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Analysis of Heliport Environmental Data; Intracoastal City



Rosanne M. Weiss

July 1990

DOT/FAA/CT-TN89/43

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16. Abstract During a 2-day period in May 1988, heliport environmental data were collected at Petroleum Helicopter Incorporated's Heliport in Intracoastal City, LA. The purpose of this data collection activity was to gather measurements of rotorwash at a heavy use heliport frequented by larger helicopters with higher gross weights than observed during previous data collection activities. The previous data collection activities are documented in Technical Note DOT/FAA/CT-TN87/54, I, titled, "Analysis of Heliport Environmental Data: Indianapolis Downtown Heliport, Wall Street Heliport, Volume I, Summary." During this operation, ten wind vector transmitters were situated at various locations around the facility in order to gather information to describe the rotorwash induced wind speed and wind direction changes. This report documents the results of this data collection activity. The data collection and analysis methodology are explained. Graphical presentations of the heliport environment and of rotorwash induced wind speeds and wind speed and direction changes are included. The Concepts Analysis Division Report, ACD-330-89-10, "Analysis of Heliport Environmental Data, Intracoastal City, LA," contains the heliport wind speed and direction plots for each flight. <i>Keywords:</i> The results of this study will be considered in future modifications of the Federal Aviation Administration (FAA) Heliport Design Advisory Circular (AC) 150/5390-2.			
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EXECUTIVE SUMMARY

During 2 days in May 1988, heliport environmental data were collected at Petroleum Helicopter Incorporated's Heliport in Intracoastal City, LA. The purpose of this data collection activity was to collect data to obtain unobtrusive operational measures of rotorwash from maneuvering helicopters at a heavy use facility frequented by larger/heavier helicopters than those seen during previous data collection activities at New York's Wall Street Heliport and Indianapolis Downtown Heliport during the summer of 1987 (see Technical Report DOT/FAA/CT-TN87/54, I, "Analysis of Helicopter Environmental Data: Indianapolis Downtown Heliport, Wall Street Heliport Volume I Summary"). The two parameters collected were wind speed and wind direction.

Ten wind vector transmitters were placed strategically around the facility in order to collect data from the most active pads as well as from the normal approach/departure area. The data collection activity was conducted only during daylight hours under visual meteorological conditions. Other observations such as visibility, surface winds, type rotorcraft in operation, type maneuver, estimated hover heights, and path of the aircraft were recorded by the data collection team.

This report documents the results of this activity. The locations of the sensors around the heliport, the heliport environment in terms of wind speed and direction, expert observations, and data collection procedures are described. Data plots of the two parameters as well as for changes in speed and direction due to the operating aircraft are included.

It was determined that, for the larger/heavier helicopters observed during this test period, high wind velocities due to helicopter rotorwash occur a significant percentage of the time at the surface. In addition, it was observed that the winds generated by these helicopters had a greater impact on surface wind direction than on wind speed. The forward movement of the aircraft had a greater impact on wind direction shifts than on velocity shifts.

One aspect not considered in this data collection activity was the effects of multi-aircraft operations in close proximity to one another. Therefore, additional wind sensor data collection activities will be planned to study this issue.

INTRODUCTION

PURPOSE.

This report examines the environmental data, wind speed and direction, collected at a private use heliport at Intracoastal City, Louisiana (LA), in order to more fully explore rotorwash during rotorcraft operations. The "Heliport Parking, Taxiing, and Landing Area Criteria Test Plan," DOT/FAA/CT-TN87/10, addressed issues concerning rotorcraft separation in ground maneuver areas at heliports. One issue discussed in DOT/FAA/CT-TN87/10, involved the measurement of rotorwash due to rotorcraft maneuvering in parking and taxiing areas.

OBJECTIVE.

The objective of this data collection activity was to obtain unobtrusive operational measures of the heliport environment in terms of wind speed and direction changes due to rotorwash from maneuvering helicopters. The measures will be used to develop characteristic vertical profiles of the rotorcraft induced wind velocities under varying environmental conditions. Other uses of the data include the development of heliport design and construction considerations that take into account rotorwash effects.

BACKGROUND.

The focus of this data collection activity was the measurement of maneuvering helicopter rotorwash in the heliport environment. Guidelines concerning clearances in the parking areas and in relation to taxi routes are spelled out in the current Federal Aviation Administration (FAA) Heliport Design Advisory Circular (AC 150/5390-2). These guidelines were based on pilot experience, tempered with engineering judgement, with little actual environmental data used to support the decisions made. The guidelines may or may not reflect the clearances actually required for surface operations, or desired by rotorcraft pilots. The issue of rotorwash impact on helicopter control and stability and its effect on required or desired separation criteria was examined by the FAA Technical Center in the summer of 1987. Results of that data collection activity were reported in DOT/FAA/CT-TN87/54, I, "Analysis of Heliport Environmental Data: Indianapolis Downtown Heliport, Wall Street Heliport, Volume I Summary." From preliminary analysis of the Indianapolis and Wall Street data and from further discussions with rotorcraft related organizations, it was determined that subsequent data collection should be conducted at a heavy use facility frequented by larger/heavier helicopters.

METHODS

DATA COLLECTION.

LOCATION. Environmental data were collected at Petroleum Helicopters Incorporated's (PHI) Heliport in Intracoastal City, LA, over a 2-day period in May 1988. This location was chosen based on the number and type of operations that occur there everyday.

PROCEDURES. Ten Belfort Instrument Company wind vector transmitters were used to collect wind data during rotorcraft maneuvers at the heliport. These transmitters consist of two major elements: an upper section containing a wind speed generator attached to an airplane rudder shaped vane, and a fixed, vertical support and connector housing. The wind speed generator is housed in a weatherproof housing and is driven by a six-blade propeller. The transmitter senses both wind speed and direction. These measurements are converted into two direct current (dc) voltages, one of which is a sine value and the other a cosine value. From the sine and cosine values, wind speed and wind direction can be calculated. The sensors were connected to an interface system which provided the data to a Zenith personal computer (PC). The data were as collected at 30 hertz (Hz). The PC was programmed to read the sine and cosine sensor values, sensor number, and time in a chronological manner. Photographs of the sensors are presented in appendix A.

The ten sensors were placed strategically around the heliport in order to collect data from the parking pads which experienced the most activity, as well as from the normal approach/departure area. A drawing of the heliport showing the locations of these sensors along with separation distances from each other and from ground facilities is found in figure 1. Two sensors were placed in front of parking pads B-1 and C-1. These two pads are used for heavy helicopter operations. One sensor was placed in front of each of the following pads: C-2, C-3, B-2, and B-3. These four helipads were used for smaller helicopter operations. The wind speed generators were approximately 20 inches above the ground.

The data collection system was operational during daylight hours only. The weather was visual flight rules (VFR) with clear skies and temperatures reaching a high of 90 degrees. The winds were calm during the data collection period.

Measurements were taken of the distances between the helipads as well as the distances each sensor was from its corresponding coverage area. These measurements will aid in analysis of rotorwash dispersion across the surface. Ground photos were taken of the ground facilities to aid in the discussion of sensor placement.

OBSERVATIONS. The observers were responsible for recording the following information for each operation:

- Visibility and winds
- Type rotorcraft
- Type maneuver
- Hover/taxi height
- Path of the helicopter during the maneuver and lateral displacement
- Chronological history for each maneuver

The observers began the data collection before the helicopter began maneuvering and stopped data collection after the helicopter either left the area or shut down. When the helicopter passed near each sensor the observer entered an event mark into a data file on the PC. Aircraft type, hover height, and observed path of the helicopter were noted on the heliport map.

ROTORCRAFT TYPES.

During the 2-day period, data were collected for 100 operations. Many times the surface environment was at or near capacity, with four or five helicopters operating simultaneously. Data were recorded for 11 different rotorcraft types. A breakdown of rotorcraft operations by type is found in table 1.

TABLE 1. TYPE ROTORCRAFT AND NUMBER OF OPERATIONS

<u>Aircraft Type</u>	<u>Number of Operations</u>
Aerospatiale Astar	19
Aerospatiale Twin Star	11
Bell 212	5
Bell 214ST	8
Bell 222UT	2
Bell 412	1
Bell Jet Ranger	13
Bell Long Ranger	15
Boelkow 105	14
Puma	1
Sikorsky S-76B	<u>11</u>
Total	100

DATA PROCESSING AND ANALYSIS

ROTORCRAFT GROUPINGS.

The helicopters were grouped into the same weight classes as used in DOT/FAA/CT-TN87/54, I, which documents the data collection activity conducted at New York's Wall Street Heliport and Indianapolis Downtown Heliport. The breakdown of the aircraft by weight class is found in table 2.

TABLE 2. OBSERVED ROTORCRAFT CLASSIFIED BY GROSS WEIGHT

<u>3000-7000 lbs</u>	<u>>7000 lbs</u>
Astar	Bell 212
Boelkow 105	Bell 214ST
Jet Ranger	Bell 222UT
Long Ranger	Bell 412
Twin Star	Puma
	Sikorsky S-76B

SENSOR GROUPINGS.

Due to wind and operational conditions the approach and departure patterns flown during the observation period varied. Therefore, for the purposes of data processing and analysis, the sensors were grouped into seven possible configurations based on which sensors were active due to the helicopter's movement. Table 3 lists these configurations.

TABLE 3. SENSOR USAGE FOR DIFFERENT ACTIVITY PATTERNS

<u>Configuration</u>	<u>Active Sensors</u>	<u>Applicable Activity</u>
A	1 - 10	Both Classes Approaches + Departures
B	5, 6, 9, 10	3000-7000 lb Approaches + Departures
C	2 - 10	Both Weight Classes- Departures
D	1 - 6	Both Approaches, 3000-7000 lb Departures
E	1 - 4, 7, 8	>7000 lb Approaches, 3000-7000 lb Departures
F	1, 2, 7, 8	Both Approaches, >7000 lb Departures
G	1 - 8	3000-7000 lb Taxi Operations

As seen in table 3, configurations A, B, D, E, and F are applicable to both approaches and departures, while C is applicable to departures only and G to taxi operations. The figures in appendix A depict the aircraft's paths for each configuration.

Data analysis procedures also subdivided the configurations into sensor groupings. Table 4 lists these subdivisions with applicable sensor configurations.

TABLE 4. SENSOR GROUPINGS BY CONFIGURATION

<u>Sensor Grouping</u>	<u>Applicable Configuration</u>
1,2	A, D, E, F, G
3,4	D, E, G
5,6	D, G
7,8	E, F, G
3,4,7,8	A, C
5,6,9,10	A, B, C
2 Only	C

These groupings represent particular areas of coverage: 1, 2 covered the approach/departure area; 3, 4 the area around pad C1; 5, 6 the area from the edge of pad C2 to the far edge of C3; 7, 8 the area around pad B1; 3, 4, 7, 8 the area of coverage between C1 and B1; 5, 6, 9, 10 the area between C2, C3 and B2, B3; and sensor 2 only for operations to the far right of the approach/departure area. These areas are shown in figure 1.

GRAPHICAL AND TABULAR ANALYSIS.

Plots were produced for this data using a California Computer's Calcomp model 1051 drum plotter using Calcomp 907 software for the Digital Equipment Corporation (DEC) VAX 11/750 minicomputer. The individual plots generated were divided into two types: wind direction with speed and wind direction with order of collection.

The wind direction with wind speed plots show a vector representing wind direction with a numerical value printed at the end of each vector indicating the wind speed in knots. The second type plot shows the wind direction line with the numerical value indicating the order of collection. Examples of each of these plots are found in figures 2 and 3.

The 100-knot change near sensors 5 and 6 was most likely due to the aircraft making a high approach over the initial portion of coverage area and then settling down near pad C3.

For the larger aircraft, the figures for velocity changes ranged from less than 1 percent near the approach area to 5 percent between pads B1 and C1. Actual changes ranged from 76 knots near the approach area and near pad C1, to 86 knots between pads C3 and D3.

During Departures. Plots of the distribution for wind velocity changes during departure operations are found in figures 11 and 12.

Velocity changes were less than 11 knots at least 70 percent of the time for both classes of aircraft with configurations D, E, and F and with configurations A and C for the 3000-7000 lb aircraft. For 7000+ lb aircraft, configurations A and C, and 3000-7000 lb aircraft, configuration B, at least 55 percent of the generated velocity changes were less than 11 knots.

The percentage of higher (>10 kts) velocity changes were observed in the areas covered by sensors 5, 6, 9, and 10 during departures in which these sensors were activated, and between pads B1 and C1 (sensors 3, 4, 7, and 8) during the larger aircraft departures for configuration C.

The maximum changes in velocity for all coverage areas, ranged from 12 to 85 knots across all coverage areas for 3000-7000 lb aircraft, and from 36 to 98 knots for the larger helicopters. The maximum velocity change (98 knots) was seen during departures by the larger aircraft near pad B1.

The percentage of large wind speed changes (> 41 kts) during 3000-7000 lb departures ranged from less than 1 percent near sensors 1 and 2, to 6 percent in the area covered by sensors 5, 6, 9, and 10. For the larger helicopters the percentages ranged from 3 to 11 percent. The highest percentage was seen near sensors 3, 4, 7, and 8.

During Taxi Operations. Plots for the wind velocity changes for taxiing operations are found in figure 13. Taxiing data were collected for only the 3000-7000 lb aircraft. Velocity changes of 11 knots or less were observed at least 86 percent of the time. No more than 2 percent of the observed velocity changes were greater than 41 knots.

Table 6 contains the maximum observed wind speed changes for each area, along with the procedure that produced those velocity changes.

TABLE 6. OBSERVED MAXIMUM WIND SPEED CHANGES BY HELIPORT AREA

<u>Area</u>	<u>Sensors</u>	<u>Maximum Change</u>	<u>Maneuver/Procedure</u>
T/L	1,2	95.67	>7000 lb Aircraft Departure
P C1	3,4	89.26	>7000 lb Aircraft Approach
P C2, C3	5,6	100.44	3000-7000 lb Aircraft Approach
P B1	7,8	98.10	>7000 lb Aircraft Departure
P B2, B3	9,10	83.84	3000-7000 lb Aircraft Approach

Other C calcomp plots were produced showing the percentage of actual observed windspeeds at each 5-knot interval and the percentages of observed wind speed changes by 5-knot intervals. These plots present approach, departure and taxi operations data by helicopter weight class for each applicable sensor pattern. Plots of the percentages of wind direction changes by 10° intervals for each pattern were also produced.

RESULTS

WIND SENSOR DATA.

All wind sensor plots for these data are included in Concepts Analysis Division Report, ACD-330-89-10, "Analysis of Heliport Environmental Data, Intracoastal City, LA." Appendixes A to E contain the plots showing wind direction with order of collection, while appendixes F to J contain plots with wind direction and wind speed (see figures 2 and 3 for sample plots). For this data collection activity, an operation period is defined as the time period from just prior to the aircraft's initiating a maneuver to the time when the aircraft either touched down or flew out of the area.

As seen in table 2 the aircraft at Intracoastal City were representative of only two of the three weight classes examined in the previous data collection activities in New York and Indianapolis (Technical Note DOT/FAA/CT-TN87/54).

ACTUAL WIND SPEEDS. These data were obtained directly from the sensor measurements.

During Approaches. Figure 4 contains plots of the observed wind speeds during operational periods for 3000-7000 lb aircraft approaches, for the appropriate sensor configurations, while figure 5 contains similar plots for >7000 lb aircraft approaches.

The average time for each approach operation for the 3000-7000 lb aircraft, with configurations A, B, D, and F, lasted from 25.3 to 34 seconds. For the larger weight class the average times of approach operations ranged from 22.9 to 31.7 seconds for applicable configurations A, D, E, and F.

For both weight classes with configuration A, at least 65 percent of the approaches generated less than 11 knots of wind for all sensor coverage areas. With configurations B, D, and E, for both weight classes and with configuration F for the larger aircraft, the percentage of low wind conditions (<11 knots) during approaches occurred 50 to 84 percent of the time. With configuration F for 3000-7000 lb aircraft, the percentage of winds (<11 knots) was at least 72 percent.

For approach configurations A, D, E, and F, regardless of aircraft weight, larger percentages of the high wind conditions (> 20 knots) were observed in the area of coverage between pads C1 and B1. Smaller proportions of high wind conditions were seen in the area covered by sensors 1 and 2 when these sensors were activated by the approach (configurations A, D, E, and F). During the approach for both weight classes, the aircraft was out of ground effect at this

area of coverage, with an average height of 20 feet above ground level (AGL), while at the middle area covered by sensors 3, 4, 7, and 8 the aircraft was much lower, 10 to 15 feet AGL; thus, the sensors in this area showed larger winds. However, for approaches in which all ten sensors were activated (configuration A), the percentages and distribution of high wind conditions were similar across all three groupings. The duration of these high wind conditions ranged from 1 to 10 seconds per approach operation. These conditions occurred, at most, 30 percent of the period for smaller helicopters, and, at most, 40 percent for larger helicopters.

The percentages of observed wind speeds greater than 41 knots for 3000-7000 lb class approaches for all sensor configurations ranged from less than 1 percent for the area covered by sensors 1 and 2, to 13 percent for the area covered by sensors 5, 6, 9, and 10. The maximum observed winds during approach operations for each sensor grouping ranged from 90 knots at the area covered by sensors 1 and 2, to 106 knots near sensors 5, 6, 9, and 10. The maximum wind speed observed for the middle area covered by sensors 3, 4, 7, and 8 ranged from 83 to 89 knots.

For approaches by the larger aircraft, the percentages of observed wind velocities >41 knots ranged from 5.5 percent near sensors 1 and 2, to 16 percent near sensors 3 and 4. The actual winds observed ranged from 90 knots in the vicinity of sensors 1 and 2, to 98 knots near sensors 3 and 4. The maximum speed for the larger aircraft in the vicinity of sensors 3, 4, 7, and 8 was as much as 97 knots.

During Departures. Plots of actual wind speeds for 3000-7000 lb helicopter departures, for each applicable sensor configuration, are found in figure 6. Figure 7 contains departure plots of actual wind speed for the larger helicopters. For the 3000-7000 lb aircraft, the average time for a departure ranged from 25 to 34 seconds. The average time for a departure for the larger aircraft ranged from 17 to 34 seconds.

The percentage of occurrences of the higher wind (>20 knots) conditions observed for all departure operations at each measured area were similar or slightly larger than that seen for the approaches. Most of these higher wind observations occurred in the vicinity of pads B2, B3, C2, and C3. The sensors covering these areas included sensors 5, 6, 9, and 10. However, when the aircraft lifted off near pads C1 and B1, in the areas covered by sensors 3 and 4 or 7 and 8, higher wind speeds were also more prevalent. In the vicinity of the liftoff areas, wind speeds as high as 112 knots were seen. The duration of these greater than 20-knot wind conditions during departures lasted as long as 14 seconds, which corresponded to, at most, 34 percent of the period for the 3000-7000 lb helicopters and 36 percent for the larger helicopters. These high wind conditions can be explained by the helicopter having low airspeed (below translational lift) during initial liftoff activity.

The percentage of observed winds greater than 41 knots for the 3000-7000 lb departures for all areas ranged from less than 1 percent for sensors 1 and 2, to 8 percent for the area covered by sensors 5, 6, 9, and 10. The maximum speeds were from 41 knots at sensor 2, to 91 knots at sensors 5, 6, 9, and 10.

These figures were somewhat higher for the larger aircraft (>7000 lbs). The percentage of winds greater than 41 knots increased to as much as 17 percent near

sensors 3, 4, 7, and 8. The area around sensors 1 and 2 also showed an increase in higher winds, up to 6 percent when the liftoff occurred at sensors 7 and 8. Maximum speeds reached 112 knots near sensors 7 and 8 during the liftoff period.

During Taxi Operations. Plots of observed wind speeds for taxi operations are found in figure 8. All observed taxi operations were conducted by the 3000-7000 lb aircraft. The average time for each taxi operation was 48 seconds. Over all the sensor groupings, at least 67 percent of the wind observations were less than 11 knots. The maximum observed wind was 86 knots near pad B1 (sensors 5 and 6). High wind conditions (>20 kts), averaged approximately 4 seconds per operation. At most, 3 percent of the observations were greater than 41 knots.

Maximum observed wind speeds for each area, along with the procedure that produced that speed, are reported in table 5.

TABLE 5. OBSERVED MAXIMUM WIND SPEEDS BY HELIPORT AREA

<u>Area</u>	<u>Sensors</u>	<u>Maximum Speed (knots)</u>	<u>Maneuver/Procedure</u>
TO/LNDG	1,2	97.81	>7000 lb Aircraft Departure
PAD C1	3,4	97.28	>7000 lb Aircraft Approach
PADS C2, C3	5,6	105.89	3000-7000 lb Aircraft Approach
PAD B1	7,8	112.58	>7000 lb Aircraft Departure
PADS B2, B3	9,10	90.27	>7000 lb Aircraft Approach

CHANGES IN WIND SPEED. Another measure of the effect of rotorwash is the changes in wind speed observed during the operational periods. These changes were generated by comparing each wind speed measurement to the previous measure.

During Approaches. Plots of the distributions of wind velocity changes for approaches are found in figures 9 and 10.

Changes in wind speed were less than 11 knots at least 65 percent of the time for both weight classes with configuration A and F, with configuration D for 3000-7000 lb aircraft, and for the larger helicopters for configuration E. With configuration B for the 3000-7000 lb helicopters and configuration D for the larger helicopters, at least 50 percent of the approaches generated changes less than 11 knots.

The smallest proportion of high wind speed changes were seen in the area covered by sensors 1 and 2. As discussed previously, the aircraft was more likely to be out of ground effect at this area due to high approaches. However, when all sensors were activated by the approach, all areas of coverage showed similar large percentages of small wind speed changes.

The percentage of observed large wind speed changes (>41 kts), for 3000-7000 lb aircraft, for the approach area and between pads C1 and B1 was less than 1 percent. For the area between pads C2, B2 and C3, B3 it was 9 percent.

The maximum observed change for each sensor grouping ranged from 86 knots near the approach area (sensors 1 and 2) to 100 knots between pads C2 and C3 (sensors 5 and 6). For the areas near pads C1, C2, B1, and B2 (sensors 3, 4, 7, and 8), the maximum change observed was 83 knots.

CHANGES IN WIND DIRECTION. Since wind direction influences the amount of lift that can be generated, the changes in wind direction were also examined as a measure of rotorwash effect. These changes were calculated by comparing each measurement of direction to the previous measurement.

Figures 14 and 15 contain plots of the percentages of observed wind direction changes for approaches. Large shifts in wind direction (>30 degrees) were observed 70 percent or more of the time for both weight groupings near the area where the actual approach was made. That is, when the approach occurred near sensors 1 and 2, that area had the largest shifts; when it was made to the area covered by sensors 5, 6, 9, and 10 (between pads B3 and C3), that area had the percent of large direction shifts. At the other data collection locations these large shifts occurred anywhere from 20 to 66 percent of the time. The smallest percent of large direction variations was observed near pad B1 covered by sensors 7 and 8.

Plots of observed wind direction shifts for departures are found in figures 16 and 17. For departures with both weight groupings the large shifts were seen at least 79 percent of the time at the approach/departure area (sensors 1 and 2), when the departure actually took place near those sensors. When the helicopter actually lifted off near sensors 3, 4, 7, and 8, the largest percent of wind direction shifts were observed at that area.

Based on the location where the departure maneuver occurred, the wind shifts ranged from 40° to 180° . The percentage of these observed large wind shifts occurred as much as 89 percent of the period.

For the taxi operations, the largest percent of observed wind shifts greater than 30° (76 percent) was seen near sensors 1 and 2, the approach/departure area. These data are plotted in figure 18. All taxi operations saw wind shifts up to 180° with the percentage of shifts $>51^{\circ}$ ranging from 23 to 69 percent.

The large shifts near sensors 1 and 2 for all 3 types of operation can be explained by the aircraft's height above ground. Even though the aircraft is out of ground effect, the rotorwash still has a major effect on wind direction at the surface and up to a height of twice the rotor diameter. This effect is directly influenced by the helicopter's power setting.

CONCLUSIONS

1. Wind velocities in excess of 20 knots occurred as much as 14 seconds per approach/departure operation. This corresponds to, at most, 40 percent of the total operation period. The significance of these wind velocities in relation to other aircraft, however, is dependent upon the weight class and type of aircraft operating in the vicinity.

2. The winds generated by the helicopter have a stronger effect on surface wind direction than on surface wind velocity when the helicopter is maneuvering out of ground effect. Forward movement of the helicopter in the approach or departure areas will have a greater effect on wind direction shifts than on wind velocity changes.

3. Since this data did not account for the effects of other aircraft operating in the vicinity of those being observed, additional data must be collected with aircraft operating nearby.

INTRACOASTAL CITY, LA. P.H.I. HELIPORT

SENSOR

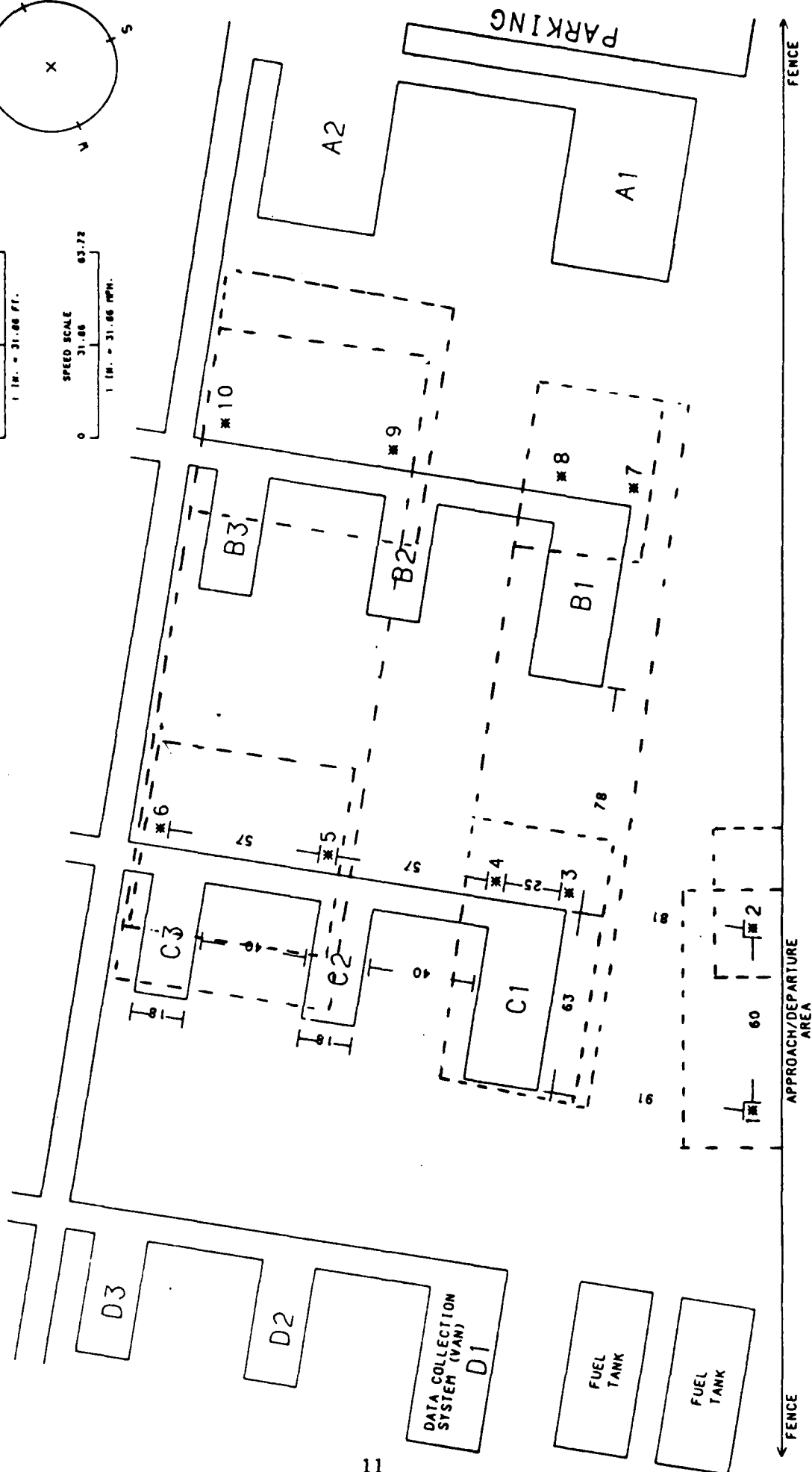
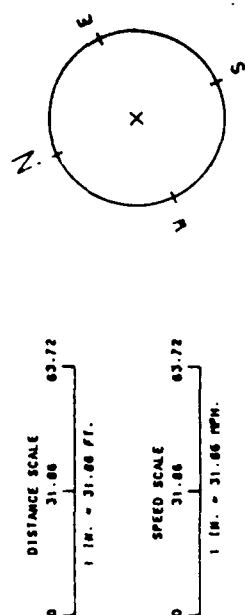


FIGURE 1. HELIPORT DRAWING

INTRACOASTAL CITY, LA. P.H.I. HELIPORT

LINE'S INDICATE WIND DIRECTION
LINE LENGTHS INDICATE WIND SPEED
LINE NUMBERING OCCURS IF WIND SPEED IS 10 MPH. OR GREATER
LINE NUMBERING INDICATES WIND SPEED
X SENSOR

INPUT FILE : ICC095.REA
TYPE OF MANEUVER : DEPARTURE
AIRCRAFT TYPE : T-STAR
GROSS WEIGHT : 5,291 LBS.

