NASA TECHNICAL NOTE

NASA TN D-6137

NOISE MEASUREMENTS FOR A THREE-ENGINE TURBOFAN TRANSPORT AIRPLANE DURING CLIMBOUT AND LANDING APPROACH OPERATIONS

by W. Latham Copeland and Lorenzo R. Clark

Langley Research Center
Hampton, Va. 23365

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION • WASHINGTON, D. C. • MAY 1971

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
NASA TN D-6137		

4. Title and Subtitle	5. Report Date
NOISE MEASUREMENTS FOR A THREE-ENGINE TURBOFAN TRANSPORT AIRPLANE DURING CLIMBOUT AND LANDING APPROACH OPERATIONS	May 1971
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
W. Latham Copeland and Lorenzo R. Clark	L-5994
	10. Work Unit No. 126-62-11-02
9. Performing Organization Name and Address	11. Contract or Grant No.
NASA Langley Research Center Hampton, Va. 23365	
	13. Type of Report and Period Covered
12. Sponsoring Agency Name and Address	Technical Note
National Aeronautics and Space Administration Washington, D.C. 20546	14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

Noise measurements have been made for a three-engine turbofan transport airplane during climbout and landing approach operations in which the airplane operating procedures were carefully controlled. These controlled procedures included an orderly scheduling of operating variables such as engine power, speed, altitude, and flap settings. The results of these studies are presented for seven climbout operations involving various climb speeds, flap settings, and engine power settings and for three landing approach operations involving various glide-slope angles. The noise data are correlated with airplane operating procedures and position.

In general, the results from the climbout studies indicated that the lower noise levels (6 dB to 14 dB) were associated with profiles employing lower engine powers during second-segment climb. It was also found that, for a given climb profile and climb rate, slightly higher noise levels are associated with operations employing fixed flaps than with a specified flap retraction schedule.

The results from the landing approach studies indicated that generally lower noise levels were associated with the steeper glide slopes. For these steeper glide slopes, noise reductions attained (4 dB to 9 dB) resulted from both the increased altitude and the lower engine powers.

17. Key Words (Suggested by Author(s))	18. Distribution Statement
Landing approach noise Climbout noise Noise abatement	Unclassified – Unlimited

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price*
Unclassified	Unclassified	53	$3.00

*For sale by the National Technical Information Service, Springfield, Virginia 22151

NOISE MEASUREMENTS FOR A THREE-ENGINE TURBOFAN TRANSPORT AIRPLANE DURING CLIMBOUT AND LANDING APPROACH OPERATIONS

By W. Latham Copeland and Lorenzo R. Clark
Langley Research Center

SUMMARY

Noise measurements have been made for a three-engine turbofan transport airplane during climbout and landing approach operations in which the airplane operating procedures were carefully controlled. These controlled procedures included an orderly scheduling of operating variables such as engine power, speed, altitude, and flap settings. The results of these studies are presented for seven climbout operations involving various climb speeds, flap settings, and engine power settings and three for landing approach operations involving various glide-slope angles. The noise data were correlated with airplane operating procedures and position.

In general, the results from the climbout studies indicated that lower noise levels (6 dB to 14 dB) were associated with profiles employing lower engine powers during second-segment climb. Also, for a given climb profile and climb rate, slightly higher noise levels are associated with operations employing fixed flaps than with a specified flap retraction schedule.

The results from the landing approach studies indicated that generally lower noise levels were associated with the steeper glide slopes. For these steeper glide slopes the noise reductions attained (4 dB to 9 dB) resulted from both the increased altitude and the lower engine powers.

INTRODUCTION

The noise from commercial jet transports during climbout and landing approach operations has become a serious problem in communities near many of the nation's airports. One means for controlling the noise in airport communities is by using climbout and landing approach procedures which are specifically chosen to reduce the noise exposure on the ground. To obtain noise data on the effectiveness of such procedures in reducing the noise, the National Aeronautics and Space Administration (NASA) and the Federal Aviation Agency (FAA) have jointly conducted a flight-test program using

commercial transport airplanes. In this program, several flight profiles were used under conditions in which the airplane operating procedure was carefully controlled by an orderly scheduling of operational variables such as engine power, speed, altitude, and flap settings.

Tests of this program and related studies for four-engine turbojet and turbofan transports have been reported in references 1 to 7. These tests have provided useful data showing the amount of noise reduction obtained related to the profile flown and the power cutback employed for the particular airplanes studied. The present tests extend this program to include a three-engine turbofan transport. These tests consisted of several runs for each of seven climbout profiles associated with varied engine power schedules and for each of three landing approach profiles. This report presents acoustic data in both physical and subjective units and the relation between these data and airplane operational parameters and flight position.

SYMBOLS AND ABBREVIATIONS

Values are given in both SI and U.S. Customary Units. The measurements and calculations were made in U.S. Customary Units.

d_{av}	average duration of 10-dB-down point, sec
h	altitude, meters (feet)
V_2	initial climb speed, knots

Subscripts:

av	average
t1,t2	tone correction by method of reference 8

Abbreviations:

dB	decibel, unit of measure of sound pressure level, ref. 0.0002 dyne/cm^2
EPNL(FAA)	effective perceived noise level obtained by integration method specified by FAA for aircraft certification (ref. 9)

EPNL(FAA)(app) effective perceived noise level obtained by estimation method specified by FAA for aircraft certification (ref. 10)

OASPL overall sound pressure level

SPL sound pressure level, dB

SR slant range, meters (feet)

Notation used from reference 8:

EPNdB effective perceived noise level obtained by integration method

EEPNdB effective perceived noise level obtained by estimation method

Max. dB(A) maximum OASPL that would be observed on standard sound-level meter containing "A" spectral-weighting network

Max. dB(C) maximum OASPL that would be observed on standard sound-level meter containing "C" spectral-weighting network

Max. dB(N) maximum OASPL that employs spectral weighting derived from same research data underlying concept of perceived noisiness

Max. PNdB maximum value of perceived noise level calculated with aid of noy tables (calculated during temporal course of given aircraft sound)

Peak PNdB perceived noise level as calculated from highest levels reached in individual 1/3-octave bands during noise exposure

APPARATUS AND METHODS

Tests were conducted in the vicinity of the NASA Wallops Station on April 16, 1966, and January 20 to 23, 1967. The infrequently used runway at Wallops Station was suitable for these tests because the climbout and landing approach operations could be conducted with minimum interference from other aircraft and also because the length of the runway would accommodate the test airplanes. The area west of the runway was used for the acoustic measuring range since it was generally flat (elevation 11.6 m (38 ft) above mean sea level), open fields and easily accessible by roadways.

The general locations of the noise measuring stations with respect to the runway are noted in figure 1. Positions of the noise measuring stations are given in figure 2 along with the location of the ground radar tracking station. Provisions were made at the radar station for maintaining communication between the radar station and each noise measuring station by radio.

Airplane Description

The airplane used in these tests (fig. 3) was powered by three turbofan engines, each rated at 62 275 N (14 000 lbf) thrust at sea-level conditions. The gross weight of the airplane during the tests varied between approximately 58 500 and 64 500 kg (129 000 and 142 000 lbm) for the take-off—climbout tests and 49 900 and 64 500 kg (110 000 and 142 000 lbm) for the landing approach tests.

Test Procedures

The seven climbout profiles and the three landing approach profiles along with the airplane operating procedures used are shown in tables I and II, respectively. Briefly, the climbout profiles employed power reductions and speed and flap scheduling. The landing approach operations involved single- and two-segment glide slopes of 3° and 6°. Three to six runs were made for each climbout profile, and 10 or 11 runs were made for each landing approach profile. Ground-based radar was used to provide space positioning of the airplane.

Climbout.- Two power reduction schedules were employed in the climbout operations. Profiles 1 and 2 consisted of power reduction from take-off power to maximum continuous power; profiles 3 to 7 involved reductions from take-off power to that required for maintaining a climb rate of 152 m/min (500 ft/min). All power cutbacks occurred at an altitude of 457 m (1500 ft) except for profile 1 where the power cut occurred at an altitude of 305 m (1000 ft). Climbouts were accomplished at speeds of V_2 + 10 or 20 knots with 15° flaps. The profiles differed in detail with regard to climb speed and flap schedule. (See table I.) The actual climbout procedures were performed as closely as possible to the profile descriptions of table I. From 3 to 6 climbouts were made of each profile with the take-off initiated from the east end of the runway.

Radar tracking data are shown in figure 4. Radar acquisition was accomplished prior to rotation and was maintained until the airplane was beyond the test area (station 5 of fig. 2). A countdown, provided by the radar station over a radio link, was used to time initiation of power cutbacks as the prescribed altitude was approached. Plots such as those of figure 4 were used to obtain airplane altitude, lateral displacement, and slant range as the airplane passed each noise measuring station. These data are included in table III.

Additional information regarding the operating conditions of the airplane was determined from photographs taken periodically of the airplane flight instrumentation panel. These photographs provided information regarding percent compressor speed, engine pressure ratio (EPR), and airplane climb rate, altitude, climb speed, and flap setting to correlate with airplane position data from ground radar. The photographs were taken upon command from the radar tracking station at predetermined positions along the flight track. The data obtained from the series of photographs are included in table IV.

Landing approach.- The landing approach operations involved three profiles consisting of a conventional 3° single-segment, a 6° single-segment, and a two-segment (6° transition into a 3°) glide slope. Landing flare was scheduled at an altitude of 38 m (125 ft) and 1326 m (4350 ft) from runway threshold for the conventional 3° approach and at an altitude of 159 m (520 ft) and 2835 m (9300 ft) from runway threshold for the 6° single-segment approach. Initiation of transition from 6° to 3° was scheduled at an altitude of 352 m (1153 ft) and 6236 m (20 460 ft) from runway threshold, and completion of transition was scheduled at an altitude of 232 m (760 ft) and 4724 m (15 500 ft) from runway threshold.

The actual approach operations were performed as closely as possible to the procedures shown in table II. (See ref. 6 for additional details.) The airplane was vectored into position to intercept the glide slope at an altitude of 457 or 914 m (1500 or 3000 ft) depending on the profile employed. From this point on the pilot flew the airplane by using flight director guidance. The guidance signals were obtained from simulated ILS beam patterns derived in the radar tracking computer. The approach speeds were normally the same for the three profiles; however, both power and speed varied during the actual flights, due to the discretion of the pilot in attempting to fly the profile.

Ten or eleven runs were made of each of the three landing approach profiles. Radar lock-on was obtained during the approach at a distance of approximately 13 716 m (45 000 ft) from runway threshold and was maintained until touchdown. Radar tracking data from noise measuring station 4 to touchdown are shown in figure 5 for all the test flights. Plots such as these were used to obtain airplane altitude, lateral displacement, and slant range as the airplane passed each noise measuring station. These data are included in table V. Information regarding airplane operating conditions such as speed, power, and flap schedule were not obtained for the landing approach operations.

Atmospheric conditions.- On the days of the tests observations of surface wind velocities and directions at 0900, 1200, and 1500 hours local time were made at the control tower which is located close to the active runway. Conventional radiosonde data were also obtained in order to provide the upper air data on temperature, pressure, wind velocity and direction, and relative humidity as a function of altitude. These rawinsonde

data along with the tower surface wind information are included in table VI. Generally, low winds (not exceeding 10 knots) prevailed for the period of the tests.

Noise Measurements

Each noise measuring station was a self-sufficient mobile unit in that the instrumentation necessary for data acquisition was installed in a station wagon. Measurements were made in accordance with the methods of reference 11.

Data acquisition.- The microphones were the conventional piezoelectric ceramic type having a frequency response flat to within ±3 dB over the frequency range of 20 to 10 000 Hz. The microphones were located about 1.52 m (5 ft) above ground level, the longitudinal axis being parallel to the ground and generally perpendicular to the vertical projection of the flight path. Microphone windscreens were used at all times. The output of the microphone along with voice and timing signal was recorded on a multichannel direct-record tape recorder located at the particular station. The entire sound measurement system was calibrated in the field by means of conventional discrete-frequency calibrators at the beginning and end of each day of flight tests.

Data reduction and analysis.- The analog tape recordings made in the field were digitized for use in computing the overall noise level and the effective perceived noise level (EPNdB) required by reference 9. The details of the system used in obtaining these measures are given in reference 8 along with detailed descriptions of the objective measures used throughout the present paper.

RESULTS AND DISCUSSION

The noise-measurement results obtained during the tests are presented in figures 6 to 13 in the form of typical noise time histories, noise spectra, and summary noise-level plots as a function of distance for the climbout and landing approach operations. In addition, the detailed listing of various noise measurements obtained at each station for each flight operation is given in tables VII and VIII for the climbout and landing approach, respectively. Also in these tables are the altitudes, slant ranges, and duration d_{av} of the 10-dB-down point (see fig. 6).

Noise Time Histories

In figure 6 are presented typical time histories of sound pressure levels as measured at the various measuring locations during the flight tests. Climbout data are given in figure 6(a) for run 3 of profile 2, and landing approach data are given in figure 6(b) for run 8 of profile 1. These time histories were plotted from data obtained at a 1/2-second sampling rate of the airplane flyover for each noise measuring station. The zero on the

time scale corresponds to the time of the peak flyover noise level and thus does not necessarily correspond to the time at which the airplane is directly over the station.

In figure 6(a), it can be seen that, in general, the noise levels during the climbout increase as the airplane approaches the measuring station, reach a maximum as the airplane passes approximately over the station, and decrease as the airplane continues beyond the measuring station. As the airplane passes from station 1 to station 5 during the climbout, the altitude of the aircraft is increasing; therefore, the maximum noise levels decrease. However, the time-history curves become less peaked as altitude increases, and the durations d_{av} generally increase. (See also table VII.)

Similar results are shown in figure 6(b) for the landing approach operations. The noise levels increase and the durations decrease as the airplane altitude decreases. In addition, the durations of the noise time histories at the 10-dB-down point vary from approximately 5 seconds to 25 seconds. (See table VIII.)

Noise Spectra

In figure 7 are presented the noise spectra taken at the time of occurrence of the Max. dB(C) in the noise time histories of figure 6. Plotted in figure 7 are the 1/3-octave band levels as a function of band center frequency.

Shown in figure 7(a) are the noise spectra measured at the five microphone locations during climbout for run 3 of profile 2. The spectra generally are seen to contain considerably more energy in the low-frequency range (100 to 500 Hz) which can be attributed to the predominance of jet exhaust noise during the climbout operations.

Similar noise-spectra results are shown in figure 7(b) for the measurements made at the four microphone locations during the landing approach operation of run 8 of profile 1. Although the spectra contain considerable energy in the low-frequency range, there is also present some high-frequency (above 2000 Hz) noise energy which is associated with the blade passage frequencies of the engine-fan and compressor rotating stages.

Average Noise Levels as a Function of Distance

Shown in figures 8 to 13 are the noise levels as a function of distance along the runway center line extended during the climbout and landing approach operations.

Climbout.- In figure 8 are presented the maximum sound pressure levels (Max. dB(C)) measured at each station along the ground track for the seven climbout profiles investigated. The circles represent average Max. dB(C) values of all runs of a given profile for a given measuring station, and the vertical bars represent the range of noise levels measured. Also shown in the figure are the average slant ranges (SR_{av}) of

the airplane for each measuring station. (See table III.) The dash portion of each curve represents the range within which power reductions were made.

The data shown in figures 8(a) and 8(b) are for profiles 1 and 2, which involve maximum continuous power during the climbout procedure. Although initiation of maximum continuous power is scheduled to occur at different points along the profile, at an altitude of 305 m (1000 ft) for profile 1 and at an altitude of 457 m (1500 ft) for profile 2 (table I), the noise levels measured at each station are approximately the same for the two profiles (table VII).

The data plotted in figures 8(c) to 8(g) are for the five profiles involving a climb rate of 152 m/min (500 ft/min) during the climbout procedure. Although the power settings are similar during the first and second segments of climb, profile 3 involves a lower speed and a fixed flap angle. The resulting lower speeds and altitudes over stations 3, 4, and 5 resulted generally in higher noise levels than for the other 152-m/min (500-ft/min) profiles involving flap retraction schedules.

It is significant to note that, in general, little scatter exists in the measured noise levels from run to run for any given profile over a given station, as indicated by the vertical bars through the data points in figure 8. The largest scatter bands shown in figure 8 are usually associated with the measurements obtained at stations 1 and 2, and the degree of scatter is attributed to the variation in the time at which airplane power reductions were initiated.

The average values of the maximum perceived noise levels (Max. PNdB) and effective perceived noise levels (EPNL(FAA)) corresponding to the test conditions of figure 8 have been determined and plotted in figure 9. In general, the perceived noise levels are about 2 to 5 dB higher than the corresponding measured values of sound pressure levels. (See table VII.) The EPNL(FAA) values are seen to be generally higher than the Max. PNdB values, especially at measuring stations over which the airplane is at the higher altitudes. This increase in the EPNL(FAA) values results mainly from the duration correction. Because of the reference duration time of 10 seconds, both positive and negative noise-level corrections are obtained. Aside from the aforementioned differences in absolute decibel values, the same general conclusions can be drawn from the perceived and effective perceived noise levels of figure 9 as were drawn from the overall sound pressure levels of figure 8.

A summary of the range of average values of noise levels measured along the ground track of the airplane for the various power reduction procedures associated with the seven climbout profiles is given in figure 10. Sound pressure levels (Max. dB(C)) and effective perceived noise level (EPNL(FAA)) are presented in figures 10(a) and 10(b), respectively. The hatched area is an indication of the noise reduction attained by means

of second-segment power reduction. The upper bounds of the hatching are associated with the continuous power settings of profiles 1 and 2 and the lower bounds of the hatching are associated with the power required for 152-m/min (500-ft/min) climb rate used in profiles 3 to 7. The range of noise levels measured at station 1 are generally associated with take-off engine power settings. Following the power reductions, which usually occurred between stations 1 and 2, noise reductions of from 6 to 14 dB were realized between the two basic profiles.

Landing approach.- In figure 11 are presented the maximum sound pressure levels (Max. dB(C)) measured at the various stations located along the ground track for the three landing approach procedures investigated. The circles represent average Max. dB(C) values of all runs of a given profile for a given measuring station and the vertical bars represent the range of noise levels measured. Also shown in the figure are the average slant ranges (SR_{av}) of the airplane when passing the measuring stations. (See table V.)

Examination of the results in figure 11 indicates that the noise levels increase as the altitude decreases in the approach. In addition, with the exception of station 1, noise levels associated with the 6^{o} single-segment (profile 2) and the 6^{o} to 3^{o} two-segment (profile 3) approaches are about 2 to 10 dB lower than those associated with the 3^{o} single-segment (profile 1) approach path. The lowest noise levels were associated with profile 2, followed by profiles 1 and 3. Lower noise levels during the steeper approaches were expected since both higher altitudes and lower powers are involved. Of these two factors the increased altitude, in general, accounted for the major portion of the noise reduction. As was previously mentioned, the two steep approach profiles were flown by utilizing higher engine power settings than were required, and therefore, the full benefits of lower noise levels which would accrue were not realized. The larger scatter in the landing noise data of figure 11 (as compared with the climbout noise data of fig. 8) is a result of the variation in power settings used during the landing approach operations. The noise levels measured at station 1 are primarily a function of the engine power setting used during the flare to touchdown.

The average values of the maximum perceived noise levels (Max. PNdB) and the effective perceived noise levels (EPNL(FAA)) corresponding to the results given in figure 11 are plotted in figure 12. It may be noted, in general, that the Max. PNdB and EPNL(FAA) levels are about 5 to 10 dB higher than the corresponding measured Max. dB(C) values in figure 11 and table VIII and the curves are shaped somewhat differently from those in figure 11.

A summary of the range of average values of noise levels measured along the ground track of the airplane for the three landing approach procedures studied are given in figure 13. Sound pressure levels (Max. dB(C)) and effective perceived noise levels

(EPNL(FAA)) are presented in figures 13(a) and 13(b), respectively. The hatched area is an indication of the noise reductions attained through increased glide-slope angles during landing approach, and these noise reductions are noted to be on the order of 4 to 9 dB. The upper bounds are generally associated with the 3° single-segment approach of profile 1 whereas the lower bound is generally associated with the 6° single-segment approach of profile 2. The 6° to 3° two-segment approach of profile 3 falls between these two boundaries.

CONCLUDING REMARKS

Noise measurements have been made for a three-engine turbofan transport airplane during climbout and landing approach operations in which the airplane operating procedures were carefully controlled. These controlled procedures included an orderly scheduling of operating variables such as engine power, speed, altitude, and flap settings. The results of these studies are presented for seven climbout operations involving various climb speeds, flap settings, and engine power settings and for three landing approach operations involving various glide-slope angles. The noise data were correlated with airplane operating procedures and position.

In general, the results from the climbout studies indicated that lower noise levels (6 dB to 14 dB) were associated with profiles employing lower engine powers during second-segment climb. Also, for a given climb profile and climb rate, slightly higher noise levels are associated with operations employing fixed flaps than with a specified flap retraction schedule.

The results from the landing approach studies indicated that generally lower noise levels were associated with the steeper glide slopes. For these steeper glide slopes the noise reduction attained (4 dB to 9 dB) resulted from both the increased altitude and the lower engine powers.

Langley Research Center,
National Aeronautics and Space Administration,
Hampton, Va., March 15, 1971.

REFERENCES

1. Copeland, W. Latham; Hilton, David A.; Huckel, Vera; Dibble, Andrew C., Jr.; and Maglieri, Domenic J.: Noise Measurement Evaluations of Various Take-Off—Climbout Profiles of a Four-Engine Turbojet Transport Airplane. NASA TN D-3715, 1966.

2. Copeland, W. Latham: Two Methods of Evaluating Climbout Noise. Progress of NASA Research Relating to Noise Alleviation of Large Subsonic Jet Aircraft, NASA SP-189, 1968, pp. 369-376.

3. Erzberger, Heinz; Lee, Homer Q.; Peery, H. Rodney; and Drinkwater, Fred J., III: Technique for Calculating Optimum Noise-Abatement Take-Off Profiles. Progress of NASA Research Relating to Noise Alleviation of Large Subsonic Jet Aircraft, NASA SP-189, 1968, pp. 395-410.

4. Zalovcik, John A.; and Schaefer, William T., Jr.: NASA Research on Noise-Abatement Approach Profiles for Multiengine Jet Transport Aircraft. NASA TN D-4044, 1967.

5. Zalovcik, John A.: Effect of Thrust and Altitude in Steep Approaches on Ground Track Noise. NASA TN D-4241, 1967.

6. Sawyer, Richard H.; and Schaefer, William T., Jr.: Operational Limitations in Flying Noise-Abatement Approaches. NASA TN D-5497, 1969.

7. Quigley, Hervey C.; Snyder, C. Thomas; Fry, Emmett B.; Power, Leo J.; Innis, Robert C.; and Copeland, W. Latham: Flight and Simulation Investigation of Methods for Implementing Noise-Abatement Landing Approaches. NASA TN D-5781, 1970.

8. Hecker, Michael H. L.; and Kryter, Karl D.: Comparisons Between Subjective Ratings of Aircraft Noise and Various Objective Measures. Tech. Rep. NO-68-33, FAA, Apr. 1968.

9. Anon.: Noise Standards: Aircraft Type Certification. Federal Register, vol. 34, no. 221, Nov. 18, 1969, pp. 18364-18379.

10. Sperry, William C.: Aircraft Noise Evaluation. Rep. No. FAA-NO-68-34, FAA, Sept. 1968. (Available from DDC as AD 676 230.)

11. Anon.: Measurements of Aircraft Exterior Noise in the Field. ARP 796, Soc. Automot. Eng., Inc., June 15, 1965.

TABLE I.- CLIMBOUT PROFILES AND AIRPLANE OPERATING PROCEDURES

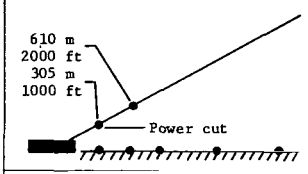
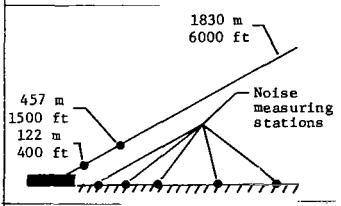
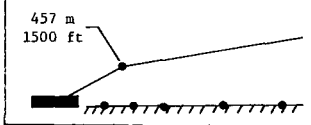
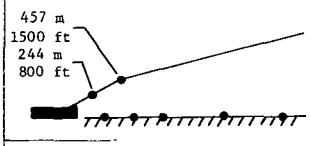
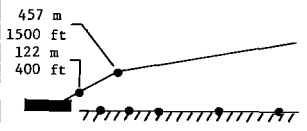
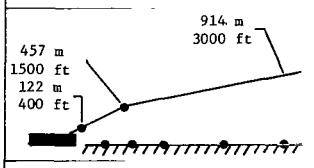
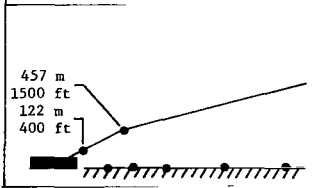
Schematic	Profile	Description of procedure
	1	Take-off power at V_2 + 10 knots with 15° flaps; at 305-m (1000-ft) altitude reduce power from take-off power to maximum continuous power, holding V_2 + 10 knots and 15° flaps; at 610-m (2000-ft) altitude retract flaps and accelerate as per schedule. (Deck angle limitation, 15°.)
	2	Take-off power at V_2 + 10 knots with 15° flaps; at 122-m (400-ft) altitude begin reducing to 0° flaps as per schedule and accelerate to 210 knots; at 457-m (1500-ft) altitude reduce to maximum continuous power and accelerate to 220 knots; at 183-m (6000-ft) altitude continue smooth acceleration to 250 knots and maintain stabilized power.
	3	Take-off power at V_2 + 10 knots with 15° flaps; at 457-m (1500-ft) altitude reduce power to that required for 152-m/min (500-ft/min) climb rate with 15° flaps and speed attained at end of segment 1; maintain this speed and configuration. (Deck angle limitation, 15°.)
	4	Take-off power at V_2 + 10 knots with 15° flaps; at 244-m (800-ft) altitude begin retracting flaps as per schedule; at 457-m (1500-ft) altitude reduce power to that required for 152-m/min (500-ft/min) climb rate with 2° flaps and maintain.
	5	Take-off power at V_2 + 10 or 20 knots with 15° flaps; at 122-m (400-ft) altitude retract flaps to 5° and add 10 knots to climb speed; at 457-m (1500-ft) altitude reduce power from take-off power to power required for 152-m/min (500-ft/min) climb rate, holding V_2 + 10 or 20 knots and 5° flaps; maintain these conditions until 914-m (3000-ft) altitude is reached, then proceed SOP climb not to exceed 210 KIAS. (Deck angle limitation, 15°.)
	6	Take-off power at V_2 + 10 or 20 knots with 15° flaps; at 122-m (400-ft) altitude retract flaps to 5° and then to 2° prior to reaching 457-m (1500-ft) altitude; at this altitude reduce power from take-off power to power required for 152-m/min (500-ft/min) climb rate, holding airspeed and 2° flaps; upon reaching 914-m (3000-ft) altitude proceed SOP not to exceed 210 KIAS. (Deck angle limitation, 15°.)
	7	Take-off power at V_2 + 10 knots with 15° flaps; at 122-m (400-ft) altitude begin retracting flaps as per schedule and accelerate to 210 knots; flaps are to be at 0° prior to reaching 457-m (1500-ft) altitude; at this altitude reduce power to that required to maintain 1.5 positive gradient with one engine inoperative (approximately 91-m/min (300-ft/min) climb rate at 210 knots with one engine inoperative); maintain at 210 knots.

