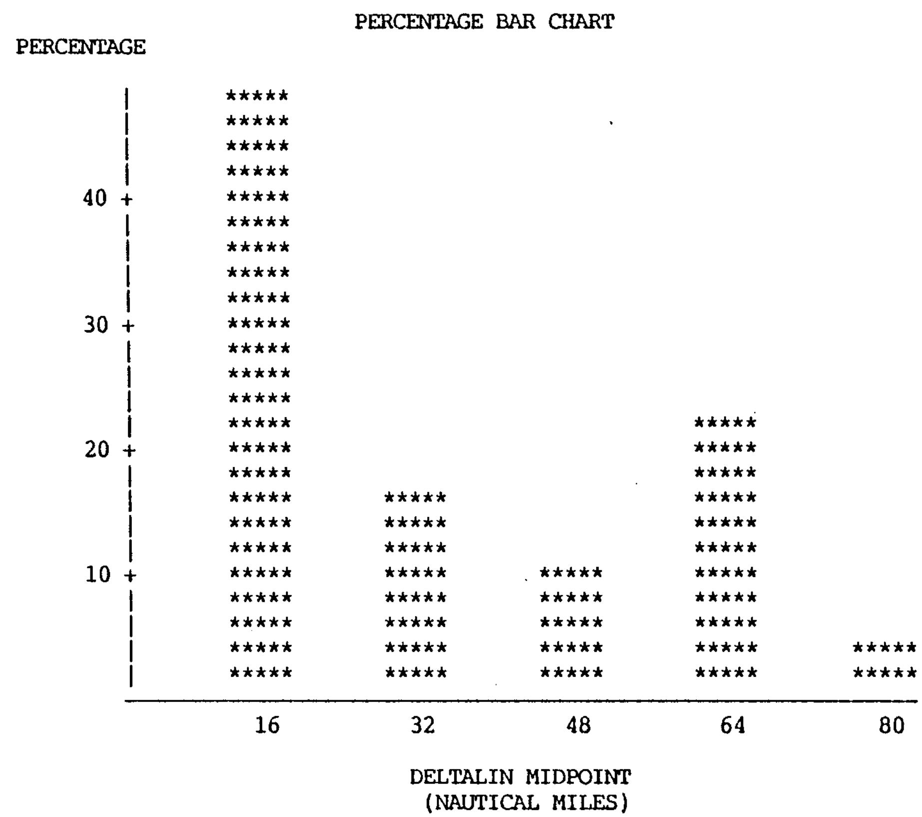


FIGURE A-18
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
DISTANCE BETWEEN LATERAL ENTRY AND LATERAL EXIT

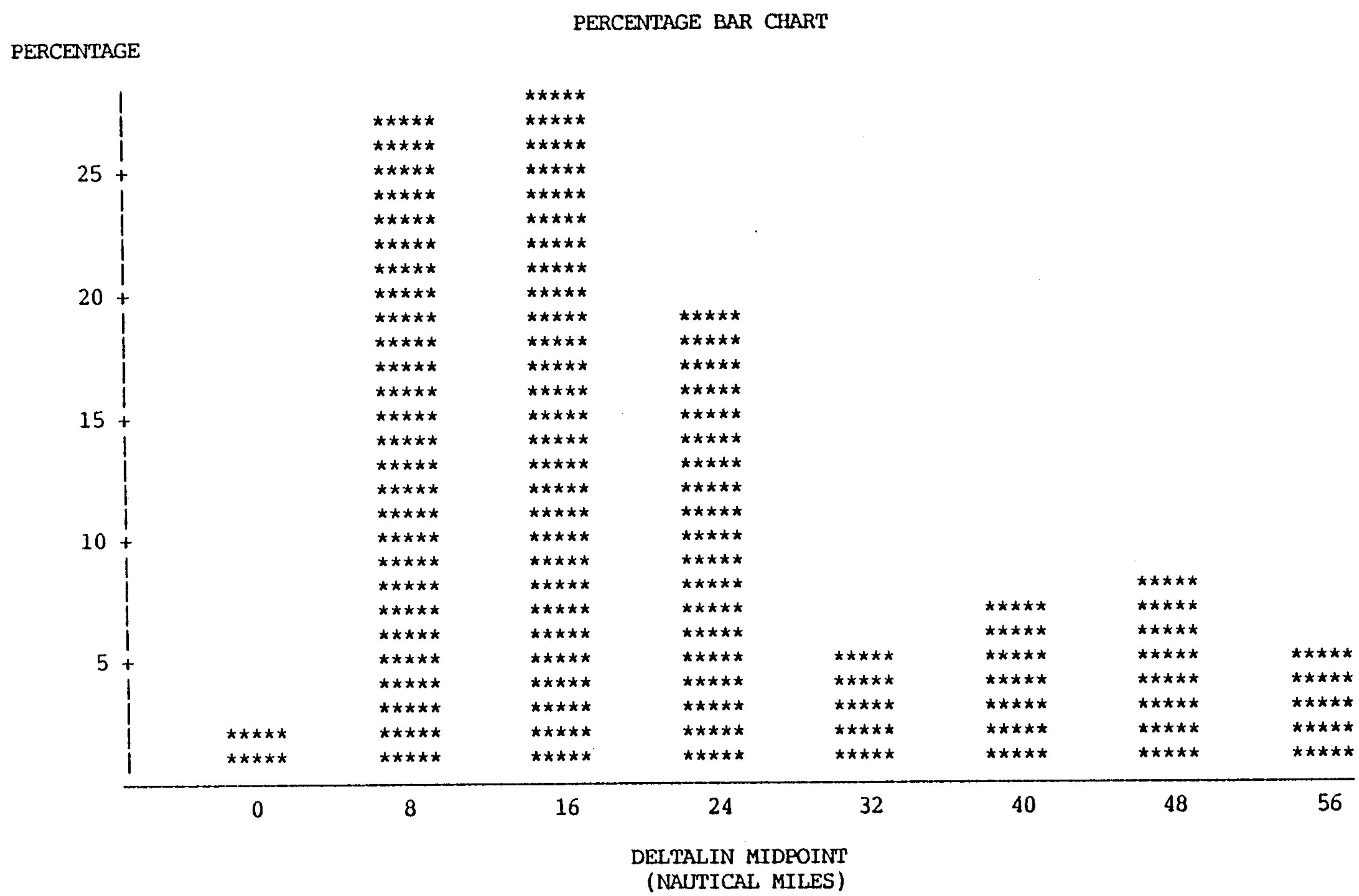


FIGURE A-19
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
DISTANCE BETWEEN LATERAL ENTRY AND LATERAL EXIT

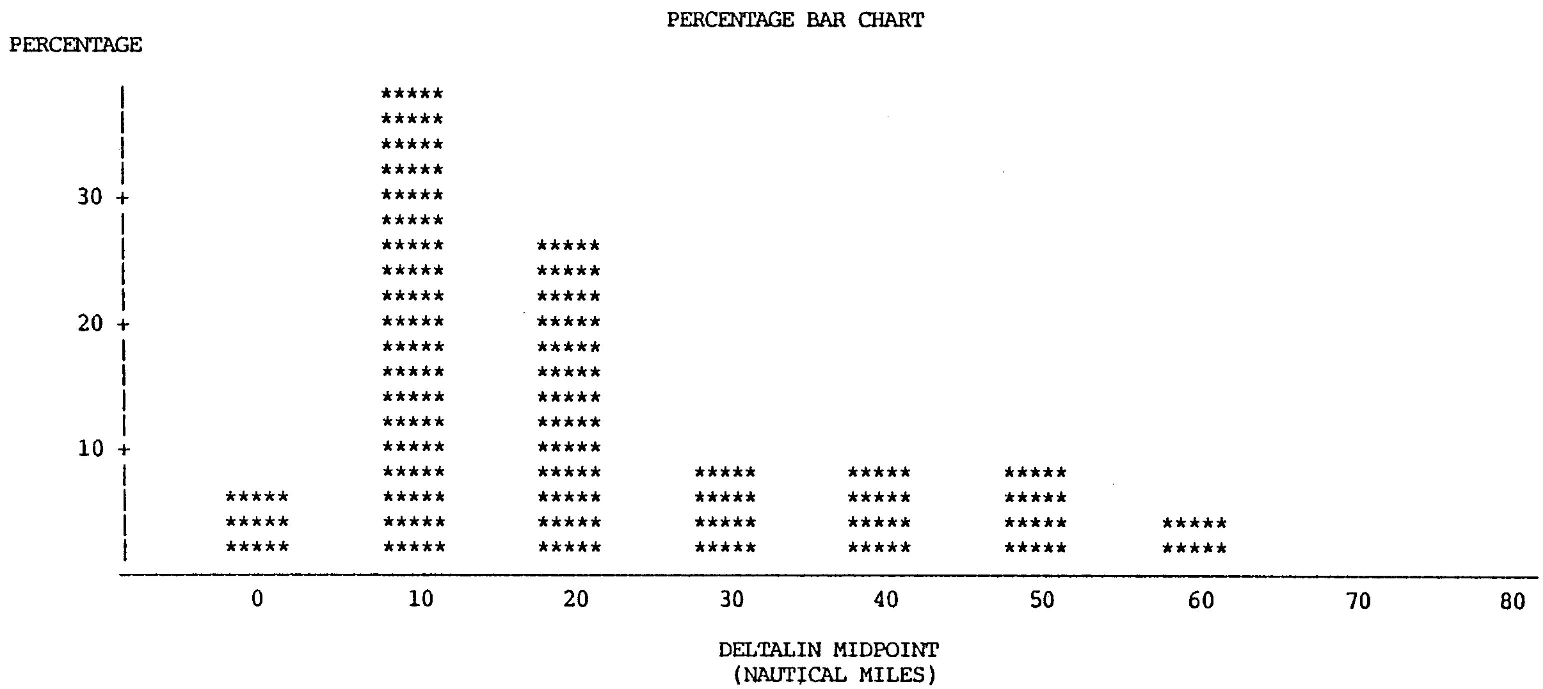


FIGURE A-20
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
DISTANCE BETWEEN LATERAL ENTRY AND LATERAL EXIT

PERCENTAGE BAR CHART

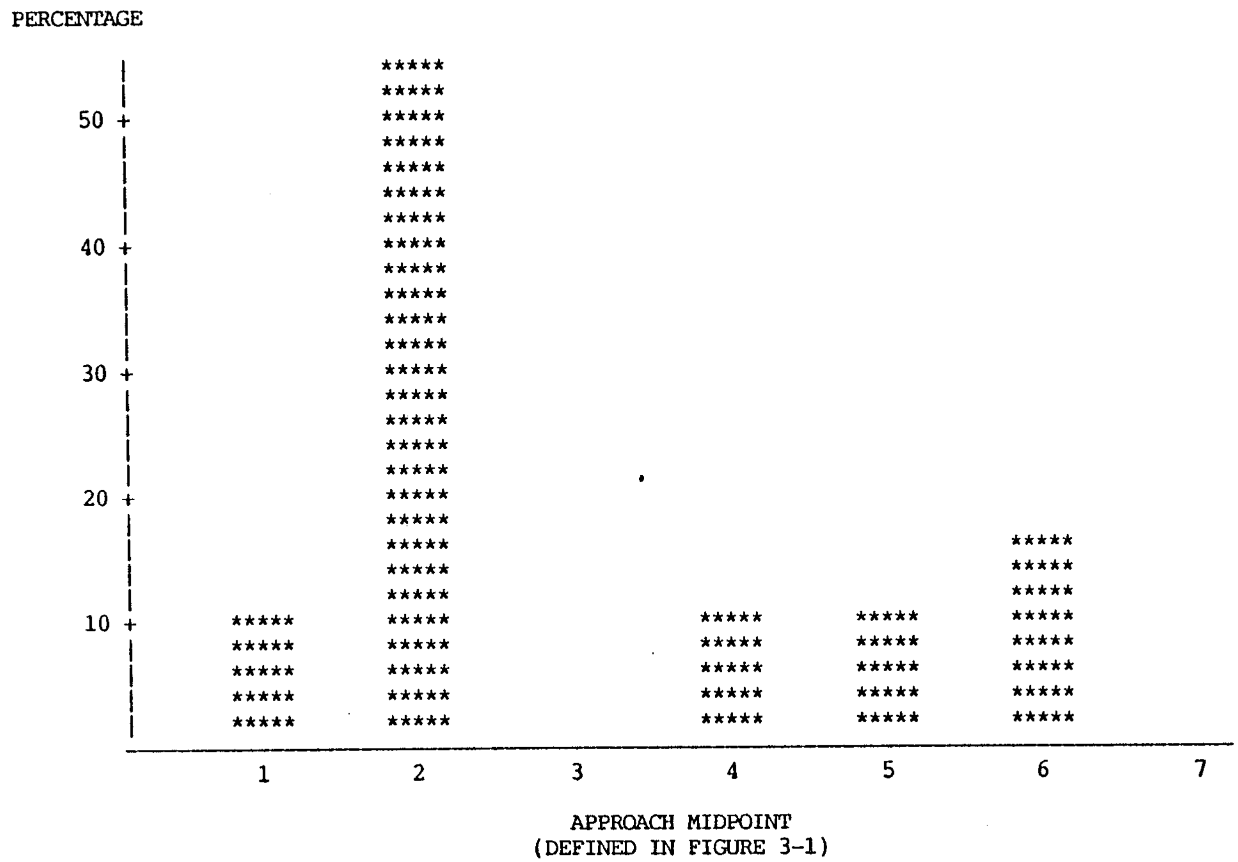


FIGURE A-21
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
EMSAW APPROACH PATTERN

PERCENTAGE BAR CHART

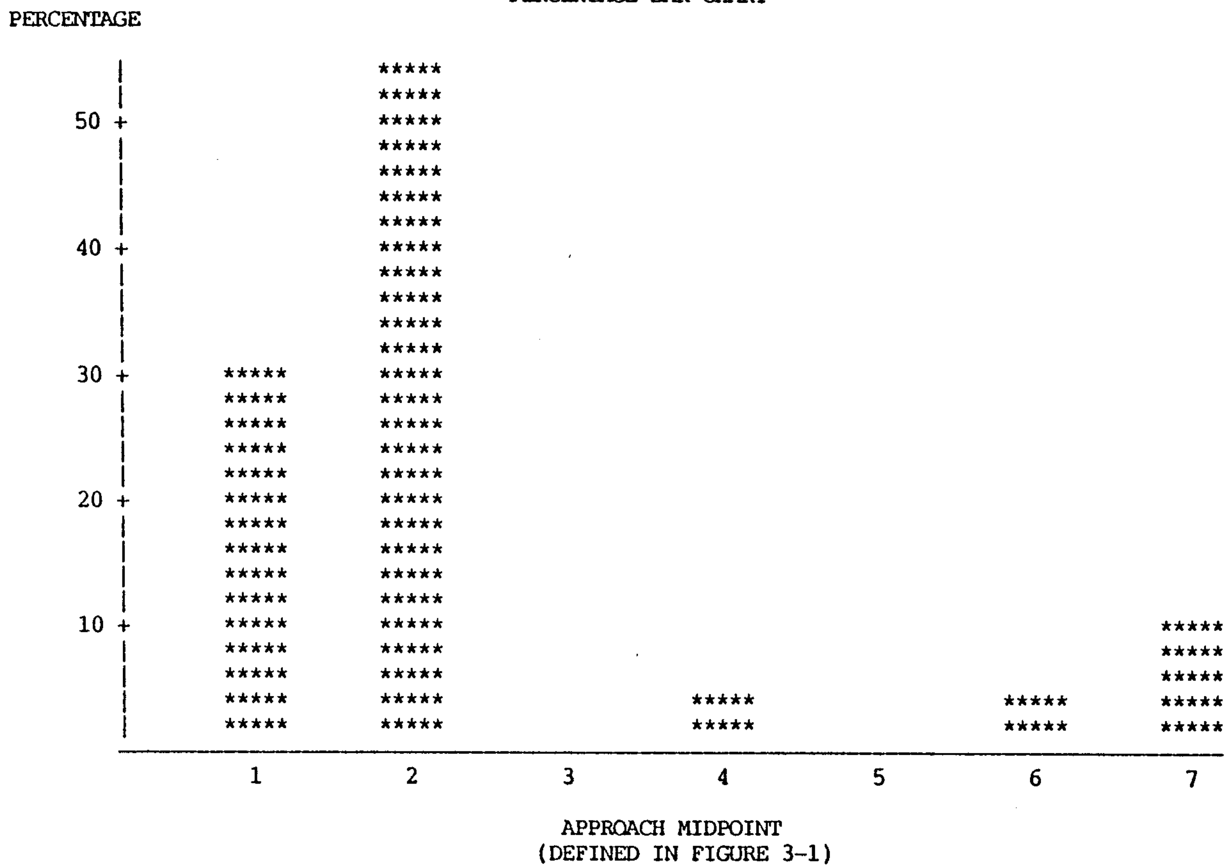


FIGURE A-22
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
EMSAW APPROACH PATTERN

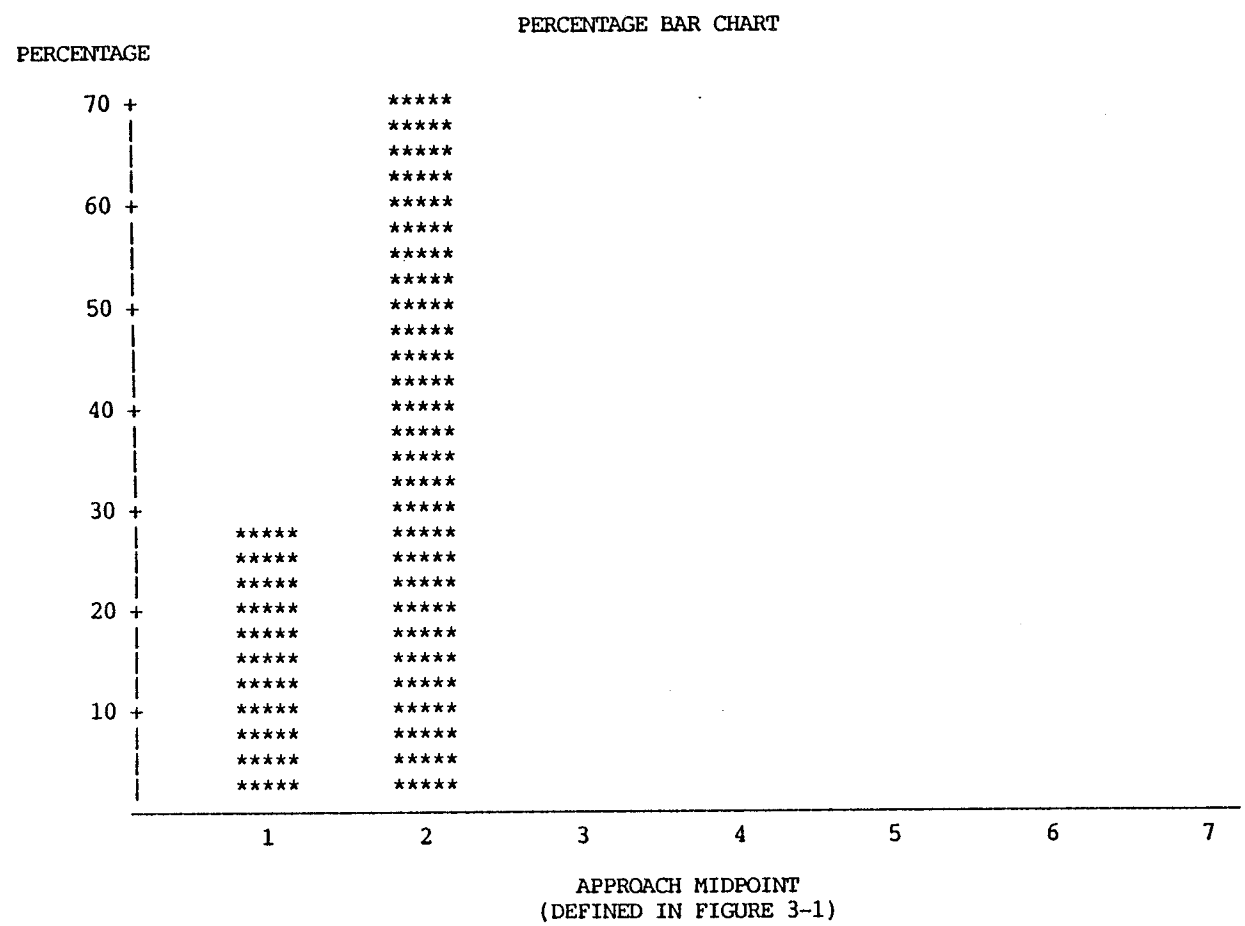


FIGURE A-23
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
EMSAW APPROACH PATTERN

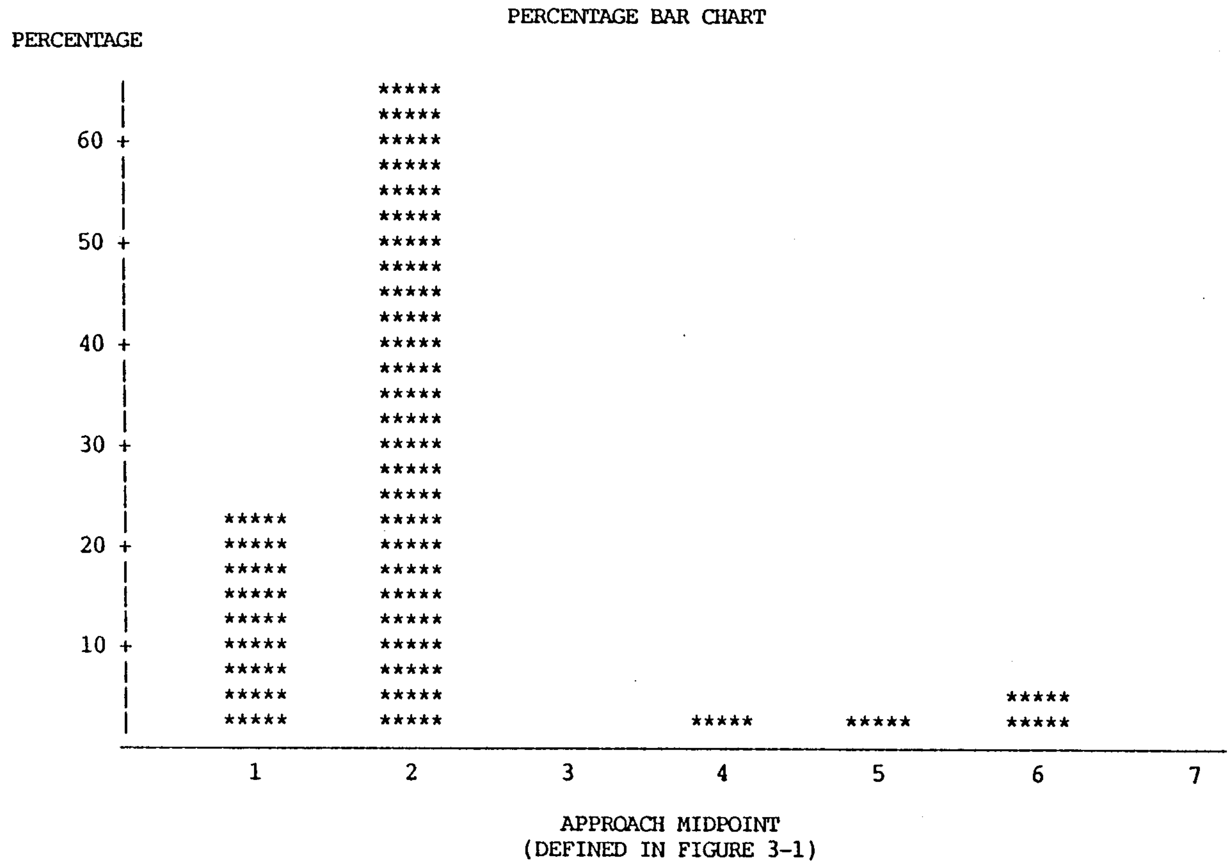


FIGURE A-24
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
EMSAW APPROACH PATTERN

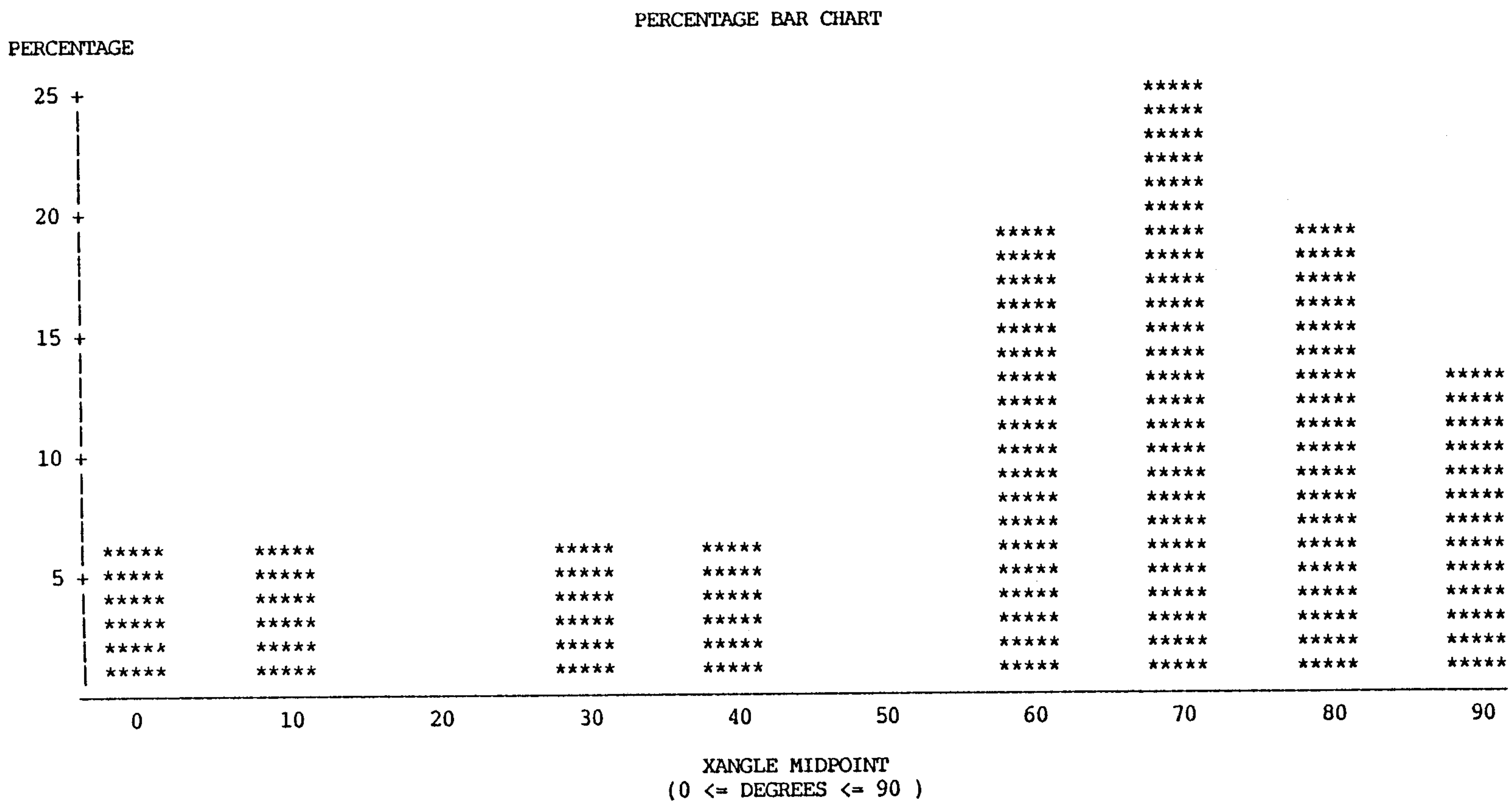


FIGURE A-25
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
LATERAL CROSSING ANGLE

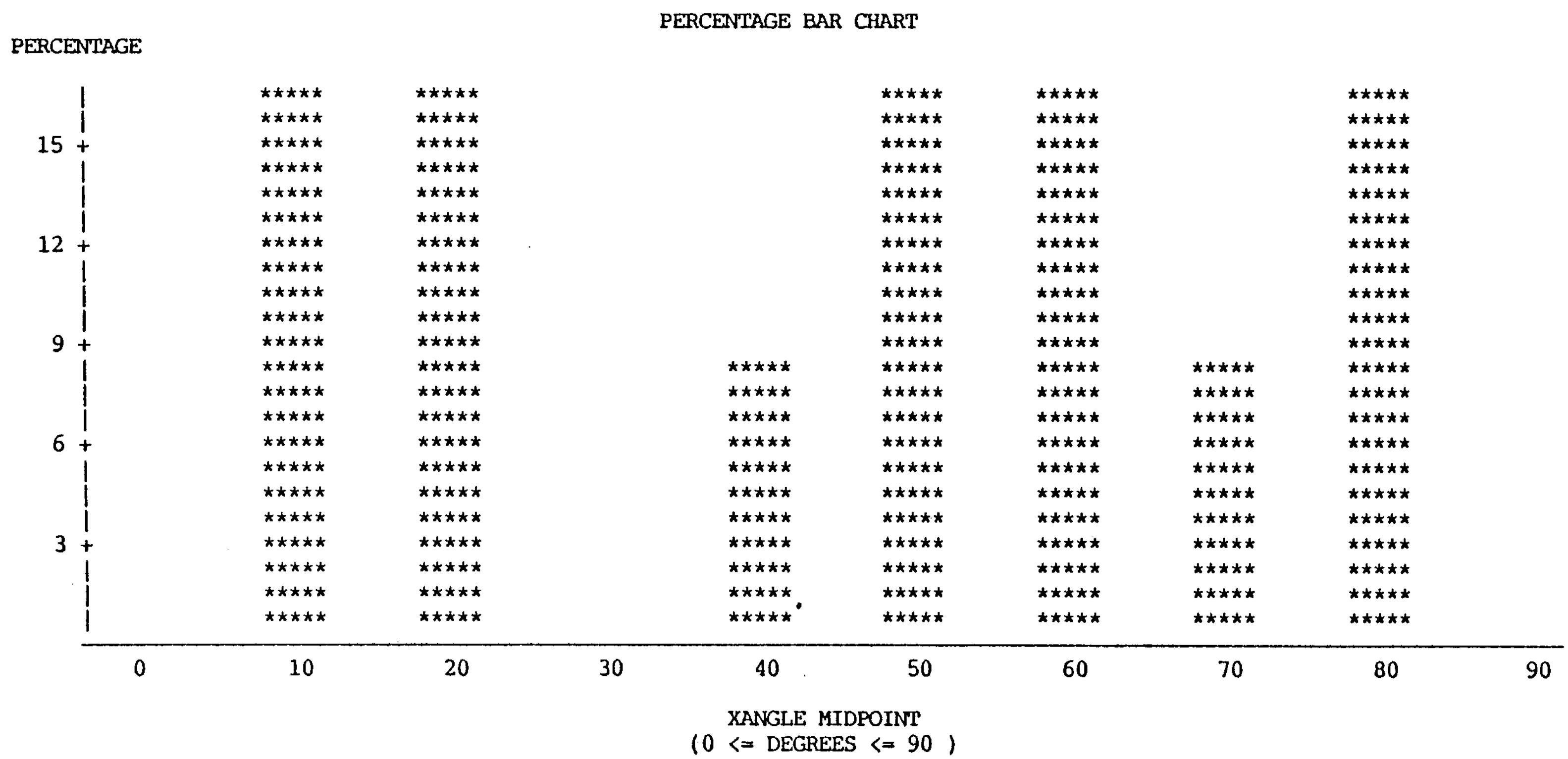


FIGURE A-26
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
LATERAL CROSSING ANGLE

PERCENTAGE BAR CHART

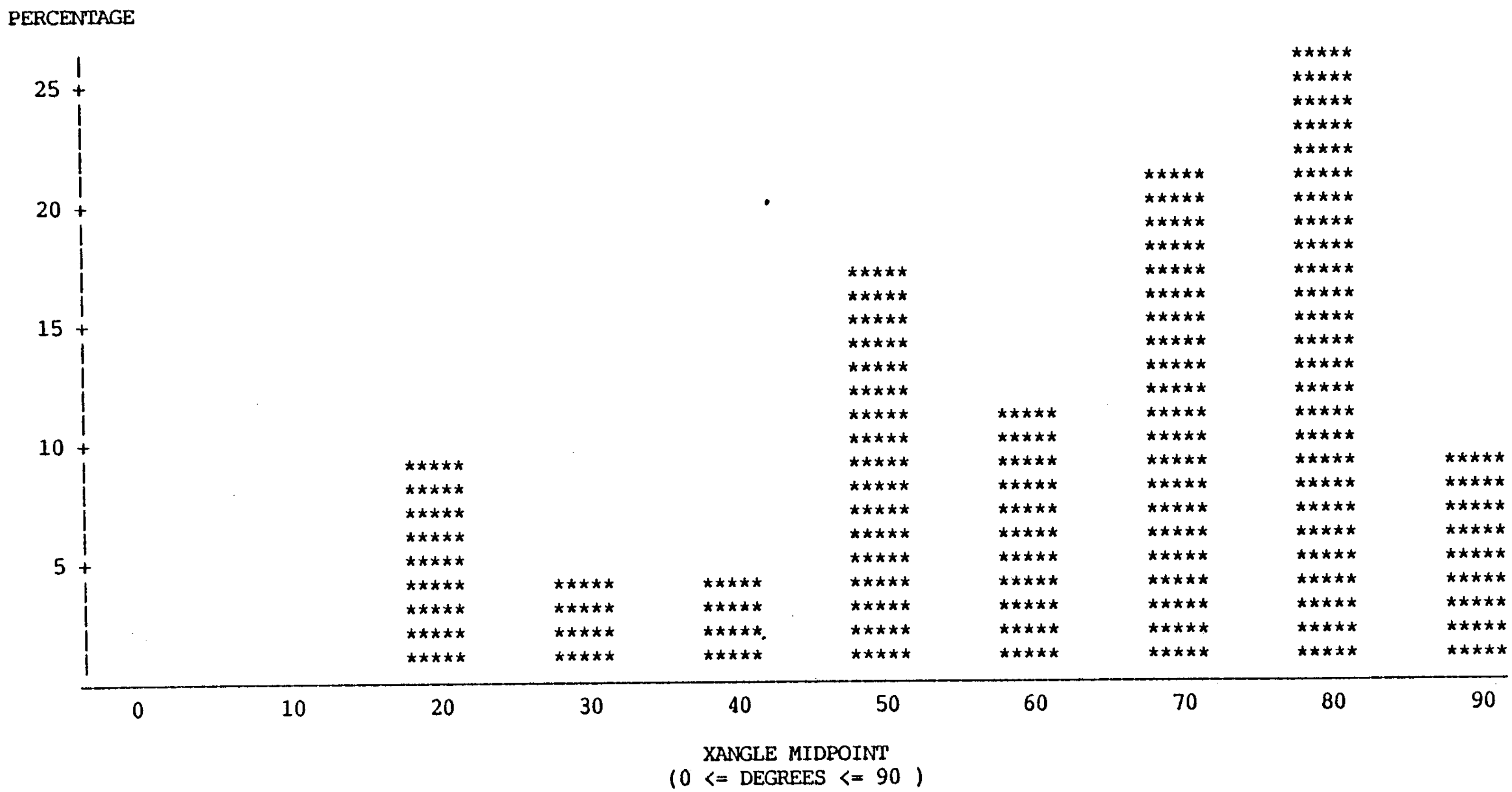


FIGURE A-27
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
LATERAL CROSSING ANGLE

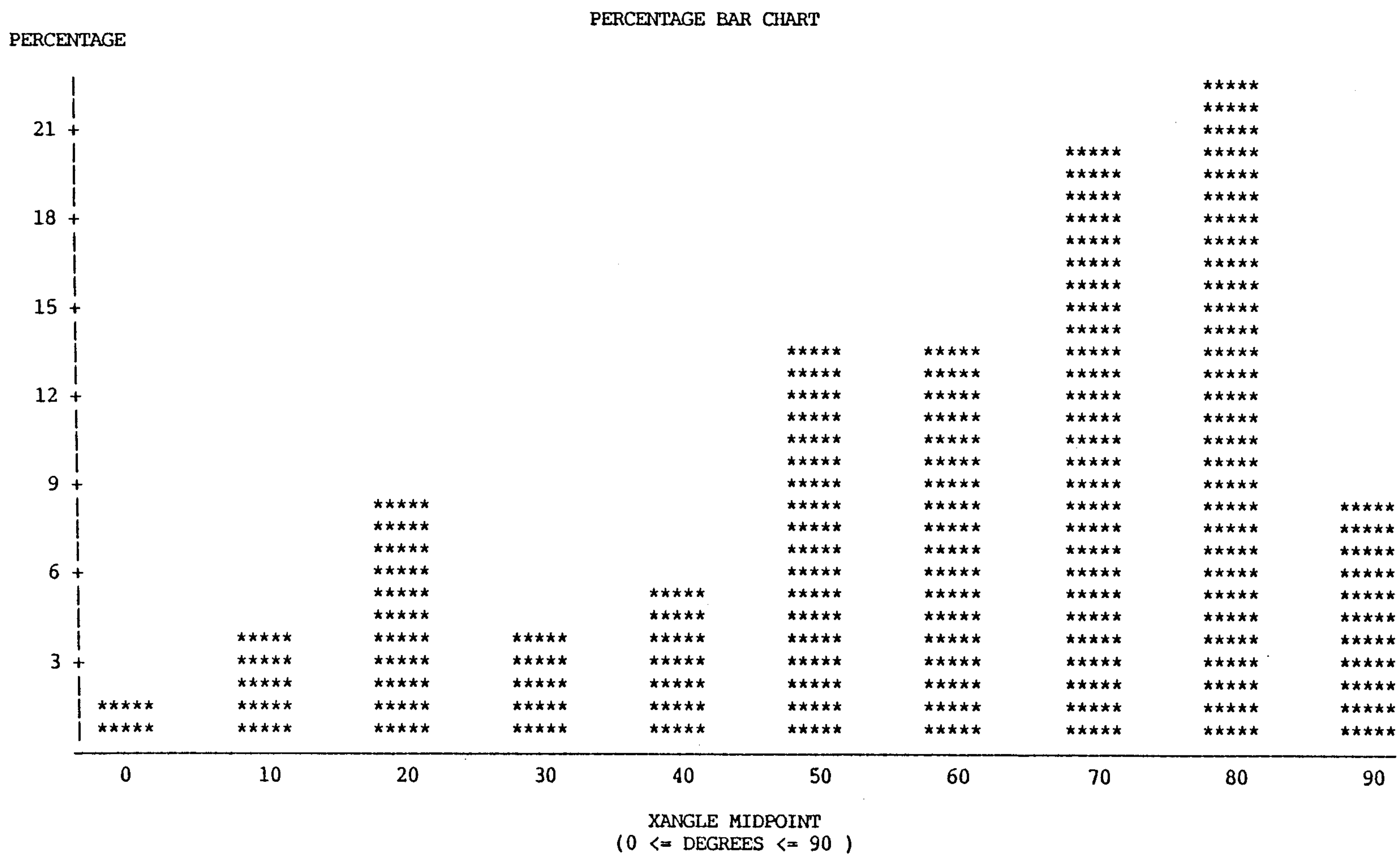


FIGURE A-28
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
LATERAL CROSSING ANGLE

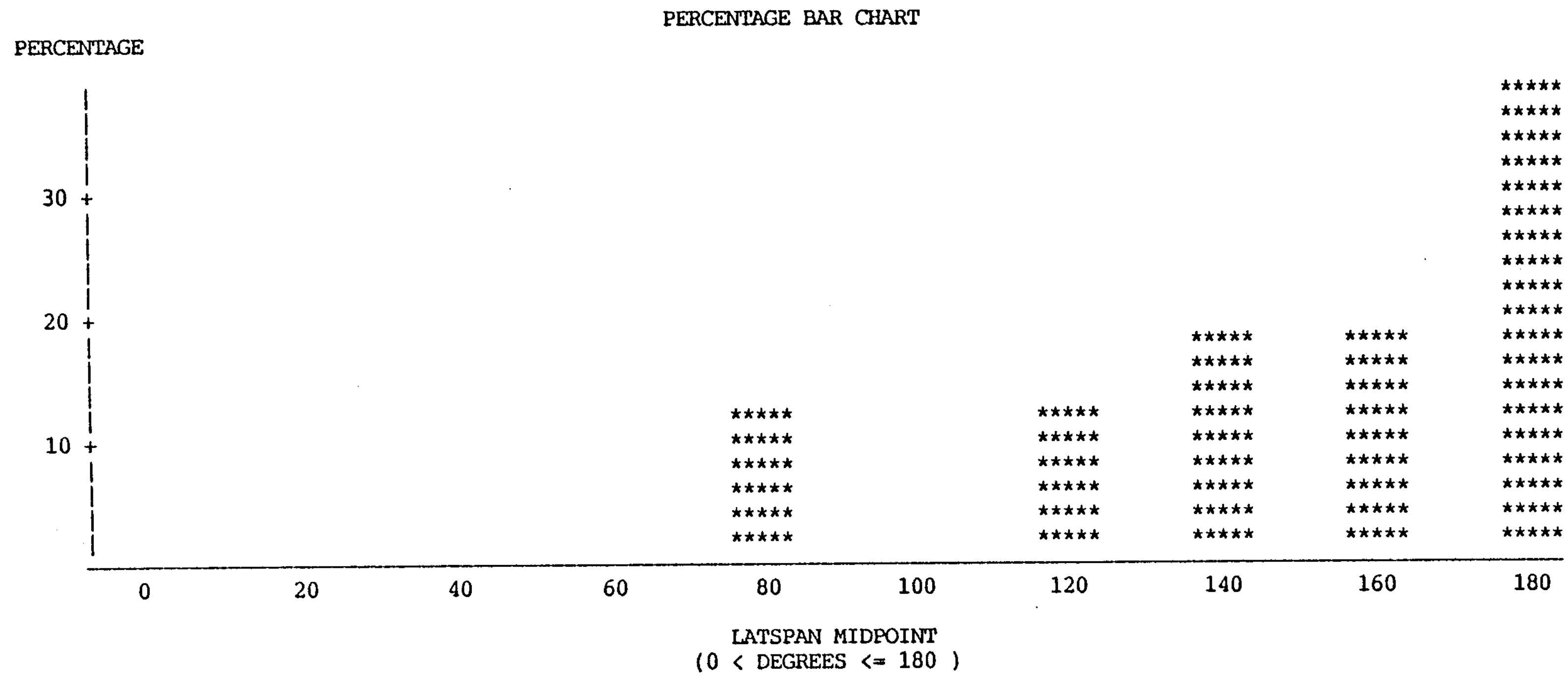


FIGURE A-29
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
LATERAL SPAN

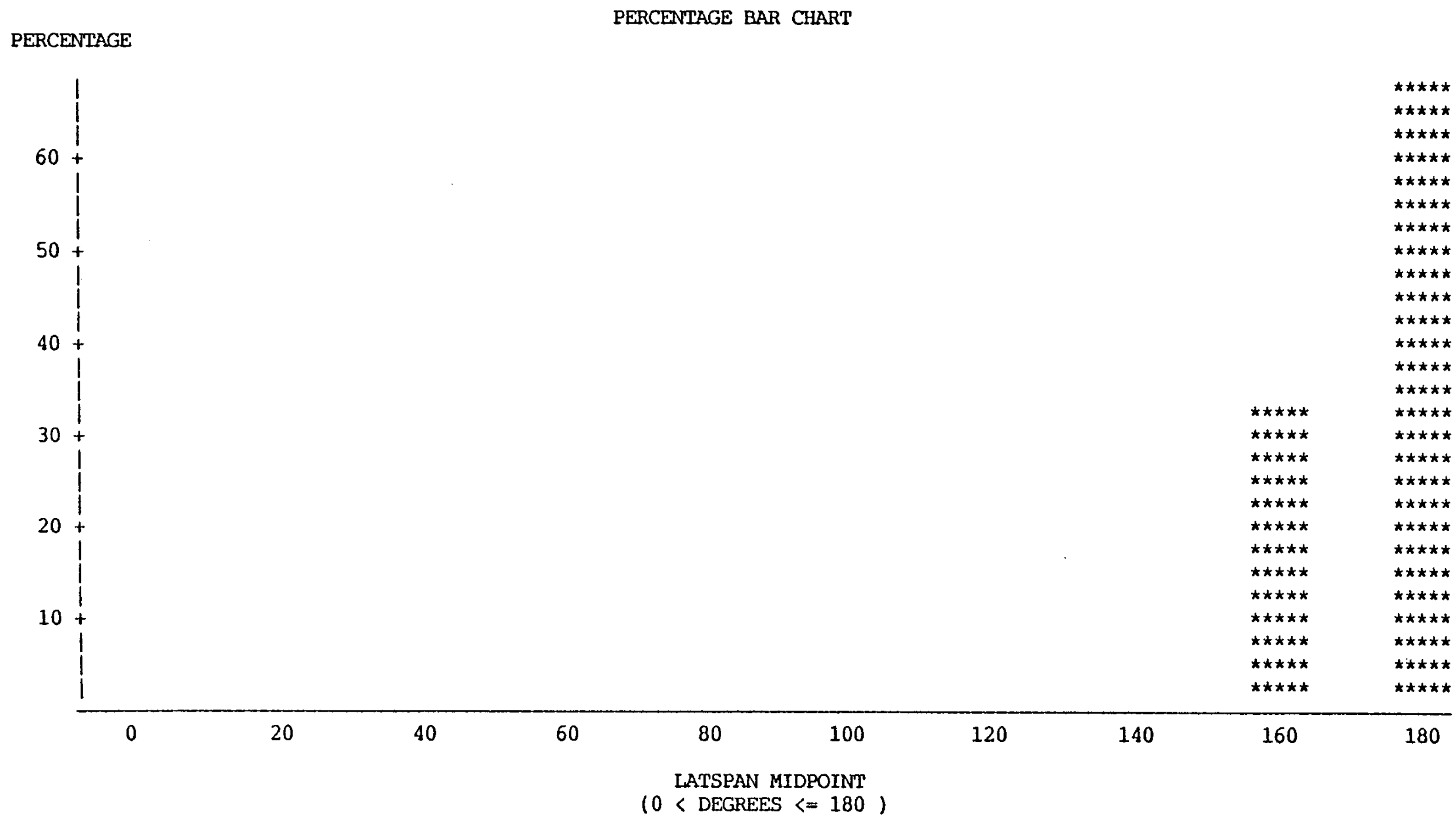


FIGURE A-30
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
LATERAL SPAN

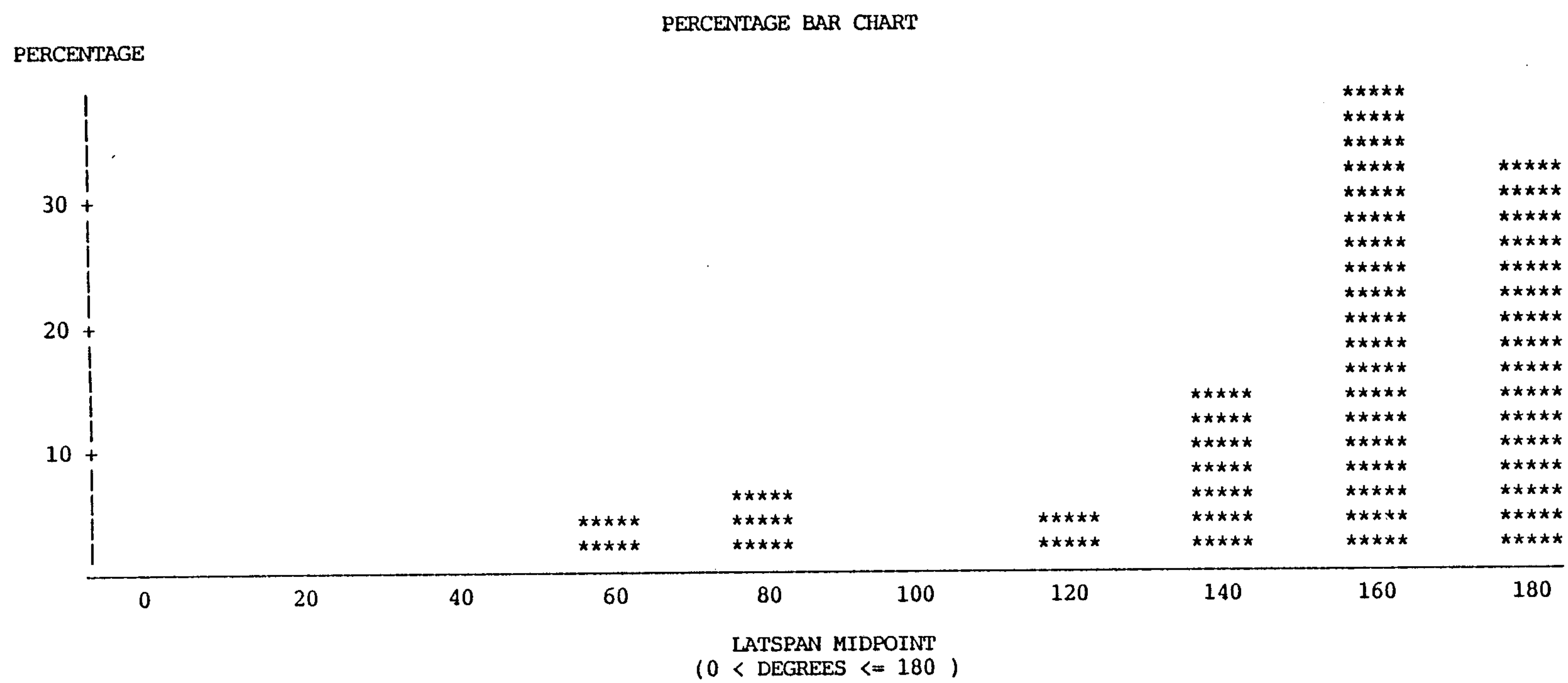


FIGURE A-31
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
LATERAL SPAN

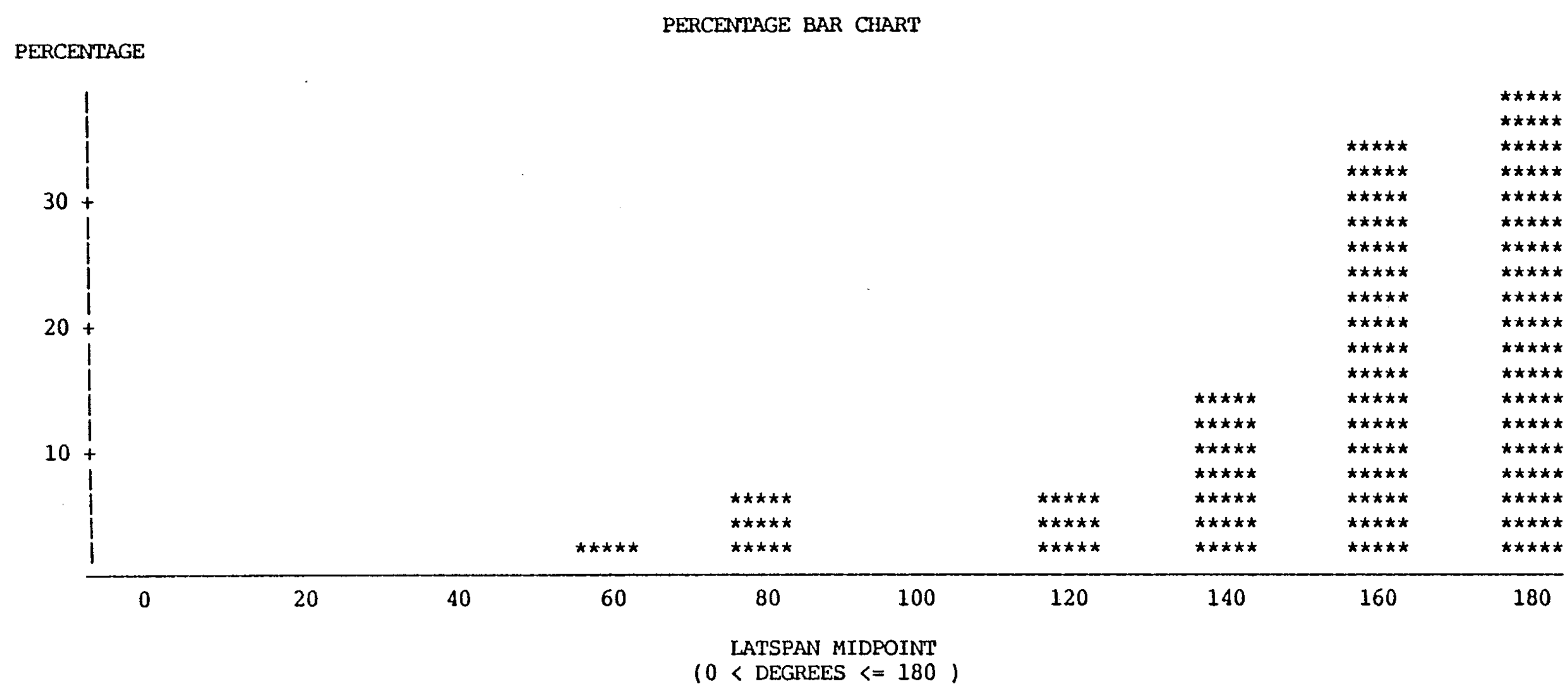


FIGURE A-32
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
LATERAL SPAN

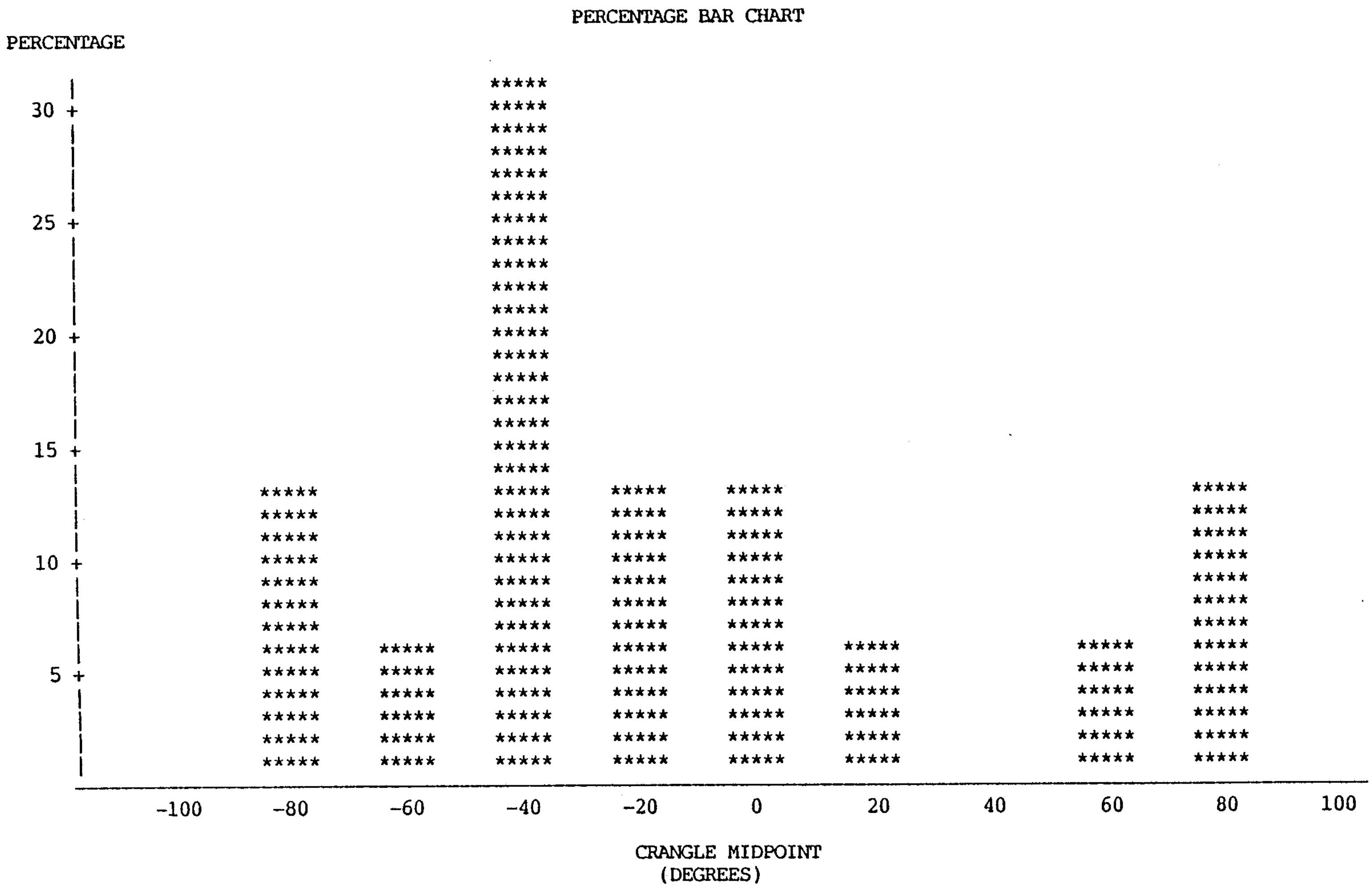


FIGURE A-33
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB CRITICAL LATERAL ANGLE

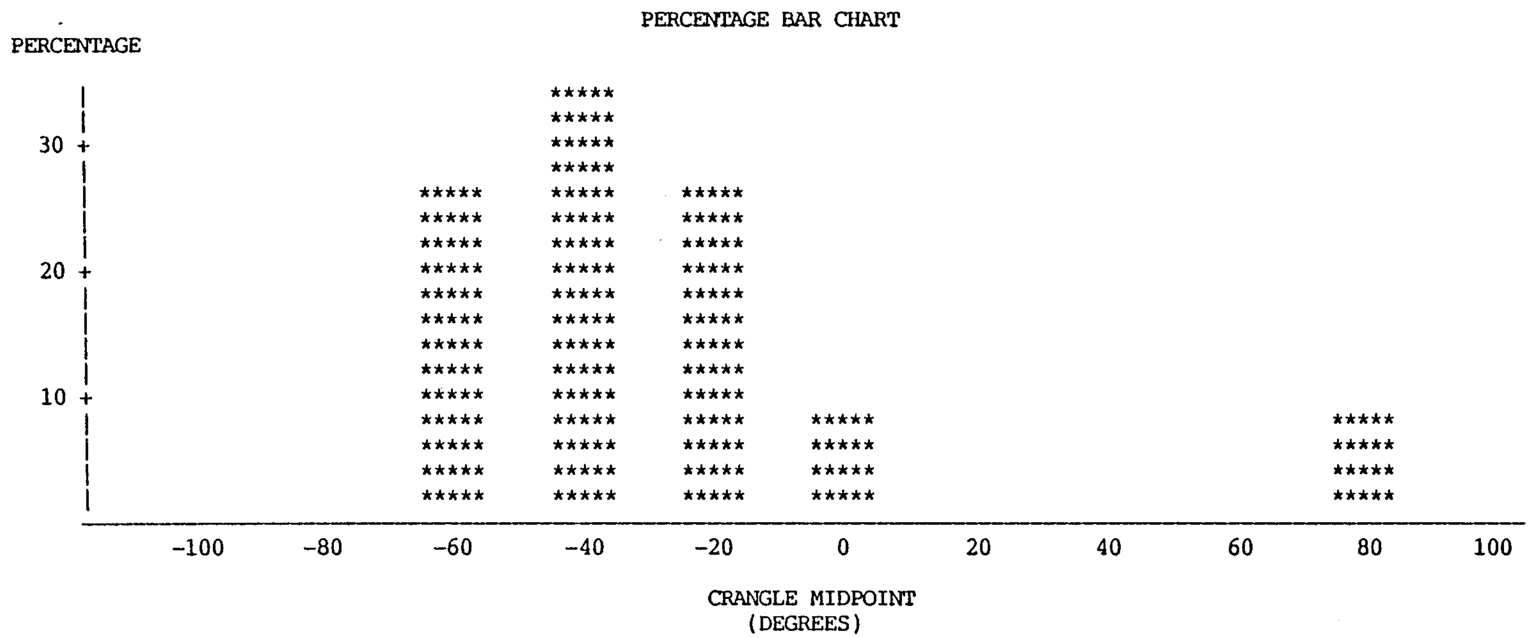


FIGURE A-34
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
CRITICAL LATERAL ANGLE

PERCENTAGE BAR CHART

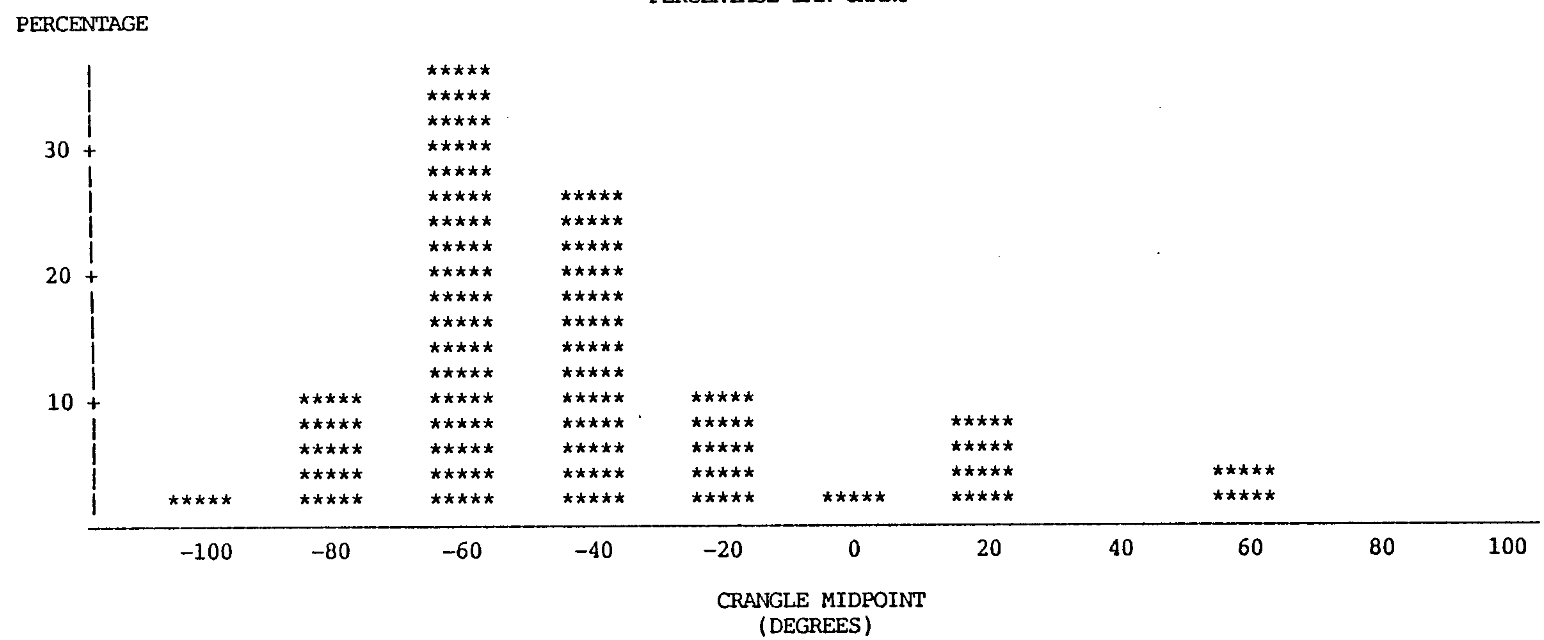


FIGURE A-35
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
CRITICAL LATERAL ANGLE

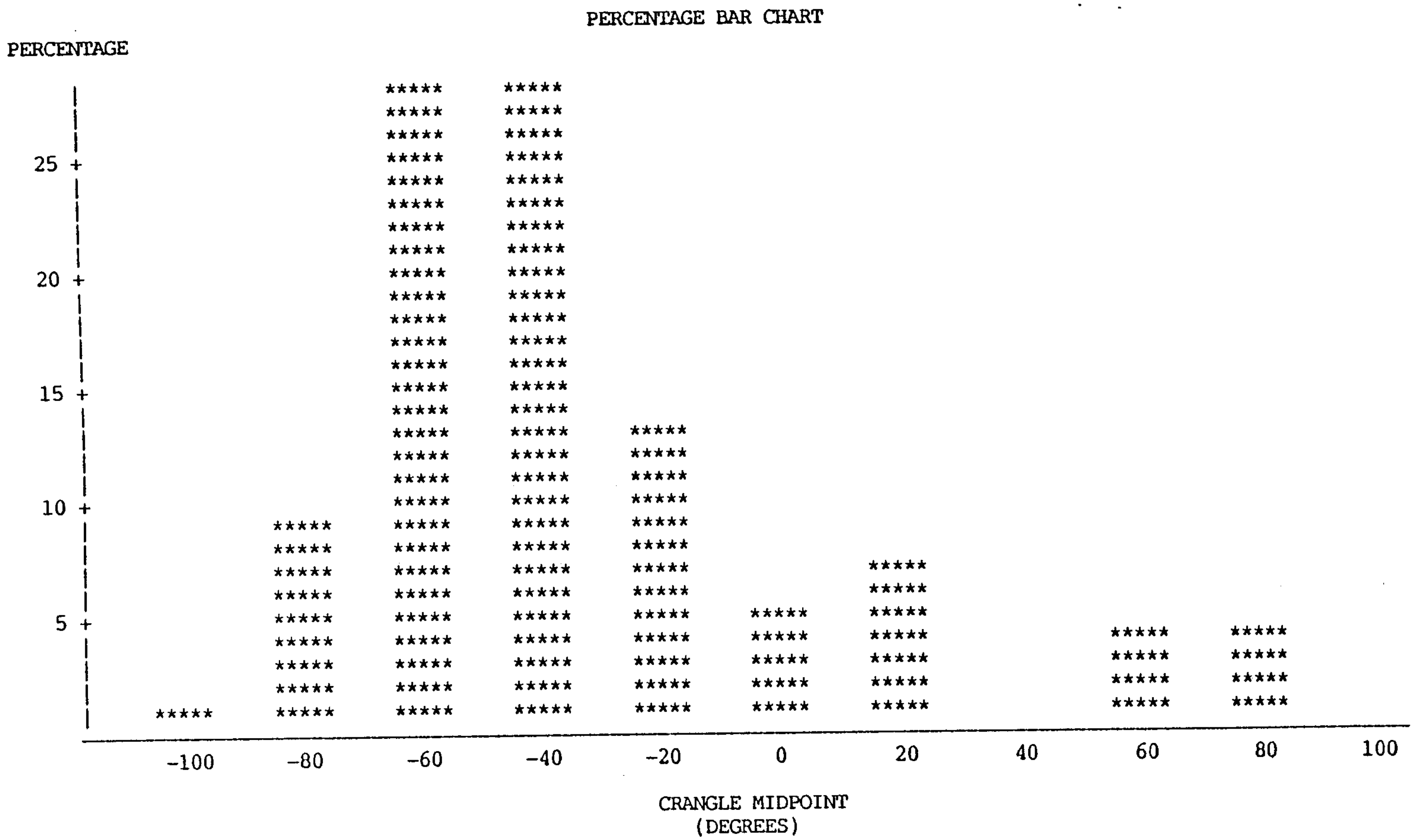


FIGURE A-36
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
CRITICAL LATERAL ANGLE

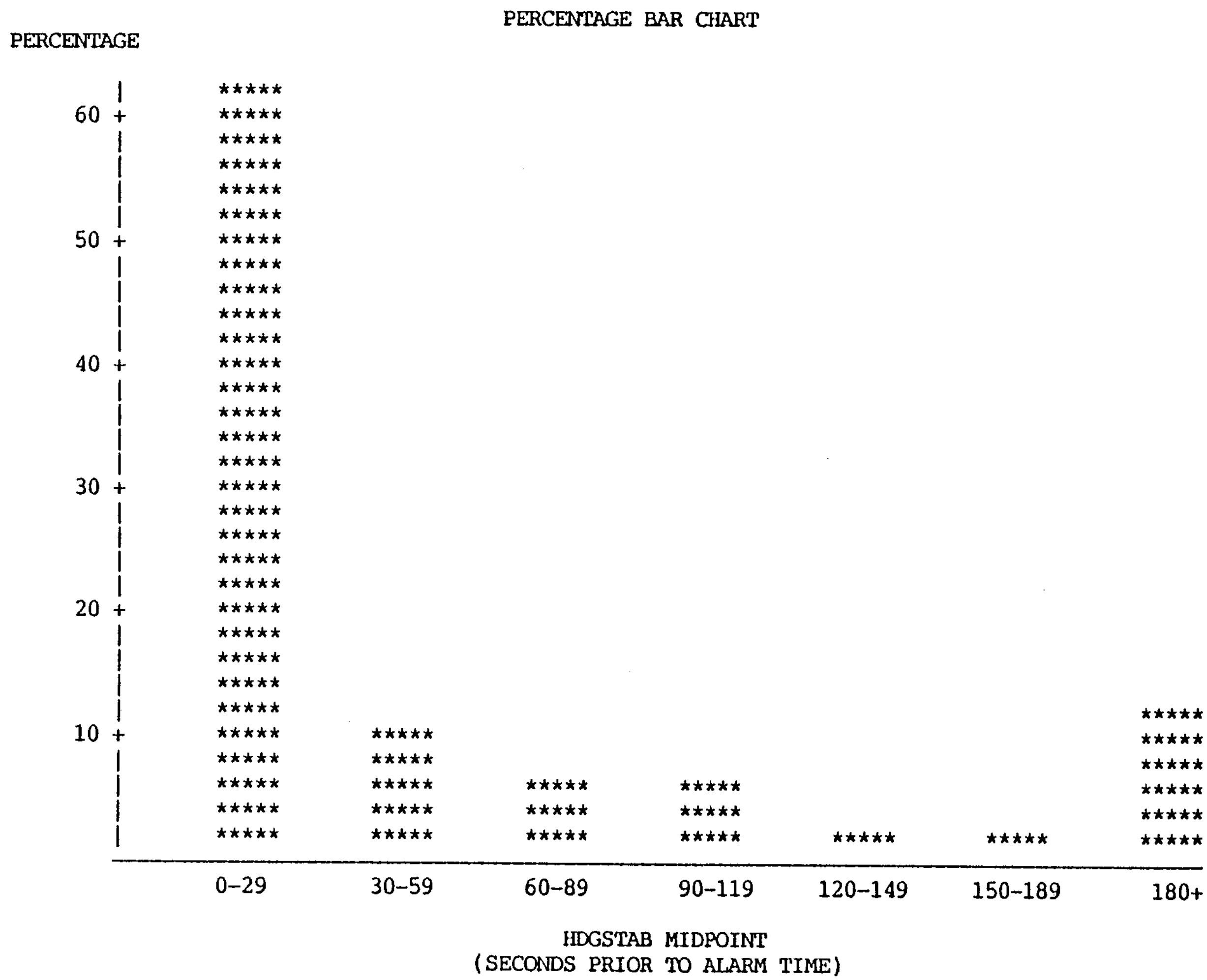


FIGURE A-37
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB HEADING STABILITY