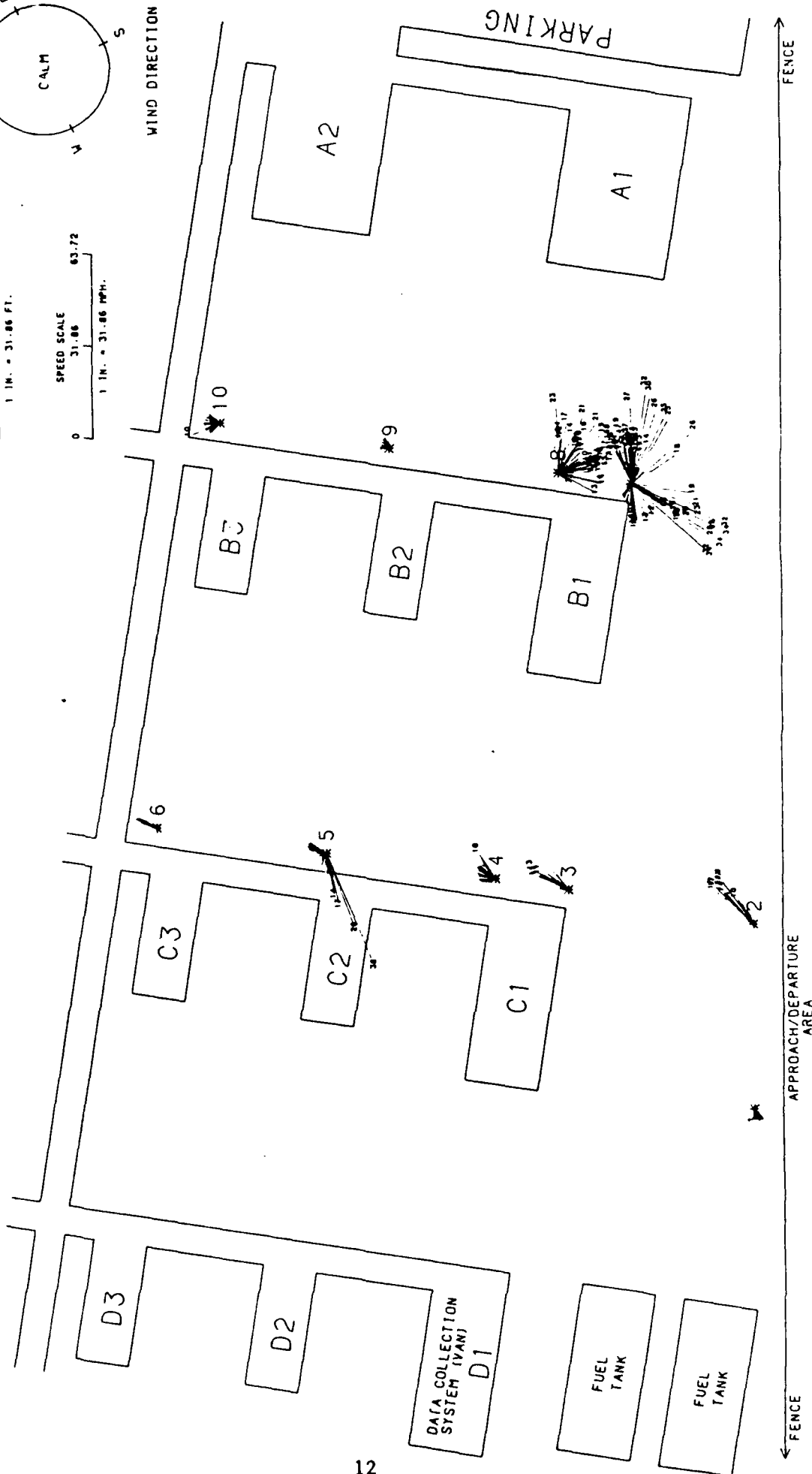
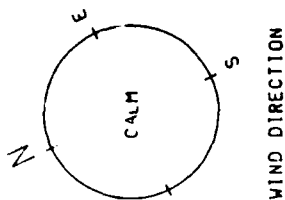
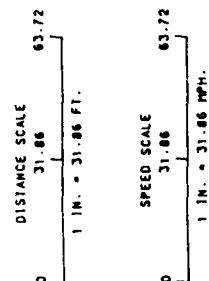


FIGURE 2. SAMPLE WIND DIRECTION/WIND SPEED PLOT

INTRACOASTAL CITY, LA. P.H.I. HELIPORT

LINES INDICATE WIND DIRECTION
 LINE - ENDS INDICATE WIND SPEED
 LINE NUMBERING OCCURS IF WIND SPEED IS 10 MPH. OR GREATER
 LINE NUMBERING INDICATES ORDER OF COLLECTION
 * SENSOR

INPUT FILE - ICC099-REA
 TYPE OF MANEUVER - DEPARTURE
 AIRCRAFT TYPE - T-28A
 GROSS WEIGHT - 5,291 LBS.

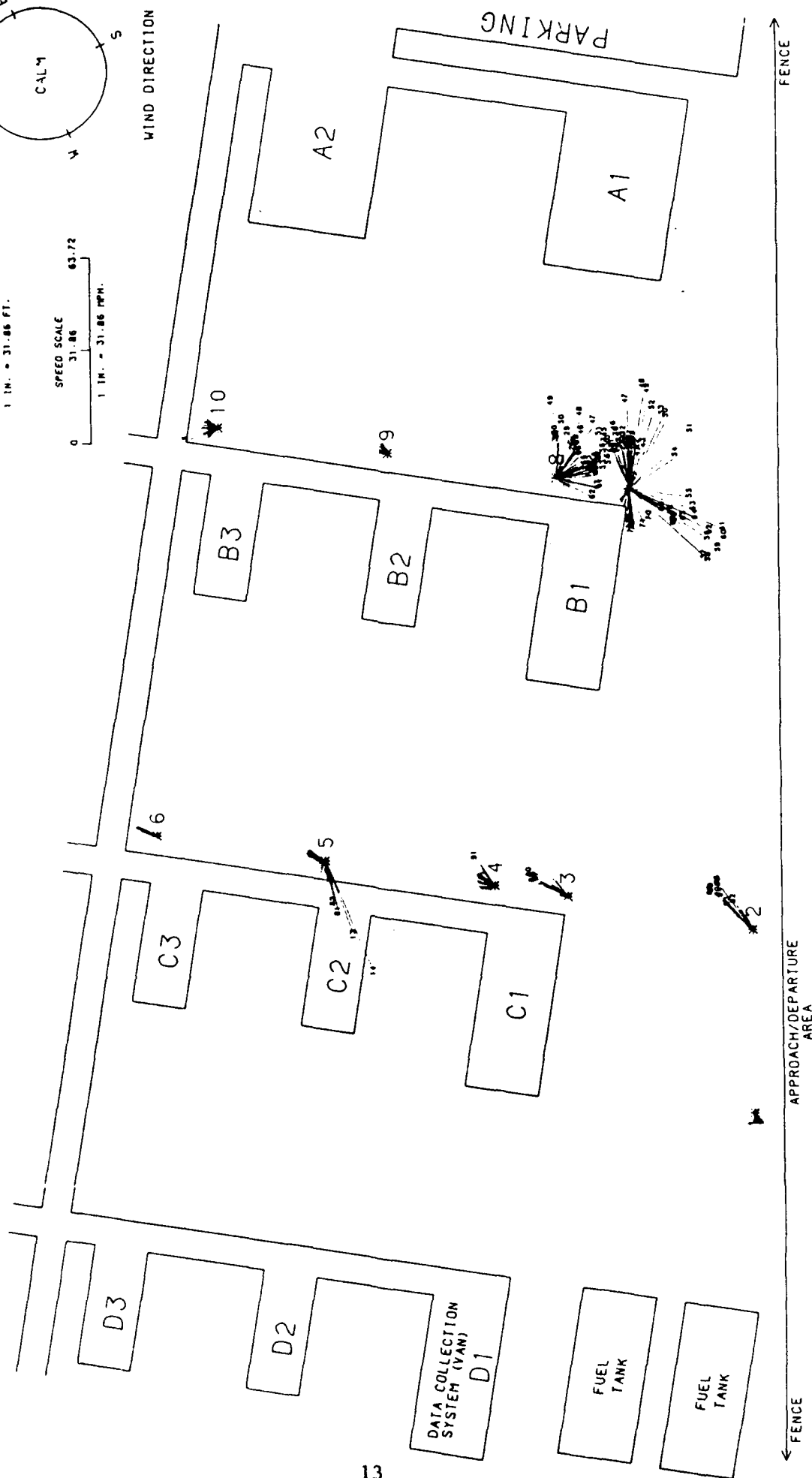
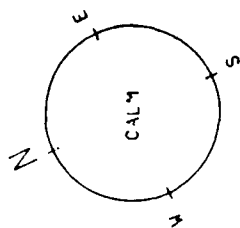
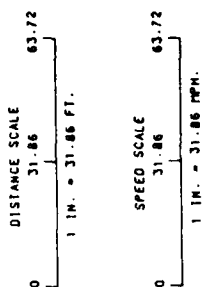


FIGURE 3. SAMPLE WIND DIRECTION/ORDER OF COLLECTION PLOT

3000 - 7000 lb APPROACHES CONFIGURATION A

NOT RECORDED AT THE
AIRPORT OF THE ARMY
ON 11-12-57

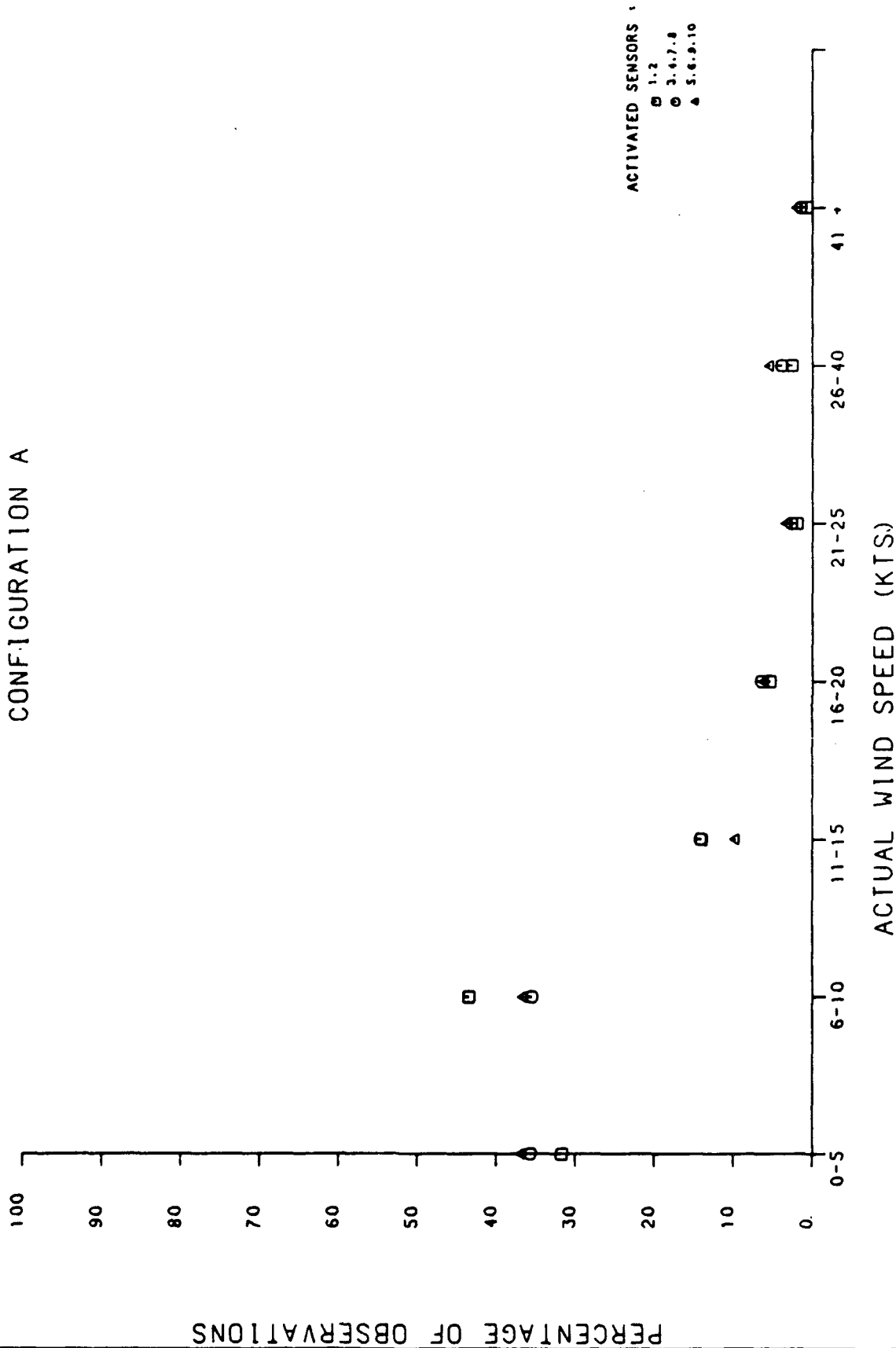


FIGURE 4. PLOTS OF OBSERVED WIND SPEEDS FOR 3000-7000 POUND AIRCRAFT APPROACHES (SHEET 1 OF 4)

3000 - 7000 lb APPROACHES CONFIGURATION B

PL 10-10000-10000
10000-10000-10000
10000-10000-10000

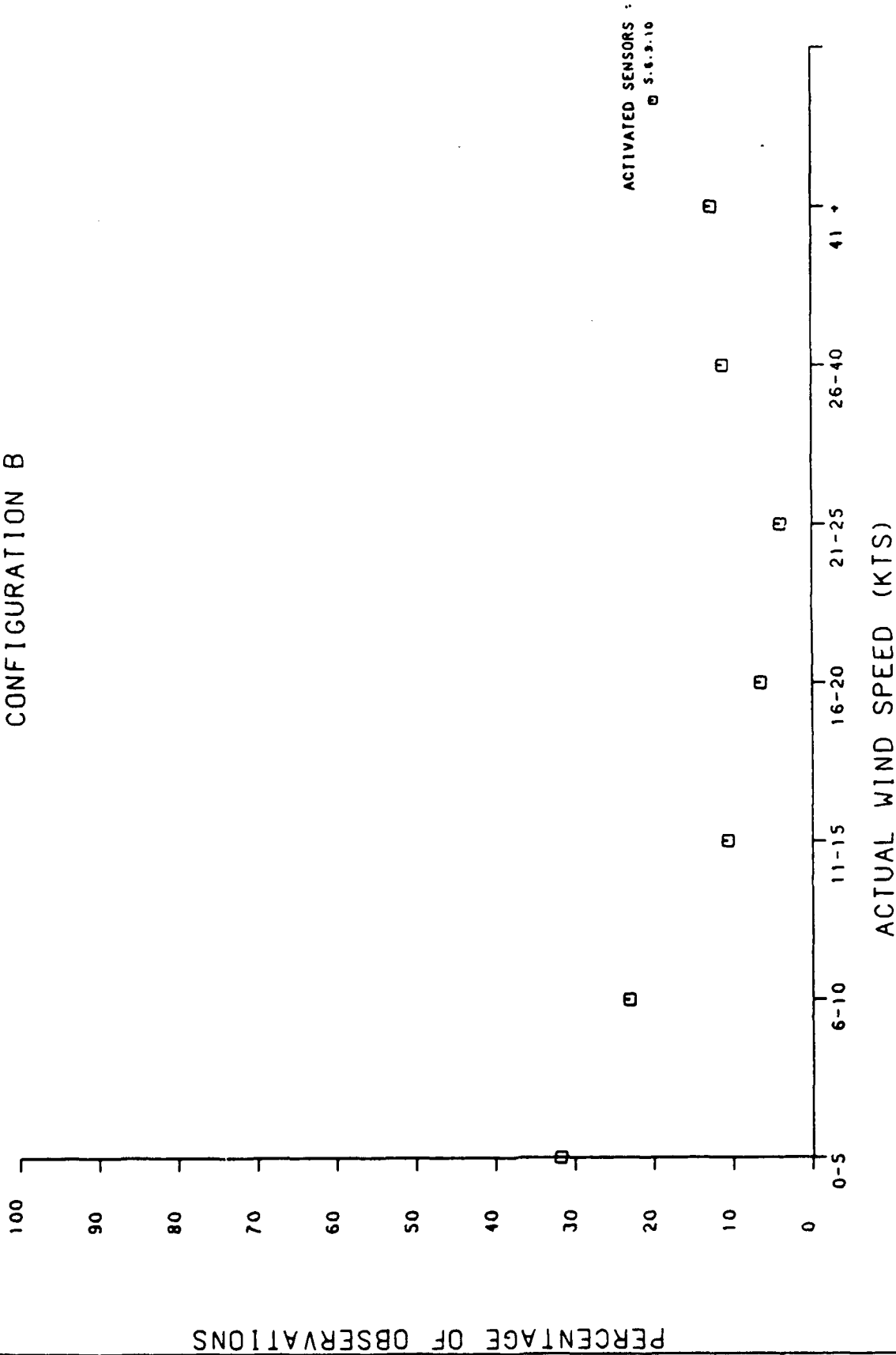


FIGURE 4. PLOTS OF OBSERVED WIND SPEEDS FOR 3000-7000 POUND AIRCRAFT APPROACHES (SHEET 2 OF 4)

3000 - 7000 lb APPROACHES CONFIGURATION D

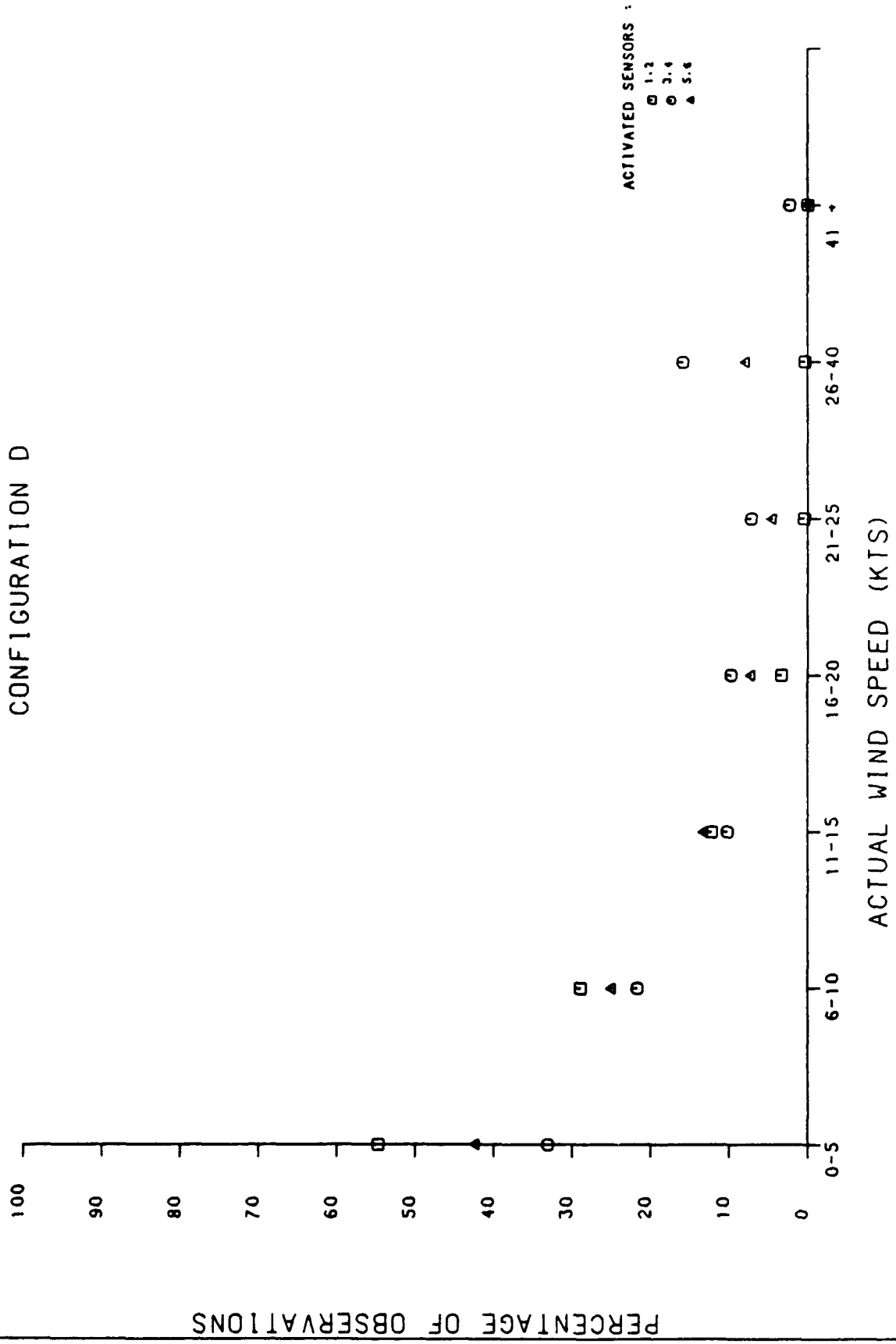


FIGURE 4. PLOTS OF OBSERVED WIND SPEEDS FOR 3000-7000 POUND AIRCRAFT APPROACHES (SHEET 3 OF 4)

3000 - 7000 lb APPROACHES CONFIGURATION F

NOT REPRODUCED
WITHOUT AUTHORITY
OF THE AIR FORCE
OFFICE OF
AERONAUTICAL
RESEARCH
AND
DEVELOPMENT

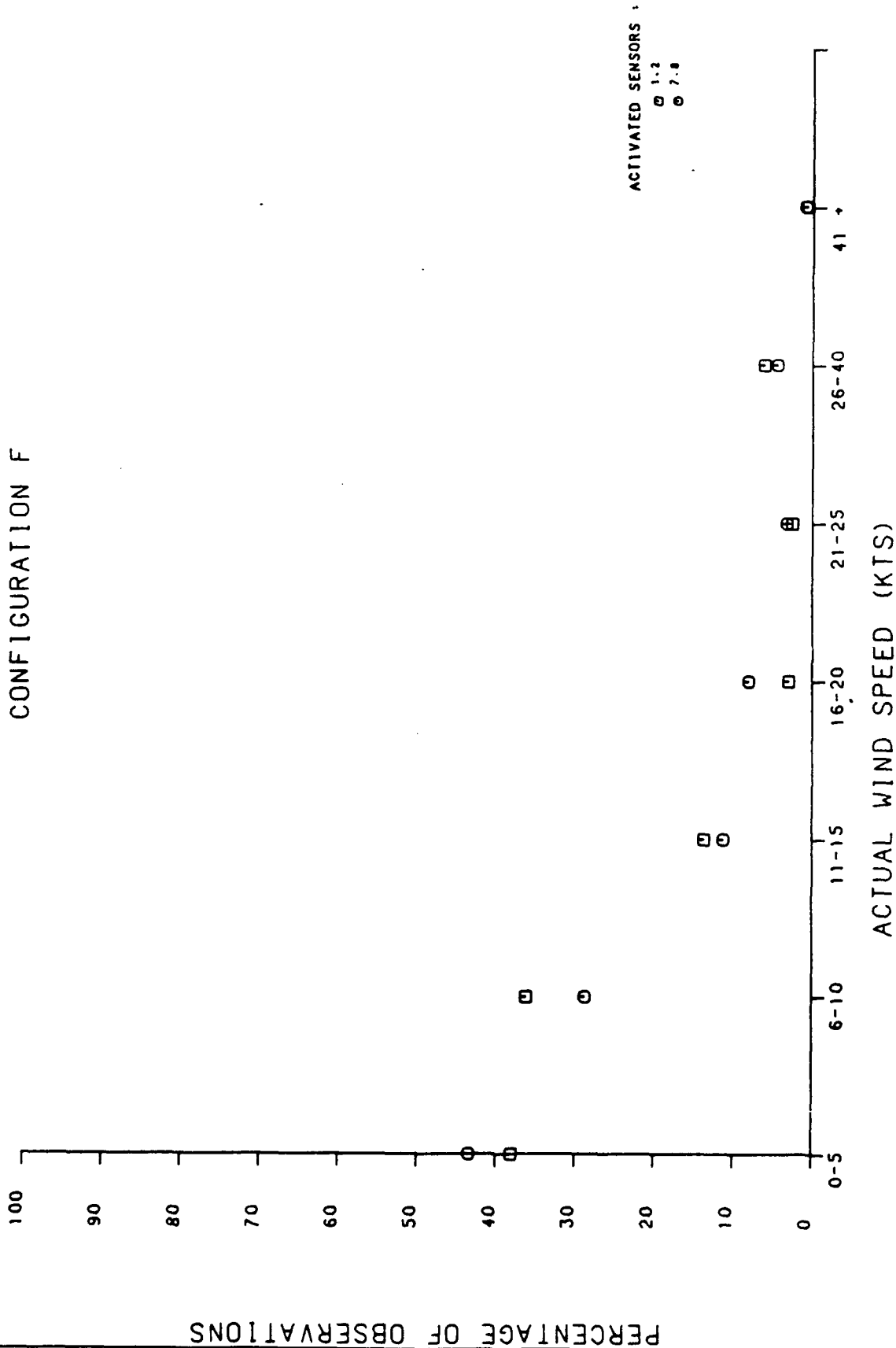
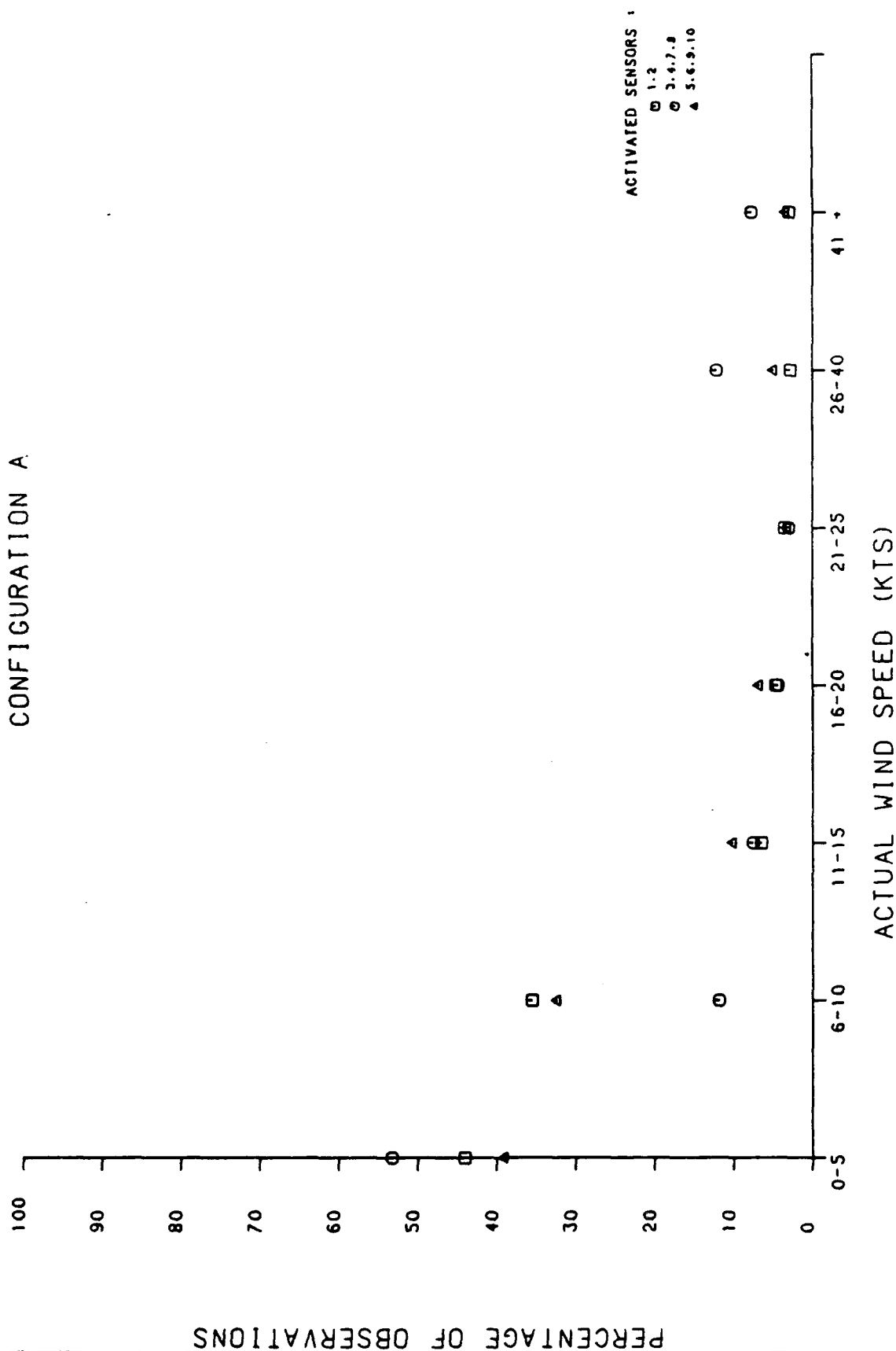


