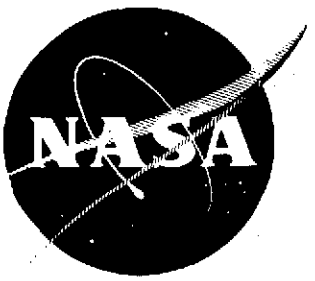
NASA CR 120986
BOEING D3-8686



ACOUSTIC ATTENUATION DESIGN REQUIREMENTS ESTABLISHED THROUGH EPNL PARAMETRIC TRADES

BY
HENRY F. VELDMAN

1972

THE BOEING COMPANY
WICHITA DIVISION - WICHITA, KANSAS, 67210

PREPARED FOR

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

NASA-LEWIS RESEARCH CENTER
CONTRACT NAS 3-14321
H. BLOOMER, PROJECT MANAGER

NASA CR 120986
BOEING D3-8686

TOPICAL REPORT

ACOUSTIC ATTENUATION DESIGN REQUIREMENT ESTABLISHED THROUGH EPNL PARAMETRIC TRADES

BY
HENRY F. VELDMAN

THE BOEING COMPANY
3801 SOUTH OLIVER
WICHITA, KANSAS 67210

PREPARED FOR
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
1972

CONTRACT NASA 3-14321

NASA-LEWIS RESEARCH CENTER
CLEVELAND, OHIO
H. BLOOMER, PROJECT MANAGER
V/STOL AND NOISE DIVISION

FOREWORD

The work described herein was done by The Boeing Company, Wichita Division, under NASA contract NAS 3-14321 with Mr. H. Bloomer, V/STOL and Noise Division, NASA-Lewis Research Center, as Project Manager.

ABSTRACT

A method is presented to establish acoustic attenuation design requirements through parametric trade studies using the subjective noise unit of effective perceived noise level (EPNL). Results obtained from these studies are then used with an optimization procedure to provide an acoustic lining configuration that is balanced with respect to engine performance losses and lining attenuation characteristics.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

SUMMARY

An analysis plan was developed for design of acoustically treated nacelles for suppression of fan generated noise from high bypass turbofan engines. The plan was followed in developing two conceptual nacelle designs. The first was a flight nacelle for the NASA/General Electric quiet engine typical of a 707/DC-8 class airplane installation. The quiet engine nacelle design was modified to a design for the NASA Lewis quiet fan. Measured noise data from the NASA quiet fan were used for acoustic design of both conceptual nacelles. This plan included a trade study to select lining attenuation requirements which would provide a 10 EPNdB reduction in flyover noise.

The procedure developed includes a systematic variation of the far field acoustic spectra for each component of the engine noise source and the corresponding change in PNL/EPNL associated with the acoustic spectra variations. Results obtained from these studies are used together with an optimization procedure to minimize the amount of acoustic treatment for a balanced acoustic design that includes engine performance considerations. The design attenuation spectra established in this manner were used to determine the lining characteristics best suited to satisfy the acoustic design objective.

1.0 INTRODUCTION

The FAA noise standards set forth in FAR Part 36 have led to the implementation of various designs to reduce the noise being radiated from high bypass turbofan engines. One method of achieving the noise reduction goal is through the design and installation of acoustic liners in the inlet and fan exhaust duct of turbofan engines. This document summarizes one phase of a systematic acoustic lining procedure that has been developed to ensure a reasonable lining design configuration both with respect to acoustic performance and minimum engine performance degradation. This design procedure was developed for and used to establish the attenuation objectives for conceptual nacelle design of the NASA-Lewis QF-2 fan.

The acoustic attenuation design requirements or objectives can be established by a series of PNL/EPNL parametric trade studies. Either test data or estimated values of the engine acoustic signature together with airplane flight path information are used to compute a baseline (untreated) EPNL value for a specific engine configuration. Through the use of a systematic incremental reduction in the various noise components of the engine and computing the associated EPNL value, a matrix of noise reduction values can be established. This matrix will define the various combinations of acoustic attenuations that are required for each noise source to achieve a specific noise reduction goal. A weighting function was used to minimize the total area of acoustic treatment in the engine while meeting the desired EPNL objective. The weighting function related attenuation to the treated area required to obtain that attenuation. By minimizing the sums of these products, the total treated area can be optimized.

The procedure identifies attenuation requirements for inlet and fan duct linings prior to the actual detail design and provides confidence that the acoustic attenuation objective can be obtained. In addition, effects of component noise floors are considered and the effect of the acoustic treatment on engine operational losses are held to a minimum. This procedure allows the engineer flexibility in selecting the attenuated acoustic spectrum. This capability is desirable to respond to geometric and/or manufacturing constraints.

2.0 TECHNICAL APPROACH

The basic elements used to provide an acoustic lining configuration that is balanced with respect to engine performance losses and lining attenuation characteristics are outlined in Table I. The steps identified in the flow chart are used to perform a systematic variation of the far field acoustic signature. Each cycle provides one value in the EPNL matrix. Details of the individual analysis elements are outlined in the following paragraphs.

The analysis begins with the identification of the baseline spectra for each component of the noise source (Step 1). In this document, the total noise source is assumed to be a composite of the: (1) fan noise, (2) primary jet noise, (3) secondary jet noise, and (4) turbomachinery noise.

A reduction in Sound Pressure Level (SPL) of an acoustic spectrum is usually referred to as applying attenuation to a baseline component spectra (Step 2). Each component attenuation spectra should be representative of the expected reduction derived from either tests or analysis. The total attenuated noise spectrum of the engine is the power sum of each of the individual attenuated noise components.

The significance of a balanced acoustic design for a particular noise source is closely linked to the "noise floor" concept. Consider two noise components, the fan and jet noise of a turbofan engine. If, at a given frequency, the fan noise has been attenuated to a level below that of the jet noise, then subsequent reduction in the fan noise level will not result in a discernable lower overall noise level. In this case, the noise floor has been established by the jet noise level.

The next step in evaluating the acoustic performance is to extrapolate the attenuated spectra to the requested condition (Step 3). The form at which the input data is available may consist of a set of 1/3 octave data that is either measured or predicted on a polar radius around the noise source or at a sideline distance. The output can be calculated at any one of the above conditions or flight conditions simulating approach, takeoff, or level fly by.

The airplane flight characteristics and atmospheric environment are used to determine the projected SPL spectra by accounting for factors such as the propagation time and distance, the atmospheric attenuation corrections, directivity index and doppler shift.

The atmospheric attenuation corrections are the standard atmospheric absorption as a function of distance, relative humidity, and temperature (Reference 1) and the extra ground attenuation as a function of elevation angle and distance (Reference 2).

The propagation distance is accounted for by the spherical divergence which takes the form of:

$$\Delta \text{dB} = 20 \log_{10} (\text{Distance ratio between input and output condition})$$

The corrections due to the doppler shift effect are taken from Reference 3.

Differences in the number of engines between the input and projected condition are corrected by using the relation

$$\Delta \text{dB} = 10 \log_{10} (\text{number of engines})$$

The relative jet velocity correction due to the forward airplane speed, outlined in Reference 4, defines a frequency shift as

$$\text{Frequency shift} = \frac{\text{Primary jet velocity} - \text{forward airplane speed}}{\text{Primary jet velocity under static condition}}$$

The change in the sound pressure level (SPL) due to the relative jet velocity is expressed as

$$\Delta \text{dB} = 80 \log_{10} (\text{Frequency shift})$$

The conversion from projected SPL values to subjective units is performed in Step 4. Each 1/3 octave SPL value is converted to the respective NOY unit. The details of this procedure can be found in Reference 5.

The Perceived Noise Level (PNL) is calculated at each angle by using the relation (Reference 6).

$$\text{PNL} = 40 + 33.3 \log_{10} \quad \text{NOY}_{max} + .15 \left(\Sigma \text{ NOY} - \text{NOY}_{max} \right)$$

When spectral irregularities are present, the PNL value is adjusted to account for a tone correction by applying the technique set forth in Reference 7.

The Effective Perceived Noise Level (EPNL) is calculated by integrating the time history of the tone corrected PNL as outlined in Reference 7.

3.0 ACOUSTIC TRADE STUDY

The noise abatement system for this program considered the placement of lining material in the inlet and the fan duct. In the analyses, the total fan noise spectrum (Table 2) is treated as being a composite of two independent noise sources. The inlet radiated noise controls the forward quadrant (Table 3), the fan duct radiated noise dominates the aft quadrant (Table 4).

The spectral Power Insertion Loss (PIL) characteristics of tuned single layer acoustic linings tend to have a bell shaped curve about the tuned frequency. The PIL curve shape used for this acoustic trade study, generated from flow duct data, is shown in Figure 1. Segmented acoustic lining configurations were considered for the inlet and fan duct. In one segment, the attenuation was tuned to the fan fundamental frequency and the second segment was tuned to the second fan harmonic. For convenience, the acoustic lining segments in the inlet are referred to as inlet fundamental and inlet harmonic while the lining segments in the fan duct are referred to as fan fundamental and fan harmonic. When the PIL curves of the fundamental and harmonic overlap each other, algebraic addition was used to obtain the resultant PIL.

The attenuated forward and aft fan noise spectrum was combined with jet noise and turbomachinery noise components to form a composite polar spectrum. This spectrum and the appropriate flight parameters were used to obtain an EPNL value.

The EPNL trade studies were conducted for typical takeoff and approach conditions with the observer located at 3.5 n.m. from brake release and 1.0 n.m. from touchdown respectively, as defined in FAR Part 36 (Reference 7). The takeoff and approach were simulated using the flight conditions listed in Table 5. If the value of PNLT at the 10 dB down point is 90 PNdB or less, Reference 7 allows the option of using a time interval between the initial and the final time value for which PNLT equals 90 PNdB. This option was not used because it can give rise to discontinuities when the maximum PNLT value approaches a value equal to or less than 90 PNdB.

The EPNL trade study calculations were accomplished by varying the four lining segment characteristics: (1) inlet fundamental, (2) inlet harmonic, (3) fan fundamental, and (4) fan harmonic, independently at successive values of 0, 5, 10, 20, and 30 dB for the peak value of attenuation. In addition, for the takeoff simulation, primary jet noise attenuations were simulated by applying a uniform attenuation factor to the jet SPL spectrum in increments of 0, 2.5, 5, 7.5, and 10 dB. The approach condition was evaluated with and without the turbomachinery noise component. Table 6 identifies the 8 EPNL trades presented in this document. Runs 1A and 2A represent the baseline engine as simulated for approach and takeoff conditions. Runs 10A and 11A have the primary jet and turbine noise components removed which would be representative of the noise levels measured on a fan test configuration.

The data was plotted in terms of Δ EPNL versus inlet fundamental attenuation for constant fan fundamental attenuations. These data reflect combinations of inlet and fan harmonic acoustic treatment. For improved visibility, a cross plotting of the data was accomplished for constant Δ EPNL levels of 5 and 10 EPNdB. Each graph depicts the variation of inlet fundamental attenuation versus fan fundamental attenuation for different values of inlet harmonic attenuations (Figures 2 and 3). In each case, the fan harmonic attenuation has a constant preassigned value. Whenever a graph appears blank, this merely indicates that the Δ EPNL level cannot be achieved for the attenuation conditions stated. Asterisks appearing within the tabulated data sets indicate that

the attenuation value is outside the range of 0 to 30 dB. The "with tone" notation in the graph heading indicates that the standard tone correction was used as identified in FAR Part 36.

4.0 SELECTION OF DESIGN ATTENUATION SPECTRA

The EPNL trade study provides a data bank of Δ EPNL values for combinations of inlet and fan duct attenuation levels tuned to the fundamental and harmonic blade passage frequency of the fan. In view of the large amount of data that can be generated to evaluate various combinations of attenuation levels to satisfy specific design goals, a systematic method was developed to evaluate the EPNL trade study results. This method uses weighting functions that are applied to the individual attenuation levels, such that the summation of these functions are proportional to the total acoustic treatment area.

A four-dimensional interpolation using the Δ EPNL data bank was performed to identify each attenuation spectra which gave a 10 EPNdB reduction at takeoff and approach. The results of the interpolation showed that a great number of different spectra satisfied the acoustic design criteria. The selection of the optimum spectra, based on minimum treated area was accomplished by using a lining optimization procedure described in Reference 8, which is based on maximizing the attenuation of a "pink" noise source. This source has a constant SPL for one octave bandwidth and is zero elsewhere. Figures 4 and 5 show results of this optimization procedure for inlet and exhaust Mach numbers of .4 as a function of Hf/c, where H is the duct height between the lined walls, f is the frequency, and c is the speed of sound. The results presented are attenuation level for a one octave attenuation bandwidth versus the ratio of the lining length, L, to duct height, H. The ratio of duct length to height is proportional to the ratio of treated area to flow area in an annular duct with all surfaces lined.

The curves of Figures 4 and 5 were approximated by an equation of the following form:

$$\phi \left(\frac{\text{Treated Area}}{\text{Flow Area}}\right) = C \ \Delta \text{dB}^{5/3}$$

Figure 6 compares the theoretical and empirical curves for Hf/c = 1.0 when the inlet and exhaust Mach numbers are .4. The constant C depends on the value of Hf/c and the flow condition in the duct (i.e., Mach number and direction of flow relative to the noise source). The value of the constant increases with Hf/c. For example, at an exhaust Mach number of .4, the constant increases by a factor of 1.75 as Hf/c is doubled. At an inlet Mach number of .4, the constant increases a factor of 1.6 as Hf/c is doubled. The following table compares relative values of the proportionality constant as a function of Hf/c and duct flow condition.

Hf/c	Inlet Mach No. = 0.4	Exhaust Mach No. = 0.4
1	0.455	1.0*
2	0.73	1.75

*Reference Value

The relative values of the constants listed above are proportional to the theoretical treated area required to obtain a given level of suppression, assuming equivalent flow areas in the inlet and exhaust ducts. The results for Hf/c = 1 show the increased efficiency of inlet linings compared to fan duct linings, which is theoretically predicted assuming no velocity gradients in the ducts. This

magnitude of increased efficiency had not been observed in flow duct tests of linings conducted prior to this study. Consequently, the effectiveness of inlet and fan duct linings were assumed equal for this study. Subsequently, it was discovered that if inlet linings are designed considering velocity gradients, the lining effectiveness approaches the theoretical levels, (Reference 9).

The weighting function used to minimize treated area while achieving a given level of suppression was

$$\phi\left(\frac{\text{Treated Area}}{\text{Flow Area}}\right) = \left(\Delta\,\text{dB}^{5/3}_{\text{fundamental}} + 1.6\ \Delta\,\text{dB}^{5/3}_{\text{harmonic}}\right)\text{inlet} + \left(\Delta\,\text{dB}^{5/3}_{\text{fundamental}} + 1.75\ \Delta\,\text{dB}^{5/3}_{\text{harmonic}}\right)\text{fan duct.}$$

The optimum lining configuration determined by the ϕ function satisfied the design objective while minimizing the amount of treated area in the inlet and fan duct. Figure 7 shows the EPNL reduction versus the optimum value of the weighting function ϕ. Each point on the curve represents the inlet and fan duct attenuation spectra for minimum treated area. The results show that the 10 EPNdB reduction goal can be achieved at the approach condition. However, the goal cannot be achieved at takeoff without core jet suppression since the noise floor level is established by the primary jet.

The attenuation requirements for the approach condition were selected as those which gave a 10 EPNdB reduction with the minimum value of the weighting function, ϕ. Figures 8 and 9 show the attenuation requirements at approach for the inlet and fan duct, respectively. Takeoff attenuation requirements were reduced to 7.5 EPNdB due to the presence of the noise floor controlled by the primary jet. The requirements, based on minimum ϕ, are shown in Figures 10 and 11 for the inlet and fan duct, respectively.

5.0 RESULTS

The airplane flyover noise prediction computer program (EPNL program) was developed to accept individual noise component spectra. Each spectra defining the 1/3 octave SPL variation with frequency and position. The acoustic characteristic of a turbofan engine was defined by four noise components.

a. Noise due to the low pressure compressor rotation, usually referred to as "Fan Noise" or simply "Fan."

b. Primary exhaust jet noise; Jet prim or Jet 1

c. Secondary exhaust jet noise; Jet sec or Jet 2

d. Turbo machinery noise; Turb

The array defining the turbomachinery noise includes all other internally generated noise.

The computer program internally separates the fan into forward and aft radiated noise components (fan fwd and fan aft). Equal power distribution is assumed at 90^{o} with a rapidly decreasing influence of the forward fan component in the aft quadrant and vice versa.

At this stage all the noise components are stored individually. Changes in the spectra due to noise suppression techniques or due to different flight characteristics can be accounted for on a per component basis. After all components have been adjusted to match the simulated configuration they are added together for flyover simulation calculations.

The acoustic data for the QF-2 fan was made available in the form of the combined fan and secondary jet spectra at a polar distance of 100 feet. The primary jet noise spectra was obtained at a 250 feet polar distance. Turbomachinery noise was only defined in a frequency region from 1,250 to 10,000 Hz and for angles from 100^{o} to 130^{o}. The above information and the data source are identified in Table 7. The 1/3 octave spectra are listed in Tables 8 through 10.

All the data was subsequently standardized to a 200 feet polar arc distance at 59^{o}F and 70% relative humidity. Furthermore, a polar spectrum defining the secondary jet noise was generated to accomplish the separation of the QF-2 fan and secondary jet noise. The modified data and the type is identified in Table 11. The 1/3 octave spectra are listed in Tables 12 through 15.

The EPNL computer program was modified to include the option allowing either fan or combined fan and secondary jet noise as basic component input.

A sample of the EPNL program output is shown in Tables 16 through 21 for a typical approach condition. The details and explanation of the input code and data format is described in Appendix I (EPNL program description). Table 17 lists the input spectra of the QF-2 fan and secondary jet noise (Fan Jet 2), the primary jet noise (Jet Prim), and the secondary jet joise (Jet Sec). The fan noise spectrum, which is calculated by subtracting the secondary jet noise from the QF-2 noise data, is tabulated in Table 18 (Fan Base). The total jet noise (Jet Tot) is the sum of the primary and secondary jet noise. The turbomachinery noise (Turb Base) was extrapolated to include all angles (10^{o} through 170^{o}) and all frequencies (50 to 10,000 Hz) with an arbitrary lower noise limit of 10 dB.

A sample of the trade study output is listed in Table 19. Each line represents the results of a particular combination of inlet and/or fan duct attenuation. The notation at the head of Table 19 is as follows:

Two columns each under "inlet" and "fan duct" indicate the fundamental and harmonic peak attenuation value in dB. The number under "jet" is an identifier applicable to the jet noise used. The next column contains the EPNL value. Next listed are airplane altitude at overhead, airplane velocity, relative humidity, and temperature. The sideline and offset values are relative to the FAR Part 36 measuring stations. The climb gradient is listed as "Gamma", while "Alpha" is the airplane angle of attack relative to the flight path.

The "duration" is the length of time of the flyover which is used in the EPNL calculation. The "DEPNL" value is the change in EPNdB relative to the condition for no attenuation in the inlet or the fan duct.

Appendix 7 contains the reduced data from the EPNL and PHI computer programs. The results presented are for a 5 and 10 EPNdB noise reduction. The run identification numbers are listed in Table 6.

6.0 APPLICATIONS AND LIMITATIONS

The technique outlined in this document can be applied to any turbofan engine installation whether mounted on a test stand or on an airplane. A sufficiently detailed noise source description on a narrow band or 1/3 octave band basis is desirable to conduct comprehensive EPNL trade studies. If the SPL spectra is only available at a few angles and/or in octave band form, an EPNL trade study should be limited to establishing preliminary design attenuation objectives.

The basic limitations in the computer program are the following:

1. A single airplane configuration can be analyzed during a flyover. This implies a constant power setting, climb gradient, angle of attack, and airplane velocity. Although this may seem like a severe limitation, in actual flight the above parameters do not change very drastically except in a cutback procedure during takeoff.

2. The attenuation is applied in equal amounts at all angles. Angular dependency is neglected because sufficient data were not available to justify the use of a directivity correction. However, inclusion of directivity patterns can easily be incorporated.

7.0 CONCLUSIONS AND RECOMMENDATIONS

A trade study based on EPNL level together with a program to minimize the acoustic treatment required to achieve the attenuation goal is an economic and effective method to estimate lining attenuation requirements for a balanced design with respect to engine and acoustic performance. In addition, the portion of the acoustic spectra where the attenuation goal can be achieved are identified without spending an excessive amount of computer time and/or engineering manhours.

A common method of reducing aircraft noise is through the use of acoustic lining materials and different nozzle configurations: however, there are other techniques which may satisfy a particular requirement. The cutback procedure was introduced to lower the noise level in populated areas around the flight path. A proposed two-segmented approach profile can be examined for the same reason. Changes in airplane configuration, such as different flap settings, have also been suggested as possible candidates for an improved acoustic flyover performance. In view of these considerations, a desirable extension of the present EPNL program would be a modification to account for changes in power setting, engine spool down time, climb gradient, angle of attack, and airplane velocity.

8.0 REFERENCES

1. Society of Automotive Engineers Aerospace Recommended Practice (ARP) 866, "Standard Values of Atmospheric Absorption as a Function of Temperature and Humidity for Use in Evaluating Aircraft Flyover Noise," SAE Committee A-21, August 31, 1964.

2. Society of Automotive Engineers Aerospace Information Report (AIR) 923, "Method for Calculating the Attenuation of Aircraft Ground to Ground Noise Propagation During Takeoff and Landing," SAE Committee A-21, August 15, 1966.

3. Technical Note D6-17095 TN, "Doppler Effect Correction for Motions of Source, Observer and Fluid," The Boeing Company, R. A. Mangiarotty, November 21, 1966.

4. "Method of Flight Vehicle Noise Prediction," WADC T.R. 58-354, Part II.

5. R. A. Pinker, "Mathematical Formulation of the Noy Tables," Journal of Sound Vibration (1968), Volume 8, pp. 488-493.

6. Society of Automotive Engineers Aerospace Recommended Practice (ARP), 865, "Definitions and Procedures for Computing the Perceived Noise Level of Aircraft Noise," SAE Committee A-21, October 15, 1964.

7. Federal Aviation Administration, DOT. Federal Aviation Regulations, Part 36 – Noise Standards: Aircraft Type Certification.

8. Anderson, A. O.; and Fischer, F. W.: Optimization of Duct Linings for Sound Attenuation, D6-29356 TN, The Boeing Company, January 20, 1968.

9. Eversman, Walter: Effect of Boundary Layer on the Transmission and Attenuation of Sound in an Acoustically Treated Circular Duct, J. Acoust. Soc. Am., Vol. 49, No. 5 (Part 1), May 1971, pp. 1372 - 1380.

FIGURES

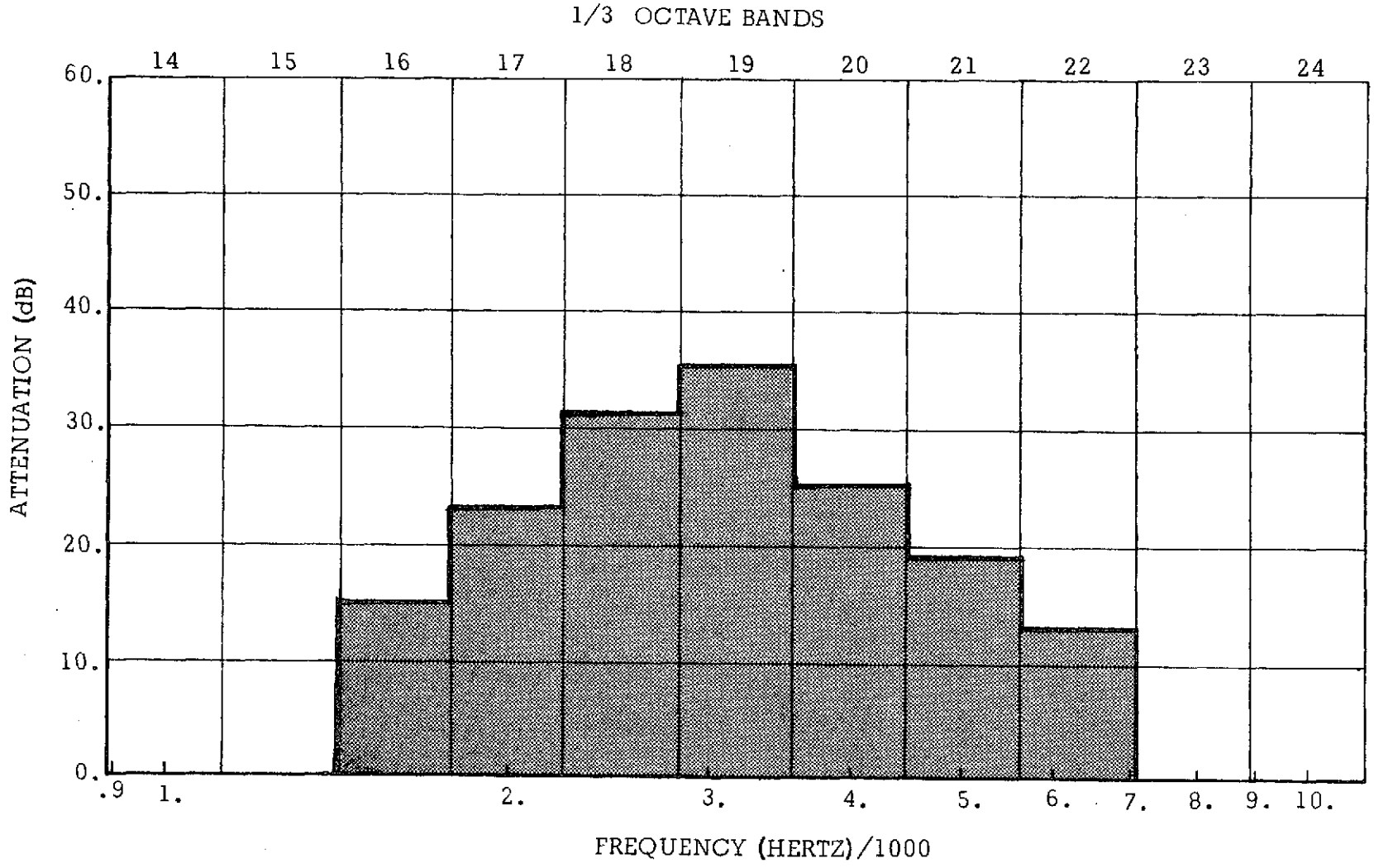
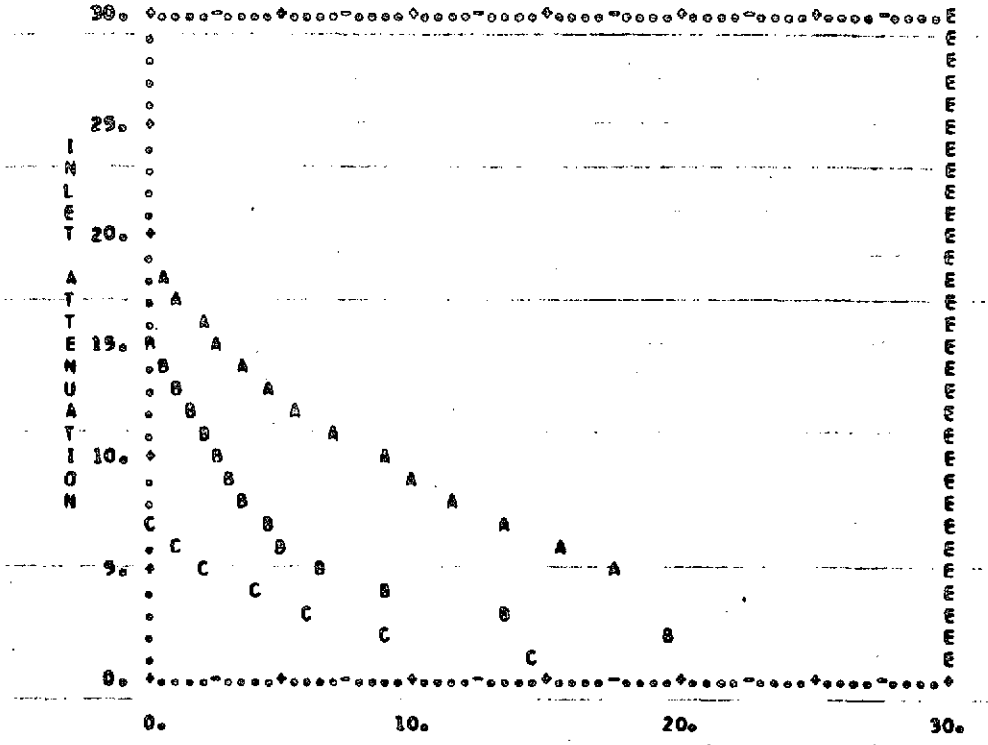


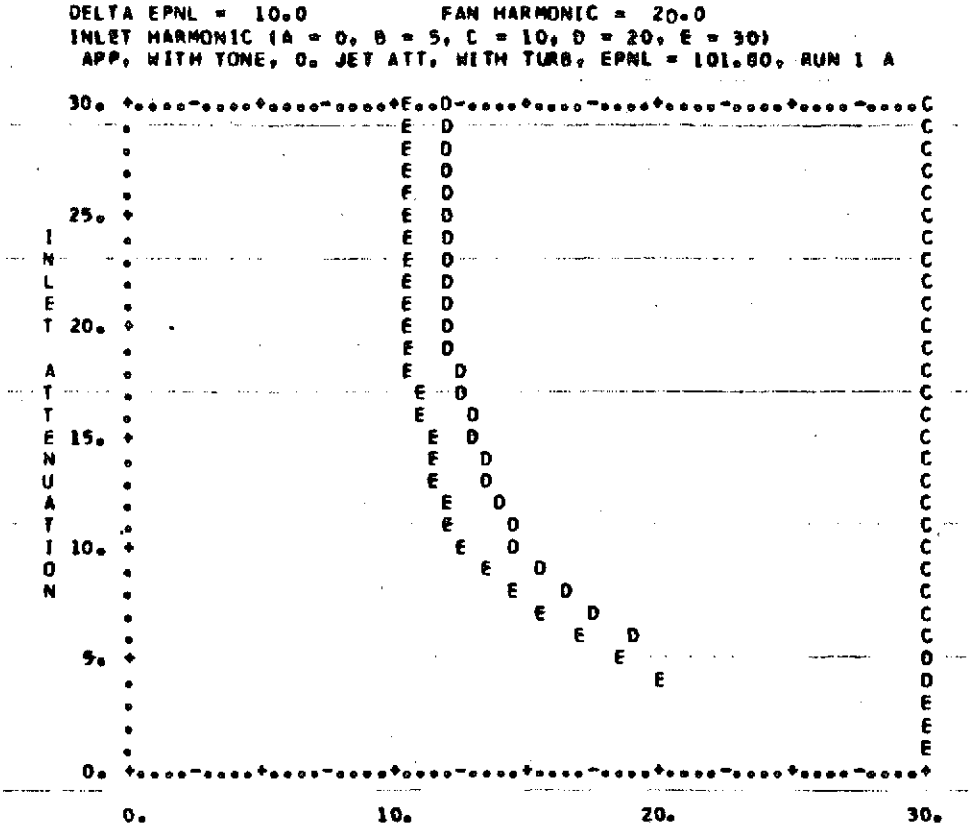
Figure 1. Power Insertion Loss Characteristics



FAN HARMONIC = 20.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	F 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	14.53	******	******
2.00	******	19.33	9.04	******	******
3.00	******	13.40	6.00	******	******
4.00	******	8.97	3.79	******	******
5.00	17.65	6.37	1.96	******	******
6.00	15.55	5.21	0.96	******	******
7.00	13.58	4.38	0.06	******	******
8.00	11.72	3.66	******	******	******
9.00	9.98	2.98	******	******	******
10.00	8.94	2.32	******	******	******
11.00	7.20	1.88	******	******	******
12.00	5.67	1.45	******	******	******
13.00	4.50	1.02	******	******	******
14.00	3.57	0.61	******	******	******
15.00	2.69	0.20	******	******	******
16.00	1.84	******	******	******	******
17.00	1.04	******	******	******	******
18.00	0.28	******	******	******	******
19.00	******	******	******	******	******
20.00	******	******	******	******	******
21.00	******	******	******	******	******
22.00	******	******	******	******	******
23.00	******	******	******	******	******
24.00	******	******	******	******	******
25.00	******	******	******	******	******
26.00	******	******	******	******	******
27.00	******	******	******	******	******
28.00	******	******	******	******	******
29.00	******	******	******	******	******
30.00	******	******	******	******	******

Figure 2. Inlet Attenuation Versus Fan Duct Attenuation for 5 EPNdB Reduction



FAN HARMONIC = 20.0		DELTA EPNL = 10.0			
INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	20.02
5.00	******	******	******	******	18.63
6.00	******	******	******	18.84	16.99
7.00	******	******	******	17.64	15.57
8.00	******	******	******	16.55	14.35
9.00	******	******	******	15.54	13.28
10.00	******	******	******	14.60	12.34
11.00	******	******	******	14.30	12.12
12.00	******	******	******	14.00	11.91
13.00	******	******	******	13.71	11.70
14.00	******	******	******	13.43	11.50
15.00	******	******	******	13.16	11.30
16.00	******	******	******	12.89	11.11
17.00	******	******	******	12.64	10.93
18.00	******	******	******	12.39	10.75
19.00	******	******	******	12.15	10.57
20.00	******	******	******	11.91	10.40
21.00	******	******	******	11.91	10.40
22.00	******	******	******	11.91	10.40
23.00	******	******	******	11.91	10.40
24.00	******	******	******	11.91	10.40
25.00	******	******	******	11.91	10.40
26.00	******	******	******	11.91	10.40
27.00	******	******	******	11.91	10.40
28.00	******	******	******	11.91	10.40
29.00	******	******	******	11.91	10.40
30.00	******	******	******	11.91	10.40

Figure 3. Inlet Attenuation Versus Fan Duct Attenuation for 10 EPNdB Reduction

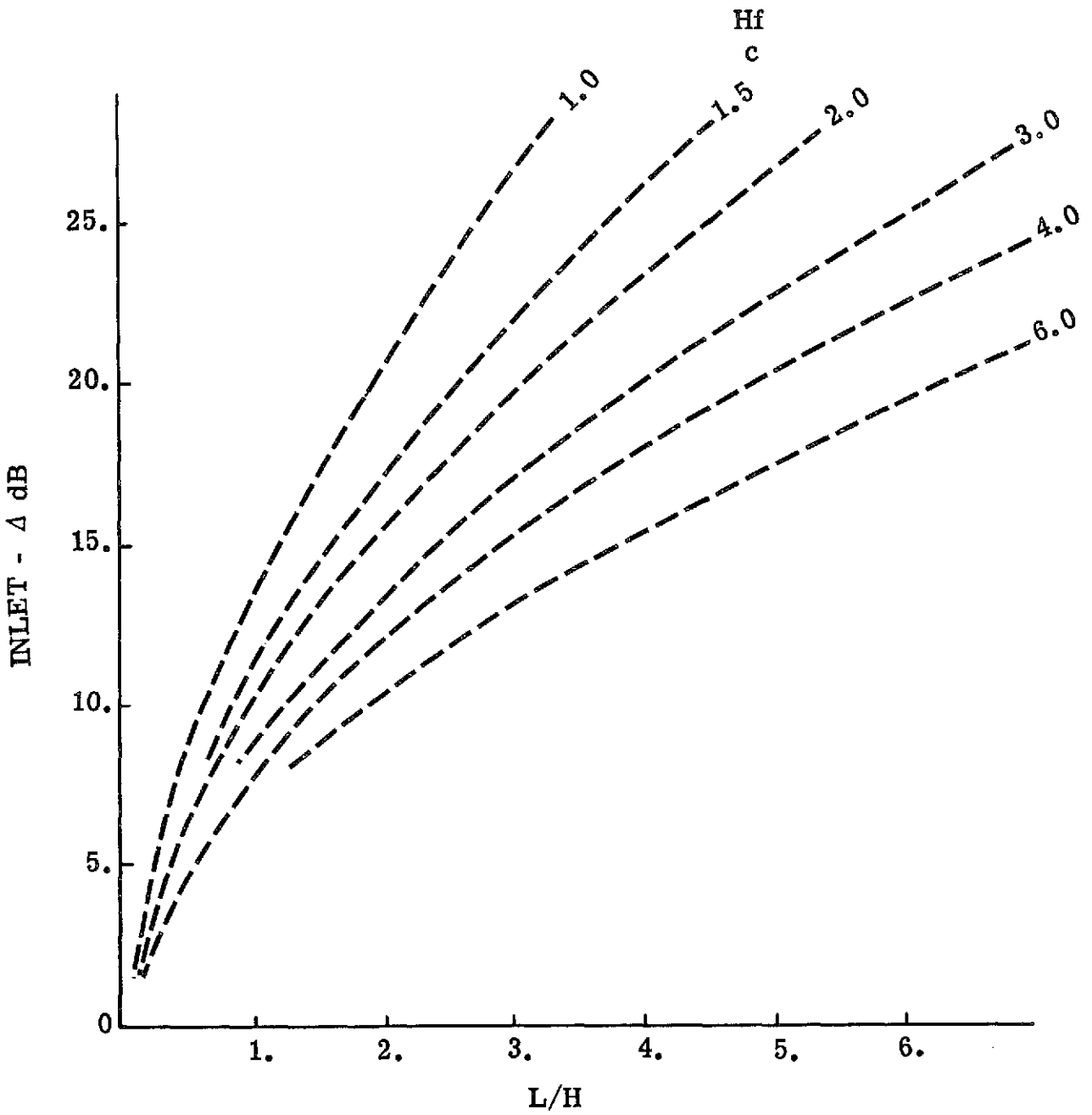


Figure 4. Inlet Mode Attenuation (M = -.4) over 1 Octave - Band

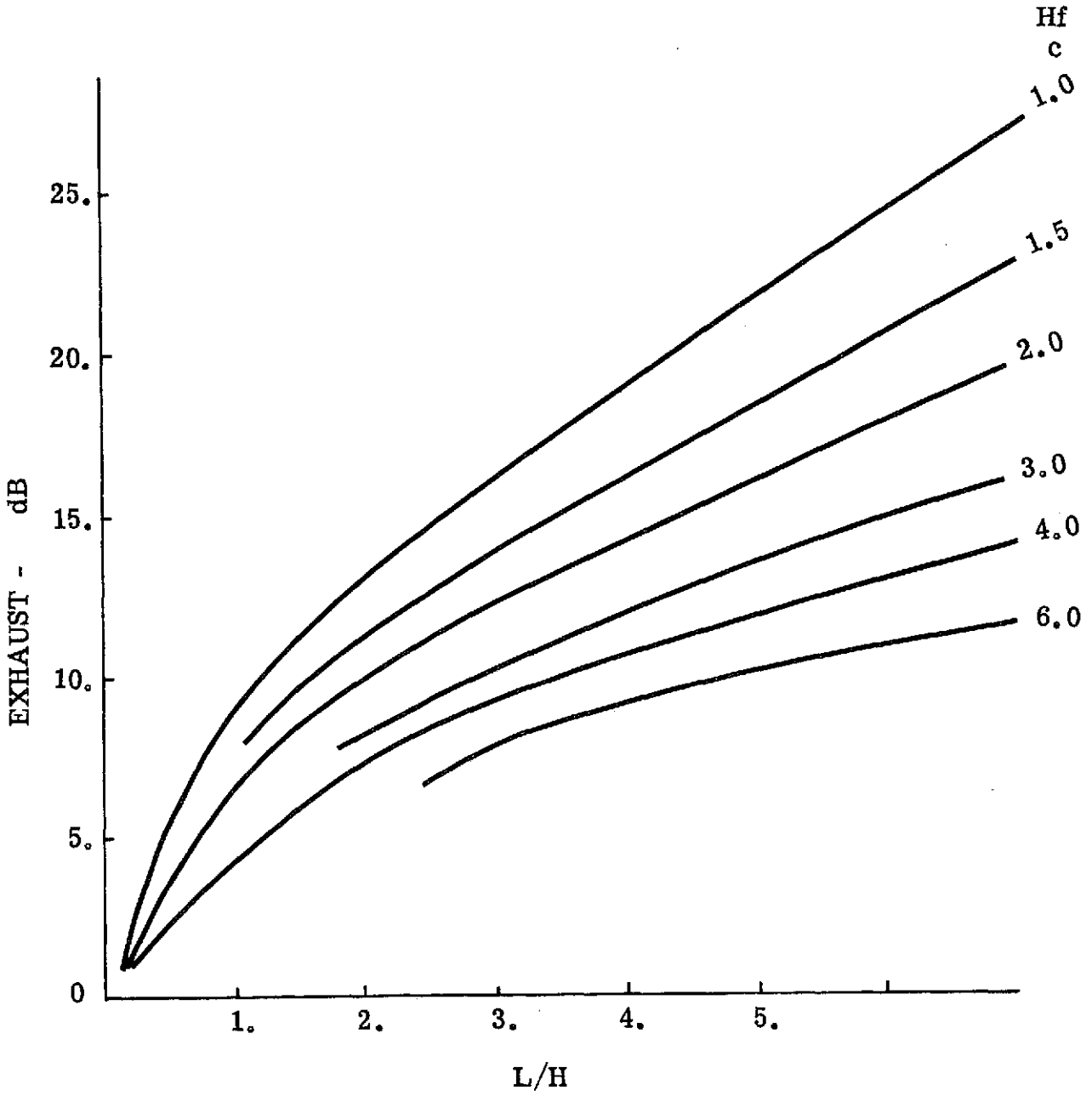


Figure 5. Exhaust Mode Attenuation (M = .4) over 1 Octave - Band

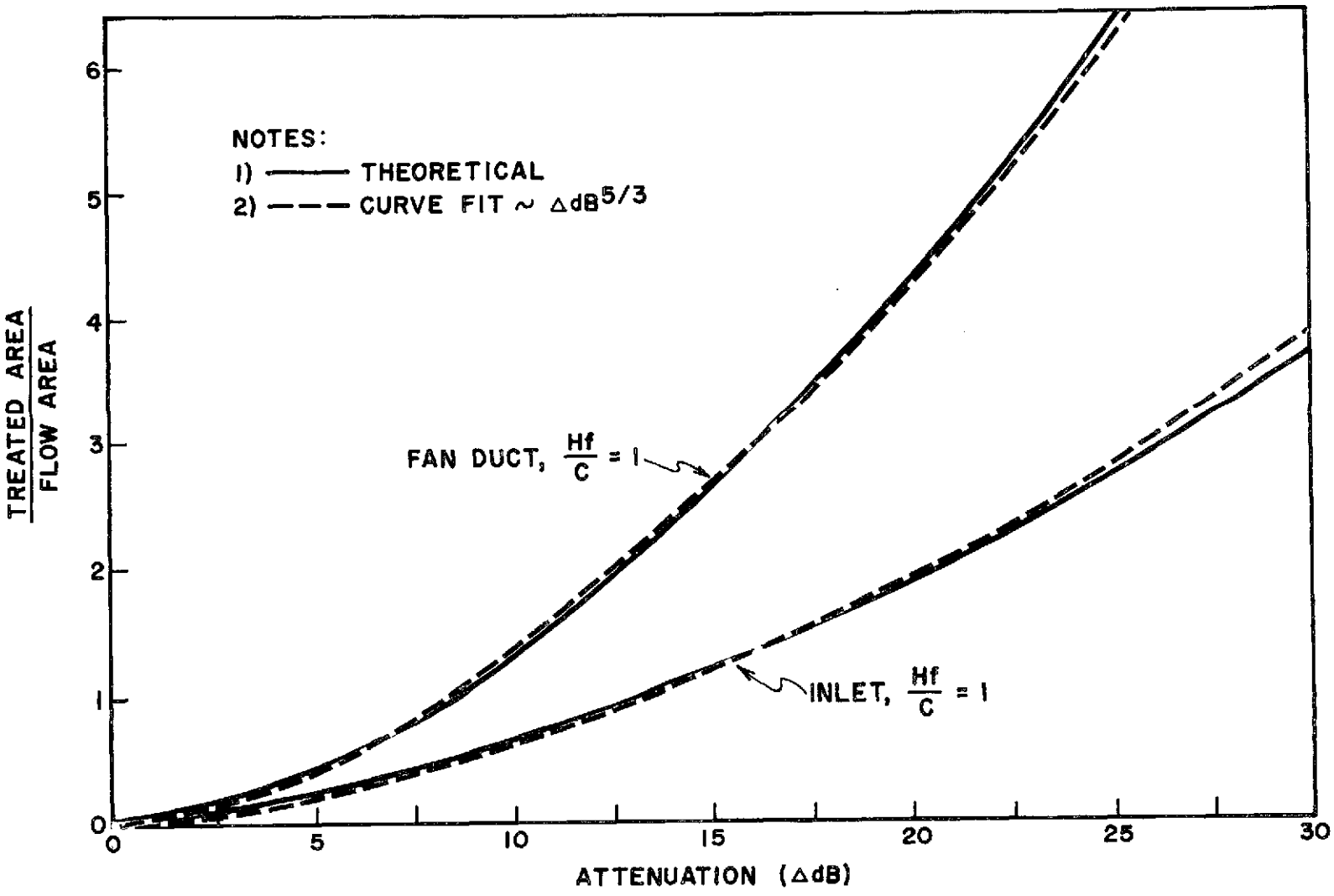


Figure 6. Relation Between Treated Area, Flow Area, and Attenuation

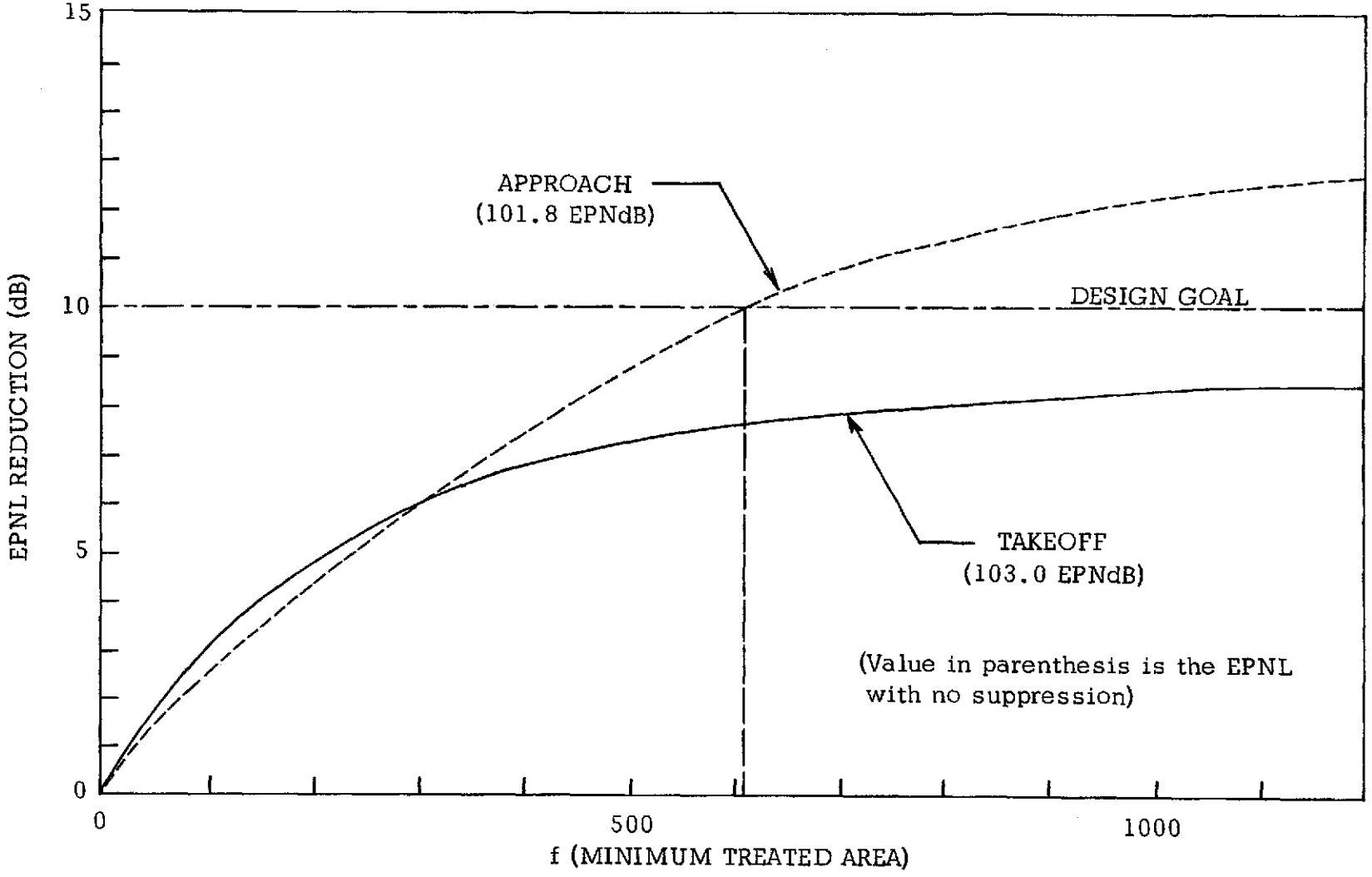


Figure 7. Attenuation Trade Study Results

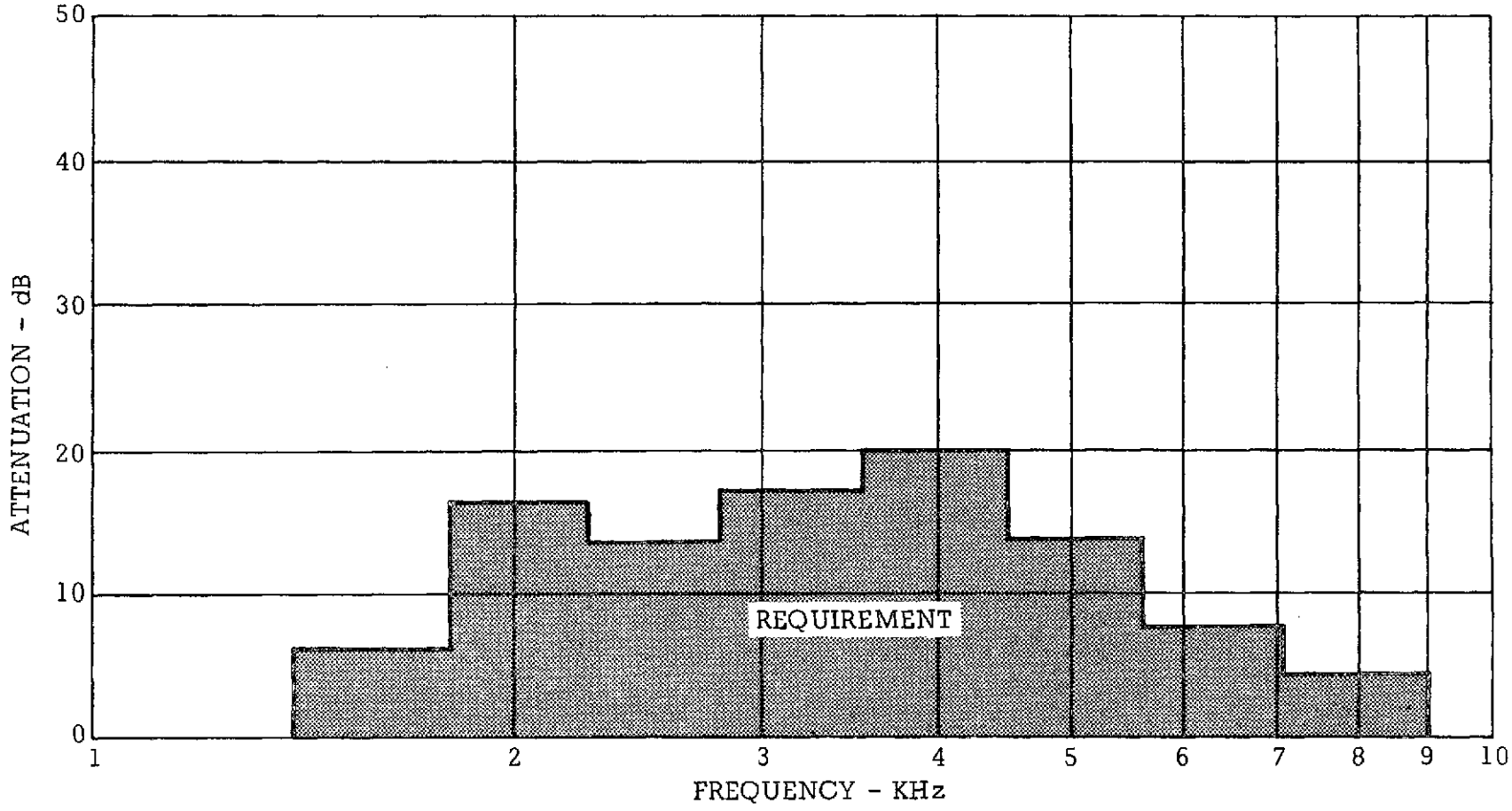


Figure 8. Inlet Lining Attenuation Requirement - Approach

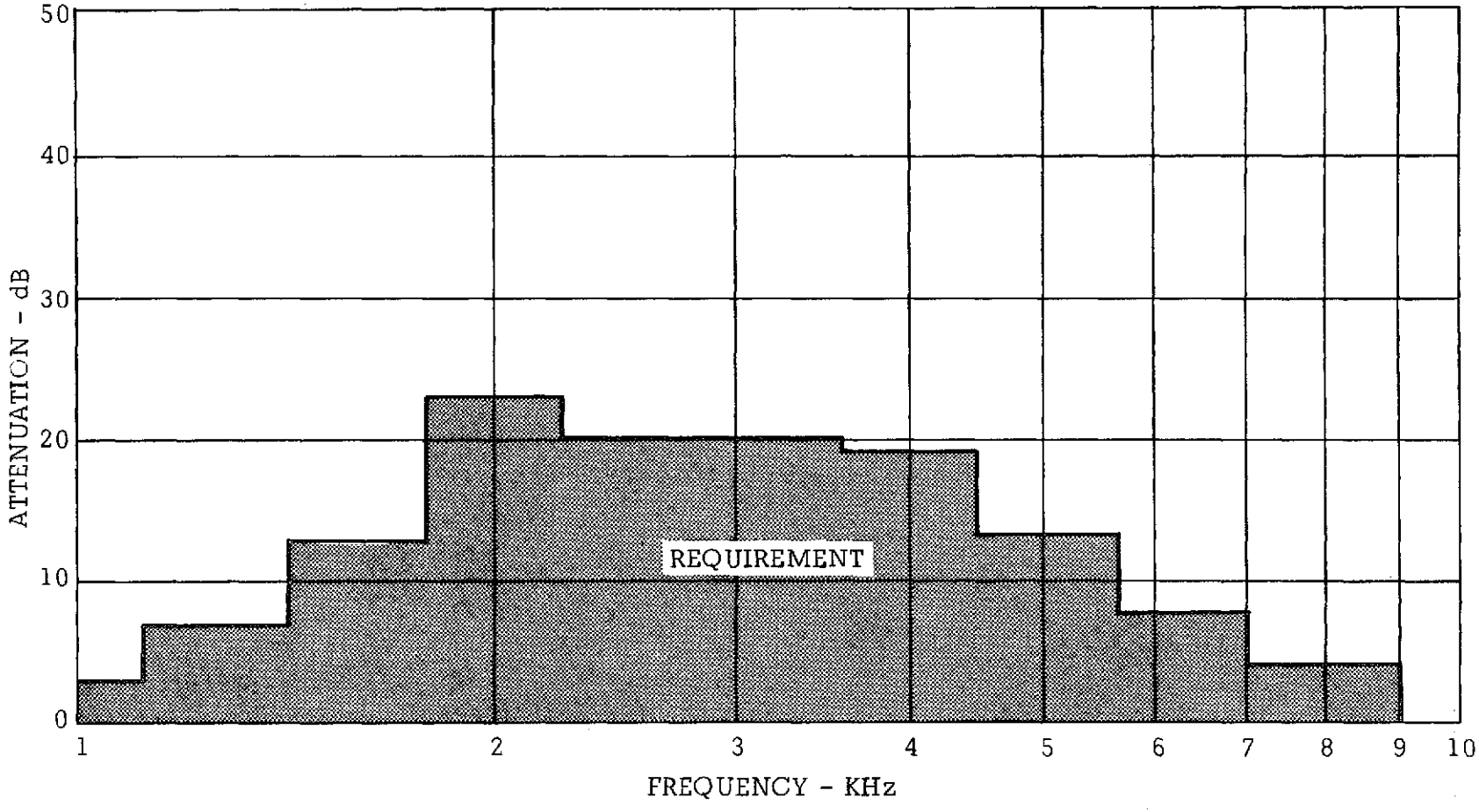


Figure 9. Fan Duct Lining Attenuation Requirement - Approach

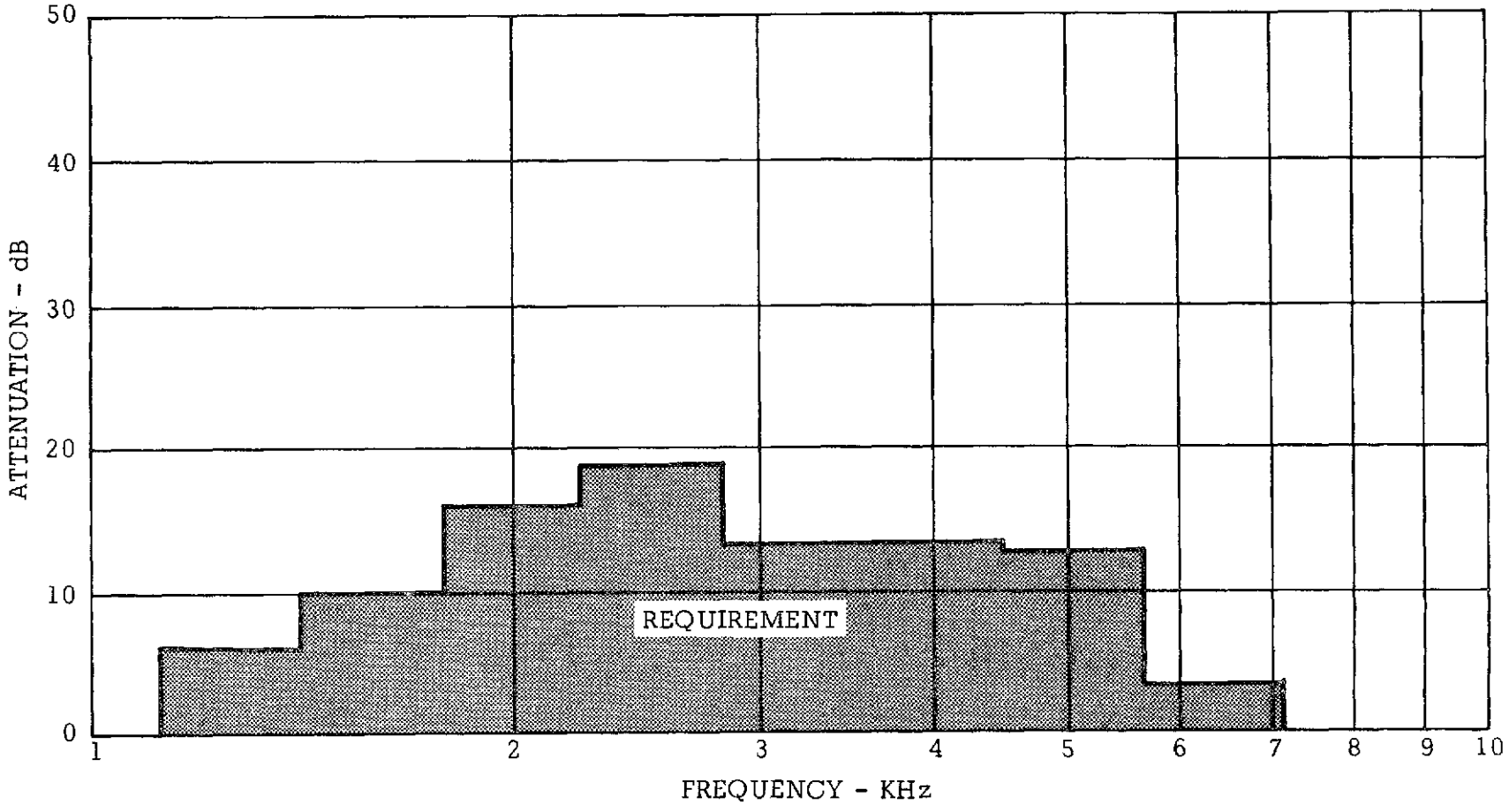


Figure 10. Inlet Lining Attenuation Requirement - Takeoff

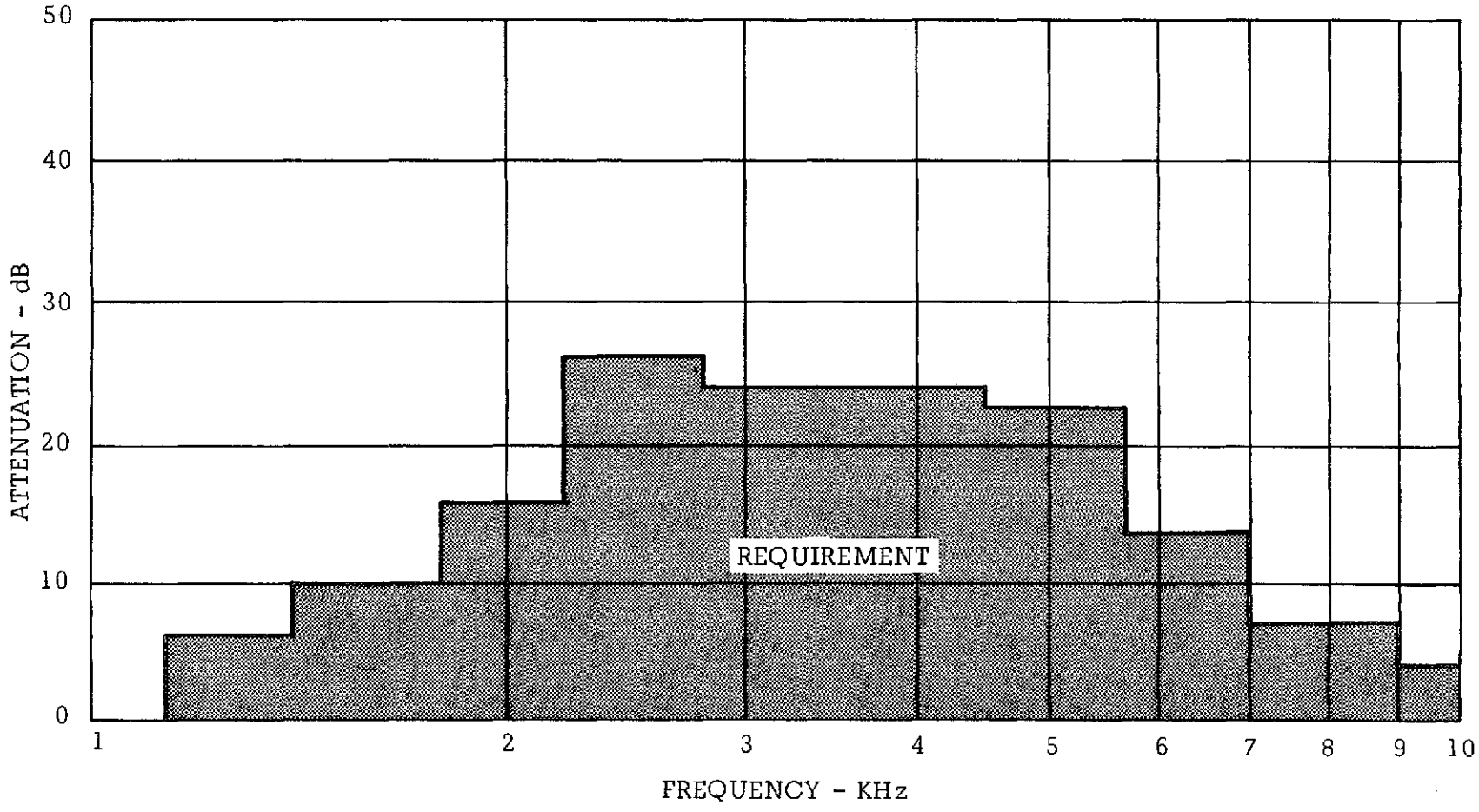


Figure 11. Fan Duct Lining Attenuation Requirement - Takeoff

TABLES

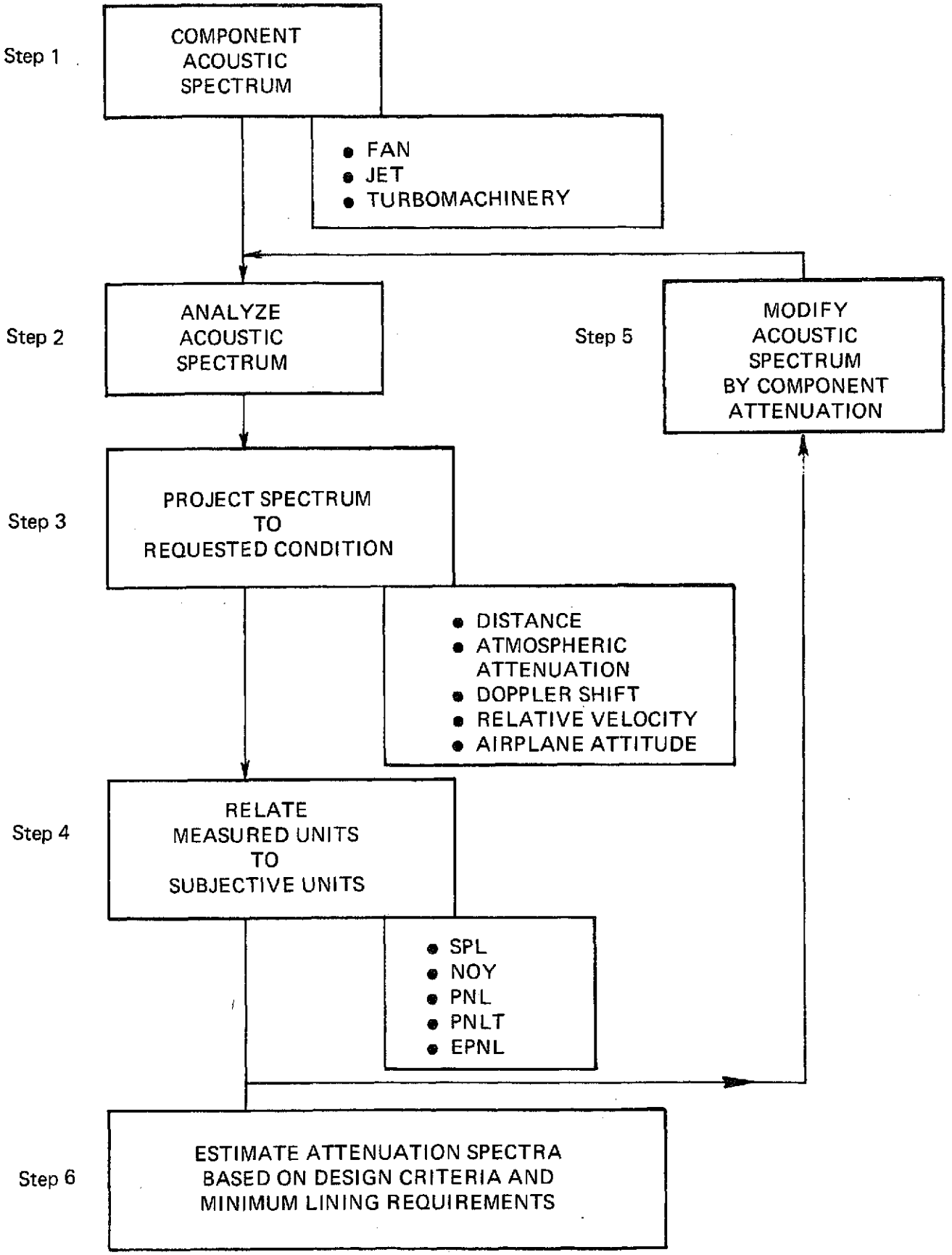


TABLE 1
SCHEMATIC OF ACOUSTIC TRADE STUDY AND ABSORBER EVALUATION

TABLE 2
FAN NOISE SPECTRUM

APPROACH

BAND	ANGLE FREQ.	10.	20.	30.	40.	50.	60.	70.	80.	90.	100.	110.	120.	130.	140.	150.	160.	170.
		FAN																
17	50.	48.6	62.6	50.6	46.6	55.6	46.6	47.6	47.6	49.6	51.6	51.6	53.6	54.6	56.6	58.6	58.6	58.6
18	63.	48.6	62.6	50.6	46.6	55.6	46.6	47.6	47.6	49.6	51.6	51.6	53.6	54.6	56.6	58.6	58.6	58.6
19	80.	48.6	62.6	50.6	46.6	55.6	46.6	47.6	47.6	49.6	51.6	51.6	53.6	54.6	56.6	58.6	58.6	58.6
20	100.	48.6	62.6	50.6	46.6	55.6	46.6	47.6	47.6	49.6	51.6	51.6	53.6	54.6	56.6	58.6	58.6	58.6
21	125.	62.5	68.1	66.5	68.2	66.9	62.5	63.5	65.2	65.5	65.5	67.5	64.9	65.9	64.1	66.1	66.1	66.1
22	160.	66.9	70.5	70.1	66.1	69.1	64.8	65.8	67.1	66.4	65.1	65.1	64.8	62.5	53.6	71.0	71.0	71.0
23	200.	69.5	78.6	71.5	66.4	74.2	65.2	64.9	63.6	62.5	64.5	66.2	66.5	69.2	69.5	66.9	62.1	62.1
24	250.	69.6	74.9	69.3	63.7	72.1	64.3	64.1	64.1	66.1	66.8	69.3	68.8	69.9	68.9	66.8	63.5	63.5
25	315.	69.8	75.6	70.7	68.8	73.5	65.6	65.5	65.5	65.2	65.9	68.4	67.9	68.9	69.6	66.5	59.1	59.1
26	400.	72.9	74.8	70.8	69.9	72.6	65.7	65.6	65.6	67.6	68.6	69.6	69.4	70.4	70.1	67.9	63.8	63.8
27	500.	74.0	77.5	73.9	73.0	75.8	68.9	66.8	66.8	67.4	68.7	70.8	71.0	71.7	71.5	68.6	65.5	65.5
28	630.	75.0	80.8	76.0	74.0	75.9	59.7	69.7	68.9	70.9	71.9	72.9	71.8	73.9	72.7	70.3	67.8	67.8
29	800.	76.0	83.9	77.0	77.0	79.0	72.0	70.0	70.0	72.0	74.0	74.0	73.9	75.9	74.9	70.5	68.2	68.2
30	1000.	79.0	85.0	80.0	78.0	80.0	74.0	73.0	73.0	76.0	77.0	78.0	77.0	79.0	79.0	73.8	71.7	71.7
31	1250.	80.0	85.0	82.0	80.0	81.0	74.0	74.0	75.0	78.0	79.0	80.0	79.0	80.0	80.0	75.9	73.9	73.9
32	1600.	84.0	89.0	86.0	83.0	85.0	78.0	76.0	77.0	80.0	82.0	82.0	82.0	83.0	82.0	79.0	75.9	75.9
33	2000.	89.0	94.0	90.0	88.0	90.0	84.0	81.0	81.0	83.0	85.0	86.0	86.0	87.0	86.0	82.0	79.0	79.0
34	2500.	83.0	88.0	86.0	84.0	85.0	77.0	76.0	77.0	80.0	83.0	83.0	83.0	84.0	83.0	79.0	74.0	74.0
35	3150.	82.0	87.0	86.0	85.0	86.0	79.0	76.0	77.0	81.0	83.0	84.0	84.0	84.0	82.0	77.0	74.0	74.0
36	4000.	83.0	89.0	86.0	85.0	88.0	81.0	77.0	77.0	81.0	82.0	84.0	84.0	84.0	83.0	78.0	75.0	75.0
37	5000.	83.0	88.0	85.0	83.0	87.0	79.0	74.0	75.0	78.0	80.0	81.0	82.0	83.0	82.0	77.0	73.0	73.0
38	6300.	82.0	86.0	84.0	81.0	86.0	78.0	73.0	74.0	77.0	79.0	80.0	81.0	83.0	82.0	77.0	73.0	73.0
39	8000.	79.0	84.0	82.0	81.0	84.0	76.0	71.0	70.0	74.0	76.0	76.0	79.0	81.0	80.0	75.0	71.0	71.0
40	10000.	75.0	80.7	79.0	77.0	80.0	72.0	65.0	67.0	68.0	71.0	74.0	74.0	76.0	75.0	70.0	67.0	67.0

TAKEOFF

BAND	ANGLE FREQ.	10.	20.	30.	40.	50.	60.	70.	80.	90.	100.	110.	120.	130.	140.	150.	160.	170.
		FAN																
17	50.	60.6	65.6	58.6	58.6	64.6	59.6	59.6	59.6	62.6	63.6	65.6	67.6	69.6	72.6	74.6	74.6	74.6
18	63.	60.6	65.6	58.6	58.6	64.6	59.6	59.6	59.6	62.6	63.6	65.6	67.6	69.6	72.6	74.6	74.6	74.6
19	80.	60.6	65.6	59.6	58.6	64.6	59.6	59.6	59.6	62.6	63.6	65.6	67.6	69.6	72.6	74.6	74.6	74.6
20	100.	60.6	65.6	58.6	58.6	64.6	59.6	59.6	59.6	64.6	63.6	65.6	67.6	69.6	72.6	74.6	74.6	74.6
21	125.	74.5	72.1	76.2	74.5	78.5	73.5	75.5	78.6	75.9	79.5	79.5	81.5	80.9	80.1	82.1	82.1	82.1
22	160.	77.4	82.4	78.1	78.1	81.4	77.9	79.1	80.3	61.6	78.9	79.1	78.8	77.5	69.6	71.6	71.6	71.6
23	200.	79.2	82.9	78.4	78.4	81.9	76.9	76.9	76.9	77.5	76.5	78.5	80.5	84.2	85.5	85.5	82.9	82.9
24	250.	78.3	83.3	77.4	76.3	79.8	76.1	76.1	77.3	78.4	81.3	82.1	82.8	83.4	84.9	85.1	79.5	79.5
25	315.	80.7	83.5	80.8	79.8	84.7	79.7	78.6	78.6	78.9	80.4	81.2	81.9	83.9	84.2	84.5	75.1	75.1
26	400.	84.9	85.8	82.9	81.9	83.7	79.8	78.7	79.8	79.3	81.6	82.6	83.4	84.3	84.8	82.1	77.8	79.8
27	500.	81.9	84.3	80.9	81.9	85.9	80.9	79.8	78.8	79.5	80.7	81.6	82.5	83.4	83.9	81.5	76.9	76.9
28	630.	83.9	85.9	81.9	81.9	84.9	79.9	78.9	79.9	79.6	81.8	82.8	82.6	83.6	83.1	82.4	79.1	79.1
29	800.	83.0	88.0	83.0	83.0	85.9	80.9	79.9	79.9	81.8	82.9	83.9	83.8	84.8	83.4	81.6	76.5	76.5
30	1000.	85.0	89.0	86.0	86.0	90.0	84.0	82.0	83.0	83.9	85.0	85.9	84.9	85.9	84.6	82.1	79.4	79.4
31	1250.	86.0	90.0	87.0	87.0	90.0	84.0	83.0	84.0	86.0	87.0	87.0	87.0	87.9	85.8	82.4	79.9	79.9
32	1600.	87.0	91.0	88.0	89.0	91.0	95.0	95.0	86.0	88.0	89.0	90.0	89.0	91.0	86.9	83.6	81.4	81.4
33	2000.	86.0	93.0	91.0	89.0	92.0	87.0	87.0	87.0	90.0	92.0	92.0	92.0	94.0	89.0	85.8	82.7	82.7
34	2500.	91.0	98.0	97.0	97.0	100.0	94.0	92.0	91.0	93.0	95.0	96.0	95.0	96.0	91.0	87.9	84.9	84.9
35	3150.	90.0	96.0	95.0	94.0	99.0	92.0	91.0	90.0	92.0	94.0	94.0	94.0	95.0	90.0	86.9	83.9	83.9
36	4000.	88.0	93.0	90.0	90.0	93.0	88.0	87.0	88.0	91.0	93.0	93.0	92.0	93.0	88.0	83.9	81.9	81.9
37	5000.	88.0	94.0	92.0	91.0	94.0	89.0	88.0	89.0	91.0	92.0	93.0	93.0	93.0	90.0	85.0	81.9	81.9
38	6300.	88.0	97.0	91.0	90.0	93.0	87.0	86.0	88.0	89.0	91.0	92.0	93.0	93.0	90.0	85.0	81.9	81.9
39	8000.	84.0	89.0	88.0	88.0	90.0	84.0	83.0	84.0	86.0	89.0	90.0	91.0	91.0	88.0	83.0	79.9	79.9
40	10000.	80.0	86.0	84.0	84.0	86.0	80.0	79.0	80.0	82.0	85.0	86.0	87.0	87.0	84.0	78.9	75.9	75.9

TABLE 3
FORWARD FAN NOISE SPECTRUM

APPROACH

FAN FWD

BAND	ANGLE FREQ.	10.	20.	30.	40.	50.	60.	70.	80.	90.	100.	110.	120.	130.	140.	150.	160.	170.
17	50.	48.6	62.6	50.6	46.6	55.6	46.5	47.2	47.0	46.6	42.7	41.0	32.0	28.2	25.0	22.2	17.0	12.4
18	63.	48.6	62.6	50.6	46.6	55.6	46.5	47.2	47.0	46.6	42.7	41.0	32.0	28.2	25.0	22.2	17.0	12.4
19	80.	48.6	62.6	50.6	46.6	55.6	46.5	47.2	47.0	46.6	42.7	41.0	32.0	28.2	25.0	22.2	17.0	12.4
20	100.	48.6	62.6	50.6	46.6	55.6	46.5	47.2	47.0	46.6	42.7	41.0	32.0	28.2	25.0	22.2	17.0	12.4
21	125.	62.5	68.1	66.5	68.2	66.9	62.5	63.1	64.6	62.5	56.6	57.0	43.3	39.5	32.5	29.8	24.6	20.0
22	160.	66.9	70.5	70.1	66.1	69.1	64.7	65.4	66.5	61.4	56.2	54.5	43.2	35.1	22.0	34.6	29.5	24.8
23	200.	69.5	78.6	71.5	66.4	74.2	65.1	64.5	63.0	59.5	55.6	55.6	44.9	42.8	37.9	30.5	20.6	15.9
24	250.	68.6	74.9	69.3	69.7	72.0	64.2	63.7	63.5	63.1	57.9	58.7	47.2	43.4	37.3	30.5	22.0	17.3
25	315.	69.8	75.6	70.7	68.8	73.5	65.6	65.1	64.9	62.2	57.0	57.8	46.3	42.6	38.0	30.2	17.6	12.9
26	400.	72.9	74.8	70.8	69.9	72.5	65.7	65.2	65.0	64.7	59.7	59.1	47.8	44.0	38.5	31.9	22.3	18.0
27	500.	74.0	77.5	73.9	73.0	75.8	69.9	66.4	66.2	64.8	59.8	60.3	49.4	45.3	39.9	32.3	24.0	19.3
28	630.	75.0	80.5	76.0	74.0	75.9	69.9	68.5	68.3	67.9	63.0	62.4	50.2	47.5	41.1	33.9	26.2	21.6
29	800.	76.0	83.9	77.0	77.0	79.0	71.9	69.6	69.4	69.0	65.1	63.4	52.3	49.6	43.3	34.1	26.6	22.0
30	1000.	79.0	85.0	80.0	78.0	80.0	74.0	72.6	72.4	73.0	69.1	67.4	55.4	52.6	47.4	37.5	30.2	25.6
31	1250.	80.0	85.0	82.0	80.0	81.0	74.0	73.6	74.4	75.0	70.1	69.4	57.4	53.6	48.4	39.5	32.3	28.1
32	1600.	84.0	89.0	86.0	83.0	85.0	78.0	75.6	76.4	77.0	73.1	71.4	60.4	56.6	50.4	42.6	34.4	29.7
33	2000.	89.0	94.0	90.0	88.0	90.0	84.0	80.6	80.4	80.0	76.1	75.4	64.4	60.6	54.4	45.7	37.5	32.8
34	2500.	83.0	88.0	86.0	84.0	85.0	77.0	75.6	76.4	77.0	74.1	72.4	61.4	57.6	51.4	42.6	32.5	27.8
35	3150.	82.0	87.0	96.0	85.0	86.0	79.0	75.6	76.4	78.0	74.1	73.4	62.4	57.6	50.4	40.7	32.4	27.8
36	4000.	83.0	89.0	96.0	85.0	88.0	81.0	76.6	76.4	78.0	73.1	73.4	62.4	57.6	51.4	41.6	33.4	29.2
37	5000.	83.0	88.0	85.0	83.0	87.0	79.0	73.6	74.4	75.0	71.1	70.4	60.4	56.6	50.4	40.7	31.4	26.8
38	6300.	82.0	86.0	84.0	83.0	86.0	79.0	72.6	73.4	74.0	70.1	69.4	59.4	56.6	50.4	40.7	31.5	26.8
39	8000.	79.0	84.0	82.0	81.0	84.0	76.0	70.6	69.4	71.0	67.1	67.4	57.4	54.6	48.4	38.6	29.4	24.9
40	10000.	75.0	80.0	79.0	77.0	80.0	72.0	65.6	66.4	65.0	62.1	63.4	52.4	49.6	43.4	33.7	25.4	20.8

TAKEOFF

FAN FWD

BAND	ANGLE FREQ.	10.	20.	30.	40.	50.	60.	70.	80.	90.	100.	110.	120.	130.	140.	150.	160.	170.
17	50.	60.6	65.6	58.6	58.6	64.6	59.5	59.2	59.0	59.6	54.7	55.0	46.0	43.2	41.0	38.2	33.0	28.4
18	63.	60.6	65.6	58.6	58.6	64.6	59.5	59.2	59.0	59.6	54.7	55.0	46.0	43.2	41.0	38.2	33.0	28.4
19	80.	60.6	65.6	58.6	58.6	64.6	59.5	59.2	59.0	59.6	54.7	55.0	46.0	43.2	41.0	38.2	33.0	28.4
20	100.	60.6	65.6	58.6	58.6	64.6	59.5	59.2	59.0	61.6	54.7	55.0	46.0	43.2	41.0	38.2	33.0	28.4
21	125.	74.5	72.1	76.1	74.5	78.5	73.5	75.1	78.0	72.9	70.6	69.0	59.9	54.5	48.5	45.8	40.6	36.3
22	160.	77.4	82.4	78.1	78.1	81.4	77.7	78.7	79.7	58.6	70.0	68.5	57.2	51.1	38.0	35.2	30.0	25.8
23	200.	79.2	82.9	78.4	78.4	81.9	76.9	75.5	76.3	74.5	67.6	68.0	58.9	57.8	53.9	49.2	41.4	36.7
24	250.	78.3	83.3	77.4	76.3	79.9	76.0	75.7	76.7	75.4	72.4	71.5	61.2	57.0	53.3	49.7	39.0	33.3
25	315.	80.7	83.5	80.8	79.8	84.7	79.7	73.2	78.0	75.9	71.5	70.6	60.3	57.6	52.5	48.2	33.6	28.9
26	400.	84.9	85.8	82.9	81.9	83.7	79.8	73.3	79.2	76.3	72.8	72.0	61.8	57.9	53.2	45.7	38.3	33.7
27	500.	81.9	84.8	80.9	81.9	85.9	80.8	79.4	78.2	76.5	71.8	71.0	60.9	57.0	52.3	45.1	35.4	30.7
28	630.	83.9	85.9	81.9	81.9	84.9	79.9	79.5	79.3	76.7	72.9	72.2	61.0	57.2	51.5	45.0	37.5	33.3
29	800.	83.0	88.0	83.0	83.0	85.9	80.9	79.5	79.3	78.9	74.0	73.3	62.2	58.4	51.8	45.2	35.0	30.4
30	1000.	85.0	89.0	86.0	86.0	90.0	83.9	81.6	82.4	80.9	76.1	75.4	63.3	59.5	53.0	45.7	37.9	33.6
31	1250.	86.0	90.0	87.0	87.0	90.0	84.0	82.6	83.6	83.0	78.1	76.4	65.3	61.6	54.2	46.0	38.4	33.7
32	1600.	87.0	91.0	88.0	88.0	91.0	86.0	84.6	85.4	85.0	80.1	79.4	67.4	64.6	55.3	47.3	39.9	35.2
33	2000.	89.0	93.0	91.0	89.0	92.0	87.0	86.6	86.4	87.0	83.1	81.4	70.4	67.6	57.3	49.5	41.2	36.5
34	2500.	91.0	98.0	97.0	97.0	100.0	94.0	93.6	90.4	90.0	86.1	85.4	73.4	69.6	59.4	51.6	43.3	38.7
35	3150.	90.0	96.0	95.0	94.0	98.0	92.0	90.6	89.4	89.0	85.1	83.4	72.4	68.6	58.4	50.6	42.3	38.1
36	4000.	88.0	93.0	90.0	90.0	93.0	88.0	86.6	87.4	89.0	84.1	82.4	70.4	66.6	56.4	47.6	40.3	35.7
37	5000.	88.0	94.0	92.0	91.0	94.0	89.0	87.6	88.4	88.0	83.1	82.4	71.4	66.6	58.4	48.6	40.4	35.7
38	6300.	88.0	92.0	91.0	90.0	93.0	87.0	85.6	87.4	86.0	82.1	81.4	71.4	66.6	58.4	48.6	40.4	36.1
39	8000.	84.0	89.0	88.0	88.0	90.0	84.0	82.6	83.4	83.0	80.1	79.4	69.4	64.6	56.4	46.6	38.4	33.8
40	10000.	80.0	86.7	84.0	84.0	86.0	80.0	78.6	79.4	79.0	76.1	75.4	65.4	60.6	57.4	42.6	34.3	29.7

TABLE 4
AFT FAN NOISE SPECTRUM

FAN AFT

APPROACH

BAND	ANGLE FREQ.	10.	20.	30.	40.	50.	60.	70.	80.	90.	100.	110.	120.	130.	140.	150.	160.	170.
17	50.	2.4	21.0	14.2	15.0	29.2	25.0	37.0	38.7	46.5	51.0	51.2	53.5	54.6	56.6	58.6	58.6	58.6
18	63.	2.4	21.0	14.2	15.0	29.2	25.0	37.0	38.7	46.5	51.0	51.2	53.5	54.6	56.6	58.6	58.6	58.6
19	80.	2.4	21.0	14.2	15.0	29.2	25.0	37.0	38.7	46.5	51.0	51.2	53.5	54.6	56.6	58.6	58.6	58.6
20	100.	2.4	21.0	14.2	15.0	29.2	25.0	37.0	38.7	46.5	51.0	51.2	53.5	54.6	56.6	58.6	58.6	58.6
21	125.	16.4	26.6	30.1	36.6	40.6	40.9	53.0	56.3	62.5	64.9	67.1	64.9	65.9	64.1	66.1	66.1	66.1
22	160.	20.6	29.0	33.7	34.5	42.7	43.7	55.2	58.2	63.6	64.5	64.7	64.8	62.5	53.6	71.0	71.0	71.0
23	200.	23.7	37.1	35.2	34.8	47.8	43.6	54.4	54.7	59.5	63.9	65.8	66.5	69.1	69.5	66.9	62.1	62.1
24	250.	22.4	33.3	31.9	37.1	45.7	42.7	53.5	55.2	63.0	66.2	68.9	68.7	69.8	68.9	66.8	63.5	63.5
25	315.	23.6	34.1	34.3	37.2	47.1	44.0	54.9	56.6	62.1	65.3	68.0	67.9	68.9	69.6	66.5	59.1	59.1
26	400.	26.8	33.2	34.4	38.3	46.2	44.1	55.1	56.8	64.6	68.0	69.2	69.4	70.4	70.1	67.9	63.8	63.8
27	500.	27.8	36.0	37.6	41.4	49.5	47.3	56.3	57.9	64.7	68.1	70.4	71.0	71.7	71.5	68.4	65.5	65.5
28	630.	29.2	39.3	39.6	42.4	49.5	48.3	58.4	60.0	67.9	71.3	72.5	71.8	73.9	72.7	70.3	67.8	67.8
29	800.	29.8	42.4	40.7	45.4	52.6	50.4	59.4	61.1	68.9	73.4	73.6	73.9	75.9	74.9	70.5	68.2	68.2
30	1000.	32.8	43.5	43.7	46.4	53.6	52.4	62.4	64.1	73.0	76.4	77.6	76.9	79.0	79.0	73.8	71.7	71.7
31	1250.	33.8	43.4	45.7	48.4	54.6	52.4	63.4	66.1	75.0	78.4	79.6	79.0	80.0	80.0	75.9	73.9	73.9
32	1600.	37.8	47.5	49.7	51.4	58.6	56.4	65.4	68.1	77.0	81.4	81.6	82.0	83.0	82.0	79.0	75.9	75.9
33	2000.	42.8	52.5	53.7	56.4	63.6	62.4	70.4	72.1	80.0	84.4	85.6	86.0	87.0	86.0	82.0	79.0	79.0
34	2500.	36.8	46.5	49.6	52.4	58.6	55.4	65.4	68.1	77.0	82.4	82.6	83.0	84.0	83.0	79.0	74.0	74.0
35	3150.	35.8	45.4	49.6	53.4	59.6	57.4	65.4	68.1	78.0	82.4	83.6	84.0	84.0	82.0	77.0	74.0	74.0
36	4000.	37.2	47.5	49.7	53.4	61.6	59.4	66.4	68.1	78.0	81.4	83.6	84.0	84.0	83.0	78.0	75.0	75.0
37	5000.	36.8	46.5	49.6	51.4	60.6	57.4	63.4	66.1	75.0	79.4	80.6	82.0	83.0	82.0	77.0	73.0	73.0
38	6300.	35.9	44.5	47.6	51.4	59.6	56.4	62.4	65.1	74.0	78.4	79.6	81.0	83.0	82.0	77.0	73.0	73.0
39	8000.	32.4	42.5	45.7	49.4	57.6	54.4	60.4	61.1	71.0	75.4	77.6	79.0	81.0	80.0	75.0	71.0	71.0
40	10000.	28.9	38.5	42.6	45.4	53.6	50.4	55.4	58.1	65.0	70.6	73.6	74.0	76.0	75.0	70.0	67.0	67.0

FAN AFT

TAKEOFF

BAND	ANGLE FREQ.	10.	20.	30.	40.	50.	60.	70.	80.	90.	100.	110.	120.	130.	140.	150.	160.	170.
17	50.	14.5	24.0	22.2	27.0	38.2	38.0	49.0	50.7	59.5	63.0	65.2	67.5	69.6	72.6	74.6	74.6	74.6
18	63.	14.5	24.0	22.2	27.0	38.2	38.0	49.0	50.7	59.5	63.0	65.2	67.5	69.6	72.6	74.6	74.6	74.6
19	80.	14.5	24.0	22.2	27.0	38.2	38.0	49.0	50.7	59.5	63.0	65.2	67.5	69.6	72.6	74.6	74.6	74.6
20	100.	14.5	24.0	22.2	27.0	38.2	38.0	49.0	50.7	61.5	63.0	65.2	67.5	69.6	72.6	74.6	74.6	74.6
21	125.	28.4	30.6	39.8	42.9	42.2	51.9	65.0	69.7	72.9	78.9	79.1	81.5	80.9	80.1	82.1	82.1	82.1
22	160.	31.2	40.9	41.7	46.5	55.0	55.2	68.5	71.4	58.5	78.3	78.7	78.8	77.5	59.6	71.6	71.6	71.6
23	200.	33.0	41.4	42.0	46.8	55.5	55.1	66.4	68.0	74.5	75.9	78.1	80.5	84.1	85.5	85.5	82.9	82.9
24	250.	32.1	41.7	41.1	44.7	53.4	54.4	65.5	68.4	75.4	80.7	81.7	82.7	83.4	84.9	85.1	79.5	79.5
25	315.	34.5	42.0	44.4	48.2	58.3	58.1	68.0	69.7	75.9	79.8	80.8	81.9	83.9	84.1	84.5	75.1	75.1
26	400.	38.7	44.3	46.5	50.3	57.3	58.2	66.2	70.9	76.2	81.0	82.2	83.4	84.3	84.8	82.1	79.8	79.8
27	500.	35.7	43.3	44.6	50.3	59.5	59.3	69.3	69.9	76.5	80.1	81.2	82.5	83.3	83.9	81.5	76.9	76.9
28	630.	37.8	44.3	45.8	50.3	58.5	58.3	68.3	71.0	76.6	81.2	82.4	82.8	83.5	83.1	82.4	79.1	79.1
29	800.	37.2	46.4	46.6	51.4	59.6	59.3	69.4	71.0	78.8	82.3	83.5	83.8	84.7	83.4	81.6	76.5	76.5
30	1000.	38.9	47.4	49.6	54.4	63.6	62.4	71.4	74.1	80.9	84.4	85.5	84.9	85.9	84.6	82.1	79.4	79.4
31	1250.	39.8	48.5	50.7	55.4	63.6	62.4	72.4	75.1	82.9	86.4	86.6	86.9	87.9	85.8	87.4	79.9	79.9
32	1600.	40.8	49.4	51.6	56.4	64.6	64.4	74.4	77.1	85.0	88.4	89.6	88.9	91.0	86.9	83.6	81.4	81.4
33	2000.	41.8	51.5	54.6	57.4	65.6	65.4	76.4	78.1	87.0	91.4	91.6	92.0	94.0	88.9	85.8	82.7	82.7
34	2500.	44.8	56.5	60.6	65.4	73.6	72.4	81.4	82.1	90.0	94.4	95.6	95.0	96.0	91.0	87.9	84.9	84.9
35	3150.	43.8	54.5	58.7	62.4	71.6	73.4	80.4	81.1	89.0	93.4	93.6	94.0	95.0	90.0	86.9	83.9	83.9
36	4000.	41.8	51.5	53.7	58.4	66.6	66.4	76.4	79.1	88.0	92.4	92.6	92.0	93.0	88.0	83.9	81.9	81.9
37	5000.	41.9	52.5	55.6	59.4	67.6	67.4	77.4	80.1	88.0	91.4	92.6	93.0	93.0	90.0	85.0	81.9	81.9
38	6300.	42.2	50.5	54.7	58.4	66.6	65.4	75.4	79.1	86.0	90.4	91.6	93.0	93.0	90.0	85.0	81.9	81.9
39	8000.	37.8	47.5	51.7	56.4	63.6	62.4	72.4	75.1	83.0	88.4	89.6	91.0	91.0	88.0	83.0	79.9	79.9
40	10000.	32.9	44.5	47.7	52.4	59.6	58.4	68.4	71.1	79.0	84.4	85.6	87.0	87.0	84.0	79.9	75.9	75.9