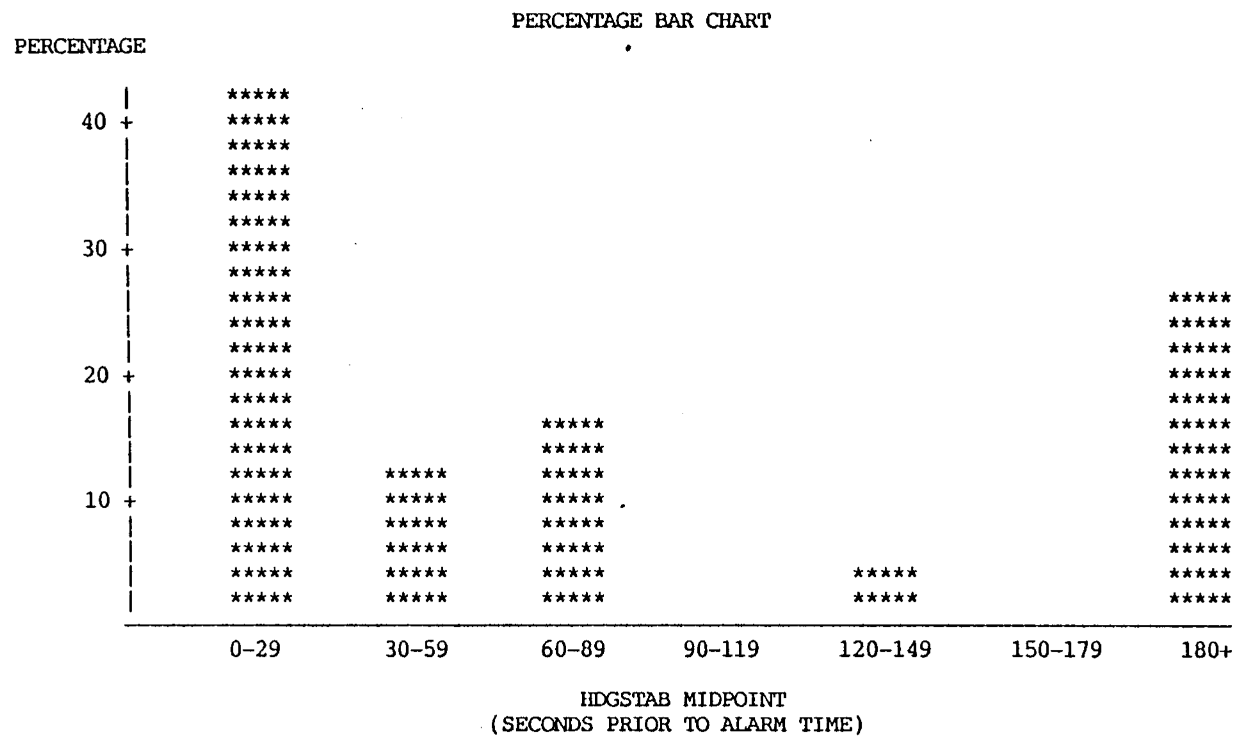


FIGURE A-38
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW HEADING STABILITY

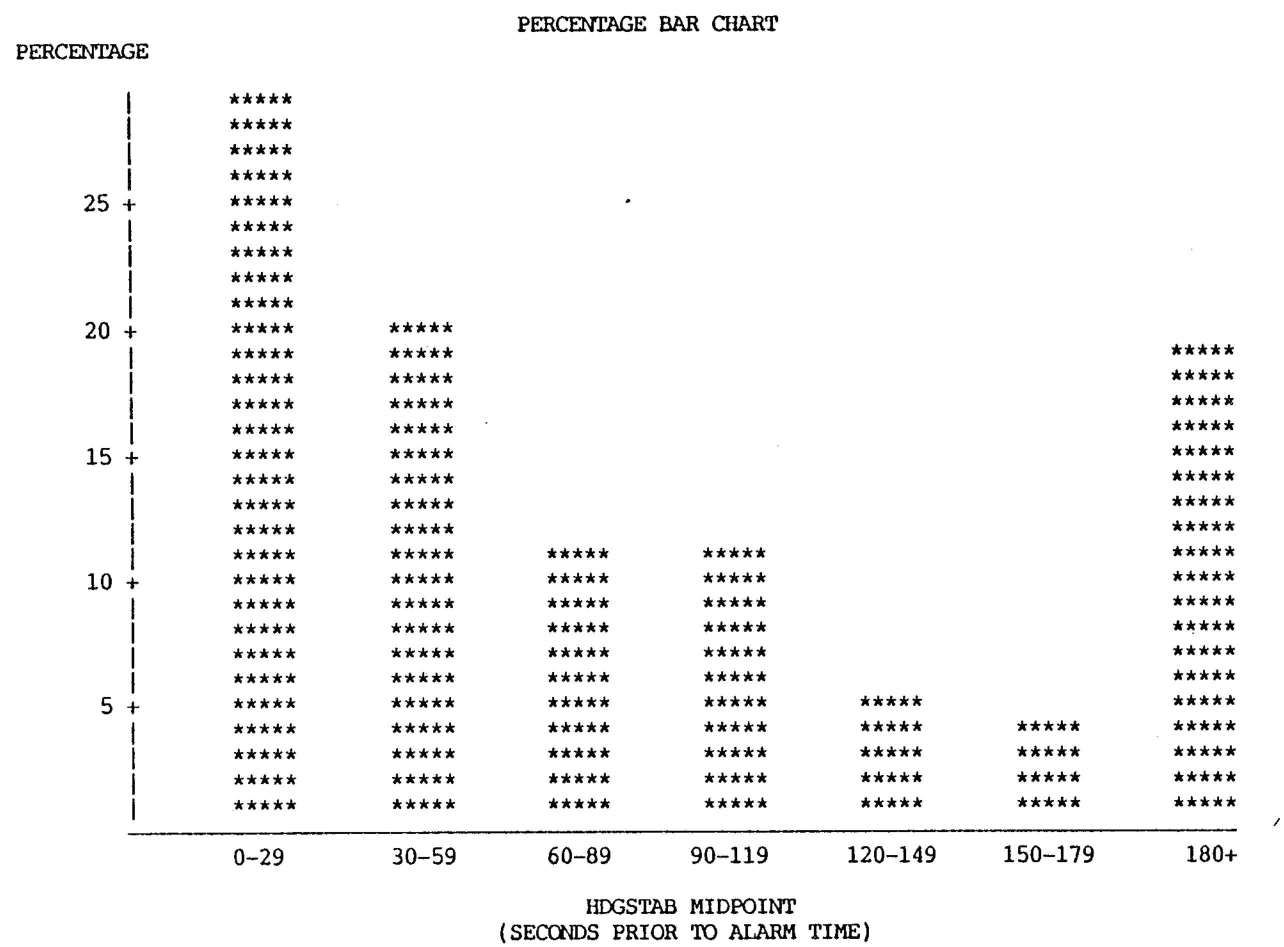


FIGURE A-39
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
HEADING STABILITY

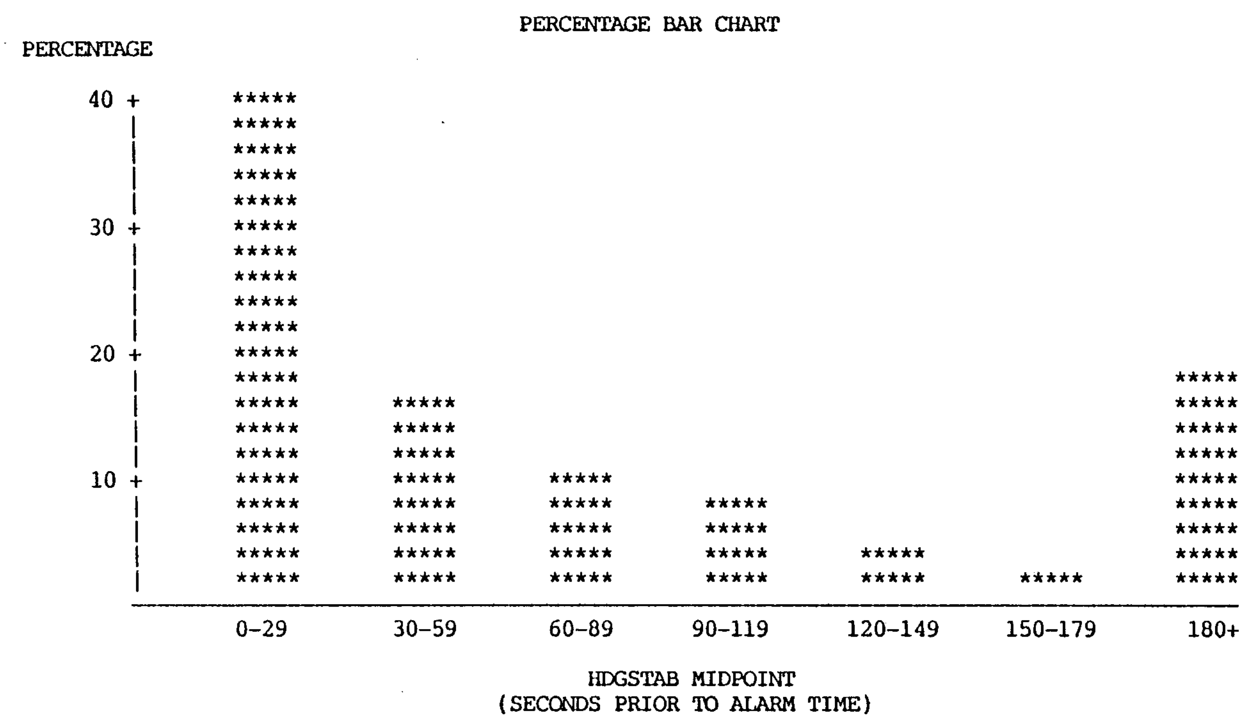


FIGURE A-40
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
HEADING STABILITY

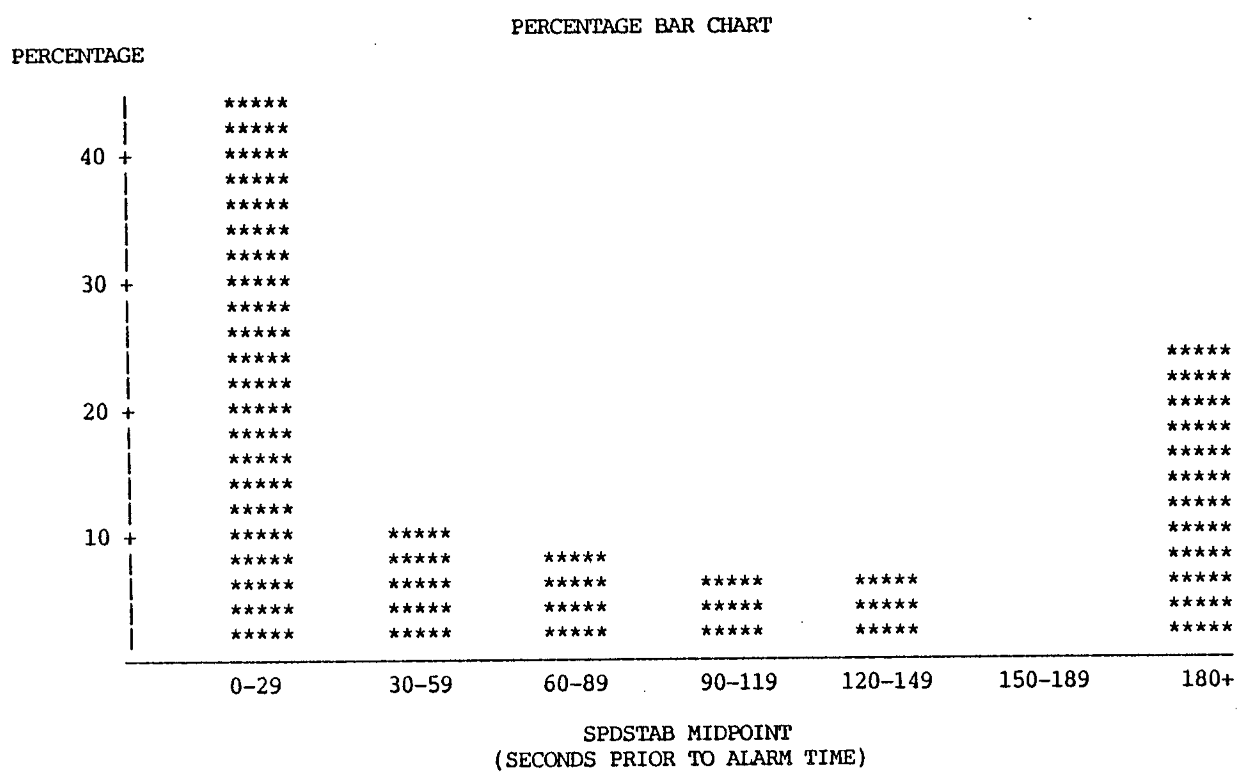


FIGURE A-41
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB GROUNDSPEED STABILITY

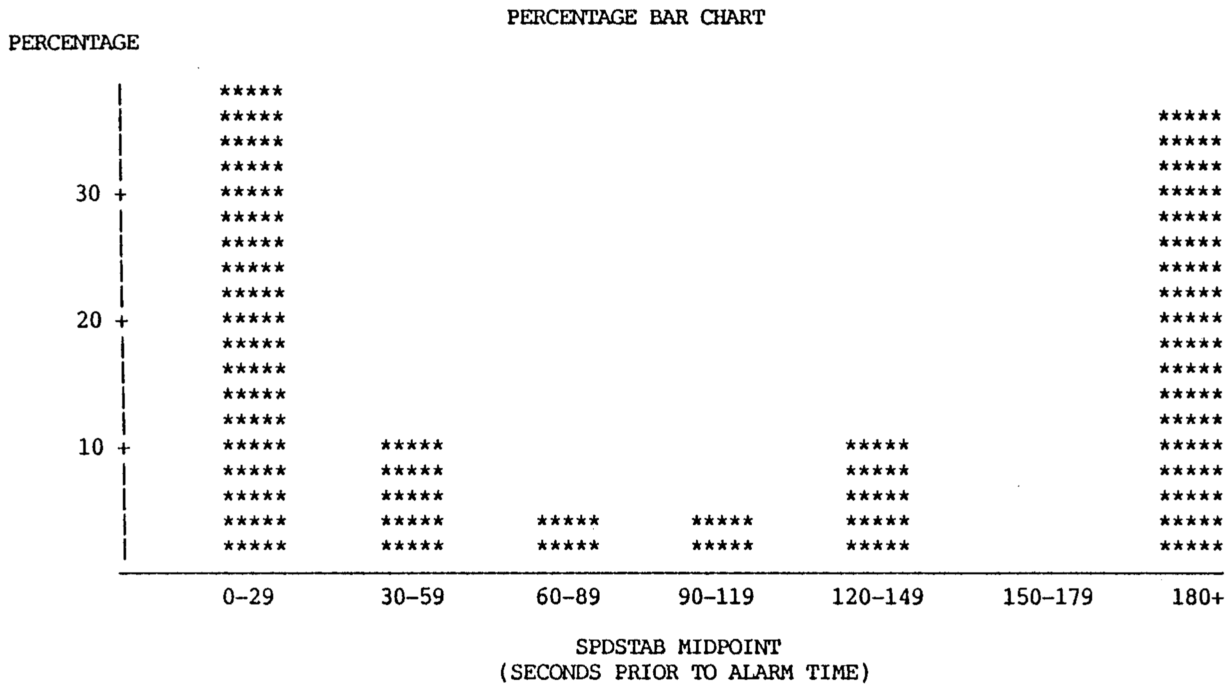


FIGURE A-42
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW GROUNDSPEED STABILITY

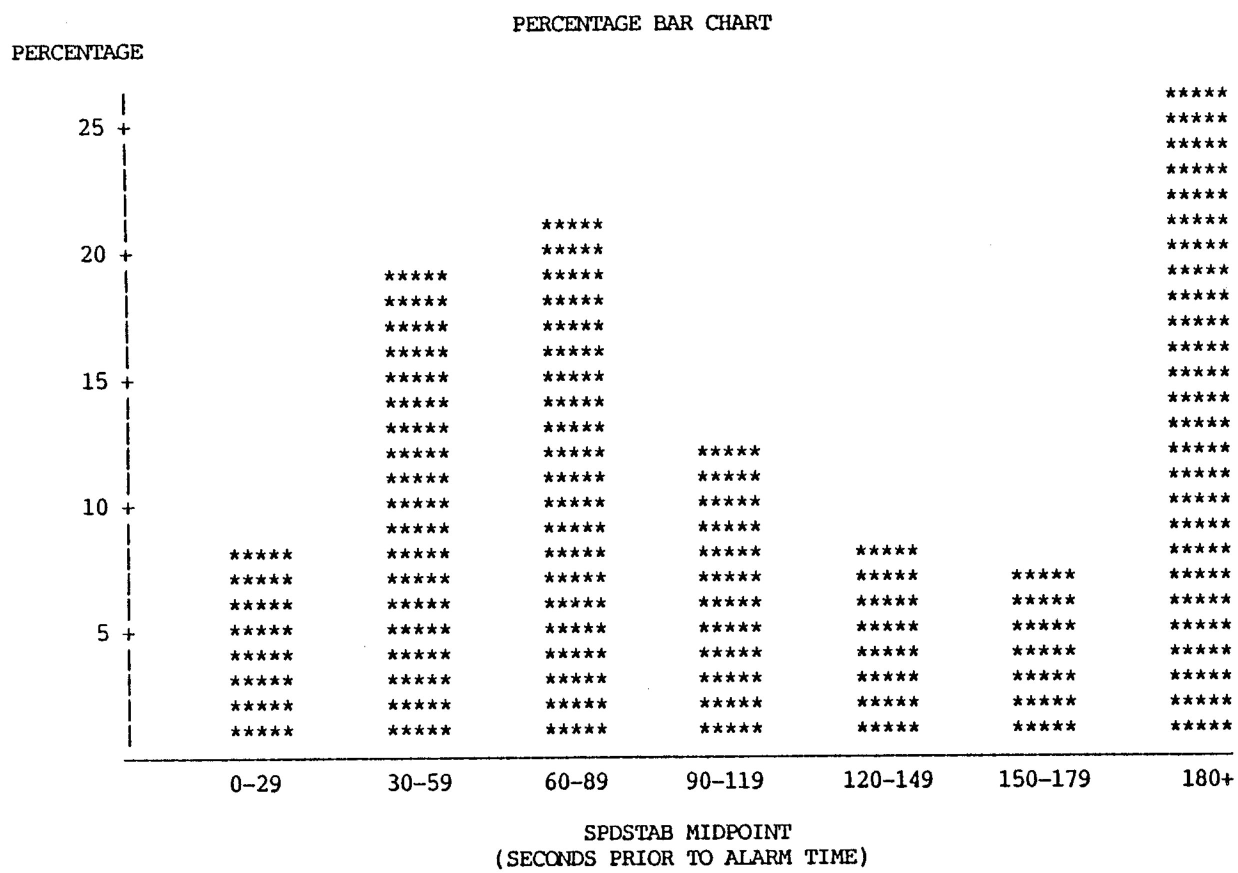


FIGURE A-43
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
GROUNDSPEED STABILITY

PERCENTAGE BAR CHART

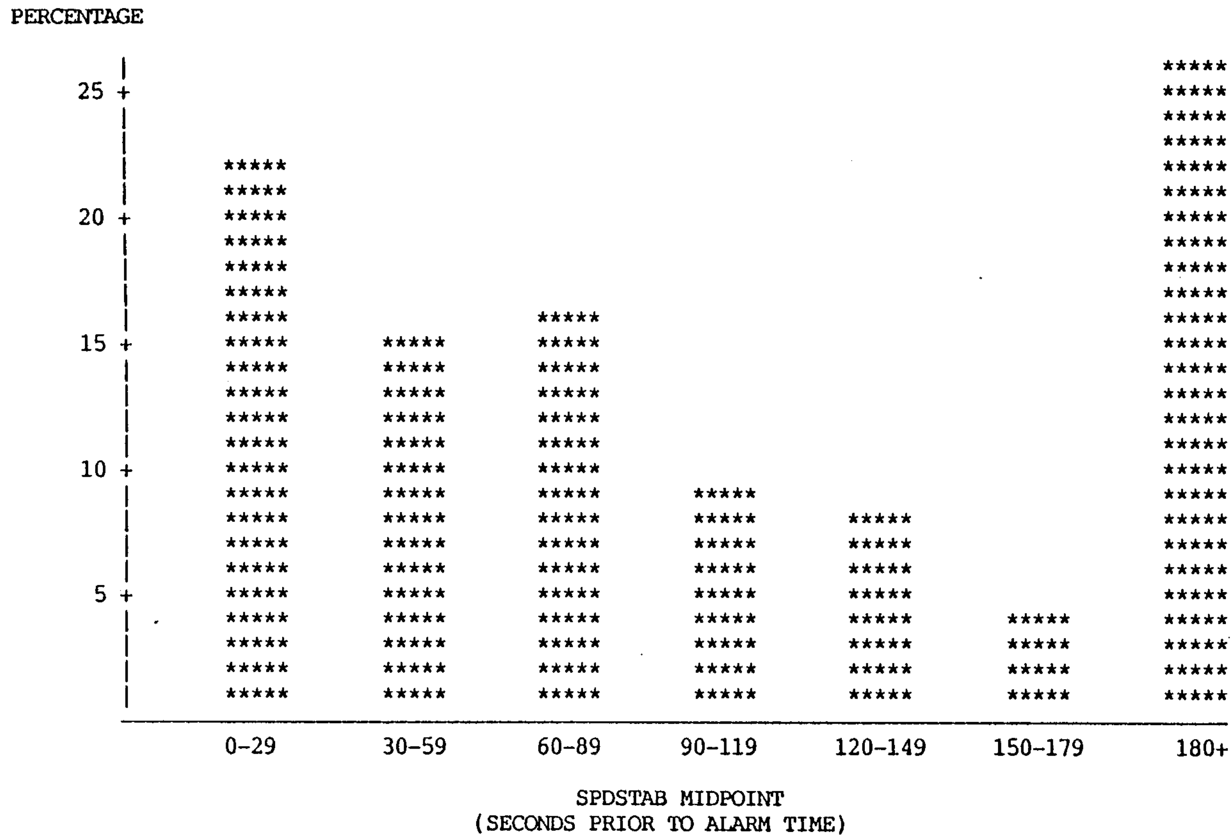


FIGURE A-44
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED GROUNDSPEED STABILITY

PERCENTAGE BAR CHART

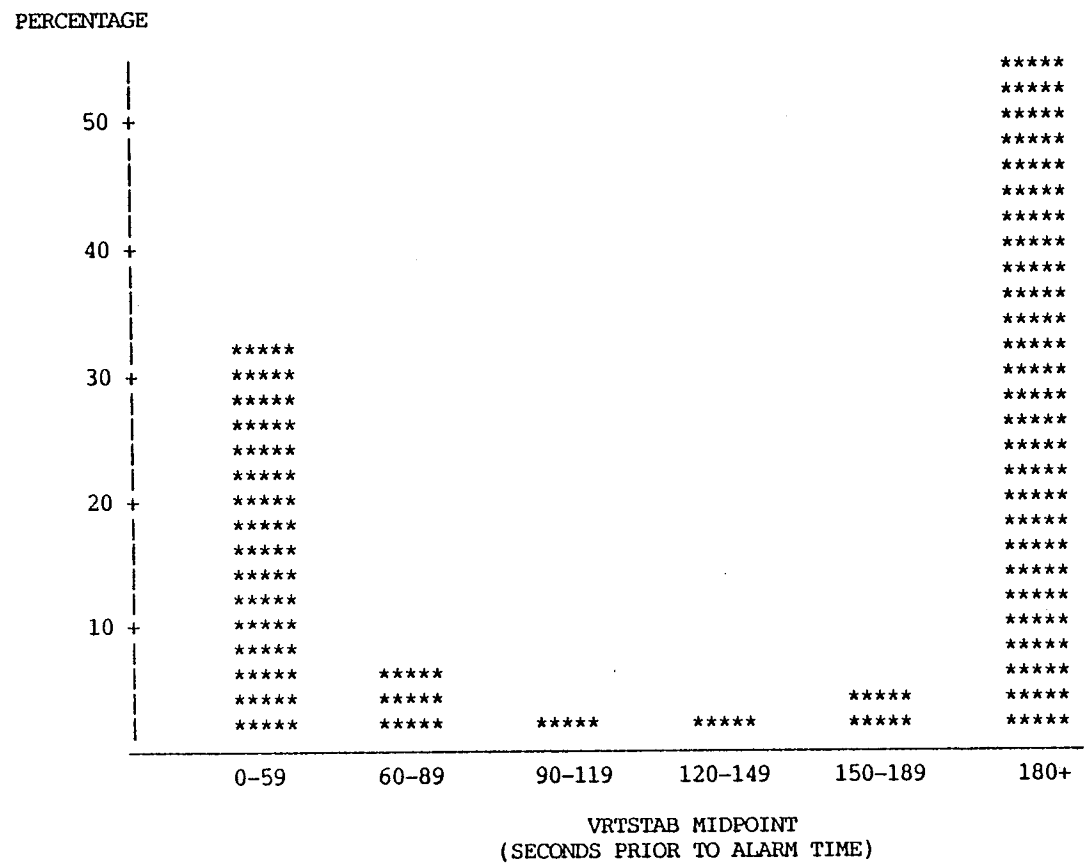


FIGURE A-45
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
VERTICAL STABILITY

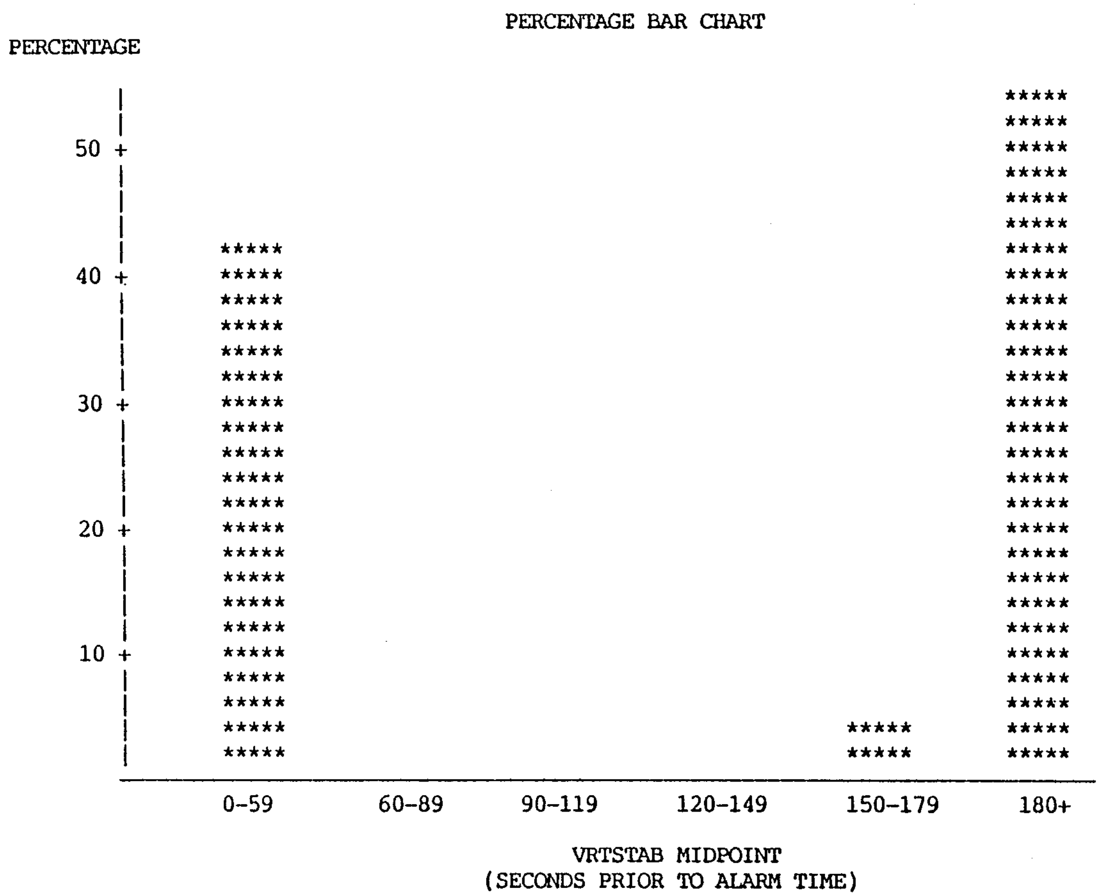


FIGURE A-46
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
VERTICAL STABILITY

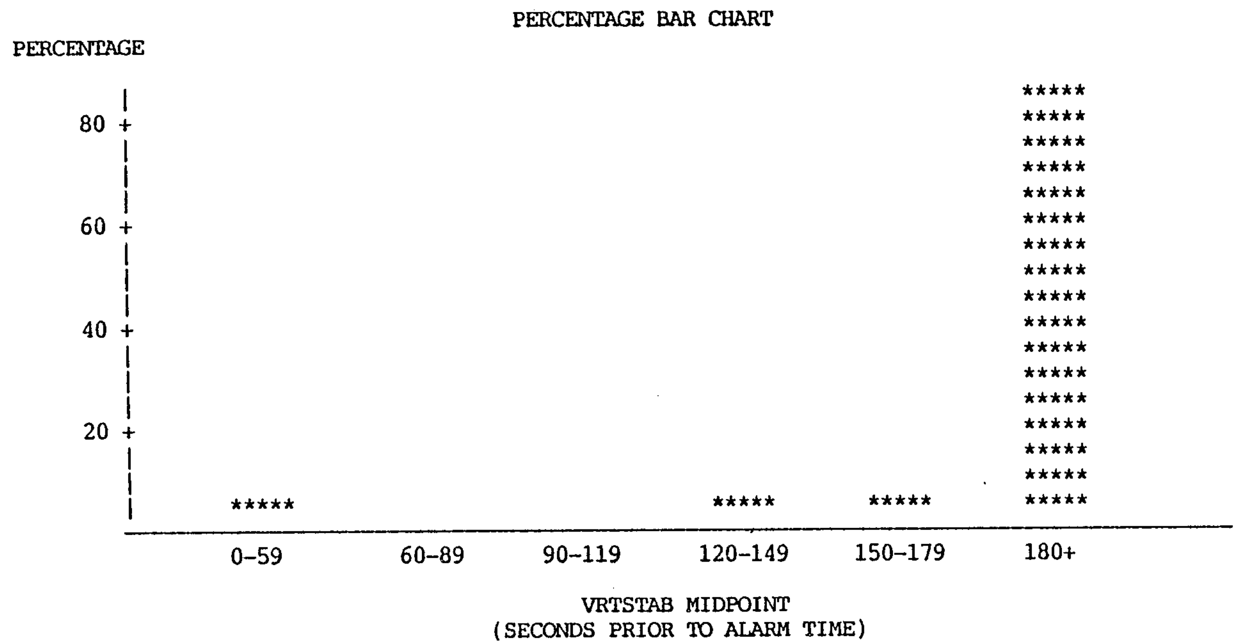


FIGURE A-47
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
VERTICAL STABILITY

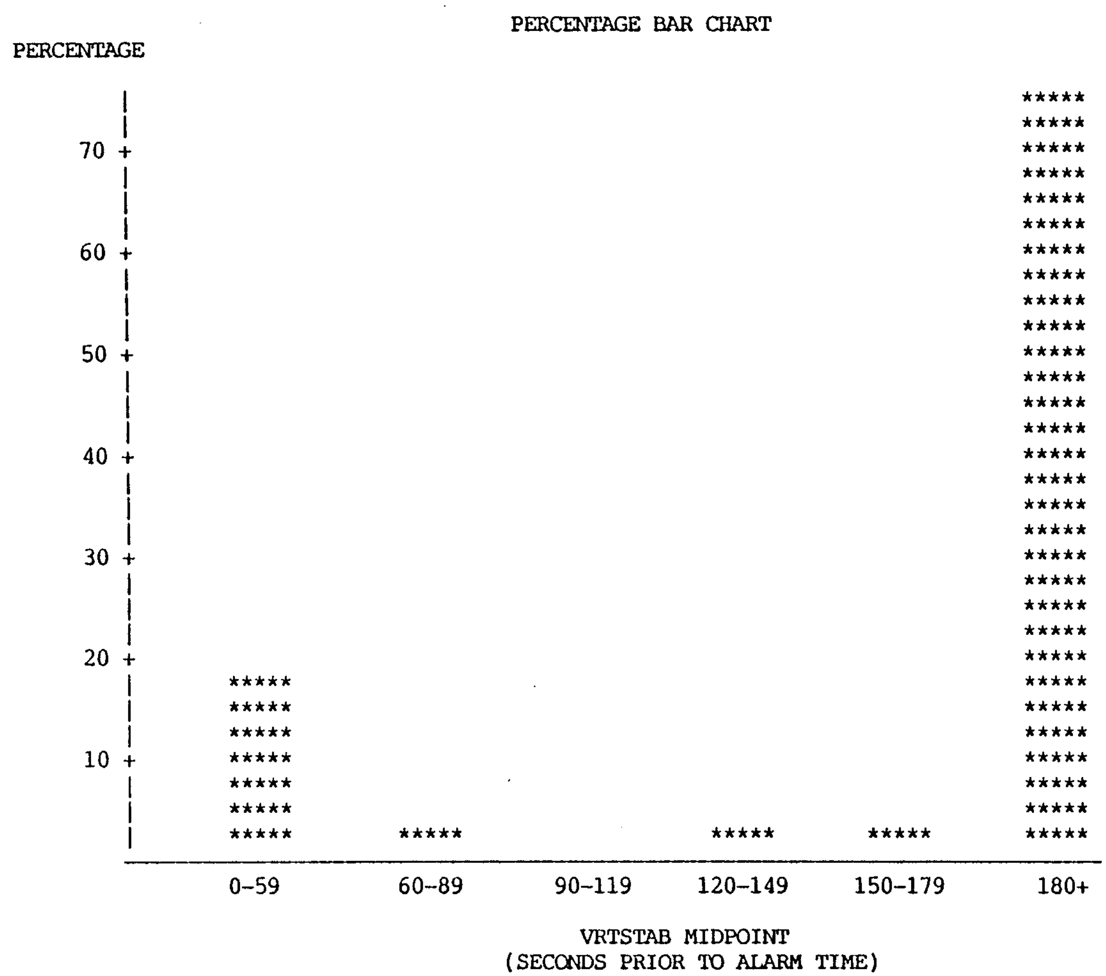


FIGURE A-48
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
VERTICAL STABILITY

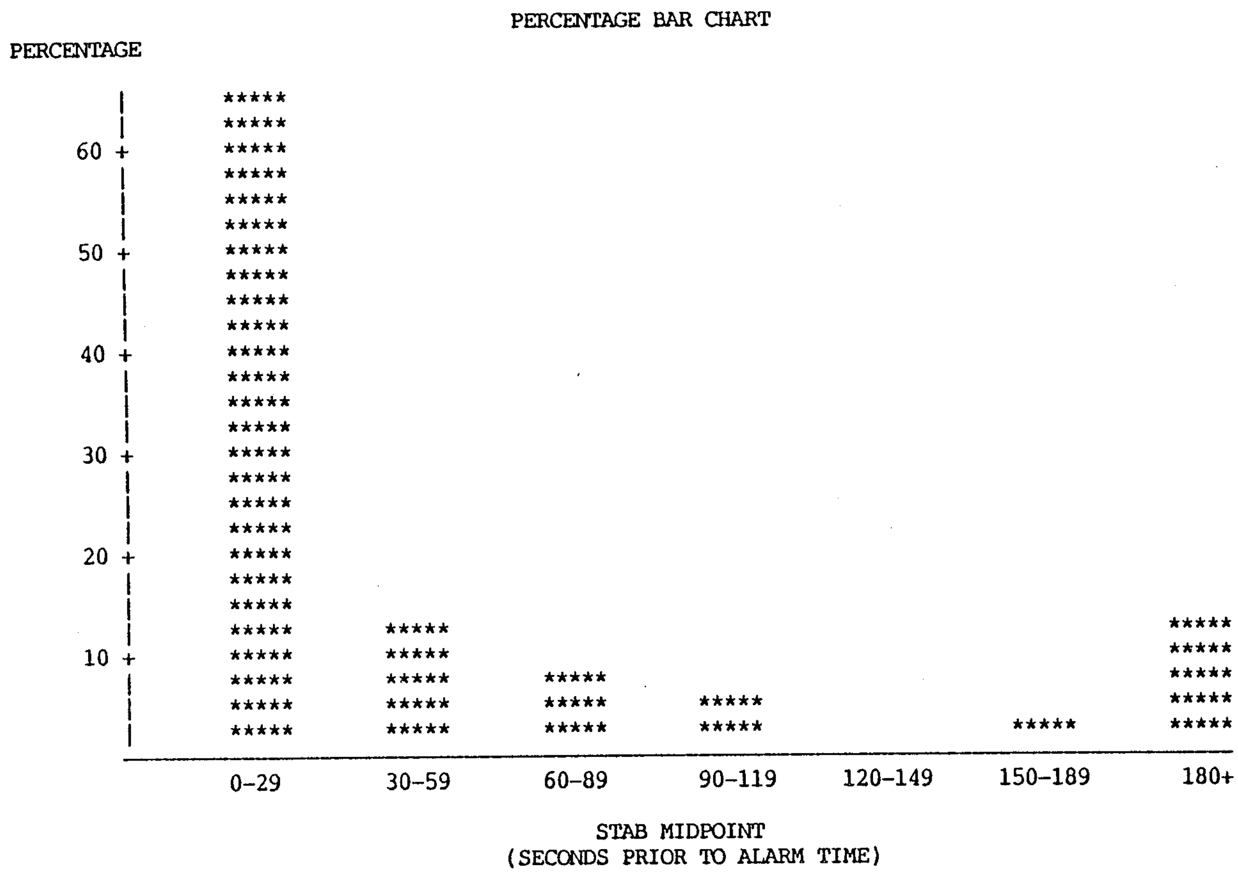


FIGURE A-49
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
TOTAL STABILITY

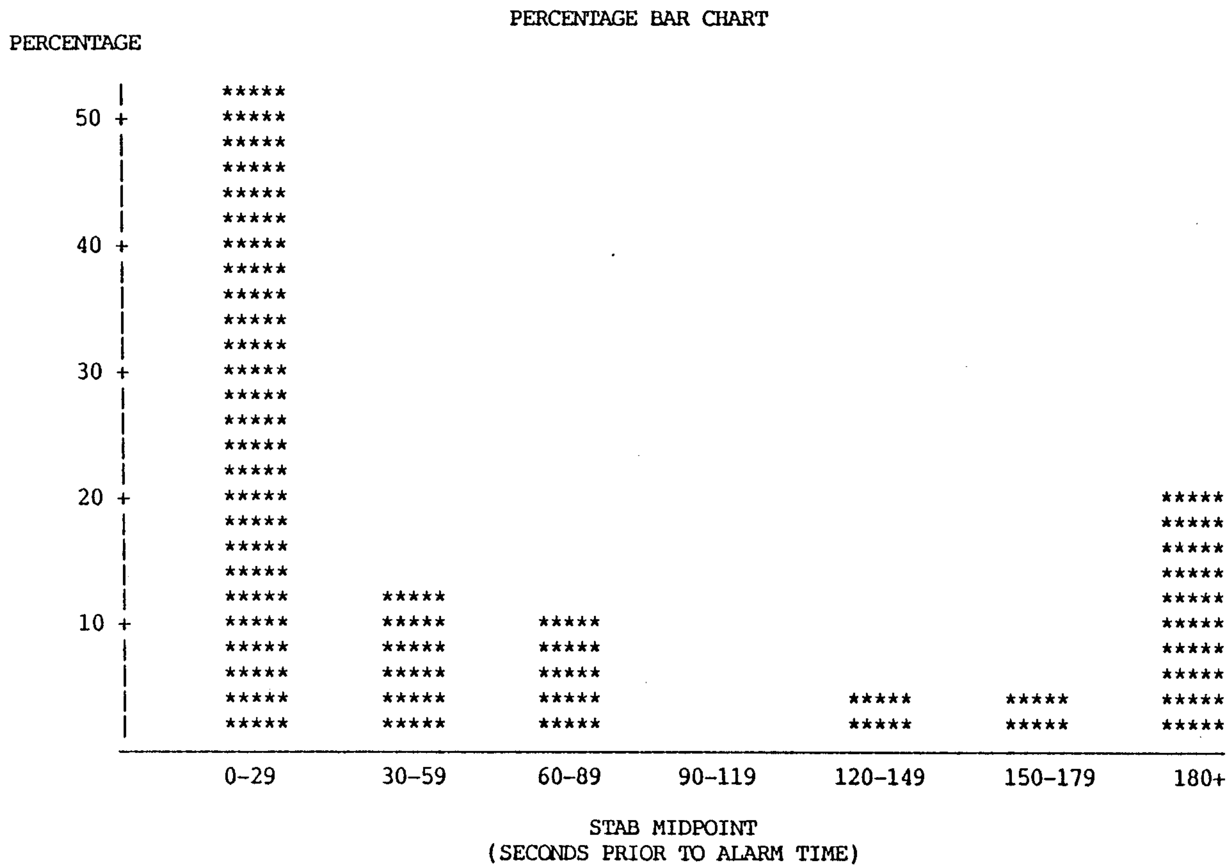


FIGURE A-50
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
TOTAL STABILITY

PERCENTAGE BAR CHART

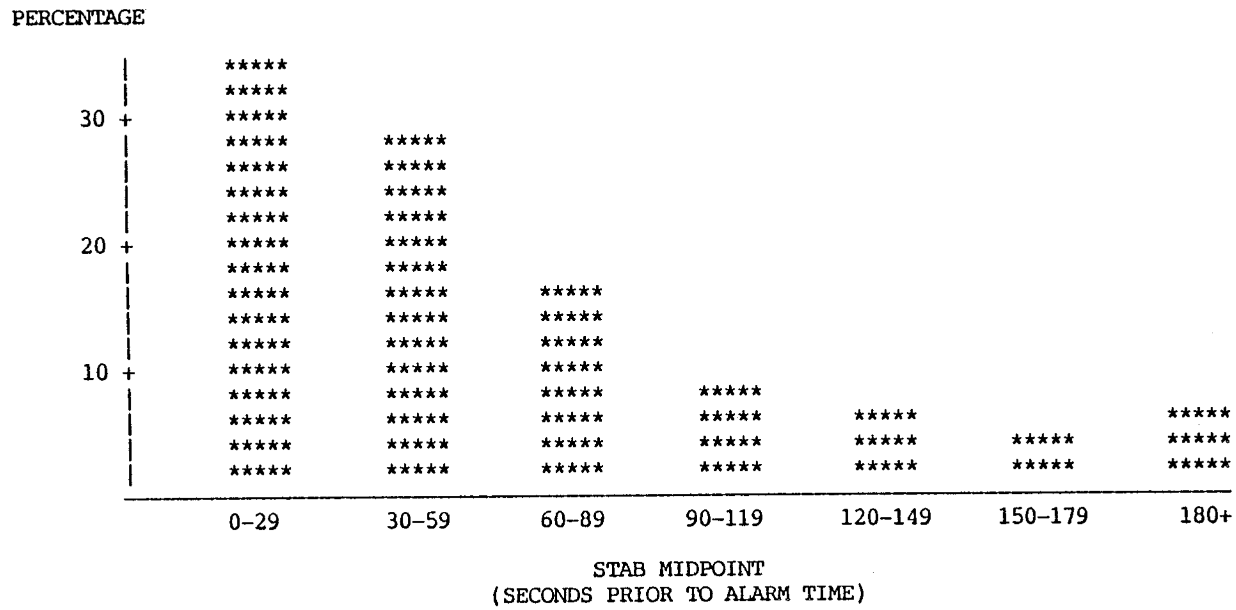


FIGURE A-51
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
TOTAL STABILITY

PERCENTAGE BAR CHART

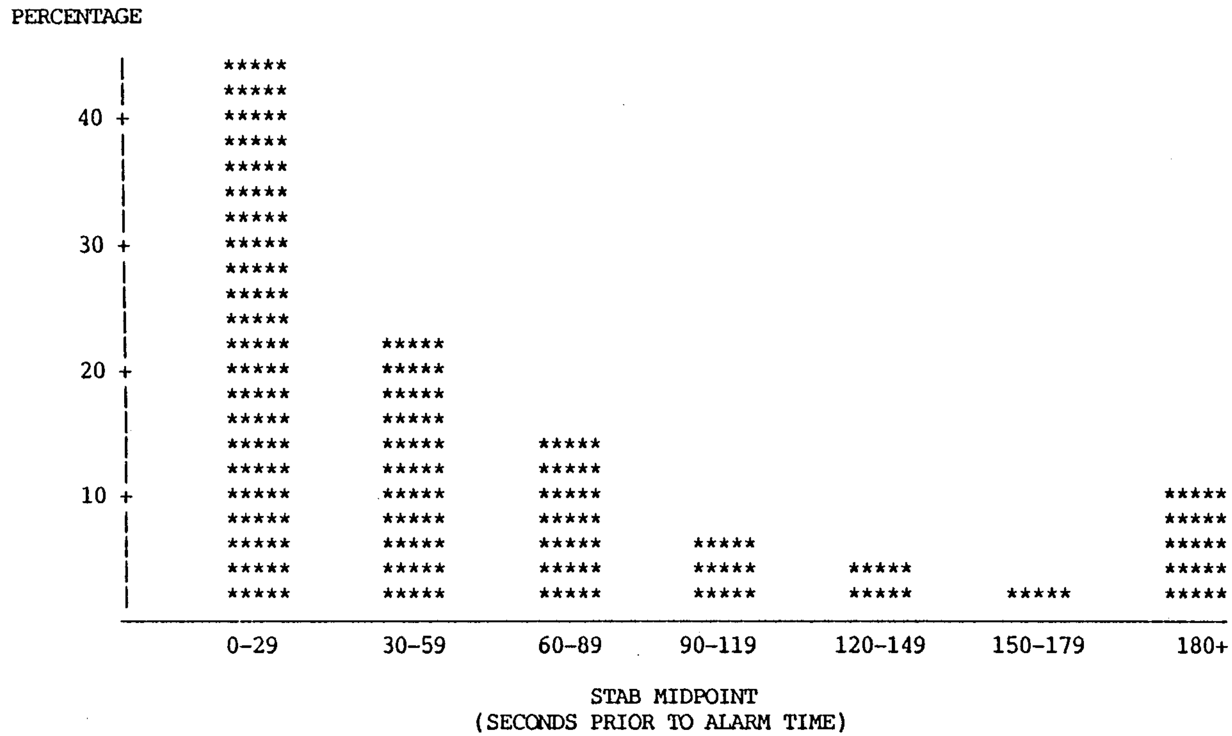


FIGURE A-52
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
TOTAL STABILITY

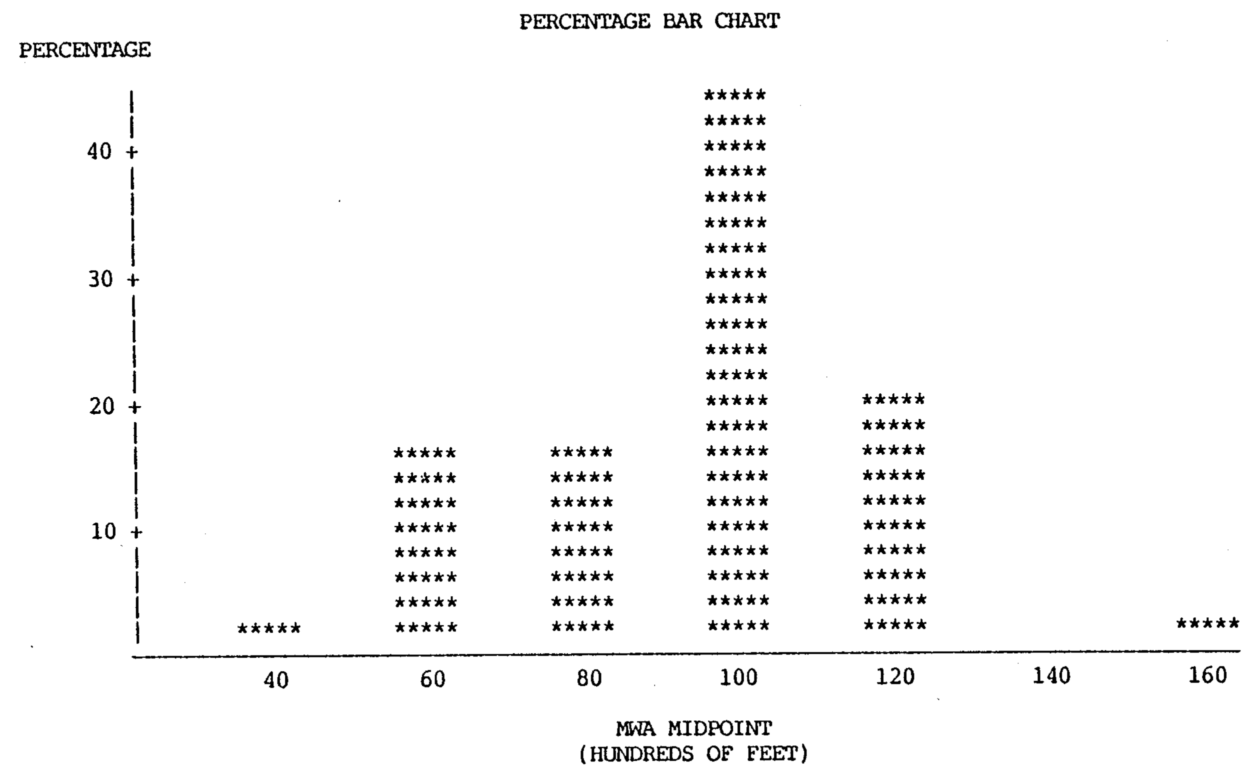


FIGURE A-53
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
MINIMUM WARNING ALTITUDE

PERCENTAGE BAR CHART

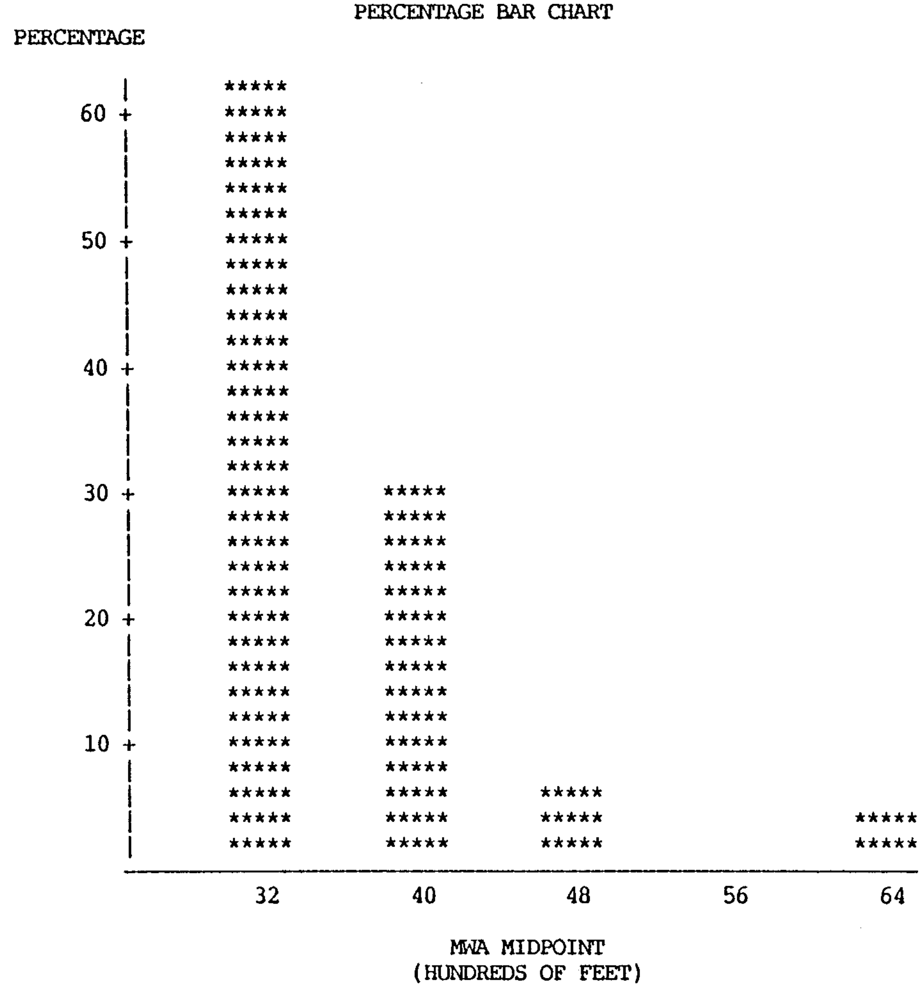


FIGURE A-54
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
MINIMUM WARNING ALTITUDE

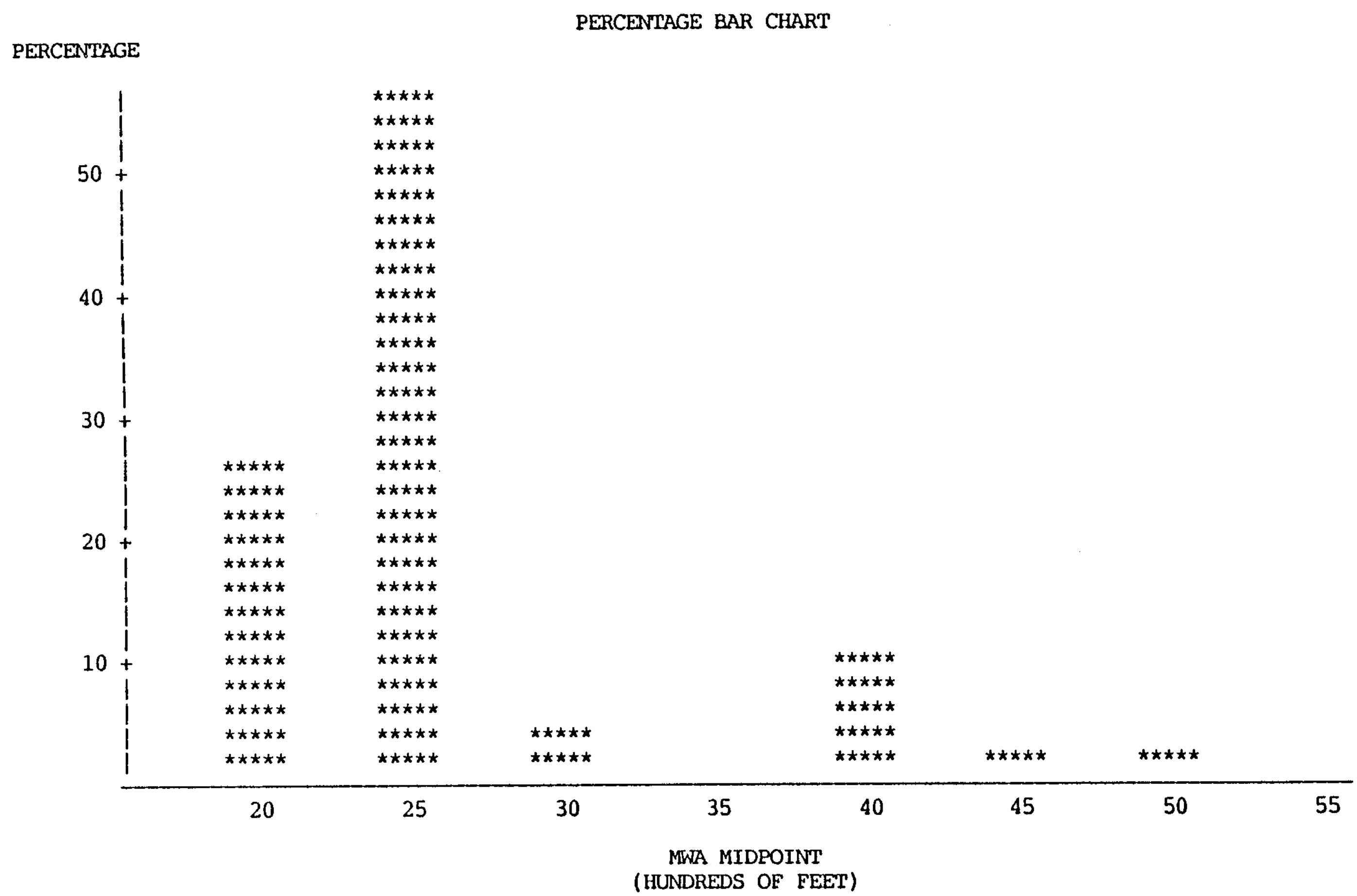


FIGURE A-55
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
MINIMUM WARNING ALTITUDE

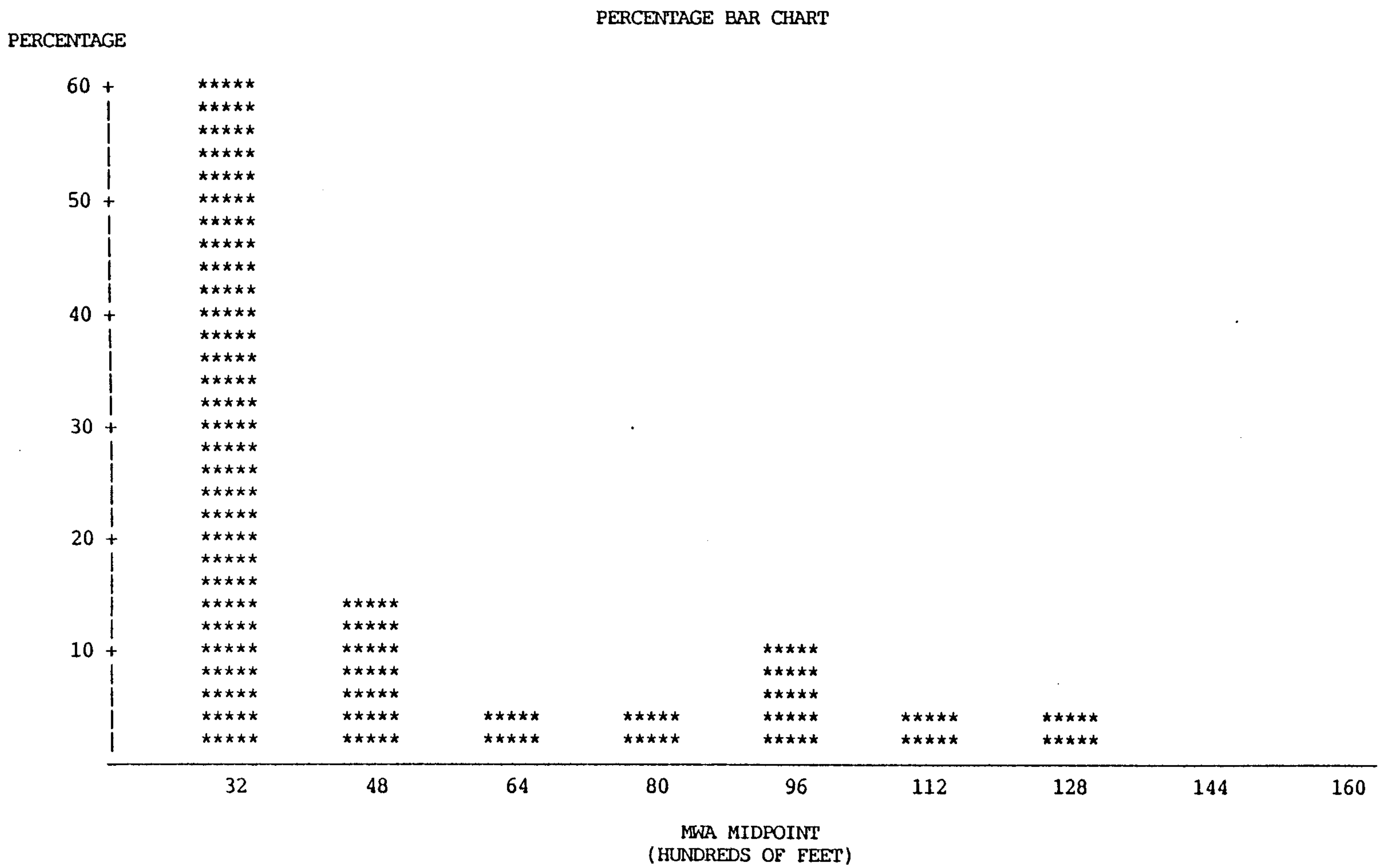


FIGURE A-56
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
MINIMUM WARNING ALTITUDE

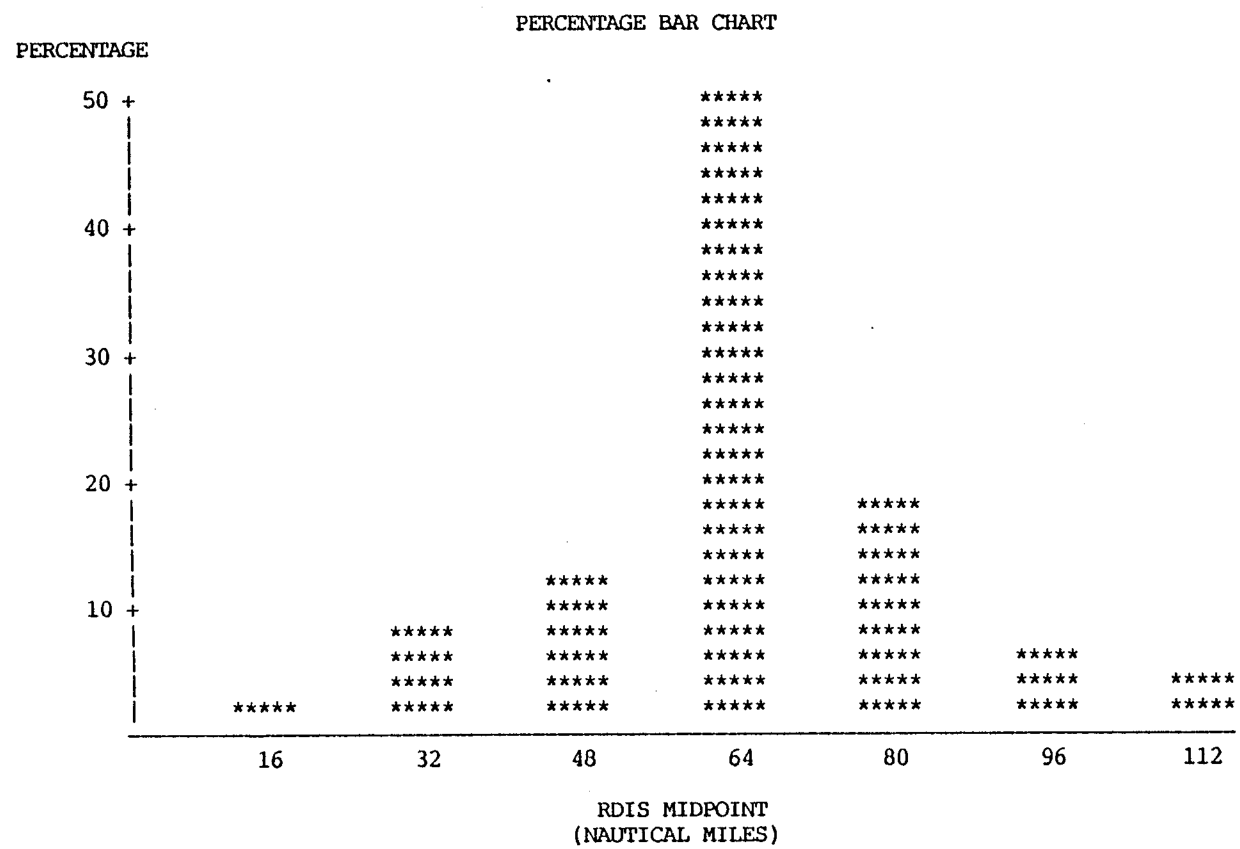


FIGURE A-57
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
DISTANCE FROM RADAR

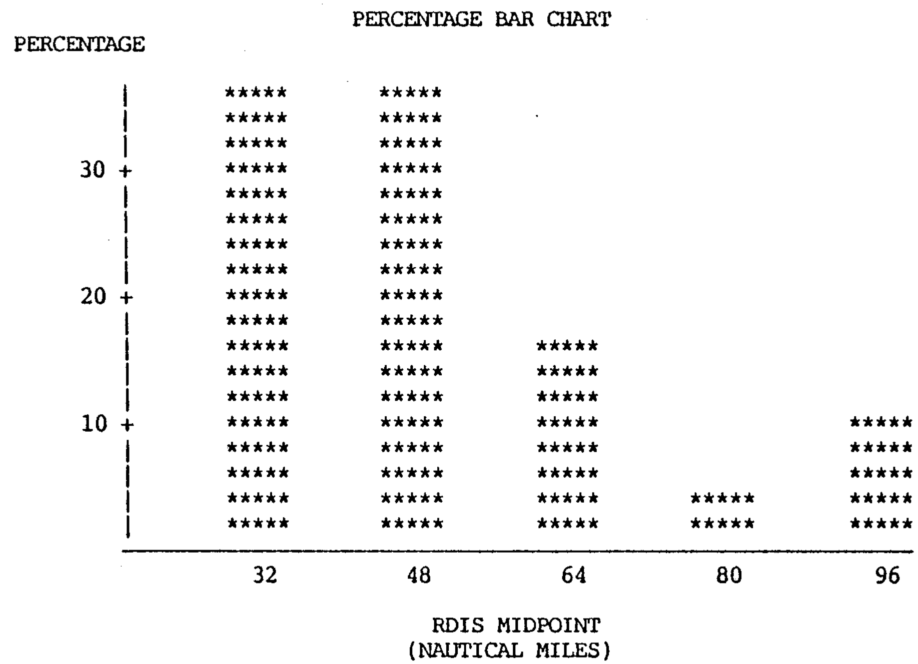


FIGURE A-58
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
DISTANCE FROM RADAR

PERCENTAGE BAR CHART

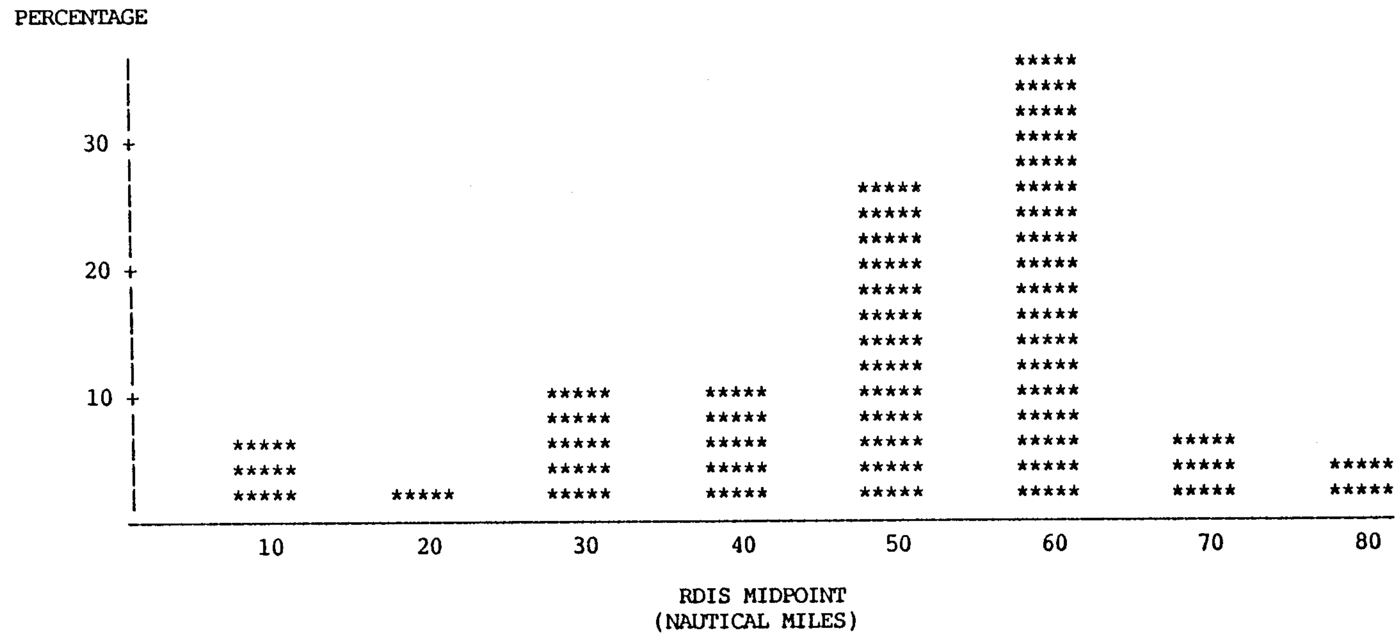


FIGURE A-59
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
DISTANCE FROM RADAR