FIGURE 4. PLOTS OF OBSERVED WIND SPEEDS FOR 3000-7000 POUND AIRCRAFT APPROACHES (SHEET 4 OF 4)

7000+ 16 APPROACHES

CONFIGURATION A

ALL INFORMATION CONTAINED
HEREIN IS UNCLASSIFIED
DATE 01-19-2001 BY 60322



7000+ lb APPROACHES CONFIGURATION D

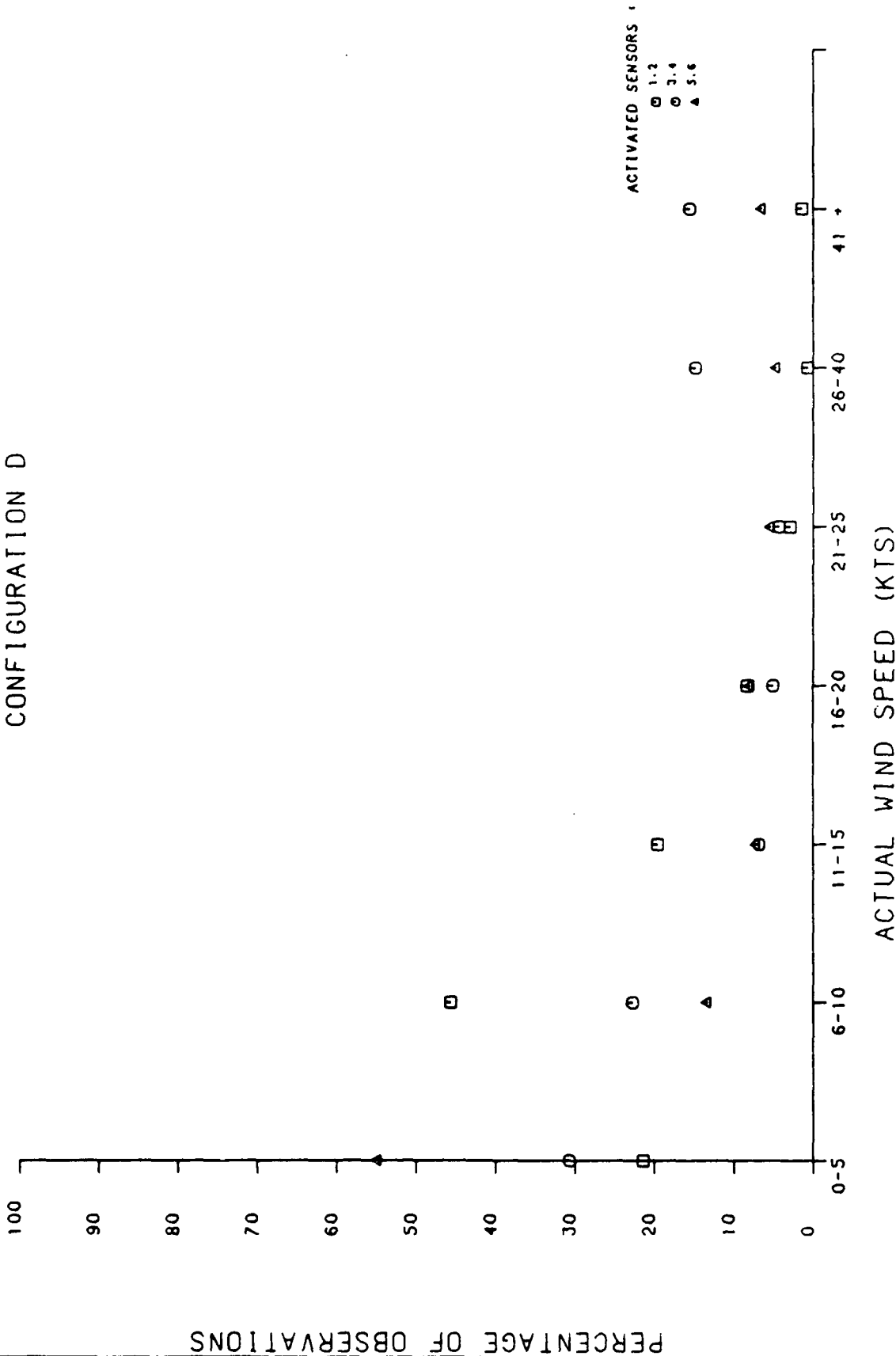


FIGURE 5. PLOTS OF OBSERVED WIND SPEEDS FOR AIRCRAFT GREATER THAN 7000 POUNDS, APPROACHES (SHEET 2 OF 4)

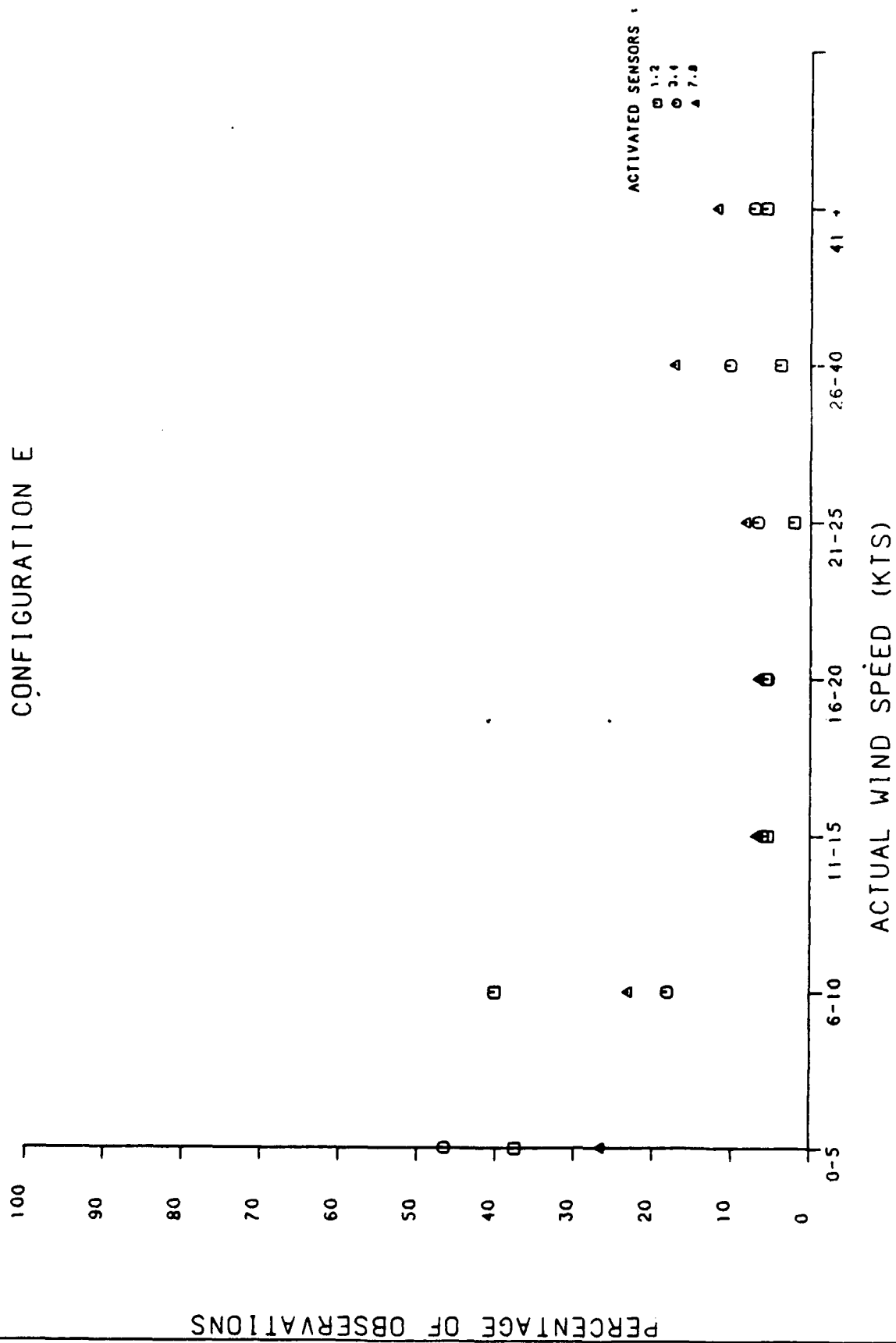


FIGURE 5. PLOTS OF OBSERVED WIND SPEEDS FOR AIRCRAFT GREATER THAN 7000 POUNDS, APPROACHES (SHEET 3 OF 4)

7000+ 1b APPROACHES CONFIGURATION F

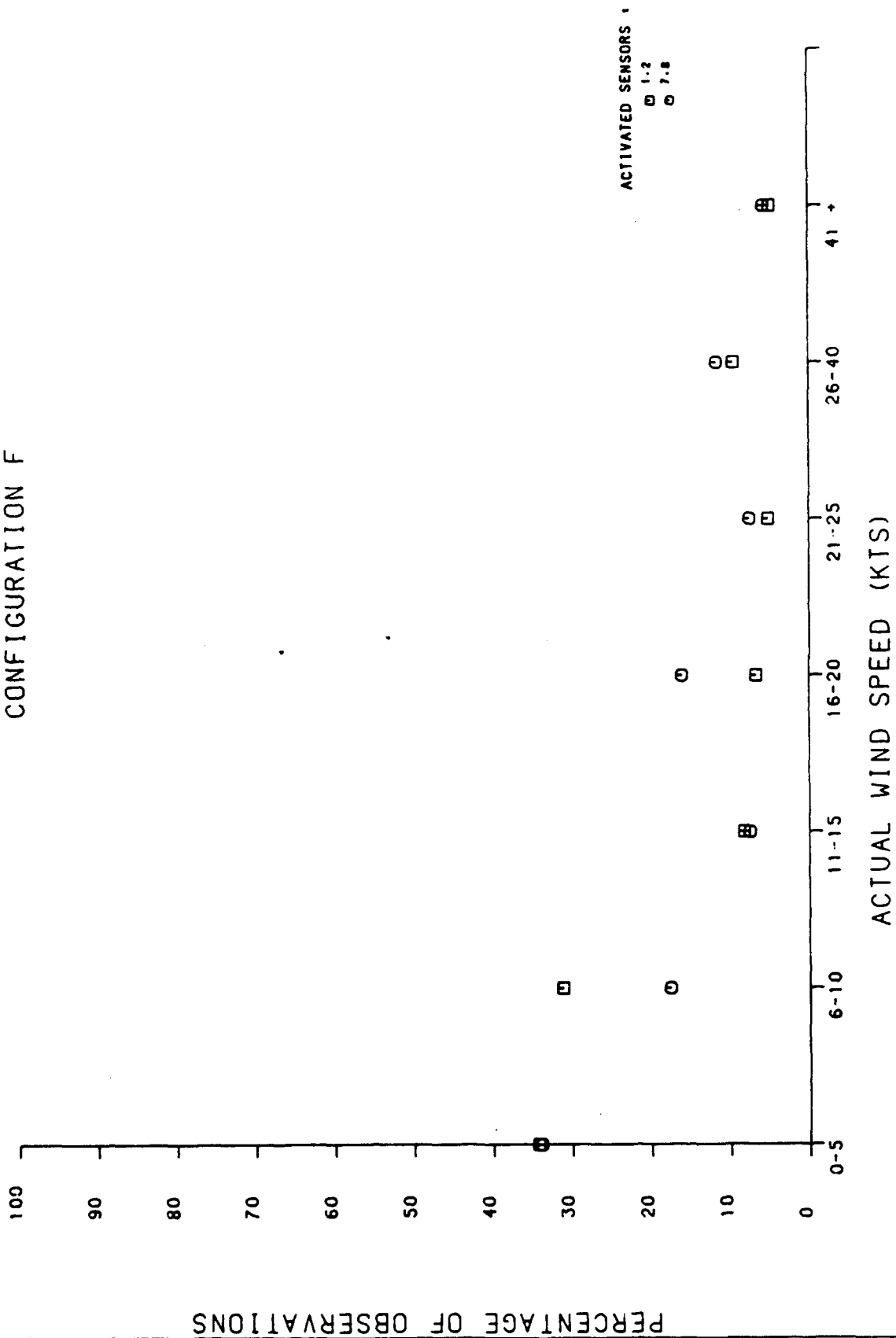


FIGURE 5. PLOTS OF OBSERVED WIND SPEEDS FOR AIRCRAFT GREATER THAN 7000 POUNDS, APPROACHES (SHEET 4 OF 4)

3000 - 7000 lb DEPARTURES CONFIGURATION A

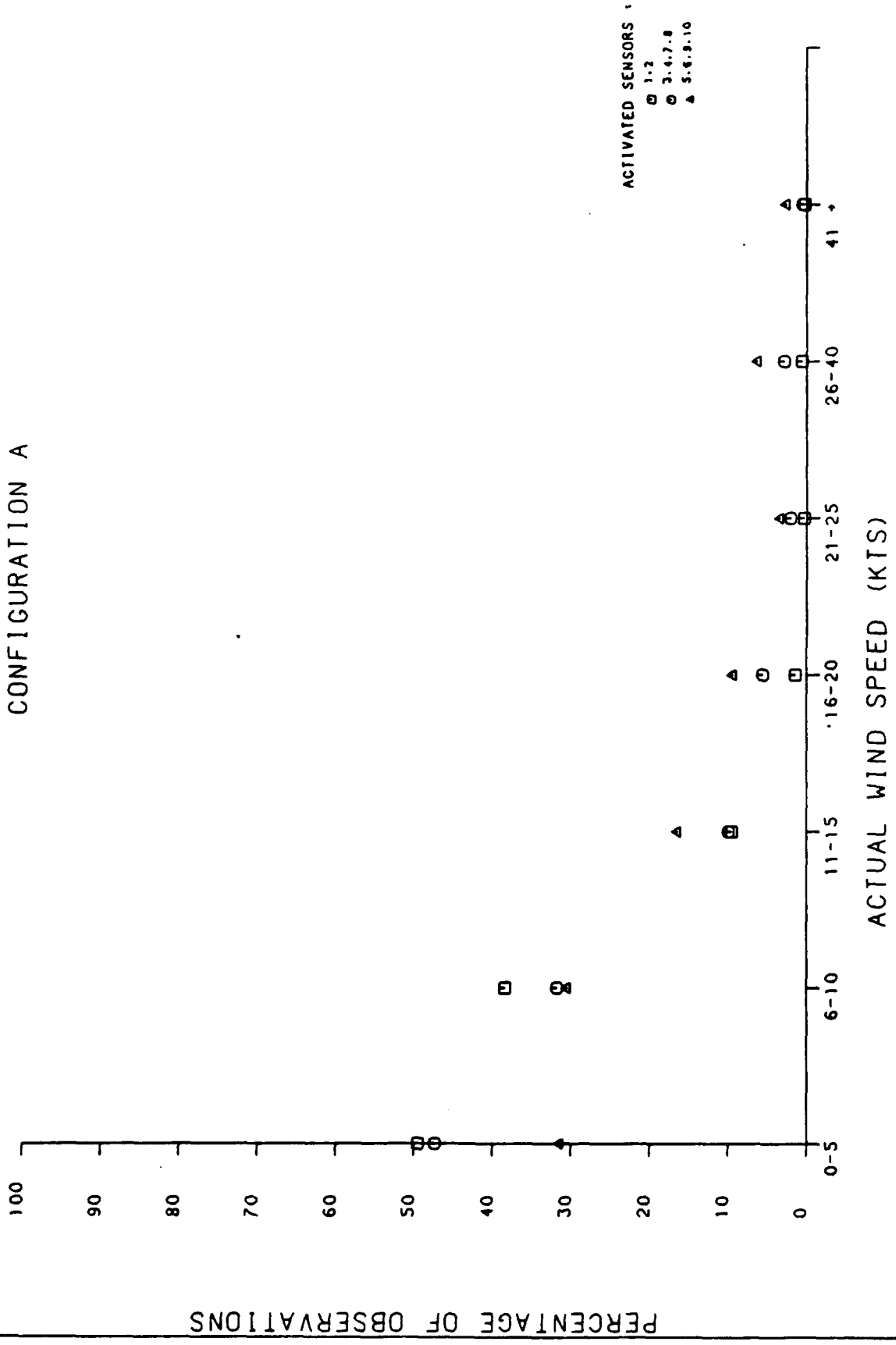
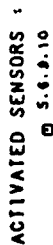


FIGURE 6. PLOTS OF OBSERVED WIND SPEEDS FOR 3000-7000 POUND AIRCRAFT DEPARTURES (SHEET 1 OF 5)

2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045 2046 2047 2048 2049 2050 2051 2052 2053 2054 2055 2056 2057 2058 2059 2060 2061 2062 2063 2064 2065 2066 2067 2068 2069 2070 2071 2072 2073 2074 2075 2076 2077 2078 2079 2080 2081 2082 2083 2084 2085 2086 2087 2088 2089 2090 2091 2092 2093 2094 2095 2096 2097 2098 2099 2100 2101 2102 2103 2104 2105 2106 2107 2108 2109 2110 2111 2112 2113 2114 2115 2116 2117 2118 2119 2120 2121 2122 2123 2124 2125 2126 2127 2128 2129 2130 2131 2132 2133 2134 2135 2136 2137 2138 2139 2140 2141 2142 2143 2144 2145 2146 2147 2148 2149 2150 2151 2152 2153 2154 2155 2156 2157 2158 2159 2160 2161 2162 2163 2164 2165 2166 2167 2168 2169 2170 2171 2172 2173 2174 2175 2176 2177 2178 2179 2180 2181 2182 2183 2184 2185 2186 2187 2188 2189 2190 2191 2192 2193 2194 2195 2196 2197 2198 2199 2200 2201 2202 2203 2204 2205 2206 2207 2208 2209 2210 2211 2212 2213 2214 2215 2216 2217 2218 2219 2220 2221 2222 2223 2224 2225 2226 2227 2228 2229 2230 2231 2232 2233 2234 2235 2236 2237 2238 2239 2240 2241 2242 2243 2244 2245 2246 2247 2248 2249 2250 2251 2252 2253 2254 2255 2256 2257 2258 2259 2260 2261 2262 2263 2264 2265 2266 2267 2268 2269 2270 2271 2272 2273 2274 2275 2276 2277 2278 2279 2280 2281 2282 2283 2284 2285 2286 2287 2288 2289 2290 2291 2292 2293 2294 2295 2296 2297 2298 2299 2300 2301 2302 2303 2304 2305 2306 2307 2308 2309 2310 2311 2312 2313 2314 2315 2316 2317 2318 2319 2320 2321 2322 2323 2324 2325 2326 2327 2328 2329 2330 2331 2332 2333 2334 2335 2336 2337 2338 2339 2340 2341 2342 2343 2344 2345 2346 2347 2348 2349 2350 2351 2352 2353 2354 2355 2356 2357 2358 2359 2360 2361 2362 2363 2364 2365 2366 2367 2368 2369 2370 2371 2372 2373 2374 2375 2376 2377 2378 2379 2380 2381 2382 2383 2384 2385 2386 2387 2388 2389 2390 2391 2392 2393 2394 2395 2396 2397 2398 2399 2400 2401 2402 2403 2404 2405 2406 2407 2408 2409 2410 2411 2412 2413 2414 2415 2416 2417 2418 2419 2420 2421 2422 2423 2424 2425 2426 2427 2428 2429 2430 2431 2432 2433 2434 2435 2436 2437 2438 2439 2440 2441 2442 2443 2444 2445 2446 2447 2448 2449 2450 2451 2452 2453 2454 2455 2456 2457 2458 2459 2460 2461 2462 2463 2464 2465 2466 2467 2468 2469 2470 2471 2472 2473 2474 2475 2476 2477 2478 2479 2480 2481 2482 2483 2484 2485 2486 2487 2488 2489 2490 2491 2492 2493 2494 2495 2496 2497 2498 2499 2500 2501 2502 2503 2504 2505 2506 2507 2508 2509 2510 2511 2512 2513 2514 2515 2516 2517 2518 2519 2520 2521 2522 2523 2524 2525 2526 2527 2528 2529 2530 2531 2532 2533 2534 2535 2536 2537 2538 2539 2540 2541 2542 2543 2544 2545 2546 2547 2548 2549 2550 2551 2552 2553 2554 2555 2556 2557 2558 2559 2560 2561 2562 2563 2564 2565 2566 2567 2568 2569 2570 2571 2572 2573 2574 2575 2576 2577 2578 2579 2580 2581 2582 2583 2584 2585 2586 2587 2588 2589 2590 2591 2592 2593 2594 2595 2596 2597 2598 2599 2600 2601 2602 2603 2604 2605 2606 2607 2608 2609 2610 2611 2612 2613 2614 2615 2616 2617 2618 2619 2620 2621 2622 2623 2624 2625 2626 2627 2628 2629 2630 2631 2632 2633 2634 2635 2636 2637 2638 2639 2640 2641 2642 2643 2644 2645 2646 2647 2648 2649 2650 2651 2652 2653 2654 2655 2656 2657 2658 2659 2660 2661 2662 2663 2664 2665 2666 2667 2668 2669 2670 2671 2672 2673 2674 2675 2676 2677 2678 2679 2680 2681 2682 2683 2684 2685 2686 2687 2688 2689 2690 2691 2692 2693 2694 2695 2696 2697 2698 2699 2700 2701 2702 2703 2704 2705 2706 2707 2708 2709 2710 2711 2712 2713 2714 2715 2716 2717 2718 2719 2720 2721 2722 2723 2724 2725 2726 2727 2728 2729 2730 2731 2732 2733 2734 2735 2736 2737 2738 2739 2740 2741 2742 2743 2744 2745 2746 2747 2748 2749 2750 2751 2752 2753 2754 2755 2756 2757 2758 2759 2760 2761 2762 2763 2764 2765 2766 2767 2768 2769 2770 2771 2772 2773 2774 2775 2776 2777 2778 2779 2780 2781 2782 2783 2784 2785 2786 2787 2788 2789 2790 2791 2792 2793 2794 2795 2796 2797 2798 2799 2800 2801 2802 2803 2804 2805 2806 2807 2808 2809 2810 2811 2812 2813 2814 2815 2816 2817 2818 2819 2820 2821 2822 2823 2824 2825 2826 2827 2828 2829 2830 2831 2



23

3000 - 7000 lb DEPARTURES CONFIGURATION C

NOT RECORDED AT
THIS LOCATION
SINCE ALL INFORMATION
IS AVAILABLE AT
STATION

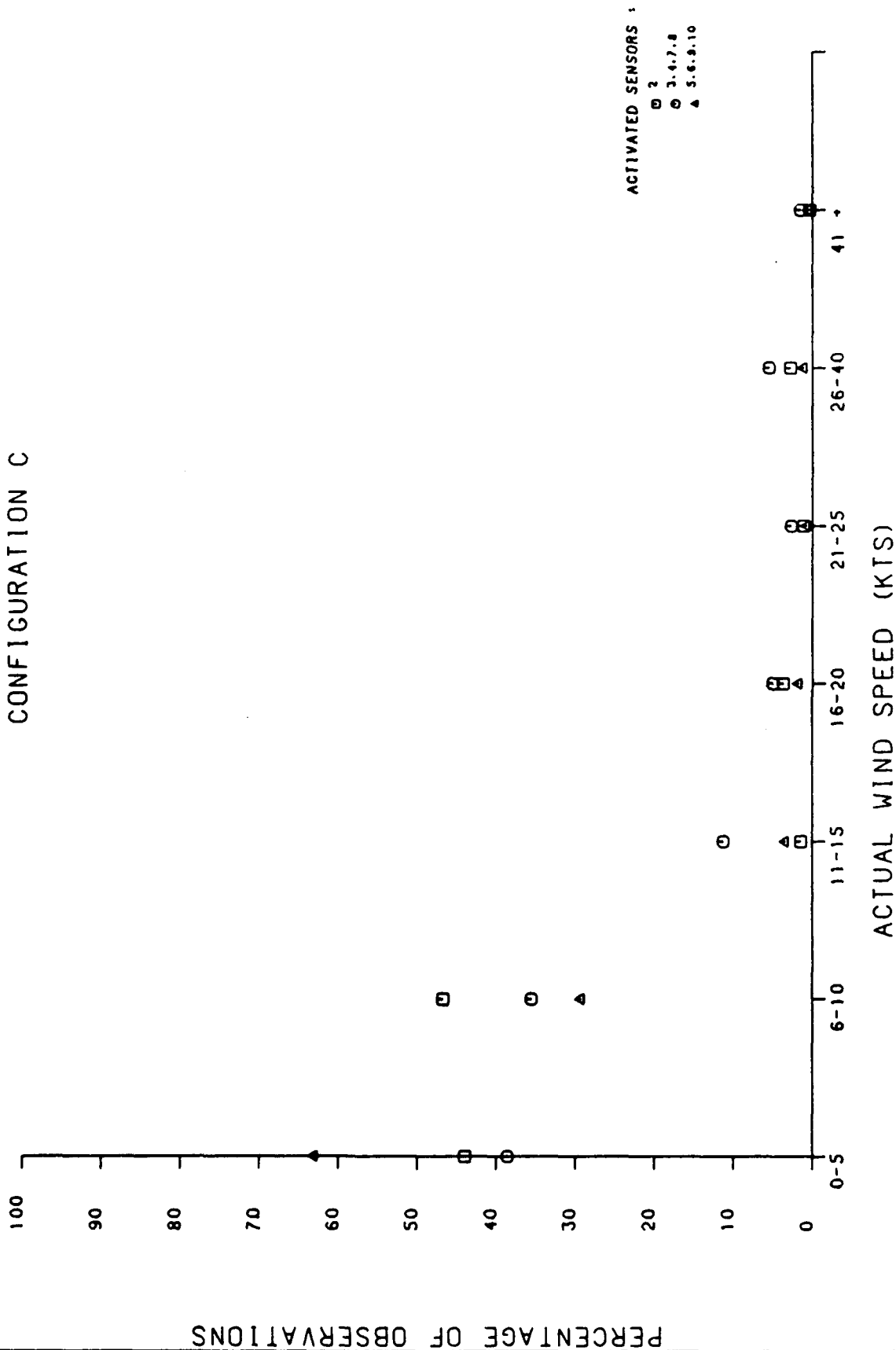


FIGURE 6. PLOTS OF OBSERVED WIND SPEEDS FOR 3000-7000 POUND AIRCRAFT DEPARTURES (SHEET 3 OF 5)