TABLE II.- LANDING APPROACH PROFILES AND AIRPLANE OPERATING PROCEDURES

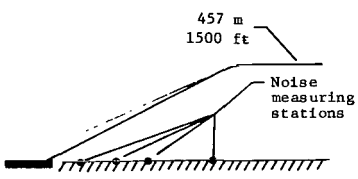
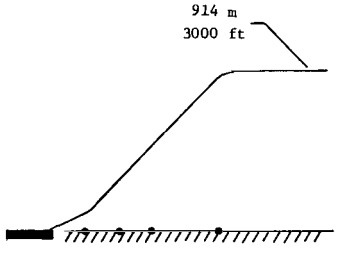
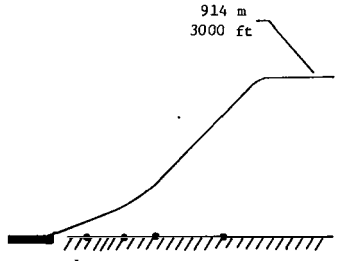
Schematic	Profile	Glide-slope angle	Description of procedure
	1	3° single segment	Approach the noise measuring area at level flight of 457-m (1500-ft) altitude until 3° glide slope is intercepted; maintain airplane along 3° glide path to 38-m (125-ft) altitude; at this altitude and 1326 m (4350 ft) from runway threshold commence to flare at 7-sec/deg flare rate and proceed to touchdown.
	2	6° single segment	Approach the noise measuring area at level flight of 914-m (3000-ft) altitude until 6° glide slope is intercepted; maintain airplane along 6° glide path to 159-m (520-ft) altitude; at this altitude and 2835 m (9300 ft) from runway threshold commence to flare at 7-sec/deg flare rate and proceed to touchdown.
	3	6° to 3° two segment	Approach the noise measuring area at level flight of 914-m (3000-ft) altitude until 6° glide slope is intercepted; maintain airplane along 6° glide path to 352-m (1153-ft) altitude; at this altitude and 6236 m (20 460 ft) from runway threshold commence transition into 3° glide slope at a transition rate of 7 sec/deg; at 232-m (760-ft) altitude and 4724 m (15 500 ft) from runway threshold complete transition into 3° glide slope; proceed along 3° glide path to touchdown.

TABLE III.- MEASURED POSITION DATA FOR CLIMBOUT OPERATIONS

Profile	Run	Station 1						Station 2						Station 3						Station 4						Station 5					
		Altitude		Lateral displacement		Slant range		Altitude		Lateral displacement		Slant range		Altitude		Lateral displacement		Slant range		Altitude		Lateral displacement		Slant range		Altitude		Lateral displacement		Slant range	
		m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft
1	1	305	1000	31	100	306	1005	488	1600	61	200	492	1612	671	2200	134	440	685	2243	1012	3320	128	420	1021	3346	1310	4300	134	440	1318	4322
	2	342	1120	24	80	343	1123	519	1700	0	0	519	1700	700	2280	43	140	700	2284	1170	3840	73	240	1173	3847	1680	5500	189	620	1687	5535
	3	318	1040	12	40	318	1041	488	1600	55	180	491	1610	708	2320	98	320	720	2342	1281	4200	214	700	1300	4258	1792	5880	153	500	1800	5901
	4	318	1040	6	20	318	1040	519	1700	24	80	520	1702	671	2200	24	80	671	2201	1243	4080	274	900	1274	4178	1792	5880	189	620	1803	5912
2	1	275	900	11	35	275	901	452	1480	12	40	452	1480	616	2020	53	175	620	2028	1182	3880	55	180	1186	3884	1830	6000	---	---	1830	6000
	2	281	920	6	20	281	920	476	1560	0	0	476	1560	700	2280	6	20	700	2280	1220	4000	3	10	1220	4000	1800	5900	---	---	1800	5900
	3	275	900	6	20	275	900	452	1480	18	60	452	1481	647	2120	18	60	647	2120	1196	3920	24	80	1196	3920	1770	5800	---	---	1770	5800
	4	281	920	12	40	281	921	488	1600	12	40	488	1601	732	2400	21	70	732	2400	1306	4280	9	30	1306	4280	1921	6300	---	---	1921	6300
3	1	330	1080	9	30	330	1080	574	1880	12	40	574	1880	598	1960	17	55	599	1961	684	2240	12	40	684	2240	794	2600	---	---	794	2600
	2	342	1120	3	10	342	1120	574	1880	15	50	574	1880	601	1970	14	45	601	1970	708	2320	12	40	708	2320	794	2600	---	---	794	2600
	3	366	1200	3	10	366	1200	537	1760	12	40	537	1760	580	1900	0	0	580	1900	687	2250	24	80	687	2250	794	2600	---	---	794	2600
4	1	342	1120	40	130	344	1128	574	1880	76	250	575	1888	653	2140	105	345	662	2168	763	2500	---	---	763	2500	854	2800	---	---	854	2800
	2	314	1030	18	60	315	1032	488	1600	9	30	488	1600	598	1960	24	80	599	1963	733	2400	12	40	733	2400	885	2900	---	---	885	2900
	3	375	1230	3	10	375	1230	555	1820	11	35	555	1820	708	2320	31	100	715	2342	866	2840	18	60	866	2840	1037	3400	---	---	1037	3400
	4	384	1260	3	10	384	1260	576	1890	31	100	578	1893	720	2360	18	60	720	2360	879	2880	15	50	879	2880	1069	3500	---	---	1069	3500
5	1	351	1150	122	400	371	1217	543	1780	37	120	545	1784	684	2240	214	700	716	2347	800	2620	195	640	823	2697	915	3000	31	100	915	3001
	2	351	1150	31	100	352	1154	567	1860	6	20	567	1860	659	2160	6	20	659	2160	787	2580	37	120	789	2583	787	2850	76	250	874	2861
	3	305	1000	52	170	310	1014	488	1600	24	80	488	1601	659	2160	6	20	659	2160	756	2480	27	90	757	2481	854	2800	73	240	857	2810
	4	305	1000	24	80	306	1003	506	1660	43	140	508	1665	605	1980	46	150	605	1985	714	2340	18	60	714	2340	794	2600	73	240	796	2611
	5	244	800	15	50	244	801	415	1360	24	80	416	1362	562	1840	113	370	573	1877	659	2160	46	150	652	2165	763	2500	49	160	764	2505
	6	336	1100	52	170	340	1113	549	1800	34	110	550	1803	714	2340	0	0	714	2340	854	2800	192	630	875	2870	915	3000	55	180	915	3005
6	1	336	1100	104	340	351	1151	519	1700	61	200	523	1712	684	2240	92	300	689	2260	720	2360	92	300	725	2379	885	2900	195	640	905	2970
	2	326	1070	40	130	314	1028	476	1560	27	90	477	1562	641	2100	85	280	646	2118	763	2500	116	380	771	2526	903	2960	61	200	905	2967
	3	305	1000	61	200	311	1020	488	1600	12	40	488	1600	703	2300	43	140	704	2304	870	2850	12	40	870	2850	940	3080	110	360	946	3101
7	1	296	970	5	15	296	970	488	1600	12	40	488	1600	684	2240	9	30	744	2440	800	2620	11	35	800	2620	1037	3400	---	---	1037	3400
	2	---	----	5	15	---	----	476	1560	12	40	476	1560	665	2180	24	80	666	2181	840	2750	0	0	840	2750	1037	3400	---	---	1037	3400
	3	293	960	6	20	293	960	476	1560	24	80	476	1562	607	1990	3	10	607	1990	805	2640	122	400	805	2640	1007	3300	---	---	1007	3300
	4	305	1000	5	15	305	1000	500	1640	31	100	502	1643	671	2200	0	0	671	2200	897	2940	31	100	897	2941	1099	3600	---	---	1099	3600

TABLE IV.- OPERATING CONDITIONS DURING CLIMBOUT PROFILES

Profile	Run	Airplane gross weight (a)		Flight deck readouts												
				Photo	Indicated airspeed, knots	Altitude		Climb rate		Flap angle, deg	Compressor N_1, % span, for engine			Engine pressure ratio for engine		
		kg	lbm			m	ft	m/min	ft/min		1	2	3	1	2	3
1	1	61 300	135 000	1	175	305	1 000	610	2000	5	93	93	93	1.95	1.95	1.95
				2	190	769	2 520	641	2100	2	88	88	88	1.80	1.81	1.82
				3	195	890	2 920	641	2100	2	88	88	88	1.80	1.82	1.83
				4	210	1042	3 420	610	2000	0	88	88	88	1.82	1.82	1.83
				5	220	1296	4 250	915	3000	0	89	89	88	1.82	1.82	1.83
				6	166	2827	9 270	1220	4000	0	89	89	89	1.89	1.88	1.88
	2	60 400	133 000	1	190	238	779	641	2100	5	94	94	93	1.96	1.95	1.96
				2	200	616	2 020	641	2100	2	90	90	90	1.87	1.88	1.85
				3	205	763	2 500	769	2520	2	90	90	90	1.87	1.88	1.87
				4	205	1037	3 400	1094	3590	0	89	89	89	1.89	1.90	1.90
				5	205	1608	5 270	1007	3300	0	90	90	89	1.89	1.89	1.88
				6	205	3050	10 000	610	2000	0	88	88	89	1.81	1.83	1.80
	3	59 400	131 000	1	183	262	860	641	2100	5	95	96	95	1.99	2.00	2.10
				2	210	604	1 980	793	2600	0	90	90	90	1.86	1.87	1.88
				3	215	851	2 790	1068	3500	0	90	90	90	1.87	1.87	1.87
				4	200	3220	10 540	702	2300	0	86	85	85	1.75	1.74	1.73
	4	58 500	129 000	1	182	241	790	641	2100	5	94	95	94	1.95	1.98	1.98
				2	220	735	2 410	793	2600	0	90	90	90	1.83	1.84	1.85
				3	210	1500	4 920	1129	3700	0	90	90	90	1.88	1.90	1.90
				4	210	2070	6 790	1068	3500	0	90	90	90	1.89	1.91	1.91
				5	215	3420	11 210	915	3000	0	92	92	91	1.95	1.99	1.98
2	1	64 000	141 000	1	---	226	740	534	1750	5	92	92	92	1.96	1.96	1.94
				2	---	348	1 140	503	1650	2	92	92	92	1.96	1.96	1.96
				3	---	513	1 680	412	1350	0	88	88	88	1.84	1.84	1.84
				4	---	852	2 790	----	----	0	90	90	90	1.90	1.90	1.90
				5	---	1403	4 600	----	----	0	90	90	90	1.90	1.90	1.92
	2	63 000	138 700	1	---	226	740	473	1550	5	92	92	92	1.96	1.96	1.96
				2	---	415	1 360	595	1950	2	92	92	92	1.94	1.94	1.94
				3	---	610	2 000	740	2425	0	90	90	90	1.88	1.88	1.88
				4	---	900	2 950	889	2900	0	90	90	90	1.88	1.88	1.88
				5	---	1331	4 360	808	2650	0	90	90	90	1.90	1.88	1.90
	3	62 100	137 000	1	160	104	340	473	1550	15	92	92	92	1.96	1.94	1.94
				2	---	271	890	473	1550	3	92	92	92	1.96	1.96	1.94
				3	---	494	1 620	503	1650	0	92	92	92	1.92	1.92	1.92
				4	---	799	2 620	----	----	0	90	90	90	1.86	1.88	1.84
				5	---	1129	3 700	----	----	0	90	90	90	1.88	1.90	1.88
	4	61 300	135 000	1	---	116	380	503	1650	15	92	92	92	1.96	1.96	1.94
				2	---	299	980	534	1750	2	90	90	90	1.96	1.96	1.94
				3	---	562	1 840	702	2300	0	90	90	90	1.90	1.88	1.90
				4	---	909	2 980	----	----	0	90	90	90	1.90	1.88	1.90
				5	---	1400	4 590	----	----	0	90	90	90	1.90	1.88	1.90
3	1	64 400	141 800	1	158	107	350	457	1500	15	92	92	92	1.94	1.94	1.94
				2	170	339	1 080	687	2250	15	92	92	92	1.94	1.94	1.94
				3	165	628	2 060	214	700	15	76	76	76	1.44	1.44	1.44
				4	174	623	2 040	61	200	15	76	76	76	1.44	1.44	1.44
				5	170	671	2 200	130	425	15	76	76	76	1.44	1.44	1.44

[a]Estimated on average fuel consumption.

TABLE IV.- OPERATING CONDITIONS DURING CLIMBOUT PROFILES – Continued

Profile	Run	Airplane gross weight (a)		Flight deck readouts													
				Photo	Indicated airspeed, knots	Altitude		Climb rate		Flap angle, deg	Compressor N_1, % span, for engine			Engine pressure ratio for engine		
		kg	lbm			m	ft	m/min	ft/min		1	2	3	1	2	3
3	2	63 700	140 300	1	156	146	480	503	1650	15	92	92	92	1.96	1.96	1.94
				2	170	339	1080	687	2250	15	92	92	92	1.96	1.96	1.94
				3	175	567	1860	92	300	15	76	76	76	1.44	1.44	1.44
				4	170	641	2100	168	550	15	76	76	76	1.44	1.44	1.44
				5	170	687	2250	130	425	15	76	76	76	1.44	1.44	1.44
	3	62 700	138 200	1	161	177	580	534	1750	15	92	92	92	1.96	1.96	1.96
				2	169	391	1280	740	2425	15	92	92	92	1.96	1.98	1.94
				3	167	555	1820	61	200	15	76	76	76	1.44	1.44	1.44
				4	168	641	2100	153	500	15	76	76	76	1.44	1.42	1.44
				5	168	698	2290	130	425	15	76	76	76	1.44	1.43	1.44
4	1	64 500	142 000	1	169	226	740	534	1750	15	90	90	90	1.94	1.94	1.94
				2	185	452	1480	503	1650	5	92	92	92	1.96	1.96	1.96
				3	181	----	----	168	550	2	75	75	75	1.44	1.44	1.44
				4	184	726	2380	130	425	2	75	75	75	1.42	1.42	1.42
				5	191	----	----	168	550	2	75	75	75	1.44	1.44	1.44
	2	62 800	138 500	1	164	146	480	580	1900	15	92	92	92	1.94	1.92	1.96
				2	173	342	1120	656	2150	7	90	90	90	1.96	1.94	1.96
				3	188	565	1850	313	1025	2	74	74	74	1.44	1.40	1.40
				4	189	726	2380	130	425	2	74	74	74	1.43	1.43	1.43
				5	191	787	2580	168	550	2	76	74	74	1.42	1.40	1.40
	3	62 100	137 000	1	167	226	740	702	2300	15	92	92	92	1.98	1.96	1.96
				2	172	372	1220	618	2025	4	92	92	92	1.98	1.96	1.96
				3	194	659	2160	534	1750	2	76	76	76	1.44	1.44	1.44
				4	188	763	2500	458	1500	2	76	76	76	1.48	1.46	1.46
				5	185	818	2680	214	700	2	76	76	76	1.44	1.44	1.45
	4	61 400	135 200	1	175	208	680	641	2100	15	92	92	92	1.96	1.98	1.98
				2	190	274	900	687	2250	5	92	92	92	1.98	1.98	1.98
				3	190	680	2230	641	2100	2	76	76	76	1.44	1.44	1.44
				4	190	732	2400	503	1650	2	76	76	76	1.46	1.46	1.46
				5	190	836	2740	247	810	2	76	76	76	1.45	1.45	1.45
5	1	60 800	134 000	1	---	----	----	---	----	---	---	---	---	---	---	---
				2	170	678	2060	---	----	5	76	75	74	1.45	1.42	1.42
				3	170	732	2400	---	----	5	76	75	74	1.43	1.43	1.43
				4	173	885	2900	274	900	5	76	75	74	1.45	1.44	1.43
				5	168	958	3140	168	550	5	76	75	74	1.45	1.44	1.44
	2	59 900	132 000	1	170	259	850	610	2000	5	94	94	94	1.94	1.94	1.94
				2	170	580	1900	549	1800	5	75	74	74	1.42	1.42	1.42
				3	162	677	2220	122	400	5	75	74	74	1.41	1.40	1.41
				4	170	882	2890	168	550	5	75	74	74	1.41	1.40	1.41
				5	165	927	3040	274	900	5	75	74	74	1.41	1.41	1.42
				6	167	1043	3420	153	500	5	75	74	74	1.42	1.41	1.43
	3	59 000	130 000	1	180	287	940	---	----	5	92	92	92	1.94	1.94	1.94
				2	---	----	----	---	----	---	---	---	---	---	---	---
				3	173	702	2300	---	----	5	74	73	73	1.40	1.39	1.40
				4	170	796	2610	122	400	5	74	73	74	1.40	1.40	1.40
				5	169	888	2910	153	500	5	74	73	73	1.40	1.40	1.40
				6	168	970	3180	153	500	5	74	73	73	1.40	1.40	1.40
	4	61 300	135 000	1	170	384	930	610	2000	5	93	93	93	1.94	1.94	1.94
				2	170	580	1900	397	1300	5	74	73	74	1.39	1.39	1.40
				3	177	625	2050	183	600	5	73	73	74	1.39	1.39	1.40
				4	179	708	2320	305	1000	5	74	73	74	1.39	1.39	1.40
				5	175	815	2670	214	700	5	74	73	73	1.39	1.39	1.40
				6	168	903	2960	198	650	5	74	73	73	1.39	1.39	1.40

[a]Estimated on average fuel consumption.

TABLE IV.- OPERATING CONDITIONS DURING CLIMBOUT PROFILES – Concluded

Profile	Run	Airplane gross weight (a)		Photo	Flight deck readouts												
					Indicated airspeed, knots	Altitude		Climb rate		Flap angle, deg	Compressor N_1, % span, for engine			Engine pressure ratio for engine			
		kg	lbm			m	ft	m/min	ft/min		1	2	3	1	2	3	
5	5	60 400	133 000	1	180	207	680	458	1500	5	92	93	92	1.94	1.95	1.95	
				2	190	531	1740	427	1400	5	75	74	74	1.40	1.40	1.40	
				3	180	760	2490	305	1000	5	74	74	74	1.40	1.40	1.40	
				4	170	909	2980	336	1100	5	75	74	74	1.40	1.40	1.40	
	6	59 700	131 600	1	170	235	770	549	1800	5	94	94	94	1.95	1.95	1.95	
				2	170	616	2020	549	1800	5	73	72	72	1.38	1.38	1.40	
				3	169	708	2320	137	450	5	74	73	73	1.39	1.38	1.39	
				4	160	833	2730	168	550	5	74	73	73	1.40	1.39	1.40	
				5	160	922	3020	153	500	5	74	73	73	1.40	1.39	1.40	
6	1	61 300	135 000	1	165	280	950	610	2000	5	92	93	93	1.94	1.95	1.96	
				2	180	470	1540	610	2000	5	92	93	93	1.94	1.95	1.96	
				3	179	671	2200	153	500	2	75	75	74	1.40	1.39	1.40	
				4	185	735	2410	305	1000	2	75	74	74	1.40	1.39	1.40	
				5	185	888	2910	168	550	2	75	73	73	1.41	1.39	1.40	
	2	60 500	133 200	1	172	226	740	549	1800	5	94	94	93	1.95	1.94	1.95	
				2	180	637	2090	519	1700	2	75	74	74	1.40	1.40	1.40	
				3	180	735	2410	214	700	2	75	74	74	1.40	1.40	1.40	
				4	185	900	2950	244	800	2	75	74	74	1.41	1.40	1.40	
				5	215	992	3250	244	800	0	75	75	74	1.40	1.40	1.40	
	3	59 700	131 600	1	175	241	790	519	1700	5	93	93	93	1.95	1.95	1.96	
				2	190	473	1550	702	2300	2	89	88	88	1.78	1.78	1.80	
				3	175	703	2300	519	1700	2	75	74	74	1.40	1.40	1.40	
				4	175	796	2610	305	1000	2	75	74	74	1.40	1.40	1.40	
				5	182	878	2880	122	400	2	75	74	74	1.40	1.40	1.40	
				6	210	1031	3380	274	900	0	55	54	55	1.10	1.09	1.10	
7	1	64 300	141 600	1	210	174	570	534	1750	0	92	92	92	1.92	1.92	1.92	
				2	210	287	940	618	2025	0	76	76	76	1.42	1.42	1.42	
				3	210	763	2500	247	810	0	76	76	76	1.44	1.42	1.42	
				4	210	817	2680	168	550	0	76	76	76	1.44	1.42	1.42	
				5	210	964	3160	336	1100	0	76	76	76	1.44	1.44	1.44	
	2	63 300	139 500	1	170	----	----	503	1650	---	92	92	92	1.96	1.94	1.96	
				2	180	274	900	519	1700	2	90	90	90	1.96	1.94	1.96	
				3	210	732	2400	274	900	0	76	76	76	1.44	1.44	1.44	
				4	210	854	2800	290	950	0	76	76	76	1.44	1.44	1.44	
				5	210	----	3160	336	1100	0	76	76	76	1.44	1.44	1.44	
	3	62 500	137 600	1	165	177	580	702	2300	5	92	90	92	1.94	1.96	1.96	
				2	179	274	900	473	1550	2	92	92	92	1.96	1.96	1.96	
				3	199	439	1440	618	2025	0	90	90	90	1.94	1.96	1.94	
				4	211	714	2340	397	1300	0	76	76	76	1.44	1.44	1.44	
				5	213	794	2600	274	900	0	76	76	76	1.44	1.44	1.44	
	4	61 900	136 300	1	161	159	520	580	1900	5	92	92	92	1.96	1.96	1.96	
				2	181	311	1020	534	1750	2	92	92	92	1.96	1.96	1.96	
				3	203	464	1520	687	2250	0	90	90	90	1.96	1.96	1.94	
				4	210	763	2500	336	1100	0	76	76	76	1.46	1.44	1.44	
				5	209	909	2980	336	1100	0	76	76	76	1.44	1.44	1.44	

[a]Estimated on average fuel consumption.

TABLE V.- MEASURED POSITION DATA FOR LANDING APPROACH OPERATIONS

Profile	Glide slope angle	Run	Station 1						Station 2						Station 3						Station 4					
			Altitude		Lateral displacement		Slant range		Altitude		Lateral displacement		Slant range		Altitude		Lateral displacement		Slant range		Altitude		Lateral displacement		Slant range	
			m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft
1	3^{o} single segment	1	88	290	6	20	88	290	168	550	6	20	168	550	241	790	6	20	241	790	400	1310	31	100	401	1315
		2	70	230	0	0	70	230	137	450	24	80	139	455	183	600	40	130	188	615	323	1060	24	80	325	1065
		3	82	270	18	60	84	275	165	540	27	90	166	545	241	790	37	120	244	800	397	1300	55	180	400	1310
		4	85	280	6	20	85	280	171	560	34	110	174	570	244	800	15	50	244	800	424	1390	98	320	435	1425
		5	92	300	3	10	92	300	171	560	6	20	171	560	244	800	0	0	244	800	415	1360	49	160	418	1370
		6	88	290	6	20	88	290	168	550	27	90	171	560	235	770	9	30	235	770	424	1390	0	0	424	1390
		7	88	290	3	10	88	290	174	570	15	50	174	570	244	880	12	40	244	800	418	1370	6	20	418	1370
		8	92	300	18	60	93	305	171	560	27	90	172	565	238	780	24	80	239	785	424	1390	12	40	424	1390
		9	92	300	6	20	92	300	168	550	12	40	168	550	238	780	0	0	238	780	421	1380	43	140	423	1385
		10	82	270	23	75	84	275	165	540	6	20	165	540	238	780	18	60	238	780	421	1380	52	170	424	1390
		11	88	290	12	40	88	290	165	540	15	50	165	540	241	790	15	50	241	790	415	1360	0	0	415	1360
2	6^{o} single segment	1	107	350	0	0	107	350	284	930	0	0	284	930	436	1430	6	20	436	1430	854	2800	61	200	856	2805
		2	104	340	6	20	104	340	271	890	6	20	271	890	445	1460	6	20	445	1460	851	2790	12	40	851	2790
		3	101	330	0	0	101	330	277	910	6	20	277	910	443	1450	24	80	443	1450	854	2800	18	60	854	2800
		4	104	340	15	50	105	345	287	940	6	20	287	940	448	1470	0	0	448	1470	870	2820	6	20	870	2820
		5	101	330	9	30	101	330	277	910	3	10	277	910	448	1470	11	37	448	1470	848	2780	24	80	848	2780
		6	110	360	0	0	110	360	274	900	12	40	274	900	439	1440	12	40	439	1440	870	2820	31	100	870	2820
		7	110	360	0	0	110	360	277	910	0	0	277	910	451	1480	12	40	451	1480	854	2800	18	60	854	2800
		8	110	360	6	20	110	360	277	910	9	30	277	910	445	1460	27	90	445	1460	854	2800	15	50	854	2800
		9	104	340	15	50	105	345	274	900	6	20	274	900	436	1430	9	30	436	1430	854	2800	15	50	854	2800
		10	101	330	21	70	105	345	284	930	37	120	285	935	443	1450	46	150	444	1455	833	2730	9	30	833	2730
3	6^{o} to 3^{o} two segment	1	104	340	12	40	104	340	186	610	12	40	186	610	293	960	18	60	294	965	695	2280	18	60	695	2280
		2	104	340	12	40	104	340	177	580	6	20	177	580	305	1000	3	10	305	1000	634	2240	24	80	634	2240
		3	110	360	12	40	110	360	180	590	12	40	180	590	308	1010	0	0	308	1010	677	2220	9	30	677	2220
		4	116	380	12	40	116	380	183	600	21	70	185	605	305	1000	3	10	305	1000	674	2210	6	20	674	2210
		5	113	370	15	50	113	370	180	590	9	30	180	590	311	1020	0	0	311	1020	665	2180	6	20	665	2180
		6	92	300	21	70	95	310	168	550	9	30	168	550	274	900	34	110	277	910	732	2400	12	40	732	2400
		7	110	360	12	40	110	360	177	580	0	0	177	580	287	940	49	160	290	950	720	2360	3	10	720	2360
		8	110	360	0	0	110	360	180	590	9	30	180	590	324	1060	43	140	326	1070	616	2020	37	120	624	2025
		9	113	370	18	60	114	375	174	570	18	60	175	575	290	950	70	230	297	975	641	2100	55	180	642	2105
		10	116	380	27	90	117	385	189	620	18	60	191	625	296	970	52	170	300	985	625	2050	12	40	625	2050

TABLE VI.- SURFACE AND UPPER AIR ATMOSPHERIC CONDITIONS

Date of tests	Upper air data									Surface winds		
	Altitude		Atmospheric pressure		Temperature		Percent relative humidity	Wind velocity, knots	Wind direction,[a] deg	Time of day	Velocity, knots	Direction,[a] deg
	m	ft	N/m^2	lb/ft^2	^oK	^oF						
4-16-66	0	0	104 139	2175	282	48	52	8	110	0900	Calm	---
	305	1000	100 548	2100	282	49	3	8	100			
	610	2000	97 005	2025	280	45	36	5	060	1200	11	115
	915	3000	93 366	1950	277	40	44	5	020			
	1220	4000	89 775	1875	275	35	50	5	350	1500	8	115
	1525	5000	86 280	1802	272	30	58	9	340			
1-20-67	0	0	102 559	2141	273	32	92	10	240	0900	7	190
	305	1000	98 729	2062	275	35	61	25	200			
	610	2000	94 132	1966	279	43	57	32	180	1200	8	190
	915	3000	95 281	1990	277	39	50	38	225			
	1220	4000	89 057	1860	276	37	47	25	220	1500	5	190
	1525	5000	85 705	1790	278	41	41	25	220			
1-21-67	0	0	102 798	2147	271	29	96	12	235	0900	10	210
	305	1000	98 633	2060	272	31	69	39	219			
	610	2000	95 281	1990	277	40	34	43	220	1200	10	210
	915	3000	91 930	1920	277	39	27	40	220			
	1220	4000	88 339	1845	278	41	24	35	227	1500	10	210
	1525	5000	84 987	1775	277	40	25	33	231			
1-23-67	0	0	102 607	2143	277	40	95	8	200	0900	10	210
	305	1000	99 016	2068	287	58	64	20	225			
	610	2000	95 138	1987	286	55	61	18	239	1200	10	180
	915	3000	91 930	1920	284	51	58	14	240			
	1220	4000	88 578	1850	282	48	55	11	233	1500	10	180
	1525	5000	85 514	1786	280	44	67	12	233			

[a]Direction from which wind is blowing.