TABLE 5
APPROACH AND TAKEOFF FLIGHT CONDITIONS

CONDITION	ROTOR SPEED (%)	FAA REF. POINT (N. MILE)	VELOCITY (FT/SEC.)	ALTITUDE (FT.)	CLIMB GRADIENT	ANGLE OF ATTACK
Approach	60	1	254	370	-3.0^{o}	3.7^{o}
Takeoff	90	3.5	317.44	1000	4.57^{o}	7.6^{o}

TABLE 6
EPNL TRADE STUDY RUN IDENTIFICATION

RUN	CONDITION	TURBINE NOISE	PRIMARY JET ATTENUATION (dB)	EPN LEVEL WITHOUT LININGS (EPNdB)
1A	Approach	Yes	0	101.80
2A	Takeoff	No	0	103.02
5A	Takeoff	No	10	101.83
10A	Takeoff	No		101.70
11A	Approach	No		101.66
12A	Takeoff	No	2.5	102.56
13A	Takeoff	No	5.0	102.22
14A	Takeoff	No	7.5	101.98

TABLE 7
INPUT DATA IDENTIFICATION

DATA	TYPE	ORIGIN
Fan + Jet 2	100-ft. Polar	NASA-Lewis
Jet	250-ft. Polar	General Electric
Turbomachinery	370-ft. Sideline	General Electric

TABLE 8
FAN AND SECONDARY JET NOISE SPECTRUM (100-FT. POLAR)

APPROACH

FAN + JET2

BAND	ANGLE / FREQ.	10.	20.	30.	40.	50.	60.	70.	80.	90.	100.	110.	120.	130.	140.	150.	160.	170.
17	50.	72.0	86.0	74.0	70.0	79.0	70.0	71.0	71.0	73.0	75.0	75.0	77.0	78.0	80.0	82.0	82.0	82.0
18	63.	72.0	86.0	74.0	70.0	79.0	70.0	71.0	71.0	73.0	75.0	75.0	77.0	78.0	80.0	82.0	82.0	82.0
19	80.	72.0	86.0	74.0	70.0	79.0	70.0	71.0	71.0	73.0	75.0	75.0	77.0	78.0	80.0	82.0	82.0	82.0
20	100.	72.0	86.0	74.0	70.0	79.0	70.0	71.0	71.0	73.0	75.0	75.0	77.0	78.0	80.0	82.0	82.0	82.0
21	125.	73.0	82.0	76.0	76.0	79.0	72.0	73.0	74.0	75.0	76.0	77.0	77.0	78.0	78.0	80.0	80.0	80.0
22	160.	75.0	84.0	78.0	74.0	79.0	73.0	74.0	75.0	75.0	75.0	75.0	76.0	76.0	77.0	78.0	78.0	78.0
23	200.	77.0	87.0	79.0	74.0	82.0	73.0	73.0	72.0	72.0	74.0	75.0	76.0	78.0	79.0	79.0	78.0	78.0
24	250.	76.0	84.0	76.0	76.0	80.0	72.0	72.0	72.0	74.0	75.0	77.0	77.0	78.0	78.0	78.0	77.0	77.0
25	315.	77.0	84.0	78.0	76.0	81.0	73.0	73.0	73.0	73.0	74.0	76.0	76.0	77.0	78.0	77.0	75.0	75.0
26	400.	80.0	83.0	78.0	77.0	80.0	73.0	73.0	73.0	75.0	76.0	77.0	77.0	78.0	78.0	77.0	75.0	75.0
27	500.	81.0	85.0	81.0	80.0	83.0	76.0	74.0	74.0	75.0	76.0	78.0	78.0	79.0	79.0	77.0	75.0	75.0
28	630.	82.0	88.0	83.0	81.0	83.0	77.0	76.0	76.0	78.0	79.0	80.0	79.0	81.0	80.0	78.0	76.0	76.0
29	800.	83.0	91.0	84.0	84.0	86.0	79.0	77.0	77.0	79.0	81.0	81.0	81.0	83.0	82.0	78.0	76.0	76.0
30	1000.	86.0	92.0	87.0	85.0	87.0	81.0	80.0	80.0	83.0	84.0	85.0	84.0	86.0	86.0	81.0	79.0	79.0
31	1250.	87.0	92.0	89.0	87.0	88.0	81.0	81.0	82.0	85.0	86.0	87.0	86.0	87.0	87.0	83.0	81.0	81.0
32	1600.	91.0	96.0	93.0	90.0	92.0	85.0	83.0	84.0	87.0	89.0	89.0	89.0	90.0	89.0	86.0	83.0	83.0
33	2000.	96.0	101.0	97.0	95.0	97.0	91.0	88.0	88.0	90.0	92.0	93.0	93.0	94.0	93.0	89.0	86.0	86.0
34	2500.	90.0	95.0	93.0	91.0	92.0	84.0	83.0	84.0	87.0	90.0	90.0	90.0	91.0	90.0	86.0	81.0	81.0
35	3150.	90.0	95.0	94.0	93.0	94.0	87.0	84.0	85.0	89.0	91.0	92.0	92.0	92.0	90.0	85.0	82.0	82.0
36	4000.	91.0	97.0	94.0	93.0	96.0	89.0	85.0	85.0	89.0	90.0	92.0	92.0	92.0	91.0	86.0	83.0	83.0
37	5000.	91.0	96.0	93.0	91.0	95.0	87.0	82.0	83.0	86.0	88.0	89.0	90.0	91.0	90.0	85.0	81.0	81.0
38	6300.	90.0	94.0	92.0	91.0	94.0	85.0	81.0	82.0	85.0	87.0	88.0	89.0	91.0	90.0	85.0	81.0	81.0
39	8000.	88.0	93.0	91.0	90.0	93.0	85.0	80.0	79.0	83.0	85.0	87.0	88.0	90.0	89.0	84.0	80.0	80.0
40	10000.	85.0	90.0	87.0	87.0	90.0	82.0	76.0	77.0	78.0	81.0	84.0	84.0	86.0	85.0	80.0	77.0	77.0

TAKEOFF

FAN + JET2

BAND	ANGLE / FREQ.	10.	20.	30.	40.	50.	60.	70.	80.	90.	100.	110.	120.	130.	140.	150.	160.	170.
17	50.	84.0	89.0	82.0	82.0	88.0	83.0	83.0	83.0	86.0	87.0	89.0	91.0	93.0	96.0	98.0	98.0	98.0
18	63.	84.0	89.0	82.0	82.0	88.0	83.0	83.0	83.0	86.0	87.0	89.0	91.0	93.0	96.0	98.0	98.0	98.0
19	80.	84.0	89.0	82.0	82.0	88.0	83.0	83.0	83.0	86.0	87.0	89.0	91.0	93.0	96.0	98.0	98.0	98.0
20	100.	84.0	89.0	82.0	82.0	88.0	83.0	83.0	83.0	86.0	87.0	89.0	91.0	93.0	96.0	98.0	98.0	98.0
21	125.	85.0	88.0	85.0	84.0	89.0	84.0	85.0	87.0	88.0	89.0	90.0	92.0	93.0	94.0	96.0	96.0	96.0
22	160.	86.0	91.0	86.0	86.0	90.0	86.0	87.0	88.0	88.0	88.0	89.0	90.0	91.0	93.0	95.0	95.0	95.0
23	200.	87.0	91.0	86.0	86.0	90.0	85.0	85.0	85.0	85.0	86.0	88.0	90.0	93.0	95.0	96.0	95.0	95.0
24	250.	86.0	91.0	85.0	84.0	88.0	84.0	84.0	85.0	87.0	89.0	90.0	91.0	92.0	94.0	95.0	93.0	93.0
25	315.	89.0	91.0	88.0	87.0	92.0	87.0	86.0	86.0	87.0	88.0	89.0	90.0	92.0	93.0	94.0	91.0	91.0
26	400.	92.0	93.0	90.0	89.0	91.0	87.0	86.0	87.0	87.0	89.0	90.0	91.0	92.0	93.0	92.0	91.0	91.0
27	500.	89.0	92.0	88.0	89.0	93.0	88.0	87.0	86.0	87.0	88.0	89.0	90.0	91.0	92.0	91.0	89.0	89.0
28	630.	91.0	93.0	89.0	89.0	92.0	87.0	86.0	87.0	87.0	89.0	90.0	90.0	91.0	91.0	91.0	89.0	89.0
29	800.	90.0	95.0	90.0	90.0	93.0	88.0	87.0	87.0	89.0	90.0	91.0	91.0	92.0	91.0	90.0	87.0	87.0
30	1000.	92.0	96.0	93.0	93.0	97.0	91.0	89.0	90.0	91.0	92.0	93.0	92.0	93.0	92.0	90.0	88.0	88.0
31	1250.	93.0	97.0	94.0	94.0	97.0	91.0	90.0	91.0	93.0	94.0	94.0	94.0	95.0	93.0	90.0	88.0	88.0
32	1600.	94.0	98.0	95.0	95.0	98.0	93.0	92.0	93.0	95.0	96.0	97.0	96.0	98.0	94.0	91.0	89.0	89.0
33	2000.	95.0	100.0	98.0	96.0	99.0	94.0	94.0	94.0	97.0	99.0	99.0	99.0	101.0	96.0	93.0	90.0	90.0
34	2500.	98.0	105.0	104.0	104.0	107.0	101.0	99.0	98.0	100.0	102.0	103.0	102.0	103.0	98.0	95.0	92.0	92.0
35	3150.	98.0	104.0	103.0	102.0	106.0	103.0	99.0	98.0	100.0	102.0	102.0	102.0	103.0	98.0	95.0	92.0	92.0
36	4000.	96.0	101.0	98.0	98.0	101.0	96.0	95.0	96.0	99.0	101.0	101.0	100.0	101.0	96.0	92.0	90.0	90.0
37	5000.	96.0	102.0	100.0	99.0	102.0	97.0	96.0	97.0	99.0	100.0	101.0	101.0	101.0	98.0	93.0	90.0	90.0
38	6300.	96.0	100.0	99.0	96.0	101.0	95.0	94.0	96.0	97.0	99.0	100.0	101.0	101.0	98.0	93.0	90.0	90.0
39	8000.	93.0	98.0	97.0	[illegible]	99.0	93.0	92.0	93.0	95.0	98.0	99.0	100.0	100.0	97.0	92.0	89.0	89.0
40	10000.	90.0	96.0	94.0	94.0	95.0	90.0	89.0	90.0	92.0	95.0	96.0	97.0	97.0	94.0	89.0	86.0	86.0

TABLE 9
PRIMARY JET NOISE SPECTRUM (250 FT. POLAR)

APPROACH

JET PRIM

BAND	ANGLE FREQ.	10.	20.	30.	40.	50.	60.	70.	80.	90.	100.	110.	120.	130.	140.	150.	160.	170.
17	50.	53.2	52.1	52.9	53.6	54.6	55.2	55.9	57.2	58.9	60.8	63.0	65.9	69.2	73.2	77.9	75.6	75.6
18	63.	54.8	53.5	53.8	54.4	54.9	56.0	56.8	58.1	59.5	61.5	63.5	66.4	69.4	73.1	76.7	74.8	74.8
19	80.	56.0	54.5	54.7	55.3	55.9	56.6	57.5	58.7	60.2	61.9	64.0	66.7	69.4	72.7	75.3	73.4	73.4
20	100.	56.4	54.7	55.0	55.4	56.2	57.0	57.8	58.9	60.4	62.1	64.2	66.6	69.1	72.1	73.9	71.7	71.7
21	125.	56.9	55.0	54.9	55.5	56.2	57.0	57.8	58.9	60.3	62.0	63.8	66.2	68.5	71.2	72.0	70.1	70.1
22	160.	56.8	54.7	54.7	55.3	56.0	56.4	57.4	58.6	60.0	61.6	63.3	65.5	67.7	69.9	70.1	68.3	68.3
23	200.	56.5	54.3	54.4	54.8	55.5	56.3	57.1	58.1	59.3	60.9	62.6	64.6	66.6	68.5	68.2	66.4	66.4
24	250.	56.2	53.8	53.7	54.2	54.7	55.5	56.4	57.3	58.6	60.1	61.6	63.4	65.3	66.8	66.0	64.3	64.3
25	315.	55.7	53.0	52.9	53.3	53.8	54.6	55.5	56.4	57.5	59.1	60.5	62.2	63.9	64.9	63.9	62.2	62.2
26	400.	55.0	52.2	52.0	52.2	52.9	53.6	54.5	55.4	56.4	57.8	59.1	60.9	62.4	62.9	61.8	60.3	60.3
27	500.	54.2	51.2	50.8	51.1	51.8	52.5	53.3	54.3	55.3	56.5	57.8	59.5	60.8	60.8	59.5	58.3	58.3
28	630.	53.3	50.1	49.8	50.0	50.6	51.3	52.1	53.0	54.0	55.1	56.5	57.9	59.2	58.8	57.4	56.3	56.3
29	800.	52.6	49.1	48.5	48.8	49.4	50.0	50.8	51.7	52.7	53.8	55.0	56.4	57.4	56.8	55.3	54.4	54.4
30	1000.	51.5	48.0	47.3	47.5	48.1	48.7	49.5	50.4	51.2	52.3	53.5	54.8	55.7	54.8	53.2	52.5	52.5
31	1250.	50.5	46.7	46.0	46.2	46.7	47.3	48.1	49.0	49.8	51.0	52.1	53.3	53.9	53.0	51.2	50.6	50.6
32	1600.	49.4	45.4	44.7	44.9	45.2	46.1	46.8	47.6	48.4	49.5	50.8	51.9	52.0	51.2	49.2	48.9	48.9
33	2000.	48.2	44.1	43.4	43.4	43.9	44.7	45.5	46.2	47.0	48.1	49.3	50.3	50.3	49.4	47.4	47.2	47.2
34	2500.	46.8	42.7	42.0	41.9	42.5	43.3	44.1	44.8	45.7	46.7	47.9	49.0	48.6	47.7	45.6	45.4	45.4
35	3150.	45.4	41.3	40.6	40.7	41.2	41.9	42.8	43.5	44.4	45.4	46.7	47.7	47.0	46.1	44.0	43.8	43.8
36	4000.	44.0	39.8	39.4	39.4	40.0	40.6	41.5	42.2	43.2	44.2	45.4	46.5	45.6	44.6	42.5	42.2	42.2
37	5000.	42.7	36.5	38.1	38.1	38.7	39.3	40.2	41.0	42.0	42.9	44.1	45.1	44.1	43.1	41.0	40.7	40.7
38	6300.	41.5	37.3	36.9	36.9	37.5	38.2	39.0	39.8	40.8	41.7	42.9	43.9	42.7	41.7	39.6	39.3	39.3
39	8000.	40.4	36.2	35.7	35.7	36.2	37.0	37.7	38.6	39.5	40.6	41.6	42.7	41.3	40.3	38.3	38.0	38.0
40	10000.	39.2	35.1	34.4	34.6	35.1	35.8	36.5	37.3	38.3	39.2	40.4	41.5	40.0	39.0	36.9	36.7	36.7

TAKEOFF

JET PRIM

BAND	ANGLE FREQ.	10.	20.	30.	40.	50.	60.	70.	80.	90.	100.	110.	120.	130.	140.	150.	160.	170.
17	50.	77.7	76.6	77.3	78.1	79.1	79.6	80.3	81.6	83.3	85.2	87.4	90.3	93.7	97.7	102.3	100.1	100.1
18	63.	80.3	79.0	79.3	79.9	80.5	81.6	82.3	83.6	85.0	87.0	89.0	92.0	95.0	98.6	102.2	100.3	100.3
19	80.	82.6	81.1	81.3	81.9	82.5	83.2	84.1	85.3	86.8	88.5	90.6	93.3	96.0	99.3	101.9	100.0	100.0
20	100.	84.0	82.3	82.6	83.0	83.8	84.6	85.4	86.6	88.1	89.8	91.8	94.2	96.7	99.7	101.5	93.3	93.3
21	125.	85.5	83.6	83.5	84.1	84.8	85.5	86.4	87.5	88.9	90.6	92.4	94.7	97.1	99.8	100.6	98.7	98.7
22	160.	86.2	84.1	84.2	84.7	85.4	86.2	86.9	88.1	89.5	91.1	92.8	94.9	97.1	99.3	99.6	97.7	97.7
23	200.	86.8	84.6	84.6	85.0	85.8	86.5	87.4	88.3	89.5	91.1	92.9	94.8	96.9	98.7	98.4	96.7	96.7
24	250.	87.2	84.8	84.7	85.1	85.7	86.5	87.4	88.2	89.5	91.0	92.6	94.4	96.3	97.7	97.0	95.3	95.3
25	315.	87.2	84.6	84.4	84.9	85.4	86.2	87.1	87.9	89.1	90.6	92.1	93.8	95.5	96.5	95.4	93.8	93.8
26	400.	87.1	84.2	84.1	84.3	85.0	85.7	86.5	87.5	88.5	89.9	91.1	93.0	94.5	95.0	93.9	92.3	92.3
27	500.	86.7	83.7	83.3	83.6	84.3	85.0	85.8	86.4	87.8	89.0	90.3	92.0	93.3	93.3	92.0	90.8	90.8
28	630.	86.1	82.9	82.6	82.8	83.3	84.1	84.9	85.8	86.8	87.9	89.3	90.7	91.9	91.6	90.2	89.1	89.1
29	800.	85.4	82.0	81.5	81.8	82.3	83.0	83.8	84.7	85.6	86.8	88.0	89.4	90.3	89.8	88.3	87.3	87.3
30	1000.	84.6	81.0	80.4	80.6	81.1	81.8	82.6	83.4	84.3	85.3	86.6	87.9	88.7	87.9	86.3	85.5	85.5
31	1250.	83.6	79.8	79.1	79.3	79.8	80.4	81.2	82.0	82.9	84.0	85.2	86.4	87.0	86.1	84.3	83.7	83.7
32	1600.	82.4	76.4	77.8	77.9	78.3	79.1	77.8	80.8	81.4	82.5	83.8	84.9	85.1	84.2	82.3	81.9	81.9
33	2000.	81.1	77.0	76.3	76.3	76.8	77.6	78.4	79.1	79.9	81.0	82.2	83.2	83.2	82.3	80.3	80.1	80.1
34	2500.	79.6	75.4	74.8	74.6	75.2	76.0	76.4	77.6	78.4	79.5	80.6	81.7	81.4	80.4	78.4	79.1	78.1
35	3150.	78.3	73.8	73.2	73.2	73.7	74.4	75.3	76.0	76.9	77.9	79.2	80.2	79.6	78.6	76.6	76.3	76.3
36	4000.	76.3	72.2	71.7	71.7	72.3	72.9	73.9	74.9	75.5	76.5	77.7	78.9	77.9	76.9	74.8	74.6	74.6
37	5000.	74.8	70.7	70.2	70.2	70.8	71.4	72.3	73.1	74.1	75.0	76.2	77.2	76.2	75.2	73.1	72.9	72.9
38	6300.	73.5	69.4	68.9	68.9	69.5	70.2	71.0	71.8	72.8	73.7	74.9	75.9	74.7	73.7	71.6	71.4	71.4
39	8000.	72.3	68.2	67.6	67.7	68.7	69.0	69.7	70.5	71.5	72.5	73.6	74.7	73.3	72.3	70.2	70.0	70.0
40	10000.	71.2	67.1	66.4	66.6	67.1	67.8	68.5	69.3	70.3	71.2	72.4	73.5	72.0	71.0	68.9	68.7	68.7

TABLE 10
TURBOMACHINERY NOISE SPECTRUM (370 FT. SIDELINE)

APPROACH

TURB BASE

BAND	ANGLE FREQ.	10.	20.	30.	40.	50.	60.	70.	80.	90.	100.	110.	120.	130.	140.	150.	160.	170.
17	50.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	10.0	10.0	10.0	0.0	0.0	0.0	0.0
18	63.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	10.0	10.0	10.0	0.0	0.0	0.0	0.0
19	80.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	10.0	10.0	10.0	0.0	0.0	0.0	0.0
20	100.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	10.0	10.0	10.0	0.0	0.0	0.0	0.0
21	125.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	10.0	10.0	10.0	0.0	0.0	0.0	0.0
22	160.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	10.0	10.0	10.0	0.0	0.0	0.0	0.0
23	200.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	10.0	10.0	10.0	0.0	0.0	0.0	0.0
24	250.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	10.0	10.0	10.0	0.0	0.0	0.0	0.0
25	315.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	10.0	10.0	10.0	0.0	0.0	0.0	0.0
26	400.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	10.0	10.0	10.0	0.0	0.0	0.0	0.0
27	500.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	10.0	10.0	10.0	0.0	0.0	0.0	0.0
28	630.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	10.0	10.0	10.0	0.0	0.0	0.0	0.0
29	800.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	10.0	10.0	10.0	0.0	0.0	0.0	0.0
30	1000.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	10.0	10.0	10.0	0.0	0.0	0.0	0.0
31	1250.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	40.0	41.0	41.6	10.0	0.0	0.0	0.0	0.0
32	1600.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	43.0	43.0	44.8	40.0	0.0	0.0	0.0	0.0
33	2000.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	46.0	46.7	47.7	43.5	0.0	0.0	0.0	0.0
34	2500.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	48.0	49.5	50.8	47.7	0.0	0.0	0.0	0.0
35	3150.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	52.1	52.8	53.7	50.0	0.0	0.0	0.0	0.0
36	4000.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	58.0	55.5	54.3	55.1	0.0	0.0	0.0	0.0
37	5000.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	62.5	60.5	64.2	60.2	0.0	0.0	0.0	0.0
38	6300.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	67.5	65.5	69.0	65.4	0.0	0.0	0.0	0.0
39	8000.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	68.1	70.0	69.0	65.2	0.0	0.0	0.0	0.0
40	10000.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	68.5	68.0	68.7	60.0	0.0	0.0	0.0	0.0

TABLE 11
MODIFIED DATA IDENTIFICATION

DATA	TYPE
Fan + Jet 2	200-ft. Polar
Jet 1	200-ft. Polar
Jet 2	200-ft. Polar
Turbomachinery	200-ft. Polar

TABLE 12
FAN AND SECONDARY JET NOISE SPECTRUM (200-FT. POLAR)

APPROACH

FAN + JET2

BAND	FREQ. \ ANGLE	10.	20.	30.	40.	50.	60.	70.	80.	90.	100.	110.	120.	130.	140.	150.	160.	170.
17	50.	65.0	79.0	67.0	63.0	72.0	63.0	64.0	64.0	66.0	68.0	68.0	70.0	71.0	73.0	75.0	75.0	75.0
18	63.	65.0	79.0	67.0	63.0	72.0	63.0	64.0	64.0	66.0	68.0	68.0	70.0	71.0	73.0	75.0	75.0	75.0
19	80.	65.0	79.0	67.0	63.0	72.0	63.0	64.0	64.0	66.0	68.0	68.0	70.0	71.0	73.0	75.0	75.0	75.0
20	100.	65.0	79.0	67.0	63.0	72.0	63.0	64.0	64.0	66.0	68.0	68.0	70.0	71.0	73.0	75.0	75.0	75.0
21	125.	66.0	75.0	69.0	69.0	72.0	65.0	66.0	67.0	68.0	69.0	70.0	70.0	71.0	71.0	73.0	73.0	73.0
22	160.	68.0	77.0	71.0	67.0	72.0	66.0	67.0	68.0	68.0	68.0	68.0	69.0	69.0	70.0	71.0	71.0	71.0
23	200.	70.0	80.0	72.0	67.0	75.0	66.0	66.0	65.0	65.0	67.0	68.0	69.0	71.0	72.0	72.0	71.0	71.0
24	250.	69.0	77.0	69.0	69.0	73.0	65.0	65.0	65.0	67.0	68.0	70.0	70.0	71.0	71.0	71.0	70.0	70.0
25	315.	70.0	77.0	71.0	69.0	74.0	66.0	66.0	66.0	66.0	67.0	69.0	69.0	70.0	71.0	70.0	68.0	68.0
26	400.	73.0	76.0	71.0	70.0	73.0	66.0	66.0	66.0	68.0	69.0	70.0	70.0	71.0	71.0	70.0	68.0	68.0
27	500.	74.0	76.0	74.0	73.0	76.0	69.0	67.0	67.0	68.0	69.0	71.0	71.0	72.0	72.0	70.0	68.0	68.0
28	630.	75.0	81.0	76.0	74.0	76.0	70.0	69.0	69.0	71.0	72.0	73.0	72.0	74.0	73.0	71.0	69.0	69.0
29	800.	76.0	84.0	77.0	77.0	79.0	72.0	73.0	70.0	72.0	74.0	74.0	74.0	76.0	75.0	71.0	69.0	69.0
30	1000.	79.0	85.0	80.0	78.0	80.0	74.0	73.0	73.0	76.0	77.0	78.0	77.0	79.0	79.0	74.0	72.0	72.0
31	1250.	80.0	85.0	82.0	80.0	81.0	74.0	74.0	75.0	78.0	79.0	80.0	79.0	83.0	80.0	76.0	74.0	74.0
32	1600.	84.0	89.0	86.0	83.0	85.0	78.0	76.0	77.0	80.0	82.0	82.0	82.0	83.0	82.0	79.0	76.0	76.0
33	2000.	89.0	94.0	90.0	88.0	90.0	84.0	81.0	81.0	83.0	85.0	86.0	86.0	87.0	86.0	82.0	79.0	79.0
34	2500.	83.0	86.0	86.0	84.0	85.0	77.0	76.0	77.0	80.0	83.0	83.0	83.0	84.0	83.0	79.0	74.0	74.0
35	3150.	82.0	87.0	86.0	85.0	86.0	79.0	76.0	77.0	81.0	83.0	84.0	84.0	84.0	82.0	77.0	74.0	74.0
36	4000.	83.0	89.0	86.0	85.0	88.0	81.0	77.0	77.0	81.0	82.0	84.0	84.0	84.0	83.0	78.0	75.0	75.0
37	5000.	83.0	88.0	85.0	83.0	87.0	79.0	74.0	75.0	78.0	80.0	81.0	82.0	83.0	82.0	77.0	73.0	73.0
38	6300.	82.0	86.0	84.0	83.0	86.0	78.0	73.0	74.0	77.0	79.0	80.0	81.0	83.0	82.0	77.0	73.0	73.0
39	8000.	79.0	84.0	82.0	81.0	84.0	76.0	71.0	70.0	74.0	76.0	78.0	79.0	81.0	80.0	75.0	71.0	71.0
40	10000.	75.0	80.0	74.0	77.0	80.0	72.0	66.0	67.0	68.0	71.0	74.0	74.0	76.0	75.0	70.0	67.0	67.0

TAKEOFF

FAN + JET2

BAND	FREQ. \ ANGLE	10.	20.	30.	40.	50.	60.	70.	80.	90.	100.	110.	120.	130.	140.	150.	160.	170.
17	50.	77.0	82.0	75.0	75.0	81.0	76.0	75.0	76.0	79.0	80.0	82.0	84.0	86.0	89.0	91.0	91.0	91.0
18	63.	77.0	82.0	75.0	75.0	81.0	76.0	76.0	76.0	79.0	80.0	82.0	84.0	86.0	89.0	91.0	91.0	91.0
19	80.	77.0	82.0	75.0	75.0	81.0	76.0	76.0	76.0	79.0	80.0	82.0	84.0	86.0	89.0	91.0	91.0	91.0
20	100.	77.0	82.0	75.0	75.0	81.0	76.0	76.0	76.0	81.0	80.0	82.0	84.0	86.0	89.0	91.0	91.0	91.0
21	125.	78.0	81.0	78.0	77.0	82.0	77.0	78.0	80.0	81.0	82.0	83.0	85.0	86.0	87.0	89.0	89.0	89.0
22	160.	79.0	84.0	79.0	79.0	83.0	79.0	80.0	81.0	78.0	81.0	82.0	83.0	84.0	86.0	88.0	88.0	88.0
23	200.	80.0	84.0	79.0	79.0	83.0	78.0	78.0	76.0	80.0	79.0	81.0	83.0	86.0	88.0	89.0	88.0	88.0
24	250.	79.0	84.0	78.0	77.0	81.0	77.0	77.0	78.0	80.0	82.0	83.0	84.0	85.0	87.0	88.0	86.0	86.0
25	315.	81.0	84.0	81.0	80.0	85.0	80.0	79.0	79.0	80.0	81.0	82.0	83.0	85.0	86.0	87.0	84.0	84.0
26	400.	85.0	86.0	83.0	82.0	84.0	80.0	79.0	80.0	80.0	82.0	83.0	84.0	85.0	86.0	85.0	84.0	84.0
27	500.	82.0	85.0	81.0	82.0	86.0	81.0	80.0	79.0	80.0	81.0	82.0	83.0	84.0	85.0	84.0	82.0	82.0
28	630.	84.0	86.0	82.0	82.0	85.0	83.0	79.0	80.0	80.0	82.0	83.0	83.0	84.0	84.0	84.0	82.0	82.0
29	800.	83.0	88.0	83.0	83.0	86.0	81.0	80.0	80.0	82.0	83.0	84.0	84.0	85.0	84.0	83.0	80.0	80.0
30	1000.	85.0	89.0	86.0	86.0	90.0	84.0	82.0	83.0	84.0	85.0	86.0	85.0	86.0	85.0	83.0	81.0	81.0
31	1250.	86.0	90.0	87.0	87.0	90.0	84.0	83.0	84.0	86.0	87.0	87.0	87.0	88.0	86.0	83.0	81.0	81.0
32	1600.	87.0	91.0	88.0	88.0	91.0	86.0	85.0	86.0	88.0	89.0	90.0	89.0	91.0	87.0	84.0	82.0	82.0
33	2000.	88.0	93.0	91.0	87.0	92.0	87.0	87.0	87.0	90.0	92.0	92.0	92.0	94.0	89.0	86.0	83.0	83.0
34	2500.	91.0	98.0	97.0	97.0	100.0	94.0	92.0	91.0	93.0	95.0	96.0	95.0	96.0	91.0	88.0	85.0	85.0
35	3150.	90.0	96.0	95.0	94.0	98.0	92.0	91.0	90.0	92.0	94.0	94.0	94.0	95.0	90.0	87.0	84.0	84.0
36	4000.	88.0	93.0	90.0	90.0	93.0	88.0	87.0	88.0	91.0	93.0	93.0	92.0	93.0	88.0	84.0	82.0	82.0
37	5000.	88.0	94.0	92.0	91.0	94.0	89.0	84.0	85.0	91.0	92.0	93.0	93.0	93.0	90.0	85.0	82.0	82.0
38	6300.	88.0	92.0	91.0	90.0	93.0	87.0	85.0	86.0	89.0	91.0	92.0	93.0	93.0	90.0	85.0	82.0	82.0
39	8000.	84.0	89.0	88.0	88.0	90.0	85.0	83.0	84.0	86.0	89.0	90.0	91.0	91.0	88.0	81.0	80.0	80.0
40	10000.	80.0	86.0	84.0	84.0	86.0	80.0	79.0	80.0	82.0	85.0	86.0	87.0	87.0	84.0	79.0	76.0	76.0

TABLE 13
PRIMARY JET NOISE SPECTRUM (200-FT. POLAR)

APPROACH

JET PRIM

BAND	ANGLE / FREQ.	10.	20.	30.	40.	50.	60.	70.	80.	90.	100.	110.	120.	130.	140.	150.	160.	170.
17	50.	55.0	54.0	55.0	56.0	57.0	57.0	58.0	59.0	61.0	63.0	65.0	68.0	71.0	75.0	80.0	78.0	78.0
18	63.	57.0	55.0	56.0	56.0	57.0	58.0	59.0	60.0	61.0	63.0	65.0	68.0	71.0	75.0	79.0	77.0	77.0
19	80.	58.0	57.0	57.0	57.0	58.0	59.0	60.0	61.0	62.0	64.0	66.0	69.0	71.0	75.0	77.0	75.0	75.0
20	100.	58.0	57.0	57.0	57.0	58.0	59.0	60.0	61.0	62.0	64.0	66.0	69.0	71.0	74.0	76.0	74.0	74.0
21	125.	59.0	57.0	57.0	58.0	58.0	59.0	60.0	61.0	62.0	64.0	66.0	68.0	71.0	73.0	74.0	72.0	72.0
22	160.	59.0	57.0	57.0	57.0	58.0	59.0	59.0	61.0	62.0	64.0	65.0	68.0	70.0	72.0	72.0	70.0	70.0
23	200.	59.0	56.0	56.0	57.0	58.0	58.0	59.0	60.0	61.0	63.0	65.0	67.0	69.0	71.0	70.0	68.0	68.0
24	250.	58.0	56.0	56.0	56.0	57.0	58.0	58.0	59.0	61.0	62.0	64.0	65.0	67.0	69.0	68.0	66.0	66.0
25	315.	58.0	55.0	55.0	55.0	56.0	57.0	58.0	58.0	60.0	61.0	63.0	64.0	66.0	67.0	66.0	64.0	64.0
26	400.	57.0	54.0	54.0	54.0	55.0	55.0	57.0	57.0	58.0	60.0	61.0	63.0	64.0	65.0	64.0	62.0	62.0
27	500.	56.0	53.0	53.0	53.0	54.0	55.0	55.0	56.0	57.0	59.0	60.0	62.0	63.0	63.0	62.0	60.0	60.0
28	630.	55.0	52.0	52.0	52.0	53.0	53.0	54.0	55.0	56.0	57.0	59.0	60.0	61.0	61.0	60.0	58.0	58.0
29	800.	55.0	51.0	51.0	51.0	52.0	52.0	53.0	54.0	55.0	56.0	57.0	59.0	60.0	59.0	57.0	57.0	57.0
30	1000.	54.0	50.0	49.0	50.0	50.0	51.0	52.0	53.0	53.0	54.0	56.0	57.0	58.0	57.0	55.0	55.0	55.0
31	1250.	53.0	49.0	48.0	48.0	49.0	50.0	50.0	51.0	52.0	53.0	54.0	56.0	56.0	55.0	53.0	53.0	53.0
32	1600.	52.0	48.0	47.0	47.0	47.0	48.0	49.0	50.0	51.0	52.0	53.0	54.0	54.0	53.0	51.0	51.0	51.0
33	2000.	51.0	46.0	46.0	46.0	46.0	47.0	48.0	49.0	49.0	50.0	52.0	53.0	53.0	52.0	50.0	50.0	50.0
34	2500.	49.0	45.0	44.0	44.0	45.0	46.0	46.0	47.0	48.0	49.0	50.0	51.0	51.0	50.0	48.0	48.0	48.0
35	3150.	48.0	44.0	43.0	43.0	44.0	44.0	45.0	45.0	47.0	48.0	49.0	50.0	49.0	49.0	46.0	46.0	46.0
36	4000.	47.0	42.0	42.0	42.0	43.0	43.0	44.0	45.0	46.0	47.0	48.0	49.0	48.0	47.0	45.0	45.0	45.0
37	5000.	45.0	41.0	41.0	41.0	41.0	42.0	43.0	44.0	45.0	46.0	47.0	48.0	47.0	46.0	44.0	43.0	43.0
38	6300.	44.0	40.0	40.0	40.0	40.0	41.0	42.0	43.0	44.0	45.0	46.0	47.0	46.0	45.0	42.0	42.0	42.0
39	8000.	44.0	39.0	39.0	39.0	39.0	40.0	41.0	42.0	43.0	44.0	45.0	46.0	44.0	43.0	41.0	41.0	41.0
40	10000.	43.0	39.0	38.0	38.0	39.0	39.0	40.0	41.0	42.0	43.0	44.0	45.0	44.0	43.0	40.0	40.0	40.0

TAKEOFF

JET PRIM

BAND	ANGLE / FREQ.	10.	20.	30.	40.	50.	60.	70.	80.	90.	100.	110.	120.	130.	140.	150.	160.	170.
17	50.	80.0	79.0	79.0	80.0	81.0	82.0	82.0	84.0	85.0	87.0	89.0	92.0	96.0	100.0	104.0	102.0	102.0
18	63.	82.0	81.0	81.0	82.0	82.0	84.0	84.0	86.0	87.0	89.0	91.0	94.0	97.0	101.0	104.0	102.0	102.0
19	80.	85.0	83.0	83.0	84.0	85.0	85.0	86.0	87.0	89.0	91.0	93.0	95.0	98.0	101.0	104.0	102.0	102.0
20	100.	86.0	84.0	85.0	85.0	86.0	87.0	87.0	89.0	90.0	92.0	94.0	96.0	99.0	102.0	104.0	95.0	95.0
21	125.	88.0	86.0	86.0	86.0	87.0	88.0	89.0	90.0	91.0	93.0	94.0	97.0	99.0	102.0	103.0	101.0	101.0
22	160.	86.0	86.0	86.0	87.0	87.0	88.0	89.0	90.0	92.0	93.0	95.0	97.0	99.0	101.0	102.0	100.0	100.0
23	200.	89.0	87.0	87.0	87.0	88.0	89.0	89.0	90.0	92.0	93.0	95.0	97.0	99.0	101.0	100.0	99.0	99.0
24	250.	89.0	87.0	87.0	87.0	88.0	89.0	89.0	90.0	92.0	93.0	95.0	96.0	98.0	100.0	99.0	97.0	97.0
25	315.	89.0	87.0	86.0	87.0	87.0	88.0	89.0	90.0	91.0	93.0	94.0	96.0	98.0	99.0	97.0	96.0	96.0
26	400.	89.0	86.0	86.0	86.0	87.0	88.0	89.0	90.0	91.0	92.0	93.0	95.0	97.0	97.0	96.0	94.0	94.0
27	500.	89.0	86.0	85.0	86.0	86.0	87.0	88.0	89.0	90.0	91.0	92.0	94.0	95.0	95.0	94.0	93.0	93.0
28	630.	88.0	85.0	85.0	85.0	85.0	86.0	87.0	88.0	89.0	90.0	91.0	93.0	94.0	94.0	92.0	91.0	91.0
29	800.	88.0	84.0	84.0	84.0	84.0	85.0	86.0	87.0	88.0	89.0	90.0	92.0	92.0	92.0	90.0	89.0	89.0
30	1000.	87.0	83.0	83.0	83.0	83.0	84.0	85.0	86.0	86.0	87.0	89.0	90.0	91.0	90.0	88.0	88.0	88.0
31	1250.	86.0	82.0	81.0	82.0	82.0	83.0	83.0	84.0	85.0	86.0	87.0	89.0	89.0	88.0	87.0	86.0	86.0
32	1600.	85.0	81.0	80.0	80.0	81.0	81.0	82.0	83.0	84.0	85.0	86.0	87.0	87.0	86.0	85.0	84.0	84.0
33	2000.	83.0	79.0	79.0	79.0	79.0	80.0	81.0	81.0	82.0	83.0	85.0	86.0	86.0	85.0	83.0	82.0	82.0
34	2500.	82.0	78.0	77.0	77.0	78.0	78.0	79.0	80.0	81.0	82.0	83.0	84.0	84.0	83.0	81.0	80.0	80.0
35	3150.	80.0	76.0	76.0	76.0	76.0	77.0	77.0	78.0	79.0	80.0	82.0	83.0	82.0	81.0	79.0	79.0	79.0
36	4000.	79.0	75.0	74.0	74.0	75.0	75.0	76.0	77.0	78.0	79.0	80.0	81.0	80.0	79.0	77.0	77.0	77.0
37	5000.	77.0	73.0	73.0	73.0	73.0	74.0	75.0	76.0	77.0	78.0	79.0	80.0	79.0	78.0	76.0	76.0	76.0
38	6300.	76.0	72.0	72.0	72.0	72.0	73.0	74.0	75.0	76.0	77.0	78.0	79.0	78.0	77.0	74.0	74.0	74.0
39	8000.	75.0	71.0	71.0	71.0	71.0	72.0	73.0	74.0	75.0	76.0	77.0	78.0	76.0	75.0	73.0	73.0	73.0
40	10000.	74.0	71.0	70.0	70.0	71.0	71.0	72.0	73.0	74.0	75.0	76.0	77.0	76.0	75.0	72.0	72.0	72.0

TABLE 14
SECONDARY JET NOISE SPECTRUM (200-FT. POLAR)

APPROACH

JET SEC

BAND	ANGLE FREQ.	10.	20.	30.	40.	50.	60.	70.	80.	90.	100.	110.	120.	130.	140.	150.	160.	170.
17	50.	64.9	78.9	66.9	62.9	71.9	62.9	63.9	63.9	65.9	67.9	67.9	69.9	70.9	72.9	74.9	74.9	74.9
18	63.	64.9	78.9	66.9	62.9	71.9	62.9	63.9	63.9	65.9	67.9	67.9	69.9	70.9	72.9	74.9	74.9	74.9
19	80.	64.9	78.9	66.9	62.9	71.9	62.9	63.9	63.9	65.9	67.9	67.9	69.9	70.9	72.9	74.9	74.9	74.9
20	100.	64.9	78.9	66.9	62.9	71.9	62.9	63.9	63.9	65.9	67.9	67.9	69.9	70.9	72.9	74.9	74.9	74.9
21	125.	63.4	77.4	65.4	61.4	70.4	61.4	62.4	62.4	64.4	66.4	66.4	68.4	69.4	71.4	73.4	73.4	73.4
22	160.	61.9	75.9	63.9	59.9	68.9	59.9	60.9	60.9	62.9	64.9	64.9	66.9	67.9	69.9	41.9	41.9	41.9
23	200.	60.4	74.4	62.4	58.4	67.4	58.4	59.4	59.4	61.4	63.4	63.4	65.4	66.4	68.4	70.4	70.4	70.4
24	250.	58.9	72.9	60.9	56.9	65.9	56.9	57.9	57.9	59.9	61.9	61.9	63.9	64.9	66.9	68.9	68.9	68.9
25	315.	57.4	71.4	59.4	55.4	64.4	55.4	56.4	56.4	58.4	60.4	60.4	62.4	63.4	65.4	67.4	67.4	67.4
26	400.	55.9	69.9	57.9	53.9	62.9	53.9	54.9	54.9	56.9	58.9	58.9	60.9	61.9	63.9	65.9	65.9	65.9
27	500.	54.4	68.4	56.4	52.4	61.4	52.4	53.4	53.4	55.4	57.4	57.4	29.4	60.4	62.4	64.4	64.4	64.4
28	630.	52.9	66.9	54.9	50.9	59.9	50.9	51.9	51.9	53.9	55.9	55.9	57.9	58.9	60.9	62.9	62.9	62.9
29	800.	51.4	65.4	53.4	49.4	58.4	49.4	50.4	50.4	52.4	54.4	54.4	56.4	57.4	59.4	61.4	61.4	61.4
30	1000.	49.9	63.9	51.9	47.9	56.9	47.9	48.9	48.9	50.9	52.9	52.9	54.9	55.9	57.9	59.9	59.9	59.9
31	1250.	48.4	62.4	50.4	46.4	55.4	46.4	47.4	47.4	49.4	51.4	51.4	53.4	54.4	56.4	58.4	58.4	58.4
32	1600.	46.9	60.9	48.9	44.9	53.9	44.9	45.9	45.9	47.9	49.9	49.9	51.9	52.9	54.9	56.9	56.9	56.9
33	2000.	45.4	59.4	47.4	43.4	52.4	43.4	44.4	44.4	46.4	48.4	48.4	50.4	51.4	53.4	55.4	55.4	55.4
34	2500.	43.9	57.9	45.9	41.9	50.9	41.9	42.9	42.9	44.9	46.9	46.9	48.9	49.9	51.9	53.9	53.9	53.9
35	3150.	42.4	56.4	44.4	40.4	49.4	40.4	41.4	41.4	43.4	45.4	45.4	47.4	48.4	50.4	52.4	52.4	52.4
36	4000.	40.9	54.9	42.9	38.9	47.9	38.9	39.9	39.9	41.9	43.9	43.9	45.9	46.9	48.9	50.9	50.9	50.9
37	5000.	39.4	53.4	41.4	37.4	46.4	37.4	38.4	38.4	40.4	42.4	42.4	44.4	45.4	47.4	49.4	49.4	49.4
38	6300.	37.9	51.9	39.9	35.9	44.9	35.9	36.9	36.9	38.9	40.9	40.9	42.9	43.9	45.9	47.9	47.9	47.9
39	8000.	36.4	50.4	38.4	34.4	43.4	34.4	35.4	35.4	37.4	39.4	39.4	41.4	42.4	44.4	46.4	46.4	46.4
40	10000.	34.9	48.9	36.9	32.9	41.9	32.9	33.9	33.9	35.9	37.9	37.9	39.9	40.9	42.9	44.9	44.9	44.9

TAKEOFF

JET SEC

BAND	ANGLE FREQ.	10.	20.	30.	40.	50.	60.	70.	80.	90.	100.	110.	120.	130.	140.	150.	160.	170.
17	50.	76.9	81.9	74.9	74.9	80.9	75.9	75.9	75.9	78.9	79.9	81.9	83.9	85.9	88.9	90.9	90.9	90.9
18	63.	76.9	81.4	74.9	74.9	80.9	75.9	75.9	75.9	78.9	79.9	81.9	83.9	85.9	88.9	90.9	90.9	90.9
19	80.	76.9	81.9	74.9	74.9	80.9	75.9	75.9	75.9	78.9	79.9	81.9	83.9	85.9	88.9	90.9	90.9	90.9
20	100.	76.9	81.9	74.9	74.9	80.9	75.9	75.9	75.9	80.9	79.9	81.9	83.9	85.9	88.9	90.9	90.9	90.9
21	125.	75.4	80.4	73.4	73.4	79.4	74.4	74.4	74.4	79.4	78.4	80.4	82.4	84.4	87.4	89.4	89.4	89.4
22	160.	73.9	78.9	71.9	71.9	77.9	72.9	72.9	72.9	77.9	76.9	78.9	80.9	82.9	85.9	87.9	87.9	87.9
23	200.	72.4	77.4	70.4	70.4	76.4	71.4	71.4	71.4	76.4	75.4	77.4	79.4	81.4	84.4	86.4	86.4	86.4
24	250.	70.9	75.9	68.9	68.9	74.9	69.9	69.9	69.9	74.9	73.9	75.9	77.9	79.9	82.9	84.9	84.9	84.9
25	315.	69.4	74.4	67.4	67.6	73.4	68.4	68.4	68.4	73.4	72.4	74.4	76.4	78.4	81.4	83.4	83.4	83.4
26	400.	67.9	72.9	65.9	65.9	71.9	66.9	66.9	66.9	71.9	70.9	72.9	74.9	76.9	79.9	81.9	81.9	81.9
27	500.	66.4	71.4	64.4	64.4	70.4	65.4	65.4	65.4	70.4	69.4	71.4	73.4	75.4	78.4	80.4	80.4	80.4
28	630.	64.9	69.9	62.9	62.9	68.9	63.9	63.9	63.9	68.9	67.9	69.9	71.9	73.9	76.9	78.9	78.9	78.9
29	800.	63.4	68.4	61.4	61.4	67.4	62.4	62.4	62.4	67.4	66.4	68.4	70.4	72.4	75.4	77.4	77.4	77.4
30	1000.	61.9	66.9	59.9	59.9	65.9	60.9	60.9	60.9	65.9	64.9	66.9	68.9	70.9	73.9	75.9	75.9	75.9
31	1250.	60.4	65.4	58.4	58.4	64.4	57.4	57.4	59.4	64.4	63.4	65.4	67.4	69.4	72.4	74.4	74.4	74.4
32	1600.	58.9	63.9	56.9	56.9	62.9	57.9	57.9	57.9	62.9	61.9	63.9	65.9	67.9	70.9	72.9	72.9	72.9
33	2000.	57.4	62.4	55.4	55.4	61.4	56.4	56.4	56.4	61.4	60.4	62.4	64.4	66.4	69.4	71.4	71.4	71.4
34	2500.	55.9	60.9	53.9	53.9	59.9	54.9	54.9	54.9	59.9	58.9	60.9	62.9	64.9	67.9	69.9	69.9	69.9
35	3150.	54.4	59.4	52.4	52.4	58.4	53.4	53.4	51.4	58.4	57.4	59.4	61.4	61.4	66.4	68.4	68.4	68.4
36	4000.	52.9	57.9	50.9	50.9	56.9	51.9	51.9	51.9	56.9	55.9	57.9	59.9	61.9	64.9	66.9	66.9	66.9
37	5000.	51.4	56.4	49.4	49.4	55.4	50.4	50.4	50.4	55.4	54.4	56.4	58.4	60.4	63.4	65.4	65.4	65.4
38	6300.	49.9	54.9	47.9	47.9	53.9	48.9	48.9	48.9	53.9	52.9	54.9	56.9	58.9	61.9	63.9	63.9	63.9
39	8000.	48.4	53.4	46.4	46.4	52.4	47.4	47.4	47.4	52.4	51.4	53.4	55.4	57.4	60.4	62.4	62.4	62.4
40	10000.	46.9	51.9	44.9	44.9	50.9	45.9	45.9	45.9	50.9	49.9	51.9	53.9	55.9	58.9	60.9	60.9	60.9

TABLE 15
TURBOMACHINERY NOISE SPECTRUM (200-FT. POLAR)

TURB

BAND	ANGLE FREQ.	10.	20.	30.	40.	50.	60.	70.	80.	90.	100.	110.	120.	130.	140.	150.	160.	170.
17	50.	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
18	63.	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
19	80.	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
20	100.	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
21	125.	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
22	160.	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
23	200.	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
24	250.	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
25	315.	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	15.0	15.0	15.0	15.0	10.0	10.0	10.0	10.0
26	400.	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	14.0	20.0	20.0	20.0	20.0	14.0	10.0	10.0	10.0
27	500.	10.0	10.0	10.0	10.0	10.0	10.0	10.0	14.0	18.0	25.0	25.0	25.0	25.0	18.0	14.0	10.0	10.0
28	630.	10.0	10.0	10.0	10.0	10.0	10.0	13.0	17.0	22.0	30.0	30.0	30.0	30.0	22.0	17.0	13.0	10.0
29	800.	10.0	10.0	10.0	10.0	10.0	12.0	16.0	21.0	26.0	35.0	35.0	35.0	35.0	26.0	21.0	16.0	12.0
30	1000.	10.0	10.0	10.0	10.0	12.0	15.0	19.0	24.0	30.0	40.0	40.0	40.0	40.0	30.0	24.0	19.0	15.0
31	1250.	10.0	10.0	10.0	11.0	14.0	18.0	23.0	28.0	34.0	46.0	48.0	50.0	45.0	34.0	24.0	23.0	18.0
32	1600.	10.0	10.0	10.0	12.0	16.0	20.0	26.0	31.0	38.0	50.0	50.0	53.0	50.0	35.0	31.0	26.0	20.0
33	2000.	10.0	10.0	10.0	13.0	18.0	23.0	29.0	35.0	42.0	53.0	54.0	56.0	54.0	42.0	35.0	29.0	23.0
34	2500.	10.0	10.0	10.0	14.0	20.0	25.0	32.0	38.0	46.0	55.0	57.0	60.0	54.0	46.0	38.0	32.0	25.0
35	3150.	10.0	10.0	10.0	15.0	21.0	28.0	35.0	42.0	50.0	59.0	61.0	63.0	61.0	50.0	42.0	35.0	28.0
36	4000.	10.0	10.0	10.0	16.0	23.0	30.0	38.0	45.0	54.0	60.0	64.0	69.0	67.0	54.0	45.0	38.0	30.0
37	5000.	10.0	10.0	10.0	17.0	25.0	33.0	41.0	49.0	58.0	70.0	69.0	74.0	72.0	58.0	49.0	41.0	33.0
38	6300.	10.0	10.0	10.0	18.0	27.0	35.0	44.0	53.0	62.0	76.0	75.0	80.0	78.0	62.0	53.0	44.0	35.0
39	8000.	10.0	10.0	10.0	19.0	28.0	37.0	47.0	56.0	66.0	78.0	81.0	81.0	80.0	66.0	56.0	47.0	37.0
40	10000.	10.0	10.0	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	80.0	83.0	77.0	70.0	60.0	50.0	40.0

APPROACH

```
BREAKDOWN OF CONTROL CARD

      1 --- 1 = ONE HEADER CARD  ------------------- 1
      2 --- 1 = SECOND HEADER CARD  ---------------- 1
      3 --- 0 = FIXED NOISE SOURCE  ---------------- 0
      4 --- 0 = STANDARD (NON POLAR ANGLE) INPUT  - 0
      5 --- NOT USED  ------------------------------ 0
      6 --- 0 = SIDELINE INPUT  = 1 POLAR INPUT --- 1
      7 --- 4 = STANDARD (FORMAT 17) SPL INPUT  --- 4
      8 --- NOT USED  ------------------------------ 0
      9 --- 0 = DST TONE CORRECTION  ---------------- 0
     10 --- NOT USED  ------------------------------ 0

     11 --- 1 = PUNCHED OUTPUT  -------------------- 1
     12-15 ----- NOT USED  ------------------------- 0101
     16 --- 1 = DETERMIN ATT. ANGLES INTERNALLY --- 1
     17 --- NOT USED  ------------------------------ 0
     18 --- 1 = READ OPTIMUM JET - SUPP. CARD  ---- 1
     19 --- 1 = SHORT FORM OUTPUT  ----------------- 1
     20 --- 1 = STANDARD (LONG FORM) OUTPUT  ------ 0

 21      --- 1 = JET CORE INPUT  -------------1
     22 --- 1 = DEVELOP FOOTPRINT  ----------------0
     23 --- 1 = TIME PRINT (GEOM SUB)  ------------0
     24 --- 1 =     DETERMINE DOPPLER EFFECTS  ---- 1
     25 --- 1 = FAN NOISE INPUT  ------------------- 1
     26 --- 1 = OMIT JET SHIFT  ------------------- 1
     27 --- 1 = TURBINE NOISE INPUT  --------------- 1
     28 --- 0 = USE GROUND ATTENUATION  ------------ 0
     29 --- 1 = USE JET, INLET, FWD DUCT ATTEN.---- 1
     30 --- 1 = GRID GEN. FOR DEVELOPING EPNL CNTRS 0

 31-32 --- NO OF INPUT CASES  ---------------  1
 33-34 --- NO OF POLAR ANGLES  ---------------- 17
 35-36 --- 24 = 1/3 OCTAVE DATA  ---------------- 24
 37-38 ---                       ---------------- 0
 39-40 --- NO OF FLIGHT PROFILE SECTIONS  ------- 0
 41-42 --- NO OF P.P.M. INPUTS  ----------------- 0
 43-44 ---                       ---------------- 0
 45-46 --- NO OF MODES SUMMED ------------------- 0
 47-48 --- NO OF GRIDPOINTS  -------------------- 0
 49-50 --- NO OF ATTENUATIONS  ------------------ 1
    51 --- NO OF ENGINES  ------------------------  4.0

CONTROL CARD AND DATA INPUT

1100014000101011011010011111010 11724 0 0 0 0 0 0 1   4.

     SPL24=SPL-FAN+JET 2     SPLJE=SPL JET 1     SPLREF=SPL JET 2
     CONVERTED FROM 100 F    0 200 FT   APP      271971

  ALTITUDE  VELOCITY  HUMIDITY    TEMP  SIDELINE    OFFSET     POWER     OVHTIM        NJ
    200.00       0.0      70.00   59.00       0.0       0.0       0.0       0.0        17
    370.00     294.00     70.00   59.00       0.0       0.0
```

TABLE 16
EPNL PROGRAM INPUT (CONTROL CARDS)

FAN JET2

ANGLE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
10.00	65.	65.	65.	65.	66.	68.	70.	69.	70.	73.	74.	75.	76.	79.	80.	84.	89.	83.	82.	83.	83.	82.	79.	75.
20.00	75.	75.	75.	75.	75.	77.	80.	77.	77.	76.	78.	81.	84.	85.	85.	89.	94.	86.	87.	89.	88.	86.	84.	80.
30.00	67.	67.	67.	67.	69.	71.	72.	69.	71.	71.	74.	76.	77.	80.	82.	86.	90.	86.	86.	86.	85.	84.	82.	79.
40.00	63.	63.	63.	63.	64.	67.	67.	66.	69.	70.	73.	74.	77.	79.	80.	83.	88.	84.	85.	85.	83.	83.	81.	77.
50.00	72.	72.	72.	72.	73.	72.	75.	73.	74.	73.	76.	76.	79.	80.	81.	85.	90.	85.	86.	86.	87.	86.	84.	80.
60.00	67.	67.	67.	67.	68.	68.	69.	65.	66.	66.	69.	70.	72.	74.	74.	78.	84.	77.	79.	81.	79.	78.	76.	72.
70.00	64.	64.	64.	64.	66.	67.	66.	65.	66.	66.	67.	69.	70.	73.	74.	76.	81.	76.	76.	77.	74.	73.	71.	66.
80.00	64.	64.	64.	64.	67.	68.	65.	65.	66.	66.	67.	69.	70.	73.	75.	77.	81.	77.	77.	77.	75.	74.	70.	67.
90.00	66.	66.	66.	66.	67.	68.	66.	67.	66.	68.	68.	71.	72.	76.	78.	80.	83.	80.	81.	81.	78.	77.	74.	68.
100.00	68.	68.	68.	68.	69.	68.	67.	68.	67.	69.	69.	72.	74.	77.	79.	82.	85.	83.	83.	82.	80.	79.	76.	71.
110.00	68.	68.	68.	68.	70.	68.	68.	70.	69.	70.	71.	73.	74.	78.	80.	82.	86.	83.	84.	84.	81.	80.	78.	74.
120.00	70.	70.	70.	70.	71.	69.	69.	70.	69.	70.	71.	73.	74.	77.	79.	82.	86.	84.	84.	84.	82.	81.	79.	74.
130.00	71.	71.	71.	71.	71.	69.	71.	71.	70.	71.	72.	74.	76.	79.	80.	83.	87.	84.	84.	84.	83.	83.	81.	76.
140.00	73.	73.	73.	73.	73.	70.	72.	71.	71.	71.	73.	73.	75.	79.	80.	82.	86.	83.	82.	83.	82.	82.	80.	75.
150.00	75.	75.	75.	75.	73.	71.	72.	71.	70.	70.	70.	71.	71.	74.	76.	79.	82.	79.	77.	78.	77.	77.	75.	70.
160.00	75.	75.	75.	75.	73.	71.	71.	70.	68.	68.	68.	69.	69.	72.	74.	76.	79.	74.	74.	75.	73.	73.	71.	67.
170.00	75.	75.	75.	75.	73.	71.	71.	70.	68.	68.	68.	69.	69.	72.	74.	76.	79.	74.	74.	75.	73.	73.	71.	67.

JET PRIM

ANGLE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
10.00	55.	57.	58.	58.	57.	59.	58.	58.	58.	57.	56.	55.	55.	54.	53.	52.	51.	49.	48.	47.	45.	44.	44.	43.
20.00	54.	55.	57.	57.	57.	57.	56.	56.	55.	54.	53.	52.	51.	50.	49.	48.	48.	45.	44.	42.	41.	40.	39.	39.
30.00	55.	56.	57.	57.	57.	57.	56.	56.	55.	54.	53.	52.	51.	49.	48.	47.	46.	44.	43.	42.	41.	40.	39.	38.
40.00	56.	56.	57.	57.	58.	57.	57.	56.	55.	54.	53.	52.	51.	50.	49.	47.	46.	44.	43.	42.	41.	40.	39.	38.
50.00	57.	57.	58.	58.	58.	58.	58.	57.	56.	55.	54.	53.	52.	50.	49.	47.	46.	45.	44.	43.	41.	40.	39.	39.
60.00	57.	58.	59.	59.	59.	59.	58.	58.	57.	56.	55.	55.	53.	52.	51.	50.	48.	47.	46.	44.	43.	42.	41.	40.
70.00	58.	59.	60.	60.	60.	59.	59.	59.	58.	57.	56.	54.	53.	52.	50.	49.	48.	46.	45.	44.	43.	42.	41.	40.
80.00	59.	60.	61.	61.	61.	61.	60.	59.	59.	57.	57.	55.	54.	53.	51.	50.	49.	47.	46.	45.	44.	43.	42.	41.
90.00	61.	61.	62.	62.	62.	62.	61.	61.	60.	59.	57.	56.	55.	53.	52.	51.	49.	48.	47.	46.	45.	44.	43.	42.
100.00	63.	63.	64.	64.	64.	64.	63.	62.	61.	60.	59.	57.	56.	54.	53.	52.	50.	49.	48.	47.	46.	45.	44.	43.
110.00	65.	65.	66.	66.	66.	65.	65.	64.	63.	61.	60.	59.	57.	56.	54.	53.	52.	50.	49.	48.	47.	46.	45.	44.
120.00	68.	68.	69.	69.	68.	68.	67.	65.	64.	63.	62.	60.	59.	57.	56.	54.	53.	51.	50.	49.	48.	47.	46.	45.
130.00	71.	71.	71.	71.	71.	70.	69.	67.	66.	64.	63.	61.	60.	58.	56.	54.	53.	51.	49.	48.	47.	46.	44.	44.
140.00	75.	75.	75.	74.	73.	72.	71.	69.	67.	65.	63.	61.	59.	57.	55.	53.	52.	50.	49.	47.	46.	45.	43.	43.
150.00	80.	79.	77.	76.	74.	72.	70.	68.	66.	64.	62.	60.	57.	55.	53.	51.	50.	48.	46.	45.	44.	42.	41.	40.
160.00	78.	77.	75.	74.	72.	70.	68.	66.	64.	62.	60.	58.	57.	55.	53.	51.	50.	48.	46.	45.	43.	42.	41.	40.
170.00	78.	77.	75.	74.	72.	70.	68.	66.	64.	62.	60.	58.	57.	55.	53.	51.	50.	48.	46.	45.	43.	42.	41.	40.

JET SEC

ANGLE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
10.00	65.	65.	65.	65.	63.	62.	60.	59.	57.	55.	54.	53.	51.	50.	48.	47.	45.	44.	42.	41.	35.	38.	36.	35.
20.00	75.	75.	75.	75.	77.	76.	74.	73.	71.	70.	69.	67.	65.	64.	62.	61.	59.	58.	56.	55.	53.	52.	50.	49.
30.00	67.	67.	67.	67.	65.	64.	62.	61.	59.	58.	56.	55.	53.	52.	50.	49.	47.	46.	44.	43.	41.	40.	38.	37.
40.00	63.	63.	63.	63.	61.	60.	59.	57.	55.	54.	52.	51.	49.	48.	46.	45.	43.	42.	40.	39.	37.	36.	34.	33.
50.00	72.	72.	72.	72.	70.	69.	67.	66.	64.	63.	61.	60.	58.	57.	55.	54.	52.	51.	49.	48.	46.	45.	43.	42.
60.00	63.	63.	63.	63.	61.	60.	58.	57.	55.	54.	52.	51.	49.	48.	46.	45.	43.	42.	40.	39.	37.	36.	34.	33.
70.00	64.	64.	64.	64.	62.	61.	59.	58.	56.	55.	54.	52.	50.	49.	47.	46.	44.	43.	41.	40.	38.	37.	35.	34.
80.00	64.	64.	64.	64.	62.	61.	59.	58.	56.	55.	53.	52.	50.	49.	47.	46.	44.	43.	41.	40.	38.	37.	35.	34.
90.00	66.	66.	66.	66.	64.	63.	61.	60.	58.	57.	55.	54.	52.	51.	49.	48.	46.	45.	43.	42.	40.	39.	37.	36.
100.00	68.	68.	68.	68.	66.	65.	63.	62.	60.	59.	57.	56.	54.	53.	51.	50.	48.	47.	45.	44.	42.	41.	39.	38.
110.00	68.	68.	68.	68.	66.	65.	63.	62.	60.	59.	57.	56.	54.	53.	51.	50.	48.	47.	45.	44.	42.	41.	39.	38.
120.00	70.	70.	70.	70.	68.	67.	65.	64.	62.	61.	59.	58.	56.	55.	53.	52.	50.	49.	47.	46.	44.	43.	41.	40.
130.00	71.	71.	71.	71.	69.	68.	66.	65.	63.	62.	60.	59.	57.	56.	54.	53.	51.	50.	48.	47.	45.	44.	42.	41.
140.00	73.	73.	73.	73.	71.	70.	69.	67.	65.	64.	62.	61.	59.	58.	55.	55.	53.	52.	50.	49.	47.	46.	44.	43.
150.00	75.	75.	75.	75.	73.	42.	70.	69.	67.	66.	64.	63.	61.	60.	58.	57.	55.	54.	52.	51.	49.	48.	46.	45.
160.00	75.	75.	75.	75.	73.	42.	70.	69.	67.	66.	64.	63.	61.	60.	58.	57.	55.	54.	52.	51.	49.	48.	46.	45.
170.00	75.	75.	75.	75.	73.	42.	70.	69.	67.	66.	64.	63.	61.	60.	58.	57.	55.	54.	52.	51.	49.	48.	46.	45.

TABLE 17
EPNL PROGRAM INPUT
(FAN, PRIMARY AND SECONDARY JET NOISE SPECTRUM)

FAN BASE

ANGLE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
10.00	49.	49.	49.	49.	67.	67.	69.	69.	70.	73.	74.	75.	76.	79.	80.	84.	89.	83.	82.	83.	83.	82.	79.	75.
20.00	63.	63.	63.	63.	68.	70.	79.	75.	76.	75.	77.	81.	84.	85.	85.	89.	94.	88.	87.	89.	88.	86.	84.	80.
30.00	51.	51.	51.	51.	67.	70.	71.	68.	71.	71.	74.	76.	77.	80.	82.	86.	90.	86.	86.	86.	86.	85.	84.	82.	79.
40.00	47.	47.	47.	47.	66.	66.	65.	67.	69.	70.	73.	74.	77.	78.	80.	83.	88.	84.	85.	85.	83.	83.	81.	77.
50.00	56.	56.	56.	56.	67.	69.	74.	72.	73.	73.	76.	76.	79.	80.	81.	85.	90.	85.	86.	88.	87.	86.	84.	80.
60.00	47.	47.	47.	47.	64.	65.	64.	66.	64.	69.	70.	72.	74.	74.	76.	79.	84.	77.	79.	81.	79.	79.	76.	72.
70.00	48.	48.	48.	48.	64.	66.	65.	64.	65.	66.	67.	67.	70.	73.	74.	76.	81.	76.	76.	77.	74.	73.	71.	66.
80.00	48.	48.	48.	48.	63.	67.	64.	64.	65.	60.	67.	69.	70.	73.	75.	77.	81.	77.	77.	77.	75.	74.	70.	67.
90.00	50.	50.	50.	50.	66.	66.	63.	66.	65.	69.	67.	71.	72.	76.	78.	80.	83.	80.	81.	81.	78.	77.	74.	69.
100.00	52.	52.	52.	52.	67.	65.	65.	67.	66.	69.	69.	72.	74.	77.	79.	82.	85.	83.	83.	82.	80.	79.	76.	71.
110.00	52.	52.	52.	52.	66.	65.	66.	64.	68.	70.	71.	73.	74.	74.	80.	82.	86.	83.	84.	84.	81.	80.	78.	74.
120.00	54.	54.	54.	54.	67.	65.	66.	67.	68.	69.	71.	72.	74.	77.	74.	82.	86.	82.	84.	84.	82.	81.	79.	74.
130.00	55.	55.	55.	55.	66.	62.	67.	70.	69.	70.	72.	74.	76.	79.	80.	83.	87.	84.	84.	84.	83.	83.	81.	76.
140.00	57.	57.	57.	57.	64.	54.	70.	69.	70.	70.	71.	73.	75.	79.	80.	82.	86.	83.	82.	83.	82.	82.	80.	75.
150.00	59.	59.	59.	59.	64.	71.	67.	67.	67.	69.	69.	70.	70.	74.	76.	79.	82.	79.	77.	78.	77.	77.	75.	70.
160.00	59.	59.	59.	59.	60.	71.	62.	63.	59.	64.	66.	69.	68.	72.	74.	76.	79.	74.	74.	75.	73.	73.	71.	67.
170.00	59.	59.	59.	59.	60.	71.	62.	63.	59.	64.	66.	68.	68.	72.	74.	76.	79.	74.	74.	75.	73.	73.	71.	67.

JET TOT

ANGLE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
10.00	66.	66.	66.	66.	65.	64.	63.	61.	61.	59.	58.	57.	57.	55.	54.	53.	52.	50.	49.	48.	46.	45.	45.	44.
20.00	75.	75.	75.	75.	74.	76.	74.	73.	71.	70.	69.	67.	66.	64.	63.	61.	60.	58.	57.	55.	54.	52.	51.	49.
30.00	67.	67.	67.	67.	66.	65.	63.	62.	61.	59.	58.	57.	55.	54.	52.	51.	50.	48.	47.	45.	44.	43.	42.	40.
40.00	64.	64.	64.	64.	63.	62.	61.	59.	58.	57.	56.	54.	53.	52.	50.	49.	48.	46.	45.	44.	43.	41.	40.	39.
50.00	72.	72.	72.	72.	71.	69.	68.	66.	65.	64.	62.	61.	59.	58.	56.	55.	53.	52.	51.	49.	48.	46.	45.	44.
60.00	64.	64.	64.	64.	63.	62.	61.	60.	59.	58.	57.	55.	54.	53.	52.	50.	49.	47.	46.	44.	43.	42.	41.	40.
70.00	65.	65.	65.	65.	64.	63.	62.	61.	60.	59.	57.	56.	55.	54.	52.	51.	50.	48.	47.	45.	44.	43.	42.	41.
80.00	65.	65.	65.	65.	65.	64.	63.	61.	60.	59.	58.	57.	56.	54.	53.	51.	50.	48.	47.	46.	45.	44.	43.	42.
90.00	67.	67.	67.	67.	66.	65.	64.	63.	62.	60.	59.	58.	57.	55.	54.	53.	51.	50.	49.	47.	46.	45.	44.	43.
100.00	69.	69.	69.	69.	68.	67.	66.	65.	64.	62.	61.	59.	58.	56.	55.	54.	52.	51.	50.	49.	48.	46.	45.	44.
110.00	70.	70.	70.	70.	69.	68.	67.	66.	65.	63.	62.	61.	59.	58.	56.	55.	54.	52.	51.	49.	48.	47.	46.	45.
120.00	72.	72.	72.	72.	71.	70.	69.	67.	66.	65.	62.	62.	61.	59.	58.	56.	55.	53.	52.	51.	50.	48.	47.	46.
130.00	74.	74.	74.	74.	73.	72.	71.	69.	68.	66.	65.	63.	62.	60.	58.	56.	55.	53.	52.	50.	49.	48.	46.	46.
140.00	77.	77.	77.	76.	75.	74.	73.	71.	69.	67.	66.	64.	62.	60.	59.	57.	56.	54.	53.	51.	50.	48.	47.	46.
150.00	81.	80.	79.	78.	76.	77.	73.	71.	70.	68.	66.	65.	63.	61.	60.	59.	57.	55.	53.	52.	51.	49.	48.	46.
160.00	80.	79.	78.	77.	75.	70.	72.	71.	69.	67.	66.	64.	63.	61.	60.	58.	57.	55.	53.	52.	50.	49.	48.	46.
170.00	80.	79.	78.	77.	75.	70.	72.	71.	69.	67.	66.	64.	63.	61.	60.	58.	57.	55.	53.	52.	50.	49.	48.	46.

DELTA JET PRIMARY = 0.0

• TURB BASE

ANGLE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
10.00	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.
20.00	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.
30.00	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.
40.00	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
50.00	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	12.	14.	16.	18.	20.	21.	23.	25.	27.	28.	30.
60.00	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	12.	15.	18.	20.	23.	25.	28.	30.	33.	35.	37.	40.
70.00	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	13.	16.	19.	23.	26.	29.	32.	35.	38.	41.	44.	47.	50.
80.00	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	14.	17.	21.	24.	28.	31.	35.	38.	42.	45.	49.	53.	56.	60.
90.00	10.	10.	10.	10.	10.	10.	10.	10.	10.	14.	19.	22.	26.	30.	34.	38.	42.	46.	50.	54.	58.	62.	66.	70.
100.00	10.	10.	10.	10.	10.	10.	10.	10.	15.	20.	25.	30.	35.	40.	46.	50.	53.	55.	59.	66.	70.	76.	78.	80.
110.00	10.	10.	10.	10.	10.	10.	10.	10.	15.	20.	25.	30.	35.	40.	48.	50.	54.	57.	61.	64.	69.	75.	81.	80.
120.00	10.	10.	10.	10.	10.	10.	10.	10.	15.	20.	25.	30.	35.	40.	50.	53.	56.	60.	63.	69.	74.	80.	81.	83.
130.00	10.	10.	10.	10.	10.	10.	10.	10.	15.	20.	25.	30.	35.	40.	45.	50.	54.	58.	61.	67.	72.	78.	80.	77.
140.00	10.	10.	10.	10.	10.	10.	10.	10.	10.	14.	19.	22.	26.	30.	34.	38.	42.	46.	50.	54.	58.	62.	66.	70.
150.00	10.	10.	10.	10.	10.	10.	10.	10.	10.	14.	17.	21.	24.	28.	31.	35.	39.	42.	45.	49.	53.	56.	60.
160.00	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	13.	16.	19.	23.	26.	29.	32.	35.	38.	41.	44.	47.	50.
170.00	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	12.	15.	18.	20.	23.	25.	28.	30.	33.	35.	37.	40.

TABLE 18
EPNL PROGRAM INPUT
(FAN, TOTAL JET, AND TURBOMACHINERY NOISE SPECTRUM)

INLET	FANDUCT	JET	EPNL	ALTITUDE	VEL	REL HUM	TEMP	SIDLINE	OFFSET	GAMMA	ALPHA	DURATION	D EPNL
0.0	0.0	20.0	4.465	98.13	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.73	2.67
5.0	0.0	20.0	4.465	98.23	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.53	3.57
10.0	0.0	20.0	4.465	97.88	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.58	3.92
20.0	0.0	20.0	4.465	96.58	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.26	5.21
30.0	0.0	20.0	4.465	96.50	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.61	5.30
0.0	5.0	20.0	4.465	98.62	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.43	3.18
5.0	5.0	20.0	4.465	97.59	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.17	4.21
10.0	5.0	20.0	4.465	97.17	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.20	4.63
20.0	5.0	20.0	4.465	95.58	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.39	6.12
30.0	5.0	20.0	4.465	95.59	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.65	6.21
0.0	10.0	20.0	4.465	97.78	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.16	3.52
5.0	10.0	20.0	4.465	97.19	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.94	4.61
10.0	10.0	20.0	4.465	96.70	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.96	5.10
20.0	10.0	20.0	4.465	94.98	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.28	6.92
30.0	10.0	20.0	4.465	94.77	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.56	7.03
0.0	20.0	20.0	4.465	97.93	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.81	3.87
5.0	20.0	20.0	4.465	96.68	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.48	5.12
10.0	20.0	20.0	4.465	96.11	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.47	5.69
20.0	20.0	20.0	4.465	93.89	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.68	7.91
30.0	20.0	20.0	4.465	93.48	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.93	8.12
0.0	30.0	20.0	4.465	98.00	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.82	3.80
5.0	30.0	20.0	4.465	96.76	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.47	5.04
10.0	30.0	20.0	4.465	96.17	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.45	5.63
20.0	30.0	20.0	4.465	94.11	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.59	7.69
30.0	30.0	20.0	4.465	93.71	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.86	7.89
0.0	0.0	20.0	4.465	94.73	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	6.32	3.07
5.0	0.0	20.0	4.465	97.68	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	6.10	4.12
10.0	0.0	20.0	4.465	97.19	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.88	4.61
20.0	0.0	20.0	4.465	96.47	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.72	5.32
30.0	0.0	20.0	4.465	96.53	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.77	5.27
0.0	5.0	20.0	4.465	98.14	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.97	3.66
5.0	5.0	20.0	4.465	96.94	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.70	4.86
10.0	5.0	20.0	4.465	96.35	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.44	5.45
20.0	5.0	20.0	4.465	95.66	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.75	6.24
30.0	5.0	20.0	4.465	95.62	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.80	6.18
0.0	10.0	20.0	4.465	97.79	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.73	4.01
5.0	10.0	20.0	4.465	96.43	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.45	5.37
10.0	10.0	20.0	4.465	95.77	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.19	6.03
20.0	10.0	20.0	4.465	94.84	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	6.02	6.96
30.0	10.0	20.0	4.465	94.83	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.81	6.97
0.0	20.0	20.0	4.465	97.38	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.29	4.42
5.0	20.0	20.0	4.465	95.85	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.94	5.95
10.0	20.0	20.0	4.465	95.06	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.65	6.76
20.0	20.0	20.0	4.465	93.81	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.38	7.99
30.0	20.0	20.0	4.465	93.74	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.18	8.06
0.0	30.0	20.0	4.465	97.45	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.29	4.35
5.0	30.0	20.0	4.465	95.93	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.91	5.87
10.0	30.0	20.0	4.465	95.11	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.61	6.69
20.0	30.0	20.0	4.465	93.00	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.29	7.80
30.0	30.0	20.0	4.465	93.93	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.10	7.87
0.0	0.0	20.0	4.465	98.37	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	6.58	3.43
5.0	0.0	20.0	4.465	97.09	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	6.42	4.71
10.0	0.0	20.0	4.465	96.39	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.73	5.41
20.0	0.0	20.0	4.465	95.05	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.05	5.85
30.0	0.0	20.0	4.465	95.01	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.06	5.89
0.0	5.0	20.0	4.465	97.73	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	6.21	4.07
5.0	5.0	20.0	4.465	96.35	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	6.32	5.45
10.0	5.0	20.0	4.465	95.45	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.79	6.35
20.0	5.0	20.0	4.465	94.85	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.96	6.95
30.0	5.0	20.0	4.465	94.82	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.99	6.98
0.0	10.0	20.0	4.465	97.35	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.97	4.45
5.0	10.0	20.0	4.465	95.75	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	6.06	6.05
10.0	10.0	20.0	4.465	94.73	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.57	7.07
20.0	10.0	20.0	4.465	93.09	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.27	7.81
30.0	10.0	20.0	4.465	93.06	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.37	7.84
0.0	10.0	20.0	4.465	96.89	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.49	4.91

TABLE 19a.
EPNL PROGRAM OUTPUT

5.0	10.0	20.0	20.0	4.465	95.05	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.47	6.75
10.0	10.0	20.0	20.0	4.465	93.78	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.94	8.02
20.0	10.0	20.0	20.0	4.465	92.73	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.64	9.07
30.0	10.0	20.0	20.0	4.465	92.43	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.73	9.17
0.0	10.0	30.0	20.0	4.465	96.95	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.46	4.85
5.0	10.0	30.0	20.0	4.465	95.11	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.38	6.69
10.0	10.0	30.0	20.0	4.465	94.85	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.87	7.05
20.0	10.0	30.0	20.0	4.465	92.99	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.53	8.81
30.0	10.0	30.0	20.0	4.465	92.90	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.61	8.90
0.0	20.0	0.0	20.0	4.465	95.34	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.01	5.86
5.0	20.0	0.0	20.0	4.465	95.47	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.48	6.33
10.0	20.0	0.0	20.0	4.465	95.10	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.47	6.70
20.0	20.0	0.0	20.0	4.465	95.02	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.20	6.78
30.0	20.0	0.0	20.0	4.465	95.04	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.26	6.76
0.0	20.0	5.0	20.0	4.465	94.97	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.06	5.91
5.0	20.0	5.0	20.0	4.465	94.26	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.54	7.54
10.0	20.0	5.0	20.0	4.465	94.06	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.15	7.94
20.0	20.0	5.0	20.0	4.465	93.56	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.02	8.24
30.0	20.0	5.0	20.0	4.465	93.58	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.06	8.22
0.0	20.0	10.0	20.0	4.465	94.01	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.88	7.79
5.0	20.0	10.0	20.0	4.465	93.75	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.28	8.55
10.0	20.0	10.0	20.0	4.465	92.61	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.35	9.19
20.0	20.0	10.0	20.0	4.465	92.19	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.10	9.61
30.0	20.0	10.0	20.0	4.465	92.20	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.10	9.60
0.0	20.0	20.0	20.0	4.465	92.90	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.24	8.90
5.0	20.0	20.0	20.0	4.465	91.82	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.64	9.98
10.0	20.0	20.0	20.0	4.465	90.85	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	3.72	10.95
20.0	20.0	20.0	20.0	4.465	90.15	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	3.46	11.65
30.0	20.0	20.0	20.0	4.465	90.18	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	3.46	11.62
0.0	20.0	30.0	20.0	4.465	92.98	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.13	8.82
5.0	20.0	30.0	20.0	4.465	91.91	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.53	9.89
10.0	20.0	30.0	20.0	4.465	90.92	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	3.60	10.88
20.0	20.0	30.0	20.0	4.465	90.52	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	3.34	11.28
30.0	20.0	30.0	20.0	4.465	90.63	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	3.35	11.17
0.0	30.0	0.0	20.0	4.465	95.56	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.63	6.24
5.0	30.0	0.0	20.0	4.465	95.33	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.45	6.47
10.0	30.0	0.0	20.0	4.465	94.92	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.29	6.88
20.0	30.0	0.0	20.0	4.465	94.80	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	3.12	7.00
30.0	30.0	0.0	20.0	4.465	94.80	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	3.11	7.00
0.0	30.0	5.0	20.0	4.465	94.46	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.80	7.34
5.0	30.0	5.0	20.0	4.465	94.07	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.60	7.73
10.0	30.0	5.0	20.0	4.465	93.62	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	3.99	8.18
20.0	30.0	5.0	20.0	4.465	93.26	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	3.80	8.54
30.0	30.0	5.0	20.0	4.465	93.40	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	3.84	8.40
0.0	30.0	10.0	20.0	4.465	93.52	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.81	8.28
5.0	30.0	10.0	20.0	4.465	93.00	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.20	8.80
10.0	30.0	10.0	20.0	4.465	92.26	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.09	9.54
20.0	30.0	10.0	20.0	4.465	91.84	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	3.79	9.91
30.0	30.0	10.0	20.0	4.465	91.92	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	3.87	9.88
0.0	30.0	20.0	20.0	4.465	92.56	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.17	9.24
5.0	30.0	20.0	20.0	4.465	91.61	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.56	10.19
10.0	30.0	20.0	20.0	4.465	90.29	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	3.45	11.51
20.0	30.0	20.0	20.0	4.465	89.64	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	3.15	12.16
30.0	30.0	20.0	20.0	4.465	89.71	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	3.22	12.09
0.0	30.0	30.0	20.0	4.465	92.58	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.05	9.22
5.0	30.0	30.0	20.0	4.465	91.85	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.44	9.95
10.0	30.0	30.0	20.0	4.465	90.46	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	3.34	11.44
20.0	30.0	30.0	20.0	4.465	90.03	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	3.03	11.77
30.0	30.0	30.0	20.0	4.465	89.20	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	3.11	11.60
0.0	0.0	0.0	30.0	4.465	99.95	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.45	2.95
5.0	0.0	0.0	30.0	4.465	98.07	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.23	3.73
10.0	0.0	0.0	30.0	4.465	97.78	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.26	4.02
20.0	0.0	0.0	30.0	4.465	96.76	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.74	5.04
30.0	0.0	0.0	30.0	4.465	96.09	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.08	5.71
0.0	0.0	5.0	30.0	4.465	98.64	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.34	3.27
5.0	0.0	5.0	30.0	4.465	97.67	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.09	4.13
10.0	0.0	5.0	30.0	4.465	97.29	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.12	4.51
20.0	0.0	5.0	30.0	4.465	95.76	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.09	6.04
30.0	0.0	5.0	30.0	4.465	95.50	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.41	6.21
0.0	0.0	10.0	30.0	4.465	98.08	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.97	3.72
5.0	0.0	10.0	30.0	4.465	96.91	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.71	4.89
10.0	0.0	10.0	30.0	4.465	96.38	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.73	5.42
20.0	0.0	10.0	30.0	4.465	94.34	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.06	7.46
30.0	0.0	10.0	30.0	4.465	94.27	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.35	7.53
0.0	0.0	20.0	30.0	4.465	97.83	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.67	3.97
5.0	0.0	20.0	30.0	4.465	96.57	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.37	5.23
10.0	0.0	20.0	30.0	4.465	95.97	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.35	5.83
20.0	0.0	20.0	30.0	4.465	93.58	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.51	8.22
30.0	0.0	20.0	30.0	4.465	93.35	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.76	8.49
0.0	0.0	30.0	30.0	4.465	97.91	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.72	3.89
5.0	0.0	30.0	30.0	4.465	96.66	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.38	5.14
10.0	0.0	30.0	30.0	4.465	96.05	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.35	5.75
20.0	0.0	30.0	30.0	4.465	93.97	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.47	7.93
30.0	0.0	30.0	30.0	4.465	93.63	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	4.72	8.17
0.0	5.0	0.0	30.0	4.465	98.40	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	6.02	3.40
5.0	5.0	0.0	30.0	4.465	97.47	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.77	4.33
10.0	5.0	0.0	30.0	4.465	96.97	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.22	4.83
20.0	5.0	0.0	30.0	4.465	96.12	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.17	5.68
30.0	5.0	0.0	30.0	4.465	95.89	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.25	5.71
0.0	5.0	5.0	30.0	4.465	98.05	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.89	3.75
5.0	5.0	5.0	30.0	4.465	97.02	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.61	4.78
10.0	5.0	5.0	30.0	4.465	96.48	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.35	5.32
20.0	5.0	5.0	30.0	4.465	95.60	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.50	6.20
30.0	5.0	5.0	30.0	4.465	95.63	370.00	254.00	70.00	59.00	0.0	0. -3.00	3.70	5.56	6.17

TABLE 19b.
EPNL PROGRAM OUTPUT

0.0	5.0	10.0	30.0	4.465	97.50	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.51	4.24
5.0	5.0	10.0	30.0	4.465	96.11	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.23	5.69
10.0	5.0	10.0	30.0	4.465	95.46	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.97	6.44
20.0	5.0	10.0	30.0	4.465	94.38	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.81	7.52
30.0	5.0	10.0	30.0	4.465	94.34	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.60	7.46
0.0	5.0	20.0	30.0	4.465	97.27	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.18	4.53
5.0	5.0	20.0	30.0	4.465	96.69	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.81	6.12
10.0	5.0	20.0	30.0	4.465	94.83	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.51	6.97
20.0	5.0	20.0	30.0	4.465	93.50	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.20	8.30
30.0	5.0	20.0	30.0	4.465	93.42	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.01	8.38
0.0	5.0	30.0	30.0	4.465	97.35	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.20	4.45
5.0	5.0	30.0	30.0	4.465	95.77	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.80	6.03
10.0	5.0	30.0	30.0	4.465	94.92	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.49	6.88
20.0	5.0	30.0	30.0	4.465	93.73	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.14	8.07
30.0	5.0	30.0	30.0	4.465	93.66	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.95	8.14
0.0	10.0	0.0	30.0	4.465	97.39	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	6.27	3.81
5.0	10.0	0.0	30.0	4.465	96.76	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.69	5.04
10.0	10.0	0.0	30.0	4.465	96.05	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.91	5.75
20.0	10.0	0.0	30.0	4.465	95.54	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.56	6.26
30.0	10.0	0.0	30.0	4.465	95.46	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.58	6.34
0.0	10.0	5.0	30.0	4.465	97.61	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	6.12	4.19
5.0	10.0	5.0	30.0	4.465	96.38	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	6.13	5.42
10.0	10.0	5.0	30.0	4.465	95.50	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.33	6.30
20.0	10.0	5.0	30.0	4.465	94.91	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.77	6.89
30.0	10.0	5.0	30.0	4.465	94.84	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.79	6.96
0.0	10.0	10.0	30.0	4.465	97.09	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.74	4.71
5.0	10.0	10.0	30.0	4.465	95.36	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.85	6.44
10.0	10.0	10.0	30.0	4.465	94.19	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.35	7.61
20.0	10.0	10.0	30.0	4.465	93.28	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.06	8.52
30.0	10.0	10.0	30.0	4.465	93.33	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.15	8.47
0.0	10.0	20.0	30.0	4.465	96.75	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.37	5.05
5.0	10.0	20.0	30.0	4.465	94.92	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.31	6.98
10.0	10.0	20.0	30.0	4.465	93.47	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.77	8.33
20.0	10.0	20.0	30.0	4.465	92.31	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.44	9.49
30.0	10.0	20.0	30.0	4.465	92.19	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.51	9.61
0.0	10.0	30.0	30.0	4.465	96.83	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.37	4.97
5.0	10.0	30.0	30.0	4.465	94.92	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.28	6.88
10.0	10.0	30.0	30.0	4.465	93.57	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.73	8.23
20.0	10.0	30.0	30.0	4.465	92.54	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.37	9.17
30.0	10.0	30.0	30.0	4.465	92.53	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.45	9.27
0.0	20.0	0.0	30.0	4.465	95.45	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.62	6.35
5.0	20.0	0.0	30.0	4.465	94.98	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.05	6.82
10.0	20.0	0.0	30.0	4.465	94.71	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	3.91	7.09
20.0	20.0	0.0	30.0	4.465	94.48	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	3.75	7.32
30.0	20.0	0.0	30.0	4.465	94.50	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	3.81	7.30
0.0	20.0	5.0	30.0	4.465	94.89	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.08	6.92
5.0	20.0	5.0	30.0	4.465	94.29	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.41	7.51
10.0	20.0	5.0	30.0	4.465	93.91	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.01	7.89
20.0	20.0	5.0	30.0	4.465	93.63	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	3.85	8.17
30.0	20.0	5.0	30.0	4.465	93.66	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	3.89	8.14
0.0	20.0	10.0	30.0	4.465	93.45	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.67	8.45
5.0	20.0	10.0	30.0	4.465	92.42	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.07	9.38
10.0	20.0	10.0	30.0	4.465	91.62	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.14	10.18
20.0	20.0	10.0	30.0	4.465	91.25	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	3.89	10.55
30.0	20.0	10.0	30.0	4.465	91.27	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	3.89	10.53
0.0	20.0	20.0	30.0	4.465	92.49	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.03	9.31
5.0	20.0	20.0	30.0	4.465	91.29	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.43	10.51
10.0	20.0	20.0	30.0	4.465	90.17	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	3.50	11.63
20.0	20.0	20.0	30.0	4.465	89.31	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	3.25	12.49
30.0	20.0	20.0	30.0	4.465	89.34	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	3.25	12.46
0.0	20.0	30.0	30.0	4.465	92.53	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.97	9.17
5.0	20.0	30.0	30.0	4.465	91.46	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.37	10.34
10.0	20.0	30.0	30.0	4.465	90.54	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	3.44	11.46
20.0	20.0	30.0	30.0	4.465	89.84	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	3.18	11.96
30.0	20.0	30.0	30.0	4.465	89.86	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	3.19	11.86
0.0	30.0	0.0	30.0	4.465	95.03	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.08	6.77
5.0	30.0	0.0	30.0	4.465	94.04	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.01	6.96
10.0	30.0	0.0	30.0	4.465	93.51	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	3.74	7.29
20.0	30.0	0.0	30.0	4.465	93.22	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	2.67	7.58
30.0	30.0	0.0	30.0	4.465	93.21	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	2.67	7.59
0.0	30.0	5.0	30.0	4.465	94.50	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.58	7.30
5.0	30.0	5.0	30.0	4.465	94.13	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.15	7.68
10.0	30.0	5.0	30.0	4.465	93.70	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	3.83	8.10
20.0	30.0	5.0	30.0	4.465	93.32	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	2.64	8.48
30.0	30.0	5.0	30.0	4.465	93.47	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	3.66	8.33
0.0	30.0	10.0	30.0	4.465	92.87	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	5.60	8.93
5.0	30.0	10.0	30.0	4.465	92.26	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.98	9.54
10.0	30.0	10.0	30.0	4.465	91.36	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	3.88	10.44
20.0	30.0	10.0	30.0	4.465	90.35	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	3.58	10.92
30.0	30.0	10.0	30.0	4.465	90.32	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	3.65	10.88
0.0	30.0	20.0	30.0	4.465	92.94	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.96	9.71
5.0	30.0	20.0	30.0	4.465	91.84	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.34	10.76
10.0	30.0	20.0	30.0	4.465	89.51	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	3.24	12.29
20.0	30.0	20.0	30.0	4.465	88.70	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	2.93	13.10
30.0	30.0	20.0	30.0	4.465	88.75	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	3.01	13.05
0.0	30.0	30.0	30.0	4.465	92.14	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.89	9.66
5.0	30.0	30.0	30.0	4.465	91.36	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	4.28	10.44
10.0	30.0	30.0	30.0	4.465	89.71	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	3.19	12.09
20.0	30.0	30.0	30.0	4.465	88.26	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	2.87	12.54
30.0	30.0	30.0	30.0	4.465	88.44	370.00	254.00	70.00	59.00	0.0	0.	-3.00	3.70	2.95	12.36

TABLE 19c.
EPNL PROGRAM OUTPUT

APPENDIX 1
EPNL PROGRAM DESCRIPTION

PROGRAM DESCRIPTION

The object of this computer program is to use aircraft sound data to estimate the time pattern at other hypothetical observer locations and convert the projected sound into subjective units. The time history of an aircraft flyby is simulated using either stationary ground runup data, flyover data measured at other than requested conditions, or predicted data. Acceptable input consists of one-third octave band sound pressure levels (SPL) as a function of: (1) directivity angle at a constant polar radius, or (2) directivity angle at a constant sideline distance. Since these input spectra may be derived by other prediction methods, or may be actual test measurements, this computer program will be useful in all phases of aircraft development from preliminary design to final test. Output consists of SPL spectra for both the input and projected conditions with the results presented in terms of perceived noise level (PNL), tone corrected PNL (TCPNL), peak TCPNL, effective perceived noise level (EPNL, as defined by the FAA), and overall sound pressure level (OASPL).