3000 - 7000 lb DEPARTURES CONFIGURATION D

FOR INFORMATION
OF THE AIRCRAFT
PILOT ONLY
DO NOT USE FOR
FLIGHT DATA

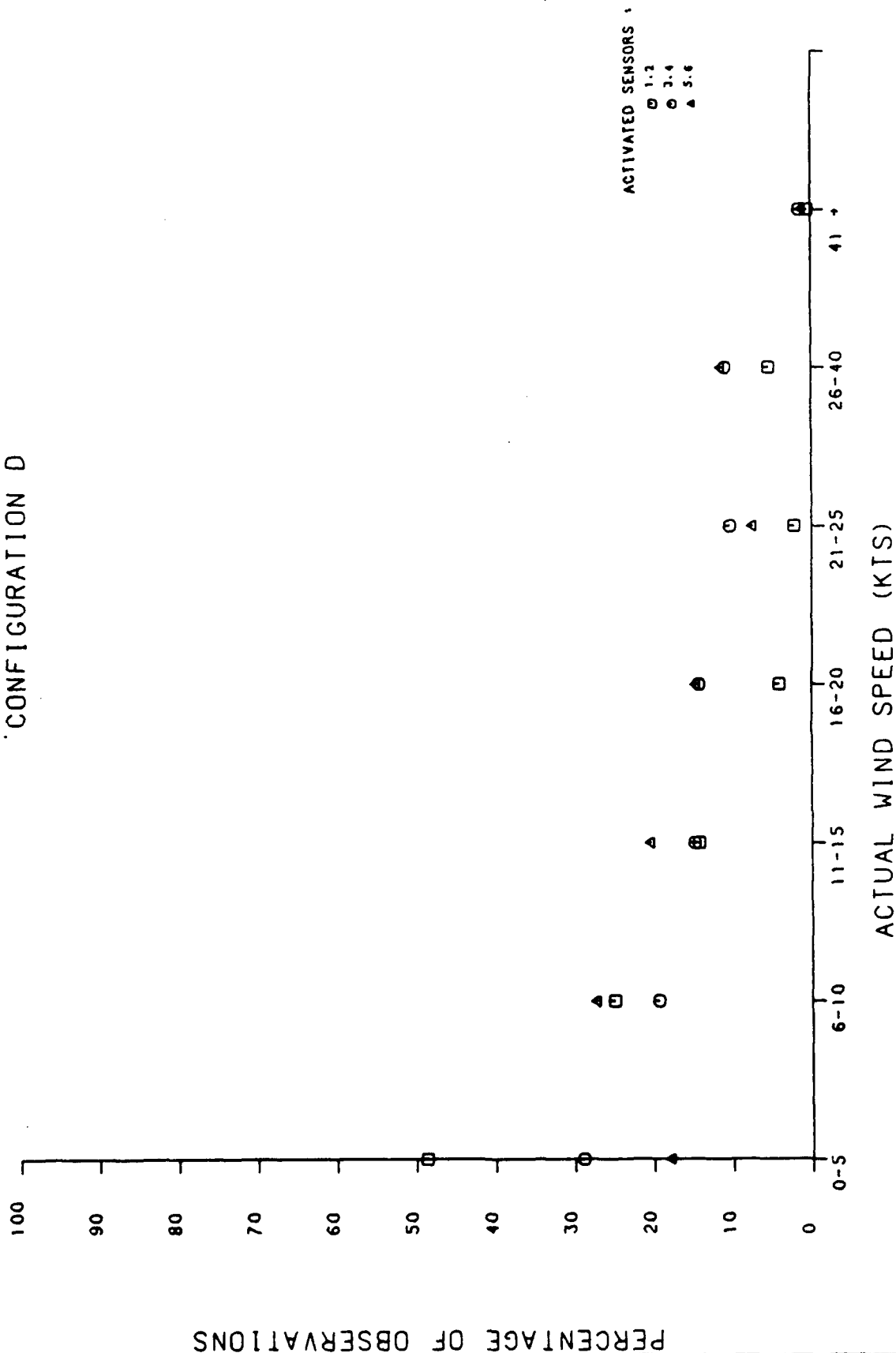


FIGURE 6. PLOTS OF OBSERVED WIND SPEEDS FOR 3000-7000 POUND AIRCRAFT DEPARTURES (SHEET 4 OF 5)

3000 - 7000 lb DEPARTURES CONFIGURATION E

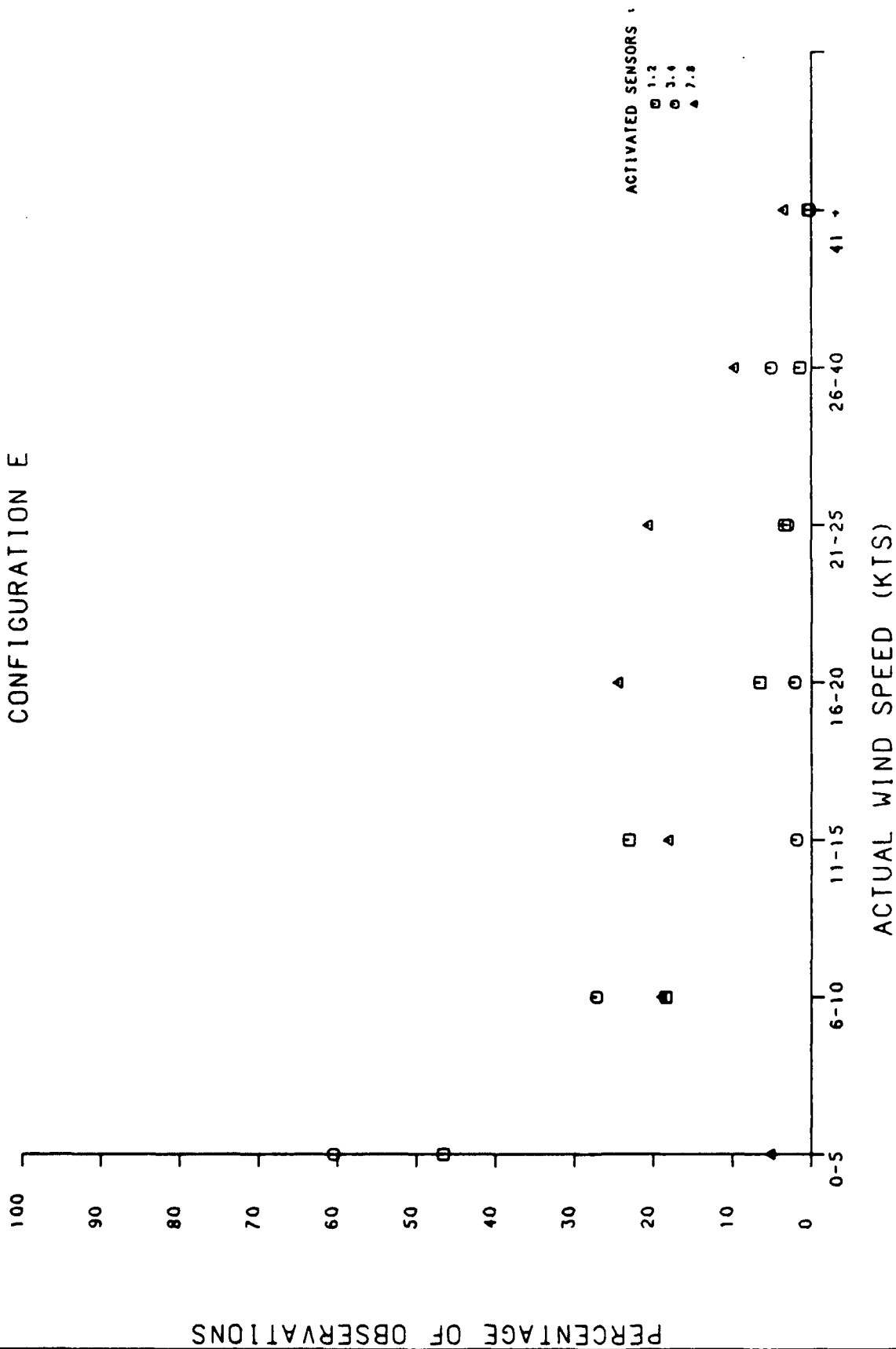


FIGURE 6. PLOTS OF OBSERVED WIND SPEEDS FOR 3000-7000 POUND AIRCRAFT DEPARTURES (SHEET 5 OF 5)

7000+ lb DEPARTURES CONFIGURATION A

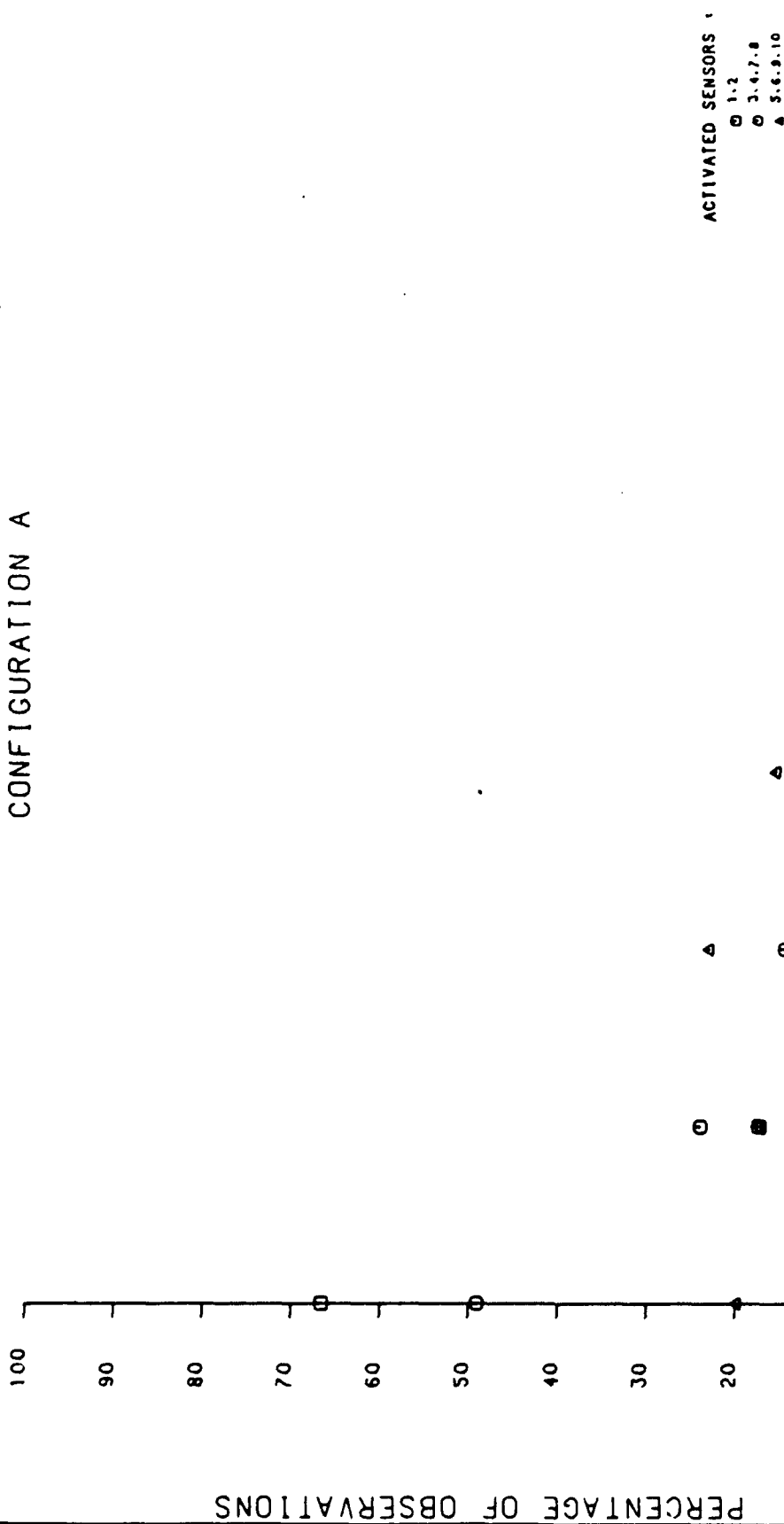


FIGURE 7. PLOTS OF OBSERVED WIND SPEEDS FOR AIRCRAFT GREATER THAN 7000 POUNDS, DEPARTURES (SHEET 1 OF 3)

7000+ 16 DEPARTURES CONFIGURATION C

PERCENTAGE OF OBSERVATIONS

100
90
80
70
60
50
40
30
20
10
0

ACTUAL WIND SPEED (KTS)

0-5 6-10 11-15 16-20 21-25 26-40 41 +

ACTIVATED SENSORS
□ 2
○ 3,4,7,8
△ 5,6,9,10

0-5 6-10 11-15 16-20 21-25 26-40 41 +

FIGURE 7. PLOTS OF OBSERVED WIND SPEEDS FOR AIRCRAFT GREATER THAN 7000 POUNDS, DEPARTURES (SHEET 2 OF 3)

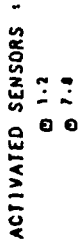
[illegible]

FIGURE 7. PLOTS OF OBSERVED WIND SPEEDS FOR AIRCRAFT GREATER THAN 7000 POUNDS, DEPARTURES (SHEET 3 OF 3)

3000 - 7000 lb TAXI CONFIGURATION C

FOR INFORMATION OF THE
ACTING AIRCRAFT ENGINEER
ALSO SEE 4117 12 1964

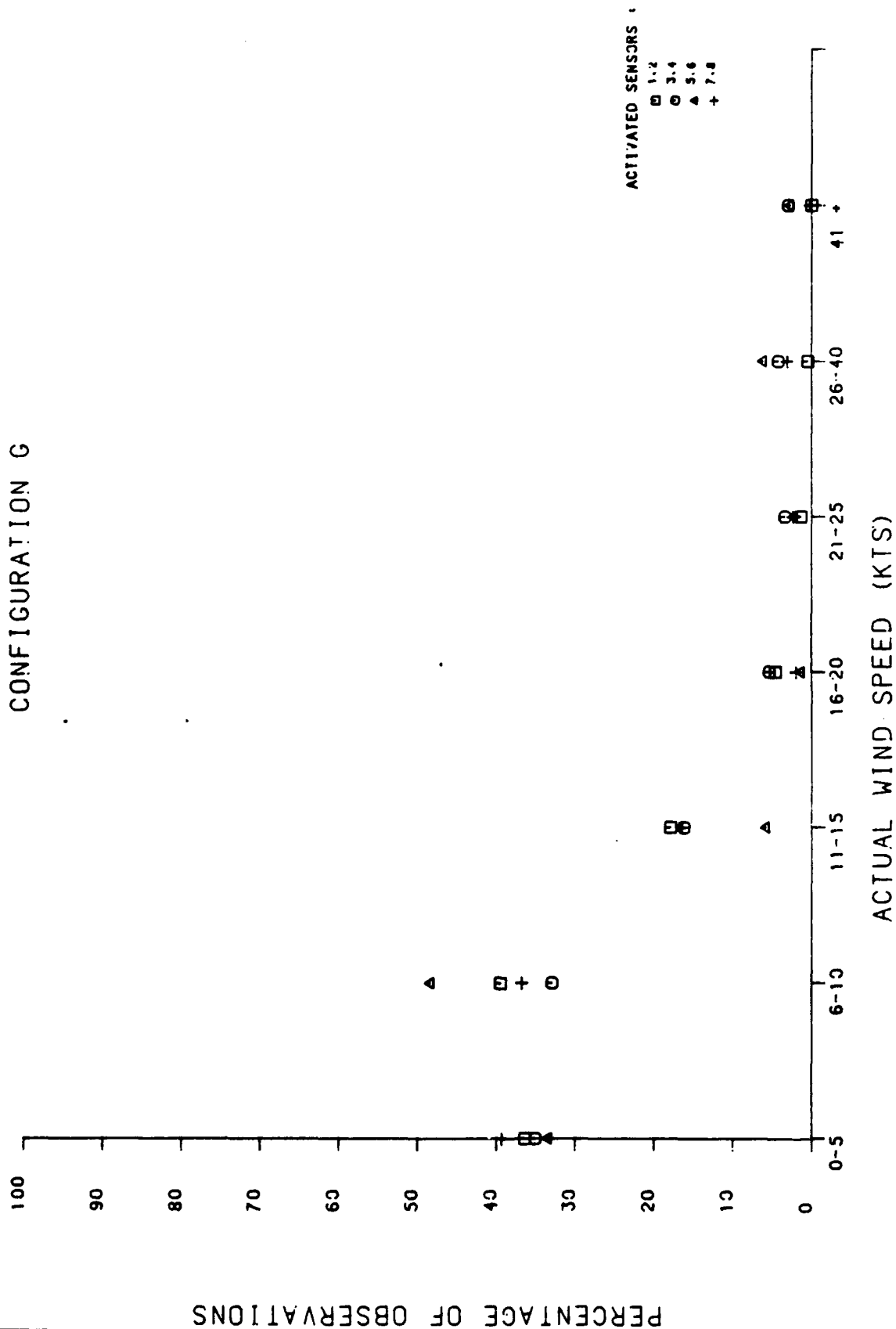


FIGURE 8. PLOT OBSERVED WIND SPEEDS FOR ALL TAXI OPERATIONS

3000 - 7000 lb APPROACHES CONFIGURATION A

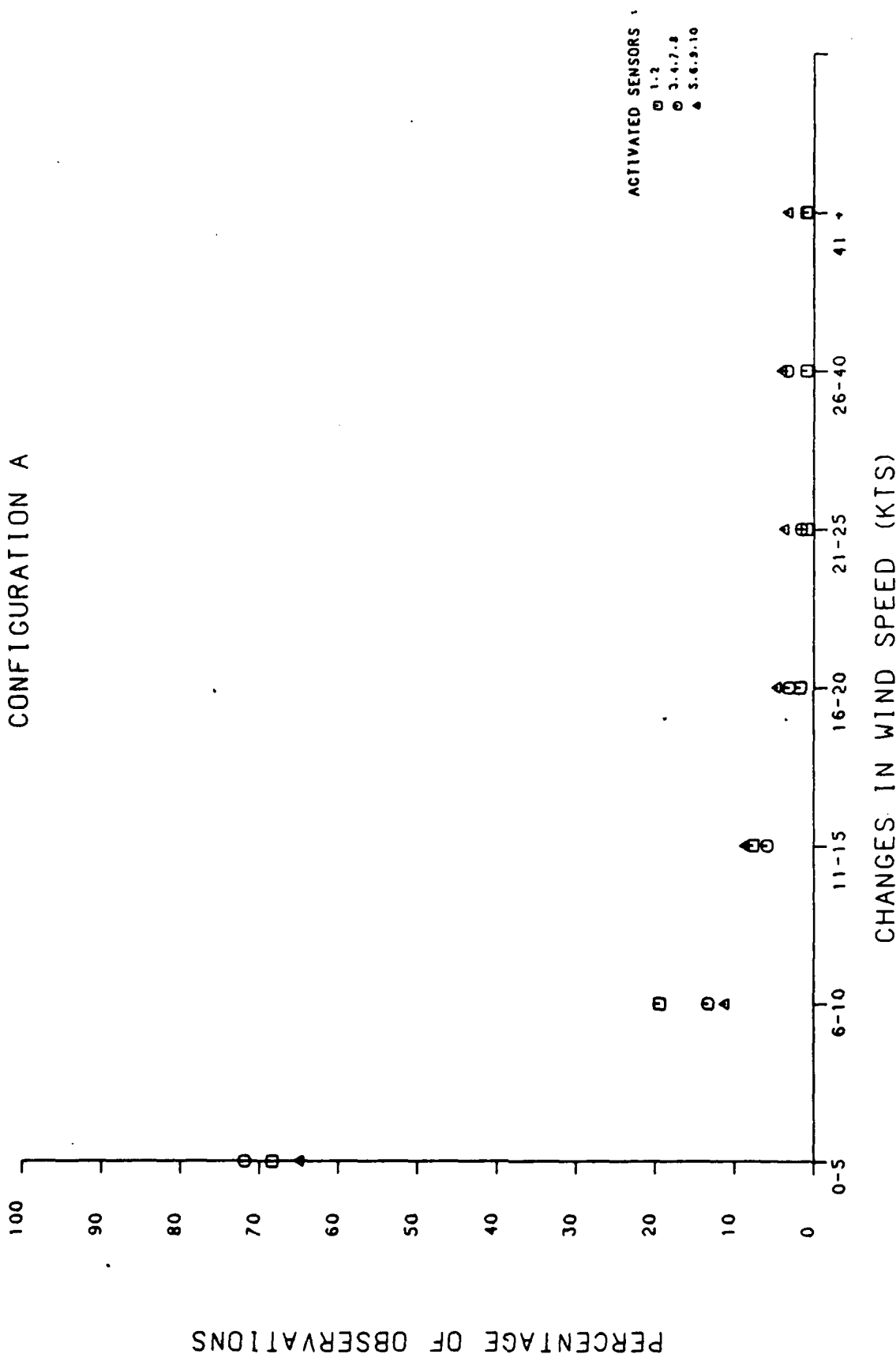


FIGURE 9. PLOTS OF DISTRIBUTIONS FOR VELOCITY CHANGES FOR 3000-7000 POUND AIRCRAFT, APPROACHES (SHEET 1 OF 4)

3000 - 7000 lb APPROACHES CONFIGURATION B

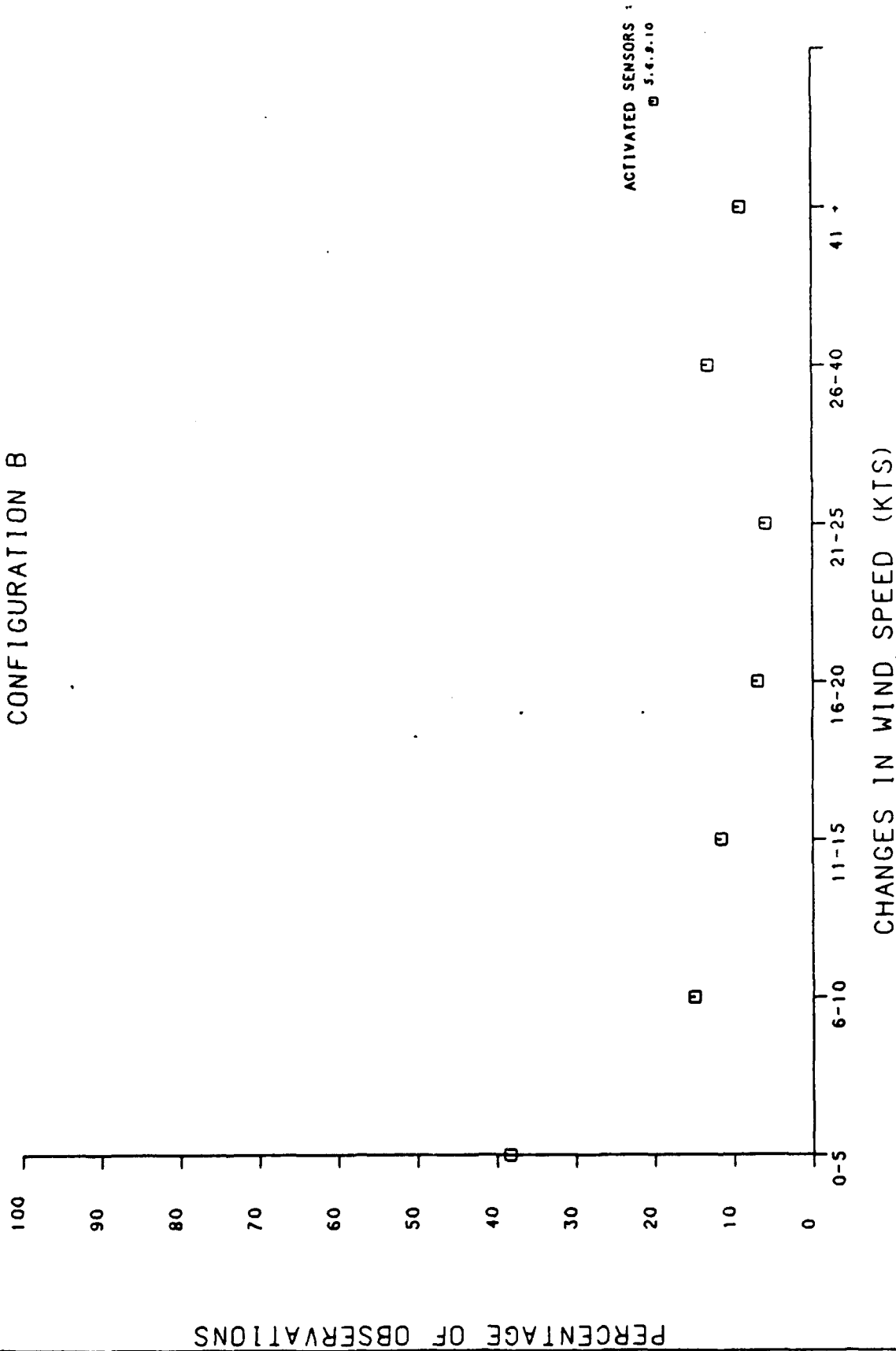


FIGURE 9. PLOTS OF DISTRIBUTIONS FOR VELOCITY CHANGES FOR 3000-7000 POUND
 AIRCRAFT, APPROACHES (SHEET 2 OF 4)

3000 - 7000 lb APPROACHES CONFIGURATION D

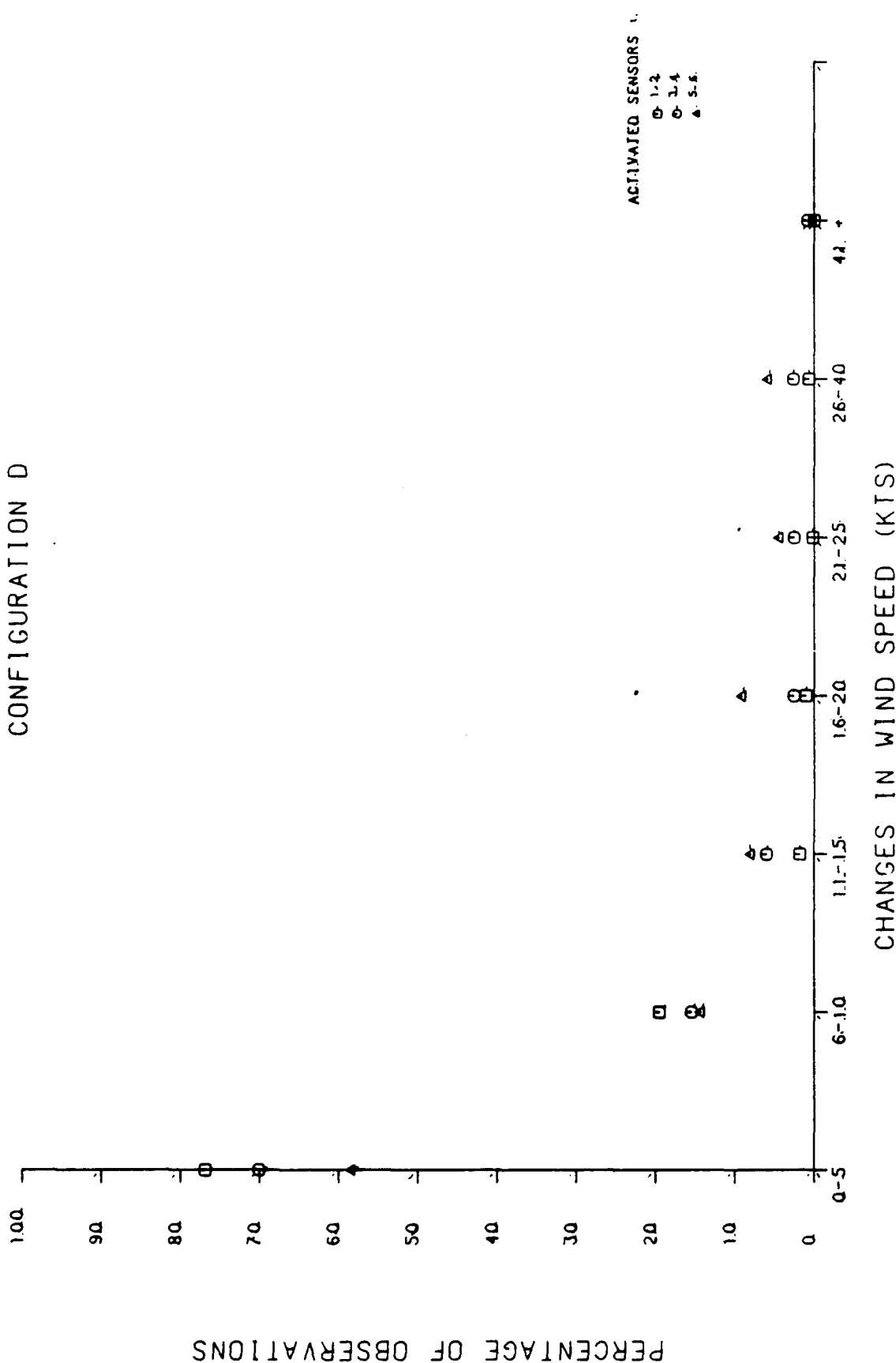


FIGURE 9. PLOTS OF DISTRIBUTIONS FOR VELOCITY CHANGES FOR 3000-7000 POUND AIRCRAFT, APPROACHES (SHEET 3 OF 4)