TABLE VII.- NOISE MEASUREMENTS DURING CLIMBOUT OPERATIONS

Profile	Run	Station	Altitude		Slant range		d_{av}, sec	Max. dB(A)	Max. dB(C)	Max. dB(N)	Max. PNdB	Max. $PNdB_{t1}$	Max. $PNdB_{t2}$	Peak PNdB	Peak $PNdB_{t1}$	Peak $PNdB_{t2}$	EPNdB	$EPNdB_{t1}$	$EPNdB_{t2}$	EPNL(FAA)	EEPNdB	$EEPNdB_{t1}$	$EEPNdB_{t2}$	EPNL(FAA)(app)
			m	ft	m	ft																		
1	1	1	305	1000	306	1005	8.0	97.9	107.1	102.9	108.7	108.8	110.0	111.1	111.1	112.0	104.4	104.5	106.0	107.8	106.7	106.8	108.0	108.0
	2		342	1120	343	1123	10.5	96.3	106.7	102.7	108.3	108.3	110.0	110.0	110.0	111.2	104.2	104.2	105.7	107.5	107.4	107.4	108.8	108.8
	3		317	1040	318	1041	8.5	99.0	109.6	105.7	111.1	111.1	112.8	113.1	113.1	114.6	106.5	106.6	108.4	110.2	109.1	109.6	111.5	111.5
	4		317	1040	317	1040	7.5	98.8	109.6	105.5	111.4	111.5	113.3	112.5	112.5	114.2	105.5	105.5	107.5	109.3	109.5	109.5	111.3	111.3
		Average	320	1050	321	1052	8.6	98.0	108.3	104.2	109.9	109.9	111.5	111.7	111.7	113.0	105.2	105.2	106.9	108.7	108.2	108.3	109.9	109.9
1	1	2	488	1600	492	1612	15.0	85.5	96.2	92.0	97.7	97.7	99.4	99.1	99.1	100.5	94.5	94.5	96.1	97.9	98.0	98.0	99.7	99.7
	2		519	1700	519	1700	14.0	89.1	101.1	96.5	102.2	102.2	104.4	103.4	103.4	104.9	98.6	98.6	100.5	102.3	102.3	102.3	104.7	104.7
	3		488	1600	491	1610	12.5	88.1	99.4	95.0	100.4	100.4	102.4	102.8	102.8	106.1	97.0	97.0	98.8	100.6	100.1	100.1	101.8	101.8
	4		519	1700	520	1702	10.5	89.8	101.1	96.8	102.3	102.4	104.3	105.1	105.1	108.4	98.8	98.9	100.9	102.7	101.3	101.5	103.5	103.5
		Average	504	1650	505	1656	13.0	88.1	99.5	95.1	100.7	100.7	102.6	102.6	102.6	104.9	97.2	97.2	99.1	100.9	100.4	100.4	102.4	102.4
1	1	3	671	2200	685	2243	17.5	86.4	97.1	93.0	98.0	98.0	102.5	99.8	99.8	102.9	95.5	95.6	98.9	100.7	98.9	99.0	103.2	103.2
	2		695	2280	697	2284	14.5	90.8	99.8	97.2	102.2	102.3	106.5	104.9	104.9	108.2	97.6	97.8	100.7	102.5	102.1	102.1	105.3	105.3
	3		708	2320	715	2342	14.5	89.0	98.4	94.3	100.5	100.6	104.6	102.7	102.8	106.0	96.2	96.3	99.5	101.3	100.8	100.9	104.3	104.3
	4		671	2200	672	2201	14.0	90.4	99.1	96.9	101.8	101.8	106.9	104.6	104.6	107.9	97.0	97.0	99.6	101.4	101.5	101.5	105.1	105.1
		Average	686	2250	694	2268	15.1	89.2	98.6	95.4	100.6	100.6	105.1	103.0	103.0	106.3	96.6	96.6	99.7	101.5	100.8	100.9	104.5	104.5
1	1	5	1311	4300	1318	4322	25.0	77.6	87.0	83.4	88.6	89.6	90.3	90.2	90.2	91.3	88.2	88.4	90.1	91.9	90.7	91.6	92.4	92.4
	2		1678	5500	1686	5535	30.5	76.9	87.3	83.2	88.6	88.8	90.9	90.3	90.3	91.8	89.0	89.0	91.0	92.8	91.5	91.6	93.7	93.7
	3		1792	5880	1800	5901	39.5	76.9	87.1	82.7	88.4	88.4	90.4	90.1	90.1	91.3	89.9	90.0	91.9	93.7	92.5	92.5	94.6	94.6
	4		1792	5880	1802	5912	33.0	77.1	86.6	82.4	87.6	87.8	91.3	90.2	90.2	91.6	88.3	88.1	90.4	92.2	91.0	90.4	93.9	93.9
		Average	1642	5390	1652	5417	32.0	77.1	87.0	82.9	88.3	88.7	90.7	90.2	90.2	91.5	88.9	88.9	90.9	92.7	91.4	91.5	93.7	93.7
2	1	1	274	900	275	901	9.5	96.5	106.6	102.8	108.1	109.1	109.6	109.7	109.7	111.0	103.8	103.9	105.7	107.5	106.7	107.5	108.3	108.3
	2		281	920	280	920	8.0	97.0	107.7	103.5	108.7	108.7	111.4	110.0	110.0	111.9	103.9	104.0	106.5	108.3	106.9	106.9	109.4	109.4
	3		274	900	274	900	10.0	96.6	106.5	102.8	108.1	108.1	110.8	109.3	109.3	111.2	103.7	103.7	106.0	107.8	107.0	107.0	109.6	109.6
	4		281	920	281	921	9.0	95.9	106.2	102.4	107.7	107.7	110.2	109.2	109.2	110.9	103.5	103.6	105.9	107.7	106.3	106.3	108.4	108.4
		Average	278	910	278	911	9.1	96.5	106.8	102.9	108.2	108.4	110.5	109.6	109.6	111.3	103.7	103.8	106.0	107.8	106.7	106.9	108.9	108.9
2	1	2	452	1480	452	1480	17.0	91.3	98.8	96.0	101.6	101.6	103.4	103.3	103.3	104.5	99.2	99.2	101.3	103.1	102.6	102.3	104.1	104.1
	2		476	1560	476	1560	13.0	92.3	101.8	98.5	104.1	104.9	107.1	105.8	106.1	107.8	99.8	99.8	102.3	104.1	103.8	104.0	106.2	106.2
	3		452	1480	452	1481	11.5	93.8	103.8	100.1	105.5	105.5	108.6	106.5	106.5	108.3	101.2	101.3	103.5	105.3	105.2	105.2	107.7	107.7
	4		488	1600	489	1601	14.0	92.4	102.1	98.3	103.8	103.8	106.5	105.5	105.5	107.4	100.2	100.4	102.9	104.7	104.0	104.0	106.6	106.6
		Average	467	1530	468	1531	13.8	92.5	101.6	98.2	103.8	104.0	106.4	105.3	105.4	107.0	100.1	100.2	102.5	104.3	103.9	104.0	106.2	106.2
2	1	3	616	2020	619	2028	19.0	88.9	98.0	94.6	99.8	100.7	102.0	100.6	100.6	103.3	97.2	97.4	99.3	101.1	101.2	101.9	103.5	103.5
	2		695	2280	695	2280	12.0	89.3	99.9	96.0	101.0	101.0	103.4	102.3	102.3	104.3	97.4	97.4	100.0	101.8	101.1	101.1	104.4	104.4
	3		647	2120	647	2120	15.5	90.4	99.8	96.4	101.0	101.0	104.9	102.1	102.1	104.4	97.7	97.8	99.9	101.7	101.8	101.8	105.3	105.3
	4		733	2400	733	2400	17.5	88.0	98.4	94.5	99.9	100.5	102.0	101.1	101.1	103.5	97.1	97.1	99.6	101.4	101.2	101.1	103.3	103.3
		Average	673	2205	675	2207	16.0	89.2	99.0	95.4	100.4	100.8	103.1	101.5	101.5	103.9	97.3	97.4	99.7	101.5	101.3	101.5	104.1	104.1
2	1	4	1182	3880	1184	3884	30.5	79.5	88.5	84.3	88.6	89.4	91.3	90.8	90.8	91.7	88.5	88.6	90.5	92.3	92.1	92.6	94.3	94.3
	2		1220	4000	1220	4000	29.5	80.0	91.0	86.2	90.9	91.0	96.0	93.9	94.0	96.1	90.5	90.8	94.2	96.0	93.8	94.0	97.9	97.9
	3		1196	3920	1196	3920	25.0	82.6	91.4	87.1	91.9	93.1	95.7	94.2	94.2	95.7	90.7	90.9	93.1	94.9	94.2	95.3	97.9	97.9
	4		1307	4280	1307	4280	26.0	83.8	90.7	88.4	92.8	93.9	96.4	94.0	94.0	96.9	90.4	88.9	94.1	95.9	95.0	94.0	98.3	98.3
		Average	1225	4020	1225	4021	27.8	81.5	90.4	86.5	91.0	91.8	94.8	93.2	93.2	95.1	90.0	89.8	93.0	94.8	93.8	94.0	97.1	97.1

TABLE VII.- *NOISE MEASUREMENTS DURING CLIMBOUT OPERATIONS* – Continued

Profile	Run	Station	Altitude		Slant range		d_{av}, sec	Max. dB(A)	Max. dB(C)	Max. dB(N)	Max. PNdB	Max. $PNdB_{t1}$	Max. $PNdB_{t2}$	Peak PNdB	Peak $PNdB_{t1}$	Peak $PNdB_{t2}$	EPNdB	$EPNdB_{t1}$	$EPNdB_{t2}$	EPNL(FAA)	EEPNdB	$EEPNdB_{t1}$	$EEPNdB_{t2}$	EPNL(FAA)(app)
			m	ft	m	ft																		
2	1	5	1839	6000	1830	6000	30.5	74.0	86.0	81.4	85.0	85.0	86.4	86.3	86.3	87.2	85.2	85.3	87.0	88.8	87.9	87.9	89.5	89.5
	2		1800	5900	1800	5900	37.0	76.1	88.3	83.8	88.5	88.6	90.7	90.2	90.2	91.4	88.0	88.1	90.4	92.2	92.4	92.4	94.6	94.6
	3		1770	5800	1770	5800	28.5	76.2	88.3	83.8	88.4	88.4	90.3	89.7	89.8	91.4	86.8	87.3	89.5	91.3	90.1	91.2	93.1	93.1
	4		1921	6300	1921	6300	31.0	75.8	88.6	83.3	88.0	88.3	90.1	90.2	90.2	91.8	87.8	87.9	89.9	91.7	91.3	91.4	93.3	93.3
		Average	1830	6000	1830	6000	31.8	75.5	87.8	83.1	87.5	87.6	89.4	89.1	89.1	90.4	87.0	87.2	89.2	91.0	90.4	90.7	92.6	92.6
3	1	1	329	1080	329	1080	9.5	94.9	105.3	101.2	106.2	107.0	108.4	107.8	107.8	109.3	102.3	102.6	104.1	105.9	104.9	105.6	106.8	106.8
	2		342	1120	342	1120	10.5	93.6	102.3	99.1	104.7	105.1	106.7	105.7	106.0	106.8	99.6	99.7	101.3	103.1	103.2	103.3	105.3	105.3
	3		366	1200	366	1200	16.0	88.4	94.6	92.9	99.2	99.2	100.8	99.8	99.8	101.4	94.3	94.3	95.9	97.7	97.4	97.4	99.3	99.3
		Average	346	1133	346	1133	12.0	92.3	100.7	97.7	103.4	103.8	105.3	104.4	104.5	105.8	98.7	98.8	100.4	102.2	101.8	102.1	103.8	103.8
3	1	2	544	1880	544	1880	25.0	82.7	89.1	87.3	92.9	94.0	95.3	94.3	95.0	96.3	90.2	89.9	92.2	94.0	94.3	94.3	96.5	96.5
	2		544	1880	544	1880	20.5	83.8	90.2	88.7	94.9	95.8	97.5	96.1	96.1	98.8	91.7	91.4	94.2	96.0	95.9	95.7	98.6	98.6
	3		537	1760	537	1760	16.0	83.4	91.8	87.9	94.0	94.0	96.7	96.8	96.8	99.5	91.9	92.0	94.1	95.8	94.9	94.9	97.6	97.6
		Average	562	1840	562	1840	20.5	83.3	90.4	88.0	93.9	94.6	96.5	95.7	96.0	98.2	91.3	91.1	93.5	95.2	95.0	95.0	97.6	97.6
3	1	3	598	1960	598	1960	20.5	81.1	88.7	86.1	91.9	92.0	94.5	93.2	93.2	94.8	88.7	89.0	90.8	92.6	93.0	93.2	95.7	95.7
	2		601	1970	601	1970	20.5	80.9	89.8	86.5	91.6	93.0	94.6	93.7	93.7	96.1	89.8	90.1	92.2	94.0	93.0	94.3	95.9	95.9
	3		580	1900	580	1900	20.0	82.3	89.0	87.4	93.4	93.4	96.1	94.5	94.5	97.7	90.1	90.1	92.5	94.3	94.4	94.4	96.8	96.8
		Average	593	1943	594	1944	20.3	81.4	89.2	86.7	92.3	92.8	95.1	93.8	93.8	96.2	89.5	89.7	91.8	93.6	93.5	94.0	96.1	96.1
3	1	4	684	2240	683	2240	29.5	78.4	84.2	83.1	88.9	88.9	92.2	90.2	90.2	92.9	86.0	86.1	87.9	89.7	90.5	90.5	92.7	92.7
	2		708	2320	708	2320	24.0	77.0	84.9	82.0	87.6	87.6	90.6	89.5	89.5	92.6	86.3	86.4	88.3	90.1	89.1	89.1	91.9	91.9
	3		686	2250	686	2250	22.5	78.2	84.1	82.7	88.7	88.7	91.8	90.3	90.3	93.4	85.7	86.0	87.7	89.5	89.9	90.0	92.4	92.4
		Average	694	2270	694	2270	25.3	77.9	84.4	82.6	88.4	88.4	91.5	90.0	90.0	93.0	86.0	86.2	88.0	89.8	89.8	89.9	92.3	92.3
3	1	5	794	2600	794	2600	28.5	78.1	85.5	82.6	88.6	88.7	91.7	90.4	90.5	93.1	87.4	87.6	89.7	91.5	90.8	90.9	93.9	93.9
	2		794	2600	794	2600	27.0	78.9	85.7	83.4	89.4	89.4	91.9	90.5	90.3	93.1	87.0	87.3	88.9	90.7	91.4	91.4	93.8	93.8
	3		794	2600	794	2600	30.0	79.9	86.1	84.5	90.1	90.1	92.1	91.0	91.0	93.3	87.0	87.2	89.2	91.0	92.1	92.2	94.2	94.2
		Average	794	2600	794	2600	28.5	79.0	85.8	83.5	89.4	89.4	91.9	90.6	90.6	93.2	87.1	87.4	89.3	91.1	91.4	91.5	94.0	94.0
4	1	1	342	1120	344	1128	11.5	94.5	100.3	98.3	104.4	104.4	105.7	105.8	105.8	107.2	99.6	99.6	101.3	103.1	103.1	103.1	104.6	104.6
	2		314	1030	315	1032	11.5	95.2	104.7	100.8	106.1	106.1	108.6	108.0	108.0	109.2	102.2	102.2	104.2	106.0	105.0	105.0	107.4	107.4
	3		375	1230	375	1230	10.0	91.1	99.0	95.7	101.9	102.0	103.8	103.4	103.4	104.9	97.4	97.5	99.8	101.6	100.1	100.0	102.9	102.9
	4		384	1260	384	1260	14.5	87.6	95.7	92.2	98.1	98.4	100.3	100.1	100.1	101.4	95.3	95.3	97.4	99.2	98.1	98.1	100.5	100.5
		Average	354	1160	355	1163	11.9	92.1	99.9	96.8	102.6	102.7	104.6	104.3	104.3	105.7	98.6	98.6	100.7	102.5	101.6	101.6	103.9	103.9
4	1	2	544	1880	576	1888	18.0	80.8	88.0	85.5	90.9	90.9	92.3	91.7	91.7	93.2	86.6	86.8	88.0	89.8	90.4	90.4	92.0	92.0
	2		488	1600	488	1600	18.0	79.4	87.5	84.9	89.4	89.4	91.2	91.2	91.2	94.5	84.8	85.0	87.0	88.8	89.7	89.7	92.4	92.4
	3		555	1820	555	1820	17.5	80.7	87.9	85.7	92.1	93.8	95.0	94.1	94.1	97.4	88.4	87.9	90.3	92.1	92.5	92.2	94.5	94.5
	4		576	1890	577	1893	24.0	77.0	85.2	81.8	87.7	87.7	89.7	90.1	90.1	93.4	85.6	85.9	87.6	89.4	88.6	88.6	90.8	90.8
		Average	604	1798	550	1800	19.4	79.5	87.2	84.5	90.0	90.5	92.1	91.8	91.8	94.6	86.4	86.4	88.2	90.0	90.3	90.4	92.4	92.4
4	1	3	653	2140	662	2168	23.5	78.0	87.6	84.3	89.2	90.2	91.0	90.7	90.7	92.6	85.2	85.4	87.4	89.2	89.2	90.2	91.1	91.1
	2		598	1960	599	1963	20.0	76.7	86.8	82.8	88.1	88.8	90.8	90.0	90.0	92.8	86.5	86.6	88.6	90.4	89.7	90.3	92.4	92.4
	3		708	2320	715	2342	21.0	77.4	88.1	83.4	88.2	88.4	91.3	90.9	90.9	93.6	86.3	86.5	86.0	87.8	89.7	90.0	90.3	90.3
	4		720	2360	720	2360	5.0	76.2	89.7	84.5	89.3	89.3	91.0	91.1	91.1	92.8	80.2	80.4	82.0	83.8	84.5	84.5	85.8	85.8
		Average	670	2195	675	2208	17.4	77.1	88.0	83.8	88.7	89.2	91.0	90.6	90.6	93.0	84.6	84.7	86.0	87.8	88.3	88.8	89.9	89.9

TABLE VII.- NOISE MEASUREMENTS DURING CLIMBOUT OPERATIONS – Continued

Profile	Run	Station	Altitude		Slant range		d_{av}, sec	Max. dB(A)	Max. dB(C)	Max. dB(N)	Max. PNdB	Max. $PNdB_{t1}$	Max. $PNdB_{t2}$	Peak PNdB	Peak $PNdB_{t1}$	Peak $PNdB_{t2}$	EPNdB	$EPNdB_{t1}$	$EPNdB_{t2}$	EPNL(FAA)	EEPNdB	$EEPNdB_{t1}$	$EEPNdB_{t2}$	EPNL(FAA)(app)
			m	ft	m	ft																		
4	1	4	763	2500	763	2500	17.0	71.0	81.6	77.8	82.2	83.2	84.0	84.0	84.0	85.3	79.1	79.5	80.6	82.4	81.8	82.7	83.5	83.5
	2		733	2400	733	2400	25.5	71.0	82.0	77.9	81.9	82.5	83.7	84.1	84.1	86.5	80.2	80.4	82.1	83.9	83.3	83.4	85.4	85.4
	3		866	2840	866	2840	23.0	73.2	81.8	79.4	84.9	88.8	88.2	85.9	89.9	89.2	83.3	89.9	86.6	88.4	87.7	93.9	91.0	91.0
	4		878	2880	878	2880	22.0	70.5	81.3	77.3	82.2	83.5	83.6	84.0	84.4	86.2	78.7	79.1	80.8	82.6	82.3	93.2	84.1	84.1
		Average	810	2655	810	2655	21.9	71.4	81.7	78.1	82.8	84.5	84.8	84.5	85.6	86.8	80.3	82.2	82.5	84.3	83.8	88.3	86.0	86.0
4	1	5	854	2800	854	2800	28.5	71.5	81.5	77.6	83.1	83.3	85.6	85.2	85.3	87.0	81.1	81.4	82.7	84.5	85.3	85.6	87.7	87.7
	2		885	2900	885	2900	29.0	71.1	81.1	77.4	82.4	82.7	83.8	83.4	83.4	85.4	80.0	80.4	81.6	83.4	84.1	84.3	85.5	85.5
	3		1038	3400	1038	3400	34.0	69.9	81.7	77.3	81.6	81.6	82.7	83.4	83.4	84.4	80.0	80.4	81.5	83.3	83.9	83.9	85.2	85.2
	4		1068	3500	1068	3500	30.5	69.2	79.5	75.8	79.9	80.1	81.3	81.2	81.2	82.3	77.7	77.9	79.2	81.0	82.0	82.1	83.5	85.5
		Average	961	3150	961	3150	30.5	70.4	81.0	77.0	81.8	81.9	83.4	83.3	83.3	84.8	79.7	80.0	81.2	83.1	83.8	84.0	85.5	86.0
5	1	1	351	1150	614	1217	10.5	95.5	102.2	99.7	105.7	105.7	110.3	108.2	108.2	109.9	101.3	101.3	104.1	105.9	104.1	104.1	108.5	108.5
	2		351	1150	352	1154	20.5	89.1	97.4	94.1	110.5	100.9	102.9	102.4	102.4	103.5	98.4	98.6	100.1	101.9	101.8	102.4	104.1	104.1
	3		305	1000	309	1014	25.5	100.2	106.6	103.9	110.5	110.5	111.6	112.3	112.3	113.0	108.5	108.6	110.2	112.0	112.2	112.2	114.0	114.0
		Average	336	1100	344	1128	18.8	94.9	102.0	99.2	108.9	105.7	108.2	107.6	107.6	108.8	102.7	102.8	104.8	106.6	106.0	106.2	108.9	108.9
5	1	2	543	1780	544	1784	19.5	78.2	85.6	84.5	90.3	90.3	93.6	93.3	93.3	96.6	85.1	85.5	86.7	88.5	90.3	90.8	93.0	93.0
	2		567	1860	567	1860	17.5	77.6	86.7	83.4	89.3	89.5	92.5	92.5	92.5	95.8	86.4	86.7	88.5	90.3	91.0	91.1	94.0	94.0
	3		488	1600	489	1601	24.0	75.2	83.5	80.4	86.1	86.2	87.3	88.3	88.3	89.0	83.8	84.1	85.4	87.2	88.1	88.2	89.3	89.3
	4		506	1660	508	1665	23.0	77.0	83.3	81.4	87.6	87.6	89.2	88.9	88.9	90.5	85.0	85.1	86.8	88.6	88.3	88.3	90.2	90.2
	5		415	1360	416	1362	18.0	77.9	86.2	83.5	89.6	89.6	91.2	91.0	91.0	92.7	86.5	86.6	88.1	89.9	89.6	89.6	91.4	91.4
	6		549	1800	550	1803	11.0	84.9	91.8	89.6	95.8	96.4	98.1	97.4	97.4	99.6	91.3	91.3	92.9	94.7	94.4	94.9	96.5	96.5
		Average	511	1677	513	1679	18.8	78.5	86.2	83.8	89.8	89.9	92.0	91.9	91.9	94.0	86.4	86.6	88.1	89.9	90.3	90.5	92.4	92.4
5	1	3	683	2240	716	2347	18.0	76.0	86.3	82.4	87.6	88.6	89.9	89.3	89.3	90.5	85.0	85.1	87.0	88.8	88.7	89.4	91.3	91.3
	2		659	2160	659	2160	25.0	76.3	83.7	81.3	87.0	87.0	88.6	88.2	88.2	89.6	84.7	86.9	87.9	89.7	88.6	88.6	90.2	90.2
	3		659	2160	659	2160	20.0	76.1	85.0	81.8	87.6	87.6	90.3	89.2	89.2	90.2	85.4	85.5	87.3	89.1	88.9	88.9	91.4	91.4
	4		604	1980	605	1985	23.5	75.2	82.9	80.5	86.7	86.7	88.2	88.2	88.2	89.2	82.9	83.0	84.7	86.5	87.7	87.7	89.6	89.6
	5		562	1840	572	1877	17.0	75.8	84.2	80.6	86.7	87.2	88.4	88.8	88.8	89.7	84.2	84.4	86.3	88.1	87.7	88.2	89.4	89.4
	6		714	2340	714	2340	18.5	76.5	85.4	81.6	87.9	87.9	89.7	89.6	89.6	91.2	85.2	85.4	86.8	88.6	88.8	88.8	90.6	90.6
		Average	644	2120	655	2145	20.3	76.0	84.6	81.4	87.3	87.5	89.2	88.9	88.9	90.1	84.6	85.1	86.7	88.5	88.4	88.6	90.7	90.4
5	1	5	915	3000	915	3001	10.5	78.3	87.3	82.7	88.8	88.8	90.0	91.5	91.5	93.3	84.6	84.6	86.3	88.1	87.2	87.2	88.4	88.4
	2		869	2850	873	2861	20.5	72.5	82.0	78.2	83.7	84.2	87.4	85.7	85.7	86.4	81.3	81.6	84.1	85.9	85.0	85.5	88.8	88.8
	3		878	2800	857	2810	26.0	70.8	79.0	75.8	80.9	81.2	82.4	83.2	83.2	84.5	78.9	79.1	81.3	83.1	82.5	82.9	84.0	84.0
	4		794	2600	796	2611	20.0	70.3	80.1	76.1	80.5	81.0	83.5	83.2	83.2	83.9	78.6	78.9	81.1	82.9	81.5	82.5	84.8	84.8
	5		763	2500	765	2505	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	6		915	3000	917	3005	19.0	71.0	78.8	75.9	80.9	80.9	84.1	82.5	82.5	84.5	78.4	78.4	80.6	82.4	81.8	81.8	84.6	84.6
		Average	852	2792	855	2799	19.2	72.6	81.4	77.7	83.0	83.2	85.5	85.2	85.2	86.5	80.4	80.5	82.7	84.5	83.6	84.0	86.1	86.1
6	1	1	336	1100	352	1151	7.5	97.4	107.1	103.4	108.8	108.8	112.2	111.1	111.1	112.4	103.3	103.3	106.3	108.1	106.3	106.3	109.5	109.5
6	1	2	519	1700	523	1712	14.0	86.1	91.7	89.9	96.0	96.5	97.0	97.2	97.2	98.1	91.1	91.3	92.5	94.3	94.7	94.9	96.5	96.5
	2		476	1560	477	1562	19.0	80.2	85.9	84.5	90.5	90.5	92.7	91.9	91.9	93.6	87.4	87.4	89.0	90.8	90.8	90.8	92.9	92.9
	3		488	1600	488	1600	16.0	81.4	88.8	85.8	92.2	92.9	92.8	93.4	93.4	94.6	88.8	88.8	90.3	92.1	92.0	92.0	93.0	93.0
		Average	494	1620	496	1625	16.3	82.6	88.8	86.7	92.9	93.1	94.2	94.2	94.2	95.4	89.1	89.2	90.6	92.4	92.6	92.6	94.1	94.1