The simulation technique consists of applying various corrections to the input SPL spectra to obtain the projected SPL spectra. Corrections due to the following effects are determined by this program: (1) spherical divergence, (2) atmospheric absorption, (3) extra ground attenuation, and (4) number of engines. Also, the program has the options to determine: (1) doppler shift effects and (2) tone corrected PNL and effective perceived noise level.

State-of-the-art techniques of sound calculation are incorporated in such a way that if the calculation procedures change and become standardized, this program can be easily modified. The basic idea is to control the correction effects by selection of the calculation techniques used. A program user controls the selection of computation by means of an input control card which selects the sequence of calculation subroutines. The subroutines are in a general form such that the conditions supplied by input determine the value of the corrections to be applied. Variations in noise characteristics might be achieved for example by considering doppler shift effects and extra ground attenuation for one simulation and neglecting these effects for another simulation.

Input Data

The input data can consist of three basic types of noise spectra: (1) SPL measurements on a polar arc around a stationary engine, (2) SPL measurements on a sideline parallel to the stationary engine, and (3) SPL measurements at a given location during an aircraft flyby. All data inputting is handled by the main program.

In discussing the input data, a set consists of the SPL measurements for one operating condition, and a case consists of one to four sets of data. A computer run consists of an unlimited number of cases and is terminated by an end-of-file card. This section of the report describes the data input cards in the sequence necessary for proper program execution. Unless specified in the writeup, the cards are needed only when indicated on the control card. A description of each storage array, where the numbers in parenthesis denote the dimensions of the array, is presented in the section on the main program.

Control Card

The first of each case must be a control card. Columns (1—30) are 30 one-digit indicators which

control the sequence of program execution and are stored in (MF(30)) in order. Columns (31–50) are 10 two-digit indicators which also control the sequence of execution and are stored in (MN(10)) in order. Column (51) is an indicator for the number of engines to be considered. In the following description of the indicators in Columns (1–50), blank values are considered as zeros and indicate no special action is to be taken.

Column	Description
(3)	(MF(3)) – For a value less than 0, the program expects the SPL input as a function of time. A value of 1 indicates one-quarter second input and a value of 2 indicates one-half second input.
(4)	(MF(4)) – For a value of 4, the program expects polar angle input using a format (F10., 12F5./10X, 12F5.).
$(6)_{IN}$	(MF(6)) – For any nonzero value, the program expects the SPL input as a function of a constant polar distance. For a zero value and also a zero value in (MF(3)), the program expects the SPL input as a function of a constant sideline distance.
(9)	(MF(9)) – For a zero value determine the pure tone correction.
(10)	(MF(10)) – For a value of 1, apply engine shielding effect.
(11)	(MF(11)) – For a value of 1, generate card output for EPNL trade study.
(16)	(MF(16)) – Generate the attenuation trades internally.
(17)	(MF(17)) – For a value of 1, omit the relative jet velocity correction.
(18)	(MF(18)) – For a value of 1, read a card which indicates the uniform jet suppression value.
(19)	(MF(19)) – For a value of 1, use the short form printout.
(20)	(MF(20)) – For a value of 1, use the long form printout.
(21)	(MF(21)) – For a value of 1, the SPLJE array is interpreted as the primary jet noise spectrum.
(22)	(MF(22)) – For a value of 1, develop a footprint output.
(24)	(MF(24)) – For a value of 1, determine the doppler shift effect.
(25)	(MF(25)) – For a value of 1, the SPL24 array is interpreted as the fan noise and secondary jet noise spectrum.
(26)	(MF(26)) – For a value of 1, omit any jet noise correction for irregularities.
(27)	(MF(27)) – For a value of 1, input the turbine noise spectrum.

(28) (MF(28)) – For any nonzero value, the program suppresses the correction calculation for extra ground attenuation. A value of 1 suppresses the correction for the predicted data. A value of 2 suppresses the correction for both input and predicted data.

(29) (MF(29)) – For a value of 1, the program expects component noise spectrum. It also expects data cards specifying the peak attenuation which is applied to an attenuation spectrum.

(30) (MF(30)) – For a value of 1, the program expects a card describing a new condition (such as velocity, altitude, etc.).

(1) (MN(1)) – Number of input cases.

(2) (MN(2)) – Number of polar angles.

(3) (MN(3)) – Number of 1/3 octave bands (24).

(5) (MN(5)) – Number of flight profile sections.

(6) (MN(6)) – Number of R.P.M. inputs.

(8) (MN(8)) – Number of modes summed.

(9) (MN(9)) – Number of grid line points.

(10) (MN(10)) – Number of attenuations.

Input Condition Card

This card is automatically read (FORMAT 9F8.0) and is the first card of a series of data sets (number of sets indicated by (MN(1)). The numbers in each field are stored in sequence in (H(3,4); V(3,4); HREL (3,4); TEMP (3,4); X(3,4); Y (3,4); GAMM (2); ALP 2; VMJET). Field one is the polar distance (field two = 0) or altitude of the aircraft in feet; field two is the aircraft speed in feet per second; field three is the atmospheric relative humidity in percent; field four is the atmospheric temperature in ^{O}F; field five is the sideline distance in feet; field six is the parallel offset distance in feet; field seven is the climb gradient in degrees; field eight is the angle of attack in degrees; field nine is the jet velocity at the aircraft speed in feet per second.

Prediction Condition Card

This card is automatically read (FORMAT 9F8.0) and must follow the input condition card. The information on this card (corresponding field for field with the first nine fields of the input condition card) describes the conditions of the projected data.

Spectral Data Cards

These cards are read according to the format (F10.3, 12F5.2/10X, 12F5.2). Information on these cards is stored in SPL24, SPLJE, SPLREF, and SPLTU. Each spectral set is preceded by a data card containing an identifier, the jet velocity at zero airplane velocity (if applicable), and a title descriptor (FORMAT 2F10., 13A4). After the array SPLJE is read in, the card describing the attenuation spectra are to be read in where CAT is the maximum value in the array ATEN.

Output

The output from this program consists of printed, plotted, and/or punched parameters. All printing, plotting, and punching of the output data are controlled by the program user by control card indicators.

Printed Output

At the start of a case, the title, control indicators, and the conditions describing the input and predicted spectra are printed. The input SPL data and the predicted SPL, PNL, OASPL, and EPNL values are automatically printed. IF MF(19) = 1 and MF(20) = 0, a special short form printout is used showing the essential flight and environmental parameters, the peak attenuation values, the time duration factor, the relative change in EPNL, and a counter indicating the number of runs made.

Punched Output

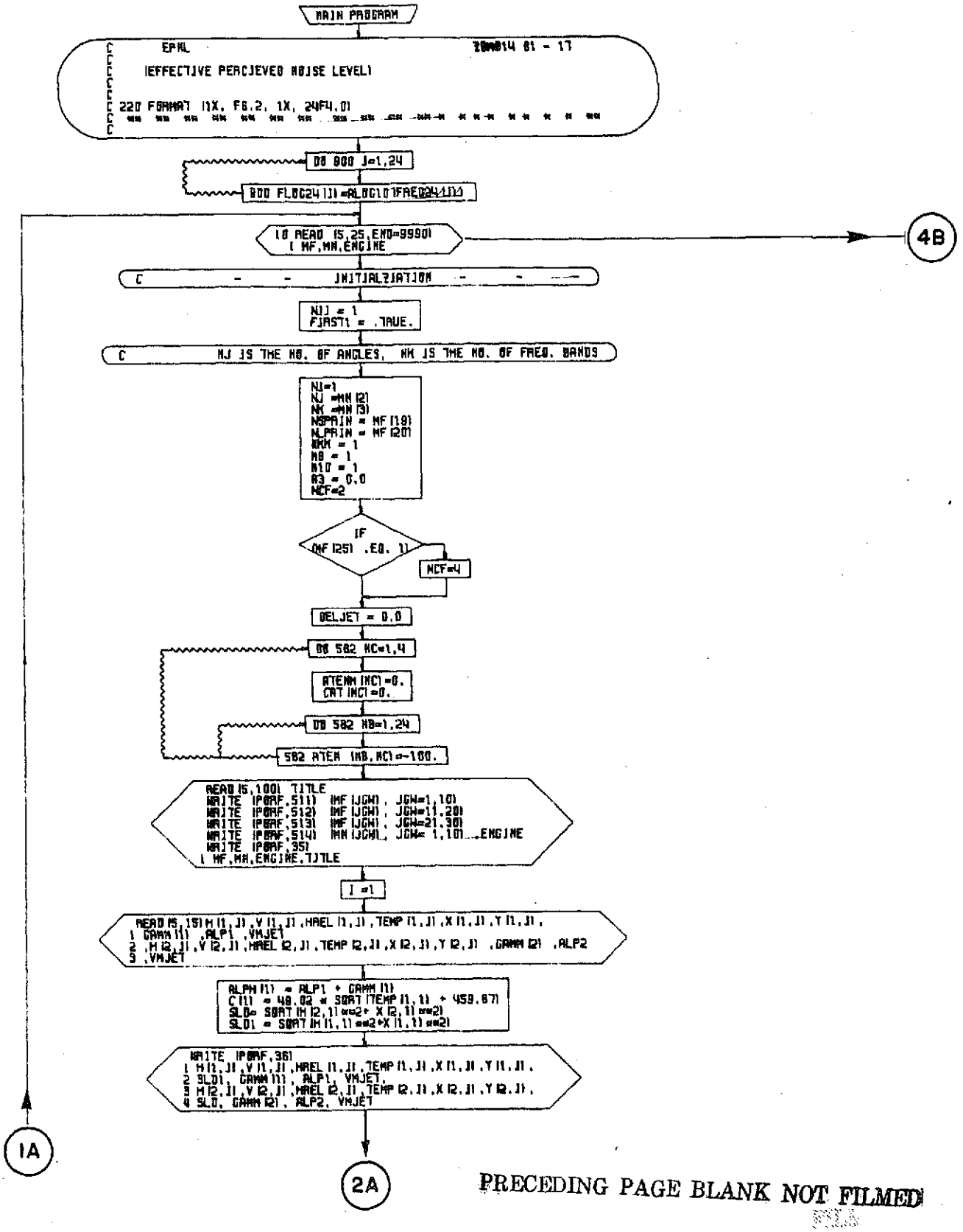
The punched output consists of one card for each run (MF(11) = 1). The card contains the peak attenuations, the jet noise identifier, the EPNL level, the change in EPNL, and a counter indicating the number of runs made.

Main Control Program

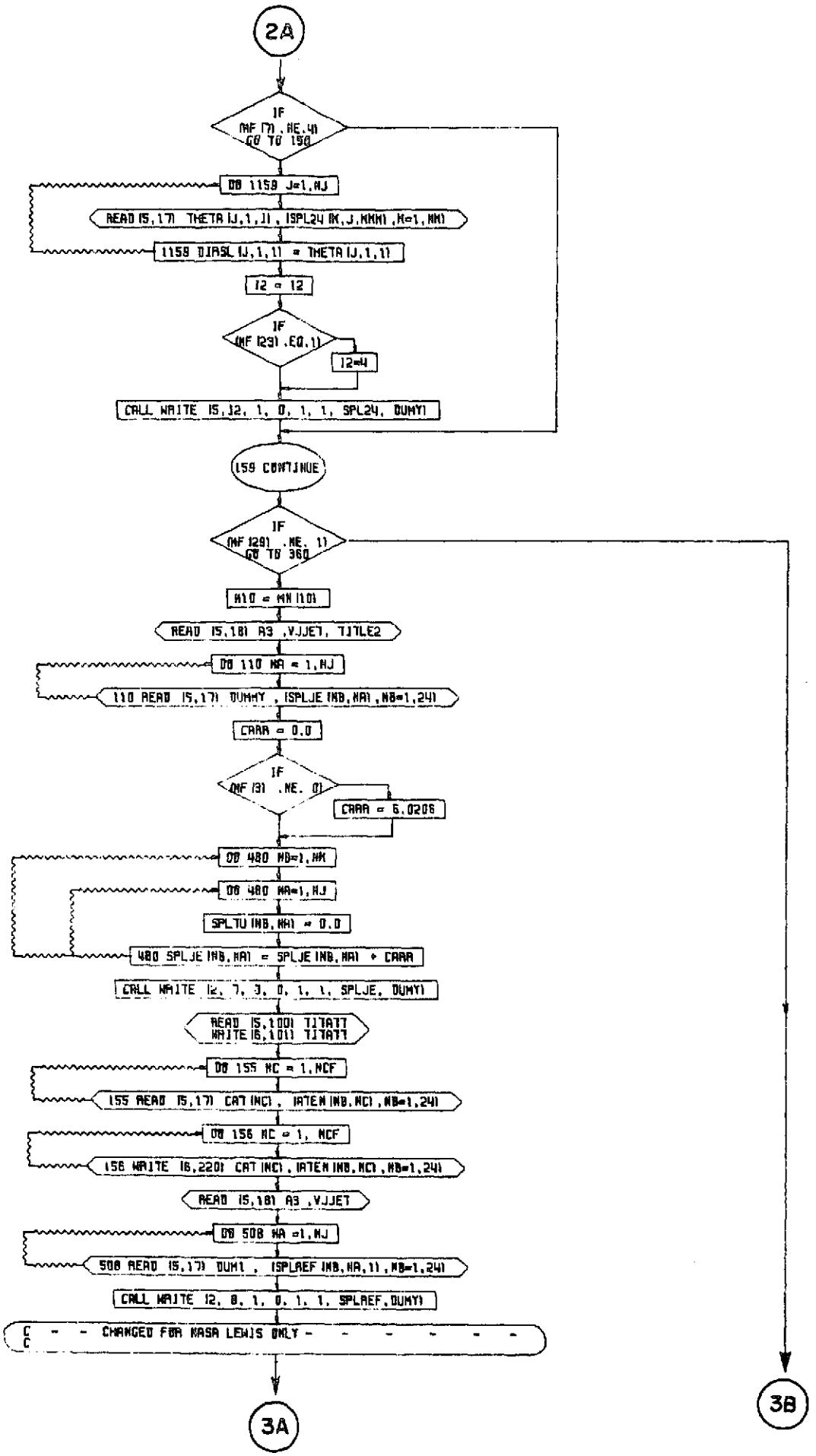
The main control program has general control over input, order of solution, and output throughout the computer run. This is done by calling into operation specialized subroutines in a controlled logical order.

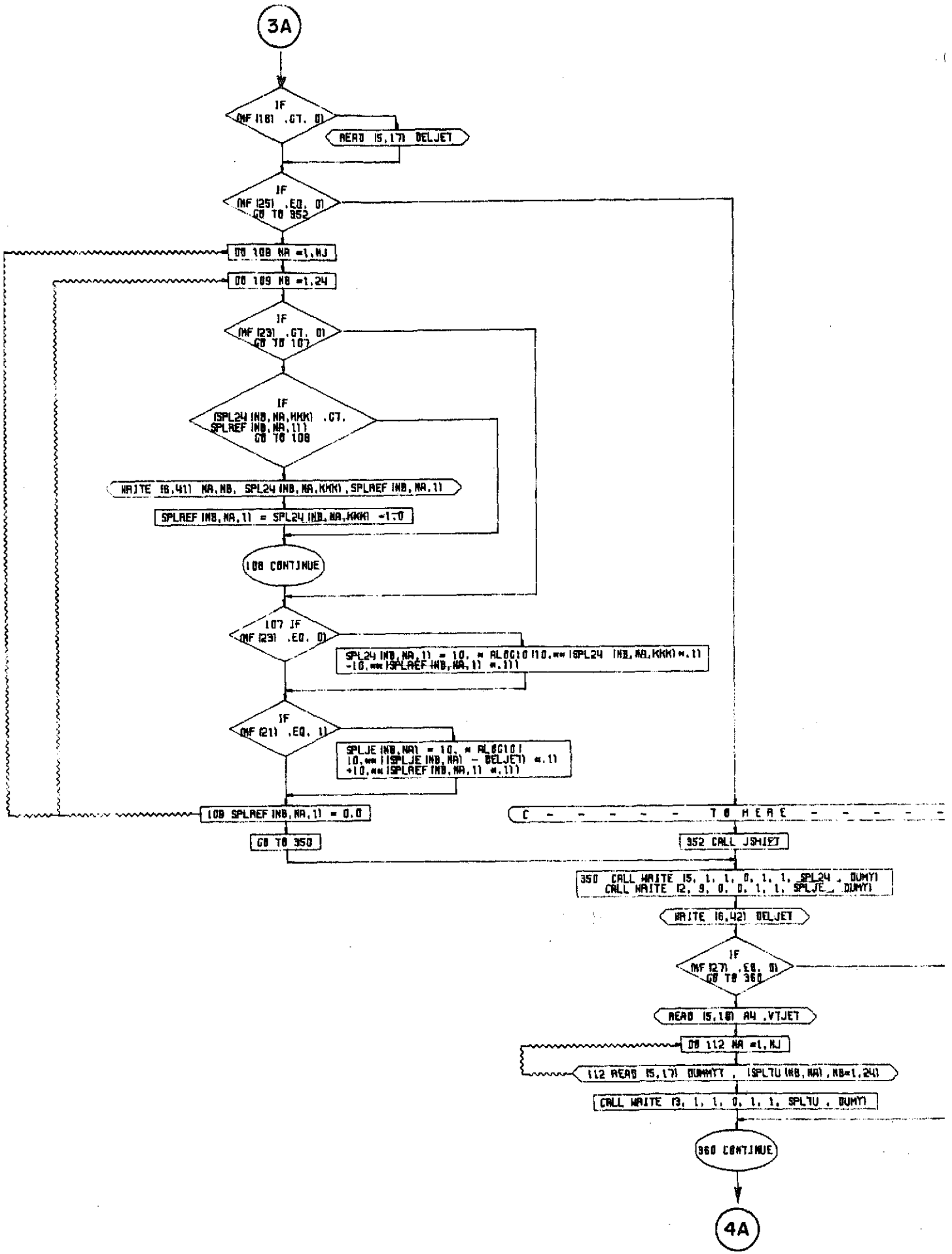
APPENDIX 2

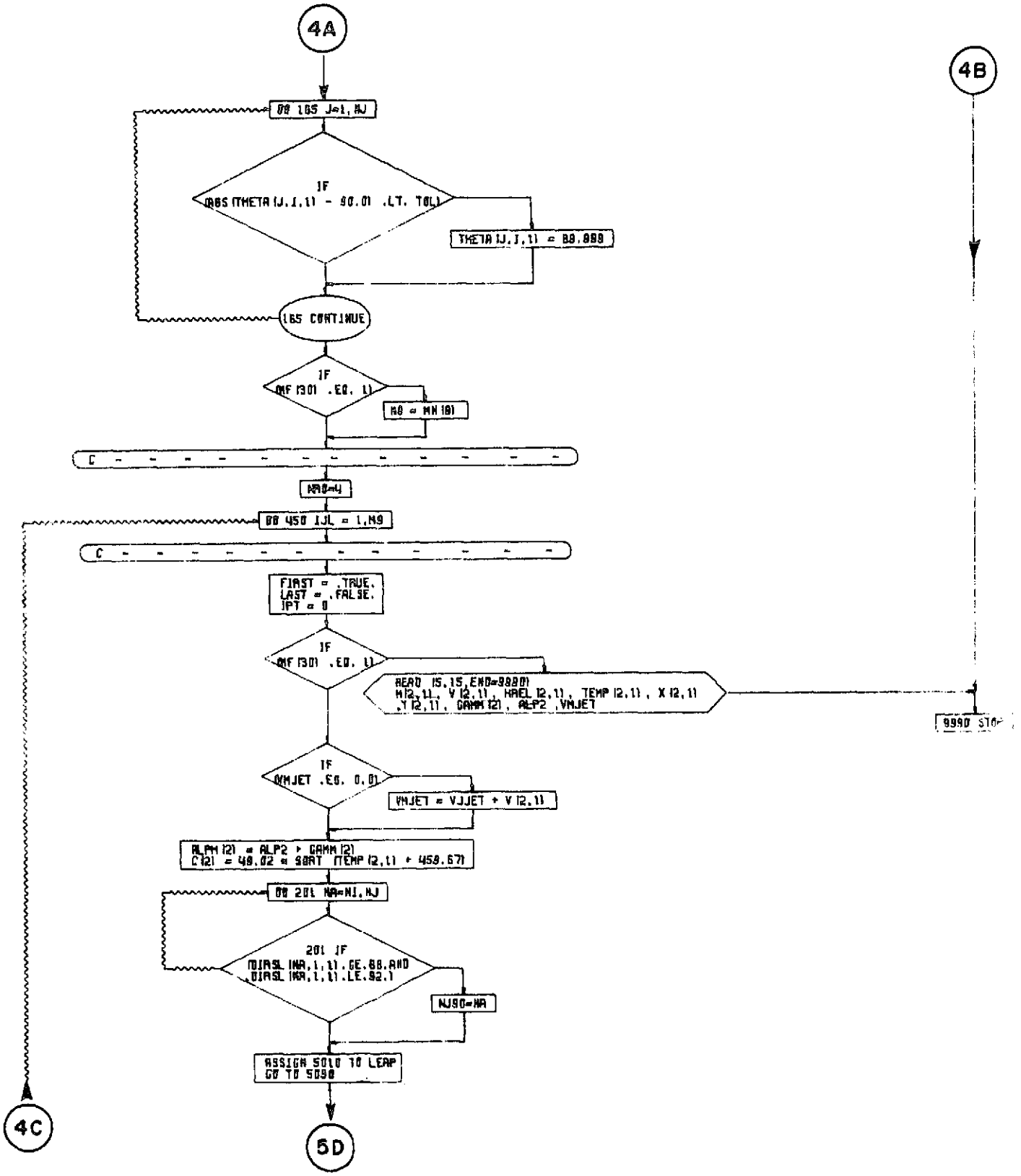
EPNL PROGRAM FLOW CHART

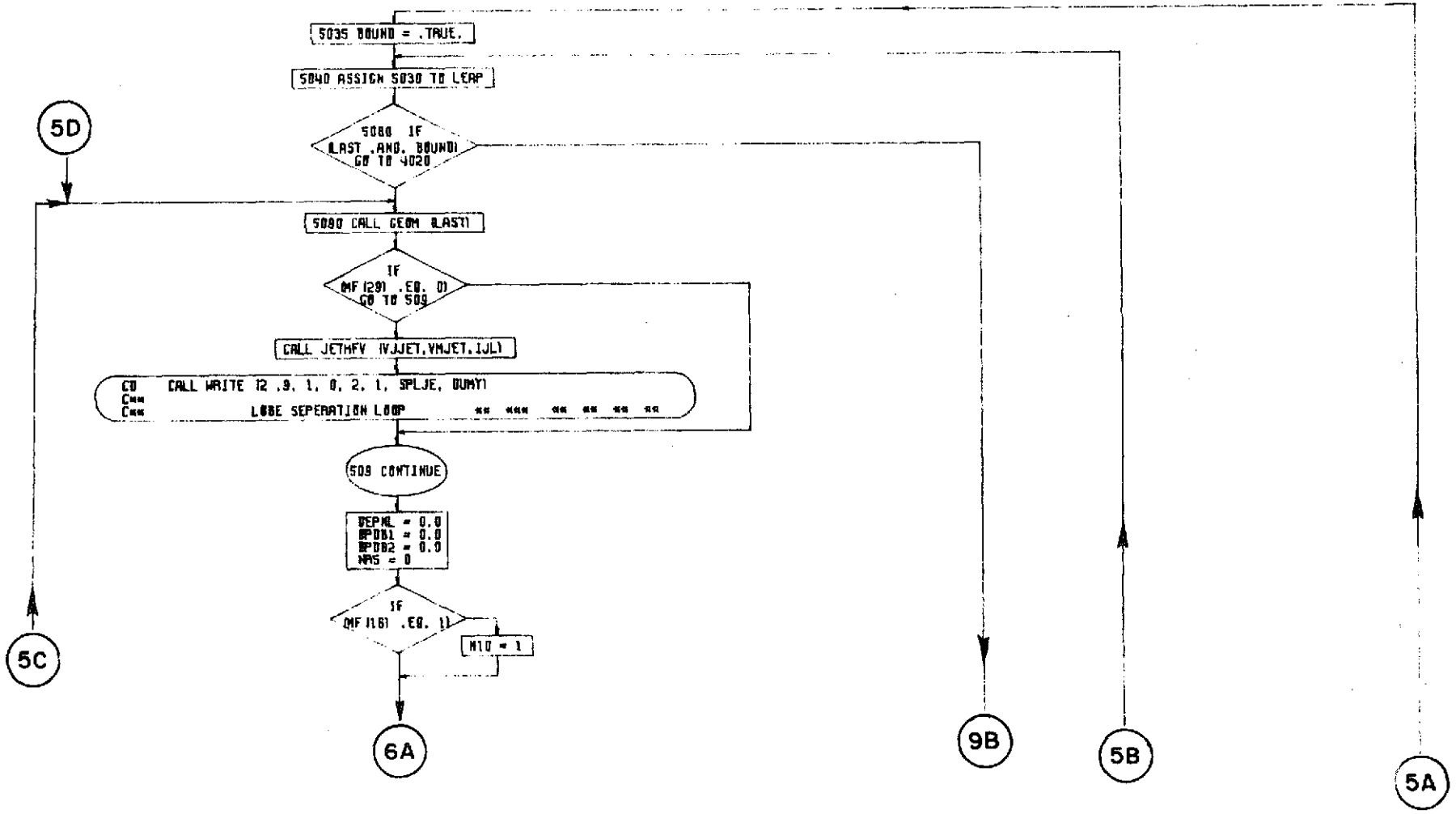


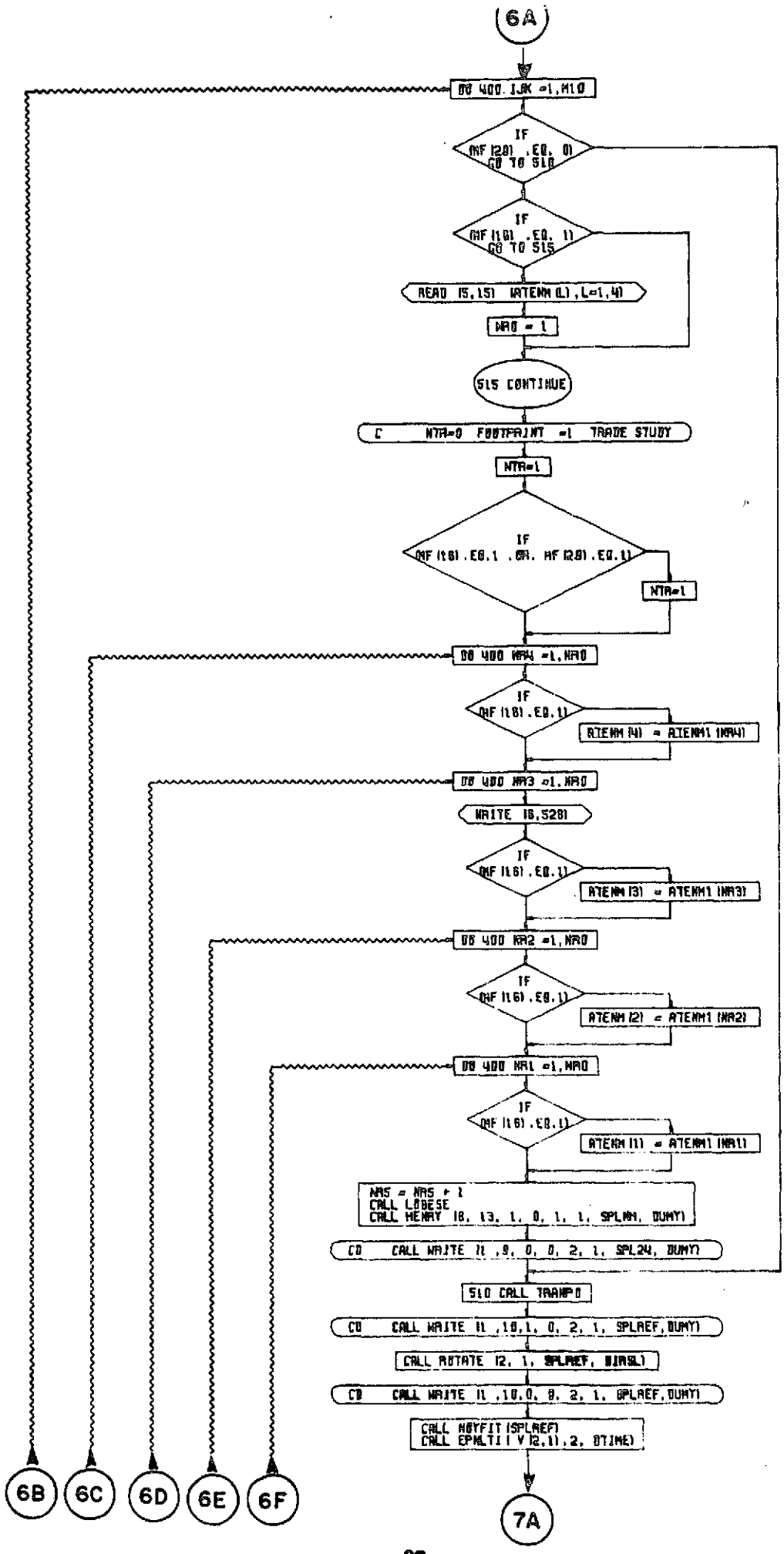
PRECEDING PAGE BLANK NOT FILMED

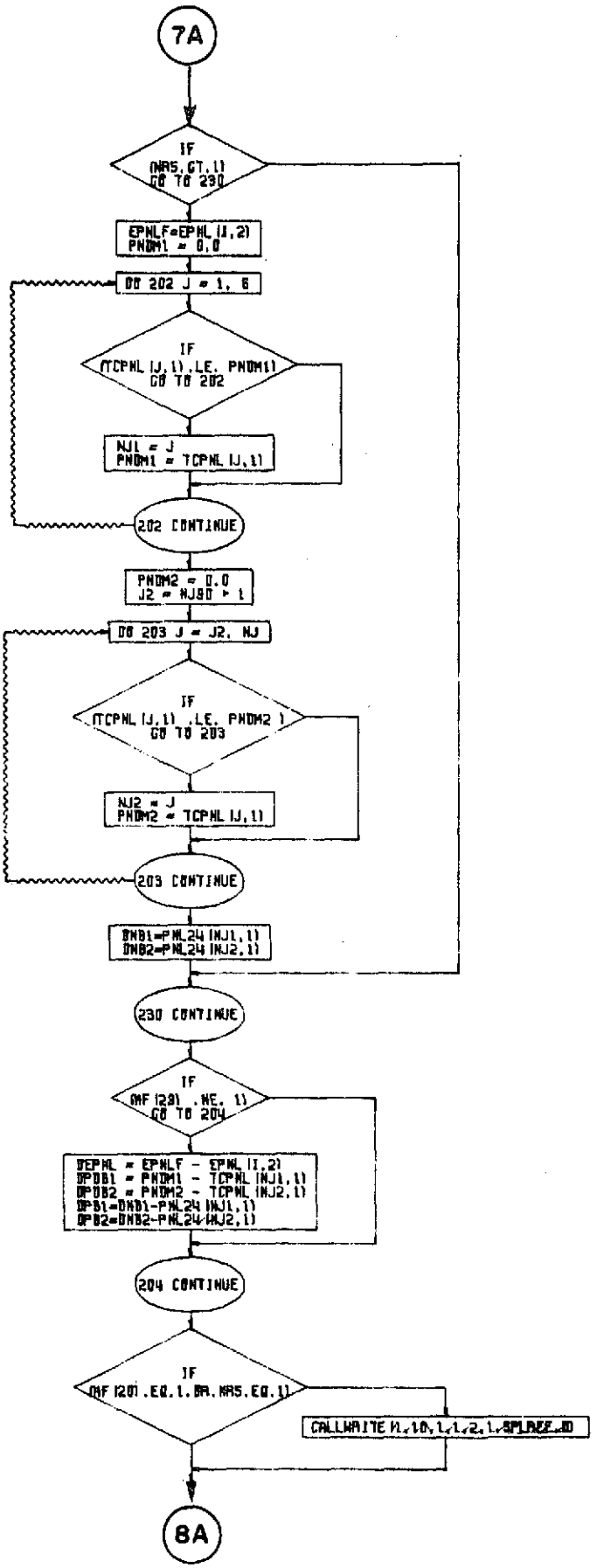

2A
IF (NF (7) .NE.4) GO TO 159
DO 1159 J=1,NJ
READ (5,17) THETA(J,1,1), (SPL24(K,J,KKK1),K=1,NK)
1159 DIASL(J,1,1) = THETA(J,1,1)
12 = 12
IF (NF (29) .EQ.1)
12=4
CALL WRITE (5,12, 1, 0, 1, 1, SPL24, DUMY)
159 CONTINUE
IF (NF (29) .NE. 1) GO TO 360
N10 = NN(10)
READ (5,18) A3 ,VJJET, TITLE2
DO 110 NA = 1,NJ
110 READ (5,17) DUMMY , (SPLJE(NB,NA),NB=1,24)
CARA = 0.0
IF (NF (3) .NE. 0)
CARA = 6.0206
DO 480 NB=1,NK
DO 480 NA=1,NJ
SPLJU(NB,NA) = 0.0
480 SPLJE(NB,NA) = SPLJE(NB,NA) + CARA
CALL WRITE (2, 7, 3, 0, 1, 1, SPLJE, DUMY)
READ (5,100) TITATT
WRITE (6,101) TITATT
DO 155 NC = 1,NCF
155 READ (5,17) CAT(NC), (ATEN(NB,NC),NB=1,24)
DO 156 NC = 1, NCF
156 WRITE (6,220) CAT(NC), (ATEN(NB,NC),NB=1,24)
READ (5,18) A3 ,VJJET
DO 508 NA =1,NJ
508 READ (5,17) DUM1 , (SPLAEF(NB,NA,1),NB=1,24)
CALL WRITE (2, 8, 1, 0, 1, 1, SPLAEF,DUMY)
C - - - CHANGED FOR NASA LEWIS ONLY - - - - - - -
3A
3B

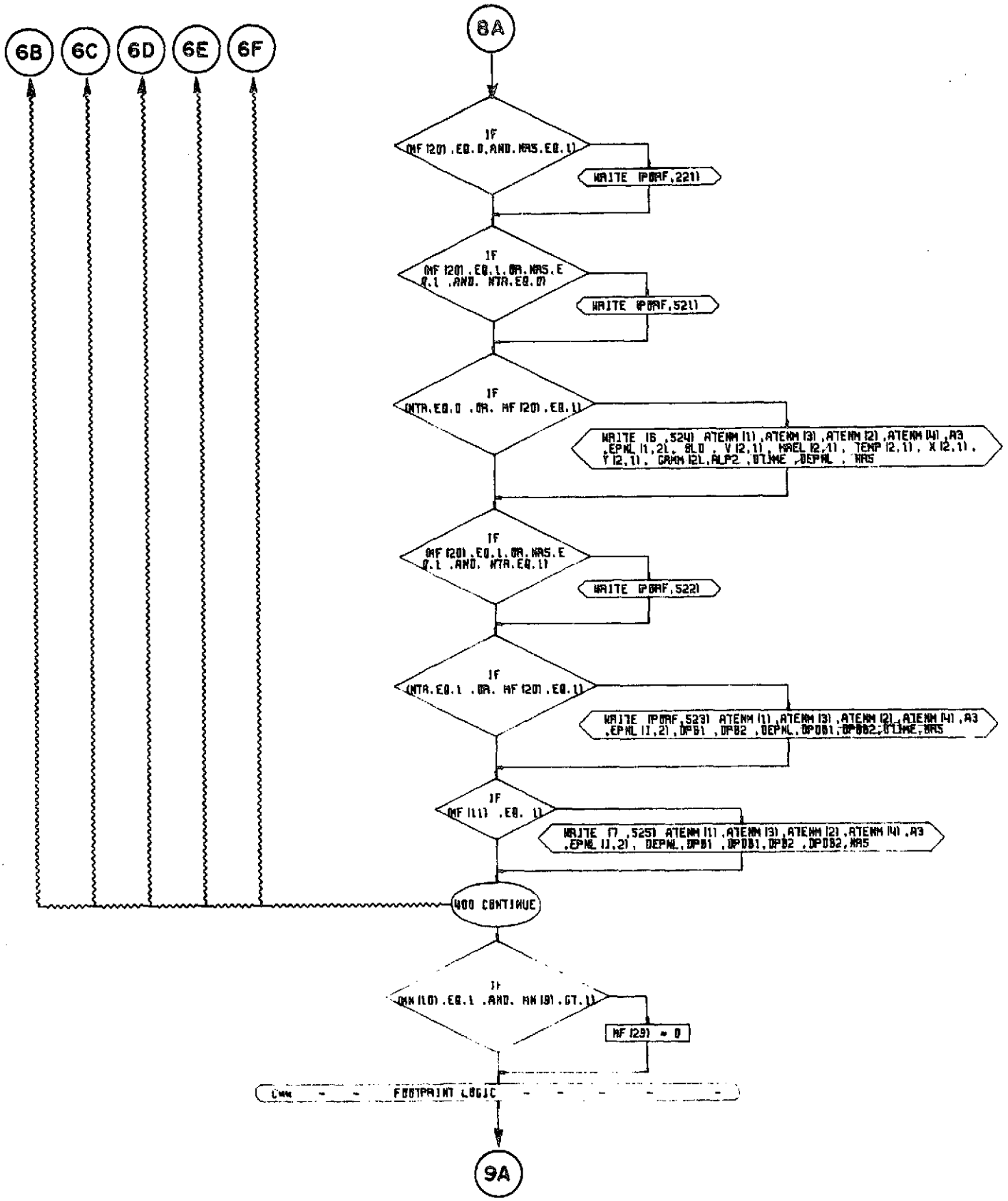

3A
IF (NF(16) .GT. 0)
READ (5,17) DELJET
IF (NF(25) .EQ. 0) GO TO 352
DO 108 NA =1,NJ
DO 109 NB =1,24
IF (NF(23) .GT. 0) GO TO 107
IF (SPL24(NB,NA,KKK) .GT. SPLREF(NB,NA,1)) GO TO 108
WRITE (6,41) NA,NB, SPL24(NB,NA,KKK),SPLREF(NB,NA,1)
SPLREF(NB,NA,1) = SPL24(NB,NA,KKK) -1.0
108 CONTINUE
107 IF (NF(23) .EQ. 0)
SPL24(NB,NA,1) = 10.** ALOG10(10.**(SPL24(NB,NA,KKK)*.1) -10.**(SPLREF(NB,NA,1)*.1))
IF (NF(21) .EQ. 1)
SPLJE(NB,NA) = 10.* ALOG10(10.**(SPLJE(NB,NA) - DELJET)*.1) +10.**(SPLREF(NB,NA,1)*.1))
109 SPLREF(NB,NA,1) = 0.0
GO TO 350
C - - - - - - TO HERE - - - - - -
352 CALL JSHIFT
350 CALL WRITE (5, 1, 1, 0, 1, 1, SPL24 , DUMY)
CALL WRITE (2, 9, 0, 0, 1, 1, SPLJE , DUMY)
WRITE (6,42) DELJET
IF (NF(27) .EQ. 0) GO TO 360
READ (5,18) A4 ,VTJET
DO 112 NA =1,NJ
112 READ (5,17) DUMMYY , (SPLTU(NB,NA) ,NB=1,24)
CALL WRITE (3, 1, 1, 0, 1, 1, SPLTU , DUMY)
360 CONTINUE
4A

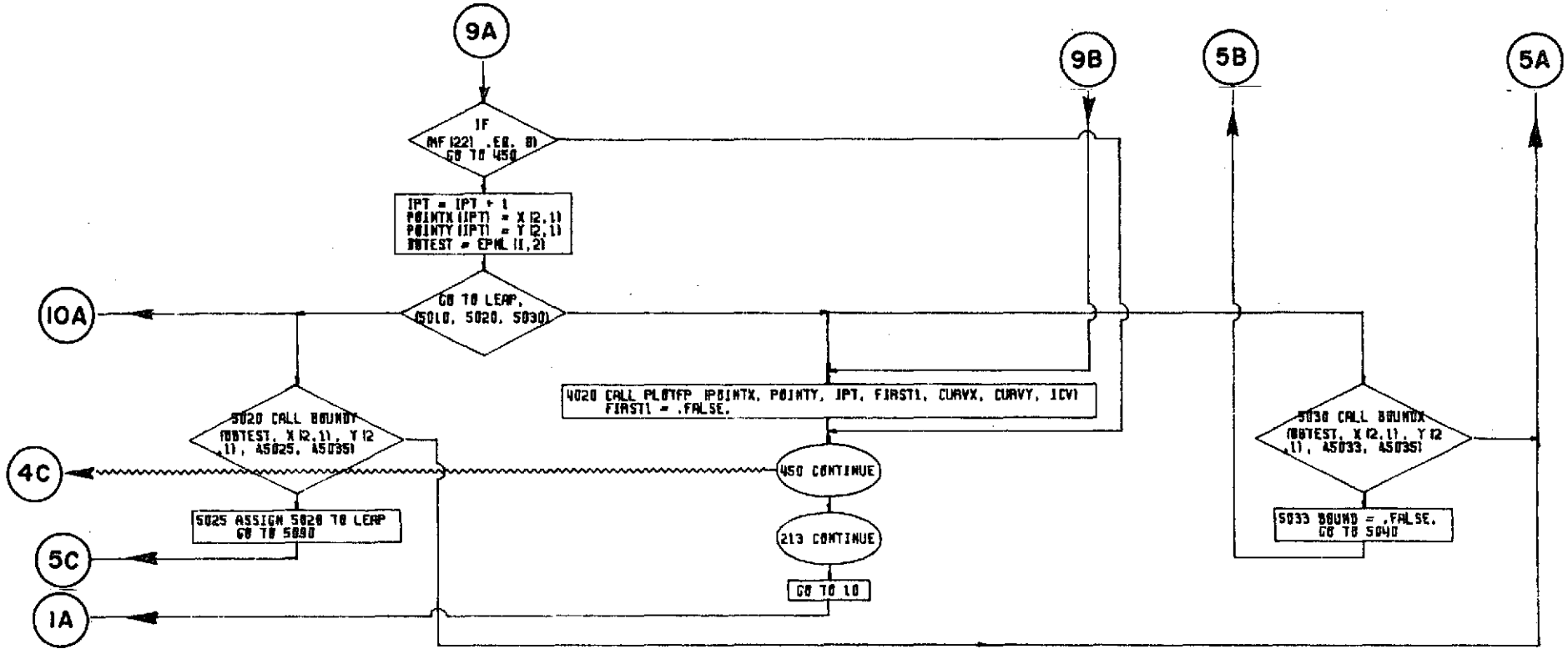

4A
4B
4C
5D
DO 165 J=1,NJ
IF
ABS(THETA(J,I,1) - 90.01 .LT. TOL)
THETA(J,I,1) = 89.999
165 CONTINUE
IF
ONF(30) .EQ. 1)
NB = MN(8)
C - - - - - - - - - - - - - -
NRD=4
DO 450 IJL = 1,N9
C - - - - - - - - - - - - - -
FIRST = .TRUE.
LAST = .FALSE.
IPT = 0
IF
ONF(30) .EQ. 1)
READ (5,15,END=9990)
M(2,1), V(2,1), HAEL(2,1), TEMP(2,1), X(2,1)
,Y(2,1), GAMM(2), ALP2 ,VMJET
9990 STOP
IF
(VMJET .EQ. 0.0)
VMJET = VJJET + V(2,1)
ALPH(2) = ALP2 + GAMM(2)
C(2) = 48.02 * SQRT (TEMP(2,1) + 459.67)
DO 201 NA=NJ,NJ
201 IF
(DIASL(NA,1,1).GE.88.AND
.DIASL(NA,1,1).LE.92.)
NJSO=NA
ASSIGN 5010 TO LEAP
GO TO 5090

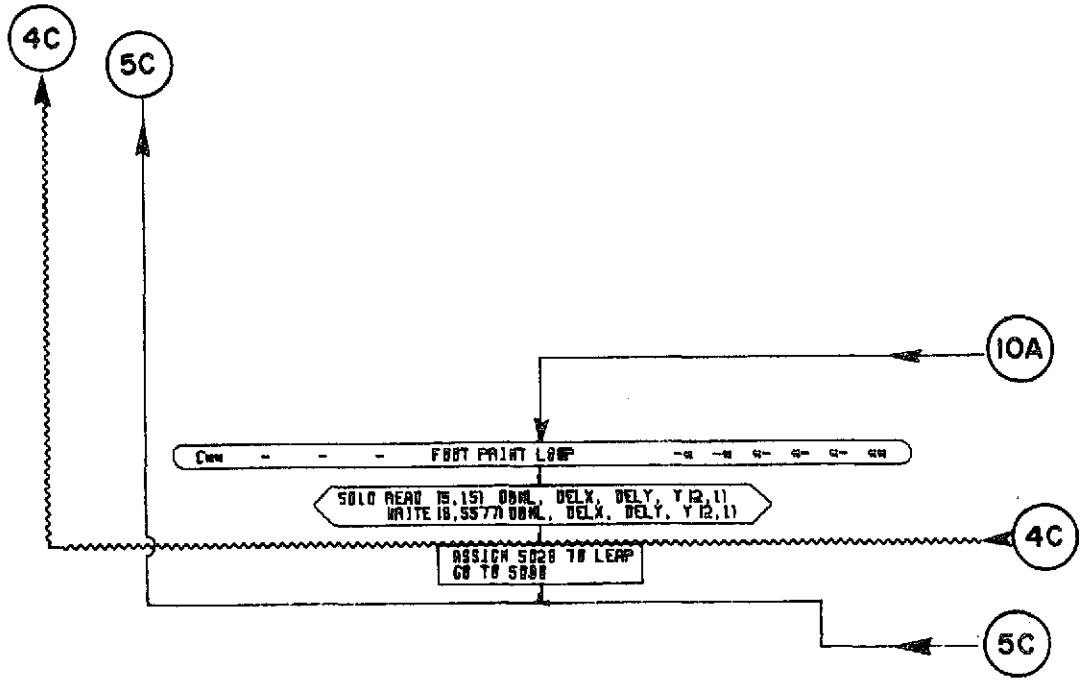

5035 BOUND = .TRUE.
5040 ASSIGN 5030 TO LERP
5080 IF (LAST .AND. BOUND) GO TO 4020
5090 CALL GEOM (LAST)
IF (MF(29) .EQ. 0) GO TO 509
CALL JETHFV (VJJET,VMJET,IJL)
CO CALL WRITE (2 ,9, 1, 0, 2, 1, SPLJE, DUMY)
C** LOBE SEPERATION LOOP ** *** ** ** ** **
509 CONTINUE
DEPML = 0.0
DPDB1 = 0.0
DPDB2 = 0.0
NRS = 0
IF (MF(16) .EQ. 1)
M10 = 1
5D
5C
6A
9B
5B
5A

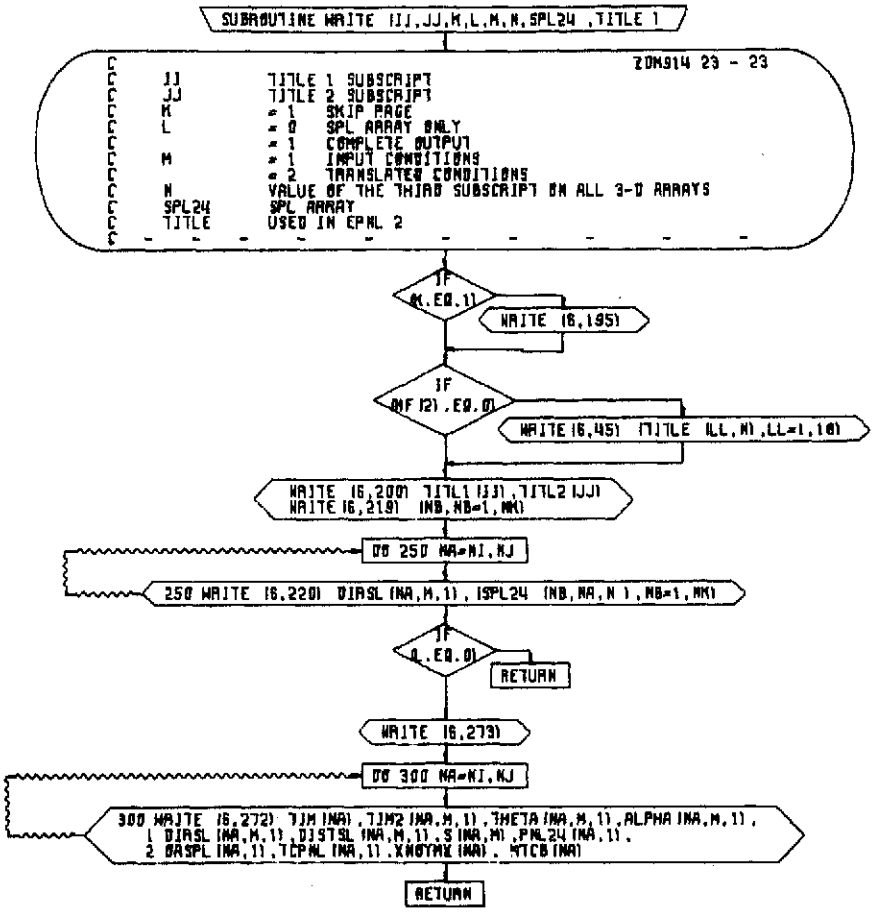

6A
DO 400 IJK =1,M10
IF
(NF (28) .EQ. 0)
GO TO 515
IF
(NF (16) .EQ. 1)
GO TO 515
READ (5,15) (ATENM (L), L=1,4)
NRO = 1
515 CONTINUE
C NTR=0 FOOTPRINT =1 TRADE STUDY
NTR=1
IF
(NF (16) .EQ.1 .OR. NF (28) .EQ.1)
NTR=1
DO 400 NR4 =1,NRO
IF
(NF (18) .EQ.1)
ATENM (4) = ATENM1 (NR4)
DO 400 NR3 =1,NRO
WRITE (6,528)
IF
(NF (16) .EQ.1)
ATENM (3) = ATENM1 (NR3)
DO 400 NR2 =1,NRO
IF
(NF (16) .EQ.1)
ATENM (2) = ATENM1 (NR2)
DO 400 NR1 =1,NRO
IF
(NF (16) .EQ.1)
ATENM (1) = ATENM1 (NR1)
NRS = NRS + 1
CALL LOBESE
CALL MEMRY (8, 13, 1, 0, 1, 1, SPLNM, DUMY)
CO CALL WRITE (1 ,9, 0, 0, 2, 1, SPL24, DUMY)
510 CALL TRANPO
CO CALL WRITE (1 ,10,1, 0, 2, 1, SPLREF,DUMY)
CALL ROTATE (2, 1, SPLREF, BIASL)
CO CALL WRITE (1 ,10,0, 0, 2, 1, SPLREF,DUMY)
CALL MOVFIT (SPLREF)
CALL EPMLTI (V (2,1),2, DTIME)
6B
6C
6D
6E
6F
7A

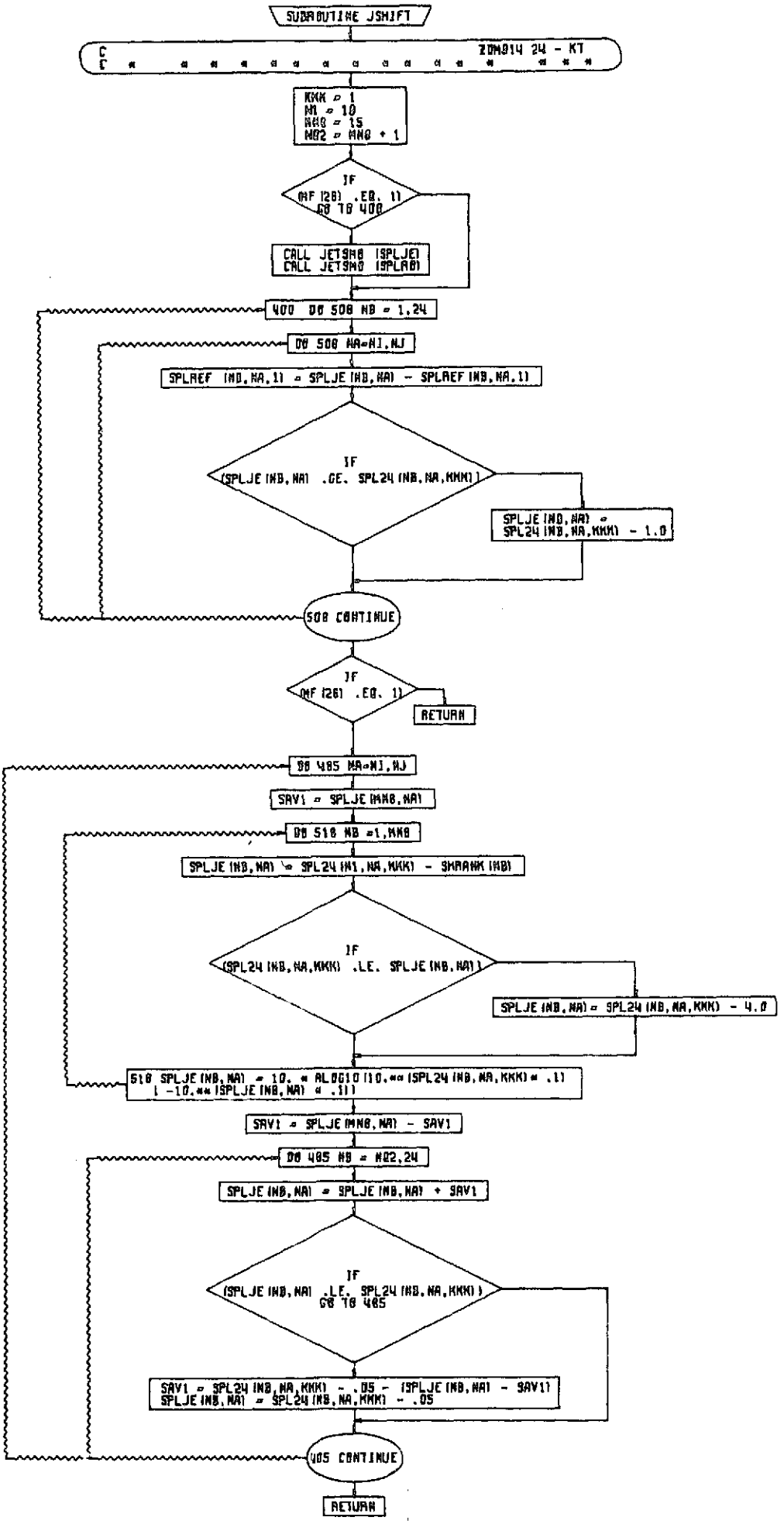

7A
IF
(NR5.GT.1)
GO TO 230
EPNLF=EPNL(I,2)
PNOM1 = 0.0
DO 202 J = 1, 6
IF
(TCPNL(J,1).LE. PNOM1)
GO TO 202
NJ1 = J
PNOM1 = TCPNL(J,1)
202 CONTINUE
PNOM2 = 0.0
J2 = NJ80 + 1
DO 203 J = J2, NJ
IF
(TCPNL(J,1) .LE. PNOM2)
GO TO 203
NJ2 = J
PNOM2 = TCPNL(J,1)
203 CONTINUE
DNB1=PNL24(NJ1,1)
DNB2=PNL24(NJ2,1)
230 CONTINUE
IF
(NF(28) .NE. 1)
GO TO 204
DEPNL = EPNLF - EPNL(I,2)
DPOB1 = PNOM1 - TCPNL(NJ1,1)
DPOB2 = PNOM2 - TCPNL(NJ2,1)
DPB1=DNB1-PNL24(NJ1,1)
DPB2=DNB2-PNL24(NJ2,1)
204 CONTINUE
IF
(NF(20).EQ.1.OR.NR5.EQ.1)
CALLWRITE(1,10,1,1,2,1,SPLINE_ID
8A

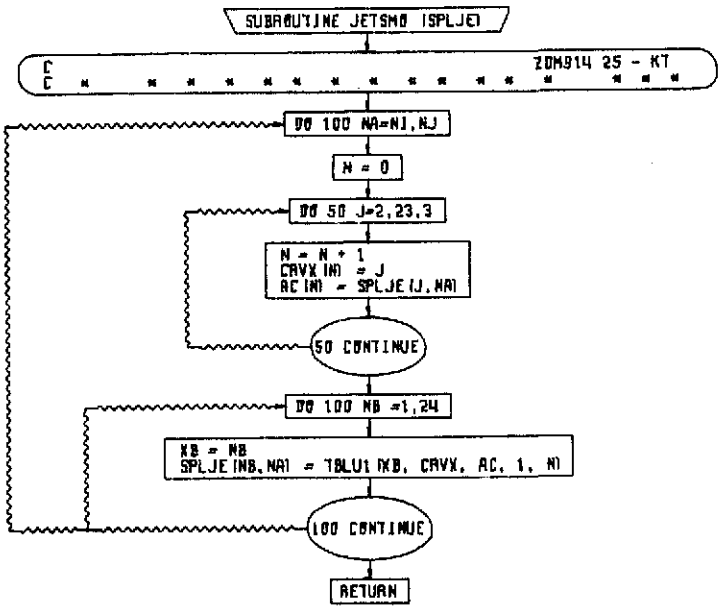

6B
6C
6D
6E
6F
8A
IF
(MF(20),EQ.0,AND.MAS.EQ.1)
WRITE (9,MF,221)
IF
(MF(20),EQ.1,OR.MAS.EQ.1 ,AND. NTA.EQ.0)
WRITE (9,MF,521)
IF
(NTA.EQ.0 ,OR. MF(20),EQ.1)
WRITE (6,524) ATENM(1),ATENM(3),ATENM(2),ATENM(4),A3 ,EPNL(1,2), BLO , V(2,1), MAEL(2,1), TEMP(2,1), X(2,1), Y(2,1), GAMM(2L,ALP2 ,DTIME ,DEPNL , MAS
IF
(MF(20),EQ.1,OR.MAS.EQ.1 ,AND. NTA.EQ.1)
WRITE (9,MF,522)
IF
(NTA.EQ.1 ,OR. MF(20),EQ.1)
WRITE (9,MF,523) ATENM(1),ATENM(3),ATENM(2),ATENM(4),A3 ,EPNL(1,2),DPB1 ,DPB2 ,DEPNL,DPDB1,DPDB2,DTIME,MAS
IF
(MF(11) ,EQ. 1)
WRITE (7 ,525) ATENM(1),ATENM(3),ATENM(2),ATENM(4),A3 ,EPNL(1,2), DEPNL,DPB1 ,DPDB1,DPB2 ,DPDB2,MAS
400 CONTINUE
IF
(MN(10).EQ.1 .AND. MN(9).GT.1)
MF(29) = 0
FOOTPRINT LOGIC
9A

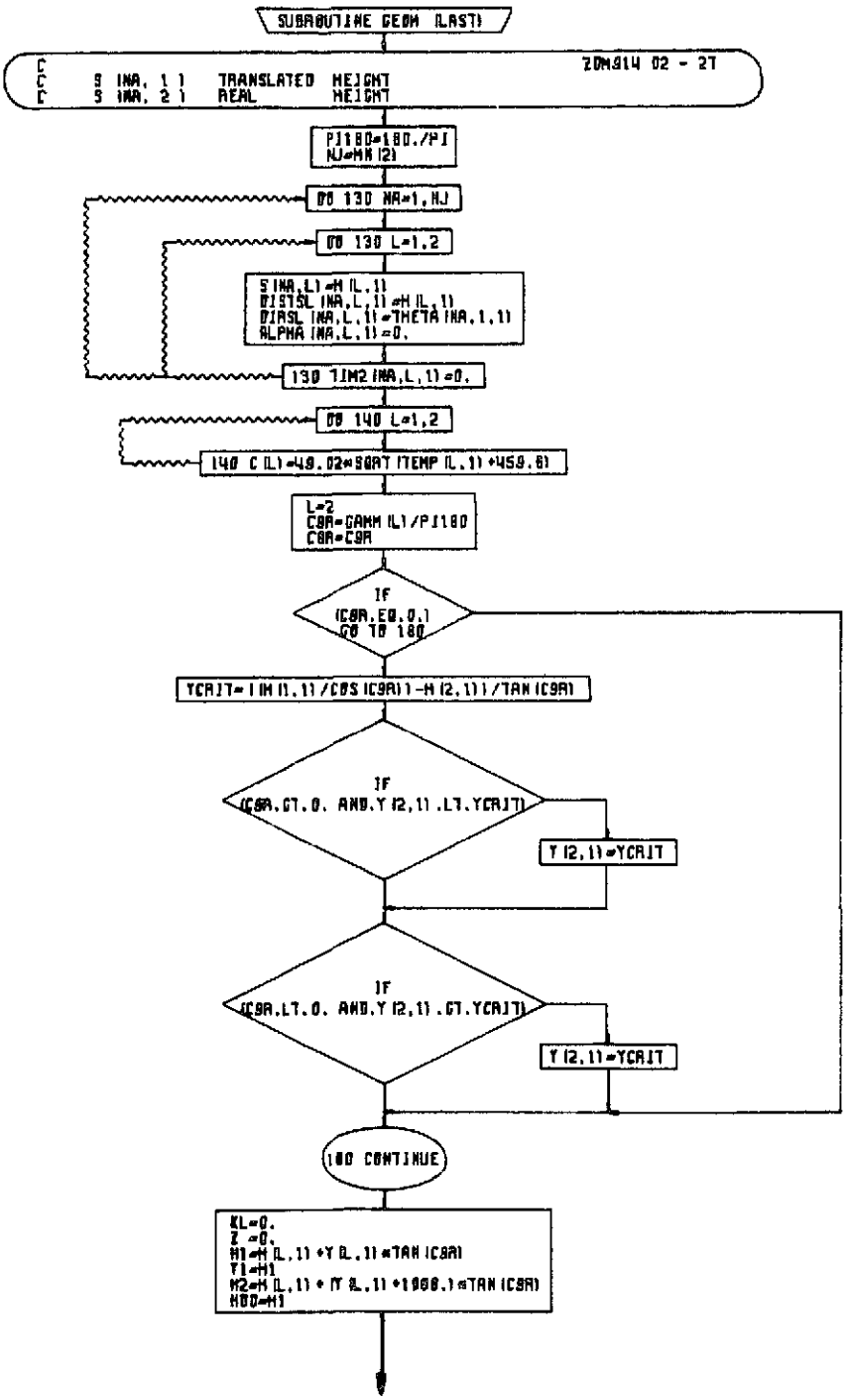

9A
9B
5B
5A
IF
(NF(22) .EQ. 0)
GO TO 450
IPT = IPT + 1
POINTX(IPT) = X(2,1)
POINTY(IPT) = Y(2,1)
BBTEST = EPML(1,2)
GO TO LEAP,
(5010, 5020, 5030)
10A
4020 CALL PLOTFP (POINTX, POINTY, IPT, FIRST1, CURVX, CURVY, ICV)
FIRST1 = .FALSE.
5020 CALL BOUNDY
(BBTEST, X(2,1), Y(2
,1), 45025, 45035)
4C
450 CONTINUE
213 CONTINUE
GO TO 10
5025 ASSIGN 5020 TO LEAP
GO TO 5090
5C
1A
5030 CALL BOUNDX
(BBTEST, X(2,1), Y(2
,1), 45033, 45035)
5033 BOUND = .FALSE.
GO TO 5040

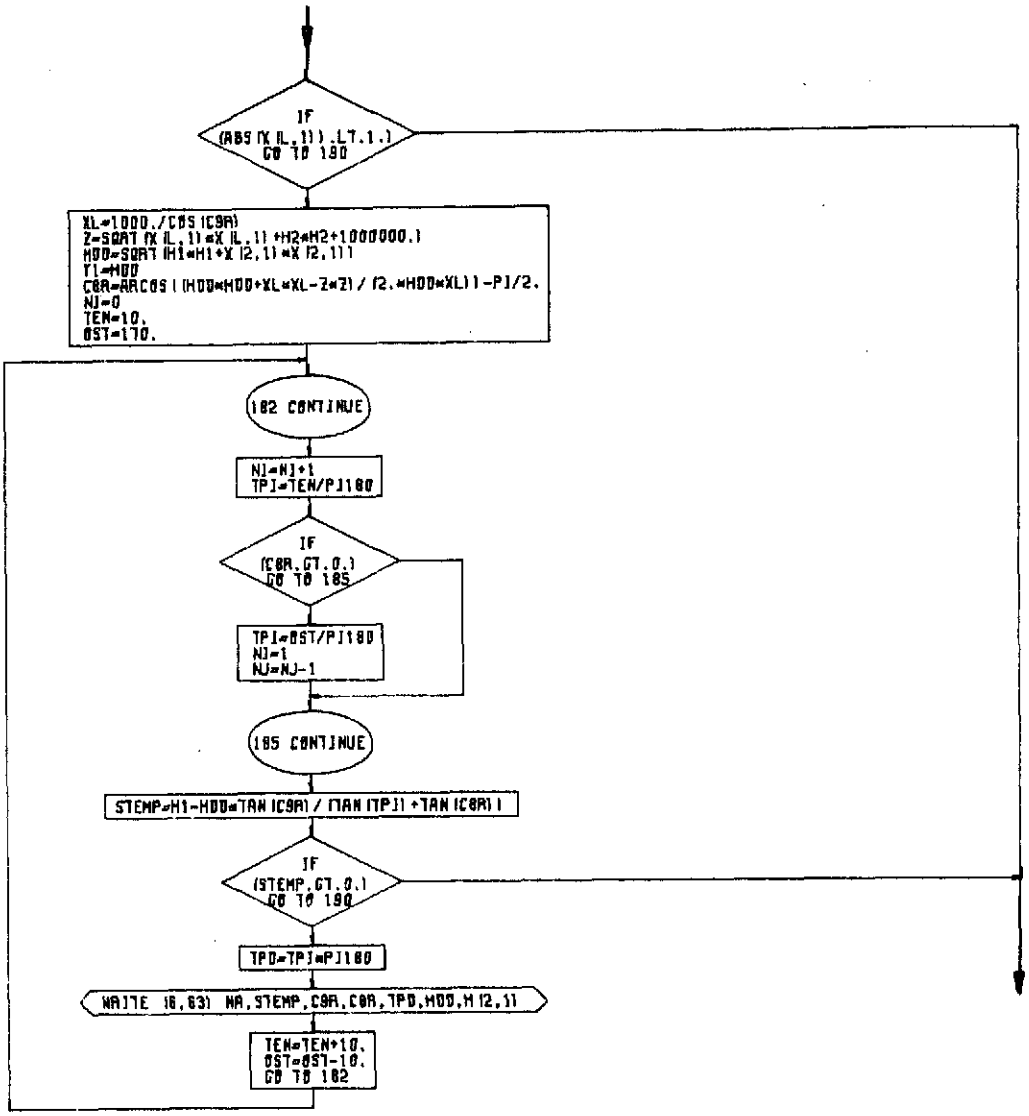

4C
5C
10A
FAST PAINT LOOP
SOLO READ (5,15) OBNL, DELX, DELY, Y(2,1)
WRITE (8,5577) OBNL, DELX, DELY, Y(2,1)
4C
ASSIGN 5028 TO LEAP
GO TO 5088
5C

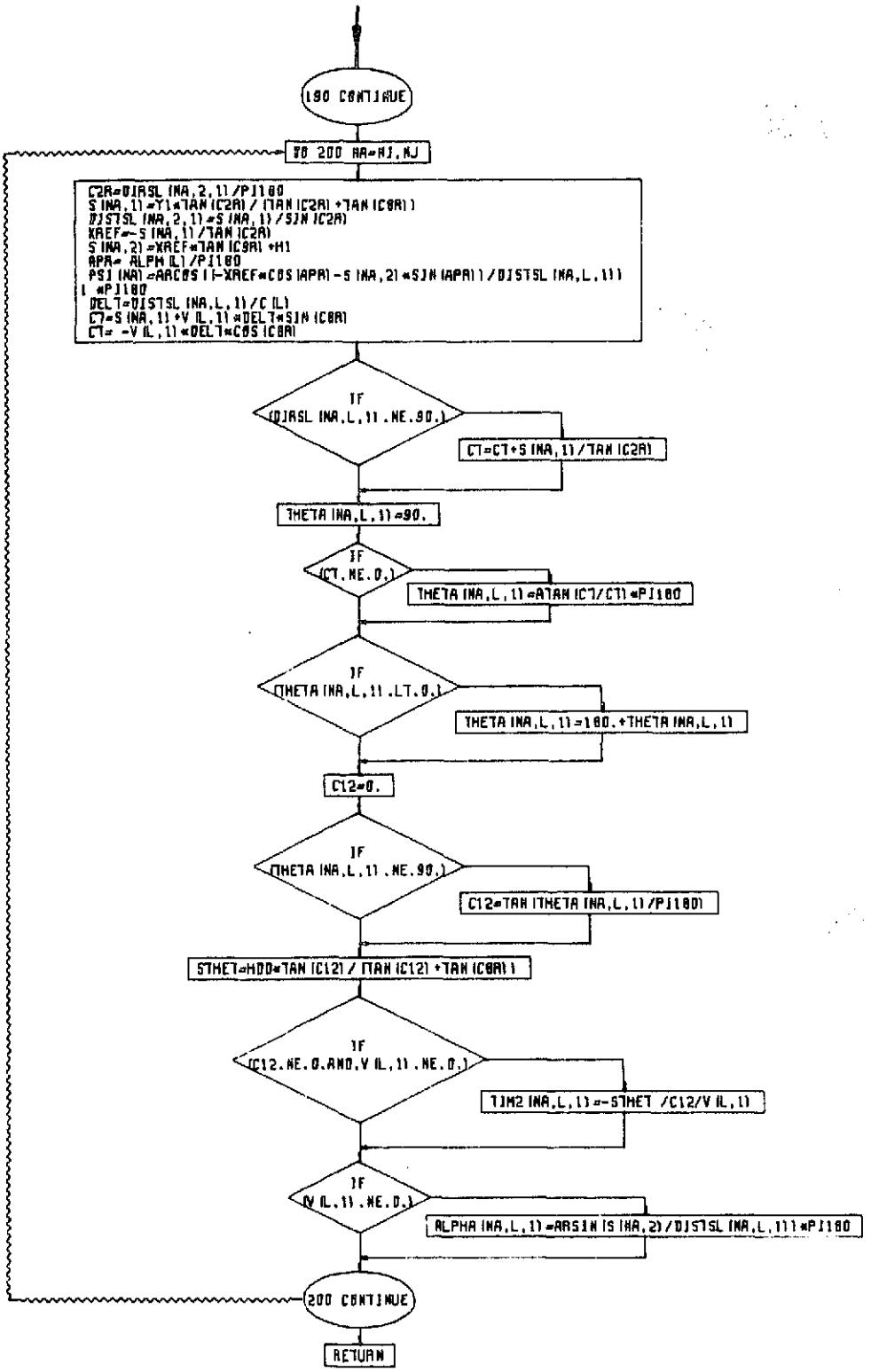

SUBROUTINE WRITE (JJ,JJ,K,L,M,N,SPL24 ,TITLE)
ZDM914 23 - 23
JJ TITLE 1 SUBSCRIPT
JJ TITLE 2 SUBSCRIPT
K = 1 SKIP PAGE
L = 0 SPL ARRAY ONLY
= 1 COMPLETE OUTPUT
M = 1 INPUT CONDITIONS
= 2 TRANSLATED CONDITIONS
N VALUE OF THE THIRD SUBSCRIPT ON ALL 3-D ARRAYS
SPL24 SPL ARRAY
TITLE USED IN EPNL 2
IF
K.EQ.1)
WRITE (6,195)
IF
(NF(2).EQ.0)
WRITE(6,45) (TITLE (LL,M),LL=1,18)
WRITE (6,200) TITL1(JJ),TITL2(JJ)
WRITE(6,219) (NB,NB=1,NK)
DO 250 NA=NI,NJ
250 WRITE (6,220) (BIASL(NA,M,1),(SPL24 (NB,NA,N),NB=1,NK)
IF
L.EQ.0)
RETURN
WRITE (6,273)
DO 300 NA=NI,NJ
300 WRITE (6,272) TJM(NA),TJM2(NA,M,1),THETA(NA,M,1),ALPHA(NA,M,1),
1 BIASL(NA,M,1),DISTSL(NA,M,1),S(NA,M),PNL24(NA,1),
2 BASPL(NA,1),TCPNL(NA,1),XMOTMX(NA), MTCB(NA)
RETURN

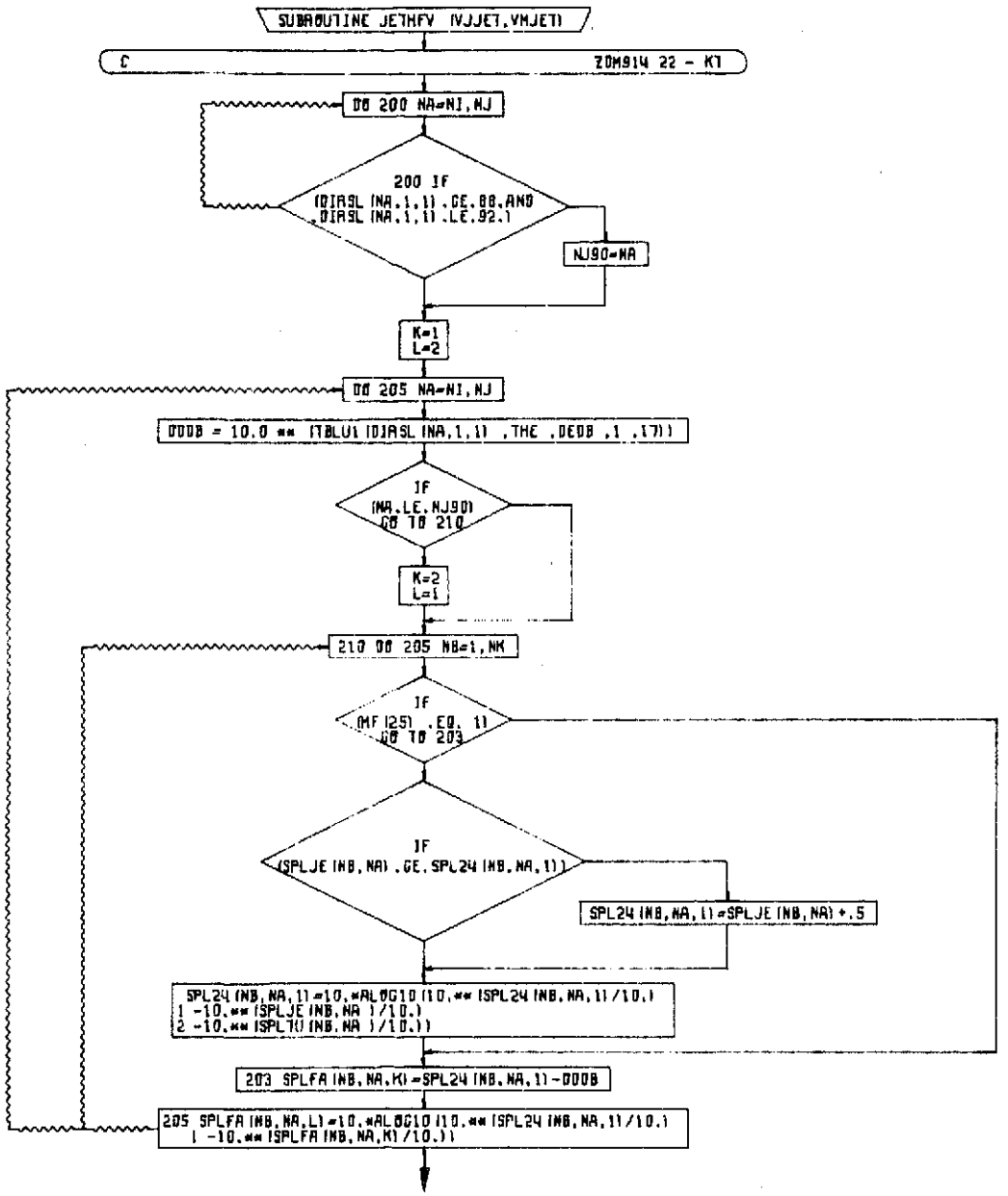

SUBROUTINE JSHIFT
C ZDM814 24 - KT
C * * * * * * * * * * * * * * * * * *
KKK = 1
M1 = 10
MM8 = 15
M82 = MM8 + 1
IF (MF(28) .EQ. 1) GO TO 400
CALL JETSM8 (SPLJE)
CALL JETSM8 (SPLA8)
400 DO 508 NB = 1,24
DO 508 NA=M1,MJ
SPLREF (NB,NA,1) = SPLJE (NB,NA) - SPLREF (NB,NA,1)
IF (SPLJE (NB,NA) .GE. SPL24 (NB,NA,KKK))
SPLJE (NB,NA) = SPL24 (NB,NA,KKK) - 1.0
508 CONTINUE
IF (MF(26) .EQ. 1)
RETURN
DO 485 NA=M1,MJ
SAV1 = SPLJE (MM8,NA)
DO 510 NB =1,MM8
SPLJE (NB,NA) = SPL24 (M1,NA,KKK) - SHRANK (NB)
IF (SPL24 (NB,NA,KKK) .LE. SPLJE (NB,NA))
SPLJE (NB,NA) = SPL24 (NB,NA,KKK) - 4.0
510 SPLJE (NB,NA) = 10. * ALOG10 (10.**(SPL24 (NB,NA,KKK) * .1)
1 -10.**(SPLJE (NB,NA) * .1))
SAV1 = SPLJE (MM8,NA) - SAV1
DO 485 NB = M82,24
SPLJE (NB,NA) = SPLJE (NB,NA) + SAV1
IF (SPLJE (NB,NA) .LE. SPL24 (NB,NA,KKK))
GO TO 485
SAV1 = SPL24 (NB,NA,KKK) - .05 - (SPLJE (NB,NA) - SAV1)
SPLJE (NB,NA) = SPL24 (NB,NA,KKK) - .05
485 CONTINUE
RETURN

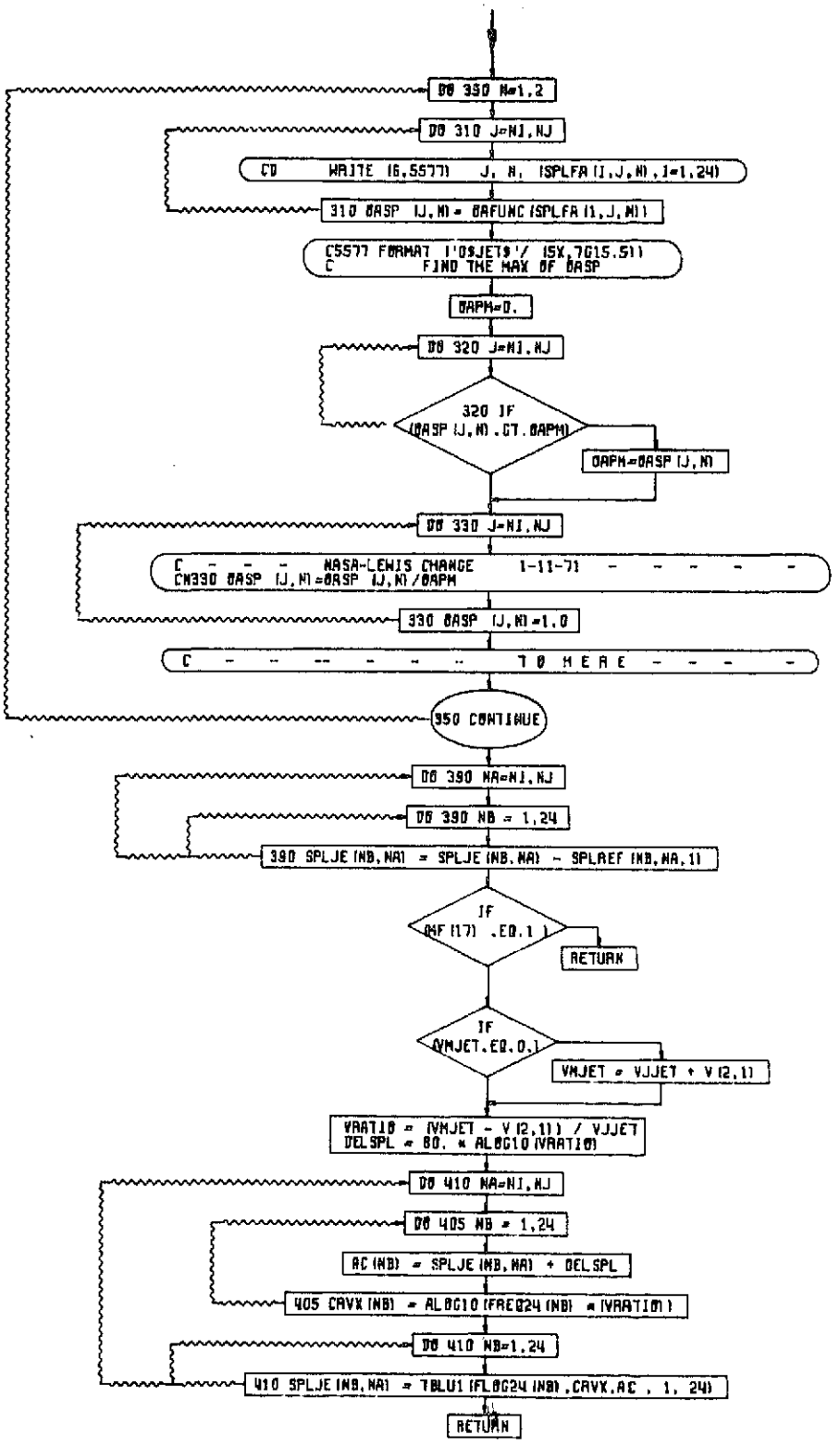

SUBROUTINE JETSMO (SPLJE)
C
ZDM914 25 - KT
DO 100 NA=N1,NJ
N = 0
DO 50 J=2,23,3
N = N + 1
CRVX(N) = J
AC(N) = SPLJE(J,NA)
50 CONTINUE
DO 100 NB =1,24
KB = NB
SPLJE(NB,NA) = TBLU1(KB, CRVX, AC, 1, N)
100 CONTINUE
RETURN

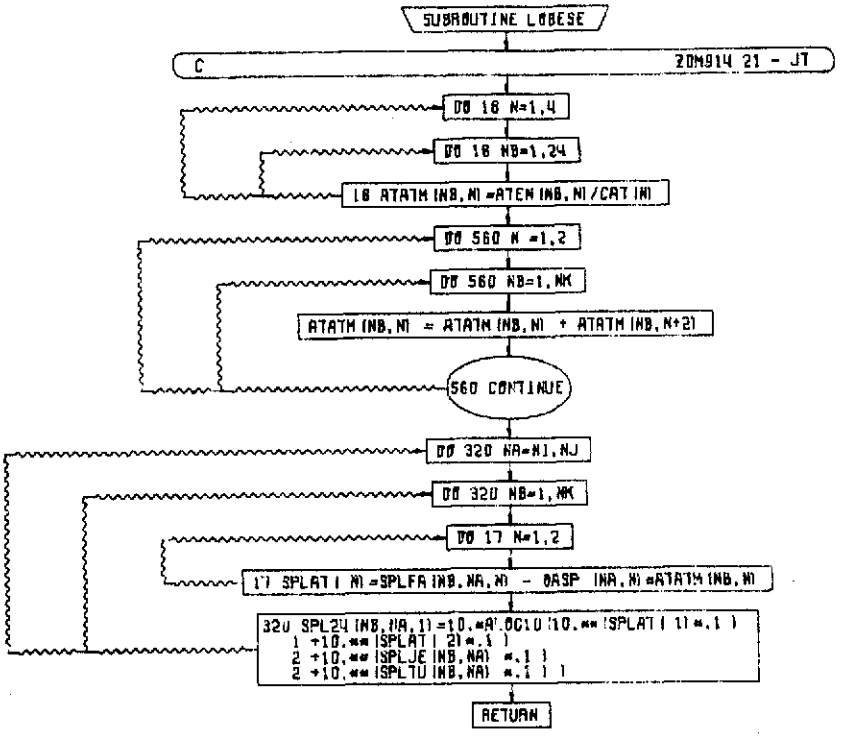

SUBROUTINE GEOM (LAST)
C
C S (NA, 1) TRANSLATED HEIGHT
C S (NA, 2) REAL HEIGHT
ZOM314 02 - 27
PI180=180./PI
NJ=MM(2)
DO 130 NA=1,NJ
DO 130 L=1,2
S(NA,L)=H(L,1)
DISTSL(NA,L,1)=H(L,1)
DIASL(NA,L,1)=THETA(NA,1,1)
ALPHA(NA,L,1)=0.
130 TIM2(NA,L,1)=0.
DO 140 L=1,2
140 C(L)=49.02*SQRT(TEMP(L,1)+459.6)
L=2
C8A=GAMM(L)/PI180
C8A=C8A
IF
(C8A.EQ.0.)
GO TO 180
YCRIT=(TIM(1,1)/COS(C8A))-H(2,1))/TAN(C8A)
IF
(C8A.GT.0. AND.Y(2,1).LT.YCRIT)
Y(2,1)=YCRIT
IF
(C8A.LT.0. AND.Y(2,1).GT.YCRIT)
Y(2,1)=YCRIT
180 CONTINUE
XL=0.
Z=0.
H1=H(L,1)+Y(L,1)*TAN(C8A)
T1=H1
H2=H(L,1)+(Y(L,1)+1000.)*TAN(C8A)
H00=H1

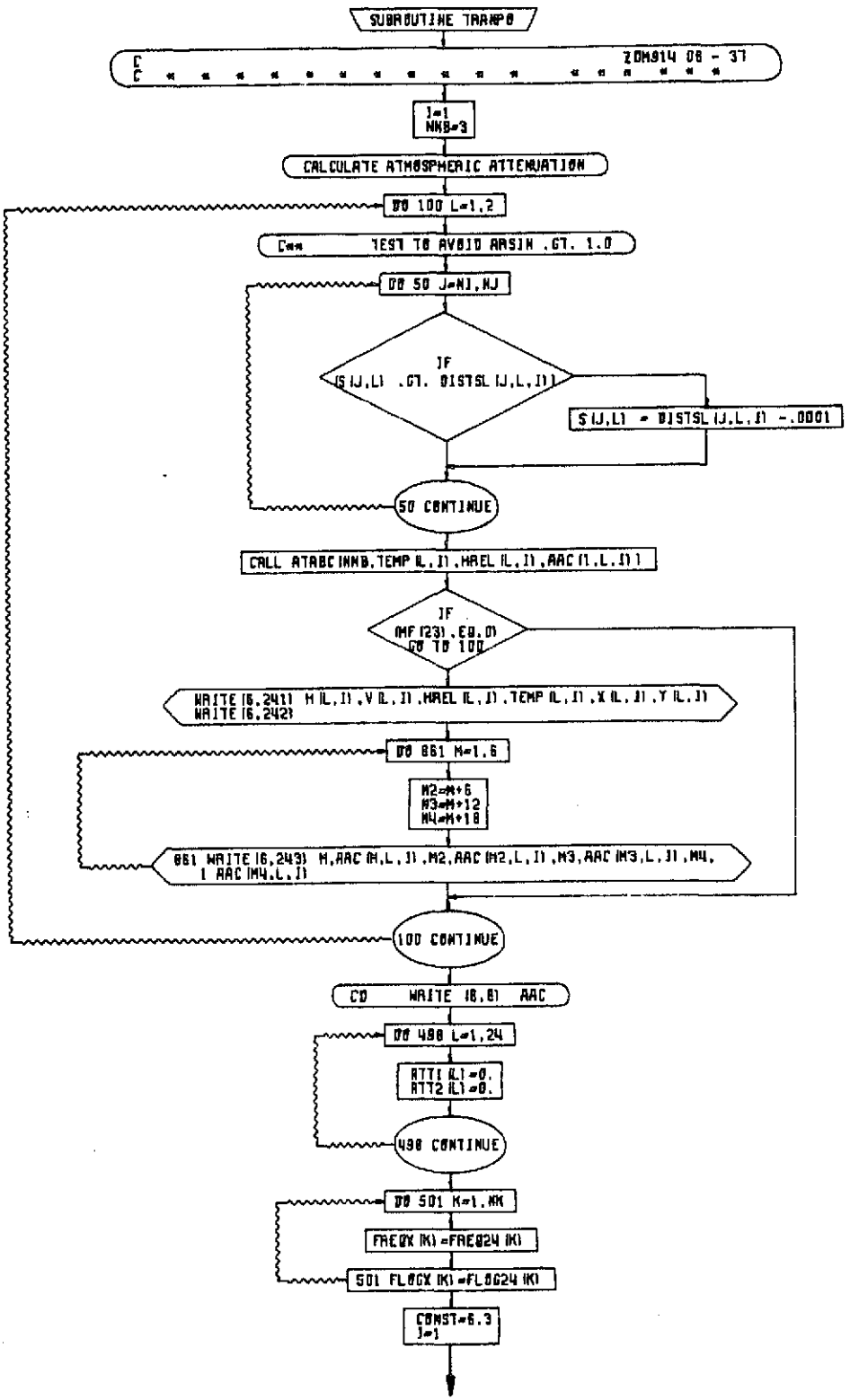

IF
(ABS(X(L,1)).LT.1.)
GO TO 190
XL=1000./COS(C8A)
Z=SQRT(X(L,1)*X(L,1)+H2*H2+1000000.)
HDD=SQRT(H1*H1+X(2,1)*X(2,1))
T1=HDD
C8A=ARCOS((HDD*HDD+XL*XL-Z*Z)/(2.*HDD*XL))-PI/2.
NJ=0
TEN=10.
DST=170.
182 CONTINUE
NJ=NJ+1
TPJ=TEN/PI180
IF
(C8A.GT.0.)
GO TO 185
TPJ=DST/PI180
NJ=1
NJ=NJ-1
185 CONTINUE
STEMP=H1-HDD*TAN(C8A)/(TAN(TPJ)+TAN(C8A))
IF
(STEMP.GT.0.)
GO TO 190
TPD=TPJ*PI180
WRITE (6,63) NA,STEMP,C8A,C8A,TPD,HDD,H(2,1)
TEN=TEN+10.
DST=DST-10.
GO TO 182

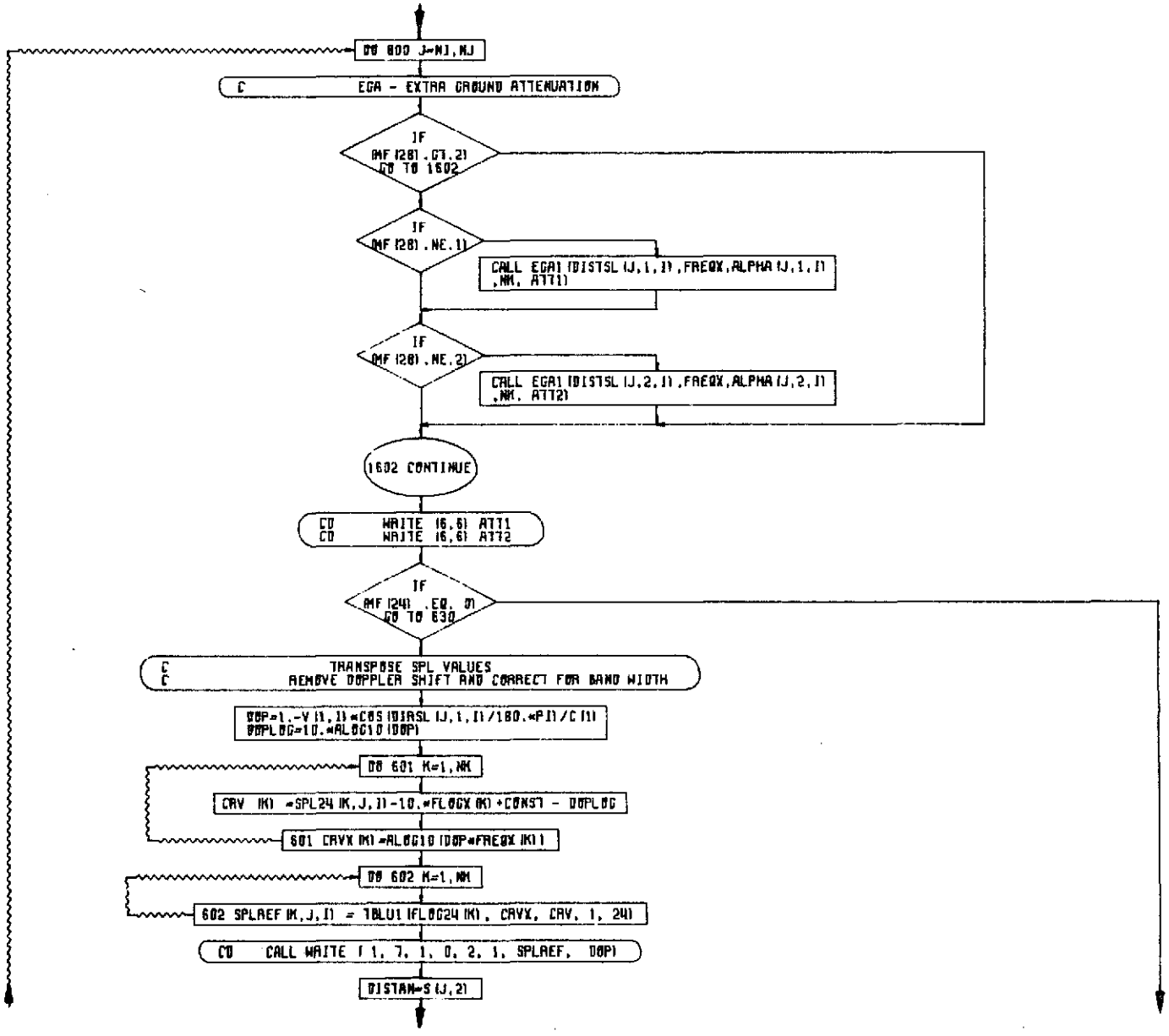

190 CONTINUE
DO 200 NA=NJ,NJ
C2R=DIRSL(NA,2,1)/PI180
S(NA,1)=Y1*TAN(C2R)/(TAN(C2R)+TAN(C8R))
DISTSL(NA,2,1)=S(NA,1)/SIN(C2R)
XREF=-S(NA,1)/TAN(C2R)
S(NA,2)=XREF*TAN(C8R)+H1
APR=ALPH(L)/PI180
PSI(NA)=ARCOS((-XREF*COS(APR)-S(NA,2)*SIN(APR))/DISTSL(NA,L,1))
*PI180
DELT=DISTSL(NA,L,1)/C(L)
CT=S(NA,1)+V(L,1)*DELT*SIN(C8R)
CT=-V(L,1)*DELT*COS(C8R)
IF (DIRSL(NA,L,1).NE.90.)
CT=CT+S(NA,1)/TAN(C2R)
THETA(NA,L,1)=90.
IF (CT.NE.0.)
THETA(NA,L,1)=ATAN(CT/CT)*PI180
IF (THETA(NA,L,1).LT.0.)
THETA(NA,L,1)=180.+THETA(NA,L,1)
C12=0.
IF (THETA(NA,L,1).NE.90.)
C12=TAN(THETA(NA,L,1)/PI180)
STHET=HDD*TAN(C12)/(TAN(C12)+TAN(C8R))
IF (C12.NE.0.AND.V(L,1).NE.0.)
TIM2(NA,L,1)=-STHET/C12/V(L,1)
IF (V(L,1).NE.0.)
ALPHA(NA,L,1)=ARSIN(S(NA,2)/DISTSL(NA,L,1))*PI180
200 CONTINUE
RETURN

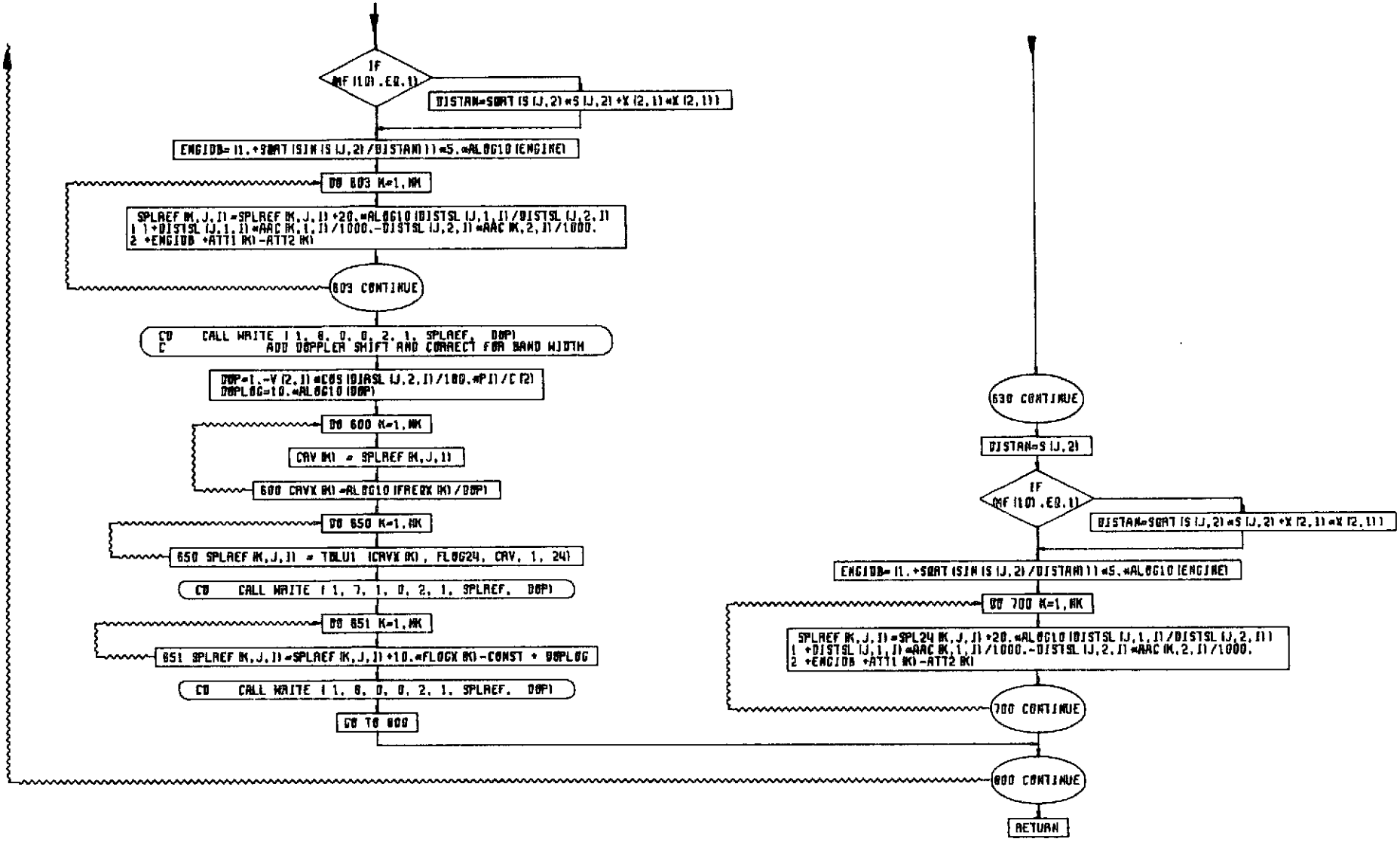

SUBROUTINE JETMFV (VJJET,VMJET)
C ZOM914 22 - KT
DO 200 NA=NI,NJ
200 IF (DIASL(NA,1,1).GE.88.AND.DIASL(NA,1,1).LE.92.)
NJ90=NA
K=1
L=2
DO 205 NA=NI,NJ
DDDB = 10.0 ** (TBLU1(DIASL(NA,1,1),THE,DEDB,1,17))
IF (NA.LE.NJ90) GO TO 210
K=2
L=1
210 DO 205 NB=1,NK
IF (MF(25).EQ.1) GO TO 203
IF (SPLJE(NB,NA).GE.SPL24(NB,NA,1))
SPL24(NB,NA,1)=SPLJE(NB,NA)+.5
SPL24(NB,NA,1)=10.**ALOG10(10.**(SPL24(NB,NA,1)/10.)
1 -10.**(SPLJE(NB,NA)/10.)
2 -10.**(SPLT(NB,NA)/10.))
203 SPLFA(NB,NA,K)=SPL24(NB,NA,1)-DDDB
205 SPLFA(NB,NA,L)=10.*ALOG10(10.**(SPL24(NB,NA,1)/10.)
1 -10.**(SPLFA(NB,NA,K)/10.))