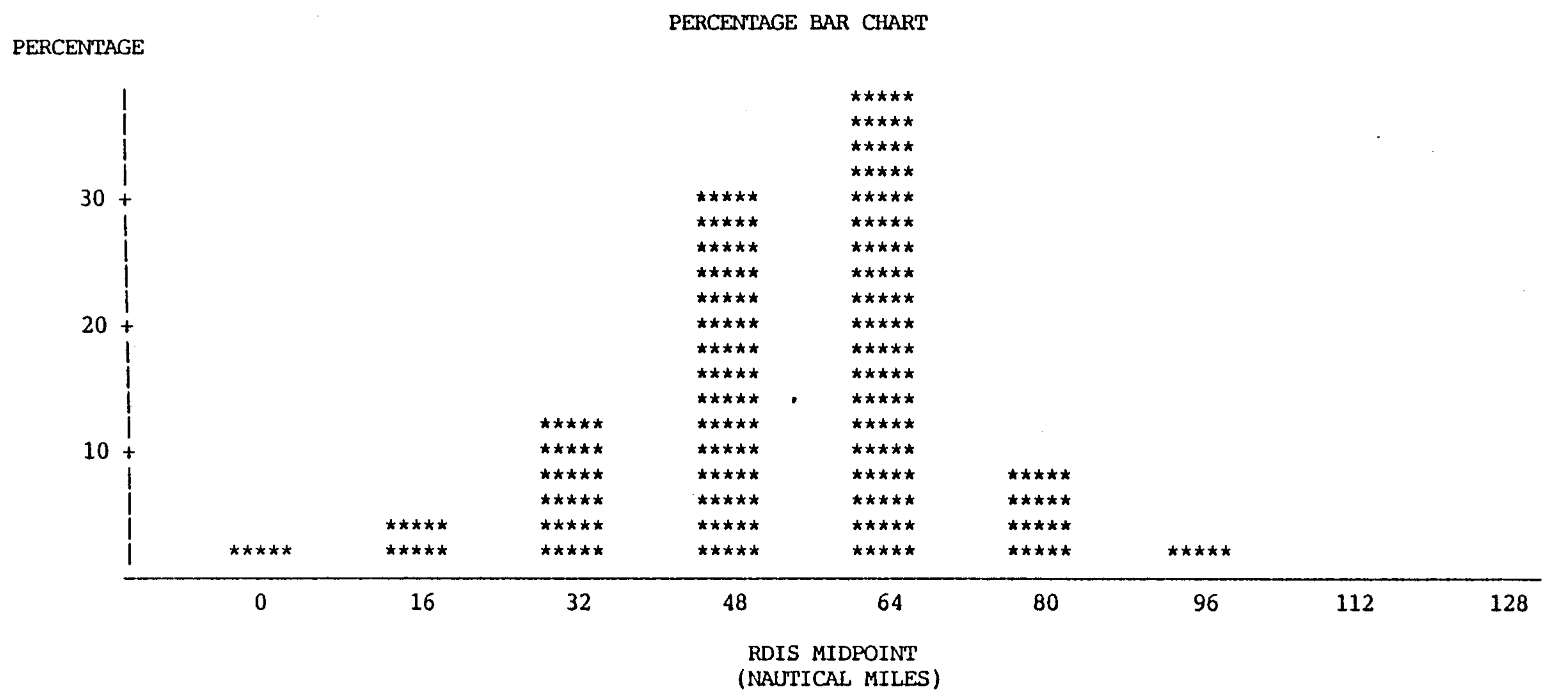


FIGURE A-60
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED DISTANCE FROM RADAR

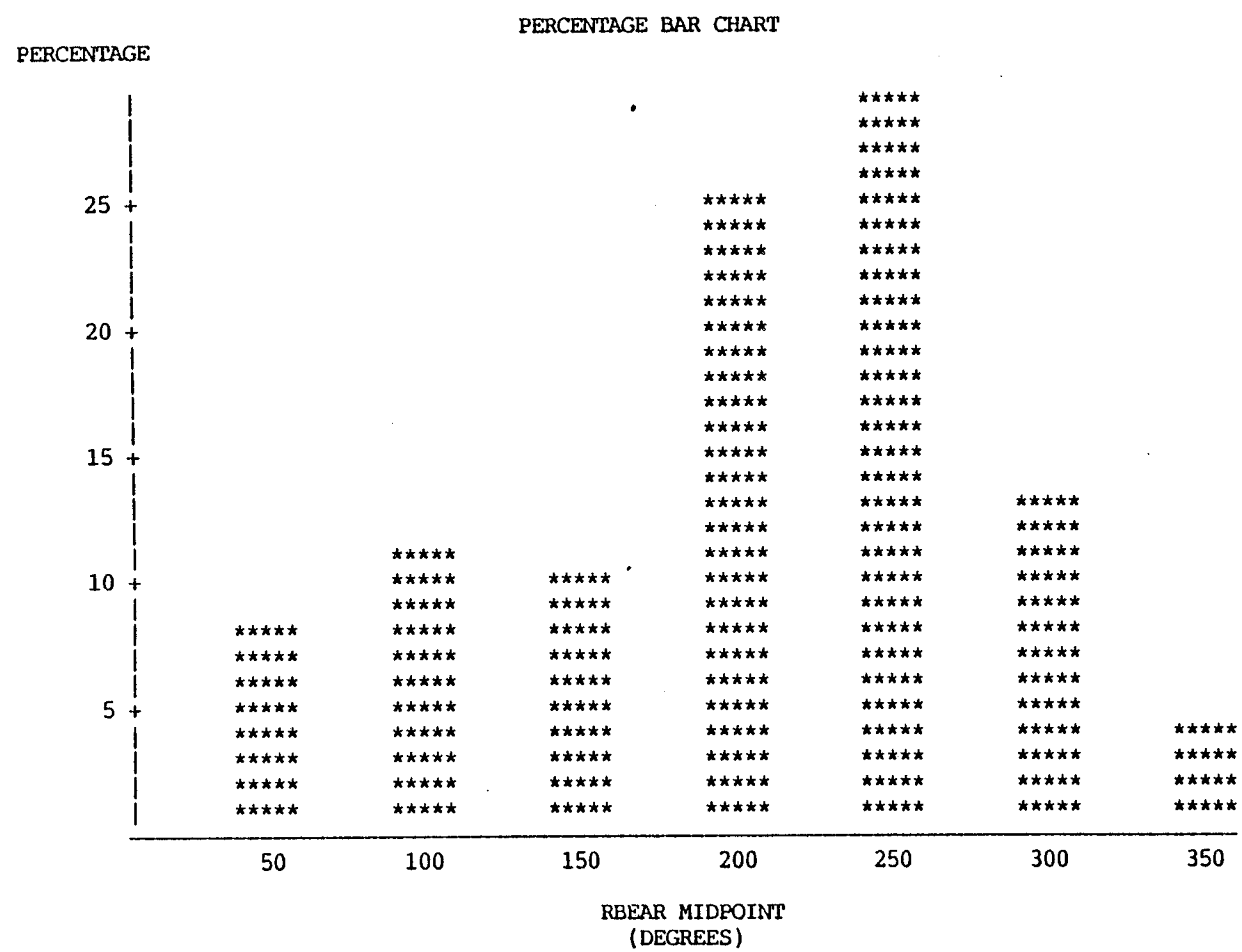


FIGURE A-61
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB BEARING FROM RADAR

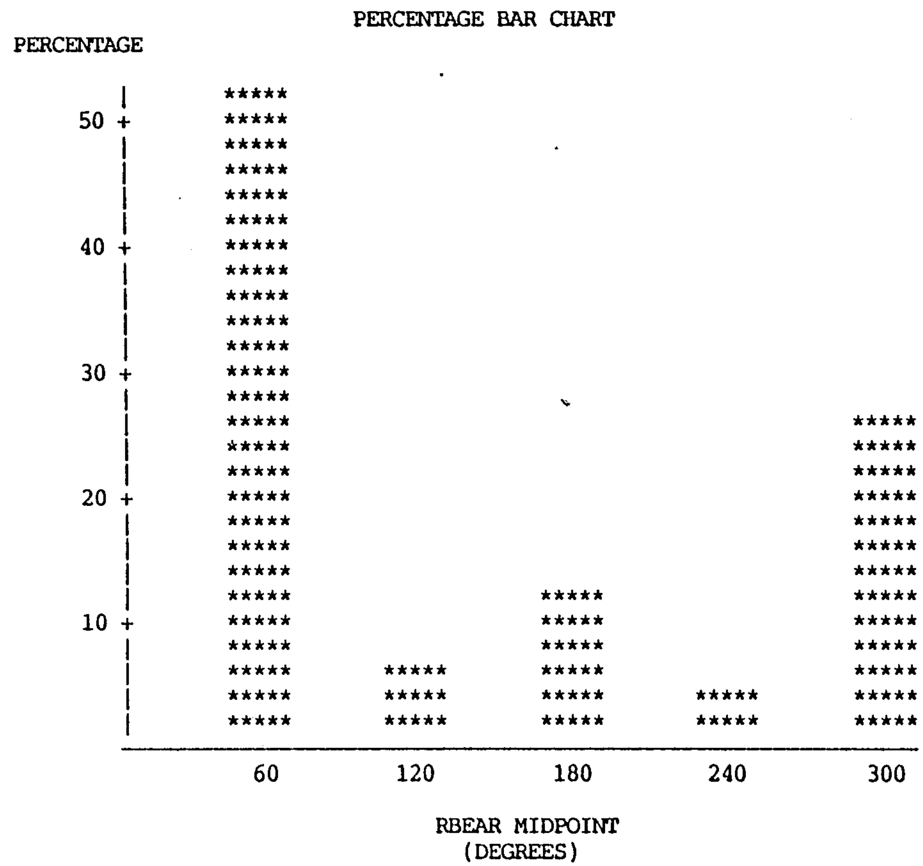


FIGURE A-62
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW BEARING FROM RADAR

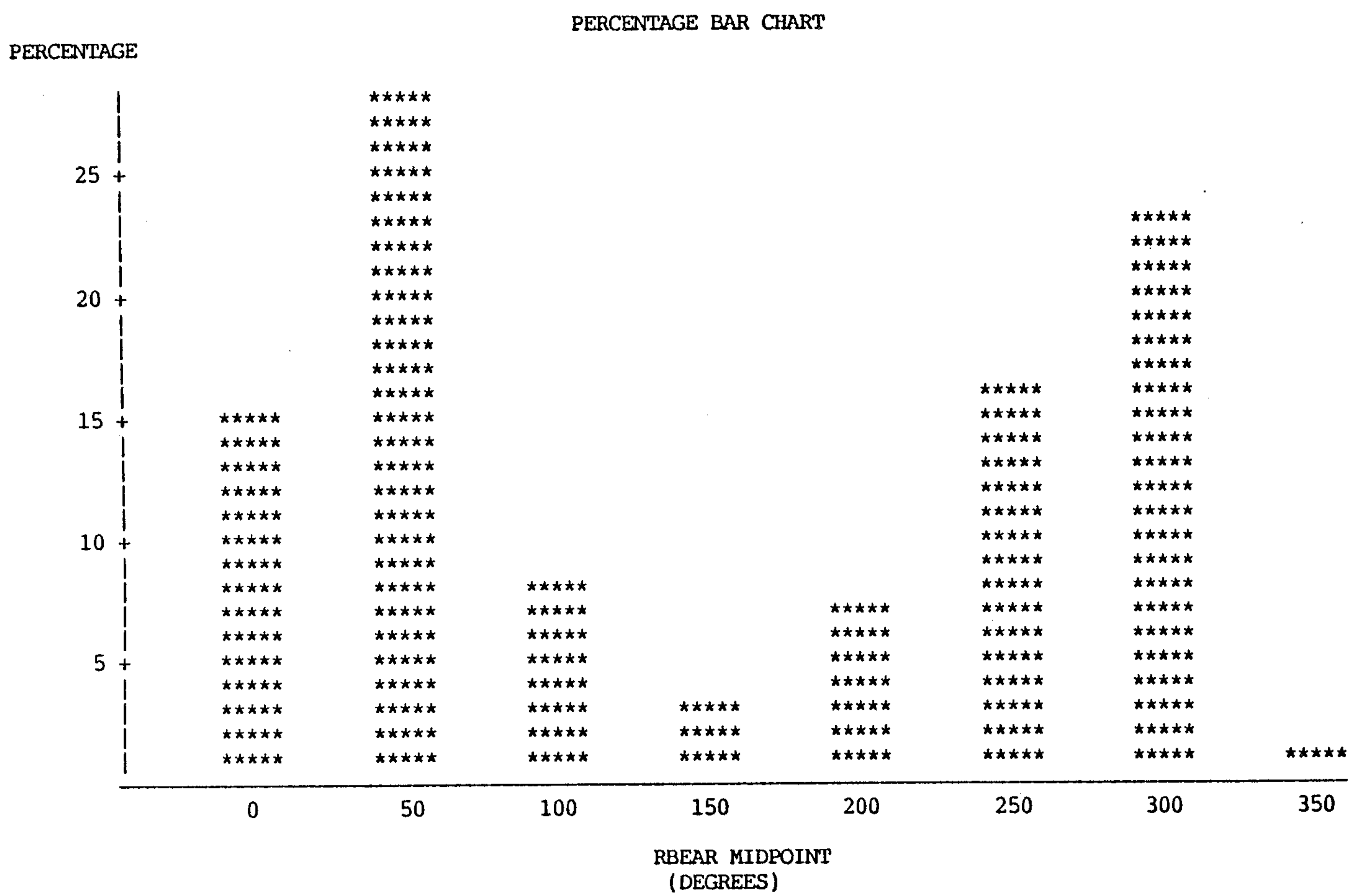


FIGURE A-63
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
BEARING FROM RADAR

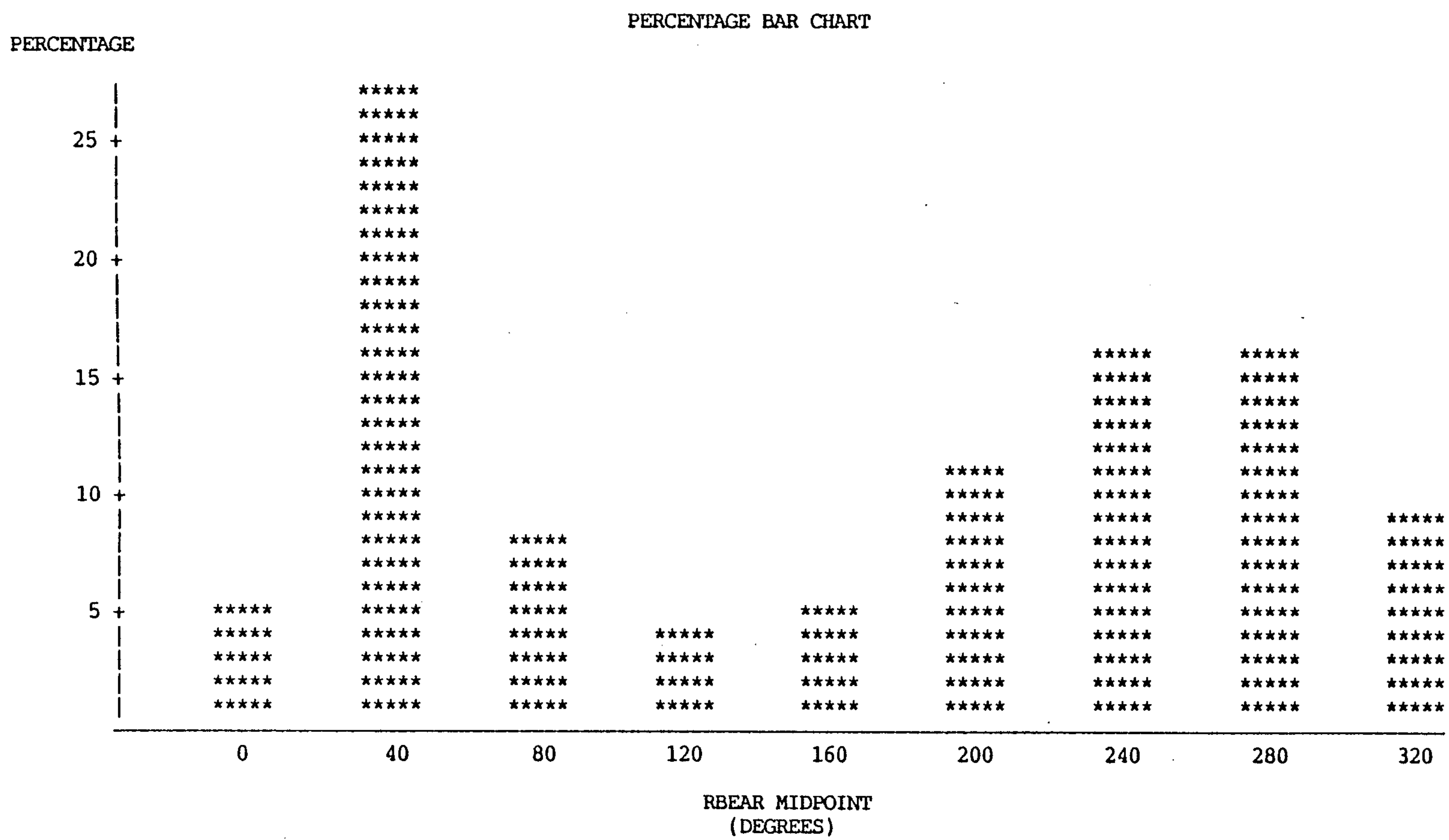


FIGURE A-64
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
BEARING FROM RADAR

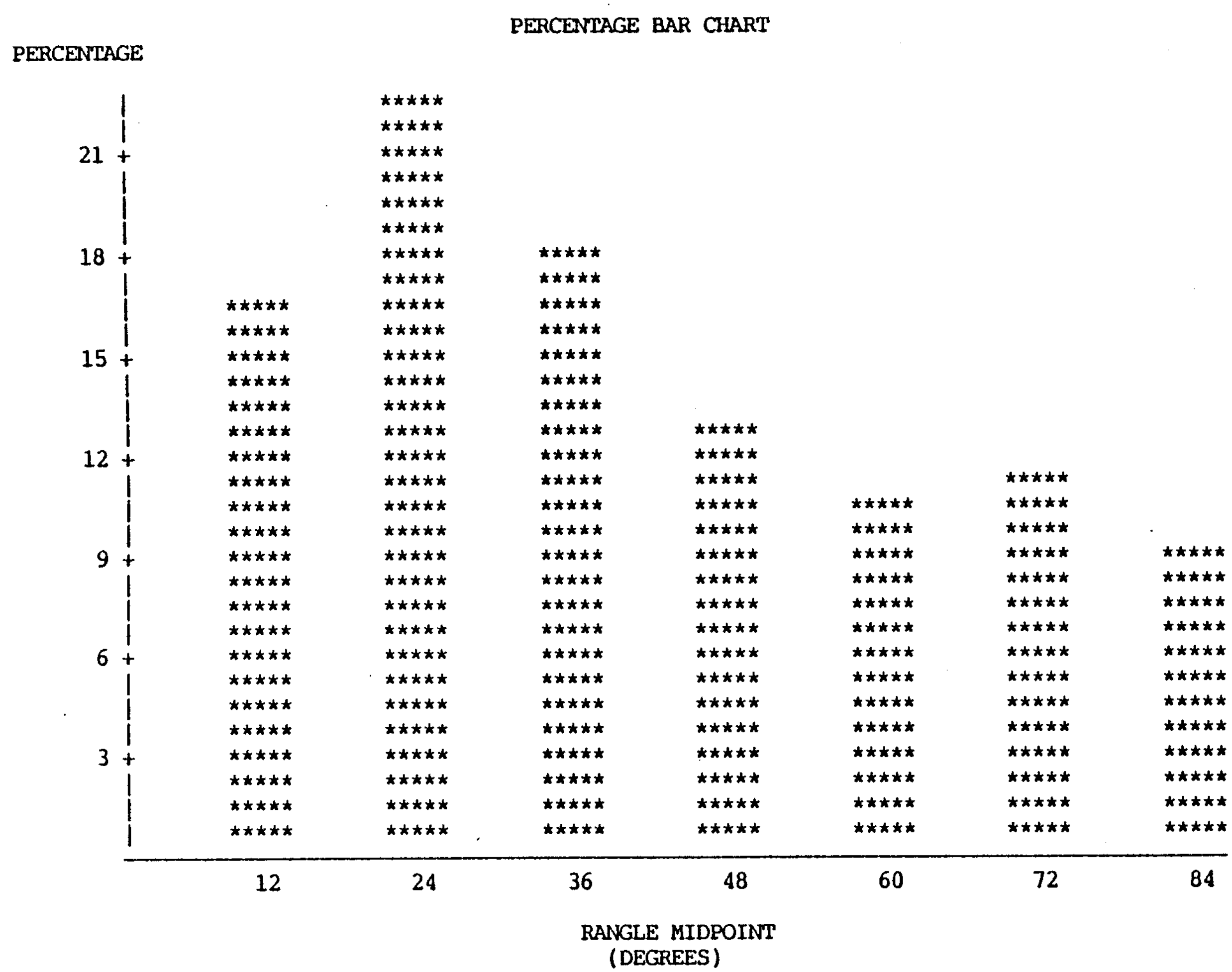


FIGURE A-65
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB ANGLE FROM RADIAL HEADING

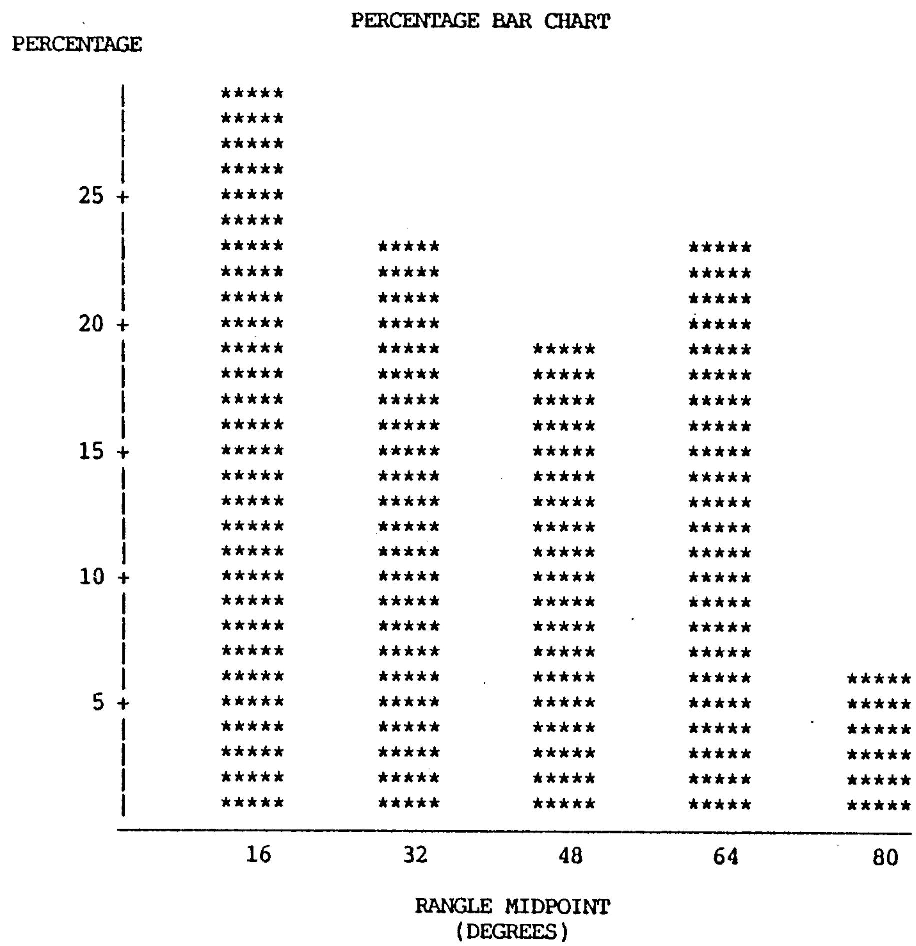


FIGURE A-66
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW ANGLE FROM RADIAL HEADING

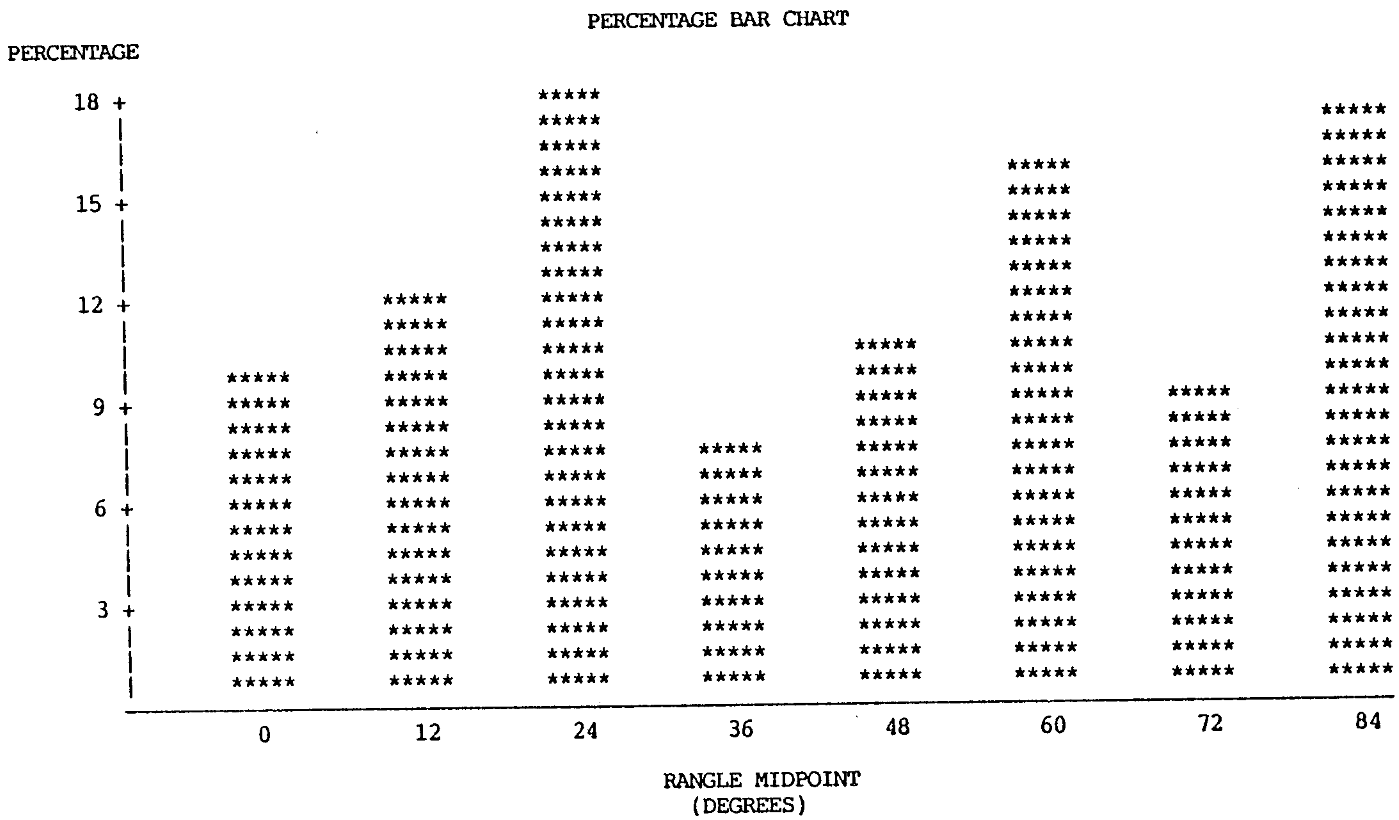


FIGURE A-67
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
ANGLE FROM RADIAL HEADING

PERCENTAGE BAR CHART

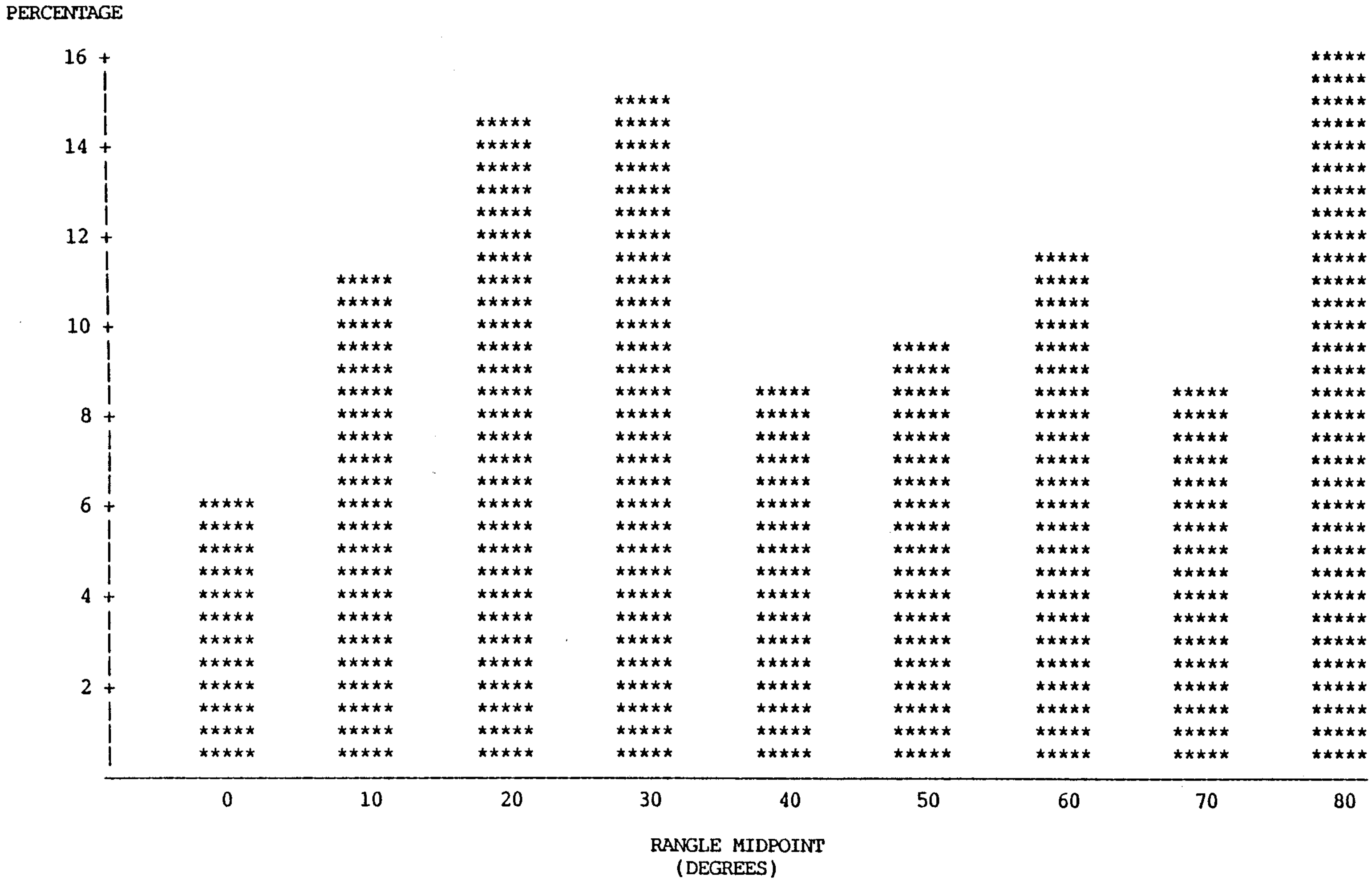


FIGURE A-68
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED ANGLE FROM RADIAL HEADING

PERCENTAGE BAR CHART

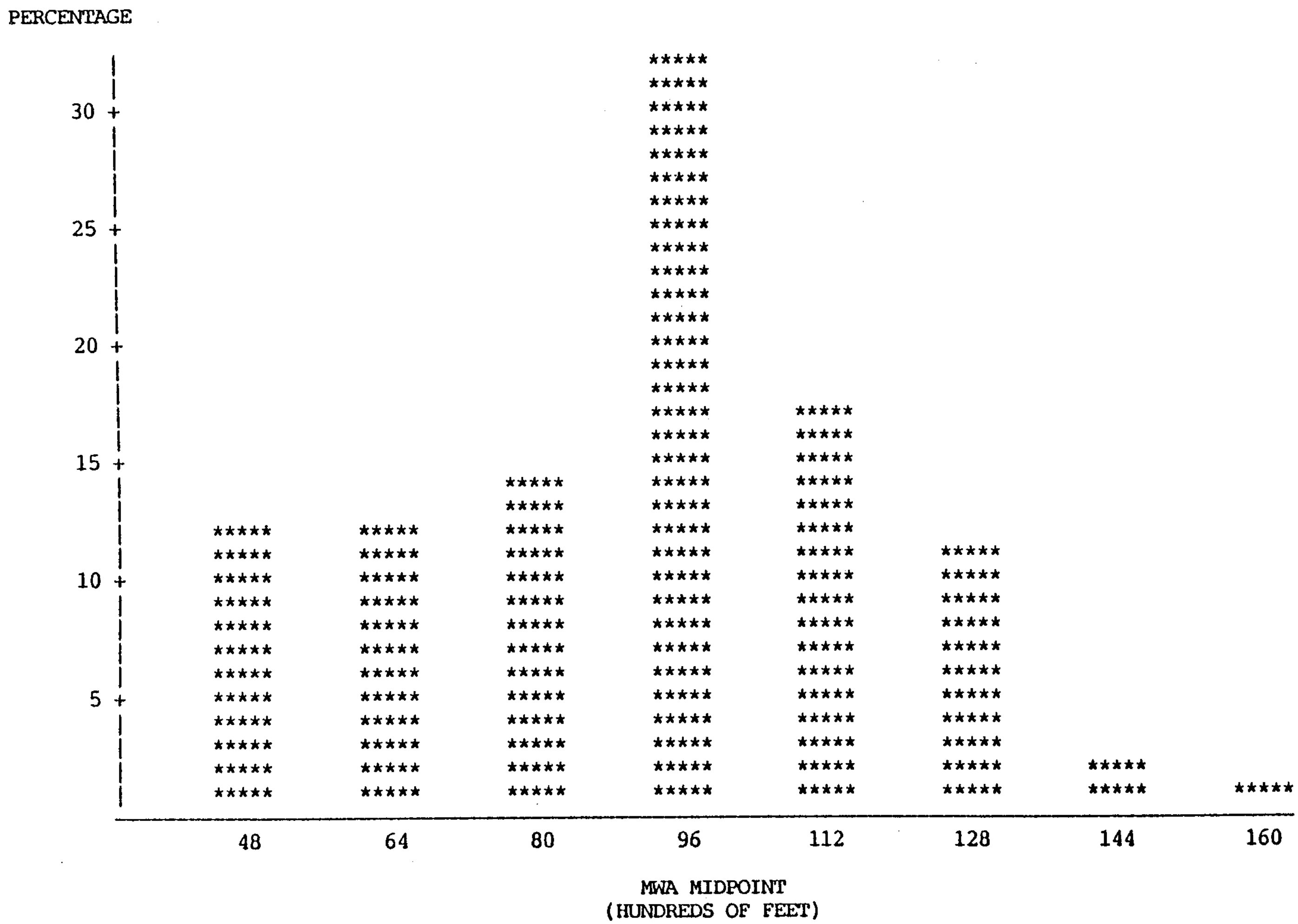


FIGURE A-69
EMSAW ENVIRONMENTAL CHARACTERISTICS FOR ZAB MINIMUM WARNING ALTITUDE (ENTIRE CENTER)

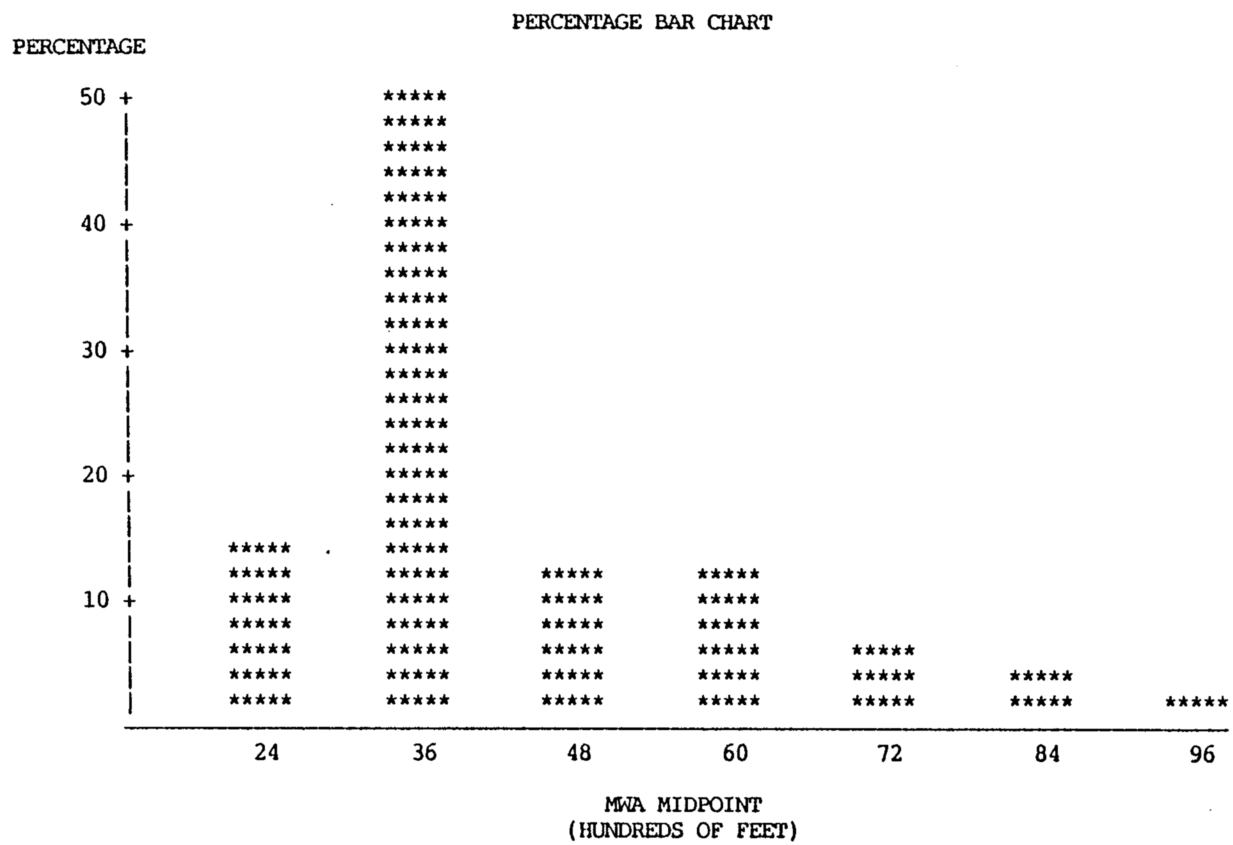


FIGURE A-70
EMSAW ENVIRONMENTAL CHARACTERISTICS FOR ZFW
MINIMUM WARNING ALTITUDE (ENTIRE CENTER)

PERCENTAGE BAR CHART

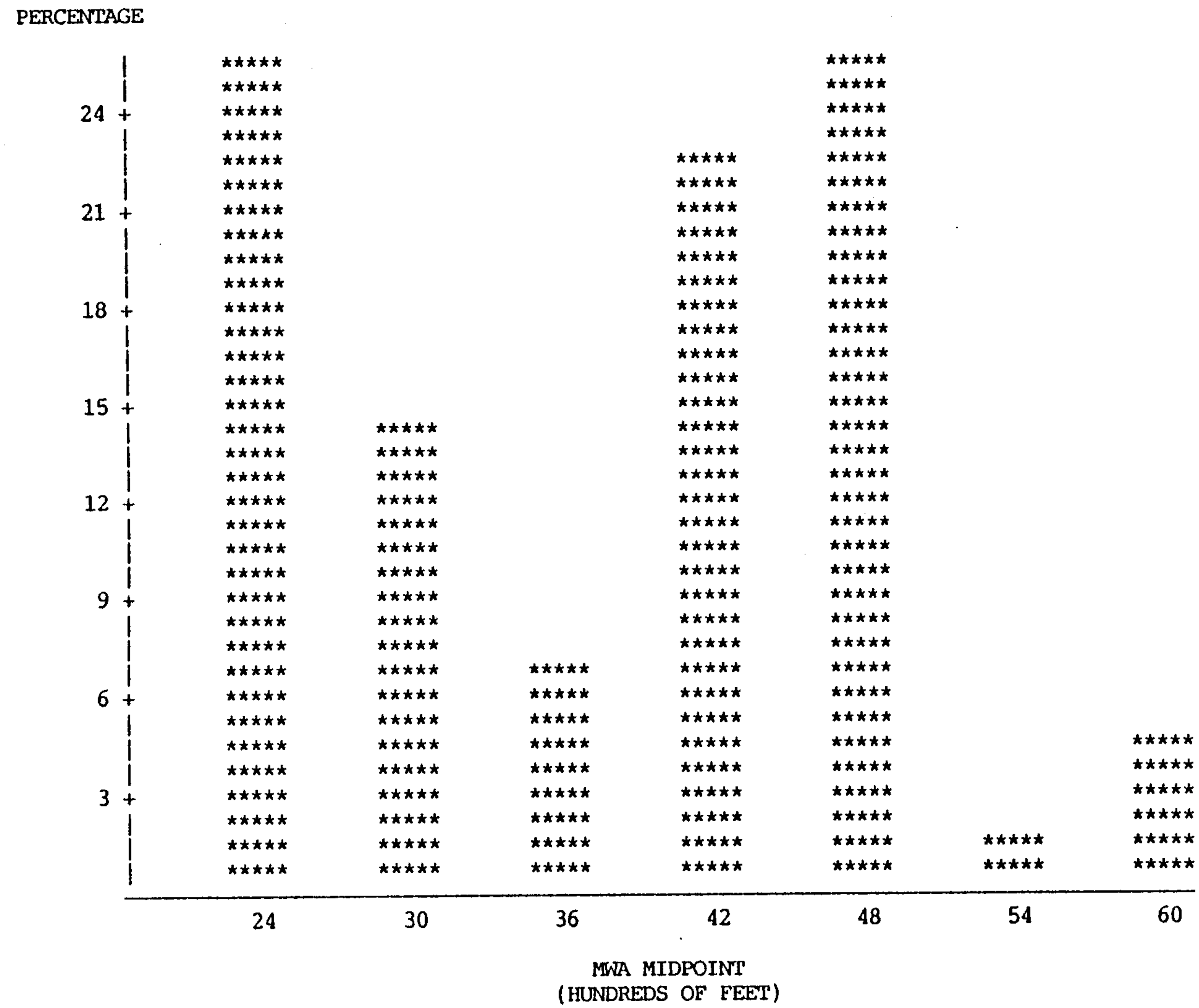


FIGURE A-71
EMSAW ENVIRONMENTAL CHARACTERISTICS FOR ZNY MINIMUM WARNING ALTITUDE (ENTIRE CENTER)

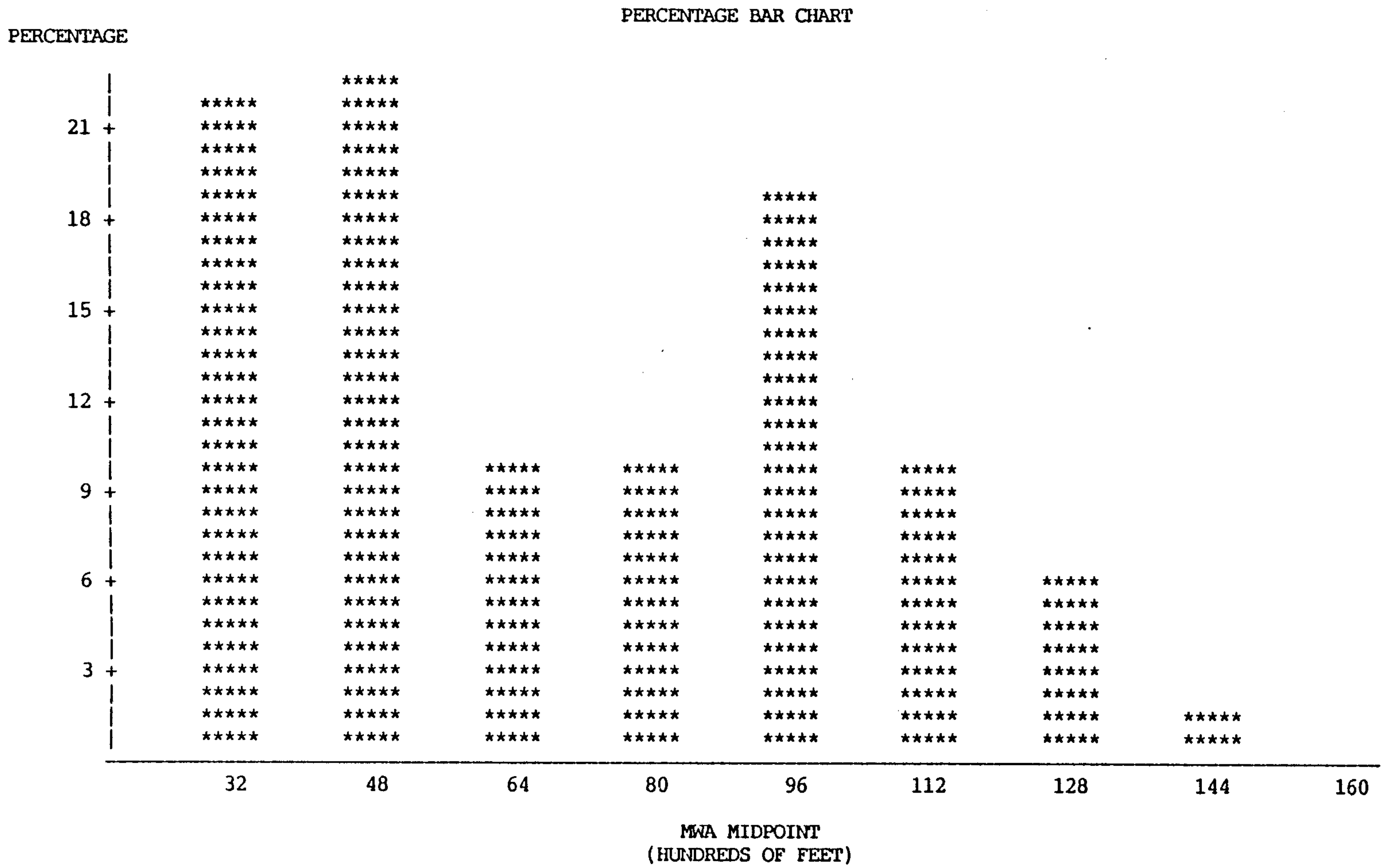


FIGURE A-72
EMSAW ENVIRONMENTAL CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
MINIMUM WARNING ALTITUDE (ENTIRE CENTER)

PERCENTAGE BAR CHART

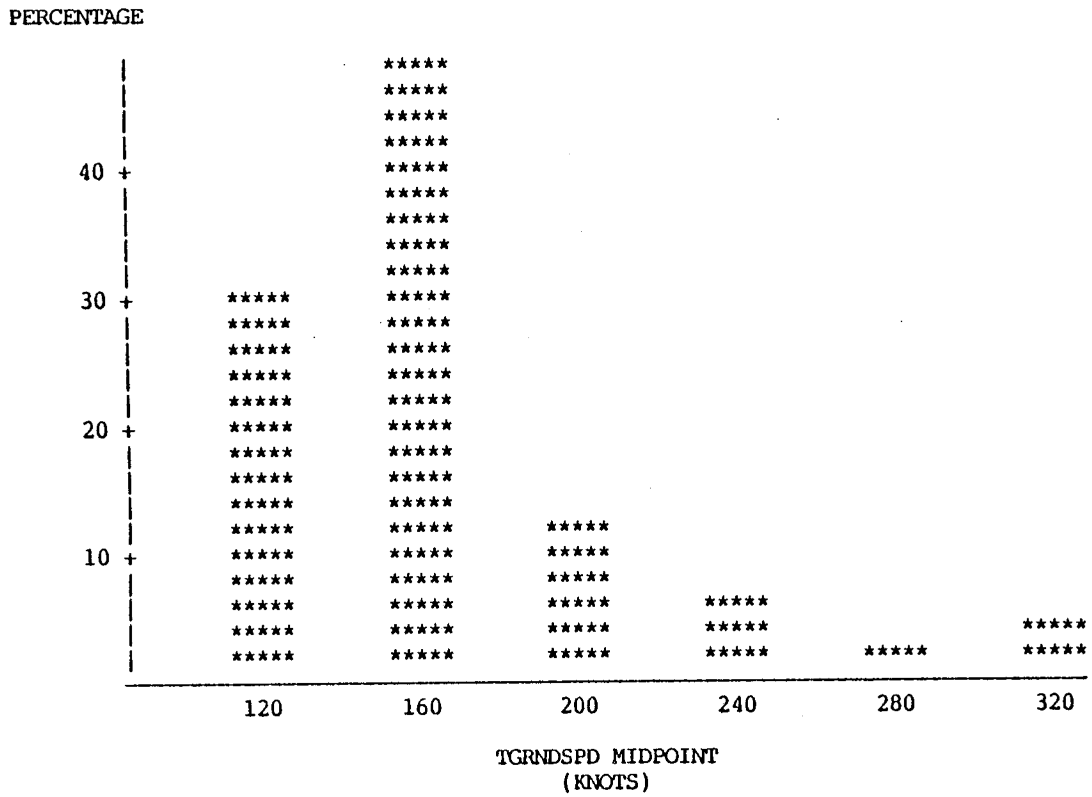


FIGURE A-73
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU GROUND SPEED

PERCENTAGE BAR CHART

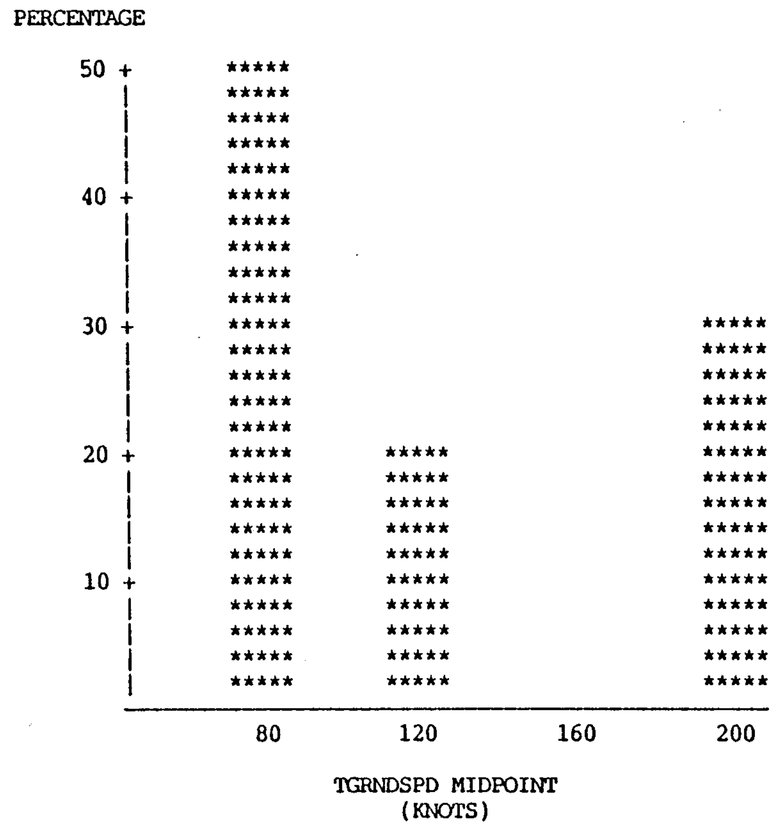


FIGURE A-74
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR LA GROUND SPEED

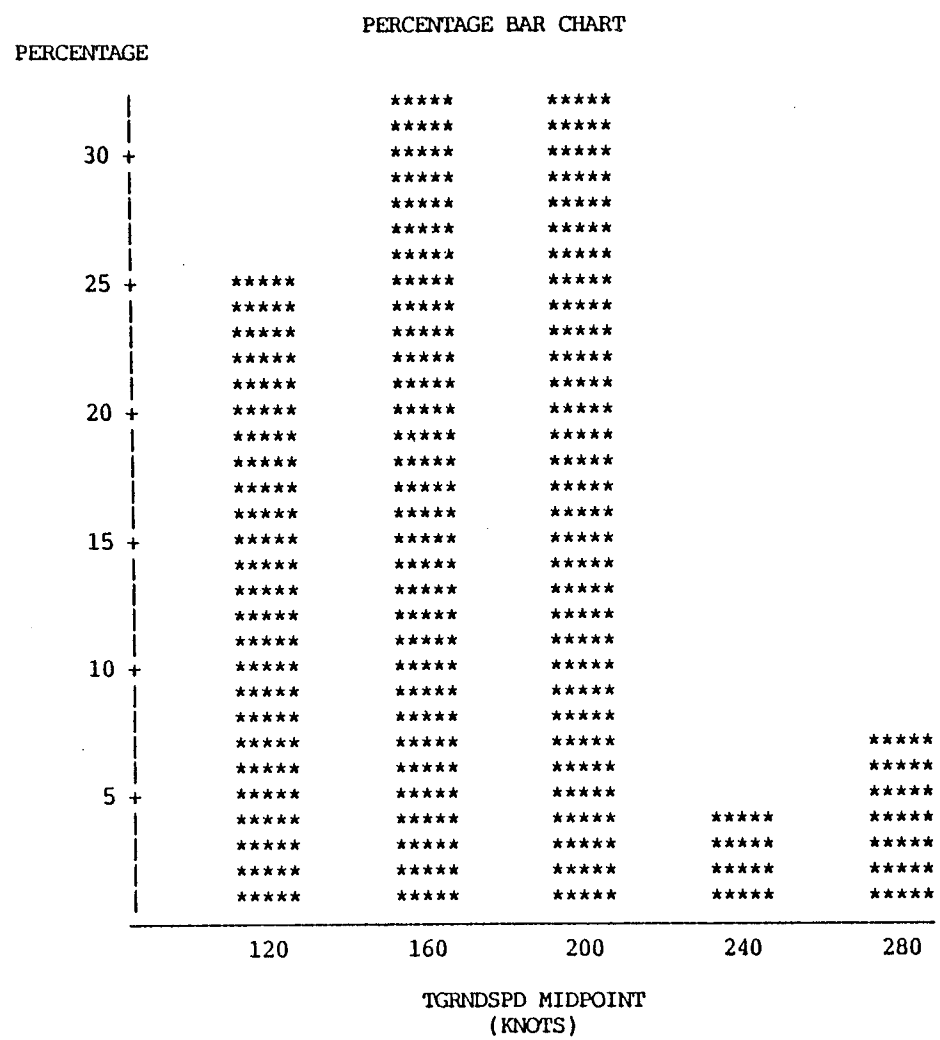


FIGURE A-75
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR NY GROUND SPEED

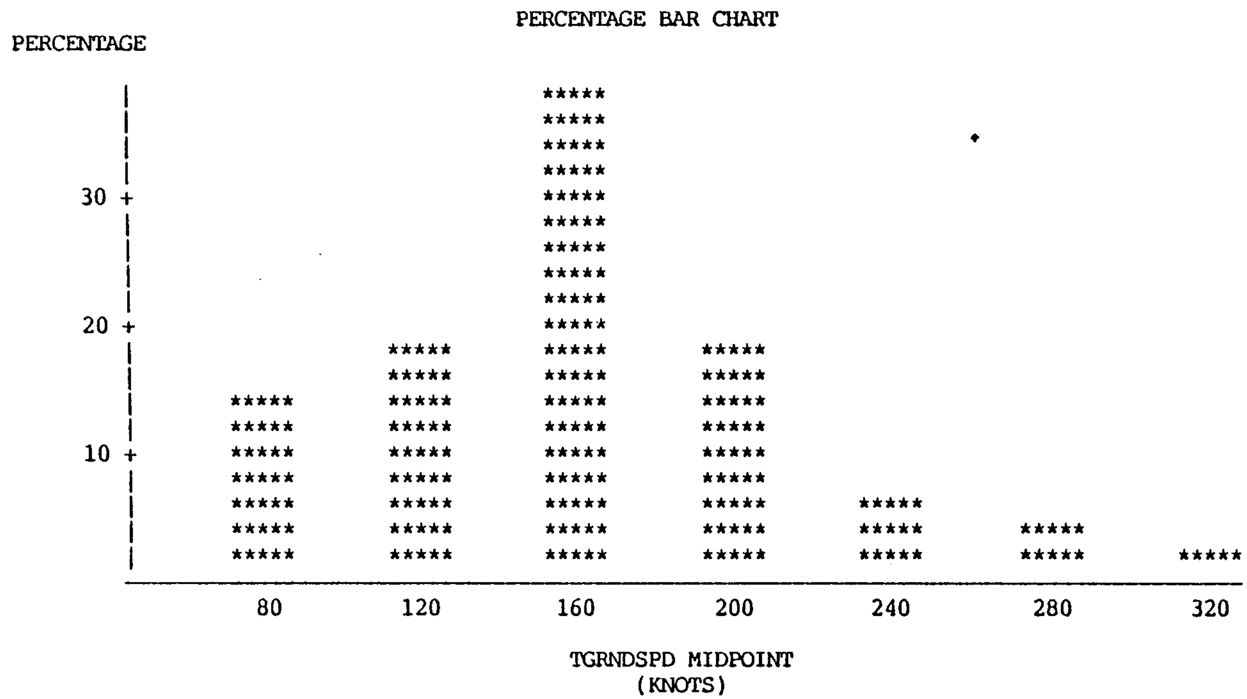


FIGURE A-76
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU, LA, AND NY COMBINED GROUND SPEED

PERCENTAGE BAR CHART

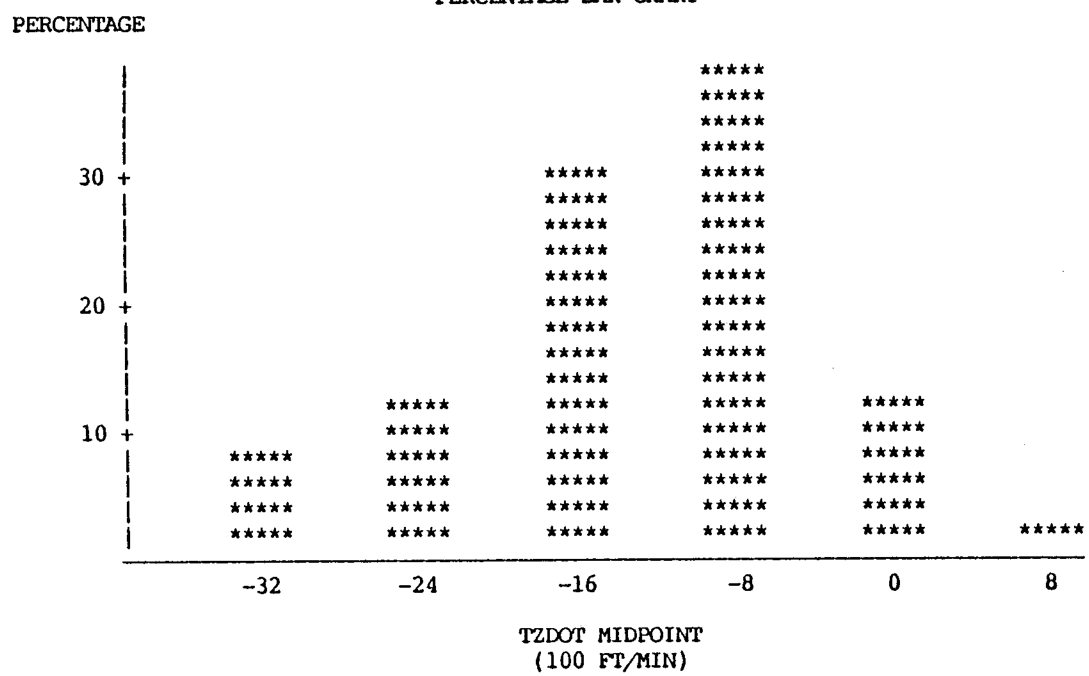


FIGURE A-77
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU
ALTITUDE CHANGE RATE

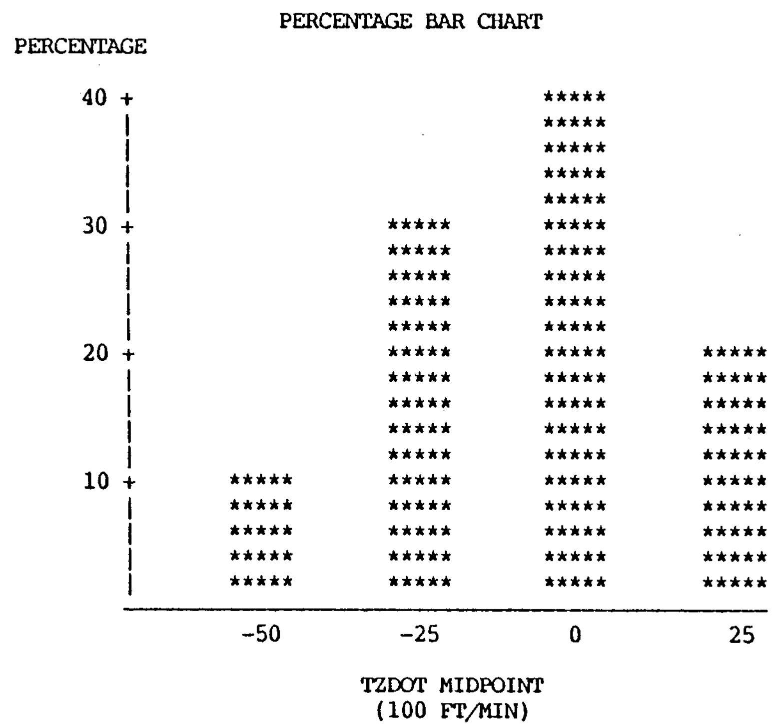


FIGURE A-78
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR LA ALTITUDE CHANGE RATE

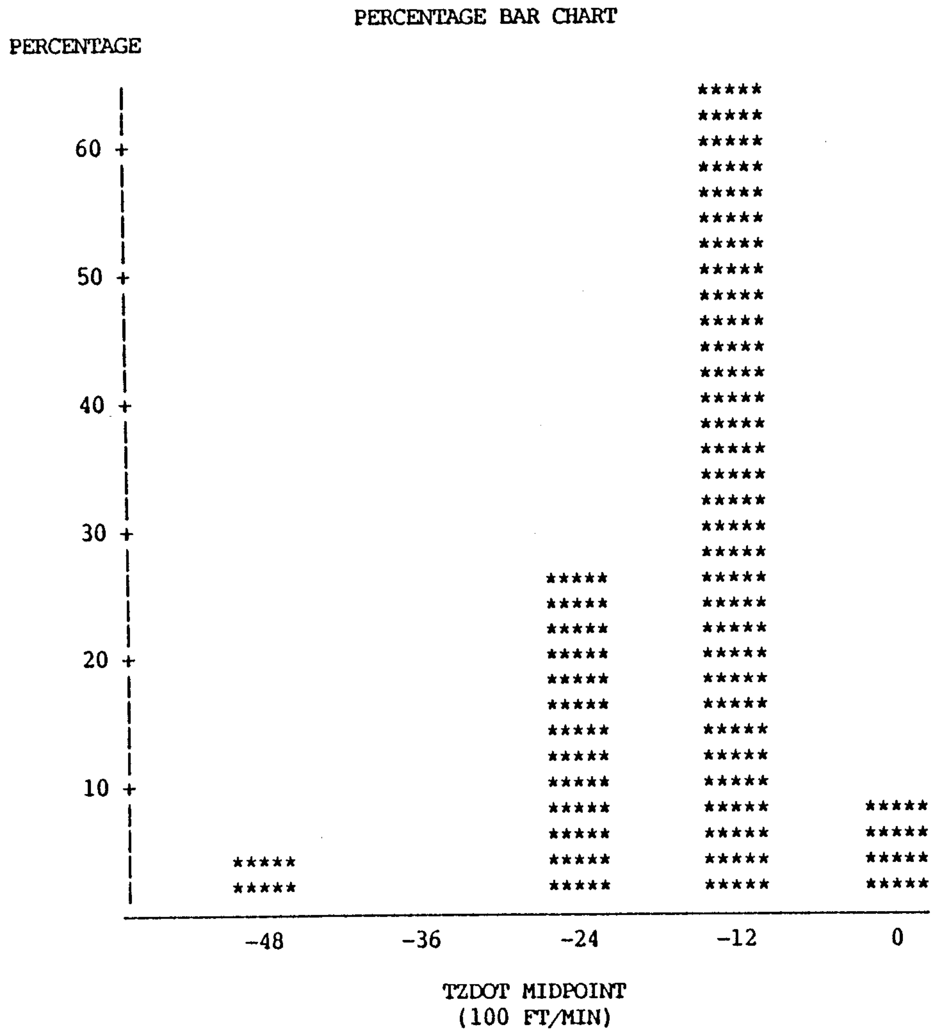


FIGURE A-79
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR NY
ALTITUDE CHANGE RATE

PERCENTAGE BAR CHART

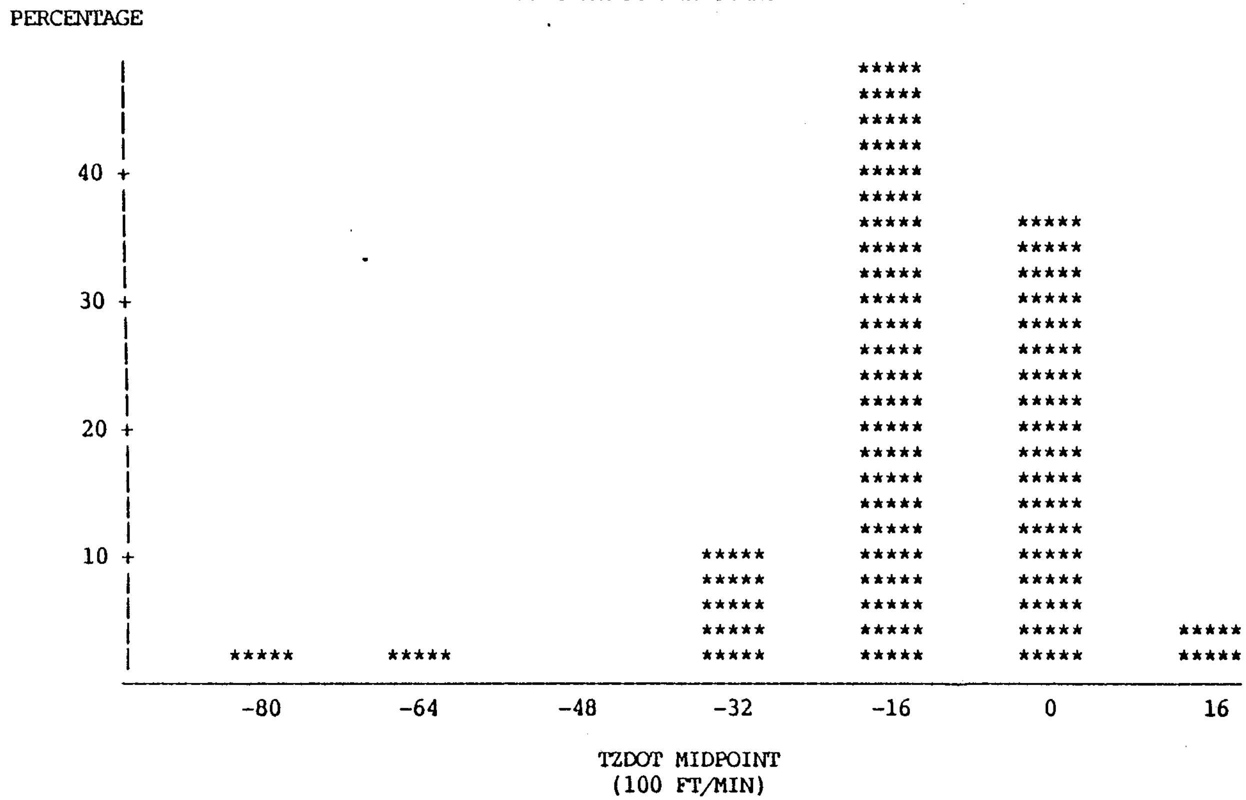


FIGURE A-80
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU, LA, AND NY COMBINED
ALTITUDE CHANGE RATE

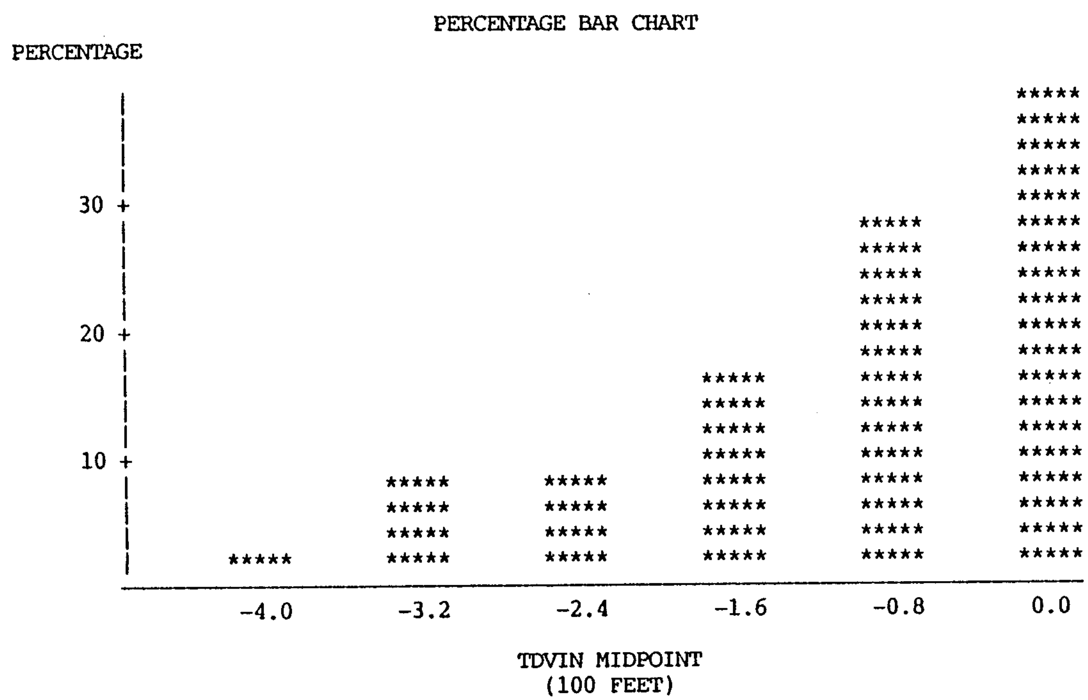


FIGURE A-81
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU
DISTANCE TO VERTICAL ENTRY