TABLE VII.- NOISE MEASUREMENTS DURING CLIMBOUT OPERATIONS – Concluded

Profile	Run	Station	Altitude		Slant range		d_{av}, sec	Max. dB(A)	Max. dB(C)	Max. dB(N)	Max. PNdB	Max. $PNdB_{t1}$	Max. $PNdB_{t2}$	Peak PNdB	Peak $PNdB_{t1}$	Peak $PNdB_{t2}$	EPNdB	$EPNdB_{t1}$	$EPNdB_{t2}$	EPNL(FAA)	EEPNdB	$EEPNdB_{t1}$	$EEPNdB_{t2}$	EPNL(FAA)(app)
			m	ft	m	ft																		
6	1	3	684	2240	690	2260	23.5	75.4	83.5	80.6	86.9	86.9	87.8	88.0	88.0	88.0	84.1	84.2	86.1	87.9	88.7	88.7	89.9	89.9
	2		640	2100	645	2118	20.5	75.2	84.4	80.6	86.5	87.0	87.7	88.5	88.5	88.5	85.1	85.2	86.6	88.4	87.6	88.0	89.2	89.2
	3		702	2300	704	2304	17.5	76.4	85.7	82.3	87.4	87.4	89.7	88.3	88.3	89.0	83.5	83.6	86.1	87.9	88.1	88.2	90.8	90.8
		Average	625	2213	680	2227	20.5	75.7	84.5	81.2	86.9	87.1	88.4	88.3	88.3	88.5	84.2	84.3	86.3	88.1	88.1	88.3	90.0	90.0
6	1	5	885	2900	906	2970	23.0	68.1	75.5	72.7	78.2	78.2	80.5	79.8	79.8	80.8	76.1	76.4	78.7	80.5	79.3	79.3	81.8	81.8
	2		903	2960	905	2967	26.5	68.4	76.1	73.4	78.2	78.6	80.9	80.4	80.4	82.2	76.4	76.7	79.1	80.9	79.8	80.0	82.5	82.5
	3		940	3080	946	3101	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
		Average	909	2980	919	3012	24.8	68.3	75.8	73.1	78.2	78.4	80.7	80.1	80.1	81.5	76.3	76.6	78.9	80.7	79.6	79.7	82.2	82.2
7	1	1	296	970	296	970	10.5	95.2	106.0	101.9	107.0	107.0	109.1	108.2	108.2	109.5	102.5	102.6	104.7	106.5	106.0	106.0	108.3	108.3
	2		----	----	----	----	9.0	97.2	106.4	103.0	108.4	108.4	110.3	109.2	109.2	110.3	103.5	103.5	105.5	107.3	106.8	106.8	108.8	108.8
	3		293	960	293	960	9.5	96.1	106.0	102.4	107.3	107.9	109.1	109.1	109.1	110.6	103.5	103.7	105.4	107.2	105.9	106.5	107.8	107.8
	4		305	1000	305	1000	11.0	96.0	105.9	102.3	107.3	107.3	109.2	108.6	108.6	110.3	102.5	102.6	104.6	106.4	106.3	106.3	108.3	108.3
		Average	297	973	298	977	10.0	96.1	106.1	102.4	107.5	107.7	109.4	108.8	108.8	110.2	103.0	103.1	105.1	106.9	106.3	106.4	108.3	108.3
7	1	2	488	1600	488	1600	15.5	78.6	87.5	83.5	89.0	89.0	92.0	91.3	91.3	93.9	86.9	87.1	89.0	90.8	89.9	89.9	93.0	93.0
	2		476	1560	476	1560	17.5	80.5	86.9	85.3	90.8	90.8	92.9	92.7	92.7	95.8	87.1	87.3	89.6	91.4	91.1	91.1	93.5	93.5
	3		476	1560	477	1562	16.5	80.0	87.4	84.9	90.8	90.8	93.7	91.9	91.9	94.7	87.4	87.6	89.6	91.4	90.3	90.3	93.2	93.2
	4		500	1640	502	1643	21.0	82.4	87.0	87.0	92.7	92.7	96.5	93.7	93.7	96.9	88.5	88.7	90.7	92.5	92.7	92.7	95.7	95.7
		Average	485	1590	485	1591	17.6	80.4	87.6	85.2	90.8	90.8	93.8	92.4	92.4	95.3	87.5	87.7	89.7	91.5	91.0	91.0	93.9	93.7
7	1	3	683	2240	683	2240	17.5	75.8	86.7	82.7	87.1	87.1	89.1	89.1	89.3	90.9	84.6	84.8	86.8	88.6	88.2	88.2	90.3	90.3
	2		664	2180	665	2181	21.5	76.6	84.2	81.7	86.7	86.7	88.5	88.2	88.2	89.7	83.9	83.9	85.6	87.4	87.8	87.8	89.5	89.5
	3		607	1990	607	1990	21.5	78.0	86.6	83.2	89.3	89.3	92.6	91.3	91.3	94.6	86.4	86.6	89.7	91.5	89.5	89.6	92.8	92.8
	4		671	2200	671	2200	15.5	76.8	85.3	81.7	87.5	87.7	90.4	89.0	89.1	91.9	84.4	84.5	87.4	89.2	88.1	88.4	91.0	91.0
		Average	657	2153	656	2153	19.0	76.8	85.7	82.3	87.7	87.7	90.2	89.4	89.4	89.5	91.8	85.0	87.4	89.2	88.4	88.5	90.9	90.9
7	1	4	799	2620	799	2620	25.5	73.2	82.5	79.3	83.6	83.6	85.0	84.4	84.4	85.7	79.0	79.1	80.9	82.7	84.3	84.3	85.7	85.7
	2		839	2750	839	2750	19.0	72.9	80.8	78.2	82.4	82.5	84.5	83.6	83.6	84.5	78.6	78.7	80.4	82.2	82.8	83.0	84.7	84.7
	3		805	2640	805	2640	17.0	72.4	82.9	78.7	82.6	83.1	84.2	84.4	84.4	85.7	79.9	80.0	81.7	83.5	83.0	83.4	84.6	84.6
	4		897	2940	897	2941	22.0	71.1	82.6	77.8	81.1	81.3	83.3	83.5	85.5	85.0	78.7	78.8	80.7	82.5	83.3	83.5	85.5	85.5
		Average	835	2738	835	2738	20.8	72.4	82.2	78.5	82.4	82.6	84.3	84.0	84.5	85.2	79.1	79.2	80.9	82.7	83.4	83.6	85.1	85.1
7	1	5	1037	3400	1037	3400	30.0	72.3	81.6	77.6	81.7	81.7	82.3	83.9	83.9	83.9	79.8	79.9	81.0	82.8	84.2	84.2	85.1	85.1
	2		1037	3400	1037	3400	30.5	72.2	82.5	78.7	82.7	82.7	83.9	84.3	84.3	84.3	79.6	79.7	80.9	82.7	84.3	84.3	85.6	85.6
	3		1006	3300	1006	3300	32.0	72.3	81.4	78.2	82.3	82.4	84.3	83.9	84.9	84.9	80.3	80.5	81.9	83.7	84.5	84.6	86.4	86.4
	4		1099	3600	1099	3600	36.0	72.8	80.7	78.0	82.5	82.5	83.2	85.3	85.9	85.9	79.9	80.1	81.0	82.8	85.4	85.4	86.2	86.2
		Average	1045	3425	1045	3425	32.1	72.4	81.6	78.1	82.3	82.3	83.4	84.4	84.4	84.8	79.8	80.0	81.2	83.0	84.6	84.6	85.8	85.8

TABLE VIII.- NOISE MEASUREMENTS DURING LANDING APPROACH OPERATIONS

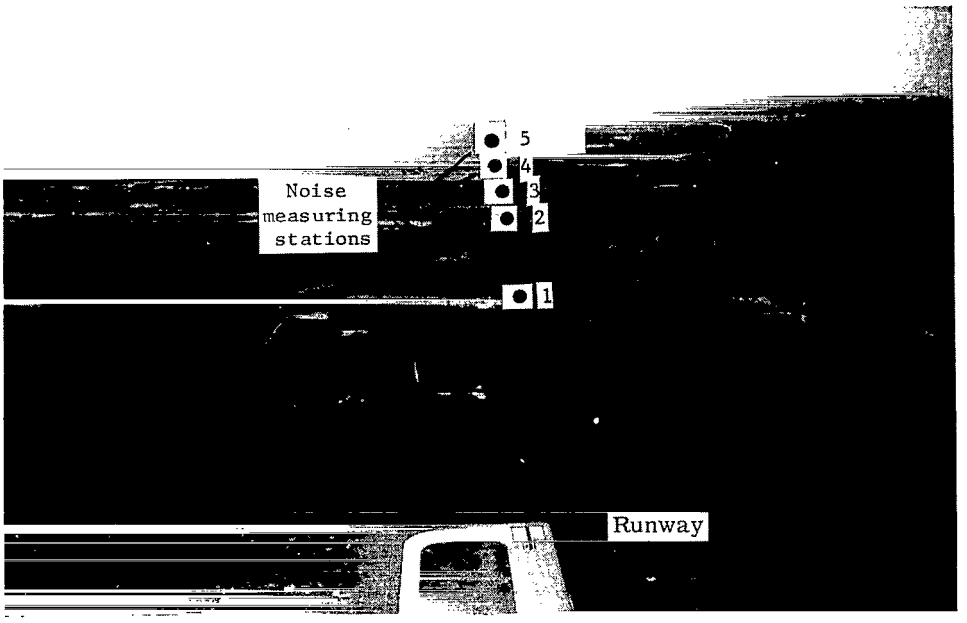
Profile	Run	Station	Altitude		Slant range		d_{av}, sec	Max. dB(A)	Max. dB(C)	Max. dB(N)	Max. PNdB	Max. $PNdB_{t1}$	Max. $PNdB_{t2}$	Peak PNdB	Peak $PNdB_{t1}$	Peak $PNdB_{t2}$	EPNdB	$EPNdB_{t1}$	$EPNdB_{t2}$	EPNL(FAA)	FEPNdB	$EEPNdB_{t1}$	$EEPNdB_{t2}$	EPNL(FAA)(app)
			m	ft	m	ft																		
1	3	1	82	270	84	275	5.0	94.6	97.0	101.9	108.3	108.3	108.6	108.6	108.6	109.8	99.2	99.2	100.3	102.1	102.0	102.0	103.2	103.2
	4		86	280	86	280	5.0	93.3	97.2	100.7	107.7	109.9	108.2	110.3	110.3	109.6	98.7	100.1	100.1	101.9	101.4	102.9	102.8	102.8
	5		92	300	92	300	6.0	92.5	96.0	100.0	107.2	109.5	107.5	109.7	109.7	109.1	97.8	99.2	99.1	100.9	101.5	103.2	102.5	102.5
	6		89	290	89	290	6.0	92.2	96.0	99.5	106.8	108.2	107.1	108.5	108.5	108.5	98.0	98.2	99.3	101.1	101.1	101.9	102.5	102.5
	7		89	290	89	290	6.0	93.0	98.1	100.2	107.1	108.3	107.7	107.7	107.7	108.9	99.1	100.1	100.4	102.2	101.8	103.3	103.0	103.0
	8		92	300	93	305	6.0	94.3	99.2	101.4	108.8	110.1	109.4	109.4	109.4	110.7	100.2	100.9	101.6	103.4	103.6	104.1	104.9	104.9
	11		89	290	89	290	5.5	94.2	100.3	101.1	108.3	109.6	109.2	109.2	109.2	110.4	100.1	100.2	101.4	103.2	103.1	103.1	104.3	104.3
		Average	88	289	89	290	5.6	93.4	97.7	100.7	107.7	109.1	108.2	109.1	109.1	109.6	99.0	99.8	100.3	102.1	102.1	102.9	103.3	103.3
1	1	2	168	550	168	550	9.0	86.8	91.3	94.2	101.1	103.6	103.0	102.3	104.9	104.3	94.8	96.4	96.7	98.5	97.8	100.3	99.3	99.3
	2		137	450	139	455	8.0	87.4	91.3	95.3	102.5	106.3	105.1	103.7	106.5	106.1	95.3	96.7	97.9	99.7	98.9	101.1	101.8	101.8
	3		165	540	166	545	8.5	85.8	89.7	93.3	99.7	99.8	101.6	100.2	100.2	101.9	93.1	93.5	95.1	96.9	96.1	96.8	98.6	98.6
	4		171	560	174	570	10.5	87.1	90.9	94.4	101.0	101.8	102.0	101.6	101.6	103.1	94.7	95.7	96.5	98.3	98.0	98.7	98.9	98.9
	5		171	560	171	560	10.0	87.3	90.5	95.0	101.7	102.3	103.2	102.3	102.3	103.8	94.8	95.8	96.8	98.6	98.4	99.0	99.9	99.9
	6		168	550	171	560	9.0	87.0	91.5	94.7	101.3	102.5	103.6	102.1	102.1	104.4	94.9	95.9	97.1	98.9	98.0	98.9	100.3	100.3
	7		174	570	174	570	9.5	91.8	97.5	98.5	105.7	109.2	108.3	106.8	109.9	109.4	100.0	102.3	102.5	104.3	103.0	104.3	105.3	105.3
	8		171	560	172	565	9.5	88.9	94.8	95.3	102.5	105.0	104.6	103.6	106.0	105.7	96.7	98.5	99.0	100.8	99.8	102.0	101.9	101.9
	9		168	550	168	550	10.5	88.9	95.9	96.3	103.6	106.4	106.1	104.9	107.6	107.5	97.7	99.8	100.1	101.9	100.9	102.7	103.3	103.3
	10		165	540	165	540	9.5	89.2	94.6	96.0	103.3	105.9	105.5	104.3	106.6	106.5	96.7	98.4	98.9	100.7	100.0	101.9	102.5	102.5
	11		165	540	165	540	9.5	88.7	95.2	95.1	102.3	104.7	104.6	103.3	105.8	105.1	96.8	98.4	99.0	100.8	99.6	101.7	101.6	101.6
		Average	166	543	167	546	9.4	88.1	93.0	95.3	102.2	104.3	104.3	103.2	104.9	105.3	96.0	97.4	98.1	99.9	99.1	100.7	101.2	101.2
1	1	3	241	790	241	790	12.5	82.7	88.0	89.3	96.3	96.3	102.0	98.9	98.9	102.0	92.2	92.3	95.9	97.7	95.5	95.5	98.7	98.7
	2		183	600	188	615	12.5	85.4	89.1	92.1	99.0	101.4	101.5	99.4	99.4	101.9	92.3	93.3	95.7	97.5	95.9	97.1	97.8	97.8
	3		241	790	244	800	12.5	85.2	90.1	91.8	98.5	98.5	102.1	100.6	100.6	103.3	93.2	93.6	97.8	99.6	97.3	97.3	101.0	101.0
	4		244	800	244	800	12.0	86.2	91.7	93.2	100.3	100.3	104.4	101.9	101.9	104.4	93.5	93.5	96.5	98.3	97.6	97.6	101.4	101.4
	5		244	800	244	800	13.0	83.5	90.1	89.7	96.6	96.6	101.8	98.6	98.6	101.0	92.4	92.4	95.3	97.1	95.0	95.0	99.6	99.6
	6		235	770	235	770	12.0	85.0	88.1	91.6	98.2	98.2	101.1	98.8	98.8	101.7	91.9	92.0	95.7	97.5	95.7	95.8	98.7	98.7
	7		244	800	244	800	11.5	87.3	95.0	92.9	98.9	98.9	101.2	101.9	101.9	103.7	95.7	95.8	98.0	99.8	97.8	97.8	100.1	100.1
	8		238	780	239	785	13.5	86.3	93.4	92.4	98.9	98.9	103.5	101.4	101.4	103.0	94.7	95.2	98.9	100.7	97.3	97.3	101.8	101.8
	9		238	780	238	780	15.5	86.7	91.9	93.2	99.7	99.7	103.3	102.1	102.1	105.4	94.9	94.9	97.6	99.4	98.2	98.2	101.7	101.7
	10		238	780	238	780	13.5	86.6	92.6	92.4	99.0	99.0	103.4	101.9	101.9	105.1	95.2	95.3	99.5	101.3	98.2	98.2	102.6	102.6
	11		241	790	241	790	12.0	86.1	92.9	92.2	99.2	99.2	105.1	102.6	102.6	105.9	95.1	95.1	99.9	101.7	97.8	97.8	103.4	103.4
		Average	235	771	236	774	12.8	85.5	91.2	91.9	98.6	98.8	102.7	100.7	100.7	103.4	93.7	93.9	97.3	99.1	96.9	97.0	100.6	100.6
1	1	4	400	1310	401	1315	24.5	76.5	83.0	82.1	88.3	88.3	90.7	89.4	89.4	92.7	85.3	85.4	87.7	89.5	89.0	89.1	91.4	91.4
	2		324	1060	325	1065	24.0	75.1	82.0	80.2	86.3	86.4	88.9	87.8	87.8	87.8	83.1	83.2	85.1	86.9	87.0	87.1	88.9	88.9
	3		397	1300	400	1310	21.0	77.3	83.8	83.7	90.5	94.0	93.1	91.1	94.4	93.5	85.8	87.2	88.3	90.1	90.2	92.2	92.8	92.8
	4		425	1390	435	1425	25.5	74.6	81.0	79.8	85.8	85.9	88.1	86.6	86.6	88.7	82.9	82.9	85.0	86.8	86.5	86.6	87.9	87.9
	5		415	1360	418	1370	24.0	77.0	82.9	82.3	88.8	92.4	91.6	90.6	90.6	92.5	86.3	87.5	88.6	90.4	89.6	91.8	92.2	92.2
	7		418	1370	418	1370	18.5	73.8	85.1	80.6	86.4	86.7	89.7	88.4	89.4	91.2	84.0	85.9	87.3	89.1	87.6	89.8	90.8	90.8
	8		424	1390	424	1390	22.0	74.2	82.3	80.6	85.8	86.4	89.8	89.9	89.9	92.2	83.4	83.6	86.8	88.6	86.9	87.4	90.7	90.7
	9		421	1380	423	1385	21.5	80.2	86.9	85.2	91.4	91.4	94.0	92.4	92.4	95.1	88.3	88.4	90.8	92.6	92.2	92.2	95.0	95.0
	10		421	1380	424	1390	23.0	76.0	81.8	81.6	88.1	91.0	90.2	88.7	88.7	90.7	84.1	84.4	86.6	88.4	87.5	89.5	89.9	89.9
	11		415	1360	415	1360	26.0	75.8	81.8	81.4	87.8	91.5	90.5	88.6	88.6	90.8	84.9	85.9	87.5	89.3	88.4	90.2	91.0	91.0
		Average	406	1330	408	1338	23.0	76.1	83.1	81.8	87.9	89.4	90.7	89.4	89.8	91.6	84.8	85.4	87.4	89.2	88.5	89.6	91.1	91.1

TABLE VIII.- NOISE MEASUREMENTS DURING LANDING APPROACH OPERATIONS – Continued

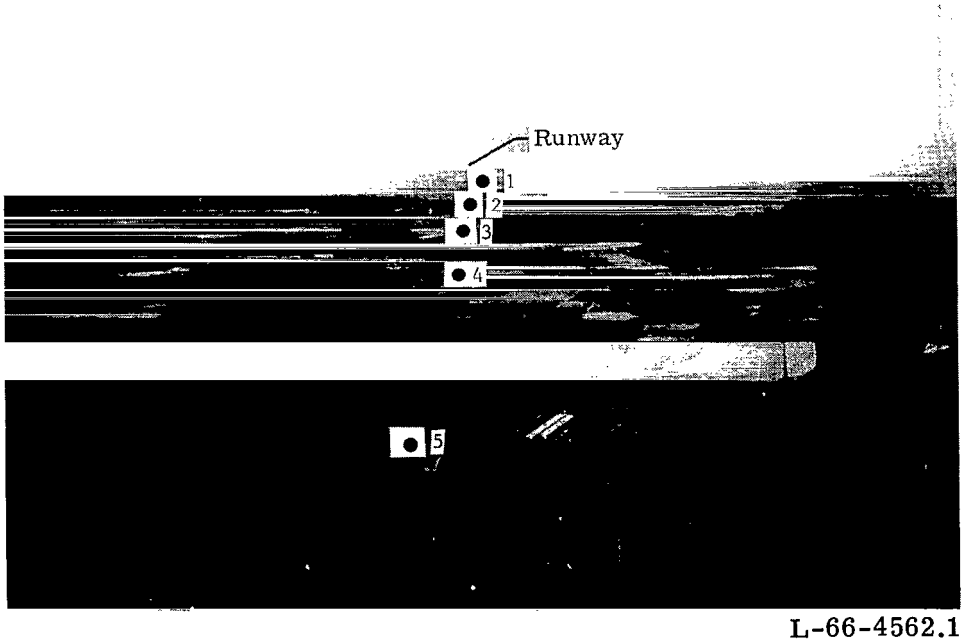
Profile	Run	Station	Altitude		Slant range		d_{av}, sec	Max. dB(A)	Max. dB(C)	Max. dB(N)	Max. PNdB	Max. $PNdB_{t1}$	Max. $PNdB_{t2}$	Peak PNdB	Peak $PNdB_{t1}$	Peak $PNdB_{t2}$	EPNdB	$EPNdB_{t1}$	$EPNdB_{t2}$	EPNL(FAA)	EEPNdB	$EEPNdB_{t1}$	$EEPNdB_{t2}$	EPNL(FAA)(app)
			m	ft	m	ft																		
2	1	1	107	350	107	350	6.0	92.4	95.6	99.3	106.3	106.3	107.6	106.8	106.8	107.6	97.6	97.8	98.9	100.7	101.1	101.1	102.4	102.4
	2		104	340	104	340	6.0	89.6	92.4	96.9	103.8	103.8	105.0	104.0	104.0	105.2	95.9	96.0	97.1	98.9	99.0	99.4	100.3	100.3
	3		101	330	101	330	6.0	90.6	93.3	97.6	104.1	104.1	105.8	104.4	104.4	106.1	95.1	95.1	96.6	98.4	98.9	98.9	100.6	100.6
	4		104	340	105	345	6.5	89.5	91.8	96.9	103.3	103.3	104.8	103.7	103.7	105.1	94.9	95.2	96.3	98.1	97.6	97.6	99.0	99.0
	5		101	330	101	330	14.0	88.5	90.9	96.1	102.8	102.8	104.5	103.5	103.5	104.1	94.6	94.8	95.9	97.7	98.0	98.0	99.3	99.3
	6		110	360	110	360	6.5	91.9	94.9	99.3	106.1	106.1	107.3	106.5	106.5	107.7	97.6	98.2	99.1	100.9	100.4	100.4	102.1	102.1
	7		110	360	110	360	7.0	87.8	90.6	95.2	101.9	101.9	103.5	102.3	102.3	103.8	94.0	94.0	95.8	97.6	97.2	97.2	98.7	98.7
	8		110	360	110	360	7.0	87.9	90.5	95.2	101.7	101.7	103.7	101.9	101.9	103.9	93.2	93.2	95.0	96.8	96.4	96.4	98.5	98.5
	9		104	340	105	345	15.5	85.2	88.5	92.2	99.3	99.3	101.3	99.8	99.8	100.5	91.7	92.1	93.1	94.9	95.0	95.0	96.5	96.5
	10		101	330	105	345	7.5	83.6	87.7	90.2	97.7	98.9	99.1	98.0	98.0	98.8	90.4	90.6	91.5	93.3	93.7	94.5	95.1	95.1
		Average	105	344	106	347	8.2	88.7	91.6	95.9	102.7	102.8	104.3	103.1	103.1	104.3	94.5	94.7	95.9	97.7	97.7	97.9	99.3	99.3
2	1	2	284	930	284	930	13.0	84.7	85.5	92.6	98.3	98.3	101.0	98.5	98.5	101.1	92.7	92.7	95.6	97.4	96.7	96.7	99.3	99.3
	2		272	890	272	890	10.5	88.0	89.0	96.0	101.8	104.2	105.1	102.2	104.5	104.2	95.5	96.3	98.6	100.4	98.8	100.9	102.4	102.4
	3		278	910	278	910	15.0	85.3	86.4	93.1	98.9	100.1	103.7	99.4	99.4	104.0	93.8	93.9	97.5	99.3	96.9	97.9	101.0	101.0
	4		287	940	287	940	11.5	87.1	88.1	94.9	100.7	100.7	103.0	101.2	101.2	103.4	95.5	95.5	98.0	99.8	98.5	98.5	101.2	101.2
	5		278	910	278	910	12.5	87.5	88.3	95.4	101.3	101.3	104.8	101.8	101.8	105.3	95.6	95.7	98.9	100.7	98.8	98.8	101.8	101.8
	6		274	900	274	900	13.0	85.5	86.6	93.6	99.4	99.4	104.0	99.8	99.8	103.6	94.2	94.2	98.2	100.0	97.2	97.2	101.8	101.8
	7		278	910	278	910	22.0	84.4	85.7	92.7	98.3	98.3	103.6	99.1	99.1	104.6	93.7	93.7	97.7	99.0	97.2	97.2	101.1	101.1
	8		278	910	278	910	12.0	85.5	87.1	93.6	99.7	99.7	104.1	100.1	100.1	104.8	94.2	94.2	97.8	99.5	98.8	97.8	101.1	101.1
	9		274	900	274	900	12.5	87.1	88.4	94.8	100.6	100.6	103.8	101.1	101.1	102.8	95.3	95.3	97.8	99.6	98.4	98.4	101.3	101.3
	10		284	930	285	935	13.5	89.7	91.9	97.7	104.2	105.7	106.3	104.7	104.7	106.4	98.4	99.4	100.8	102.6	102.0	102.9	104.5	104.5
		Average	288	913	279	914	13.6	86.5	87.7	94.4	100.3	100.8	103.9	100.8	101.0	104.0	94.9	95.1	98.1	99.8	98.2	98.6	101.6	101.6
2	1	3	436	1430	436	1430	14.0	80.4	85.2	86.7	93.9	97.8	96.8	95.1	98.2	97.9	88.2	89.2	91.3	93.1	91.4	94.5	94.6	94.6
	2		445	1460	445	1460	25.0	75.6	78.3	82.3	87.5	88.5	93.0	89.3	89.3	91.0	84.5	84.8	88.1	89.9	87.1	87.8	91.9	91.9
	3		442	1450	442	1450	17.0	80.5	84.6	87.4	93.6	93.6	97.0	94.4	94.4	97.5	89.2	89.2	92.0	93.8	92.5	92.5	95.4	95.4
	4		448	1470	448	1470	22.0	79.2	82.2	86.3	92.5	92.5	95.3	94.4	94.4	97.4	88.5	88.6	91.3	93.1	91.4	91.4	94.3	94.3
	5		448	1470	448	1470	18.5	78.2	83.0	84.5	91.5	91.5	94.9	93.1	93.1	96.5	86.4	86.5	90.5	92.3	91.2	91.2	94.6	94.6
	6		439	1440	439	1440	18.5	79.7	83.8	86.4	92.7	94.5	96.0	94.1	94.1	97.7	89.2	89.7	91.7	93.5	91.7	92.7	95.1	95.1
	7		452	1480	452	1480	19.5	78.4	81.9	85.5	91.6	91.9	93.9	92.3	92.3	94.6	87.6	87.9	90.1	91.9	90.8	91.1	93.3	93.3
	8		445	1460	445	1460	18.5	80.2	85.2	87.1	93.3	93.3	97.1	94.5	94.5	98.1	89.2	89.3	91.8	93.6	92.5	92.5	95.3	95.3
	9		436	1430	436	1430	20.0	78.5	81.9	85.2	91.5	91.5	95.7	92.1	92.1	95.3	87.3	87.7	90.4	92.2	90.2	90.6	93.9	93.9
	10		442	1450	444	1455	27.0	77.6	81.9	84.3	90.3	90.3	95.0	92.6	92.6	94.3	86.4	86.5	90.6	92.4	89.7	89.7	93.4	93.4
		Average	444	1454	444	1455	20.0	78.8	82.8	85.6	91.8	92.5	95.5	93.2	93.5	96.0	87.7	87.9	90.8	92.6	90.1	91.4	94.2	94.2
2	1	4	854	2800	856	2805	32.5	73.8	78.4	77.8	82.8	82.8	86.0	84.2	84.2	86.5	82.9	82.9	85.6	87.4	85.3	85.3	88.6	88.6
	2		852	2790	852	2790	27.5	66.7	72.3	72.0	77.5	77.5	80.6	77.9	77.9	78.5	74.9	75.0	77.2	79.0	79.0	79.2	82.3	82.3
	3		854	2800	854	2800	26.5	69.7	75.4	74.6	79.9	79.9	83.3	80.6	80.6	84.1	75.6	75.6	78.4	80.2	79.5	79.5	82.2	82.2
	4		860	2820	860	2820	20.0	70.5	75.7	75.5	81.4	81.4	84.8	82.3	82.3	85.3	78.3	78.4	80.8	82.6	81.5	81.5	84.7	84.7
	5		848	2780	848	2780	27.0	69.3	73.7	74.5	80.3	80.3	84.8	81.0	81.0	83.4	76.7	76.7	89.3	81.1	80.5	80.5	84.2	84.2
	6		854	2820	854	2820	31.0	67.6	72.2	71.7	76.9	76.9	78.9	77.3	77.3	79.2	74.6	74.7	76.7	78.5	79.1	79.1	81.2	81.2
	7		854	2800	854	2800	36.5	64.7	70.8	68.9	73.7	73.7	76.2	75.6	75.6	77.1	73.9	74.0	76.0	77.8	77.1	77.1	79.7	79.7
	8		854	2800	854	2800	37.0	63.9	69.4	68.2	73.5	73.5	76.0	74.6	74.6	76.8	72.9	73.1	75.3	77.1	76.6	76.6	79.1	79.1
	9		854	2800	854	2800	31.0	69.9	75.1	74.9	80.2	80.2	82.3	80.3	80.3	82.5	77.0	77.2	79.6	81.4	81.9	81.9	83.3	83.3
	10		833	2730	833	2730	23.5	72.7	78.1	77.4	82.8	82.8	85.7	83.7	83.7	86.3	80.8	80.9	83.4	85.2	84.4	84.5	87.3	87.3
		Average	852	2794	853	2795	29.3	68.9	74.1	73.6	78.9	78.9	81.9	79.8	79.8	82.0	76.8	76.9	80.2	81.0	80.5	80.5	83.3	83.3