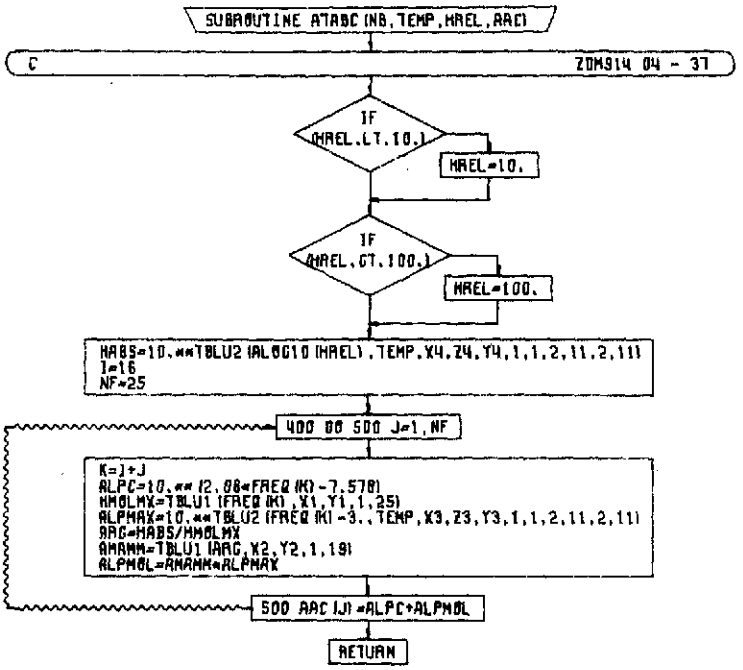

DO 350 N=1,2
DO 310 J=NJ,NJ
CD WRITE (6,5577) J, N, (SPLFA (I,J,N),I=1,24)
310 DASP (J,N) = DAFUNC (SPLFA (1,J,N))
(5577 FORMAT ('0DJETS'/ (5X,7G15.5))
C FIND THE MAX OF DASP
DAPM=0.
DO 320 J=NJ,NJ
320 IF (DASP (J,N) .GT. DAPM)
DAPM=DASP (J,N)
DO 330 J=NJ,NJ
C - - - - NASA-LEWIS CHANGE 1-11-71 - - - - - -
CW330 DASP (J,N)=DASP (J,N)/DAPM
330 DASP (J,N)=1.0
C - - - - - - - T O H E R E - - - - -
350 CONTINUE
DO 390 NA=NJ,NJ
DO 390 NB = 1,24
390 SPLJE (NB,NA) = SPLJE (NB,NA) - SPLREF (NB,NA,1)
IF (NF (17) .EQ.1)
RETURN
IF (VMJET.EQ.0.)
VMJET = VJJET + V (2,1)
VRATIO = (VMJET - V (2,1)) / VJJET
DELSPL = 80. * ALOG10 (VRATIO)
DO 410 NA=NJ,NJ
DO 405 NB = 1,24
AC (NB) = SPLJE (NB,NA) + DELSPL
405 CAVX (NB) = ALOG10 (FREQ24 (NB) * (VRATIO))
DO 410 NB=1,24
410 SPLJE (NB,NA) = TBLU1 (FLOG24 (NB),CAVX,AC , 1, 24)
RETURN

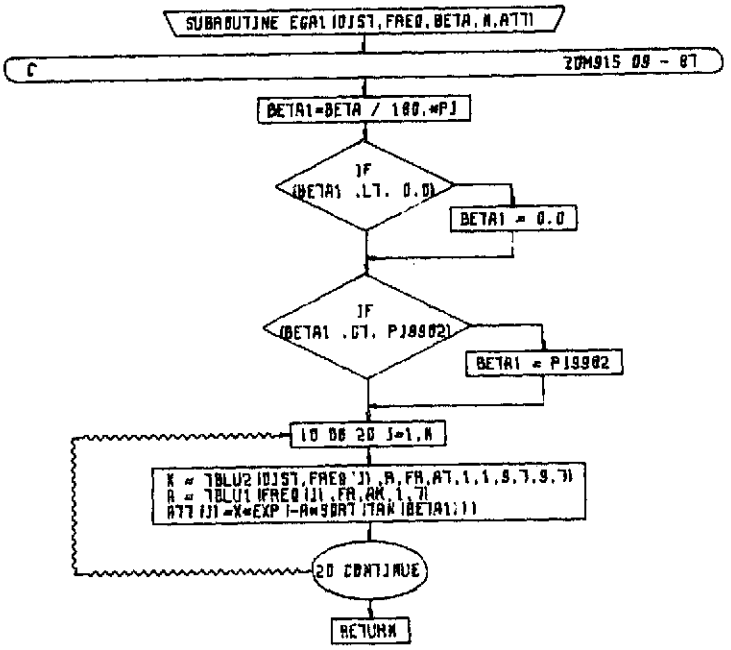

SUBROUTINE LOBESE
C 20M914 21 - JT
DO 18 N=1,4
DO 18 NB=1,24
18 ATATM(NB,N)=ATEN(NB,N)/CAT(N)
DO 560 N =1,2
DO 560 NB=1,NK
ATATM(NB,N) = ATATM(NB,N) + ATATM(NB,N+2)
560 CONTINUE
DO 320 NA=N1,NJ
DO 320 NB=1,NK
DO 17 N=1,2
17 SPLAT(N)=SPLFA(NB,NA,N) - BASP(NA,N)*ATATM(NB,N)
320 SPL24(NB,NA,1)=10.**AT.OG10(10.**(SPLAT(1)*.1)
1 +10.**(SPLAT(2)*.1)
2 +10.**(SPLJE(NB,NA)*.1)
2 +10.**(SPLTU(NB,NA)*.1))
RETURN

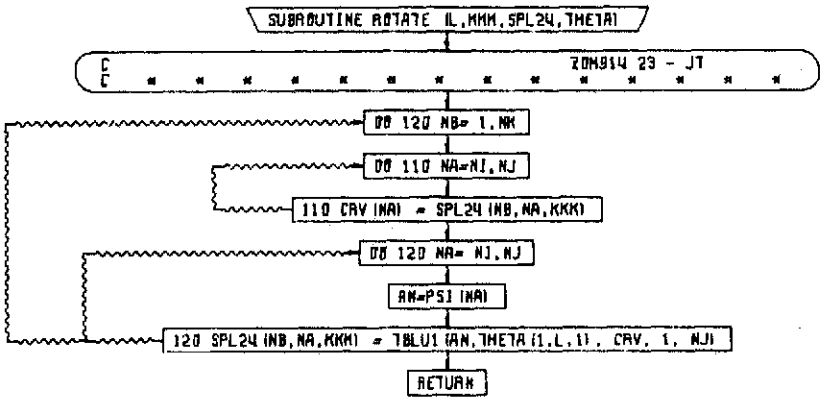

SUBROUTINE TRAMP8
C
C
ZDM914 08 - 37
I=1
NNB=3
CALCULATE ATMOSPHERIC ATTENUATION
DO 100 L=1,2
C** TEST TO AVOID ARSIN .GT. 1.0
DO 50 J=NJ,NJ
IF
(S(J,L) .GT. DISTSL(J,L,I))
S(J,L) = DISTSL(J,L,I) -.0001
50 CONTINUE
CALL ATABC(NNB,TEMP(L,I),HREL(L,I),AAC(1,L,I))
IF
(MF(23).EQ.0)
GO TO 100
WRITE(6,241) M(L,I),V(L,I),HREL(L,I),TEMP(L,I),X(L,I),Y(L,I)
WRITE(6,242)
DO 861 M=1,6
M2=M+6
M3=M+12
M4=M+18
861 WRITE(6,243) M,AAC(M,L,I),M2,AAC(M2,L,I),M3,AAC(M3,L,I),M4,
1 AAC(M4,L,I)
100 CONTINUE
CD WRITE(6,8) AAC
DO 498 L=1,24
ATT1(L)=0.
ATT2(L)=0.
498 CONTINUE
DO 501 K=1,NK
FREQX(K)=FREQ24(K)
501 FLOGX(K)=FLOG24(K)
CONST=6.3
J=1

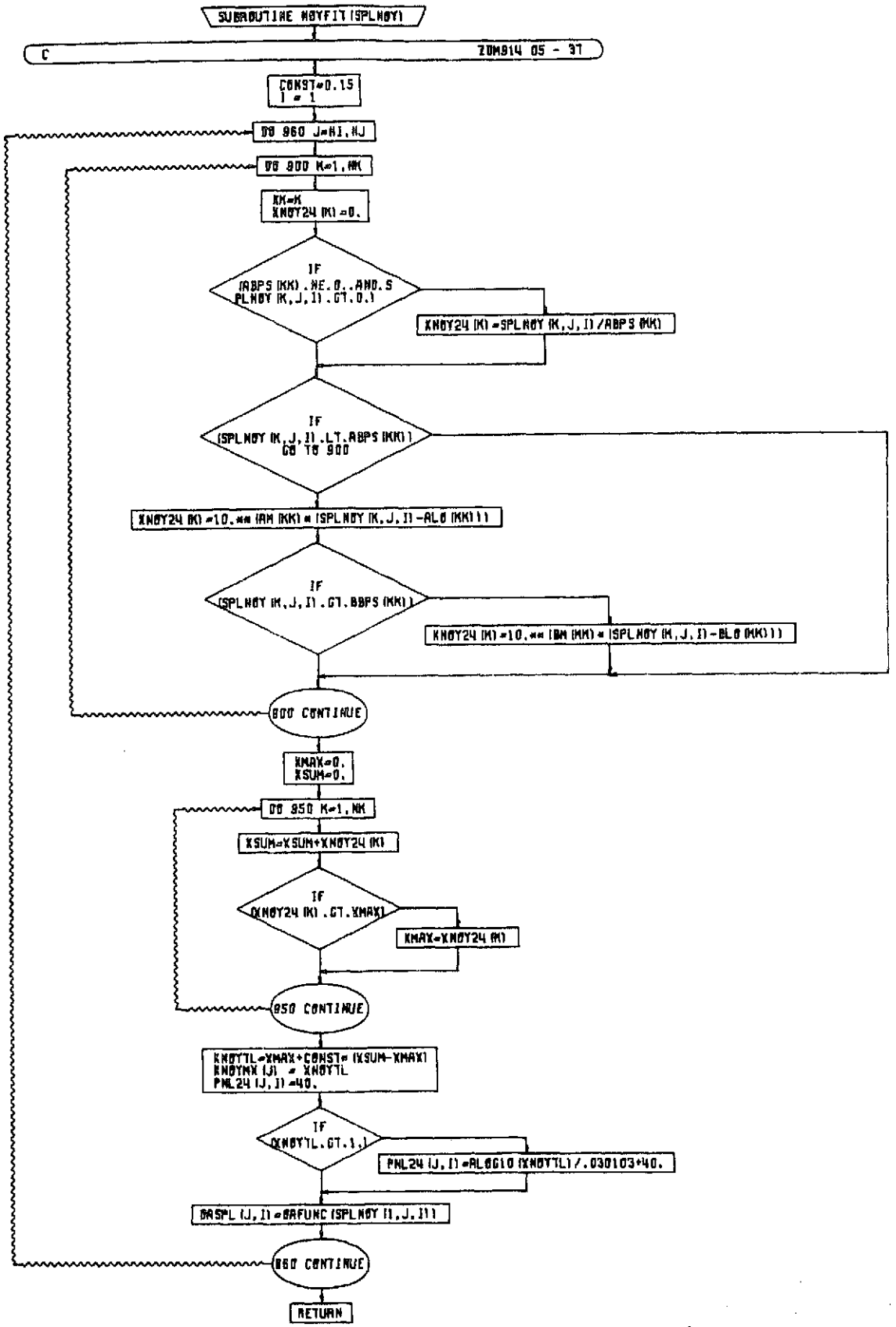

DO 600 J=NJ,NJ
C EGA - EXTRA GROUND ATTENUATION
IF (MF(28).GT.2) GO TO 1602
IF (MF(28).NE.1)
CALL EGA1(DISTSL(J,1,I),FREQX,ALPHA(J,1,I),NK, ATT1)
IF (MF(28).NE.2)
CALL EGA1(DISTSL(J,2,I),FREQX,ALPHA(J,2,I),NK, ATT2)
1602 CONTINUE
CO WRITE(6,6) ATT1
CO WRITE(6,6) ATT2
IF (MF(24).EQ.0) GO TO 630
C TRANSPOSE SPL VALUES
C REMOVE DOPPLER SHIFT AND CORRECT FOR BAND WIDTH
DOP=1.-V(1,I)*COS(DIRSL(J,1,I)/180.*PI)/C(1)
DOPLOG=10.*ALOG10(DOP)
DO 601 K=1,NK
CRV(K)=SPL24(K,J,I)-10.*FLOGX(K)+CONST-DOPLOG
601 CRVX(K)=ALOG10(DOP*FREQX(K))
DO 602 K=1,NK
602 SPLREF(K,J,I) = TBLU1(FLOG24(K), CRVX, CRV, 1, 24)
CO CALL WRITE(1, 7, 1, 0, 2, 1, SPLREF, DOP)
DISTAN=S(J,2)

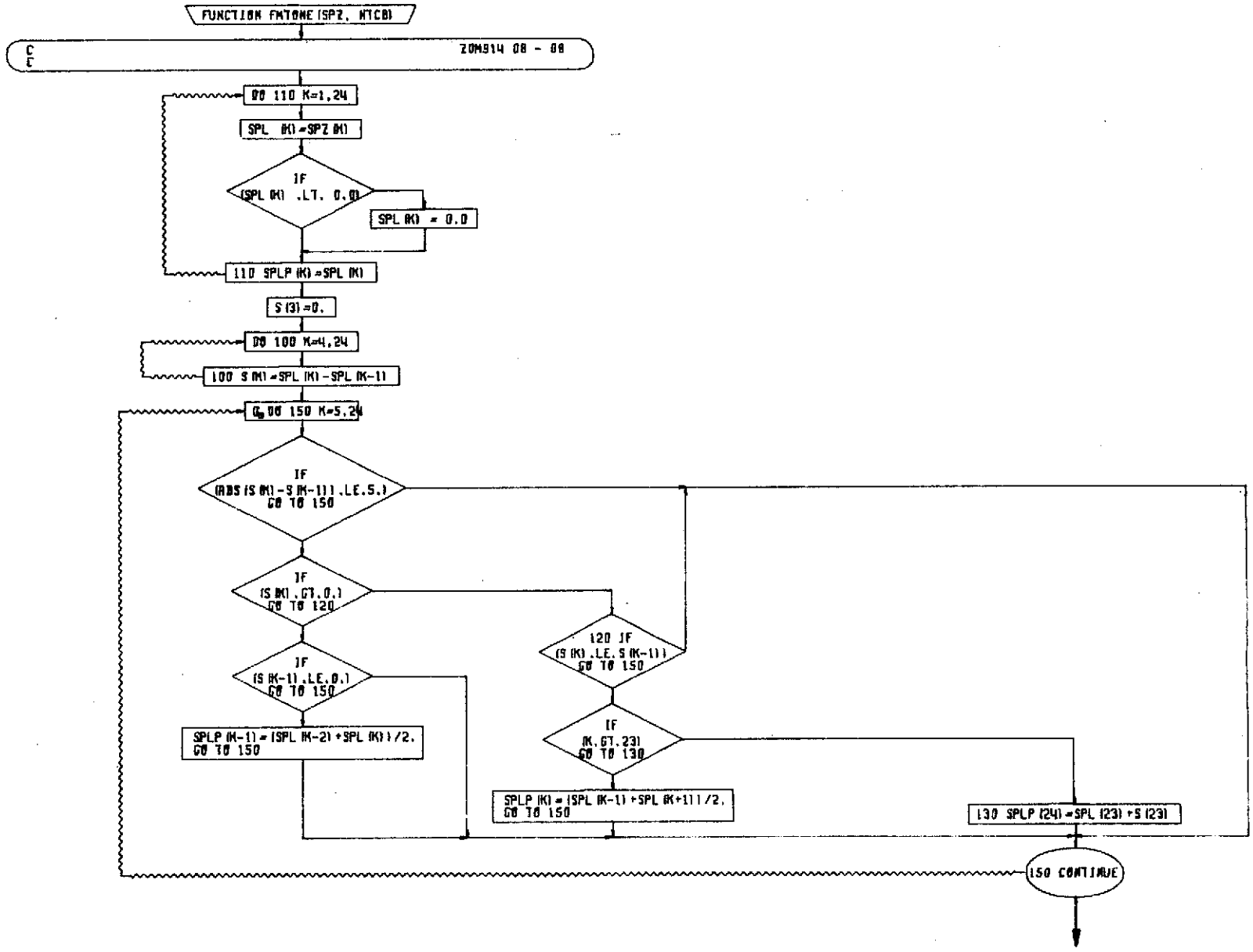

IF
(MF(10).EQ.1)
DISTAN=SQRT(S(J,2)**S(J,2)+X(2,1)**X(2,1))
ENGIDB=(1.+SQRT(SIN(S(J,2)/DISTAN)))**5.*ALOG10(ENGINE)
DO 803 K=1,NK
SPLREF(K,J,I)=SPLREF(K,J,I)+20.*ALOG10(DISTSL(J,1,I)/DISTSL(J,2,I)
1)+DISTSL(J,1,I)*AAC(K,1,I)/1000.-DISTSL(J,2,I)*AAC(K,2,I)/1000.
2 +ENGIDB+ATT1(K)-ATT2(K)
803 CONTINUE
CD CALL WRITE(1, 8, 0, 0, 2, 1, SPLREF, DBP)
C ADD DOPPLER SHIFT AND CORRECT FOR BAND WIDTH
DOP=(1.-V(2,I)*COS(DIASL(J,2,I)/180.*PI)/C(2)
DOPLOG=10.*ALOG10(DOP)
DO 600 K=1,NK
CAV(K) = SPLREF(K,J,I)
600 CAVX(K)=ALOG10(FREQX(K)/DOP)
DO 650 K=1,NK
650 SPLREF(K,J,I) = TBLU1(CAVX(K), FLOG24, CAV, 1, 24)
CD CALL WRITE(1, 7, 1, 0, 2, 1, SPLREF, DBP)
DO 651 K=1,NK
651 SPLREF(K,J,I)=SPLREF(K,J,I)+10.*FLOGX(K)-CONST + DBPLOG
CD CALL WRITE(1, 8, 0, 0, 2, 1, SPLREF, DBP)
GO TO 800
630 CONTINUE
DISTAN=S(J,2)
IF
(MF(10).EQ.1)
DISTAN=SQRT(S(J,2)**S(J,2)+X(2,1)**X(2,1))
ENGIDB=(1.+SQRT(SIN(S(J,2)/DISTAN)))**5.*ALOG10(ENGINE)
DO 700 K=1,NK
SPLREF(K,J,I)=SPL24(K,J,I)+20.*ALOG10(DISTSL(J,1,I)/DISTSL(J,2,I))
1 +DISTSL(J,1,I)*AAC(K,1,I)/1000.-DISTSL(J,2,I)*AAC(K,2,I)/1000.
2 +ENGIDB+ATT1(K)-ATT2(K)
700 CONTINUE
800 CONTINUE
RETURN

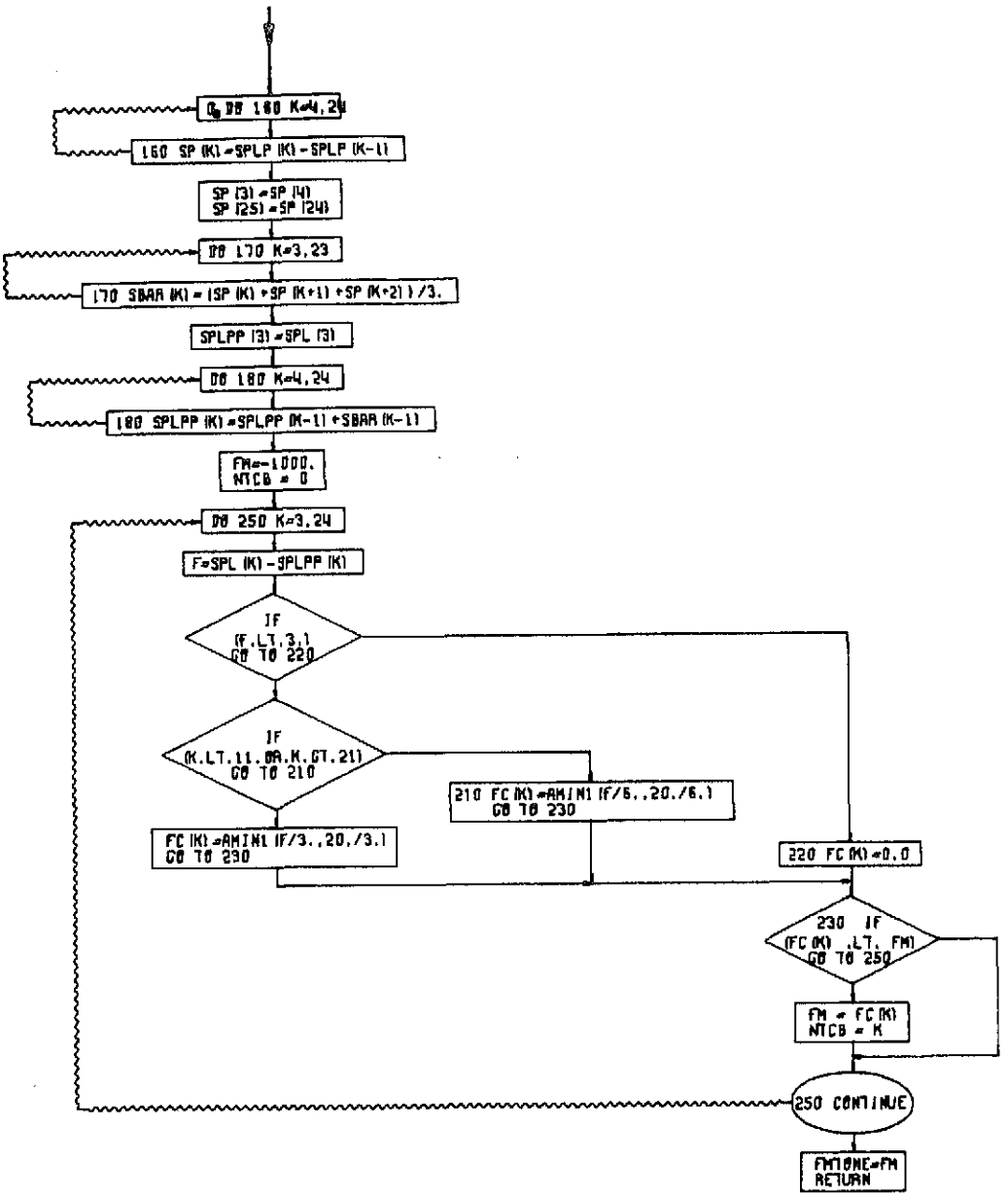

SUBROUTINE ATABC (NB, TEMP, HREL, AAC)
C
ZDM914 04 - 37
IF (HREL.LT.10.)
HREL=10.
IF (HREL.GT.100.)
HREL=100.
HABS=10.**TBLU2 (ALOG10 (HREL), TEMP, X4, Z4, Y4, 1, 1, 2, 11, 2, 11)
I=16
NF=25
400 DO 500 J=1, NF
K=I+J
ALPC=10.** (2.88*FREQ (K) -7.578)
HMOLMX=TBLU1 (FREQ (K), X1, Y1, 1, 25)
ALPMAX=10.**TBLU2 (FREQ (K) -3., TEMP, X3, Z3, Y3, 1, 1, 2, 11, 2, 11)
AAC=HABS/HMOLMX
AMAMM=TBLU1 (AAC, X2, Y2, 1, 19)
ALPMOL=AMAMM*ALPMAX
500 AAC (J) =ALPC+ALPMOL
RETURN

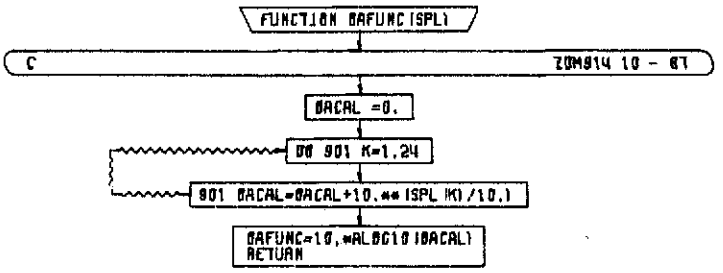

SUBROUTINE EGA1(DIST,FREQ,BETA,N,ATT)
C
BETA1=BETA / 180.*PI
IF
(BETA1 .LT. 0.0)
BETA1 = 0.0
IF
(BETA1 .GT. PI/2.)
BETA1 = PI/2.
DO 20 J=1,N
20 CONTINUE
RETURN

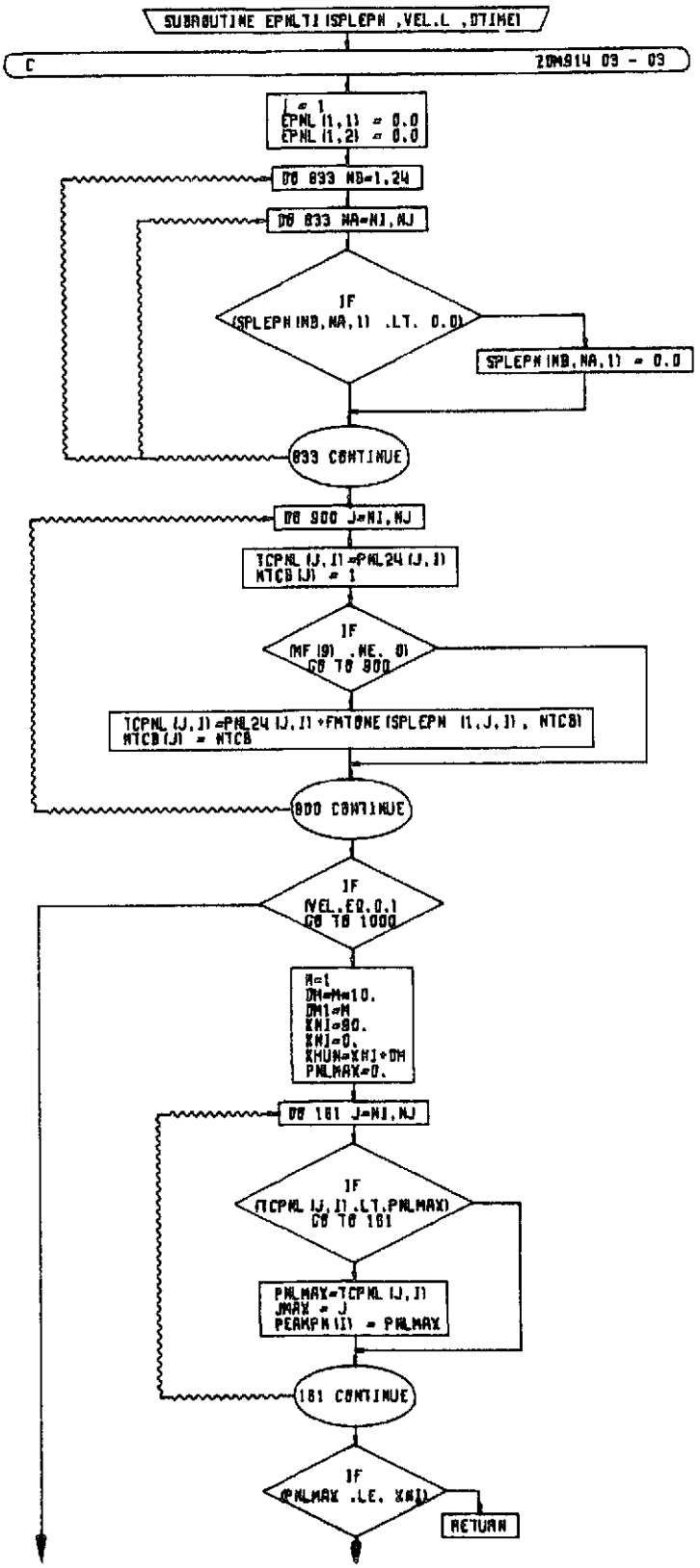

SUBROUTINE ROTATE (L,MMM,SPL24,THETA)
C ZOM914 23 - JT
C * * * * * * * * * * * * * * *
DO 120 NB= 1,NK
DO 110 NA=NJ,NJ
110 CRV(NA) = SPL24(NB,NA,KKK)
DO 120 NA= NJ,NJ
AN=PSI(NA)
120 SPL24(NB,NA,KKK) = TBLU1(AN,THETA(1,L,1), CRV, 1, NJ)
RETURN

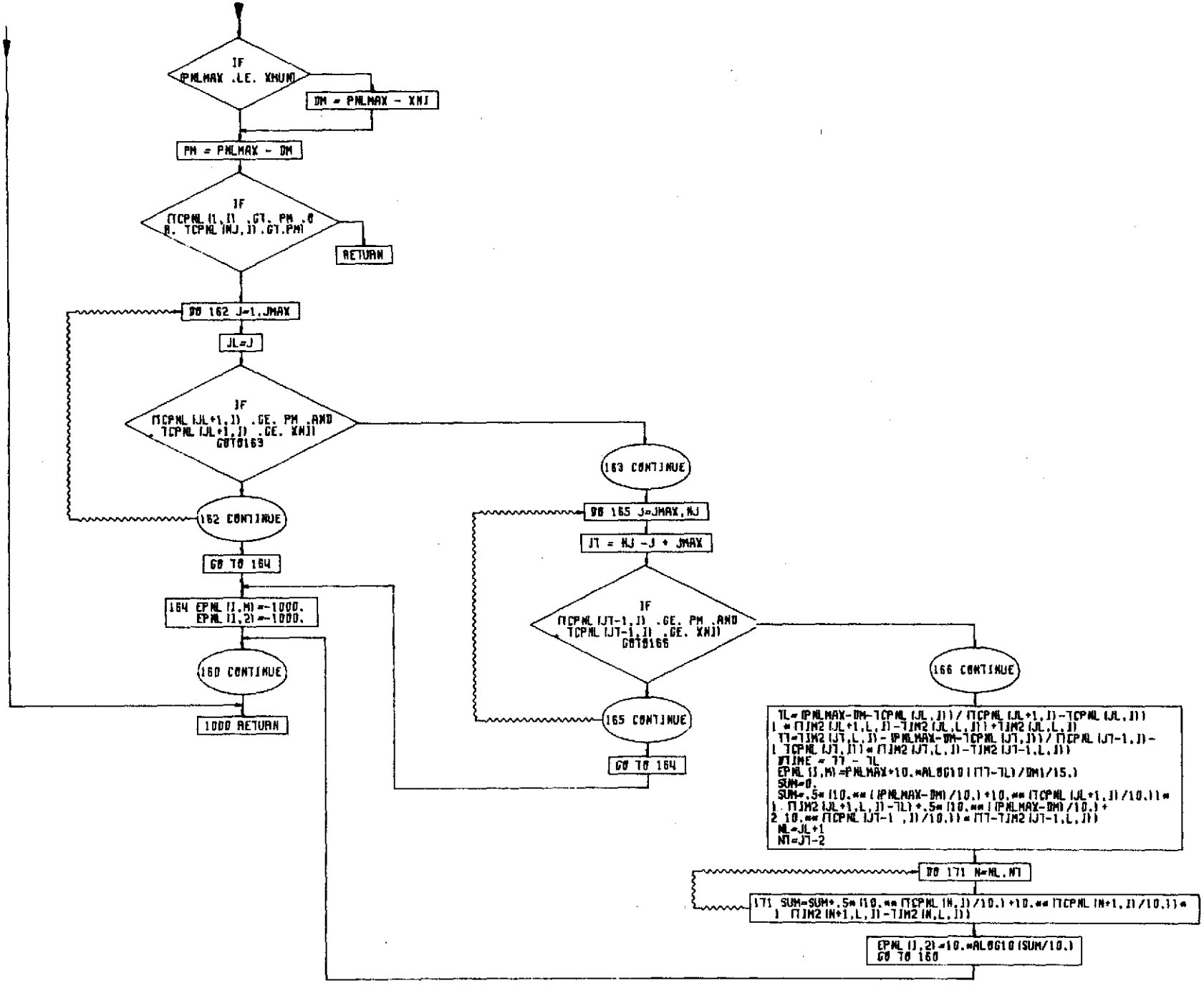

SUBROUTINE NOYFIT (SPLNOY)
C
ZUM914 05 - 37
CONST=0.15
I = 1
DO 960 J=NI,NJ
DO 900 K=1,NK
KK=K
XNOY24 (K) =0.
IF
(ABPS (KK) .NE. 0. .AND. S
PLNOY (K,J,I) .GT. 0.1
XNOY24 (K) =SPLNOY (K,J,I) /ABPS (KK)
IF
(SPLNOY (K,J,I) .LT. ABPS (KK))
GO TO 900
XNOY24 (K) =10.** (AM (KK) * (SPLNOY (K,J,I) -BL0 (KK)))
IF
(SPLNOY (K,J,I) .GT. BBPS (KK))
XNOY24 (K) =10.** (BM (KK) * (SPLNOY (K,J,I) -BL0 (KK)))
900 CONTINUE
XMAX=0.
XSUM=0.
DO 950 K=1,NK
XSUM=XSUM+XNOY24 (K)
IF
(XNOY24 (K) .GT. XMAX)
XMAX=XNOY24 (K)
950 CONTINUE
XNOYTL=XMAX+CONST* (XSUM-XMAX)
XNOYMX (J) = XNOYTL
PNL24 (J,I) =40.
IF
(XNOYTL .GT. 1.)
PNL24 (J,I) =AL0G10 (XNOYTL) /.030103+40.
BASPL (J,I) =BAFUNC (SPLNOY (1,J,I))
960 CONTINUE
RETURN

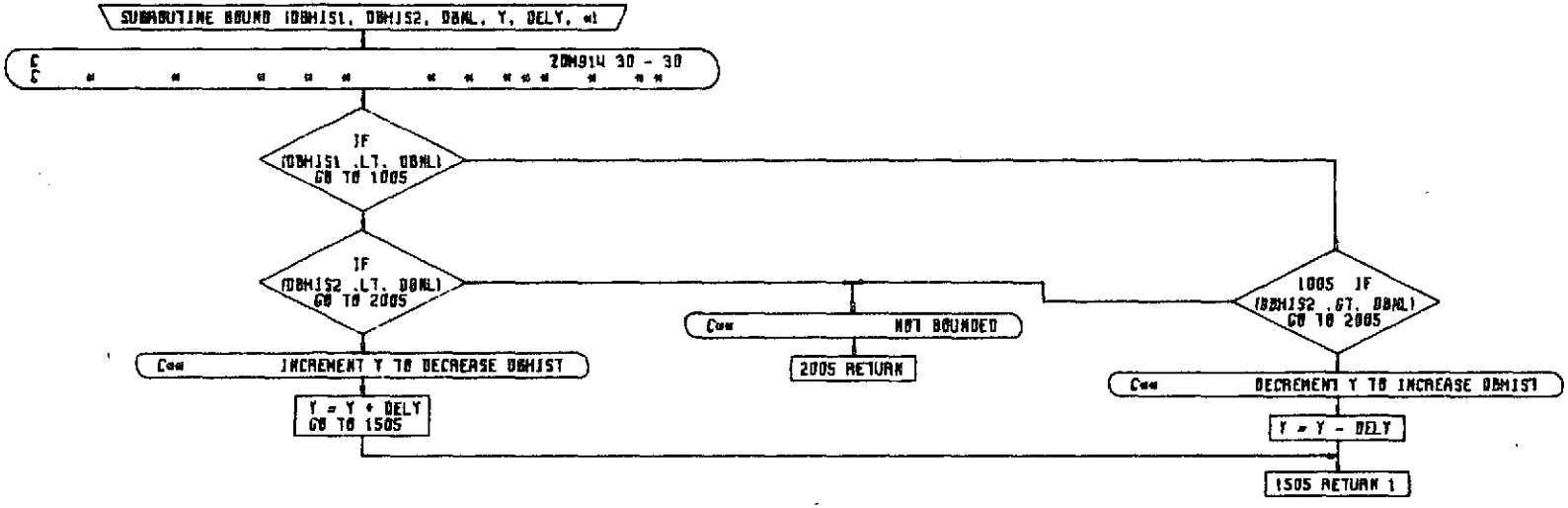

FUNCTION FMTONE(SPZ, MTCB)
C
C ZOM914 08 - 08
DO 110 K=1,24
SPL (K)=SPZ(K)
IF (SPL(K) .LT. 0.0)
SPL(K) = 0.0
110 SPLP(K)=SPL(K)
S(3)=0.
DO 100 K=4,24
100 S(K)=SPL(K)-SPL(K-1)
DO 150 K=5,24
IF (ABS(S(K)-S(K-1)).LE.5.) GO TO 150
IF (S(K).GT.0.) GO TO 120
IF (S(K-1).LE.0.) GO TO 150
SPLP(K-1)=(SPL(K-2)+SPL(K))/2. GO TO 150
120 IF (S(K).LE.S(K-1)) GO TO 150
IF (K.GT.23) GO TO 130
SPLP(K)=(SPL(K-1)+SPL(K+1))/2. GO TO 150
130 SPLP(24)=SPL(23)+S(23)
150 CONTINUE

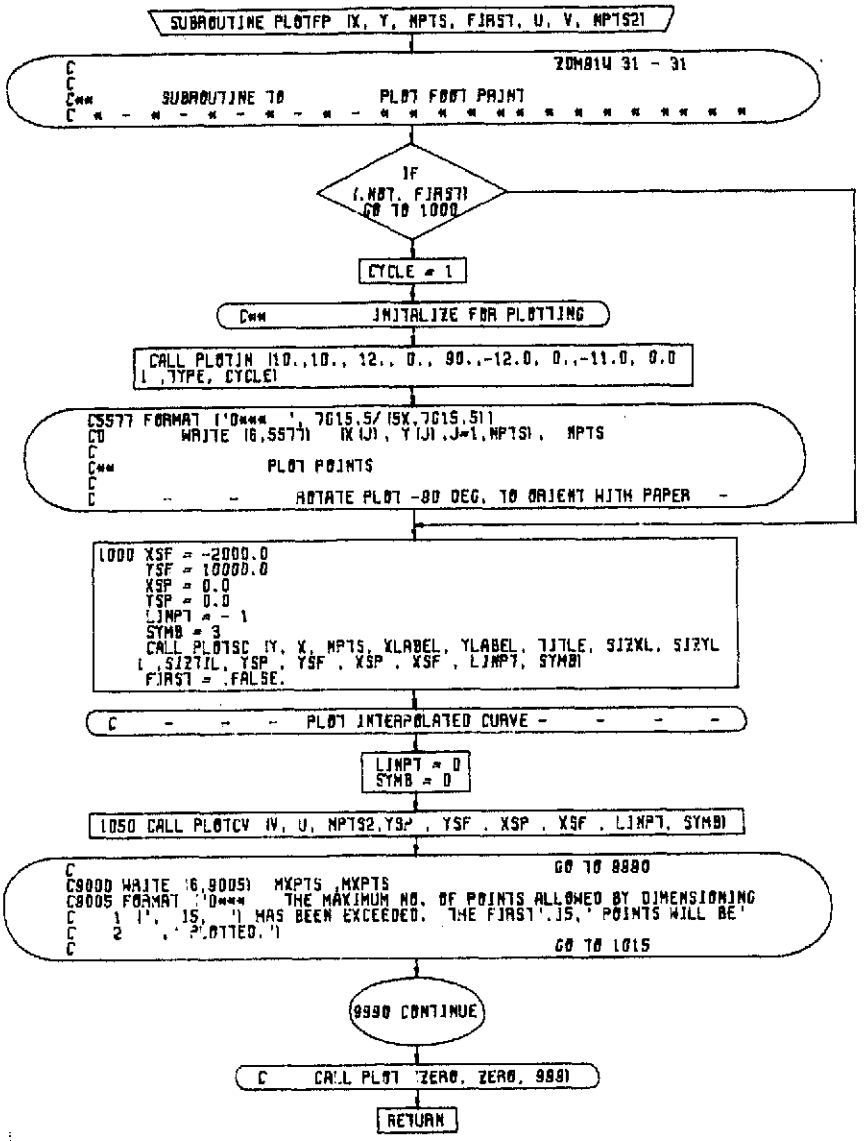

DO 160 K=4,24
160 SP(K)=SPLP(K)-SPLP(K-1)
SP(3)=SP(4)
SP(25)=SP(24)
DO 170 K=3,23
170 SBAR(K)=(SP(K)+SP(K+1)+SP(K+2))/3.
SPLPP(3)=SPL(3)
DO 180 K=4,24
180 SPLPP(K)=SPLPP(K-1)+SBAR(K-1)
FM=-1000.
NTCB=0
DO 250 K=3,24
F=SPL(K)-SPLPP(K)
IF (F.LT.3.) GO TO 220
IF (K.LT.11.OR.K.GT.21) GO TO 210
210 FC(K)=AMIN1(F/6.,20./6.) GO TO 230
FC(K)=AMIN1(F/3.,20./3.) GO TO 230
220 FC(K)=0.0
230 IF (FC(K).LT.FM) GO TO 250
FM=FC(K)
NTCB=K
250 CONTINUE
FM1ONE=FM
RETURN

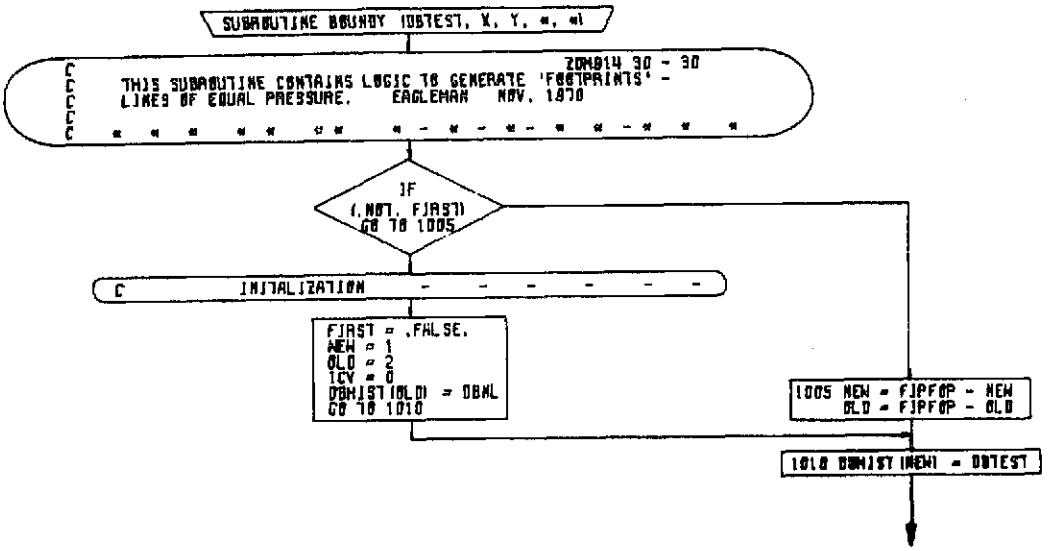

FUNCTION BAFUNC(SPL)
C
ZOM914 10 - 87
BACAL =0.
DO 901 K=1,24
901 BACAL=BACAL+10.**(SPL(K)/10.)
BAFUNC=10.*ALOG10(BACAL)
RETURN

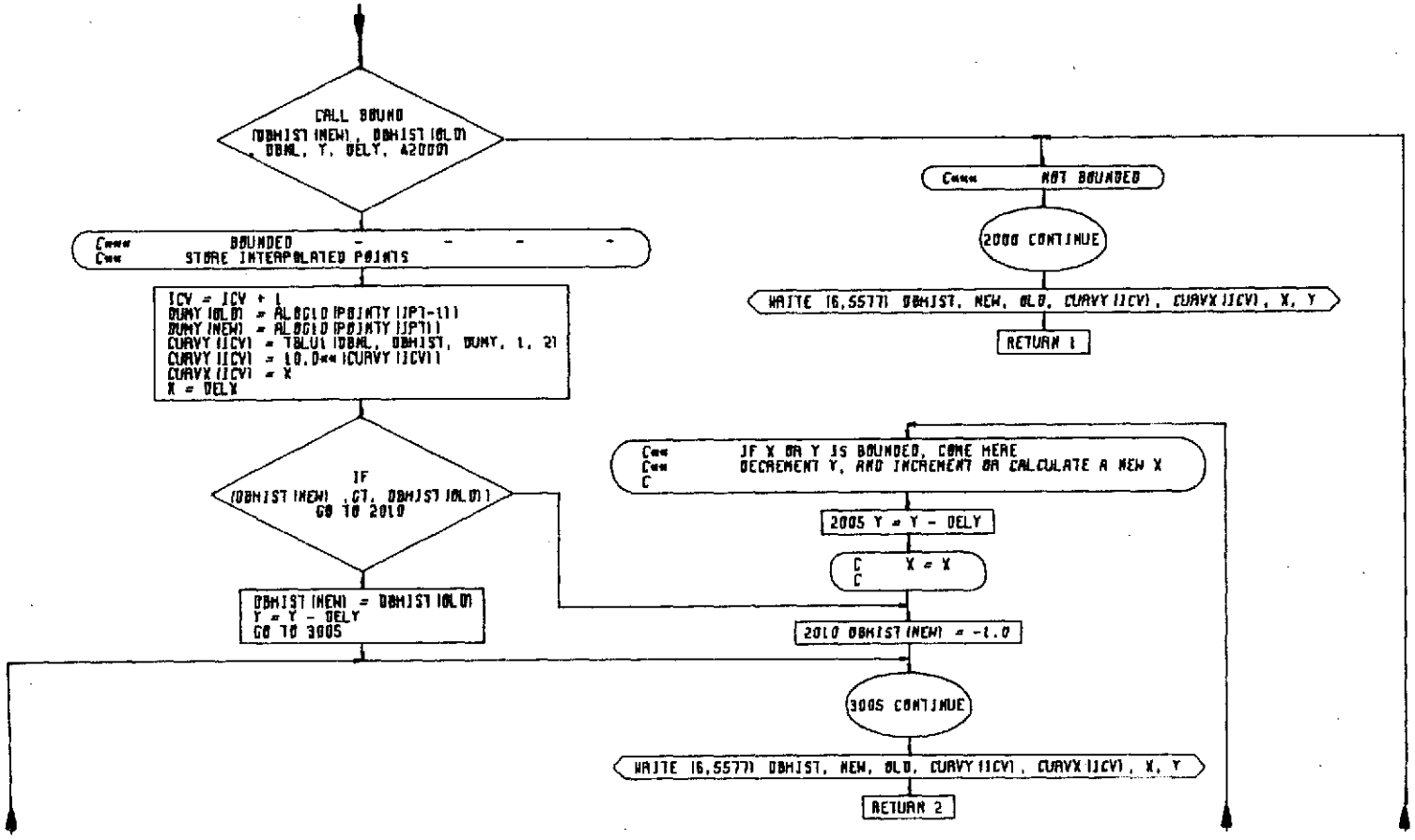

SUBROUTINE EPNLTI(SPLEPN ,VEL,L ,DTIME)
C
I2M9I4 03 - 03
I = 1
EPNL (1,1) = 0.0
EPNL (1,2) = 0.0
DO 833 NB=1,24
DO 833 NA=NI,NJ
IF
(SPLEPN(NB,NA,1) .LT. 0.0)
SPLEPN(NB,NA,1) = 0.0
833 CONTINUE
DO 800 J=NI,NJ
TCPNL (J,I)=PNL24 (J,I)
NTCB(J) = 1
IF
(NF(9) .NE. 0)
GO TO 800
TCPNL (J,I)=PNL24 (J,I)+FNTONE(SPLEPN (1,J,I) , NTCB)
NTCB(J) = NTCB
800 CONTINUE
IF
(VEL.EQ.0.)
GO TO 1000
M=1
DM=M*10.
DM1=M
XNI=80.
XNJ=0.
XHUN=XNI+DM
PNLMAX=0.
DO 161 J=NI,NJ
IF
(TCPNL (J,I).LT.PNLMAX)
GO TO 161
PNLMAX=TCPNL (J,I)
JMAX = J
PEAKPN(I) = PNLMAX
161 CONTINUE
IF
(PNLMAX .LE. XNJ)
RETURN

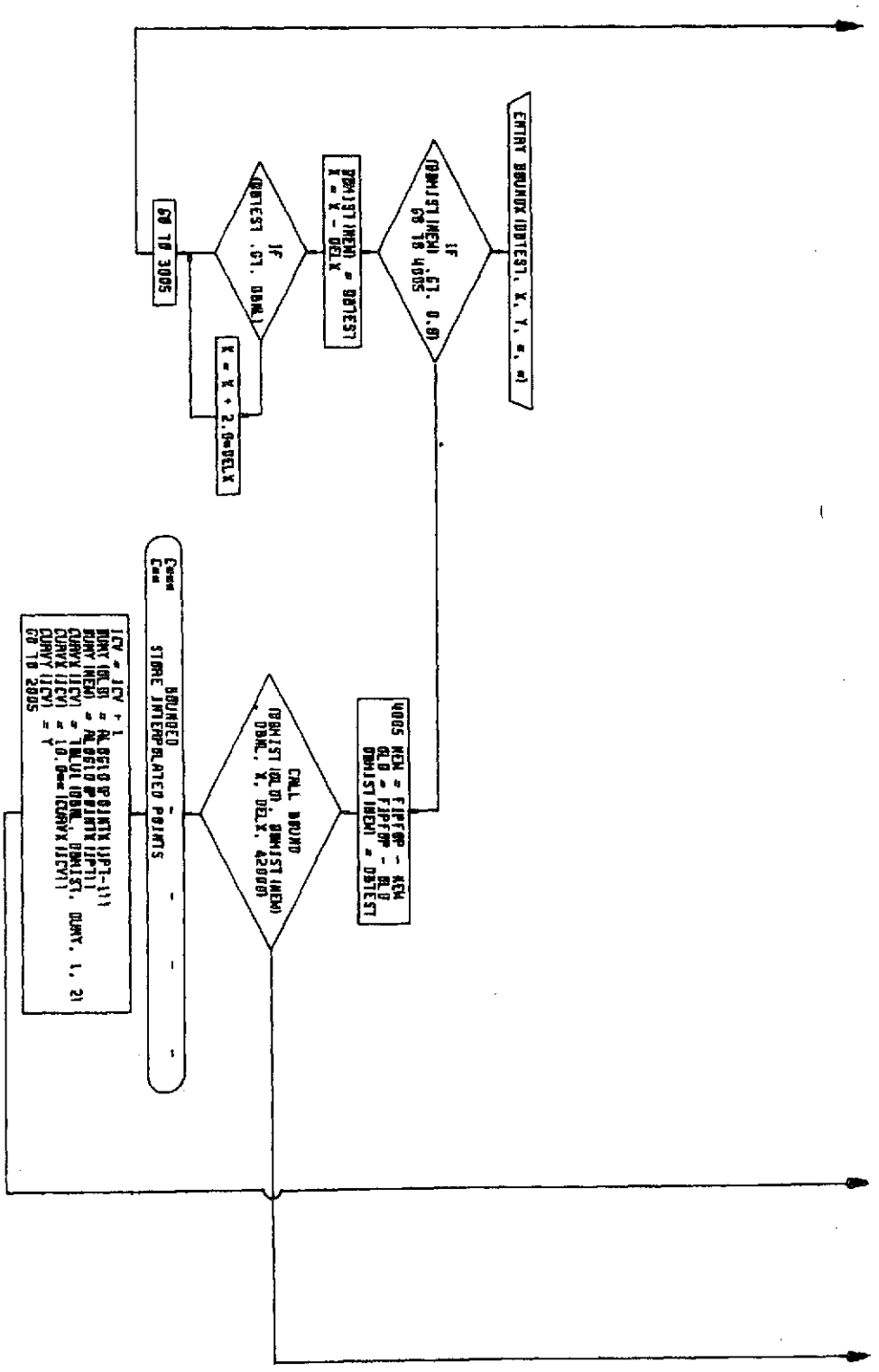

IF
(PNLMAX .LE. XMUN)
DM = PNLMAX - XNJ
PM = PNLMAX - DM
IF
(TCPNL(1,J) .GT. PM .O
R. TCPNL(NJ,J).GT.PM)
RETURN
DO 162 J=1,JMAX
JL=J
IF
(TCPNL(JL+1,J) .GE. PM .AND
. TCPNL(JL+1,J) .GE. XNJ)
GOTO163
162 CONTINUE
GO TO 164
164 EPNL(I,M)=-1000.
EPNL(1,2)=-1000.
160 CONTINUE
1000 RETURN
163 CONTINUE
DO 165 J=JMAX,NJ
JT = NJ -J + JMAX
IF
(TCPNL(JT-1,J) .GE. PM .AND
TCPNL(JT-1,J) .GE. XNJ)
GOTO166
165 CONTINUE
GO TO 164
166 CONTINUE
TL=(PNLMAX-DM-TCPNL(JL,J))/(TCPNL(JL+1,J)-TCPNL(JL,J))
1 *(TJM2(JL+1,L,J)-TJM2(JL,L,J))+TJM2(JL,L,J)
TT=TJM2(JT,L,J)-(PNLMAX-DM-TCPNL(JT,J))/(TCPNL(JT-1,J)-
1 TCPNL(JT,J))*(TJM2(JT,L,J)-TJM2(JT-1,L,J))
DTIME = TT - TL
EPNL(I,M)=PNLMAX+10.*ALOG10((TT-TL)/DM1/15.)
SUM=0.
SUM=.5*(10.**((PNLMAX-DM)/10.)+10.**(TCPNL(JL+1,J)/10.))*
1 (TJM2(JL+1,L,J)-TL)+.5*(10.**((PNLMAX-DM)/10.)+
2 10.**(TCPNL(JT-1 ,J)/10.))*(TT-TJM2(JT-1,L,J))
ML=JL+1
MT=JT-2
DO 171 N=ML,MT
171 SUM=SUM+.5*(10.**(TCPNL(N,J)/10.)+10.**(TCPNL(N+1,J)/10.))*
1 (TJM2(N+1,L,J)-TJM2(N,L,J))
EPNL(I,2)=10.*ALOG10(SUM/10.)
GO TO 160


SUBROUTINE BOUND (DBHIS1, DBHIS2, DBNL, Y, DELY, *)
C
C
ZDM914 30 - 30
IF
(DBHIS1 .LT. DBNL)
GO TO 1005
IF
(DBHIS2 .LT. DBNL)
GO TO 2005
C** INCREMENT Y TO DECREASE DBHIST
Y = Y + DELY
GO TO 1505
C** NOT BOUNDED
2005 RETURN
1005 IF
(DBHIS2 .GT. DBNL)
GO TO 2005
C** DECREMENT Y TO INCREASE DBHIST
Y = Y - DELY
1505 RETURN 1


SUBROUTINE PLOTFP (X, Y, NPTS, FIRST, U, V, NPTS2)
C 20M814 31 - 31
C
C** SUBROUTINE TO PLOT FOOT PRINT
C * - * - * - * - * - * * * * * * * * * * * * * *
IF (.NOT. FIRST) GO TO 1000
CYCLE = 1
C** INITALIZE FOR PLOTTING
CALL PLOTIN (10.,10., 12., 0., 90.,-12.0, 0.,-11.0, 0.0 ,TYPE, CYCLE)
5577 FORMAT ('0*** ', 7G15.5/ (5X,7G15.5))
WRITE (6,5577) (X(J), Y(J),J=1,NPTS), NPTS
C** PLOT POINTS
C - - ROTATE PLOT -80 DEG. TO ORIENT WITH PAPER -
1000 XSF = -2000.0
YSF = 10000.0
XSP = 0.0
YSP = 0.0
LINPT = -1
SYMB = 3
CALL PLOTSC (Y, X, NPTS, XLABEL, YLABEL, TITLE, SIZXL, SIZYL ,SIZTIL, YSP , YSF , XSP , XSF , LINPT, SYMB)
FIRST = .FALSE.
C - - - PLOT INTERPOLATED CURVE - - - -
LINPT = 0
SYMB = 0
1050 CALL PLOTCV (V, U, NPTS2,YSP , YSF , XSP , XSF , LINPT, SYMB)
C GO TO 9990
9000 WRITE (6,9005) MXPTS ,MXPTS
9005 FORMAT ('0*** THE MAXIMUM NO. OF POINTS ALLOWED BY DIMENSIONING
1 ', I5, ' HAS BEEN EXCEEDED. THE FIRST ',I5,' POINTS WILL BE'
2 ' PLOTTED.')
C GO TO 1015
9990 CONTINUE
C CALL PLOT (ZERO, ZERO, 999)
RETURN


SUBROUTINE BOUNDY (DBTEST, X, Y, *, *)
C
C THIS SUBROUTINE CONTAINS LOGIC TO GENERATE 'FOOTPRINTS' -
C LINES OF EQUAL PRESSURE. EAGLEMAN NOV. 1970
C
C
IF
(.NOT. FIRST)
GO TO 1005
C INITALIZATION
FIRST = .FALSE.
NEW = 1
OLD = 2
ICV = 0
DBHIST(OLD) = DBAL
GO TO 1010
1005 NEW = FIPFOP - NEW
OLD = FIPFOP - OLD
1010 DBHIST(NEW) = DBTEST


CALL BOUND
(DBHIST(NEW), DBHIST(OLD)
, DBAL, Y, DELY, A2000)
C**** BOUNDED
C*** STORE INTERPOLATED POINTS
ICV = ICV + 1
DUMY(OLD) = ALOG10(POINTY(JP1-1))
DUMY(NEW) = ALOG10(POINTY(JP1))
CURVY(ICV) = TBLU1(DBAL, DBHIST, DUMY, 1, 21
CURVY(ICV) = 10.0**(CURVY(ICV))
CURVX(ICV) = X
X = DELX
IF
(DBHIST(NEW) .GT. DBHIST(OLD))
GO TO 2010
DBHIST(NEW) = DBHIST(OLD)
Y = Y - DELY
GO TO 3005
C**** NOT BOUNDED
2000 CONTINUE
WRITE(6,5577) DBHIST, NEW, OLD, CURVY(ICV), CURVX(ICV), X, Y
RETURN 1
C**** IF X OR Y IS BOUNDED, COME HERE
C*** DECREMENT Y, AND INCREMENT OR CALCULATE A NEW X
C
2005 Y = Y - DELY
C X = X
C
2010 DBHIST(NEW) = -1.0
3005 CONTINUE
WRITE(6,5577) DBHIST, NEW, OLD, CURVY(ICV), CURVX(ICV), X, Y
RETURN 2


ENTRY BOUNDX (OBTEST, X, Y, *, *)
IF (OBMIST(MEM) .GT. 0.0) GO TO 4005
IF (OBTEST .GT. OBML)
OBMIST(MEM) = OBTEST X = X - DELX
X = X + 2.0*DELX
GO TO 3005
4005 MEM = FIPTRP - MEM
OLD = FIPTRP - OLD
OBMIST(MEM) = OBTEST
CALL BOUND (OBMIST(OLD), OBMIST(MEM) OBML, X, DELX, 420005)
Cases
Case
BOUNDED
STORE INTERPOLATED POINTS
ICV = ICV + 1
RUNY(OLD) = RLOCLD*POINTX(IPT-1)
RUNY(MEM) = RLOCLD*POINTX(IPT1)
CURVX(ICV) = TRAIL(OBML, OBMIST, RUNY, 1, 2)
CURVY(ICV) = Y
GO TO 2005