THIS DOCUMENT CONTAINS
UNCLASSIFIED INFORMATION
EXCEPT WHERE SHOWN
OTHERWISE

3000 - 7000 lb APPROACHES CONFIGURATION F

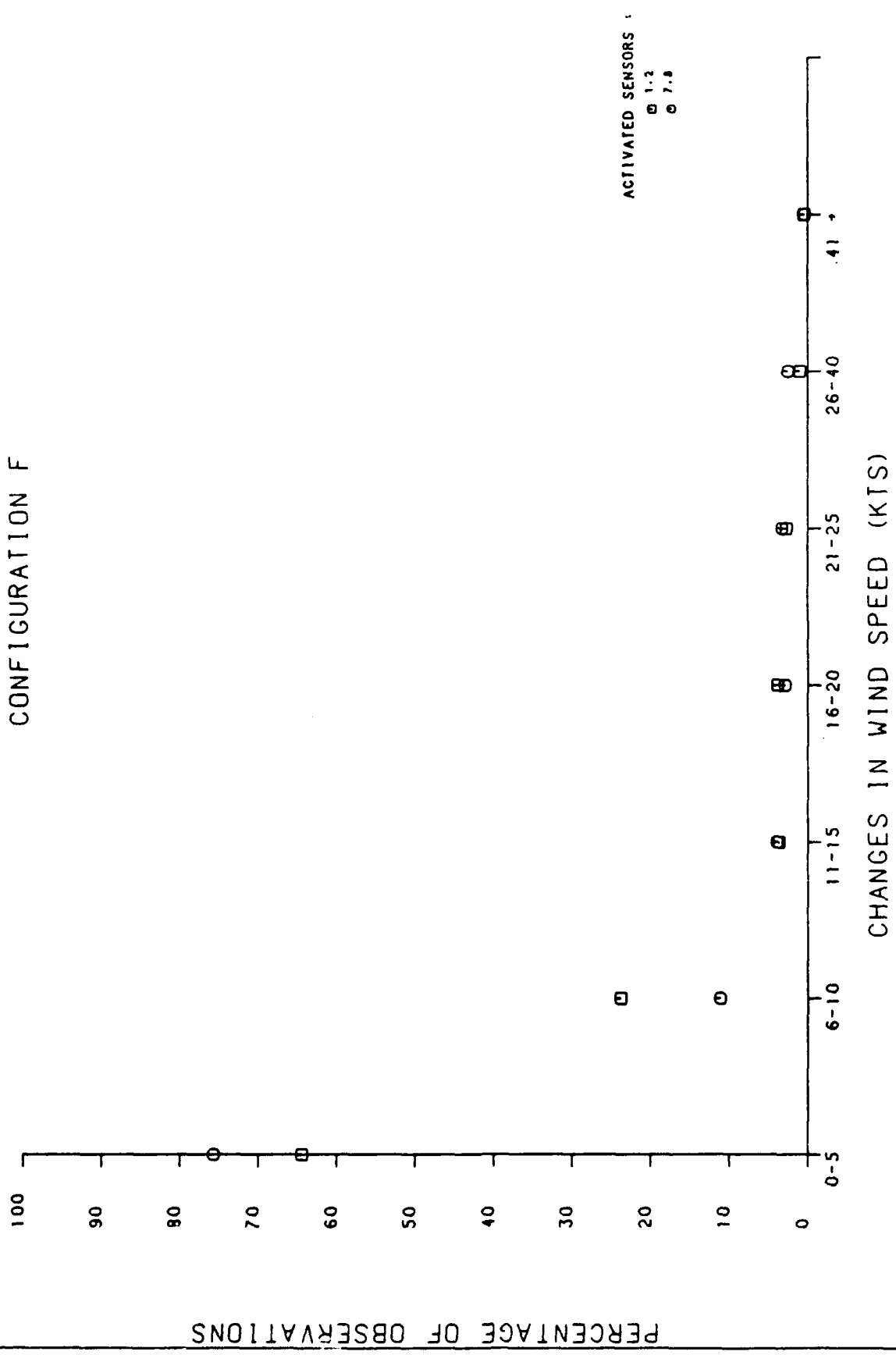


FIGURE 9. PLOTS OF DISTRIBUTIONS FOR VELOCITY CHANGES FOR 3000-7000 POUND AIRCRAFT, APPROACHES (SHEET 4 OF 4)

7000+ 1b APPROACHES CONFIGURATION A

PL 10 (Rev. 1-64)
FORM 10-1 (Rev. 1-64)
GPO : 1964 O - 371-000

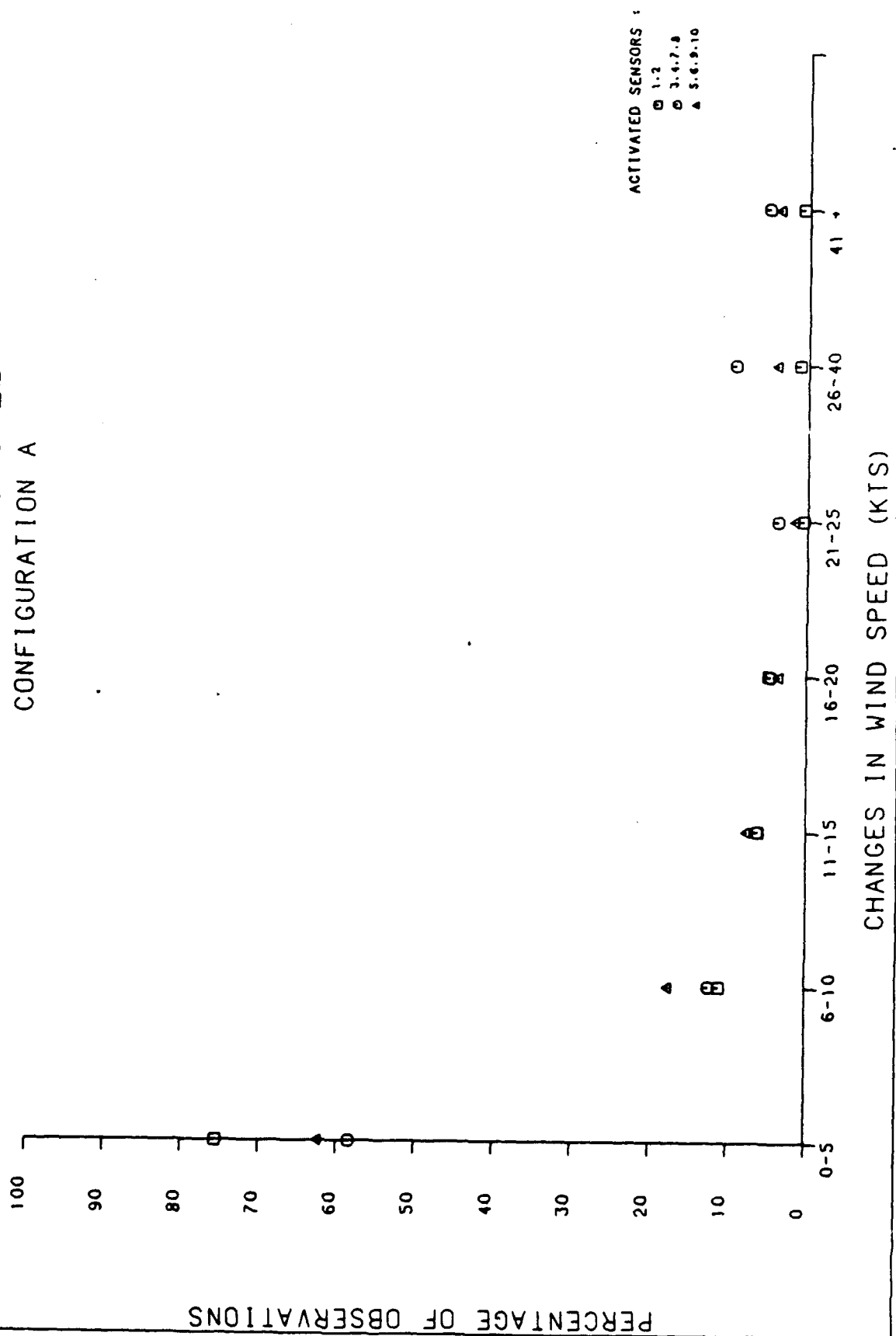


FIGURE 10. PLOTS OF DISTRIBUTIONS FOR VELOCITY CHANGES FOR AIRCRAFT GREATER THAN 7000 POUNDS, APPROACHES (SHEET 1 OF 4)

7000+ 1b APPROACHES CONFIGURATION D

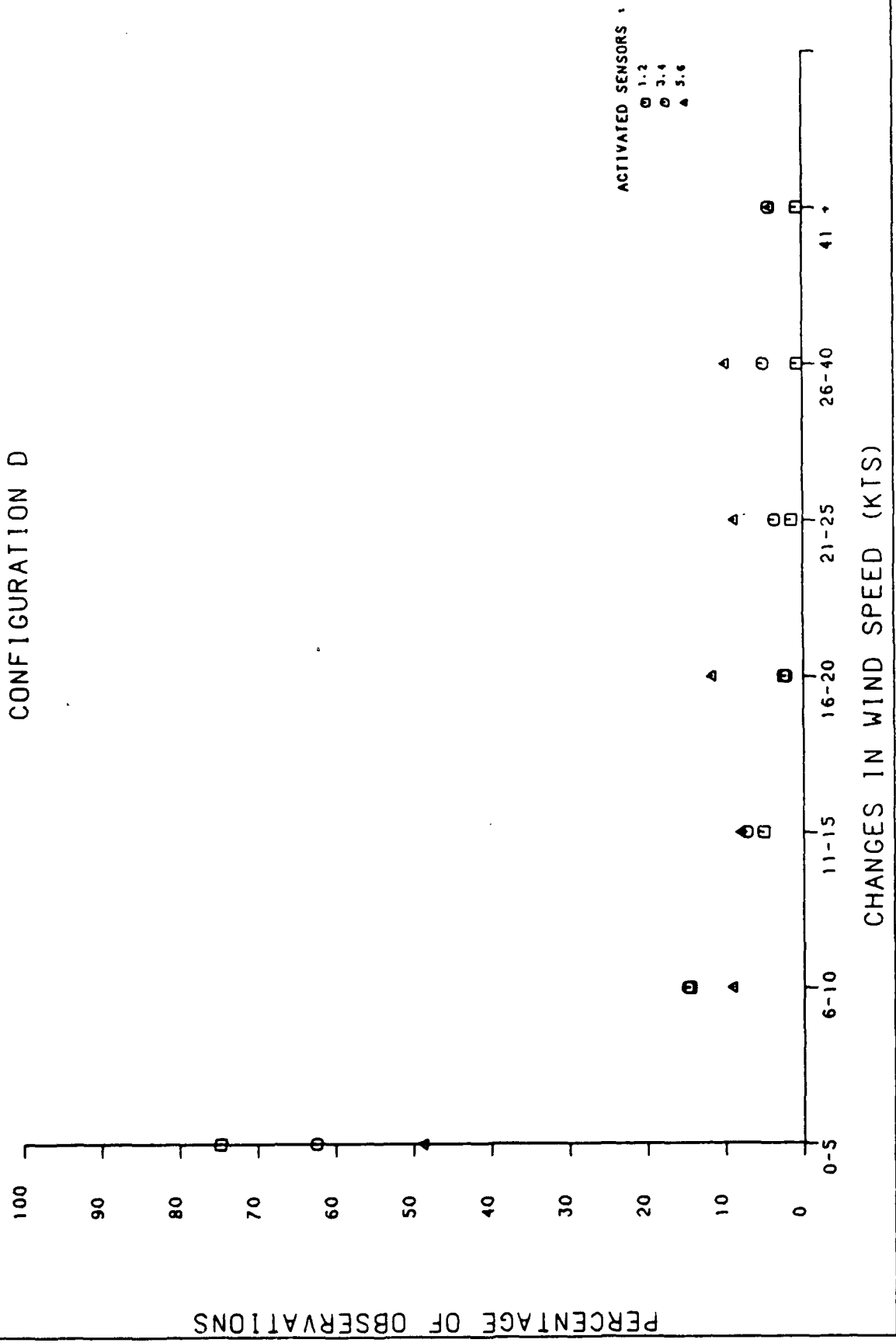


FIGURE 10. PLOTS OF DISTRIBUTIONS FOR VELOCITY CHANGES FOR AIRCRAFT GREATER THAN 7000 POUNDS, APPROACHES (SHEET 2 OF 4)

7000+ 16 APPROACHES CONFIGURATION E

THIS DOCUMENT IS
UNCLASSIFIED
DATE 01-01-01 BY 1045

PERCENTAGE OF OBSERVATIONS

100
90
80
70
60
50
40
30
20
10
0

CHANGES IN WIND SPEED (KTS)

0-5 6-10 11-15 16-20 21-25 26-40 41 +

ACTIVATED SENSORS :

□ 1-2
○ 3-4
△ 7-8

FIGURE 10. PLOTS OF DISTRIBUTIONS FOR VELOCITY CHANGES FOR AIRCRAFT GREATER THAN 7000 POUNDS, APPROACHES (SHEET 3 OF 4)

7000+ 1b APPROACHES CONFIGURATION F

PERCENTAGE OF OBSERVATIONS

100
90
80
70
60
50
40
30
20
10
0

CHANGES IN WIND SPEED (KTS)

ACTIVATED SENSORS
1.2
7.8

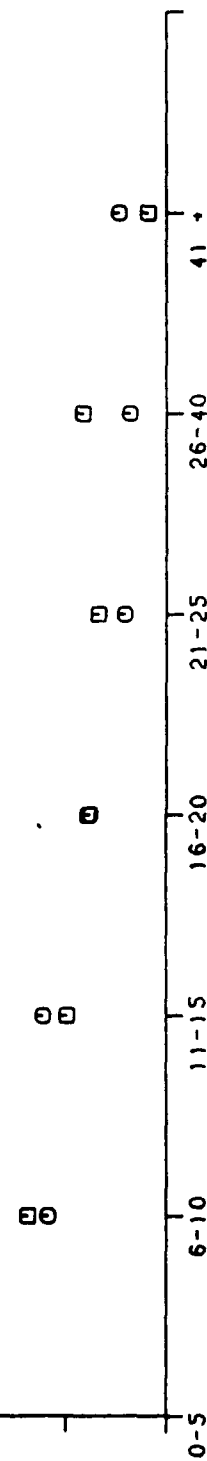


FIGURE 10. PLOTS OF DISTRIBUTIONS FOR VELOCITY CHANGES FOR AIRCRAFT GREATER THAN 7000 POUNDS, APPROACHES (SHEET 4 OF 4)

3000 - 7000 lb DEPARTURES CONFIGURATION A

NOT RECORDED AT
FACILITY OFFICE
FACILITY OFFICE

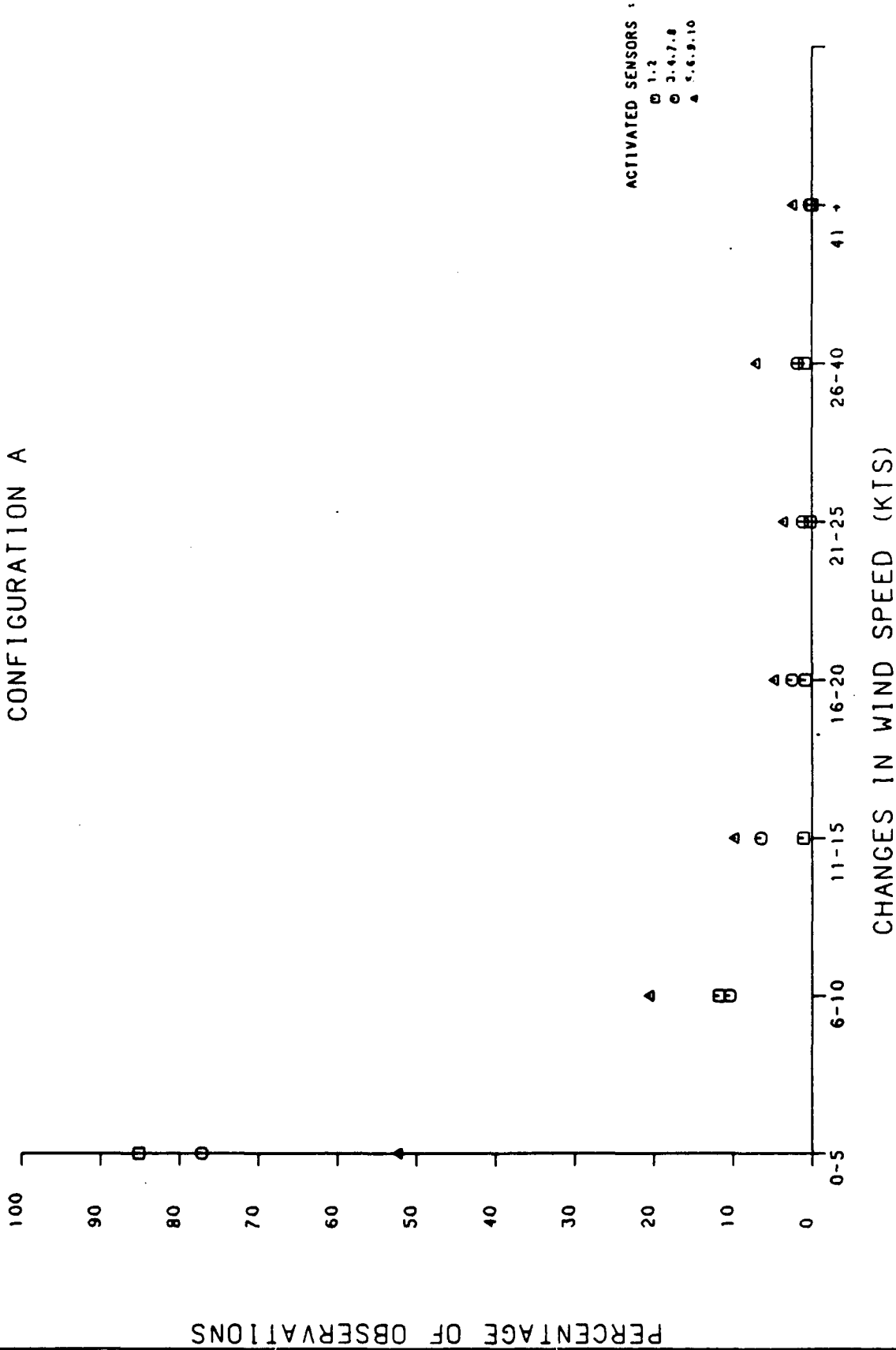


FIGURE 11. PLOTS OF DISTRIBUTIONS FOR VELOCITY CHANGES FOR 3000-7000 POUND AIRCRAFT, DEPARTURES (SHEET 1 OF 5)

3000 - 7000 lb DEPARTURES CONFIGURATION B

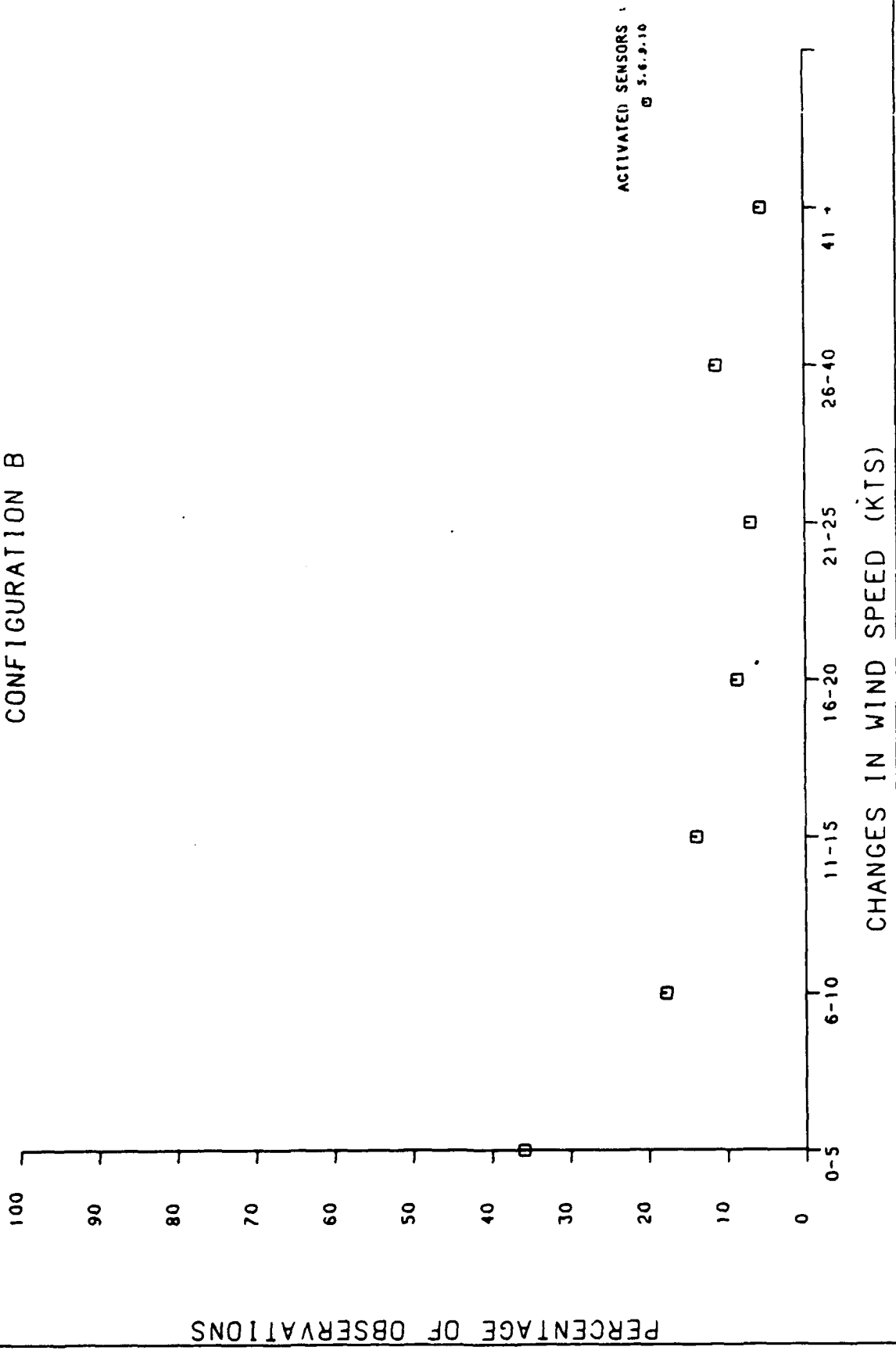


FIGURE 11. PLOTS OF DISTRIBUTIONS FOR VELOCITY CHANGES FOR 3000-7000 POUND
 AIRCRAFT, DEPARTURES (SHEET 2 OF 5)

3000 - 7000 lb DEPARTURES CONFIGURATION C

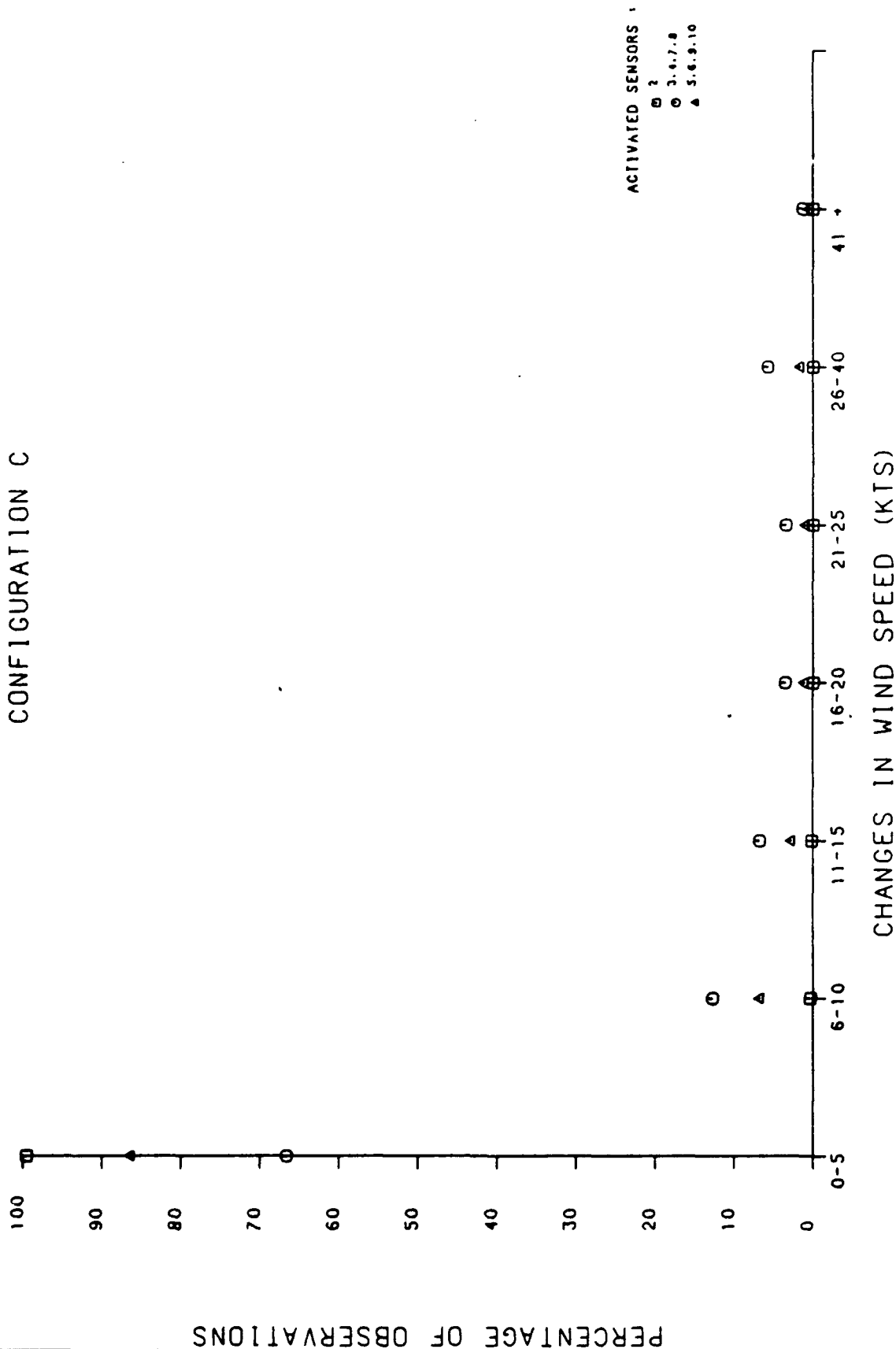


FIGURE 11. PLOTS DISTRIBUTION FOR VELOCITY CHANGES FOR 3000-7000 POUND AIRCRAFT, DEPARTURES (SHEET 3 of 5)

3000 - 7000 lb DEPARTURES CONFIGURATION D

NOT REPRODUCED AT THE
DISCRETION OF THE AIRCRAFT
MANUFACTURER

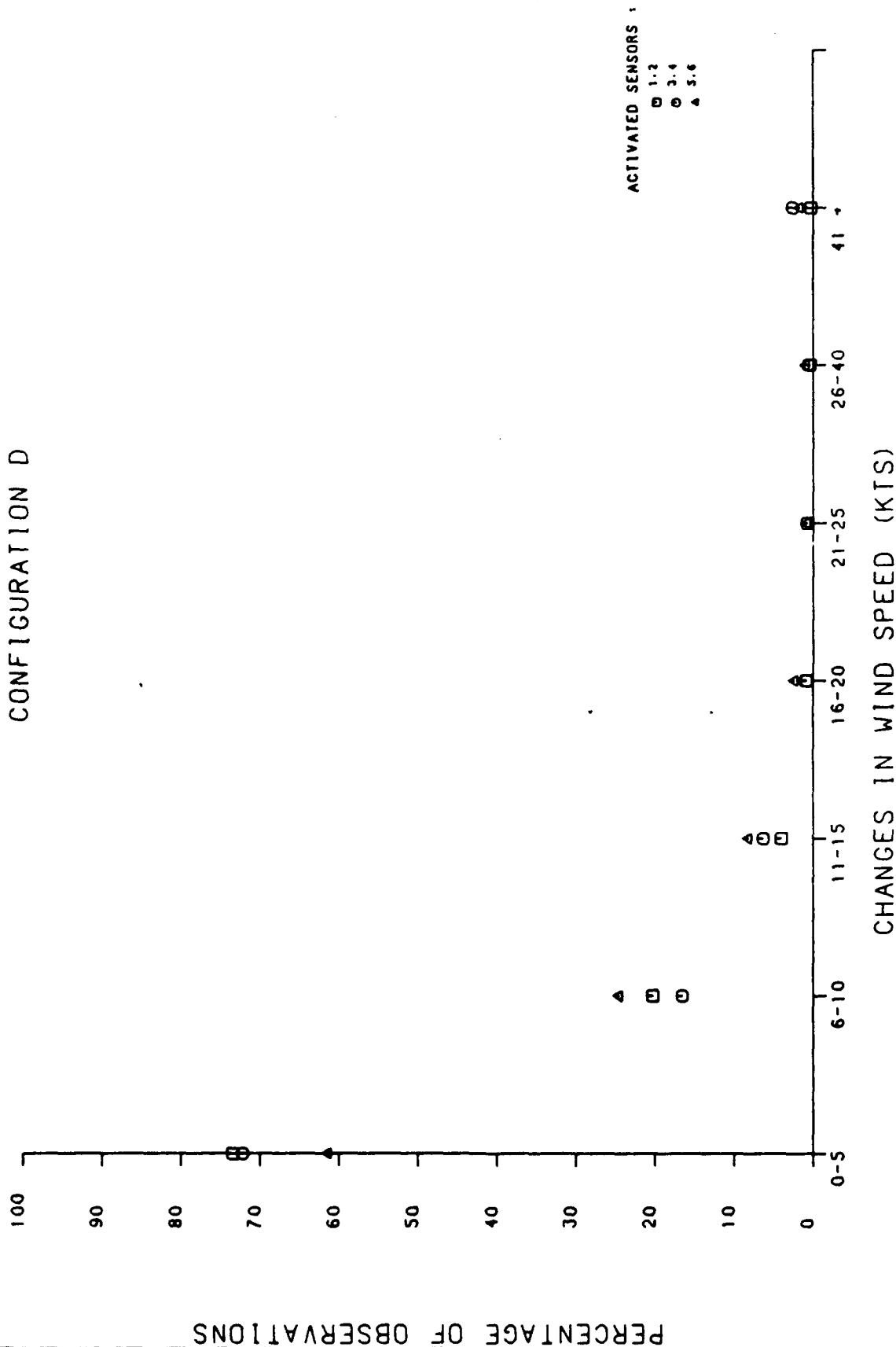


FIGURE 11. PLOTS OF DISTRIBUTIONS FOR VELOCITY CHANGES FOR 3000-7000 POUND AIRCRAFT, DEPARTURES (SHEET 4 OF 5)