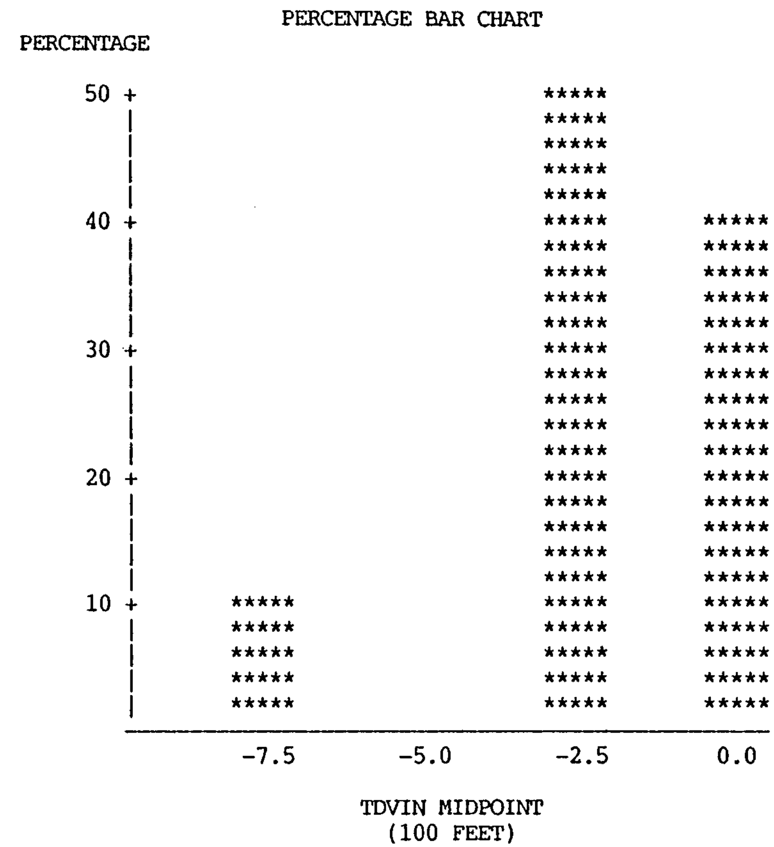


FIGURE A-82
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR LA
DISTANCE TO VERTICAL ENTRY

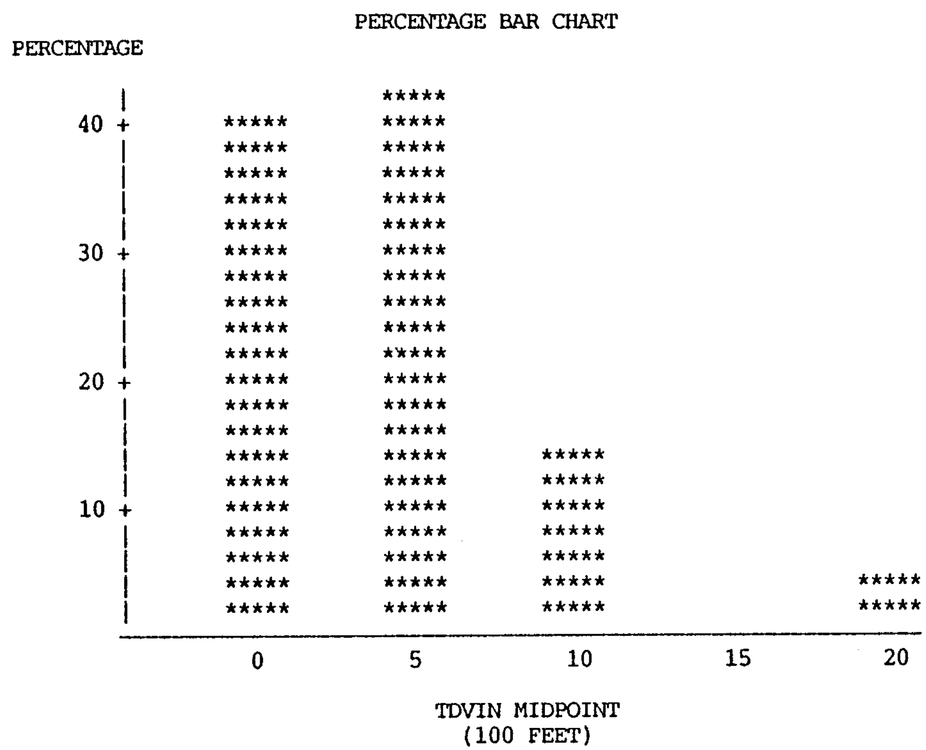


FIGURE A-83
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR NY DISTANCE TO VERTICAL ENTRY

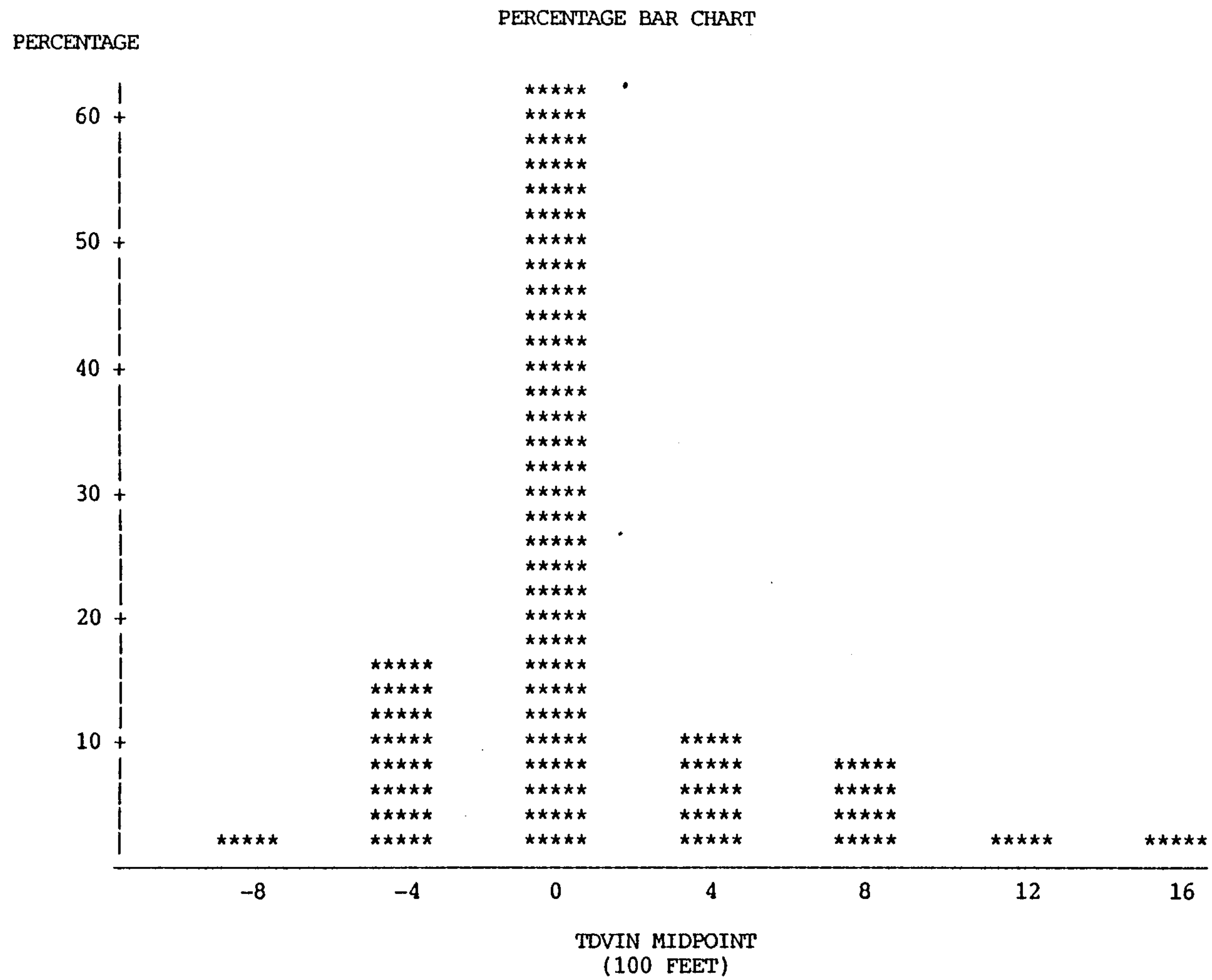


FIGURE A-84
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU, LA, AND NY COMBINED
DISTANCE TO VERTICAL ENTRY

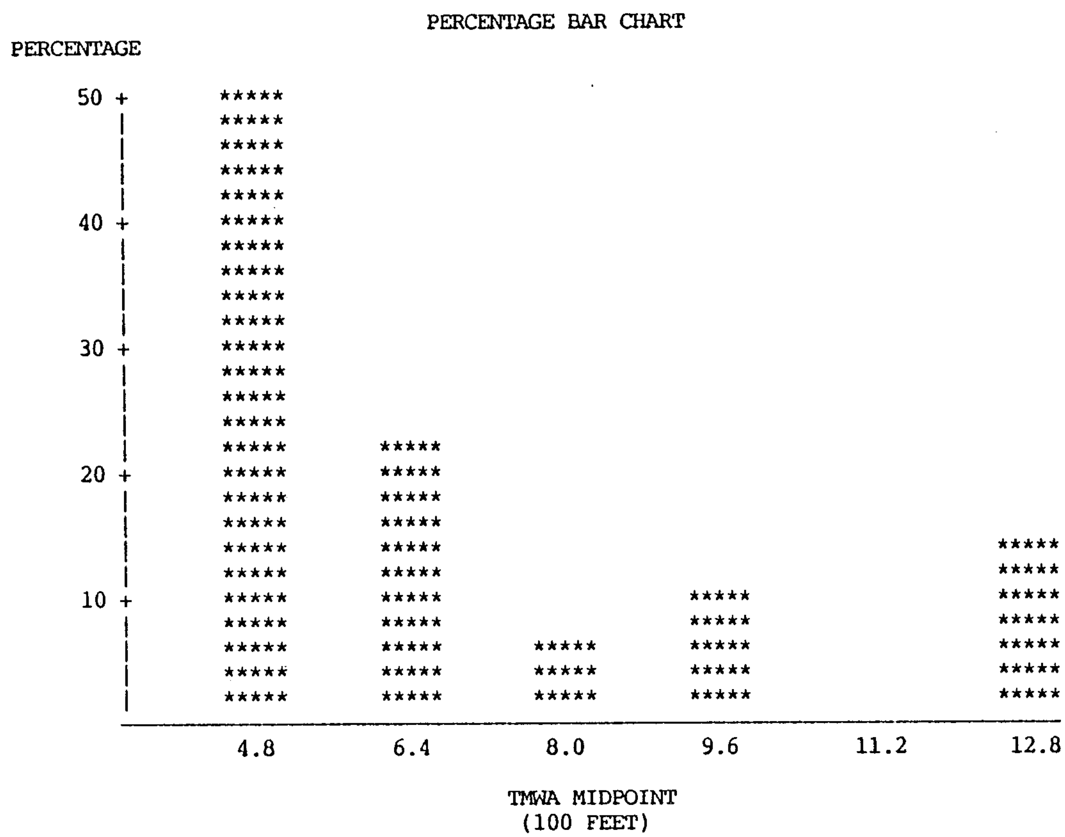


FIGURE A-85
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU MINIMUM WARNING ALTITUDE

```
                 PERCENTAGE BAR CHART
PERCENTAGE

    40 +         *****
       |         *****
       |         *****
       |         *****
       |         *****
    30 +         *****                                  *****
       |         *****                                  *****
       |         *****                                  *****
       |         *****                                  *****
       |         *****                                  *****
    20 +         *****                       *****      *****
       |         *****                       *****      *****
       |         *****                       *****      *****
       |         *****                       *****      *****
       |         *****                       *****      *****
    10 +         *****          *****        *****      *****
       |         *****          *****        *****      *****
       |         *****          *****        *****      *****
       |         *****          *****        *****      *****
       |         *****          *****        *****      *****
       ---------------------------------------------------------
                   6              12           18         24

                             TMWA MIDPOINT
                              (100 FEET)
```

FIGURE A-86
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR LA MINIMUM WARNING ALTITUDE

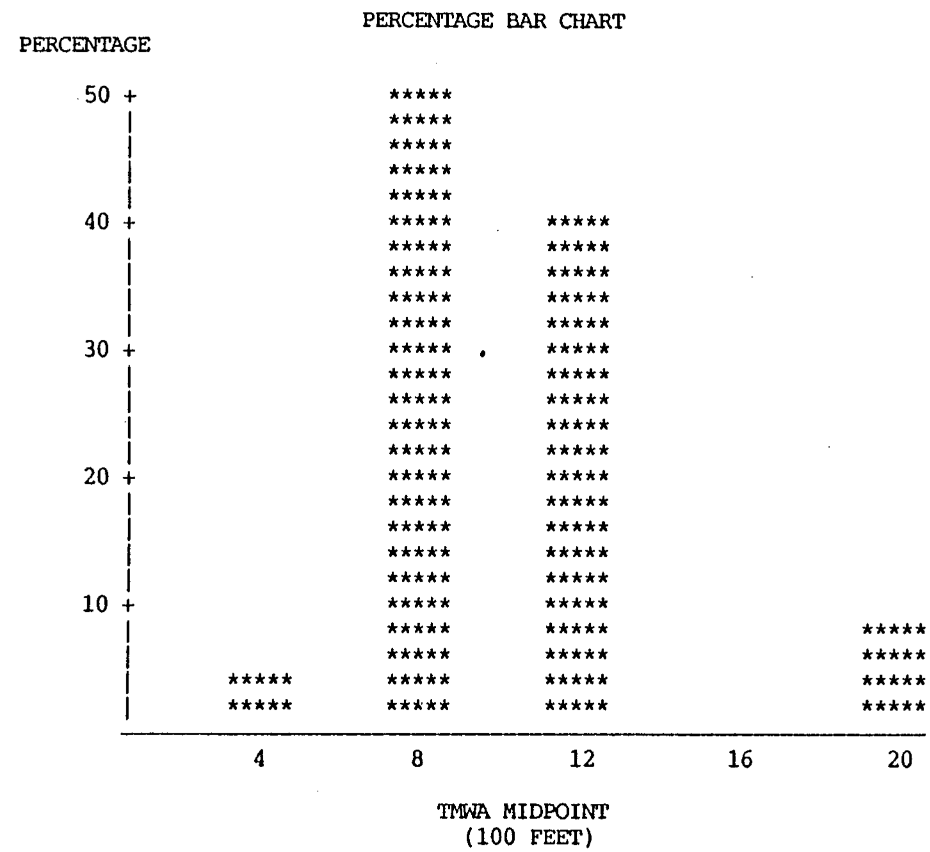


FIGURE A-87
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR NY MINIMUM WARNING ALTITUDE

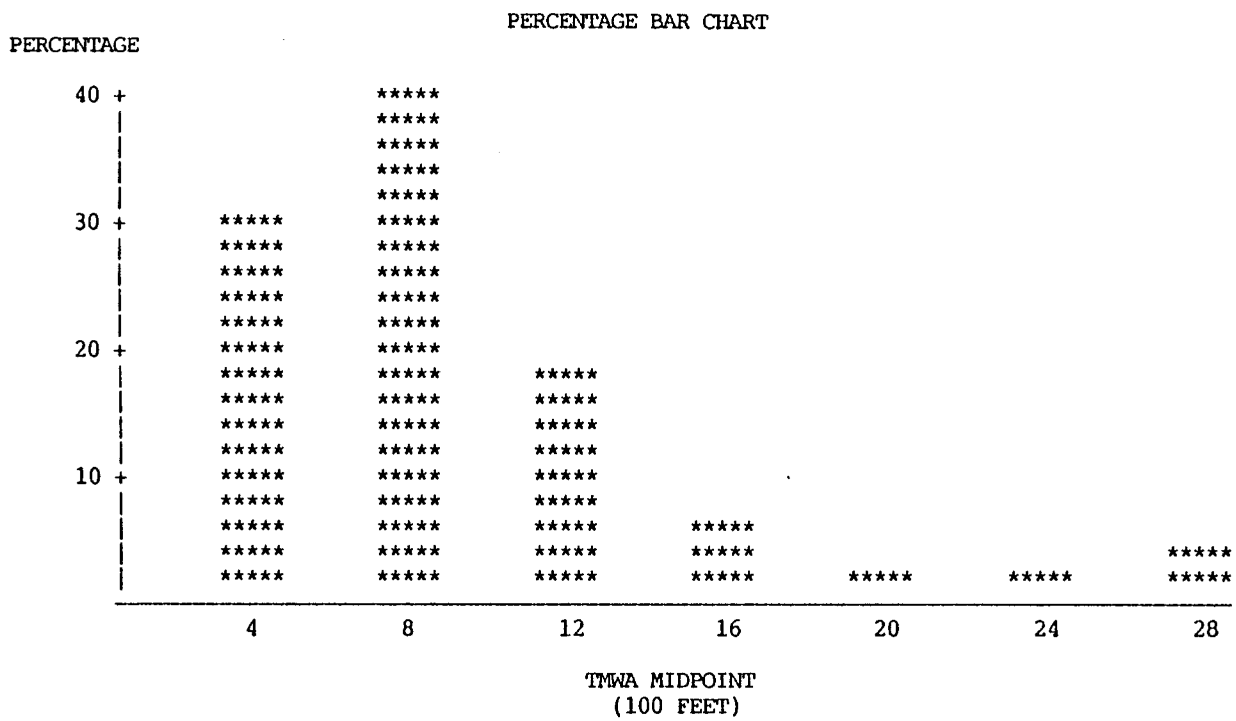


FIGURE A-88
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU, LA, AND NY COMBINED
MINIMUM WARNING ALTITUDE

PERCENTAGE BAR CHART

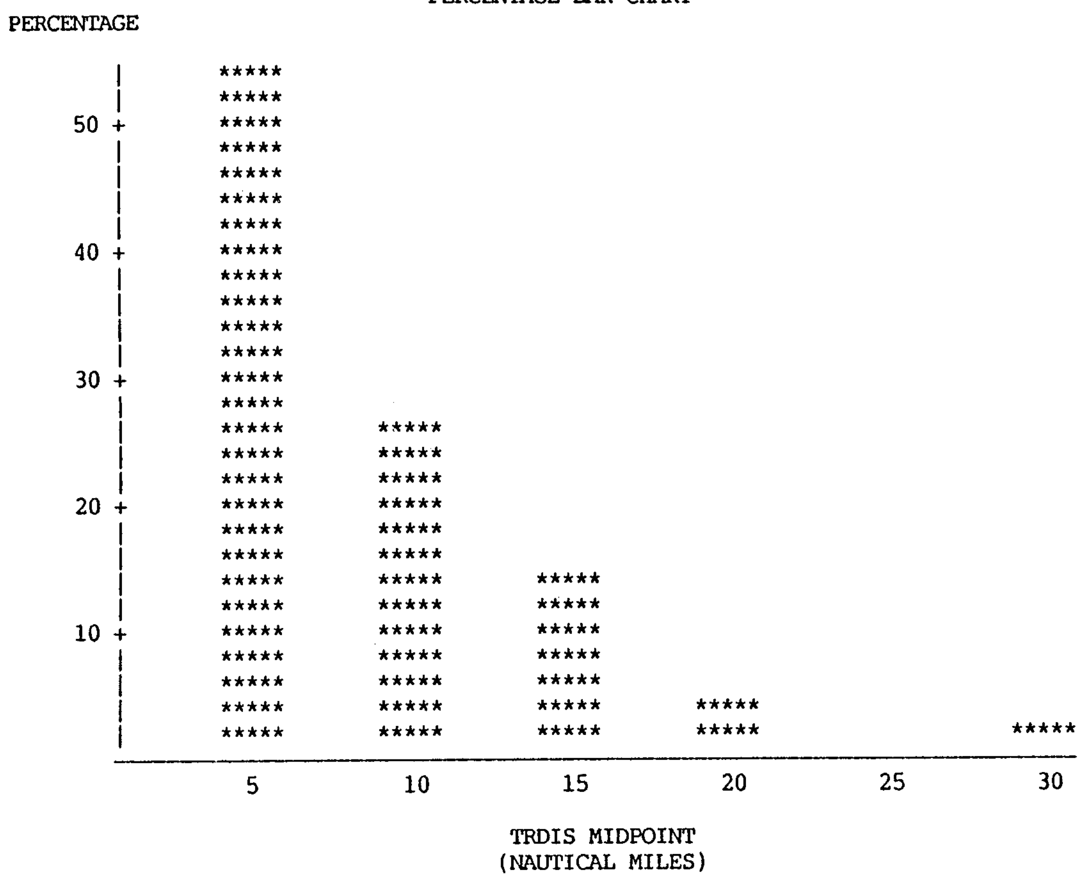


FIGURE A-89
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU
DISTANCE FROM RADAR

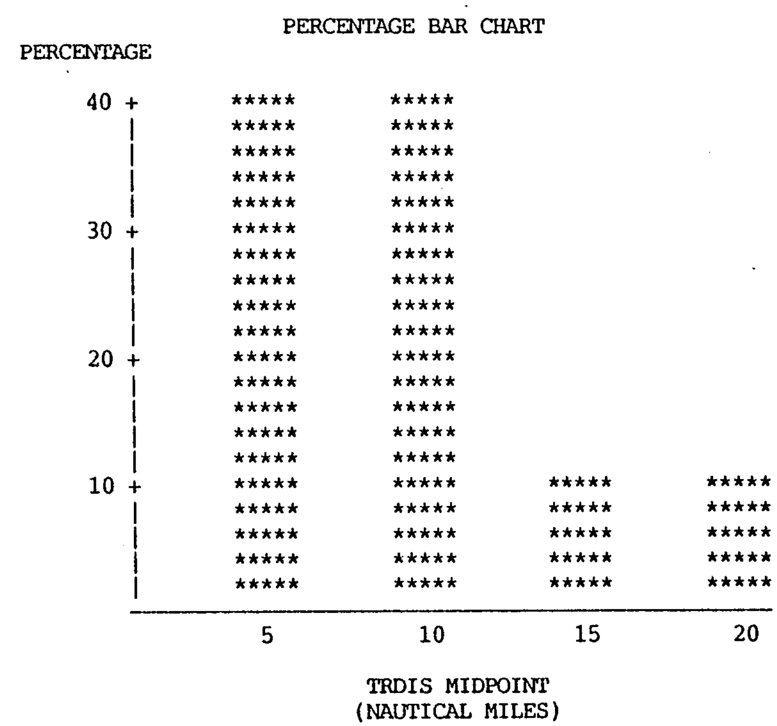


FIGURE A-90
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR LA DISTANCE FROM RADAR

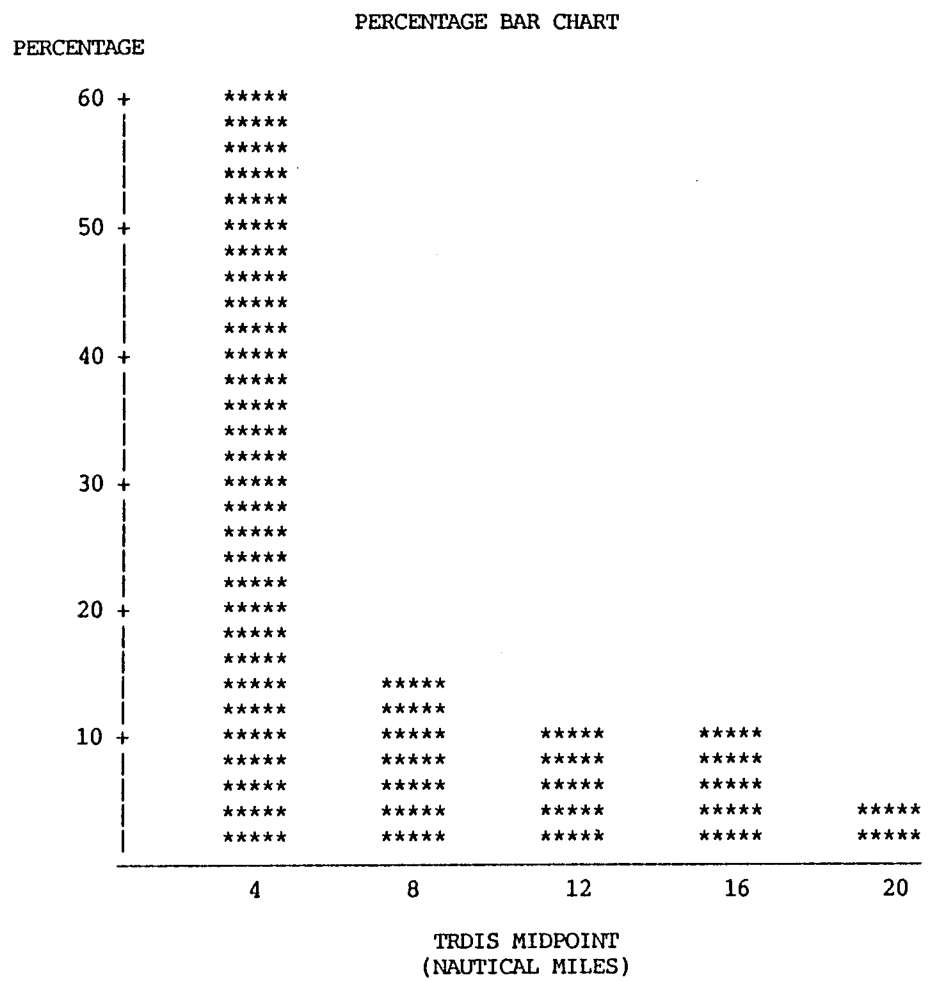


FIGURE A-91
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR NY
DISTANCE FROM RADAR

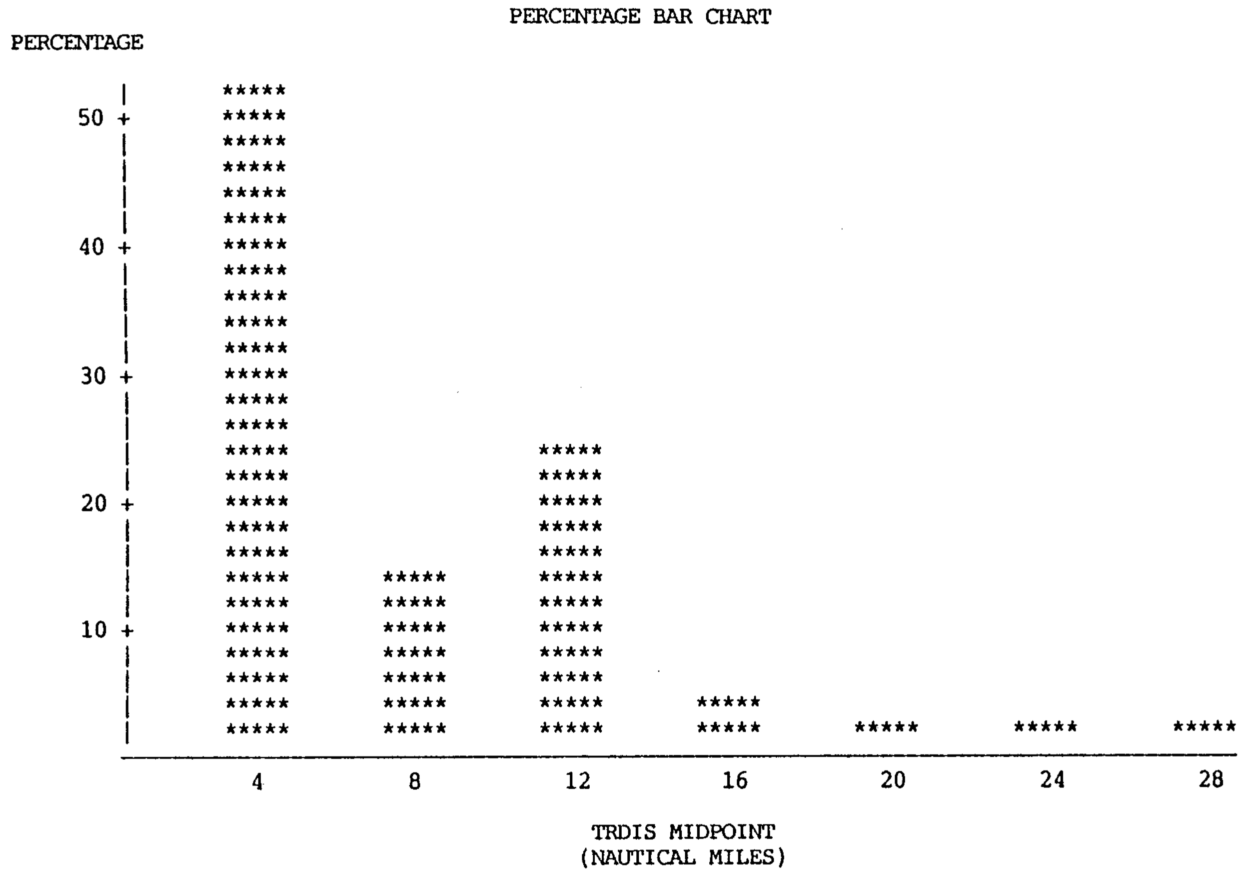


FIGURE A-92
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU, LA, AND NY COMBINED DISTANCE FROM RADAR

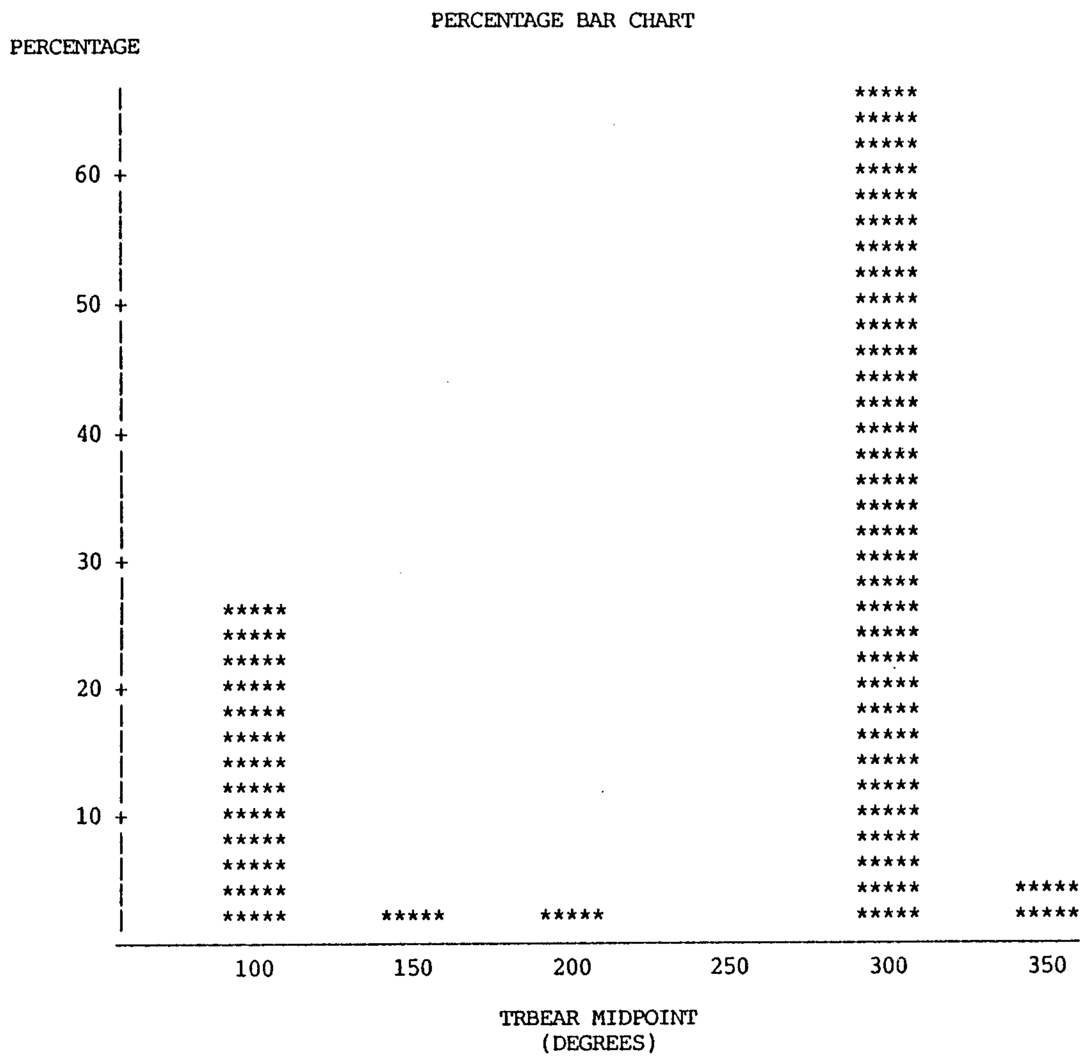


FIGURE A-93
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU BEARING FROM RADAR

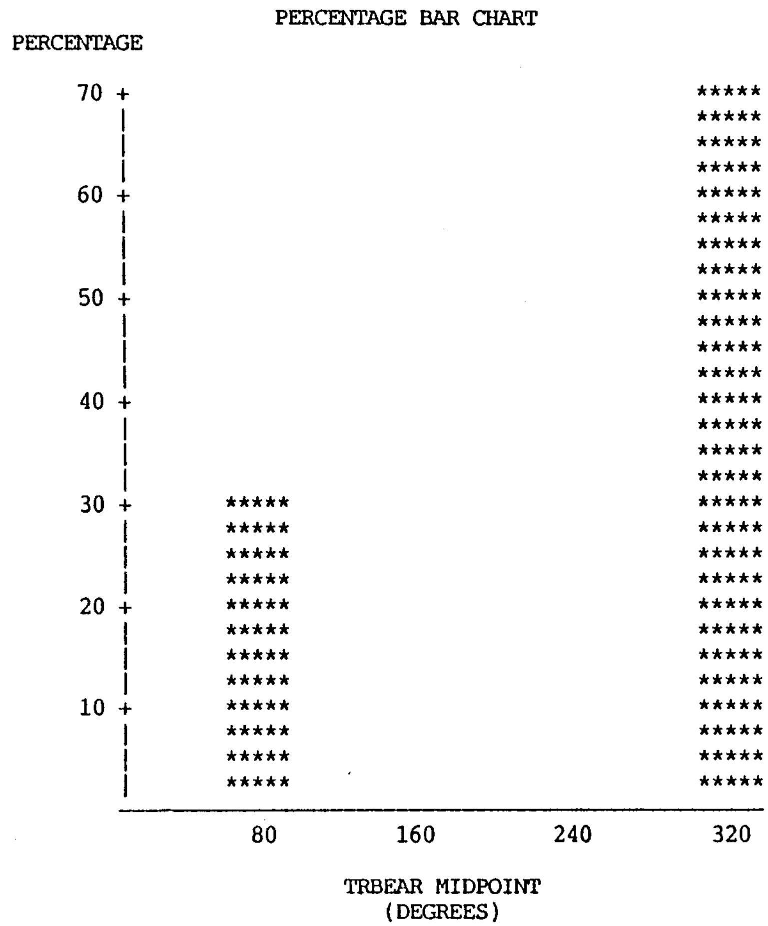


FIGURE A-94
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR LA BEARING FROM RADAR

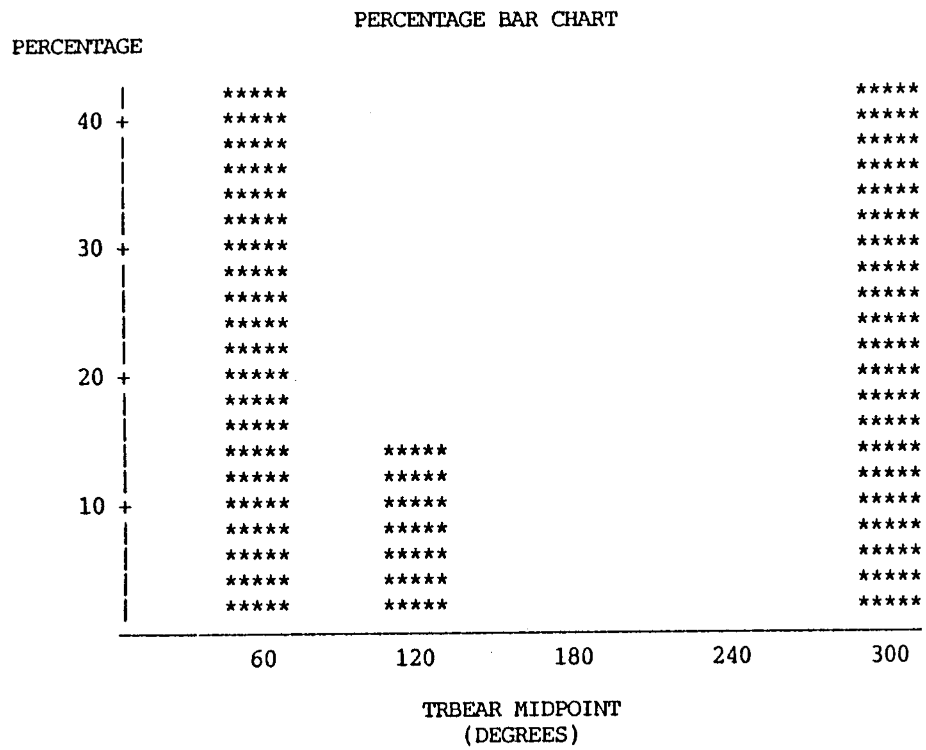


FIGURE A-95
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR NY BEARING FROM RADAR

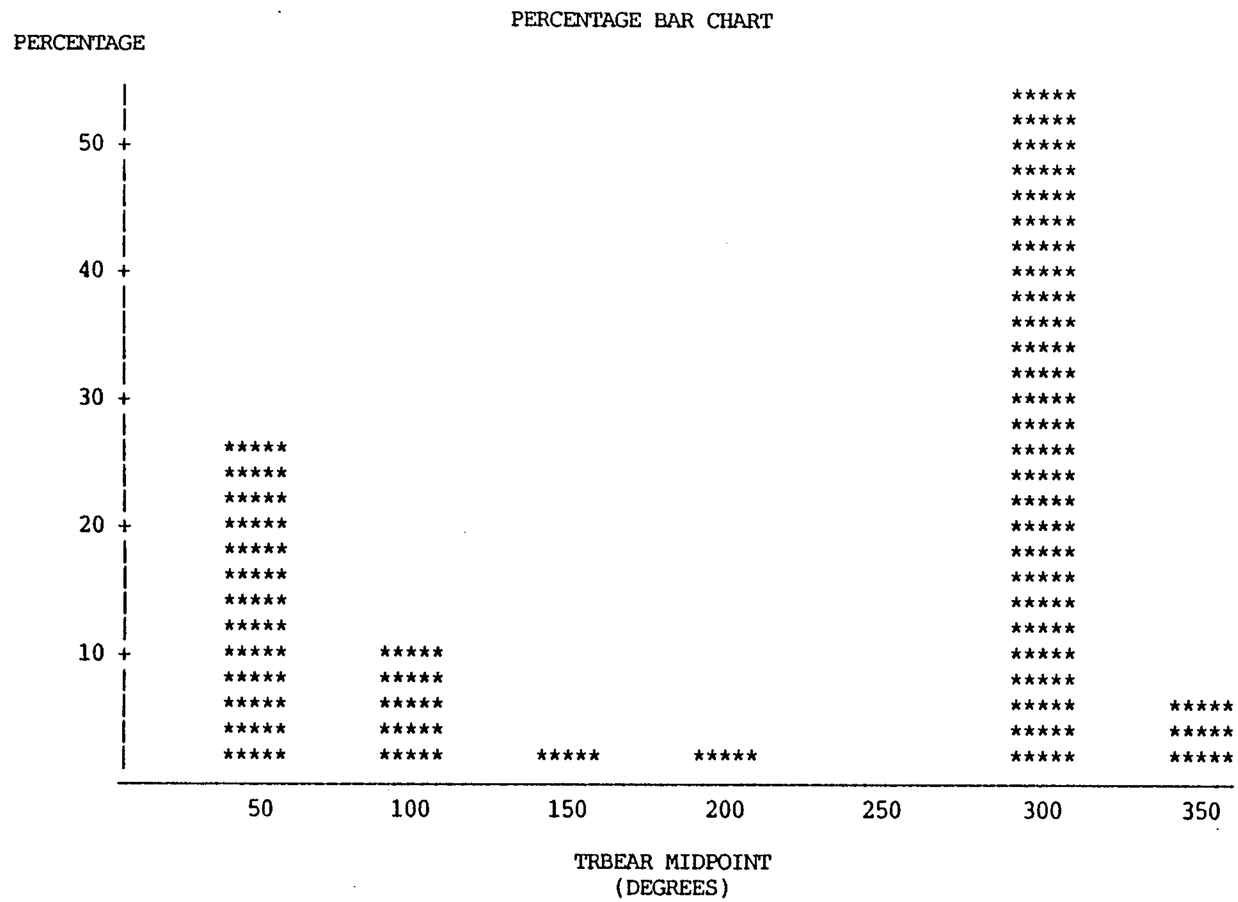


FIGURE A-96
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU, LA, AND NY COMBINED BEARING FROM RADAR

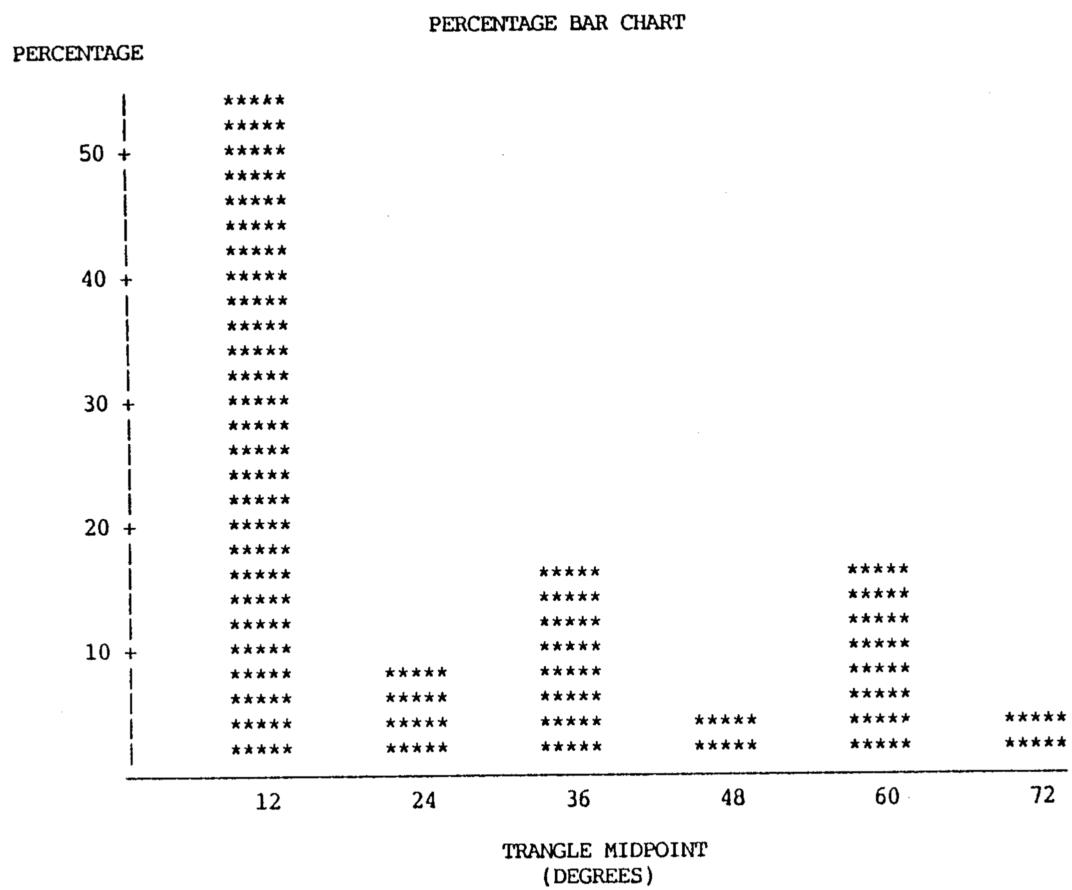


FIGURE A-97
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU ANGLE FROM RADIAL HEADING

PERCENTAGE BAR CHART

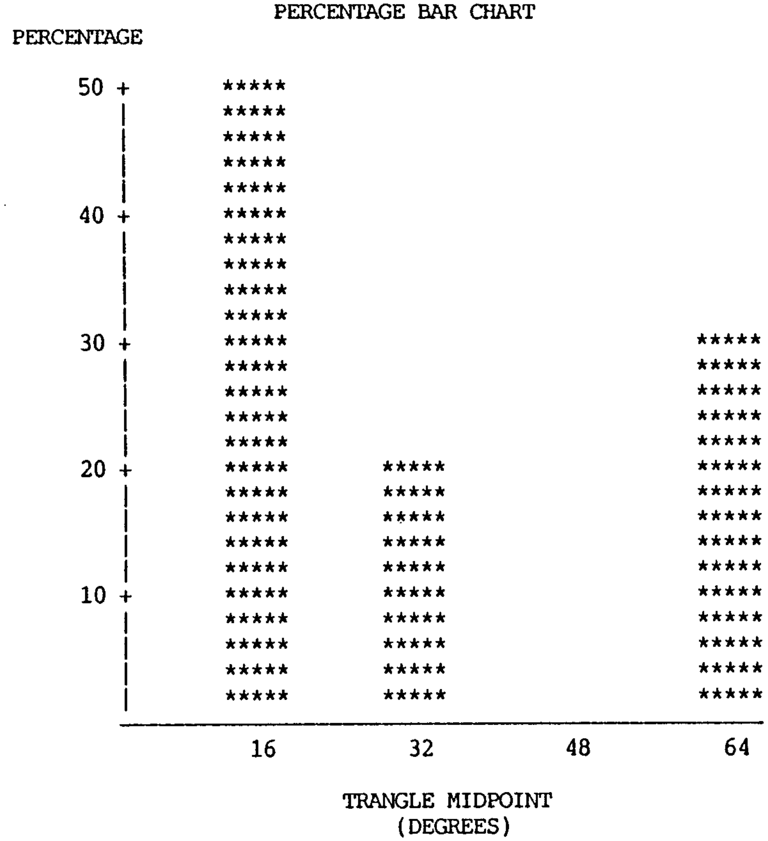


FIGURE A-98
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR LA ANGLE FROM RADIAL HEADING

PERCENTAGE BAR CHART

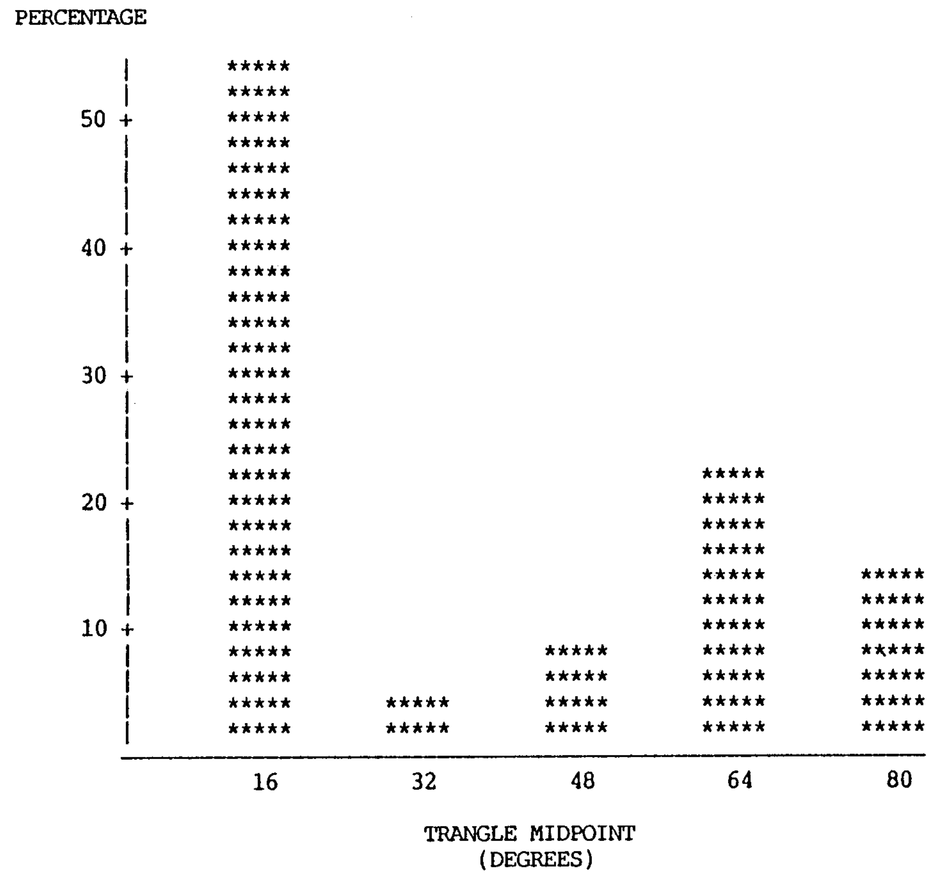


FIGURE A-99
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR NY ANGLE FROM RADIAL HEADING

PERCENTAGE BAR CHART

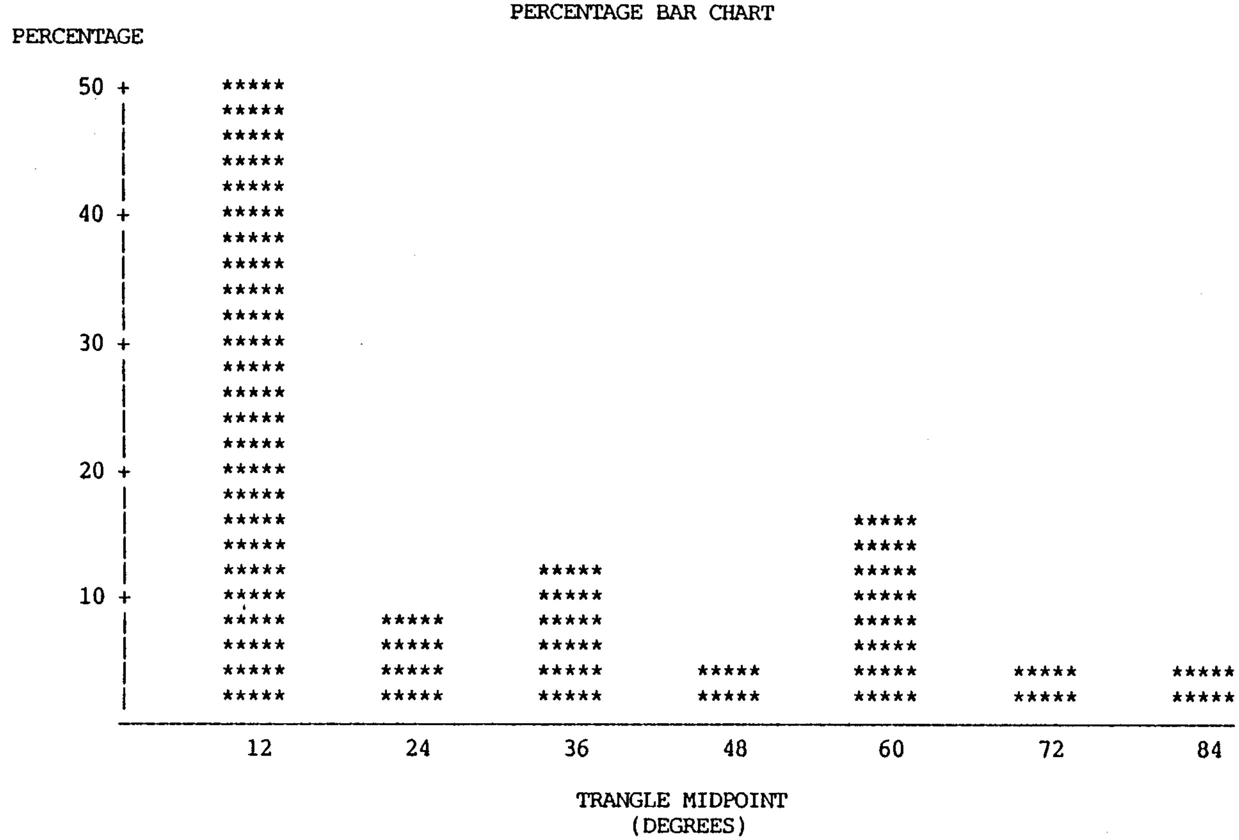


FIGURE A-100
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU, LA, AND NY COMBINED
ANGLE FROM RADIAL HEADING

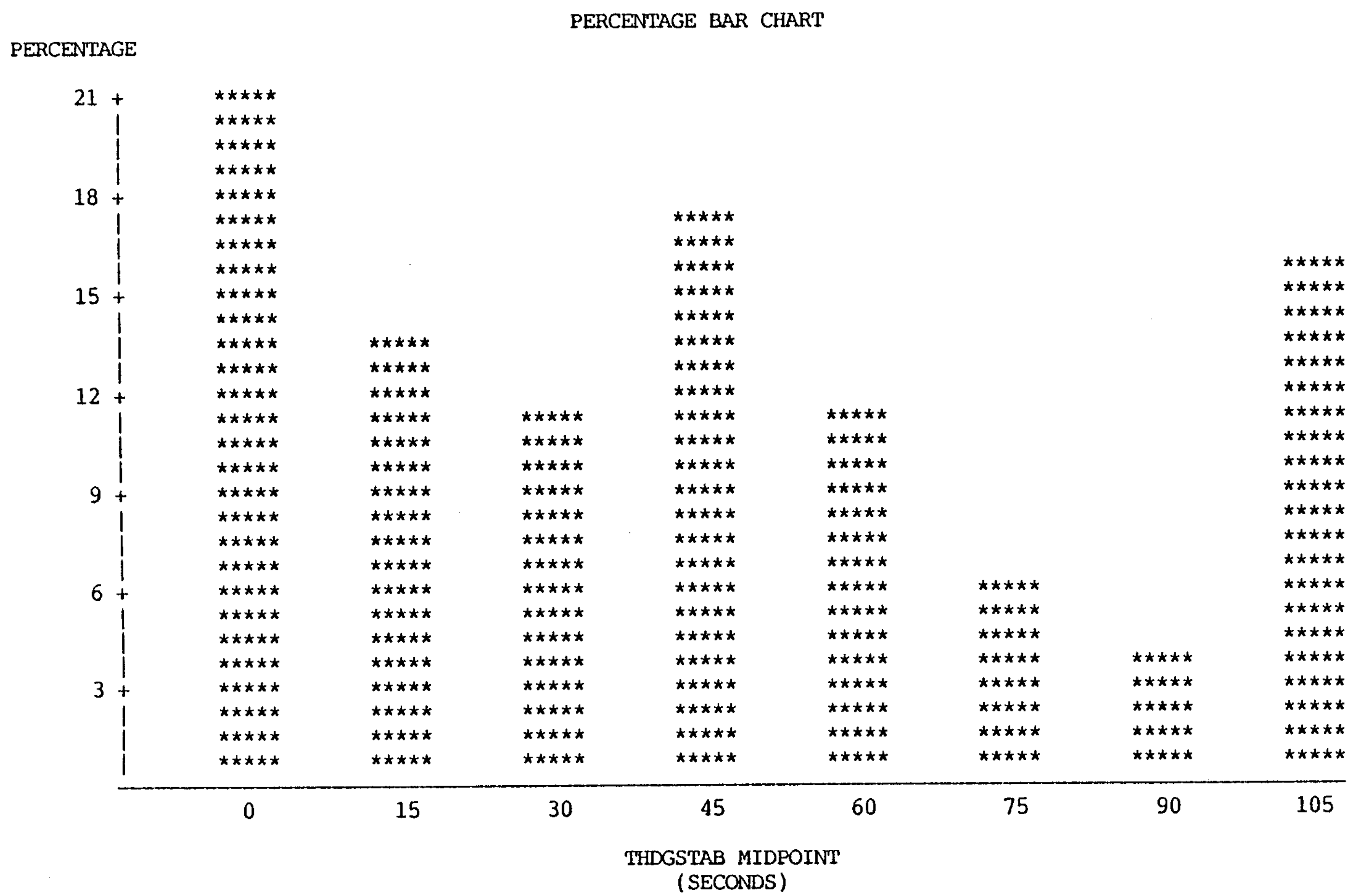


FIGURE A-101
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU HEADING STABILITY

PERCENTAGE BAR CHART

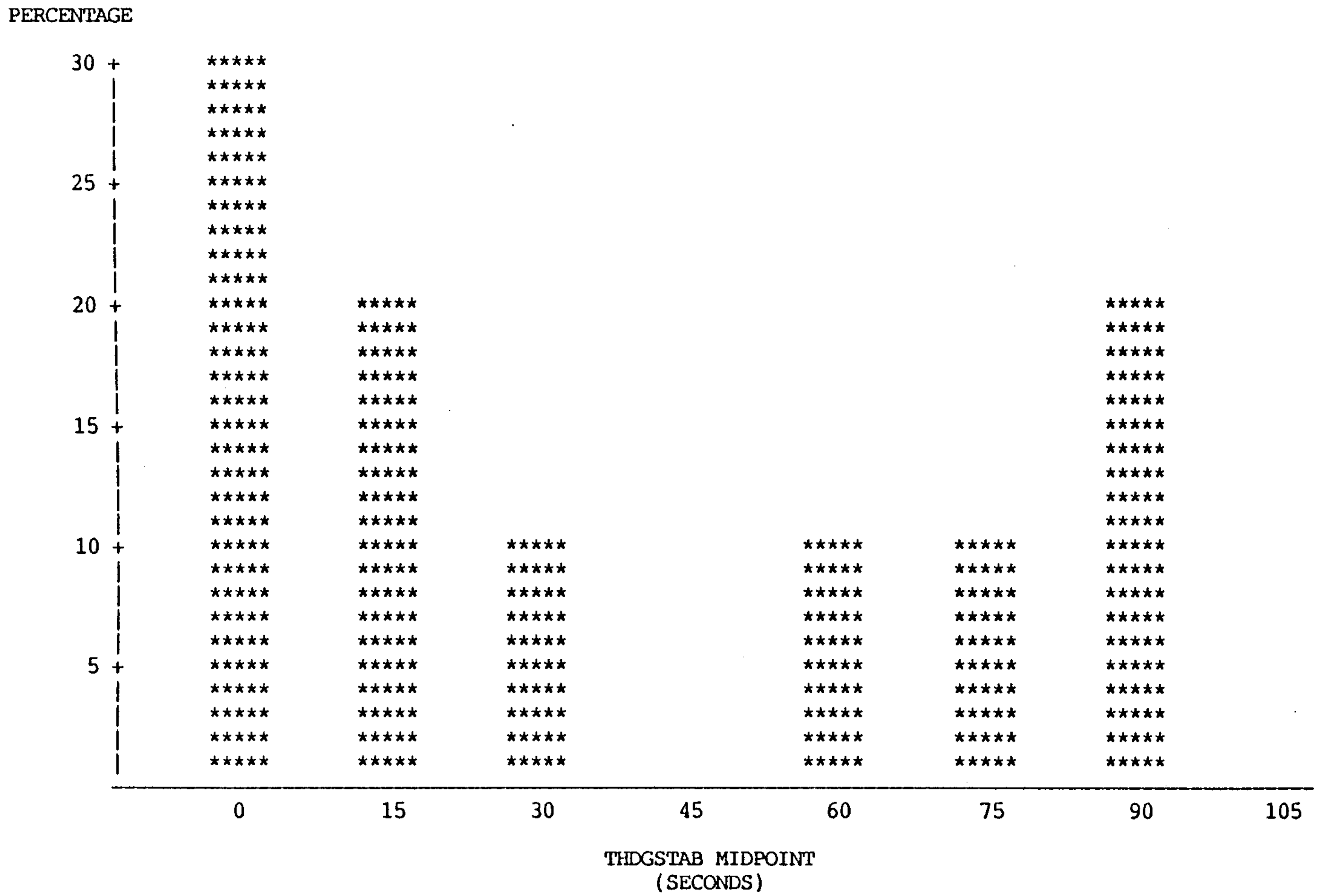


FIGURE A-102
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR LA HEADING STABILITY

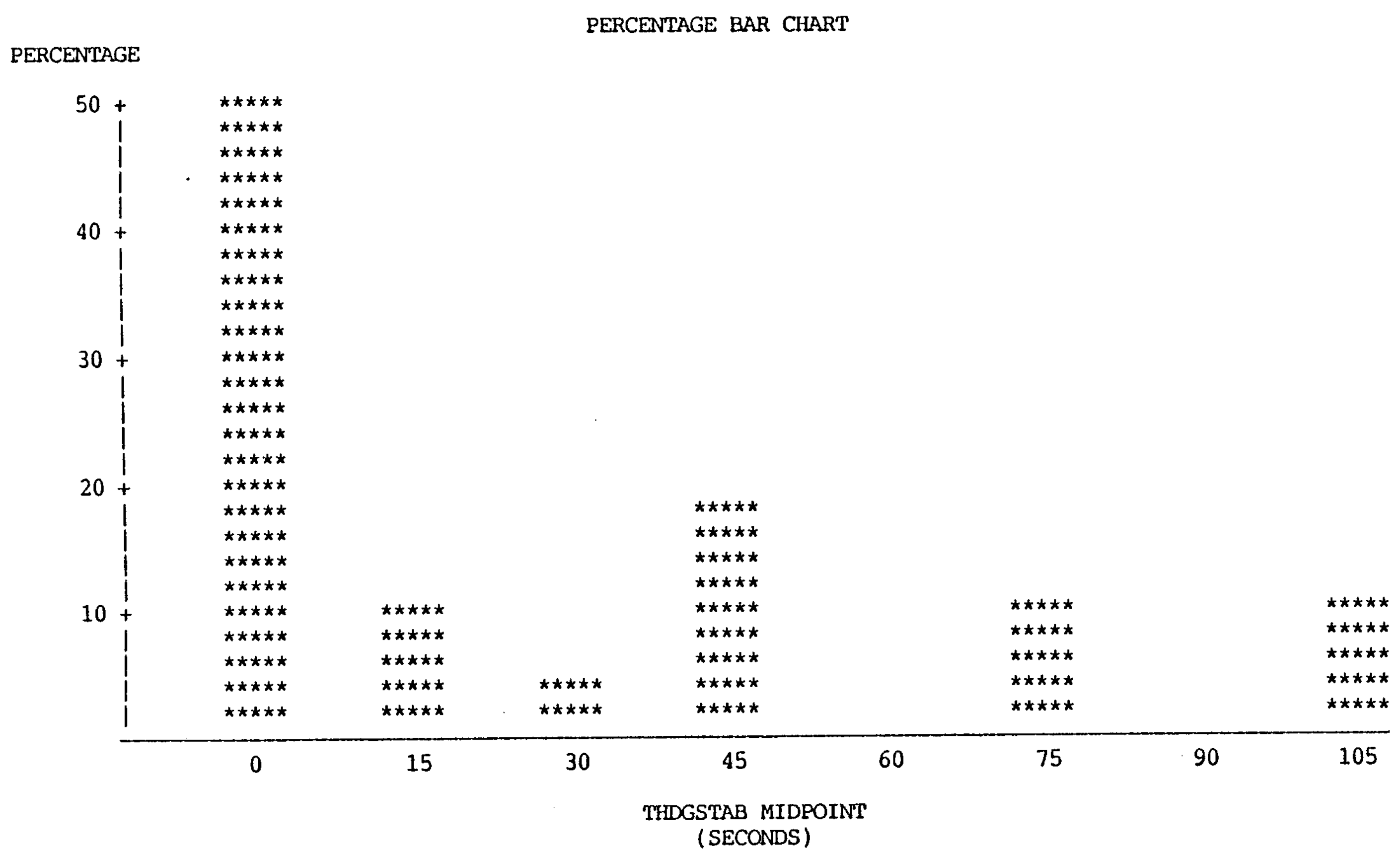


FIGURE A-103
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR NY HEADING STABILITY