APPENDIX 3

EPNL PROGRAM LISTING

C-2

```
C       EPNL                                                    7DM914 01 - 1T
C
C     (EFFECTIVE PERCIEVED NOISE LEVEL)
C
      LOGICAL *4  FIRST, LAST ,FIRST1 ,BOUND
      INTEGER *4   PAPER/06/, PORF/06/
      REAL *4  TOL/1.0E-04/
     1                              ,BLANK/'     '/ ,TITLE2(13)
     2    ,BAST(3)/'1   BASELINE'/, INPT(5)/'INPUT)                '/
     3    ,ATTT(3)/'0 ATTENUATED'/, CALT(5)/'CALCULATED)           '/
     4    ,DELT(3)/'0      DELTA'/,CALST(5)/'CALCULATED - SHRANK)'/
     5                            , TURB(5)/'TURBINE)              '/
     6    ,ATENM1(5)/0.0 ,5.0 ,10.0 ,20.0, 30.0/
      COMMON / AREA1 / SPL24(24,70,2),SPLREF(24,70,1)
      COMMON/AREA2/TITLE(40)
      COMMON / AREA3 / FREQ24(24),FLOG24(24),FREQ8(8),FLOG8(8),BWN(24)
      COMMON / AREA4 / MF(30),MN(10),ENGINE ,NI,NJ,NK,NII,CRV(400),MKT
      COMMON / AREA5 / PNL24(70,1),XNOY24(24),EPNL(4,2),PEAKPN (4),
     1                 OASPL(70,1),TCPNL(70,1) ,XNOYMX(70), MTCB(70)
      COMMON/AREA6/THRUST(4),THRUSI (6),OVHTIM(4),TIM(70),TIM2(70,3,1)
      COMMON /FOOTPT/ ICV, CURVX(100), CURVY(100), IPT, POINTX(250)
     1     ,POINTY(250), DBNL, DELX, DELY
      COMMON/GEOM1/H(3,4),V(3,4),HREL(3,4),TEMP(3,4),X(3,4),Y(3,4),  PI
     1      ,GAMM(2) ,ALPH(2), S(70,2), W(70,2) ,C(2)
      COMMON/GEOM2/THETA(70,3,1),ALPHA(70,3,1),DIRSL(70,3,1),
     1  DISTSL(70,3,1),AAC(25,2,4)
      COMMON/CONNOY/ABPS(24),BBPS(24),ALO(24),BLO(24),AM(24),BM(24)
      COMMON /HEVJE/  SPLEA(24,70,2) ,SPLJE(24,70), DAPS(70,2)
     1      ,SPLTU(24,70)
      COMMON  /HEVJT/  CAT(4) ,ATEN(24,4) ,ATATM(24,4) ,ATENM(4)
C
      DIMENSION CRVX(50),HH(32),XX1(32),FREQP(8),FREQC(8),NBAND(24)
C
    5 FORMAT(7F10.4/F8.4,I2)
   15 FORMAT(9F8.0)
   16 FORMAT (9F7.0)
   17 FORMAT(   F10.3,  12F5.2 / 10X,12F5.2)
   18 FORMAT(2F10.0, 13A4)
   20 FORMAT (18A4)
   25 FORMAT(3011,1012,F5.0 ,2F8.0)
   31 FORMAT(2X,18F4.0)
   35 FORMAT(1H1, 28H CONTROL CARD AND DATA INPUT //
     1  2X,3011,1012,F5.0  //  2X,18A4 / 2X,18A4 /
     2       2X, 7A4,F4.1, 4A4, F4.1, 3A4, F4.1, A4//)
   36 FORMAT(//// 96H          ALTITUDE  VELOCITY  HUMIDITY       TEMP  SID
     1EL INE    OFFSET     POWER    OVHTIM         NJ /
     2  7X,3F10.2,I10 / 7X,6F10.2  )
   41 FORMAT (2X,2I5,  3F10.2)
   42 FORMAT (//  15X, 'DELTA JET PRIMARY =', F4.1)
  100 FORMAT (18A4)
  101 FORMAT (1H1,36A4)
```

```
 105 FORMAT     (7A4,F4.1, 4A4, F4.1, 3A4, F4.1, A4)
 199 FORMAT (5X,18A4)
 200 FORMAT  (1H1,55X,22H S P L        I N P U T/)
2000 FORMAT(1H1,55X,36H S P L          T R A N S L A T E D /)
 210 FORMAT(1H , 3X,15H POWER LEVEL = ,F10.2, 2H   ,6X,11HALTITUDE = ,
    1  F10.2,6X,11HSIDELINE = ,F10.2 )
 219 FORMAT (1X,5HANGLE,24(1X,I3   ))
 220 FORMAT (3X,27F4.0)
 221 FORMAT(1H1)
 272 FORMAT (1X, 5F8.2 ,2F10.2, 4F8.2, I4)
 273 FORMAT (1X,/ '    TIME     TIME    THETA    ELEVA    DIRSL     DIST'
    1   ,T52, 'HEIGHT     PNL      OASPL    TCPNL  XNOYMX  TCBAND'/)
 280 FORMAT (  /1X,16H MAXIMUM TCPNL = , F10.2,
    1 1X,19HAPPROXIMATE EPNL = , F10.2,
    2 1X,19HINTEGRATION EPNL = , F10.2)
 511 FORMAT ('1BREAKDOWN  OF CONTROL CARD  E P N L  1',///,
    1  '      1 --- 1 = ONE HEADER CARD  ------------------ ', I1, / ,
    2  '      2 --- 1 = SECOND HEADER CARD  --------------- ', I1, / ,
    3  '      3 --- 0 = FIXED NOISE SOURCE  --------------- ', I1, / ,
    4  '      4 --- 0 = STANDARD (NON POLAR ANGLE) INPUT  - ', I1, / ,
    5  '      5 --- NOT USED  ---------------------------- ', I1, / ,
    6  '      6 --- 0 = SIDELINE INPUT  = 1 POLAR INPUT --- ', I1, / ,
    7  '      7 --- 4 = STANDARD (FORMAT 17) SPL INPUT  --- ', I1, / ,
    8  '      8 --- NOT USED  ---------------------------- ', I1, / ,
    9  '      9 --- 0 = USE TONE CORRECTION      ---------- ', I1, / ,
    X  '     10 --- 1=   APPLY SHIELDING EFFECT  ---------- ', I1, / /)
 512 FORMAT (
    1  '     11 --- 1 = PUNCHED OUTPUT  ------------------ ', I1, / ,
    5  '     12-15  ----- NOT USED  ---------------------- ', 4I1, / ,
    6  '     16 --- 1 = GENERATE ATT. TRADES INTERNALLY --- ', I1, / ,
    7  '     17 --- 1 = OMIT REL. JET VEL. CORRECTION  ---- ', I1, / ,
    8  '     18 --- 1 = READ UNIFORM JET - SUPP. CARD  ---- ', I1, / ,
    9  '     19 --- 1 = SHORT FORM OUTPUT  --------------- ', I1, / ,
    X  '     20 --- 1 = STANDARD  (LONG FORM)  OUTPUT  ---- ', I1, / /)
 513 FORMAT (
    1  '     21 --- 1 = JET CORE INPUT     ----------------', I1, / ,
    2  '     22 --- 1 = DEVELOP FOOTPRINT  ----------------', I1, / ,
    3  '     23 --- 1 = TIME PRINT  (GEOM SUB)  ----------', I1, / ,
    4  '     24 --- 1 =     DETERMINE DOPPLER EFFECTS  ---- ', I1, / ,
    5  '     25 --- 1 = FAN NOISE INPUT  ----------------- ', I1, / ,
    6  '     26 --- -1= OMIT JET SHIFT   ----------------- ', I1, / ,
    7  '     27 --- 1 = TURBINE NOISE INPUT  ------------- ', I1, / ,
    8  '     28 --- 0 = USE GROUND ATENUATION  ----------- ', I1, / ,
    9  '     29 --- 1 = USE JET, INLET, FWD DUCT ATTEN.---- ',  I1,  /,
    A  '     30 --- 1 = GRID GEN. FOR DEVELOPING EPNL CNTRS ', I1,   //)
 514 FORMAT (' 31-32 --- NO OF INPUT CASES  ------------- ', I2, / ,
    1  ' 33-34 --- NO OF POLAR ANGLES  ----------------- ', I2, / ,
    2  ' 35-36 --- 24 = 1/3 OCTAVE DATA  ---------------- ', I2, / ,
    3  ' 37-38 ---                       ---------------- ', I2, / ,
    4  ' 39-40 --- NO OF FLIGHT PROFILE SECTIONS   ------- ', I2, / ,
    5  ' 41-42 --- NO OF R.P.M. INPUTS  ----------------- ', I2, / ,
```

```
     6   ' 43-44 ---          ------------------------------ ',  I2,  /,
     7   ' 45-46 --- NO OF MODES SUMMED -------------------- ',  I2,  /,
     8   ' 47-48 --- NO OF GRIDLPOINTS  -------------------- ',  I2,  /,
     9   ' 49-50 --- NO OF ATTENUATIONS   ------------------ ', I2, / ,
     A   '    51 --- NO OF ENGINES  ------------------------ ', F5.1)
  522 FORMAT (// '   INLET   FANDUCT      JET      FPNL  SLANT D    VEL'
     1   '   REL HUM   TEMP  SIDLINE  OFFSET GAMMA  ALPHA  DURATION',
     2   '  D EPNL  SEQ'/)
  523 FORMAT (1X, 4F5.1, F8.3, 5F8.2, 2X, F8.1, F8.0, F6.2, F7.2
     1  ,2F9.2, I4)
  524 FORMAT (3A4, ' JET DATA (', 5A4, 5X, 13A4//' ANGLE', 24(1X,I3)/
     1    (3X,25F4.0))
  525 FORMAT (1X, 4F5.1, F8.3, 2F8.2, 30X, I5)
  526 FORMAT ('0')
C***  PREFERRED FULL OCTAVE
      DATA  FREQP
     1  / 63., 125., 250., 500., 1000., 2000., 4000., 8000. /
C***  COMMON FULL OCTAVE
      DATA  FREQC
     1  / 53., 106., 212., 424., 848., 1696., 3392., 6784.  /
C
C  **  **  **  **  **  **  **   **  **  **  ** *  * * *  * *  *  *  **
C
      DO 900 I=1,24
  900 FLOG24(I)=ALOG10(FREQ24(I))
C
   10 READ (5,25,END=9990)
     1            MF,MN,ENGINE ,THRUST(1) ,OVHTIM(1)
C              -      -       INITIALZIATION    -       -       -
      FIRST1 = .TRUE.
C              NJ IS THE NO. OF ANGLES,  NK IS THE NO. OF FREQ. BANDS
      NI=1
      NJ =MN(2)
      NK =MN(3)
      NSPRIN = MF(19)
      NLPRIN = MF(20)
      KKK = 1
      M9 = 1
      M10 = 1
      A3 = 0.0
      NCF=2
      IF (MF(25) .EQ. 1)  NCF=4
      DELJET = 0.0
      DO  582  NC=1,4
      ATENM(NC)=0.
      CAT(NC)=1.
      DO  582  NB=1,24
  582 ATEN (NB,NC)=0.0
C
                     READ(5,100) (TITLE(L),L=1,36)
      WRITE (PORF,511)     (MF(JGW), JGW=1,10)
```

```
      WRITE (PORF,512)      (MF(JGW), JGW=11,20)
      WRITE (PORF,513)      (MF(JGW), JGW=21,30)
      WRITE (PORF,514)      (MN(JGW), JGW= 1,10) ,ENGINE
      WRITE (PORF,35)
     1              MF,MN,ENGINE,(TITLE(L),L=1,25)
     2    ,ATENM(1),(TITLE(L),L=27,30),  ATENM(2),  (TITLE(L),L=32,34)
     3     ,A3, TITLE(36)
      I =1
      READ(5,15)H(1,I),V(1,I),HREL(1,I),TEMP(1,I),X(1,I),Y(1,I),
     1       GAMM(1) ,ALP1 ,VMJET
     2  ,H(2,I),V(2,I),HREL(2,I),TEMP(2,I),X(2,I),Y(2,I) ,GAMM(2) ,ALP2
     3     ,VMJET
      ALPH(1) = ALP1 + GAMM(1)
      C(1) = 49.02 * SQRT(TEMP(1,1) + 459.67)
      WRITE (PORF,36)
     1             H(1,I),V(1,I),HREL(1,I),TEMP(1,I),X(1,I),Y(1,I),
     2  THRUST(I),OVHTIM(I),NJ
     3  ,H(2,I),V(2,I),HREL(2,I),TEMP(2,I),X(2,I),Y(2,I)
      IF(MF(7).NE.4) GO TO 159
      DO 1159 J=1,NJ
      READ(5,17) THETA(J,1,I),(SPL24(K,J,KKK),K=1,NK)
 1159 DIRSL(J,1,1) = THETA(J,1,1)
       CALL WRITE (5,12, 1, 0, 1, 1, SPL24, DUMY)
  159 CONTINUE
        IF (MF(29) .NE. 1)                                  GO TO 360
      M10 = MN(10)
      READ (5,18)  A3 ,VJJET, TITLE2
          DO 110  NA = 1,NJ
  110 READ (5,17)  DUMMY          ,(SPLJE(NB,NA),NB=1,24)
      CARR = C.0
        IF (MF(3) .NE. 0)             CARR = 6.0206
          DO 480  NB=1,NK
          DO 480  NA=1,NJ
      SPLTU(NB,NA) = C.0
  480 SPLJE(NB,NA) = SPLJE(NB,NA) + CARR
       CALL WRITE (2, 7, 0, 0, 1, 1, SPLJE, DUMY)
          DO 155 NC = 1,NCF
  155 READ  (5,17)  CAT(NC), (ATEN(NB,NC),NB=1,24)
      READ (5,18)  A3 ,VJJET
          DO 508 NA =1,NJ
  508 READ (5,17)  DUM1 ,  (SPLREF(NB,NA,1),NB=1,24)
       CALL WRITE (2, 8, 1, 0, 1, 1, SPLREF,DUMY)
C
C   -   -  CHANGED FOR NASA LEWIS ONLY -    -     -     -     -    -
C
        IF (MF(18) .GT. 0)     READ (5,17)  DELJET
        IF (MF(25) .EQ. 0)                                  GO TO 352
          DO  109 NA =1,NJ
          DO  109 NB =1,24
        IF (SPL24(NB,NA,KKK) .GT. SPLREF(NB,NA,1))            GO TO 108
      WRITE (6,41)  NA,NB, SPL24(NB,NA,KKK),SPLREF(NB,NA,1)
```

```
      SPLREF(NB,NA,1)    = SPL24(NB,NA,KKK) -1.0
  108 CONTINUE
      SPL24(NB,NA,1)  = 10. * ALOG10(10.**(SPL24 (NB,NA,KKK)*.1)
     1                              -10.**(SPLREF(NB,NA,1)  *.1))
        IF (MF(21) .EQ. 1)
     1SPLJE(NB,NA)     = 10. * ALOG10(
     2                    10.**((SPLJE(NB,NA) - DELJET)     *.1)
     3                              +10.**(SPLREF(NB,NA,1)  *.1))
  109 SPLREF(NB,NA,1)  = 0.0
                                                        GO TO 350
C   -    -    -    -    -      T O   H E R E    -    -    -    -    -
  352 CALL  JSHIFT
  350  CALL WRITE (5, 1, 1, 0, 1, 1, SPL24 , DUMY)
       CALL WRITE (2, 9, 0, 0, 1, 1, SPLJE , DUMY)
      WRITE (6,42)  DELJET
        IF (MF(27) .EQ. 0)                              GO TO 360
      READ (5,18)  A4 ,VTJET
          DO 112 NA =1,NJ
  112 READ (5,17)  THETA(NA,1,I),  (SPLTU(NB,NA),NB=1,24)
       CALL WRITE (3, 1, 1, 0, 1, 1, SPLTU , DUMY)
  360 CONTINUE
          DO 165 J=1,NJ
       IF (ABS(THETA(J,I,1) - 90.0) .LT. TOL)   THETA(J,I,1) = 89.999
  165 CONTINUE
        IF (MF(30) .EQ. 1)       M9 = MN(9)
        IF (MF(20) .EQ. 1)                                GO TO 166
       WRITE (6,221)
       WRITE (6,522)
  166 CONTINUE
C   -    -    -    -    -    -    -    -    -    -    -    -
      NRO=5
          DO 450 IJL = 1,M9
C   -    -    -    -    -    -    -    -    -    -    -    -
      FIRST = .TRUE.
      LAST = .FALSE.
      IPT = 0
        IF (MF(30) .EQ. 1)     READ (5,15,END=9990)
     1               H(2,1), V(2,1), HREL(2,1), TEMP(2,1), X(2,1)
     2                  ,Y(2,1), GAMM(2), ALP2 ,VMJET
        IF (VMJET .EQ. 0.0)     VMJET = VJJET + V(2,1)
       ALPH(2) = ALP2 + GAMM(2)
       C(2) = 49.02 * SQRT (TEMP(2,1) + 459.67)
      ASSIGN 5010 TO LEAP
                                                        GO TO 5090
C**   -     -     -      FOOT PRINT LOOP              -*   -*   *-   *-   *-   **
 5010 READ (5,15)  DBNL, DELX, DELY, Y(2,1)
 5577 FORMAT ('0$$M$$  ', 8G15.7)
      WRITE(6,5577)DBNL, DELX, DELY, Y(2,1)
      ASSIGN 5020 TO LEAP
                                                        GO TO 5090
 5020 CALL BOUNDY (DBTEST, X(2,1), Y(2,1), +5025, +5035)
```

```
 5025 ASSIGN 5C2C TO LEAP
                                                        GO TO 5090
 5030 CALL BOUNDX (DBTEST, X(2,1), Y(2,1), *5033, *5035)
 5033 BOUND = .FALSE.
                                                        GO TO 5040
 5035 BOUND = .TRUE.
 5040 ASSIGN 5C3C TO LEAP
 5080  IF (LAST .AND. BOUND)                          GO TO 4020
 5090 CALL GEOM (LAST)
        IF (MF(29) .EQ. 0)                               GO TO 509
      CALL JETHFV  (VJJET ,VMJET)
CD    CALL WRITE (2 ,9, 1, 0, 2, 1, SPLJE, DUMY)
C**
C**                LOBE SEPERATION LOOP          **  ***   **  **  **  **
  509 CONTINUE
      NR5 = 0
        IF (MF(16) .EQ. 1)     M10 = 1
           DO 4CC IJK =1,M10
        IF (MF(29) .EQ. 0)                               GO TO 510
        IF (MF(16) .EQ. 1)                               GO TO 515
      READ (5,15)  (ATENM(L),L=1,4)
      NRO = 1
  515 CONTINUE
           DO 4CC NR4 =1,NRO
      ATENM(4) = ATENM1(NR4)
           DO 4CC NR3 =1,NRO
      WRITE (6,526)
      ATENM(3) = ATENM1(NR3)
           DO 4CC NR2 =1,NRO
      ATENM(2) = ATENM1(NR2)
           DO 4CC NR1 =1,NRO
      ATENM(1) = ATENM1(NR1)
      NR5 = NR5 + 1
      CALL LOBESE
CD    CALL WRITE (1 ,9, 0, 0, 2, 1, SPL24, DUMY)
  510 CALL TRANPO
CD    CALL WRITE (1 ,10,1, 0, 2, 1, SPLREF,DUMY)
      CALL ROTATE(2,1,SPLREF,DIRSL)
CD    CALL WRITE (1 ,10,0, 0, 2, 1, SPLREF,DUMY)
                    CALL NOYFIT(SPLREF)
                 CALL EPNLTI(SPLREF,V(2,1),2, DTIME)
        IF (NR5 .EQ. 1)      EPNLF = EPNL(I,2)
      DEPNL = C.0
        IF (MF(29) .EQ. 1)      DEPNL = EPNLF - EPNL(I,2)
        IF (MF(20) .EQ. 1)    CALL WRITE (1, 10, 1, 1, 2, 1, SPLREF,0)
        IF (NLPRIN .EQ.1)   WRITE (PORF,522)
      SLD= SQRT(H(2,1)**2+ X(2,1)**2)
           WRITE (PORF,523) ATENM(1),ATENM(3),ATENM(2),ATENM(4),A3
     1   ,EPNL(I,2),   SLD    , V(2,1), HREL(2,1), TEMP(2,1), X(2,1),
     2      Y(2,1), GAMM(2), ALP2 ,DTIME ,DEPNL , NR5
        IF (MF(11) .EQ. 1)
```

```
     1         WRITE (7   ,525) ATENM(1),ATENM(3),ATENM(2),ATENM(4),A3
     2   ,EPNL(I,2),  DEPNL                                          ,NR5
CF                      WRITE (PAPER,523)   ATENM(1), ATENM(2), A3,
CF   1    EPNL(I,2),  H(2,1), V(2,1), HREL(2,1), TEMP(2,1), X(2,1),
CF   2      Y(2,1), GAMM(2), ALP2 ,DTIME ,DEPNL
  400 CONTINUE
        IF (MN(10).EQ.1 .AND. MN(9).GT.1)      MF(29) = 0
C**    -    -      FOOTPRINT LOGIC     -     -     -     -          -
        IF (MF(22) .EQ. 0)                            GO TO 450
       IPT = IPT + 1
       POINTX(IPT) = X(2,1)
       POINTY(IPT) = Y(2,1)
       DBTEST = EPNL(I,2)
                               GO TO LEAP,(5010, 5020, 5030)
C
 4020 CONTINUE
C4020 CALL PLOTFP (POINTX, POINTY, IPT, FIRST1, CURVX, CURVY, ICV)
       FIRST1 = .FALSE.
  450 CONTINUE
  213 CONTINUE
       GO TO 10
 9990 STOP
       END
```

```
      SUBROUTINE WRITE (II,JJ,K,L,M,N,SPL24 ,TITLE )
C                                                          ZDM914 23 - 23
C     II            TITLE 1 SUBSCRIPT
C     JJ            TITLE 2 SUBSCRIPT
C     K             = 1   SKIP PAGE
C     L             = 0   SPL ARRAY ONLY
C                   = 1   COMPLETE OUTPUT
C     M             = 1   INPUT CONDITIONS
C                   = 2   TRANSLATED CONDITIONS
C     N             VALUE OF THE THIRD SUBSCRIPT ON ALL 3-D ARRAYS
C     SPL24         SPL ARRAY
C     TITLE         USED IN EPNL 2
      COMMON / AREA4 / MF(30),MN(10),ENGINE ,NI,NJ,NK,NII,CRV(400),MKT
      COMMON / AREA5 / PNL24(70,1),XNOY24(24),EPNL(4,2),PEAKPN (4),
     1                 OASPL(70,1),TCPNL(70,1) ,XNOYMX(70), MTCB(70)
      COMMON/AREA6/THRUST(4),THRUSI (6),OVHTIM(4),TIM(70),TIM2(70,3,1)
      COMMON/GEOM1/H(3,4),V(3,4),HREL(3,4),TEMP(3,4),X(3,4),Y(3,4),  PI
     1      ,GAMM(2) ,ALPH(2), S(70,2), W(70,2) ,C(2)
      COMMON/GEOM2/THETA(70,3,1),ALPHA(70,3,1),DIRSL(70,3,1),
     1  DISTSL(70,3,1),AAC(25,2,4)
      COMMON /HFVJE/  SPLFA(24,70,2) ,SPLJE(24,70), OAPS(70,2)
     1      ,SPLTU(24,70)
      DIMENSION         SPL24(24,17,1)
      DIMENSION         TITL1(8),TITL2(13), TITLE(18,3)
      DATA    TITL1     /'ENG.','JET ','TURB','    ', 'FAN ','JET2',
     1     '    ', '    ' /
     2      ,TITL2     /'BASE','ATT.','CORR','    ','FWD ','AFT ','PRIM'
     3    ,'SEC ', 'TOT ','TRAN','(DA)','JET2','    '/
   45 FORMAT ( 1X,18A4)
  195 FORMAT ('1')
  200 FORMAT (/55X,A4,10X,A4/)
  219 FORMAT (5X'ANGLE'2X,(24(1X,I2,1X) ) /)
  220 FORMAT (5X,F6.2,1X,24F4.0)
  272 FORMAT (1X,5F8.2,2F10.2,4F8.2,I4)
  273 FORMAT ( /5X     ' TIME     TIME    THETA    ELEVA    DIRSL     DIST'
     1 4X'HEIGHT     PNL     OASPL    TCPNL     NOYMAX  NB'/)
C    -     -     -     -     -     -     -     -     -     -
      IF (K.EQ.1) WRITE (6,195)
      IF (MF(2).EQ.0) WRITE(6,45) (TITLE (LL,N),LL=1,18)
      WRITE (6,200) TITL1(II),TITL2(JJ)
      WRITE(6,219) (NB,NB=1,NK)
      DO 250 NA=NI,NJ
  250 WRITE (6,220) DIRSL(NA,M,1),(SPL24 (NB,NA,N ),NB=1,NK)
      IF (L.EQ.0) RETURN
      WRITE (6,273)
      DO 300 NA=NI,NJ
  300 WRITE (6,272) TIM(NA),TIM2(NA,M,1),THETA(NA,M,1),ALPHA(NA,M,1),
     1  DIRSL(NA,M,1),DISTSL(NA,M,1),S(NA,M),PNL24(NA,1),
     2  OASPL(NA,1),TCPNL(NA,1),XNOYMX(NA), MTCB(NA)
      RETURN
      END
```

```
      SUBROUTINE GEOM (LAST)
C                                                          ZDM914 02 - 2T
      LOGICAL *4  LAST
      REAL * 4    BIG/1.0E+50/
      COMMON / AREA4 / MF(30),MN(10),ENGINE ,NI,NJ,NK,NII,CRV(400),MKT
      COMMON/AREA6/THRUST(4),THRUSI (6),OVHTIM(4),TIM(70),TIM2(70,3,1)
      COMMON/GEOM1/H(3,4),V(3,4),HREL(3,4),TEMP(3,4),X(3,4),Y(3,4),  PI
     1     ,GAMM(2), ALPH(2), S(70,2), W(70,2) ,C(2)
      COMMON/GEOM2/THETA(70,3,1),ALPHA(70,3,1),DIRSL(70,3,1),
     1  DISTSL(70,3,1),AAC(25,2,4)
      COMMON / GEOM7 / PSI(70)
      DIMENSION CRVX(50) ,P(3,4)
C     S (NA, 1 )   TRANSLATED  HEIGHT
C     S (NA, 2 )   REAL        HEIGHT
   63 FORMAT (///10X'***  X(2,1) TOO LARGE  S('I3,',1) IS NEG',2X,F15.5
     1    // 10X,8F12.5///)
      PI180=180./PI
      NJ=MN(2)
      DO  130 NA=1,NJ
      DO   13C  L=1,2
      S(NA,L)=H(L,1)
      DISTSL(NA,L,1)=H(L,1)
      DIRSL(NA,L,1)=THETA(NA,1,1)
      ALPHA(NA,L,1)=0.
  130 TIM2(NA,L,1)=0.
      DO  140 L=1,2
  140 C(L)=49.02*SQRT(TEMP(L,1)+459.6)
      L=2
      C9R=GAMM(L)/PI180
      C8R=C9R
      IF (C9R.EQ.0.) GO TO 180
      YCRIT=((H(1,1)/COS(C9R))-H(2,1))/TAN(C9R)
      IF (C9R.GT.0. AND.Y(2,1).LT.YCRIT) Y(2,1)=YCRIT
      IF (C9R.LT.0. AND.Y(2,1).GT.YCRIT) Y(2,1)=YCRIT
  180 CONTINUE
      XL=0.
      Z =0.
      H1=H(L,1)+Y(L,1)*TAN(C9R)
      Y1=H1
      H2=H(L,1)+(Y(L,1)+1000.)*TAN(C9R)
      HDD=H1
      IF(ABS(X(L,1)).LT.1.) GO TO 190
      XL=1000./COS(C9R)
      Z=SQRT(X(L,1)*X(L,1)+H2*H2+1000000.)
      HDD=SQRT(H1*H1+X(2,1)*X(2,1))
      Y1=HDD
      C8R=ARCOS((HDD*HDD+XL*XL-Z*Z)/(2.*HDD*XL))-PI/2.
      NI=0
      TEN=10.
      OST=170.
  182 CONTINUE
```

```
      NI=NI+1
      TPI=TEN/PI180
      IF(C8R.GT.C.) GO TO 185
      TPI=OST/PI180
      NI=1
      NJ=NJ-1
  185 CONTINUE
      STEMP=H1-HDD*TAN(C9R)/(TAN(TPI)+TAN(C8R))
      IF(STEMP.GT.0.) GO TO 190
      TPD=TPI*PI180
      WRITE (6,63)  NA,STEMP,C9R,C8R,TPD,HDD,H(2,1)
      TEN=TEN+10.
      OST=OST-10.
      GO TO 182
  190 CONTINUE
      DO  200  NA=NI,NJ
      C2R=DIRSL(NA,2,1)/PI180
      S(NA,1)=Y1*TAN(C2R)/(TAN(C2R)+TAN(C8R))
      DISTSL(NA,2,1)=S(NA,1)/SIN(C2R)
      XREF=-S(NA,1)/TAN(C2R)
      S(NA,2)=XREF*TAN(C9R)+H1
      APR= ALPH(L)/PI180
      PSI(NA)=ARCOS((-XREF*COS(APR)-S(NA,2)*SIN(APR))/DISTSL(NA,L,1))
     1     *PI180
      DELT=DISTSL(NA,L,1)/C(L)
      C7=S(NA,1)+V(L,1)*DELT*SIN(C8R)
      CT=         -V(L,1)*DELT*COS(C8R)
      IF (DIRSL(NA,L,1).NE.90.)  CT=CT+S(NA,1)/TAN(C2R)
      THETA(NA,L,1)=90.
      IF (CT.NE.0.) THETA(NA,L,1)=ATAN(C7/CT)*PI180
      IF(THETA(NA,L,1).LT.0.)  THETA(NA,L,1)=180.+THETA(NA,L,1)
      C12=0.
      IF (THETA(NA,L,1).NE.90.) C12=TAN(THETA(NA,L,1)/PI180)
      STHET=HCD*TAN(C12)/(TAN(C12)+TAN(C8R))
      IF (C12.NE.0.AND.V(L,1).NE.0.) TIM2(NA,L,1)=-STHET /C12/V(L,1)
      IF (V(L,1).NE.0.)ALPHA(NA,L,1)=ARSIN(S(NA,2)/DISTSL(NA,L,1))*PI180
  200 CONTINUE
      RETURN
      END
```

```
      SUBROUTINE TRANPO
C                                                              ZDM914 06 - 3T
      COMMON / AREA1 / SPL24(24,70,2),SPLREF(24,70,1)
      COMMON / AREA3 / FREQ24(24),FLOG24(24),FREQ8(8),FLOG8(8),BWN(24)
      COMMON / AREA4 / MF(30),MN(10),ENGINE ,NI,NJ,NK,NII,CRV(400),MKT
      COMMON/GEOM1/H(3,4),V(3,4),HREL(3,4),TEMP(3,4),X(3,4),Y(3,4),  PI
     1      ,GAMM(2), ALPH(2), S(70,2), W(70,2) ,C(2)
      COMMON/GEOM2/THETA(70,3,1),ALPHA(70,3,1),DIRSL(70,3,1),
     1  DISTSL(70,3,1),AAC(25,2,4)
      DIMENSION CRVX(50),FREQX(24),FLOGX(24)
      DIMENSION ATT1(24),ATT2(24)
  241 FORMAT(/, 3X,4HH = ,F12.2,4HV = ,F12.2,7HHREL = ,F12.2,7HTEMP = ,
     1  F12.2,4HX = ,F12.2,4HY = ,F12.2)
  242 FORMAT(3X,21HABSORPTION CORRECTORS )
  243 FORMAT(3X,4(I3,1H=,G15.6,3X))
C   *   *   *   *   *   *   *   *   *   *   *   *       *   *   *   *   *   *
      I=1
      NNB=3
CALCULATE ATMOSPHERIC ATTENUATION
      DO 100 L=1,2
C**         TEST TO AVOID ARSIN .GT. 1.0
      DO  50 J=NI,NJ
        IF (S(J,L) .GT. DISTSL(J,L,I))     S(J,L) = DISTSL(J,L,I) -.0001
   50 CONTINUE
      CALL ATABC(NNB,TEMP(L,I),HREL(L,I),AAC(1,L,I))
      IF(MF(23).EQ.0) GO TO 100
      WRITE(6,241) H(L,I),V(L,I),HREL(L,I),TEMP(L,I),X(L,I),Y(L,I)
      WRITE(6,242)
      DO 861 M=1,6
      M2=M+6
      M3=M+12
      M4=M+18
  861 WRITE(6,243) M,AAC(M,L,I),M2,AAC(M2,L,I),M3,AAC(M3,L,I),M4,
     1  AAC(M4,L,I)
  100 CONTINUE
    6 FORMAT (/12F9.3)
CD     WRITE (6,6)  AAC
      DO 498 L=1,24
      ATT1(L)=0.
      ATT2(L)=0.
  498 CONTINUE
      DO 501 K=1,NK
      FREQX(K)=FREQ24(K)
  501 FLOGX(K)=FLOG24(K)
      CONST=6.2
            I=1
      DO 800 J=NI,NJ
C               EGA - EXTRA GROUND ATTENUATION
      IF(MF(28).GT.2) GO TO 1602
      IF(MF(28).NE.1) CALL EGA1(DISTSL(J,1,I),FREQX,ALPHA(J,1,I)
     1    ,NK, ATT1)
```

```
      IF(MF(28).NE.2) CALL EGA1(DISTSL(J,2,I),FREQX,ALPHA(J,2,I)
     1    ,NK, ATT2)
 1602 CONTINUE
CD       WRITE (6,6) ATT1
CD       WRITE (6,6) ATT2
         IF (MF(24) .EQ. 0)                              GO TO 630
C                    TRANSPOSE SPL VALUES
C                 REMOVE DOPPLER SHIFT AND CORRECT FOR BAND WIDTH
      DOP=1.-V(1,I)*COS(DIRSL(J,1,I)/180.*PI)/C(1)
      DOPLOG=10.*ALOG10(DOP)
      DO 601 K=1,NK
      CRV    (K)     =SPL24(K,J,I)-10.*FLOGX(K)+CONST - DOPLOG
  601 CRVX(K)=ALOG10(DOP*FREQX(K))
      DO 602 K=1,NK
  602 SPLREF(K,J,I) = TBLU1(FLOG24(K), CRVX, CRV, 1, 24)
CD     CALL WRITE ( 1, 7, 1, 0, 2, 1, SPLREF,  DOP)
      DISTAN=S(J,2)
      IF (MF(10).EQ.1)  DISTAN=SQRT(S(J,2)*S(J,2)+X(2,1)*X(2,1))
      ENGIDB=(1.+SQRT(SIN(S(J,2)/DISTAN)))*5.*ALOG10(ENGINE)
      DO 603 K=1,NK
      SPLREF(K,J,I)=SPLREF(K,J,I)+20.*ALOG10(DISTSL(J,1,I)/DISTSL(J,2,I)
     1  )+DISTSL(J,1,I)*AAC(K,1,I)/1000.-DISTSL(J,2,I)*AAC(K,2,I)/1000.
     2  +ENGIDB    +ATT1(K)-ATT2(K)
  603 CONTINUE
CD     CALL WRITE ( 1, 8, 0, 0, 2, 1, SPLREF,  DOP)
C                ADD DOPPLER SHIFT AND CORRECT FOR BAND WIDTH
      DOP=1.-V(2,I)*COS(DIRSL(J,2,I)/180.*PI)/C(2)
      DOPLOG=10.*ALOG10(DOP)
      DO 600 K=1,NK
      CRV(K) = SPLREF(K,J,1)
  600 CRVX(K)=ALOG10(FREQX(K)/DOP)
      DO 650 K=1,NK
  650 SPLREF(K,J,I) = TBLU1 (CRVX(K), FLOG24, CRV, 1, 24)
CD     CALL WRITE ( 1, 7, 1, 0, 2, 1, SPLREF,  DOP)
      DO 651 K=1,NK
  651 SPLREF(K,J,I)=SPLREF(K,J,I)+10.*FLOGX(K)-CONST + DOPLOG
CD     CALL WRITE ( 1, 8, 0, 0, 2, 1, SPLREF,  DOP)
                                                        GO TO 800
  630 CONTINUE
      DISTAN=S(J,2)
      IF (MF(10).EQ.1)  DISTAN=SQRT(S(J,2)*S(J,2)+X(2,1)*X(2,1))
      ENGIDB=(1.+SQRT(SIN(S(J,2)/DISTAN)))*5.*ALOG10(ENGINE)
      DO 700 K=1,NK
      SPLREF(K,J,I)=SPL24(K,J,I)+20.*ALOG10(DISTSL(J,1,I)/DISTSL(J,2,I))
     1  +DISTSL(J,1,I)*AAC(K,1,I)/1000.-DISTSL(J,2,I)*AAC(K,2,I)/1000.
     2  +ENGIDB    +ATT1(K)-ATT2(K)
  700 CONTINUE
  800 CONTINUE
      RETURN
      END
```

```
      SUBROUTINE ROTATE (L,KKK,SPL24,THETA)
C                                                          ZDM914 23 - JT
      REAL *4 SPL24(24,70,2), THETA(70,3,1)
      COMMON / AREA4 / MF(30),MN(10),ENGINE,NI,NJ,NK,NII,CRV(400),MKT
      COMMON /GEOM1/  H(3,4),V(3,4), HREL(3,4), TEMP(3,4), X(3,4),
     1             Y(3,4), PI, GAMM(2), ALPH(2), S(70,2), W(70,2), C(2)
      COMMON / GEOM7 / PSI(70)
C     *     *     *     *     *     *     *     *     *     *     *     *     *     *
          DO 120 NB= 1,NK
          DO 110 NA=NI,NJ
  110 CRV(NA) = SPL24(NB,NA,KKK)
          DO 120 NA= NI,NJ
      AN=PSI(NA)
  120 SPL24(NB,NA,KKK) = TBLU1(AN,THETA(1,L,1), CRV, 1, NJ)
      RETURN
      END
```

```
      SUBROUTINE NOYFIT(SPLNOY)
C                                                                  ZDM914 05 - 3T
      COMMON / AREA4 / MF(30),MN(10),ENGINE ,NI,NJ,NK,NII,CRV(400),MKT
      COMMON / AREA5 / PNL24(70,1),XNOY24(24),EPNL(4,2),PEAKPN (4),
     1                 OASPL(70,1),TCPNL(70,1), XNOYMX(70), MTCB(70)
      COMMON/CCNNOY/ABPS(24),BBPS(24),ALO(24),BLO(24),AM(24),BM(24)
      DIMENSION SPLNOY(24,70,1)
      CONST=0.15
      I = 1
      DO 960 J=NI,NJ
      DO 900 K=1,NK
      KK=K
      XNOY24(K)=0.
      IF(ABPS(KK).NE.C..AND.SPLNOY(K,J,I).GT.0.)
     1  XNOY24(K)=SPLNOY(K,J,I)/ABPS(KK)
      IF(SPLNOY(K,J,I).LT.ABPS(KK)) GO TO 900
      XNOY24(K)=10.**(AM(KK)*(SPLNOY(K,J,I)-ALO(KK)))
      IF(SPLNOY(K,J,I).GT.BBPS(KK))
     1  XNOY24(K)=10.**(BM(KK)*(SPLNOY(K,J,I)-BLO(KK)))
  900 CONTINUE
      XMAX=0.
      XSUM=0.
      DO 950 K=1,NK
      XSUM=XSUM+XNOY24(K)
      IF(XNOY24(K).GT.XMAX) XMAX=XNOY24(K)
  950 CONTINUE
      XNOYTL=XMAX+CONST*(XSUM-XMAX)
      XNOYMX(J) = XNOYTL
      PNL24(J,I)=40.
      IF(XNOYTL.GT.1.) PNL24(J,I)=ALOG10(XNOYTL)/.030103+40.
      OASPL(J,I)=OAFUNC(SPLNOY(1,J,I))
  960 CONTINUE
      RETURN
      END
```

```
      SUBROUTINE EPNLTI(SPLEPN ,VEL,L ,DTIME)
C                                                          ZDM914 03 - 03
      COMMON / AREA1 / SPL24(24,70,2),SPLREF(24,70,1)
      COMMON / AREA3 / FREQ24(24),FLOG24(24),FREQ8(8),FLOG8(8),BWN(24)
      COMMON / AREA4 / MF(30),MN(10),ENGINE ,NI,NJ,NK,NII,CRV(400),MKT
      COMMON / AREA5 / PNL24(70,1),XNOY24(24),EPNL(4,2),PEAKPN (4),
     1                 OASPL(70,1),TCPNL(70,1) ,XNOYMX(70), MTCB(70)
      COMMON/AREA6/THRUST(4),THRUSI (6),OVHTIM(4),TIM(70),TIM2(70,3,1)
      COMMON/GEOM1/H(3,4),V(3,4),HREL(3,4),TEMP(3,4),X(3,4),Y(3,4),  PI
     1     ,GAMM(2) ,ALPH(2) ,S(70,2) ,W(70,2) ,C(2)
      COMMON/GEOM2/THETA(70,3,1),ALPHA(70,3,1),DIRSL(70,3,1),
     1  DISTSL(70,3,1),AAC(25,2,4)
      DIMENSION SPLEPN (24,60,1)
      I = 1
      EPNL(1,1) = 0.0
      EPNL(1,2) = 0.0
          DO  833 NB=1,24
      DO 833 NA=NI,NJ
        IF(SPLEPN(NB,NA,1) .LT. 0.0)  SPLEPN(NB,NA,1) = 0.0
  833 CONTINUE
      DO 900 J=NI,NJ
      TCPNL(J,I)=PNL24(J,I)
      MTCB(J) = 1
        IF (MF(9) .NE. 0)                                  GO TO 900
      TCPNL(J,I)=PNL24(J,I)+FMTONE(SPLEPN (1,J,I), NTCB)
      MTCB(J) = NTCB
  900 CONTINUE
      IF(VEL.EQ.0.) GO TO 1000
      M=1
      DM=M*10.
      DM1=M
      XNI=90.
      XNI=0.
      XHUN=XNI+DM
      PNLMAX=0.
      DO 161 J=NI,NJ
      IF(TCPNL(J,I).LT.PNLMAX) GO TO 161
      PNLMAX=TCPNL(J,I)
      JMAX = J
      PEAKPN(I) = PNLMAX
  161 CONTINUE
        IF (PNLMAX .LE. XNI)                                RETURN
        IF (PNLMAX .LE. XHUN)      DM = PNLMAX - XNI
      PM = PNLMAX - DM
        IF (TCPNL(1,I) .GT. PM  .OR.  TCPNL(NJ,I).GT.PM)    RETURN
      DO 162 J=1,JMAX
      JL=J
      IF(TCPNL(JL+1,I) .GE. PM  .AND.  TCPNL(JL+1,I) .GE. XNI)  GOTO163
  162 CONTINUE
      GO TO 164
  163 CONTINUE
```

```
      DO 165 J=JMAX,NJ
      JT = NJ -J + JMAX
      IF(TCPNL(JT-1,I) .GE. PM  .AND.  TCPNL(JT-1,I) .GE. XNI)  GOTO166
  165 CONTINUE
      GO TO 164
  166 CONTINUE
      TL=(PNLMAX-DM-TCPNL(JL,I))/(TCPNL(JL+1,I)-TCPNL(JL,I))
     1  *(TIM2(JL+1,L,I)-TIM2(JL,L,I))+TIM2(JL,L,I)
      TT=TIM2(JT,L,I)-(PNLMAX-DM-TCPNL(JT,I))/(TCPNL(JT-1,I)-
     1  TCPNL(JT,I))*(TIM2(JT,L,I)-TIM2(JT-1,L,I))
      DTIME = TT - TL
      EPNL(I,M)=PNLMAX+10.*ALOG10((TT-TL)/DM1/15.)
      SUM=0.
      SUM=.5*(10.**((PNLMAX-DM)/10.)+10.**(TCPNL(JL+1,I)/10.))*
     1  (TIM2(JL+1,L,I)-TL)+.5*(10.**((PNLMAX-DM)/10.)+
     2  10.**(TCPNL(JT-1 ,I)/10.))*(TT-TIM2(JT-1,L,I))
      NL=JL+1
      NT=JT-2
      DO 171 N=NL,NT
  171 SUM=SUM+.5*(10.**(TCPNL(N,I)/10.)+10.**(TCPNL(N+1,I)/10.))*
     1  (TIM2(N+1,L,I)-TIM2(N,L,I))
      EPNL(I,2)=10.*ALOG10(SUM/10.)
      GO TO 160
  164 EPNL(I,M)=-1000.
      EPNL(I,2)=-1000.
  160 CONTINUE
 1000 RETURN
      END
```

```
      SUBROUTINE JSHIFT
C                                                          ZDM914 24 - KT
      COMMON / AREA1 / SPL24(24,70,2),SPLREF(24,70,1)
      COMMON / AREA4 / MF(30),MN(10),ENGINE ,NI,NJ,NK,NII,CRV(400),MKT
      COMMON / HFVJE / SPLFA(24,70,2),SPLJE(24,70),OASP(70,2)
     1      ,SPLTU(24,70)
      REAL *4  ACC(25), CRVX(25) ,SPLRO(24,70)
     1   ,SHRANK(24) /17., 16.8, 16.5, 16., 15.0, 14.5, 14.0, 13.5,12.5,
     2   12., 11.5, 11., 10., 9., 8., 6., 4., 1., 0., .5, 1.5, 3., 5.,
     3        7./
      EQUIVALENCE (SPLREF(1,1,1), SPLRO(1,1))
C   *      *   *   *   *   *   *   *   *   *   *   *   *      *   *   *
      KKK = 1
      N1 = 19
      MN8 = 15
      NO2 = MN8 + 1
        IF (MF(26) .EQ. 1)                                  GO TO 400
      CALL  JETSMO (SPLJE)
      CALL  JETSMO (SPLRO)
  400     DO  508  NB = 1,24
      DO 508 NA=NI,NJ
      SPLREF (NB,NA,1) = SPLJE(NB,NA) - SPLREF(NB,NA,1)
        IF (SPLJE(NB,NA) .GE. SPL24(NB,NA,KKK))   SPLJE(NB,NA) =
     1          SPL24(NB,NA,KKK) - 1.0
  508 CONTINUE
        IF (MF(26) .EQ. 1)        RETURN
      DO 485 NA=NI,NJ
      SAV1 = SPLJE(MN8,NA)
          DO  518  NB =1,MN8
      SPLJE(NB,NA) = SPL24(N1,NA,KKK) - SHRANK(NB)
        IF (SPL24(NB,NA,KKK) .LE. SPLJE(NB,NA))
     1     SPLJE(NB,NA)= SPL24(NB,NA,KKK) - 4.0
  518 SPLJE(NB,NA) = 10. * ALOG10(10.**(SPL24(NB,NA,KKK)* .1)
     1                          -10.**(SPLJE(NB,NA)     * .1))
      SAV1 = SPLJE(MN8,NA) - SAV1
          DO  485  NB = NO2,24
      SPLJE(NB,NA) = SPLJE(NB,NA) + SAV1
        IF (SPLJE(NB,NA) .LE. SPL24(NB,NA,KKK))            GO TO 485
      SAV1 = SPL24(NB,NA,KKK) - .05 - (SPLJE(NB,NA) - SAV1)
      SPLJE(NB,NA) = SPL24(NB,NA,KKK) - .05
  485 CONTINUE
      RETURN
      END
```

```
      SUBROUTINE JETSMO (SPLJE)
C                                                          ZDM914 25 - KT
      COMMON / AREA4 / MF(30),MN(10),ENGINE,NI,NJJ(1),NK,NII,CRV(400)
     1,MKT
      REAL *4   AC(25), CRVX(25) ,SPLJE(24,70)
      EQUIVALENCE                                    (NJ,NJJ(1))
C   *      *   *   *   *   *   *   *   *   *   *   *   *      *   *   *
      DO 100 NA=NI,NJ
      N = 0
          DO  50 J=2,23,3
      N = N + 1
      CRVX(N) = J
      AC(N) = SPLJE(J,NA)
   50 CONTINUE
          DO 100 NB =1,24
      XB = NB
      SPLJE(NB,NA) = TBLU1(XB, CRVX, AC, 1, N)
  100 CONTINUE
      RETURN
      END
```

```
      SUBROUTINE JETHFV (VJJET,VMJET)
C                                                          ZDM914 22 - KT
      REAL *4  AC(25), CRVX(25)
      COMMON / AREA1 / SPL24(24,70,2),SPLREF(24,70,1)
      COMMON /AREA3/  FREQ24(24), FLOG24(24), FREQ8(8), FLOG8(8),BWN(24)
      COMMON / AREA4 / MF(30),MN(10),ENGINE ,NI,NJ,NK,NII,CRV(400),MKT
      COMMON /GEOM1/   H(3,4), V(3,4), HREL(3,4), TEMP(3,4), X(3,4)
     1    ,Y(3,4), PI, GAMM(2), ALPH(2), S(70,2), W(70,2), C(2)
      COMMON / GEOM2 / THETA(70,3,1),ALPHA(70,3,1),DIRSL(70,3,1),
     1  DISTSL(70,3,1),AAC(25,2,4)
      COMMON / HFVJE / SPLFA(24,70,2),SPLJE(24,70),OASP(70,2)
     1     ,SPLTU(24,70)
      DIMENSION         DE DB(17)   ,THE(17)
      DATA  DE DB/-4., -3.52288, -3. ,-2.52288, -2. ,-1.52288, -.39794,
     1 -.22185, .47712, -.22185, -.39794, -1.52288, -2.0, -2.52288
     2  ,-3., -3.52288, -4./
     3       ,THE/10., 20., 30., 40., 50., 60., 70., 80., 90., 100.,
     4       110., 120., 130., 140., 150., 160., 170./
      DO 200 NA=NI,NJ
  200 IF (DIRSL(NA,1,1).GE.88.AND.DIRSL(NA,1,1).LE.92.)  NJ90=NA
      K=1
      L=2
      DO 205 NA=NI,NJ
      DDDB = 10.0 ** (TBLU1(DIRSL(NA,1,1) ,THE ,DEDB ,1 ,17))
      IF (NA.LE.NJ90)  GO TO 210
      K=2
      L=1
  210 DO  205  NB=1,NK
        IF (MF(25) .EQ. 1)                                  GO TO 203
      IF (SPLJE(NB,NA).GE.SPL24(NB,NA,1)) SPL24(NB,NA,1)=SPLJE(NB,NA)+.5
      SPL24(NB,NA,1)=10.*ALOG10(10.**(SPL24(NB,NA,1)/10.)
     1                          -10.**(SPLJE(NB,NA  )/10.)
     2                          -10.**(SPLTU(NB,NA  )/10.))
  203 SPLFA(NB,NA,K)=SPL24(NB,NA,1)-DDDB
  205 SPLFA(NB,NA,L)=10.*ALOG10(10.**(SPL24(NB,NA,1)/10.)
     1                          -10.**(SPLFA(NB,NA,K)/10.))
      DO  350   N=1,2
      DO 310 J=NI,NJ
CC      WRITE (6,5577)   J, N, (SPLFA(I,J,N),I=1,24)
  310 OASP (J,N)= OAFUNC(SPLFA(1,J,N))
C5577 FORMAT ('0SJETS'/ (5X,7G15.5))
C          FIND THE MAX OF OASP
      OAPM=0.
      DO 320 J=NI,NJ
  320 IF (OASP(J,N).GT.OAPM)  OAPM=OASP(J,N)
      DO 330 J=NI,NJ
C   -   -   -     NASA-LEWIS CHANGE      1-11-71   -    -    -    -    -
CN330 OASP (J,N)=OASP (J,N)/OAPM
  330 OASP (J,N)=1.0
C   -   -   --   -   -   -       T O   H E R E   -   -   -       -
  350 CONTINUE
```

```
      DO 390 NA=NI,NJ
          DO 390  NB = 1,24
  390 SPLJE(NB,NA) = SPLJE(NB,NA) - SPLREF(NB,NA,1)
      IF (MF(17) .EQ.1 )  RETURN
      IF(VMJET.EQ.0.) VMJET = VJJET + V(2,1)
      VRATIO = (VMJET - V(2,1)) / VJJET
      DELSPL = 80. * ALOG10(VRATIO)
      DO 410 NA=NI,NJ
          DO 405  NB = 1,24
      AC(NB) = SPLJE(NB,NA) + DELSPL
  405 CRVX(NB) = ALOG10(FREQ24(NB) *(VRATIO))
          DO 410 NB=1,24
  410 SPLJE(NB,NA) = TBLU1(FLOG24(NB),CRVX,AC , 1, 24)
      RETURN
      END
```

```
      SUBROUTINE LOBESE
C                                                          ZDM914 21 - JT
      COMMON / AREA1 / SPL24(24,70,2),SPLREF(24,70,1)
      COMMON / AREA4 / MF(30),MN(10),ENGINE ,NI,NJ,NK,NII,CRV(400),MKT
      COMMON / HFVJE / SPLFA(24,70,2),SPLJE(24,70),OASP(70,2)
     1      ,SPLTU(24,70)
      COMMON / HFVJT / CAT(4),ATEN(24,4),ATATM(24,4),ATENM(4)
      DIMENSION        SPLAT(2)
      DO 18 N=1,4
      DO 18 NB=1,24
   18 ATATM(NB,N)=ATEN(NB,N)/CAT(N)
      DO  560  N =1,2
      DO  560  NB=1,NK
      ATATM(NB,N) = ATATM(NB,N) + ATATM(NB,N+2)
  560 CONTINUE
      DO 320 NA=NI,NJ
      DO  320  NB=1,NK
      DO 17 N=1,2
   17 SPLAT(     N)=SPLFA(NB,NA,N) - OASP (NA,N)*ATATM(NB,N)
  320 SPL24(NB,NA,1)=10.*ALOG10(10.**(SPLAT(       1)*.1 )
     1                          +10.**(SPLAT(       2)*.1 )
     2                          +10.**(SPLJE(NB,NA)  *.1 )
     2                          +10.**(SPLTU(NB,NA)  *.1 ) )
      RETURN
      END
```

```
      FUNCTION FMTONE(SPZ, NTCB)
C                                                                  ZDM914 08 - 08
      DIMENSION SPL(25),S(25),SPLP(25),SP(25),SBAR(25),SPLPP(25),FC(25)
     1    ,SPZ(1)
      EQUIVALENCE (SP,S,SPLPP)  , (SPLP, SBAR,FC)
C
      DO 110 K=1,24
      SPL (K)=SPZ(K)
        IF (SPL(K) .LT. 0.0)    SPL(K) = 0.0
  110 SPLP(K)=SPL(K)
      S(3)=0.
      DO 100 K=4,24
  100 S(K)=SPL(K)-SPL(K-1)

      DO 150 K=5,24
      IF(ABS(S(K)-S(K-1)).LE.5.) GO TO 150
      IF(S(K).GT.0.) GO TO 120
      IF(S(K-1).LE.0.) GO TO 150
      SPLP(K-1)=(SPL(K-2)+SPL(K))/2.
      GO TO 150
  120 IF(S(K).LE.S(K-1)) GO TO 150
      IF(K.GT.23) GO TO 130
      SPLP(K)=(SPL(K-1)+SPL(K+1))/2.
      GO TO 150
  130 SPLP(24)=SPL(23)+S(23)
  150 CONTINUE

      DO 160 K=4,24
  160 SP(K)=SPLP(K)-SPLP(K-1)
      SP(3)=SP(4)
      SP(25)=SP(24)
      DO 170 K=3,23
  170 SBAR(K)=(SP(K)+SP(K+1)+SP(K+2))/3.
      SPLPP(3)=SPL(3)
      DO 180 K=4,24
  180 SPLPP(K)=SPLPP(K-1)+SBAR(K-1)
      FM=-1000.
      NTCB = 0
      DO 250 K=3,24
      F=SPL(K)-SPLPP(K)
      IF(F.LT.3.) GO TO 220
      IF(K.LT.11.OR.K.GT.21) GO TO 210
      FC(K)=AMIN1(F/3.,20./3.)
      GO TO 230
  210 FC(K)=AMIN1(F/6.,20./6.)
      GO TO 230
  220 FC(K)=0.0
  230   IF  (FC(K) .LT. FM)                    GO TO 250
      FM = FC(K)
      NTCB = K
  250 CONTINUE
```

```
FMTONE=FM
RETURN
END
```

```
      SUBROUTINE ATABC(NB,TEMP,HREL,AAC)
                                                              ZDM914 04 - 3T
C
      DIMENSION AAC(1),PFREQ(8),CFREQ(8),TFREQ(25),FREQ(41),X1(25),
     1          Y1(25),X2(19),Y2(19),X3(2),Y3(2,11),Z3(11),X4(2),
     2          Y4(2,11),Z4(11)
      EQUIVALENCE (FREQ(1),PFREQ(1)),(FREQ(9),CFREQ(1)),
     1            (FREQ(17),TFREQ(1),X1(1)),(Z3(1),Z4(1))
      DATA PFREQ/1.799341,2.09691,2.39794,2.69897,3.,3.30103,3.60206,
     1           3.778786/
      DATA CFREQ/1.724276,2.025306,2.326336,2.628389,2.929419,3.230449,
     1           3.531479,3.702431/
      DATA TFREQ/1.69897,1.799341,1.90309,2.,2.09691,2.20412,2.30103,
     1           2.39794,2.498311,2.60206,2.69897,2.799341,2.90309,3.,
     2           3.09691,3.20412,3.30103,3.39794,3.498311,3.60206,
     3           3.650308,3.748963,3.851258,3.951338,4.049218/
      DATA Y1/.22,.25,.28,.32,.36,.41,.45,.51,.56,.63,.7,.79,.89,1.01,
     1        1.14,1.27,1.41,1.57,1.75,1.98,2.10,2.36,2.67,2.98,3.26/
      DATA X2/0.,.5,.65,.75,.9,1.,1.12,1.25,1.5,2.,2.5,3.,3.5,4.,4.5,5.,
     1        6.,6.5,8./
      DATA Y2/0.,.69,.9,.96,1.,1.,.95,.865,.75,.57,.45,.37,.31,.27,.24,
     1        .225,.21,.2,.2/
      DATA X3/-.522879,.954243/
      DATA Y3/.0086,1.498311,.079181,1.556303,.136721,1.618048,.198657,
     1        1.672098,.247973,1.724276,.292256,1.770852,.342423,
     2        1.812913,.380211,1.869232,.431364,1.908485,.477121,
     3        1.954243,.525045,1.995635/
      DATA Z3/0.,10.,20.,30.,40.,50.,60.,70.,80.,90.,100./
      DATA X4/1.,2./
      DATA Y4/-.958607,.021189,-.744727,.230449,-.545155,.431364,
     1        -.346787,.633468,-.180454,.80618,-.017729,.963788,.113943,
     2        1.10721,.255273,1.255273,.406540,1.389166,.531479,
     3        1.518514,.662758,1.643453/
      IF(HREL.LT.10.) HREL=10.
      IF(HREL.GT.100.) HREL=100.
      HABS=10.**TBLU2(ALOG10(HREL),TEMP,X4,Z4,Y4,1,1,2,11,2,11)
      I=16
      NF=25
  400 DO 500 J=1,NF
      K=I+J
      ALPC=10.**(2.06*FREQ(K)-7.578)
      HMOLMX=TBLU1(FREQ(K),X1,Y1,1,25)
      ALPMAX=10.**TBLU2(FREQ(K)-3.,TEMP,X3,Z3,Y3,1,1,2,11,2,11)
      ARG=HABS/HMOLMX
      AMAMM=TBLU1(ARG,X2,Y2,1,19)
      ALPMOL=AMAMM*ALPMAX
  500 AAC(J)=ALPC+ALPMOL
      RETURN
      END
```

```
      SUBROUTINE EGA1(DIST,FREQ,BETA,N,ATT)
C                                                                  ZDM915 09 - 8T
      DIMENSION FREQ(N),ATT(N),AK(7),AT(63),FR(7),R(9)
      DATA              AK / 2.7, 2.27, 2.19, 1.93, 1.63, 2.11, 2.11/
      DATA               AT/
     1     .5  ,1.  ,1.  ,1.  ,1.5 ,2.  ,4.  ,4.5 ,5.  ,
     2     1.  ,1.5 ,2.  ,2.  ,2.5 ,3.  ,6.  ,7.  ,7.  ,
     3     1.  ,1.5 ,2.  ,2.5 ,3.  ,4.  ,7.5 ,9.  ,9.  ,
     4     1.  ,1.5 ,2.  ,3.  ,4.  ,5.  ,10. ,11. ,11. ,
     5     1.  ,1.5 ,2.  ,3.5 ,5.  ,6.  ,11. ,13. ,14. ,
     6     1.  ,2.  ,3.  ,4.5 ,6.  ,7.  ,13. ,15. ,15. ,
     7     1.  ,2.  ,3.  ,4.5 ,6.  ,7.  ,13. ,15. ,15. /
      DATA              FR /53., 106., 212., 425., 850., 1700., 3400./
      DATA               R  /100.,200.,400.,600.,800.,1000.,2000.,3000.,
     1  4000./
      DATA PI/3.14159265/
      DATA PI9902/1.55508836/
      BETA1=BETA / 180.*PI
        IF (BETA1 .LT. 0.0)  BETA1 = 0.0
        IF (BETA1 .GT. PI9902)  BETA1 = PI9902
   10 DO 20  I=1,N
      X = TBLU2(DIST,FREQ(I),R,FR,AT,1,1,9,7,9,7)
      A = TBLU1(FREQ(I),FR,AK,1,7)
      ATT(I)=X*EXP(-A*SQRT(TAN(BETA1)))
   20 CONTINUE
      RETURN
      END
```

```
      FUNCTION OAFUNC(SPL)
C                                                          ZDM914 10 - BT
      DIMENSION SPL(24)
      OACAL =0.
      DO 901 K=1,24
  901 OACAL=OACAL+10.**(SPL(K)/10.)
      OAFUNC=10.*ALOG10(OACAL)
      RETURN
      END
```

```
      BLOCK DATA
C                                                                ZDM914 13 - 8T
      COMMON / AREA1 / SPL24(24,70,2),SPLREF(24,70,1)
      COMMON/AREA2/TITLE(40)
      COMMON / AREA3 / FREQ24(24),FLOG24(24),FREQ8(8),FLOG8(8),BWN(24)
      COMMON / AREA4 / MF(30),MN(10),ENGINE ,NI,NJ,NK,NII,CRV(400),MKT
      COMMON/AREA5/PNL24(70),XNOY24(24),EPNL(8),PEAKPN(4),
     1              OASPL(70,1),TCPNL(70,1) ,XNOYMX(70), MTCB(70)
      COMMON/AREA6/THRUST(4),THRUSI (6),OVHTIM(4),TIM(70),TIM2(70,3,1)
      COMMON/GEOM1/H(3,4),V(3,4),HREL(3,4),TEMP(3,4),X(3,4),Y(3,4),  PI
     1     ,GAMM(2) ,ALPH(2) ,S(70,2) ,W(70,2)  ,C(2)
      COMMON/GEOM2/THETA(14),THETA2(196),ALPHA(210),DIRSL(210),
     1  DISTSL(210),AAC(200)
      COMMON/CONNOY/ABPS(24),BBPS(24),ALO(24),BLO(24),AM(24),BM(24)
      COMMON  /HFVJE/   SPLFA(24,70,2), SPLJE(24,70), OASP(70,2)
     1      ,SPLTU(24,70)
      DATA PI  /  3.1415926536    /    ,SPLTU/1680*0.0/
     2     ,AAC/ 200*0.0/, TITLE/40*0./
     4    ,PEAKPN/4*0.0/
     5    ,EPNL  /8*0.0/
     6    ,TIM   /70*0.0/
     8    ,TCPNL /70*0.0/
      DATA THETA/30.,40.,50.,60.,70.,80.,90.,100.,110.,120.,130.,140.,
     1          150.,160./
      DATA BWN /1.0,2.0,3.0,4.0,5.0,6.0,7.0,8.0,9.0,10.0,11.0,12.0,
     1 13.0,14.0,15.0,16.0,17.0,18.0,19.0,20.0,21.0,22.0,23.0,24.0/
      DATA  FREQ24
     1 / 50.,  63.,  80.,  100., 125., 160., 200., 250., 315., 400.,
     2  500., 630., 800., 1000.,1250.,1600.,2000.,2500.,3150.,4000.,
     3 5000.,6300.,8000.,10000.   /
      DATA  ABPS/
     1     64.   ,60.  ,56.  ,53.  ,51.  ,48.  ,46.  ,44.  ,42.  ,40.  ,
     2     40.   ,40.  ,40.  ,40.  ,38.  ,34.  ,32.  ,30.  ,29.  ,29.  ,
     3     30.   ,31.  ,37.  ,41.    /
      DATA  BBPS/
     1     91.   ,85.9 ,87.3 ,79.9 ,79.8 ,76.  ,74.  ,74.9 ,94.6 ,1000.,
     2     1000. ,1000.,1000.,1000.,1000.,1000.,1000.,1000.,1000.,1000.,
     3     1000. ,1000.,44.3 ,50.7   /
      DATA  ALO /
     1     64.   ,60.  ,56.  ,53.  ,51.  ,48.  ,46.  ,44.  ,42.  ,40.  ,
     2     40.   ,40.  ,40.  ,40.  ,38.  ,34.  ,32.  ,30.  ,29.  ,29.  ,
     3     30.   ,31.  ,37.  ,41.    /
      DATA BLO /
     1     52.   ,51.  ,49.  ,47.  ,46.  ,45.  ,43.  ,42.  ,41.  ,40.  ,
     2     40.   ,40.  ,40.  ,40.  ,38.  ,34.  ,32.  ,30.  ,29.  ,29.  ,
     3     30.   ,31.  ,34.  ,37.    /
      DATA AM /
     1    .043478  ,.04057   ,.036831  ,.036831  ,.035336  ,
     2    .033333  ,.03333   ,.032051  ,.030675  ,.030103  ,
     3    .03C103  ,.C301C3  ,.030103  ,.030103  ,.030103  ,
     4    .02996   ,.02996   ,.02996   ,.02996   ,.02996   ,
```

```
5     .C2996    ,.C2996    ,.042285   ,.042285/
 DATA BM/15*.030103,9*.02996/
 END
```

```
      FUNCTION TBLU1(XX,X,Y,MDX,NLX)
C                                                          ZDM914 14 - 14
      DIMENSION X(1),Y(1)
      NO X = MDX-1
      CALL SEARCH(X,XX,NO X,NLX,I,DELTA 1,A 1)
      TBLU1 = Y(I) + (Y(I+1)-Y(I))*DELTA 1/A 1
      RETURN
      END
```

```
FUNCTION TBLU2(XX,YY,X,Y,F2,MDX,MDY,NLX,NLY,NFX,NFY)
DIMENSION F2(NFX,NFY),X(1),Y(1)
NO X = MDX-1
NO Y = MDY-1
CALL SEARCH(X,XX,NO X,NLX,I,DELTA 1,A 1)
CALL SEARCH(Y,YY,NO Y,NLY,J,DELTA 2,A 2)
DFX1 = (F2(I+1,J)-F2(I,J))*DELTA 1/A1
DFX2 = (F2(I+1,J+1)-F2(I,J+1))*DELTA 1/A1
TBLU2 = F2(I,J) + DFX1 + (F2(I,J+1)-F2(I,J)+DFX2-DFX1)*DELTA 2/A 2
RETURN
END
```

```
      SUBROUTINE SEARCH(X,XX,NOX,NLX,I,DELTA,A)
      DIMENSION X(1)
    1 NO X = NO X + 1
      IF(XX.LT.X(NO X)) GO TO 5
      IF(NO X.GE.NLX)GO TO 5
      GO TO 1
    5 DELTA = XX - X(NO X)
      I = NO X
      IF(NO X.NE.1) GO TO 10
      A = X(NO X + 1) - X(NO X)
      RETURN
   10 IF(XX.LT.X(NLX)) GO TO 20
      DELTA = XX - X(NO X-1)
      A = X(NOX) - X(NO X-1)
      I = NO X - 1
      RETURN
   20 DELTA = XX - X(NO X - 1)
      A = X(NO X) - X(NO X-1)
      I = (NO X-1)
      RETURN
      END
```

```
      SUBROUTINE BOUNDY (DBTEST, X, Y, *, *)
C
C                                                          ZDM914 30 - 30
C     THIS SUBROUTINE CONTAINS LOGIC TO GENERATE 'FOOTPRINTS' -
C     LINES OF EQUAL PRESSURE.    EAGLEMAN   NOV. 1970
C
      LOGICAL *4   FIRST
      INTEGER *4  OLD ,FIPFOP/03/
      REAL *4   DBHIST(2), DUMY(2)
      COMMON /FOOTPT/  ICV, CURVX(100), CURVY(100), IPT, POINTX(250)
     1    ,POINTY(250), DBNL, DELX, DELY, FIRST
C     *   *    *    *  *    * *     *  -  *  -  * -  *   *  - *   *    *
        IF (.NOT. FIRST)                                    GO TO 1005
C            INITALIZATION      -     -    -     -     -    -
      FIRST = .FALSE.
      NEW = 1
      OLD = 2
      ICV = 0
      DBHIST(OLD) = DBNL
                                                            GO TO 1010
 1005 NEW = FIPFOP - NEW
      OLD = FIPFOP - OLD
 1010 DBHIST(NEW) = DBTEST
      CALL BOUND (DBHIST(NEW), DBHIST(OLD), DBNL, Y, DELY, +2000)
C***          BOUNDED       -          -       -         -
C**       STORE INTERPOLATED POINTS
      ICV = ICV + 1
      DUMY(OLD) = ALOG10(POINTY(IPT-1))
      DUMY(NEW) = ALOG10(POINTY(IPT))
      CURVY(ICV) = TBLU1(DBNL, DBHIST, DUMY, 1, 2)
      CURVY(ICV) = 10.0**(CURVY(ICV))
      CURVX(ICV) = X
      X = DELX
        IF (DBHIST(NEW) .GT. DBHIST(OLD))                   GO TO 2010
      DBHIST(NEW) = DBHIST(OLD)
      Y = Y + DELY
                                                            GO TO 3005
C***       NOT BOUNDED
 2000 CONTINUE
 5577 FORMAT ('0$$B$$  ',  8G15.7)
        WRITE (6,5577)  DBHIST, NEW, OLD, CURVY(ICV), CURVX(ICV), X, Y
      RETURN 1
C
C**        IF X OR Y IS BOUNDED, COME HERE
C**        DECREMENT Y, AND INCREMENT OR CALCULATE A NEW X
C
 2005 Y = Y - DELY
C
C     X = X
C
 2010 DBHIST(NEW) = -1.0
```

```
C
 3005 CONTINUE
        WRITE(6,5577)  DBHIST, NEW, OLD, CURVY(ICV), CURVX(ICV), X, Y
      RETURN 2
C
C
      ENTRY BOUNDX(DBTEST, X, Y, *, *)
C
        IF (DBHIST(NEW) .GT. 0.0)                              GO TO 4005
      DBHIST(NEW) = DBTEST
      X = X - DELX
        IF (DBTEST .GT. DBNL)     X = X + 2.0*DELX
                                                               GO TO 3005
 4005 NEW = FIPFOP - NEW
      OLD = FIPFOP - OLD
      DBHIST(NEW) = DBTEST
      CALL BOUND (DBHIST(OLD), DBHIST(NEW), DBNL, X, DELX, +2000)
C***            BOUNDED       -          -       -          -
C**       STORE INTERPOLATED POINTS
      ICV = ICV + 1
      DUMY(OLD) = ALOG10(POINTX(IPT-1))
      DUMY(NEW) = ALOG10(POINTX(IPT))
      CURVX(ICV) = TBLU1(DBNL, DBHIST, DUMY, 1, 2)
      CURVX(ICV) = 10.0**(CURVX(ICV))
      CURVY(ICV) = Y
                                                               GO TO 2005
      END
```

```
      SUBROUTINE BOUND (DBHIS1, DBHIS2, DBNL, Y, DELY, *)
C                                                          ZDM914 30 - 30
C     *        *        *    *    *        *    *   * * *    *    * *
        IF (DBHIS1 .LT. DBNL)                             GO TO 1005
        IF (DBHIS2 .LT. DBNL)                             GO TO 2005
C**           INCREMENT Y TO DECREASE DBHIST
      Y = Y + DELY
                                                           GO TO 1505
 1005   IF (DBHIS2 .GT. DBNL)                             GO TO 2005
C**           DECREMENT Y TO INCREASE DBHIST
      Y = Y - DELY
 1505 RETURN  1
C**                  NOT BOUNDED
 2005 RETURN
C**                       BOUNDED
      END
```

```
      SUBROUTINE PLOTFP (X, Y, NPTS, FIRST, U, V, NPTS2)
C                                                        ZDM914 31 - 31
C
C**       SUBROUTINE TO          PLOT FOOT PRINT
      LOGICAL *4  FIRST
      INTEGER *4  MXPTS/1000/, XLABEL(1)/'   '/,SIZXL/0/     ,CYCLE
     1           ,YLABEL(1)/'  '                                /, SIZYL/00/
     2           ,TITLE(4)/'EPNL TEST DATA  '/, SIZTIL/14/ ,TYPE/'REC'/
     3   ,SYMB
      REAL *4   X(1)   , Y(1), U(1),      ZERO/0.0/ ,V(1)
C  *  -  *  -  *  -  *  -  *  -  *  *  *  *  *  *  *  *  *  *  *  *  *
        IF (.NOT. FIRST)                                  GO TO 1000
      CYCLE = 1
C
C**           INITALIZE FOR PLOTTING
      CALL PLOTIN (10.,10., 12., 0., 90.,-12.0, 0.,-11.0, 0.0
     1   ,TYPE, CYCLE)
C
C5577 FORMAT ('0***  ', 7G15.5/(5X,7G15.5))
CC        WRITE (6,5577)  (X(J), Y(J),J=1,NPTS),  NPTS
C
C**                PLOT POINTS
C
C       -      -       ROTATE PLOT -90 DEG. TO ORIENT WITH PAPER   -
 1000 XSF = -2000.0
      YSF = 10000.0
      XSP = 0.0
      YSP = 0.0
      LINPT = - 1
      SYMB = 2
      CALL PLOTSC (Y, X, NPTS, XLABEL, YLABEL, TITLE, SIZXL, SIZYL
     1              ,SIZTIL, YSP , YSF , XSP , XSF , LINPT, SYMB)
      FIRST = .FALSE.
C     -     -     -   PLOT INTERPOLATED CURVE -     -     -     -
      LINPT = 0
      SYMB = 0
 1050 CALL PLOTCV (V, U, NPTS2,YSP , YSF , XSP , XSF , LINPT, SYMB)
C                                                     GO TO 9990
C9000 WRITE (6,9005)  MXPTS ,MXPTS
C9005 FORMAT ('0***    THE MAXIMUM NO. OF POINTS ALLOWED BY DIMENSIONING
C    1 (',  I5,  ') HAS BEEN EXCEEDED.  THE FIRST',I5,' POINTS WILL BE'
C    2    ,' PLOTTED.')
C                                                     GO TO 1015
 9990 CONTINUE
C     CALL PLOT (ZERO, ZERO, 999)
      RETURN
      END
```

APPENDIX 4

PHI PROGRAM DESCRIPTION

PHI PROGRAM

This computer program evaluates the relative effectiveness of the inlet and fan duct lining and the fundamental and harmonic attenuation.

The main program accepts the punched output from the Aircraft Noise Time History Prediction Program (EPNL program).

Program Input

1. Title card columns (1-72)

2. K1, K10 (2I5)

   K1 indicates the number of attenuations used with values as indicated by DATA statement ATENM2. If K1 = 4, then the data statement is rearranged by replacing ATENM2(4) = ATENM2(5).

   K10 = 0 at all times.

3. LON1, LON2, LON3, LON4, MTH, NST, NIN, IPHI (8I5)

   LON1 = 1 Write input

   LON2 = 1 Write revised input

   LON3 = 1 Plot attenuation

   LON4 = Plot phi study

   IPHI = 1 Long printout for design information

   = 0 Short printout for documentation

   NST = Start of phi calculation (integer between initial and final peak attenuation value)

   NTH = Final value of NST

   NIN = Increment to be used in going from NST to NTH

4. C1, C2, C3, C4, C5 (5F10.1)

   Constants used in the elevation of the phi function.

5. ATT2 (40X, F6.0)

   The change in EPNL as effected by the attenuation.

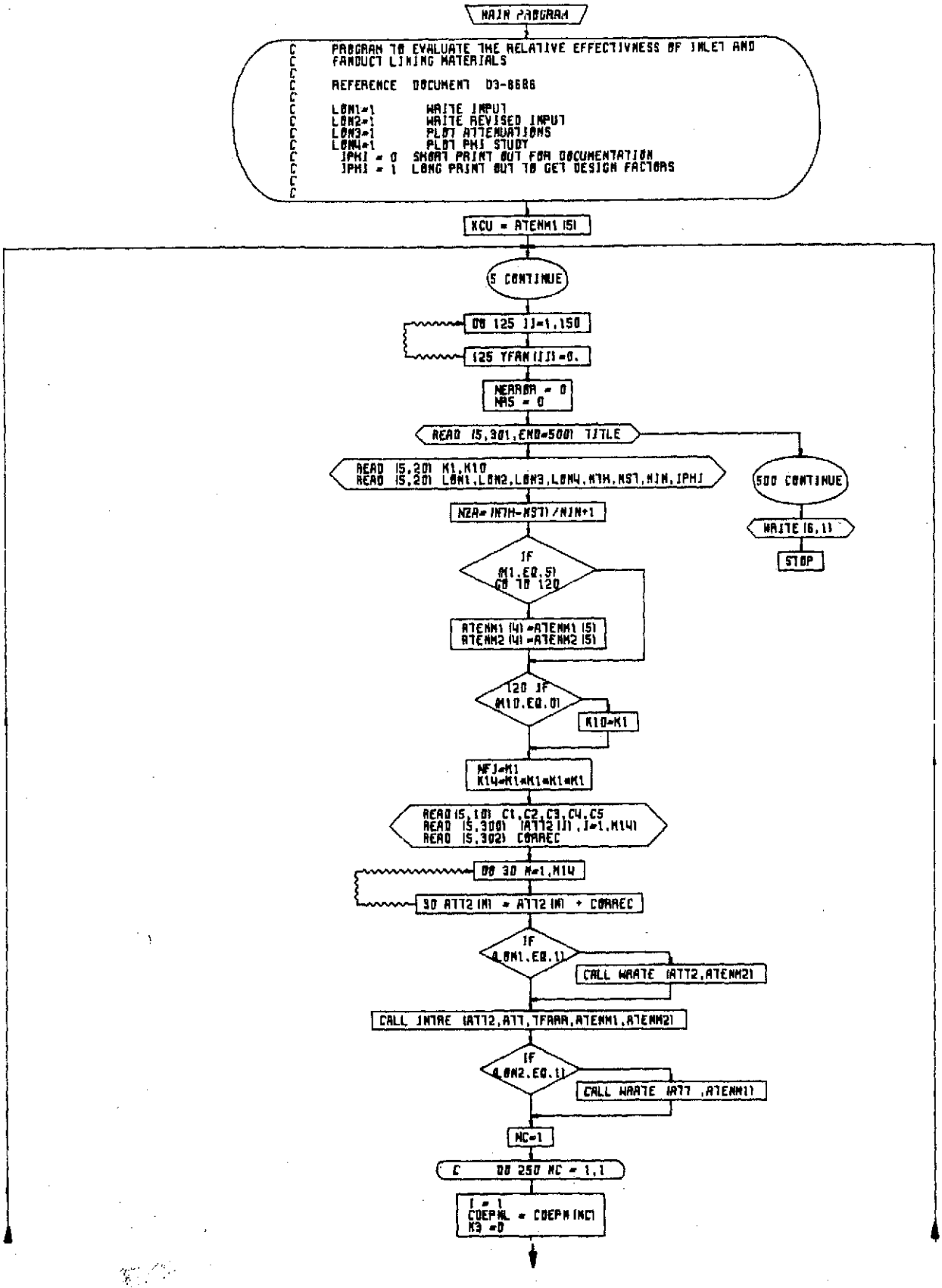
6. CORREC (F10.2)

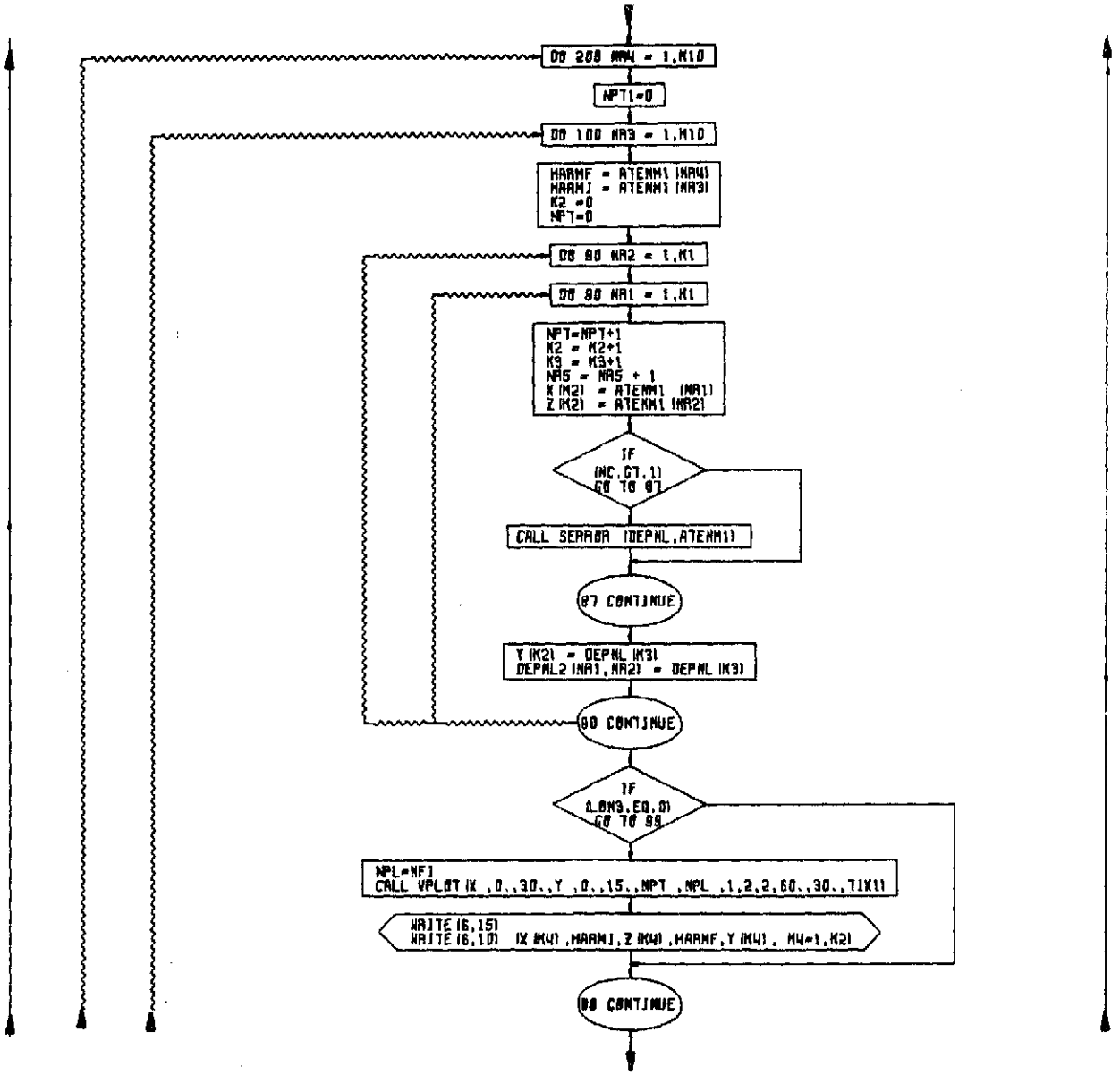
The difference between the first EPNL calculated and the reference EPNL value.

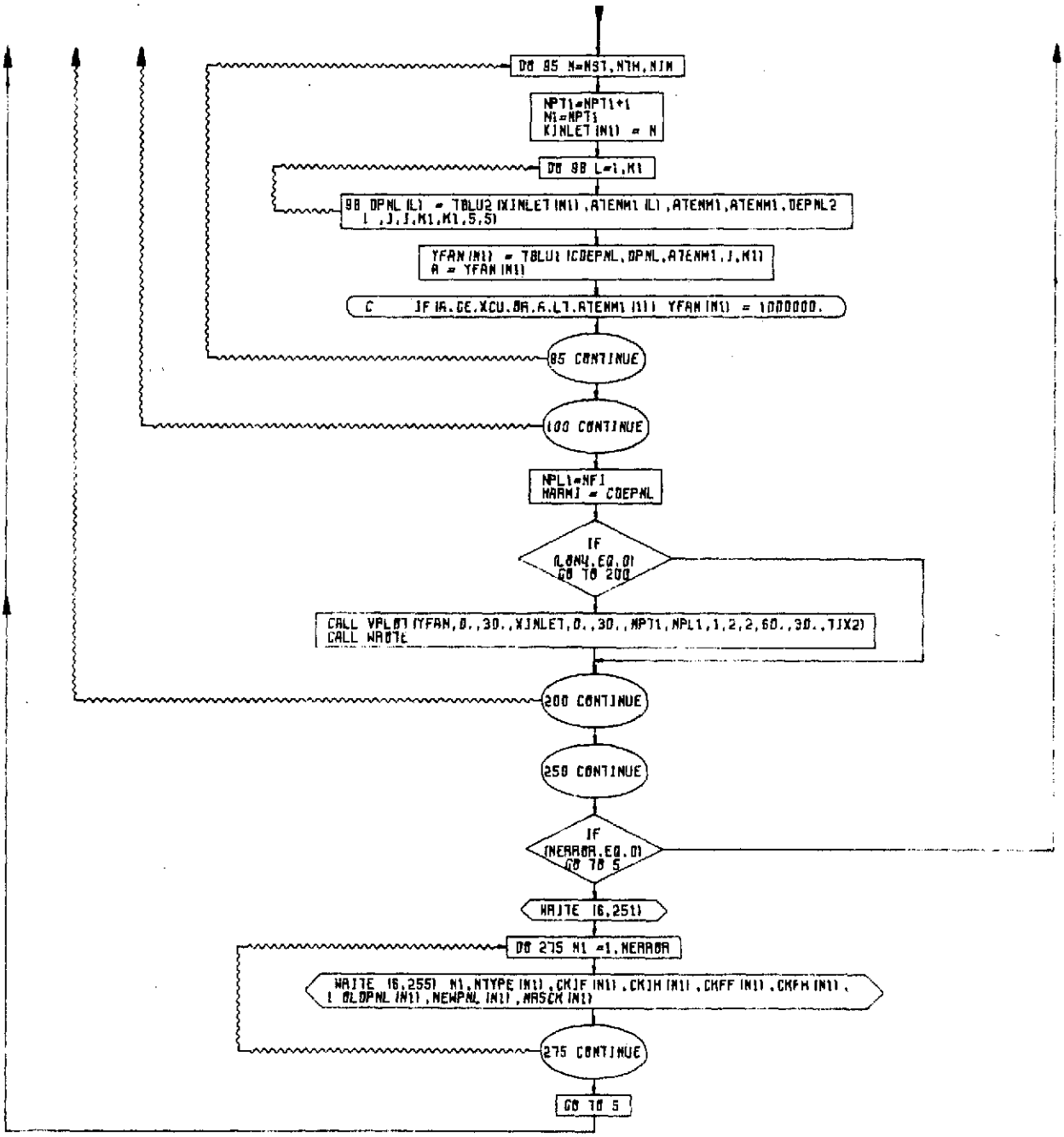
The program is set up to accept inputs for attenuations of 0, 5, 10, 20, and 30 dB (ATENM2). The revised input (ATENM1) can be changed to allow a detailed description of the attenuation, for instance 0., 2.5, 5, 7.5, 10 dB.

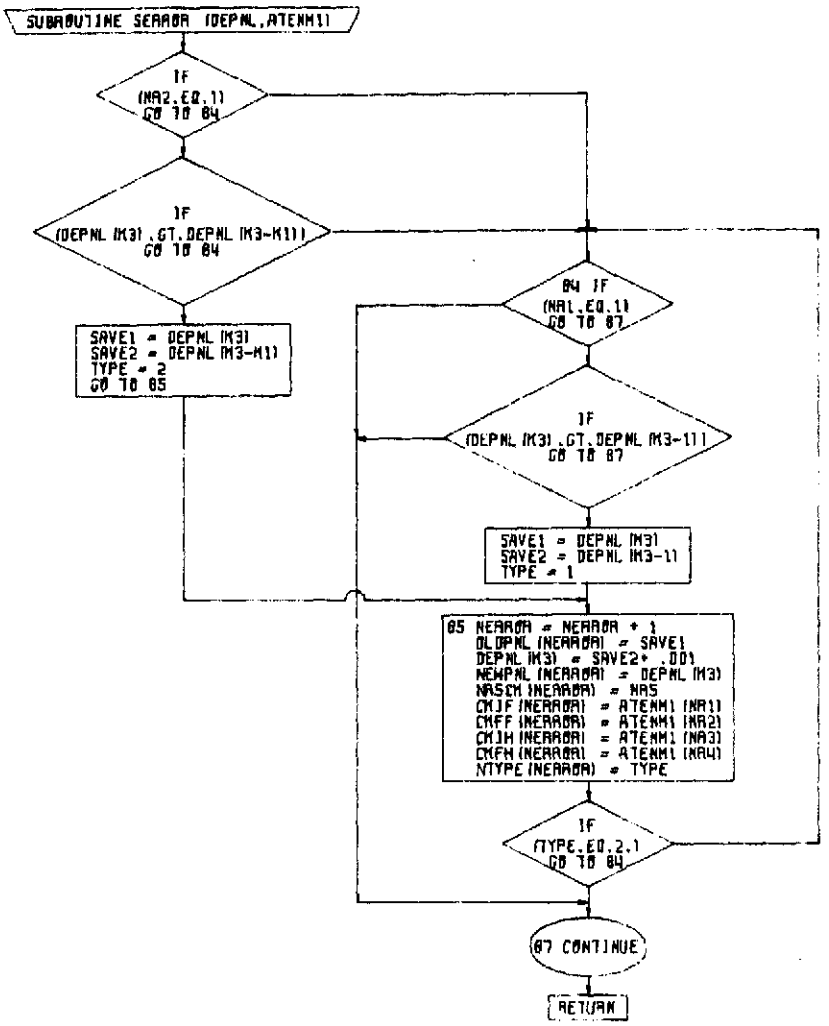
APPENDIX 5

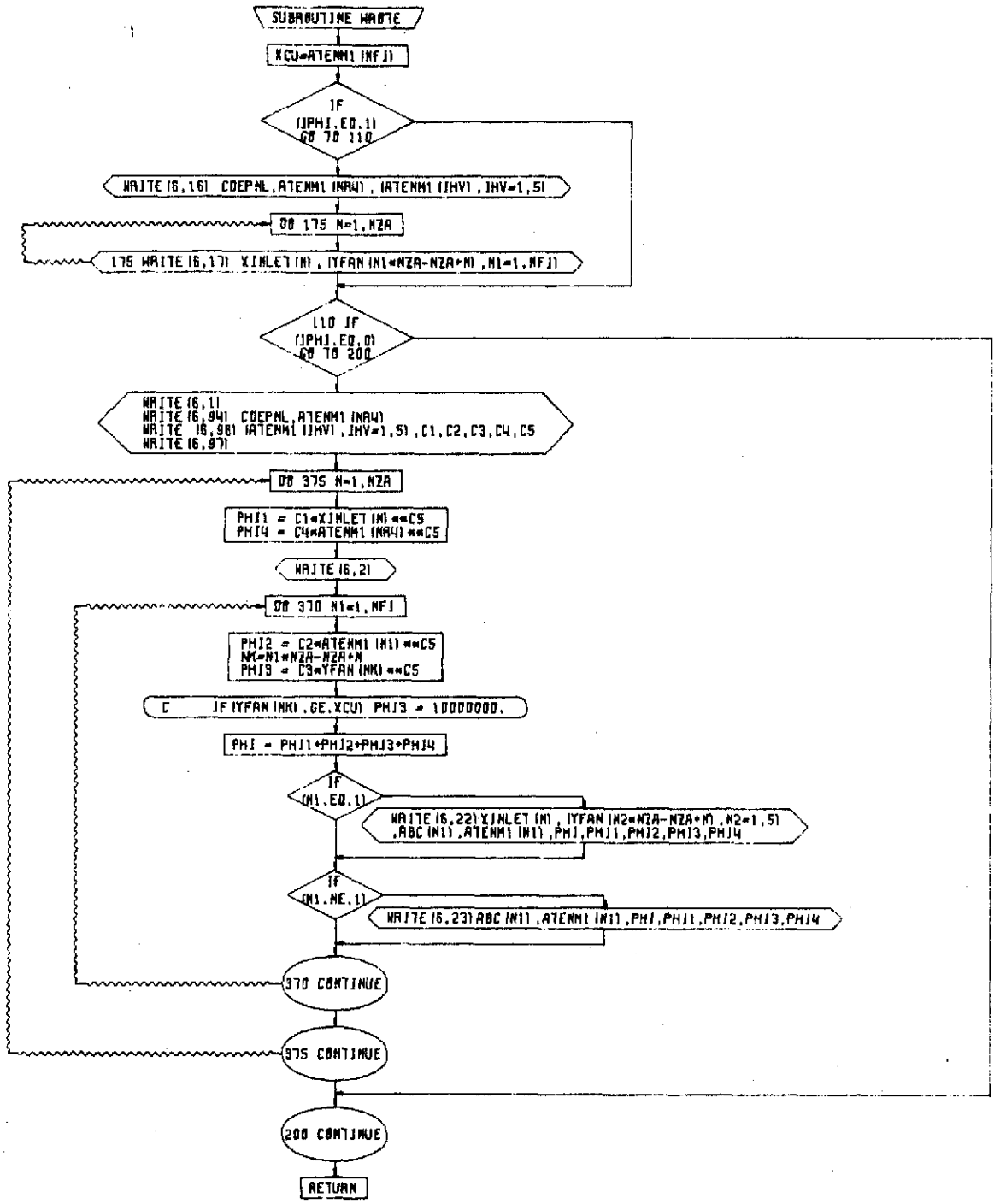
PHI PROGRAM FLOW CHART

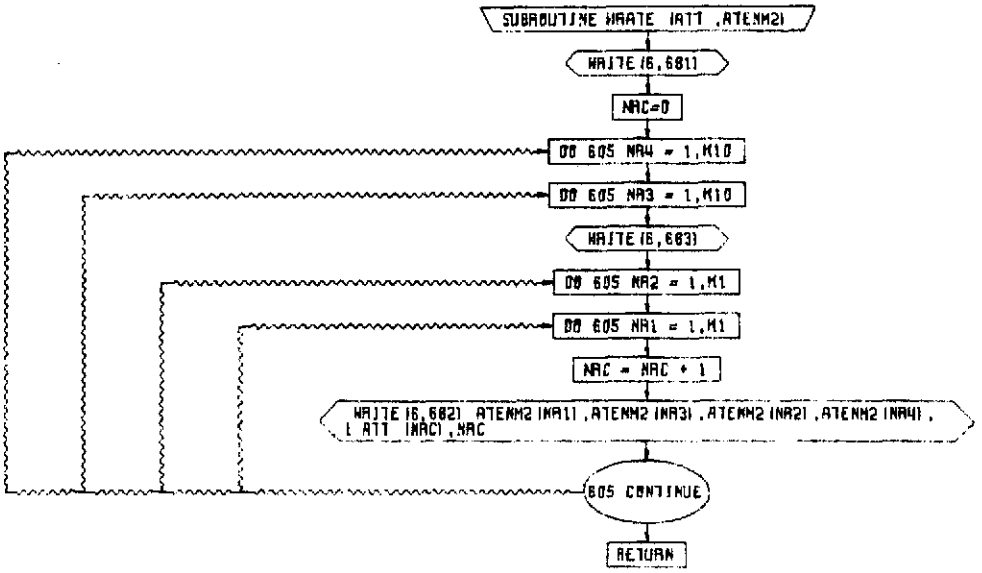


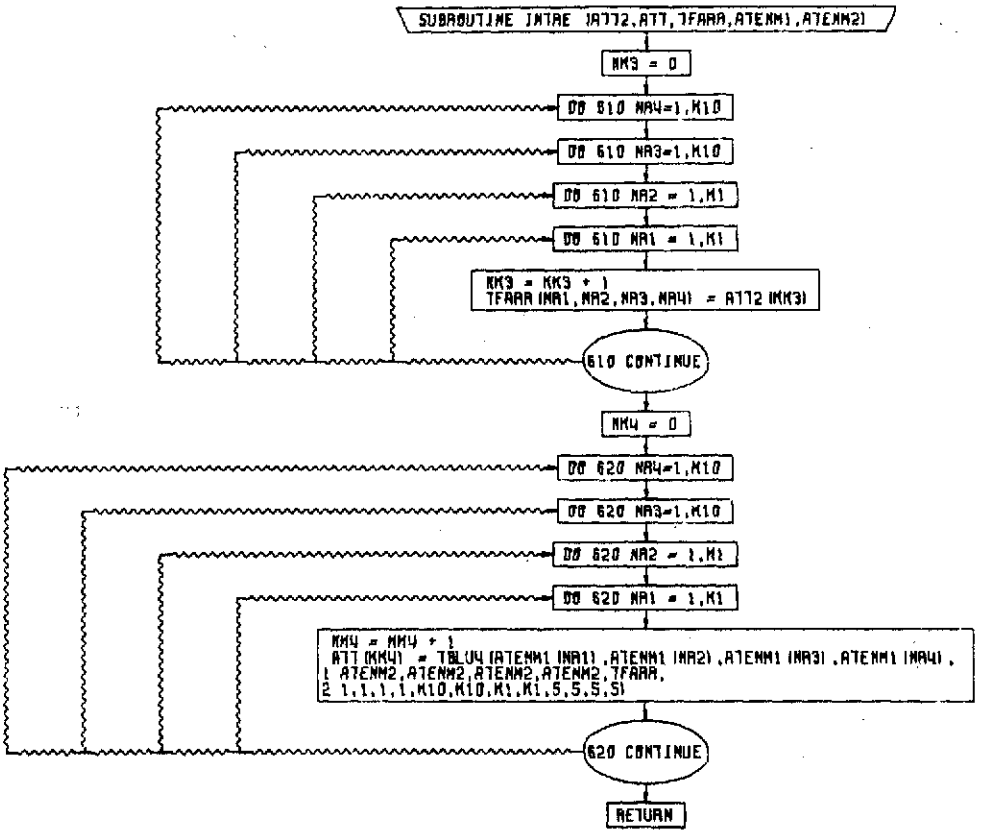

DO 200 NA4 = 1,K10
NPT1=0
DO 100 NA3 = 1,K10
HARMF = ATENM1 (NA4)
HARMJ = ATENM1 (NA3)
K2 =0
NPT=0
DO 80 NA2 = 1,K1
DO 80 NA1 = 1,K1
NPT=NPT+1
K2 = K2+1
K3 = K3+1
NA5 = NA5 + 1
X (K2) = ATENM1 (NA1)
Z (K2) = ATENM1 (NA2)
IF
(NC.GT.1)
GO TO 87
CALL SERABA (DEPNL,ATENM1)
87 CONTINUE
Y (K2) = DEPNL (K3)
DEPNL2 (NA1,NA2) = DEPNL (K3)
80 CONTINUE
IF
(LON3.EQ.0)
GO TO 99
NPL=NF1
CALL VPLOT (X ,0.,30.,Y ,0.,15.,NPT ,NPL ,1,2,2,60.,30.,TIX11)
WRITE (6,15)
WRITE (6,10) IX (K4) ,HARMJ, Z (K4) ,HARMF,Y (K4) , K4=1,K2)
99 CONTINUE

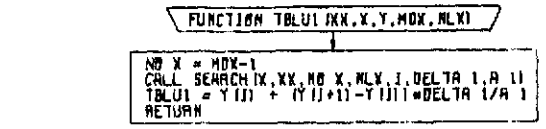

DO 85 N=NST,NTH,NIN
NPT1=NPT1+1
N1=NPT1
XINLET(N1) = N
DO 98 L=1,M1
98 DPNL(L) = TBLU2(XINLET(N1),ATENM1(L),ATENM1,ATENM1,DEPNL2
1 ,J,J,M1,M1,5,5)
YFAN(N1) = TBLU1(CDEPNL,DPNL,ATENM1,J,M1)
A = YFAN(N1)
C IF(A.GE.XCU.OR.A.LT.ATENM1(1)) YFAN(N1) = 1000000.
85 CONTINUE
100 CONTINUE
NPL1=NF1
NARMJ = CDEPNL
IF
(LONY.EQ.0)
GO TO 200
CALL VPLOT(YFAN,0.,30.,XINLET,0.,30.,NPT1,NPL1,1,2,2,60.,30.,TJX2)
CALL WRITE
200 CONTINUE
250 CONTINUE
IF
(NERROR.EQ.0)
GO TO 5
WRITE (6,251)
DO 275 N1 =1,NERROR
WRITE (6,255) N1,NTYPE(N1),CKIF(N1),CKIM(N1),CKFF(N1),CKFM(N1),
1 OLDPNL(N1),NEWPNL(N1),MASCK(N1)
275 CONTINUE
GO TO 5

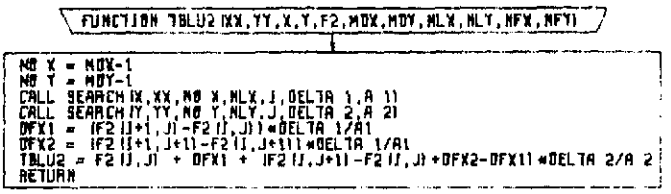

SUBROUTINE SEARCH (DEPNL,ATENM1)
IF (NA2.EQ.1) GO TO 84
IF (DEPNL(K3).GT.DEPNL(K3-K11)) GO TO 84
SAVE1 = DEPNL(K3)
SAVE2 = DEPNL(K3-K11)
TYPE = 2
GO TO 85
84 IF (NA1.EQ.1) GO TO 87
IF (DEPNL(K3).GT.DEPNL(K3-11)) GO TO 87
SAVE1 = DEPNL(K3)
SAVE2 = DEPNL(K3-11)
TYPE = 1
85 NEARGR = NEARGR + 1
OLDPNL(NEARGR) = SAVE1
DEPNL(K3) = SAVE2+ .001
NEWPNL(NEARGR) = DEPNL(K3)
NASEM(NEARGR) = NAS
CMJF(NEARGR) = ATENM1(NA1)
CMFF(NEARGR) = ATENM1(NA2)
CMJH(NEARGR) = ATENM1(NA3)
CMFH(NEARGR) = ATENM1(NA4)
NTYPE(NEARGR) = TYPE
IF (TYPE.EQ.2.) GO TO 84
87 CONTINUE
RETURN

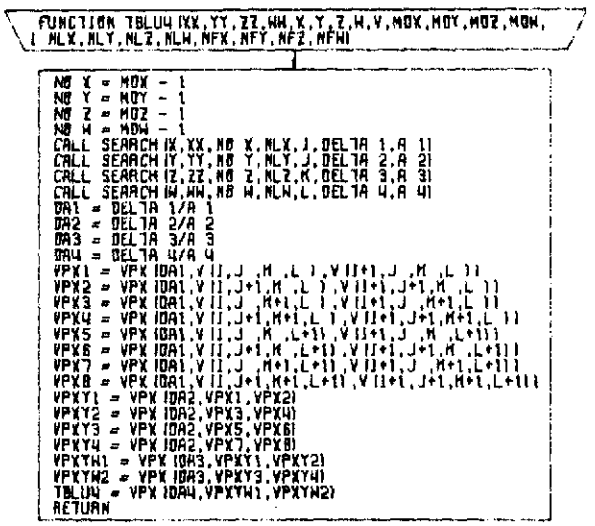

SUBROUTINE WRITE
XCU=ATENM1(NFJ)
IF (IPHI.EQ.1) GO TO 110
WRITE(6,16) COEPNL,ATENM1(NAW),(ATENM1(IHV),IHV=1,5)
DO 175 N=1,NZA
175 WRITE(6,17) XINLET(N),(YFAN(N1*NZA-NZA+N),N1=1,NFJ)
110 IF (IPHI.EQ.0) GO TO 200
WRITE(6,1)
WRITE(6,94) COEPNL,ATENM1(NAW)
WRITE(6,96)(ATENM1(IHV),IHV=1,5),C1,C2,C3,C4,C5
WRITE(6,97)
DO 375 N=1,NZA
PHI1 = C1*XINLET(N)**C5
PHI4 = C4*ATENM1(NAW)**C5
WRITE(6,21)
DO 370 N1=1,NFJ
PHI2 = C2*ATENM1(N1)**C5
NK=N1*NZA-NZA+N
PHI3 = C3*YFAN(NK)**C5
C IF(YFAN(NK).GE.XCU) PHI3 = 10000000.
PHI = PHI1+PHI2+PHI3+PHI4
IF (N1.EQ.1)
WRITE(6,22)XINLET(N),(YFAN(N2*NZA-NZA+N),N2=1,5) ,ABC(N1),ATENM1(N1),PHI,PHI1,PHI2,PHI3,PHI4
IF (N1.NE.1)
WRITE(6,23)ABC(N1),ATENM1(N1),PHI,PHI1,PHI2,PHI3,PHI4
370 CONTINUE
375 CONTINUE
200 CONTINUE
RETURN

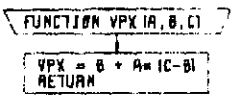

SUBROUTINE WRATE (ATT ,ATENM2)
WRITE(6,681)
NRC=0
DO 605 NR4 = 1,K10
DO 605 NR3 = 1,K10
WRITE(6,683)
DO 605 NR2 = 1,K1
DO 605 NR1 = 1,K1
NRC = NRC + 1
WRITE(6,682) ATENM2(NR1),ATENM2(NR3),ATENM2(NR2),ATENM2(NR4),
(ATT (NRC),NRC
605 CONTINUE
RETURN

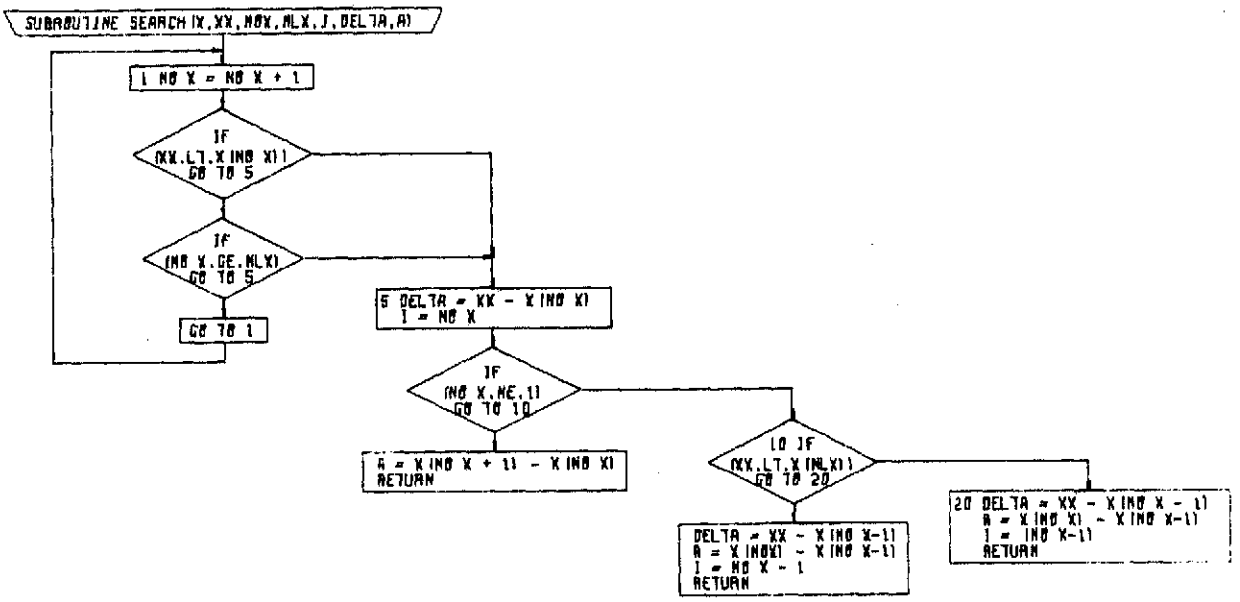

SUBROUTINE INTRE (ATT2,ATT,TFARR,ATENM1,ATENM2)
NK3 = 0
DO 610 NA4=1,K10
DO 610 NA3=1,K10
DO 610 NA2 = 1,K1
DO 610 NA1 = 1,K1
NK3 = NK3 + 1
TFARR (NA1,NA2,NA3,NA4) = ATT2 (NK3)
610 CONTINUE
NK4 = 0
DO 620 NA4=1,K10
DO 620 NA3=1,K10
DO 620 NA2 = 1,K1
DO 620 NA1 = 1,K1
NK4 = NK4 + 1
ATT (NK4) = TBLU4 (ATENM1 (NA1) ,ATENM1 (NA2) ,ATENM1 (NA3) ,ATENM1 (NA4) ,
1 ATENM2,ATENM2,ATENM2,ATENM2,TFARR,
2 1,1,1,1,K10,K10,K1,K1,5,5,5,5)
620 CONTINUE
RETURN

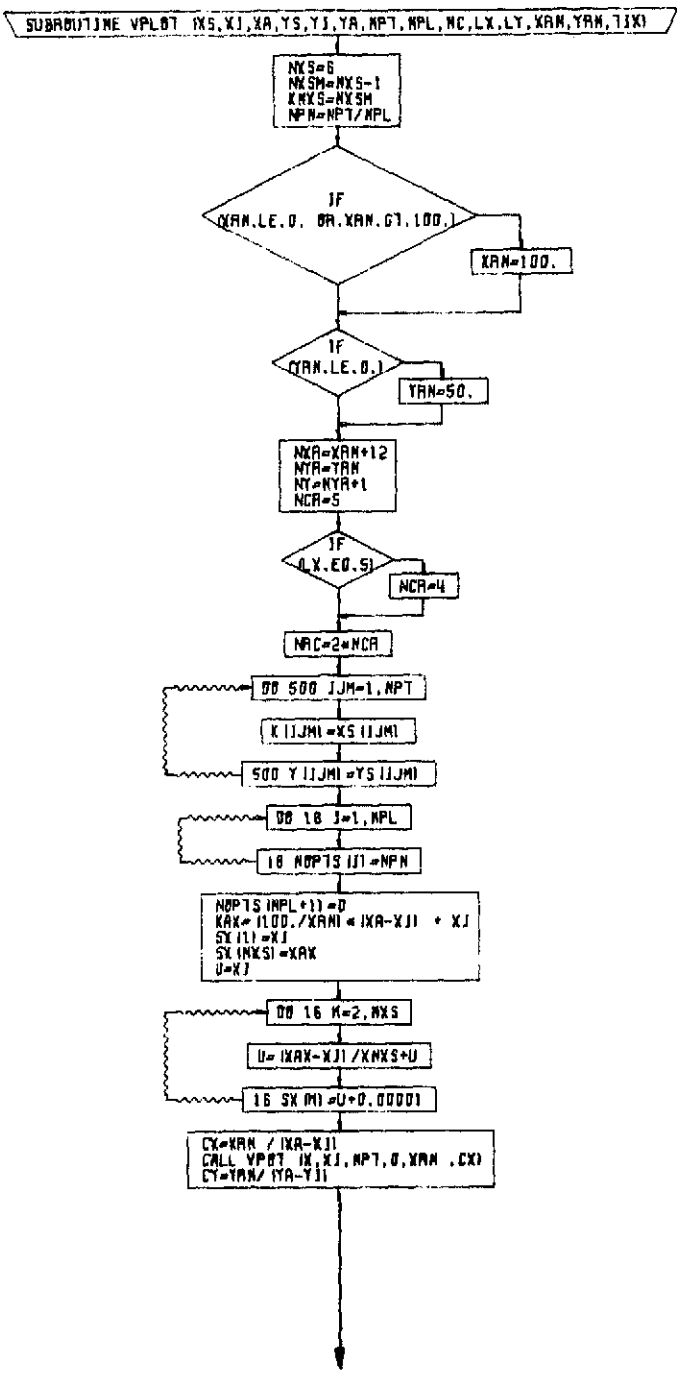

FUNCTION TBLU1(XX,X,Y,MDX,NLX)
NB X = MDX-1
CALL SEARCH(X,XX,NB X,NLX,J,DELTA 1,A 1)
TBLU1 = Y(J) + (Y(J+1)-Y(J))*DELTA 1/A 1
RETURN

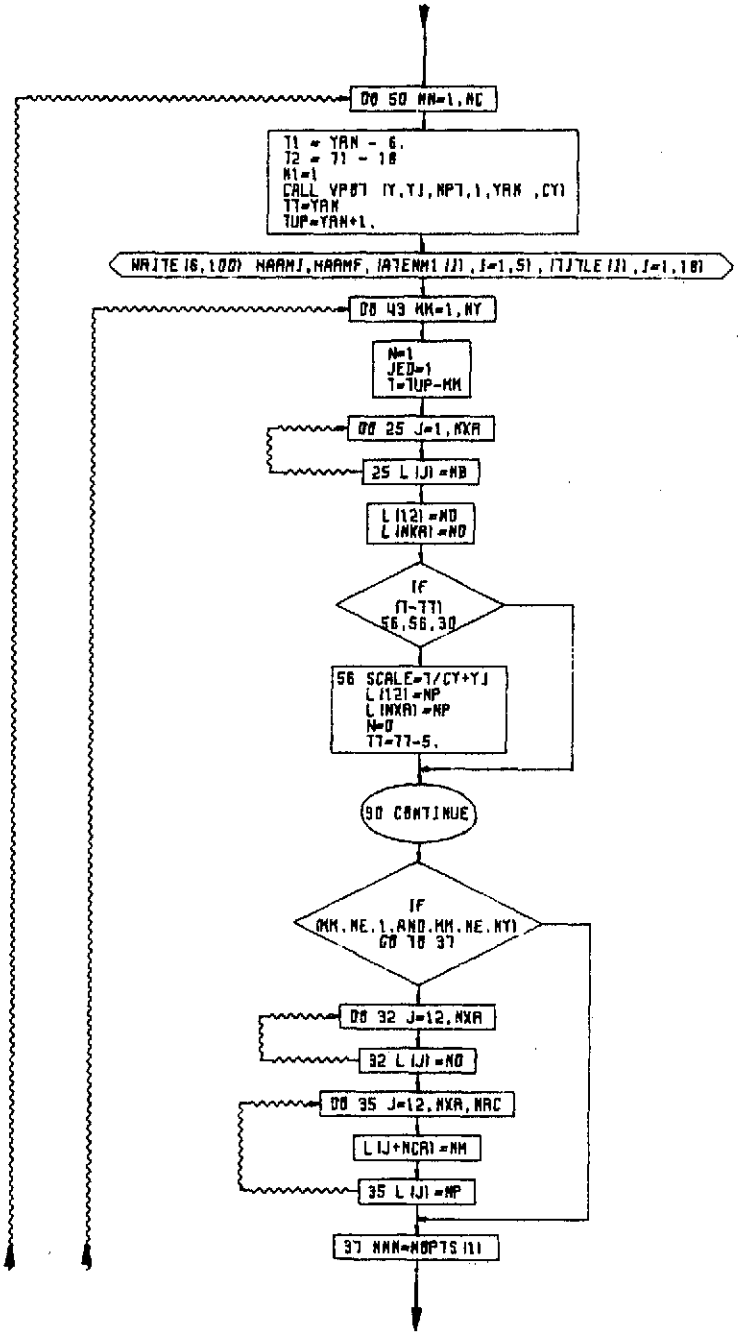

FUNCTION TBLU2(XX,YY,X,Y,F2,MDX,MDY,NLX,NLY,NFX,NFY)
NB X = MDX-1
NB Y = MDY-1
CALL SEARCH(X,XX,NB X,NLX,J,DELTA 1,A 1)
CALL SEARCH(Y,YY,NB Y,NLY,J,DELTA 2,A 2)
DFX1 = (F2(I+1,J)-F2(I,J))*DELTA 1/A1
DFX2 = (F2(I+1,J+1)-F2(I,J+1))*DELTA 1/A1
TBLU2 = F2(I,J) + DFX1 + (F2(I,J+1)-F2(I,J)+DFX2-DFX1)*DELTA 2/A 2
RETURN