3000 - 7000 lb DEPARTURES CONFIGURATION E

NAV. INSTRUMENTS DIV.
AERONAUTICAL ENGINEERING
WASHINGTON, D.C. 20330

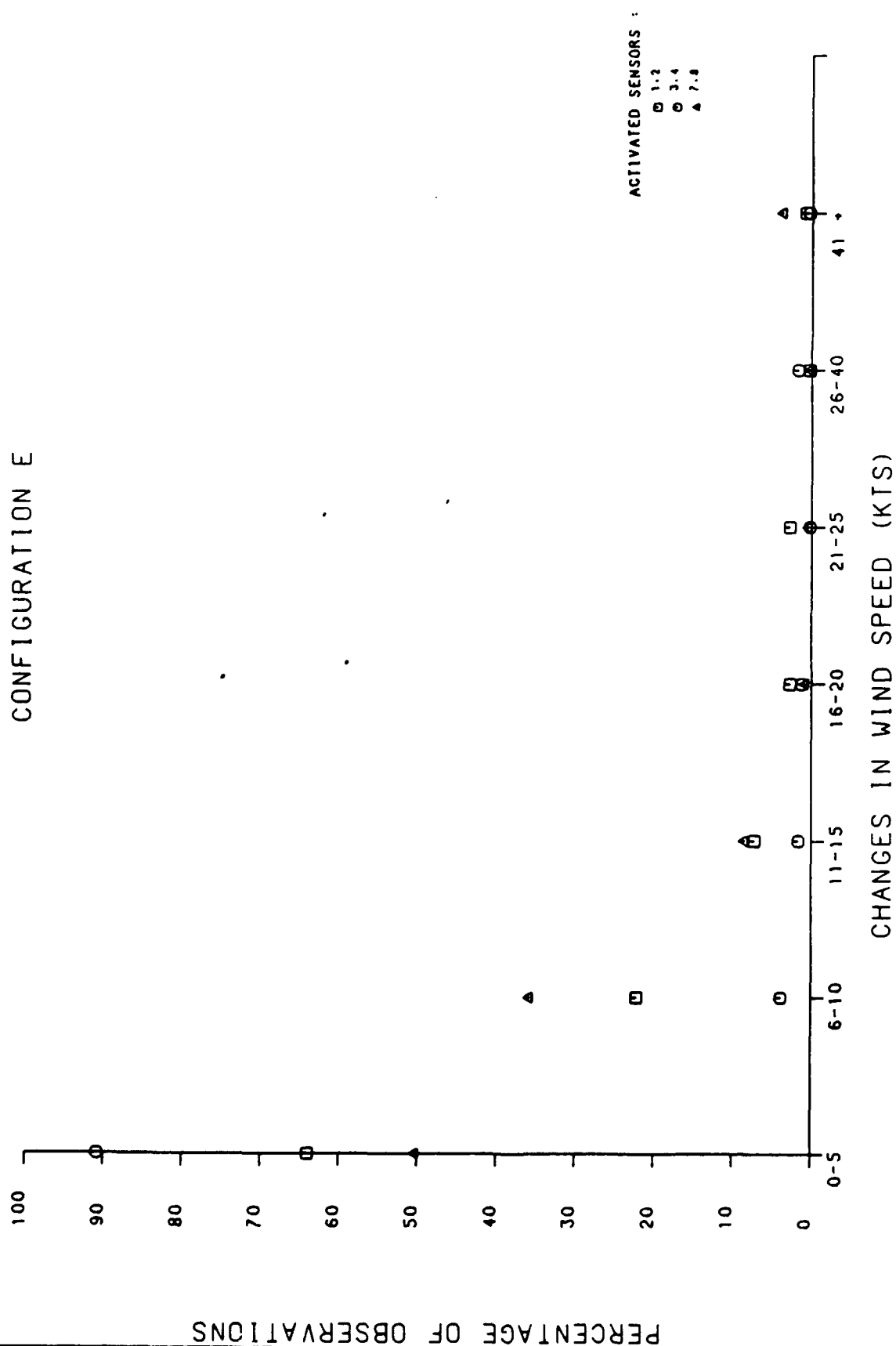


FIGURE 11. PLOTS OF DISTRIBUTIONS FOR VELOCITY CHANGES FOR 3000-7000 POUND AIRCRAFT, DEPARTURES (SHEET 5 OF 5)

7000+ 16 DEPARTURES CONFIGURATION A

PERCENTAGE OF OBSERVATIONS

100

90

80

70

60

50

40

30

20

10

0

0-5

6-10

11-15

16-20

21-25

26-40

41+

CHANGES IN WIND SPEED (KTS)

ACTIVATED SENSORS :

□ 1,2

□ 3,4,7,8

▲ 5,6,9,10

60

55

50

45

40

35

30

25

20

15

10

5

0

0

0

0

0

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FIGURE 12. PLOTS OF DISTRIBUTIONS FOR VELOCITY CHANGES FOR AIRCRAFT GREATER THAN 7000 POUNDS, DEPARTURES (SHEET 1 OF 3)

7000+ 1b DEPARTURES CONFIGURATION C

7000+ 1b DEPARTURES
CONFIGURATION C
SHEET 2 OF 3

PERCENTAGE OF OBSERVATIONS

100
90
80
70
60
50
40
30
20
10
0

0-5

6-10

11-15

16-20

21-25

26-40

41+

CHANGES IN WIND SPEED (KTS)

ACTIVATED SENSORS

□ 2
○ 3, 4, 7, 8
△ 5, 6, 9, 10

FIGURE 12. PLOTS OF DISTRIBUTIONS FOR VELOCITY CHANGES FOR AIRCRAFT GREATER THAN 7000 POUNDS, DEPARTURES (SHEET 2 OF 3)

7000+ 16 DEPARTURES CONFIGURATION F

DATA PREPARED BY
FOR THE AIRCRAFT
RESEARCH CENTER
RESEARCH CENTER
RESEARCH CENTER

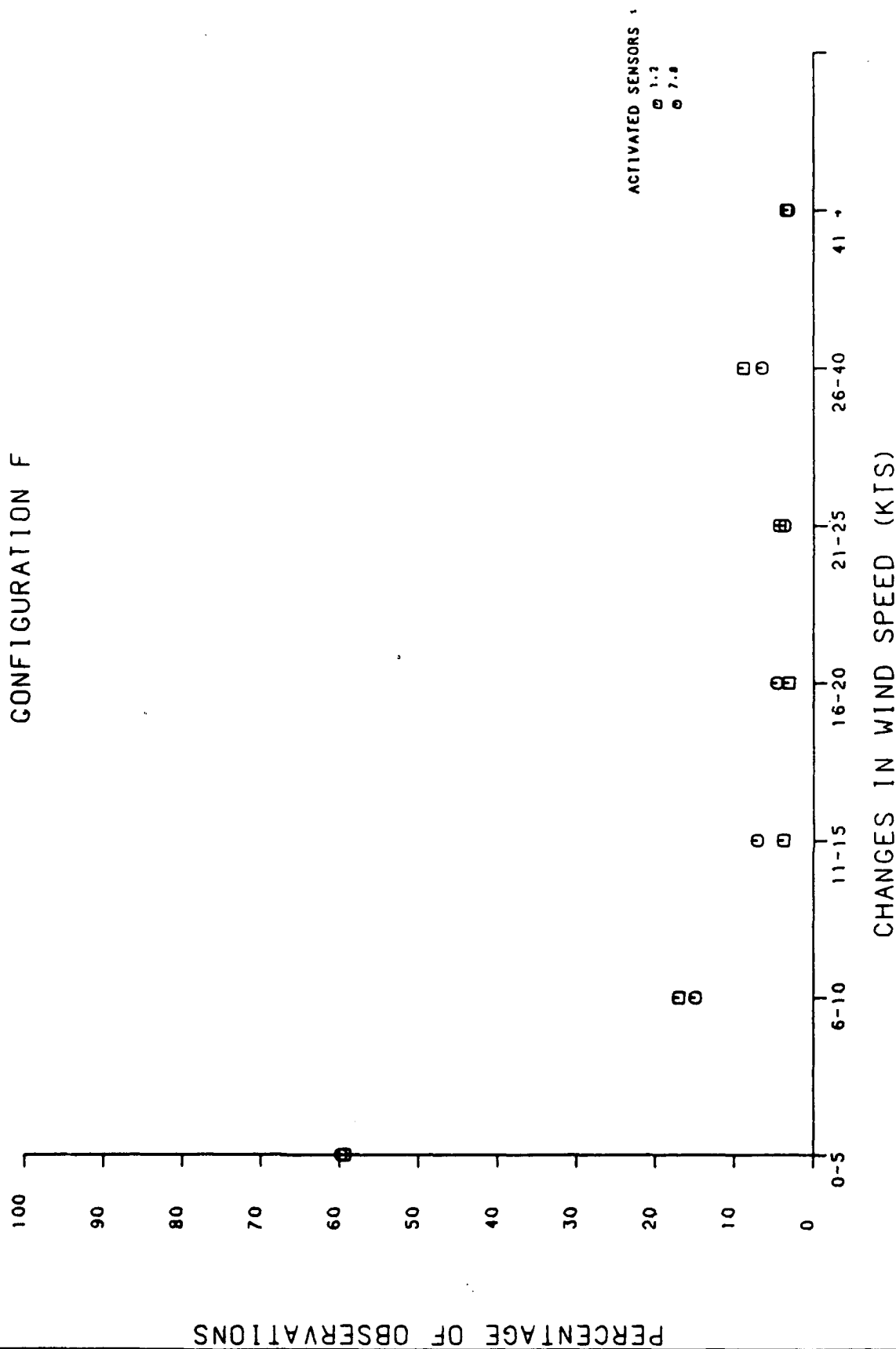
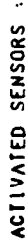


FIGURE 12. PLOTS OF DISTRIBUTIONS FOR VELOCITY CHANGES FOR AIRCRAFT GREATER THAN 7000 POUNDS, DEPARTURES (SHEET 3 OF 3)

1. The first step is to identify the problem.
 2. The second step is to define the problem.
 3. The third step is to analyze the problem.
 4. The fourth step is to develop a solution.
 5. The fifth step is to implement the solution.
 6. The sixth step is to evaluate the solution.
 7. The seventh step is to monitor the solution.
 8. The eighth step is to maintain the solution.
 9. The ninth step is to improve the solution.
 10. The tenth step is to document the solution.



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FOR INFORMATION OF THE
 AIRCRAFT OPERATOR
 AND THE AIRCRAFT MAINTENANCE PERSONNEL

3000 - 7000 lb APPROACHES CONFIGURATION B

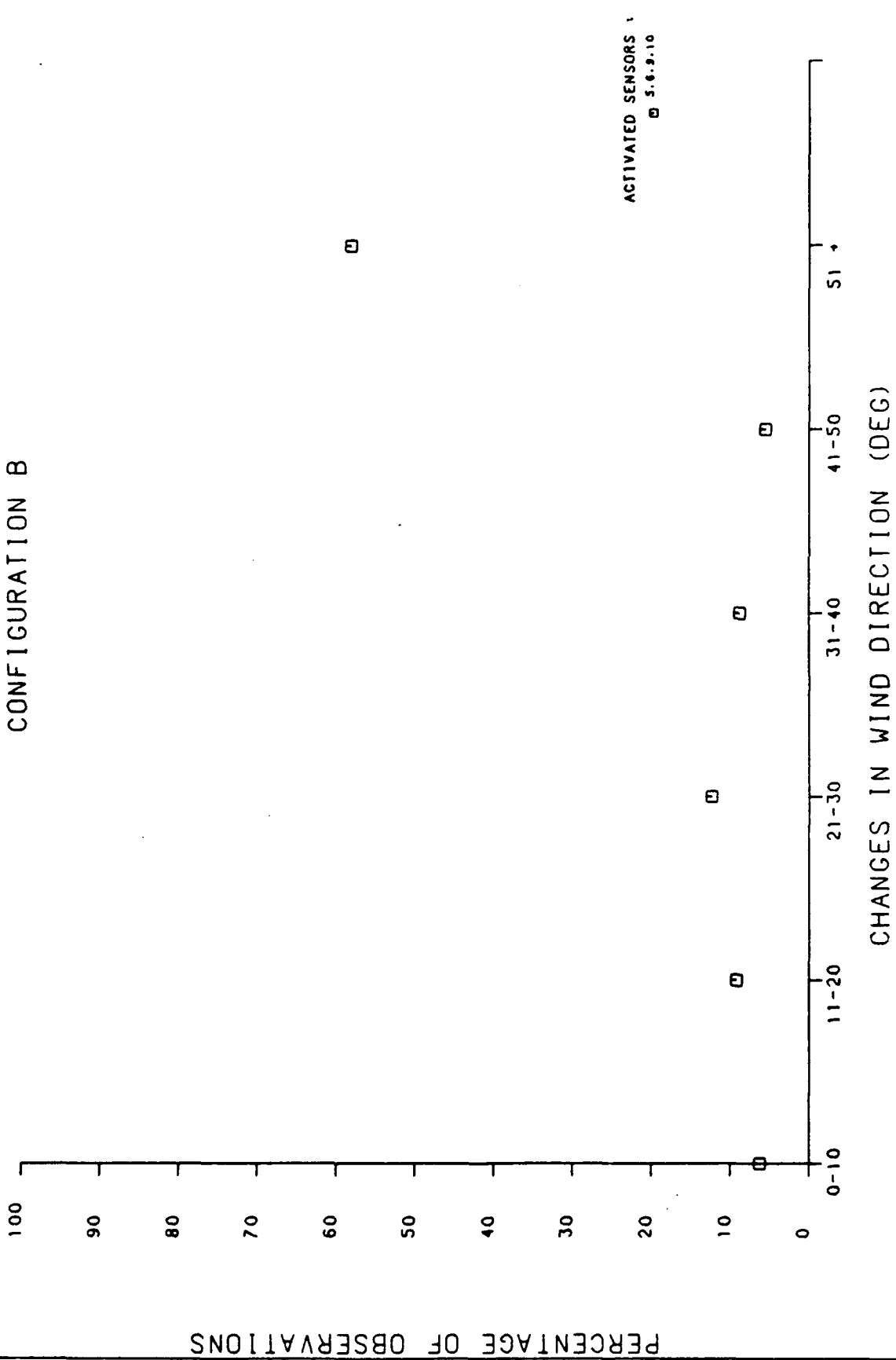


FIGURE 14. PLOTS OF DISTRIBUTIONS FOR WIND DIRECTION CHANGES FOR 3000-7000 POUND AIRCRAFT, APPROACHES (SHEET 2 OF 4)

3000 - 7000 lb APPROACHES CONFIGURATION F

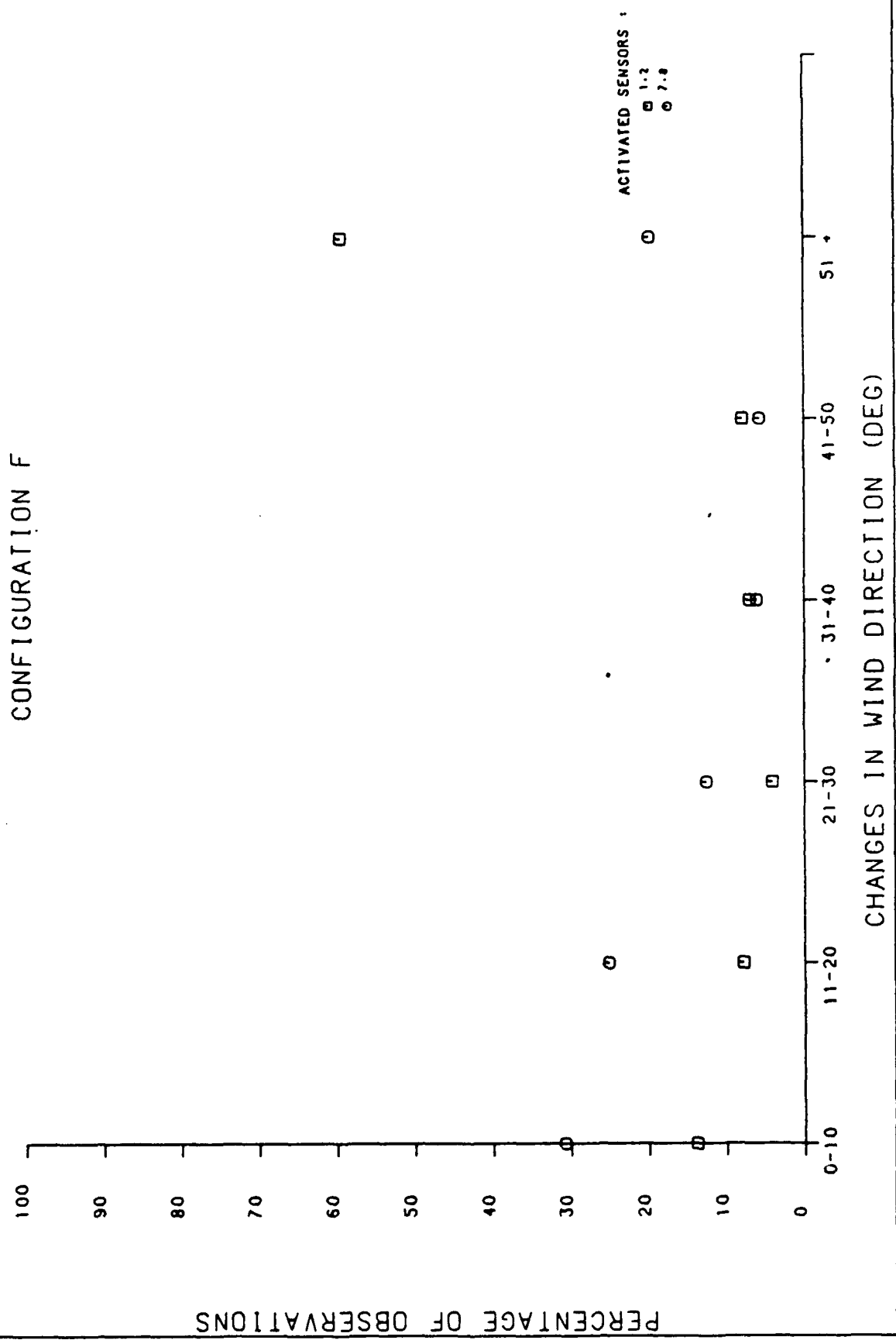


FIGURE 14. PLOTS OF DISTRIBUTIONS FOR WIND DIRECTION CHANGES FOR 3000-7000 POUND AIRCRAFT, APPROACHES (SHEET 3 OF 4)

3000 - 7000 1.6 APPROACHES CONFIGURATION D

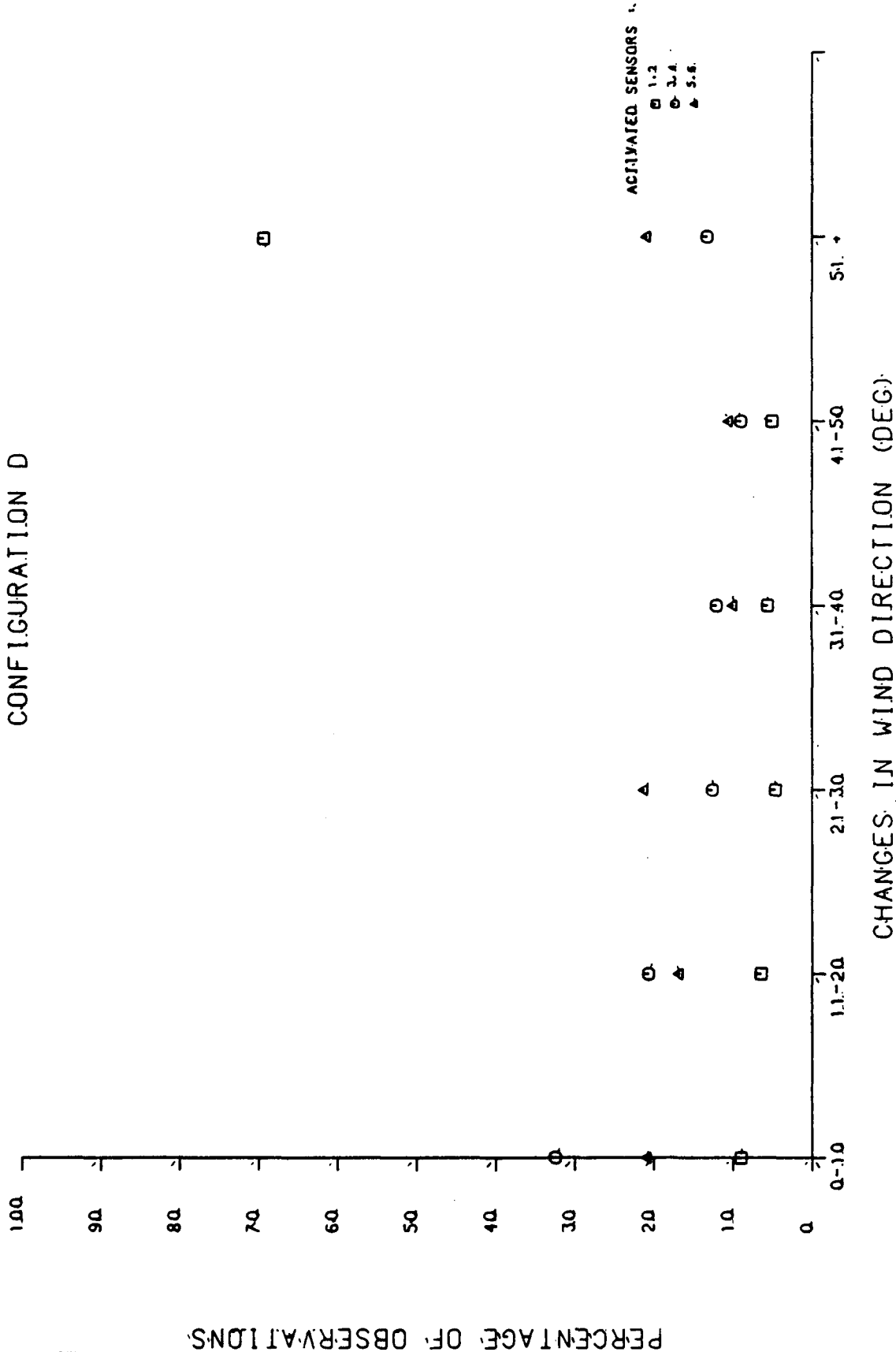


FIGURE 14. PLOTS OF DISTRIBUTIONS FOR WIND DIRECTION CHANGES FOR 3000-7000
 POUND AIRCRAFT, APPROACHES (SHEET 4 OF 4)

7000+ 1b APPROACHES CONFIGURATION A

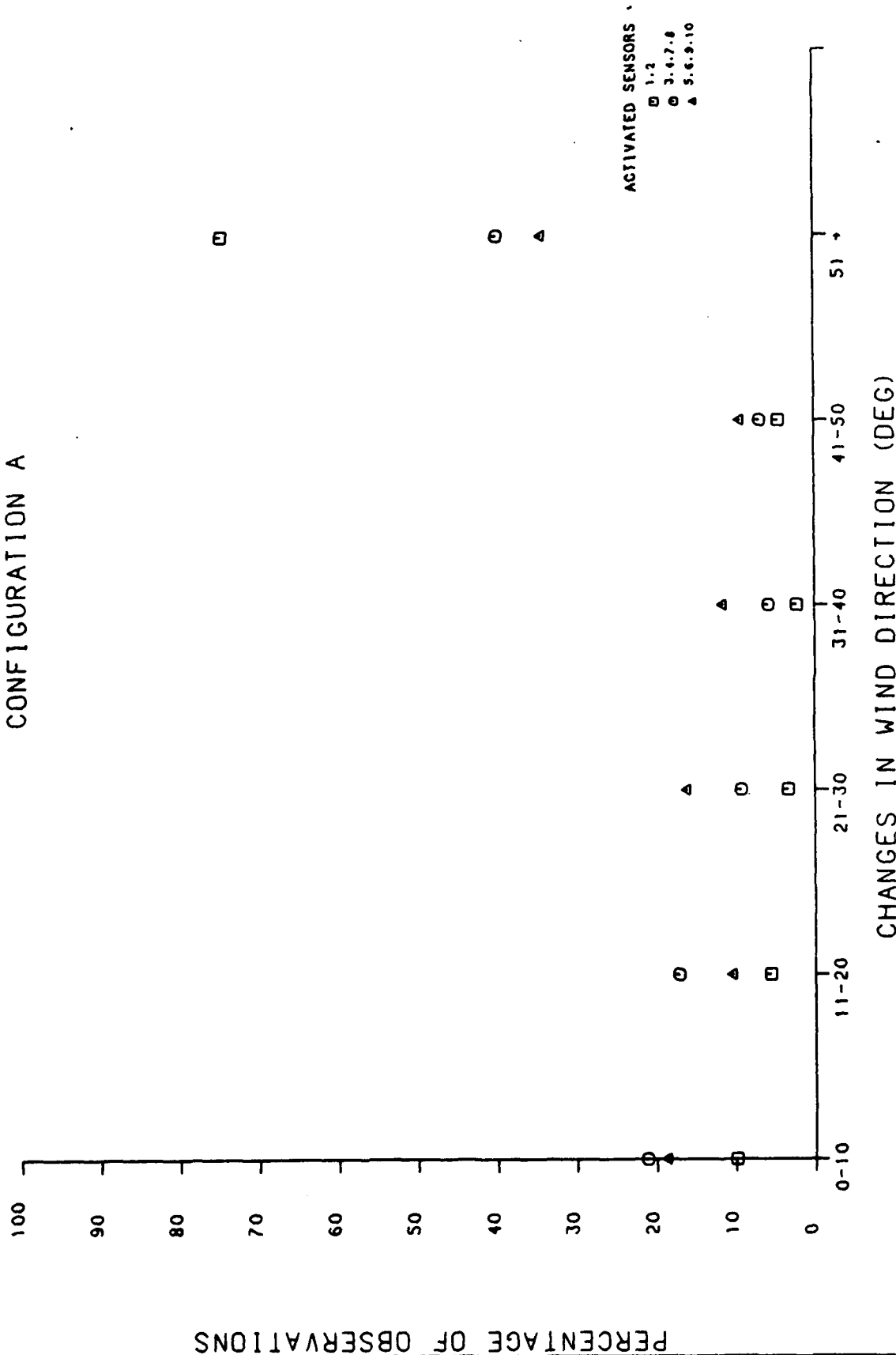
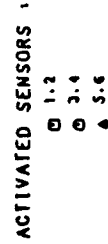


FIGURE 15. PLOTS OF DISTRIBUTIONS FOR WIND DIRECTION CHANGES FOR AIRCRAFT
 GREATER THAN 7000 POUNDS, APPROACHES (SHEET 1 OF 4)

DATA PREPARED BY
FBI RECORDS SECTION
APR 19 1977
ALBUQUERQUE, N.M.