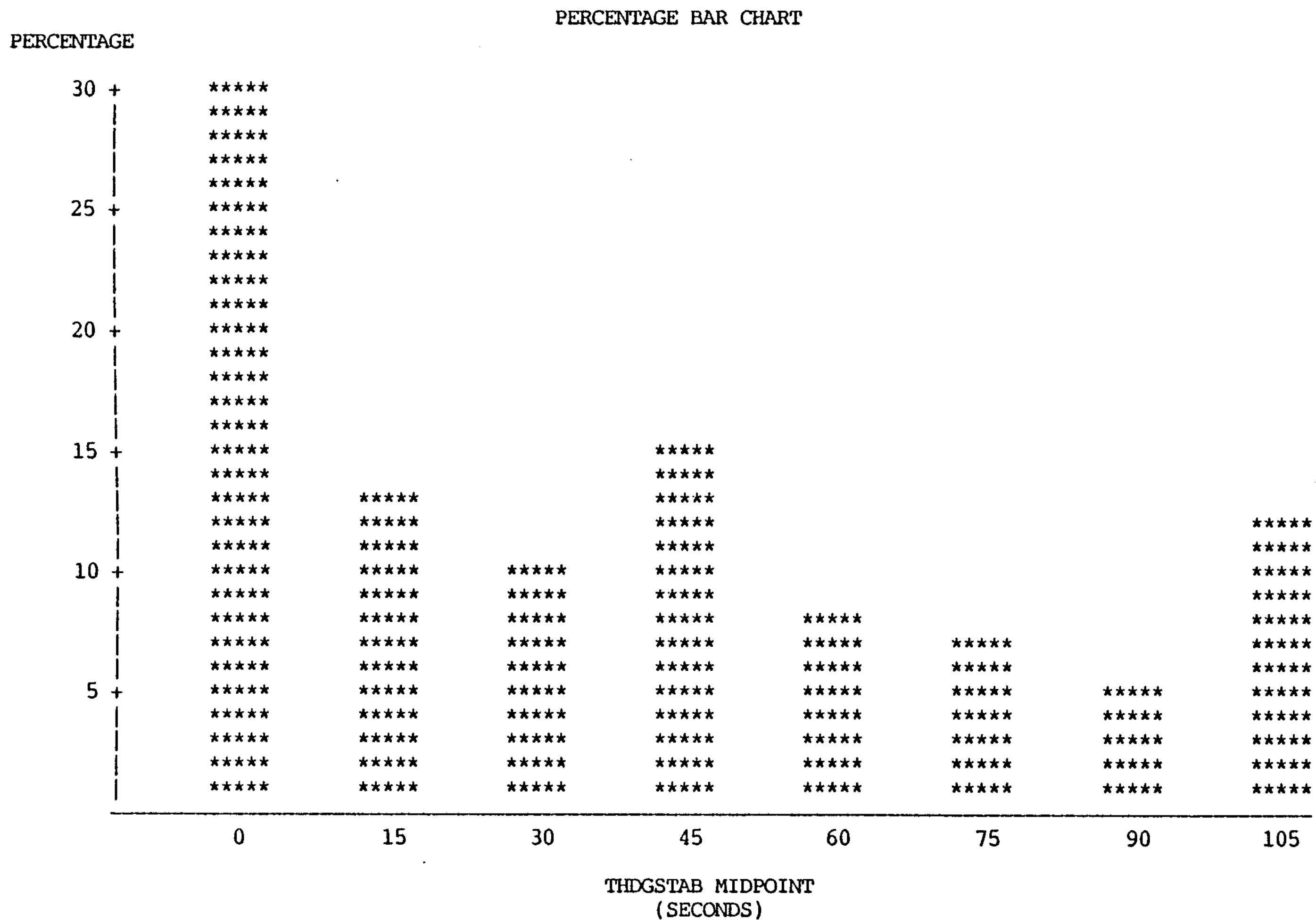


FIGURE A-104
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU, LA, AND NY COMBINED HEADING STABILITY

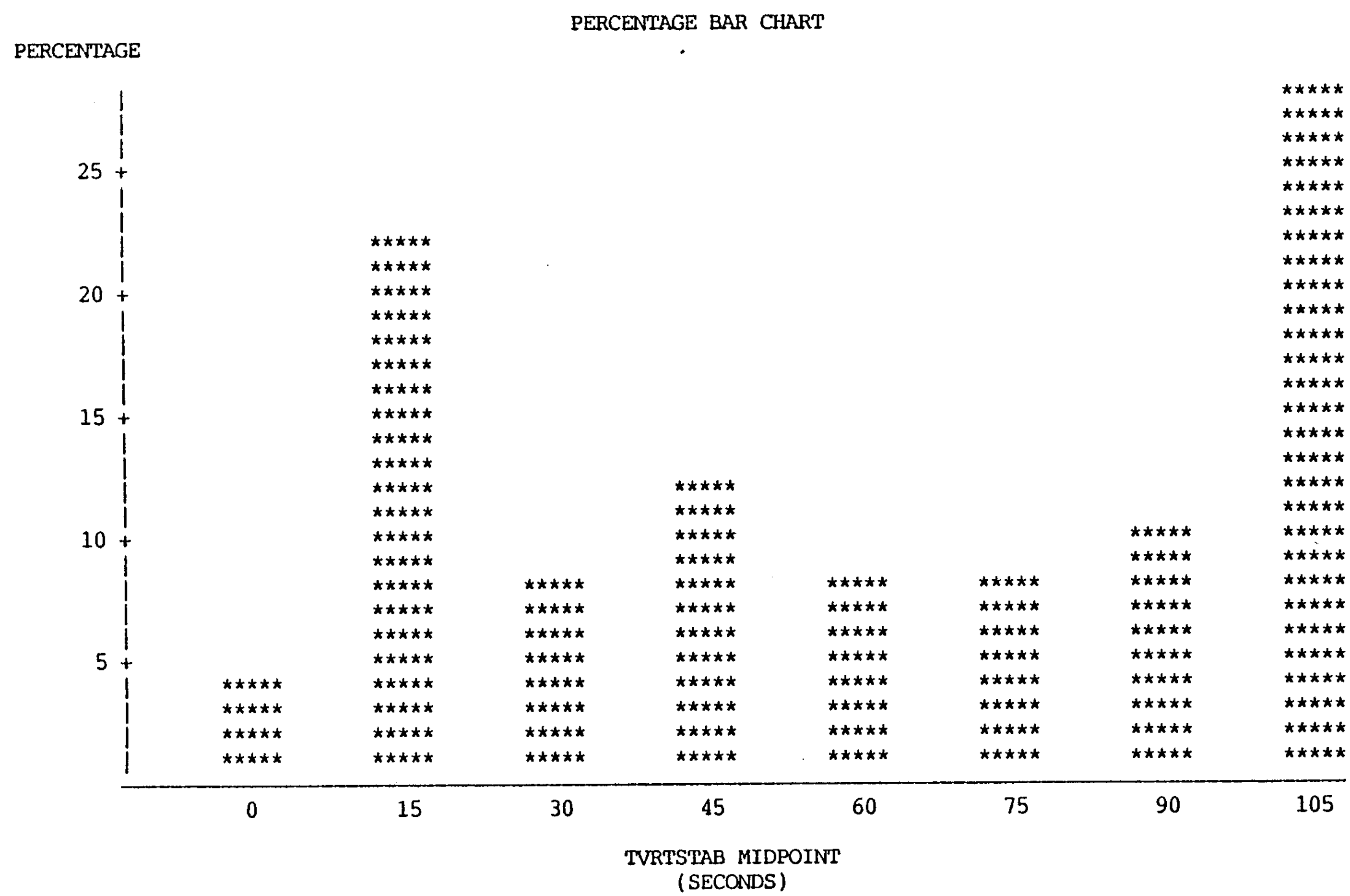


FIGURE A-105
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU VERTICAL STABILITY

PERCENTAGE BAR CHART

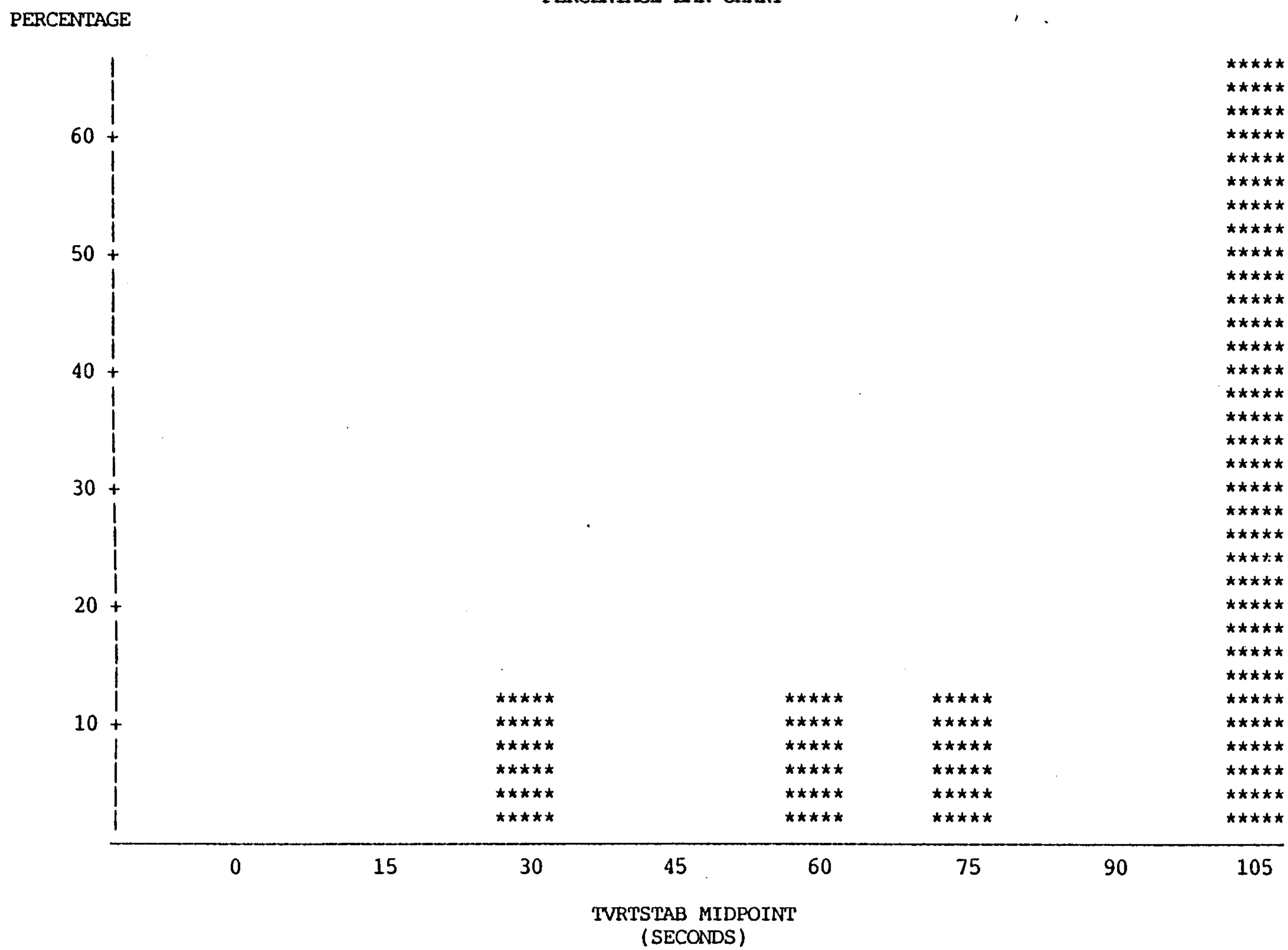


FIGURE A-106
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR LA VERTICAL STABILITY

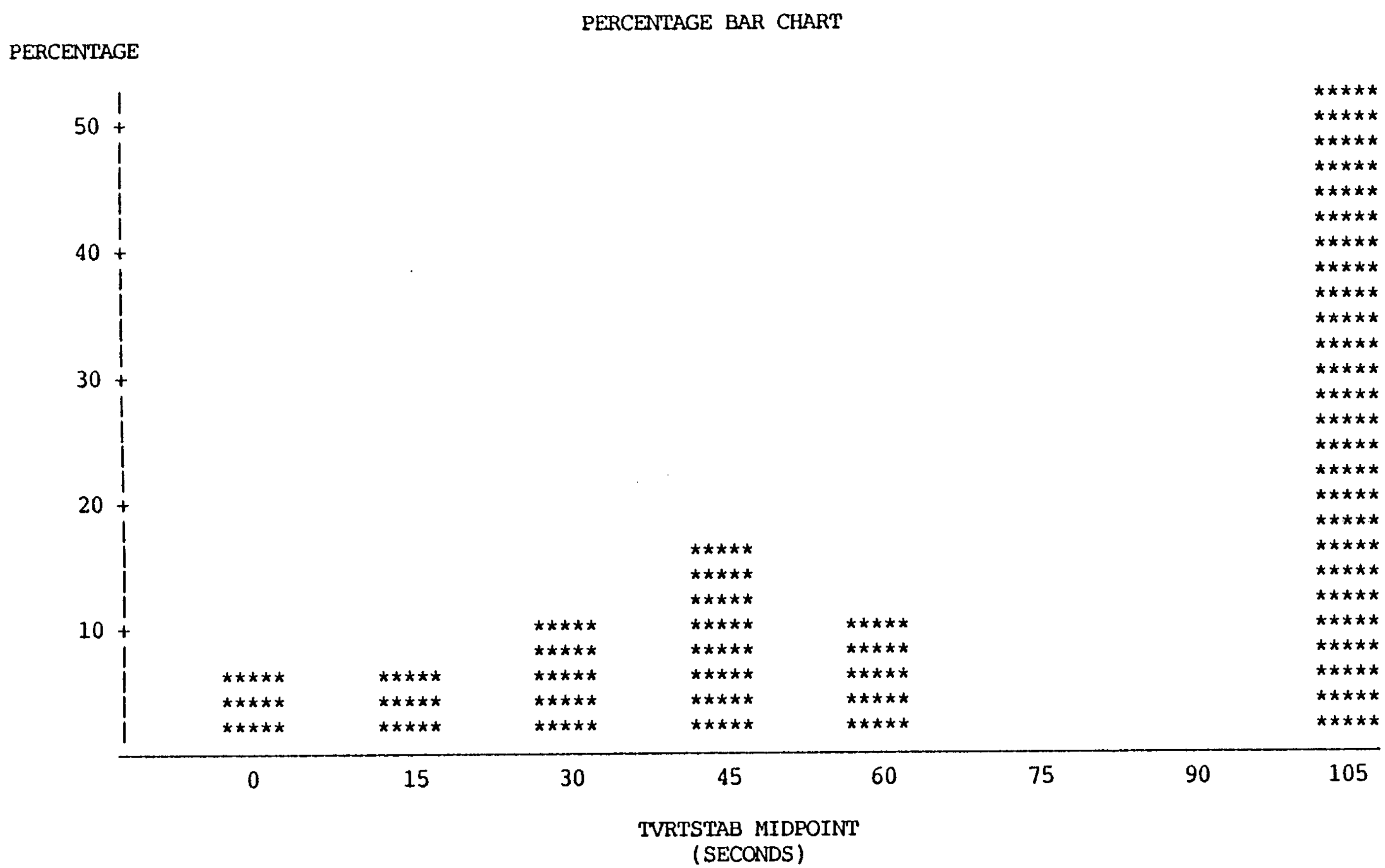


FIGURE A-107
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR NY VERTICAL STABILITY

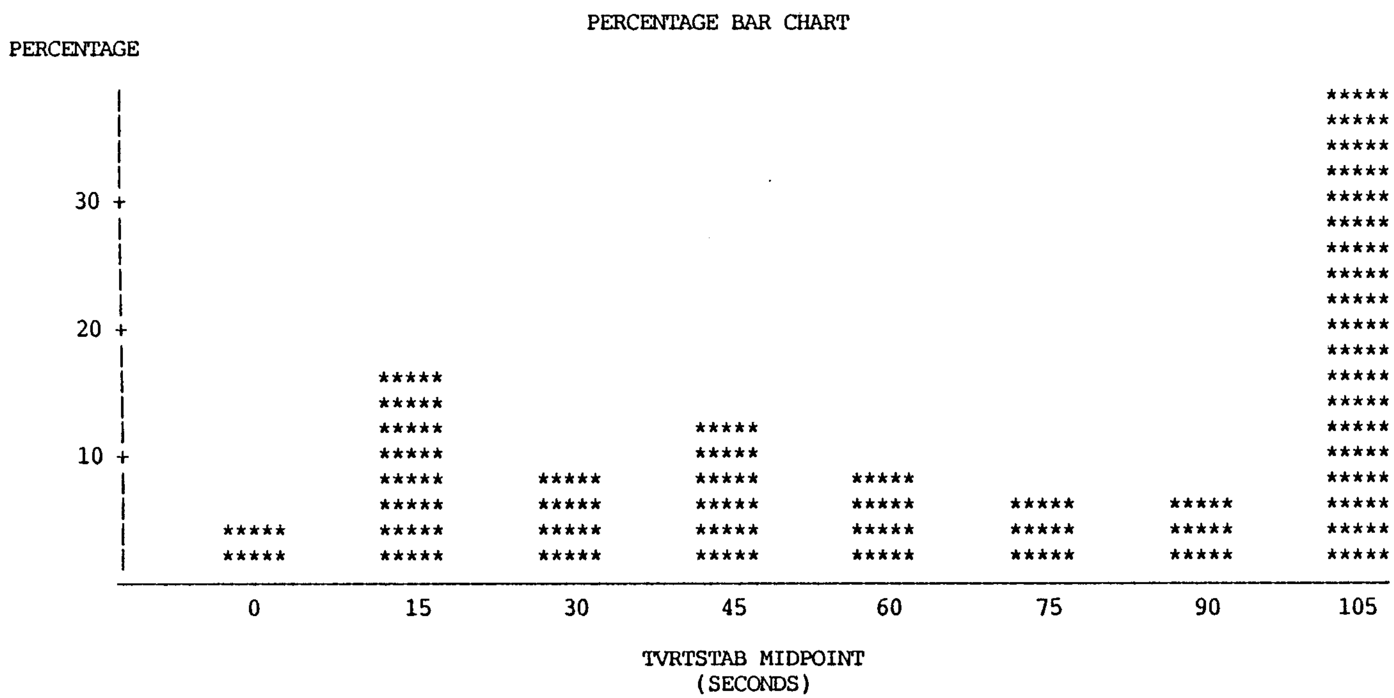


FIGURE A-108
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU, LA, AND NY COMBINED
VERTICAL STABILITY

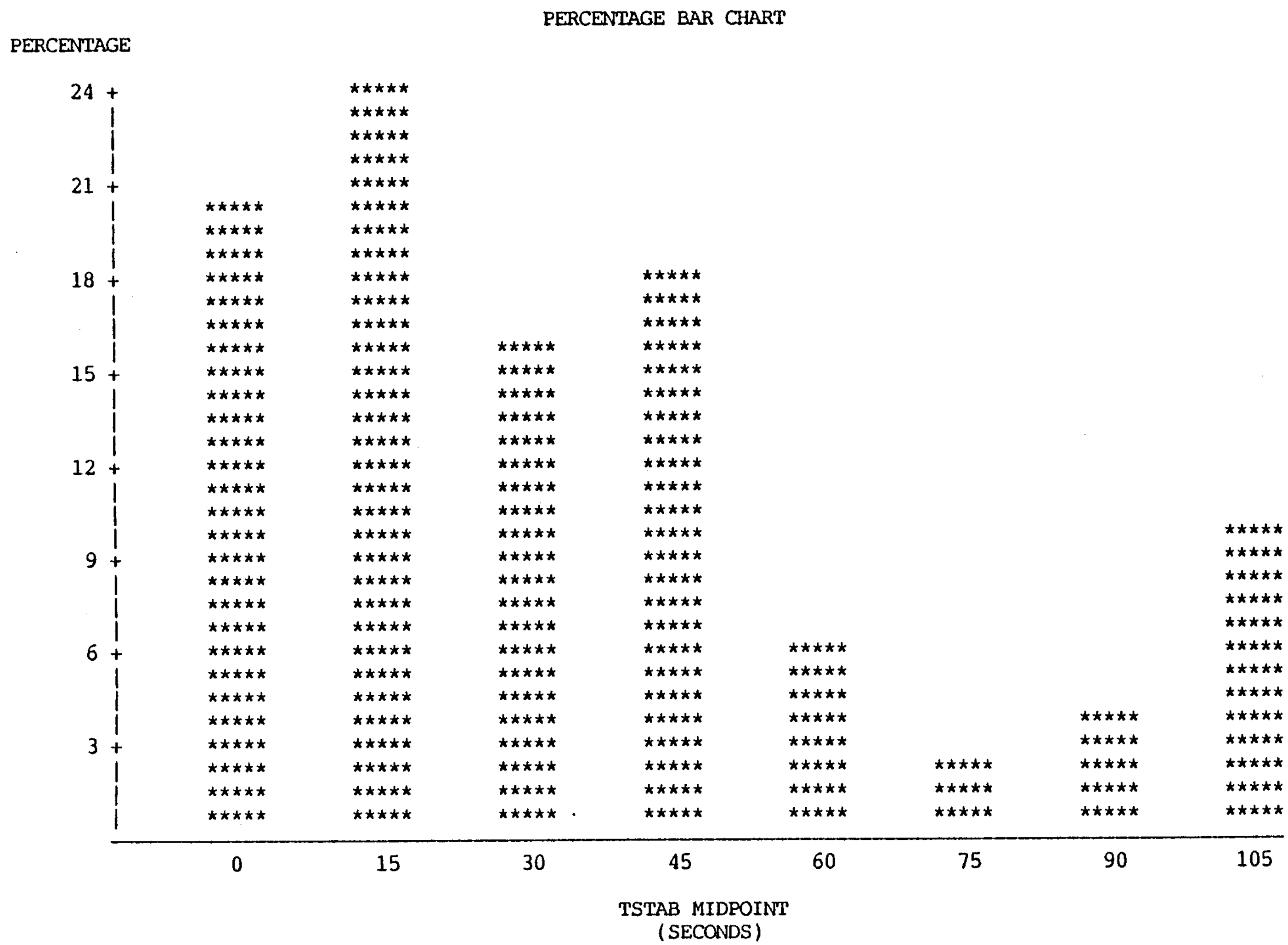


FIGURE A-109
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU
TOTAL STABILITY

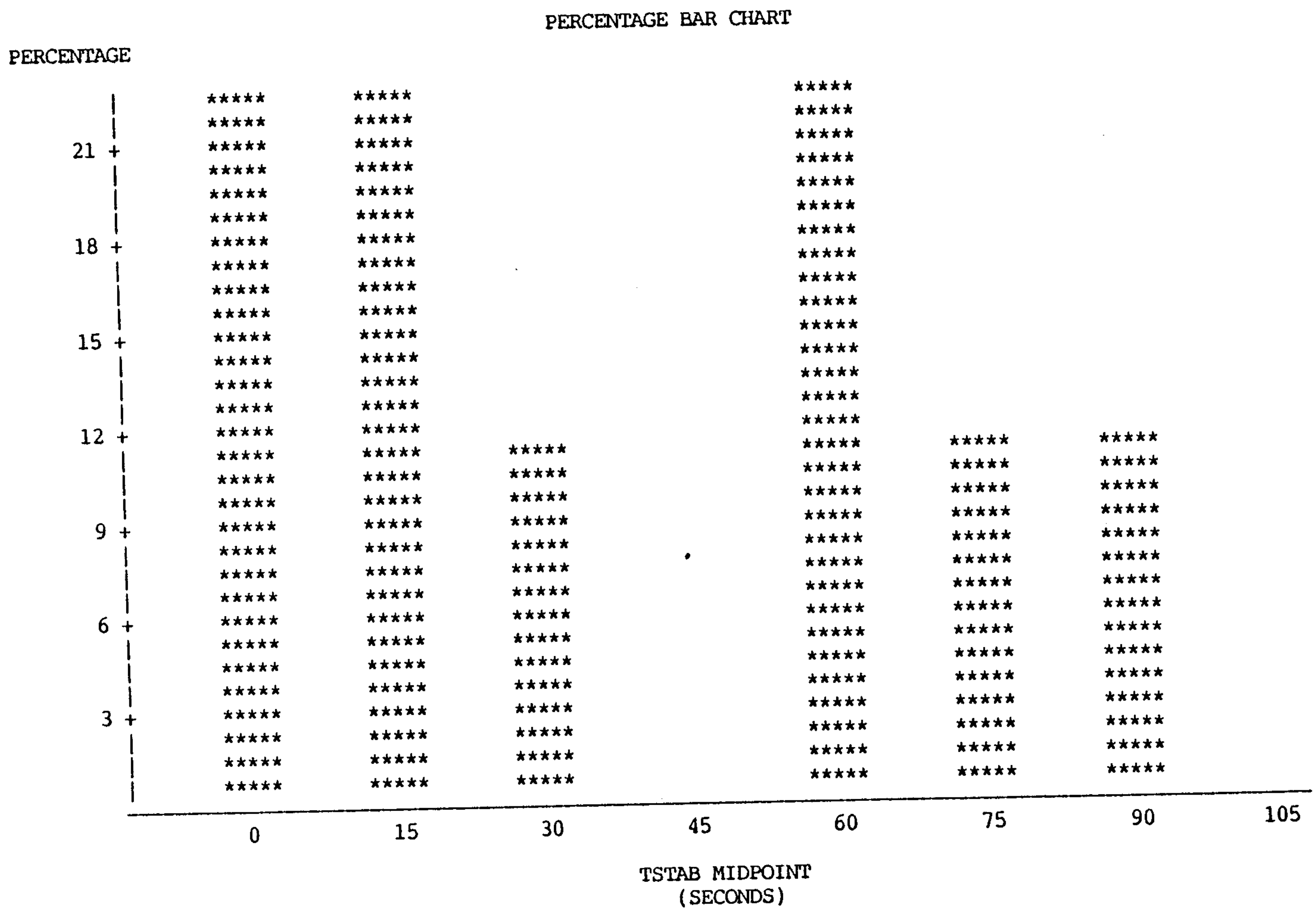


FIGURE A-110
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR LA
TOTAL STABILITY

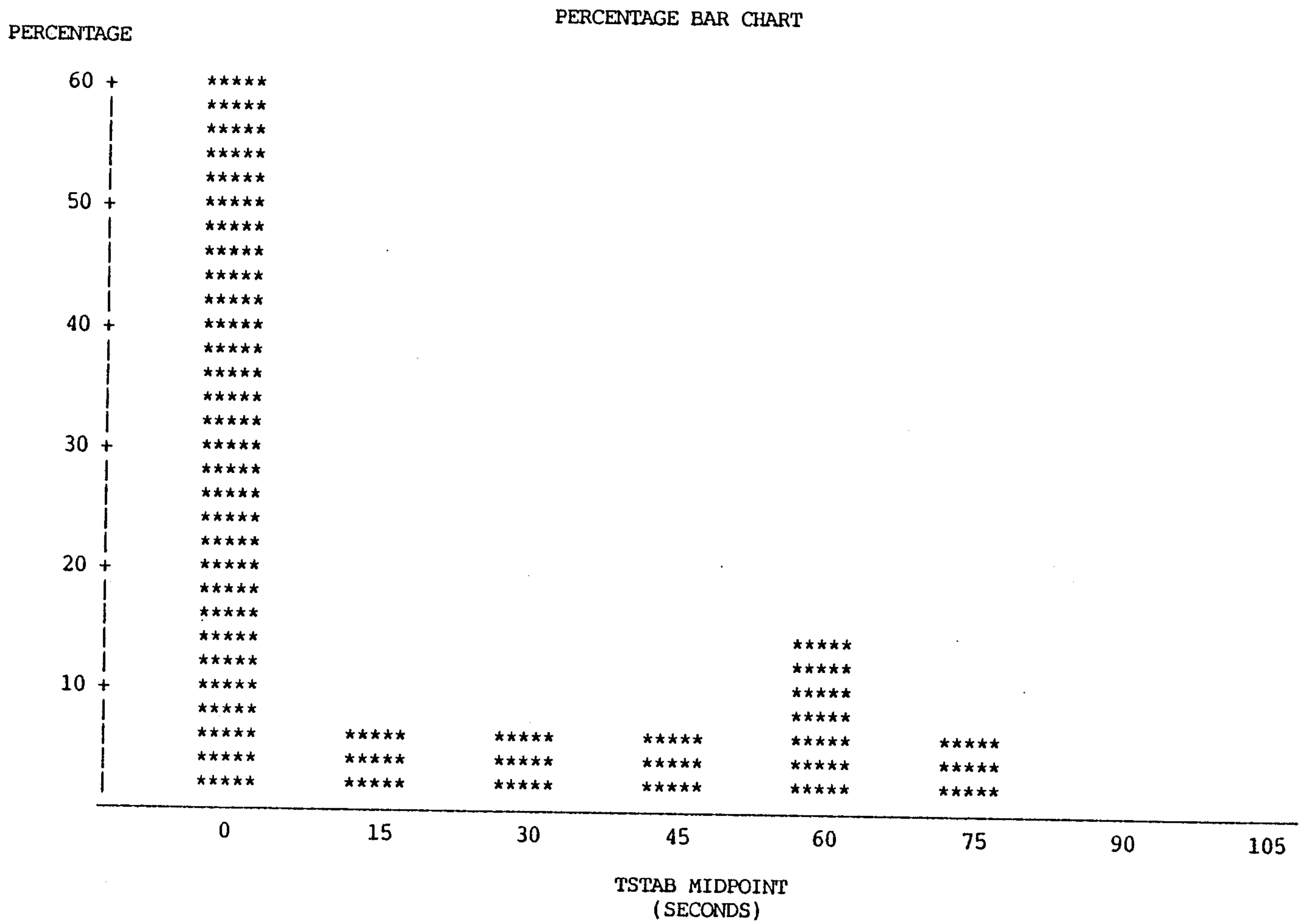


FIGURE A-111
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR NY
TOTAL STABILITY

PERCENTAGE BAR CHART

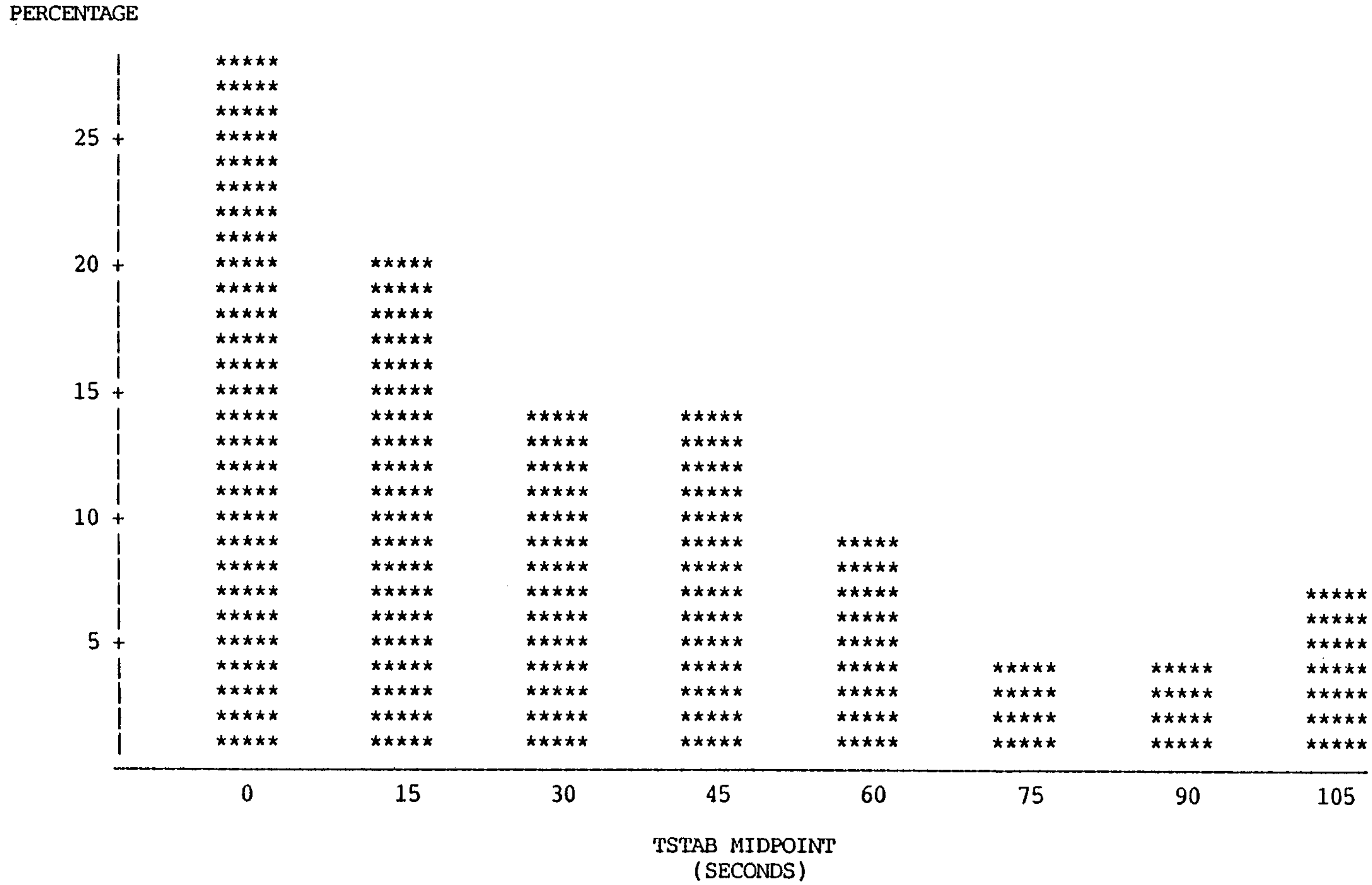


FIGURE A-112
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU, LA, AND NY COMBINED
TOTAL STABILITY

APPENDIX B

CUMULATIVE DISTRIBUTIONS

This Appendix provides the frequency and cumulative frequency distribution tables of the encounter characteristics identified in Sections 3 and 4. Tables B-1 through B-72 are for the en route parameters; Tables B-73 through B-100 are for the terminal characteristics. This information is useful for the random generation of scenario parameters.

For each observed value of a parameter, the following information is provided: number of observations of that value (COUNT), frequency percentage of the value (CELL), and cumulative frequency percentage (CUM).

TABLE B-1
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
GROUND SPEED
(KNOTS)

VARIABLE=GRNDSPD

FREQUENCY TABLE

		PERCENTS				PERCENTS				PERCENTS	
VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM
36	1	1.3	1.3	142	1	1.3	36.7	242	1	1.3	70.9
37	1	1.3	2.5	143	1	1.3	38.0	246	1	1.3	72.2
39	1	1.3	3.8	144	1	1.3	39.2	251	1	1.3	73.4
41	1	1.3	5.1	145	1	1.3	40.5	256	1	1.3	74.7
48	1	1.3	6.3	150	1	1.3	41.8	265	1	1.3	75.9
56	2	2.5	8.9	152	1	1.3	43.0	271	2	2.5	78.5
66	1	1.3	10.1	155	1	1.3	44.3	273	1	1.3	79.7
68	1	1.3	11.4	158	1	1.3	45.6	275	1	1.3	81.0
69	1	1.3	12.7	160	1	1.3	46.8	307	1	1.3	82.3
75	1	1.3	13.9	161	1	1.3	48.1	309	1	1.3	83.5
76	1	1.3	15.2	169	1	1.3	49.4	334	1	1.3	84.8
78	1	1.3	16.5	170	1	1.3	50.6	339	1	1.3	86.1
80	1	1.3	17.7	172	1	1.3	51.9	341	1	1.3	87.3
81	1	1.3	19.0	177	1	1.3	53.2	342	1	1.3	88.6
82	1	1.3	20.3	184	2	2.5	55.7	346	1	1.3	89.9
100	1	1.3	21.5	188	1	1.3	57.0	369	1	1.3	91.1
102	1	1.3	22.8	195	1	1.3	58.2	388	1	1.3	92.4
104	1	1.3	24.1	214	2	2.5	60.8	396	1	1.3	93.7
118	2	2.5	26.6	216	1	1.3	62.0	403	1	1.3	94.9
119	1	1.3	27.8	217	1	1.3	63.3	439	1	1.3	96.2
123	1	1.3	29.1	226	1	1.3	64.6	444	1	1.3	97.5
127	1	1.3	30.4	228	1	1.3	65.8	476	1	1.3	98.7
128	2	2.5	32.9	236	1	1.3	67.1	519	1	1.3	100.0
133	1	1.3	34.2	237	1	1.3	68.4				
134	1	1.3	35.4	241	1	1.3	69.6				

TABLE B-2
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
GROUND SPEED
(KNOTS)

VARIABLE=GRNDSPD

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
36	1	3.2	3.2	221	1	3.2	35.5	286	1	3.2	71.0
86	1	3.2	6.5	223	1	3.2	38.7	296	1	3.2	74.2
95	1	3.2	9.7	239	1	3.2	41.9	315	1	3.2	77.4
141	1	3.2	12.9	249	1	3.2	45.2	316	1	3.2	80.6
144	1	3.2	16.1	250	1	3.2	48.4	325	1	3.2	83.9
150	1	3.2	19.4	258	1	3.2	51.6	327	2	6.5	90.3
178	1	3.2	22.6	260	1	3.2	54.8	337	1	3.2	93.5
184	1	3.2	25.8	271	1	3.2	58.1	398	1	3.2	96.8
203	1	3.2	29.0	275	1	3.2	61.3	407	1	3.2	100.0
212	1	3.2	32.3	277	2	6.5	67.7				

TABLE B-3
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
GROUND SPEED
(KNOTS)

VARIABLE=GRNDSPD

FREQUENCY TABLE

		PERCENTS				PERCENTS				PERCENTS	
VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM
139	1	0.6	0.6	230	2	1.2	28.9	279	6	3.6	71.1
141	1	0.6	1.2	231	1	0.6	29.5	280	2	1.2	72.3
150	1	0.6	1.8	232	1	0.6	30.1	281	2	1.2	73.5
164	2	1.2	3.0	233	1	0.6	30.7	285	2	1.2	74.7
170	1	0.6	3.6	234	1	0.6	31.3	287	3	1.8	76.5
181	1	0.6	4.2	235	4	2.4	33.7	288	4	2.4	78.9
186	1	0.6	4.8	236	2	1.2	34.9	289	1	0.6	79.5
191	2	1.2	6.0	237	2	1.2	36.1	291	3	1.8	81.3
193	1	0.6	6.6	239	3	1.8	38.0	292	1	0.6	81.9
194	1	0.6	7.2	240	1	0.6	38.6	293	1	0.6	82.5
197	1	0.6	7.8	242	3	1.8	40.4	294	1	0.6	83.1
198	1	0.6	8.4	243	2	1.2	41.6	295	1	0.6	83.7
199	1	0.6	9.0	244	2	1.2	42.8	296	2	1.2	84.9
200	2	1.2	10.2	246	4	2.4	45.2	297	1	0.6	85.5
203	2	1.2	11.4	247	1	0.6	45.8	298	2	1.2	86.7
204	1	0.6	12.0	249	3	1.8	47.6	299	1	0.6	87.3
205	2	1.2	13.3	250	5	3.0	50.6	302	2	1.2	88.6
207	2	1.2	14.5	252	2	1.2	51.8	303	1	0.6	89.2
210	1	0.6	15.1	253	3	1.8	53.6	306	2	1.2	90.4
211	1	0.6	15.7	256	2	1.2	54.8	308	1	0.6	91.0
212	2	1.2	16.9	260	1	0.6	55.4	309	1	0.6	91.6
213	1	0.6	17.5	261	2	1.2	56.6	311	2	1.2	92.8
214	1	0.6	18.1	263	3	1.8	58.4	312	1	0.6	93.4
215	3	1.8	19.9	264	2	1.2	59.6	313	1	0.6	94.0
217	1	0.6	20.5	266	1	0.6	60.2	317	1	0.6	94.6
219	1	0.6	21.1	267	1	0.6	60.8	325	1	0.6	95.2
221	2	1.2	22.3	268	1	0.6	61.4	332	1	0.6	95.8
222	2	1.2	23.5	269	1	0.6	62.0	354	1	0.6	96.4
223	1	0.6	24.1	270	1	0.6	62.7	363	1	0.6	97.0
224	1	0.6	24.7	272	2	1.2	63.9	373	1	0.6	97.6
225	1	0.6	25.3	273	1	0.6	64.5	407	1	0.6	98.2
227	1	0.6	25.9	275	2	1.2	65.7	426	1	0.6	98.8
228	1	0.6	26.5	277	1	0 6	66.3	428	1	0.6	99.4
229	2	1.2	27.7	278	2	1.2	67.5	463	1	0.6	100.0

TABLE B-4
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
GROUND SPEED
(KNOTS)

VARIABLE=GRNDSPD

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
36	2	0.7	0.7	152	1	0.4	15.6	217	2	0.7	34.1
37	1	0.4	1.1	155	1	0.4	15.9	219	1	0.4	34.4
39	1	0.4	1.4	158	1	0.4	16.3	221	3	1.1	35.5
41	1	0.4	1.8	160	1	0.4	16.7	222	2	0.7	36.2
48	1	0.4	2.2	161	1	0.4	17.0	223	2	0.7	37.0
56	2	0.7	2.9	164	2	0.7	17.8	224	1	0.4	37.3
66	1	0.4	3.3	169	1	0.4	18.1	225	1	0.4	37.7
68	1	0.4	3.6	170	2	0.7	18.8	226	1	0.4	38.0
69	1	0.4	4.0	172	1	0.4	19.2	227	1	0.4	38.4
75	1	0.4	4.3	177	1	0.4	19.6	228	2	0.7	39.1
76	1	0.4	4.7	178	1	0.4	19.9	229	2	0.7	39.9
78	1	0.4	5.1	181	1	0.4	20.3	230	2	0.7	40.6
80	1	0.4	5.4	184	3	1.1	21.4	231	1	0.4	40.9
81	1	0.4	5.8	186	1	0.4	21.7	232	1	0.4	41.3
82	1	0.4	6.2	188	1	0.4	22.1	233	1	0.4	41.7
86	1	0.4	6.5	191	2	0.7	22.8	234	1	0.4	42.0
95	1	0.4	6.9	193	1	0.4	23.2	235	4	1.4	43.5
100	1	0.4	7.2	194	1	0.4	23.6	236	3	1.1	44.6
102	1	0.4	7.6	195	1	0.4	23.9	237	3	1.1	45.7
104	1	0.4	8.0	197	1	0.4	24.3	239	4	1.4	47.1
118	2	0.7	8.7	198	1	0.4	24.6	240	1	0.4	47.5
119	1	0.4	9.1	199	1	0.4	25.0	241	1	0.4	47.8
123	1	0.4	9.4	200	2	0.7	25.7	242	4	1.4	49.3
127	1	0.4	9.8	203	3	1.1	26.8	243	2	0.7	50.0
128	2	0.7	10.5	204	1	0.4	27.2	244	2	0.7	50.7
133	1	0.4	10.9	205	2	0.7	27.9	246	5	1.8	52.5
134	1	0.4	11.2	207	2	0.7	28.6	247	1	0.4	52.9
139	1	0.4	11.6	210	1	0.4	29.0	249	4	1.4	54.3
141	2	0.7	12.3	211	1	0.4	29.3	250	6	2.2	56.5
142	1	0.4	12.7	212	3	1.1	30.4	251	1	0.4	56.9
143	1	0.4	13.0	213	1	0.4	30.8	252	2	0.7	57.6
144	2	0.7	13.8	214	3	1.1	31.9	253	3	1.1	58.7
145	1	0.4	14.1	215	3	1.1	33.0	256	3	1.1	59.8
150	3	1.1	15.2	216	1	0.4	33.3	258	1	0.4	60.1

TABLE B-4
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
GROUND SPEED
(KNOTS)
(CONCLUDED)

VARIABLE=GRNDSPD

FREQUENCY TABLE (CONT.)

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
260	2	0.7	60.9
261	2	0.7	61.6
263	3	1.1	62.7
264	2	0.7	63.4
265	1	0.4	63.8
266	1	0.4	64.1
267	1	0.4	64.5
268	1	0.4	64.9
269	1	0.4	65.2
270	1	0.4	65.6
271	3	1.1	66.7
272	2	0.7	67.4
273	2	0.7	68.1
275	4	1.4	69.6
277	3	1.1	70.7
278	2	0.7	71.4
279	6	2.2	73.6
280	2	0.7	74.3
281	2	0.7	75.0
285	2	0.7	75.7
286	1	0.4	76.1
287	3	1.1	77.2
288	4	1.4	78.6
289	1	0.4	79.0
291	3	1.1	80.1
292	1	0.4	80.4
293	1	0.4	80.8
294	1	0.4	81.2
295	1	0.4	81.5
296	3	1.1	82.6
297	1	0.4	83.0
298	2	0.7	83.7
299	1	0.4	84.1
302	2	0.7	84.8
303	1	0.4	85.1
306	2	0.7	85.9
307	1	0.4	86.2
308	1	0.4	86.6
309	2	0.7	87.3
311	2	0.7	88.0
312	1	0.4	88.4
313	1	0.4	88.8
315	1	0.4	89.1
316	1	0.4	89.5
317	1	0.4	89.9
325	2	0.7	90.6
327	2	0.7	91.3
332	1	0.4	91.7
334	1	0.4	92.0
337	1	0.4	92.4
339	1	0.4	92.8
341	1	0.4	93.1
342	1	0.4	93.5
346	1	0.4	93.8
354	1	0.4	94.2
363	1	0.4	94.6
369	1	0.4	94.9
373	1	0.4	95.3
388	1	0.4	95.7
396	1	0.4	96.0
398	1	0.4	96.4
403	1	0.4	96.7
407	2	0.7	97.5
426	1	0.4	97.8
428	1	0.4	98.2
439	1	0.4	98.6
444	1	0.4	98.9
463	1	0.4	99.3
476	1	0.4	99.6
519	1	0.4	100.0

TABLE B-5
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
ALTITUDE CHANGE RATE
(100 FT/MIN)

VARIABLE=ZDOT

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
-147	1	1.3	1.3	-34	1	1.3	30.4	-8	1	1.3	63.3
-123	1	1.3	2.5	-33	1	1.3	31.6	-7	1	1.3	64.6
-94	1	1.3	3.8	-30	1	1.3	32.9	-6	1	1.3	65.8
-93	1	1.3	5.1	-28	3	3.8	36.7	-5	5	6.3	72.2
-80	1	1.3	6.3	-27	2	2.5	39.2	-2	3	3.8	75.9
-73	1	1.3	7.6	-26	2	2.5	41.8	-1	2	2.5	78.5
-71	1	1.3	8.9	-25	1	1.3	43.0	0	9	11.4	89.9
-67	1	1.3	10.1	-23	1	1.3	44.3	4	1	1.3	91.1
-60	1	1.3	11.4	-20	2	2.5	46.8	6	1	1.3	92.4
-58	1	1.3	12.7	-19	2	2.5	49.4	7	1	1.3	93.7
-56	1	1.3	13.9	-16	2	2.5	51.9	15	1	1.3	94.9
-55	1	1.3	15.2	-15	1	1.3	53.2	18	1	1.3	96.2
-50	3	3.8	19.0	-14	1	1.3	54.4	29	1	1.3	97.5
-47	3	3.8	22.8	-13	1	1.3	55.7	35	1	1.3	98.7
-40	2	2.5	25.3	-11	1	1.3	57.0	38	1	1.3	100.0
-37	1	1.3	26.6	-10	3	3.8	60.8				
-35	2	2.5	29.1	-9	1	1.3	62.0				

TABLE B-6
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
ALTITUDE CHANGE RATE
(100 FT/MIN)

VARIABLE=ZDOT

FREQUENCY TABLE

		PERCENTS	
VALUE	COUNT	CELL	CUM
-228	1	3.2	3.2
-151	1	3.2	6.5
-146	1	3.2	9.7
-61	1	3.2	12.9
-54	1	3.2	16.1
-50	1	3.2	19.4
-47	1	3.2	22.6
-43	1	3.2	25.8
-40	1	3.2	29.0
-37	1	3.2	32.3

		PERCENTS	
VALUE	COUNT	CELL	CUM
-35	1	3.2	35.5
-32	1	3.2	38.7
-30	1	3.2	41.9
-29	1	3.2	45.2
-28	1	3.2	48.4
-20	1	3.2	51.6
-19	1	3.2	54.8
-18	1	3.2	58.1
-17	2	6.5	64.5
-16	1	3.2	67.7

		PERCENTS	
VALUE	COUNT	CELL	CUM
-15	2	6.5	74.2
-14	1	3.2	77.4
-13	1	3.2	80.6
-11	1	3.2	83.9
-9	2	6.5	90.3
-8	1	3.2	93.5
-7	1	3.2	96.8
10	1	3.2	100.0

TABLE B-7
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
ALTITUDE CHANGE RATE
(100 FT/MIN)

VARIABLE=ZDOT

FREQUENCY TABLE

		PERCENTS				PERCENTS				PERCENTS	
VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM
-59	1	0.6	0.6	-25	3	1.8	15.1	-12	11	6.6	81.3
-57	1	0.6	1.2	-24	3	1.8	16.9	-11	5	3.0	84.3
-44	1	0.6	1.8	-23	5	3.0	19.9	-10	8	4.8	89.2
-42	1	0.6	2.4	-22	7	4.2	24.1	-9	2	1.2	90.4
-39	2	1.2	3.6	-21	3	1.8	25.9	-8	2	1.2	91.6
-38	1	0.6	4.2	-20	9	5.4	31.3	-7	3	1.8	93.4
-35	1	0.6	4.8	-19	5	3.0	34.3	-6	2	1.2	94.6
-34	3	1.8	6.6	-18	7	4.2	38.6	-5	2	1.2	95.8
-32	3	1.8	8.4	-17	13	7.8	46.4	-4	3	1.8	97.6
-30	3	1.8	10.2	-16	11	6.6	53.0	-2	2	1.2	98.8
-28	1	0.6	10.8	-15	16	9.6	62.7	0	1	0.6	99.4
-27	1	0.6	11.4	-14	11	6.6	69.3	20	1	0.6	100.0
-26	3	1.8	13.3	-13	9	5.4	74.7				

TABLE B-8
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
ALTITUDE CHANGE RATE
(100 FT/MIN)

VARIABLE=ZDOT

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
-228	1	0.4	0.4
-151	1	0.4	0.7
-147	1	0.4	1.1
-146	1	0.4	1.4
-123	1	0.4	1.8
-94	1	0.4	2.2
-93	1	0.4	2.5
-80	1	0.4	2.9
-73	1	0.4	3.3
-71	1	0.4	3.6
-67	1	0.4	4.0
-61	1	0.4	4.3
-60	1	0.4	4.7
-59	1	0.4	5.1
-58	1	0.4	5.4
-57	1	0.4	5.8
-56	1	0.4	6.2
-55	1	0.4	6.5
-54	1	0.4	6.9
-50	4	1.4	8.3
-47	4	1.4	9.8
-44	1	0.4	10.1
-43	1	0.4	10.5
-42	1	0.4	10.9

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
-40	3	1.1	12.0
-39	2	0.7	12.7
-38	1	0.4	13.0
-37	2	0.7	13.8
-35	4	1.4	15.2
-34	4	1.4	16.7
-33	1	0.4	17.0
-32	4	1.4	18.5
-30	5	1.8	20.3
-29	1	0.4	20.7
-28	5	1.8	22.5
-27	3	1.1	23.6
-26	5	1.8	25.4
-25	4	1.4	26.8
-24	3	1.1	27.9
-23	6	2.2	30.1
-22	7	2.5	32.6
-21	3	1.1	33.7
-20	12	4.3	38.0
-19	8	2.9	40.9
-18	8	2.9	43.8
-17	15	5.4	49.3
-16	14	5.1	54.3
-15	19	6.9	61.2

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
-14	13	4.7	65.9
-13	11	4.0	69.9
-12	11	4.0	73.9
-11	7	2.5	76.4
-10	11	4.0	80.4
-9	5	1.8	82.2
-8	4	1.4	83.7
-7	5	1.8	85.5
-6	3	1.1	86.6
-5	7	2.5	89.1
-4	3	1.1	90.2
-2	5	1.8	92.0
-1	2	0.7	92.8
0	10	3.6	96.4
4	1	0.4	96.7
6	1	0.4	97.1
7	1	0.4	97.5
10	1	0.4	97.8
15	1	0.4	98.2
18	1	0.4	98.6
20	1	0.4	98.9
29	1	0.4	99.3
35	1	0.4	99.6
38	1	0.4	100.0

TABLE B-9
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
DISTANCE TO VERTICAL ENTRY
(HUNDREDS OF FEET)

VARIABLE=DVIN

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
-64.94	1	1.3	1.3
-61.75	1	1.3	2.5
-56.75	1	1.3	3.8
-33.44	1	1.3	5.1
-26	1	1.3	6.3
-20	1	1.3	7.6
-18.32	1	1.3	8.9
-17	1	1.3	10.1
-15	1	1.3	11.4
-14	1	1.3	12.7
-13	1	1.3	13.9
-10	1	1.3	15.2
-9.63	1	1.3	16.5
-9	1	1.3	17.7
-7	1	1.3	19.0
-5	5	6.3	25.3
-2	1	1.3	26.6
-1.5	3	3.8	30.4
-1	2	2.5	32.9
0	2	2.5	35.4
0.5	1	1.3	36.7
1	3	3.8	40.5
2	3	3.8	44.3
4	1	1.3	45.6
5	1	1.3	46.8
7	1	1.3	48.1
8.34	1	1.3	49.4
10	1	1.3	50.6
11	1	1.3	51.9
12	1	1.3	53.2
12.84	1	1.3	54.4
13.59	1	1.3	55.7
14	1	1.3	57.0
14.28	1	1.3	58.2
15	1	1.3	59.5
16	1	1.3	60.8
17.96	1	1.3	62.0
18.46	1	1.3	63.3
19.37	1	1.3	64.6
23.06	1	1.3	65.8
24	1	1.3	67.1
24.21	1	1.3	68.4
25	1	1.3	69.6
30	2	2.5	72.2
32	1	1.3	73.4
33.18	1	1.3	74.7
34	1	1.3	75.9
34.5	1	1.3	77.2
37.15	1	1.3	78.5
41.25	1	1.3	79.7
47	2	2.5	82.3
50.59	1	1.3	83.5
50.96	1	1.3	84.8
51	1	1.3	86.1
56	1	1.3	87.3
57	1	1.3	88.6
59.4	1	1.3	89.9
60.21	1	1.3	91.1
65.78	1	1.3	92.4
67	1	1.3	93.7
68.65	1	1.3	94.9
71	1	1.3	96.2
71.28	1	1.3	97.5
79	1	1.3	98.7
85.71	1	1.3	100.0

TABLE B-10
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
DISTANCE TO VERTICAL ENTRY
(HUNDREDS OF FEET)

VARIABLE=DVIN

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
-23	1	3.2	3.2	25.9	1	3.2	38.7	49.78	1	3.2	74.2
-0.1	1	3.2	6.5	27.03	1	3.2	41.9	51.71	1	3.2	77.4
1.5	1	3.2	9.7	28.59	1	3.2	45.2	52.31	1	3.2	80.6
8.18	1	3.2	12.9	28.68	1	3.2	48.4	53.87	1	3.2	83.9
16.53	1	3.2	16.1	32.18	1	3.2	51.6	59.06	1	3.2	87.1
16.71	1	3.2	19.4	38.28	1	3.2	54.8	61.18	1	3.2	90.3
17.62	1	3.2	22.6	42.46	1	3.2	58.1	64.43	1	3.2	93.5
17.71	1	3.2	25.8	43.56	1	3.2	61.3	68.68	1	3.2	96.8
18	1	3.2	29.0	45.81	1	3.2	64.5	77.46	1	3.2	100.0
24	1	3.2	32.3	46.59	1	3.2	67.7				
25.18	1	3.2	35.5	49.65	1	3.2	71.0				

TABLE B-11
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
DISTANCE TO VERTICAL ENTRY
(HUNDREDS OF FEET)

VARIABLE=DVIN

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
-12	1	0.6	0.6	16	1	0.6	24.1	26	5	3.0	60.8
-7	1	0.6	1.2	16.93	4	2.4	26.5	26.59	2	1.2	62.0
1	3	1.8	3.0	17	5	3.0	29.5	26.78	1	0.6	62.7
1.34	1	0.6	3.6	17.68	1	0.6	30.1	26.9	1	0.6	63.3
1.62	1	0.6	4.2	17.93	2	1.2	31.3	27	1	0.6	63.9
2	1	0.6	4.8	18	1	0.6	31.9	27.03	1	0.6	64.5
3	1	0.6	5.4	19	2	1.2	33.1	27.62	1	0.6	65.1
4.46	1	0.6	6.0	20	3	1.8	34.9	27.87	1	0.6	65.7
5	1	0.6	6.6	20.43	1	0.6	35.5	27.9	1	0.6	66.3
8.46	1	0.6	7.2	20.5	1	0.6	36.1	27.96	1	0.6	66.9
8.5	1	0.6	7.8	20.78	1	0.6	36.7	28	1	0.6	67.5
9	1	0.6	8.4	21	4	2.4	39.2	28.12	1	0.6	68.1
9.87	1	0.6	9.0	21.25	1	0.6	39.8	28.34	1	0.6	68.7
9.96	1	0.6	9.6	21.5	1	0.6	40.4	28.78	1	0.6	69.3
10	2	1.2	10.8	21.65	1	0.6	41.0	28.81	1	0.6	69.9
10.5	1	0.6	11.4	22	2	1.2	42.2	28.87	1	0.6	70.5
11	1	0.6	12.0	22.03	1	0.6	42.8	28.9	1	0.6	71.1
11.9	1	0.6	12.7	22.68	1	0.6	43.4	28.96	1	0.6	71.7
12	1	0.6	13.3	23	3	1.8	45.2	29	1	0.6	72.3
12.68	1	0.6	13.9	23.43	2	1.2	46.4	29.9	1	0.6	72.9
13.56	1	0.6	14.5	23.5	2	1.2	47.6	30	1	0.6	73.5
13.62	1	0.6	15.1	23.78	1	0.6	48.2	30.34	1	0.6	74.1
13.87	1	0.6	15.7	23.93	1	0.6	48.8	31	1	0.6	74.7
14.18	1	0.6	16.3	24	2	1.2	50.0	31.59	1	0.6	75.3
14.46	2	1.2	17.5	24.18	1	0.6	50.6	31.71	2	1.2	76.5
14.56	1	0.6	18.1	24.5	1	0.6	51.2	31.96	1	0.6	77.1
14.71	1	0.6	18.7	24.81	1	0.6	51.8	32	2	1.2	78.3
14.84	1	0.6	19.3	24.93	1	0.6	52.4	32.15	1	0.6	78.9
14.87	1	0.6	19.9	24.96	1	0.6	53.0	32.5	1	0.6	79.5
14.9	1	0.6	20.5	25	3	1.8	54.8	32.59	1	0.6	80.1
15	2	1.2	21.7	25.46	2	1.2	56.0	33	4	2.4	82.5
15.56	1	0.6	22.3	25.5	1	0.6	56.6	33.81	1	0.6	83.1
15.87	1	0.6	22.9	25.65	1	0.6	57.2	33.9	1	0.6	83.7
15.93	1	0.6	23.5	25.93	1	0.6	57.8	33.93	1	0.6	84.3

TABLE B-11
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
DISTANCE TO VERTICAL ENTRY
(HUNDREDS OF FEET)
(CONCLUDED)

VARIABLE=DVIN

FREQUENCY TABLE (CONT.)

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
34	3	1.8	86.1
34.59	1	0.6	86.7
34.75	1	0.6	87.3
35.84	1	0.6	88.0
36	1	0.6	88.6
37	1	0.6	89.2
37.53	1	0.6	89.8
38	2	1.2	91.0
39	1	0.6	91.6
39.78	1	0.6	92.2
39.96	1	0.6	92.8
40	2	1.2	94.0
42	1	0.6	94.6
42.96	1	0.6	95.2
44.09	1	0.6	95.8
47.59	1	0.6	96.4
48.06	1	0.6	97.0
51	1	0.6	97.6
51.96	1	0.6	98.2
59.75	1	0.6	98.8
69.06	1	0.6	99.4
74.21	1	0.6	100.0

TABLE B-12
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
DISTANCE TO VERTICAL ENTRY
(HUNDREDS OF FEET)

VARIABLE=DVIN

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
-64.94	1	0.4	0.4
-61.75	1	0.4	0.7
-56.75	1	0.4	1.1
-33.44	1	0.4	1.4
-26	1	0.4	1.8
-23	1	0.4	2.2
-20	1	0.4	2.5
-18.32	1	0.4	2.9
-17	1	0.4	3.3
-15	1	0.4	3.6
-14	1	0.4	4.0
-13	1	0.4	4.3
-12	1	0.4	4.7
-10	1	0.4	5.1
-9.63	1	0.4	5.4
-9	1	0.4	5.8
-7	2	0.7	6.5
-5	5	1.8	8.3
-2	1	0.4	8.7
-1.5	3	1.1	9.8
-1	2	0.7	10.5
-0.1	1	0.4	10.9
0	2	0.7	11.6
0.5	1	0.4	12.0
1	6	2.2	14.1
1.34	1	0.4	14.5
1.5	1	0.4	14.9
1.62	1	0.4	15.2
2	4	1.4	16.7
3	1	0.4	17.0
4	1	0.4	17.4
4.46	1	0.4	17.8
5	2	0.7	18.5
7	1	0.4	18.8

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
8.18	1	0.4	19.2
8.34	1	0.4	19.6
8.46	1	0.4	19.9
8.5	1	0.4	20.3
9	1	0.4	20.7
9.87	1	0.4	21.0
9.96	1	0.4	21.4
10	3	1.1	22.5
10.5	1	0.4	22.8
11	2	0.7	23.6
11.9	1	0.4	23.9
12	2	0.7	24.6
12.68	1	0.4	25.0
12.84	1	0.4	25.4
13.56	1	0.4	25.7
13.59	1	0.4	26.1
13.62	1	0.4	26.4
13.87	1	0.4	26.8
14	1	0.4	27.2
14.18	1	0.4	27.5
14.28	1	0.4	27.9
14.46	2	0.7	28.6
14.56	1	0.4	29.0
14.71	1	0.4	29.3
14.84	1	0.4	29.7
14.87	1	0.4	30.1
14.9	1	0.4	30.4
15	3	1.1	31.5
15.56	1	0.4	31.9
15.87	1	0.4	32.2
15.93	1	0.4	32.6
16	2	0.7	33.3
16.53	1	0.4	33.7
16.71	1	0.4	34.1

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
16.93	4	1.4	35.5
17	5	1.8	37.3
17.62	1	0.4	37.7
17.68	1	0.4	38.0
17.71	1	0.4	38.4
17.93	2	0.7	39.1
17.96	1	0.4	39.5
18	2	0.7	40.2
18.46	1	0.4	40.6
19	2	0.7	41.3
19.37	1	0.4	41.7
20	3	1.1	42.8
20.43	1	0.4	43.1
20.5	1	0.4	43.5
20.78	1	0.4	43.8
21	4	1.4	45.3
21.25	1	0.4	45.7
21.5	1	0.4	46.0
21.65	1	0.4	46.4
22	2	0.7	47.1
22.03	1	0.4	47.5
22.68	1	0.4	47.8
23	3	1.1	48.9
23.06	1	0.4	49.3
23.43	2	0.7	50.0
23.5	2	0.7	50.7
23.78	1	0.4	51.1
23.93	1	0.4	51.4
24	4	1.4	52.9
24.18	1	0.4	53.3
24.21	1	0.4	53.6
24.5	1	0.4	54.0
24.81	1	0.4	54.3
24.93	1	0.4	54.7

TABLE B-12
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
DISTANCE TO VERTICAL ENTRY
(HUNDREDS OF FEET)
(CONCLUDED)

VARIABLE=DVIN

FREQUENCY TABLE (CONT.)

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
24.96	1	0.4	55.1
25	4	1.4	56.5
25.18	1	0.4	56.9
25.46	2	0.7	57.6
25.5	1	0.4	58.0
25.65	1	0.4	58.3
25.9	1	0.4	58.7
25.93	1	0.4	59.1
26	5	1.8	60.9
26.59	2	0.7	61.6
26.78	1	0.4	62.0
26.9	1	0.4	62.3
27	1	0.4	62.7
27.03	2	0.7	63.4
27.62	1	0.4	63.8
27.87	1	0.4	64.1
27.9	1	0.4	64.5
27.96	1	0.4	64.9
28	1	0.4	65.2
28.12	1	0.4	65.6
28.34	1	0.4	65.9
28.59	1	0.4	66.3
28.68	1	0.4	66.7
28.78	1	0.4	67.0
28.81	1	0.4	67.4
28.87	1	0.4	67.8
28.9	1	0.4	68.1
28.96	1	0.4	68.5
29	1	0.4	68.8
29.9	1	0.4	69.2
30	3	1.1	70.3
30.34	1	0.4	70.7
31	1	0.4	71.0
31.59	1	0.4	71.4
31.71	2	0.7	72.1
31.96	1	0.4	72.5
32	3	1.1	73.6
32.15	1	0.4	73.9
32.18	1	0.4	74.3
32.5	1	0.4	74.6
32.59	1	0.4	75.0
33	4	1.4	76.4
33.18	1	0.4	76.8
33.81	1	0.4	77.2
33.9	1	0.4	77.5
33.93	1	0.4	77.9
34	4	1.4	79.3
34.5	1	0.4	79.7
34.59	1	0.4	80.1
34.75	1	0.4	80.4
35.84	1	0.4	80.8
36	1	0.4	81.2
37	1	0.4	81.5
37.15	1	0.4	81.9
37.53	1	0.4	82.2
38	2	0.7	83.0
38.28	1	0.4	83.3
39	1	0.4	83.7
39.78	1	0.4	84.1
39.96	1	0.4	84.4
40	2	0.7	85.1
41.25	1	0.4	85.5
42	1	0.4	85.9
42.46	1	0.4	86.2
42.96	1	0.4	86.6
43.56	1	0.4	87.0
44.09	1	0.4	87.3
45.81	1	0.4	87.7
46.59	1	0.4	88.0
47	2	0.7	88.8
47.59	1	0.4	89.1
48.06	1	0.4	89.5
49.65	1	0.4	89.9
49.78	1	0.4	90.2
50.59	1	0.4	90.6
50.96	1	0.4	90.9
51	2	0.7	91.7
51.71	1	0.4	92.0
51.96	1	0.4	92.4
52.31	1	0.4	92.8
53.87	1	0.4	93.1
56	1	0.4	93.5
57	1	0.4	93.8
59.06	1	0.4	94.2
59.4	1	0.4	94.6
59.75	1	0.4	94.9
60.21	1	0.4	95.3
61.18	1	0.4	95.7
64.43	1	0.4	96.0
65.78	1	0.4	96.4
67	1	0.4	96.7
68.65	1	0.4	97.1
68.68	1	0.4	97.5
69.06	1	0.4	97.8
71	1	0.4	98.2
71.28	1	0.4	98.6
74.21	1	0.4	98.9
77.46	1	0.4	99.3
79	1	0.4	99.6
85.71	1	0.4	100.0

TABLE B-13
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
DISTANCE TO LATERAL ENTRY
(NAUTICAL MILES)

VARIABLE=DLIN

FREQUENCY TABLE

		PERCENTS				PERCENTS				PERCENTS	
VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM
0	63	79.7	79.7	1.73722	1	1.3	87.3	6.78944	1	1.3	94.9
0.17	1	1.3	81.0	1.86833	1	1.3	88.6	9.13417	1	1.3	96.2
0.262222	1	1.3	82.3	1.89333	1	1.3	89.9	9.515	1	1.3	97.5
0.704167	1	1.3	83.5	1.92306	1	1.3	91.1	10.07	1	1.3	98.7
1.255	1	1.3	84.8	4.095	1	1.3	92.4	11.2089	1	1.3	100.0
1.45528	1	1.3	86.1	4.49556	1	1.3	93.7				

TABLE B-14
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
DISTANCE TO LATERAL ENTRY
(NAUTICAL MILES)

VARIABLE=DLIN

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0	19	61.3	61.3
0.221111	1	3.2	64.5
0.846389	1	3.2	67.7
2.62056	1	3.2	71.0
2.71333	1	3.2	74.2
3.225	1	3.2	77.4
3.33556	1	3.2	80.6
3.54167	1	3.2	83.9
3.99667	1	3.2	87.1
4.84944	1	3.2	90.3
5.46361	1	3.2	93.5
6.54	1	3.2	96.8
7.52778	1	3.2	100.0

TABLE B-15
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
DISTANCE TO LATERAL ENTRY
(NAUTICAL MILES)

VARIABLE=DLIN

FREQUENCY TABLE

		PERCENTS				PERCENTS				PERCENTS	
VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM
0	119	71.7	71.7	2.	1	0.6	81.3	3.93361	1	0.6	91.0
.07	1	0.6	72.3	2.01167	1	0.6	81.9	4.00833	1	0.6	91.6
0.135	1	0.6	72.9	2.17861	1	0.6	82.5	4.02778	1	0.6	92.2
0.159444	1	0.6	73.5	2.21833	1	0.6	83.1	4.16667	1	0.6	92.8
0.56	1	0.6	74.1	2.23	1	0.6	83.7	4.28417	1	0.6	93.4
0.605	1	0.6	74.7	2.26667	1	0.6	84.3	4.44	1	0.6	94.0
0.721111	1	0.6	75.3	2.53111	1	0.6	84.9	4.65833	1	0.6	94.6
0.776667	1	0.6	75.9	2.55556	1	0.6	85.5	4.71361	1	0.6	95.2
0.91	1	0.6	76.5	2.90278	1	0.6	86.1	5.01111	1	0.6	95.8
1.21667	1	0.6	77.1	2.92222	1	0.6	86.7	5.28	1	0.6	96.4
1.31278	1	0.6	77.7	3.045	1	0.6	87.3	5.68611	1	0.6	97.0
1.46667	1	0.6	78.3	3.325	1	0.6	88.0	5.94611	1	0.6	97.6
1.485	1	0.6	78.9	3.5125	1	0.6	88.6	6.22417	1	0.6	98.2
1.67556	1	0.6	79.5	3.57139	1	0.6	89.2	6.32	1	0.6	98.8
1.80556	1	0.6	80.1	3.7525	1	0.6	89.8	6.43889	1	0.6	99.4
1.87917	1	0.6	80.7	3.79556	1	0.6	90.4	7.69833	1	0.6	100.0

TABLE B-16
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
DISTANCE TO LATERAL ENTRY
(NAUTICAL MILES)

VARIABLE=DLIN

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0	201	72.8	72.8
.07	1	0.4	73.2
0.135	1	0.4	73.6
0.159444	1	0.4	73.9
0.17	1	0.4	74.3
0.221111	1	0.4	74.6
0.262222	1	0.4	75.0
0.56	1	0.4	75.4
0.605	1	0.4	75.7
0.704167	1	0.4	76.1
0.721111	1	0.4	76.4
0.776667	1	0.4	76.8
0.846389	1	0.4	77.2
0.91	1	0.4	77.5
1.21667	1	0.4	77.9
1.255	1	0.4	78.3
1.31278	1	0.4	78.6
1.45528	1	0.4	79.0
1.46667	1	0.4	79.3
1.485	1	0.4	79.7
1.67556	1	0.4	80.1
1.73722	1	0.4	80.4
1.80556	1	0.4	80.8
1.86833	1	0.4	81.2
1.87917	1	0.4	81.5
1.89333	1	0.4	81.9
1.92306	1	0.4	82.2
2	1	0.4	82.6
2.01167	1	0.4	83.0
2.17861	1	0.4	83.3
2.21833	1	0.4	83.7
2.23	1	0.4	84.1
2.26667	1	0.4	84.4
2.53111	1	0.4	84.8
2.55556	1	0.4	85.1
2.62056	1	0.4	85.5
2.71333	1	0.4	85.9
2.90278	1	0.4	86.2
2.92222	1	0.4	86.6
3.045	1	0.4	87.0
3.225	1	0.4	87.3
3.325	1	0.4	87.7
3.33556	1	0.4	88.0
3.5125	1	0.4	88.4
3.54167	1	0.4	88.8
3.57139	1	0.4	89.1
3.7525	1	0.4	89.5
3.79556	1	0.4	89.9
3.93361	1	0.4	90.2
3.99667	1	0.4	90.6
4.00833	1	0.4	90.9
4.02778	1	0.4	91.3
4.095	1	0.4	91.7
4.16667	1	0.4	92.0
4.28417	1	0.4	92.4
4.44	1	0.4	92.8
4.49556	1	0.4	93.1
4.65833	1	0.4	93.5
4.71361	1	0.4	93.8
4.84944	1	0.4	94.2
5.01111	1	0.4	94.6
5.28	1	0.4	94.9
5.46361	1	0.4	95.3
5.68611	1	0.4	95.7
5.94611	1	0.4	96.0
6.22417	1	0.4	96.4
6.32	1	0.4	96.7
6.43889	1	0.4	97.1
6.54	1	0.4	97.5
6.78944	1	0.4	97.8
7.52778	1	0.4	98.2
7.69833	1	0.4	98.6
9.13417	1	0.4	98.9
9.515	1	0.4	99.3
10.07	1	0.4	99.6
11.2089	1	0.4	100.0

TABLE B-17
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
DISTANCE BETWEEN LATERAL ENTRY AND LATERAL EXIT
(NAUTICAL MILES)

VARIABLE=DELTALIN

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0.19	1	1.3	1.3	9.68528	1	1.3	35.4	19.57	1	1.3	69.6
0.356667	1	1.3	2.5	10.0833	1	1.3	36.7	19.8917	1	1.3	70.9
0.986667	1	1.3	3.8	10.2267	1	1.3	38.0	20.24	1	1.3	72.2
1.25	1	1.3	5.1	10.3653	1	1.3	39.2	20.5978	1	1.3	73.4
1.45778	1	1.3	6.3	10.3756	1	1.3	40.5	20.8853	1	1.3	74.7
2.16	1	1.3	7.6	10.4675	1	1.3	41.8	21.6278	1	1.3	75.9
2.81417	1	1.3	8.9	11.3411	1	1.3	43.0	23.7936	1	1.3	77.2
2.87083	1	1.3	10.1	11.3775	1	1.3	44.3	25.9544	1	1.3	78.5
3.57333	1	1.3	11.4	11.44	1	1.3	45.6	27.64	1	1.3	79.7
3.69	1	1.3	12.7	11.47	1	1.3	46.8	28.135	1	1.3	81.0
3.95111	1	1.3	13.9	11.6533	1	1.3	48.1	29.4011	1	1.3	82.3
4.2	1	1.3	15.2	12.8489	1	1.3	49.4	30.7125	1	1.3	83.5
4.80611	1	1.3	16.5	12.8808	1	1.3	50.6	31.4283	1	1.3	84.8
5.20778	1	1.3	17.7	12.9767	1	1.3	51.9	35.0067	1	1.3	86.1
5.83111	1	1.3	19.0	13.0983	1	1.3	53.2	35.52	1	1.3	87.3
6.0975	1	1.3	20.3	13.5417	1	1.3	54.4	35.595	1	1.3	88.6
6.2	1	1.3	21.5	13.7347	1	1.3	55.7	35.7675	1	1.3	89.9
6.2525	1	1.3	22.8	14.1625	1	1.3	57.0	36.0967	1	1.3	91.1
6.29278	1	1.3	24.1	14.2875	1	1.3	58.2	39.6028	1	1.3	92.4
6.77333	1	1.3	25.3	14.5667	1	1.3	59.5	40.2375	1	1.3	93.7
7.72167	1	1.3	26.6	14.9661	1	1.3	60.8	41.3833	1	1.3	94.9
7.91583	1	1.3	27.8	15.54	1	1.3	62.0	42.18	1	1.3	96.2
8.04444	1	1.3	29.1	16.4067	1	1.3	63.3	43.5175	1	1.3	97.5
8.35	1	1.3	30.4	16.5142	1	1.3	64.6	45.9128	1	1.3	98.7
8.41667	1	1.3	31.6	17.5678	1	1.3	65.8	50.2717	1	1.3	100.0
8.97	1	1.3	32.9	19.1475	1	1.3	67.1				
9.6525	1	1.3	34.2	19.5289	1	1.3	68.4				

TABLE B-18
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
DISTANCE BETWEEN LATERAL ENTRY AND LATERAL EXIT
(NAUTICAL MILES)

VARIABLE=DELTALIN

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
2.79	1	3.2	3.2
6.50611	1	3.2	6.5
7.76389	1	3.2	9.7
11.61	1	3.2	12.9
11.6892	1	3.2	16.1
13.1992	1	3.2	19.4
13.4583	1	3.2	22.6
13.6961	1	3.2	25.8
14.1067	1	3.2	29.0
16.0539	1	3.2	32.3
17.0767	1	3.2	35.5
19.9358	1	3.2	38.7
20.4344	1	3.2	41.9
20.4528	1	3.2	45.2
23.865	1	3.2	48.4
26.3625	1	3.2	51.6
31.3194	1	3.2	54.8
34.2867	1	3.2	58.1
37.7361	1	3.2	61.3
39.96	1	3.2	64.5
49.06	1	3.2	67.7
51.4831	1	3.2	71.0
55.8639	1	3.2	74.2
57.0158	1	3.2	77.4
57.1342	1	3.2	80.6
57.8375	1	3.2	83.9
61.7094	1	3.2	87.1
63.9889	1	3.2	90.3
64.5131	1	3.2	93.5
65.8333	1	3.2	96.8
84.3544	1	3.2	100.0

TABLE B-19
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
DISTANCE BETWEEN LATERAL ENTRY AND LATERAL EXIT
(NAUTICAL MILES)

VARIABLE=DELTALIN

FREQUENCY TABLE

		PERCENTS				PERCENTS				PERCENTS	
VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM
1.98056	1	0.6	0.6	10.7644	1	0.6	21.1	14.8611	1	0.6	41.6
3.32111	1	0.6	1.2	10.8694	1	0.6	21.7	15.2269	1	0.6	42.2
3.51861	1	0.6	1.8	11.1233	1	0.6	22.3	15.375	1	0.6	42.8
3.78611	1	0.6	2.4	11.1289	1	0.6	22.9	15.5278	1	0.6	43.4
4.57333	1	0.6	3.0	11.2233	1	0.6	23.5	15.6	2	1.2	44.6
5.225	1	0.6	3.6	11.3433	1	0.6	24.1	16.1067	1	0.6	45.2
5.24833	1	0.6	4.2	11.4003	1	0.6	24.7	16.3417	1	0.6	45.8
5.74389	1	0.6	4.8	11.4325	1	0.6	25.3	16.675	1	0.6	46.4
6.325	1	0.6	5.4	11.47	1	0.6	25.9	16.73	1	0.6	47.0
6.6125	1	0.6	6.0	11.5417	1	0.6	26.5	16.7833	1	0.6	47.6
7.36	1	0.6	6.6	11.7025	1	0.6	27.1	17.43	1	0.6	48.2
7.41667	1	0.6	7.2	11.8044	1	0.6	27.7	17.6111	1	0.6	48.8
7.46167	1	0.6	7.8	11.8656	1	0.6	28.3	17.6733	1	0.6	49.4
7.6125	1	0.6	8.4	11.9756	1	0.6	28.9	17.68	1	0.6	50.0
7.85778	1	0.6	9.0	12.3808	1	0.6	29.5	17.7375	1	0.6	50.6
7.99	1	0.6	9.6	12.4156	1	0.6	30.1	17.9375	1	0.6	51.2
8.04667	1	0.6	10.2	12.5192	1	0.6	30.7	18.6106	1	0.6	51.8
8.13167	1	0.6	10.8	12.5264	1	0.6	31.3	18.6994	1	0.6	52.4
8.2	1	0.6	11.4	12.5669	1	0.6	31.9	18.705	1	0.6	53.0
8.31111	1	0.6	12.0	12.6	1	0.6	32.5	18.8	1	0.6	53.6
8.37861	1	0.6	12.7	12.7417	1	0.6	33.1	18.8244	1	0.6	54.2
8.76	1	0.6	13.3	12.8736	1	0.6	33.7	18.8325	1	0.6	54.8
8.88333	1	0.6	13.9	13.2419	1	0.6	34.3	18.995	1	0.6	55.4
9.41417	1	0.6	14.5	13.3039	1	0.6	34.9	18.9958	1	0.6	56.0
9.89972	1	0.6	15.1	13.5528	1	0.6	35.5	19.1736	1	0.6	56.6
10.0528	1	0.6	15.7	13.8889	1	0.6	36.1	19.8886	1	0.6	57.2
10.0694	1	0.6	16.3	14.025	1	0.6	36.7	20.1583	1	0.6	57.8
10.0725	1	0.6	16.9	14.03	1	0.6	37.3	20.1697	1	0.6	58.4
10.175	1	0.6	17.5	14.105	1	0.6	38.0	20.6367	1	0.6	59.0
10.1842	1	0.6	18.1	14.3206	1	0.6	38.6	20.65	1	0.6	59.6
10.4	1	0.6	18.7	14.3344	1	0.6	39.2	20.6747	1	0.6	60.2
10.5497	1	0.6	19.3	14.3775	1	0.6	39.8	20.925	1	0.6	60.8
10.75	1	0.6	19.9	14.5483	1	0.6	40.4	21.01	1	0.6	61.4
10.7625	1	0.6	20.5	14.56	1	0.6	41.0	21.1178	1	0.6	62.0

TABLE B-19
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
DISTANCE BETWEEN LATERAL ENTRY AND LATERAL EXIT
(NAUTICAL MILES)
(CONCLUDED)

VARIABLE=DELTALIN

FREQUENCY TABLE (CONT.)