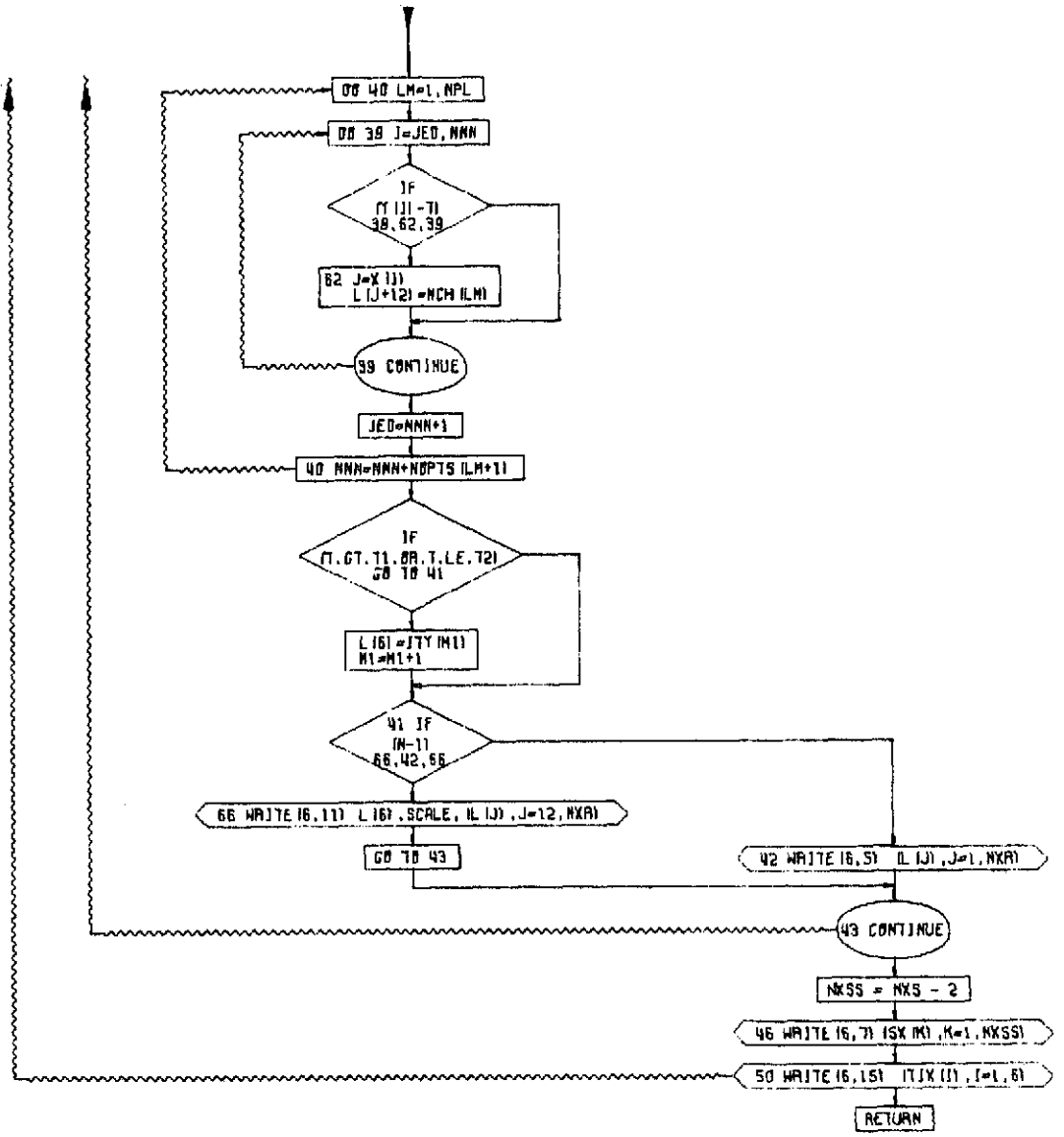

FUNCTION TBLU4(XX,YY,ZZ,WW,X,Y,Z,W,V,MDX,MDY,MDZ,MDW,
NLX,NLY,NLZ,NLW,NFX,NFY,NFZ,NFW)
NB X = MDX - 1
NB Y = MDY - 1
NB Z = MDZ - 1
NB W = MDW - 1
CALL SEARCH(X,XX,NB X,NLX,J,DELTA 1,A 1)
CALL SEARCH(Y,YY,NB Y,NLY,J,DELTA 2,A 2)
CALL SEARCH(Z,ZZ,NB Z,NLZ,K,DELTA 3,A 3)
CALL SEARCH(W,WW,NB W,NLW,L,DELTA 4,A 4)
DA1 = DELTA 1/A 1
DA2 = DELTA 2/A 2
DA3 = DELTA 3/A 3
DA4 = DELTA 4/A 4
VPX1 = VPX(DA1,V(I,J ,K ,L),V(I+1,J ,K ,L))
VPX2 = VPX(DA1,V(I,J+1,K ,L),V(I+1,J+1,K ,L))
VPX3 = VPX(DA1,V(I,J ,K+1,L),V(I+1,J ,K+1,L))
VPX4 = VPX(DA1,V(I,J+1,K+1,L),V(I+1,J+1,K+1,L))
VPX5 = VPX(DA1,V(I,J ,K ,L+1),V(I+1,J ,K ,L+1))
VPX6 = VPX(DA1,V(I,J+1,K ,L+1),V(I+1,J+1,K ,L+1))
VPX7 = VPX(DA1,V(I,J ,K+1,L+1),V(I+1,J ,K+1,L+1))
VPX8 = VPX(DA1,V(I,J+1,K+1,L+1),V(I+1,J+1,K+1,L+1))
VPXY1 = VPX(DA2,VPX1,VPX2)
VPXY2 = VPX(DA2,VPX3,VPX4)
VPXY3 = VPX(DA2,VPX5,VPX6)
VPXY4 = VPX(DA2,VPX7,VPX8)
VPXYW1 = VPX(DA3,VPXY1,VPXY2)
VPXYW2 = VPX(DA3,VPXY3,VPXY4)
TBLU4 = VPX(DA4,VPXYW1,VPXYW2)
RETURN

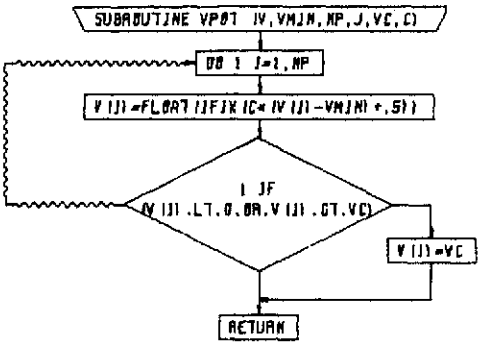

FUNCTION VPX(A,B,C)
VPX = B + A*(C-B)
RETURN


SUBROUTINE SEARCH(X,XX,N0X,MLX,J,DELTA,A)
1 N0 X = N0 X + 1
IF (XX.LT.X(N0 X)) GO TO 5
IF (N0 X.GE.MLX) GO TO 5
GO TO 1
5 DELTA = XX - X(N0 X)
I = N0 X
IF (N0 X.NE.1) GO TO 10
A = X(N0 X + 1) - X(N0 X)
RETURN
10 IF (XX.LT.X(MLX)) GO TO 20
DELTA = XX - X(N0 X-1)
A = X(N0X) - X(N0 X-1)
I = N0 X - 1
RETURN
20 DELTA = XX - X(N0 X - 1)
A = X(N0 X) - X(N0 X-1)
I = N0 X-1
RETURN


SUBROUTINE VPLOT (XS,XI,XA,YS,YI,YA,NPT,NPL,NC,LX,LY,XAN,YAN,IIX)
NXS=6
NXSM=NXS-1
XNXS=NXSM
NPN=NPT/NPL
IF (XAN.LE.0. OR.XAN.GT.100.)
XAN=100.
IF (YAN.LE.0.)
YAN=50.
NXA=XAN+12
NYA=YAN
NY=NYA+1
NCA=5
IF (LX.EQ.5)
NCA=4
NAC=2*NCA
DO 500 JJM=1,NPT
X(1,JJM)=XS(1,JJM)
500 Y(1,JJM)=YS(1,JJM)
DO 18 I=1,NPL
18 NOPTS(I)=NPN
NOPTS(NPL+1)=0
XAX=(100./XAN)*(XA-XI) + XI
SX(1)=XI
SX(NXS)=XAX
U=XI
DO 16 K=2,NXS
U=(XAX-XI)/XNXS+U
16 SX(K)=U+0.00001
CX=XAN / (XA-XI)
CALL VPOT (N,XI,NPT,0,XAN ,CX)
CY=YAN/ (YA-YI)


DO 50 MM=1,NC
T1 = YAN - 6.
T2 = T1 - 18
N1=1
CALL VPST (Y,YJ,NPT,1,YAN ,CY)
TT=YAN
TUP=YAN+1.
WRITE(6,100) HAAMJ,HAAMF,(ATENM1(J),J=1,5),(TITLE(J),J=1,18)
DO 43 MM=1,NY
N=1
JED=1
T=TUP-MM
DO 25 J=1,NXA
25 L(J)=NB
L(12)=ND
L(NXA)=ND
IF
(T-TT)
56,56,30
56 SCALE=T/CY+YJ
L(12)=NP
L(NXA)=NP
N=0
TT=TT-5.
90 CONTINUE
IF
(MM.NE.1.AND.MM.NE.NY)
GO TO 37
DO 32 J=12,NXA
32 L(J)=ND
DO 35 J=12,NXA,NRC
L(J+NCA)=MM
35 L(J)=NP
37 MMM=NOPTS(1)


DO 40 LM=1,NPL
DO 39 I=JED,NNN
IF
(T(I)-T)
38,62,39
62 J=X(I)
L(J+12)=MCH(LM)
39 CONTINUE
JED=NNN+1
40 NNN=NNN+NOPTS(LM+1)
IF
(T.GT.T1.OR.T.LE.T2)
GO TO 41
L(6)=TTY(M1)
M1=M1+1
41 IF
(N-1)
66,42,66
66 WRITE(6,11) L(6),SCALE,(L(J),J=12,NXA)
GO TO 43
42 WRITE(6,5) (L(J),J=1,NXA)
43 CONTINUE
NXSS = NXS - 2
46 WRITE(6,7) (SX(K),K=1,NXSS)
50 WRITE(6,15) (TJX(I),I=1,6)
RETURN


SUBROUTINE VPOT (V,VMIN,NP,J,VC,C)
DO 1 I=1,NP
V(I)=FLOAT(IFIX(C*(V(I)-VMIN)+.5))
IF
(V(I).LT.0.OR.V(I).GT.VC)
V(I)=VC
RETURN

APPENDIX 6

PHI PROGRAM LISTING

```
C
C
C     PROGRAM TO EVALUATE THE RELATIVE EFFECTIVNESS OF INLET AND
C     FANDUCT LINING MATERIALS
C
C     REFERENCE  DOCUMENT  D3-8686
C
C     LON1=1        WRITE INPUT
C     LON2=1        WRITE REVISED INPUT
C     LON3=1        PLOT ATTENUATIONS
C     LON4=1        PLOT PHI STUDY
C      IPHI = 0  SHORT PRINT OUT FOR DOCUMENTATION
C      IPHI = 1  LONG PRINT OUT TO GET DESIGN FACTORS
C
C
      REAL              NEWPNL
      DIMENSION         X(25),      Y(25),      Z(25)
      DIMENSION         ATT(625),   DEPNL(625)
      DIMENSION         DEPNL2(5,5)
      DIMENSION         TIX1(6),    TIX2(6)
      DIMENSION         ATENM2(5),   ATT2(625),   TFARR(5,5,5,5)
      COMMON / COMM1 / OLDPNL(625), NEWPNL(625), NRSCK(625),NTYPE(625)
     1                ,CKIF(625),  CKFF(625),  CKIH(625),  CKFH(625)
      COMMON / COMM2 / K1,K2,K3,K4,NR1,NR2,NR3,NR4,NR5,NERROR,K10,K14
      COMMON / COMM3 / IFLAG,IPHI,NTH,NFI,NST,NIN,NZA,NZB
      COMMON/COMM4/DPNL(5),XINLET(150),YFAN(150)
      COMMON/COMM5/ C1,C2,C3,C4,C5,CDEPNL
      COMMON / COMM6 / ATENM1(5),ABC(5)
      COMMON / COMM7 / LON1,LON2,LON3,LON4,LON5,LON6,LON7,LON8
      DIMENSION         CDEPN(6)
      DATA CDEPN        /10.,5*0./
      DATA  ATENM2      /0.,5.,10.,20.,30./
      DATA  ATENM1      /0.,5.,10.,20.,30./
      EQUIVALENCE       (ATT(1),DEPNL(1))
      DATA              ABC/'A','B','C','D','E'/
      DATA  TIX1       /'INLE','T AT','TENU','ATIO','N   ','     '/
      DATA  TIX2       /'FAN ','DUCT',' ATT','ENUA','TION','     '/
      COMMON            / RFOPLO / HARMI,HARMF,TITLE(36)
    1 FORMAT('1')
   10 FORMAT(4F10.1,F10.2)
   15 FORMAT(/10X,'INLET'15X'FANDUCT'6X'D-EPNL'/5X'FUND.'5X'HARM.'
     1               5X'FUND.'5X'HARM.'/)
   20 FORMAT (10I5)
  251 FORMAT('1     DATA CORRECTIONS'///
     1' TYPE = 1  INCREASED INLET FUND. ATT. GAVE DECREASED DELTA EPNL'/
     2' TYPE = 2  INCREASED FAN   FUND. ATT. GAVE DECREASED DELTA EPNL'/
     3//3X' NO. '3X' TYPE'3X'INLET'3X'INLET'3X' FAN '3X' FAN '3X' OLD '
     43X' NEW '3X' DATA'/19X'FUND.'3X'HARM.'3X'FUND.'3X'HARM.'3X'DEPNL'
     53X'DEPNL'3X' CARD'/)
  255 FORMAT(2X,I3,8X,I1,1X,4(3X,F5.2),2(2X,F6.3),5X,I3)
  300 FORMAT(40X,F6.0)
```

PRECEDING PAGE BLANK NOT FILMED

```
  301 FORMAT(19A4)
  302 FORMAT(F10.0)
      XCU = ATENM1(5)
    5 CONTINUE
      DO  125  II=1,150
  125 YFAN(II)=0.
      NERROR = 0
      NR5 = 0
      READ (5,301,END=500) TITLE
      READ  (5,20)  K1,K10
      READ  (5,20)  LON1,LON2,LON3,LON4,NTH,NST,NIN,IPHI
      NZA=(NTH-NST)/NIN+1
      IF (K1.EQ.5)  GO TO 120
      ATENM1(4)=ATENM1(5)
      ATENM2(4)=ATENM2(5)
  120 IF (K10.EQ.0)  K10=K1
      NFI=K1
      K14=K1*K1*K1*K1
      READ(5,10) C1,C2,C3,C4,C5
      READ (5,300)   (ATT2(I),I=1,K14)
      READ (5,302) CORREC
      DO 30 N=1,K14
   30 ATT2(N) = ATT2(N) + CORREC
      IF (LON1.EQ.1)  CALL  WRATE (ATT2,ATENM2)
      CALL        INTRE (ATT2,ATT,TFARR,ATENM1,ATENM2)
      IF (LON2.EQ.1)  CALL  WRATE (ATT ,ATENM1)
      NC=1
C     DO 250 NC = 1,1
      I = 1
      CDEPNL = CDEPN(NC)
      K3 =0
      DO 200 NR4 = 1,K10
      NPT1=0
      DO 100 NR3 = 1,K10
      HARMF = ATENM1(NR4)
      HARMI = ATENM1(NR3)
      K2 =0
      NPT=0
      DO 90  NR2 = 1,K1
      DO 90  NR1 = 1,K1
      NPT=NPT+1
      K2 = K2+1
      K3 = K3+1
      NR5 = NR5 + 1
      X(K2) = ATENM1 (NR1)
      Z(K2) = ATENM1(NR2)
      IF(NC.GT.1) GO TO 87
      CALL        SERROR (DEPNL,ATENM1)
   87 CONTINUE
      Y(K2) = DEPNL(K3)
      DEPNL2(NR1,NR2) = DEPNL(K3)
```

```
   90 CONTINUE
      IF (LON3.EQ.0)  GO TO 99
      NPL=NFI
      CALL VPLOT(X    ,0.,30.,Y      ,0.,15. ,NPT ,NPL ,1,2,2,60.,30.,TIX1)
      WRITE(6,15)
      WRITE(6,10) (X(K4),HARMI,Z(K4),HARMF,Y(K4), K4=1,K2)
   99 CONTINUE
      DO  95  N=NST,NTH,NIN
      NPT1=NPT1+1
      N1=NPT1
      XINLET(N1) = N
      DO  98  L=1,K1
   98 DPNL(L) = TBLU2(XINLET(N1),ATENM1(L),ATENM1,ATENM1,DEPNL2
     1                  ,I,I,K1,K1,5,5)
      YFAN(N1) = TBLU1(CDEPNL,DPNL,ATENM1,I,K1)
      A = YFAN(N1)
C     IF(A.GE.XCU.OR.A.LT.ATENM1(1)) YFAN(N1) = 1000000.
   95 CONTINUE
  100 CONTINUE
      NPL1=NFI
      HARMI = CDEPNL
      IF (LON4.EQ.0)  GO TO 200
      CALL VPLOT(YFAN,0.,30.,XINLET,0.,30.,NPT1,NPL1,1,2,2,60.,30.,TIX2)
      CALL WROTE
  200 CONTINUE
  250 CONTINUE
      IF(NERROR.EQ.0) GO TO 5
      WRITE (6,251)
      DO 275 N1 =1,NERROR
      WRITE (6,255) N1,NTYPE(N1),CKIF(N1),CKIH(N1),CKFF(N1),CKFH(N1),
     1          OLDPNL(N1),NEWPNL(N1),NR5CK(N1)
  275 CONTINUE
      GO TO 5
  500 CONTINUE
      WRITE(6,1)
      STOP
      END
```

```
      SUBROUTINE SERROR (DEPNL,ATENM1)
      REAL               NEWPNL
      COMMON / COMM1 / OLDPNL(625), NEWPNL(625), NR5CK(625),NTYPE(625)
     1                ,CKIF(625),  CKFF(625),  CKIH(625),  CKFH(625)
      COMMON / COMM2 / K1,K2,K3,K4,NR1,NR2,NR3,NR4,NR5,NERROR,K10,K14
      COMMON / COMM7 / LON1,LON2,LON3,LON4,LON5,LON6,LON7,LON8
      DIMENSION          DEPNL(625),ATENM1(5)
      IF(NR2.EQ.1) GO TO 84
      IF(DEPNL(K3).GT.DEPNL(K3-K1)) GO TO 84
      SAVE1 = DEPNL(K3)
      SAVE2 = DEPNL(K3-K1)
      TYPE = 2
      GO TO 85
   84 IF(NR1.EQ.1) GO TO 87
      IF(DEPNL(K3).GT.DEPNL(K3-1)) GO TO 87
      SAVE1 = DEPNL(K3)
      SAVE2 = DEPNL(K3-1)
      TYPE = 1
   85 NERROR = NERROR + 1
      OLDPNL(NERROR) = SAVE1
      DEPNL(K3) = SAVE2+ .001
      NEWPNL(NERROR) = DEPNL(K3)
      NR5CK(NERROR) = NR5
      CKIF(NERROR) = ATENM1(NR1)
      CKFF(NERROR) = ATENM1(NR2)
      CKIH(NERROR) = ATENM1(NR3)
      CKFH(NERROR) = ATENM1(NR4)
      NTYPE(NERROR) = TYPE
      IF(TYPE.EQ.2.) GO TO 84
   87 CONTINUE
      RETURN
      END
```

```
      SUBROUTINE WROTE
      COMMON / COMM2 / K1,K2,K3,K4,NR1,NR2,NR3,NR4,NR5,NERROR,K10,K14
      COMMON / COMM3 / IFLAG,IPHI,NTH,NFI,NST,NIN,NZA,NZB
      COMMON/COMM4/DPNL(5),XINLET(150),YFAN(150)
      COMMON/COMM5/ C1,C2,C3,C4,C5,CDEPNL
      COMMON / COMM6 / ATENM1(5),ABC(5)
      COMMON / COMM7 / LON1,LON2,LON3,LON4,LON5,LON6,LON7,LON8
    1 FORMAT('1')
    2 FORMAT (/)
   16 FORMAT(//10X'DELTA EPNL    = 'F5.1,10X'FAN HARMONIC = 'F5.1
     1                /                    26X'A'10X'B'9X' C'9X' D'9X' E'/
     1  4X'INLET HARMONIC = '5X,5(F4.1,7X)/
     1                      /10X'INLET'2X,5(8X'FAN')/10X'FUND.'3X,
     2       5(6X'FUND.')/)
   17 FORMAT(9X,F6.2,3X,5(5X,F6.2))
   22 FORMAT(5X,F5.2,6X,5(3X,F5.2),12X,A1,1X,F5.2,5(2X,F7.2))
   23 FORMAT(68X,A1,1X,F5.2,5(2X,F7.2))
   94 FORMAT(5X'DELTA EPNL    = 'F4.1,10X'FAN HARMONIC = 'F4.1/)
   96 FORMAT(21X'A'7X'B'7X'C'7X'D'7X'E'16X'FUNCTION PHI'/3X'INLET HARMON
     1IC ='  2X,5(F4.1,4X),12X, 'C1 = 'F5.3,3X'C2 = 'F5.3,3X
     3  'C3 = 'F5.3,3X'C4 = 'F5.3/70X'EXPONENT C5 = 'F5.3/5X'INLET'5X,
     4 5(5X'FAN'),15X'INLET'2X'  PHI  '2X'PHI(IF)'2X'PHI(IH)'2X'PHI(FF)'
     5  2X'PHI(FH)')
   97 FORMAT(5X'FUND.'6X,5(3X,'FUND.'),14X'HARM.' )
      XCU=ATENM1(NFI)
      IF(IPHI.EQ.1) GO TO 110
      WRITE(6,16) CDEPNL,ATENM1(NR4),(ATENM1(IHV),IHV=1,5)
      DO  175  N=1,NZA
  175 WRITE(6,17) XINLET(N),(YFAN(N1*NZA-NZA+N),N1=1,NFI)
  110 IF(IPHI.EQ.0) GO TO 200
      WRITE(6,1)
      WRITE(6,94) CDEPNL,ATENM1(NR4)
      WRITE (6,96)(ATENM1(IHV),IHV=1,5),C1,C2,C3,C4,C5
      WRITE(6,97)
      DO  375  N=1,NZA
      PHI1 = C1*XINLET(N)**C5
      PHI4 = C4*ATENM1(NR4)**C5
      WRITE(6,2)
      DO  370  N1=1,NFI
      PHI2 = C2*ATENM1(N1)**C5
      NK=N1*NZA-NZA+N
      PHI3 = C3*YFAN(NK)**C5
C     IF(YFAN(NK).GE.XCU) PHI3 = 10000000.
      PHI = PHI1+PHI2+PHI3+PHI4
      IF(N1.EQ.1) WRITE(6,22)XINLET(N),(YFAN(N2*NZA-NZA+N),N2=1,5)
     1                       ,ABC(N1),ATENM1(N1),PHI,PHI1,PHI2,PHI3,PHI4
      IF(N1.NE.1) WRITE(6,23)ABC(N1),ATENM1(N1),PHI,PHI1,PHI2,PHI3,PHI4
  370 CONTINUE
  375 CONTINUE
  200 CONTINUE
      RETURN
```

```
      SUBROUTINE WRATE (ATT ,ATENM2)
      DIMENSION         ATT(1),ATENM2(1)
      COMMON / COMM2 / K1,K2,K3,K4,NR1,NR2,NR3,NR4,NR5,NERROR,K10,K14
  681 FORMAT('1'20X,'INLET'15X'FANDUCT'6X'D-FPNL'14X'DATA'/
     1        17X'FUND.'5X'HARM. '
     2                 5X'FUND.'5X'HARM. '22X'CARD')
  682 FORMAT(11X,4F10.1,F10.2,12X,I5)
  683 FORMAT(/)
      WRITE(6,681)
      NRC=0
      DO 605 NR4 = 1,K10
      DO 605 NR3 = 1,K10
      WRITE(6,683)
      DO 605 NR2 = 1,K1
      DO 605 NR1 = 1,K1
      NRC = NRC + 1
      WRITE(6,682) ATENM2(NR1),ATENM2(NR3),ATENM2(NR2),ATENM2(NR4),
     1              ATT (NRC),NRC
  605 CONTINUE
      RETURN
      END
```

```
      SUBROUTINE INTRE (ATT2,ATT,TFARR,ATENM1,ATENM2)
      COMMON / COMM2 / K1,K2,K3,K4,NR1,NR2,NR3,NR4,NR5,NERROR,K10,K14
      DIMENSION        TFARR(5,5,5,5)
      DIMENSION        ATT2(1),ATT (1),ATENM1(1),ATENM2(1)
      KK3 = 0
      DO  610  NR4=1,K10
      DO  610  NR3=1,K10
      DO 610 NR2 = 1,K1
      DO 610 NR1 = 1,K1
      KK3 = KK3 + 1
      TFARR(NR1,NR2,NR3,NR4) = ATT2(KK3)
  610 CONTINUE
      KK4 = 0
      DO  620  NR4=1,K10
      DO  620  NR3=1,K10
      DO 620 NR2 = 1,K1
      DO 620 NR1 = 1,K1
      KK4 = KK4 + 1
      ATT(KK4) = TBLU4(ATENM1(NR1),ATENM1(NR2),ATENM1(NR3),ATENM1(NR4),
     1                 ATENM2,ATENM2,ATENM2,ATENM2,TFARR,
     2                 1,1,1,1,K10,K10,K1,K1,5,5,5,5)
  620 CONTINUE
      RETURN
      END
```

```
FUNCTION TBLU1(XX,X,Y,MDX,NLX)
DIMENSION X(1),Y(1)
NO X = MDX-1
CALL SEARCH(X,XX,NO X,NLX,I,DELTA 1,A 1)
TBLU1 = Y(I) + (Y(I+1)-Y(I))*DELTA 1/A 1
RETURN
END
```

```
FUNCTION TBLU2(XX,YY,X,Y,F2,MDX,MDY,NLX,NLY,NFX,NFY)
DIMENSION F2(NFX,NFY),X(1),Y(1)
NO X = MDX-1
NO Y = MDY-1
CALL SEARCH(X,XX,NO X,NLX,I,DELTA 1,A 1)
CALL SEARCH(Y,YY,NO Y,NLY,J,DELTA 2,A 2)
DFX1 = (F2(I+1,J)-F2(I,J))*DELTA 1/A1
DFX2 = (F2(I+1,J+1)-F2(I,J+1))*DELTA 1/A1
TBLU2 = F2(I,J) + DFX1 + (F2(I,J+1)-F2(I,J)+DFX2-DFX1)*DELTA 2/A 2
RETURN
END
```

```
      FUNCTION TBLU4(XX,YY,ZZ,WW,X,Y,Z,W,V,MDX,MDY,MDZ,MDW,
     1                NLX,NLY,NLZ,NLW,NFX,NFY,NFZ,NFW)
      DIMENSION    V(NFX,NFY,NFZ,NFW),X(1),Y(1),Z(1),W(1)
      NO X = MDX - 1
      NO Y = MDY - 1
      NO Z = MDZ - 1
      NO W = MDW - 1
      CALL SEARCH(X,XX,NO X,NLX,I,DELTA 1,A 1)
      CALL SEARCH(Y,YY,NO Y,NLY,J,DELTA 2,A 2)
      CALL SEARCH(Z,ZZ,NO Z,NLZ,K,DELTA 3,A 3)
      CALL SEARCH(W,WW,NO W,NLW,L,DELTA 4,A 4)
      DA1 = DELTA 1/A 1
      DA2 = DELTA 2/A 2
      DA3 = DELTA 3/A 3
      DA4 = DELTA 4/A 4
      VPX1    = VPX(DA1,V(I,J   ,K   ,L   ),V(I+1,J   ,K   ,L   ))
      VPX2    = VPX(DA1,V(I,J+1,K   ,L   ),V(I+1,J+1,K   ,L   ))
      VPX3    = VPX(DA1,V(I,J   ,K+1,L   ),V(I+1,J   ,K+1,L   ))
      VPX4    = VPX(DA1,V(I,J+1,K+1,L   ),V(I+1,J+1,K+1,L   ))
      VPX5    = VPX(DA1,V(I,J   ,K   ,L+1),V(I+1,J   ,K   ,L+1))
      VPX6    = VPX(DA1,V(I,J+1,K   ,L+1),V(I+1,J+1,K   ,L+1))
      VPX7    = VPX(DA1,V(I,J   ,K+1,L+1),V(I+1,J   ,K+1,L+1))
      VPX8    = VPX(DA1,V(I,J+1,K+1,L+1),V(I+1,J+1,K+1,L+1))
      VPXY1   = VPX(DA2,VPX1,VPX2)
      VPXY2   = VPX(DA2,VPX3,VPX4)
      VPXY3   = VPX(DA2,VPX5,VPX6)
      VPXY4   = VPX(DA2,VPX7,VPX8)
      VPXYW1  = VPX(DA3,VPXY1,VPXY2)
      VPXYW2  = VPX(DA3,VPXY3,VPXY4)
      TBLU4   = VPX(DA4,VPXYW1,VPXYW2)
      RETURN
      END
```

```
FUNCTION VPX(A,B,C)
VPX = B + A*(C-B)
RETURN
END
```

```
      SUBROUTINE SEARCH(X,XX,NOX,NLX,I,DELTA,A)
      DIMENSION X(1)
    1 NO X = NO X + 1
      IF(XX.LT.X(NO X)) GO TO 5
      IF(NO X.GE.NLX)GO TO 5
      GO TO 1
    5 DELTA = XX - X(NO X)
      I = NO X
      IF(NO X.NE.1) GO TO 10
      A = X(NO X + 1) - X(NO X)
      RETURN
   10 IF(XX.LT.X(NLX)) GO TO 20
      DELTA = XX - X(NO X-1)
      A = X(NOX) - X(NO X-1)
      I = NO X - 1
      RETURN
   20 DELTA = XX - X(NO X - 1)
      A = X(NO X) - X(NO X-1)
      I = (NO X-1)
      RETURN
      END
```

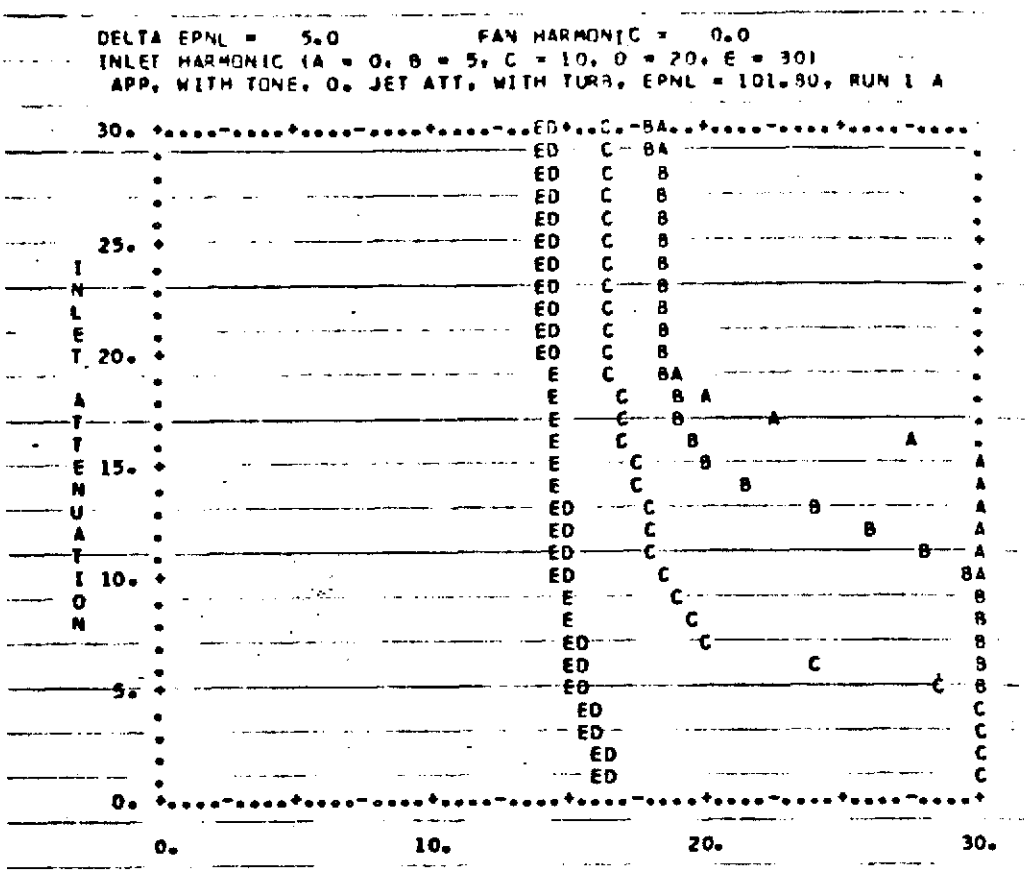
```
      SUBROUTINE VPLOT (XS,XI,XA,YS,YI,YA,NPT,NPL,NC,LX,LY,XRN,YRN,TIX)
      DIMENSION        XS(1),YS(1),NOPTS(30),SX(20),X(200),Y(200)
      DIMENSION        ITY(18),TIX(6),L(120),NCH(27)
      COMMON           / RFOPLO / HARMI,HARMF,TITLE(36)
      COMMON / COMM6 / ATENM1(5),ABC(5)
      DATA             ND/'.'/,NP/'+'/,NM/'-'/,NB/' '/
      DATA             NCH/'A','B','C','D','E','F','G','H','I','J',
     1                     'K','L','M','N','O','P','Q','R','S','T','U',
     2                     'V','W','X','Y','Z',' '/
      DATA  ITY       /'I','N','L','E','T',' ','A','T','T','E','N','U',
     1                 'A','T','I','O','N',' '/
    3 FORMAT('1'18A4/18A4)
  100 FORMAT('1      DELTA EPNL = 'F5.1,10X'FAN HARMONIC = 'F5.1/7X
     1       'INLET HARMONIC (A = 'F4.1 'B = 'F4.1 ' C = 'F4.1
     1     ' D = 'F4.1 ' E = 'F4.1
     1      /7X,18A4/)
    5 FORMAT(120A1)
    7 FORMAT(/F13.0,10F20.0)
   11 FORMAT(5X,A1,1X,F3.0,1X,109A1)
   15 FORMAT(/30X,6A4)
      NXS=6
      NXSM=NXS-1
      XNXS=NXSM
      NPN=NPT/NPL
      IF (XRN.LE.0. OR.XRN.GT.100.) XRN=100.
      IF (YRN.LE.0.) YRN=50.
      NXR=XRN+12
      NYR=YRN
      NY=NYR+1
      NCR=5
      IF (LX.EQ.5)NCR=4
      NRC=2*NCR
      DO   500   IJM=1,NPT
      X(IJM)=XS(IJM)
  500 Y(IJM)=YS(IJM)
      DO  18  I=1,NPL
   18 NOPTS(I)=NPN
      NOPTS(NPL+1)=0
      XAX=(100./XRN)*(XA-XI) + XI
      SX(1)=XI
      SX(NXS)=XAX
      U=XI
      DO   16   K=2,NXS
      U=(XAX-XI)/XNXS+U
   16 SX(K)=U+0.0001
      CX=XRN /(XA-XI)
      CALL          VPOT   (X,XI,NPT,0,XRN ,CX)
      CY=YRN/(YA-YI)
      DO   50   NN=1,NC
      T1 = YRN - 6.
      T2 = T1 - 18
```

```
      M1=1
      CALL          VPOT   (Y,YI,NPT,1,YRN ,CY)
      TT=YRN
      TUP=YRN+1.
      WRITE(6,100) HARMI,HARMF,(ATENM1(I),I=1,5),(TITLE(I),I=1,18)
      DO   43   KK=1,NY
      N=1
      JED=1
      T=TUP-KK
      DO   25   J=1,NXR
   25 L(J)=NB
      L(12)=NC
      L(NXR)=NC
      IF(T-TT) 56,56,30
   56 SCALE=T/CY+YI
      L(12)=NP
      L(NXR)=NP
      N=0
      TT=TT-5.
   30 CONTINUE
      IF (KK.NE.1.AND.KK.NE.NY) GO TO 37
      DO   32   J=12,NXR
   32 L(J)=ND
      DO   35   J=12,NXR,NRC
      L(J+NCR)=NM
   35 L(J)=NP
   37 NNN=NOPTS(1)
      DO   40   LM=1,NPL
      DO   39   I=JED,NNN
      IF(Y(I)-T) 39,62,39
   62 J=X(I)
      L(J+12)=NCH(LM)
   39 CONTINUE
      JED=NNN+1
   40 NNN=NNN+NOPTS(LM+1)
      IF (T.GT.T1.OR.T.LE.T2) GO TO 41
      L(6)=ITY(M1)
      M1=M1+1
   41 IF(N-1) 66,42,66
   66 WRITE(6,11) L(6),SCALE,(L(J),J=12,NXR)
      GO TO 43
   42 WRITE(6,5) (L(J),J=1,NXR)
   43 CONTINUE
      NXSS = NXS - 2
   46 WRITE(6,7)(SX(K),K=1,NXSS)
   50 WRITE(6,15) (TIX(I),I=1,6)
      RETURN
      END
```

```
      SUBROUTINE VPOT (V,VMIN,NP,J,VC,C)
      DIMENSION        V(1)
      DO   1   I=1,NP
      V(I)=FLOAT(IFIX(C*(V(I)-VMIN)+.5))
    1 IF (V(I).LT.0.OR.V(I).GT.VC) V(I)=VC
      RETURN
      END
```

APPENDIX 7

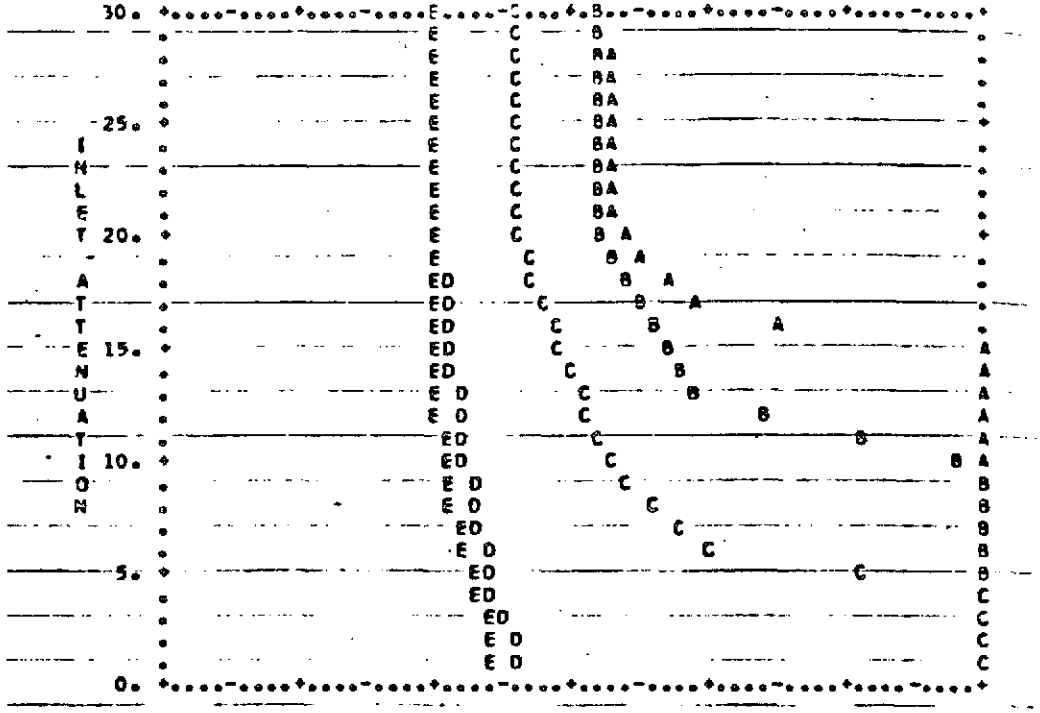
EPNL ACOUSTIC TRADE STUDY RESULTS



FAN HARMONIC = 0.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	15.57	15.99
2.00	******	******	******	16.32	15.79
3.00	******	******	******	16.07	15.59
4.00	******	******	******	15.84	15.39
5.00	******	******	28.44	15.61	15.19
6.00	******	******	23.88	15.47	15.08
7.00	******	******	19.98	15.34	14.97
8.00	******	******	19.43	15.20	14.87
9.00	******	******	18.92	15.06	14.77
10.00	******	29.75	18.43	14.92	14.67
11.00	******	27.89	18.20	14.88	14.62
12.00	******	25.90	17.98	14.84	14.57
13.00	******	23.79	17.77	14.79	14.53
14.00	******	21.53	17.56	14.75	14.48
15.00	******	19.88	17.35	14.71	14.44
16.00	27.35	19.55	17.15	14.67	14.39
17.00	22.69	19.22	16.96	14.62	14.35
18.00	19.75	18.90	16.77	14.58	14.31
19.00	19.21	18.59	16.59	14.54	14.27
20.00	18.70	18.29	16.41	14.50	14.22
21.00	18.66	18.28	16.40	14.50	14.22
22.00	18.62	18.28	16.40	14.50	14.22
23.00	18.58	18.28	16.40	14.50	14.22
24.00	18.54	18.27	16.40	14.50	14.22
25.00	18.50	18.27	16.40	14.50	14.22
26.00	18.46	18.26	16.40	14.49	14.22
27.00	18.42	18.26	16.40	14.49	14.22
28.00	18.38	18.25	16.40	14.49	14.22
29.00	18.34	18.25	16.40	14.49	14.22
30.00	18.30	18.24	16.40	14.49	14.22

DELTA EPNL = 5.0 FAN HARMONIC = 5.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
APP. WITH TONE, 0. JET ATT. WITH TURN, EPNL = 101.80, RUN 1 A

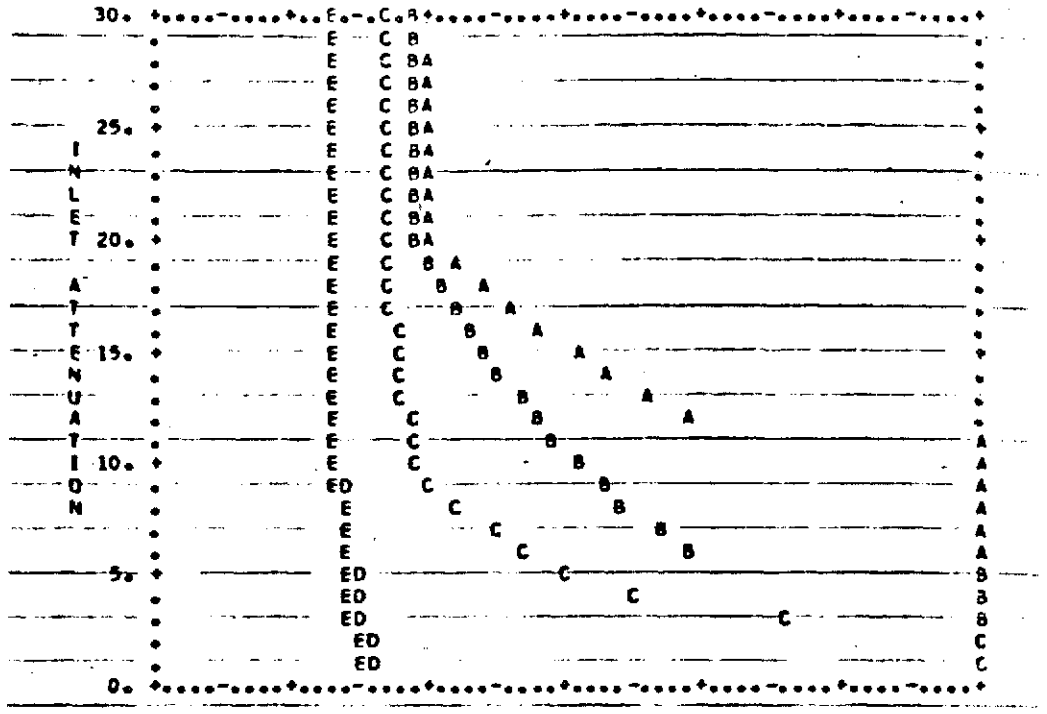


FAN DUCT ATTENUATION

FAN HARMONIC = 5.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	13.22	12.20
2.00	******	******	******	12.97	12.00
3.00	******	******	******	12.53	11.81
4.00	******	******	******	12.21	11.63
5.00	******	******	25.71	11.91	11.46
6.00	******	******	19.83	11.76	11.21
7.00	******	******	18.86	11.51	10.98
8.00	******	******	17.96	11.46	10.74
9.00	******	******	17.11	11.32	10.51
10.00	******	29.09	16.32	11.18	10.28
11.00	******	25.53	15.96	11.07	10.25
12.00	******	21.81	15.60	10.96	10.23
13.00	******	19.71	15.27	10.85	10.21
14.00	******	19.17	14.94	10.74	10.19
15.00	30.59	18.65	14.62	10.63	10.17
16.00	22.32	18.14	14.31	10.52	10.15
17.00	19.33	17.64	14.02	10.41	10.13
18.00	18.44	17.15	13.73	10.31	10.12
19.00	17.59	16.68	13.45	10.20	10.10
20.00	16.77	16.21	13.18	10.09	10.08
21.00	16.71	16.20	13.18	10.09	10.09
22.00	16.64	16.19	13.18	10.08	10.07
23.00	16.58	16.17	13.18	10.08	10.07
24.00	16.52	16.16	13.18	10.07	10.06
25.00	16.45	16.15	13.17	10.07	10.06
26.00	16.39	16.14	13.17	10.06	10.06
27.00	16.33	16.12	13.17	10.06	10.05
28.00	16.26	16.11	13.17	10.05	10.05
29.00	16.20	16.10	13.17	10.05	10.04
30.00	16.13	16.09	13.17	10.05	10.04

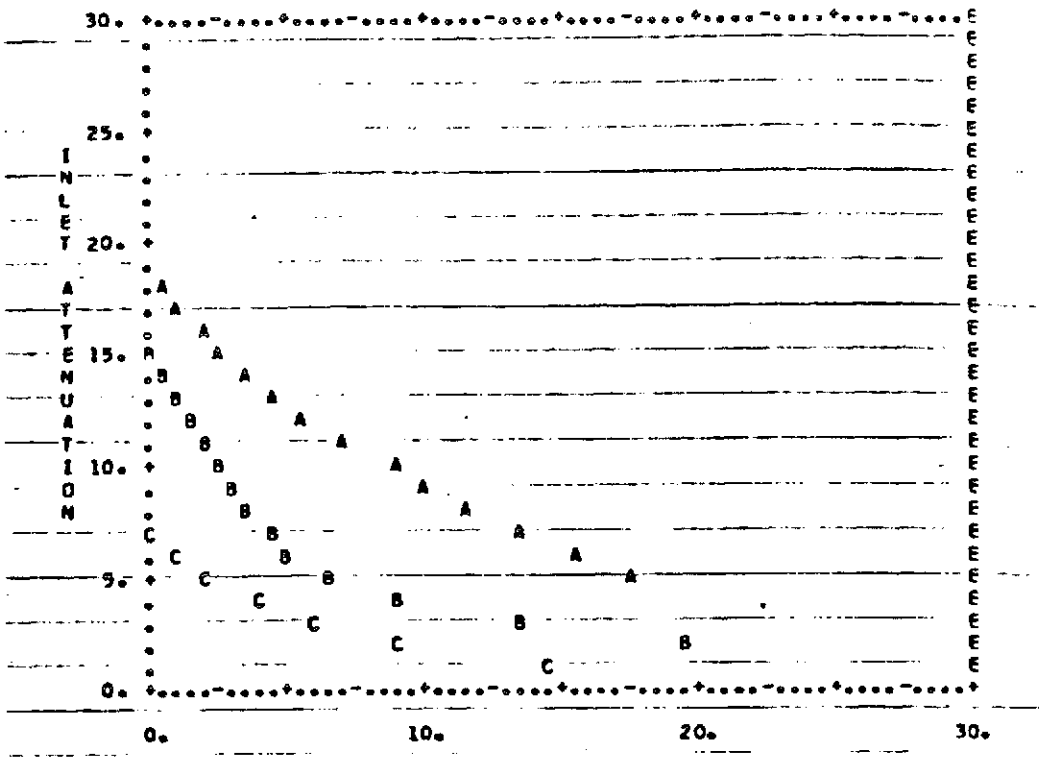
DELTA EPNL = 5.0 FAN HARMONIC = 10.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
APP, WITH TONE, 0. JET ATT, WITH TURB, EPNL = 101.80, RUN 1 A



FAN HARMONIC = 10.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	7.92	7.32
2.00	******	******	******	7.76	7.25
3.00	******	******	23.08	7.60	7.19
4.00	******	******	17.49	7.45	7.13
5.00	******	******	14.95	7.30	7.07
6.00	******	19.33	13.58	7.19	6.97
7.00	******	18.26	12.31	7.07	6.[illegible]
8.00	******	17.24	11.14	6.95	6.[illegible]
9.00	******	16.26	10.05	6.83	6.66
10.00	******	15.32	9.59	6.71	6.56
11.00	******	14.63	9.46	6.69	6.54
12.00	19.29	13.96	9.33	6.67	6.51
13.00	17.92	13.30	9.20	6.65	6.49
14.00	16.61	12.66	9.08	6.63	6.47
15.00	15.36	12.04	8.95	6.61	6.45
16.00	14.17	11.43	8.83	6.59	6.43
17.00	13.04	10.84	8.72	6.57	6.41
18.00	11.96	10.26	8.60	6.55	6.39
19.00	10.92	9.86	8.49	6.53	6.38
20.00	9.97	9.61	8.38	6.51	6.36
21.00	9.94	9.61	8.37	6.51	6.36
22.00	9.92	9.61	8.36	6.51	6.36
23.00	9.89	9.61	8.34	6.50	6.36
24.00	9.87	9.61	8.33	6.50	6.35
25.00	9.84	9.61	8.32	6.50	6.35
26.00	9.81	9.61	8.31	6.50	6.35
27.00	9.79	9.61	8.30	6.50	6.35
28.00	9.76	9.61	8.28	6.50	6.35
29.00	9.74	9.61	8.27	6.49	6.35
30.00	9.71	9.61	8.26	6.49	6.35

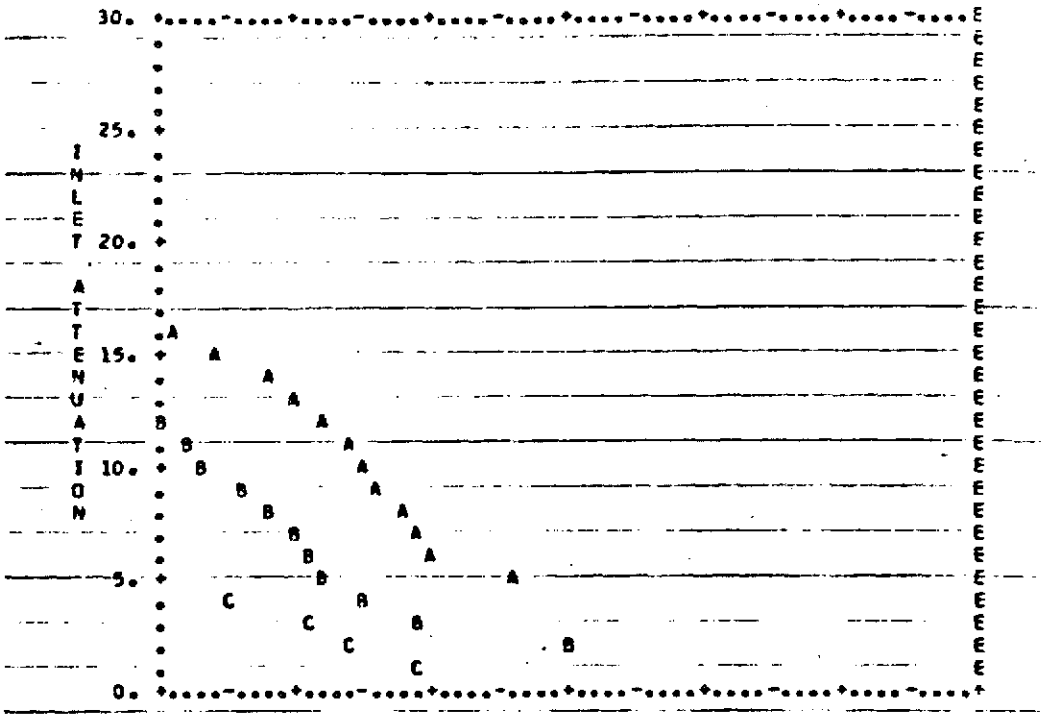
DELTA EPNL = 5.0 FAN HARMONIC = 20.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
APP, WITH TONE, 0. JET ATT, WITH TURB, EPNL = 101.80, RUN 1 A



FAN HARMONIC = 20.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	14.53	******	******
2.00	******	19.33	9.04	******	******
3.00	******	13.40	6.00	******	******
4.00	******	8.97	3.79	******	******
5.00	17.65	6.37	1.96	******	******
6.00	15.55	5.21	0.96	******	******
7.00	13.58	4.38	0.05	******	******
8.00	11.72	3.66	******	******	******
9.00	9.98	2.98	******	******	******
10.00	8.94	2.32	******	******	******
11.00	7.20	1.88	******	******	******
12.00	5.67	1.45	******	******	******
13.00	4.50	1.02	******	******	******
14.00	3.57	0.61	******	******	******
15.00	2.69	0.20	******	******	******
16.00	1.84	******	******	******	******
17.00	1.04	******	******	******	******
18.00	0.28	******	******	******	******
19.00	******	******	******	******	******
20.00	******	******	******	******	******
21.00	******	******	******	******	******
22.00	******	******	******	******	******
23.00	******	******	******	******	******
24.00	******	******	******	******	******
25.00	******	******	******	******	******
26.00	******	******	******	******	******
27.00	******	******	******	******	******
28.00	******	******	******	******	******
29.00	******	******	******	******	******
30.00	******	******	******	******	******

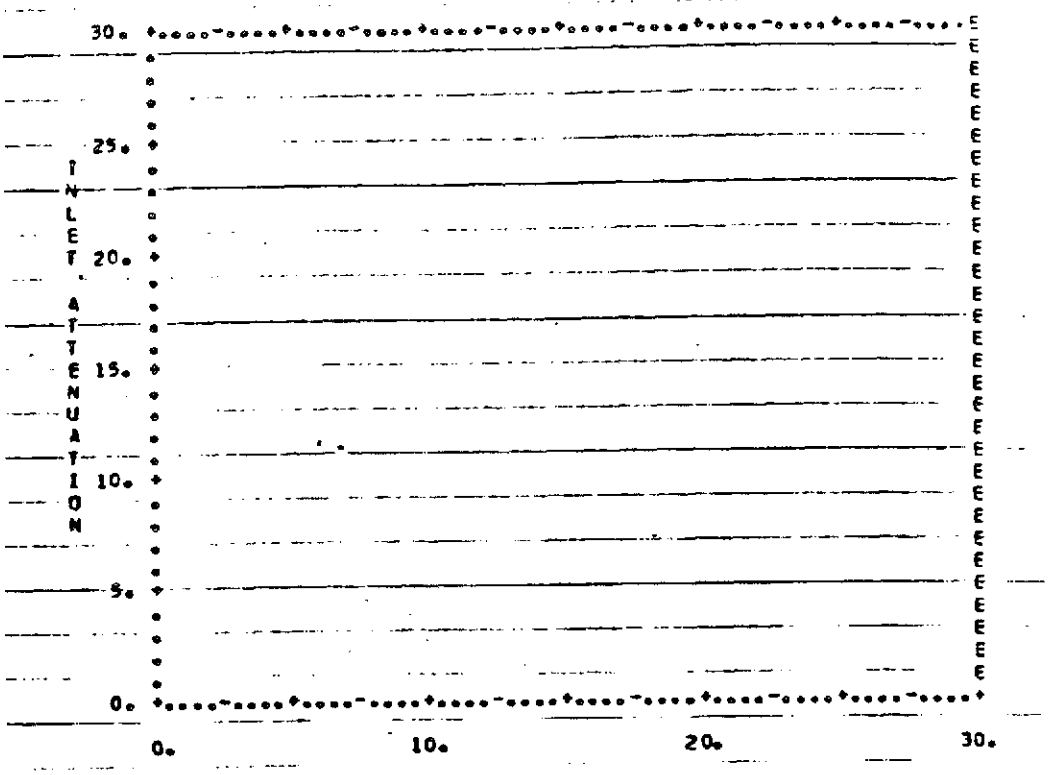
DELTA EPNL = 5.0 FAN HARMONIC = 30.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
APP. WITH TUNE, 0. JET ATT, WITH TURB, EPNL = 101.80, RUN 1 A



FAN HARMONIC = 30.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	9.55	******	******
2.00	******	15.20	7.21	******	******
3.00	******	9.26	5.44	******	******
4.00	******	7.58	2.71	******	******
5.00	13.24	6.21	******	******	******
6.00	10.11	5.59	******	******	******
7.00	9.38	5.02	******	******	****
8.00	8.78	3.90	******	******	******
9.00	8.22	2.80	******	******	******
10.00	7.69	1.73	******	******	******
11.00	6.75	0.86	******	******	******
12.00	5.91	0.00	******	******	******
13.00	5.15	******	******	******	******
14.00	3.77	******	******	******	******
15.00	2.22	******	******	******	******
16.00	0.69	******	******	******	******
17.00	******	******	******	******	******
18.00	******	******	******	******	******
19.00	******	******	******	******	******
20.00	******	******	******	******	******
21.00	******	******	******	******	******
22.00	******	******	******	******	******
23.00	******	******	******	******	******
24.00	******	******	******	******	******
25.00	******	******	******	******	******
26.00	******	******	******	******	******
27.00	******	******	******	******	******
28.00	******	******	******	******	******
29.00	******	******	******	******	******
30.00	******	******	******	******	******

DELTA EPNL = 10.0 FAN HARMONIC = 0.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
APP. WITH TONE, 0. JET ATT. WITH TURB. EPNL = 101.80. RUN 1 A

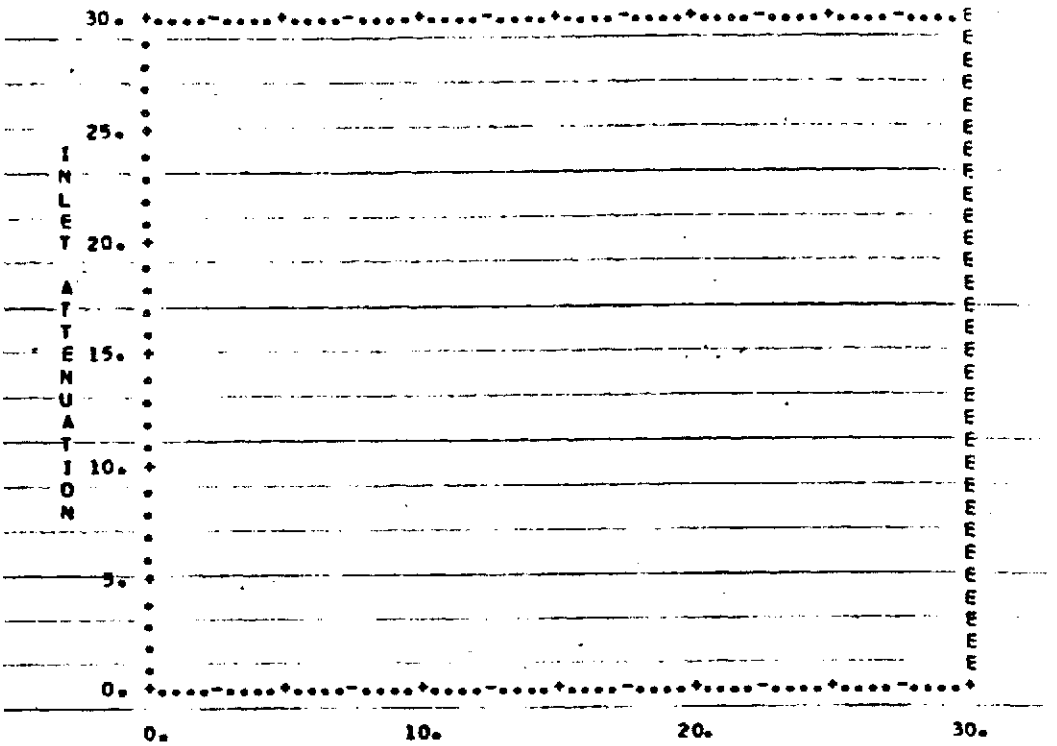


FAN DUCT ATTENUATION

FAN HARMONIC = 0.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	****
7.00	******	******	******	******	******
8.00	******	******	******	******	******
9.00	******	******	******	******	******
10.00	******	******	******	******	******
11.00	******	******	******	******	******
12.00	******	******	******	******	******
13.00	******	******	******	******	******
14.00	******	******	******	******	******
15.00	******	******	******	******	******
16.00	******	******	******	******	******
17.00	******	******	******	******	******
18.00	******	******	******	******	******
19.00	******	******	******	******	******
20.00	******	******	******	******	******
21.00	******	******	******	******	******
22.00	******	******	******	******	******
23.00	******	******	******	******	******
24.00	******	******	******	******	******
25.00	******	******	******	******	******
26.00	******	******	******	******	******
27.00	******	******	******	******	******
28.00	******	******	******	******	******
29.00	******	******	******	******	******
30.00	******	******	******	******	******

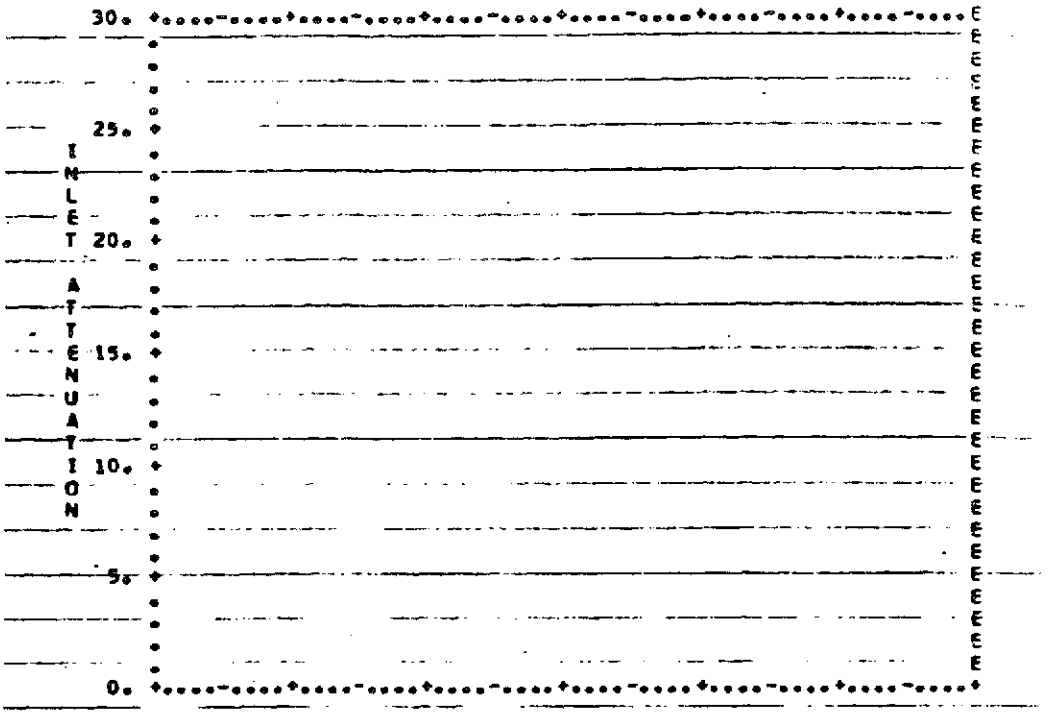
DELTA EPNL = 10.0 FAN HARMONIC = 5.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
APP, WITH TONE, 0, JET ATT, WITH TURB, EPNL = 101.80, RUN 1 A



FAN HARMONIC = 5.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	******
8.00	******	******	******	******	******
9.00	******	******	******	******	******
10.00	******	******	******	******	******
11.00	******	******	******	******	******
12.00	******	******	******	******	******
13.00	******	******	******	******	******
14.00	******	******	******	******	******
15.00	******	******	******	******	******
16.00	******	******	******	******	******
17.00	******	******	******	******	******
18.00	******	******	******	******	******
19.00	******	******	******	******	******
20.00	******	******	******	******	******
21.00	******	******	******	******	******
22.00	******	******	******	******	******
23.00	******	******	******	******	******
24.00	******	******	******	******	******
25.00	******	******	******	******	******
26.00	******	******	******	******	******
27.00	******	******	******	******	******
28.00	******	******	******	******	******
29.00	******	******	******	******	******
30.00	******	******	******	******	******

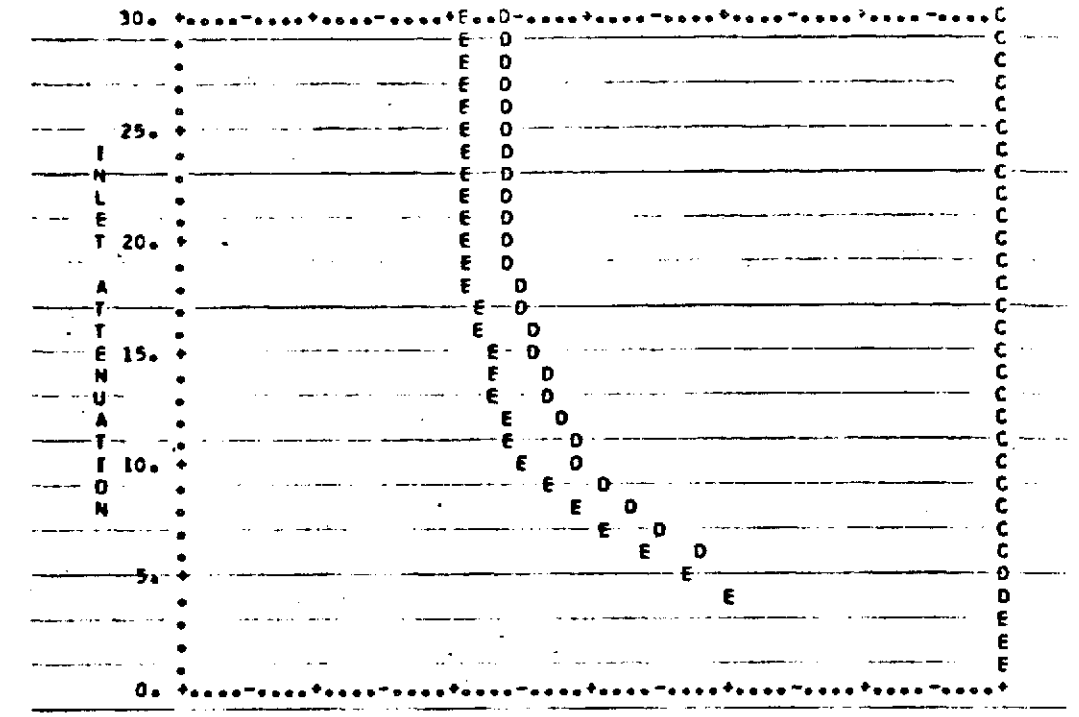
DELTA EPNL = 10.0 FAN HARMONIC = 10.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
APP, WITH TONE, 0. JET ATT, WITH TURB, EPNL = 101.80, RUN 1 A



FAN HARMONIC = 10.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	******
8.00	******	******	******	******	******
9.00	******	******	******	******	******
10.00	******	******	******	******	******
11.00	******	******	******	******	******
12.00	******	******	******	******	******
13.00	******	******	******	******	******
14.00	******	******	******	******	******
15.00	******	******	******	******	******
16.00	******	******	******	******	******
17.00	******	******	******	******	******
18.00	******	******	******	******	******
19.00	******	******	******	******	******
20.00	******	******	******	******	******
21.00	******	******	******	******	******
22.00	******	******	******	******	******
23.00	******	******	******	******	******
24.00	******	******	******	******	******
25.00	******	******	******	******	******
26.00	******	******	******	******	******
27.00	******	******	******	******	******
28.00	******	******	******	******	******
29.00	******	******	******	******	******
30.00	******	******	******	******	******

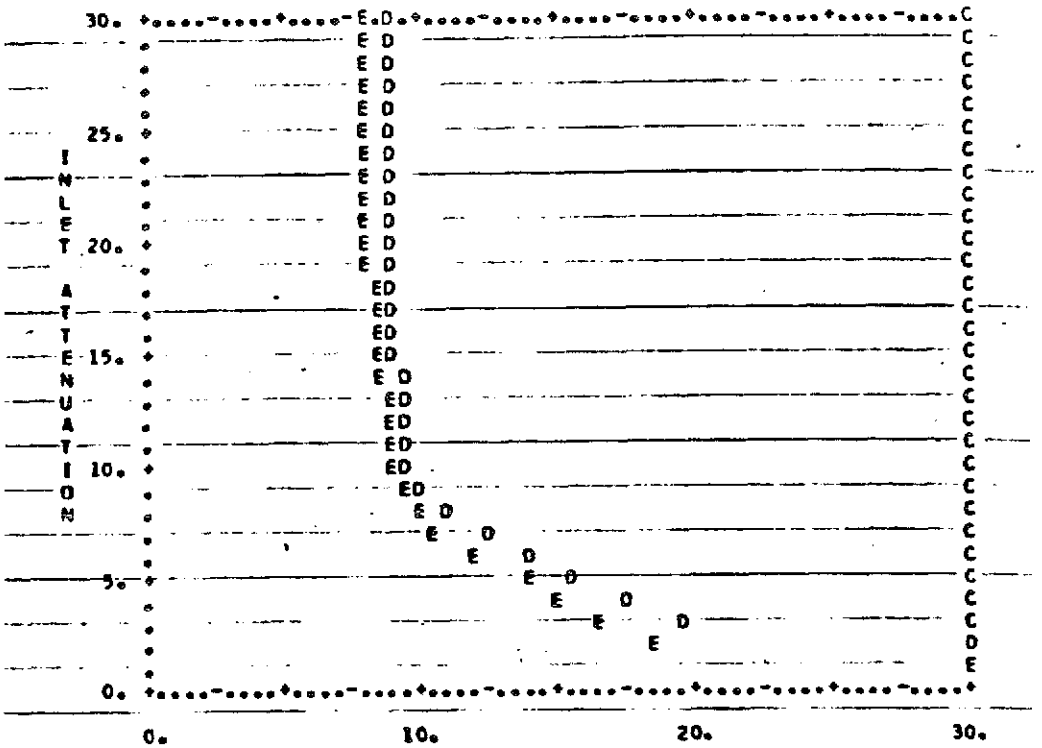
DELTA EPNL = 10.0 FAN HARMONIC = 20.0
INLET HARMONIC IA = 0, B = 5, C = 10, D = 20, E = 30
APP, WITH TONE, 0. JET ATT, WITH TURB, EPNL = 101.80, RUN 1 A



FAN HARMONIC = 20.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	20.02
5.00	******	******	******	******	18.63
6.00	******	******	******	18.84	16.99
7.00	******	******	******	17.64	15.57
8.00	******	******	******	16.55	14.35
9.00	******	******	******	15.54	13.28
10.00	******	******	******	14.60	12.34
11.00	******	******	******	14.30	12.12
12.00	******	******	******	14.00	11.91
13.00	******	******	******	13.71	11.70
14.00	******	******	******	13.43	11.59
15.00	******	******	******	13.16	11.30
16.00	******	******	******	12.89	11.11
17.00	******	******	******	12.64	10.93
18.00	******	******	******	12.39	10.75
19.00	******	******	******	12.15	10.57
20.00	******	******	******	11.91	10.40
21.00	******	******	******	11.91	10.40
22.00	******	******	******	11.91	10.40
23.00	******	******	******	11.91	10.40
24.00	******	******	******	11.91	10.40
25.00	******	******	******	11.91	10.40
26.00	******	******	******	11.91	10.40
27.00	******	******	******	11.91	10.40
28.00	******	******	******	11.91	10.40
29.00	******	******	******	11.91	10.40
30.00	******	******	******	11.91	10.40

DELTA EPNL = 10.0 FAN HARMONIC = 30.0
INLET HARMONIC IA = 0, B = 5, C = 10, D = 20, E = 30
APP, WITH TONE, 0. JET ATT, WITH TURB. EPNL = 101.80, RUN 1 A

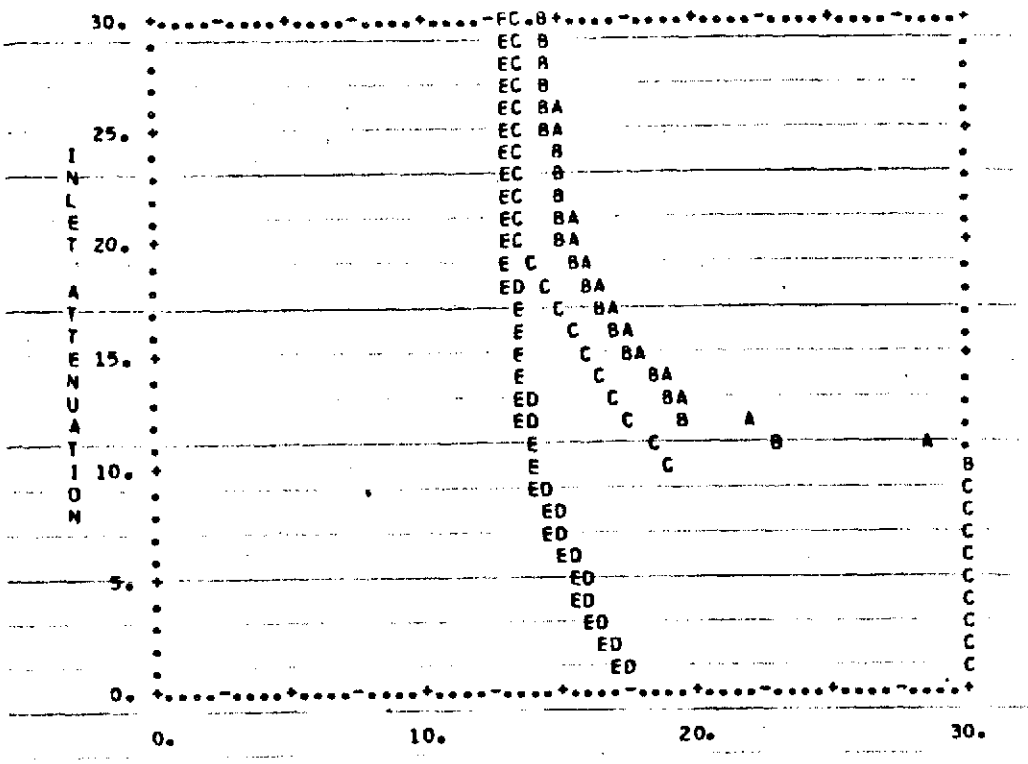


FAN DUCT ATTENUATION

FAN HARMONIC = 30.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	18.64
3.00	******	******	******	19.71	16.74
4.00	******	******	******	17.49	15.14
5.00	******	******	******	15.49	13.77
6.00	******	******	******	13.95	12.
7.00	******	******	******	12.38	10.
8.00	******	******	******	11.06	9.31
9.00	******	******	******	9.95	9.42
10.00	******	******	******	9.61	9.06
11.00	******	******	******	9.53	8.96
12.00	******	******	******	9.45	8.86
13.00	******	******	******	9.37	8.77
14.00	******	******	******	9.29	8.67
15.00	******	******	******	9.22	8.58
16.00	******	******	******	9.14	8.48
17.00	******	******	******	9.07	8.39
18.00	******	******	******	8.99	8.30
19.00	******	******	******	8.92	8.21
20.00	******	******	******	8.84	8.11
21.00	******	******	******	8.84	8.11
22.00	******	******	******	8.84	8.11
23.00	******	******	******	8.84	8.11
24.00	******	******	******	8.84	8.11
25.00	******	******	******	8.84	8.11
26.00	******	******	******	8.84	8.11
27.00	******	******	******	8.84	8.11
28.00	******	******	******	8.84	8.11
29.00	******	******	******	8.84	8.11
30.00	******	******	******	8.84	8.11

DELTA EPNL = 5.0 FAN HARMONIC = 0.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE, 0. JET ATT, NO TURB, EPNL = 103.02, RUN 2 A

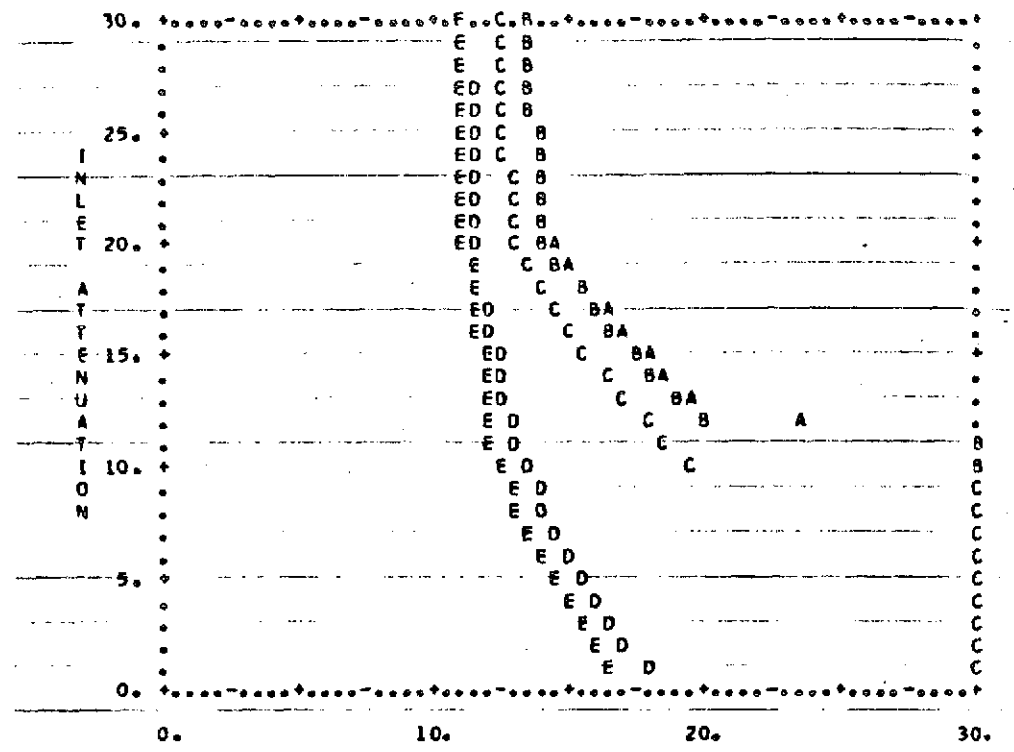


FAN DUCT ATTENUATION

FAN HARMONIC = 0.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	17.38	16.88
2.00	******	******	******	16.95	16.45
3.00	******	******	******	16.54	16.05
4.00	******	******	******	16.15	15.68
5.00	******	******	******	15.77	15.32
6.00	******	******	******	15.43	15.02
7.00	******	******	******	15.10	14.73
8.00	******	******	******	14.77	14.44
9.00	******	******	******	14.44	14.15
10.00	******	******	18.98	14.12	13.88
11.00	28.57	22.91	18.34	14.01	13.79
12.00	21.81	19.54	17.73	13.91	13.69
13.00	19.49	18.88	17.14	13.80	13.60
14.00	18.82	18.25	16.57	13.70	13.51
15.00	18.19	17.65	16.03	13.60	13.43
16.00	17.58	17.07	15.50	13.50	13.34
17.00	17.00	16.51	15.00	13.41	13.25
18.00	16.45	15.98	14.51	13.31	13.17
19.00	15.92	15.47	14.04	13.22	13.09
20.00	15.42	14.98	13.58	13.12	13.00
21.00	15.31	14.92	13.57	13.12	13.00
22.00	15.21	14.87	13.55	13.11	13.00
23.00	15.10	14.81	13.53	13.11	13.00
24.00	15.00	14.76	13.51	13.10	12.99
25.00	14.90	14.71	13.49	13.10	12.99
26.00	14.80	14.65	13.47	13.09	12.99
27.00	14.70	14.60	13.45	13.08	12.99
28.00	14.60	14.55	13.43	13.08	12.98
29.00	14.50	14.49	13.41	13.07	12.98
30.00	14.40	14.44	13.39	13.07	12.97

DELTA EPNL = 5.0 FAN HARMONIC = 5.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE, 0. JET ATT, NO TURB, EPNL = 103.02, RUN 2 A

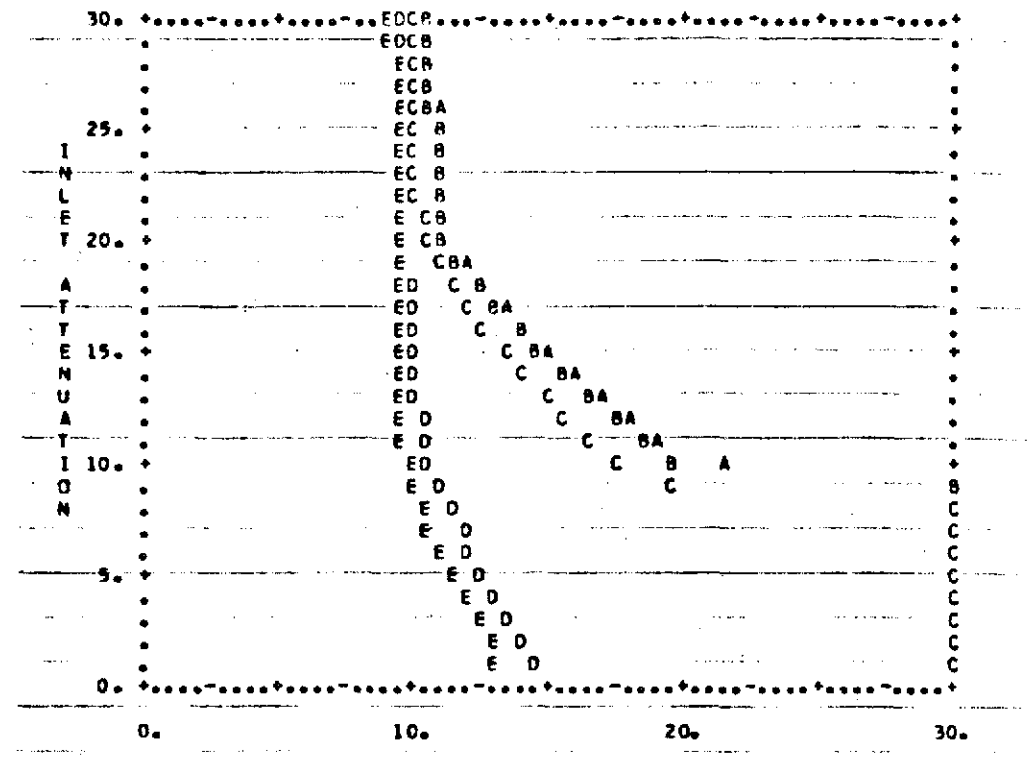


FAN DUCT ATTENUATION

FAN HARMONIC = 5.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	17.87	16.59
2.00	******	******	******	17.20	16.04
3.00	******	******	******	16.59	15.52
4.00	******	******	******	15.99	15.03
5.00	******	******	******	15.44	14.57
6.00	******	******	******	14.99	14.
7.00	******	******	******	14.56	13.65
8.00	******	******	******	14.15	13.21
9.00	******	******	******	13.76	12.79
10.00	******	******	19.57	13.39	12.38
11.00	30.72	******	18.66	13.17	12.25
12.00	23.74	19.89	17.82	12.95	12.12
13.00	19.59	19.02	17.04	12.74	11.99
14.00	18.73	18.21	16.31	12.53	11.87
15.00	17.91	17.44	15.64	12.32	11.75
16.00	17.13	16.71	15.01	12.12	11.64
17.00	16.38	16.02	14.41	11.91	11.52
18.00	15.66	15.37	13.86	11.72	11.41
19.00	14.97	14.75	13.34	11.52	11.30
20.00	14.30	14.16	12.84	11.33	11.20
21.00	14.19	14.08	12.81	11.32	11.19
22.00	14.09	14.00	12.79	11.31	11.19
23.00	13.98	13.93	12.76	11.29	11.18
24.00	13.88	13.85	12.73	11.28	11.18
25.00	13.78	13.78	12.70	11.27	11.17
26.00	13.68	13.70	12.67	11.26	11.17
27.00	13.59	13.63	12.65	11.25	11.16
28.00	13.50	13.55	12.62	11.24	11.16
29.00	13.40	13.48	12.59	11.23	11.15
30.00	13.32	13.41	12.56	11.22	11.15

DELTA EPNL = 5.0 FAN HARMONIC = 10.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE, 0. JET ATT, NO TURB, EPNL = 103.02, RUN 2 A

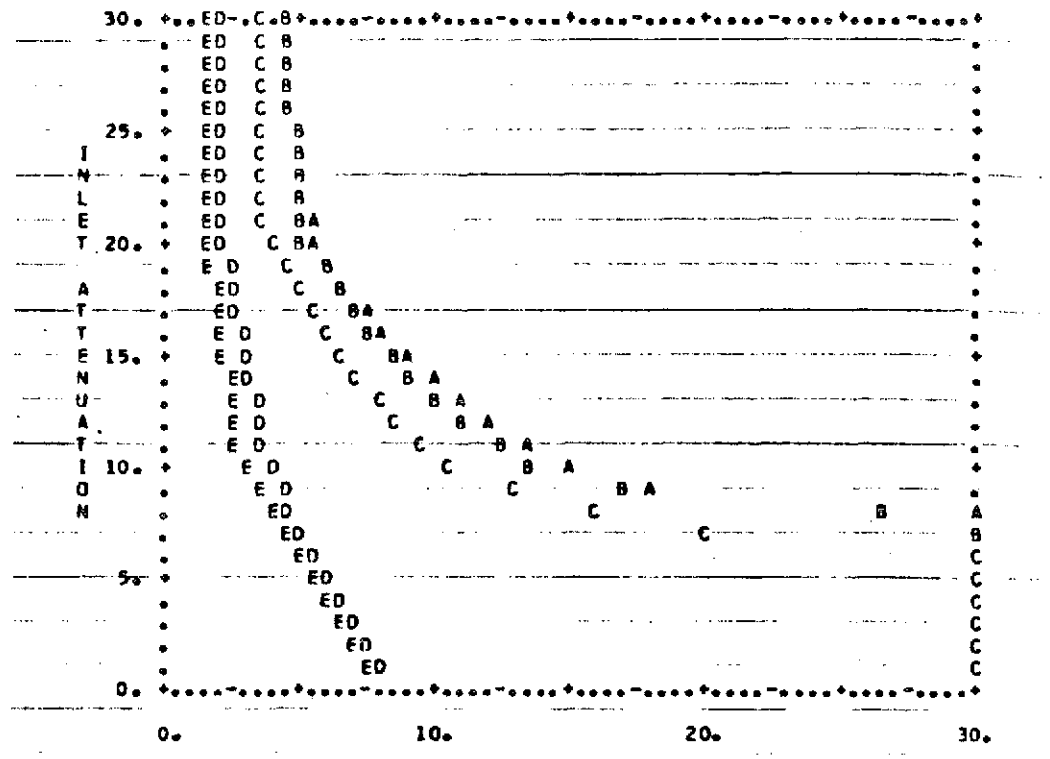


FAN DUCT ATTENUATION

FAN HARMONIC = 10.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	14.73	13.23
2.00	******	******	******	14.13	12.77
3.00	******	******	******	13.58	12.37
4.00	******	******	******	13.09	11.99
5.00	******	******	******	12.62	11.66
6.00	******	******	******	12.19	11.19
7.00	******	******	******	11.78	10.73
8.00	******	******	******	11.39	10.29
9.00	******	******	19.62	11.02	9.94
10.00	21.33	19.59	17.35	10.67	9.77
11.00	18.96	18.43	16.44	10.51	9.72
12.00	17.84	17.36	15.58	10.35	9.67
13.00	16.81	16.37	14.78	10.20	9.62
14.00	15.84	15.45	14.03	10.06	9.57
15.00	14.95	14.59	13.32	9.96	9.52
16.00	14.11	13.80	12.66	9.89	9.47
17.00	13.33	13.06	12.02	9.83	9.43
18.00	12.59	12.36	11.43	9.77	9.38
19.00	11.90	11.71	10.86	9.70	9.33
20.00	11.25	11.09	10.33	9.64	9.29
21.00	11.17	11.04	10.28	9.64	9.28
22.00	11.09	10.98	10.24	9.64	9.28
23.00	11.01	10.92	10.20	9.63	9.27
24.00	10.93	10.86	10.15	9.63	9.27
25.00	10.85	10.81	10.11	9.63	9.26
26.00	10.77	10.75	10.07	9.63	9.26
27.00	10.69	10.69	10.02	9.62	9.25
28.00	10.61	10.64	9.99	9.62	9.25
29.00	10.54	10.58	9.97	9.62	9.25
30.00	10.46	10.52	9.95	9.62	9.24

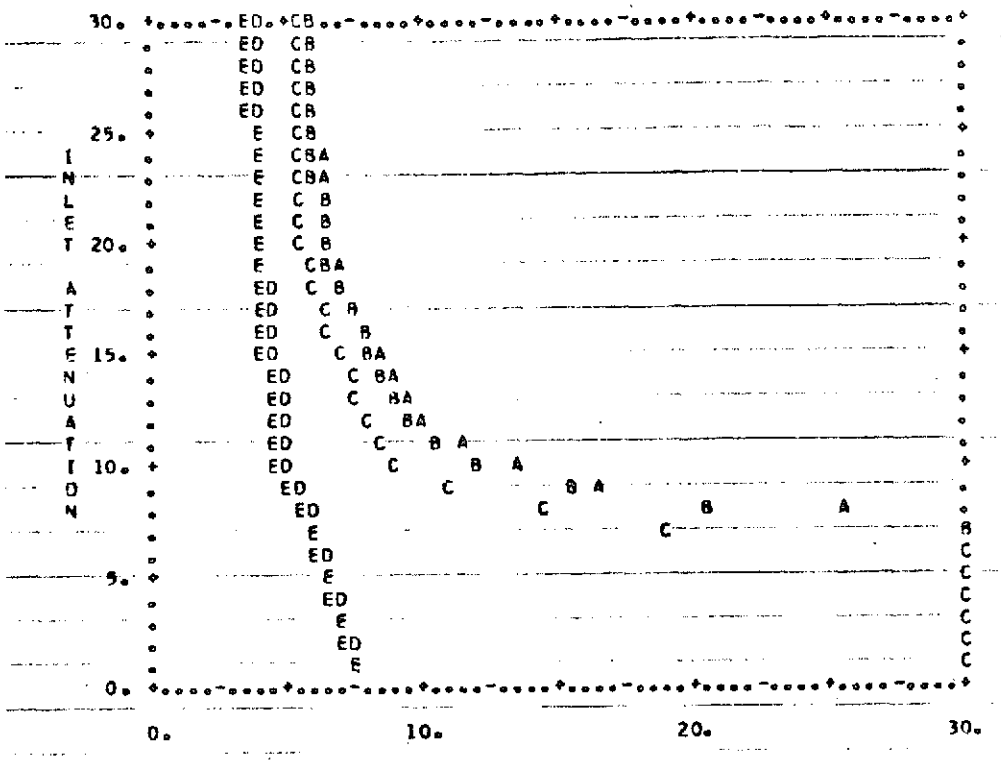
DELTA EPNL = 5.0 FAN HARMONIC = 20.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/D, WITH TONE, 0. JET ATT, NO TURB, EPNL = 103.02, RUN 2 A



FAN HARMONIC = 20.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	8.04	7.41
2.00	******	******	******	7.49	6.89
3.00	******	******	******	6.93	6.38
4.00	******	******	******	6.37	5.87
5.00	******	******	******	5.80	5.37
6.00	******	******	******	5.42	4.97
7.00	******	******	19.84	5.04	4.47
8.00	30.56	26.67	15.96	4.45	3.96
9.00	17.85	16.94	12.84	4.25	3.42
10.00	14.80	13.59	10.26	3.85	2.86
11.00	13.35	12.30	9.39	3.67	2.70
12.00	12.04	11.14	8.61	3.49	2.55
13.00	10.86	10.08	7.88	3.32	2.41
14.00	9.81	9.24	7.20	3.15	2.28
15.00	8.95	8.46	6.56	2.97	2.16
16.00	8.14	7.72	5.96	2.80	2.04
17.00	7.39	7.03	5.40	2.63	1.93
18.00	6.67	6.38	4.86	2.46	1.83
19.00	6.00	5.76	4.30	2.29	1.74
20.00	5.36	5.17	3.77	2.12	1.65
21.00	5.26	5.10	3.73	2.11	1.64
22.00	5.15	5.03	3.70	2.10	1.64
23.00	5.05	4.96	3.66	2.09	1.63
24.00	4.95	4.89	3.63	2.08	1.62
25.00	4.84	4.81	3.59	2.06	1.61
26.00	4.74	4.74	3.56	2.05	1.61
27.00	4.63	4.66	3.53	2.04	1.60
28.00	4.53	4.59	3.49	2.03	1.59
29.00	4.43	4.52	3.46	2.01	1.58
30.00	4.33	4.44	3.43	2.00	1.58

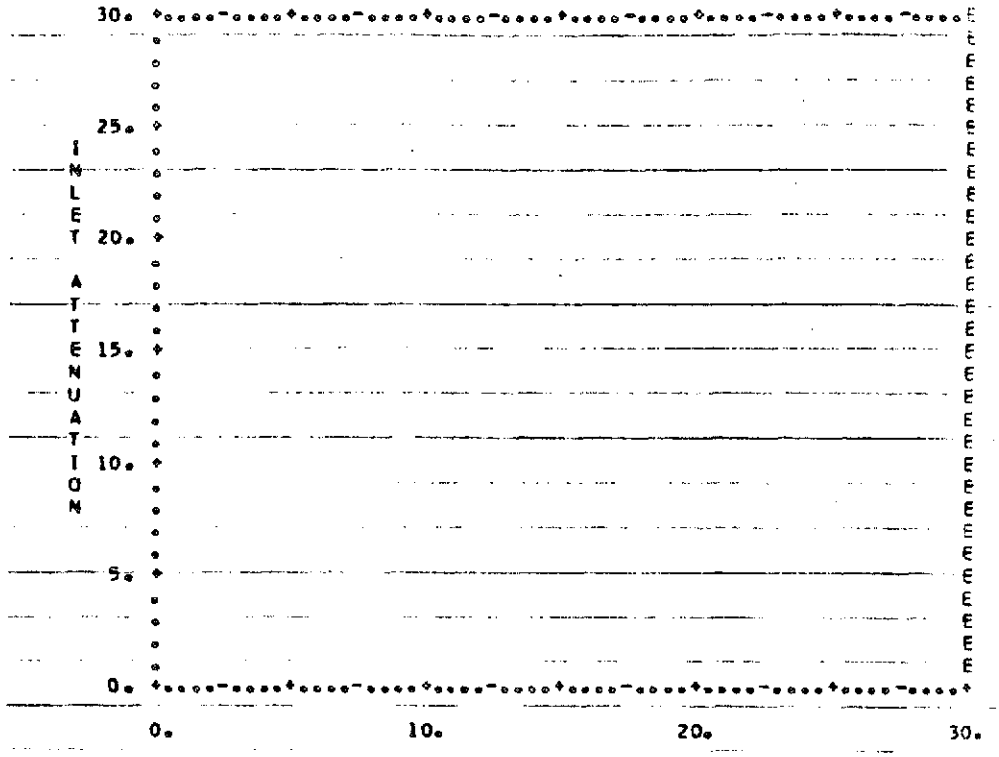
DELTA EPNL = 5.0 FAN HARMONIC = 30.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE, 0. JET ATT, NO TURB, EPNL = 103.02, RUN 2 A