53

7000+ 16 APPROACHES CONFIGURATION E

NOT REPRODUCED
WITHOUT AUTHORITY
OF THE AIR FORCE

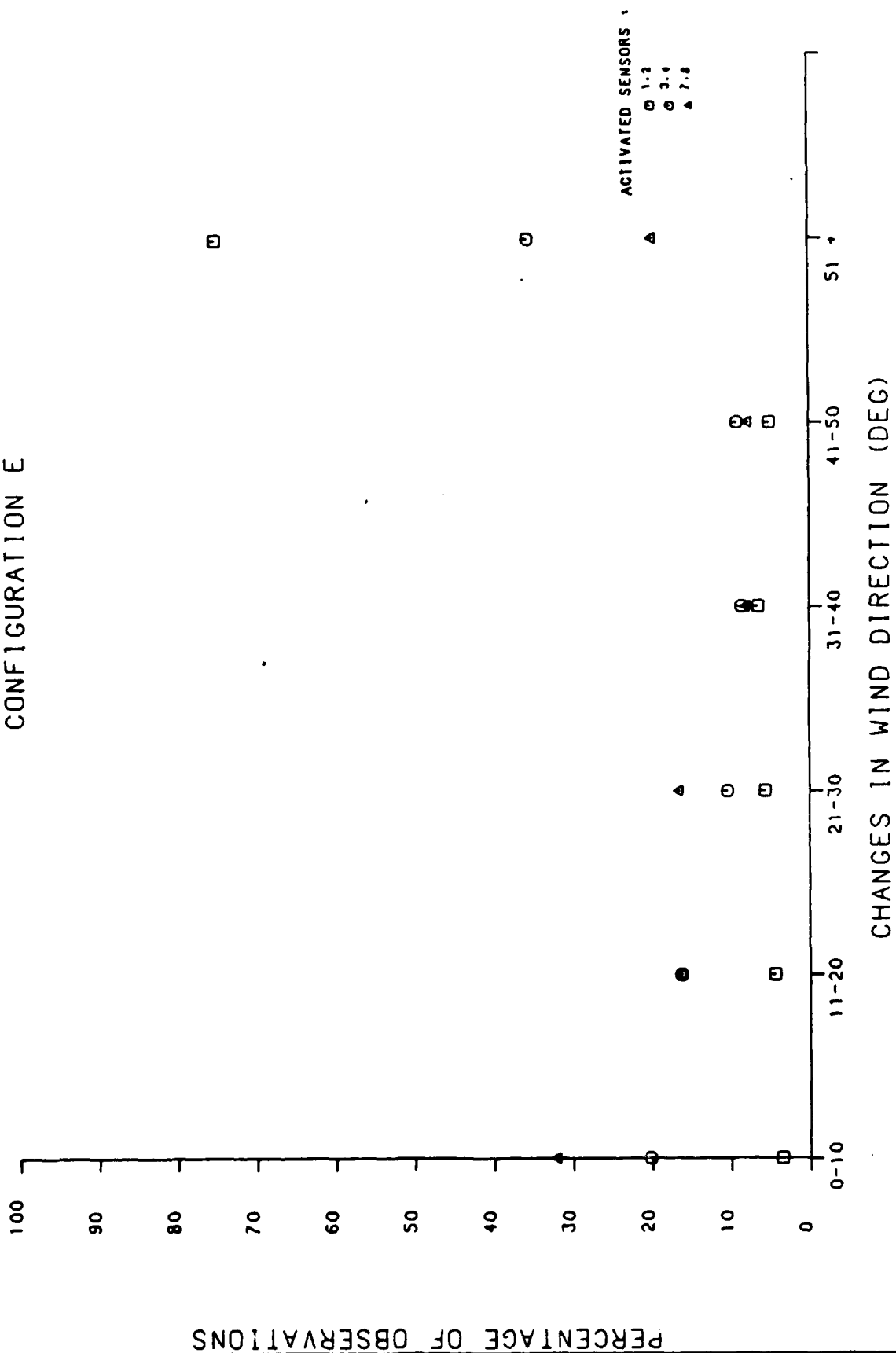
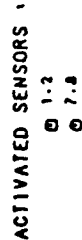


FIGURE 15. PLOTS OF DISTRIBUTIONS FOR WIND DIRECTION CHANGES FOR AIRCRAFT GREATER THAN 7000 POUNDS, APPROACHES (SHEET 3 OF 4)

ALL INFORMATION CONTAINED
HEREIN IS UNCLASSIFIED
DATE 09-18-2010 BY 60322
JLH/STW



55

3000 - 7000 16 DEPARTURES CONFIGURATION A

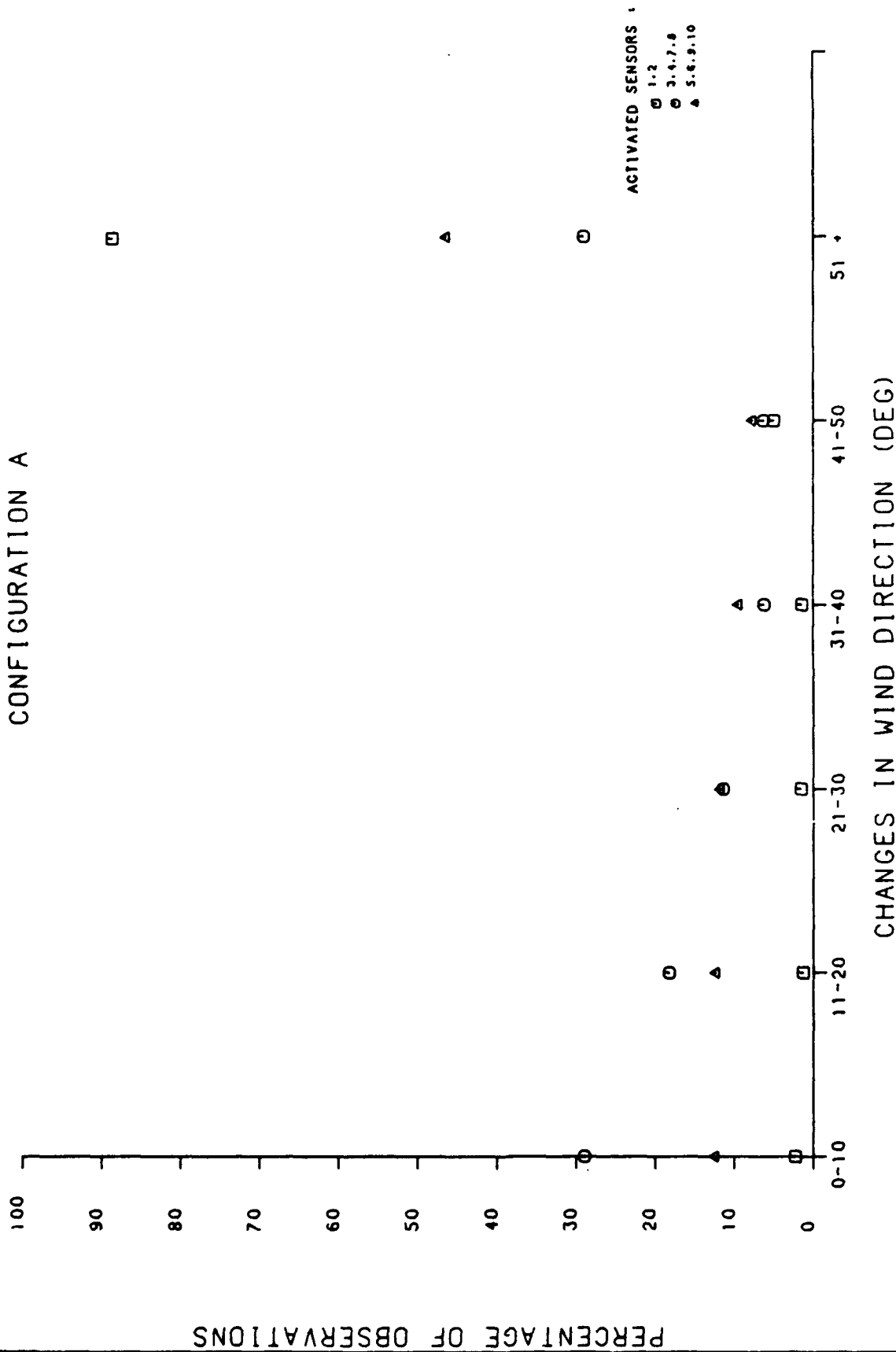


FIGURE 16. PLOTS FOR DISTRIBUTION FOR WIND DIRECTION CHANGES FOR 3000-7000 POUND AIRCRAFT, DEPARTURES (SHEET 1 OF 5)

3000 - 7000 lb DEPARTURES CONFIGURATION C

DATA PROVIDED BY
THE AIRCRAFT
MANUFACTURER
ORIGINALLY
OBTAINED FROM
THE AIRCRAFT
MANUFACTURER

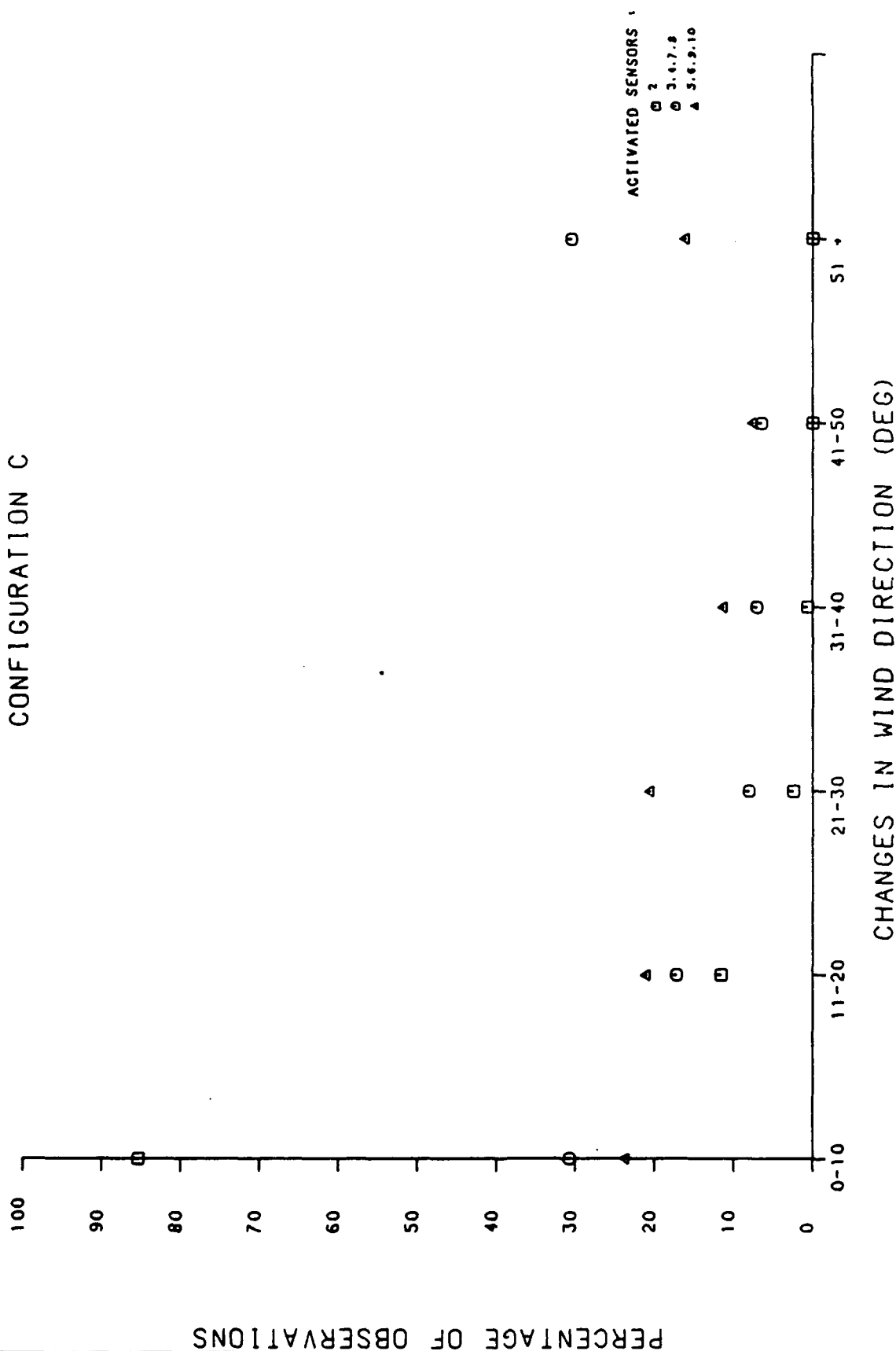


FIGURE 16. PLOTS OF DISTRIBUTIONS FOR WIND DIRECTION CHANGES FOR 3000-7000 POUND AIRCRAFT, DEPARTURES (SHEET 3 OF 5)

3000 - 7000 lb DEPARTURES CONFIGURATION D

NOT RECORDED AT
PACIFIC AIRCRAFT
DEPARTURES
SHEET 4 OF 5

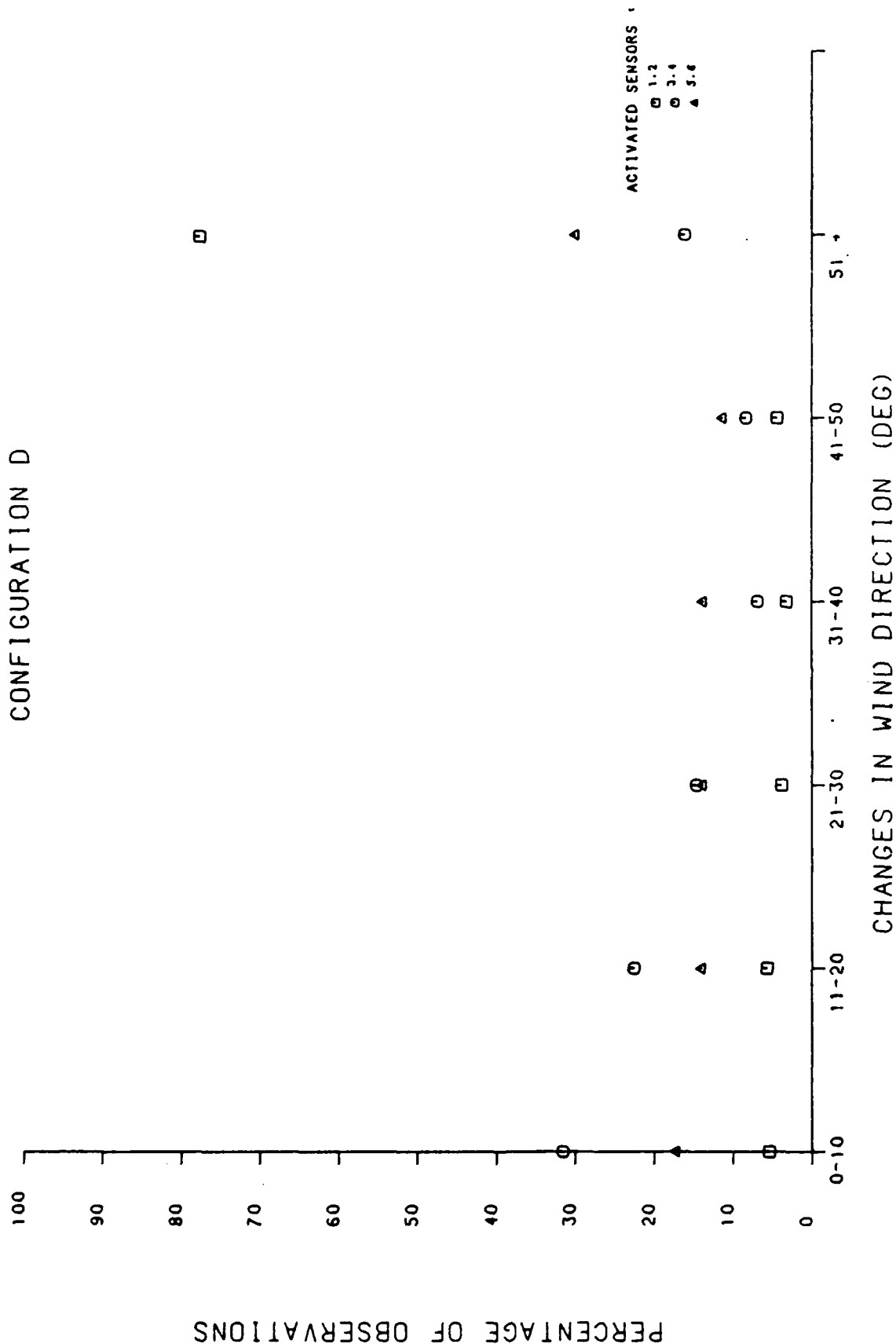


FIGURE 16. PLOTS OF DISTRIBUTIONS FOR WIND DIRECTION CHANGES FOR 3000-7000 POUND AIRCRAFT, DEPARTURES (SHEET 4 OF 5)

3000 - 7000 lb DEPARTURES CONFIGURATION E

NOT RECORDED AT
AN AIRPORT, 1970
SHEET 5 OF 5

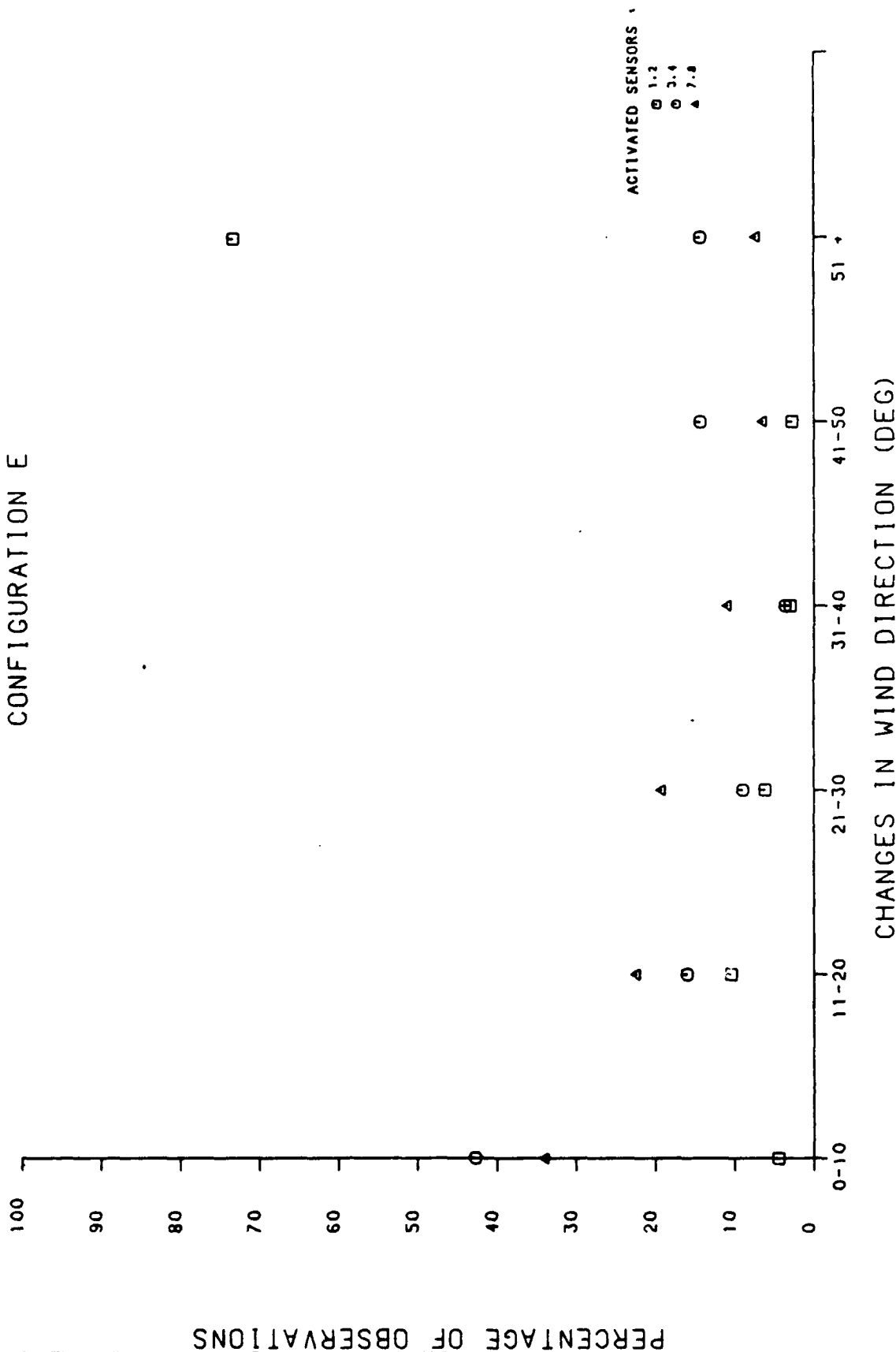


FIGURE 16. PLOTS OF DISTRIBUTIONS FOR WIND DIRECTION CHANGES FOR 3000-7000 POUND AIRCRAFT, DEPARTURES (SHEET 5 OF 5)

7000+ 16 DEPARTURES CONFIGURATION A

PERCENTAGE OF OBSERVATIONS

100
90
80
70
60
50
40
30
20
10
0

0-10

11-20

21-30

31-40

41-50

51+

CHANGES IN WIND DIRECTION (DEG)

ACTIVATED SENSORS
 1. 2
 3. 4. 7. 8
 5. 6. 9. 10

1

2

3

4

5

6

7

8

9

FIGURE 17. PLOTS OF DISTRIBUTIONS FOR WIND DIRECTION CHANGES FOR AIRCRAFT
 GREATER THAN 7000 POUNDS, DEPARTURES (SHEET 1 OF 3)

7000+ 1b DEPARTURES CONFIGURATION C

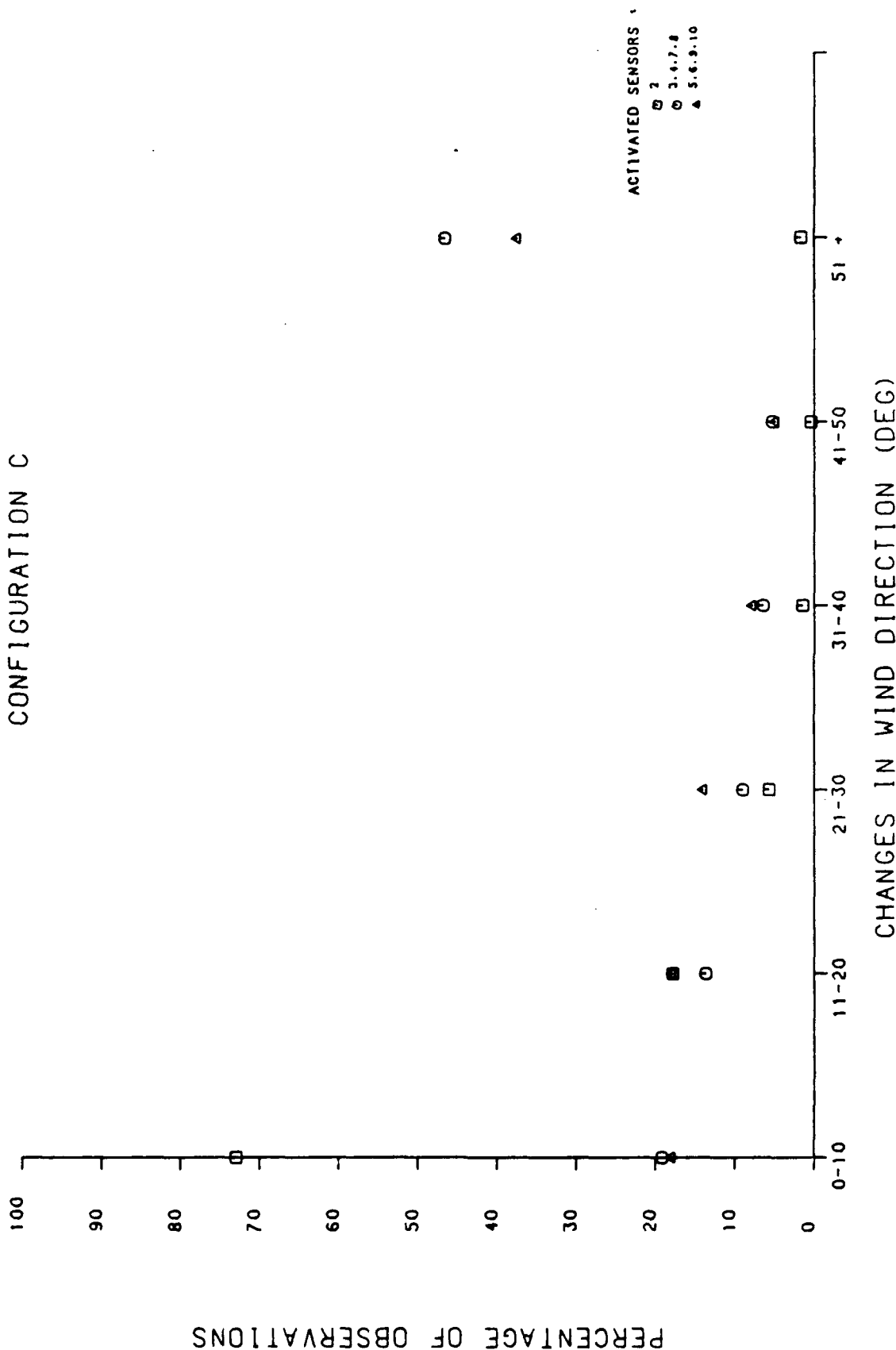


FIGURE 17. PLOTS OF DISTRIBUTIONS FOR WIND DIRECTION CHANGES FOR AIRCRAFT GREATER THAN 7000 POUNDS, DEPARTURES (SHEET 2 OF 3)

7000+ 1b DEPARTURES CONFIGURATION F

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ADMINISTRATION
WASHINGTON, D.C. 20586

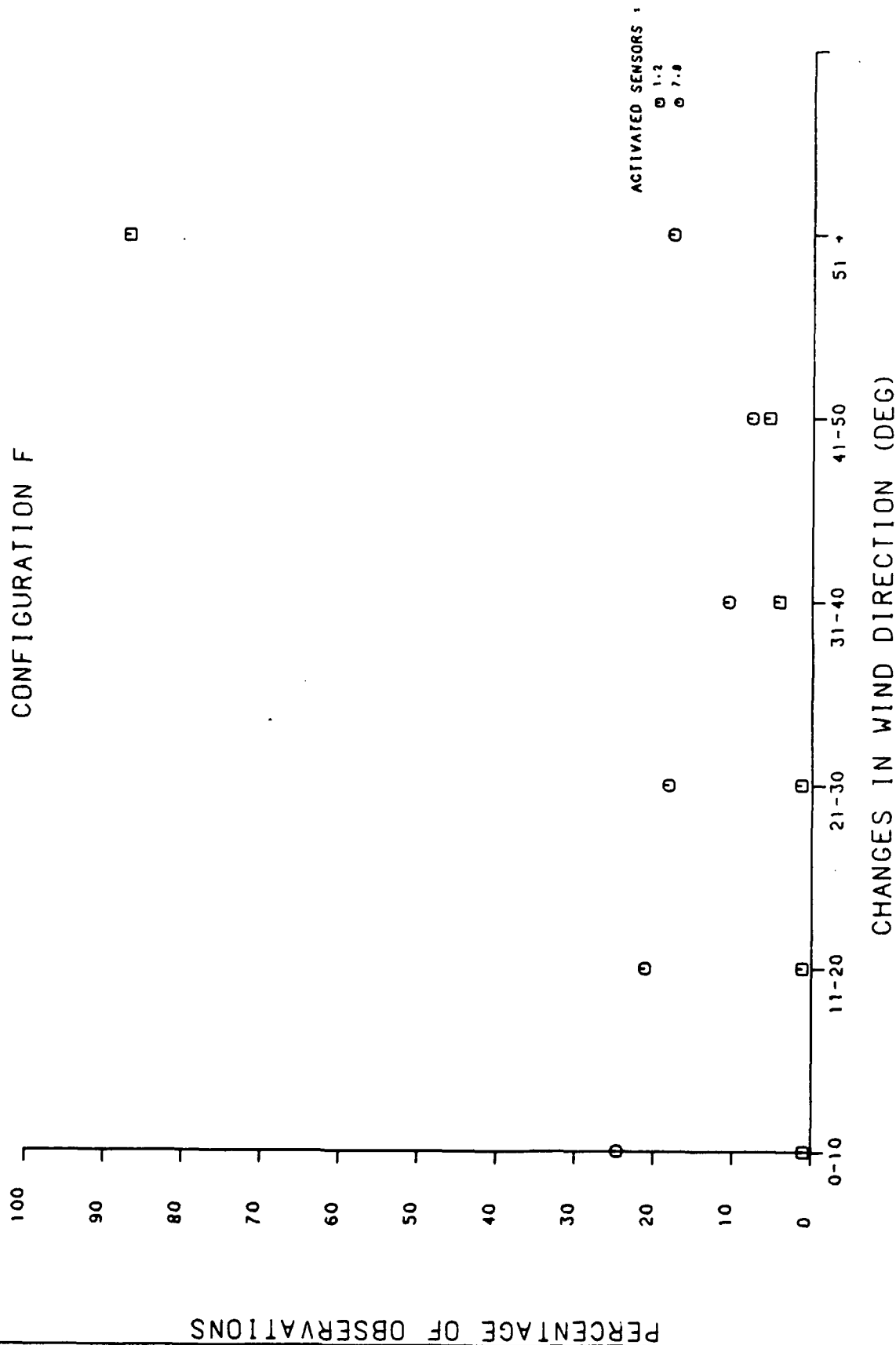


FIGURE 17. PLOTS OF DISTRIBUTIONS FOR WIND DIRECTION CHANGES FOR AIRCRAFT
GREATER THAN 7000 POUNDS, DEPARTURES (SHEET 3 OF 3)