TABLE VIII.- NOISE MEASUREMENTS DURING LANDING APPROACH OPERATIONS – Concluded

Profile	Run	Station	Altitude		Slant range		d_{av}, sec	Max. dB(A)	Max. dB(C)	Max. dB(N)	Max. PNdB	Max. $PNdB_{t1}$	Max. $PNdB_{t2}$	Peak PNdB	Peak $PNdB_{t1}$	Peak $PNdB_{t2}$	EPNdB	$EPNdB_{t1}$	$EPNdB_{t2}$	EPNL(FAA)	EEPNdB	$EEPNdB_{t1}$	$EEPNdB_{t2}$	EPNL(FAA)(app)
			m	ft	m	ft																		
3	1	1	104	340	104	340	6.0	93.7	97.8	101.4	108.3	110.7	110.1	109.5	111.6	111.2	100.0	101.3	101.5	103.3	103.1	104.9	104.3	104.3
	2		104	340	104	340	5.5	96.2	100.8	103.4	110.2	111.4	111.5	111.4	111.4	112.7	102.1	102.9	103.6	105.4	105.0	105.7	106.3	106.3
	3		110	360	110	360	6.5	95.3	98.7	102.3	109.3	111.2	110.6	110.2	112.2	111.6	100.8	101.8	102.2	104.0	103.6	105.5	104.9	104.9
	4		116	380	116	380	6.0	94.3	99.1	101.1	108.4	110.0	109.6	109.1	111.1	110.5	100.6	101.5	102.1	103.9	103.2	104.8	104.4	104.4
	5		113	370	113	370	6.0	95.7	98.6	103.0	109.6	109.6	110.8	110.3	110.3	111.5	101.4	101.4	102.5	104.3	104.3	104.3	105.6	105.6
	6		915	300	945	310	6.0	98.4	103.7	104.8	111.8	111.8	112.9	112.7	112.7	113.8	104.0	104.0	105.3	107.1	107.0	107.0	108.2	108.2
	7		110	360	110	360	6.0	96.2	101.4	102.7	109.9	111.3	110.9	111.1	111.1	112.3	102.0	102.3	103.3	105.1	105.5	106.1	106.6	106.6
	8		110	360	110	360	6.0	96.5	102.6	102.8	110.2	110.2	111.3	111.2	111.2	112.4	102.4	102.4	103.7	105.5	105.4	105.4	107.0	107.0
	9		113	370	104	375	6.0	94.7	99.9	101.4	108.6	108.6	109.8	109.3	109.3	110.5	100.7	100.7	101.9	103.7	103.8	103.8	105.0	105.0
	10		116	380	117	385	8.5	93.3	97.3	100.2	107.5	109.6	108.8	108.4	110.5	109.8	99.6	99.9	100.8	102.6	102.7	103.9	104.0	104.0
		Average	109	356	109	358	6.3	95.4	100.0	102.3	109.4	110.5	110.6	110.3	111.1	111.6	101.4	101.8	102.7	104.5	104.4	105.1	105.6	105.6
3	1	2	186	610	186	610	9.0	96.0	95.9	104.7	109.8	110.2	112.1	110.8	110.8	113.0	103.0	103.8	104.8	106.6	106.2	106.9	107.7	107.7
	2		177	580	177	580	8.5	94.6	95.0	103.0	108.4	108.4	109.9	108.8	108.8	108.8	101.6	101.7	102.9	104.7	104.7	105.1	106.3	106.3
	3		180	590	180	590	9.0	97.2	97.4	105.9	110.8	113.6	112.6	111.4	111.4	112.9	104.1	105.6	105.8	107.6	106.9	108.8	108.2	108.2
	4		183	600	185	605	8.5	94.7	96.6	103.1	108.7	109.9	110.1	109.9	109.9	109.9	102.7	103.8	104.4	106.2	105.4	106.9	106.8	106.8
	5		180	590	180	590	8.5	96.7	97.5	105.3	111.1	111.5	113.3	111.8	111.8	114.2	104.0	105.0	105.9	107.7	107.1	107.8	109.0	109.0
	6		168	550	168	550	10.0	96.8	97.4	105.5	111.2	112.6	112.7	111.8	111.8	113.3	104.4	105.4	106.0	107.8	107.6	108.6	109.1	109.1
	7		177	580	177	580	10.0	97.5	98.3	106.2	112.3	115.5	114.7	113.0	115.7	115.4	104.9	107.1	107.0	108.8	108.3	110.7	110.3	110.3
	8		180	590	180	590	9.0	95.8	97.2	104.3	110.1	110.1	111.4	110.7	110.7	112.1	103.3	103.8	104.7	106.5	106.5	106.8	107.8	107.8
	9		174	570	175	575	12.0	95.9	98.1	104.2	110.6	113.5	112.8	111.7	114.1	113.7	104.0	105.7	105.9	107.7	106.6	109.1	108.8	108.8
	10		189	620	191	625	10.0	96.4	99.6	104.6	110.9	113.7	112.8	112.3	114.6	114.3	104.6	105.4	106.4	108.2	107.6	109.3	109.2	109.2
		Average	179	588	180	590	9.5	96.2	97.3	104.7	110.4	111.9	112.2	111.2	112.0	112.8	103.7	104.7	105.4	107.2	106.7	108.0	108.3	108.3
3	1	3	293	960	294	965	15.5	83.4	86.5	90.9	97.7	100.3	99.3	98.4	98.4	99.9	92.0	92.9	94.0	95.8	95.4	97.3	97.5	97.5
	2		305	1000	305	1000	15.5	84.4	86.8	91.9	98.0	100.6	100.0	98.6	101.1	100.5	92.2	92.4	94.2	96.0	95.6	97.0	97.8	97.8
	3		308	1010	308	1010	13.0	82.2	84.2	89.7	95.9	95.9	98.0	96.5	96.5	96.5	89.3	89.4	91.5	93.3	93.1	93.1	95.3	95.3
	4		305	1000	305	1000	15.5	82.6	84.7	90.0	96.1	96.1	97.8	97.0	97.0	97.0	90.6	90.7	93.1	94.9	93.7	93.7	95.8	95.8
	5		311	1020	311	1020	16.5	81.5	84.3	88.9	94.9	96.4	99.0	95.6	95.6	100.0	89.3	90.0	92.7	94.5	92.5	94.2	96.8	96.8
	6		274	900	278	910	12.5	83.8	86.8	91.3	97.8	100.2	99.4	98.6	98.6	100.0	92.7	93.4	94.4	96.2	95.8	96.6	97.8	97.8
	7		287	940	290	950	17.0	86.1	88.3	94.1	100.8	103.5	102.9	101.7	101.7	103.6	95.0	96.1	96.9	98.7	98.1	99.9	99.9	99.9
	8		324	1060	326	1070	15.0	83.5	86.4	90.9	97.4	98.8	101.5	97.9	97.9	100.5	92.2	92.5	95.4	97.2	95.4	96.5	99.9	99.9
	9		290	950	298	975	15.0	87.1	90.5	93.9	100.3	100.3	102.0	100.8	100.8	102.4	92.3	92.3	95.4	97.2	96.3	96.3	98.4	98.4
	10		296	970	301	985	14.0	84.7	88.7	92.0	98.5	99.4	101.8	98.9	98.9	101.1	92.8	93.6	95.5	97.3	96.0	96.4	98.8	98.8
		Average	299	981	302	989	15.0	83.9	86.7	91.4	97.7	99.2	100.2	98.4	98.6	100.2	91.8	92.3	94.3	96.1	95.2	96.1	97.7	97.7
3	1	4	695	2280	695	2280	31.5	65.3	70.5	70.8	77.0	77.0	80.3	79.3	79.3	82.6	73.7	73.7	75.6	77.4	78.0	78.0	81.1	81.1
	2		684	2240	683	2240	24.5	68.8	72.8	72.9	78.1	78.1	81.5	80.7	80.7	84.0	75.6	75.6	77.3	79.1	79.9	79.9	82.2	82.2
	3		677	2220	677	2220	28.5	66.1	70.2	70.0	75.1	75.1	76.6	76.0	76.0	77.5	73.5	73.7	75.5	77.3	77.4	77.4	79.0	79.0
	4		975	2210	975	2210	26.5	66.4	73.9	71.1	77.1	79.1	79.0	78.3	78.3	79.7	75.7	76.2	77.6	79.4	78.9	80.5	80.8	80.8
	5		665	2180	665	2180	33.5	69.0	73.6	74.4	80.9	80.9	84.2	83.1	83.1	86.4	77.6	77.6	80.8	82.6	81.7	81.7	84.6	84.6
	7		720	2360	720	2360	40.0	66.2	71.8	71.3	77.6	77.6	80.9	80.0	80.0	83.3	70.7	70.8	72.5	74.3	77.3	77.3	79.1	79.1
	8		616	2020	618	2025	26.0	66.9	74.5	72.1	76.4	76.4	78.1	79.2	79.2	82.5	74.2	74.2	76.6	78.4	78.6	78.6	80.4	80.4
	9		641	2100	943	2105	26.0	67.4	73.6	72.7	78.8	78.9	82.1	80.7	80.7	84.0	73.9	74.0	76.2	78.0	79.5	79.5	82.7	82.7
	10		625	2050	625	2050	23.0	68.9	78.5	75.0	79.7	79.7	83.0	84.3	84.3	87.6	78.3	78.4	80.6	82.4	83.0	83.0	86.2	86.2
		Average	666	2184	667	2186	28.8	67.2	73.3	72.3	77.9	78.1	80.6	80.2	80.2	83.1	74.8	74.9	77.0	78.8	79.4	79.5	81.8	81.8



(a) View looking west.



L-66-4562.1

(b) View looking east.

Figure 1.- Test area at NASA Wallops Station used for take-off—climbout and landing-approach noise studies, showing runway and terrain in vicinity of measuring stations.

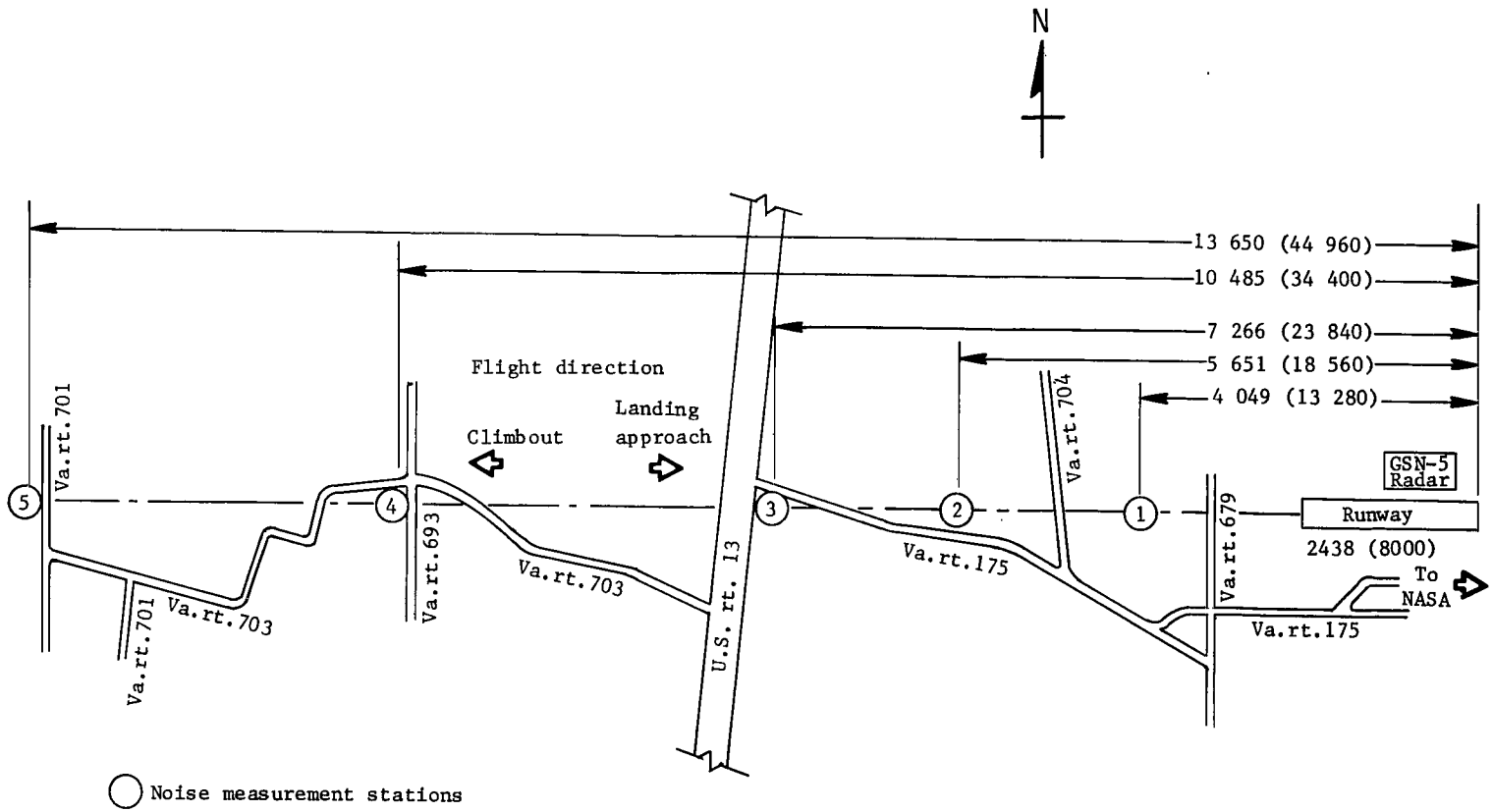
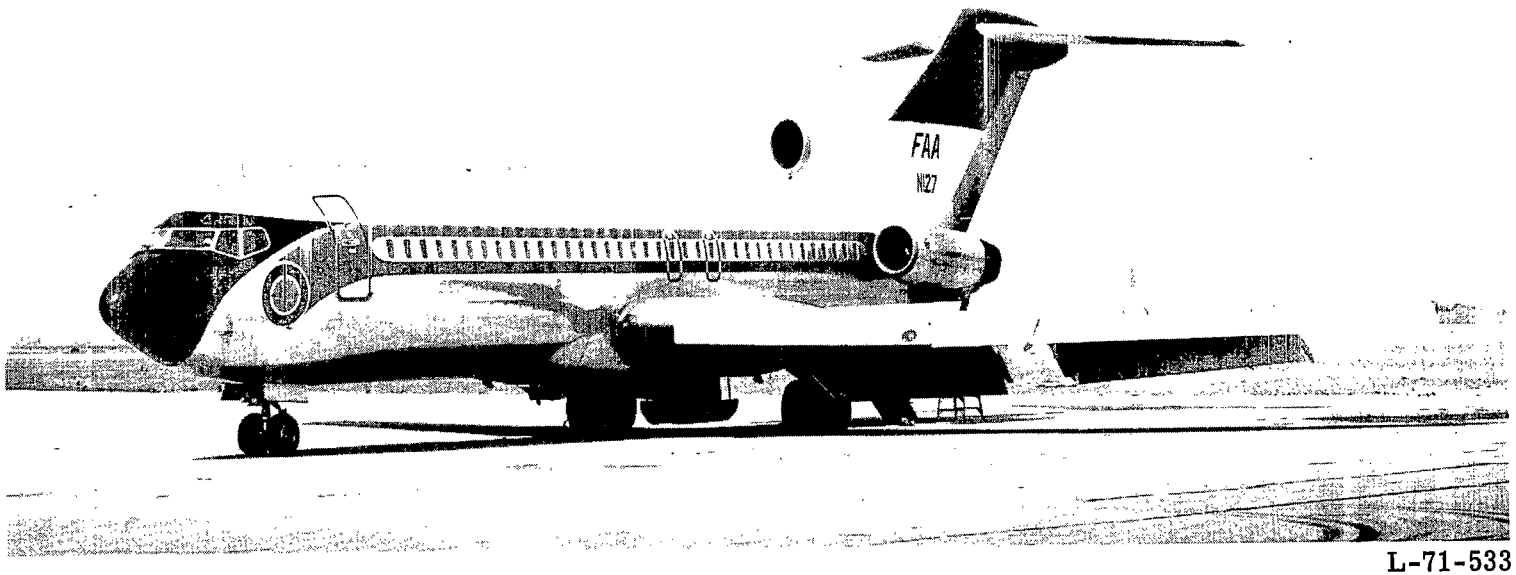
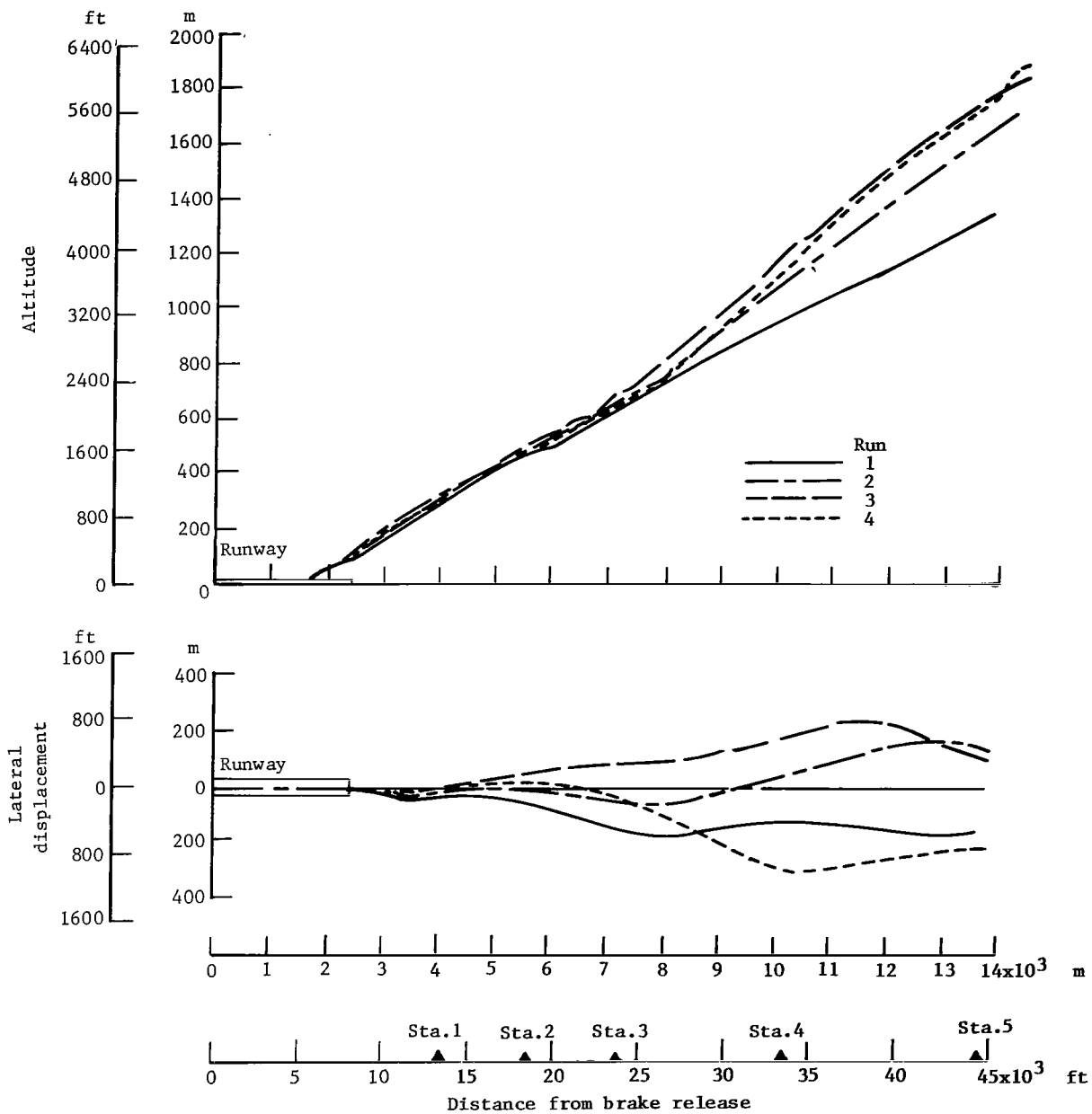


Figure 2.- Schematic of Wallops Station acoustic test range. Dimensions are in meters (feet).



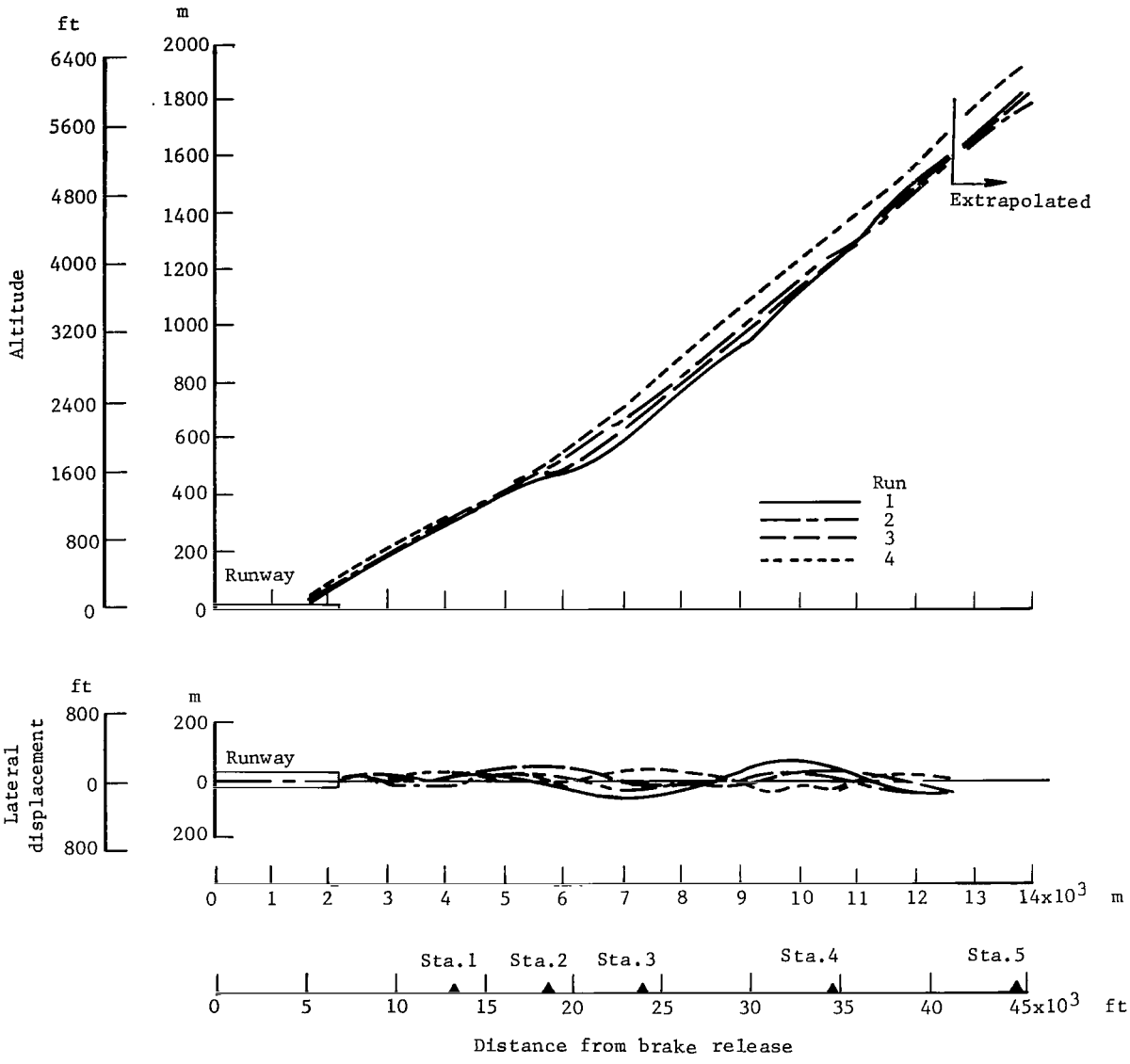
L-71-533

Figure 3.- Test airplane.



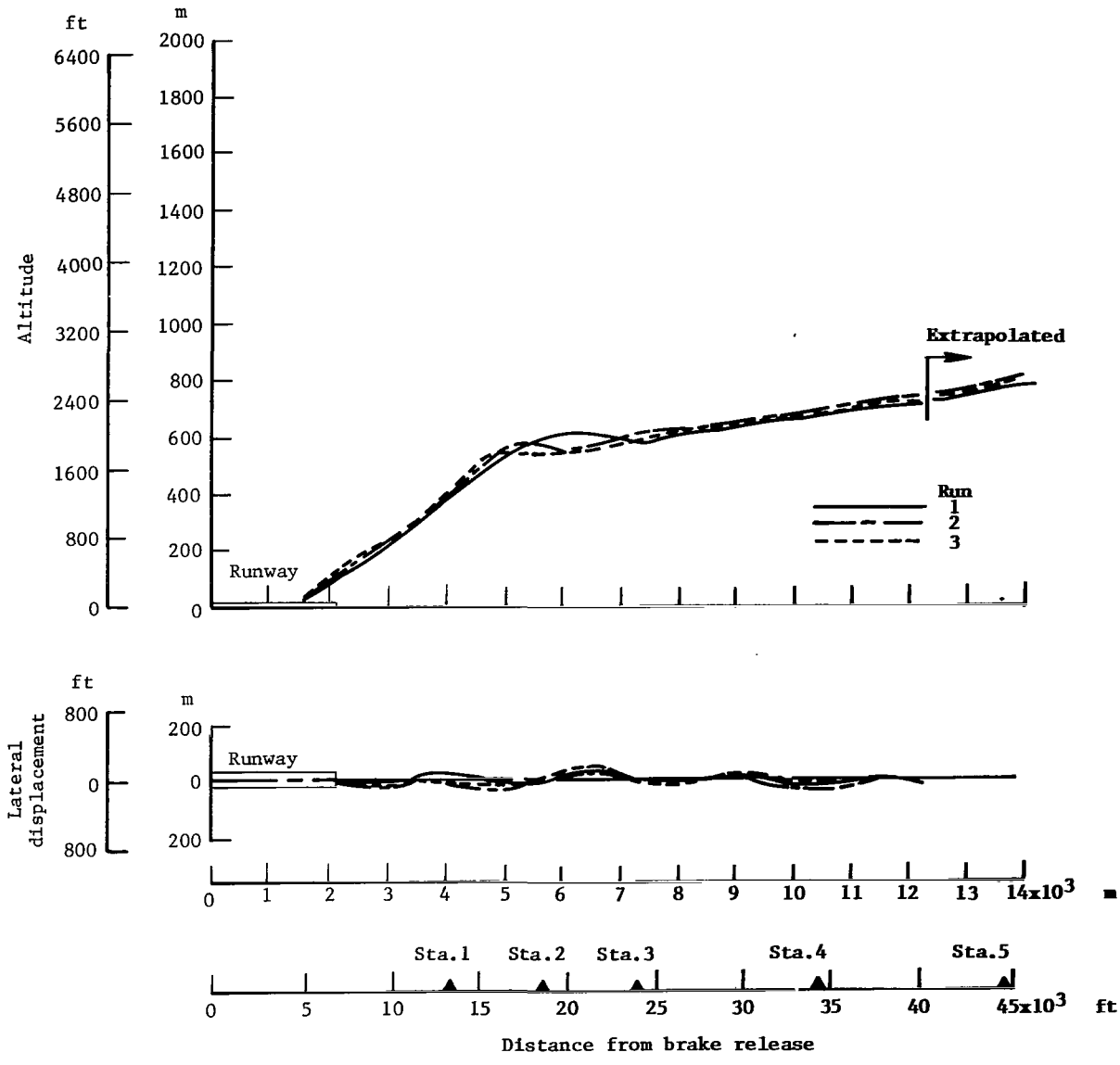
(a) Profile 1.