FAN HARMONIC = 30.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	7.56	7.47
2.00	******	******	******	7.27	7.22
3.00	******	******	******	7.01	6.96
4.00	******	******	******	6.76	6.70
5.00	******	******	******	6.54	6.43
6.00	******	******	******	6.28	6.10
7.00	******	******	18.77	6.02	5.76
8.00	25.45	20.48	14.44	5.76	5.42
9.00	16.75	15.72	10.98	5.50	5.08
10.00	13.33	12.04	9.04	5.25	4.56
11.00	11.71	10.67	8.52	5.16	4.48
12.00	10.25	9.72	8.05	5.08	4.41
13.00	9.50	9.15	7.63	4.99	4.33
14.00	8.95	8.64	7.25	4.85	4.25
15.00	8.46	8.18	6.91	4.70	4.19
16.00	8.01	7.75	6.60	4.56	4.11
17.00	7.61	7.36	6.32	4.43	4.04
18.00	7.24	7.00	6.06	4.29	3.96
19.00	6.91	6.66	5.82	4.16	3.88
20.00	6.60	6.35	5.59	4.02	3.81
21.00	6.52	6.30	5.57	4.01	3.80
22.00	6.45	6.26	5.55	3.99	3.78
23.00	6.37	6.21	5.53	3.97	3.77
24.00	6.29	6.16	5.51	3.96	3.76
25.00	6.21	6.11	5.49	3.94	3.75
26.00	6.13	6.06	5.47	3.93	3.74
27.00	6.05	6.01	5.45	3.91	3.73
28.00	5.97	5.96	5.43	3.90	3.72
29.00	5.89	5.91	5.40	3.88	3.70
30.00	5.81	5.86	5.38	3.86	3.69

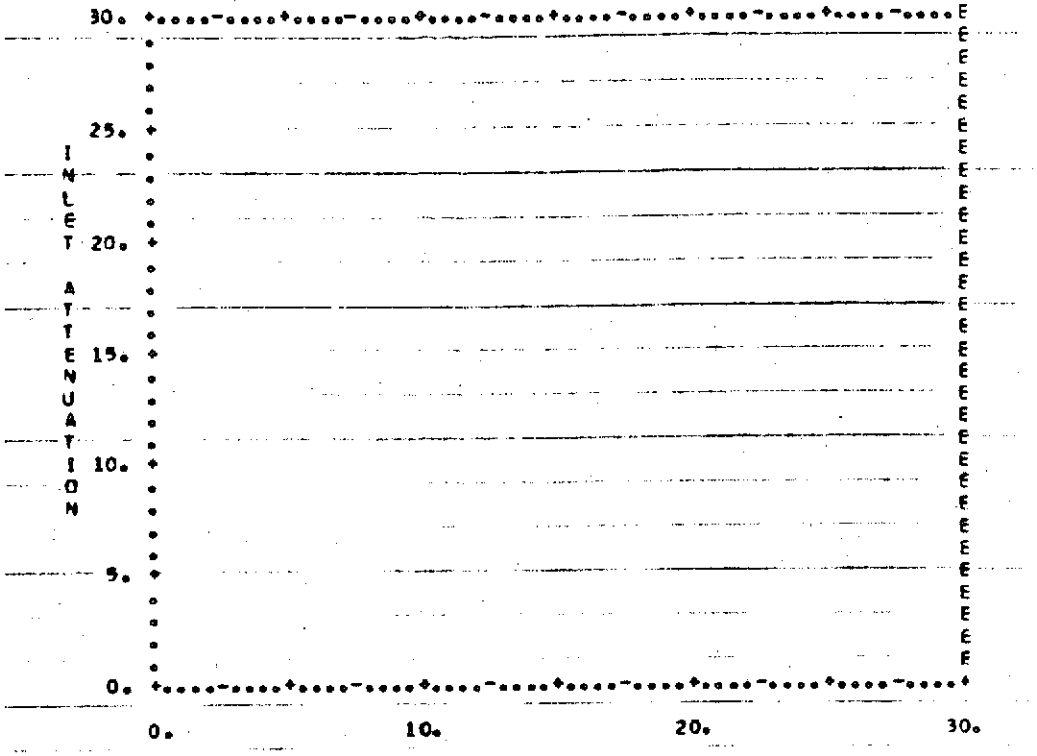
DELTA EPNL = 10.0 FAN HARMONIC = 0.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE, 0. JET ATT, NO TURB, EPNL = 103.02, RUN 2 A



FAN HARMONIC = 0.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	******
8.00	******	******	******	******	******
9.00	******	******	******	******	******
10.00	******	******	******	******	******
11.00	******	******	******	******	******
12.00	******	******	******	******	******
13.00	******	******	******	******	******
14.00	******	******	******	******	******
15.00	******	******	******	******	******
16.00	******	******	******	******	******
17.00	******	******	******	******	******
18.00	******	******	******	******	******
19.00	******	******	******	******	******
20.00	******	******	******	******	******
21.00	******	******	******	******	******
22.00	******	******	******	******	******
23.00	******	******	******	******	******
24.00	******	******	******	******	******
25.00	******	******	******	******	******
26.00	******	******	******	******	******
27.00	******	******	******	******	******
28.00	******	******	******	******	******
29.00	******	******	******	******	******
30.00	******	******	******	******	******

DELTA EPNL = 10.0 FAN HARMONIC = 5.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE, 0. JET ATT, NO TURB, EPNL = 103.02, RUN 2 A

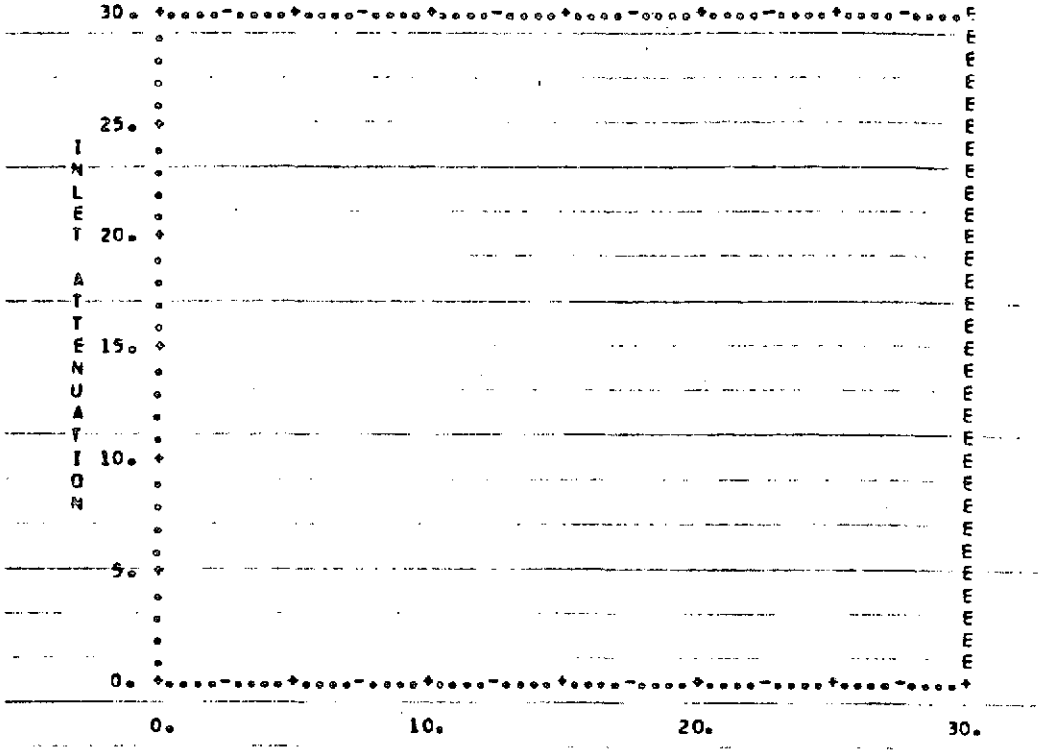


FAN DUCT ATTENUATION

FAN HARMONIC = 5.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	******
8.00	******	******	******	******	******
9.00	******	******	******	******	******
10.00	******	******	******	******	******
11.00	******	******	******	******	******
12.00	******	******	******	******	******
13.00	******	******	******	******	******
14.00	******	******	******	******	******
15.00	******	******	******	******	******
16.00	******	******	******	******	******
17.00	******	******	******	******	******
18.00	******	******	******	******	******
19.00	******	******	******	******	******
20.00	******	******	******	******	******
21.00	******	******	******	******	******
22.00	******	******	******	******	******
23.00	******	******	******	******	******
24.00	******	******	******	******	******
25.00	******	******	******	******	******
26.00	******	******	******	******	******
27.00	******	******	******	******	******
28.00	******	******	******	******	******
29.00	******	******	******	******	******
30.00	******	******	******	******	******

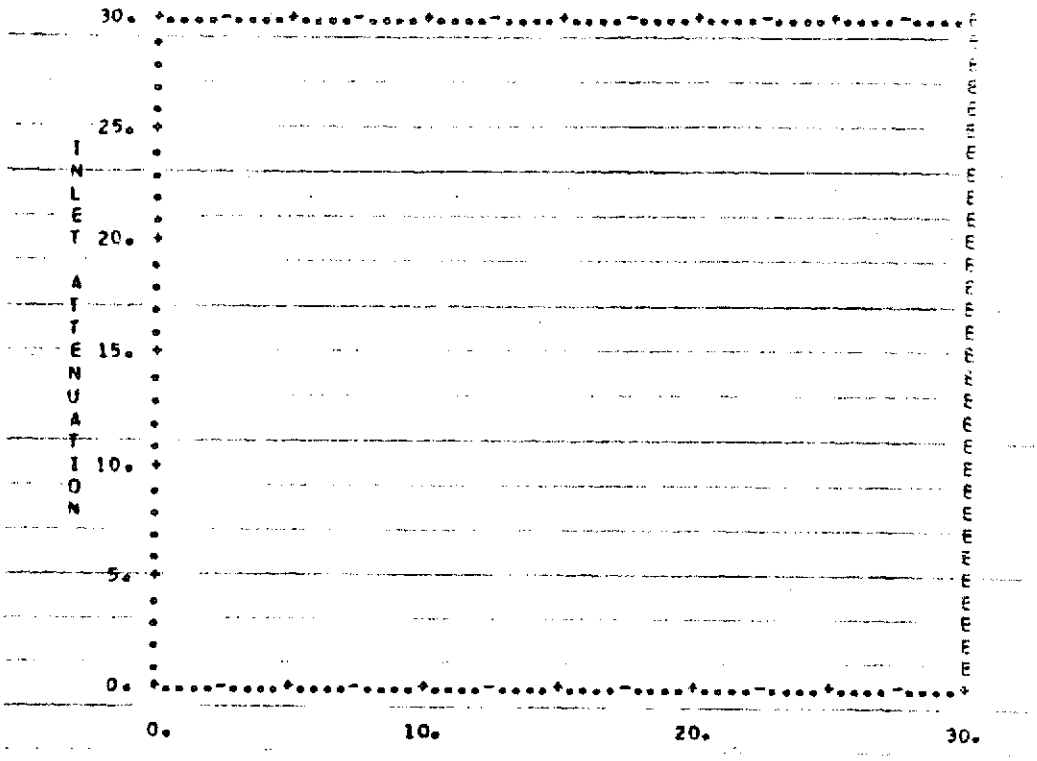
DELTA EPNL = 10.0 FAN HARMONIC = 10.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE, 0. JET ATT, NO TURB, EPNL = 103.02, RUN 2 A



FAN HARMONIC = 10.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	******
8.00	******	******	******	******	******
9.00	******	******	******	******	******
10.00	******	******	******	******	******
11.00	******	******	******	******	******
12.00	******	******	******	******	******
13.00	******	******	******	******	******
14.00	******	******	******	******	******
15.00	******	******	******	******	******
16.00	******	******	******	******	******
17.00	******	******	******	******	******
18.00	******	******	******	******	******
19.00	******	******	******	******	******
20.00	******	******	******	******	******
21.00	******	******	******	******	******
22.00	******	******	******	******	******
23.00	******	******	******	******	******
24.00	******	******	******	******	******
25.00	******	******	******	******	******
26.00	******	******	******	******	******
27.00	******	******	******	******	******
28.00	******	******	******	******	******
29.00	******	******	******	******	******
30.00	******	******	******	******	******

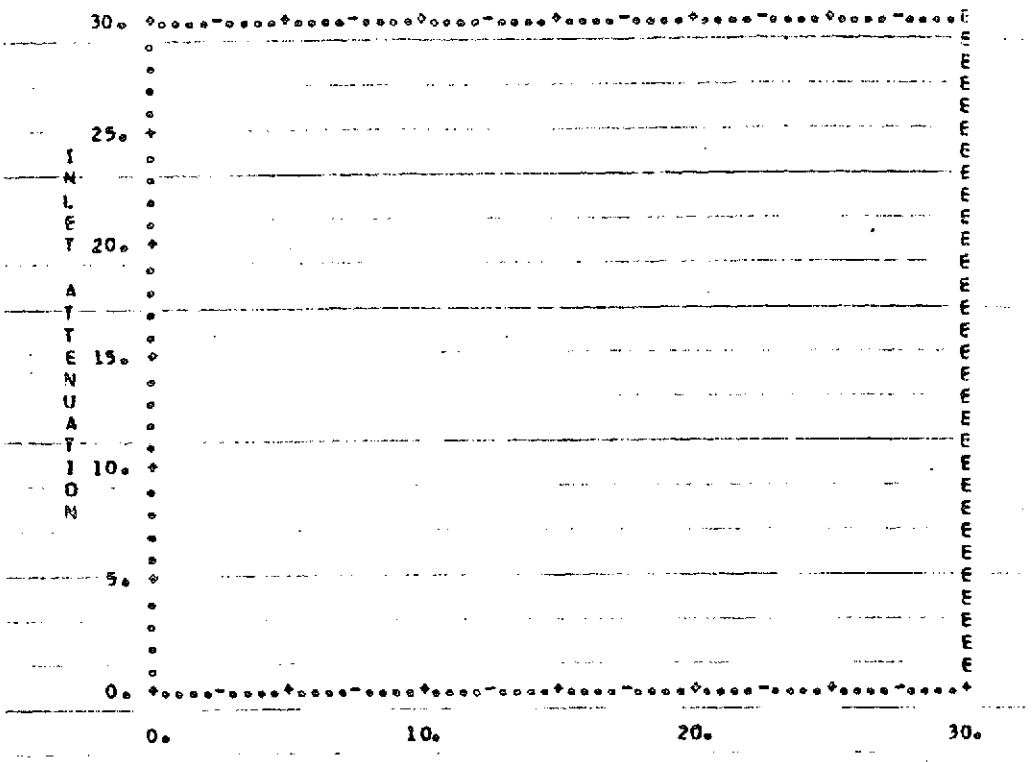
DELTA EPNL = 10.0 FAN HARMONIC = 20.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE, 0, JET ATT, NO TURB, EPNL = 103.02, RUN 2 A



FAN HARMONIC = 20.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	******
8.00	******	******	******	******	******
9.00	******	******	******	******	******
10.00	******	******	******	******	******
11.00	******	******	******	******	******
12.00	******	******	******	******	******
13.00	******	******	******	******	******
14.00	******	******	******	******	******
15.00	******	******	******	******	******
16.00	******	******	******	******	******
17.00	******	******	******	******	******
18.00	******	******	******	******	******
19.00	******	******	******	******	******
20.00	******	******	******	******	******
21.00	******	******	******	******	******
22.00	******	******	******	******	******
23.00	******	******	******	******	******
24.00	******	******	******	******	******
25.00	******	******	******	******	******
26.00	******	******	******	******	******
27.00	******	******	******	******	******
28.00	******	******	******	******	******
29.00	******	******	******	******	******
30.00	******	******	******	******	******

DELTA EPNL = 10.0 FAN HARMONIC = 30.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE, 0. JET ATT, NO TURB, EPNL = 103.02, RUN 2 A



FAN HARMONIC = 30.0 DELTA EPNL = 10.0

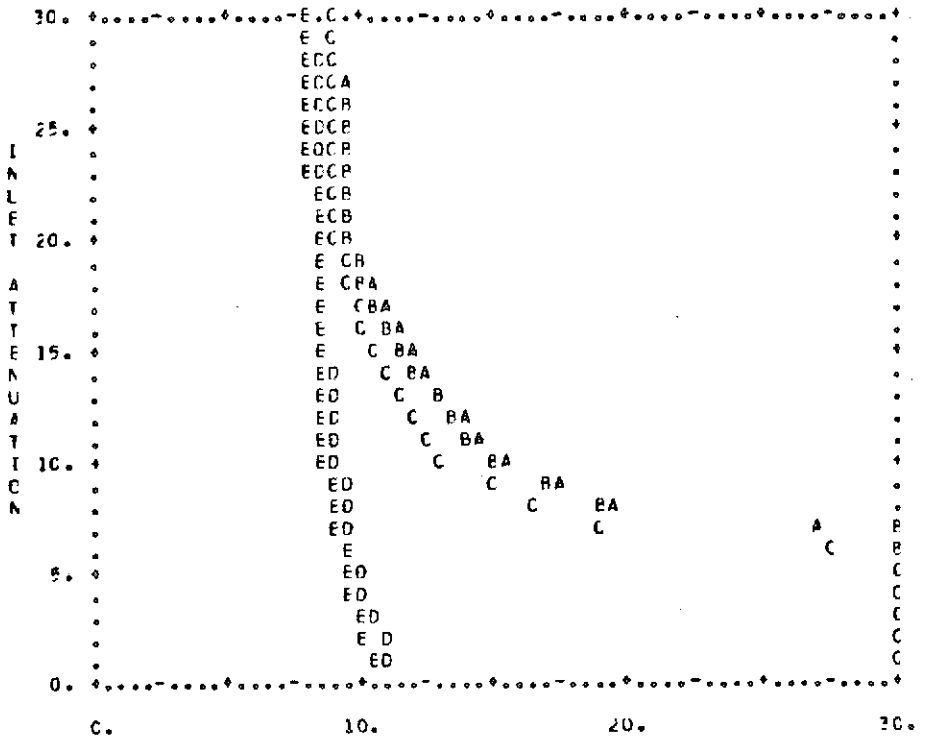
INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	******
8.00	******	******	******	******	******
9.00	******	******	******	******	******
10.00	******	******	******	******	******
11.00	******	******	******	******	******
12.00	******	******	******	******	******
13.00	******	******	******	******	******
14.00	******	******	******	******	******
15.00	******	******	******	******	******
16.00	******	******	******	******	******
17.00	******	******	******	******	******
18.00	******	******	******	******	******
19.00	******	******	******	******	******
20.00	******	******	******	******	******
21.00	******	******	******	******	******
22.00	******	******	******	******	******
23.00	******	******	******	******	******
24.00	******	******	******	******	******
25.00	******	******	******	******	******
26.00	******	******	******	******	******
27.00	******	******	******	******	******
28.00	******	******	******	******	******
29.00	******	******	******	******	******
30.00	******	******	******	******	******

```
DELTA EPNL =    5.0          FAN HARMONIC =    0.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
 T/C, WITH TONE, 10. JET ATT, NO TURB, EPNL = 101.83, RUN 5A

  30. +----+----+----+---E+B---+----+----+----+----+----+----+
      .                  ECB                                .
      .                  ECB                                .
      .                  ECBA                               .
      .                  ECBA                               .
  25. +                  ECBA                               +
      .                  ECBA                               .
      .                  EC B                               .
      .                  E CBA                              .
      .                  E CBA                              .
  20. +                  E CBA                              +
      .                  E C BA                             .
      .                  E  CB A                            .
      .                  ED  CBA                            .
      .                   E  C BA                           .
  15. +                   E   C BA                          +
      .                   E    C BA                         .
      .                   E     C BA                        .
      .                   E      C B A                      .
      .                   E       C B A                     .
      .                   E        C  BA                    .
  10. +                   E         C  EA                   +
      .                    E           C  BA                 .
      .                    ED            C   BA              .
      .                     E              C                 A     B.
      .                     ED                               C     B
   5. +                      E                               C     C
      .                      ED                              C     C
      .                       E                              C     C
      .                       ED                             C     C
      .                        ED                            C     C
   0. +----+----+----+----+----+----+----+----+----+----+----+----+

      0.                  10.                  20.                30.

                        FAN DUCT ATTENUATION
```

FAN HARMONIC = 0.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	12.85	12.42
2.00	******	******	******	12.53	12.14
3.00	******	******	******	12.23	11.88
4.00	******	******	******	11.95	11.65
5.00	******	******	******	11.68	11.43
6.00	******	******	26.59	11.37	11.13
7.00	27.21	29.54	19.03	11.08	10.84
8.00	19.80	19.54	17.29	10.79	10.58
9.00	18.14	17.63	15.77	10.51	10.32
10.00	16.65	16.03	14.43	10.24	10.08
11.00	15.99	15.35	13.87	10.17	10.04
12.00	15.36	14.72	13.36	10.11	9.99
13.00	14.77	14.13	12.89	10.05	9.94
14.00	14.22	13.59	12.46	9.99	9.89
15.00	13.69	13.08	12.05	9.93	9.84
16.00	13.20	12.60	11.68	9.87	9.79
17.00	12.73	12.15	11.33	9.81	9.74
18.00	12.29	11.73	11.00	9.75	9.69
19.00	11.86	11.33	10.69	9.69	9.65
20.00	11.46	10.96	10.41	9.63	9.60
21.00	11.35	10.91	10.34	9.63	9.59
22.00	11.25	10.85	10.27	9.62	9.59
23.00	11.15	10.80	10.20	9.61	9.58
24.00	11.06	10.75	10.13	9.61	9.58
25.00	10.96	10.70	10.05	9.60	9.57
26.00	10.87	10.65	9.98	9.60	9.57
27.00	10.78	10.60	9.90	9.59	9.56
28.00	10.70	10.55	9.83	9.59	9.56
29.00	10.62	10.50	9.76	9.58	9.55
30.00	10.54	10.45	9.69	9.57	9.55

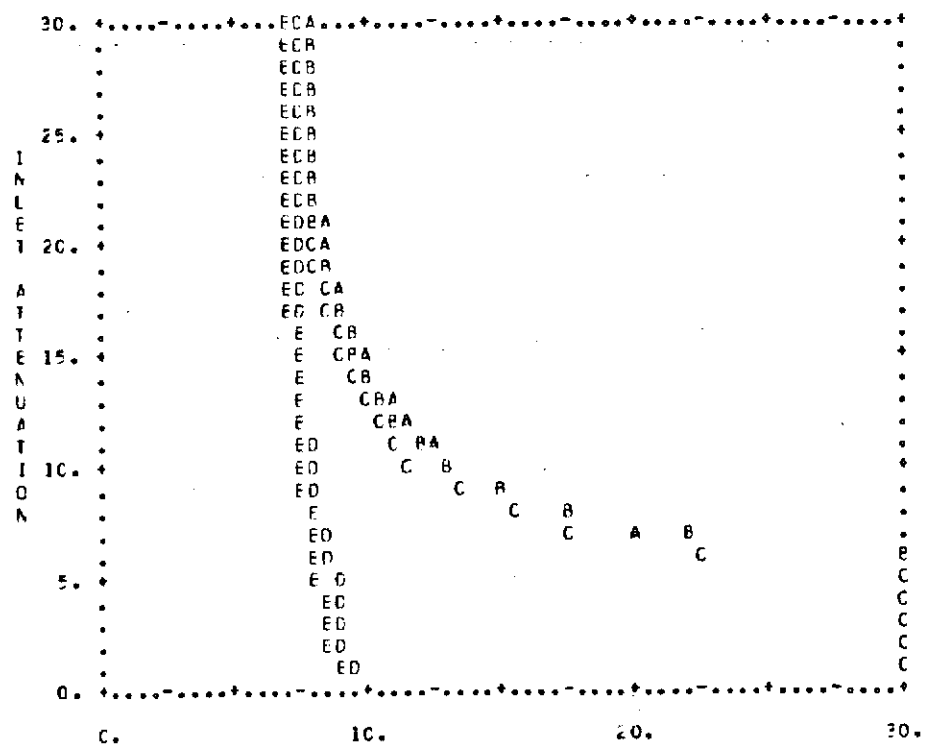
DELTA EPNL = 5.0 FAN HARMONIC = 5.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/C, WITH TONE, 10. JET ATT, NO TURB, EPNL = 101.83, RUN 5A



FAN HARMONIC = 5.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	11.23	10.28
2.00	******	******	******	10.85	10.02
3.00	******	******	******	10.49	9.87
4.00	******	******	******	10.16	9.73
5.00	******	******	******	9.90	9.59
6.00	******	******	27.68	9.75	9.39
7.00	27.18	30.00	18.84	9.59	9.19
8.00	19.26	19.23	16.72	9.43	9.00
9.00	17.26	16.95	14.84	9.28	8.82
10.00	15.48	15.00	13.18	9.13	8.65
11.00	14.68	14.19	12.53	9.03	8.61
12.00	13.93	13.46	11.96	8.94	8.57
13.00	13.24	12.80	11.44	8.85	8.53
14.00	12.59	12.19	10.97	8.76	8.49
15.00	11.99	11.64	10.54	8.68	8.45
16.00	11.43	11.13	10.15	8.60	8.41
17.00	10.90	10.66	9.84	8.52	8.37
18.00	10.40	10.22	9.56	8.44	8.33
19.00	9.96	9.87	9.32	8.36	8.29
20.00	9.66	9.58	9.07	8.29	8.26
21.00	9.61	9.53	9.05	8.29	8.25
22.00	9.56	9.48	9.02	8.28	8.25
23.00	9.51	9.43	9.00	8.28	8.25
24.00	9.46	9.38	8.98	8.27	8.24
25.00	9.41	9.33	8.96	8.27	8.24
26.00	9.35	9.28	8.94	8.26	8.24
27.00	9.30	9.23	8.92	8.26	8.23
28.00	9.25	9.18	8.89	8.25	8.23
29.00	9.20	9.13	8.87	8.25	8.23
30.00	9.14	9.08	8.85	8.24	8.22

DELTA EPNL = 5.0 FAN HARMONIC = 10.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE, 10. JET ATT, NO TURB, EPNL = 101.83, RUN 5A

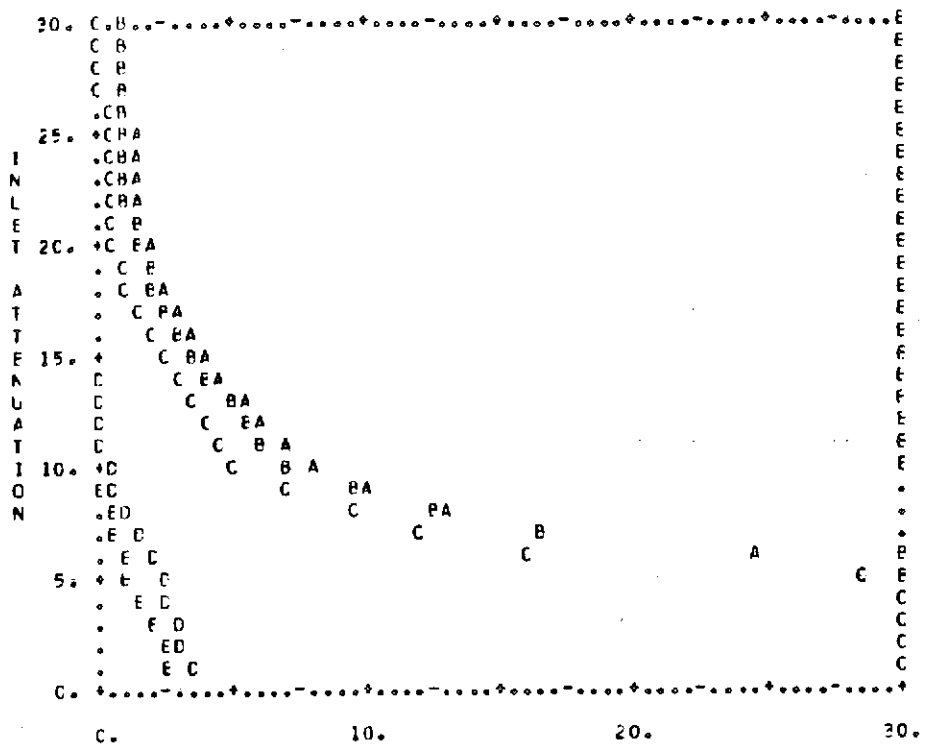


FAN DUCT ATTENUATION

FAN HARMONIC = 10.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	9.37	8.91
2.00	******	******	******	9.23	8.74
3.00	******	******	******	9.10	8.56
4.00	******	******	******	8.97	8.38
5.00	******	******	******	8.85	8.20
6.00	******	******	22.47	8.65	8.07
7.00	19.93	22.17	17.63	8.45	7.95
8.00	17.40	17.44	15.26	8.25	7.84
9.00	15.19	14.96	13.31	8.05	7.73
10.00	13.22	12.84	11.67	7.86	7.63
11.00	12.34	11.99	10.93	7.80	7.57
12.00	11.55	11.24	10.29	7.73	7.51
13.00	10.84	10.57	9.83	7.68	7.45
14.00	10.20	9.98	9.46	7.62	7.40
15.00	9.77	9.63	9.17	7.56	7.34
16.00	9.44	9.29	8.87	7.50	7.29
17.00	9.14	8.96	8.57	7.45	7.24
18.00	8.86	8.64	8.29	7.40	7.19
19.00	8.59	8.34	8.02	7.34	7.14
20.00	8.34	8.04	7.75	7.29	7.09
21.00	8.28	8.01	7.73	7.29	7.09
22.00	8.23	7.98	7.70	7.29	7.09
23.00	8.17	7.95	7.68	7.29	7.08
24.00	8.11	7.91	7.65	7.29	7.08
25.00	8.05	7.88	7.63	7.29	7.08
26.00	8.00	7.85	7.61	7.29	7.08
27.00	7.94	7.82	7.58	7.29	7.08
28.00	7.88	7.79	7.56	7.29	7.08
29.00	7.82	7.76	7.53	7.29	7.08
30.00	7.76	7.73	7.51	7.29	7.08

DELTA EPNL = 5.0 FAN HARMONIC = 20.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
1/0, WITH TONE, 10. JET ATT, NO TURB, EPNL = 101.83, RUN 5A

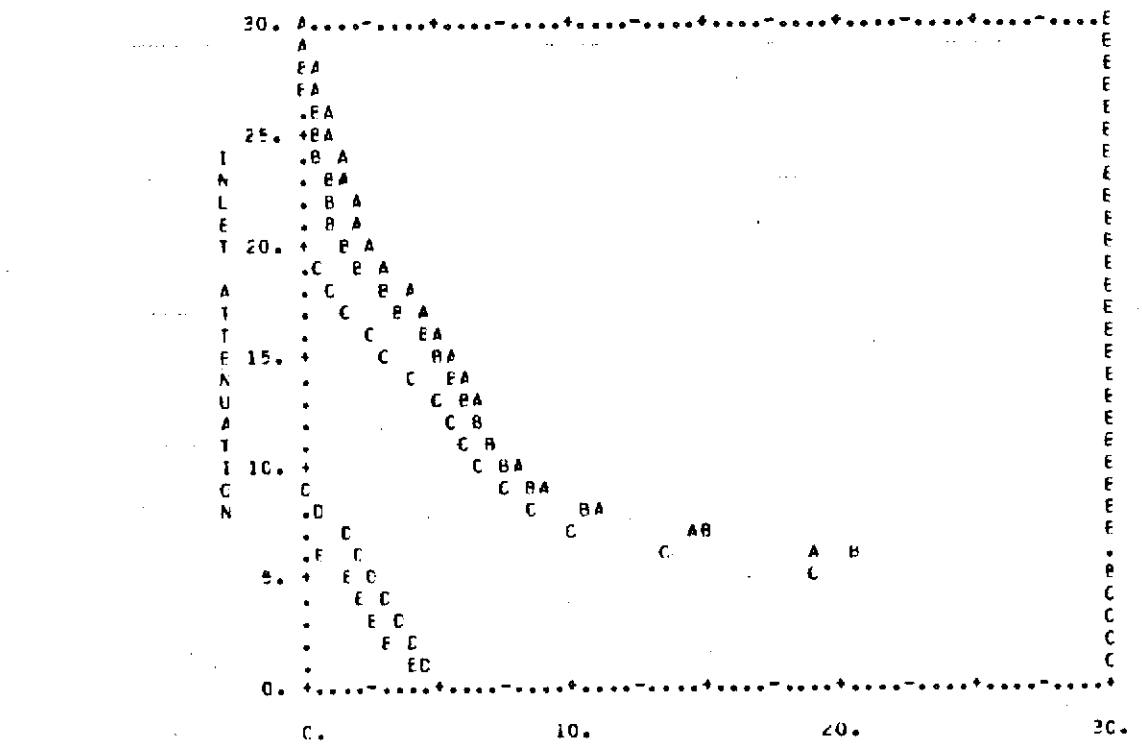


FAN DUCT ATTENUATION

FAN HARMONIC = 20.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	3.54	2.74
2.00	******	******	******	3.21	2.31
3.00	******	******	******	2.90	1.92
4.00	******	******	******	2.60	1.56
5.00	******	******	28.46	2.32	1.24
6.00	24.41	******	15.97	1.87	0.93
7.00	16.39	16.60	12.10	1.45	0.63
8.00	12.97	12.64	9.29	1.05	0.33
9.00	10.11	9.51	7.15	0.66	0.03
10.00	7.87	7.12	5.24	0.29	******
11.00	6.88	6.24	4.56	0.22	******
12.00	6.01	5.46	3.97	0.15	******
13.00	5.25	4.80	3.42	0.08	******
14.00	4.63	4.23	2.91	0.01	******
15.00	4.09	3.69	2.44	******	******
16.00	3.57	3.17	1.99	******	******
17.00	3.08	2.68	1.58	******	******
18.00	2.62	2.21	1.18	******	******
19.00	2.18	1.76	0.82	******	******
20.00	1.76	1.33	0.47	******	******
21.00	1.66	1.27	0.43	******	******
22.00	1.56	1.22	0.40	******	******
23.00	1.46	1.16	0.36	******	******
24.00	1.37	1.11	0.33	******	******
25.00	1.27	1.06	0.29	******	******
26.00	1.18	1.00	0.25	******	******
27.00	1.09	0.95	0.22	******	******
28.00	0.99	0.90	0.18	******	******
29.00	0.90	0.85	0.14	******	******
30.00	0.81	0.80	0.11	******	******

DELTA EPNL = 5.0 FAN HARMONIC = 30.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
I/C, WITH TONE, 10. JET ATT, NO TURE, EPNL = 101.83, RUN 5A

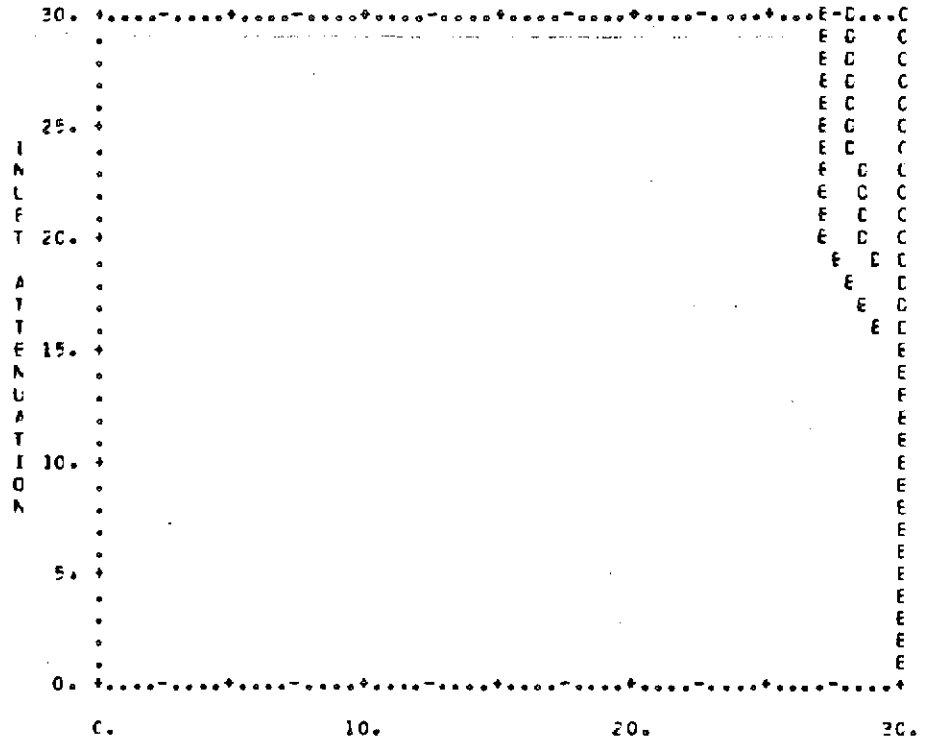


FAN DUCT ATTENUATION

FAN HARMONIC = 30.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	C 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	4.52	3.19
2.00	******	******	******	4.00	3.09
3.00	******	******	******	3.51	2.45
4.00	******	******	******	3.04	1.85
5.00	******	******	18.97	2.61	1.30
6.00	19.22	20.30	13.72	1.95	0.55
7.00	14.67	14.76	10.00	1.33	******
8.00	10.92	10.59	8.63	0.73	******
9.00	9.01	8.70	7.43	0.10	******
10.00	7.77	7.34	6.35	******	******
11.00	7.21	6.81	5.86	******	******
12.00	6.71	6.32	5.42	******	******
13.00	6.27	5.89	5.03	******	******
14.00	5.87	5.49	4.13	******	******
15.00	5.51	5.13	3.24	******	******
16.00	5.18	4.46	2.42	******	******
17.00	4.69	3.64	1.66	******	******
18.00	3.92	2.85	0.96	******	******
19.00	3.16	2.09	0.30	******	******
20.00	2.43	1.35	******	******	******
21.00	2.18	1.18	******	******	******
22.00	1.93	1.02	******	******	******
23.00	1.68	0.86	******	******	******
24.00	1.43	0.70	******	******	******
25.00	1.19	0.54	******	******	******
26.00	0.94	0.38	******	******	******
27.00	0.70	0.22	******	******	******
28.00	0.47	0.06	******	******	******
29.00	0.23	******	******	******	******
30.00	0.00	******	******	******	******

DELTA EPNL = 10.0 FAN HARMONIC = 0.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
1/0, WITH TONE, 10. JET ATT, NO TURB, EPNL = 101.83, RUN 5A

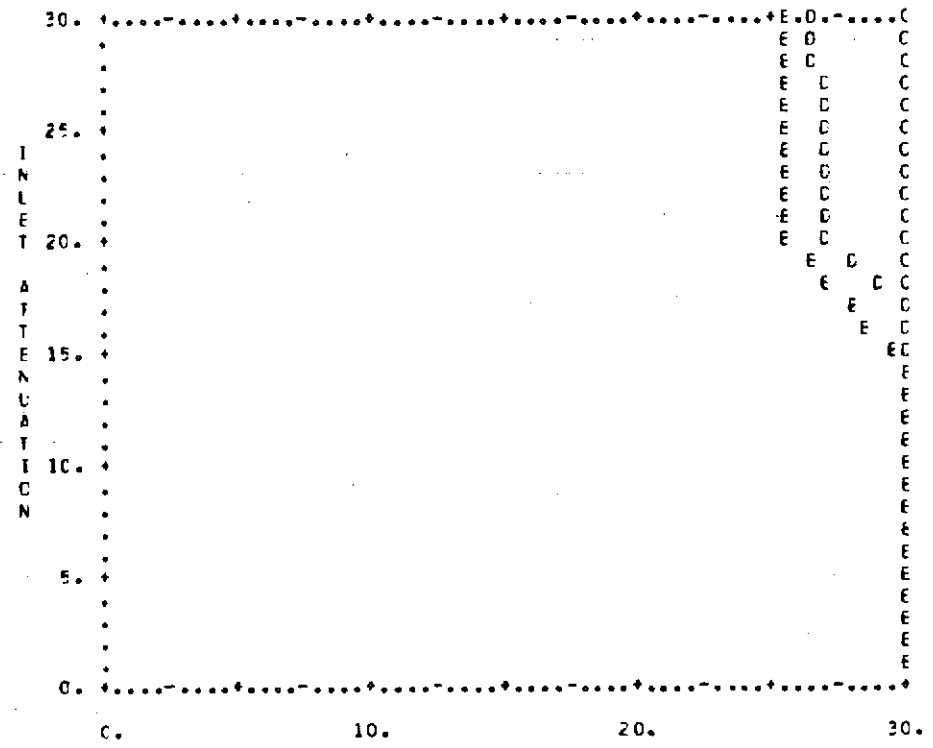


FAN DUCT ATTENUATION

FAN HARMONIC = 0.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	******
8.00	******	******	******	******	******
9.00	******	******	******	******	******
10.00	******	******	******	******	******
11.00	******	******	******	******	******
12.00	******	******	******	******	******
13.00	******	******	******	******	******
14.00	******	******	******	******	30.45
15.00	******	******	******	******	29.84
16.00	******	******	******	******	29.23
17.00	******	******	******	30.61	28.65
18.00	******	******	******	29.60	28.10
19.00	******	******	******	29.03	27.58
20.00	******	******	******	28.31	27.08
21.00	******	******	******	28.29	27.08
22.00	******	******	******	28.28	27.08
23.00	******	******	******	28.26	27.08
24.00	******	******	******	28.24	27.08
25.00	******	******	******	28.23	27.08
26.00	******	******	******	28.21	27.08
27.00	******	******	******	28.20	27.08
28.00	******	******	******	28.18	27.08
29.00	******	******	******	28.16	27.08
30.00	******	******	******	28.15	27.08

DELTA EPNL = 10.0 FAN HARMONIC = 5.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE, 10. JET ATT, NO TURB, EPNL = 101.83, RUN 5A

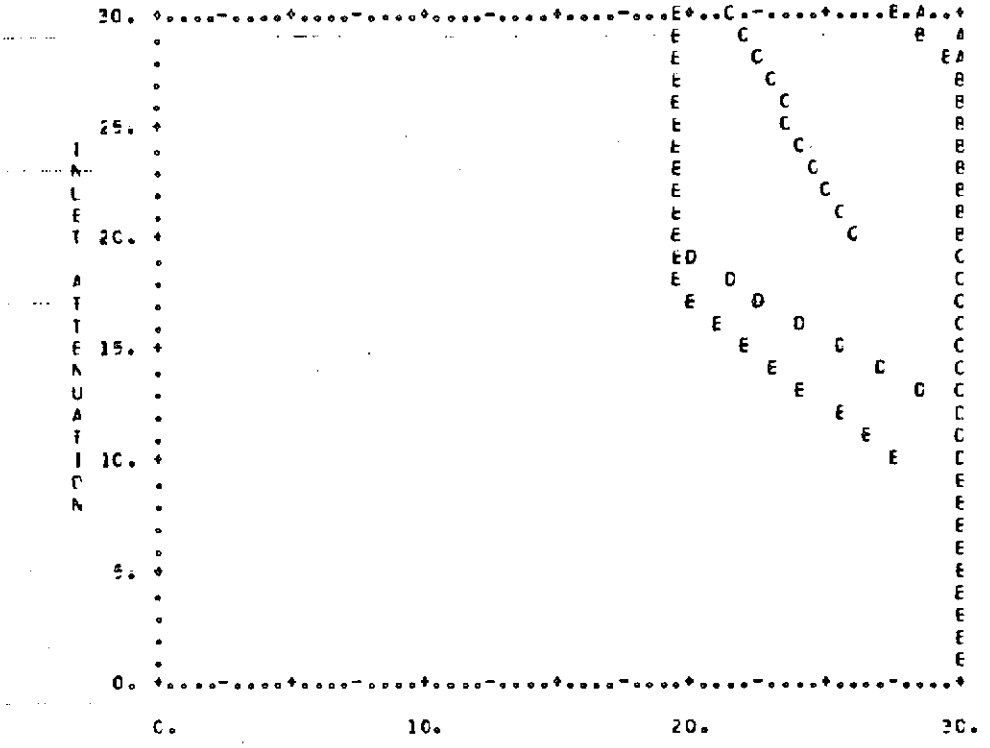


FAN DUCT ATTENUATION

FAN HARMONIC = 5.0 DELTA EPNL = 10.0

	A	B	C	D	E
INLET HARMONIC =	0	5	10	20	30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	******
8.00	******	******	******	******	******
9.00	******	******	******	******	******
10.00	******	******	******	******	******
11.00	******	******	******	******	******
12.00	******	******	******	******	******
13.00	******	******	******	******	******
14.00	******	******	******	******	30.48
15.00	******	******	******	******	29.56
16.00	******	******	******	******	28.68
17.00	******	******	******	30.19	27.84
18.00	******	******	******	29.10	27.04
19.00	******	******	******	28.07	26.27
20.00	******	******	******	27.09	25.53
21.00	******	******	******	27.05	25.52
22.00	******	******	******	27.00	25.52
23.00	******	******	******	26.95	25.52
24.00	******	******	******	26.91	25.52
25.00	******	******	******	26.86	25.52
26.00	******	******	******	26.82	25.52
27.00	******	******	30.90	26.77	25.52
28.00	******	******	30.56	26.73	25.52
29.00	******	******	30.23	26.68	25.52
30.00	******	******	29.90	26.64	25.52

DELTA EPNL = 10.0 FAN HARMONIC = 10.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE, 10. JET ATT, NC TURB, EPNL = 101.83, RUN 58



FAN INLET ATTENUATION

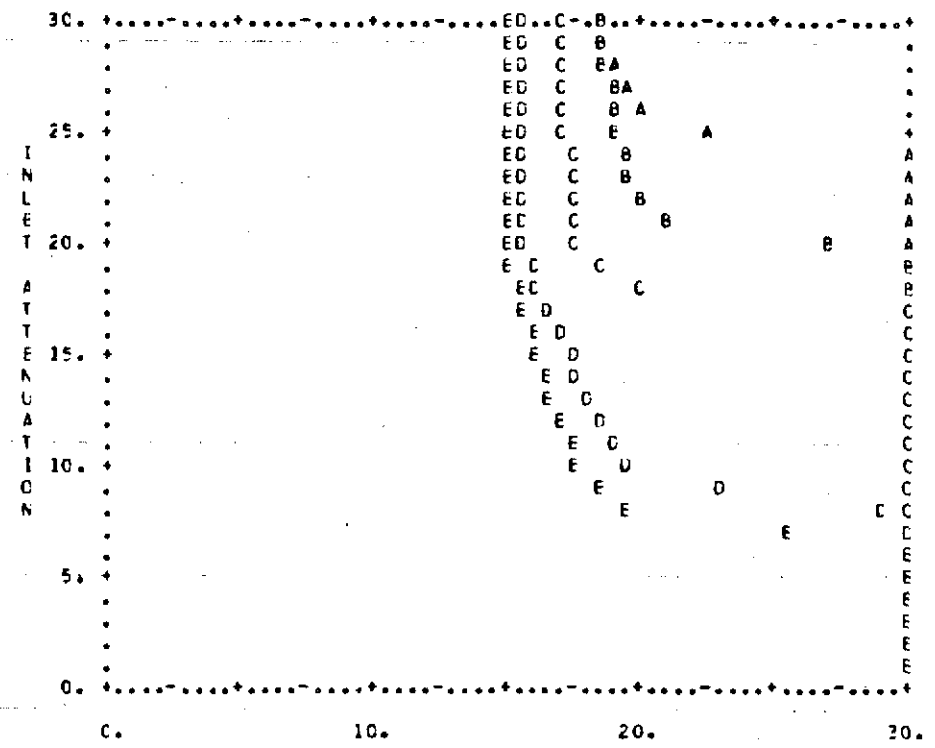
FAN HARMONIC = 10.0 DELTA EPNL = 10.0

	A	B	C	D	E
INLET HARMONIC =	0	5	10	20	30

INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	******
8.00	******	******	******	******	******
9.00	******	******	******	******	30.69
10.00	******	******	******	******	27.71
11.00	******	******	******	******	26.52
12.00	******	******	******	30.22	25.36
13.00	******	******	******	28.58	24.23
14.00	******	******	******	27.00	23.13
15.00	******	******	******	25.48	22.05
16.00	******	******	******	24.03	20.99
17.00	******	******	******	22.62	19.99
18.00	******	******	******	21.27	19.74
19.00	******	******	30.48	19.99	19.49
20.00	******	******	26.06	19.71	19.26
21.00	******	******	25.57	19.69	19.26
22.00	******	******	25.10	19.68	19.25
23.00	******	******	24.63	19.66	19.25
24.00	******	******	24.18	19.64	19.25
25.00	******	******	23.73	19.62	19.25
26.00	******	******	23.30	19.61	19.25
27.00	******	30.17	22.87	19.59	19.25
28.00	******	29.26	22.45	19.57	19.25
29.00	29.77	28.38	22.05	19.55	19.25
30.00	28.26	27.53	21.65	19.54	19.25

C-3

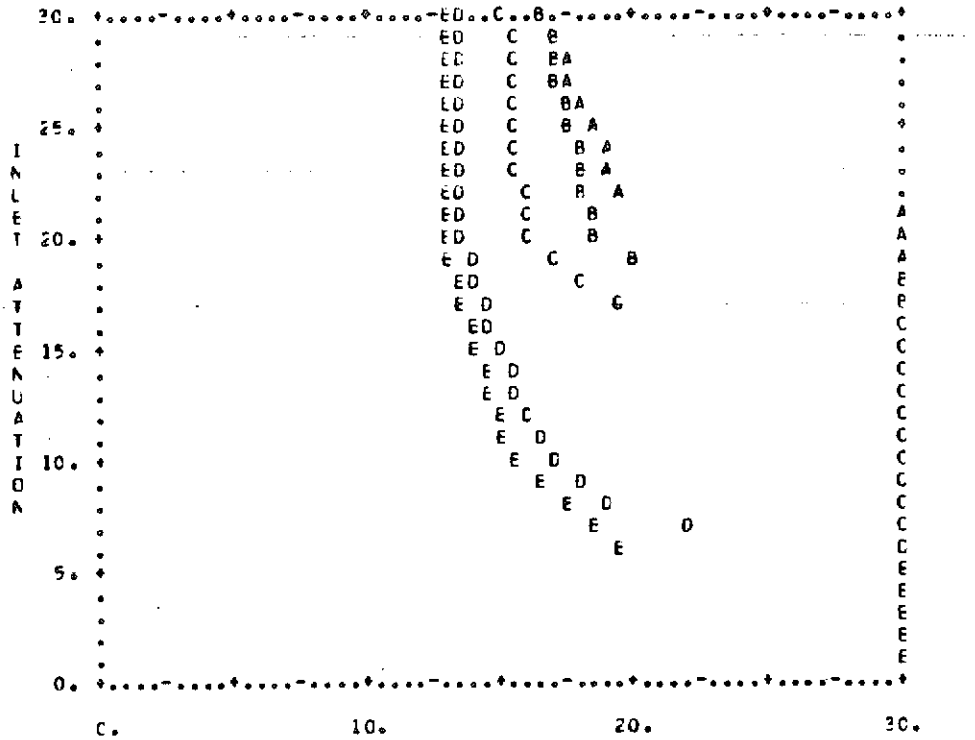
DELTA EPNL = 10.0 FAN HARMONIC = 20.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE, 10. JET ATT, NO TURB, EPNL = 101.83, RUN 5A



FAN HARMONIC = 20.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	25.45
8.00	******	******	******	29.23	19.54
9.00	******	******	******	22.89	18.51
10.00	******	******	******	19.50	17.58
11.00	******	******	******	19.01	17.26
12.00	******	******	******	18.55	16.96
13.00	******	******	******	18.11	16.66
14.00	******	******	******	17.69	16.38
15.00	******	******	******	17.29	16.11
16.00	******	******	******	16.91	15.85
17.00	******	******	******	16.55	15.59
18.00	******	******	19.89	16.20	15.35
19.00	******	******	18.72	15.87	15.11
20.00	******	27.00	17.66	15.55	14.88
21.00	******	21.10	17.57	15.54	14.88
22.00	******	19.84	17.47	15.52	14.88
23.00	******	19.63	17.38	15.51	14.88
24.00	******	19.43	17.29	15.50	14.88
25.00	22.65	19.23	17.20	15.48	14.87
26.00	19.75	19.04	17.11	15.47	14.87
27.00	19.39	18.85	17.02	15.46	14.87
28.00	19.05	18.67	16.93	15.44	14.87
29.00	18.72	18.49	16.84	15.43	14.87
30.00	18.40	18.32	16.75	15.42	14.87

DELTA EPNL = 10.0 FAN HARMONIC = 30.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/C, WITH TONE, 10. JET ATT, NO TURB, EPNL = 101.83, RUN 5A

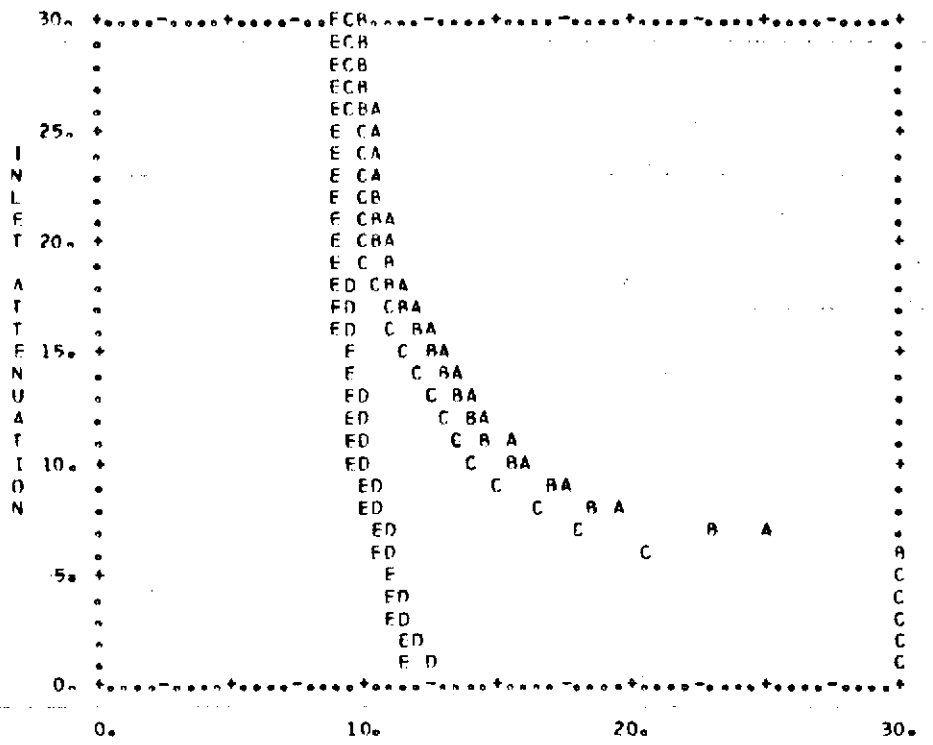


FAN DUCT ATTENUATION

FAN HARMONIC = 30.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	19.59
7.00	******	******	******	22.03	18.36
8.00	******	******	******	18.98	17.28
9.00	******	******	******	17.87	16.34
10.00	******	******	******	16.87	15.51
11.00	******	******	******	16.44	15.20
12.00	******	******	******	16.05	14.90
13.00	******	******	******	15.68	14.62
14.00	******	******	******	15.33	14.35
15.00	******	******	******	15.01	14.08
16.00	******	******	******	14.71	13.83
17.00	******	******	15.50	14.42	13.59
18.00	******	******	18.19	14.15	13.36
19.00	******	19.79	16.99	13.90	13.13
20.00	******	18.56	15.91	13.66	12.92
21.00	******	18.35	15.83	13.64	12.91
22.00	19.65	18.15	15.76	13.61	12.91
23.00	19.21	17.96	15.68	13.58	12.91
24.00	18.75	17.77	15.61	13.56	12.90
25.00	18.39	17.59	15.54	13.53	12.90
26.00	18.02	17.41	15.47	13.50	12.89
27.00	17.67	17.24	15.40	13.48	12.89
28.00	17.34	17.06	15.33	13.45	12.89
29.00	17.03	16.90	15.26	13.42	12.88
30.00	16.73	16.73	15.20	13.40	12.88

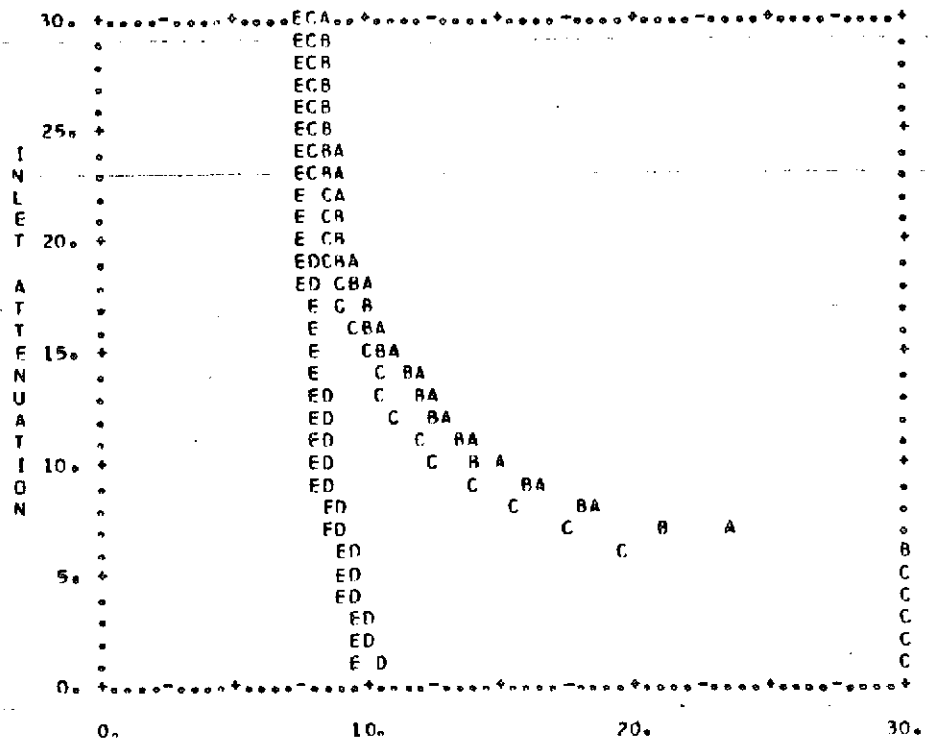
DELTA EPNL = 5.0 FAN HARMONIC = 0.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE, 0. JET ATT, NO TURB, EPNL = 101.70, RUN 10A NO JET1



FAN HARMONIC = 0.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	12.31	11.66
2.00	******	******	******	12.02	11.41
3.00	******	******	******	11.74	11.19
4.00	******	******	******	11.47	10.99
5.00	******	******	******	11.21	10.81
6.00	******	******	20.73	10.98	10.64
7.00	24.94	22.83	18.73	10.76	10.28
8.00	19.27	18.63	16.57	10.57	10.03
9.00	17.59	16.91	15.12	10.38	9.78
10.00	16.10	15.42	13.85	10.21	9.53
11.00	15.38	14.71	13.27	10.10	9.49
12.00	14.72	14.07	12.75	9.99	9.44
13.00	14.11	13.48	12.28	9.87	9.39
14.00	13.54	12.93	11.85	9.74	9.34
15.00	13.01	12.43	11.46	9.62	9.29
16.00	12.52	11.97	11.09	9.51	9.24
17.00	12.07	11.53	10.76	9.40	9.20
18.00	11.64	11.13	10.45	9.29	9.15
19.00	11.24	10.76	10.17	9.19	9.11
20.00	10.86	10.41	9.87	9.09	9.06
21.00	10.75	10.35	9.85	9.08	9.06
22.00	10.65	10.29	9.82	9.08	9.05
23.00	10.56	10.24	9.80	9.07	9.05
24.00	10.46	10.19	9.78	9.07	9.04
25.00	10.37	10.13	9.75	9.06	9.04
26.00	10.28	10.08	9.73	9.06	9.03
27.00	10.19	10.03	9.70	9.05	9.03
28.00	10.11	9.97	9.68	9.05	9.02
29.00	10.03	9.90	9.65	9.04	9.02
30.00	9.94	9.84	9.63	9.04	9.01

DELTA EPNL = 5.0 FAN HARMONIC = 5.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE, 0. JET ATT, NO TURB, EPNL = 101.70, RUN 10A NO JET1

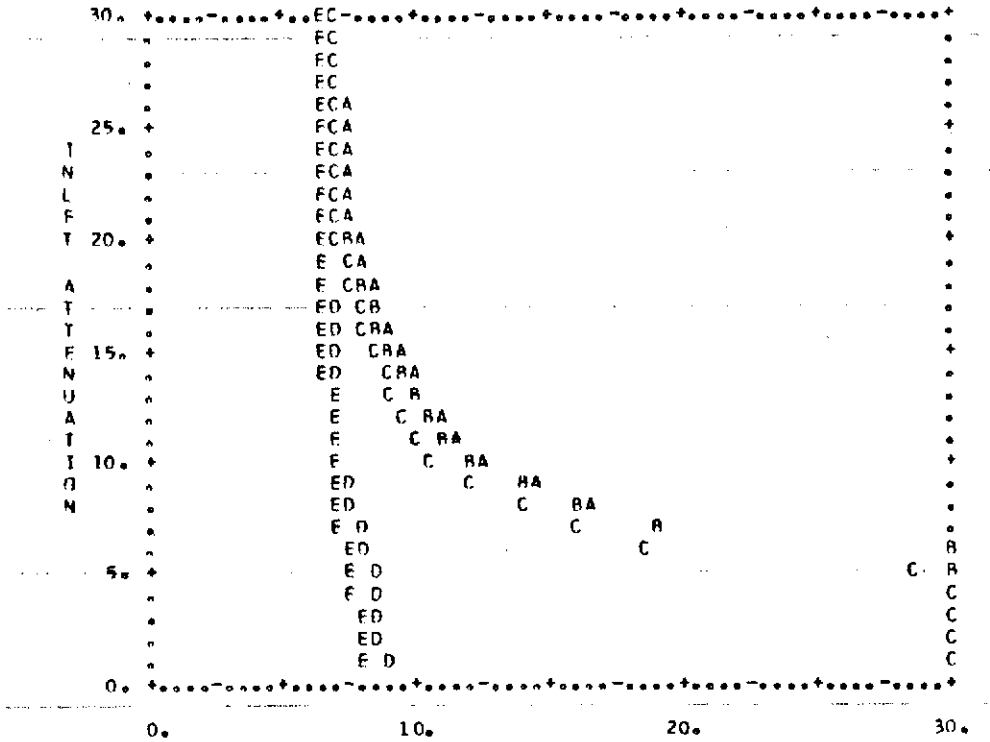


FAN DUCT ATTENUATION

FAN HARMONIC = 5.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	10.46	9.69
2.00	******	******	******	10.12	9.52
3.00	******	******	******	9.86	9.36
4.00	******	******	******	9.65	9.20
5.00	******	******	******	9.45	9.05
6.00	******	******	19.56	9.27	8.83
7.00	23.71	21.05	17.30	9.09	8.63
8.00	18.52	17.83	15.41	8.91	8.43
9.00	16.53	15.82	13.79	8.72	8.24
10.00	14.78	14.09	12.40	8.54	8.05
11.00	13.93	13.28	11.78	8.44	8.01
12.00	13.16	12.55	11.22	8.34	7.97
13.00	12.47	11.89	10.72	8.25	7.93
14.00	11.83	11.28	10.26	8.16	7.89
15.00	11.24	10.73	9.87	8.08	7.85
16.00	10.70	10.23	9.53	7.99	7.81
17.00	10.21	9.81	9.21	7.91	7.77
18.00	9.80	9.46	8.89	7.84	7.73
19.00	9.47	9.13	8.59	7.76	7.70
20.00	9.15	8.81	8.30	7.69	7.66
21.00	9.06	8.75	8.28	7.69	7.66
22.00	8.97	8.70	8.25	7.69	7.65
23.00	8.89	8.64	8.23	7.69	7.65
24.00	8.80	8.58	8.21	7.68	7.64
25.00	8.71	8.52	8.18	7.68	7.64
26.00	8.63	8.47	8.16	7.68	7.63
27.00	8.54	8.41	8.14	7.68	7.63
28.00	8.45	8.35	8.12	7.68	7.63
29.00	8.37	8.29	8.09	7.67	7.62
30.00	8.28	8.24	8.07	7.67	7.62

DELTA EPNL = 5.0 FAN HARMONIC = 10.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE, 0. JET ATT, NO TURB, EPNL = 101.70, RUN 10A NO JET1

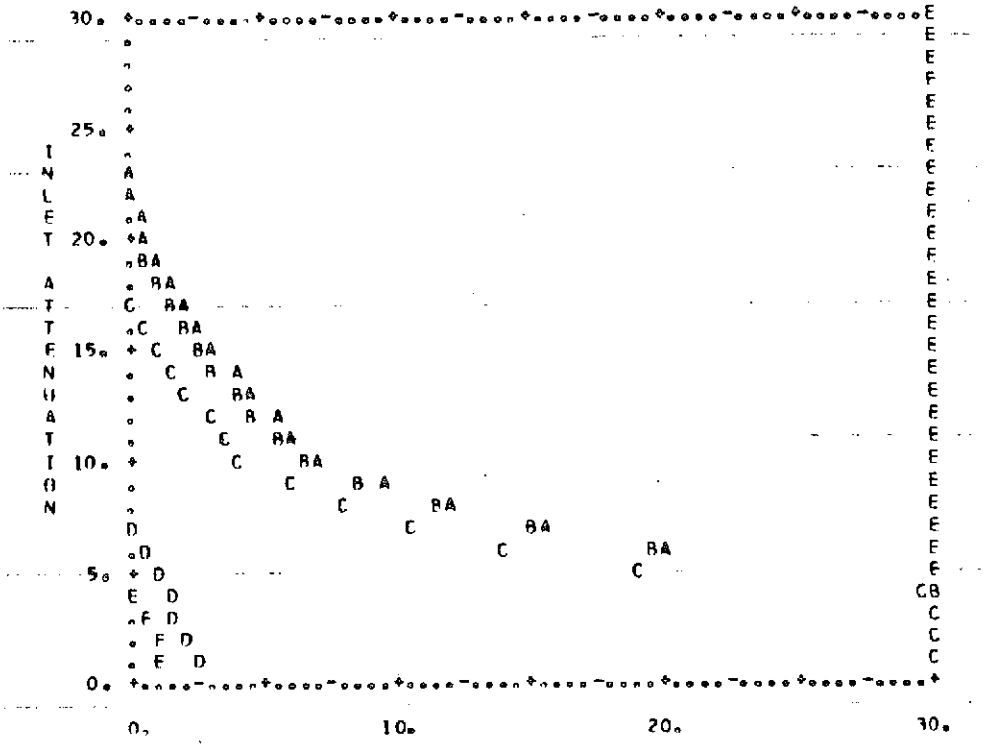


FAN DUCT ATTENUATION

FAN HARMONIC = 10.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	8.89	8.22
2.00	******	******	******	9.73	8.03
3.00	******	******	******	8.57	7.84
4.00	******	******	******	8.42	7.64
5.00	******	******	28.75	8.27	7.45
6.00	******	******	18.68	8.04	7.34
7.00	19.22	18.76	15.98	7.81	7.23
8.00	16.68	16.12	13.82	7.58	7.13
9.00	14.50	13.92	12.05	7.36	7.03
10.00	12.59	12.07	10.58	7.15	6.94
11.00	11.70	11.22	9.94	7.09	6.89
12.00	10.92	10.47	9.54	7.03	6.83
13.00	10.24	9.87	9.17	6.97	6.78
14.00	9.75	9.44	8.81	6.91	6.73
15.00	9.37	9.03	8.47	6.86	6.68
16.00	9.02	8.65	8.14	6.81	6.64
17.00	8.68	8.27	7.83	6.75	6.59
18.00	8.37	7.92	7.54	6.70	6.55
19.00	8.08	7.58	7.26	6.65	6.50
20.00	7.80	7.25	6.99	6.61	6.46
21.00	7.72	7.22	6.96	6.60	6.46
22.00	7.63	7.19	6.94	6.60	6.46
23.00	7.55	7.16	6.91	6.60	6.45
24.00	7.47	7.13	6.89	6.59	6.45
25.00	7.38	7.10	6.87	6.59	6.45
26.00	7.30	7.07	6.84	6.59	6.44
27.00	7.22	7.04	6.82	6.58	6.44
28.00	7.13	7.01	6.80	6.58	6.44
29.00	7.05	6.98	6.77	6.57	6.44
30.00	6.97	6.95	6.75	6.57	6.43

DELTA EPNL = 5.0 FAN HARMONIC = 20.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE, 0. JET ATT, NO TURB, EPNL = 101.70, RUN 10A NO JET1

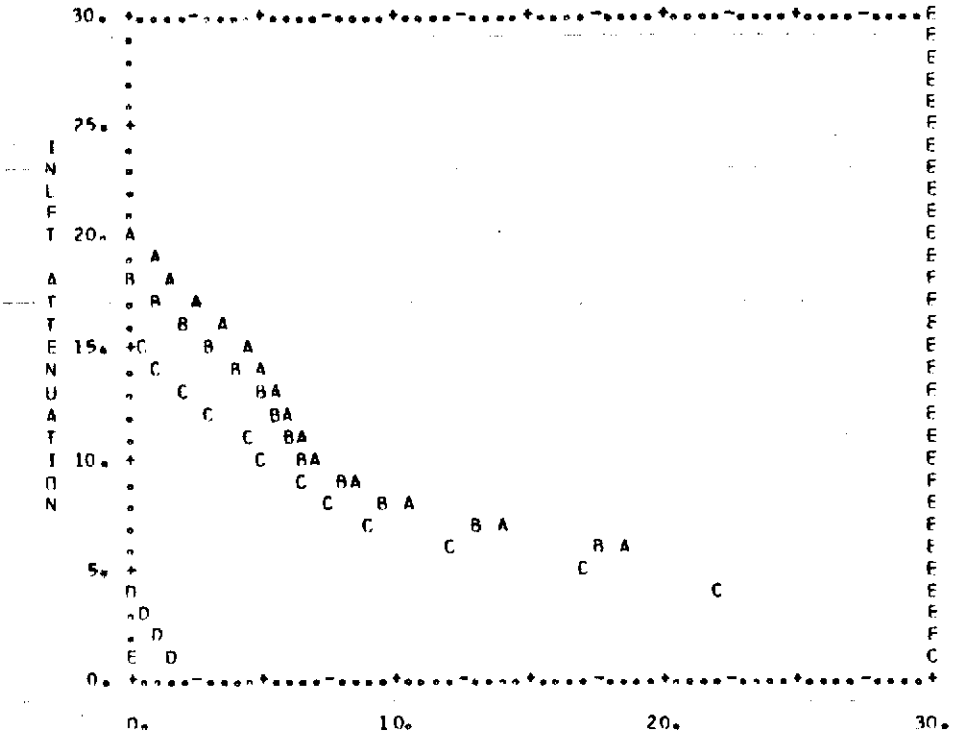


FAN DUCT ATTENUATION

FAN HARMONIC = 20.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	2.30	1.15
2.00	******	******	******	1.99	0.76
3.00	******	******	******	1.69	0.39
4.00	******	******	29.65	1.37	0.05
5.00	******	******	19.06	1.06	******
6.00	19.78	19.29	14.02	0.61	******
7.00	15.58	14.79	10.42	0.19	******
8.00	12.14	11.25	7.97	******	******
9.00	9.35	8.57	5.97	******	******
10.00	7.12	6.39	4.12	******	******
11.00	6.13	5.44	3.44	******	******
12.00	5.28	4.63	2.81	******	******
13.00	4.55	3.90	2.21	******	******
14.00	3.88	3.21	1.65	******	******
15.00	3.24	2.56	1.12	******	******
16.00	2.63	1.94	0.63	******	******
17.00	2.05	1.35	0.15	******	******
18.00	1.50	0.79	******	******	******
19.00	0.97	0.26	******	******	******
20.00	0.47	******	******	******	******
21.00	0.34	******	******	******	******
22.00	0.21	******	******	******	******
23.00	0.08	******	******	******	******
24.00	******	******	******	******	******
25.00	******	******	******	******	******
26.00	******	******	******	******	******
27.00	******	******	******	******	******
28.00	******	******	******	******	******
29.00	******	******	******	******	******
30.00	******	******	******	******	******

DELTA EPNL = 5.0 FAN HARMONIC = 30.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE, 0. JET ATT, NO TURB, EPNL = 101.70, RUN 10A NO JET1

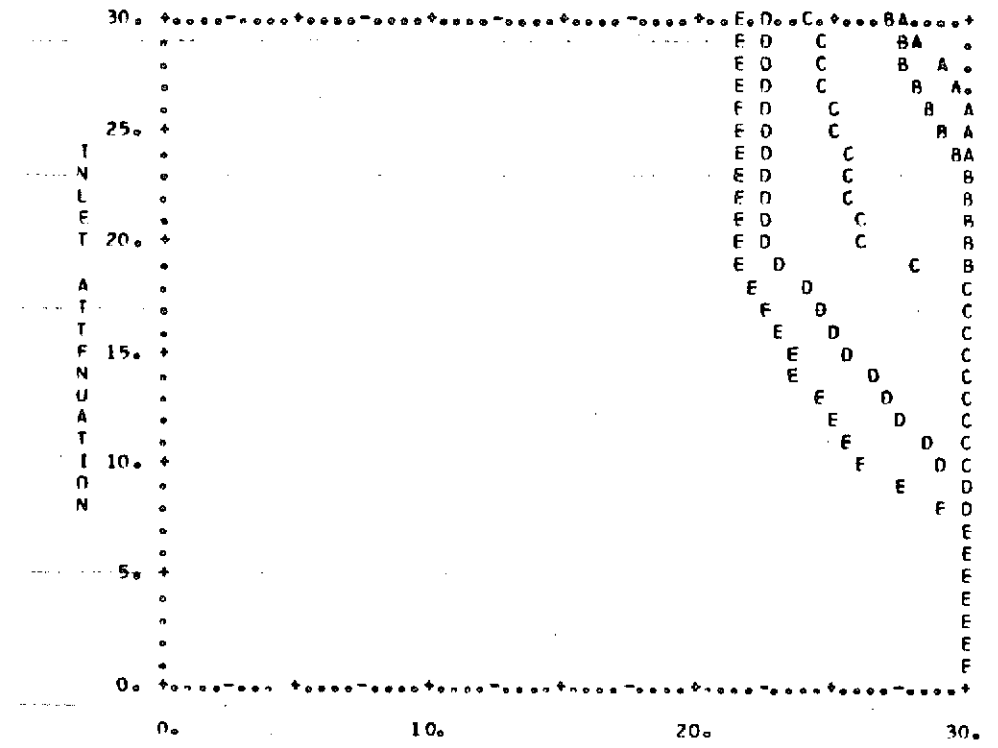


FAN DUCT ATTENUATION

FAN HARMONIC = 30.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	1.60	0.10
2.00	******	******	******	1.10	******
3.00	******	******	******	0.64	******
4.00	******	******	22.09	0.20	******
5.00	******	******	17.18	******	******
6.00	18.42	17.66	11.88	******	******
7.00	14.01	13.05	9.09	******	******
8.00	10.34	9.66	7.59	******	******
9.00	8.61	8.08	6.30	******	******
10.00	7.25	6.72	5.18	******	******
11.00	6.63	6.10	4.25	******	******
12.00	6.08	5.55	3.16	******	******
13.00	5.59	5.06	2.16	******	******
14.00	5.14	4.03	1.24	******	******
15.00	4.32	2.98	0.40	******	******
16.00	3.35	1.99	******	******	******
17.00	2.44	1.07	******	******	******
18.00	1.58	0.20	******	******	******
19.00	0.77	******	******	******	******
20.00	0.00	******	******	******	******
21.00	******	******	******	******	******
22.00	******	******	******	******	******
23.00	******	******	******	******	******
24.00	******	******	******	******	******
25.00	******	******	******	******	******
26.00	******	******	******	******	******
27.00	******	******	******	******	******
28.00	******	******	******	******	******
29.00	******	******	******	******	******
30.00	******	******	******	******	******

DELTA EPNL = 10.0 FAN HARMONIC = 0.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE, 0. JET ATT, NO TURB, EPNL = 101.70, RUN 10A NO JET1

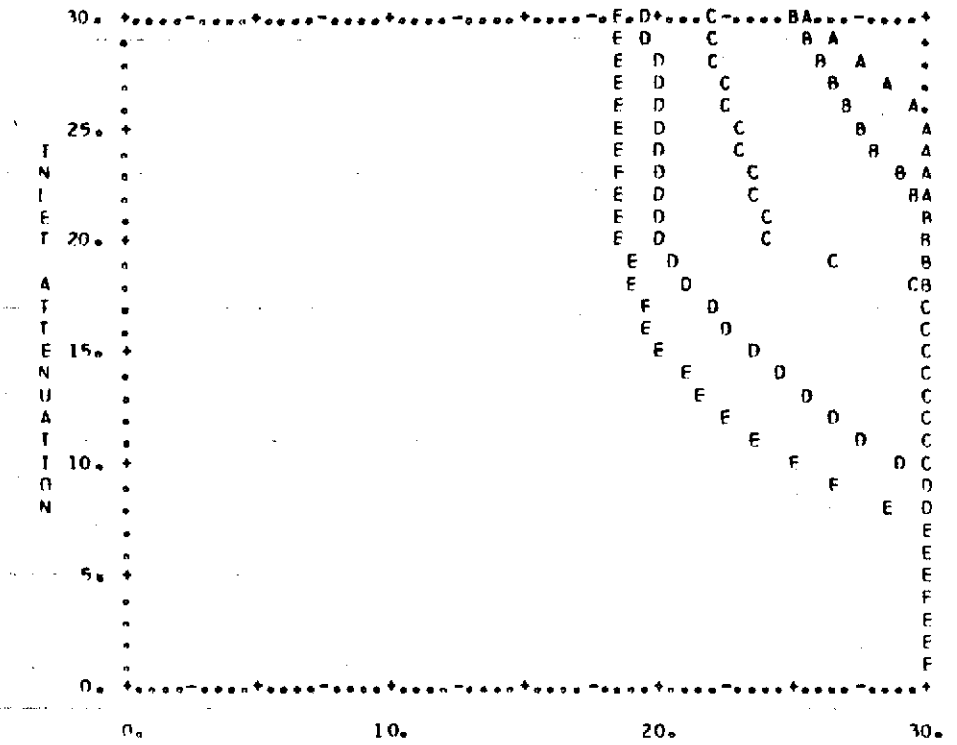


FAN DUCT ATTENUATION

FAN HARMONIC = 0.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	30.94
8.00	******	******	******	******	29.18
9.00	******	******	******	******	27.59
10.00	******	******	******	29.25	26.14
11.00	******	******	******	27.44	25.45
12.00	******	******	******	27.67	24.82
13.00	******	******	******	26.94	24.25
14.00	******	******	******	26.25	23.74
15.00	******	******	******	25.59	23.26
16.00	******	******	******	24.96	22.83
17.00	******	******	******	24.36	22.43
18.00	******	******	30.54	23.78	22.06
19.00	******	******	28.22	23.23	21.72
20.00	******	******	26.11	22.70	21.40
21.00	******	******	25.90	22.67	21.40
22.00	******	30.58	25.68	22.64	21.40
23.00	******	30.07	25.47	22.61	21.40
24.00	******	29.57	25.27	22.58	21.40
25.00	******	29.09	25.07	22.55	21.40
26.00	30.55	28.62	24.87	22.52	21.40
27.00	29.73	28.17	24.67	22.49	21.40
28.00	28.94	27.73	24.48	22.47	21.40
29.00	28.18	27.30	24.29	22.46	21.40
30.00	27.45	26.89	24.10	22.41	21.40

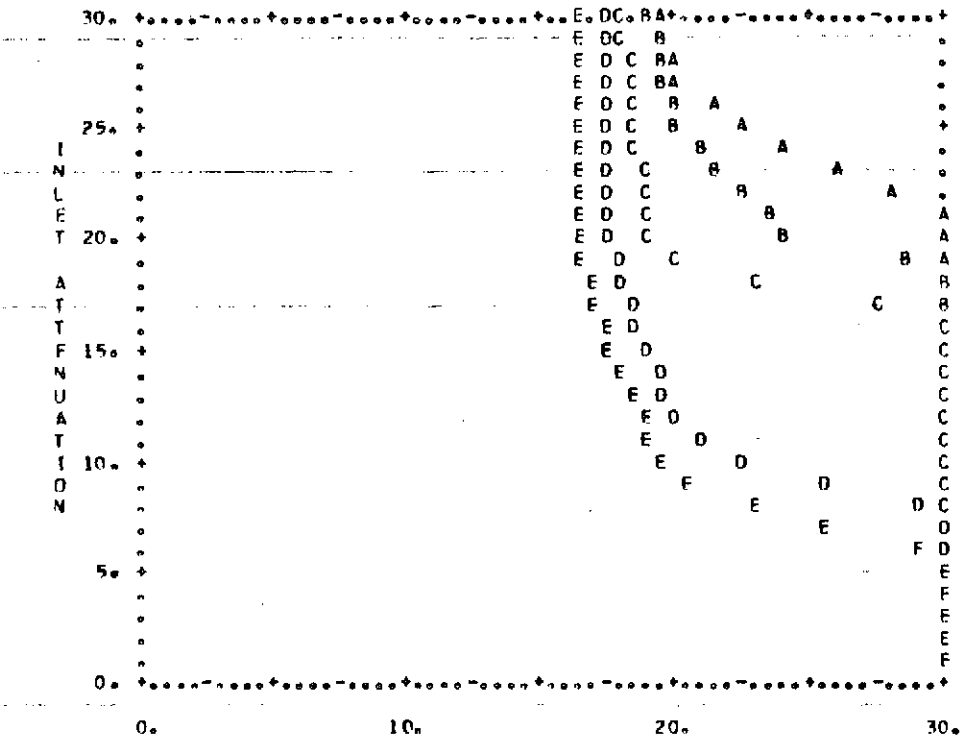
DELTA EPNL = 10.0 FAN HARMONIC = 5.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE, 0. JET ATT, NO TURB, EPNL = 101.70, RUN 10A NO JET1



FAN HARMONIC = 5.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	30.97
8.00	******	******	******	******	28.73
9.00	******	******	******	******	26.71
10.00	******	******	******	28.80	24.88
11.00	******	******	******	27.58	23.72
12.00	******	******	******	26.46	22.67
13.00	******	******	******	25.41	21.71
14.00	******	******	******	24.44	20.82
15.00	******	******	******	23.54	20.00
16.00	******	******	******	22.69	19.71
17.00	******	******	******	21.90	19.43
18.00	******	******	29.48	21.16	19.16
19.00	******	******	26.66	20.46	18.91
20.00	******	30.88	24.13	19.92	18.67
21.00	******	30.16	23.87	19.90	18.67
22.00	******	29.47	23.61	19.88	18.67
23.00	******	28.82	23.36	19.86	18.66
24.00	******	28.18	23.12	19.84	18.66
25.00	30.64	27.58	22.88	19.82	18.66
26.00	29.47	26.99	22.65	19.80	18.66
27.00	28.37	26.44	22.42	19.79	18.66
28.00	27.35	25.90	22.20	19.77	18.66
29.00	26.40	25.38	21.98	19.75	18.66
30.00	25.50	24.88	21.76	19.73	18.66

DELTA EPNL = 10.0 FAN HARMONIC = 10.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE, 0. JET ATT, NO TURB, EPNL = 101.70, RUN 10A NO JET1

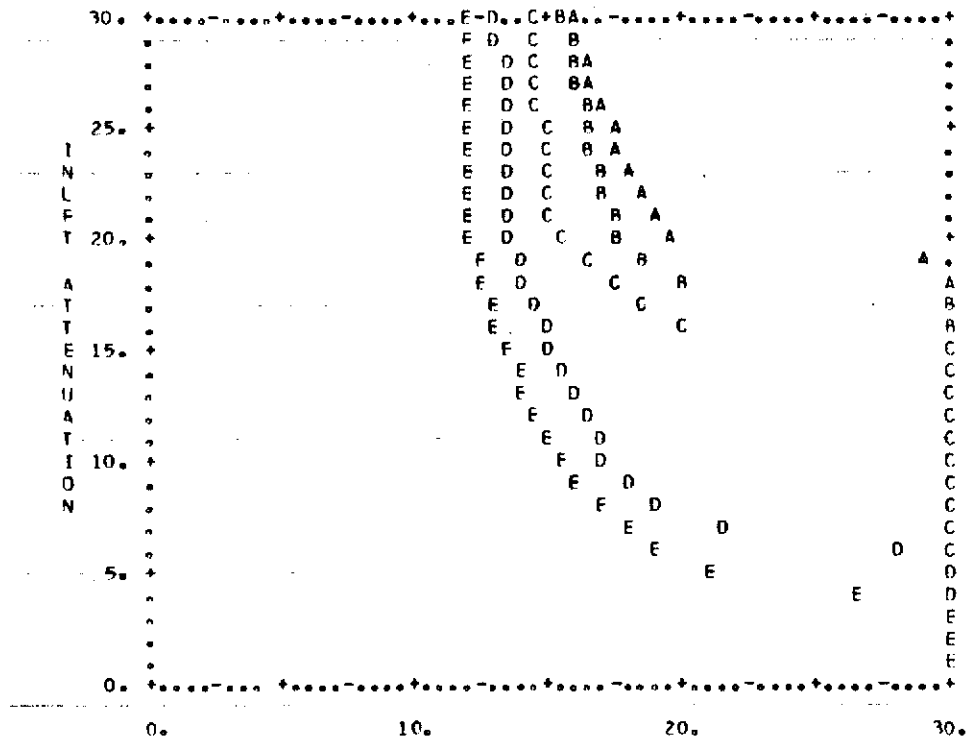


FAN DUCT ATTENUATION

FAN HARMONIC = 10.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	28.89
7.00	******	******	******	******	25.66
8.00	******	******	******	28.92	22.92
9.00	******	******	******	25.55	20.56
10.00	******	******	******	22.60	19.55
11.00	******	******	******	21.22	19.14
12.00	******	******	******	19.97	18.76
13.00	******	******	******	19.63	18.40
14.00	******	******	******	19.30	18.06
15.00	******	******	******	18.98	17.73
16.00	******	******	******	18.68	17.43
17.00	******	******	27.25	18.40	17.14
18.00	******	******	23.07	18.12	16.86
19.00	******	28.66	19.84	17.86	16.60
20.00	******	24.21	19.03	17.60	16.35
21.00	30.21	23.29	18.94	17.58	16.35
22.00	27.93	22.42	18.85	17.56	16.35
23.00	25.95	21.59	18.76	17.53	16.35
24.00	24.22	20.81	18.67	17.51	16.35
25.00	22.68	20.06	18.58	17.49	16.35
26.00	21.32	19.85	18.50	17.47	16.35
27.00	20.09	19.68	18.41	17.44	16.35
28.00	19.78	19.52	18.33	17.42	16.35
29.00	19.55	19.36	18.24	17.40	16.35
30.00	19.33	19.21	18.16	17.38	16.34

DELTA EPNL = 10.0 FAN HARMONIC = 20.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE, 0. JET ATT, NO TURB, EPNL = 101.70, RUN 10A NO JET1

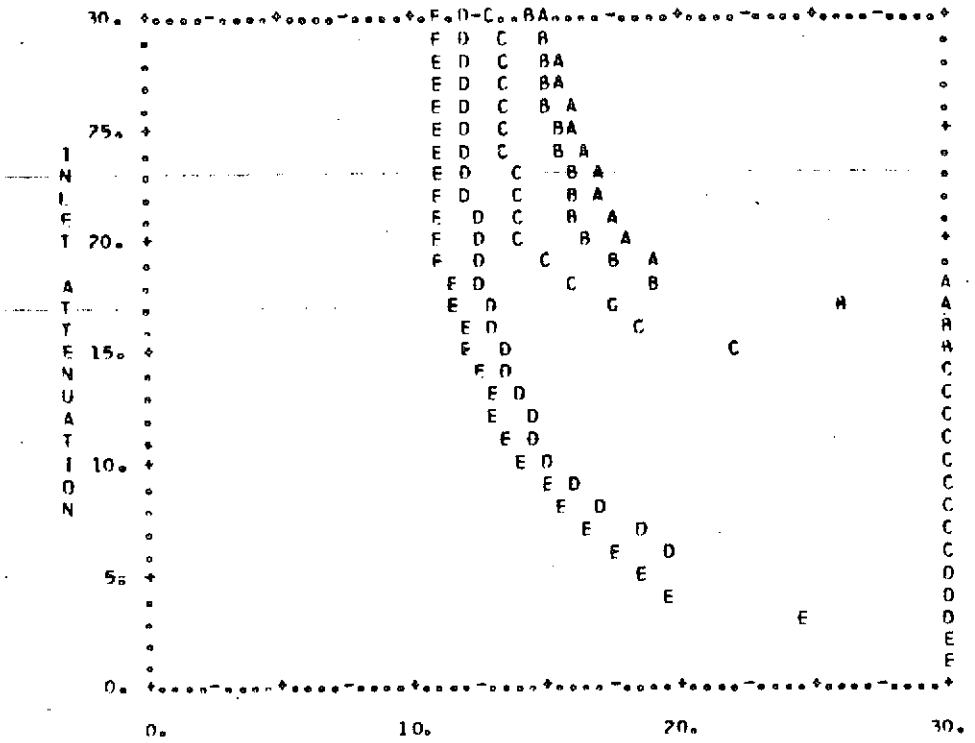


FAN DUCT ATTENUATION

FAN HARMONIC = 20.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	26.42
5.00	******	******	******	******	20.85
6.00	******	******	******	28.13	18.96
7.00	******	******	******	21.70	17.91
8.00	******	******	******	19.20	16.98
9.00	******	******	******	18.17	16.16
10.00	******	******	******	17.24	15.42
11.00	******	******	******	16.76	14.96
12.00	******	******	******	16.31	14.53
13.00	******	******	******	15.89	14.13
14.00	******	******	******	15.49	13.76
15.00	******	******	******	15.12	13.42
16.00	******	******	19.83	14.76	13.10
17.00	******	******	18.51	14.43	12.80
18.00	******	19.92	17.33	14.12	12.52
19.00	29.16	18.65	16.27	13.82	12.26
20.00	19.31	17.50	15.32	13.54	12.01
21.00	18.88	17.29	15.21	13.50	12.01
22.00	18.47	17.08	15.10	13.47	12.01
23.00	18.08	16.89	14.99	13.43	12.01
24.00	17.71	16.69	14.89	13.40	12.01
25.00	17.36	16.51	14.78	13.36	12.01
26.00	17.02	16.33	14.68	13.33	12.01
27.00	16.70	16.15	14.58	13.29	12.01
28.00	16.39	15.98	14.47	13.26	12.01
29.00	16.09	15.82	14.38	13.23	12.01
30.00	15.80	15.66	14.28	13.19	12.01

DELTA EPNL = 10.0 FAN HARMONIC = 30.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE, 0. JET ATT, NO TURB, EPNL = 101.70, RUN 104 NO JET)

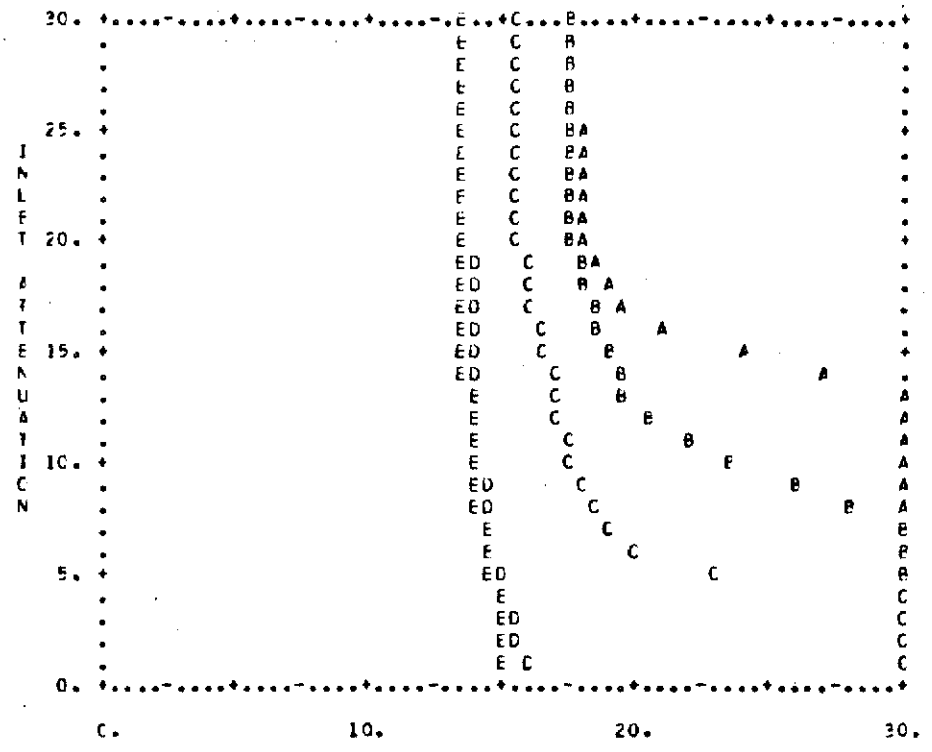


FAN DUCT ATTENUATION

FAN HARMONIC = 30.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	24.65
4.00	******	******	******	******	19.49
5.00	******	******	******	******	18.46
6.00	******	******	******	19.72	17.35
7.00	******	******	******	18.35	16.38
8.00	******	******	******	17.14	15.52
9.00	******	******	******	16.06	14.76
10.00	******	******	******	15.11	14.08
11.00	******	******	******	14.71	13.61
12.00	******	******	******	14.35	13.19
13.00	******	******	******	14.01	12.80
14.00	******	******	******	13.71	12.45
15.00	******	******	21.84	13.43	12.13
16.00	******	******	18.61	13.17	11.83
17.00	******	25.76	17.28	12.93	11.56
18.00	******	18.85	16.11	12.70	11.31
19.00	19.18	17.53	15.08	12.49	11.07
20.00	17.95	16.36	14.15	12.30	10.85
21.00	17.56	16.15	14.05	12.27	10.85
22.00	17.19	15.95	13.94	12.23	10.85
23.00	16.84	15.76	13.84	12.20	10.85
24.00	16.50	15.58	13.74	12.17	10.85
25.00	16.18	15.40	13.64	12.14	10.85
26.00	15.88	15.23	13.55	12.11	10.85
27.00	15.59	15.07	13.45	12.07	10.85
28.00	15.31	14.92	13.36	12.04	10.85
29.00	15.04	14.77	13.27	12.01	10.85
30.00	14.79	14.62	13.19	11.98	10.85