		PERCENTS				PERCENTS				PERCENTS	
VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM
21.1422	1	0.6	62.7	26.8333	1	0.6	75.3	44.4642	1	0.6	88.0
21.1833	1	0.6	63.3	27.1333	1	0.6	75.9	45.5778	1	0.6	88.6
21.39	1	0.6	63.9	28.7239	1	0.6	76.5	45.6042	1	0.6	89.2
21.5825	1	0.6	64.5	29.0244	1	0.6	77.1	45.6592	1	0.6	89.8
21.8467	1	0.6	65.1	29.2361	1	0.6	77.7	45.9378	1	0.6	90.4
21.9897	1	0.6	65.7	30.3733	1	0.6	78.3	46.3644	1	0.6	91.0
22.24	1	0.6	66.3	30.8578	1	0.6	78.9	46.4722	1	0.6	91.6
22.8267	1	0.6	66.9	32.8194	1	0.6	79.5	48.0706	1	0.6	92.2
22.8669	1	0.6	67.5	34.3506	1	0.6	80.1	48.1767	1	0.6	92.8
22.9778	1	0.6	68.1	34.4772	1	0.6	80.7	49.1792	1	0.6	93.4
23.01	1	0.6	68.7	36.9942	1	0.6	81.3	50.0133	1	0.6	94.0
23.14	1	0.6	69.3	37.7361	1	0.6	81.9	50.4586	1	0.6	94.6
23.1725	1	0.6	69.9	37.7942	1	0.6	82.5	51.6267	1	0.6	95.2
23.2711	1	0.6	70.5	38.5625	1	0.6	83.1	52.9444	1	0.6	95.8
23.275	1	0.6	71.1	39.0133	1	0.6	83.7	53.845	1	0.6	96.4
23.2986	1	0.6	71.7	39.4586	1	0.6	84.3	54.1344	1	0.6	97.0
23.3025	1	0.6	72.3	39.7017	1	0.6	84.9	54.4828	1	0.6	97.6
24.0161	1	0.6	72.9	41.1542	1	0.6	85.5	54.5956	1	0.6	98.2
24.8058	1	0.6	73.5	41.5492	1	0.6	86.1	56.9444	1	0.6	98.8
25.22	1	0.6	74.1	41.8244	1	0.6	86.7	61.2189	1	0.6	99.4
25.6514	1	0.6	74.7	43.5728	1	0.6	87.3	61.6597	1	0.6	100.0

TABLE B-20
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
DISTANCE BETWEEN LATERAL ENTRY AND LATERAL EXIT
(NAUTICAL MILES)

VARIABLE=DELTALIN

FREQUENCY TABLE

		PERCENTS				PERCENTS				PERCENTS	
VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM
0.19	1	0.4	0.4	7.46167	1	0.4	12.7	10.75	1	0.4	25.0
0.356667	1	0.4	0.7	7.6125	1	0.4	13.0	10.7625	1	0.4	25.4
0.986667	1	0.4	1.1	7.72167	1	0.4	13.4	10.7644	1	0.4	25.7
1.25	1	0.4	1.4	7.76389	1	0.4	13.8	10.8694	1	0.4	26.1
1.45778	1	0.4	1.8	7.85778	1	0.4	14.1	11.1233	1	0.4	26.4
1.98056	1	0.4	2.2	7.91583	1	0.4	14.5	11.1289	1	0.4	26.8
2.16	1	0.4	2.5	7.99	1	0.4	14.9	11.2233	1	0.4	27.2
2.79	1	0.4	2.9	8.04444	1	0.4	15.2	11.3411	1	0.4	27.5
2.81417	1	0.4	3.3	8.04667	1	0.4	15.6	11.3433	1	0.4	27.9
2.87083	1	0.4	3.6	8.13167	1	0.4	15.9	11.3775	1	0.4	28.3
3.32111	1	0.4	4.0	8.2	1	0.4	16.3	11.4003	1	0.4	28.6
3.51861	1	0.4	4.3	8.31111	1	0.4	16.7	11.4325	1	0.4	29.0
3.57333	1	0.4	4.7	8.35	1	0.4	17.0	11.44	1	0.4	29.3
3.69	1	0.4	5.1	8.37861	1	0.4	17.4	11.47	2	0.7	30.1
3.78611	1	0.4	5.4	8.41667	1	0.4	17.8	11.5417	1	0.4	30.4
3.95111	1	0.4	5.8	8.76	1	0.4	18.1	11.61	1	0.4	30.8
4.2	1	0.4	6.2	8.88333	1	0.4	18.5	11.6533	1	0.4	31.2
4.57333	1	0.4	6.5	8.97	1	0.4	18.8	11.6892	1	0.4	31.5
4.80611	1	0.4	6.9	9.41417	1	0.4	19.2	11.7025	1	0.4	31.9
5.20778	1	0.4	7.2	9.6525	1	0.4	19.6	11.8044	1	0.4	32.2
5.225	1	0.4	7.6	9.68528	1	0.4	19.9	11.8656	1	0.4	32.6
5.24833	1	0.4	8.0	9.89972	1	0.4	20.3	11.9756	1	0.4	33.0
5.74389	1	0.4	8.3	10.0528	1	0.4	20.7	12.3808	1	0.4	33.3
5.83111	1	0.4	8.7	10.0694	1	0.4	21.0	12.4156	1	0.4	33.7
6.0975	1	0.4	9.1	10.0725	1	0.4	21.4	12.5192	1	0.4	34.1
6.2	1	0.4	9.4	10.0833	1	0.4	21.7	12.5264	1	0.4	34.4
6.2525	1	0.4	9.8	10.175	1	0.4	22.1	12.5669	1	0.4	34.8
6.29278	1	0.4	10.1	10.1842	1	0.4	22.5	12.6	1	0.4	35.1
6.325	1	0.4	10.5	10.2267	1	0.4	22.8	12.7417	1	0.4	35.5
6.50611	1	0.4	10.9	10.3653	1	0.4	23.2	12.8489	1	0.4	35.9
6.6125	1	0.4	11.2	10.3756	1	0.4	23.6	12.8736	1	0.4	36.2
6.77333	1	0.4	11.6	10.4	1	0.4	23.9	12.8808	1	0.4	36.6
7.36	1	0.4	12.0	10.4675	1	0.4	24.3	12.9767	1	0.4	37.0
7.41667	1	0.4	12.3	10.5497	1	0.4	24.6	13.0983	1	0.4	37.3

TABLE B-20
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
DISTANCE BETWEEN LATERAL ENTRY AND LATERAL EXIT
(NAUTICAL MILES)
(CONTINUED)

VARIABLE=DELTALIN

FREQUENCY TABLE (CONT.)

		PERCENTS				PERCENTS				PERCENTS	
VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM
13.1992	1	0.4	37.7	16.73	1	0.4	50.4	20.8853	1	0.4	62.7
13.2419	1	0.4	38.0	16.7833	1	0.4	50.7	20.925	1	0.4	63.0
13.3039	1	0.4	38.4	17.0767	1	0.4	51.1	21.01	1	0.4	63.4
13.4583	1	0.4	38.8	17.43	1	0.4	51.4	21.1178	1	0.4	63.8
13.5417	1	0.4	39.1	17.5678	1	0.4	51.8	21.1422	1	0.4	64.1
13.5528	1	0.4	39.5	17.6111	1	0.4	52.2	21.1833	1	0.4	64.5
13.6961	1	0.4	39.9	17.6733	1	0.4	52.5	21.39	1	0.4	64.9
13.7347	1	0.4	40.2	17.68	1	0.4	52.9	21.5825	1	0.4	65.2
13.8889	1	0.4	40.6	17.7375	1	0.4	53.3	21.6278	1	0.4	65.6
14.025	1	0.4	40.9	17.9375	1	0.4	53.6	21.8467	1	0.4	65.9
14.03	1	0.4	41.3	18.6106	1	0.4	54.0	21.9897	1	0.4	66.3
14.105	1	0.4	41.7	18.6994	1	0.4	54.3	22.24	1	0.4	66.7
14.1067	1	0.4	42.0	18.705	1	0.4	54.7	22.8267	1	0.4	67.0
14.1625	1	0.4	42.4	18.8	1	0.4	55.1	22.8669	1	0.4	67.4
14.2875	1	0.4	42.8	18.8244	1	0.4	55.4	22.9778	1	0.4	67.8
14.3206	1	0.4	43.1	18.8325	1	0.4	55.8	23.01	1	0.4	68.1
14.3344	1	0.4	43.5	18.995	1	0.4	56.2	23.14	1	0.4	68.5
14.3775	1	0.4	43.8	18.9958	1	0.4	56.5	23.1725	1	0.4	68.8
14.5483	1	0.4	44.2	19.1475	1	0.4	56.9	23.2711	1	0.4	69.2
14.56	1	0.4	44.6	19.1736	1	0.4	57.2	23.275	1	0.4	69.6
14.5667	1	0.4	44.9	19.5289	1	0.4	57.6	23.2986	1	0.4	69.9
14.8611	1	0.4	45.3	19.57	1	0.4	58.0	23.3025	1	0.4	70.3
14.9661	1	0.4	45.7	19.8886	1	0.4	58.3	23.7936	1	0.4	70.7
15.2269	1	0.4	46.0	19.8917	1	0.4	58.7	23.865	1	0.4	71.0
15.375	1	0.4	46.4	19.9358	1	0.4	59.1	24.0161	1	0.4	71.4
15.5278	1	0.4	46.7	20.1583	1	0.4	59.4	24.8058	1	0.4	71.7
15.54	1	0.4	47.1	20.1697	1	0.4	59.8	25.22	1	0.4	72.1
15.6	2	0.7	47.8	20.24	1	0.4	60.1	25.6514	1	0.4	72.5
16.0539	1	0.4	48.2	20.4344	1	0.4	60.5	25.9544	1	0.4	72.8
16.1067	1	0.4	48.6	20.4528	1	0.4	60.9	26.3625	1	0.4	73.2
16.3417	1	0.4	48.9	20.5978	1	0.4	61.2	26.8333	1	0.4	73.6
16.4067	1	0.4	49.3	20.6367	1	0.4	61.6	27.1333	1	0.4	73.9
16.5142	1	0.4	49.6	20.65	1	0.4	62.0	27.64	1	0.4	74.3
16.675	1	0.4	50.0	20.6747	1	0.4	62.3	28.135	1	0.4	74.6

TABLE B-20
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
DISTANCE BETWEEN LATERAL ENTRY AND LATERAL EXIT
(NAUTICAL MILES)
(CONCLUDED)

VARIABLE=DELTALIN

FREQUENCY TABLE (CONT.)

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
28.7239	1	0.4	75.0
29.0244	1	0.4	75.4
29.2361	1	0.4	75.7
29.4011	1	0.4	76.1
30.3733	1	0.4	76.4
30.7125	1	0.4	76.8
30.8578	1	0.4	77.2
31.3194	1	0.4	77.5
31.4283	1	0.4	77.9
32.8194	1	0.4	78.3
34.2867	1	0.4	78.6
34.3506	1	0.4	79.0
34.4772	1	0.4	79.3
35.0067	1	0.4	79.7
35.52	1	0.4	80.1
35.595	1	0.4	80.4
35.7675	1	0.4	80.8
36.0967	1	0.4	81.2
36.9942	1	0.4	81.5
37.7361	2	0.7	82.2
37.7942	1	0.4	82.6
38.5625	1	0.4	83.0
39.0133	1	0.4	83.3

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
39.4586	1	0.4	83.7
39.6028	1	0.4	84.1
39.7017	1	0.4	84.4
39.96	1	0.4	84.8
40.2375	1	0.4	85.1
41.1542	1	0.4	85.5
41.3833	1	0.4	85.9
41.5492	1	0.4	86.2
41.8244	1	0.4	86.6
42.18	1	0.4	87.0
43.5175	1	0.4	87.3
43.5728	1	0.4	87.7
44.4642	1	0.4	88.0
45.5778	1	0.4	88.4
45.6042	1	0.4	88.8
45.6592	1	0.4	89.1
45.9128	1	0.4	89.5
45.9378	1	0.4	89.9
46.3644	1	0.4	90.2
46.4722	1	0.4	90.6
48.0706	1	0.4	90.9
48.1767	1	0.4	91.3
49.06	1	0.4	91.7

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
49.1792	1	0.4	92.0
50.0133	1	0.4	92.4
50.2717	1	0.4	92.8
50.4586	1	0.4	93.1
51.4831	1	0.4	93.5
51.6267	1	0.4	93.8
52.9444	1	0.4	94.2
53.845	1	0.4	94.6
54.1344	1	0.4	94.9
54.4828	1	0.4	95.3
54.5956	1	0.4	95.7
55.8639	1	0.4	96.0
56.9444	1	0.4	96.4
57.0158	1	0.4	96.7
57.1342	1	0.4	97.1
57.8375	1	0.4	97.5
61.2189	1	0.4	97.8
61.6597	1	0.4	98.2
61.7094	1	0.4	98.6
63.9889	1	0.4	98.9
64.5131	1	0.4	99.3
65.8333	1	0.4	99.6
84.3544	1	0.4	100.0

TABLE B-21
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
EMSAW APPROACH PATTERN
(DEFINED IN FIGURE 3-1)

VARIABLE=APPROACH

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
1	8	10.1	10.1
2	43	54.4	64.6
4	8	10.1	74.7
5	8	10.1	84.8
6	12	15.2	100.0

TABLE B-22
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
EMSAW APPROACH PATTERN
(DEFINED IN FIGURE 3-1)

VARIABLE=APPROACH

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
1	9	29.0	29.0
2	17	54.8	83.9
4	1	3.2	87.1
6	1	3.2	90.3
7	3	9.7	100.0

TABLE B-23
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
EMSAW APPROACH PATTERN
(DEFINED IN FIGURE 3-1)

VARIABLE=APPROACH

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
1	46	27.7	27.7
2	118	71.1	98.8
4	1	0.6	99.4
5	1	0.6	100.0

TABLE B-24
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
EMSAW APPROACH PATTERN
(DEFINED IN FIGURE 3-1)

VARIABLE=APPROACH

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
1	63	22.8	22.8
2	178	64.5	87.3
4	10	3.6	90.9
5	9	3.3	94.2
6	13	4.7	98.9
7	3	1.1	100.0

TABLE B-25
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
LATERAL CROSSING ANGLE
(0 <= DEGREES <= 90)

VARIABLE=XANGLE

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
3	1	6.3	6.3	56	1	6.3	37.5	79	2	12.5	81.3
13	1	6.3	12.5	57	1	6.3	43.7	82	1	6.3	87.5
31	1	6.3	18.7	72	1	6.3	50.0	85	1	6.3	93.8
37	1	6.3	25.0	73	1	6.3	56.2	89	1	6.3	100.0
55	1	6.3	31.2	74	2	12.5	68.8				

TABLE B-26
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
LATERAL CROSSING ANGLE
(0 <= DEGREES <= 90)

VARIABLE=XANGLE

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
6	1	8.3	8.3	37	1	8.3	41.7	63	1	8.3	75.0
13	1	8.3	16.7	49	1	8.3	50.0	74	1	8.3	83.3
16	1	8.3	25.0	52	1	8.3	58.3	79	1	8.3	91.7
21	1	8.3	33.3	56	1	8.3	66.7	81	1	8.3	100.0

TABLE B-27
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
LATERAL CROSSING ANGLE
(0 <= DEGREES <= 90)

VARIABLE=XANGLE

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
16	1	2.1	2.1	54	2	4.3	34.0	73	2	4.3	66.0
20	1	2.1	4.3	57	1	2.1	36.2	75	1	2.1	68.1
22	1	2.1	6.4	58	1	2.1	38.3	78	3	6.4	74.5
24	1	2.1	8.5	59	1	2.1	40.4	80	1	2.1	76.6
31	1	2.1	10.6	60	1	2.1	42.6	81	1	2.1	78.7
32	1	2.1	12.8	61	1	2.1	44.7	82	1	2.1	80.9
38	1	2.1	14.9	65	1	2.1	46.8	83	3	6.4	87.2
44	1	2.1	17.0	66	2	4.3	51.1	84	2	4.3	91.5
46	1	2.1	19.1	68	1	2.1	53.2	85	2	4.3	95.7
47	2	4.3	23.4	69	2	4.3	57.4	86	1	2.1	97.9
49	2	4.3	27.7	71	1	2.1	59.6	89	1	2.1	100.0
53	1	2.1	29.8	72	1	2.1	61.7				

TABLE B-28
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
LATERAL CROSSING ANGLE
(0 <= DEGREES <= 90)

VARIABLE=XANGLE

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
3	1	1.3	1.3
6	1	1.3	2.7
13	2	2.7	5.3
16	2	2.7	8.0
20	1	1.3	9.3
21	1	1.3	10.7
22	1	1.3	12.0
24	1	1.3	13.3
31	2	2.7	16.0
32	1	1.3	17.3
37	2	2.7	20.0
38	1	1.3	21.3
44	1	1.3	22.7
46	1	1.3	24.0
47	2	2.7	26.7
49	3	4.0	30.7
52	1	1.3	32.0
53	1	1.3	33.3
54	2	2.7	36.0
55	1	1.3	37.3
56	2	2.7	40.0
57	2	2.7	42.7
58	1	1.3	44.0
59	1	1.3	45.3
60	1	1.3	46.7
61	1	1.3	48.0
63	1	1.3	49.3
65	1	1.3	50.7
66	2	2.7	53.3
68	1	1.3	54.7
69	2	2.7	57.3
71	1	1.3	58.7
72	2	2.7	61.3
73	3	4.0	65.3
74	3	4.0	69.3
75	1	1.3	70.7
78	3	4.0	74.7
79	3	4.0	78.7
80	1	1.3	80.0
81	2	2.7	82.7
82	2	2.7	85.3
83	3	4.0	89.3
84	2	2.7	92.0
85	3	4.0	96.0
86	1	1.3	97.3
89	2	2.7	100.0

TABLE B-29
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
LATERAL SPAN
(0 < DEGREES <= 180)

VARIABLE=LATSPAN

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
71	1	6.3	6.3
73	1	6.3	12.5
122	2	12.5	25.0
131	1	6.3	31.2
142	1	6.3	37.5

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
149	1	6.3	43.7
157	1	6.3	50.0
166	1	6.3	56.2
168	1	6.3	62.5
172	1	6.3	68.8

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
173	1	6.3	75.0
175	1	6.3	81.3
180	3	18.7	100.0

TABLE B-30
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
LATERAL SPAN
(0 < DEGREES <= 180)

VARIABLE=LATSPAN

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
154	1	8.3	8.3
158	1	8.3	16.7
166	1	8.3	25.0
168	1	8.3	33.3
170	1	8.3	41.7
178	1	8.3	50.0
180	1	8.3	58.3
186	1	8.3	66.7
190	1	8.3	75.0
202	1	8.3	83.3
234	1	8.3	91.7
238	1	8.3	100.0

TABLE B-31
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
LATERAL SPAN
(0 < DEGREES <= 180)

VARIABLE=LATSPAN

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
60	1	2.1	2.1	148	1	2.1	29.8	170	2	4.3	72.3
62	1	2.1	4.3	150	2	4.3	34.0	174	2	4.3	76.6
74	2	4.3	8.5	152	3	6.4	40.4	176	2	4.3	80.9
84	1	2.1	10.6	156	2	4.3	44.7	178	3	6.4	87.2
110	1	2.1	12.8	158	2	4.3	48.9	180	2	4.3	91.5
116	1	2.1	14.9	160	1	2.1	51.1	182	1	2.1	93.6
130	2	4.3	19.1	162	3	6.4	57.4	194	1	2.1	95.7
132	1	2.1	21.3	164	1	2.1	59.6	202	1	2.1	97.9
136	2	4.3	25.5	166	2	4.3	63.8	208	1	2.1	100.0
146	1	2.1	27.7	168	2	4.3	68.1				

TABLE B-32
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
LATERAL SPAN
(0 < DEGREES <= 180)

VARIABLE=LATSPAN

FREQUENCY TABLE

		PERCENTS				PERCENTS				PERCENTS	
VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM
60	1	1.3	1.3	148	1	1.3	26.7	173	1	1.3	68.0
62	1	1.3	2.7	149	1	1.3	28.0	174	2	2.7	70.7
71	1	1.3	4.0	150	2	2.7	30.7	175	1	1.3	72.0
73	1	1.3	5.3	152	3	4.0	34.7	176	2	2.7	74.7
74	2	2.7	8.0	154	1	1.3	36.0	178	4	5.3	80.0
84	1	1.3	9.3	156	2	2.7	38.7	180	6	8.0	88.0
110	1	1.3	10.7	157	1	1.3	40.0	182	1	1.3	89.3
116	1	1.3	12.0	158	3	4.0	44.0	186	1	1.3	90.7
122	2	2.7	14.7	160	1	1.3	45.3	190	1	1.3	92.0
130	2	2.7	17.3	162	3	4.0	49.3	194	1	1.3	93.3
131	1	1.3	18.7	164	1	1.3	50.7	202	2	2.7	96.0
132	1	1.3	20.0	166	4	5.3	56.0	208	1	1.3	97.3
136	2	2.7	22.7	168	4	5.3	61.3	234	1	1.3	98.7
142	1	1.3	24.0	170	3	4.0	65.3	238	1	1.3	100.0
146	1	1.3	25.3	172	1	1.3	66.7				

TABLE B-33
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
CRITICAL LATERAL ANGLE
(DEGREES)

VARIABLE=CRANGLE

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
-77	1	6.3	6.3	-32	1	6.3	43.7	29	1	6.3	81.3
-71	1	6.3	12.5	-31	1	6.3	50.0	67	1	6.3	87.5
-54	1	6.3	18.7	-29	1	6.3	56.2	70	1	6.3	93.8
-43	1	6.3	25.0	-20	1	6.3	62.5	84	1	6.3	100.0
-34	1	6.3	31.2	-4	1	6.3	68.8				
-33	1	6.3	37.5	-2	1	6.3	75.0				

TABLE B-34
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
CRITICAL LATERAL ANGLE
(DEGREES)

VARIABLE=CRANGLE

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
-61	1	8.3	8.3
-59	2	16.7	25.0
-47	1	8.3	33.3
-45	2	16.7	50.0
-35	1	8.3	58.3
-19	1	8.3	66.7
-15	1	8.3	75.0
-13	1	8.3	83.3
-5	1	8.3	91.7
87	1	8.3	100.0

TABLE B-35
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
CRITICAL LATERAL ANGLE
(DEGREES)

VARIABLE=CRANGLE

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
-99	1	2.1	2.1	-53	3	6.4	46.8	-17	2	4.3	83.0
-79	1	2.1	4.3	-51	1	2.1	48.9	-11	1	2.1	85.1
-77	1	2.1	6.4	-49	4	8.5	57.4	-7	1	2.1	87.2
-73	2	4.3	10.6	-47	2	4.3	61.7	23	1	2.1	89.4
-71	1	2.1	12.8	-41	2	4.3	66.0	25	1	2.1	91.5
-67	3	6.4	19.1	-39	1	2.1	68.1	27	1	2.1	93.6
-65	3	6.4	25.5	-37	1	2.1	70.2	29	1	2.1	95.7
-63	1	2.1	27.7	-35	1	2.1	72.3	55	1	2.1	97.9
-61	2	4.3	31.9	-31	1	2.1	74.5	61	1	2.1	100.0
-59	3	6.4	38.3	-23	1	2.1	76.6				
-55	1	2.1	40.4	-19	1	2.1	78.7				

TABLE B-36
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
CRITICAL LATERAL ANGLE
(DEGREES)

VARIABLE=CRANGLE

FREQUENCY TABLE

		PERCENTS				PERCENTS				PERCENTS	
VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM
-99	1	1.3	1.3	-45	2	2.7	50.7	-13	1	1.3	78.7
-79	1	1.3	2.7	-43	1	1.3	52.0	-11	1	1.3	80.0
-77	2	2.7	5.3	-41	2	2.7	54.7	-7	1	1.3	81.3
-73	2	2.7	8.0	-39	1	1.3	56.0	-5	1	1.3	82.7
-71	2	2.7	10.7	-37	1	1.3	57.3	-4	1	1.3	84.0
-67	3	4.0	14.7	-35	2	2.7	60.0	-2	1	1.3	85.3
-65	3	4.0	18.7	-34	1	1.3	61.3	23	1	1.3	86.7
-63	1	1.3	20.0	-33	1	1.3	62.7	25	1	1.3	88.0
-61	3	4.0	24.0	-32	1	1.3	64.0	27	1	1.3	89.3
-59	5	6.7	30.7	-31	2	2.7	66.7	29	2	2.7	92.0
-55	1	1.3	32.0	-29	1	1.3	68.0	55	1	1.3	93.3
-54	1	1.3	33.3	-23	1	1.3	69.3	61	1	1.3	94.7
-53	3	4.0	37.3	-20	1	1.3	70.7	67	1	1.3	96.0
-51	1	1.3	38.7	-19	2	2.7	73.3	70	1	1.3	97.3
-49	4	5.3	44.0	-17	2	2.7	76.0	84	1	1.3	98.7
-47	3	4.0	48.0	-15	1	1.3	77.3	87	1	1.3	100.0

TABLE B-37
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
HEADING STABILITY
(SECONDS PRIOR TO ALARM TIME)

VARIABLE=HDGSTAB

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0-29	49	62.0	62.0
30-59	8	10.1	72.2
60-89	5	6.3	78.5
90-119	5	6.3	84.8
120-149	1	1.3	86.1
150-179	1	1.3	87.3
180+	10	12.7	100.0

TABLE B-38
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
HEADING STABILITY
(SECONDS PRIOR TO ALARM TIME)

VARIABLE=HDGSTAB

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0-29	13	41.9	41.9
30-59	4	12.9	54.8
60-89	5	16.1	71.0
120-149	1	3.2	74.2
180+	8	25.8	100.0

TABLE B-39
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
HEADING STABILITY
(SECONDS PRIOR TO ALARM TIME)

VARIABLE=HDGSTAB

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0-29	48	28.9	28.9
30-59	34	20.5	49.4
60-89	18	10.8	60.2
90-119	19	11.4	71.7
120-149	9	5.4	77.1
150-179	6	3.6	80.7
180+	32	19.3	100.0

TABLE B-40
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
HEADING STABILITY
(SECONDS PRIOR TO ALARM TIME)

VARIABLE=HDGSTAB

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0-29	110	39.9	39.9
30-59	46	16.7	56.5
60-89	28	10.1	66.7
90-119	24	8.7	75.4
120-149	11	4.0	79.3
150	7	2.5	81.9
180+	50	18.1	100.0

TABLE B-41
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
GROUNDSPEED STABILITY
(SECONDS PRIOR TO ALARM TIME)

VARIABLE=SPDSTAB

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0-29	35	44.3	44.3	60-89	7	8.9	63.3	120-149	5	6.3	75.9
30-59	8	10.1	54.4	90-119	5	6.3	69.6	180+	19	24.1	100.0

TABLE B-42
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
GROUNDSPEED STABILITY
(SECONDS PRIOR TO ALARM TIME)

VARIABLE=SPDSTAB

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0-29	12	38.7	38.7	60-89	1	3.2	51.6	120-149	3	9.7	64.5
30-59	3	9.7	48.4	90-119	1	3.2	54.8	180+	11	35.5	100.0

TABLE B-43
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
GROUNDSPEED STABILITY
(SECONDS PRIOR TO ALARM TIME)

VARIABLE=SPDSTAB

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0-29	13	7.8	7.8
30-59	31	18.7	26.5
60-89	35	21.1	47.6
90-119	20	12.0	59.6
120-149	13	7.8	67.5
150-179	11	6.6	74.1
180+	43	25.9	100.0

TABLE B-44
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
GROUNDSPEED STABILITY
(SECONDS PRIOR TO ALARM TIME)

VARIABLE=SPDSTAB

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0-29	60	21.7	21.7
30-59	42	15.2	37.0
60-89	43	15.6	52.5
90-119	26	9.4	62.0
120-149	21	7.6	69.6
150-179	11	4.0	73.6
180+	73	26.4	100.0

TABLE B-45

EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB

VERTICAL STABILITY

(SECONDS PRIOR TO ALARM TIME)

VARIABLE=VRTSTAB

FREQUENCY TABLE

		PERCENTS				PERCENTS				PERCENTS	
VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM
0-59	26	32.9	32.9	90-119	1	1.3	39.2	150-179	3	3.8	45.6
60-89	4	5.1	38.0	120-149	2	2.5	41.8	180+	43	54.4	100.0

TABLE B-46

EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW

VERTICAL STABILITY

(SECONDS PRIOR TO ALARM TIME)

VARIABLE=VRTSTAB

FREQUENCY TABLE

		PERCENTS				PERCENTS				PERCENTS	
VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM
0-59	13	41.9	41.9	150-179	1	3.2	45.2	180+	17	54.8	100.0

TABLE B-47
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
VERTICAL STABILITY
(SECONDS PRIOR TO ALARM TIME)

VARIABLE=VRTSTAB

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0-59	7	4.2	4.2
60-89	1	0.6	4.8
90-119	2	1.2	6.0
120-149	5	3.0	9.0
150-179	6	3.6	12.7
180+	145	87.3	100.0

TABLE B-48
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
VERTICAL STABILITY
(SECONDS PRIOR TO ALARM TIME)

VARIABLE=VRTSTAB

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0-59	46	16.7	16.7
60-89	5	1.8	18.5
90-119	3	1.1	19.6
120-149	7	2.5	22.1
150-179	10	3.6	25.7
180+	205	74.3	100.0

TABLE B-49
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
TOTAL STABILITY
(SECONDS PRIOR TO ALARM TIME)

VARIABLE=STAB

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0-29	51	64.6	64.6
30-59	9	11.4	75.9
60-89	6	7.6	83.5
90-149	3	3.8	87.3
150-179	1	1.3	88.6
180+	9	11.4	100.0

TABLE B-50
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
TOTAL STABILITY
(SECONDS PRIOR TO ALARM TIME)

VARIABLE=STAB

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0-29	16	51.6	51.6
30-59	4	12.9	64.5
60-89	3	9.7	74.2
120-149	1	3.2	77.4
150-179	1	3.2	80.6
180+	6	19.4	100.0

TABLE B-51
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
TOTAL STABILITY
(SECONDS PRIOR TO ALARM TIME)

VARIABLE=STAB

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0-29	56	33.7	33.7
30-59	45	27.1	60.8
60-89	27	16.3	77.1
90-119	13	7.8	84.9
120-149	10	6.0	91.0
150-179	5	3.0	94.0
180+	10	6.0	100.0

TABLE B-52
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
TOTAL STABILITY
(SECONDS PRIOR TO ALARM TIME)

VARIABLE=STAB

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0-29	123	44.6	44.6
30-59	58	21.0	65.6
60-89	36	13.0	78.6
90-119	16	5.8	84.4
120-149	11	4.0	88.4
150-179	7	2.5	90.9
180+	25	9.1	100.0

TABLE B-53
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
MINIMUM WARNING ALTITUDE
(HUNDREDS OF FEET)

VARIABLE=MWA

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
40	2	2.5	2.5
50	2	2.5	5.1
55	3	3.8	8.9
60	3	3.8	12.7
61	1	1.3	13.9
64	1	1.3	15.2
65	1	1.3	16.5
68	1	1.3	17.7
74	2	2.5	20.3
76	2	2.5	22.8
77	1	1.3	24.1
80	1	1.3	25.3
86	6	7.6	32.9
88	1	1.3	34.2
90	8	10.1	44.3
91	1	1.3	45.6
94	1	1.3	46.8
95	5	6.3	53.2
98	2	2.5	55.7
100	8	10.1	65.8
103	3	3.8	69.6
105	3	3.8	73.4
106	3	3.8	77.2
110	1	1.3	78.5
113	2	2.5	81.0
115	1	1.3	82.3
117	1	1.3	83.5
118	1	1.3	84.8
127	1	1.3	86.1
128	9	11.4	97.5
160	2	2.5	100.0

TABLE B-54
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
MINIMUM WARNING ALTITUDE
(HUNDREDS OF FEET)

VARIABLE=MWA

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
30	8	25.8	25.8
31	1	3.2	29.0
34	10	32.3	61.3
40	9	29.0	90.3
50	2	6.5	96.8
70	1	3.2	100.0

TABLE B-55
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
MINIMUM WARNING ALTITUDE
(HUNDREDS OF FEET)

VARIABLE=MWA

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
17	4	2.4	2.4
19	38	22.9	25.3
20	1	0.6	25.9
22	1	0.6	26.5
25	55	33.1	59.6
26	23	13.9	73.5
27	15	9.0	82.5
28	5	3.0	85.5
39	2	1.2	86.7
40	10	6.0	92.8
41	6	3.6	96.4
44	2	1.2	97.6
45	1	0.6	98.2
48	2	1.2	99.4
57	1	0.6	100.0

TABLE B-56
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
MINIMUM WARNING ALTITUDE
(HUNDREDS OF FEET)

VARIABLE=MWA

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
17	4	1.4	1.4
19	38	13.8	15.2
20	1	0.4	15.6
22	1	0.4	15.9
25	55	19.9	35.9
26	23	8.3	44.2
27	15	5.4	49.6
28	5	1.8	51.4
30	8	2.9	54.3
31	1	0.4	54.7
34	10	3.6	58.3
39	2	0.7	59.1
40	21	7.6	66.7
41	6	2.2	68.8
44	2	0.7	69.6
45	1	0.4	69.9
48	2	0.7	70.7
50	4	1.4	72.1
55	3	1.1	73.2
57	1	0.4	73.6
60	3	1.1	74.6
61	1	0.4	75.0
64	1	0.4	75.4
65	1	0.4	75.7
68	1	0.4	76.1
70	1	0.4	76.4
74	2	0.7	77.2
76	2	0.7	77.9
77	1	0.4	78.3
80	1	0.4	78.6
86	6	2.2	80.8
88	1	0.4	81.2
90	8	2.9	84.1
91	1	0.4	84.4
94	1	0.4	84.8
95	5	1.8	86.6
98	2	0.7	87.3
100	8	2.9	90.2
103	3	1.1	91.3
105	3	1.1	92.4
106	3	1.1	93.5
110	1	0.4	93.8
113	2	0.7	94.6
115	1	0.4	94.9
117	1	0.4	95.3
118	1	0.4	95.7
127	1	0.4	96.0
128	9	3.3	99.3
160	2	0.7	100.0

TABLE B-57
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
DISTANCE FROM RADAR
(NAUTICAL MILES)

VARIABLE=RDIS

FREQUENCY TABLE

		PERCENTS				PERCENTS				PERCENTS	
VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM
9.4	1	1.3	1.3	60	1	1.3	36.7	71.7	1	1.3	70.9
10.9	1	1.3	2.5	60.2	1	1.3	38.0	73.3	1	1.3	72.2
27.8	2	2.5	5.1	60.4	1	1.3	39.2	74.8	1	1.3	73.4
30.8	1	1.3	6.3	60.7	3	3.8	43.0	75.8	1	1.3	74.7
37.6	2	2.5	8.9	60.9	1	1.3	44.3	76.3	1	1.3	75.9
37.9	1	1.3	10.1	61.1	1	1.3	45.6	76.7	1	1.3	77.2
43.6	1	1.3	11.4	61.7	1	1.3	46.8	77.4	1	1.3	78.5
44.7	1	1.3	12.7	61.8	1	1.3	48.1	77.6	1	1.3	79.7
46.3	1	1.3	13.9	61.9	1	1.3	49.4	78.3	1	1.3	81.0
46.7	1	1.3	15.2	62.2	1	1.3	50.6	79.9	1	1.3	82.3
49.1	1	1.3	16.5	62.7	1	1.3	51.9	80.7	1	1.3	83.5
50.5	1	1.3	17.7	64.5	1	1.3	53.2	81.2	1	1.3	84.8
51.3	1	1.3	19.0	64.9	1	1.3	54.4	83.5	1	1.3	86.1
54.9	1	1.3	20.3	65.4	1	1.3	55.7	84	1	1.3	87.3
55.2	1	1.3	21.5	65.9	1	1.3	57.0	84.8	1	1.3	88.6
56.6	1	1.3	22.8	66.2	1	1.3	58.2	86.6	1	1.3	89.9
56.8	1	1.3	24.1	66.3	1	1.3	59.5	88.4	1	1.3	91.1
57.3	1	1.3	25.3	66.4	1	1.3	60.8	90.7	1	1.3	92.4
57.5	1	1.3	26.6	66.9	2	2.5	63.3	92.4	1	1.3	93.7
57.8	1	1.3	27.8	67.1	1	1.3	64.6	94.6	1	1.3	94.9
58.2	1	1.3	29.1	67.6	1	1.3	65.8	94.7	1	1.3	96.2
59.5	1	1.3	30.4	67.7	1	1.3	67.1	104.4	1	1.3	97.5
59.7	1	1.3	31.6	68.2	1	1.3	68.4	107.3	1	1.3	98.7
59.9	3	3.8	35.4	70.8	1	1.3	69.6	124.3	1	1.3	100.0

TABLE B-58
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
DISTANCE FROM RADAR
(NAUTICAL MILES)

VARIABLE=RDIS

FREQUENCY TABLE

		PERCENTS				PERCENTS				PERCENTS	
VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM
21.3	1	3.2	3.2	40.2	1	3.2	38.7	58.7	1	3.2	74.2
21.6	1	3.2	6.5	40.5	1	3.2	41.9	58.8	1	3.2	77.4
23.7	1	3.2	9.7	40.8	1	3.2	45.2	61.9	1	3.2	80.6
24.7	1	3.2	12.9	42.1	1	3.2	48.4	63.5	1	3.2	83.9
28.2	1	3.2	16.1	44.6	1	3.2	51.6	65.3	1	3.2	87.1
30.7	1	3.2	19.4	46.7	1	3.2	54.8	84.1	1	3.2	90.3
32.1	1	3.2	22.6	47.4	1	3.2	58.1	94.2	1	3.2	93.5
34.3	1	3.2	25.8	48.7	1	3.2	61.3	94.8	1	3.2	96.8
34.7	1	3.2	29.0	52	1	3.2	64.5	97.1	1	3.2	100.0
37.9	1	3.2	32.3	53.6	1	3.2	67.7				
39.4	1	3.2	35.5	54.6	1	3.2	71.0				

TABLE B-59
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
DISTANCE FROM RADAR
(NAUTICAL MILES)

VARIABLE=RDIS

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
1.7	1	0.6	0.6	43.2	2	1.2	23.5	52.4	1	0.6	45.8
3.1	1	0.6	1.2	44	2	1.2	24.7	52.5	1	0.6	46.4
6.1	1	0.6	1.8	44.1	1	0.6	25.3	53	1	0.6	47.0
7.5	1	0.6	2.4	44.2	1	0.6	25.9	53.2	1	0.6	47.6
7.6	1	0.6	3.0	44.7	1	0.6	26.5	53.5	1	0.6	48.2
8.8	1	0.6	3.6	44.9	1	0.6	27.1	53.7	1	0.6	48.8
11.6	1	0.6	4.2	45.2	1	0.6	27.7	53.8	1	0.6	49.4
11.7	1	0.6	4.8	45.3	1	0.6	28.3	54	1	0.6	50.0
14.6	1	0.6	5.4	45.6	1	0.6	28.9	54.3	2	1.2	51.2
21	1	0.6	6.0	45.9	1	0.6	29.5	54.6	1	0.6	51.8
21.4	1	0.6	6.6	46.1	1	0.6	30.1	54.7	1	0.6	52.4
23.2	1	0.6	7.2	46.4	1	0.6	30.7	54.9	2	1.2	53.6
26.4	1	0.6	7.8	46.5	1	0.6	31.3	55	1	0.6	54.2
26.7	3	1.8	9.6	46.9	2	1.2	32.5	55.3	2	1.2	55.4
27.1	1	0.6	10.2	47	1	0.6	33.1	55.4	1	0.6	56.0
27.6	1	0.6	10.8	47.1	1	0.6	33.7	55.8	1	0.6	56.6
28.1	1	0.6	11.4	47.3	1	0.6	34.3	55.9	2	1.2	57.8
28.8	1	0.6	12.0	47.7	1	0.6	34.9	56	4	2.4	60.2
29.4	1	0.6	12.7	48.3	1	0.6	35.5	56.1	1	0.6	60.8
29.5	1	0.6	13.3	48.6	1	0.6	36.1	56.2	2	1.2	62.0
29.7	1	0.6	13.9	48.7	1	0.6	36.7	56.5	2	1.2	63.3
30.2	1	0.6	14.5	48.8	1	0.6	37.3	56.7	1	0.6	63.9
30.8	1	0.6	15.1	49	1	0.6	38.0	56.9	2	1.2	65.1
30.9	1	0.6	15.7	49.9	1	0.6	38.6	57.5	2	1.2	66.3
32.4	1	0.6	16.3	50.5	1	0.6	39.2	57.8	2	1.2	67.5
32.5	1	0.6	16.9	50.6	1	0.6	39.8	57.9	1	0.6	68.1
33.9	1	0.6	17.5	50.7	1	0.6	40.4	58	1	0.6	68.7
34.3	1	0.6	18.1	50.9	1	0.6	41.0	58.3	2	1.2	69.9
37.8	1	0.6	18.7	51	1	0.6	41.6	58.5	1	0.6	70.5
38.9	1	0.6	19.3	51.4	1	0.6	42.2	58.6	2	1.2	71.7
40.7	2	1.2	20.5	51.5	1	0.6	42.8	58.8	1	0.6	72.3
41.1	1	0.6	21.1	52.1	1	0.6	43.4	58.9	1	0.6	72.9
41.4	1	0.6	21.7	52.2	1	0.6	44.0	59	3	1.8	74.7
42.4	1	0.6	22.3	52.3	2	1.2	45.2	59.1	2	1.2	75.9

TABLE B-59
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
DISTANCE FROM RADAR
(NAUTICAL MILES)
(CONCLUDED)

VARIABLE=RDIS

FREQUENCY TABLE (CONT.)

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
59.3	1	0.6	76.5	62.2	1	0.6	84.9	68.3	1	0.6	93.4
59.4	1	0.6	77.1	62.4	1	0.6	85.5	68.8	1	0.6	94.0
59.8	1	0.6	77.7	62.6	1	0.6	86.1	71	1	0.6	94.6
60	2	1.2	78.9	62.8	1	0.6	86.7	71.5	1	0.6	95.2
60.3	1	0.6	79.5	63	1	0.6	87.3	74.2	1	0.6	95.8
60.4	1	0.6	80.1	63.8	1	0.6	88.0	75	1	0.6	96.4
60.8	1	0.6	80.7	64	1	0.6	88.6	76.2	1	0.6	97.0
61	1	0.6	81.3	64.3	1	0.6	89.2	76.3	1	0.6	97.6
61.1	1	0.6	81.9	65.3	1	0.6	89.8	77.4	1	0.6	98.2
61.3	1	0.6	82.5	66.1	2	1.2	91.0	77.9	1	0.6	98.8
61.6	1	0.6	83.1	66.5	1	0.6	91.6	78.9	1	0.6	99.4
61.9	1	0.6	83.7	66.9	1	0.6	92.2	79	1	0.6	100.0
62	1	0.6	84.3	67.6	1	0.6	92.8				

TABLE B-60
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
DISTANCE FROM RADAR
(NAUTICAL MILES)

VARIABLE=RDIS

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
1.7	1	0.4	0.4	32.4	1	0.4	14.1	46.7	2	0.7	29.3
3.1	1	0.4	0.7	32.5	1	0.4	14.5	46.9	2	0.7	30.1
6.1	1	0.4	1.1	33.9	1	0.4	14.9	47	1	0.4	30.4
7.5	1	0.4	1.4	34.3	2	0.7	15.6	47.1	1	0.4	30.8
7.6	1	0.4	1.8	34.7	1	0.4	15.9	47.3	1	0.4	31.2
8.8	1	0.4	2.2	37.6	2	0.7	16.7	47.4	1	0.4	31.5
9.4	1	0.4	2.5	37.8	1	0.4	17.0	47.7	1	0.4	31.9
10.9	1	0.4	2.9	37.9	2	0.7	17.8	48.3	1	0.4	32.2
11.6	1	0.4	3.3	38.9	1	0.4	18.1	48.6	1	0.4	32.6
11.7	1	0.4	3.6	39.4	1	0.4	18.5	48.7	2	0.7	33.3
14.6	1	0.4	4.0	40.2	1	0.4	18.8	48.8	1	0.4	33.7
21	1	0.4	4.3	40.5	1	0.4	19.2	49	1	0.4	34.1
21.3	1	0.4	4.7	40.7	2	0.7	19.9	49.1	1	0.4	34.4
21.4	1	0.4	5.1	40.8	1	0.4	20.3	49.9	1	0.4	34.8
21.6	1	0.4	5.4	41.1	1	0.4	20.7	50.5	2	0.7	35.5
23.2	1	0.4	5.8	41.4	1	0.4	21.0	50.6	1	0.4	35.9
23.7	1	0.4	6.2	42.1	1	0.4	21.4	50.7	1	0.4	36.2
24.7	1	0.4	6.5	42.4	1	0.4	21.7	50.9	1	0.4	36.6
26.4	1	0.4	6.9	43.2	2	0.7	22.5	51	1	0.4	37.0
26.7	3	1.1	8.0	43.6	1	0.4	22.8	51.3	1	0.4	37.3
27.1	1	0.4	8.3	44	2	0.7	23.6	51.4	1	0.4	37.7
27.6	1	0.4	8.7	44.1	1	0.4	23.9	51.5	1	0.4	38.0
27.8	2	0.7	9.4	44.2	1	0.4	24.3	52	1	0.4	38.4
28.1	1	0.4	9.8	44.6	1	0.4	24.6	52.1	1	0.4	38.8
28.2	1	0.4	10.1	44.7	2	0.7	25.4	52.2	1	0.4	39.1
28.8	1	0.4	10.5	44.9	1	0.4	25.7	52.3	2	0.7	39.9
29.4	1	0.4	10.9	45.2	1	0.4	26.1	52.4	1	0.4	40.2
29.5	1	0.4	11.2	45.3	1	0.4	26.4	52.5	1	0.4	40.6
29.7	1	0.4	11.6	45.6	1	0.4	26.8	53	1	0.4	40.9
30.2	1	0.4	12.0	45.9	1	0.4	27.2	53.2	1	0.4	41.3
30.7	1	0.4	12.3	46.1	1	0.4	27.5	53.5	1	0.4	41.7
30.8	2	0.7	13.0	46.3	1	0.4	27.9	53.6	1	0.4	42.0
30.9	1	0.4	13.4	46.4	1	0.4	28.3	53.7	1	0.4	42.4
32.1	1	0.4	13.8	46.5	1	0.4	28.6	53.8	1	0.4	42.8

TABLE B-60
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
DISTANCE FROM RADAR
(NAUTICAL MILES)
(CONTINUED)

VARIABLE=RDIS

FREQUENCY TABLE (CONT.)

		PERCENTS				PERCENTS				PERCENTS	
VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM
54	1	0.4	43.1	59.4	1	0.4	63.4	65.9	1	0.4	80.1
54.3	2	0.7	43.8	59.5	1	0.4	63.8	66.1	2	0.7	80.8
54.6	2	0.7	44.6	59.7	1	0.4	64.1	66.2	1	0.4	81.2
54.7	1	0.4	44.9	59.8	1	0.4	64.5	66.3	1	0.4	81.5
54.9	3	1.1	46.0	59.9	3	1.1	65.6	66.4	1	0.4	81.9
55	1	0.4	46.4	60	3	1.1	66.7	66.5	1	0.4	82.2
55.2	1	0.4	46.7	60.2	1	0.4	67.0	66.9	3	1.1	83.3
55.3	2	0.7	47.5	60.3	1	0.4	67.4	67.1	1	0.4	83.7
55.4	1	0.4	47.8	60.4	2	0.7	68.1	67.6	2	0.7	84.4
55.8	1	0.4	48.2	60.7	3	1.1	69.2	67.7	1	0.4	84.8
55.9	2	0.7	48.9	60.8	1	0.4	69.6	68.2	1	0.4	85.1
56	4	1.4	50.4	60.9	1	0.4	69.9	68.3	1	0.4	85.5
56.1	1	0.4	50.7	61	1	0.4	70.3	68.8	1	0.4	85.9
56.2	2	0.7	51.4	61.1	2	0.7	71.0	70.8	1	0.4	86.2
56.5	2	0.7	52.2	61.3	1	0.4	71.4	71	1	0.4	86.6
56.6	1	0.4	52.5	61.6	1	0.4	71.7	71.5	1	0.4	87.0
56.7	1	0.4	52.9	61.7	1	0.4	72.1	71.7	1	0.4	87.3
56.8	1	0.4	53.3	61.8	1	0.4	72.5	73.3	1	0.4	87.7
56.9	2	0.7	54.0	61.9	3	1.1	73.6	74.2	1	0.4	88.0
57.3	1	0.4	54.3	62	1	0.4	73.9	74.8	1	0.4	88.4
57.5	3	1.1	55.4	62.2	2	0.7	74.6	75	1	0.4	88.8
57.8	3	1.1	56.5	62.4	1	0.4	75.0	75.8	1	0.4	89.1
57.9	1	0.4	56.9	62.6	1	0.4	75.4	76.2	1	0.4	89.5
58	1	0.4	57.2	62.7	1	0.4	75.7	76.3	2	0.7	90.2
58.2	1	0.4	57.6	62.8	1	0.4	76.1	76.7	1	0.4	90.6
58.3	2	0.7	58.3	63	1	0.4	76.4	77.4	2	0.7	91.3
58.5	1	0.4	58.7	63.5	1	0.4	76.8	77.6	1	0.4	91.7
58.6	2	0.7	59.4	63.8	1	0.4	77.2	77.9	1	0.4	92.0
58.7	1	0.4	59.8	64	1	0.4	77.5	78.3	1	0.4	92.4
58.8	2	0.7	60.5	64.3	1	0.4	77.9	78.9	1	0.4	92.8
58.9	1	0.4	60.9	64.5	1	0.4	78.3	79	1	0.4	93.1
59	3	1.1	62.0	64.9	1	0.4	78.6	79.9	1	0.4	93.5
59.1	2	0.7	62.7	65.3	2	0.7	79.3	80.7	1	0.4	93.8
59.3	1	0.4	63.0	65.4	1	0.4	79.7	81.2	1	0.4	94.2

TABLE B-60
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
DISTANCE FROM RADAR
(NAUTICAL MILES)
(CONCLUDED)

VARIABLE=RDIS

FREQUENCY TABLE (CONT.)

		PERCENTS				PERCENTS				PERCENTS	
VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM
83.5	1	0.4	94.6	90.7	1	0.4	96.7	97.1	1	0.4	98.9
84	1	0.4	94.9	92.4	1	0.4	97.1	104.4	1	0.4	99.3
84.1	1	0.4	95.3	94.2	1	0.4	97.5	107.3	1	0.4	99.6
84.8	1	0.4	95.7	94.6	1	0.4	97.8	124.3	1	0.4	100.0
86.6	1	0.4	96.0	94.7	1	0.4	98.2				
88.4	1	0.4	96.4	94.8	1	0.4	98.6				

TABLE B-61
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
BEARING FROM RADAR
(DEGREES)

VARIABLE=RBEAR

FREQUENCY TABLE

		PERCENTS	
VALUE	COUNT	CELL	CUM
20	1	1.3	1.3
22	1	1.3	2.5
23	1	1.3	3.8
44	1	1.3	5.1
49	1	1.3	6.3
54	1	1.3	7.6
87	1	1.3	8.9
88	1	1.3	10.1
90	1	1.3	11.4
93	1	1.3	12.7
112	4	5.1	17.7
115	1	1.3	19.0
139	2	2.5	21.5
140	1	1.3	22.8
144	1	1.3	24.1
151	1	1.3	25.3
169	2	2.5	27.8
172	1	1.3	29.1
175	1	1.3	30.4
178	1	1.3	31.6
183	1	1.3	32.9

		PERCENTS	
VALUE	COUNT	CELL	CUM
185	1	1.3	34.2
187	2	2.5	36.7
189	1	1.3	38.0
191	2	2.5	40.5
192	1	1.3	41.8
193	2	2.5	44.3
201	2	2.5	46.8
203	1	1.3	48.1
205	1	1.3	49.4
209	1	1.3	50.6
211	1	1.3	51.9
218	1	1.3	53.2
221	1	1.3	54.4
229	1	1.3	55.7
230	1	1.3	57.0
231	1	1.3	58.2
233	2	2.5	60.8
234	1	1.3	62.0
237	1	1.3	63.3
240	1	1.3	64.6
242	1	1.3	65.8

		PERCENTS	
VALUE	COUNT	CELL	CUM
243	2	2.5	68.4
253	1	1.3	69.6
254	2	2.5	72.2
255	2	2.5	74.7
257	3	3.8	78.5
258	1	1.3	79.7
266	1	1.3	81.0
269	1	1.3	82.3
274	1	1.3	83.5
275	1	1.3	84.8
277	2	2.5	87.3
289	1	1.3	88.6
291	1	1.3	89.9
295	1	1.3	91.1
297	1	1.3	92.4
303	2	2.5	94.9
304	1	1.3	96.2
328	1	1.3	97.5
339	1	1.3	98.7
352	1	1.3	100.0

TABLE B-62
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
BEARING FROM RADAR
(DEGREES)

VARIABLE=RBEAR

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
11	1	3.2	3.2	57	2	6.5	38.7	210	1	3.2	74.2
19	1	3.2	6.5	60	1	3.2	41.9	274	1	3.2	77.4
24	1	3.2	9.7	62	2	6.5	48.4	277	1	3.2	80.6
26	1	3.2	12.9	64	1	3.2	51.6	300	1	3.2	83.9
27	1	3.2	16.1	120	1	3.2	54.8	305	2	6.5	90.3
28	1	3.2	19.4	142	1	3.2	58.1	314	1	3.2	93.5
39	1	3.2	22.6	150	1	3.2	61.3	337	1	3.2	96.8
46	1	3.2	25.8	197	1	3.2	64.5	343	1	3.2	100.0
54	1	3.2	29.0	202	1	3.2	67.7				
56	1	3.2	32.3	209	1	3.2	71.0				

TABLE B-63
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
BEARING FROM RADAR
(DEGREES)

VARIABLE=RBEAR

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0	1	0.6	0.6
3	1	0.6	1.2
10	1	0.6	1.8
14	2	1.2	3.0
16	1	0.6	3.6
17	1	0.6	4.2
19	4	2.4	6.6
20	3	1.8	8.4
21	1	0.6	9.0
22	2	1.2	10.2
23	2	1.2	11.4
24	6	3.6	15.1
25	2	1.2	16.3
26	3	1.8	18.1
27	1	0.6	18.7
28	2	1.2	19.9
29	1	0.6	20.5
30	3	1.8	22.3
31	2	1.2	23.5
32	3	1.8	25.3
33	1	0.6	25.9
34	3	1.8	27.7
35	4	2.4	30.1
37	3	1.8	31.9
38	3	1.8	33.7
39	1	0.6	34.3
40	1	0.6	34.9
41	7	4.2	39.2
42	1	0.6	39.8
55	2	1.2	41.0
56	1	0.6	41.6
61	1	0.6	42.2
74	1	0.6	42.8
78	2	1.2	44.0
81	2	1.2	45.2
83	3	1.8	47.0
84	1	0.6	47.6
86	1	0.6	48.2
88	1	0.6	48.8
89	3	1.8	50.6
121	1	0.6	51.2
130	1	0.6	51.8
134	1	0.6	52.4
144	1	0.6	53.0
163	1	0.6	53.6
172	1	0.6	54.2
180	1	0.6	54.8
181	2	1.2	56.0
182	1	0.6	56.6
208	1	0.6	57.2
211	1	0.6	57.8
213	1	0.6	58.4
214	2	1.2	59.6
215	1	0.6	60.2
224	1	0.6	60.8
228	3	1.8	62.7
229	5	3.0	65.7
230	2	1.2	66.9
231	2	1.2	68.1
232	3	1.8	69.9
233	1	0.6	70.5
234	1	0.6	71.1
235	3	1.8	72.9
248	1	0.6	73.5
251	1	0.6	74.1
260	1	0.6	74.7
261	1	0.6	75.3
263	1	0.6	75.9
266	1	0.6	76.5
277	2	1.2	77.7
280	1	0.6	78.3
281	3	1.8	80.1
282	1	0.6	80.7
287	1	0.6	81.3
293	3	1.8	83.1
295	2	1.2	84.3
296	4	2.4	86.7
297	5	3.0	89.8
298	1	0.6	90.4
299	4	2.4	92.8
300	3	1.8	94.6
301	1	0.6	95.2
303	2	1.2	96.4
307	1	0.6	97.0
312	1	0.6	97.6
322	1	0.6	98.2
323	1	0.6	98.8
324	1	0.6	99.4
340	1	0.6	100.0

TABLE B-64
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
BEARING FROM RADAR
(DEGREES)

VARIABLE=RBEAR

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0	1	0.4	0.4	55	2	0.7	30.1	178	1	0.4	48.6
3	1	0.4	0.7	56	2	0.7	30.8	180	1	0.4	48.9
10	1	0.4	1.1	57	2	0.7	31.5	181	2	0.7	49.6
11	1	0.4	1.4	60	1	0.4	31.9	182	1	0.4	50.0
14	2	0.7	2.2	61	1	0.4	32.2	183	1	0.4	50.4
16	1	0.4	2.5	62	2	0.7	33.0	185	1	0.4	50.7
17	1	0.4	2.9	64	1	0.4	33.3	187	2	0.7	51.4
19	5	1.8	4.7	74	1	0.4	33.7	189	1	0.4	51.8
20	4	1.4	6.2	78	2	0.7	34.4	191	2	0.7	52.5
21	1	0.4	6.5	81	2	0.7	35.1	192	1	0.4	52.9
22	3	1.1	7.6	83	3	1.1	36.2	193	2	0.7	53.6
23	3	1.1	8.7	84	1	0.4	36.6	197	1	0.4	54.0
24	7	2.5	11.2	86	1	0.4	37.0	201	2	0.7	54.7
25	2	0.7	12.0	87	1	0.4	37.3	202	1	0.4	55.1
26	4	1.4	13.4	88	2	0.7	38.0	203	1	0.4	55.4
27	2	0.7	14.1	89	3	1.1	39.1	205	1	0.4	55.8
28	3	1.1	15.2	90	1	0.4	39.5	208	1	0.4	56.2
29	1	0.4	15.6	93	1	0.4	39.9	209	2	0.7	56.9
30	3	1.1	16.7	112	4	1.4	41.3	210	1	0.4	57.2
31	2	0.7	17.4	115	1	0.4	41.7	211	2	0.7	58.0
32	3	1.1	18.5	120	1	0.4	42.0	213	1	0.4	58.3
33	1	0.4	18.8	121	1	0.4	42.4	214	2	0.7	59.1
34	3	1.1	19.9	130	1	0.4	42.8	215	1	0.4	59.4
35	4	1.4	21.4	134	1	0.4	43.1	218	1	0.4	59.8
37	3	1.1	22.5	139	2	0.7	43.8	221	1	0.4	60.1
38	3	1.1	23.6	140	1	0.4	44.2	224	1	0.4	60.5
39	2	0.7	24.3	142	1	0.4	44.6	228	3	1.1	61.6
40	1	0.4	24.6	144	2	0.7	45.3	229	6	2.2	63.8
41	7	2.5	27.2	150	1	0.4	45.7	230	3	1.1	64.9
42	1	0.4	27.5	151	1	0.4	46.0	231	3	1.1	65.9
44	1	0.4	27.9	163	1	0.4	46.4	232	3	1.1	67.0
46	1	0.4	28.3	169	2	0.7	47.1	233	3	1.1	68.1
49	1	0.4	28.6	172	2	0.7	47.8	234	2	0.7	68.8
54	2	0.7	29.3	175	1	0.4	48.2	235	3	1.1	69.9

TABLE B-64
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
BEARING FROM RADAR
(DEGREES)
(CONCLUDED)

VARIABLE=RBEAR

FREQUENCY TABLE (CONT.)