Figure 4.- Altitude—plan-position data from ground-based radar for various climbout operations.



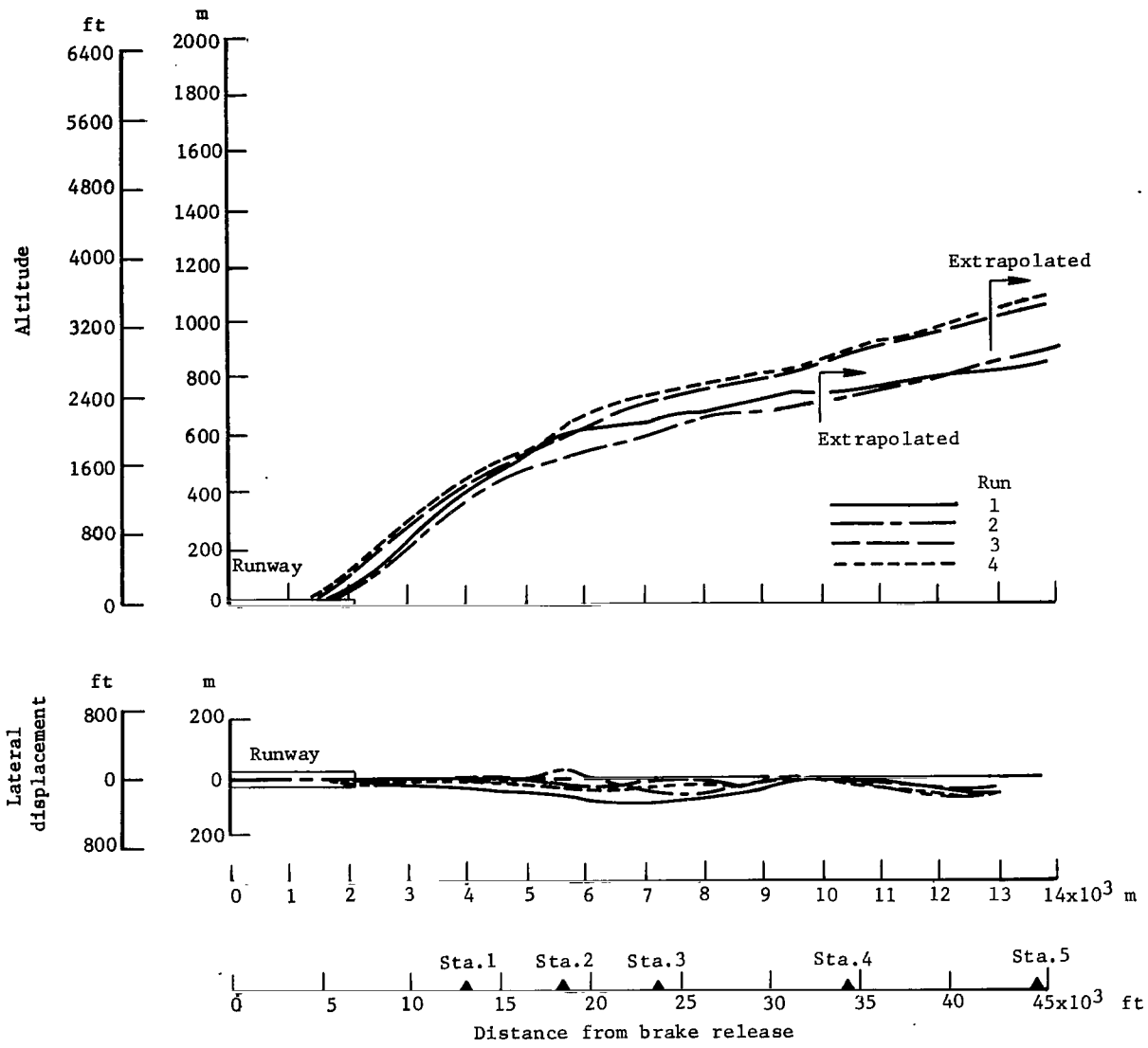
(b) Profile 2.

Figure 4.- Continued.



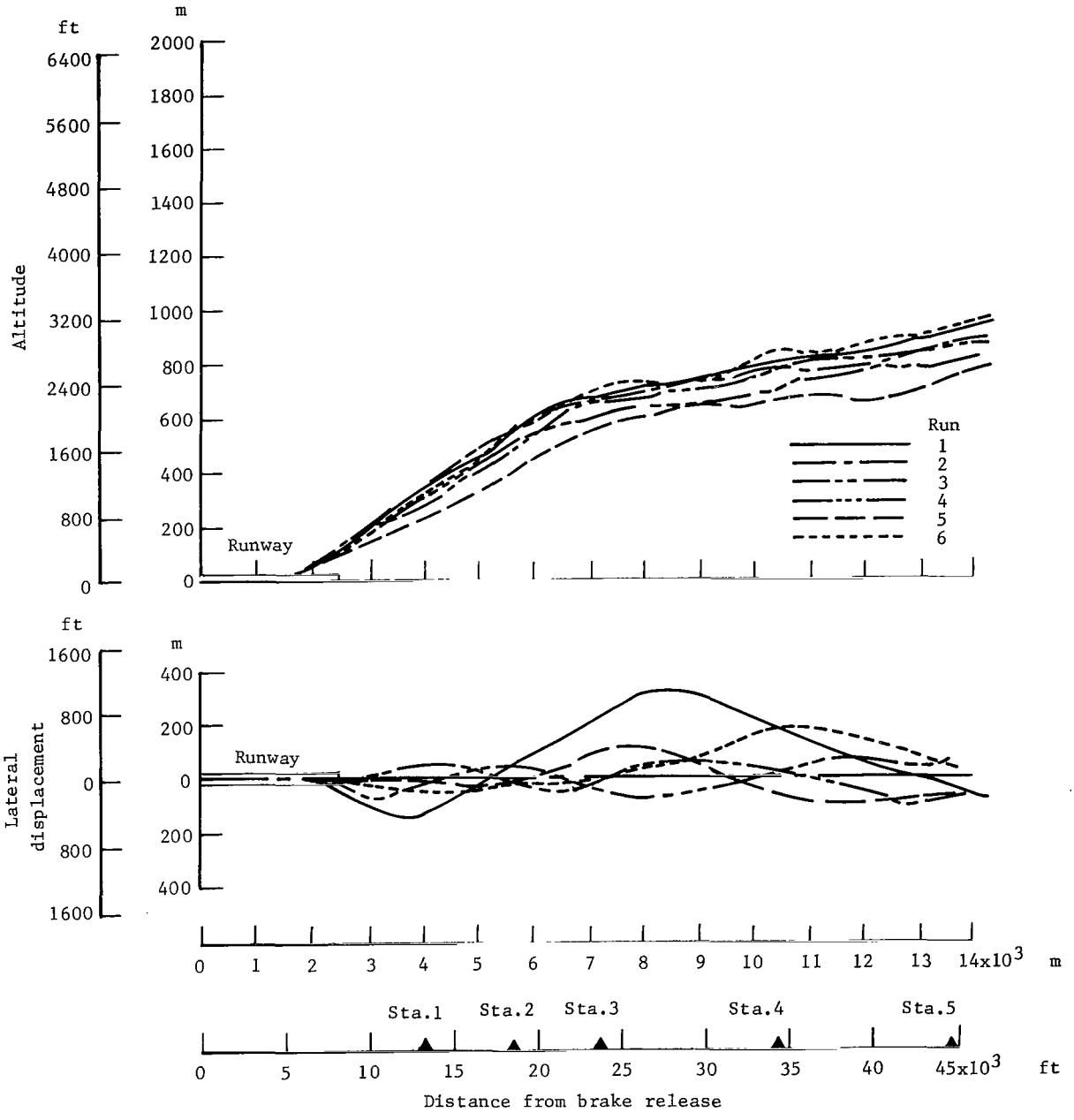
(c) Profile 3.

Figure 4.- Continued.



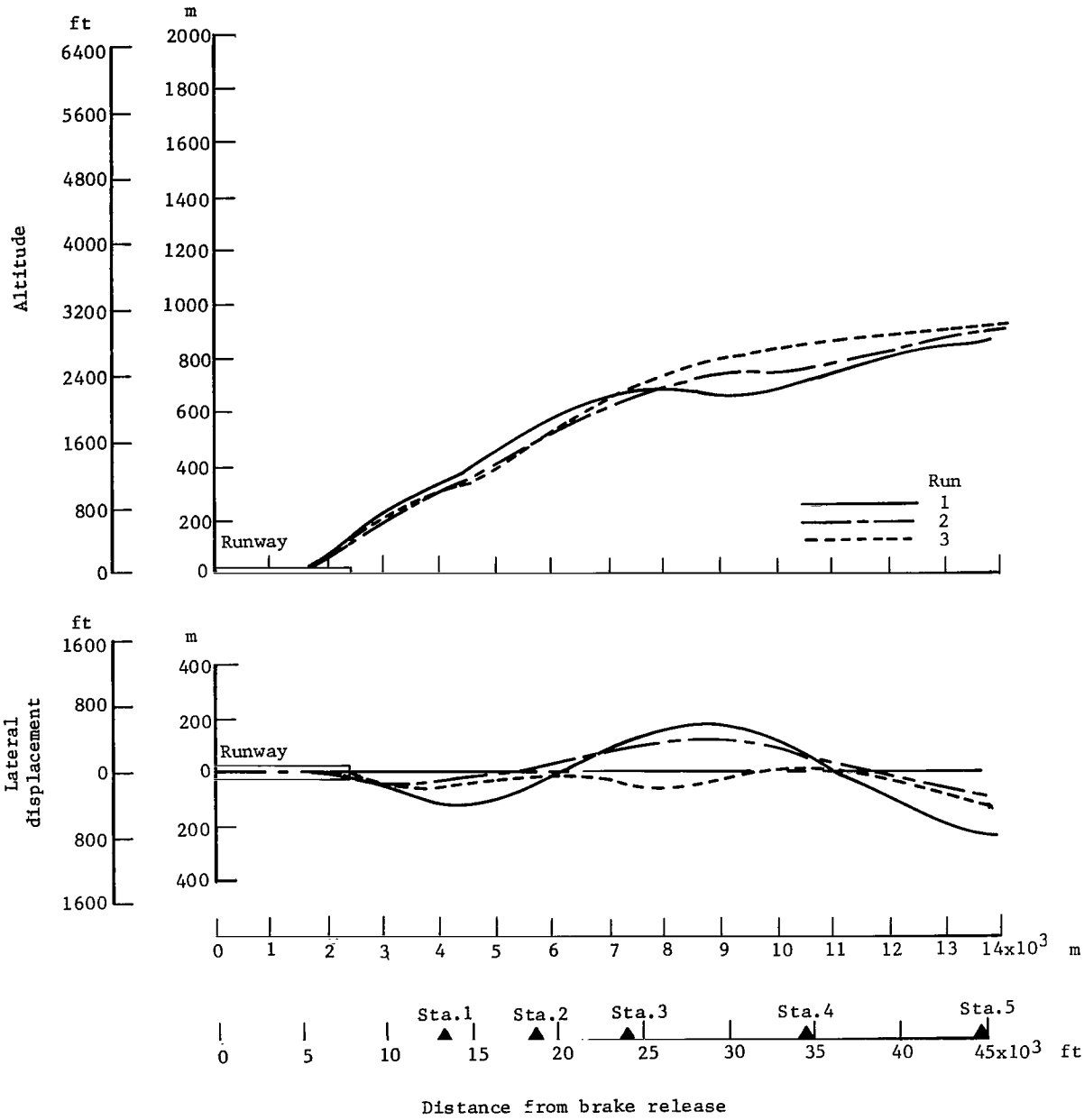
(d) Profile 4.

Figure 4.- Continued.



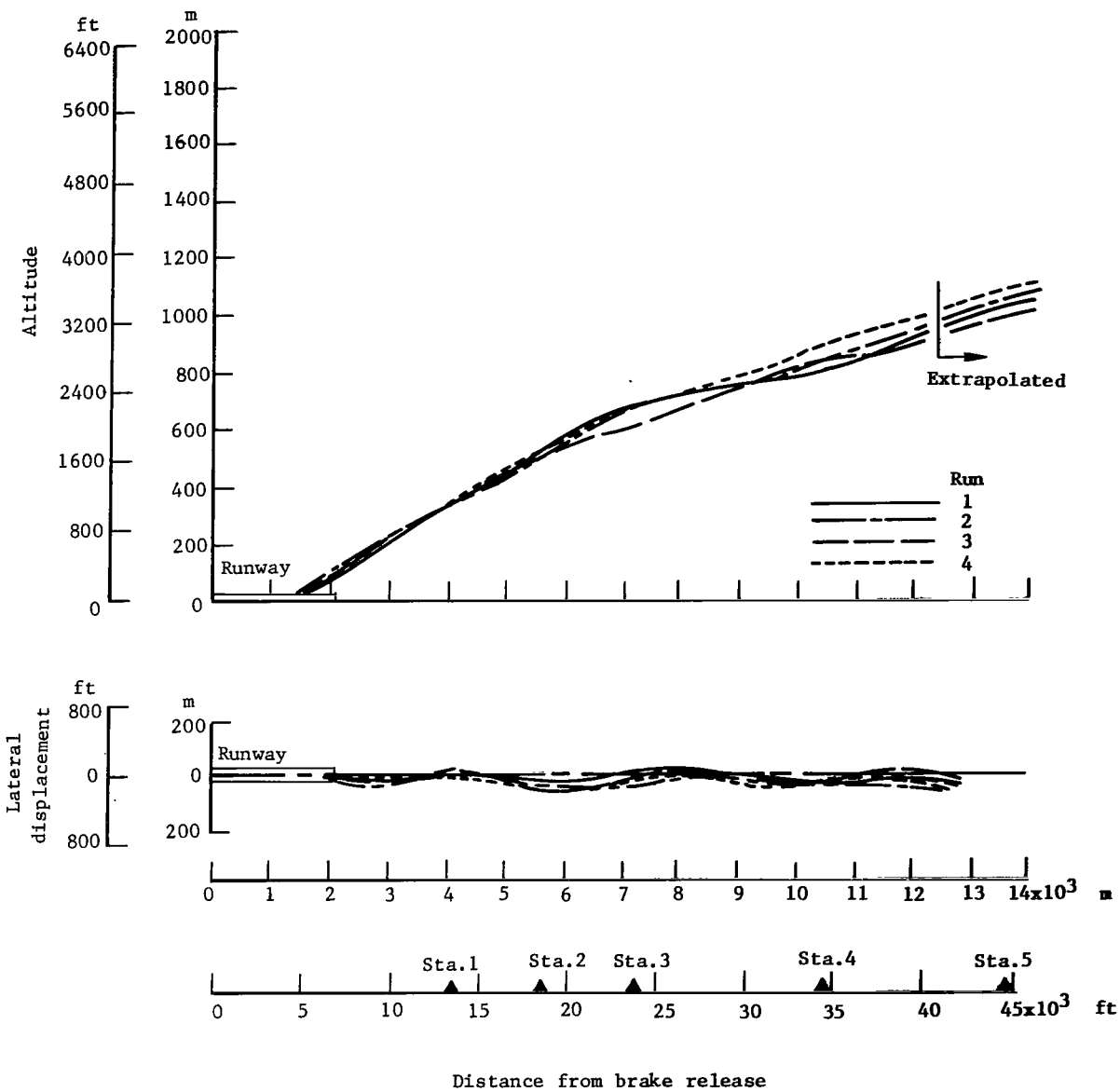
(e) Profile 5.

Figure 4.- Continued.



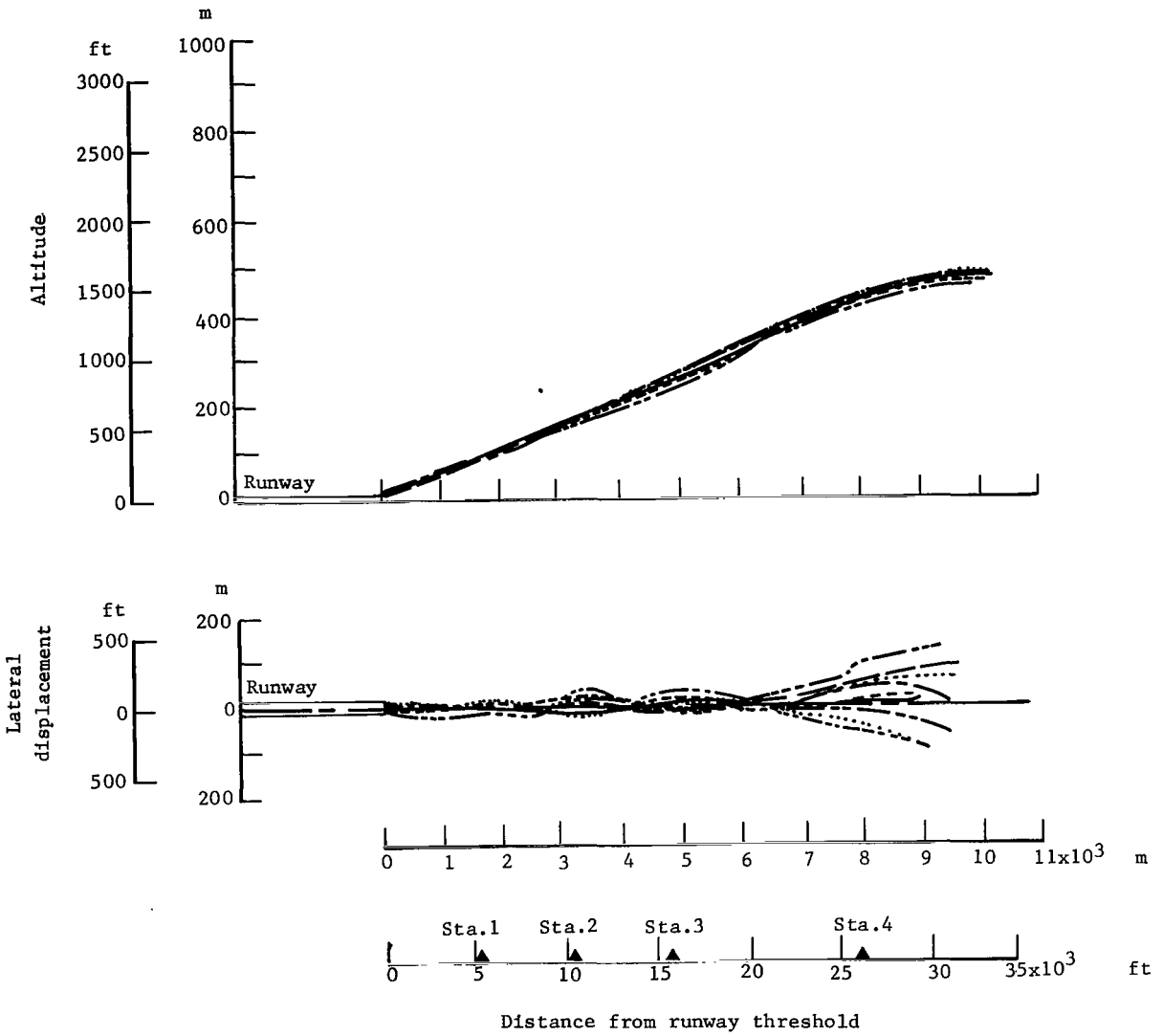
(f) Profile 6.

Figure 4.- Continued.



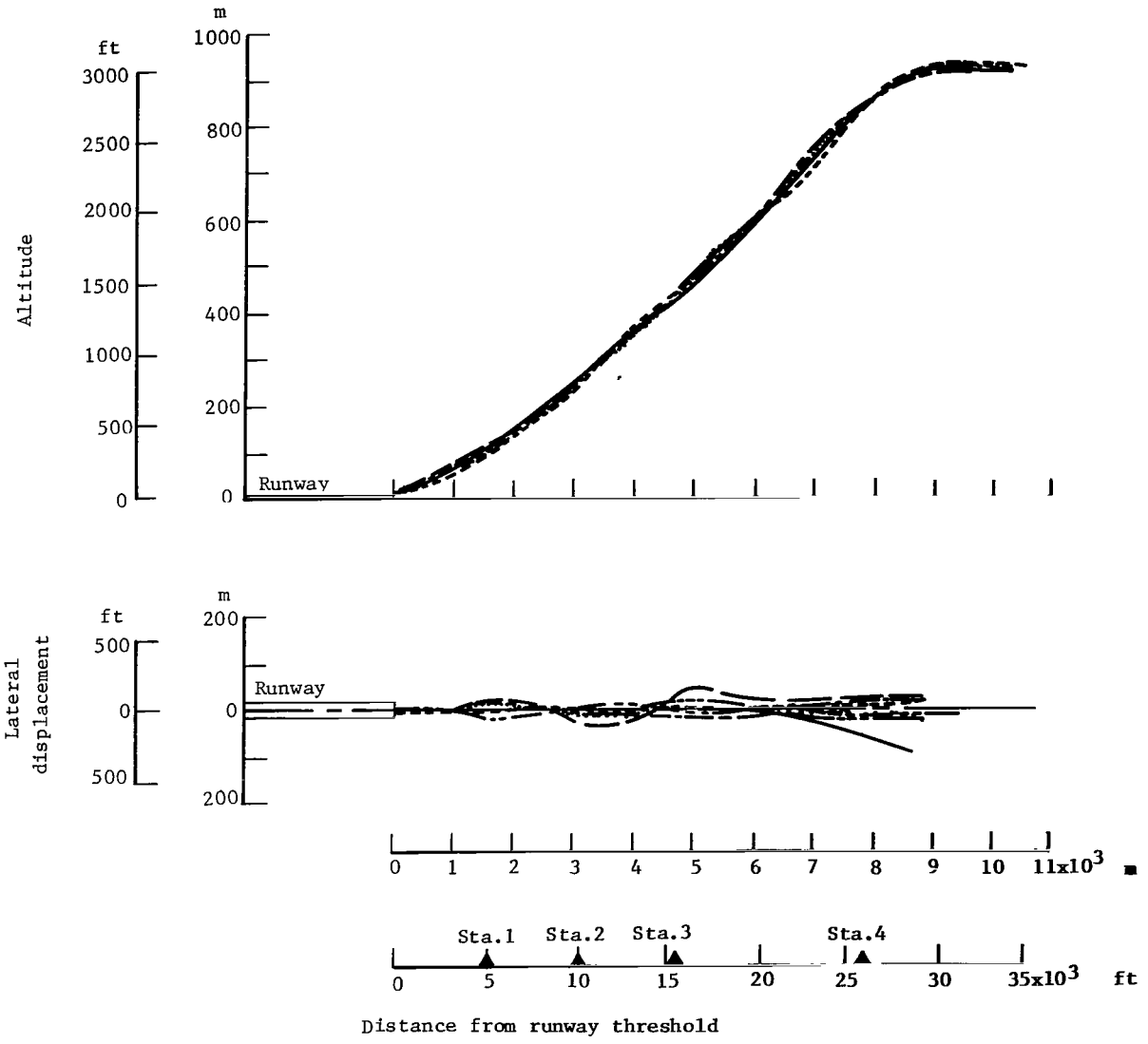
(g) Profile 7.

Figure 4.- Concluded.



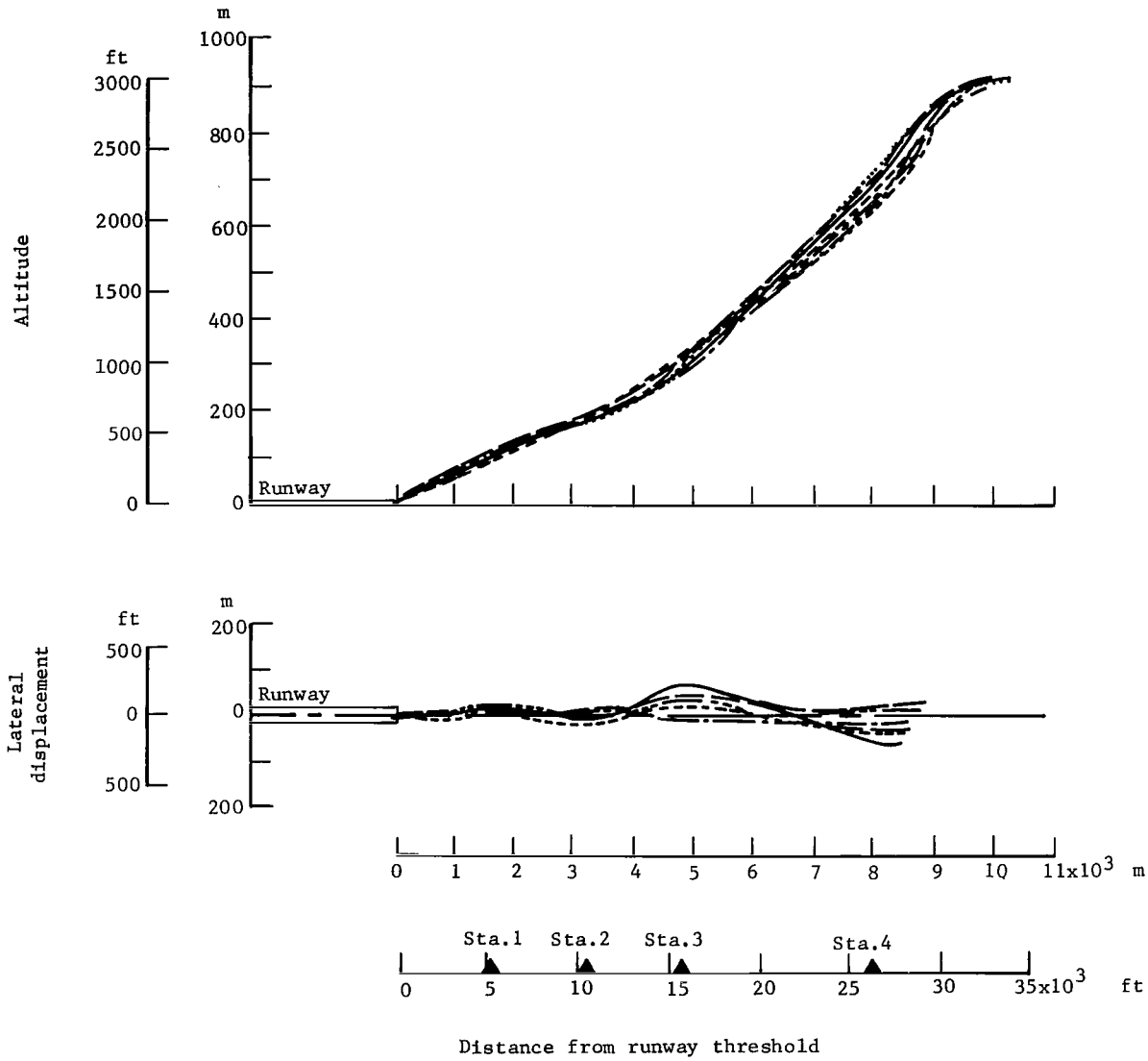
(a) Profile 1, 3^{o} single segment.