3000 - 7000 lb TAXI CONFIGURATION G

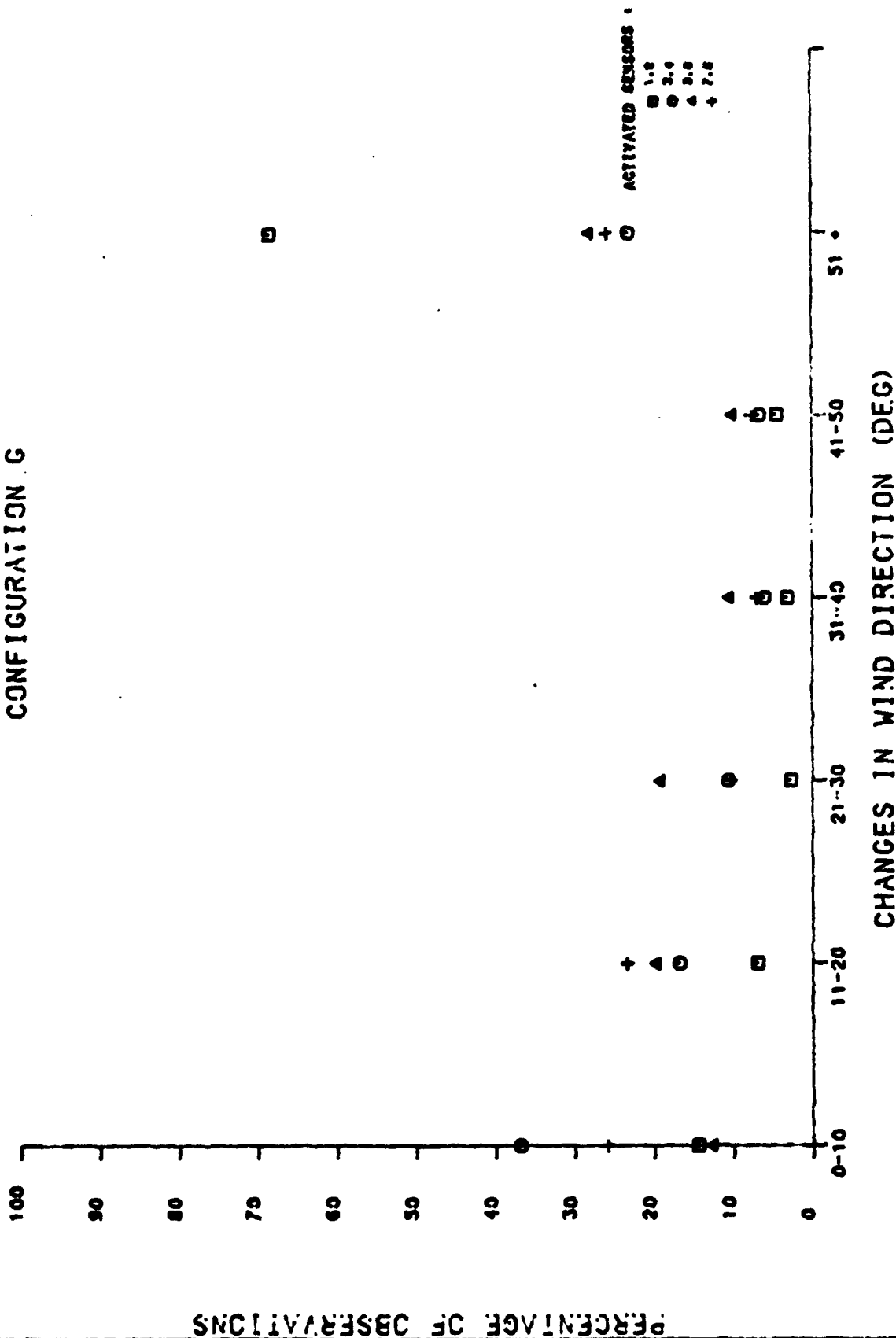


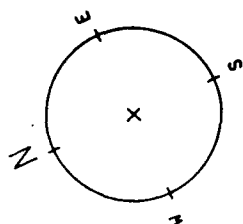
FIGURE 18. PLOT OF DISTRIBUTIONS FOR WIND DIRECTION CHANGES FOR ALL TAXI OPERATIONS

APPENDIX A

**ILLUSTRATIONS OF FLIGHTPATHS FOR EACH
SENSOR CONFIGURATION**

FLIGHT PATTERN : 8

SENSOR

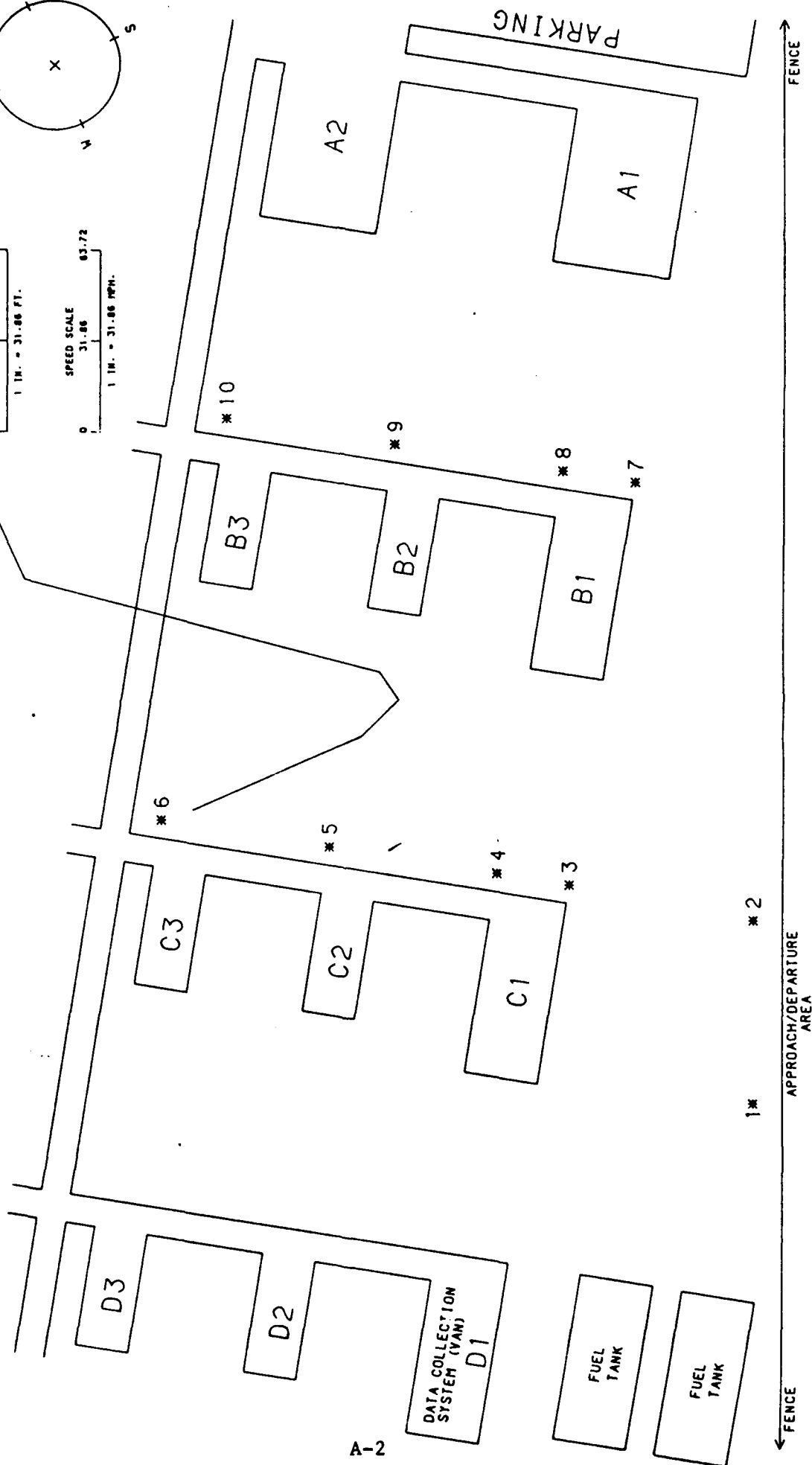


DISTANCE SCALE

0 31.86 63.72

1 IN. = 31.86 FT.

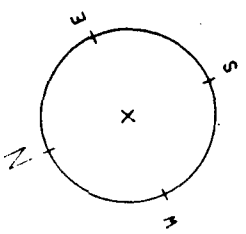
SPEED SCALE
31.86 63.72
1 IN. = 31.86 MPH.



INTRACOASTAL CITY, LA. P.H.I. HELIPORT

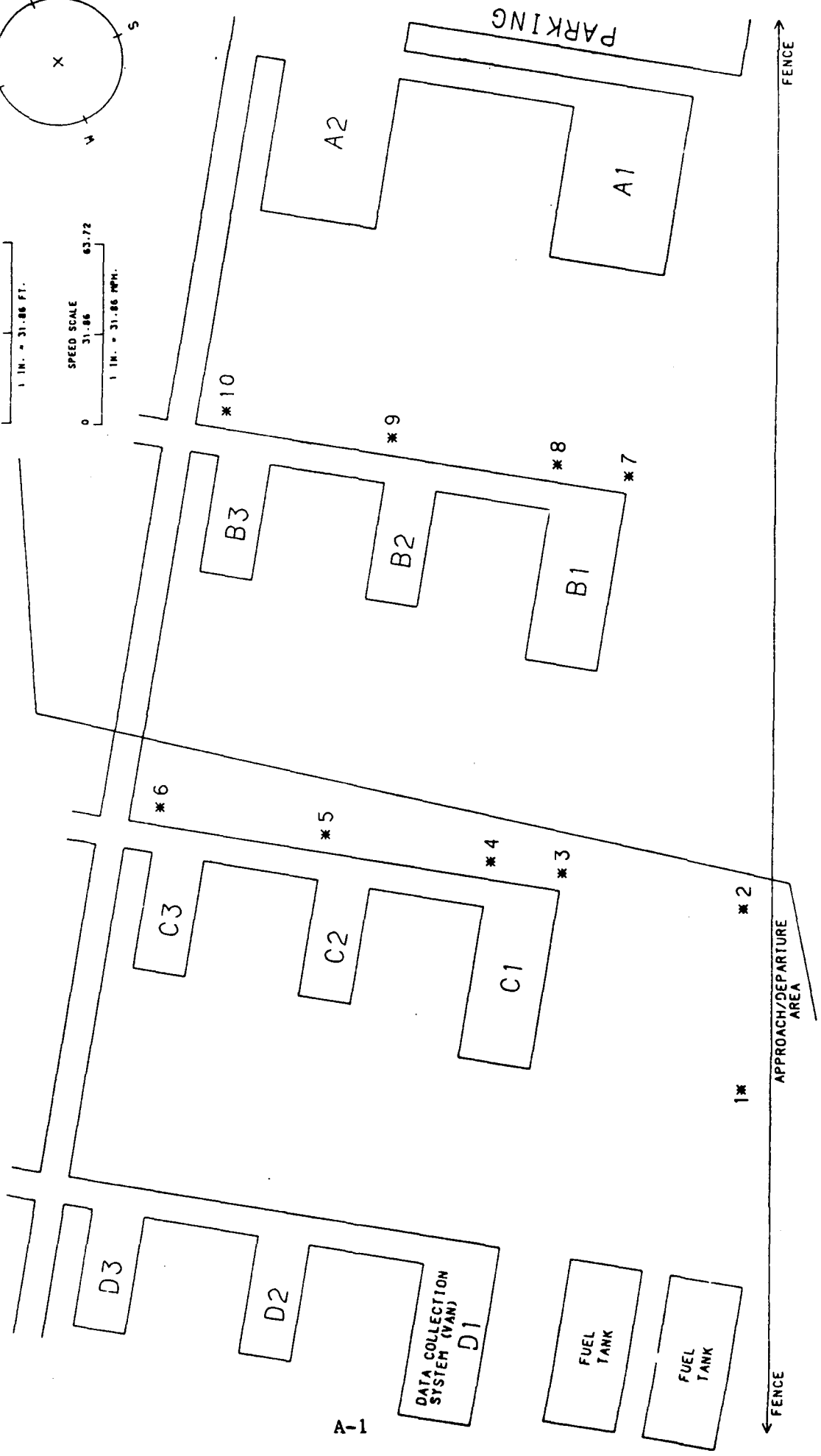
FLIGHT PATTERN - A

SENSOR



DISTANCE SCALE
0 31.86 63.72
1 IN. = 31.86 FT.

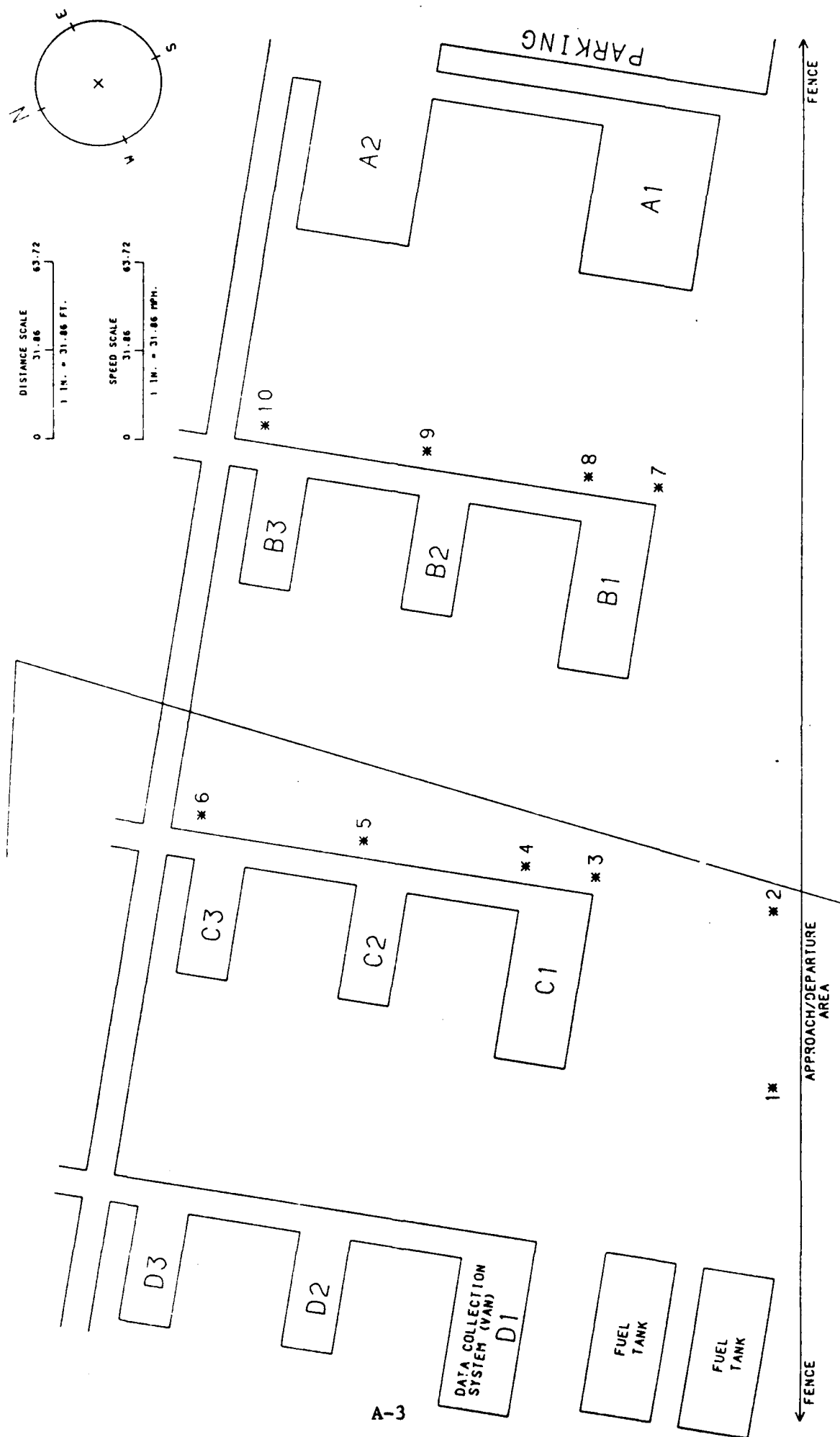
SPEED SCALE
0 31.86 63.72
1 IN. = 31.86 MPH



INTRACOASTAL CITY, LA. P.H.I. HELIPORT

FLIGHT PATTERN - C

SENSOR

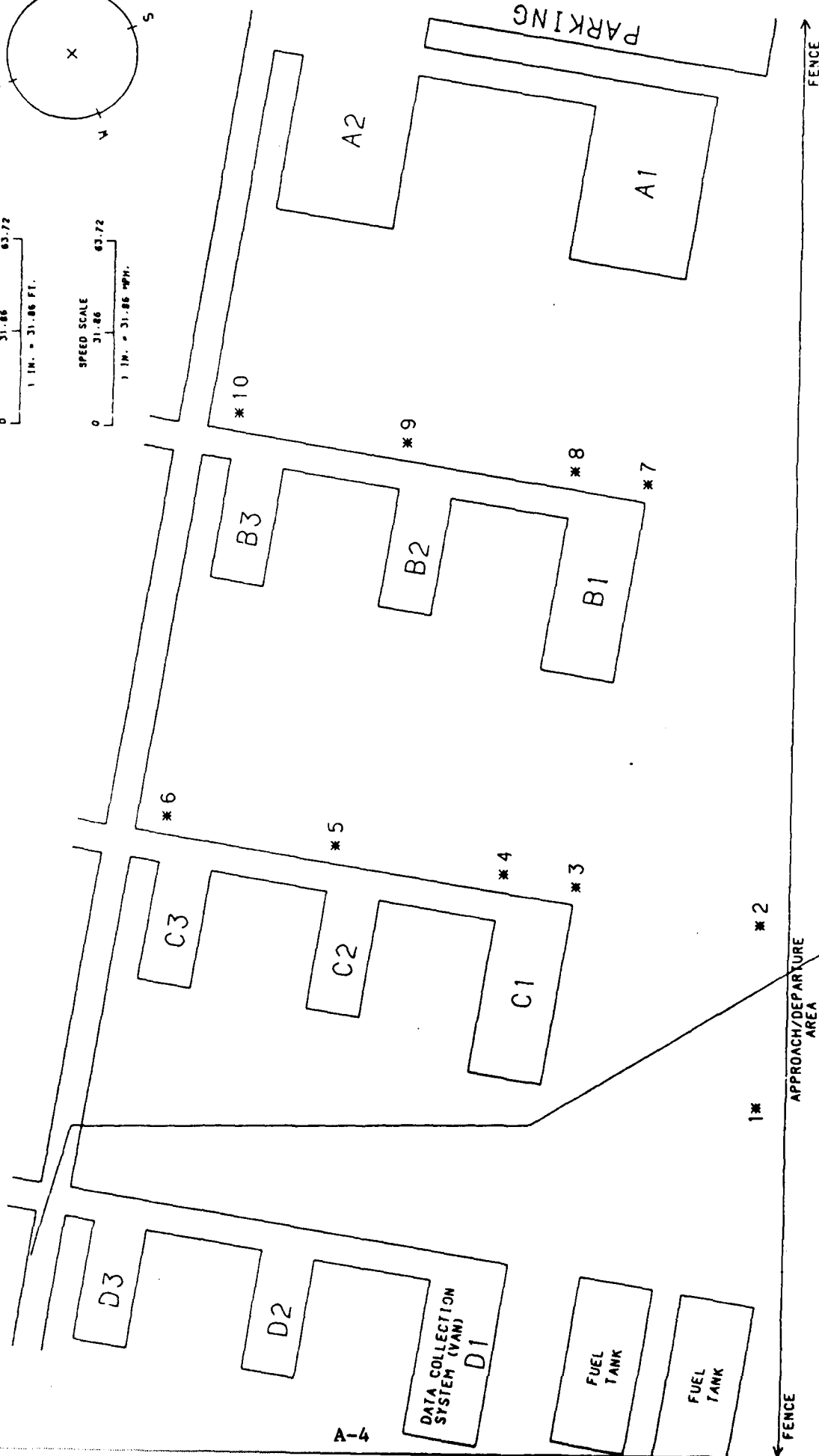
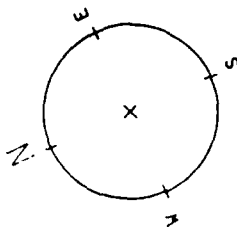


INTRACOASTAL CITY, LA. P.H.I. HELIPORT

DATA PROCESSED BY THE FAA TECHNICAL CENTER
ATLANTIC CITY AIRPORT, N.J. 08402

DISTANCE SCALE
0 31.86 63.72
1 IN. = 31.86 FT.

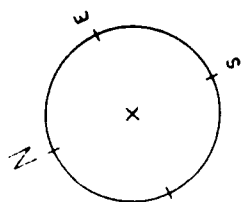
SPEED SCALE
0 31.86 63.72
1 IN. = 31.86 MPH



INTRACOASTAL CITY, LA. P.H.I. HELIPORT

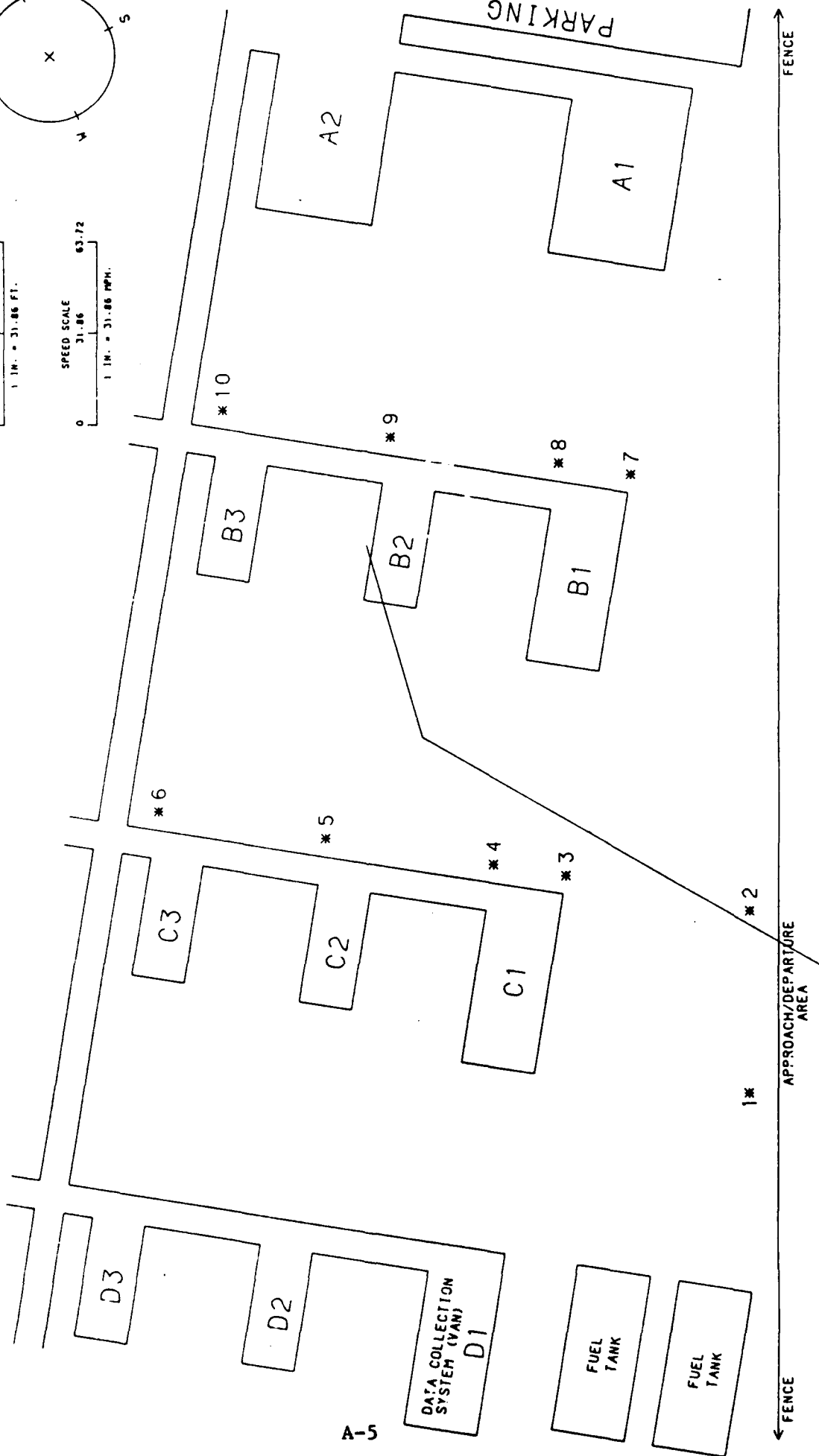
FLIGHT PATTERN - E

SENSOR



DISTANCE SCALE
0 31.86 63.72
1 IN. = 31.86 FT.

SPEED SCALE
0 31.86 63.72
1 IN. = 31.86 MPH.

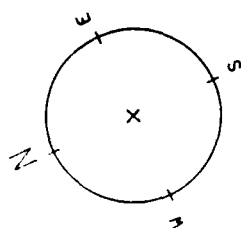


INTRACOASTAL CITY, LA. P.H.I. HELIPORT

DATA PROCESSED BY THE FAA TECHNICAL CENTER
ATLANTA CITY AIRPORT - 7 00000

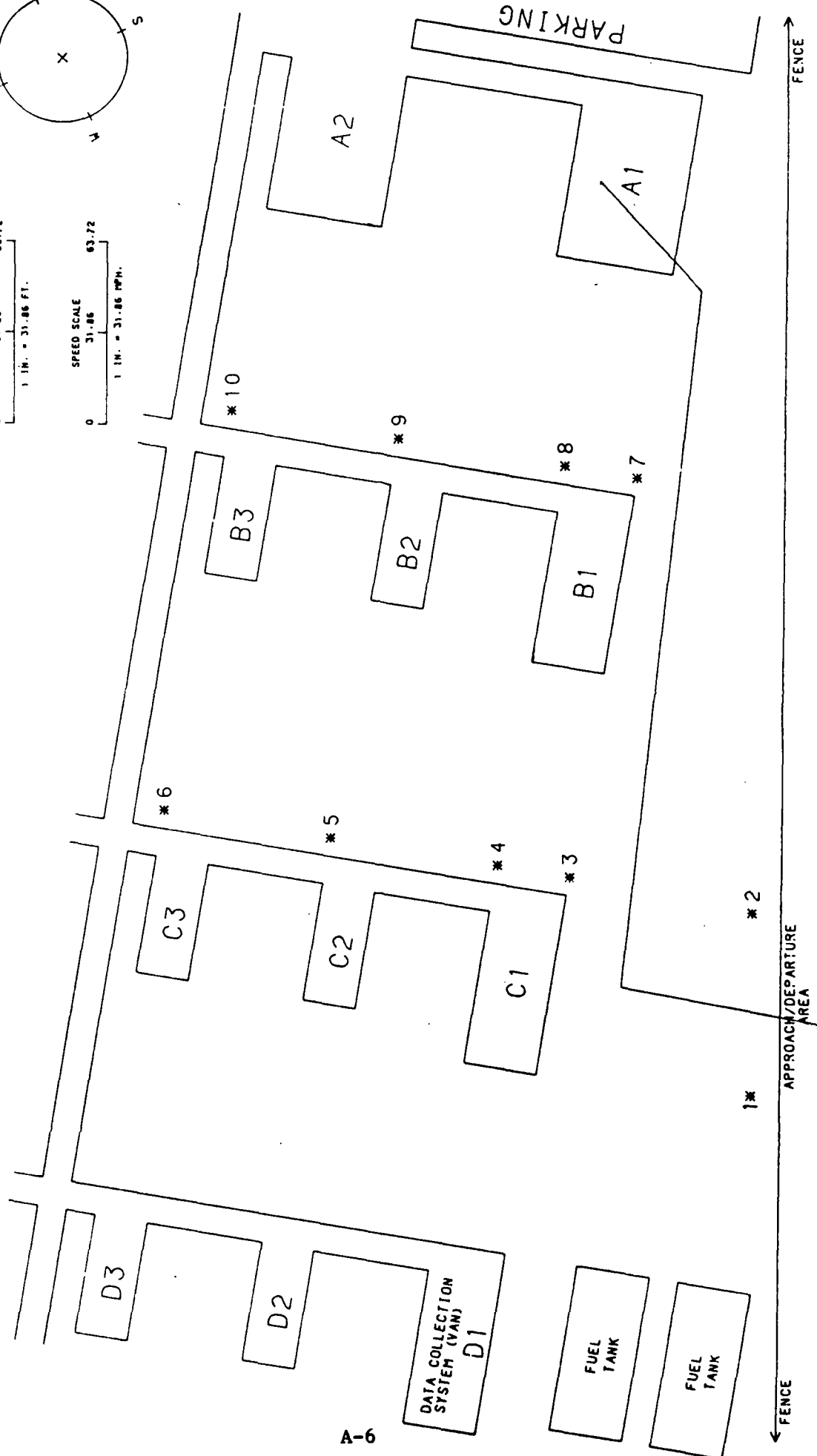
FLIGHT PATTERN 1 F

SENSOR



DISTANCE SCALE
0 31.86 63.72
1 IN. = 31.86 FT.

SPEED SCALE
0 31.86 63.72
1 IN. = 31.86 MPH.



A-6

INTRACOASTAL CITY, LA. P.H.I. HELIPORT

FLIGHT PATTERN - C

SENSOR