		PERCENTS				PERCENTS				PERCENTS	
VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM
237	1	0.4	70.3	274	2	0.7	78.6	301	1	0.4	93.1
240	1	0.4	70.7	275	1	0.4	79.0	303	4	1.4	94.6
242	1	0.4	71.0	277	5	1.8	80.8	304	1	0.4	94.9
243	2	0.7	71.7	280	1	0.4	81.2	305	2	0.7	95.7
248	1	0.4	72.1	281	3	1.1	82.2	307	1	0.4	96.0
251	1	0.4	72.5	282	1	0.4	82.6	312	1	0.4	96.4
253	1	0.4	72.8	287	1	0.4	83.0	314	1	0.4	96.7
254	2	0.7	73.6	289	1	0.4	83.3	322	1	0.4	97.1
255	2	0.7	74.3	291	1	0.4	83.7	323	1	0.4	97.5
257	3	1.1	75.4	293	3	1.1	84.8	324	1	0.4	97.8
258	1	0.4	75.7	295	3	1.1	85.9	328	1	0.4	98.2
260	1	0.4	76.1	296	4	1.4	87.3	337	1	0.4	98.6
261	1	0.4	76.4	297	6	2.2	89.5	339	1	0.4	98.9
263	1	0.4	76.8	298	1	0.4	89.9	340	1	0.4	99.3
266	2	0.7	77.5	299	4	1.4	91.3	343	1	0.4	99.6
269	1	0.4	77.9	300	4	1.4	92.8	352	1	0.4	100.0

TABLE B-65
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
ANGLE FROM RADIAL HEADING
(DEGREES)

VARIABLE=RANGLE

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
2	1	1.3	1.3
3	3	3.8	5.1
6	1	1.3	6.3
7	1	1.3	7.6
8	2	2.5	10.1
9	1	1.3	11.4
11	2	2.5	13.9
13	1	1.3	15.2
16	1	1.3	16.5
18	2	2.5	19.0
19	2	2.5	21.5
20	1	1.3	22.8
21	1	1.3	24.1
22	1	1.3	25.3
25	2	2.5	27.8
27	5	6.3	34.2
28	3	3.8	38.0
29	1	1.3	39.2
30	3	3.8	43.0
32	1	1.3	44.3
33	1	1.3	45.6
34	2	2.5	48.1
36	1	1.3	49.4
37	2	2.5	51.9
39	2	2.5	54.4
41	2	2.5	57.0
42	2	2.5	59.5
46	1	1.3	60.8
47	1	1.3	62.0
48	1	1.3	63.3
49	3	3.8	67.1
53	2	2.5	69.6
54	3	3.8	73.4
59	1	1.3	74.7
60	1	1.3	75.9
62	1	1.3	77.2
63	1	1.3	78.5
64	1	1.3	79.7
66	1	1.3	81.0
67	1	1.3	82.3
68	1	1.3	83.5
71	1	1.3	84.8
72	2	2.5	87.3
74	2	2.5	89.9
75	1	1.3	91.1
78	1	1.3	92.4
79	1	1.3	93.7
83	1	1.3	94.9
86	3	3.8	98.7
88	1	1.3	100.0

TABLE B-66
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
ANGLE FROM RADIAL HEADING
(DEGREES)

VARIABLE=RANGLE

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
3	1	3.2	3.2	29	1	3.2	35.5	56	1	3.2	74.2
5	1	3.2	6.5	31	2	6.5	41.9	59	1	3.2	77.4
7	1	3.2	9.7	33	1	3.2	45.2	60	1	3.2	80.6
8	1	3.2	12.9	34	1	3.2	48.4	61	1	3.2	83.9
11	1	3.2	16.1	35	1	3.2	51.6	62	1	3.2	87.1
16	1	3.2	19.4	40	2	6.5	58.1	64	1	3.2	90.3
17	1	3.2	22.6	44	1	3.2	61.3	65	1	3.2	93.5
21	1	3.2	25.8	46	1	3.2	64.5	87	1	3.2	96.8
22	1	3.2	29.0	48	1	3.2	67.7	89	1	3.2	100.0
25	1	3.2	32.3	53	1	3.2	71.0				

TABLE B-67
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
ANGLE FROM RADIAL HEADING
(DEGREES)

VARIABLE=RANGLE

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0	1	0.6	0.6
1	3	1.8	2.4
2	1	0.6	3.0
3	1	0.6	3.6
4	5	3.0	6.6
5	5	3.0	9.6
6	2	1.2	10.8
7	1	0.6	11.4
11	2	1.2	12.7
12	2	1.2	13.9
13	3	1.8	15.7
14	3	1.8	17.5
15	3	1.8	19.3
16	2	1.2	20.5
17	2	1.2	21.7
18	2	1.2	22.9
19	1	0.6	23.5
20	4	2.4	25.9
21	4	2.4	28.3
22	3	1.8	30.1
23	4	2.4	32.5
24	3	1.8	34.3
25	3	1.8	36.1
27	4	2.4	38.6
28	1	0.6	39.2

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
29	1	0.6	39.8
30	3	1.8	41.6
31	1	0.6	42.2
32	1	0.6	42.8
33	1	0.6	43.4
34	2	1.2	44.6
35	2	1.2	45.8
36	1	0.6	46.4
37	1	0.6	47.0
39	1	0.6	47.6
42	1	0.6	48.2
43	1	0.6	48.8
44	3	1.8	50.6
45	2	1.2	51.8
48	2	1.2	53.0
49	1	0.6	53.6
51	1	0.6	54.2
52	2	1.2	55.4
53	4	2.4	57.8
55	1	0.6	58.4
56	2	1.2	59.6
57	1	0.6	60.2
59	1	0.6	60.8
60	3	1.8	62.7
61	4	2.4	65.1

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
62	2	1.2	66.3
63	4	2.4	68.7
64	3	1.8	70.5
65	5	3.0	73.5
66	2	1.2	74.7
68	2	1.2	75.9
69	2	1.2	77.1
71	1	0.6	77.7
74	3	1.8	79.5
75	4	2.4	81.9
77	1	0.6	82.5
78	5	3.0	85.5
79	1	0.6	86.1
80	3	1.8	88.0
81	1	0.6	88.6
82	1	0.6	89.2
83	1	0.6	89.8
84	1	0.6	90.4
85	5	3.0	93.4
86	4	2.4	95.8
87	5	3.0	98.8
88	1	0.6	99.4
90	1	0.6	100.0

TABLE B-68

EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED

ANGLE FROM RADIAL HEADING

(DEGREES)

VARIABLE=RANGLE

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0	1	0.4	0.4
1	3	1.1	1.4
2	2	0.7	2.2
3	5	1.8	4.0
4	5	1.8	5.8
5	6	2.2	8.0
6	3	1.1	9.1
7	3	1.1	10.1
8	3	1.1	11.2
9	1	0.4	11.6
11	5	1.8	13.4
12	2	0.7	14.1
13	4	1.4	15.6
14	3	1.1	16.7
15	3	1.1	17.8
16	4	1.4	19.2
17	3	1.1	20.3
18	4	1.4	21.7
19	3	1.1	22.8
20	5	1.8	24.6
21	6	2.2	26.8
22	5	1.8	28.6
23	4	1.4	30.1
24	3	1.1	31.2
25	6	2.2	33.3
27	9	3.3	36.6
28	4	1.4	38.0
29	3	1.1	39.1
30	6	2.2	41.3
31	3	1.1	42.4
32	2	0.7	43.1
33	3	1.1	44.2
34	5	1.8	46.0
35	3	1.1	47.1
36	2	0.7	47.8
37	3	1.1	48.9
39	3	1.1	50.0
40	2	0.7	50.7
41	2	0.7	51.4
42	3	1.1	52.5
43	1	0.4	52.9
44	4	1.4	54.3
45	2	0.7	55.1
46	2	0.7	55.8
47	1	0.4	56.2
48	4	1.4	57.6
49	4	1.4	59.1
51	1	0.4	59.4
52	2	0.7	60.1
53	7	2.5	62.7
54	3	1.1	63.8
55	1	0.4	64.1
56	3	1.1	65.2
57	1	0.4	65.6
59	3	1.1	66.7
60	5	1.8	68.5
61	5	1.8	70.3
62	4	1.4	71.7
63	5	1.8	73.6
64	5	1.8	75.4
65	6	2.2	77.5
66	3	1.1	78.6
67	1	0.4	79.0
68	3	1.1	80.1
69	2	0.7	80.8
71	2	0.7	81.5
72	2	0.7	82.2
74	5	1.8	84.1
75	5	1.8	85.9
77	1	0.4	86.2
78	6	2.2	88.4
79	2	0.7	89.1
80	3	1.1	90.2
81	1	0.4	90.6
82	1	0.4	90.9
83	2	0.7	91.7
84	1	0.4	92.0
85	5	1.8	93.8
86	7	2.5	96.4
87	6	2.2	98.6
88	2	0.7	99.3
89	1	0.4	99.6
90	1	0.4	100.0

TABLE B-69
EMSAW ENVIRONMENTAL CHARACTERISTICS FOR ZAB
MINIMUM WARNING ALTITUDE (ENTIRE CENTER)
(HUNDREDS OF FEET)

VARIABLE=MWA

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
38	1	0.5	0.5	76	2	1.1	28.6	107	2	1.1	75.1
40	3	1.6	2.1	77	1	0.5	29.1	108	3	1.6	76.7
43	1	0.5	2.6	78	1	0.5	29.6	110	5	2.6	79.4
45	1	0.5	3.2	79	1	0.5	30.2	112	2	1.1	80.4
48	2	1.1	4.2	80	5	2.6	32.8	113	2	1.1	81.5
49	1	0.5	4.8	83	1	0.5	33.3	114	2	1.1	82.5
50	5	2.6	7.4	85	1	0.5	33.9	115	4	2.1	84.7
52	2	1.1	8.5	86	2	1.1	34.9	116	1	0.5	85.2
53	3	1.6	10.1	87	5	2.6	37.6	117	1	0.5	85.7
54	1	0.5	10.6	88	3	1.6	39.2	118	2	1.1	86.8
55	3	1.6	12.2	89	5	2.6	41.8	120	6	3.2	89.9
58	1	0.5	12.7	90	17	9.0	50.8	121	1	0.5	90.5
59	1	0.5	13.2	91	1	0.5	51.3	122	1	0.5	91.0
60	7	3.7	16.9	92	1	0.5	51.9	123	2	1.1	92.1
61	2	1.1	18.0	93	1	0.5	52.4	125	1	0.5	92.6
62	1	0.5	18.5	94	1	0.5	52.9	127	1	0.5	93.1
63	1	0.5	19.0	95	9	4.8	57.7	128	2	1.1	94.2
64	1	0.5	19.6	96	1	0.5	58.2	129	1	0.5	94.7
65	2	1.1	20.6	97	1	0.5	58.7	130	2	1.1	95.8
68	2	1.1	21.7	98	3	1.6	60.3	133	1	0.5	96.3
69	1	0.5	22.2	99	2	1.1	61.4	135	2	1.1	97.4
70	2	1.1	23.3	100	10	5.3	66.7	136	1	0.5	97.9
71	1	0.5	23.8	101	1	0.5	67.2	140	2	1.1	98.9
72	1	0.5	24.3	103	4	2.1	69.3	147	1	0.5	99.5
73	2	1.1	25.4	104	3	1.6	70.9	160	1	0.5	100.0
74	3	1.6	27.0	105	4	2.1	73.0				
75	1	0.5	27.5	106	2	1.1	74.1				

TABLE B-70
EMSAW ENVIRONMENTAL CHARACTERISTICS FOR ZFW
MINIMUM WARNING ALTITUDE (ENTIRE CENTER)
(HUNDREDS OF FEET)

VARIABLE=MWA

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
20	8	11.6	11.6	36	2	2.9	47.8	60	6	8.7	87.0
21	1	1.4	13.0	38	1	1.4	49.3	70	2	2.9	89.9
24	1	1.4	14.5	40	10	14.5	63.8	75	2	2.9	92.8
30	15	21.7	36.2	45	1	1.4	65.2	80	2	2.9	95.7
31	4	5.8	42.0	50	6	8.7	73.9	85	1	1.4	97.1
32	1	1.4	43.5	51	1	1.4	75.4	90	1	1.4	98.6
34	1	1.4	44.9	55	2	2.9	78.3	100	1	1.4	100.0

TABLE B-71
EMSAW ENVIRONMENTAL CHARACTERISTICS FOR ZNY
MINIMUM WARNING ALTITUDE (ENTIRE CENTER)
(HUNDREDS OF FEET)

VARIABLE=MWA

FREQUENCY TABLE

		PERCENTS				PERCENTS				PERCENTS	
VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM
17	4	5.6	5.6	29	2	2.8	36.6	45	4	5.6	74.6
18	1	1.4	7.0	30	2	2.8	39.4	46	1	1.4	76.1
19	1	1.4	8.5	35	1	1.4	40.8	47	1	1.4	77.5
20	2	2.8	11.3	37	2	2.8	43.7	48	10	14.1	91.5
21	2	2.8	14.1	38	2	2.8	46.5	49	1	1.4	93.0
22	2	2.8	16.9	39	3	4.2	50.7	50	1	1.4	94.4
25	5	7.0	23.9	40	6	8.5	59.2	54	1	1.4	95.8
26	1	1.4	25.4	41	4	5.6	64.8	57	1	1.4	97.2
27	3	4.2	29.6	42	1	1.4	66.2	59	1	1.4	98.6
28	3	4.2	33.8	44	2	2.8	69.0	62	1	1.4	100.0

TABLE B-72
EMSAW ENVIRONMENTAL CHARACTERISTICS FOR ZAB,ZFW,ZNY COMBINED
MINIMUM WARNING ALTITUDE (ENTIRE CENTER)
(HUNDREDS OF FEET)

VARIABLE=MWA

FREQUENCY TABLE

		PERCENTS	
VALUE	COUNT	CELL	CUM
17	4	1.2	1.2
18	1	0.3	1.5
19	1	0.3	1.8
20	10	3.0	4.9
21	3	0.9	5.8
22	2	0.6	6.4
24	1	0.3	6.7
25	5	1.5	8.2
26	1	0.3	8.5
27	3	0.9	9.4
28	3	0.9	10.3
29	2	0.6	10.9
30	17	5.2	16.1
31	4	1.2	17.3
32	1	0.3	17.6
34	1	0.3	17.9
35	1	0.3	18.2
36	2	0.6	18.8
37	2	0.6	19.5
38	4	1.2	20.7
39	3	0.9	21.6
40	19	5.8	27.4
41	4	1.2	28.6
42	1	0.3	28.9
43	1	0.3	29.2
44	2	0.6	29.8
45	6	1.8	31.6
46	1	0.3	31.9
47	1	0.3	32.2
48	12	3.6	35.9
49	2	0.6	36.5
50	12	3.6	40.1
51	1	0.3	40.4
52	2	0.6	41.0
53	3	0.9	41.9
54	2	0.6	42.6

		PERCENTS	
VALUE	COUNT	CELL	CUM
55	5	1.5	44.1
57	1	0.3	44.4
58	1	0.3	44.7
59	2	0.6	45.3
60	13	4.0	49.2
61	2	0.6	49.8
62	2	0.6	50.5
63	1	0.3	50.8
64	1	0.3	51.1
65	2	0.6	51.7
68	2	0.6	52.3
69	1	0.3	52.6
70	4	1.2	53.8
71	1	0.3	54.1
72	1	0.3	54.4
73	2	0.6	55.0
74	3	0.9	55.9
75	3	0.9	56.8
76	2	0.6	57.4
77	1	0.3	57.8
78	1	0.3	58.1
79	1	0.3	58.4
80	7	2.1	60.5
83	1	0.3	60.8
85	2	0.6	61.4
86	2	0.6	62.0
87	5	1.5	63.5
88	3	0.9	64.4
89	5	1.5	66.0
90	18	5.5	71.4
91	1	0.3	71.7
92	1	0.3	72.0
93	1	0.3	72.3
94	1	0.3	72.6
95	9	2.7	75.4
96	1	0.3	75.7

		PERCENTS	
VALUE	COUNT	CELL	CUM
97	1	0.3	76.0
98	3	0.9	76.9
99	2	0.6	77.5
100	11	3.3	80.9
101	1	0.3	81.2
103	4	1.2	82.4
104	3	0.9	83.3
105	4	1.2	84.5
106	2	0.6	85.1
107	2	0.6	85.7
108	3	0.9	86.6
110	5	1.5	88.1
112	2	0.6	88.8
113	2	0.6	89.4
114	2	0.6	90.0
115	4	1.2	91.2
116	1	0.3	91.5
117	1	0.3	91.8
118	2	0.6	92.4
120	6	1.8	94.2
121	1	0.3	94.5
122	1	0.3	94.8
123	2	0.6	95.4
125	1	0.3	95.7
127	1	0.3	96.0
128	2	0.6	96.7
129	1	0.3	97.0
130	2	0.6	97.6
133	1	0.3	97.9
135	2	0.6	98.5
136	1	0.3	98.8
140	2	0.6	99.4
147	1	0.3	99.7
160	1	0.3	100.0

TABLE B-73
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU
GROUND SPEED
(KNOTS)

VARIABLE=TGRNDSPD

FREQUENCY TABLE

		PERCENTS				PERCENTS				PERCENTS	
VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM
93.6	3	5.7	5.7	151.2	1	1.9	43.4	198	1	1.9	84.9
97.2	2	3.8	9.4	154.8	3	5.7	49.1	205.2	2	3.8	88.7
104.4	3	5.7	15.1	158.4	3	5.7	54.7	230.4	1	1.9	90.6
108	1	1.9	17.0	162	3	5.7	60.4	237.6	1	1.9	92.5
118.8	1	1.9	18.9	165.6	3	5.7	66.0	244.8	1	1.9	94.3
126	2	3.8	22.6	169.2	3	5.7	71.7	262.8	1	1.9	96.2
129.6	1	1.9	24.5	172.8	2	3.8	75.5	316.8	1	1.9	98.1
133.2	3	5.7	30.2	176.4	1	1.9	77.4	342	1	1.9	100.0
140.4	4	7.5	37.7	180	2	3.8	81.1				
147.6	2	3.8	41.5	194.4	1	1.9	83.0				

TABLE B-74

TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR LA

GROUND SPEED

(KNOTS)

VARIABLE=TGRNDSPD

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
75.6	1	10.0	10.0
79.2	1	10.0	20.0
82.8	1	10.0	30.0
86.4	1	10.0	40.0
97.2	1	10.0	50.0
100.8	1	10.0	60.0
108	1	10.0	70.0
183.6	1	10.0	80.0
194.4	1	10.0	90.0
234	1	10.0	100.0

TABLE B-75

TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR NY

GROUND SPEED

(KNOTS)

VARIABLE=TGRNDSPD

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
86.76	1	3.6	3.6
93.24	1	3.6	7.1
95.76	1	3.6	10.7
113.4	1	3.6	14.3
133.2	1	3.6	17.9
138.96	1	3.6	21.4
139.32	1	3.6	25.0
142.2	1	3.6	28.6
146.88	1	3.6	32.1
148.68	1	3.6	35.7
156.6	1	3.6	39.3
163.44	1	3.6	42.9
176.4	4	14.3	57.1
180.72	1	3.6	60.7
184.68	1	3.6	64.3
185.4	1	3.6	67.9
188.64	1	3.6	71.4
189	1	3.6	75.0
195.84	1	3.6	78.6
199.08	1	3.6	82.1
205.92	1	3.6	85.7
211.68	1	3.6	89.3
249.84	1	3.6	92.9
260.64	1	3.6	96.4
295.2	1	3.6	100.0

TABLE B-76

TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU, LA, AND NY COMBINED

GROUND SPEED

(KNOTS)

VARIABLE=TGRNDSPD

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
75.6	1	1.1	1.1
79.2	1	1.1	2.2
82.8	1	1.1	3.3
86.4	1	1.1	4.4
86.76	1	1.1	5.5
93.24	1	1.1	6.6
93.6	3	3.3	9.9
95.76	1	1.1	11.0
97.2	3	3.3	14.3
100.8	1	1.1	15.4
104.4	3	3.3	18.7
108	2	2.2	20.9
113.4	1	1.1	22.0
118.8	1	1.1	23.1
126	2	2.2	25.3
129.6	1	1.1	26.4
133.2	4	4.4	30.8
138.96	1	1.1	31.9
139.32	1	1.1	33.0
140.4	4	4.4	37.4
142.2	1	1.1	38.5
146.88	1	1.1	39.6
147.6	2	2.2	41.8
148.68	1	1.1	42.9
151.2	1	1.1	44.0
154.8	3	3.3	47.3
156.6	1	1.1	48.4
158.4	3	3.3	51.6
162	3	3.3	54.9
163.44	1	1.1	56.0
165.6	3	3.3	59.3
169.2	3	3.3	62.6
172.8	2	2.2	64.8
176.4	5	5.5	70.3
180	2	2.2	72.5
180.72	1	1.1	73.6
183.6	1	1.1	74.7
184.68	1	1.1	75.8
185.4	1	1.1	76.9
188.64	1	1.1	78.0
189	1	1.1	79.1
194.4	2	2.2	81.3
195.84	1	1.1	82.4
198	1	1.1	83.5
199.08	1	1.1	84.6
205.2	2	2.2	86.8
205.92	1	1.1	87.9
211.68	1	1.1	89.0
230.4	1	1.1	90.1
234	1	1.1	91.2
237.6	1	1.1	92.3
244.8	1	1.1	93.4
249.84	1	1.1	94.5
260.64	1	1.1	95.6
262.8	1	1.1	96.7
295.2	1	1.1	97.8
316.8	1	1.1	98.9
342	1	1.1	100.0

TABLE B-77
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU
ALTITUDE CHANGE RATE
(100 FT/MIN)

VARIABLE=TZDOT

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
-33	1	1.9	1.9	-15	1	1.9	35.8	-7.2	1	1.9	67.9
-30.078	1	1.9	3.8	-14.928	1	1.9	37.7	-6.6	1	1.9	69.8
-29.55	1	1.9	5.7	-14.55	1	1.9	39.6	-6.528	1	1.9	71.7
-29.25	1	1.9	7.5	-14.328	1	1.9	41.5	-6.45	1	1.9	73.6
-27.228	1	1.9	9.4	-13.728	1	1.9	43.4	-6.378	2	3.8	77.4
-26.478	1	1.9	11.3	-13.278	1	1.9	45.3	-5.478	1	1.9	79.2
-26.1	1	1.9	13.2	-13.2	1	1.9	47.2	-4.95	2	3.8	83.0
-22.878	1	1.9	15.1	-13.128	1	1.9	49.1	-4.65	1	1.9	84.9
-21	1	1.9	17.0	-11.1	1	1.9	50.9	-4.2	1	1.9	86.8
-20.628	1	1.9	18.9	-10.95	1	1.9	52.8	-3	1	1.9	88.7
-18.75	1	1.9	20.8	-10.5	1	1.9	54.7	-2.628	1	1.9	90.6
-18.678	1	1.9	22.6	-9.75	1	1.9	56.6	-2.478	1	1.9	92.5
-18.15	1	1.9	24.5	-9.45	1	1.9	58.5	-1.2	1	1.9	94.3
-16.65	2	3.8	28.3	-8.7	1	1.9	60.4	-1.05	1	1.9	96.2
-16.428	1	1.9	30.2	-7.95	1	1.9	62.3	2.55	1	1.9	98.1
-15.678	1	1.9	32.1	-7.5	1	1.9	64.2	14.1	1	1.9	100.0
-15.6	1	1.9	34.0	-7.35	1	1.9	66.0				

TABLE B-78
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR LA
ALTITUDE CHANGE RATE
(100 FT/MIN)

VARIABLE=TZDOT

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
-76.578	1	10.0	10.0
-27.228	1	10.0	20.0
-22.8	1	10.0	30.0
-22.578	1	10.0	40.0
-3.828	1	10.0	50.0
0	1	10.0	60.0
6	1	10.0	70.0
7.5	1	10.0	80.0
16.05	1	10.0	90.0
28.428	1	10.0	100.0

TABLE B-79
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR NY
ALTITUDE CHANGE RATE
(100 FT/MIN)

VARIABLE=TZDOT

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
-63.228	1	3.6	3.6
-25.428	2	7.1	10.7
-19.728	1	3.6	14.3
-18.978	1	3.6	17.9
-18.9	1	3.6	21.4
-18.75	1	3.6	25.0
-18.45	1	3.6	28.6
-17.1	1	3.6	32.1
-16.65	1	3.6	35.7
-16.2	1	3.6	39.3
-15.528	1	3.6	42.9
-14.7	1	3.6	46.4
-10.578	2	7.1	53.6
-10.05	1	3.6	57.1
-9.828	1	3.6	60.7
-9.528	1	3.6	64.3
-9.15	1	3.6	67.9
-9	1	3.6	71.4
-7.428	1	3.6	75.0
-7.2	1	3.6	78.6
-7.05	1	3.6	82.1
-6.978	1	3.6	85.7
-6.528	1	3.6	89.3
-6.378	1	3.6	92.9
0	1	3.6	96.4
4.878	1	3.6	100.0

TABLE B-80
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU, LA, AND NY COMBINED
ALTITUDE CHANGE RATE
(100 FT/MIN)

VARIABLE=TZDOT

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
-76.578	1	1.1	1.1
-63.228	1	1.1	2.2
-33	1	1.1	3.3
-30.078	1	1.1	4.4
-29.55	1	1.1	5.5
-29.25	1	1.1	6.6
-27.228	2	2.2	8.8
-26.478	1	1.1	9.9
-26.1	1	1.1	11.0
-25.428	2	2.2	13.2
-22.878	1	1.1	14.3
-22.8	1	1.1	15.4
-22.578	1	1.1	16.5
-21	1	1.1	17.6
-20.628	1	1.1	18.7
-19.728	1	1.1	19.8
-18.978	1	1.1	20.9
-18.9	1	1.1	22.0
-18.75	2	2.2	24.2
-18.678	1	1.1	25.3
-18.45	1	1.1	26.4
-18.15	1	1.1	27.5
-17.1	1	1.1	28.6
-16.65	3	3.3	31.9
-16.428	1	1.1	33.0
-16.2	1	1.1	34.1
-15.678	1	1.1	35.2
-15.6	1	1.1	36.3
-15.528	1	1.1	37.4
-15	1	1.1	38.5
-14.928	1	1.1	39.6
-14.7	1	1.1	40.7
-14.55	1	1.1	41.8
-14.328	1	1.1	42.9
-13.728	1	1.1	44.0
-13.278	1	1.1	45.1
-13.2	1	1.1	46.2
-13.128	1	1.1	47.3
-11.1	1	1.1	48.4
-10.95	1	1.1	49.5
-10.578	2	2.2	51.6
-10.5	1	1.1	52.7
-10.05	1	1.1	53.8
-9.828	1	1.1	54.9
-9.75	1	1.1	56.0
-9.528	1	1.1	57.1
-9.45	1	1.1	58.2
-9.15	1	1.1	59.3
-9	1	1.1	60.4
-8.7	1	1.1	61.5
-7.95	1	1.1	62.6
-7.5	1	1.1	63.7
-7.428	1	1.1	64.8
-7.35	1	1.1	65.9
-7.2	2	2.2	68.1
-7.05	1	1.1	69.2
-6.978	1	1.1	70.3
-6.6	1	1.1	71.4
-6.528	2	2.2	73.6
-6.45	1	1.1	74.7
-6.378	3	3.3	78.0
-5.478	1	1.1	79.1
-4.95	2	2.2	81.3
-4.65	1	1.1	82.4
-4.2	1	1.1	83.5
-3.828	1	1.1	84.6
-3	1	1.1	85.7
-2.628	1	1.1	86.8
-2.478	1	1.1	87.9
-1.2	1	1.1	89.0
-1.05	1	1.1	90.1
0	2	2.2	92.3
2.55	1	1.1	93.4
4.878	1	1.1	94.5
6	1	1.1	95.6
7.5	1	1.1	96.7
14.1	1	1.1	97.8
16.05	1	1.1	98.9
28.428	1	1.1	100.0

TABLE B-81

TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU

DISTANCE TO VERTICAL ENTRY

(100 FEET)

VARIABLE=TDVIN

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
-4.775	1	1.9	1.9	-1.4	1	1.9	32.1	-0.375	2	3.8	67.9
-3.462	1	1.9	3.8	-1.387	1	1.9	34.0	-0.312	1	1.9	69.8
-3.312	1	1.9	5.7	-0.975	1	1.9	35.8	-0.287	1	1.9	71.7
-3.25	1	1.9	7.5	-0.95	1	1.9	37.7	-0.266	1	1.9	73.6
-2.95	1	1.9	9.4	-0.9	1	1.9	39.6	-0.235	1	1.9	75.5
-2.62	1	1.9	11.3	-0.862	1	1.9	41.5	-0.212	1	1.9	77.4
-2.326	1	1.9	13.2	-0.825	1	1.9	43.4	-0.2	1	1.9	79.2
-2.081	1	1.9	15.1	-0.812	2	3.8	47.2	-0.178	1	1.9	81.1
-2.017	1	1.9	17.0	-0.6	2	3.8	50.9	-0.175	1	1.9	83.0
-1.937	1	1.9	18.9	-0.55	1	1.9	52.8	-0.157	1	1.9	84.9
-1.825	1	1.9	20.8	-0.512	1	1.9	54.7	-0.137	1	1.9	86.8
-1.725	1	1.9	22.6	-0.5	1	1.9	56.6	-0.125	1	1.9	88.7
-1.682	1	1.9	24.5	-0.462	1	1.9	58.5	-0.115	1	1.9	90.6
-1.575	1	1.9	26.4	-0.45	1	1.9	60.4	-0.07	1	1.9	92.5
-1.55	1	1.9	28.3	-0.437	1	1.9	62.3	-0.025	2	3.8	96.2
-1.503	1	1.9	30.2	-0.376	1	1.9	64.2	-0.012	2	3.8	100.0

TABLE B-82
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR LA
DISTANCE TO VERTICAL ENTRY
(100 FEET)

VARIABLE=TDVIN

FREQUENCY TABLE

		PERCENTS				PERCENTS				PERCENTS	
VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM
-9.362	1	10.0	10.0	-1.525	1	10.0	50.0	-0.525	1	10.0	90.0
-3.372	1	10.0	20.0	-1.443	1	10.0	60.0	-0.475	1	10.0	100.0
-3.362	1	10.0	30.0	-0.937	1	10.0	70.0				
-1.85	1	10.0	40.0	-0.822	1	10.0	80.0				

TABLE B-83
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR NY
DISTANCE TO VERTICAL ENTRY
(100 FEET)

VARIABLE=TDVIN

FREQUENCY TABLE

		PERCENTS	
VALUE	COUNT	CELL	CUM
-4.764	1	3.6	3.6
-3.151	1	3.6	7.1
-2.875	1	3.6	10.7
-1.601	1	3.6	14.3
-1.474	1	3.6	17.9
-0.928	1	3.6	21.4
-0.706	1	3.6	25.0
-0.556	1	3.6	28.6
-0.365	1	3.6	32.1
2.233	1	3.6	35.7

		PERCENTS	
VALUE	COUNT	CELL	CUM
2.266	1	3.6	39.3
2.504	1	3.6	42.9
2.68	1	3.6	46.4
3.675	1	3.6	50.0
4.106	1	3.6	53.6
4.285	1	3.6	57.1
4.354	1	3.6	60.7
5.793	1	3.6	64.3
6.31	1	3.6	67.9
6.566	1	3.6	71.4

		PERCENTS	
VALUE	COUNT	CELL	CUM
7.305	1	3.6	75.0
7.39	1	3.6	78.6
7.419	1	3.6	82.1
7.735	1	3.6	85.7
7.759	1	3.6	89.3
11.271	1	3.6	92.9
11.356	1	3.6	96.4
21	1	3.6	100.0

TABLE B-84
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU, LA, AND NY COMBINED
DISTANCE TO VERTICAL ENTRY
(100 FEET)

VARIABLE=TDVIN

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
-9.362	1	1.1	1.1	-0.975	1	1.1	33.0	-0.178	1	1.1	68.1
-4.775	1	1.1	2.2	-0.95	1	1.1	34.1	-0.175	1	1.1	69.2
-4.764	1	1.1	3.3	-0.937	1	1.1	35.2	-0.157	1	1.1	70.3
-3.462	1	1.1	4.4	-0.928	1	1.1	36.3	-0.137	1	1.1	71.4
-3.372	1	1.1	5.5	-0.9	1	1.1	37.4	-0.125	1	1.1	72.5
-3.362	1	1.1	6.6	-0.862	1	1.1	38.5	-0.115	1	1.1	73.6
-3.312	1	1.1	7.7	-0.825	1	1.1	39.6	-0.07	1	1.1	74.7
-3.25	1	1.1	8.8	-0.822	1	1.1	40.7	-0.025	2	2.2	76.9
-3.151	1	1.1	9.9	-0.812	2	2.2	42.9	-0.012	2	2.2	79.1
-2.95	1	1.1	11.0	-0.706	1	1.1	44.0	2.233	1	1.1	80.2
-2.875	1	1.1	12.1	-0.6	2	2.2	46.2	2.266	1	1.1	81.3
-2.62	1	1.1	13.2	-0.556	1	1.1	47.3	2.504	1	1.1	82.4
-2.326	1	1.1	14.3	-0.55	1	1.1	48.4	2.68	1	1.1	83.5
-2.081	1	1.1	15.4	-0.525	1	1.1	49.5	3.675	1	1.1	84.6
-2.017	1	1.1	16.5	-0.512	1	1.1	50.5	4.106	1	1.1	85.7
-1.937	1	1.1	17.6	-0.5	1	1.1	51.6	4.285	1	1.1	86.8
-1.85	1	1.1	18.7	-0.475	1	1.1	52.7	4.354	1	1.1	87.9
-1.825	1	1.1	19.8	-0.462	1	1.1	53.8	5.793	1	1.1	89.0
-1.725	1	1.1	20.9	-0.45	1	1.1	54.9	6.31	1	1.1	90.1
-1.682	1	1.1	22.0	-0.437	1	1.1	56.0	6.566	1	1.1	91.2
-1.601	1	1.1	23.1	-0.376	1	1.1	57.1	7.305	1	1.1	92.3
-1.575	1	1.1	24.2	-0.375	2	2.2	59.3	7.39	1	1.1	93.4
-1.55	1	1.1	25.3	-0.365	1	1.1	60.4	7.419	1	1.1	94.5
-1.525	1	1.1	26.4	-0.312	1	1.1	61.5	7.735	1	1.1	95.6
-1.503	1	1.1	27.5	-0.287	1	1.1	62.6	7.759	1	1.1	96.7
-1.474	1	1.1	28.6	-0.266	1	1.1	63.7	11.271	1	1.1	97.8
-1.443	1	1.1	29.7	-0.235	1	1.1	64.8	11.356	1	1.1	98.9
-1.4	1	1.1	30.8	-0.212	1	1.1	65.9	21	1	1.1	100.0
-1.387	1	1.1	31.9	-0.2	1	1.1	67.0				

TABLE B-85
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU
MINIMUM WARNING ALTITUDE
(100 FEET)

VARIABLE=TMWA

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
4	26	49.1	49.1
6	9	17.0	66.0
7	3	5.7	71.7
8	3	5.7	77.4
9	3	5.7	83.0
10	2	3.8	86.8
13	3	5.7	92.5
14	4	7.5	100.0

TABLE B-86
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR LA
MINIMUM WARNING ALTITUDE
(100 FEET)

VARIABLE=TMWA

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
6	1	10.0	10.0
7	1	10.0	20.0
8	2	20.0	40.0
10	1	10.0	50.0
15	1	10.0	60.0
20	1	10.0	70.0
27	1	10.0	80.0
28	1	10.0	90.0
29	1	10.0	100.0

TABLE B-87
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR NY
MINIMUM WARNING ALTITUDE
(100 FEET)

VARIABLE=TMWA

FREQUENCY TABLE

		PERCENTS				PERCENTS				PERCENTS	
VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM
4	1	3.6	3.6	8	4	14.3	50.0	12	4	14.3	92.9
6	4	14.3	17.9	9	1	3.6	53.6	21	1	3.6	96.4
7	5	17.9	35.7	10	7	25.0	78.6	23	1	3.6	100.0

TABLE B-88
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU, LA, AND NY COMBINED
MINIMUM WARNING ALTITUDE
(100 FEET)

VARIABLE=TMWA

FREQUENCY TABLE

		PERCENTS				PERCENTS				PERCENTS	
VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM
4	27	29.7	29.7	12	4	4.4	84.6	23	1	1.1	96.7
6	14	15.4	45.1	13	3	3.3	87.9	27	1	1.1	97.8
7	9	9.9	54.9	14	4	4.4	92.3	28	1	1.1	98.9
8	9	9.9	64.8	15	1	1.1	93.4	29	1	1.1	100.0
9	4	4.4	69.2	20	1	1.1	94.5				
10	10	11.0	80.2	21	1	1.1	95.6				

TABLE B-89
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU
DISTANCE FROM RADAR
(NAUTICAL MILES)

VARIABLE=TRDIS

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
3.3	1	1.9	1.9
4.6	1	1.9	3.8
4.7	5	9.4	13.2
4.8	3	5.7	18.9
4.9	3	5.7	24.5
5	3	5.7	30.2
5.1	4	7.5	37.7
5.2	1	1.9	39.6
5.3	1	1.9	41.5
5.4	2	3.8	45.3
5.5	2	3.8	49.1

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
6.1	1	1.9	50.9
7.1	1	1.9	52.8
7.2	1	1.9	54.7
7.9	1	1.9	56.6
9.2	1	1.9	58.5
9.6	1	1.9	60.4
10	1	1.9	62.3
10.6	1	1.9	64.2
11.1	2	3.8	67.9
11.3	1	1.9	69.8
11.5	1	1.9	71.7

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
11.6	3	5.7	77.4
11.9	1	1.9	79.2
12	1	1.9	81.1
12.6	2	3.8	84.9
12.8	2	3.8	88.7
12.9	1	1.9	90.6
13.2	1	1.9	92.5
17.1	1	1.9	94.3
19.7	1	1.9	96.2
22.4	1	1.9	98.1
29	1	1.9	100.0

TABLE B-90
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR LA
DISTANCE FROM RADAR
(NAUTICAL MILES)

VARIABLE=TRDIS

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
2.9	1	10.0	10.0
5.3	1	10.0	20.0
5.5	1	10.0	30.0
5.9	1	10.0	40.0
8.8	1	10.0	50.0
9.3	1	10.0	60.0
9.7	1	10.0	70.0
11.3	1	10.0	80.0
12.9	1	10.0	90.0
24.1	1	10.0	100.0

TABLE B-91
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR NY
DISTANCE FROM RADAR
(NAUTICAL MILES)

VARIABLE=TRDIS

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
1.7	1	3.6	3.6
1.8	1	3.6	7.1
1.9	1	3.6	10.7
2.2	1	3.6	14.3
2.6	2	7.1	21.4
2.7	1	3.6	25.0
2.8	1	3.6	28.6
2.9	2	7.1	35.7
3.1	1	3.6	39.3
3.2	1	3.6	42.9
3.3	1	3.6	46.4
3.4	1	3.6	50.0
3.8	1	3.6	53.6
4.2	1	3.6	57.1
5	1	3.6	60.7
6.1	1	3.6	64.3
6.3	1	3.6	67.9
7.4	1	3.6	71.4
7.9	1	3.6	75.0
12.6	1	3.6	78.6
13.4	1	3.6	82.1
13.5	1	3.6	85.7
15.7	1	3.6	89.3
16	1	3.6	92.9
17.2	1	3.6	96.4
21	1	3.6	100.0

TABLE B-92
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU, LA, AND NY COMBINED
DISTANCE FROM RADAR
(NAUTICAL MILES)

VARIABLE=TRDIS

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
1.7	1	1.1	1.1	5.2	1	1.1	42.9	11.5	1	1.1	73.6
1.8	1	1.1	2.2	5.3	2	2.2	45.1	11.6	3	3.3	76.9
1.9	1	1.1	3.3	5.4	2	2.2	47.3	11.9	1	1.1	78.0
2.2	1	1.1	4.4	5.5	3	3.3	50.5	12	1	1.1	79.1
2.6	2	2.2	6.6	5.9	1	1.1	51.6	12.6	3	3.3	82.4
2.7	1	1.1	7.7	6.1	2	2.2	53.8	12.8	2	2.2	84.6
2.8	1	1.1	8.8	6.3	1	1.1	54.9	12.9	2	2.2	86.8
2.9	3	3.3	12.1	7.1	1	1.1	56.0	13.2	1	1.1	87.9
3.1	1	1.1	13.2	7.2	1	1.1	57.1	13.4	1	1.1	89.0
3.2	1	1.1	14.3	7.4	1	1.1	58.2	13.5	1	1.1	90.1
3.3	2	2.2	16.5	7.9	2	2.2	60.4	15.7	1	1.1	91.2
3.4	1	1.1	17.6	8.8	1	1.1	61.5	16	1	1.1	92.3
3.8	1	1.1	18.7	9.2	1	1.1	62.6	17.1	1	1.1	93.4
4.2	1	1.1	19.8	9.3	1	1.1	63.7	17.2	1	1.1	94.5
4.6	1	1.1	20.9	9.6	1	1.1	64.8	19.7	1	1.1	95.6
4.7	5	5.5	26.4	9.7	1	1.1	65.9	21	1	1.1	96.7
4.8	3	3.3	29.7	10	1	1.1	67.0	22.4	1	1.1	97.8
4.9	3	3.3	33.0	10.6	1	1.1	68.1	24.1	1	1.1	98.9
5	4	4.4	37.4	11.1	2	2.2	70.3	29	1	1.1	100.0
5.1	4	4.4	41.8	11.3	2	2.2	72.5				

TABLE B-93
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU
BEARING FROM RADAR
(DEGREES)

VARIABLE=TRBEAR

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
64.248	1	1.9	1.9	309.287	1	1.9	34.0	318.691	3	5.7	71.7
66.357	1	1.9	3.8	311.836	1	1.9	35.8	318.779	1	1.9	73.6
67.412	1	1.9	5.7	312.363	1	1.9	37.7	318.955	2	3.8	77.4
67.764	1	1.9	7.5	313.066	1	1.9	39.6	319.131	1	1.9	79.2
67.939	1	1.9	9.4	313.945	1	1.9	41.5	319.219	1	1.9	81.1
68.027	2	3.8	13.2	314.121	1	1.9	43.4	319.307	2	3.8	84.9
68.203	1	1.9	15.1	315.439	1	1.9	45.3	319.482	1	1.9	86.8
69.961	1	1.9	17.0	315.615	1	1.9	47.2	319.922	1	1.9	88.7
71.895	1	1.9	18.9	317.197	1	1.9	49.1	320.273	1	1.9	90.6
73.301	1	1.9	20.8	317.461	1	1.9	50.9	320.801	1	1.9	92.5
75.586	1	1.9	22.6	317.549	1	1.9	52.8	321.152	1	1.9	94.3
82.969	1	1.9	24.5	317.725	1	1.9	54.7	321.504	1	1.9	96.2
86.66	1	1.9	26.4	317.813	2	3.8	58.5	327.656	1	1.9	98.1
150.205	1	1.9	28.3	317.988	2	3.8	62.3	344.443	1	1.9	100.0
202.061	1	1.9	30.2	318.164	1	1.9	64.2				
300.322	1	1.9	32.1	318.604	1	1.9	66.0				

TABLE B-94
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR LA
BEARING FROM RADAR
(DEGREES)

VARIABLE=TRBEAR

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
18.545	1	10.0	10.0
30.322	1	10.0	20.0
73.213	1	10.0	30.0
296.455	1	10.0	40.0
296.982	1	10.0	50.0
305.42	1	10.0	60.0
309.111	1	10.0	70.0
309.199	1	10.0	80.0
335.039	1	10.0	90.0
337.236	1	10.0	100.0

TABLE B-95
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR NY
BEARING FROM RADAR
(DEGREES)

VARIABLE=TRBEAR

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
3.164	1	3.6	3.6
5.713	1	3.6	7.1
10.371	1	3.6	10.7
25.752	1	3.6	14.3
35.156	1	3.6	17.9
36.387	1	3.6	21.4
42.451	1	3.6	25.0
45.264	1	3.6	28.6
53.965	1	3.6	32.1
55.02	1	3.6	35.7
87.275	1	3.6	39.3
89.912	1	3.6	42.9
96.504	1	3.6	46.4
102.217	1	3.6	50.0
103.271	1	3.6	53.6
111.885	1	3.6	57.1
295.576	1	3.6	60.7
297.773	1	3.6	64.3
298.828	1	3.6	67.9
299.268	1	3.6	71.4
299.443	1	3.6	75.0
300.674	1	3.6	78.6
300.85	1	3.6	82.1
302.52	1	3.6	85.7
306.914	1	3.6	89.3
315.967	1	3.6	92.9
336.709	1	3.6	96.4
357.627	1	3.6	100.0

TABLE B-96
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU, LA, AND NY COMBINED
BEARING FROM RADAR
(DEGREES)

VARIABLE=TRBEAR

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
3.164	1	1.1	1.1
5.713	1	1.1	2.2
10.371	1	1.1	3.3
18.545	1	1.1	4.4
25.752	1	1.1	5.5
30.322	1	1.1	6.6
35.156	1	1.1	7.7
36.387	1	1.1	8.8
42.451	1	1.1	9.9
45.264	1	1.1	11.0
53.965	1	1.1	12.1
55.02	1	1.1	13.2
64.248	1	1.1	14.3
66.357	1	1.1	15.4
67.412	1	1.1	16.5
67.764	1	1.1	17.6
67.939	1	1.1	18.7
68.027	2	2.2	20.9
68.203	1	1.1	22.0
69.961	1	1.1	23.1
71.895	1	1.1	24.2
73.213	1	1.1	25.3
73.301	1	1.1	26.4
75.586	1	1.1	27.5
82.969	1	1.1	28.6
86.66	1	1.1	29.7
87.275	1	1.1	30.8
89.912	1	1.1	31.9

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
96.504	1	1.1	33.0
102.217	1	1.1	34.1
103.271	1	1.1	35.2
111.885	1	1.1	36.3
150.205	1	1.1	37.4
202.061	1	1.1	38.5
295.576	1	1.1	39.6
296.455	1	1.1	40.7
296.982	1	1.1	41.8
297.773	1	1.1	42.9
298.828	1	1.1	44.0
299.268	1	1.1	45.1
299.443	1	1.1	46.2
300.322	1	1.1	47.3
300.674	1	1.1	48.4
300.85	1	1.1	49.5
302.52	1	1.1	50.5
305.42	1	1.1	51.6
306.914	1	1.1	52.7
309.111	1	1.1	53.8
309.199	1	1.1	54.9
309.287	1	1.1	56.0
311.836	1	1.1	57.1
312.363	1	1.1	58.2
313.066	1	1.1	59.3
313.945	1	1.1	60.4
314.121	1	1.1	61.5
315.439	1	1.1	62.6

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
315.615	1	1.1	63.7
315.967	1	1.1	64.8
317.197	1	1.1	65.9
317.461	1	1.1	67.0
317.549	1	1.1	68.1
317.725	1	1.1	69.2
317.813	2	2.2	71.4
317.988	2	2.2	73.6
318.164	1	1.1	74.7
318.604	1	1.1	75.8
318.691	3	3.3	79.1
318.779	1	1.1	80.2
318.955	2	2.2	82.4
319.131	1	1.1	83.5
319.219	1	1.1	84.6
319.307	2	2.2	86.8
319.482	1	1.1	87.9
319.922	1	1.1	89.0
320.273	1	1.1	90.1
320.801	1	1.1	91.2
321.152	1	1.1	92.3
321.504	1	1.1	93.4
327.656	1	1.1	94.5
335.039	1	1.1	95.6
336.709	1	1.1	96.7
337.236	1	1.1	97.8
344.443	1	1.1	98.9
357.627	1	1.1	100.0

TABLE B-97
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU
ANGLE FROM RADIAL HEADING
(DEGREES)

VARIABLE=TRANGLE

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
1.05	1	1.9	1.9	11.128	1	1.9	35.8	34.465	1	1.9	69.8
1.314	1	1.9	3.8	11.457	1	1.9	37.7	36.299	1	1.9	71.7
5.48	1	1.9	5.7	11.465	1	1.9	39.6	38.559	1	1.9	73.6
7.347	1	1.9	7.5	11.51	1	1.9	41.5	40.146	1	1.9	75.5
7.772	1	1.9	9.4	11.545	1	1.9	43.4	41.352	1	1.9	77.4
8.155	1	1.9	11.3	11.592	1	1.9	45.3	42.152	1	1.9	79.2
8.484	1	1.9	13.2	11.685	1	1.9	47.2	53.248	1	1.9	81.1
8.682	1	1.9	15.1	11.721	1	1.9	49.1	56.201	1	1.9	83.0
9.318	1	1.9	17.0	11.73	1	1.9	50.9	56.817	1	1.9	84.9
9.445	1	1.9	18.9	13.666	1	1.9	52.8	57.631	1	1.9	86.8
9.608	1	1.9	20.8	13.871	1	1.9	54.7	59.456	1	1.9	88.7
9.715	1	1.9	22.6	18.578	1	1.9	56.6	60.263	1	1.9	90.6
9.861	1	1.9	24.5	21.613	1	1.9	58.5	61.142	1	1.9	92.5
9.925	1	1.9	26.4	23.879	1	1.9	60.4	62.375	1	1.9	94.3
10.067	1	1.9	28.3	29.209	1	1.9	62.3	63.46	1	1.9	96.2
10.394	1	1.9	30.2	30.961	1	1.9	64.2	72.144	1	1.9	98.1
10.614	1	1.9	32.1	30.997	1	1.9	66.0	83.572	1	1.9	100.0
10.84	1	1.9	34.0	34.169	1	1.9	67.9				

TABLE B-98
TERMINAL MSAW ENCOUNTER' CHARACTERISTICS FOR LA
ANGLE FROM RADIAL HEADING
(DEGREES)

VARIABLE=TRANGLE

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
1.506	1	10.0	10.0	14.906	1	10.0	50.0	61.342	1	10.0	90.0
2.6	1	10.0	20.0	27.657	1	10.0	60.0	76.381	1	10.0	100.0
3.307	1	10.0	30.0	32.833	1	10.0	70.0				
7.475	1	10.0	40.0	57.905	1	10.0	80.0				

TABLE B-99
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR NY
ANGLE FROM RADIAL HEADING
(DEGREES)

VARIABLE=TRANGLE

FREQUENCY TABLE

		PERCENTS				PERCENTS				PERCENTS	
VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM
3.954	1	3.6	3.6	15.285	1	3.6	39.3	61.774	1	3.6	75.0
4.413	1	3.6	7.1	15.623	1	3.6	42.9	62.377	1	3.6	78.6
4.577	1	3.6	10.7	18.835	1	3.6	46.4	63.161	1	3.6	82.1
5.947	1	3.6	14.3	23.326	1	3.6	50.0	71.117	1	3.6	85.7
10.067	1	3.6	17.9	23.414	1	3.6	53.6	73.834	1	3.6	89.3
10.689	1	3.6	21.4	33.437	1	3.6	57.1	81.431	1	3.6	92.9
12.198	1	3.6	25.0	41.009	1	3.6	60.7	83.859	1	3.6	96.4
12.475	1	3.6	28.6	51.405	1	3.6	64.3	84.045	1	3.6	100.0
12.879	1	3.6	32.1	61.109	1	3.6	67.9				
15.209	1	3.6	35.7	61.228	1	3.6	71.4				

TABLE B-100

TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU, LA, AND NY COMBINED

ANGLE FROM RADIAL HEADING

(DEGREES)

VARIABLE=TRANGLE

FREQUENCY TABLE

		PERCENTS	
VALUE	COUNT	CELL	CUM
1.05	1	1.1	1.1
1.314	1	1.1	2.2
1.506	1	1.1	3.3
2.6	1	1.1	4.4
3.307	1	1.1	5.5
3.954	1	1.1	6.6
4.413	1	1.1	7.7
4.577	1	1.1	8.8
5.48	1	1.1	9.9
5.947	1	1.1	11.0
7.347	1	1.1	12.1
7.475	1	1.1	13.2
7.772	1	1.1	14.3
8.155	1	1.1	15.4
8.484	1	1.1	16.5
8.682	1	1.1	17.6
9.318	1	1.1	18.7
9.445	1	1.1	19.8
9.608	1	1.1	20.9
9.715	1	1.1	22.0
9.861	1	1.1	23.1
9.925	1	1.1	24.2
10.067	2	2.2	26.4
10.394	1	1.1	27.5
10.614	1	1.1	28.6
10.689	1	1.1	29.7
10.84	1	1.1	30.8
11.128	1	1.1	31.9
11.457	1	1.1	33.0
11.465	1	1.1	34.1

		PERCENTS	
VALUE	COUNT	CELL	CUM
11.51	1	1.1	35.2
11.545	1	1.1	36.3
11.592	1	1.1	37.4
11.685	1	1.1	38.5
11.721	1	1.1	39.6
11.73	1	1.1	40.7
12.198	1	1.1	41.8
12.475	1	1.1	42.9
12.879	1	1.1	44.0
13.666	1	1.1	45.1
13.871	1	1.1	46.2
14.906	1	1.1	47.3
15.209	1	1.1	48.4
15.285	1	1.1	49.5
15.623	1	1.1	50.5
18.578	1	1.1	51.6
18.835	1	1.1	52.7
21.613	1	1.1	53.8
23.326	1	1.1	54.9
23.414	1	1.1	56.0
23.879	1	1.1	57.1
27.657	1	1.1	58.2
29.209	1	1.1	59.3
30.961	1	1.1	60.4
30.997	1	1.1	61.5
32.833	1	1.1	62.6
33.437	1	1.1	63.7
34.169	1	1.1	64.8
34.465	1	1.1	65.9
36.299	1	1.1	67.0

		PERCENTS	
VALUE	COUNT	CELL	CUM
38.559	1	1.1	68.1
40.146	1	1.1	69.2
41.009	1	1.1	70.3
41.352	1	1.1	71.4
42.152	1	1.1	72.5
51.405	1	1.1	73.6
53.248	1	1.1	74.7
56.201	1	1.1	75.8
56.817	1	1.1	76.9
57.631	1	1.1	78.0
57.905	1	1.1	79.1
59.456	1	1.1	80.2
60.263	1	1.1	81.3
61.109	1	1.1	82.4
61.142	1	1.1	83.5
61.228	1	1.1	84.6
61.342	1	1.1	85.7
61.774	1	1.1	86.8
62.375	1	1.1	87.9
62.377	1	1.1	89.0
63.161	1	1.1	90.1
63.46	1	1.1	91.2
71.117	1	1.1	92.3
72.144	1	1.1	93.4
73.834	1	1.1	94.5
76.381	1	1.1	95.6
81.431	1	1.1	96.7
83.572	1	1.1	97.8
83.859	1	1.1	98.9
84.045	1	1.1	100.0

TABLE B-101
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU
HEADING STABILITY
(SECONDS)

VARIABLE=THDGSTAB

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0	11	21.2	21.2
15	7	13.5	34.6
30	6	11.5	46.2
45	9	17.3	63.5
60	6	11.5	75.0
75	3	5.8	80.8
90	2	3.8	84.6
105	8	15.4	100.0

TABLE B-102
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR LA
HEADING STABILITY
(SECONDS)

VARIABLE=THDGSTAB

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0	3	30.0	30.0
15	2	20.0	50.0
30	1	10.0	60.0
60	1	10.0	70.0
75	1	10.0	80.0
90	2	20.0	100.0

TABLE B-103
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR NY
HEADING STABILITY
(SECONDS)

VARIABLE=THDGSTAB

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0	11	50.0	50.0
15	2	9.1	59.1
30	1	4.5	63.6
45	4	18.2	81.8
75	2	9.1	90.9
105	2	9.1	100.0

TABLE B-104
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU, LA, AND NY COMBINED
HEADING STABILITY
(SECONDS)

VARIABLE=THDGSTAB

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0	25	29.8	29.8
15	11	13.1	42.9
30	8	9.5	52.4
45	13	15.5	67.9
60	7	8.3	76.2
75	6	7.1	83.3
90	4	4.8	88.1
105	10	11.9	100.0

TABLE B-105
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU
VERTICAL STABILITY
(SECONDS)

VARIABLE=TVRTSTAB

FREQUENCY TABLE

		PERCENTS	
VALUE	COUNT	CELL	CUM
0	2	4.0	4.0
15	11	22.0	26.0
30	4	8.0	34.0
45	6	12.0	46.0
60	4	8.0	54.0
75	4	8.0	62.0
90	5	10.0	72.0
105	14	28.0	100.0

TABLE B-106
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR LA
VERTICAL STABILITY
(SECONDS)

VARIABLE=TVRTSTAB

FREQUENCY TABLE

		PERCENTS	
VALUE	COUNT	CELL	CUM
30	1	11.1	11.1
60	1	11.1	22.2
75	1	11.1	33.3
105	6	66.7	100.0

TABLE B-107
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR NY
VERTICAL STABILITY
(SECONDS)

VARIABLE=TVRTSTAB

FREQUENCY TABLE

		PERCENTS	
VALUE	COUNT	CELL	CUM
0	1	5.3	5.3
15	1	5.3	10.5
30	2	10.5	21.1
45	3	15.8	36.8
60	2	10.5	47.4
105	10	52.6	100.0

TABLE B-108
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU, LA, AND NY COMBINED
VERTICAL STABILITY
(SECONDS)

VARIABLE=TVRTSTAB

FREQUENCY TABLE

		PERCENTS	
VALUE	COUNT	CELL	CUM
0	3	3.8	3.8
15	12	15.4	19.2
30	7	9.0	28.2
45	9	11.5	39.7
60	7	9.0	48.7
75	5	6.4	55.1
90	5	6.4	61.5
105	30	38.5	100.0

TABLE B-109
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU
TOTAL STABILITY
(SECONDS)

VARIABLE=TSTAB

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0	10	20.0	20.0
15	12	24.0	44.0
30	8	16.0	60.0
45	9	18.0	78.0
60	3	6.0	84.0
75	1	2.0	86.0
90	2	4.0	90.0
105	5	10.0	100.0

TABLE B-110
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR LA
TOTAL STABILITY
(SECONDS)

VARIABLE=TSTAB

FREQUENCY TABLE

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0	2	22.2	22.2
15	2	22.2	44.4
30	1	11.1	55.6
60	2	22.2	77.8
75	1	11.1	88.9
90	1	11.1	100.0

TABLE B-111
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR NY
TOTAL STABILITY
(SECONDS)

VARIABLE=TSTAB

FREQUENCY TABLE

		PERCENTS				PERCENTS				PERCENTS	
VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM
0	9	60.0	60.0	30	1	6.7	73.3	60	2	13.3	93.3
15	1	6.7	66.7	45	1	6.7	80.0	75	1	6.7	100.0

TABLE B-112
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU, LA, AND NY COMBINED
TOTAL STABILITY
(SECONDS)

VARIABLE=TSTAB

FREQUENCY TABLE

		PERCENTS				PERCENTS				PERCENTS	
VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM	VALUE	COUNT	CELL	CUM
0	21	28.4	28.4	45	10	13.5	75.7	90	3	4.1	93.2
15	15	20.3	48.6	60	7	9.5	85.1	105	5	6.8	100.0
30	10	13.5	62.2	75	3	4.1	89.2				

APPENDIX C

CORRELATION COEFFICIENTS

It is recognized that two or more parameters describing an MSAW encounter may be correlated. That is, the value of one parameter may be dependent upon the value of another parameter. To illustrate the degree to which each parameter is correlated with each other parameter, the correlation coefficient between each combination of parameters is provided in this Appendix. Tables C-1 through C-4 are for the en route data; Tables C-5 through C-8 are for the terminal area data. Scenarios developed using the data provided in this report should include the effects of all significant correlations.

For each combination of parameters, the Pearson product-moment correlation and the number of observations upon which it was based are provided.

TABLE C-1
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
CORRELATION TABLE

	GRNDSPD	ZDOT	DVIN	DLIN	DELTALIN	XANGLE	LATSPAN	CRANGLE	SPDSTAB	HDGSTAB	VRTSTAB	STAB
GRNDSPD	1.00000	0.13216	0.12474	0.45917	0.19676	0.18979	-0.16473	0.20298	0.09031	0.14321	0.24499	0.08937
	79	79	79	79	79	16	16	16	79	79	79	79
ZDOT	0.13216	1.00000	-0.52472	0.10675	0.09176	-0.12917	-0.48774	-0.10856	0.33519	0.30777	0.36380	0.27965
	79	79	79	79	79	16	16	16	79	79	79	79
DVIN	0.12474	-0.52472	1.00000	-0.03064	0.11230	0.16936	0.43060	0.28105	-0.30021	-0.23632	-0.07676	-0.18106
	79	79	79	79	79	16	16	16	79	79	79	79
DLIN	0.45917	0.10675	-0.03064	1.00000	0.24766	-0.06854	-0.58051	-0.01425	0.03388	0.16893	0.17514	0.11678
	79	79	79	79	79	16	16	16	79	79	79	79
DELTALIN	0.19676	0.09176	0.11230	0.24766	1.00000	0.20763	-0.10243	-0.13055	0.00845	-0.05681	-0.06955	-0.00497
	79	79	79	79	79	16	16	16	79	79	79	79
XANGLE	0.18979	-0.12917	0.16936	-0.06854	0.20763	1.00000	-0.13588	0.23412	-0.05460	-0.10389	-0.14368	-0.09365
	16	16	16	16	16	16	16	16	16	16	16	16
LATSPAN	-0.16473	-0.48774	0.43060	-0.58051	-0.10243	-0.13588	1.00000	0.06095	-0.55686	-0.46499	-0.33505	-0.41561
	16	16	16	16	16	16	16	16	16	16	16	16
CRANGLE	0.20298	-0.10856	0.28105	-0.01425	-0.13055	0.23412	0.06095	1.00000	0.24755	0.14687	0.10360	0.17905
	16	16	16	16	16	16	16	16	16	16	16	16
SPDSTAB	0.09031	0.33519	-0.30021	0.03388	0.00845	-0.05460	-0.55686	0.24755	1.00000	0.74464	0.53352	0.74526
	79	79	79	79	79	16	16	16	79	79	79	79

TABLE C-1
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
CORRELATION TABLE
(CONTINUED)

	GRNDSPD	ZDOT	DVIN	DLIN	DELTALIN	XANGLE	LATSPAN	CRANGLE	SPDSTAB	HDGSTAB	VRTSTAB	STAB
HDGSTAB	0.14321 79	0.30777 79	-0.23632 79	0.16893 79	-0.05681 79	-0.10389 16	-0.46499 16	0.14687 16	0.74464 79	1.00000 79	0.38369 79	0.92618 79
VRTSTAB	0.24499 79	0.36380 79	-0.07676 79	0.17514 79	-0.06955 79	-0.14368 16	-0.33505 16	0.10360 16	0.53352 79	0.38369 79	1.00000 79	0.44593 79
STAB	0.08937 79	0.27965 79	-0.18106 79	0.11678 79	-0.00497 79	-0.09365 16	-0.41561 16	0.17905 16	0.74526 79	0.92618 79	0.44593 79	1.00000 79
MWA	-0.09243 79	-0.05470 79	-0.21464 79	-0.20671 79	-0.12460 79	0.46479 16	0.17987 16	-0.06844 16	-0.00135 79	0.04199 79	-0.07139 79	-0.01344 79
RDIS	0.09650 79	-0.15635 79	0.14695 79	0.08248 79	-0.00098 79	-0.51911 16	0.50788 16	0.10748 16	-0.21187 79	-0.18030 79	-0.16206 79	-0.13012 79
RBEAR	-0.22265 79	-0.02787 79	-0.09340 79	-0.06805 79	-0.21579 79	0.03875 16	-0.34317 16	0.40023 16	-0.03235 79	-0.05766 79	-0.01866 79	0.03226 79
RANGLE	-0.31872 79	-0.10113 79	-0.18194 79	-0.28042 79	-0.06144 79	0.13095 16	0.46361 16	-0.31154 16	-0.20383 79	-0.16237 79	-0.17618 79	-0.10823 79

	MWA	RDIS	RBEAR	RANGLE
GRNDSPD	-0.09243 79	0.09650 79	-0.22265 79	-0.31872 79
ZDOT	-0.05470 79	-0.15635 79	-0.02787 79	-0.10113 79

TABLE C-1
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
CORRELATION TABLE
(CONTINUED)

	MWA	RDIS	RBEAR	RANGLE
DVIN	-0.21464 79	0.14695 79	-0.09340 79	-0.18194 79
DLIN	-0.20671 79	0.08248 79	-0.06805 79	-0.28042 79
DELTALIN	-0.12460 79	-0.00098 79	-0.21579 79	-0.06144 79
XANGLE	0.46479 16	-0.51911 16	0.03875 16	0.13095 16
LATSPAN	0.17987 16	0.50788 16	-0.34317 16	0.46361 16
CRANGLE	-0.06844 16	0.10748 16	0.40023 16	-0.31154 16
SPDSTAB	-0.00135 79	-0.21187 79	-0.03235 79	-0.20383 79
HDGSTAB	0.04199 79	-0.18030 79	-0.05766 79	-0.16237 79
VRTSTAB	-0.07139 79	-0.16206 79	-0.01866 79	-0.17618 79
STAB	-0.01344 79	-0.13012 79	0.03226 79	-0.10823 79

TABLE C-1
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB
CORRELATION TABLE
(CONCLUDED)

	MWA	RDIS	RBEAR	RANGLE
MWA	1.00000 79	0.04378 79	-0.02755 79	0.24701 79
RDIS	0.04378 79	1.00000 79	-0.10687 79	0.06262 79
RBEAR	-0.02755 79	-0.10687 79	1.00000 79	0.04459 79
RANGLE	0.24701 79	0.06262 79	0.04459 79	1.00000 79

TABLE C-2
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
CORRELATION TABLE

	GRNDSPD	ZDOT	DVIN	DLIN	DELTALIN	XANGLE	LATSPAN	CRANGLE	SPDSTAB	HDGSTAB	VRTSTAB	STAB
GRNDSPD	1.00000 31	0.25789 31	0.20098 31	0.23492 31	0.22249 31	-0.11928 12	0.27003 12	-0.32619 12	0.25970 31	0.18174 31	0.17853 31	0.06673 31
ZDOT	0.25789 31	1.00000 31	-0.47240 31	0.18586 31	0.24868 31	-0.56007 12	-0.19171 12	-0.26802 12	0.41082 31	0.37164 31	0.57482 31	0.36187 31
DVIN	0.20098 31	-0.47240 31	1.00000 31	-0.03271 31	-0.14779 31	0.53499 12	0.28597 12	0.16832 12	-0.48524 31	-0.43336 31	-0.74265 31	-0.51337 31
DLIN	0.23492 31	0.18586 31	-0.03271 31	1.00000 31	0.35549 31	0.28350 12	-0.23040 12	0.00946 12	0.18147 31	-0.00600 31	0.03095 31	0.03374 31
DELTALIN	0.22249 31	0.24868 31	-0.14779 31	0.35549 31	1.00000 31	0.35308 12	-0.30561 12	-0.08121 12	0.29528 31	0.00583 31	0.25729 31	-0.03896 31
XANGLE	-0.11928 12	-0.56007 12	0.53499 12	0.28350 12	0.35308 12	1.00000 12	-0.42609 12	-0.08738 12	0.04780 12	0.11251 12	-0.14732 12	-0.02527 12
LATSPAN	0.27003 12	-0.19171 12	0.28597 12	-0.23040 12	-0.30561 12	-0.42609 12	1.00000 12	0.25744 12	-0.46275 12	-0.53491 12	-0.78081 12	-0.55117 12
CRANGLE	-0.32619 12	-0.26802 12	0.16832 12	0.00946 12	-0.08121 12	-0.08738 12	0.25744 12	1.00000 12	-0.48803 12	-0.34680 12	-0.35079 12	-0.26077 12
SPDSTAB	0.25970 31	0.41082 31	-0.48524 31	0.18147 31	0.29528 31	0.04780 12	-0.46275 12	-0.48803 12	1.00000 31	0.72592 31	0.65377 31	0.80890 31

TABLE C-2
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
CORRELATION TABLE
(CONTINUED)

	GRNDSPD	ZDOT	DVIN	DLIN	DELTALIN	XANGLE	LATSPAN	CRANGLE	SPDSTAB	HDGSTAB	VRTSTAB	STAB
HDGSTAB	0.18174 31	0.37164 31	-0.43336 31	-0.00600 31	0.00583 31	0.11251 12	-0.53491 12	-0.34680 12	0.72592 31	1.00000 31	0.64366 31	0.91482 31
VRTSTAB	0.17853 31	0.57482 31	-0.74265 31	0.03095 31	0.25729 31	-0.14732 12	-0.78081 12	-0.35079 12	0.65377 31	0.64366 31	1.00000 31	0.62375 31
STAB	0.06673 31	0.36187 31	-0.51337 31	0.03374 31	-0.03896 31	-0.02527 12	-0.55117 12	-0.26077 12	0.80890 31	0.91482 31	0.62375 31	1.00000 31
MWA	0.19332 31	-0.15106 31	0.27173 31	0.17142 31	-0.21884 31	0.11944 12	-0.20790 12	-0.04227 12	-0.00501 31	0.06942 31	-0.13894 31	0.07994 31
RDIS	0.24071 31	-0.13312 31	0.41150 31	0.00111 31	-0.46515 31	-0.26473 12	0.64149 12	0.19073 12	-0.13269 31	-0.21327 31	-0.52987 31	-0.13971 31
RBEAR	0.14783 31	0.31383 31	-0.21145 31	0.22792 31	0.42796 31	0.46523 12	-0.63518 12	-0.55041 12	0.37435 31	0.39120 31	0.43394 31	0.31240 31
RANGLE	-0.03832 31	0.08885 31	0.15067 31	-0.24290 31	-0.53181 31	-0.16890 12	0.53691 12	0.18125 12	-0.13441 31	-0.00295 31	-0.25644 31	0.05825 31

	MWA	RDIS	RBEAR	RANGLE
GRNDSPD	0.19332 31	0.24071 31	0.14783 31	-0.03832 31
ZDOT	-0.15106 31	-0.13312 31	0.31383 31	0.08885 31

TABLE C-2
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
CORRELATION TABLE
(CONTINUED)

	MWA	RDIS	RBEAR	RANGLE
DVIN	0.27173 31	0.41150 31	-0.21145 31	0.15067 31
DLIN	0.17142 31	0.00111 31	0.22792 31	-0.24290 31
DELTALIN	-0.21884 31	-0.46515 31	0.42796 31	-0.53181 31
XANGLE	0.11944 12	-0.26473 12	0.46523 12	-0.16890 12
LATSPAN	-0.20790 12	0.64149 12	-0.63518 12	0.53691 12
CRANGLE	-0.04227 12	0.19073 12	-0.55041 12	0.18125 12
SPDSTAB	-0.00501 31	-0.13269 31	0.37435 31	-0.13441 31
HDGSTAB	0.06942 31	-0.21327 31	0.39120 31	-0.00295 31
VRTSTAB	-0.13894 31	-0.52987 31	0.43394 31	-0.25644 31
STAB	0.07994 31	-0.13971 31	0.31240 31	0.05825 31