Figure 5.- Altitude—plan-position data from ground-based radar for various landing approach operations.



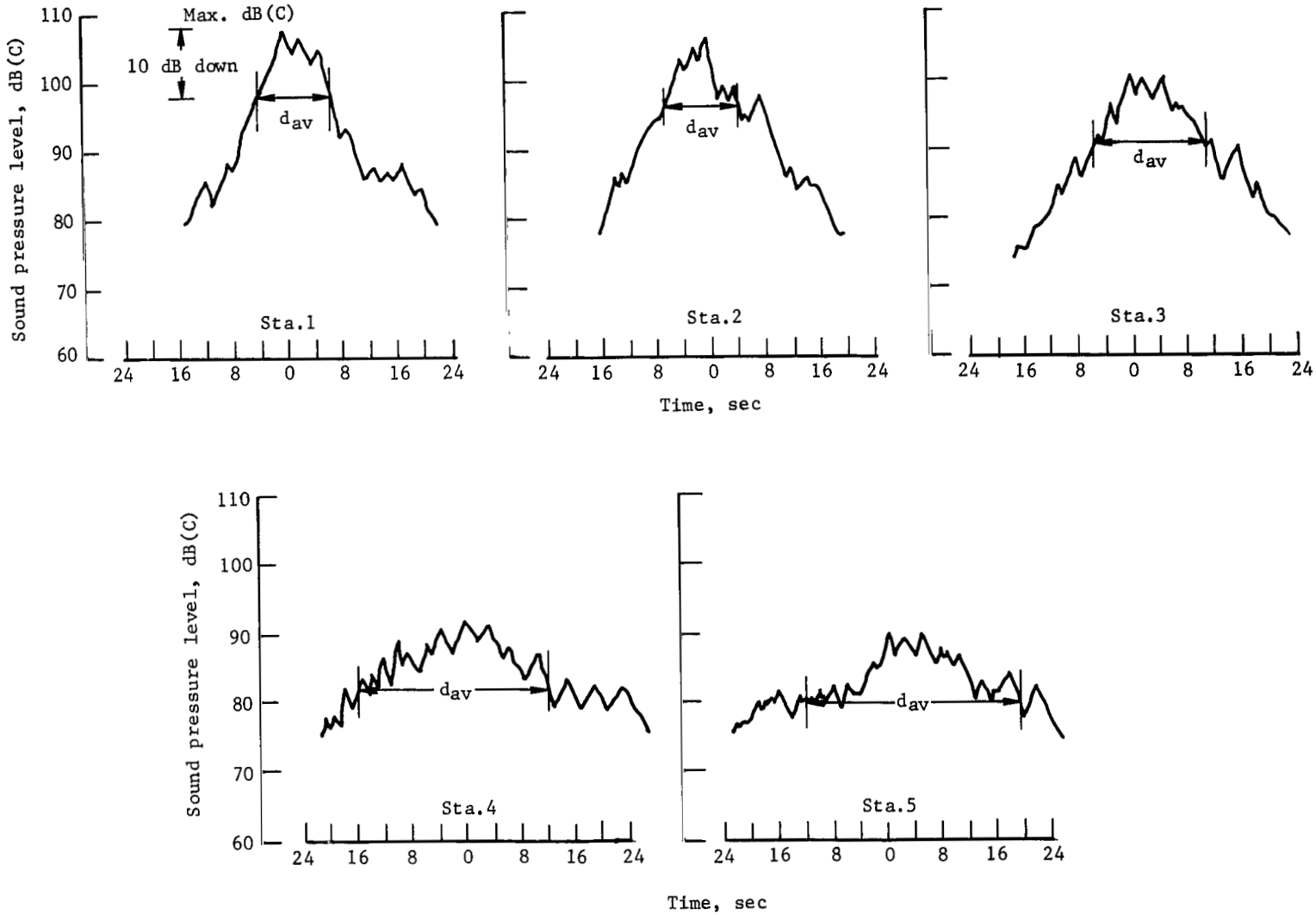
(b) Profile 2, 6^{o} single segment.

Figure 5.- Continued.



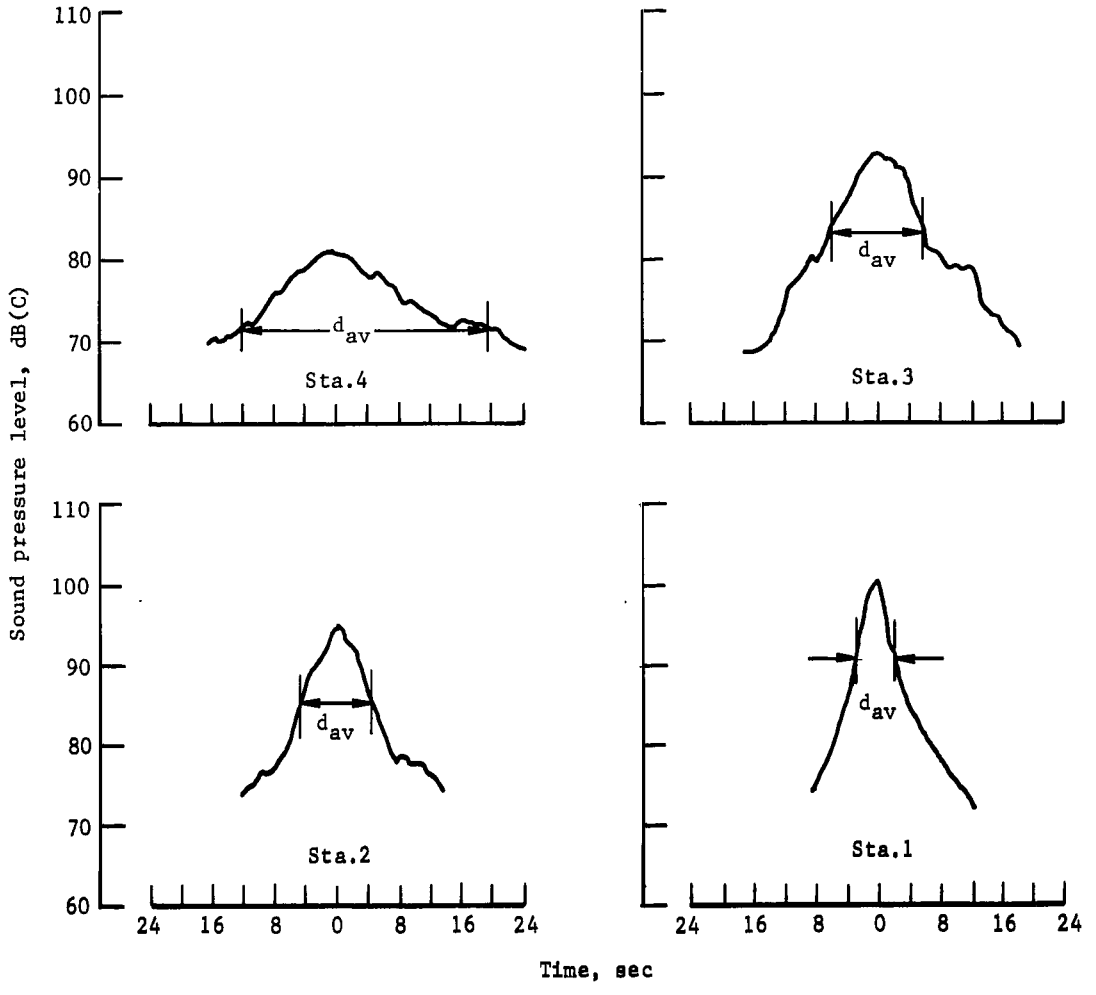
(c) Profile 3, 6^{o} to 3^{o} two segment.

Figure 5.- Concluded.



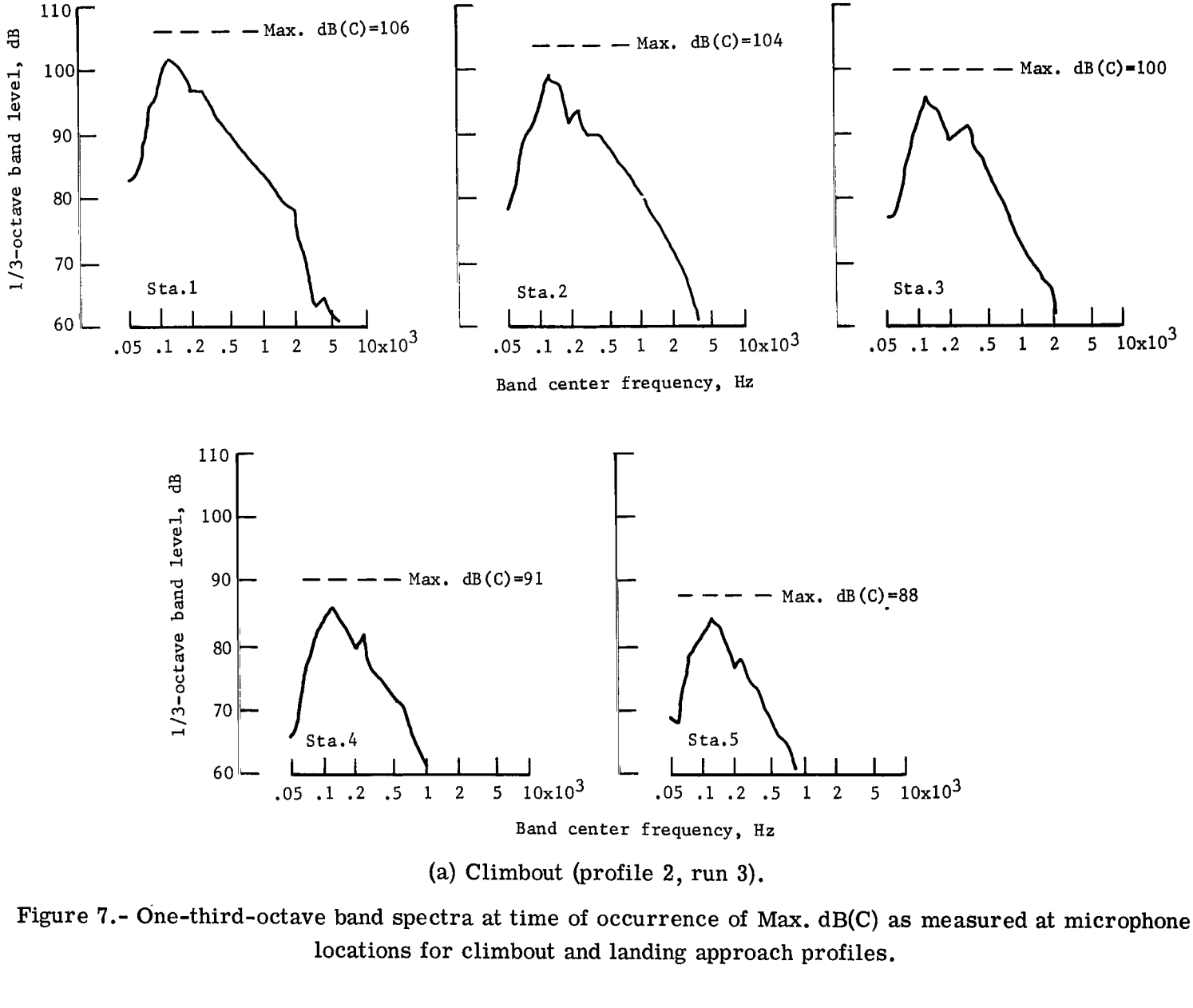
(a) Climbout (profile 2, run 3).

Figure 6.- Typical time histories of noise measured at ground stations.



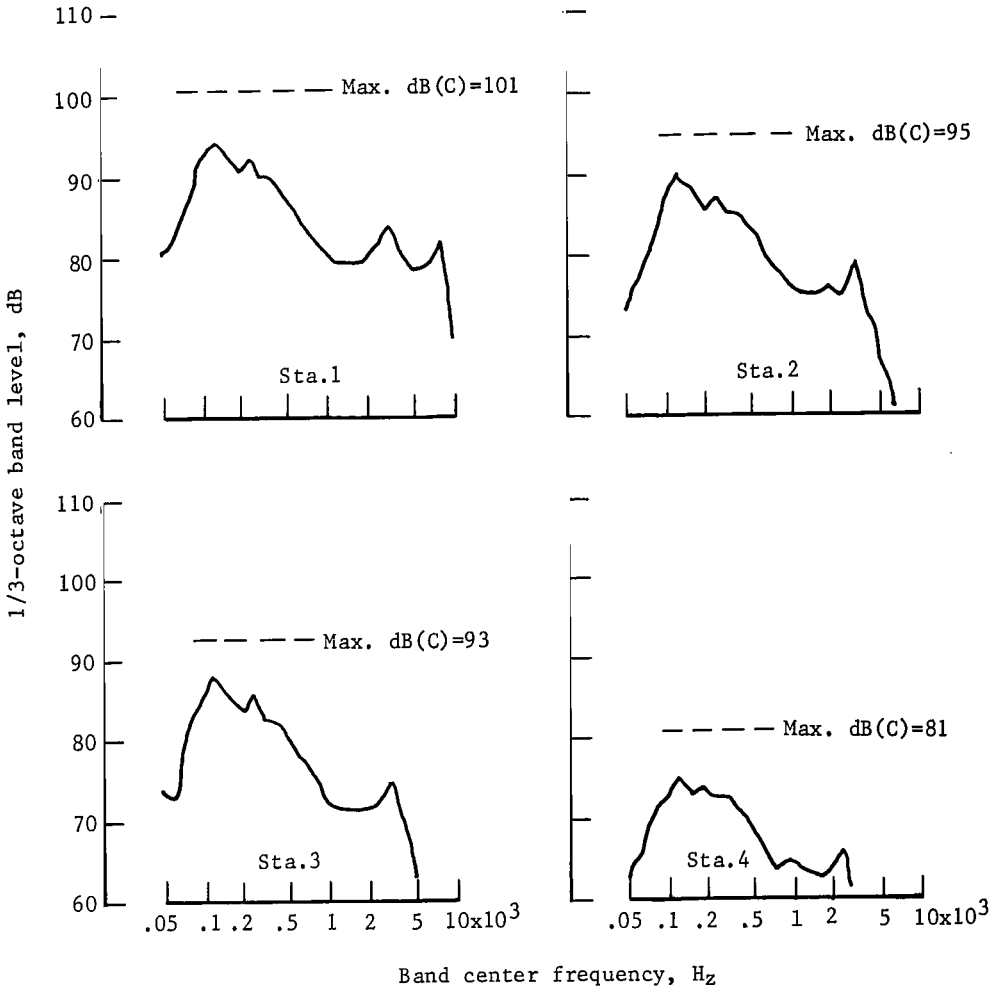
(b) Landing approach (profile 1, run 8).

Figure 6.- Concluded.



(a) Climbout (profile 2, run 3).

Figure 7.- One-third-octave band spectra at time of occurrence of Max. dB(C) as measured at microphone locations for climbout and landing approach profiles.



(b) Landing approach (profile 1, run 8).

Figure 7.- Concluded.

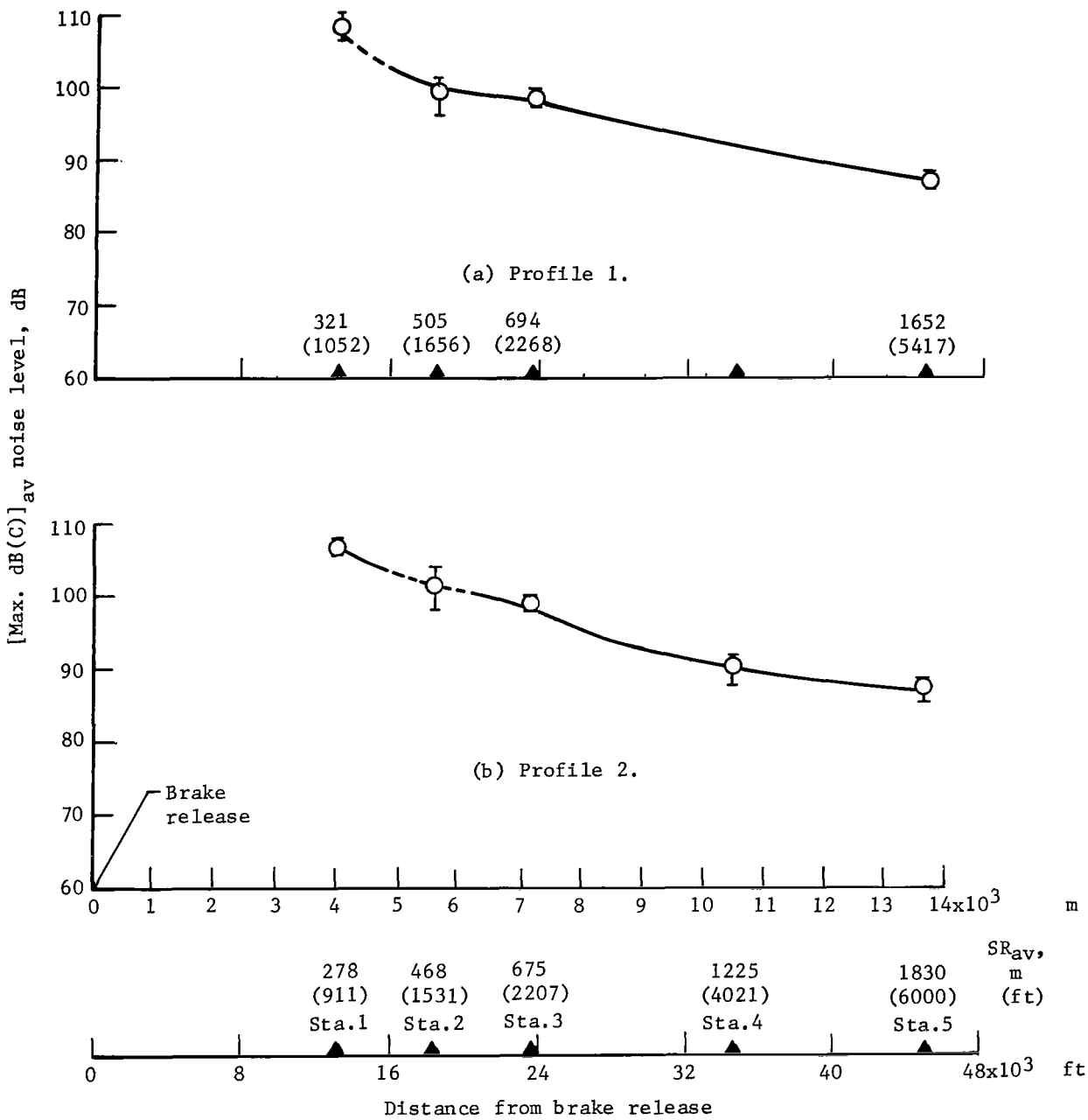


Figure 8.- Average values of sound pressure level measured along ground track of airplane for seven climbout profiles. Dash lines represent range in which power reductions were made.

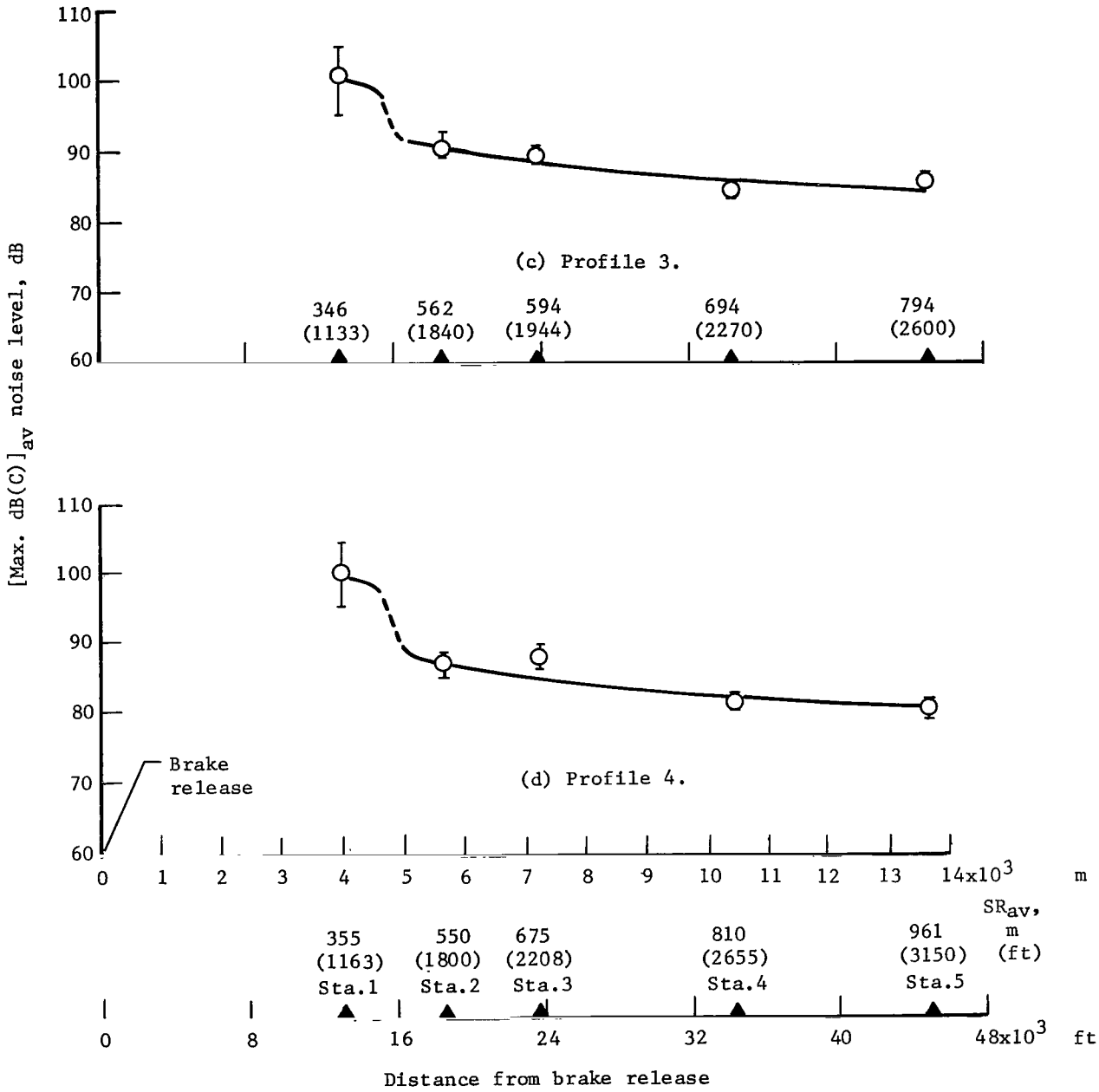


Figure 8.- Continued.

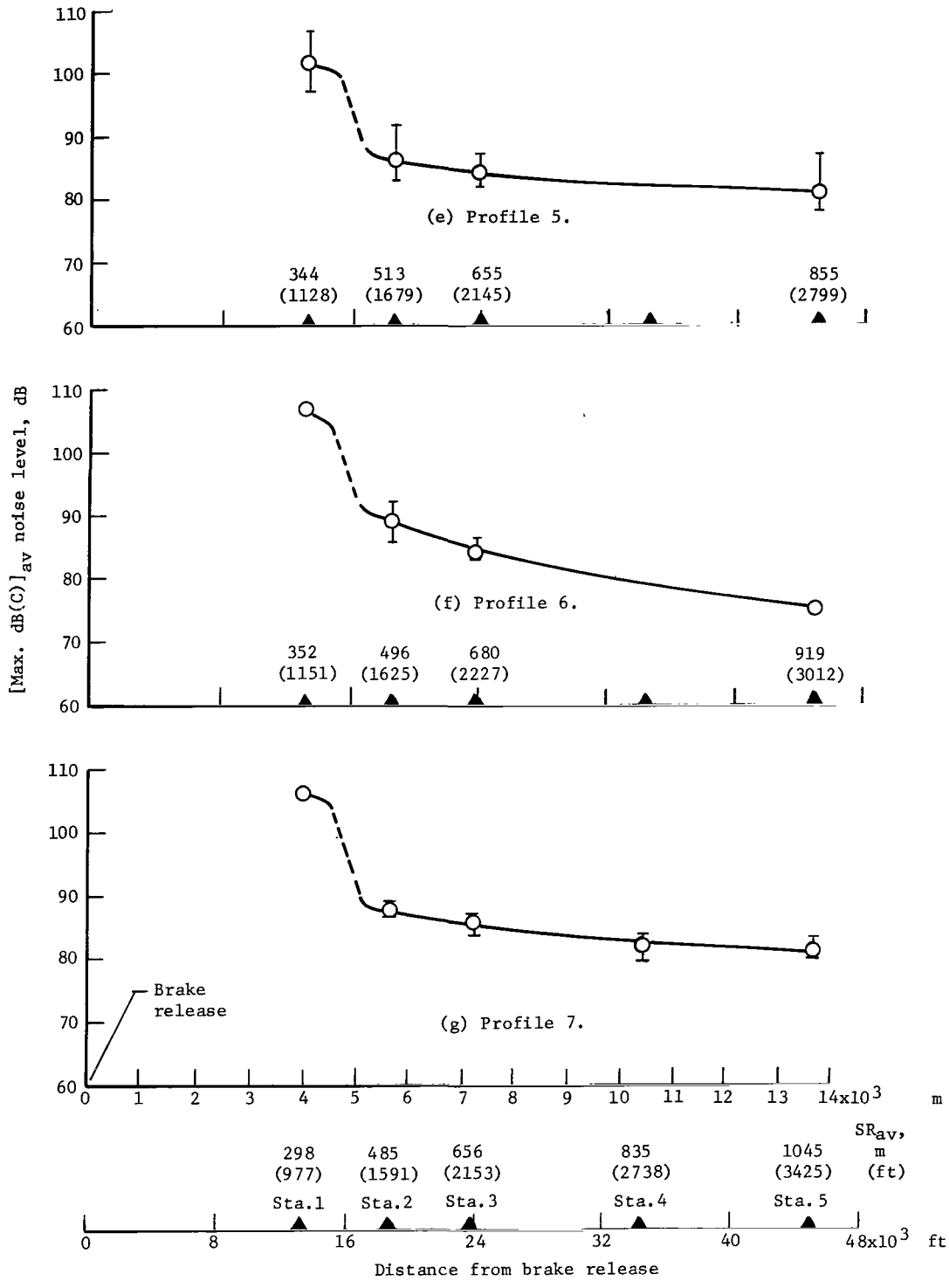


Figure 8.- Concluded.

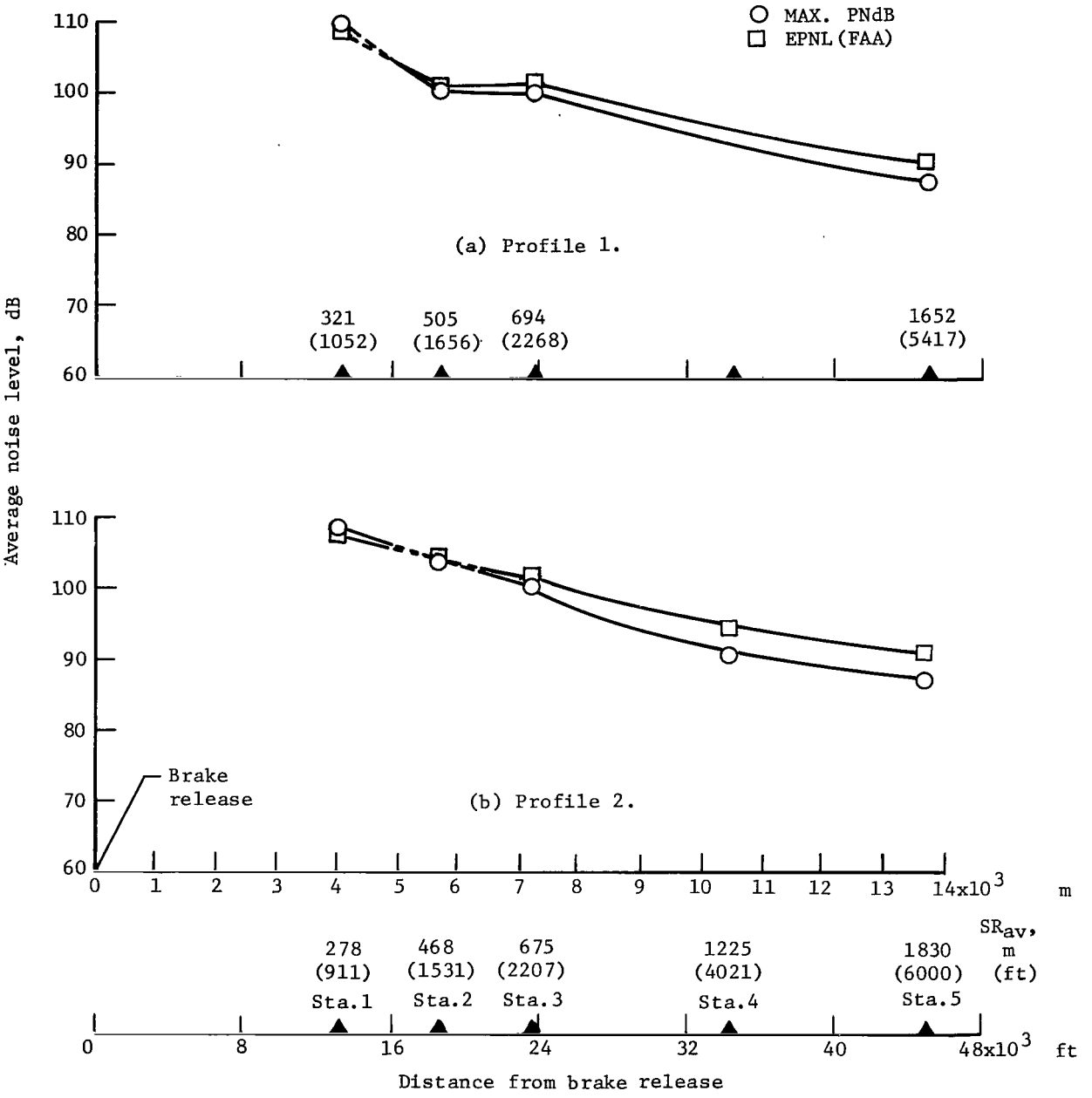


Figure 9.- Average values of perceived and effective perceived noise levels along ground track of airplane for seven climbout profiles. Dash lines represent range in which power reductions were made.

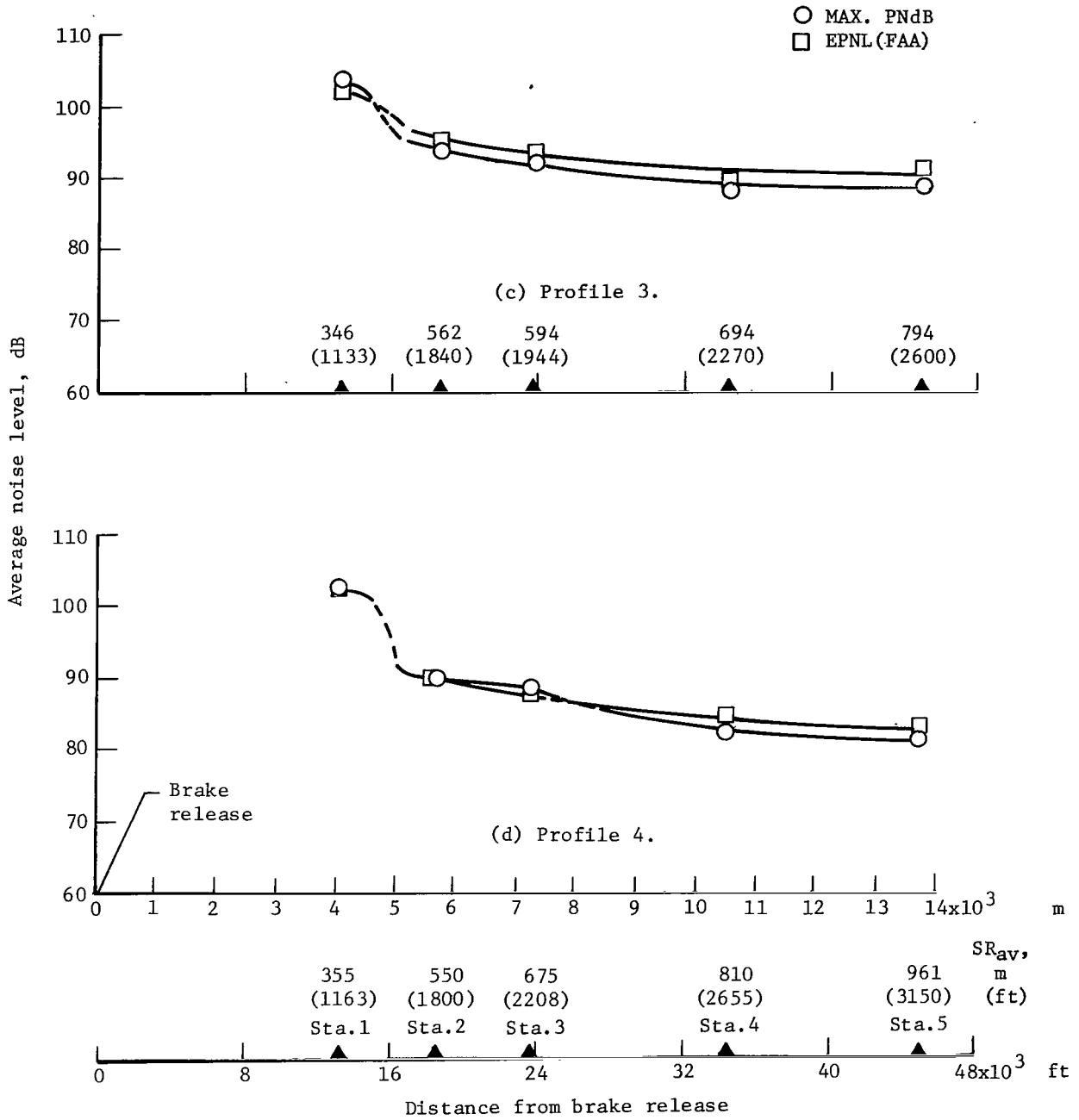


Figure 9.- Continued.

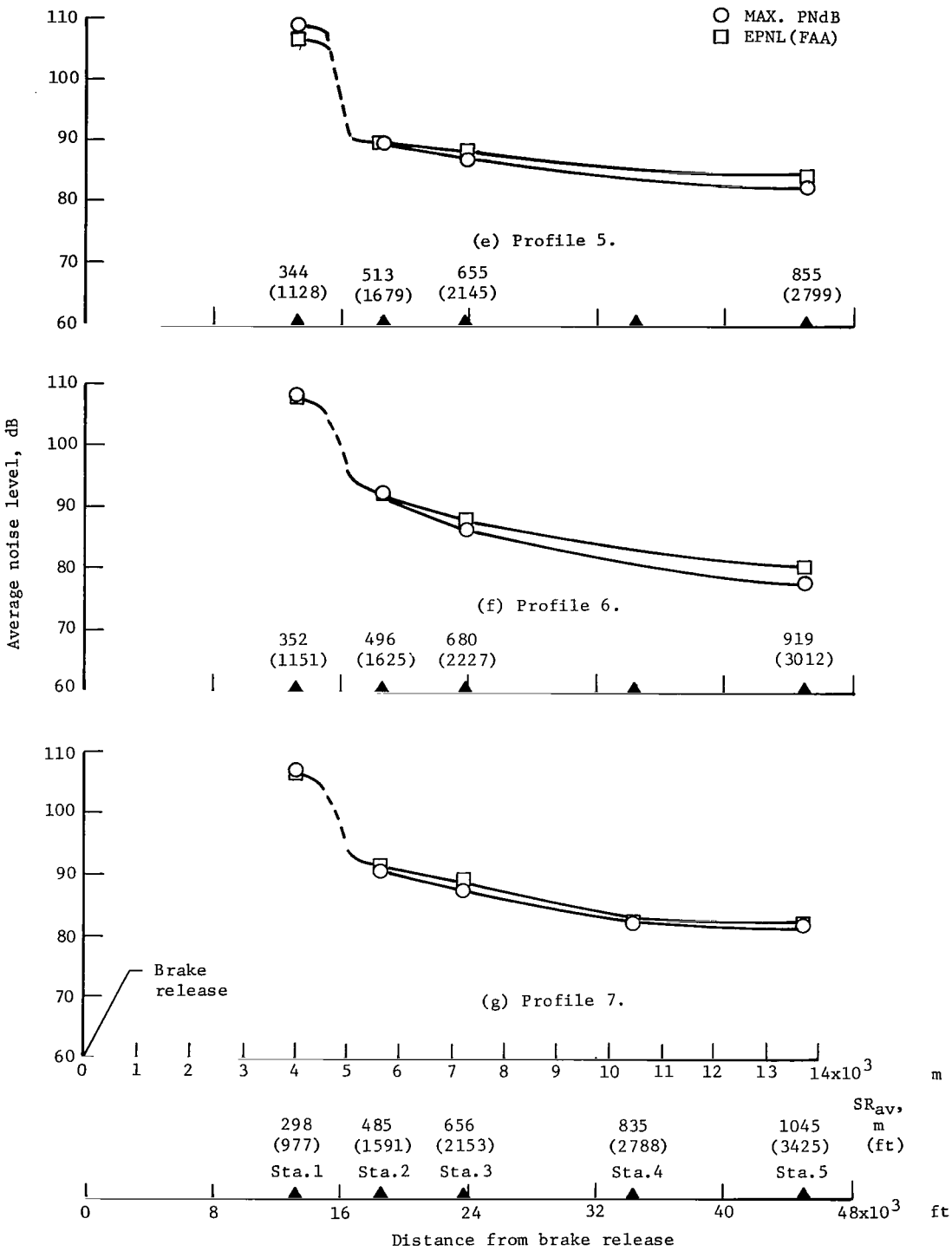


Figure 9.- Concluded.

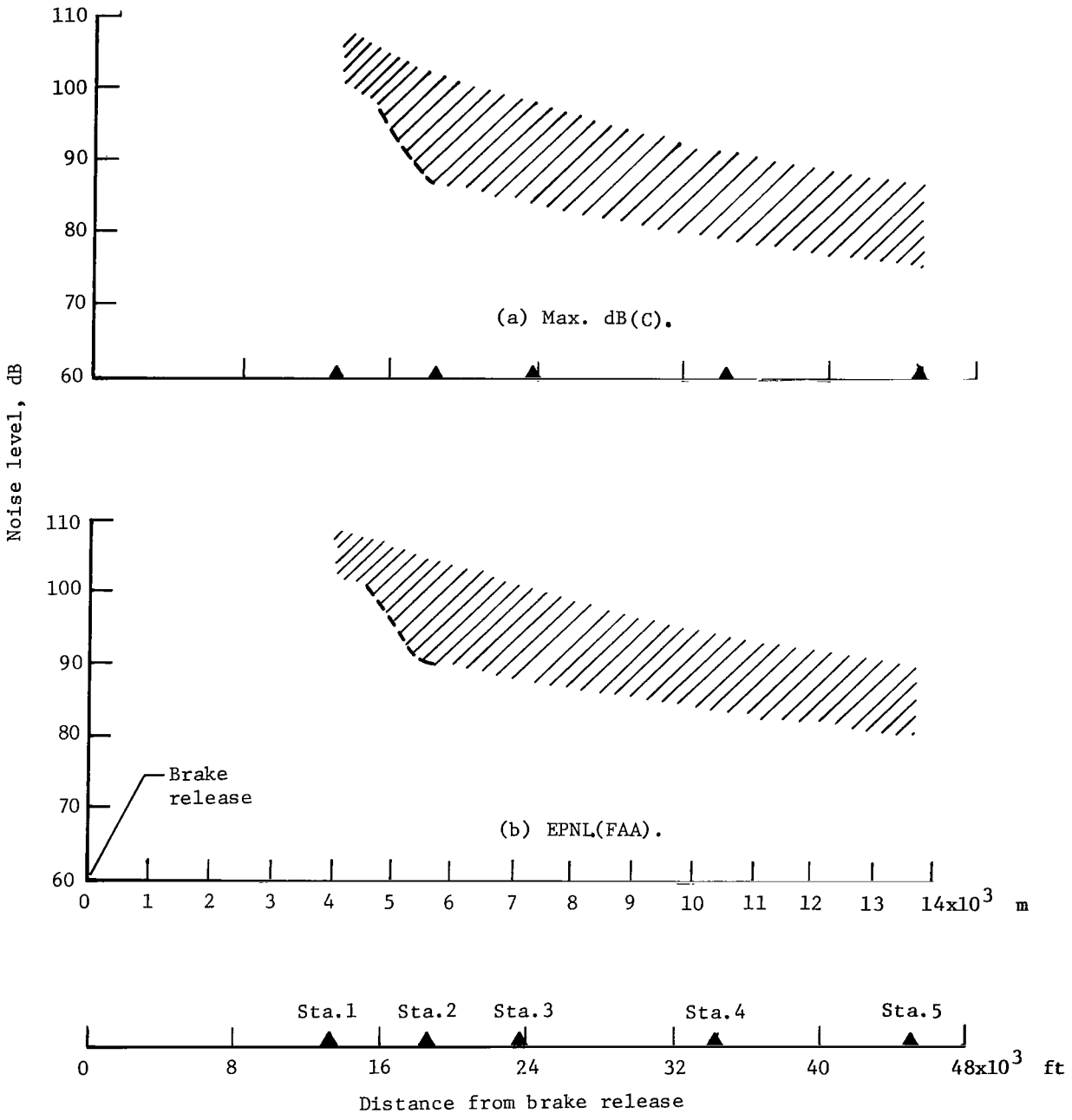


Figure 10.- Range of average values of noise levels measured along ground track of airplane for various power reduction procedures associated with seven climbout profiles.

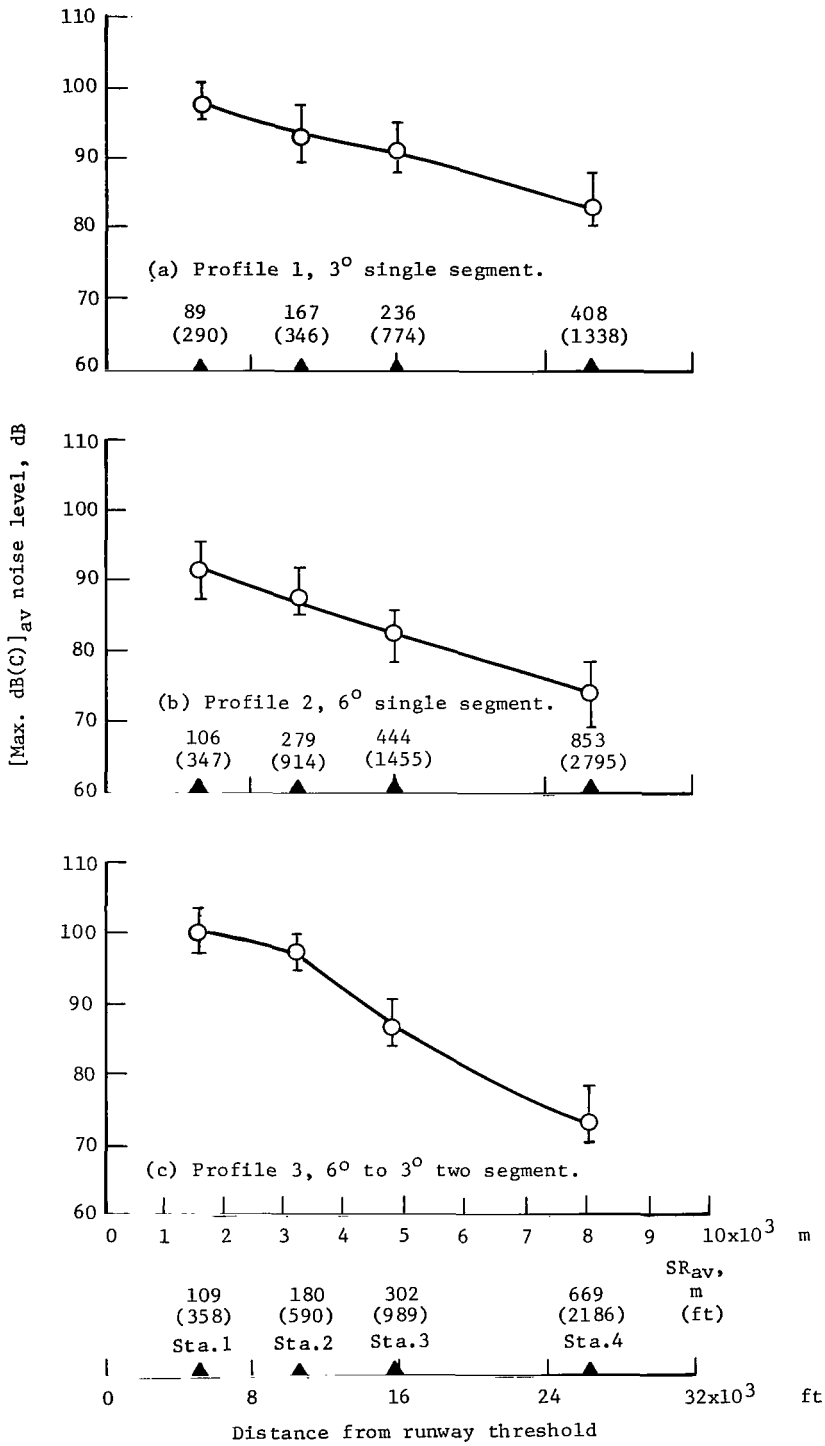


Figure 11.- Average values of sound pressure level measured along ground track of airplane for three landing approach profiles.

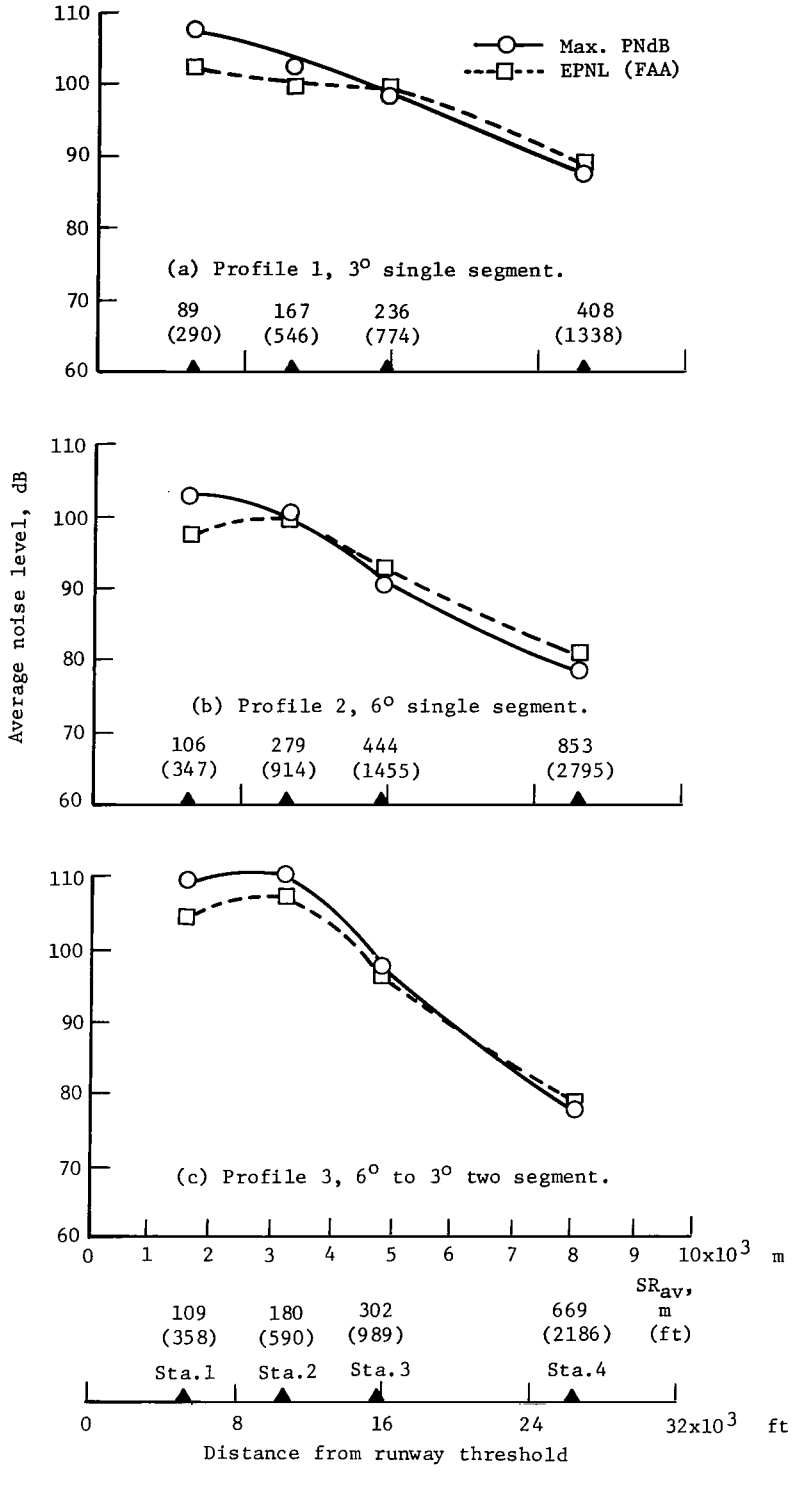


Figure 12.- Average values of perceived and effective perceived noise levels along ground track of airplane for three landing approach profiles.

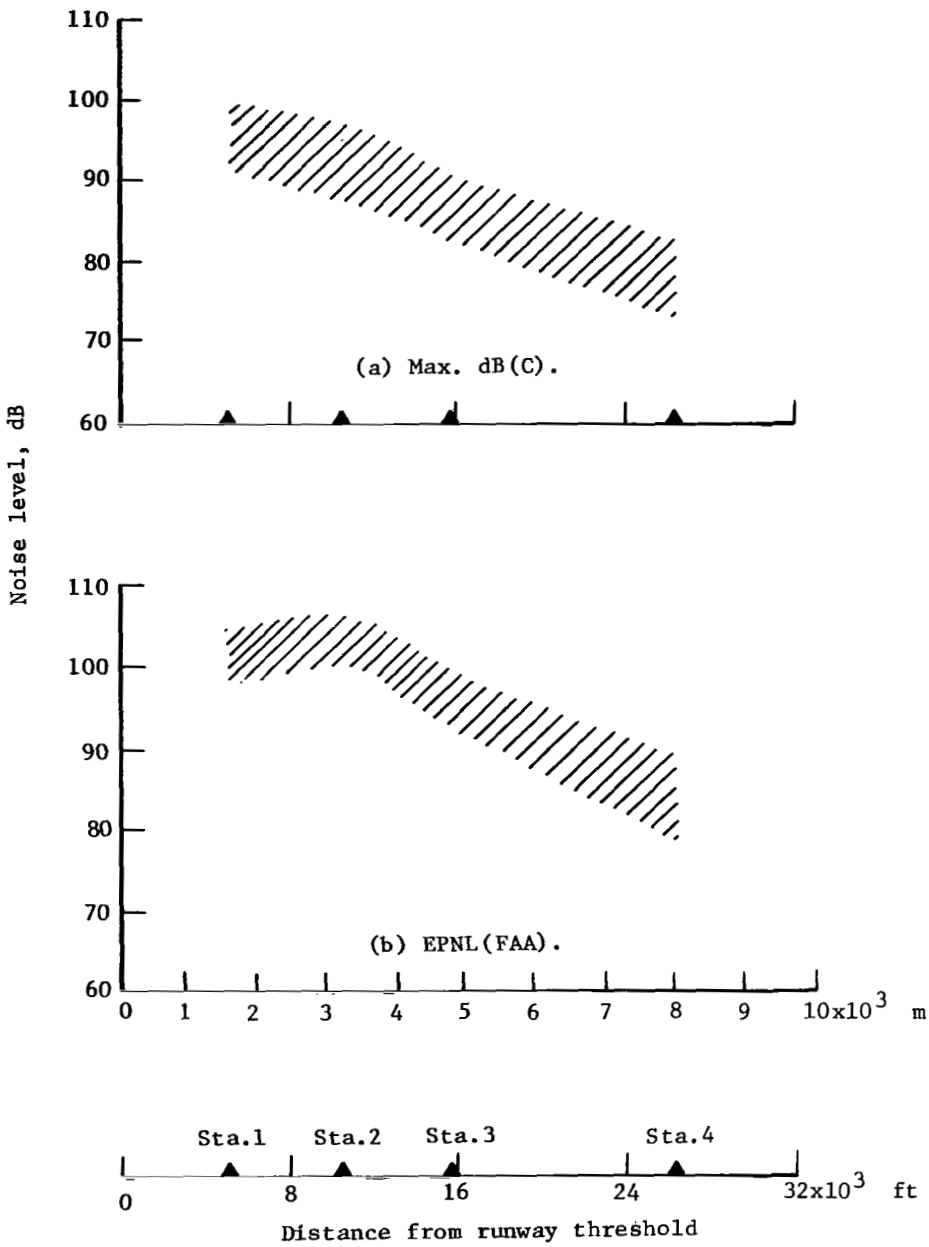


Figure 13.- Range of average values of noise levels measured along ground track of airplane for three landing approach profiles involving different glide-slope angles.

06U 001 27 51 3DS 71.10 00903
AIR FORCE WEAPONS LABORATORY /WLOL/
KIRTLAND AFB, NEW MEXICO 87117

ATT E. LOU BOWMAN, CHIEF, TECH. LIBRARY

"The aeronautical and space activities of the United States shall be conducted so as to contribute . . . to the expansion of human knowledge of phenomena in the atmosphere and space. The Administration shall provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof."

—NATIONAL AERONAUTICS AND SPACE ACT OF 1958

NASA SCIENTIFIC AND TECHNICAL PUBLICATIONS

TECHNICAL REPORTS: Scientific and technical information considered important, complete, and a lasting contribution to existing knowledge.

TECHNICAL NOTES: Information less broad in scope but nevertheless of importance as a contribution to existing knowledge.

TECHNICAL MEMORANDUMS: Information receiving limited distribution because of preliminary data, security classification, or other reasons.

CONTRACTOR REPORTS: Scientific and technical information generated under a NASA contract or grant and considered an important contribution to existing knowledge.

TECHNICAL TRANSLATIONS: Information published in a foreign language considered to merit NASA distribution in English.

SPECIAL PUBLICATIONS: Information derived from or of value to NASA activities. Publications include conference proceedings, monographs, data compilations, handbooks, sourcebooks, and special bibliographies.

TECHNOLOGY UTILIZATION PUBLICATIONS: Information on technology used by NASA that may be of particular interest in commercial and other non-aerospace applications. Publications include Tech Briefs, Technology Utilization Reports and Technology Surveys.

Details on the availability of these publications may be obtained from:

SCIENTIFIC AND TECHNICAL INFORMATION OFFICE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Washington, D.C. 20546