TABLE C-2
EMSAW ENCOUNTER CHARACTERISTICS FOR ZFW
CORRELATION TABLE
(CONCLUDED)

	MWA	RDIS	RBEAR	RANGLE
MWA	1.00000	0.34208	0.01936	0.15374
	31	31	31	31
RDIS	0.34208	1.00000	-0.39885	0.51879
	31	31	31	31
RBEAR	0.01936	-0.39885	1.00000	-0.33011
	31	31	31	31
RANGLE	0.15374	0.51879	-0.33011	1.00000
	31	31	31	31

TABLE C-3
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
CORRELATION TABLE

	GRNDSPD	ZDOT	DVIN	DLIN	DELTALIN	XANGLE	LATSPAN	CRANGLE	SPDSTAB	HDGSTAB	VRTSTAB	STAB
GRNDSPD	1.00000 166	-0.50378 166	0.53106 166	0.04644 166	0.20018 166	-0.00506 47	-0.06435 47	0.07533 47	-0.18751 166	0.26991 166	-0.02303 166	0.04339 166
ZDOT	-0.50378 166	1.00000 166	-0.82697 166	0.09075 166	-0.12872 166	0.08511 47	-0.06805 47	-0.13487 47	0.19800 166	0.00101 166	0.16367 166	0.23509 166
DVIN	0.53106 166	-0.82697 166	1.00000 166	-0.01305 166	0.21146 166	0.07048 47	0.05650 47	0.16608 47	-0.24171 166	-0.04716 166	-0.07651 166	-0.22550 166
DLIN	0.04644 166	0.09075 166	-0.01305 166	1.00000 166	-0.08750 166	-0.10557 47	-0.63274 47	0.44785 47	0.06266 166	-0.04092 166	0.08073 166	0.05933 166
DELTALIN	0.20018 166	-0.12872 166	0.21146 166	-0.08750 166	1.00000 166	0.34009 47	0.07768 47	-0.30647 47	-0.13024 166	0.04291 166	-0.06167 166	-0.09198 166
XANGLE	-0.00506 47	0.08511 47	0.07048 47	-0.10557 47	0.34009 47	1.00000 47	-0.13669 47	-0.25395 47	0.12444 47	-0.07641 47	0.06434 47	-0.11698 47
LATSPAN	-0.06435 47	-0.06805 47	0.05650 47	-0.63274 47	0.07768 47	-0.13669 47	1.00000 47	-0.57053 47	0.22916 47	0.12808 47	-0.00314 47	0.13555 47
CRANGLE	0.07533 47	-0.13487 47	0.16608 47	0.44785 47	-0.30647 47	-0.25395 47	-0.57053 47	1.00000 47	-0.32595 47	-0.09780 47	0.02019 47	-0.07476 47
SPDSTAB	-0.18751 166	0.19800 166	-0.24171 166	0.06266 166	-0.13024 166	0.12444 47	0.22916 47	-0.32595 47	1.00000 166	0.20253 166	0.02988 166	0.50189 166

TABLE C-3
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
CORRELATION TABLE
(CONTINUED)

	GRNDSPD	ZDOT	DVIN	DLIN	DELTALIN	XANGLE	LATSPAN	CRANGLE	SPDSTAB	HDGSTAB	VRTSTAB	STAB
HDGSTAB	0.26991 166	0.00101 166	-0.04716 166	-0.04092 166	0.04291 166	-0.07641 47	0.12808 47	-0.09780 47	0.20253 166	1.00000 166	0.02823 166	0.74793 166
VRTSTAB	-0.02303 166	0.16367 166	-0.07651 166	0.08073 166	-0.06167 166	0.06434 47	-0.00314 47	0.02019 47	0.02988 166	0.02823 166	1.00000 166	0.21190 166
STAB	0.04339 166	0.23509 166	-0.22550 166	0.05933 166	-0.09198 166	-0.11698 47	0.13555 47	-0.07476 47	0.50189 166	0.74793 166	0.21190 166	1.00000 166
MWA	-0.11105 166	0.10220 166	-0.23630 166	0.09823 166	-0.50206 166	-0.36166 47	-0.07797 47	-0.03248 47	0.18252 166	0.10556 166	-0.04211 166	0.18103 166
RDIS	-0.00633 166	0.02174 166	-0.10942 166	-0.05592 166	0.05376 166	-0.13736 47	0.07436 47	-0.09587 47	0.07637 166	0.04009 166	0.04656 166	0.03355 166
RBEAR	-0.23141 166	-0.11223 166	0.13779 166	-0.00070 166	0.12487 166	-0.12675 47	0.04414 47	-0.00495 47	-0.10545 166	-0.16251 166	-0.11238 166	-0.08464 166
RANGLE	0.06685 166	0.08280 166	-0.07618 166	0.07394 166	0.05372 166	0.13901 47	-0.00231 47	-0.20099 47	-0.00094 166	0.08794 166	-0.01392 166	0.03309 166

	MWA	RDIS	RBEAR	RANGLE
GRNDSPD	-0.11105 166	-0.00633 166	-0.23141 166	0.06685 166
ZDOT	0.10220 166	0.02174 166	-0.11223 166	0.08280 166

TABLE C-3
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
CORRELATION TABLE
(CONTINUED)

	MWA	RDIS	RBEAR	RANGLE
DVIN	-0.23630	-0.10942	0.13779	-0.07618
	166	166	166	166
DLIN	0.09823	-0.05592	-0.00070	0.07394
	166	166	166	166
DELTALIN	-0.50206	0.05376	0.12487	0.05372
	166	166	166	166
XANGLE	-0.36166	-0.13736	-0.12675	0.13901
	47	47	47	47
LATSPAN	-0.07797	0.07436	0.04414	-0.00231
	47	47	47	47
CRANGLE	-0.03248	-0.09587	-0.00495	-0.20099
	47	47	47	47
SPDSTAB	0.18252	0.07637	-0.10545	-0.00094
	166	166	166	166
HDGSTAB	0.10556	0.04009	-0.16251	0.08794
	166	166	166	166
VRTSTAB	-0.04211	0.04656	-0.11238	-0.01392
	166	166	166	166
STAB	0.18103	0.03355	-0.08464	0.03309
	166	166	166	166

TABLE C-3
EMSAW ENCOUNTER CHARACTERISTICS FOR ZNY
CORRELATION TABLE
(CONCLUDED)

	MWA	RDIS	RBEAR	RANGLE
MWA	1.00000	0.25085	-0.06206	0.11447
	166	166	166	166
RDIS	0.25085	1.00000	-0.09017	0.20221
	166	166	166	166
RBEAR	-0.06206	-0.09017	1.00000	-0.06544
	166	166	166	166
RANGLE	0.11447	0.20221	-0.06544	1.00000
	166	166	166	166

TABLE C-4
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
CORRELATION TABLE

	GRNDSPD	ZDOT	DVIN	DLIN	DELTALIN	XANGLE	LATSPAN	CRANGLE	SPDSTAB	HDGSTAB	VRTSTAB	STAB
GRNDSPD	1.00000	0.08585	0.27652	0.26762	0.22206	0.02152	-0.00691	0.08826	0.07422	0.23753	0.25507	0.09700
	276	276	276	276	276	75	75	75	276	276	276	276
ZDOT	0.08585	1.00000	-0.50702	0.08486	0.02570	-0.05357	-0.28478	-0.17000	0.29190	0.20471	0.43087	0.24603
	276	276	276	276	276	75	75	75	276	276	276	276
DVIN	0.27652	-0.50702	1.00000	-0.00391	0.16422	0.12610	0.28735	0.18433	-0.23781	-0.11791	-0.13680	-0.19237
	276	276	276	276	276	75	75	75	276	276	276	276
DLIN	0.26762	0.08486	-0.00391	1.00000	0.11763	-0.04993	-0.48107	0.23650	0.06758	0.03420	0.08344	0.08045
	276	276	276	276	276	75	75	75	276	276	276	276
DELTALIN	0.22206	0.02570	0.16422	0.11763	1.00000	0.13016	0.12599	-0.08644	0.01940	0.04799	0.01099	-0.02267
	276	276	276	276	276	75	75	75	276	276	276	276
XANGLE	0.02152	-0.05357	0.12610	-0.04993	0.13016	1.00000	-0.25015	-0.09551	0.05786	-0.03648	0.04100	-0.08795
	75	75	75	75	75	75	75	75	75	75	75	75
LATSPAN	-0.00691	-0.28478	0.28735	-0.48107	0.12599	-0.25015	1.00000	-0.24545	-0.04390	-0.10522	-0.33837	-0.10940
	75	75	75	75	75	75	75	75	75	75	75	75
CRANGLE	0.08826	-0.17000	0.18433	0.23650	-0.08644	-0.09551	-0.24545	1.00000	-0.23363	-0.08324	-0.13982	-0.02694
	75	75	75	75	75	75	75	75	75	75	75	75
SPDSTAB	0.07422	0.29190	-0.23781	0.06758	0.01940	0.05786	-0.04390	-0.23363	1.00000	0.45739	0.39135	0.63568
	276	276	276	276	276	75	75	75	276	276	276	276

TABLE C-4
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
CORRELATION TABLE
(CONTINUED)

	GRNDSPD	ZDOT	DVIN	DLIN	DELTALIN	XANGLE	LATSPAN	CRANGLE	SPDSTAB	HDGSTAB	VRTSTAB	STAB
HDGSTAB	0.23753 276	0.20471 276	-0.11791 276	0.03420 276	0.04799 276	-0.03648 75	-0.10522 75	-0.08324 75	0.45739 276	1.00000 276	0.30447 276	0.81997 276
VRTSTAB	0.25507 276	0.43087 276	-0.13680 276	0.08344 276	0.01099 276	0.04100 75	-0.33837 75	-0.13982 75	0.39135 276	0.30447 276	1.00000 276	0.37058 276
STAB	0.09700 276	0.24603 276	-0.19237 276	0.08045 276	-0.02267 276	-0.08795 75	-0.10940 75	-0.02694 75	0.63568 276	0.81997 276	0.37058 276	1.00000 276
MWA	-0.32245 276	-0.09113 276	-0.27259 276	-0.04903 276	-0.25486 276	0.01079 75	-0.03941 75	0.22518 75	-0.14932 276	-0.15687 276	-0.33350 276	-0.07936 276
RDIS	-0.04473 276	-0.10062 276	-0.00233 276	-0.00515 276	-0.13684 276	-0.23655 75	0.19416 75	0.12678 75	-0.11585 276	-0.12826 276	-0.23725 276	-0.08805 276
RBEAR	-0.20948 276	0.02674 276	-0.06081 276	0.00608 276	0.05525 276	0.00585 75	-0.08795 75	0.00610 75	-0.05948 276	-0.10974 276	-0.04994 276	-0.02398 276
RANGLE	-0.07437 276	0.02209 276	-0.07921 276	-0.07855 276	-0.06017 276	0.11015 75	0.10653 75	-0.20581 75	-0.05956 276	0.02761 276	-0.05918 276	0.00074 276

	MWA	RDIS	RBEAR	RANGLE
GRNDSPD	-0.32245 276	-0.04473 276	-0.20948 276	-0.07437 276
ZDOT	-0.09113 276	-0.10062 276	0.02674 276	0.02209 276

TABLE C-4
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
CORRELATION TABLE
(CONTINUED)

	MWA	RDIS	RBEAR	RANGLE
DVIN	-0.27259 276	-0.00233 276	-0.06081 276	-0.07921 276
DLIN	-0.04903 276	-0.00515 276	0.00608 276	-0.07855 276
DELTALIN	-0.25486 276	-0.13684 276	0.05525 276	-0.06017 276
XANGLE	0.01079 75	-0.23655 75	0.00585 75	0.11015 75
LATSPAN	-0.03941 75	0.19416 75	-0.08795 75	0.10653 75
CRANGLE	0.22518 75	0.12678 75	0.00610 75	-0.20581 75
SPDSTAB	-0.14932 276	-0.11585 276	-0.05948 276	-0.05956 276
HDGSTAB	-0.15687 276	-0.12826 276	-0.10974 276	0.02761 276
VRTSTAB	-0.33350 276	-0.23725 276	-0.04994 276	-0.05918 276
STAB	-0.07936 276	-0.08805 276	-0.02398 276	0.00074 276

TABLE C-4
EMSAW ENCOUNTER CHARACTERISTICS FOR ZAB, ZFW, AND ZNY COMBINED
CORRELATION TABLE
(CONCLUDED)

	MWA	RDIS	RBEAR	RANGLE
MWA	1.00000 276	0.36527 276	0.19853 276	0.01578 276
RDIS	0.36527 276	1.00000 276	-0.03867 276	0.16465 276
RBEAR	0.19853 276	-0.03867 276	1.00000 276	-0.08045 276
RANGLE	0.01578 276	0.16465 276	-0.08045 276	1.00000 276

TABLE C-5
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU
CORRELATION TABLE

	TRDIS	TRBEAR	TGRNDSPD	TZDOT	TDVIN	TMWA	TRANGLE	THDGSTAB	TVRTSTAB	TSTAB
TRDIS	1.00000 53	-0.45186 53	0.23303 53	0.04472 53	0.21306 53	0.44967 53	0.38528 53	-0.20388 52	-0.33467 50	-0.13470 50
TRBEAR	-0.45186 53	1.00000 53	0.18714 53	-0.45337 53	0.01496 53	-0.17671 53	-0.23370 53	0.07615 52	0.22492 50	0.07230 50
TGRNDSPD	0.23303 53	0.18714 53	1.00000 53	-0.18438 53	0.01959 53	0.21055 53	0.16648 53	-0.11738 52	-0.21269 50	-0.16087 50
TZDOT	0.04472 53	-0.45337 53	-0.18438 53	1.00000 53	-0.17450 53	0.06530 53	0.01636 53	0.01801 52	0.03149 50	0.07286 50
TDVIN	0.21306 53	0.01496 53	0.01959 53	-0.17450 53	1.00000 53	-0.03549 53	-0.04963 53	0.03186 52	0.19546 50	0.13863 50
TMWA	0.44967 53	-0.17671 53	0.21055 53	0.06530 53	-0.03549 53	1.00000 53	0.45687 53	-0.25793 52	-0.26752 50	-0.15897 50
TRANGLE	0.38528 53	-0.23370 53	0.16648 53	0.01636 53	-0.04963 53	0.45687 53	1.00000 53	-0.36079 52	-0.31399 50	-0.32954 50
THDGSTAB	-0.20388 52	0.07615 52	-0.11738 52	0.01801 52	0.03186 52	-0.25793 52	-0.36079 52	1.00000 52	0.31289 50	0.79799 50
TVRTSTAB	-0.33467 50	0.22492 50	-0.21269 50	0.03149 50	0.19546 50	-0.26752 50	-0.31399 50	0.31289 50	1.00000 50	0.66272 50
TSTAB	-0.13470 50	0.07230 50	-0.16087 50	0.07286 50	0.13863 50	-0.15897 50	-0.32954 50	0.79799 50	0.66272 50	1.00000 50

TABLE C-6
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR LA
CORRELATION TABLE

	TRDIS	TRBEAR	TGRNDSPD	TZDOT	TDVIN	TMWA	TRANGLE	THDGSTAB	TVRTSTAB	TSTAB
TRDIS	1.00000	0.23062	-0.13479	0.13301	-0.01061	0.75996	-0.24393	-0.07267	0.54196	-0.17455
	10	10	10	10	10	10	10	10	9	9
TRBEAR	0.23062	1.00000	-0.93416	0.32472	-0.16586	0.38106	-0.38107	-0.48229	0.66494	-0.33479
	10	10	10	10	10	10	10	10	9	9
TGRNDSPD	-0.13479	-0.93416	1.00000	-0.28373	0.28935	-0.40220	0.10695	0.53604	-0.46936	0.41142
	10	10	10	10	10	10	10	10	9	9
TZDOT	0.13301	0.32472	-0.28373	1.00000	0.05955	0.02080	0.10315	-0.46356	0.18310	-0.40632
	10	10	10	10	10	10	10	10	9	9
TDVIN	-0.01061	-0.16586	0.28935	0.05955	1.00000	-0.28275	0.02276	-0.27269	-0.11212	-0.29355
	10	10	10	10	10	10	10	10	9	9
TMWA	0.75996	0.38106	-0.40220	0.02080	-0.28275	1.00000	-0.24631	-0.04245	0.47935	-0.12725
	10	10	10	10	10	10	10	10	9	9
TRANGLE	-0.24393	-0.38107	0.10695	0.10315	0.02276	-0.24631	1.00000	-0.13864	-0.80852	-0.05519
	10	10	10	10	10	10	10	10	9	9
THDGSTAB	-0.07267	-0.48229	0.53604	-0.46356	-0.27269	-0.04245	-0.13864	1.00000	0.02131	0.96563
	10	10	10	10	10	10	10	10	9	9
TVRTSTAB	0.54196	0.66494	-0.46936	0.18310	-0.11212	0.47935	-0.80852	0.02131	1.00000	0.13852
	9	9	9	9	9	9	9	9	9	9
TSTAB	-0.17455	-0.33479	0.41142	-0.40632	-0.29355	-0.12725	-0.05519	0.96563	0.13852	1.00000
	9	9	9	9	9	9	9	9	9	9

TABLE C-7
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR NY
CORRELATION TABLE

	TRDIS	TRBEAR	TGRNDSPD	TZDOT	TDVIN	TMWA	TRANGLE	THDGSTAB	TVRTSTAB	TSTAB
TRDIS	1.00000	-0.37599	0.56305	-0.55563	0.63809	0.25336	0.32993	-0.15944	0.05669	-0.17723
	28	28	28	28	28	28	28	22	19	15
TRBEAR	-0.37599	1.00000	0.08106	0.24299	-0.31348	0.12923	-0.20402	0.23644	-0.35028	0.36416
	28	28	28	28	28	28	28	22	19	15
TGRNDSPD	0.56305	0.08106	1.00000	-0.29339	0.36643	0.40212	0.44225	-0.16433	0.00608	-0.24189
	28	28	28	28	28	28	28	22	19	15
TZDOT	-0.55563	0.24299	-0.29339	1.00000	-0.89391	0.14235	0.13428	0.09724	0.00035	0.01985
	28	28	28	28	28	28	28	22	19	15
TDVIN	0.63809	-0.31348	0.36643	-0.89391	1.00000	-0.14206	-0.11646	-0.03734	0.19536	0.03970
	28	28	28	28	28	28	28	22	19	15
TMWA	0.25336	0.12923	0.40212	0.14235	-0.14206	1.00000	0.49071	0.08033	-0.18515	0.19562
	28	28	28	28	28	28	28	22	19	15
TRANGLE	0.32993	-0.20402	0.44225	0.13428	-0.11646	0.49071	1.00000	-0.26970	0.10671	-0.34692
	28	28	28	28	28	28	28	22	19	15
THDGSTAB	-0.15944	0.23644	-0.16433	0.09724	-0.03734	0.08033	-0.26970	1.00000	-0.40042	0.91577
	22	22	22	22	22	22	22	22	15	15
TVRTSTAB	0.05669	-0.35028	0.00608	0.00035	0.19536	-0.18515	0.10671	-0.40042	1.00000	-0.20525
	19	19	19	19	19	19	19	15	19	15
TSTAB	-0.17723	0.36416	-0.24189	0.01985	0.03970	0.19562	-0.34692	0.91577	-0.20525	1.00000
	15	15	15	15	15	15	15	15	15	15

TABLE C-8
TERMINAL MSAW ENCOUNTER CHARACTERISTICS FOR HOU, LA, AND NY COMBINED
CORRELATION TABLE

	TRDIS	TRBEAR	TGRNDSPD	TZDOT	TDVIN	TMWA	TRANGLE	THDGSTAB	TVRTSTAB	TSTAB
TRDIS	1.00000	-0.26166	0.23383	-0.08743	0.18382	0.35727	0.23936	-0.14729	-0.15391	-0.09376
	91	91	91	91	91	91	91	84	78	74
TRBEAR	-0.26166	1.00000	-0.02626	0.00441	-0.31884	-0.01353	-0.28193	0.11662	0.05968	0.13734
	91	91	91	91	91	91	91	84	78	74
TGRNDSPD	0.23383	-0.02626	1.00000	-0.23684	0.26940	-0.01409	0.25656	-0.05931	-0.21212	-0.11982
	91	91	91	91	91	91	91	84	78	74
TZDOT	-0.08743	0.00441	-0.23684	1.00000	-0.38158	0.07757	0.06003	-0.07373	0.05539	-0.08120
	91	91	91	91	91	91	91	84	78	74
TDVIN	0.18382	-0.31884	0.26940	-0.38158	1.00000	-0.05580	0.04711	-0.13762	0.10659	-0.15163
	91	91	91	91	91	91	91	84	78	74
TMWA	0.35727	-0.01353	-0.01409	0.07757	-0.05580	1.00000	0.26394	-0.14399	0.08532	-0.06774
	91	91	91	91	91	91	91	84	78	74
TRANGLE	0.23936	-0.28193	0.25656	0.06003	0.04711	0.26394	1.00000	-0.33266	-0.23306	-0.30735
	91	91	91	91	91	91	91	84	78	74
THDGSTAB	-0.14729	0.11662	-0.05931	-0.07373	-0.13762	-0.14399	-0.33266	1.00000	0.07765	0.83837
	84	84	84	84	84	84	84	84	74	74
TVRTSTAB	-0.15391	0.05968	-0.21212	0.05539	0.10659	0.08532	-0.23306	0.07765	1.00000	0.39395
	78	78	78	78	78	78	78	74	78	74
TSTAB	-0.09376	0.13734	-0.11982	-0.08120	-0.15163	-0.06774	-0.30735	0.83837	0.39395	1.00000
	74	74	74	74	74	74	74	74	74	74

APPENDIX D

MSAW ENCOUNTER DATA BASE

This Appendix contains the values of the parameters identified in Sections 3 and 4 that describe each MSAW encounter studied for this report. These data compose the data set from which the statistics of Sections 3 and 4 and the information provided in Appendices A-C have been developed. Table D-1 contains the en route data; Table D-2 contains the terminal data.

TABLE D-1
DATA BASE OF EMSAW
ENCOUNTER OBSERVATIONS

Field Identifiers:

1 encounter identification code
2 GRNDSPD (knots)
3 ZDOT (100 ft/min)
4 DVIN (100 ft)
5 DLIN (nmi)
6 DELTALIN (nmi)
7 APPROACH (case type as defined in figure 3-1)
8 XANGLE (degrees)
9 LATSPAN (degrees)
10 CRANGLE (degrees)
11 HDGSTAB (seconds)
12 SPDSTAB (seconds)
13 VRTSTAB (seconds)
14 STAB (seconds)
15 MWA (100 ft)
16 RDIS (nmi)
17 RBEAR (degrees)
18 RANGLE (degrees)

Note: An observation of 0.00 for DLIN simultaneously with 99 for XANGLE and 999 for LATSPAN and CRANGLE indicates that the aircraft position, as specified in the high speed printer message, was laterally inside of the EMSAW area.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
ZAB001	128	-93	47.00	0.00	1.45	2	99	999	999	0	0	0	0	74	44.7	192	30
ZAB002	195	-60	57.00	0.70	41.38	1	72	173	-71	0	0	0	0	76	43.6	191	19
ZAB003	256	-19	18.46	0.00	5.83	2	99	999	999	0	60	180	0	90	59.9	201	28
ZAB004	127	-71	25.00	0.00	14.28	2	99	999	999	0	0	0	0	100	64.9	304	86
ZAB005	100	-94	30.00	0.00	1.25	2	99	999	999	0	0	0	0	86	66.3	303	59
ZAB006	439	-58	68.65	0.00	10.36	2	99	999	999	0	0	180	0	100	79.9	87	37
ZAB007	519	-56	67.00	9.51	31.42	1	79	175	29	0	0	180	0	113	80.7	88	30
ZAB008	82	-47	71.00	0.00	4.80	2	99	999	999	0	0	120	0	100	61.8	303	18
ZAB009	128	-26	50.59	0.00	35.52	2	99	999	999	0	0	180	0	100	49.1	90	27
ZAB010	133	-55	51.00	0.00	16.51	2	99	999	999	0	60	0	0	90	70.8	115	34
ZAB011	184	-73	65.78	0.00	10.37	2	99	999	999	0	0	150	0	100	64.5	297	46
ZAB012	119	-147	30.00	0.00	9.68	2	99	999	999	0	0	0	0	86	76.7	291	49
ZAB013	403	-50	85.71	1.45	20.59	1	85	149	67	30	120	180	30	40	67.7	237	28
ZAB014	41	-50	71.28	0.00	11.37	2	99	999	999	0	0	0	0	74	57.3	187	49
ZAB015	444	-11	-9.63	0.00	11.46	6	99	999	999	0	60	180	0	128	61.9	257	25
ZAB016	334	-7	2.00	0.00	8.35	2	99	999	999	180	180	180	180	128	60.2	258	32
ZAB017	66	6	-14.00	0.00	11.43	4	99	999	999	0	0	0	0	128	60.7	253	54
ZAB018	56	-123	-64.94	0.00	3.95	6	99	999	999	0	60	0	0	128	61.1	255	72
ZAB019	118	0	-5.00	1.73	12.84	5	3	180	-4	180	180	180	180	55	88.4	229	34
ZAB020	246	0	-7.00	0.00	3.69	6	99	999	999	180	180	0	0	127	37.6	23	3
ZAB021	341	-27	24.00	0.00	13.73	2	99	999	999	30	180	180	30	95	59.9	211	36
ZAB022	342	0	-17.00	10.06	0.18	5	57	122	-2	60	90	180	60	77	68.2	243	9
ZAB023	339	0	-1.00	9.13	35.59	5	37	73	-31	60	120	180	60	61	67.1	243	8
ZAB024	476	-34	41.25	4.49	36.09	1	74	157	-54	0	0	0	0	103	94.6	20	54

TABLE D-1
DATA BASE OF EMSAW
ENCOUNTER OBSERVATIONS
(CONTINUED)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
ZAB025	346	4	-13.00	0.00	11.34	4	99	999	999	30	180	180	30	64	74.8	193	27
ZAB026	36	-1	1.00	0.00	2.16	2	99	999	999	0	0	0	0	86	76.3	274	71
ZAB027	76	-28	10.00	0.00	11.65	2	99	999	999	0	0	0	0	86	77.4	277	27
ZAB028	251	-30	34.50	1.25	35.76	1	89	168	84	0	0	0	0	103	75.8	275	20
ZAB029	69	0	-18.32	0.00	19.14	6	99	999	999	0	90	0	0	103	73.3	277	8
ZAB030	216	-40	19.37	0.00	4.19	2	99	999	999	30	0	0	0	95	77.6	205	75
ZAB031	271	-14	-1.50	0.00	13.09	6	99	999	999	60	90	150	60	50	51.3	183	7
ZAB032	217	18	-9.00	0.00	50.27	4	99	999	999	0	30	60	0	80	9.4	295	19
ZAB033	214	15	-26.00	0.00	0.35	4	99	999	999	0	30	60	0	90	10.9	289	39
ZAB034	228	38	-5.00	0.00	19.56	4	99	999	999	0	0	60	0	60	30.8	191	60
ZAB035	388	-2	-5.00	11.20	17.56	5	56	122	-29	120	30	120	30	55	59.7	230	2
ZAB036	158	-28	24.21	0.00	14.96	2	99	999	999	0	30	180	0	128	57.8	257	6
ZAB037	81	-23	15.00	0.00	9.65	2	99	999	999	0	30	180	0	128	56.8	254	88
ZAB038	78	-50	2.00	0.00	8.97	2	99	999	999	0	0	0	0	128	56.6	254	67
ZAB039	118	0	-20.00	1.86	10.22	5	55	166	-43	0	30	180	0	100	83.5	151	79
ZAB040	39	-40	56.00	0.00	2.87	2	99	999	999	0	0	180	0	86	81.2	269	21
ZAB041	37	-8	5.00	0.00	0.98	2	99	999	999	0	0	150	0	86	84.0	139	13
ZAB042	56	-16	11.00	0.00	15.54	2	99	999	999	0	0	180	0	76	84.8	140	74
ZAB043	188	-10	17.96	0.00	29.40	2	99	999	999	0	0	0	0	117	107.3	139	53
ZAB044	102	0	-15.00	0.16	28.13	5	79	172	-77	0	0	180	0	95	46.3	172	86
ZAB045	242	0	-10.00	6.78	45.91	5	73	71	-33	150	180	180	150	90	37.9	175	18
ZAB046	396	-33	60.21	0.00	20.23	2	99	999	999	90	90	180	90	95	61.7	231	41
ZAB047	309	-27	50.96	0.00	14.16	2	99	999	999	30	90	180	30	40	60.7	233	41
ZAB048	144	-5	-1.00	0.00	27.63	6	99	999	999	30	180	180	30	98	62.2	240	42
ZAB049	143	-5	-1.50	0.00	23.79	6	99	999	999	90	180	180	90	98	65.4	242	37
ZAB050	142	-1	1.00	1.89	25.95	1	74	142	70	180	180	180	180	94	54.9	218	42
ZAB051	104	-5	2.00	0.00	19.52	2	99	999	999	60	180	180	60	105	60.4	22	68
ZAB052	184	-9	14.28	0.00	14.56	2	99	999	999	30	120	180	30	160	71.7	221	25
ZAB053	177	-35	-1.50	0.00	7.91	6	99	999	999	60	180	180	60	110	37.6	144	47
ZAB054	68	-20	-5.00	0.00	12.97	6	99	999	999	0	180	180	0	50	66.9	187	3
ZAB055	123	-2	0.00	0.00	12.88	6	99	999	999	0	60	180	0	60	27.8	185	86
ZAB056	145	7	-61.75	0.00	40.23	4	99	999	999	0	30	0	0	95	94.7	203	74
ZAB057	307	-15	-56.75	0.00	2.81	6	99	999	999	90	30	180	30	160	58.2	54	64
ZAB058	161	-2	0.00	1.92	20.88	5	82	131	-34	180	180	180	180	106	62.7	209	53
ZAB059	150	-5	1.00	0.00	13.54	2	99	999	999	180	180	180	180	106	57.5	201	63
ZAB060	152	-5	0.50	0.00	42.18	2	99	999	999	30	180	180	30	106	59.5	178	62
ZAB061	369	35	-33.44	0.00	6.25	4	99	999	999	0	0	0	0	115	124.3	234	48
ZAB062	170	-13	13.59	0.00	21.62	2	99	999	999	90	60	180	60	105	60.0	352	66
ZAB063	160	0	-5.00	0.00	8.04	6	99	999	999	180	180	180	180	105	55.2	339	78
ZAB064	172	-10	7.00	0.00	5.20	2	99	999	999	180	180	180	130	100	66.2	93	11

TABLE D-1
DATA BASE OF EMSAW
ENCOUNTER OBSERVATIONS
(CONTINUED)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
ZAB065	134	-47	59.40	0.00	3.57	2	99	999	999	0	0	60	0	113	78.3	328	11
ZAB066	265	-35	32.00	0.00	39.60	2	99	999	999	0	0	0	0	90	60.9	112	29
ZAB067	48	-47	34.00	0.00	6.77	2	99	999	999	0	0	0	0	90	66.9	112	72
ZAB068	155	-37	37.15	0.00	19.89	2	99	999	999	0	0	0	0	90	65.9	112	54
ZAB069	169	-67	47.00	0.00	43.51	2	99	999	999	0	0	0	0	90	66.4	112	28
ZAB070	226	-20	16.00	0.00	7.72	2	99	999	999	180	180	180	180	91	50.5	266	30
ZAB071	214	-6	8.34	0.00	16.40	2	99	999	999	90	120	90	90	55	86.6	233	22
ZAB072	237	-10	14.00	0.00	10.46	2	99	999	999	180	180	180	180	100	46.7	44	3
ZAB073	236	-80	79.00	0.26	35.00	1	31	180	-32	0	0	0	0	88	104.4	49	49
ZAB074	275	-19	4.00	0.00	10.08	2	99	999	999	0	60	180	0	118	67.6	193	39
ZAB075	241	29	-2.00	0.00	6.29	4	99	999	999	0	0	180	0	60	27.8	189	16
ZAB076	75	-26	12.84	0.00	8.41	2	99	999	999	0	120	180	0	128	60.7	255	33
ZAB077	80	-28	12.00	0.00	6.20	2	99	999	999	0	0	0	0	128	59.9	257	83
ZAB078	273	-16	23.06	4.09	30.71	1	13	180	-20	0	0	180	0	68	92.4	169	27
ZAB079	271	-25	33.18	0.00	6.09	2	99	999	999	0	0	180	0	65	90.7	169	27
ZFW001	327	-19	24.00	3.99	57.13	1	63	168	-59	30	60	180	30	34	21.6	305	8
ZFW002	271	-18	27.03	7.52	64.51	7	52	158	-47	30	180	180	30	34	24.7	305	3
ZFW003	36	-30	51.71	0.00	2.79	2	99	999	999	0	0	0	0	40	58.8	11	56
ZFW004	398	-28	49.78	0.22	20.45	1	13	238	-15	0	120	0	0	40	97.1	28	64
ZFW005	86	-228	42.46	0.00	23.86	2	99	999	999	0	30	0	0	40	40.2	19	7
ZFW006	203	-47	59.06	4.84	51.48	7	79	186	87	0	0	0	0	40	54.6	60	40
ZFW007	178	-35	52.31	2.62	13.69	1	56	190	-45	0	0	0	0	40	58.7	54	89
ZFW008	249	-151	43.56	0.00	11.68	2	99	999	999	0	0	0	0	40	52.0	46	46
ZFW009	239	-54	77.46	0.00	6.50	2	99	999	999	0	0	0	0	30	53.6	62	16
ZFW010	150	-146	61.18	0.00	13.45	2	99	999	999	0	0	0	0	30	61.9	57	48
ZFW011	260	-61	68.68	0.00	63.98	2	99	999	999	30	0	0	0	40	48.7	56	40
ZFW012	277	-16	16.71	0.84	57.01	1	6	180	-5	30	30	180	30	34	28.2	210	25
ZFW013	296	-20	32.18	0.00	34.28	2	99	999	999	180	30	180	30	30	30.7	209	31
ZFW014	95	10	-23.00	0.00	26.36	4	99	999	999	0	0	180	0	34	32.1	62	34
ZFW015	407	-50	64.43	2.71	16.05	1	74	154	-59	180	180	150	150	70	84.1	274	53
ZFW016	316	-37	49.65	3.33	84.35	1	81	202	-61	60	120	0	0	30	40.8	277	17
ZFW017	250	-9	16.53	3.54	65.83	1	37	170	-35	60	180	180	60	34	44.6	120	22
ZFW018	223	-11	17.71	0.00	49.06	2	99	999	999	120	180	180	120	30	65.3	314	29
ZFW019	184	-7	8.18	0.00	14.10	2	99	999	999	180	180	180	180	30	34.3	39	60
ZFW020	315	-17	28.59	0.00	57.83	2	99	999	999	60	180	180	60	34	39.4	64	5
ZFW021	141	-8	-0.10	0.00	19.93	6	99	999	999	180	180	180	180	30	46.7	337	31
ZFW022	212	-17	25.90	0.00	20.43	2	99	999	999	60	120	180	60	31	47.4	202	87
ZFW023	337	-32	46.59	0.00	13.19	2	99	999	999	60	0	180	0	40	23.7	197	21
ZFW024	144	-43	45.81	0.00	39.96	2	99	999	999	0	0	0	0	50	42.1	343	44

TABLE D-1
DATA BASE OF EMSAW
ENCOUNTER OBSERVATIONS
(CONTINUED)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	. 17	18
ZFW025	221	-9	17.62	5.46	55.86	1	49	166	-45	180	180	180	180	34	21.3	300	11
ZFW026	258	-15	1.50	3.22	11.61	7	21	178	-19	180	180	180	180	50	63.5	24	33
ZFW027	325	-40	53.87	0.00	7.76	2	99	999	999	0	0	0	0	30	94.2	26	62
ZFW028	327	-29	38.28	6.54	17.07	1	16	234	-13	0	0	0	0	40	94.8	27	61
ZFW029	277	-15	28.68	0.00	61.70	2	99	999	999	0	90	180	0	34	40.5	57	35
ZFW030	286	-13	25.18	0.00	37.73	2	99	999	999	180	180	180	180	34	37.9	142	59
ZFW031	275	-14	18.00	0.00	31.31	2	99	999	999	180	180	180	180	34	34.7	150	65
ZNY001	296	-24	36.00	0.00	54.59	2	99	999	999	150	60	180	60	19	58.8	228	16
ZNY002	363	-25	34.00	0.00	51.62	2	99	999	999	90	60	180	60	19	56.5	83	55
ZNY003	249	-24	39.96	0.00	39.70	2	99	999	999	30	30	180	30	19	57.8	78	75
ZNY004	250	-25	25.65	1.80	56.94	1	73	166	-61	0	150	0	0	19	44.0	281	85
ZNY005	302	-15	25.50	0.00	16.10	2	99	999	999	120	60	180	60	27	51.5	10	88
ZNY006	253	-14	14.84	0.00	19.88	2	99	999	999	180	90	180	90	25	54.3	30	74
ZNY007	317	-26	28.87	0.00	11.97	2	99	999	999	180	150	180	150	19	56.2	89	27
ZNY008	199	-15	24.00	0.00	45.60	2	99	999	999	30	30	180	30	19	56.0	229	32
ZNY009	311	-26	34.00	0.00	12.52	2	99	999	999	0	30	180	0	19	53.8	86	52
ZNY010	249	-15	20.00	0.00	41.15	2	99	999	999	0	60	180	0	19	57.5	234	44
ZNY011	214	-14	24.96	0.00	43.57	2	99	999	999	0	90	180	0	19	55.0	228	45
ZNY012	212	-14	23.43	0.00	16.78	2	99	999	999	180	120	180	120	19	46.1	277	69
ZNY013	279	-16	14.87	0.00	21.38	2	99	999	999	150	120	180	120	25	58.3	34	63
ZNY014	354	-35	69.06	0.00	20.64	2	99	999	999	90	0	120	0	17	29.7	74	20
ZNY015	294	-22	11.00	0.00	4.57	2	99	999	999	180	30	180	30	40	40.7	172	33
ZNY016	302	-20	32.00	0.00	12.41	2	99	999	999	0	30	180	0	39	40.7	144	64
ZNY017	250	-12	16.93	4.02	29.23	1	80	150	-65	60	180	180	60	25	56.0	22	78
ZNY018	287	-20	29.00	0.00	15.22	2	99	999	999	30	30	180	30	40	47.7	182	14
ZNY019	246	-6	11.90	0.00	8.88	2	99	999	999	180	180	180	180	41	75.0	134	42
ZNY020	239	-9	4.46	0.00	3.51	2	99	999	999	180	180	180	180	41	78.9	213	60
ZNY021	236	-2	3.00	0.72	11.86	1	44	202	-67	180	180	180	180	40	77.4	211	59
ZNY022	306	-17	24.18	0.00	7.98	2	99	999	999	90	60	180	60	27	53.2	19	79
ZNY023	267	-18	13.62	0.00	23.13	2	99	999	999	180	30	180	30	25	57.8	32	65
ZNY024	229	-23	37.00	0.00	34.47	2	99	999	999	0	150	180	0	19	54.9	230	4
ZNY025	288	-21	39.78	5.27	7.35	1	49	152	25	180	180	180	180	19	46.9	61	14
ZNY026	285	-17	25.00	3.32	23.27	1	82	110	-49	180	180	180	180	25	26.4	263	15
ZNY027	239	-23	34.75	0.00	46.47	2	99	999	999	60	90	180	60	19	56.0	235	22
ZNY028	407	-27	47.59	0.00	49.17	2	99	999	999	120	60	180	60	19	56.7	230	21
ZNY029	270	-15	25.46	0.00	15.37	2	99	999	999	0	30	180	0	25	30.9	41	15
ZNY030	261	-13	15.00	0.00	18.99	2	99	999	999	30	0	180	0	25	61.9	34	61
ZNY031	278	-16	27.96	5.94	12.74	1	60	62	23	90	60	180	60	28	46.5	56	27
ZNY032	200	-15	26.00	2.55	52.94	1	73	158	-55	90	90	180	90	19	44.1	282	86
ZNY033	463	-34	51.96	0.00	61.21	2	99	999	999	60	30	90	30	19	55.4	89	57

TABLE D-1
DATA BASE OF EMSAW
ENCOUNTER OBSERVATIONS
(CONTINUED)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
ZNY034	268	-12	24.93	2.53	21.14	1	84	152	-63	0	180	180	0	25	67.6	27	20
ZNY035	215	-11	16.93	0.00	10.86	2	99	999	999	60	120	180	60	25	64.3	38	74
ZNY036	219	-15	19.00	0.00	41.54	2	99	999	999	30	60	180	30	19	53.0	229	53
ZNY037	221	-4	8.50	0.00	7.85	2	99	999	999	150	180	180	150	27	45.6	24	86
ZNY038	170	-10	17.93	0.00	32.81	2	99	999	999	0	180	180	0	17	6.1	40	7
ZNY039	164	-5	10.50	0.00	21.18	2	99	999	999	30	90	180	30	17	3.1	23	23
ZNY040	229	-12	17.00	0.00	44.46	2	99	999	999	0	180	180	0	19	57.5	232	34
ZNY041	243	-32	37.53	0.00	18.83	2	99	999	999	0	90	150	0	26	49.0	293	62
ZNY042	242	-20	31.71	2.21	53.84	1	83	160	-65	30	180	1E0	30	19	44.7	281	85
ZNY043	210	-10	17.68	0.00	26.83	2	99	999	999	30	30	180	30	19	43.2	232	4
ZNY044	225	-7	1.34	0.00	38.56	2	99	999	999	0	60	180	0	19	47.1	232	31
ZNY045	279	-13	14.56	0.00	23.17	2	99	999	999	30	180	180	30	25	59.8	31	63
ZNY046	194	-7	14.90	0.00	18.69	2	99	999	999	0	120	180	0	25	66.1	30	65
ZNY047	266	-19	17.93	0.00	14.33	2	99	999	999	90	90	180	90	25	32.4	42	5
ZNY048	250	-12	14.18	0.00	14.86	2	99	999	999	90	180	180	90	25	32.5	41	5
ZNY049	203	-20	26.00	0.00	14.54	2	99	999	999	30	180	180	30	26	53.5	301	48
ZNY050	203	-16	28.78	0.00	7.61	2	99	999	999	0	90	180	0	26	59.0	295	61
ZNY051	242	-14	23.00	0.60	7.46	1	85	170	-73	30	30	180	30	25	64.0	24	18
ZNY052	239	-18	26.00	4.71	23.30	1	81	130	-47	30	180	180	30	26	63.0	303	65
ZNY053	250	-24	31.00	0.00	13.88	2	99	999	999	0	180	180	0	40	46.4	181	28
ZNY054	235	-20	33.00	0.00	22.97	2	99	999	999	0	60	90	0	26	55.3	300	35
ZNY055	277	-17	25.00	0.00	11.54	2	99	999	999	120	180	180	120	25	55.9	30	29
ZNY056	298	-16	26.00	0.00	14.32	2	99	999	999	120	60	180	60	27	51.4	14	78
ZNY057	205	-11	23.43	1.87	13.55	1	54	166	-41	180	30	180	30	19	45.3	280	55
ZNY058	303	-21	27.00	0.00	10.18	2	99	999	999	90	180	180	90	27	48.7	20	80
ZNY059	279	-12	17.00	0.00	11.70	2	99	999	999	30	180	150	30	27	44.9	29	13
ZNY060	246	-11	5.00	0.00	8.19	2	99	999	999	180	180	180	180	27	52.3	28	24
ZNY061	217	-34	51.00	0.00	8.37	2	99	999	999	0	60	180	0	26	54.9	298	6
ZNY062	297	-17	25.00	1.48	17.73	1	49	178	-49	60	60	180	60	25	27.6	41	1
ZNY063	235	-22	32.15	0.00	10.05	2	99	999	999	0	180	0	0	26	58.9	299	65
ZNY064	252	-15	20.50	0.06	17.42	1	68	180	-67	90	180	180	90	40	48.3	340	39
ZNY065	237	-39	39.00	3.75	9.41	1	31	162	-23	0	60	180	0	28	55.3	300	0
ZNY066	235	-44	33.00	0.00	3.78	2	99	999	999	0	90	180	0	26	56.0	299	2
ZNY067	235	-18	26.59	0.00	18.99	2	99	999	999	60	30	180	30	26	61.0	296	80
ZNY068	306	-20	33.00	0.00	14.02	2	99	999	999	90	60	180	60	27	50.9	14	82
ZNY069	263	-10	1.00	0.00	20.67	2	99	999	999	0	90	180	0	25	45.2	38	87
ZNY070	243	-5	1.62	0.13	14.37	1	78	178	-77	180	90	180	90	27	56.9	24	11
ZNY071	244	-15	23.50	3.79	3.32	1	32	174	-17	90	90	180	90	27	63.8	23	11
ZNY072	230	-17	23.78	0.00	16.67	2	99	999	999	30	30	180	30	26	59.4	293	63
ZNY073	264	-17	21.00	0.00	17.67	2	99	999	999	60	120	180	60	25	61.3	25	23

TABLE D-1
DATA BASE OF EMSAW
ENCOUNTER OBSERVATIONS
(CONTINUED)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	.17	18
ZNY074	280	-57	42.96	0.00	12.60	2	99	999	999	180	180	0	0	48	65.3	0	14
ZNY075	191	-30	34.00	0.00	22.86	2	99	999	999	0	90	180	0	26	60.0	299	64
ZNY076	164	-10	17.00	0.00	11.34	2	99	999	999	0	180	180	0	44	47.0	81	21
ZNY077	264	-19	22.00	1.46	27.13	1	71	162	-67	0	180	180	0	25	66.1	26	44
ZNY078	191	-20	23.00	0.00	21.01	2	99	999	999	180	180	180	180	39	42.4	163	77
ZNY079	181	-12	21.25	0.00	12.51	2	99	999	999	0	0	180	0	26	55.9	297	16
ZNY080	269	-23	35.84	0.00	11.43	2	99	999	999	90	120	180	90	45	38.9	130	86
ZNY081	139	20	-12.00	0.00	24.01	4	99	999	999	0	0	0	0	25	27.1	287	66
ZNY082	227	-22	38.00	0.00	9.89	2	99	999	999	0	90	160	0	26	56.5	297	12
ZNY083	233	-8	16.93	0.77	10.54	1	65	174	-59	180	60	180	60	25	14.6	277	71
ZNY084	275	-22	31.59	2.90	23.29	1	83	148	-71	180	90	180	90	48	34.3	121	51
ZNY085	285	-32	34.59	0.00	5.22	2	99	999	999	0	90	0	0	25	7.6	323	27
ZNY086	250	-17	27.90	4.16	10.06	1	89	132	55	0	0	180	0	25	7.5	312	48
ZNY087	291	-14	20.00	4.28	21.58	1	22	194	-39	150	120	180	120	40	77.9	214	78
ZNY088	253	-22	33.00	0.00	20.16	2	99	999	999	30	60	180	30	26	58.3	297	61
ZNY089	272	-10	9.00	0.00	8.31	2	99	999	999	90	180	180	90	27	50.5	24	12
ZNY090	288	-14	24.50	6.31	18.79	1	47	164	-41	60	120	180	60	25	21.4	37	5
ZNY091	287	-19	22.00	0.15	17.93	1	47	182	-49	90	60	180	60	25	28.8	41	1
ZNY092	426	-59	59.75	2.01	11.12	1	38	168	-31	30	0	180	0	20	1.7	322	75
ZNY093	232	-15	20.00	1.67	21.84	1	46	168	-37	120	180	180	120	25	43.2	25	68
ZNY094	312	-30	30.00	0.00	10.39	2	99	999	999	180	0	180	0	27	46.9	19	87
ZNY095	240	-7	1.00	0.00	15.60	2	99	999	999	0	30	180	0	25	41.4	41	85
ZNY096	211	-22	30.34	0.00	5.74	2	99	999	999	0	30	180	0	26	60.0	296	22
ZNY097	198	-15	21.00	0.00	10.17	2	99	999	999	30	150	180	30	26	55.8	297	17
ZNY098	204	-4	8.46	2.26	30.37	1	16	176	-17	120	180	180	120	41	68.3	214	84
ZNY099	221	-13	16.00	0.00	21.11	2	99	999	999	180	150	180	150	25	21.0	266	4
ZNY100	222	-22	32.59	4.00	11.22	1	53	150	-35	60	180	180	60	26	60.3	303	87
ZNY101	215	-10	20.78	0.00	15.52	2	99	999	999	180	180	150	150	25	30.8	38	1
ZNY102	200	-13	15.00	2.00	17.61	1	54	176	-53	30	90	180	30	25	26.7	41	6
ZNY103	193	-4	2.00	0.00	13.24	2	99	999	999	60	180	180	60	25	33.9	41	3
ZNY104	150	-14	17.00	0.00	7.41	2	99	999	999	60	60	60	60	44	44.2	83	17
ZNY105	213	-23	26.59	0.00	8.04	2	99	999	999	30	30	180	30	26	57.9	296	15
ZNY106	244	0	-7.00	6.43	14.03	5	20	60	-11	0	0	150	0	57	71.5	229	66
ZNY107	292	-14	21.00	1.21	8.76	1	69	208	-99	30	60	180	30	40	79.0	208	36
ZNY108	247	-30	42.00	0.00	37.73	2	99	999	999	30	120	180	30	17	11.6	224	30
ZNY109	256	-17	28.90	0.00	11.80	2	99	999	999	60	60	180	60	25	11.7	324	80
ZNY110	215	-10	14.46	4.65	10.75	1	69	136	-53	30	30	180	30	25	8.8	307	75
ZNY111	141	-13	12.00	0.00	5.24	2	99	999	999	0	90	180	0	41	76.2	19	90
ZNY112	224	-13	10.00	0.00	10.76	2	99	999	999	0	60	180	0	41	74.2	19	85

TABLE D-1
DATA BASE OF EMSAW
ENCOUNTER OBSERVATIONS
(CONTINUED)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
ZNY113	288	-18	33.90	0.00	22.23	2	99	999	999	30	60	150	30	26	60.8	295	35
ZNY114	230	-16	27.87	5.68	1.98	1	24	156	-7	30	60	120	30	28	59.3	297	4
ZNY115	207	-17	26.00	0.00	6.61	2	99	999	999	0	0	120	0	26	59.1	296	21
ZNY116	249	-16	21.65	0.00	12.38	2	99	999	999	120	180	120	120	26	52.4	293	43
ZNY117	212	-14	15.87	0.00	30.85	2	99	999	999	30	120	180	30	22	37.8	251	85
ZNY118	308	-25	32.50	0.00	23.27	2	99	999	999	30	60	180	30	26	59.0	299	22
ZNY119	246	-19	13.56	0.00	8.13	2	99	999	999	180	150	180	150	41	76.3	20	24
ZNY120	281	-23	26.78	3.51	12.56	1	61	74	27	30	30	180	30	28	48.6	55	27
ZNY121	273	-21	17.00	0.00	14.55	2	99	999	999	60	180	180	60	25	62.2	32	61
ZNY122	278	-17	33.81	1.31	18.61	1	58	178	-59	30	150	180	30	25	23.2	26	5
ZNY123	288	-16	28.81	0.00	17.67	2	99	999	999	60	60	180	60	25	26.7	33	4
ZNY124	228	-17	27.03	0.00	39.01	2	99	999	999	0	30	180	0	19	56.1	83	19
ZNY125	293	-18	26.90	0.00	45.65	2	99	999	999	180	30	180	30	19	54.0	228	13
ZNY126	236	-38	44.09	0.00	41.82	2	99	999	999	0	0	180	0	19	56.9	233	5
ZNY127	291	-32	48.06	0.00	48.17	2	99	999	999	150	30	180	30	19	58.6	81	56
ZNY128	281	-16	28.96	0.00	54.48	2	99	999	999	180	120	180	120	19	59.1	84	53
ZNY129	263	-10	9.87	0.00	48.07	2	99	999	999	180	60	180	60	19	54.7	231	20
ZNY130	332	-34	40.00	0.00	54.13	2	99	999	999	120	30	180	30	19	59.0	88	53
ZNY131	242	-15	19.00	0.00	34.35	2	99	999	999	180	180	180	180	40	71.0	215	83
ZNY132	197	-15	14.46	0.00	18.82	2	99	999	999	0	30	180	0	25	62.6	34	62
ZNY133	313	-20	32.00	0.00	11.12	2	99	999	999	180	60	180	60	27	51.0	16	87
ZNY134	263	-17	23.00	2.92	21.98	1	83	136	61	0	60	180	0	25	66.5	24	30
ZNY135	246	-13	15.56	0.00	20.63	2	99	999	999	30	180	180	30	25	62.0	32	45
ZNY136	296	-15	22.03	4.44	29.02	1	84	146	-65	180	120	180	120	25	54.6	22	74
ZNY137	275	-12	14.71	0.00	19.17	2	99	999	999	180	150	0	0	25	60.4	35	60
ZNY138	287	-19	33.93	0.00	11.40	2	99	999	999	0	60	150	0	27	50.7	17	86
ZNY139	261	-20	20.43	3.04	18.70	1	57	156	-47	0	180	180	0	25	68.8	28	60
ZNY140	295	-13	15.93	0.00	20.15	2	99	999	999	180	180	180	180	25	58.6	35	64
ZNY141	253	-15	24.00	2.17	25.65	1	66	158	-61	0	180	180	0	25	66.9	26	49
ZNY142	279	-11	10.00	0.00	11.46	2	99	999	999	60	60	180	60	25	62.8	35	69
ZNY143	291	-15	25.93	6.22	25.21	1	78	130	-49	60	120	180	60	25	52.1	21	81
ZNY144	279	-11	18.00	0.00	20.92	2	99	999	999	0	180	180	0	25	58.0	31	52
ZNY145	237	-16	13.87	0.00	10.07	2	99	999	999	90	30	180	30	25	61.6	35	68
ZNY146	311	-15	21.50	0.00	13.30	2	99	999	999	30	90	180	30	40	45.9	181	30
ZNY147	252	-18	28.00	0.55	16.72	1	72	180	-73	0	60	180	0	25	26.7	37	20
ZNY148	260	-14	28.12	0.00	15.60	2	99	999	999	0	60	180	0	25	30.2	39	18
ZNY149	223	-16	28.34	2.23	39.45	1	66	162	-51	0	90	180	0	19	44.0	281	78
ZNY150	207	-9	12.68	0.00	6.32	2	99	999	999	90	180	180	90	25	29.4	261	23
ZNY151	205	-6	9.96	5.01	10.76	1	75	84	-19	90	180	180	90	25	28.1	260	25
ZNY152	298	-12	24.81	7.69	28.72	1	85	116	-53	30	30	180	30	25	52.2	20	75
ZNY153	279	-18	31.71	0.00	14.10	2	99	999	999	30	150	180	30	40	47.3	180	24

TABLE D-1
DATA BASE OF EMSAW
ENCOUNTER OBSERVATIONS
(CONCLUDED)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
ZNY154	272	-14	23.93	0.00	45.93	2	99	999	999	180	30	180	30	19	52.3	231	21
ZNY155	299	-17	29.90	3.57	12.87	1	59	74	29	90	30	180	30	28	48.8	55	25
ZNY156	373	-28	40.00	0.00	50.45	2	99	999	999	60	60	180	60	19	58.5	229	23
ZNY157	309	-13	21.00	0.00	36.99	2	99	999	999	60	0	120	0	19	49.9	235	37
ZNY158	280	-26	27.62	0.00	45.57	2	99	999	999	90	30	180	30	19	54.3	229	13
ZNY159	256	-12	23.50	0.00	46.36	2	99	999	999	180	180	180	180	19	29.5	248	25
ZNY160	186	-16	31.96	0.00	50.01	2	99	999	999	0	0	180	0	19	53.7	78	44
ZNY161	325	-42	38.00	0.00	61.65	2	99	999	999	150	0	0	0	19	56.2	89	56
ZNY162	231	-2	1.00	0.00	37.79	2	99	999	999	30	60	180	30	19	50.6	235	34
ZNY163	428	-39	74.21	0.00	22.82	2	99	999	999	180	30	180	30	27	41.1	3	87
ZNY164	222	-8	16.93	0.00	16.34	2	99	999	999	0	30	180	0	25	62.4	37	53
ZNY165	289	-12	25.46	3.93	24.80	1	78	152	-59	30	150	180	30	25	52.5	24	78
ZNY166	234	-12	22.68	0.90	23.00	1	86	170	-79	120	150	180	120	26	61.1	300	63

TABLE D-2
DATA BASE OF TERMINAL MSAW ENCOUNTER OBSERVATIONS

Note: Z indicates insufficient data available to compute parameter.

OBS	TRACON	TRDIS (nmi)	TRBEAR (degrees)	TGRNDSPD (knots)	TZDOT (100 ft/min)	TDVIN (100 ft)	TMWA (100 ft)	TRANGLE (degrees)	THDGSTAB (seconds)	TVRTSTAB (seconds)	TSTAB (seconds)
1	HOU	5.1	317.725	133.2	-15.000	-0.812	4	11.128	0	Z	Z
2	HOU	9.6	317.988	205.2	-14.550	-2.950	14	34.169	0	15	0
3	HOU	29.0	319.922	194.4	-22.878	-0.137	6	60.263	15	15	15
4	HOU	4.8	327.656	147.6	-20.628	-0.450	4	41.352	105	90	90
5	HOU	19.7	150.205	342.0	-1.200	-0.235	7	38.559	0	0	0
6	HOU	11.5	314.121	244.8	-30.078	-0.025	13	72.144	0	45	0
7	HOU	11.3	311.836	262.8	-29.550	-1.400	13	83.572	0	45	0
8	HOU	4.7	320.273	140.4	-29.250	-2.017	4	18.578	0	15	0
9	HOU	7.2	315.615	140.4	-10.500	-1.682	6	9.608	105	105	105
10	HOU	10.0	300.322	237.6	-33.000	-0.175	8	42.152	75	90	75
11	HOU	5.3	317.197	198.0	-15.678	-0.212	4	30.997	15	30	15
12	HOU	22.4	309.287	118.8	-18.678	-0.600	13	29.209	45	60	45
13	HOU	4.8	321.504	104.4	-2.478	-1.550	4	21.613	30	30	30
14	HOU	5.0	319.307	162.0	-13.200	-0.012	4	13.871	15	60	15
15	HOU	4.8	319.482	158.4	-13.278	-0.376	4	11.685	15	75	15
16	HOU	4.6	344.443	140.4	-13.128	-0.862	4	9.861	45	105	45
17	HOU	17.1	82.969	316.8	-6.450	-1.937	4	1.314	45	60	45
18	HOU	4.7	319.131	165.6	-26.100	-2.620	4	10.067	60	15	15
19	HOU	4.9	318.691	162.0	-14.328	-0.312	4	11.592	105	30	30
20	HOU	5.1	318.691	126.0	-4.650	-3.462	4	11.465	45	105	45
21	HOU	5.5	317.813	147.6	-7.350	-1.387	4	10.394	105	105	105
22	HOU	10.6	313.066	230.4	-16.428	-0.266	14	5.480	105	105	105
23	HOU	5.4	317.813	172.8	-4.950	-0.825	4	9.318	105	15	15
24	HOU	7.1	315.439	154.8	-5.478	-1.825	6	7.772	90	105	90
25	HOU	5.2	318.164	169.2	-14.928	-0.462	4	8.155	30	105	30
26	HOU	5.0	318.779	140.4	-27.228	-0.812	4	10.840	60	45	45
27	HOU	4.7	319.219	162.0	-13.728	-0.178	4	9.445	105	105	105
28	HOU	7.9	86.660	180.0	-6.378	-1.725	10	1.050	15	45	15
29	HOU	13.2	68.203	97.2	-6.600	-0.012	6	13.666	30	60	30
30	HOU	12.9	68.027	93.6	-7.200	-0.157	9	11.457	45	75	45
31	HOU	12.8	67.939	93.6	-7.500	-0.975	6	11.545	45	75	45
32	HOU	12.6	67.764	93.6	-6.528	-0.375	8	11.721	60	90	60
33	HOU	4.9	318.955	126.0	-10.950	-0.025	4	11.730	60	105	60
34	HOU	12.0	69.961	108.0	-9.750	-0.287	6	62.375	30	45	30
35	HOU	11.6	68.027	104.4	-9.450	-2.326	7	56.201	60	15	15
36	HOU	11.6	67.412	104.4	-8.700	-0.375	8	56.817	60	75	60
37	HOU	11.1	64.248	97.2	-4.950	-3.312	9	53.248	0	Z	Z

TABLE D-2
DATA BASE OF TERMINAL MSAW
ENCOUNTER OBSERVATIONS
(CONTINUED)

Note: Z indicates insufficient data available to compute parameter.

OBS	TRACON	TRDIS (nmi)	TRBEAR (degrees)	TGRNDSPD (knots)	TZDOT (100 ft/min)	TDVIN (100 ft)	TMWA (100 ft)	TRANGLE (degrees)	THDGSTAB (seconds)	TVRTSTAB (seconds)	TSTAB (seconds)
38	HOU	6.1	317.988	165.60	-3.000	-0.950	6	57.631	30	105	30
39	HOU	5.1	320.801	133.20	-16.650	-0.437	4	30.961	0	105	0
40	HOU	4.7	321.152	129.60	-15.600	-1.503	4	23.879	0	90	0
41	HOU	4.7	319.307	158.40	-11.100	-0.125	4	11.510	105	105	105
42	HOU	5.4	317.549	165.60	-6.378	-0.500	4	8.484	45	105	45
43	HOU	12.6	75.586	151.20	-4.200	-1.575	6	34.465	45	15	15
44	HOU	11.9	73.301	154.80	2.550	-0.200	6	36.299	75	30	30
45	HOU	11.6	71.895	158.40	-16.650	-0.550	7	40.146	75	45	45
46	HOU	11.1	66.357	154.80	-2.628	-0.115	9	59.456	0	15	0
47	HOU	5.5	317.461	172.80	-18.750	-0.600	4	10.614	15	105	15
48	HOU	3.3	202.061	176.40	14.100	-4.775	10	63.460	Z	Z	Z
49	HOU	5.0	318.691	169.20	-18.150	-0.512	4	8.682	30	90	30
50	HOU	12.8	312.363	205.20	-1.050	-0.900	14	61.142	0	15	0
51	HOU	9.2	313.945	133.20	-7.950	-0.070	14	7.347	15	0	0
52	HOU	5.1	318.604	180.00	-26.478	-3.250	4	9.925	90	15	15
53	HOU	4.9	318.955	169.20	-21.000	-2.081	4	9.715	45	15	15
54	LA	9.3	309.111	79.20	6.000	-9.362	20	27.657	75	105	75
55	LA	11.3	309.199	86.40	-76.578	-3.372	27	7.475	60	105	60
56	LA	8.8	18.545	194.40	-22.578	-0.937	15	57.905	90	60	60
57	LA	5.3	305.420	75.60	16.050	-0.475	10	76.381	0	Z	Z
58	LA	2.9	30.322	183.60	-27.228	-3.362	7	61.342	15	30	15
59	LA	9.7	73.213	234.00	-22.800	-0.525	6	3.307	90	105	90
60	LA	12.9	296.455	108.00	28.428	-1.525	29	1.506	15	105	15
61	LA	5.5	337.236	97.20	0.000	-0.822	8	14.906	30	75	30
62	LA	5.9	335.039	82.80	-3.828	-1.443	8	2.600	0	105	0
63	LA	24.1	296.982	100.80	7.500	-1.850	28	32.833	0	105	0
64	NY	21.0	3.164	199.08	-25.428	11.271	9	71.117	45	Z	Z
65	NY	12.6	298.828	295.20	-25.428	11.356	21	83.859	15	Z	Z
66	NY	15.7	45.264	156.60	-63.228	21.000	6	15.285	0	Z	Z
67	NY	2.6	336.709	185.40	-7.200	-1.601	10	51.405	Z	Z	Z
68	NY	3.2	315.967	139.32	-7.428	-4.764	12	33.437	15	Z	Z
69	NY	2.8	306.914	95.76	4.878	-3.151	10	84.045	0	Z	Z
70	NY	13.4	42.451	188.64	-14.700	6.310	6	23.326	0	105	0
71	NY	13.5	36.387	205.92	-9.000	-1.474	12	81.431	0	0	0
72	NY	3.8	295.576	176.40	-19.728	4.285	8	5.947	Z	45	Z
73	NY	3.3	297.773	176.40	-9.528	4.106	7	10.067	Z	30	Z
74	NY	3.1	299.268	176.40	-10.050	2.233	8	15.623	Z	45	Z

TABLE D-2
DATA BASE OF TERMINAL MSAW
ENCOUNTER OBSERVATIONS
(CONCLUDED)

Note: Z indicates insufficient data available to compute parameter.

OBS	TRACON	TRDIS (nmi)	TRBEAR (degrees)	TGRNDSPD (knots)	TZDOT (100 ft/min)	TDVIN (100 ft)	TMWA (100 ft)	TRANGLE (degrees)	THDGSTAB (seconds)	TVRTSTAB (seconds)	TSTAB (seconds)
75	NY	2.9	300.850	176.40	-10.578	-0.706	10	18.835	Z	30	Z
76	NY	6.3	89.912	148.68	0.000	-2.875	23	63.161	45	Z	Z
77	NY	7.9	25.752	133.20	-18.750	7.419	7	41.009	Z	Z	Z
78	NY	2.9	300.674	142.20	-9.828	4.354	7	12.879	105	45	45
79	NY	2.6	302.520	138.96	-10.578	-0.556	10	15.209	105	60	60
80	NY	6.1	35.156	146.88	-15.528	7.390	8	4.577	45	15	15
81	NY	7.4	10.371	195.84	-18.450	5.793	10	73.834	45	Z	Z
82	NY	16.0	357.627	260.64	-16.650	7.735	12	23.414	0	105	0
83	NY	17.2	5.713	249.84	-17.100	7.759	12	62.377	30	105	30
84	NY	3.4	299.443	180.72	-18.978	6.566	7	12.198	75	60	60
85	NY	5.0	55.020	163.44	-18.900	7.305	10	12.475	0	105	0
86	NY	2.7	111.885	211.68	-16.200	3.675	7	61.774	0	105	0
87	NY	2.2	96.504	189.00	-6.378	2.266	6	61.228	0	105	0
88	NY	1.9	87.275	184.68	-6.978	-0.928	8	61.109	0	105	0
89	NY	1.8	102.217	86.76	-7.050	2.504	4	4.413	0	105	0
90	NY	1.7	103.271	93.24	-9.150	-0.365	6	3.954	0	105	0
91	NY	4.2	53.965	113.40	-6.528	2.680	10	10.689	75	105	75

GLOSSARY

Acronyms

AAS	Advanced Automation System
ACES	Adaptation Controlled Environment System
AP	Acquisition Phase
APM	Approach Path Monitoring
APW	Approach Path Warning
ARTCC	Air Route Traffic Control Center
ARTS	Automated Radar Terminal system
ATC	Air Traffic Control
DART	Data Analysis Reduction Tool
DID	Data Item Description
EMSAW	En Route Minimum Safe Altitude Warning
FAA	Federal Aviation Administration
GTM	General Terrain Monitoring
GTW	General Terrain Warning
HGFA	High Gross Filter Altitude
HSP	High Speed Printer
ILS	Instrument Landing System
MGFA	Middle Gross Filter Altitude
MSAW	Minimum Safe Altitude Warning
MWA	Minimum Warning Altitude
NAS	National Airspace System
RSB	Radar Sort Box
SAM	Satellite Airport Monitoring
SAR	System Analysis Recording
SLS	System Level Specification
SOW	Statement of Work
SUA	Special Use Airspace
TRACON	Terminal Radar Approach Control Facility

Abbreviations

APPROACH	EMSAW area approach pattern
CRANGLE	Critical lateral angle in degrees (en route)
D	Kolmogorov - Smirnoff statistic
DELTALIN	Lateral distance in EMSAW area in nmi (en route)
DLIN	Lateral distance to EMSAW area in nmi (en route)
DVIN	Vertical distance to EMSAW altitude in 100 ft. (en route)
ft	feet
GRNDSPD	Ground speed in knots (en route)
HDGSTAB	Heading stability in seconds (en route)
HOU	Houston TRACON
LA	Los Angeles TRACON
LATSPAN	Lateral span in degrees (en route)
min	minutes
nmi	nautical mile
NY	New York TRACON
RANGLE	Angle from radial heading in degrees (en route)
RBEAR	Bearing from radar in degrees (en route)
RDIS	Distance from radar in nmi (en route)
SPDSTAB	Speed stability in seconds (en route)
STAB	Total stability in seconds (en route)
TDVIN	Vertical distance to MSAW altitude in 100 ft. (terminal)
TGRNDSPD	Ground speed in knots (terminal)
THDGSTAB	Heading stability in seconds (terminal)

Abbreviations (Concluded)

TMWA	Minimum warning altitude (terminal)
TRANGLE	Angle from radial heading in degrees (terminal)
TRBEAR	Bearing from radar in degrees (terminal)
TRDIS	Distance from radar in nmi (terminal)
TSTAB	Total stability in seconds (terminal)
TVRTSTAB	Vertical stability in seconds (terminal)
TZDOT	Altitude change rate in 100 ft/min (terminal)
VRTSTAB	Vertical stability in seconds (en route)
W	Shapiro - Wilk statistic
XANGLE	Lateral crossing angle in degrees (en route)
ZAB	Albuquerque Center
ZDOT	Altitude change rate in 100 ft/min
ZFW	Fort Worth Center
ZNY	New York Center

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