DELTA EPNL = 5.0 FAN HARMONIC = 0.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
APP, WITH TONE, 3. JET ATT., NO TURB, EPNL = 101.66, RUN 11A NO JET1

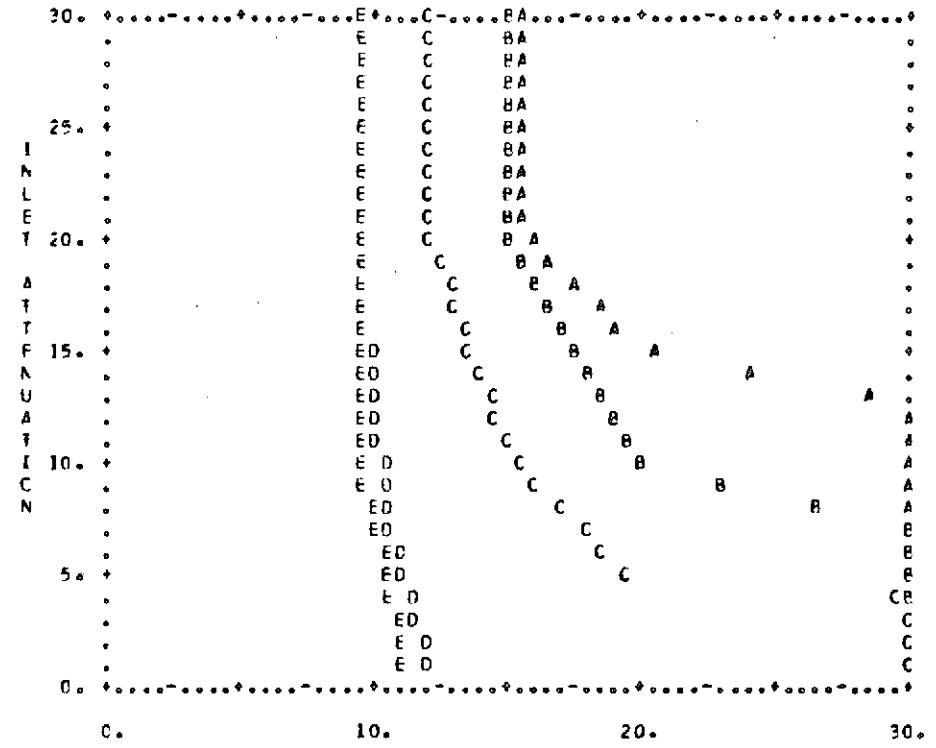


FAN DUCT ATTENUATION

FAN HARMONIC = 0.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	15.81	15.23
2.00	******	******	******	15.56	15.07
3.00	******	******	******	15.33	14.91
4.00	******	******	30.76	15.10	14.75
5.00	******	******	22.57	14.88	14.60
6.00	******	******	19.63	14.73	14.45
7.00	******	30.83	19.24	14.59	14.31
8.00	******	28.20	18.69	14.44	14.17
9.00	******	25.77	18.17	14.29	14.03
10.00	******	23.52	17.68	14.15	13.89
11.00	******	21.93	17.45	14.11	13.85
12.00	******	20.30	17.23	14.06	13.81
13.00	30.00	19.72	17.02	14.02	13.77
14.00	26.89	19.38	16.81	13.98	13.73
15.00	23.81	19.06	16.61	13.94	13.70
16.00	20.78	18.74	16.42	13.90	13.66
17.00	19.58	18.42	16.22	13.86	13.62
18.00	19.04	18.12	16.04	13.83	13.59
19.00	18.52	17.82	15.86	13.79	13.55
20.00	18.02	17.53	15.66	13.75	13.52
21.00	17.57	17.52	15.68	13.75	13.51
22.00	17.93	17.52	15.68	13.75	13.51
23.00	17.88	17.51	15.68	13.74	13.51
24.00	17.83	17.51	15.68	13.74	13.51
25.00	17.78	17.50	15.68	13.74	13.51
26.00	17.73	17.49	15.68	13.74	13.51
27.00	17.68	17.49	15.68	13.74	13.50
28.00	17.63	17.48	15.68	13.74	13.50
29.00	17.59	17.48	15.68	13.73	13.50
30.00	17.54	17.47	15.68	13.73	13.50

DELTA EPNL = 5.0 FAN HARMONIC = 5.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
APP, WITH TONE, 3. JET ATT., NO TURB, EPNL = 101.66, RUN 11A NC JET1



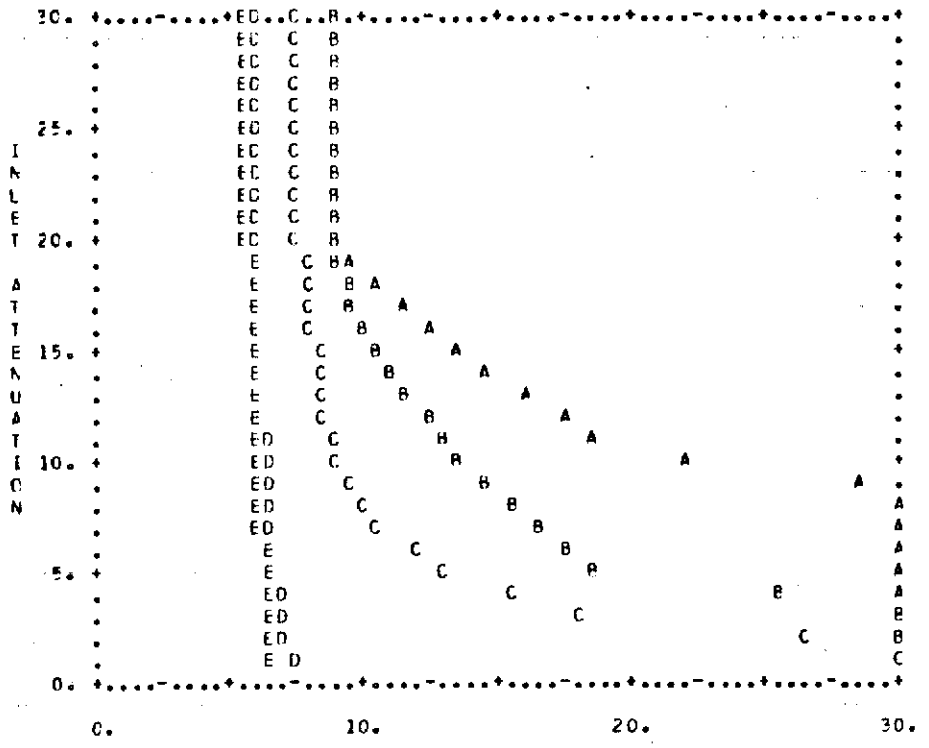
FAN DUCT ATTENUATION

FAN HARMONIC = 5.0 DELTA EPNL = 5.0

	A	B	C	D	E
INLET HARMONIC =	0	5	10	20	30

INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	12.22	11.19
2.00	******	******	******	11.89	11.02
3.00	******	******	******	11.58	10.87
4.00	******	******	29.67	11.29	10.71
5.00	******	******	19.73	11.01	10.57
6.00	******	******	18.71	10.86	10.32
7.00	******	30.90	17.76	10.71	10.08
8.00	******	24.58	16.88	10.56	9.88
9.00	******	22.79	16.06	10.42	9.71
10.00	******	19.67	15.29	10.29	9.54
11.00	******	19.37	14.93	10.18	9.53
12.00	******	18.87	14.58	10.07	9.52
13.00	28.32	18.38	14.25	9.97	9.50
14.00	24.22	17.90	13.93	9.89	9.49
15.00	20.26	17.43	13.62	9.80	9.48
16.00	19.14	16.97	13.32	9.72	9.47
17.00	18.25	16.51	13.03	9.64	9.46
18.00	17.39	16.06	12.75	9.57	9.44
19.00	16.56	15.61	12.48	9.49	9.43
20.00	15.76	15.18	12.22	9.42	9.42
21.00	15.72	15.18	12.22	9.42	9.42
22.00	15.68	15.18	12.22	9.42	9.41
23.00	15.64	15.17	12.22	9.42	9.41
24.00	15.60	15.17	12.22	9.42	9.41
25.00	15.56	15.17	12.22	9.42	9.41
26.00	15.52	15.17	12.22	9.42	9.40
27.00	15.48	15.17	12.22	9.42	9.40
28.00	15.44	15.17	12.22	9.42	9.40
29.00	15.40	15.17	12.22	9.42	9.39
30.00	15.36	15.17	12.22	9.42	9.39

DELTA EPNL = 5.0 FAN HARMONIC = 10.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
APP, WITH TONE, 3. JET ATT., NO TURB, EPNL = 101.66, RUN 11A AC JET1

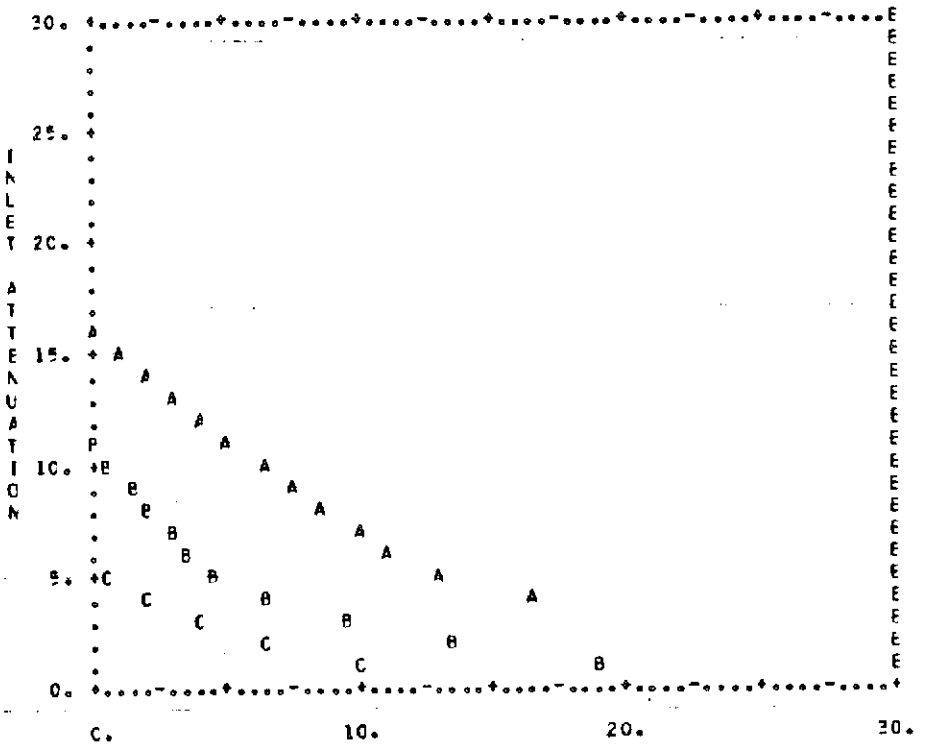


FAN DUCT ATTENUATION

FAN HARMONIC = 10.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	7.31	6.70
2.00	******	******	26.45	7.14	6.62
3.00	******	******	18.06	6.98	6.55
4.00	******	25.45	15.50	6.83	6.48
5.00	******	18.55	13.20	6.68	6.42
6.00	******	17.45	11.91	6.60	6.31
7.00	******	16.41	10.72	6.52	6.21
8.00	******	15.43	9.82	6.45	6.10
9.00	28.65	14.51	9.36	6.37	5.99
10.00	21.67	13.63	8.93	6.30	5.89
11.00	18.72	12.97	8.79	6.25	5.87
12.00	17.28	12.33	8.66	6.21	5.86
13.00	15.93	11.69	8.53	6.16	5.84
14.00	14.66	11.07	8.40	6.12	5.83
15.00	13.47	10.46	8.27	6.07	5.81
16.00	12.34	9.93	8.15	6.02	5.80
17.00	11.28	9.66	8.03	5.98	5.78
18.00	10.27	9.39	7.91	5.93	5.77
19.00	9.67	9.14	7.80	5.89	5.76
20.00	9.24	8.90	7.69	5.84	5.74
21.00	9.22	8.90	7.67	5.84	5.74
22.00	9.19	8.90	7.66	5.84	5.74
23.00	9.16	8.90	7.65	5.84	5.74
24.00	9.13	8.90	7.63	5.83	5.74
25.00	9.11	8.90	7.62	5.83	5.73
26.00	9.08	8.90	7.61	5.83	5.73
27.00	9.05	8.90	7.59	5.83	5.73
28.00	9.02	8.90	7.58	5.83	5.73
29.00	9.00	8.90	7.57	5.82	5.73
30.00	8.97	8.90	7.55	5.82	5.73

DELTA EPNL = 5.0 FAN HARMONIC = 20.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
APP, WITH TONE, 3, JET ATT., NO TURB, EPNL = 101.66, RUN 11A AC JET1

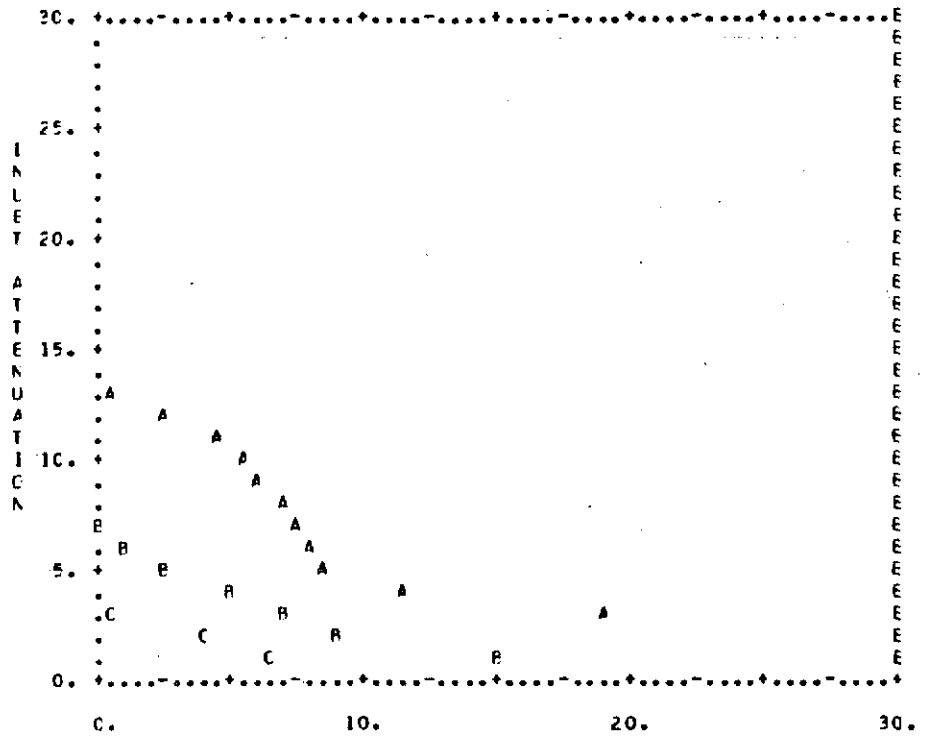


FAN DUCT ATTENUATION

FAN HARMONIC = 20.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	18.80	9.85	******	******
2.00	******	13.69	6.57	******	******
3.00	******	9.44	4.08	******	******
4.00	15.68	6.74	2.08	******	******
5.00	12.84	4.50	0.26	******	******
6.00	11.21	3.63	******	******	******
7.00	9.77	2.80	******	******	******
8.00	8.69	2.01	******	******	******
9.00	7.68	1.27	******	******	******
10.00	6.73	0.56	******	******	******
11.00	5.16	0.10	******	******	******
12.00	4.00	******	******	******	******
13.00	2.95	******	******	******	******
14.00	1.98	******	******	******	******
15.00	1.06	******	******	******	******
16.00	0.21	******	******	******	******
17.00	******	******	******	******	******
18.00	******	******	******	******	******
19.00	******	******	******	******	******
20.00	******	******	******	******	******
21.00	******	******	******	******	******
22.00	******	******	******	******	******
23.00	******	******	******	******	******
24.00	******	******	******	******	******
25.00	******	******	******	******	******
26.00	******	******	******	******	******
27.00	******	******	******	******	******
28.00	******	******	******	******	******
29.00	******	******	******	******	******
30.00	******	******	******	******	******

DELTA EPNL = 5.0 FAN HARMONIC = 30.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
APP, WITH TONE, 3. JET ATT., NO TURB, EPNL = 101.66, RUN 11A NC JET1

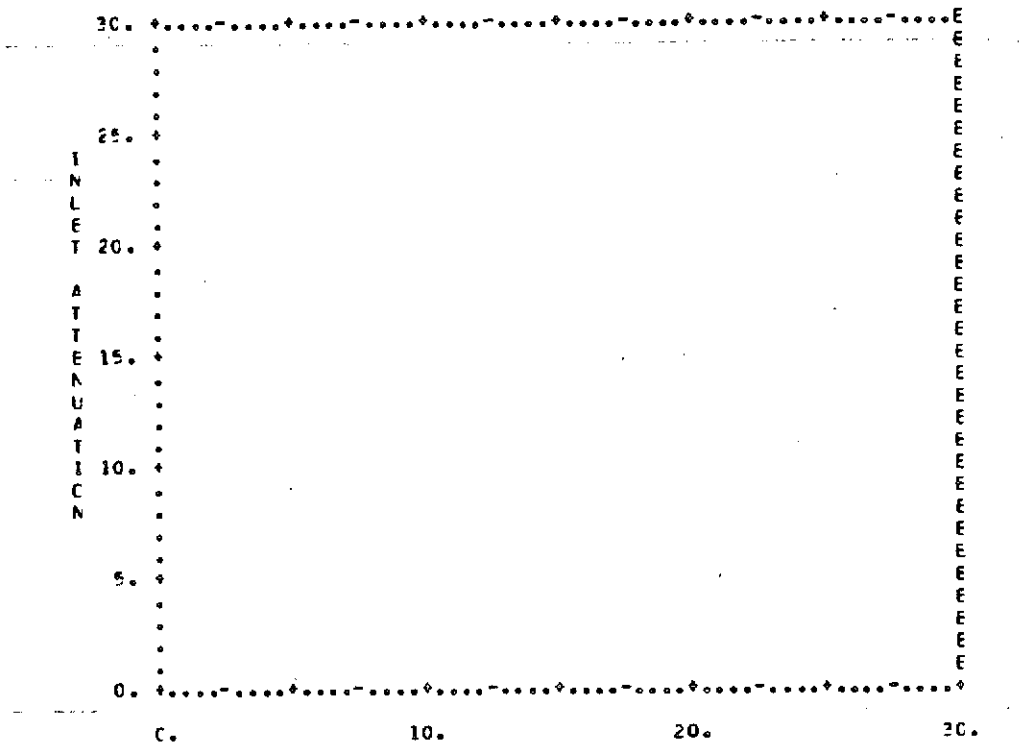


FAN DUCT ATTENUATION

FAN HARMONIC = 30.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	15.08	6.65	******	******
2.00	******	9.05	3.78	******	******
3.00	19.03	6.91	0.30	******	******
4.00	11.39	5.18	******	******	******
5.00	8.75	2.50	******	******	******
6.00	8.03	1.20	******	******	******
7.00	7.37	0.02	******	******	******
8.00	6.75	******	******	******	******
9.00	6.18	******	******	******	******
10.00	5.64	******	******	******	******
11.00	4.30	******	******	******	******
12.00	2.46	******	******	******	******
13.00	0.68	******	******	******	******
14.00	******	******	******	******	******
15.00	******	******	******	******	******
16.00	******	******	******	******	******
17.00	******	******	******	******	******
18.00	******	******	******	******	******
19.00	******	******	******	******	******
20.00	******	******	******	******	******
21.00	******	******	******	******	******
22.00	******	******	******	******	******
23.00	******	******	******	******	******
24.00	******	******	******	******	******
25.00	******	******	******	******	******
26.00	******	******	******	******	******
27.00	******	******	******	******	******
28.00	******	******	******	******	******
29.00	******	******	******	******	******
30.00	******	******	******	******	******

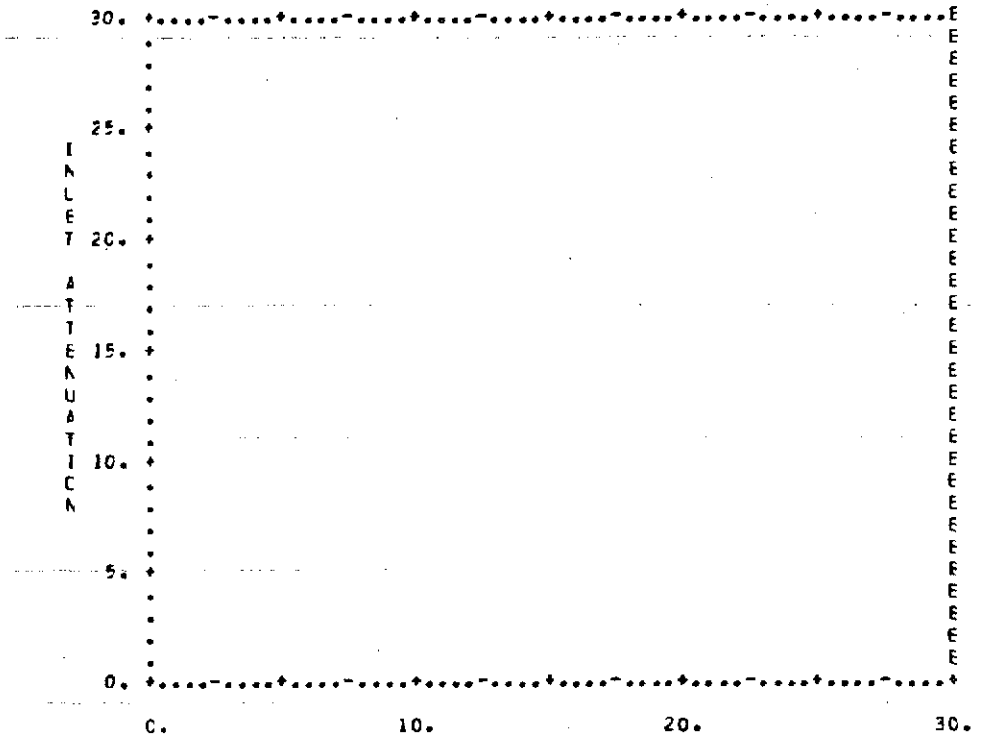
DELTA EPNL = 10.0 FAN HARMONIC = 0.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
APP, WITH TONE, 3. JET ATT., NO TURB, EPNL = 101.66, RUN 11A NC JET1



FAN HARMONIC = 0.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	******
8.00	******	******	******	******	******
9.00	******	******	******	******	******
10.00	******	******	******	******	******
11.00	******	******	******	******	******
12.00	******	******	******	******	******
13.00	******	******	******	******	******
14.00	******	******	******	******	******
15.00	******	******	******	******	******
16.00	******	******	******	******	******
17.00	******	******	******	******	******
18.00	******	******	******	******	******
19.00	******	******	******	******	******
20.00	******	******	******	******	******
21.00	******	******	******	******	******
22.00	******	******	******	******	******
23.00	******	******	******	******	******
24.00	******	******	******	******	******
25.00	******	******	******	******	******
26.00	******	******	******	******	******
27.00	******	******	******	******	******
28.00	******	******	******	******	******
29.00	******	******	******	******	******
30.00	******	******	******	******	******

DELTA EPNL = 10.0 FAN HARMONIC = 5.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
APP, WITH TONE, 3. JET ATT., NO TURB, EPNL = 101.66, RUN 11A NC JET1

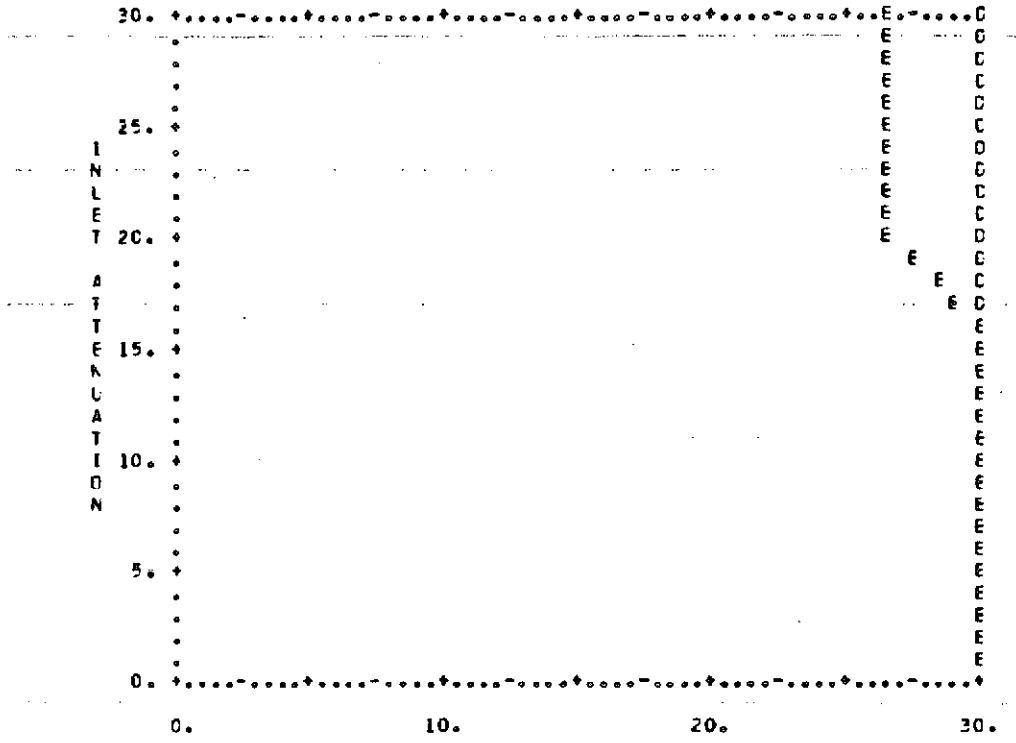


FAN DUCT ATTENUATION

FAN HARMONIC = 5.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	******
8.00	******	******	******	******	******
9.00	******	******	******	******	******
10.00	******	******	******	******	******
11.00	******	******	******	******	******
12.00	******	******	******	******	******
13.00	******	******	******	******	******
14.00	******	******	******	******	******
15.00	******	******	******	******	******
16.00	******	******	******	******	******
17.00	******	******	******	******	******
18.00	******	******	******	******	******
19.00	******	******	******	******	******
20.00	******	******	******	******	******
21.00	******	******	******	******	******
22.00	******	******	******	******	******
23.00	******	******	******	******	******
24.00	******	******	******	******	******
25.00	******	******	******	******	******
26.00	******	******	******	******	******
27.00	******	******	******	******	******
28.00	******	******	******	******	******
29.00	******	******	******	******	******
30.00	******	******	******	******	******

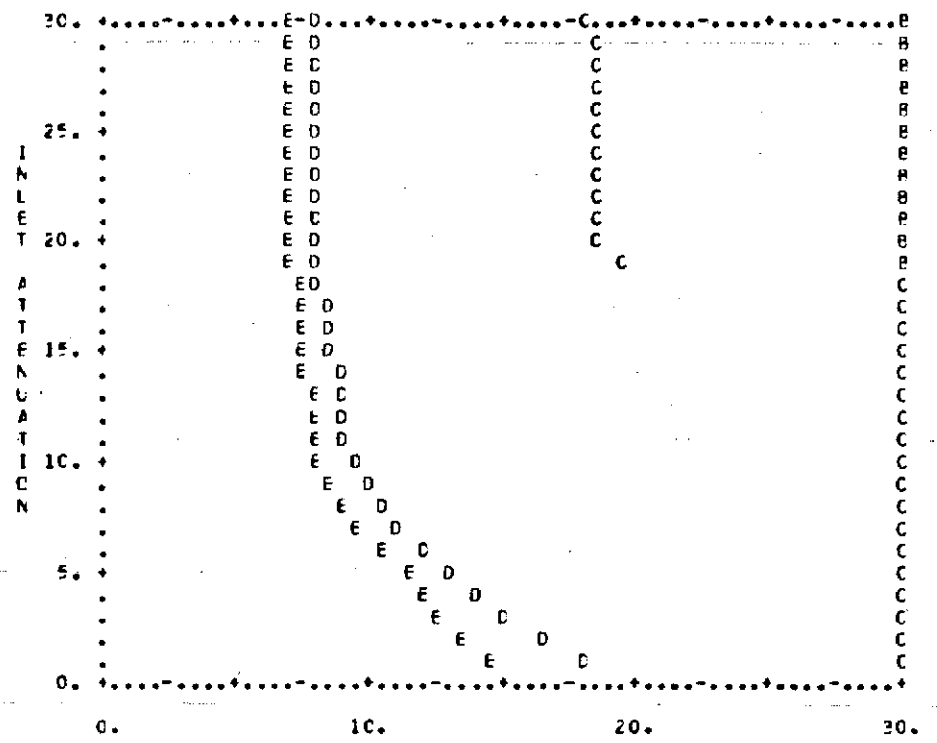
DELTA EPNL = 10.0 FAN HARMONIC = 10.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
APP, WITH TONE, 3. JET ATT., NO TURB, EPNL = 101.66, RUN 11A NC JET1



FAN HARMONIC = 10.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	******
8.00	******	******	******	******	******
9.00	******	******	******	******	******
10.00	******	******	******	******	******
11.00	******	******	******	******	******
12.00	******	******	******	******	******
13.00	******	******	******	******	******
14.00	******	******	******	******	******
15.00	******	******	******	******	******
16.00	******	******	******	******	30.07
17.00	******	******	******	******	29.16
18.00	******	******	******	******	28.29
19.00	******	******	******	******	27.46
20.00	******	******	******	******	26.67
21.00	******	******	******	******	26.67
22.00	******	******	******	******	26.66
23.00	******	******	******	******	26.66
24.00	******	******	******	******	26.66
25.00	******	******	******	******	26.66
26.00	******	******	******	******	26.66
27.00	******	******	******	******	26.66
28.00	******	******	******	******	26.65
29.00	******	******	******	******	26.65
30.00	******	******	******	******	26.65

DELTA EPNL = 10.0 FAN HARMONIC = 20.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
APP, WITH TONE, 3. JET ATT., NO TURB, EPNL = 101.66, RUN 11A NO JET1

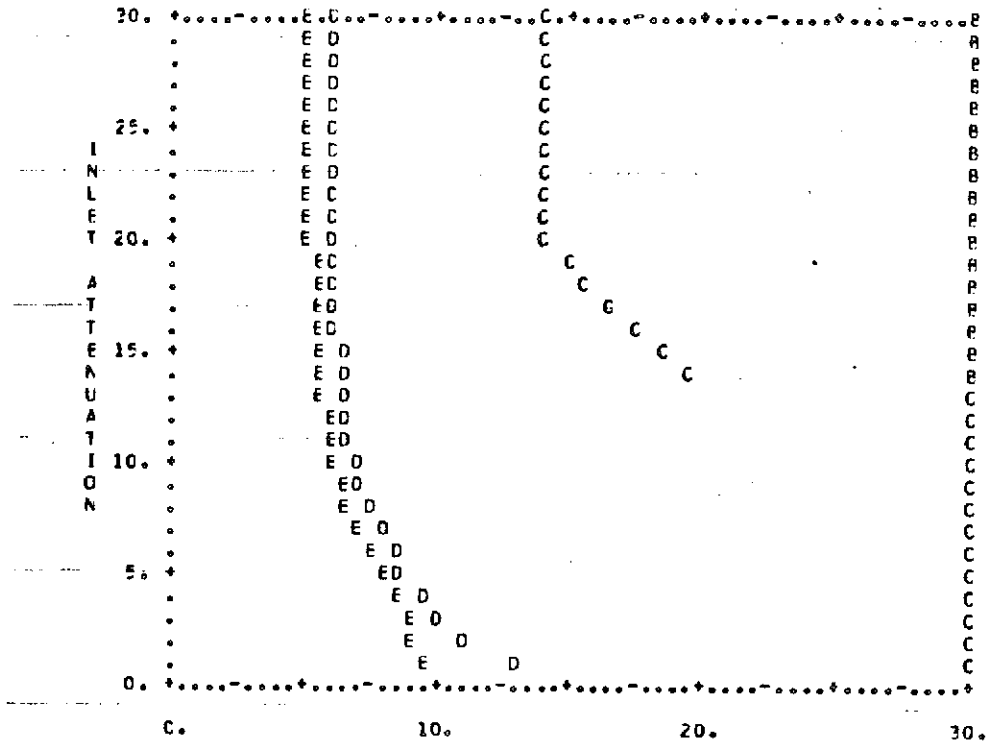


FAN DUCT ATTENUATION

FAN HARMONIC = 20.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	17.84	14.46
2.00	******	******	******	16.36	13.53
3.00	******	******	******	15.05	12.71
4.00	******	******	******	13.89	11.97
5.00	******	******	******	12.84	11.31
6.00	******	******	******	11.97	10.42
7.00	******	******	******	11.19	9.74
8.00	******	******	******	10.49	9.18
9.00	******	******	******	9.88	8.67
10.00	******	******	******	9.39	8.19
11.00	******	******	******	9.23	8.08
12.00	******	******	******	9.07	7.96
13.00	******	******	******	8.91	7.85
14.00	******	******	******	8.76	7.74
15.00	******	******	******	8.61	7.64
16.00	******	******	******	8.47	7.53
17.00	******	******	******	8.33	7.43
18.00	******	******	******	8.20	7.33
19.00	******	******	19.45	8.06	7.24
20.00	******	******	18.68	7.93	7.14
21.00	******	******	18.63	7.93	7.14
22.00	******	******	18.59	7.93	7.14
23.00	******	******	18.54	7.93	7.14
24.00	******	******	18.49	7.93	7.14
25.00	******	******	18.44	7.93	7.14
26.00	******	******	18.39	7.93	7.14
27.00	******	******	18.35	7.93	7.14
28.00	******	******	18.30	7.93	7.14
29.00	******	******	18.25	7.93	7.14
30.00	******	******	18.21	7.93	7.14

DELTA EPNL = 10.0 FAN HARMONIC = 30.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
APP, WITH TONE, 3. JET ATT., NO TURB, EPNL = 101.66, RUN 11A AC JET1

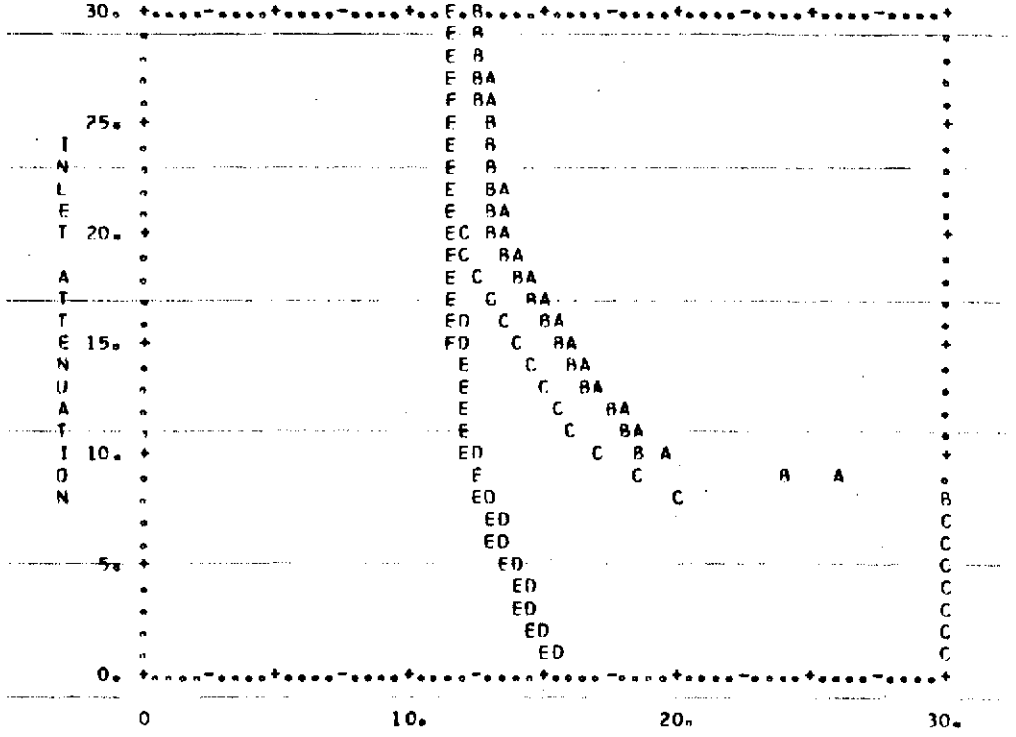


FAN OUCT ATTENUATION

FAN HARMONIC = 30.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	12.79	9.55
2.00	******	******	******	11.10	9.15
3.00	******	******	******	9.84	8.78
4.00	******	******	******	9.25	8.42
5.00	******	******	******	8.71	8.09
6.00	******	******	******	8.28	7.78
7.00	******	******	******	7.88	7.12
8.00	******	******	******	7.51	6.70
9.00	******	******	******	7.17	6.32
10.00	******	******	******	6.85	5.97
11.00	******	******	******	6.73	5.88
12.00	******	******	******	6.63	5.80
13.00	******	******	******	6.52	5.72
14.00	******	******	19.46	6.42	5.64
15.00	******	******	18.46	6.32	5.56
16.00	******	******	17.50	6.22	5.49
17.00	******	******	16.59	6.13	5.42
18.00	******	******	15.71	6.04	5.35
19.00	******	******	14.86	5.95	5.28
20.00	******	******	14.08	5.86	5.21
21.00	******	******	14.05	5.86	5.21
22.00	******	******	14.03	5.86	5.21
23.00	******	******	14.00	5.86	5.21
24.00	******	******	13.97	5.86	5.21
25.00	******	******	13.95	5.86	5.21
26.00	******	******	13.92	5.86	5.21
27.00	******	******	13.90	5.86	5.21
28.00	******	******	13.87	5.86	5.21
29.00	******	******	13.85	5.86	5.21
30.00	******	******	13.82	5.86	5.21

DELTA EPNL = 5.0 FAN HARMONIC = 0.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONF,2.5 JET ATT, NO TURB, EPNL = 102.56, RUN 12A

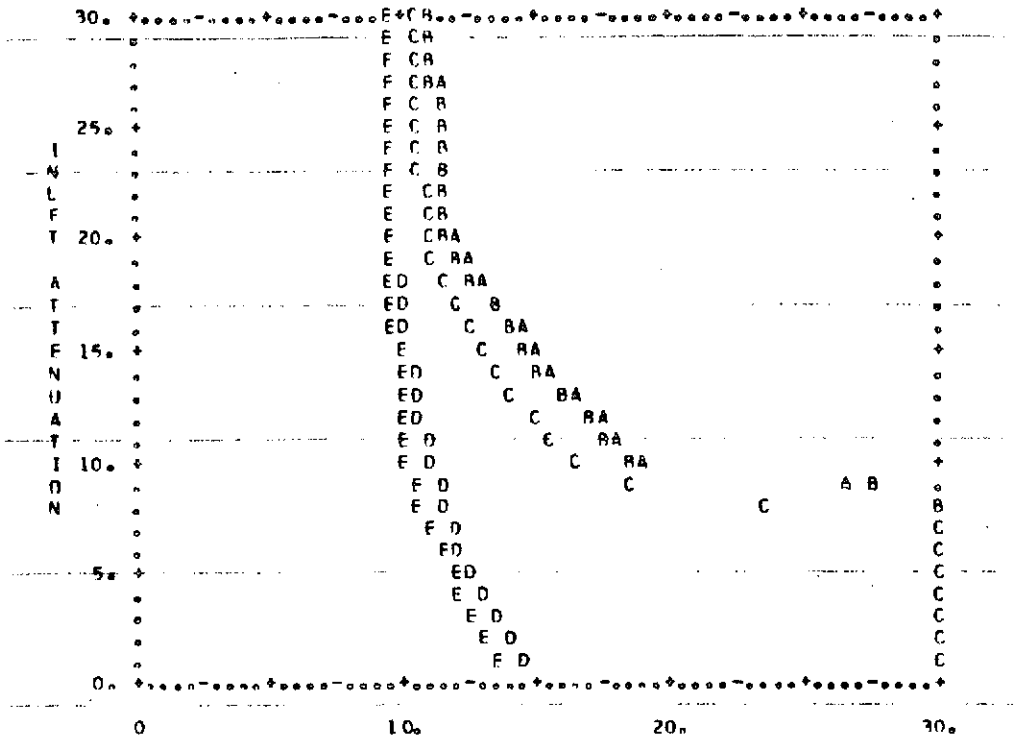


FAN DUCT ATTENUATION

FAN HARMONIC = 0.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	15.37	14.90
2.00	******	******	******	14.98	14.52
3.00	******	******	******	14.61	14.18
4.00	******	******	******	14.26	13.85
5.00	******	******	******	13.93	13.55
6.00	******	******	******	13.59	13.23
7.00	******	******	******	13.26	12.91
8.00	******	******	19.92	12.94	12.61
9.00	26.03	23.78	18.28	12.62	12.32
10.00	19.37	18.74	16.82	12.31	12.04
11.00	18.62	18.02	16.20	12.21	11.97
12.00	17.91	17.34	15.61	12.12	11.90
13.00	17.25	16.69	15.05	12.02	11.82
14.00	16.62	16.09	14.51	11.93	11.75
15.00	16.03	15.51	14.00	11.84	11.68
16.00	15.47	14.97	13.51	11.75	11.62
17.00	14.93	14.45	13.05	11.66	11.55
18.00	14.43	13.96	12.60	11.58	11.48
19.00	13.95	13.50	12.18	11.50	11.42
20.00	13.49	13.05	11.77	11.42	11.36
21.00	13.39	12.99	11.75	11.41	11.35
22.00	13.29	12.94	11.73	11.41	11.34
23.00	13.19	12.88	11.70	11.40	11.34
24.00	13.10	12.83	11.68	11.39	11.33
25.00	13.00	12.78	11.66	11.39	11.33
26.00	12.91	12.72	11.64	11.38	11.32
27.00	12.81	12.67	11.62	11.38	11.31
28.00	12.72	12.61	11.59	11.37	11.31
29.00	12.63	12.56	11.57	11.36	11.30
30.00	12.54	12.51	11.55	11.36	11.30

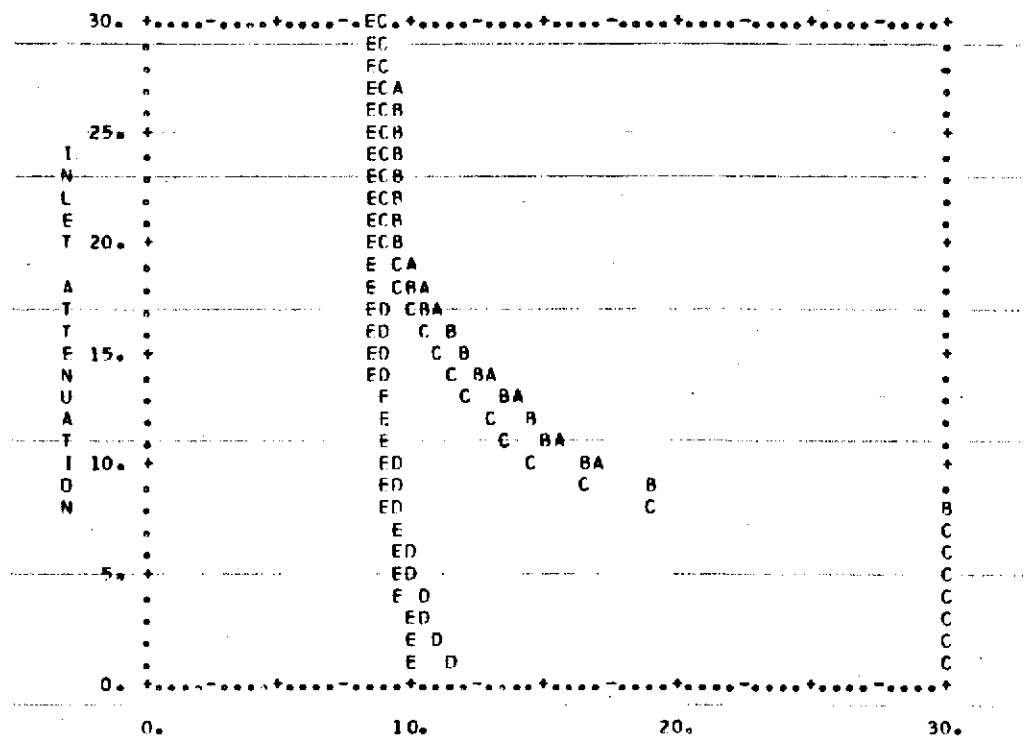
DELTA EPNL = 5.0 FAN HARMONIC = 5.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/D, WITH TONE,2.5 JET ATT, NO TURB, EPNL = 102.56, RUN 12A



FAN HARMONIC = 5.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	14.48	13.37
2.00	******	******	******	13.93	12.92
3.00	******	******	******	13.42	12.50
4.00	******	******	******	12.95	12.12
5.00	******	******	******	12.51	11.76
6.00	******	******	******	12.17	11.38
7.00	******	******	******	11.85	11.02
8.00	******	******	23.37	11.55	10.67
9.00	26.51	27.56	18.28	11.26	10.33
10.00	19.09	18.54	16.37	10.99	10.00
11.00	18.16	17.61	15.58	10.80	9.95
12.00	17.28	16.76	14.87	10.62	9.91
13.00	16.46	15.97	14.22	10.44	9.86
14.00	15.68	15.24	13.62	10.26	9.82
15.00	14.94	14.55	13.06	10.09	9.77
16.00	14.25	13.91	12.55	9.96	9.73
17.00	13.59	13.31	12.08	9.86	9.69
18.00	12.97	12.75	11.64	9.78	9.64
19.00	12.38	12.22	11.22	9.69	9.60
20.00	11.81	11.72	10.84	9.60	9.56
21.00	11.73	11.64	10.81	9.60	9.56
22.00	11.64	11.57	10.77	9.60	9.56
23.00	11.56	11.50	10.74	9.59	9.55
24.00	11.48	11.42	10.70	9.59	9.55
25.00	11.40	11.35	10.67	9.58	9.55
26.00	11.33	11.28	10.63	9.58	9.55
27.00	11.25	11.21	10.60	9.57	9.54
28.00	11.18	11.14	10.56	9.57	9.54
29.00	11.11	11.07	10.53	9.56	9.54
30.00	11.04	11.00	10.49	9.56	9.54

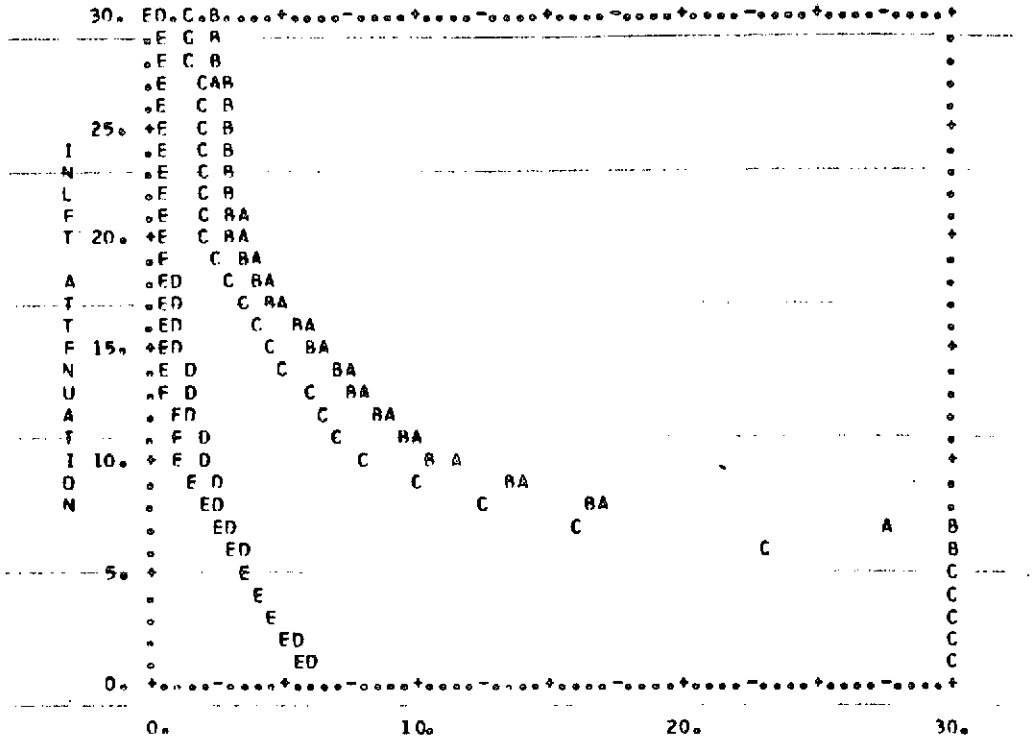
DELTA EPNL = 5.0 FAN HARMONIC = 10.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE,2.5 JET ATT, NO TURB, EPNL = 102.56, RUN 12A



FAN HARMONIC = 10.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	11.57	10.19
2.00	******	******	******	11.13	9.96
3.00	******	******	******	10.74	9.85
4.00	******	******	******	10.38	9.74
5.00	******	******	******	10.06	9.62
6.00	******	******	******	9.86	9.49
7.00	******	******	******	9.70	9.37
8.00	29.81	******	19.17	9.55	9.24
9.00	19.07	18.82	16.73	9.40	9.13
10.00	16.79	16.28	14.64	9.26	9.01
11.00	15.68	15.25	13.72	9.19	8.94
12.00	14.68	14.31	12.90	9.12	8.86
13.00	13.77	13.45	12.16	9.05	8.79
14.00	12.95	12.66	11.50	8.99	8.72
15.00	12.19	11.94	10.89	8.92	8.65
16.00	11.50	11.27	10.33	8.86	8.58
17.00	10.86	10.65	9.90	8.80	8.52
18.00	10.27	10.07	9.63	8.73	8.45
19.00	9.86	9.74	9.37	9.67	8.39
20.00	9.59	9.45	9.12	8.62	8.33
21.00	9.55	9.42	9.09	8.61	8.32
22.00	9.51	9.39	9.07	8.61	8.32
23.00	9.46	9.36	9.05	8.61	8.32
24.00	9.42	9.33	9.03	8.61	8.32
25.00	9.38	9.30	9.00	8.60	8.32
26.00	9.33	9.27	8.98	8.60	8.31
27.00	9.29	9.24	8.96	8.60	8.31
28.00	9.24	9.21	8.93	8.60	8.31
29.00	9.20	9.18	8.91	8.59	8.31
30.00	9.15	9.15	8.89	8.59	8.30

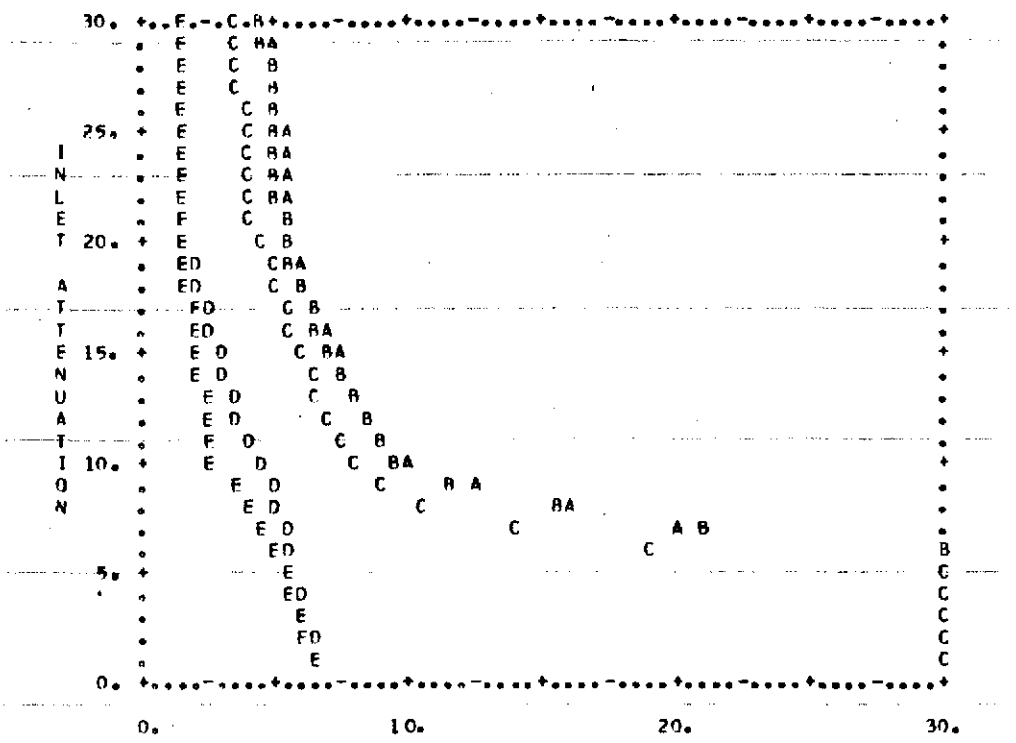
DELTA EPNL = 5.0 FAN HARMONIC = 20.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE,2.5 JET ATT, ND TURB, EPNL = 102.56, RUN 12A



FAN HARMONIC = 20.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	5.86	5.40
2.00	******	******	******	5.27	4.90
3.00	******	******	******	4.70	4.34
4.00	******	******	******	4.17	3.83
5.00	******	******	******	3.69	3.35
6.00	******	******	22.80	3.35	2.87
7.00	27.44	******	15.85	3.01	2.38
8.00	17.09	16.69	12.44	2.66	1.90
9.00	14.02	13.25	9.75	2.31	1.41
10.00	11.37	10.40	7.93	1.95	0.91
11.00	10.14	9.36	7.17	1.80	0.84
12.00	9.11	8.43	6.46	1.65	0.77
13.00	8.18	7.57	5.78	1.50	0.70
14.00	7.31	6.77	5.13	1.36	0.64
15.00	6.51	6.03	4.51	1.21	0.58
16.00	5.76	5.34	3.94	1.07	0.52
17.00	5.07	4.72	3.40	0.93	0.47
18.00	4.49	4.15	2.91	0.79	0.42
19.00	3.96	3.62	2.45	0.65	0.37
20.00	3.46	3.11	2.03	0.52	0.32
21.00	3.35	3.06	1.99	0.51	0.32
22.00	3.24	3.01	1.95	0.49	0.31
23.00	3.13	2.97	1.92	0.48	0.30
24.00	3.02	2.92	1.88	0.46	0.29
25.00	2.91	2.87	1.85	0.45	0.28
26.00	2.80	2.83	1.81	0.44	0.28
27.00	2.69	2.78	1.77	0.42	0.27
28.00	2.58	2.74	1.74	0.41	0.26
29.00	2.47	2.69	1.70	0.39	0.25
30.00	2.36	2.64	1.67	0.38	0.25

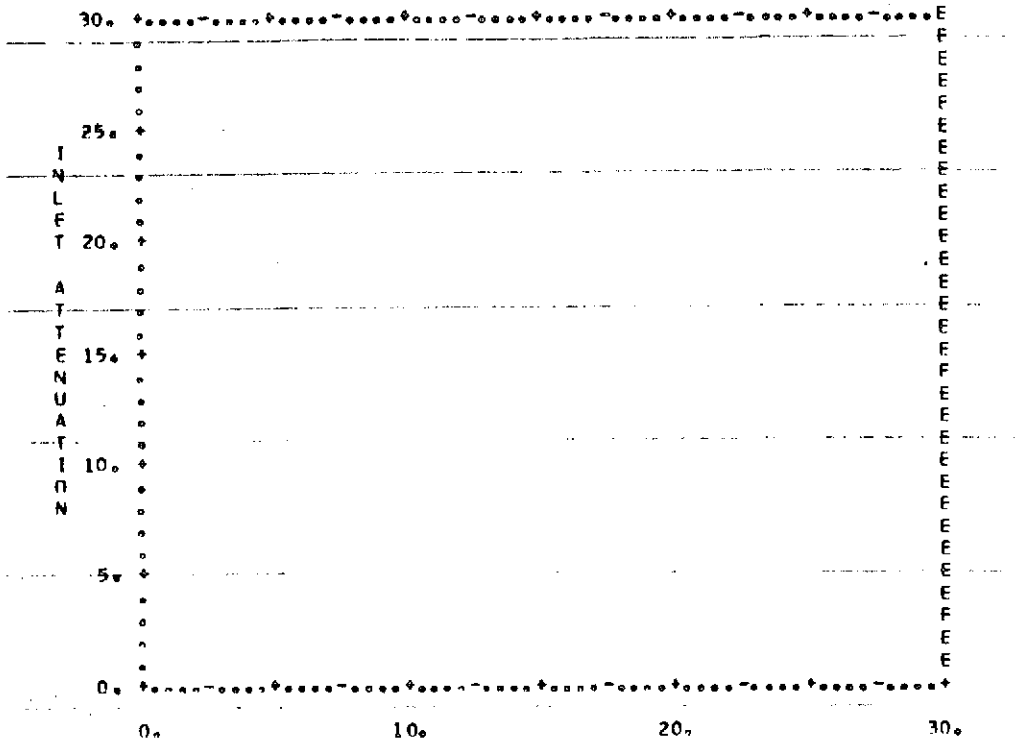
DELTA EPNL = 5.0 FAN HARMONIC = 30.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE,2.5 JET ATT, NO TURB, EPNL = 102.56, RUN 12A



FAN HARMONIC = 30.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	6.64	6.51
2.00	******	******	******	6.38	6.23
3.00	******	******	******	6.14	5.95
4.00	******	******	******	5.91	5.68
5.00	******	******	******	5.69	5.42
6.00	******	******	19.15	5.51	5.16
7.00	19.95	21.20	14.20	5.33	4.72
8.00	15.87	15.43	10.32	5.15	4.04
9.00	12.40	11.62	8.89	4.95	3.39
10.00	9.76	9.33	7.79	4.36	2.75
11.00	9.16	8.79	7.36	4.00	2.60
12.00	8.63	8.29	6.98	3.67	2.47
13.00	8.14	7.83	6.62	3.36	2.33
14.00	7.69	7.40	6.29	3.07	2.19
15.00	7.28	6.99	5.99	2.80	2.06
16.00	6.91	6.62	5.70	2.55	1.93
17.00	6.56	6.27	5.44	2.32	1.80
18.00	6.24	5.94	5.20	2.09	1.68
19.00	5.94	5.63	4.91	1.89	1.55
20.00	5.66	5.34	4.31	1.69	1.43
21.00	5.58	5.29	4.23	1.68	1.41
22.00	5.50	5.24	4.14	1.67	1.40
23.00	5.42	5.19	4.06	1.66	1.38
24.00	5.34	5.13	3.97	1.65	1.37
25.00	5.25	5.08	3.88	1.65	1.35
26.00	5.17	5.03	3.78	1.64	1.34
27.00	5.09	4.96	3.67	1.63	1.33
28.00	5.01	4.83	3.57	1.62	1.31
29.00	4.80	4.70	3.45	1.61	1.30
30.00	4.59	4.58	3.33	1.60	1.28

DELTA EPNL = 10.0 FAN HARMONIC = 0.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE,2.5 JET ATT, NO TURB, EPNL = 102.56, RUN 12A

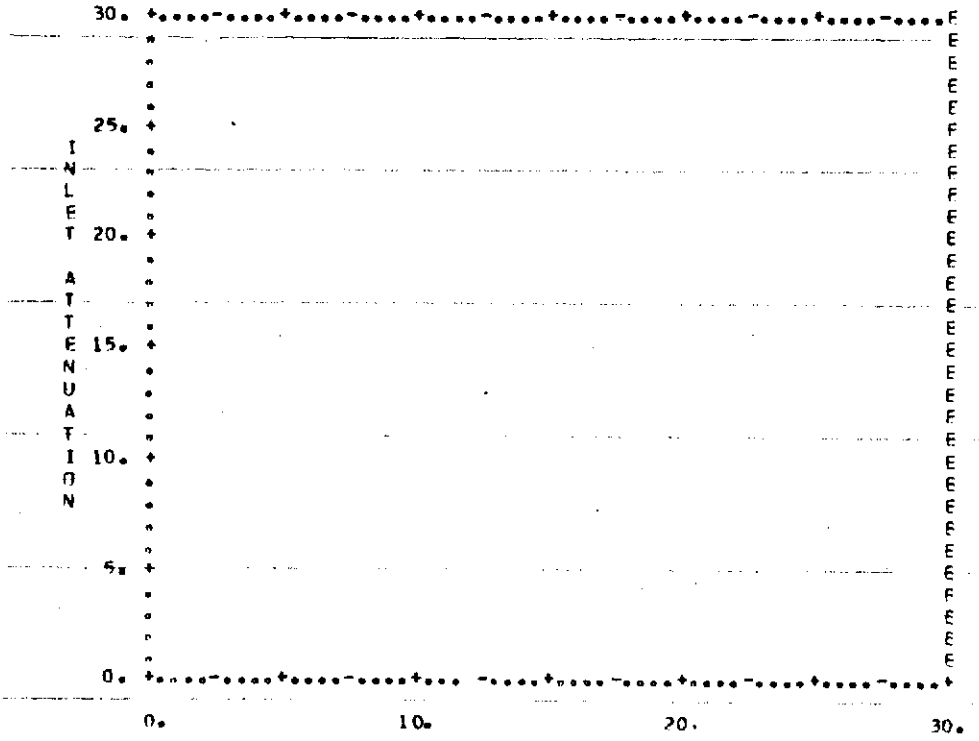


FAN DUCT ATTENUATION

FAN HARMONIC = 0.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	******
8.00	******	******	******	******	******
9.00	******	******	******	******	******
10.00	******	******	******	******	******
11.00	******	******	******	******	******
12.00	******	******	******	******	******
13.00	******	******	******	******	******
14.00	******	******	******	******	******
15.00	******	******	******	******	******
16.00	******	******	******	******	******
17.00	******	******	******	******	******
18.00	******	******	******	******	******
19.00	******	******	******	******	******
20.00	******	******	******	******	******
21.00	******	******	******	******	******
22.00	******	******	******	******	******
23.00	******	******	******	******	******
24.00	******	******	******	******	******
25.00	******	******	******	******	******
26.00	******	******	******	******	******
27.00	******	******	******	******	******
28.00	******	******	******	******	******
29.00	******	******	******	******	******
30.00	******	******	******	******	******

DELTA EPNL = 10.0 FAN HARMONIC = 5.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE,2.5 JET ATT, NO TURB, EPNL = 102.56, RUN 12A

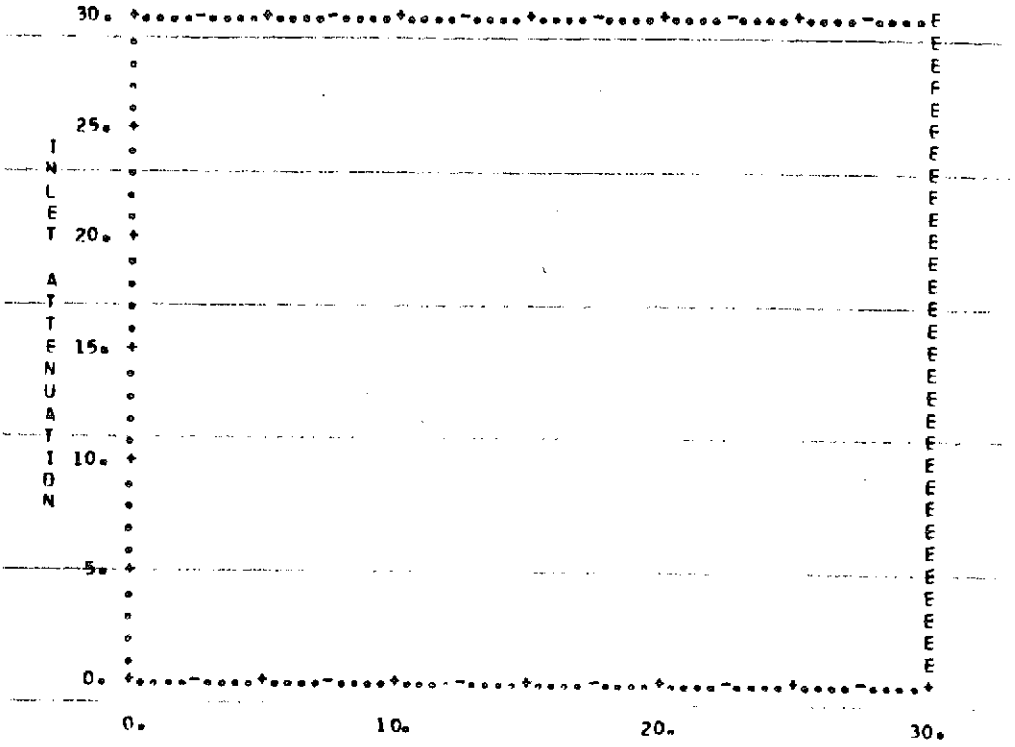


FAN DUCT ATTENUATION

FAN HARMONIC = 5.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	******
8.00	******	******	******	******	******
9.00	******	******	******	******	******
10.00	******	******	******	******	******
11.00	******	******	******	******	******
12.00	******	******	******	******	******
13.00	******	******	******	******	******
14.00	******	******	******	******	******
15.00	******	******	******	******	******
16.00	******	******	******	******	******
17.00	******	******	******	******	******
18.00	******	******	******	******	******
19.00	******	******	******	******	******
20.00	******	******	******	******	******
21.00	******	******	******	******	******
22.00	******	******	******	******	******
23.00	******	******	******	******	******
24.00	******	******	******	******	******
25.00	******	******	******	******	******
26.00	******	******	******	******	******
27.00	******	******	******	******	******
28.00	******	******	******	******	******
29.00	******	******	******	******	******
30.00	******	******	******	******	******

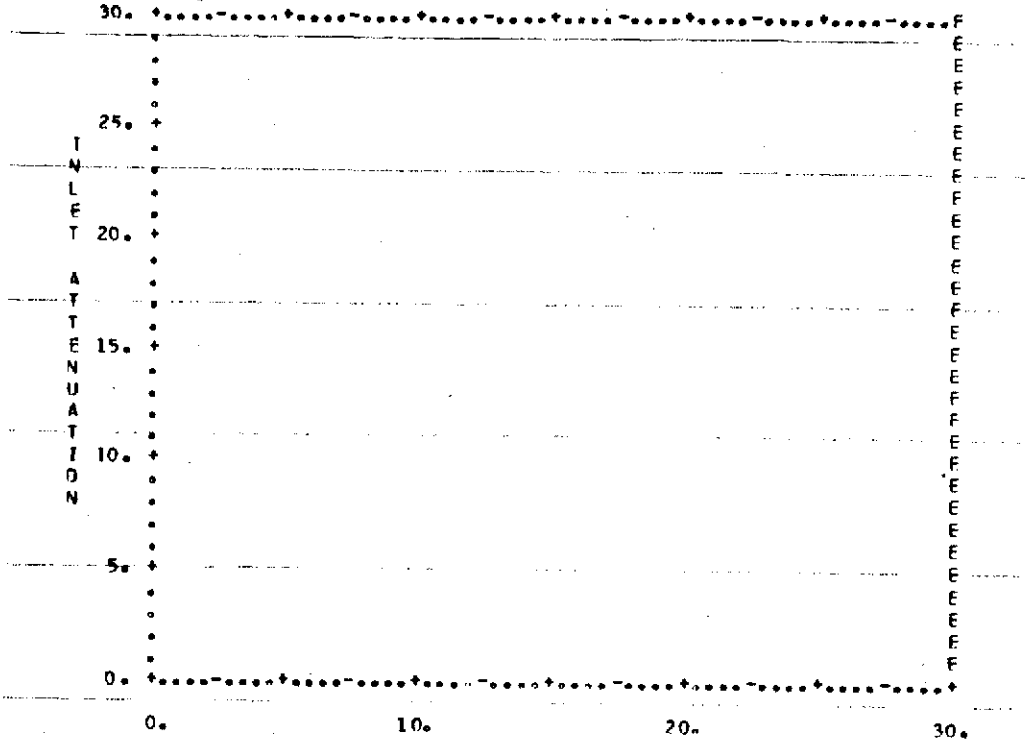
DELTA EPNL = 10.0 FAN HARMONIC = 10.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE,2.5 JET ATT, NO TURB, EPNL = 102.56, RUN 12A



FAN HARMONIC = 10.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	******
8.00	******	******	******	******	******
9.00	******	******	******	******	******
10.00	******	******	******	******	******
11.00	******	******	******	******	******
12.00	******	******	******	******	******
13.00	******	******	******	******	******
14.00	******	******	******	******	******
15.00	******	******	******	******	******
16.00	******	******	******	******	******
17.00	******	******	******	******	******
18.00	******	******	******	******	******
19.00	******	******	******	******	******
20.00	******	******	******	******	******
21.00	******	******	******	******	******
22.00	******	******	******	******	******
23.00	******	******	******	******	******
24.00	******	******	******	******	******
25.00	******	******	******	******	******
26.00	******	******	******	******	******
27.00	******	******	******	******	******
28.00	******	******	******	******	******
29.00	******	******	******	******	******
30.00	******	******	******	******	******

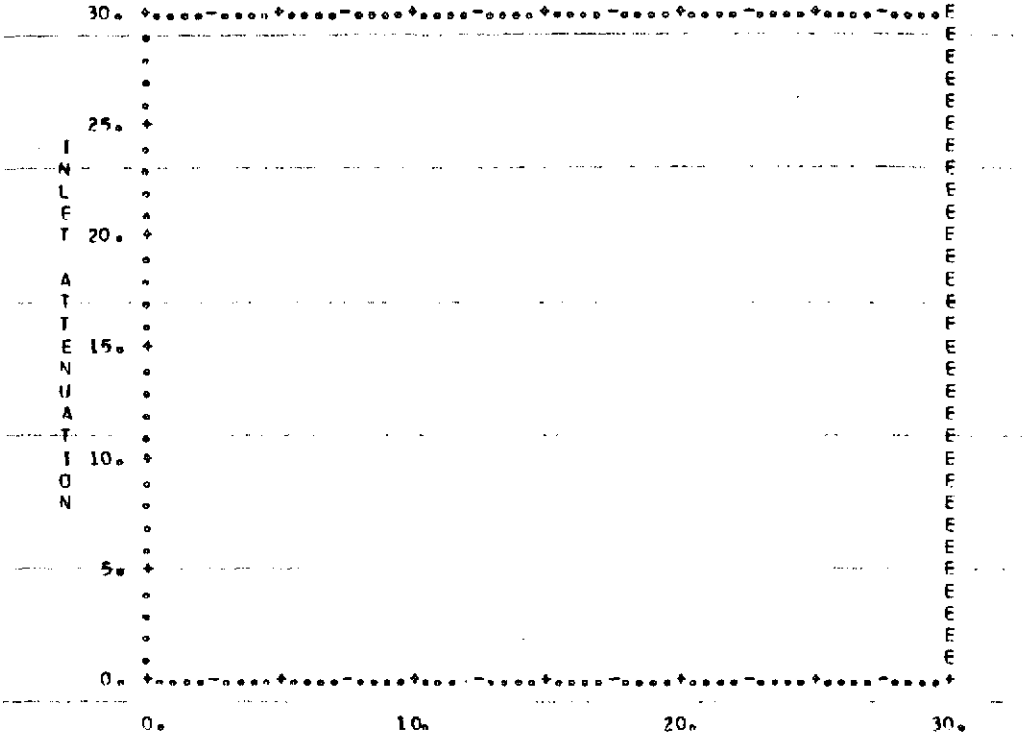
DELTA EPNL = 10.0 FAN HARMONIC = 20.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE,2.5 JET ATT, NO TURB, EPNL = 102.56, RUN 12A



FAN HARMONIC = 20.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	******
8.00	******	******	******	******	******
9.00	******	******	******	******	******
10.00	******	******	******	******	******
11.00	******	******	******	******	******
12.00	******	******	******	******	******
13.00	******	******	******	******	******
14.00	******	******	******	******	******
15.00	******	******	******	******	******
16.00	******	******	******	******	******
17.00	******	******	******	******	******
18.00	******	******	******	******	******
19.00	******	******	******	******	******
20.00	******	******	******	******	******
21.00	******	******	******	******	******
22.00	******	******	******	******	******
23.00	******	******	******	******	******
24.00	******	******	******	******	******
25.00	******	******	******	******	******
26.00	******	******	******	******	******
27.00	******	******	******	******	******
28.00	******	******	******	******	******
29.00	******	******	******	******	******
30.00	******	******	******	******	******

DELTA EPNL = 10.0 FAN HARMONIC = 30.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE,2.5 JET ATT, NO TURB, EPNL = 102.56, RUN 12A

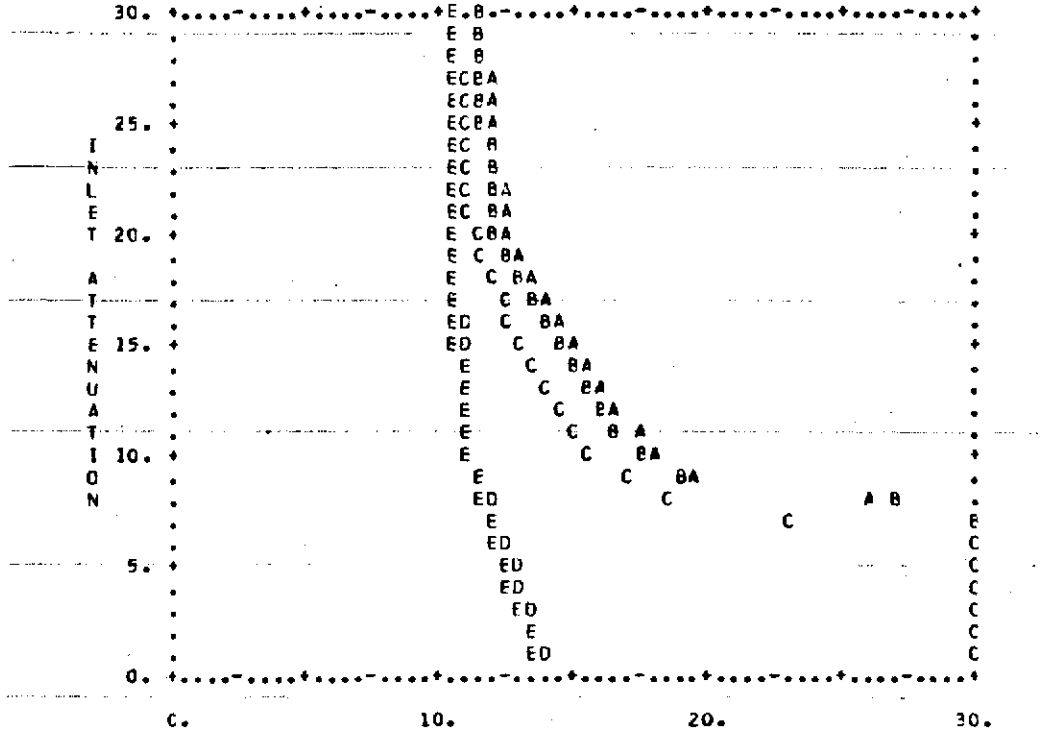


FAN DUCT ATTENUATION

FAN HARMONIC = 30.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	******
8.00	******	******	******	******	******
9.00	******	******	******	******	******
10.00	******	******	******	******	******
11.00	******	******	******	******	******
12.00	******	******	******	******	******
13.00	******	******	******	******	******
14.00	******	******	******	******	******
15.00	******	******	******	******	******
16.00	******	******	******	******	******
17.00	******	******	******	******	******
18.00	******	******	******	******	******
19.00	******	******	******	******	******
20.00	******	******	******	******	******
21.00	******	******	******	******	******
22.00	******	******	******	******	******
23.00	******	******	******	******	******
24.00	******	******	******	******	******
25.00	******	******	******	******	******
26.00	******	******	******	******	******
27.00	******	******	******	******	******
28.00	******	******	******	******	******
29.00	******	******	******	******	******
30.00	******	******	******	******	******

DELTA EPNL = 5.0 FAN HARMONIC = 0.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/C, WITH TONE,5. JET ATT, NO TURB, EPNL = 102.22, RUN-13A

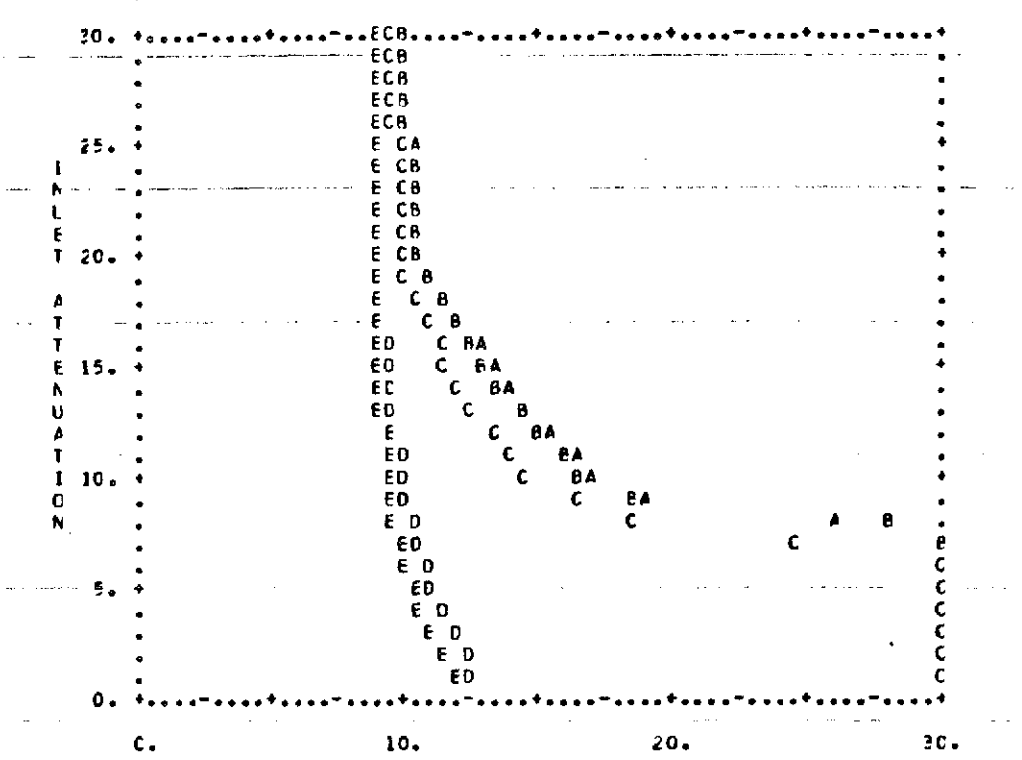


FAN DUCT ATTENUATION

FAN HARMONIC = 0.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	14.06	13.64
2.00	******	******	******	13.71	13.28
3.00	******	******	******	13.38	12.95
4.00	******	******	******	13.07	12.65
5.00	******	******	******	12.77	12.37
6.00	******	******	******	12.45	12.08
7.00	******	******	22.86	12.14	11.80
8.00	26.22	27.18	18.48	11.83	11.53
9.00	19.55	19.03	16.90	11.53	11.28
10.00	18.02	17.33	15.51	11.24	11.04
11.00	17.31	16.63	14.95	11.16	10.97
12.00	16.64	15.98	14.44	11.08	10.91
13.00	16.01	15.37	13.95	11.01	10.85
14.00	15.41	14.80	13.50	10.93	10.79
15.00	14.85	14.26	13.08	10.86	10.73
16.00	14.33	13.76	12.68	10.79	10.68
17.00	13.82	13.28	12.30	10.72	10.62
18.00	13.35	12.82	11.95	10.66	10.56
19.00	12.90	12.39	11.62	10.59	10.51
20.00	12.47	11.99	11.30	10.52	10.45
21.00	12.37	11.93	11.23	10.52	10.45
22.00	12.26	11.87	11.16	10.51	10.45
23.00	12.16	11.82	11.09	10.51	10.44
24.00	12.06	11.76	11.02	10.50	10.44
25.00	11.96	11.71	10.94	10.49	10.44
26.00	11.87	11.65	10.87	10.49	10.44
27.00	11.77	11.60	10.80	10.48	10.43
28.00	11.68	11.54	10.72	10.48	10.43
29.00	11.59	11.49	10.65	10.47	10.43
30.00	11.50	11.44	10.58	10.46	10.42

DELTA EPNL = 5.0 FAN HARMONIC = 5.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE,5. JET ATT, NO TURB, EPNL = 102.22, RUN-13A

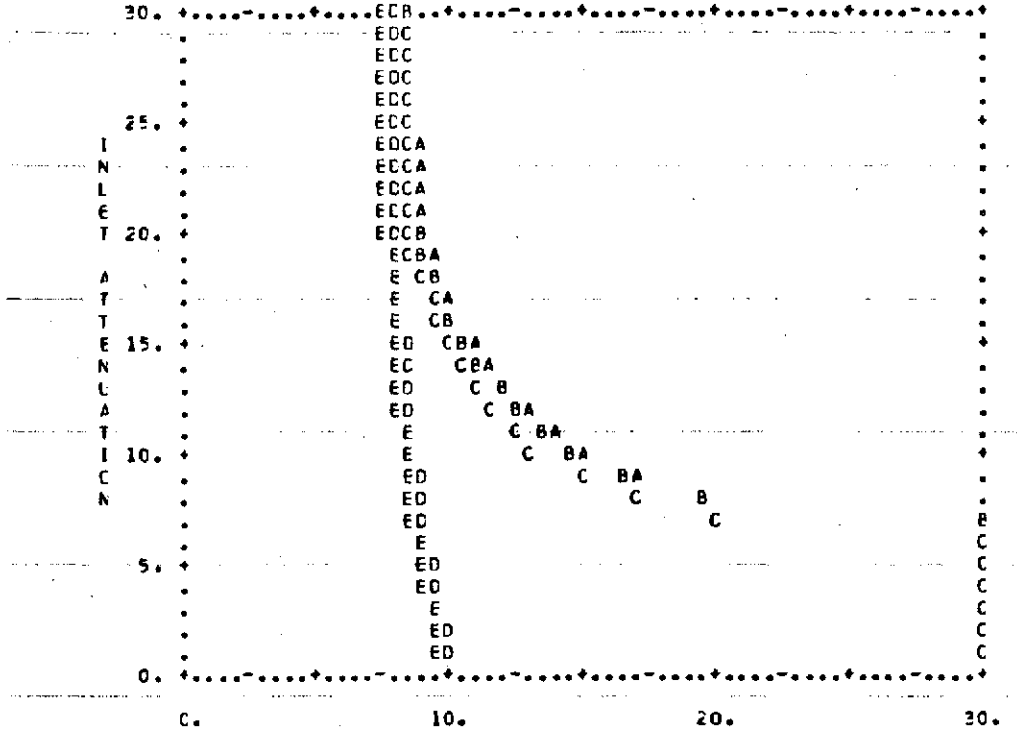


FAN CLCT ATTENUATION

FAN HARMONIC = 5.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	12.73	11.78
2.00	******	******	******	12.27	11.39
3.00	******	******	******	11.85	11.04
4.00	******	******	******	11.47	10.72
5.00	******	******	******	11.11	10.42
6.00	******	******	******	10.83	10.11
7.00	******	******	24.39	10.57	9.88
8.00	26.15	27.86	18.30	10.31	9.70
9.00	19.03	18.73	16.32	10.07	9.53
10.00	17.16	16.65	14.56	9.90	9.37
11.00	16.30	15.79	13.90	9.80	9.33
12.00	15.49	15.01	13.29	9.70	9.29
13.00	14.74	14.29	12.73	9.60	9.25
14.00	14.04	13.63	12.21	9.51	9.21
15.00	13.38	13.02	11.74	9.42	9.16
16.00	12.76	12.45	11.30	9.33	9.12
17.00	12.18	11.92	10.89	9.25	9.08
18.00	11.63	11.43	10.51	9.16	9.04
19.00	11.11	10.97	10.16	9.08	9.00
20.00	10.62	10.53	9.87	9.00	8.96
21.00	10.54	10.47	9.85	9.00	8.96
22.00	10.47	10.40	9.82	8.99	8.96
23.00	10.39	10.33	9.80	8.99	8.95
24.00	10.32	10.27	9.78	8.98	8.95
25.00	10.25	10.20	9.76	8.97	8.94
26.00	10.18	10.14	9.73	8.97	8.94
27.00	10.12	10.08	9.71	8.96	8.93
28.00	10.05	10.01	9.69	8.96	8.93
29.00	9.99	9.97	9.67	8.95	8.93
30.00	9.95	9.92	9.65	8.94	8.92

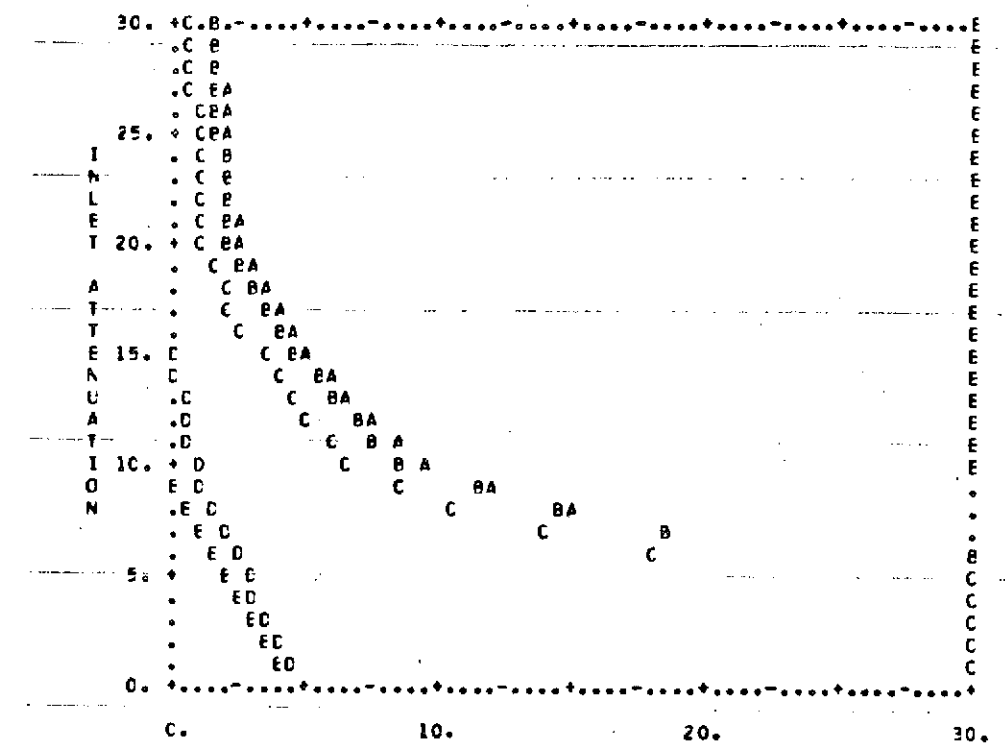
DELTA EPNL = 5.0 FAN HARMONIC = 10.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE,5. JET ATT, NO TURB, EPNL = 102.22, RUN-13A



FAN HARMONIC = 10.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	9.99	9.64
2.00	******	******	******	9.84	9.46
3.00	******	******	******	9.69	9.28
4.00	******	******	******	9.54	9.10
5.00	******	******	******	9.40	8.92
6.00	******	******	******	9.24	8.79
7.00	******	******	19.82	9.08	8.68
8.00	19.29	19.39	17.19	8.92	8.56
9.00	16.95	16.69	14.99	8.75	8.45
10.00	14.84	14.37	13.14	8.59	8.35
11.00	13.87	13.45	12.30	8.52	8.28
12.00	12.99	12.62	11.56	8.46	8.21
13.00	12.20	11.87	10.89	8.39	8.15
14.00	11.48	11.19	10.30	8.33	8.08
15.00	10.82	10.56	9.86	8.27	8.02
16.00	10.22	9.99	9.56	8.21	7.96
17.00	9.82	9.68	9.27	8.15	7.90
18.00	9.53	9.37	9.00	8.10	7.85
19.00	9.25	9.07	8.73	8.04	7.79
20.00	9.00	8.78	8.47	7.99	7.73
21.00	8.95	8.75	8.44	7.98	7.73
22.00	8.90	8.71	8.42	7.98	7.73
23.00	8.85	8.68	8.39	7.98	7.73
24.00	8.80	8.65	8.37	7.97	7.73
25.00	8.74	8.62	8.34	7.97	7.73
26.00	8.69	8.58	8.32	7.97	7.73
27.00	8.64	8.55	8.30	7.96	7.73
28.00	8.59	8.52	8.27	7.96	7.73
29.00	8.54	8.49	8.25	7.96	7.73
30.00	8.48	8.46	8.23	7.96	7.72

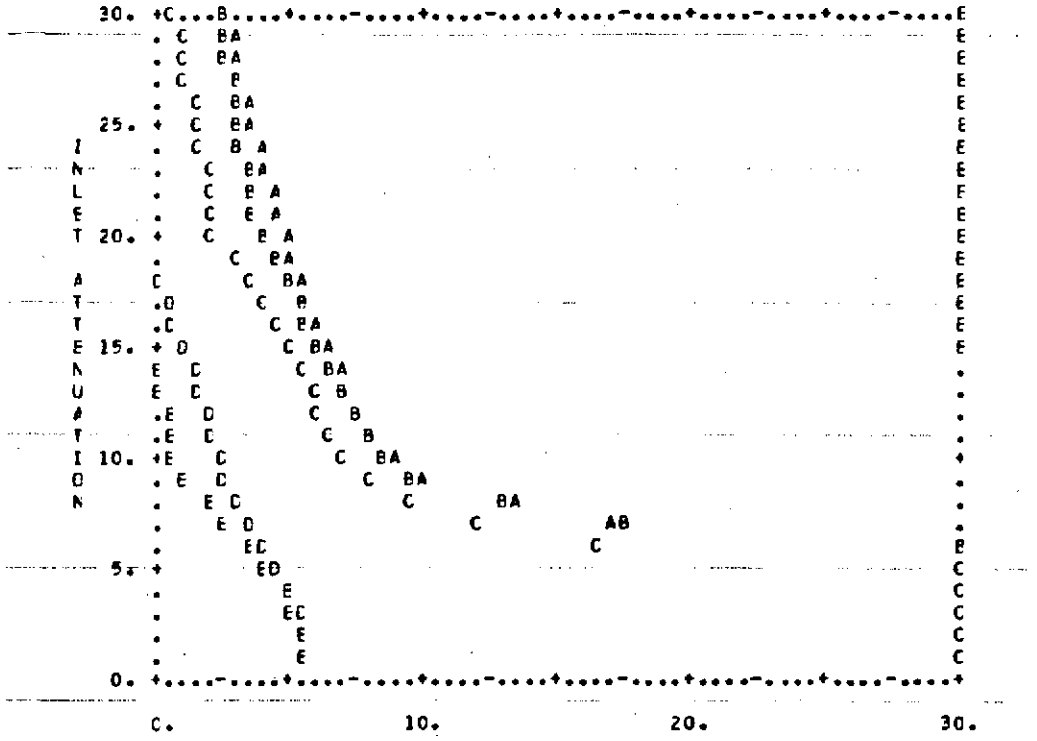
DELTA EPNL = 5.0 FAN HARMONIC = 20.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/C, WITH TONE,5. JET ATT, NO TURB, EPNL = 102.22, RUN-13A



FAN HARMONIC = 20.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	4.64	3.93
2.00	******	******	******	4.15	3.40
3.00	******	******	******	3.67	2.91
4.00	******	******	******	3.22	2.47
5.00	******	******	******	2.79	2.06
6.00	******	******	18.13	2.37	1.58
7.00	18.27	18.64	13.83	1.97	1.10
8.00	14.65	14.60	10.38	1.57	0.62
9.00	11.98	11.31	8.26	1.19	0.14
10.00	9.57	8.72	6.54	0.82	******
11.00	8.48	7.75	5.83	0.67	******
12.00	7.49	6.87	5.15	0.52	******
13.00	6.60	6.06	4.48	0.38	******
14.00	5.80	5.33	3.84	0.23	******
15.00	5.06	4.67	3.26	0.09	******
16.00	4.44	4.06	2.72	******	******
17.00	3.87	3.49	2.23	******	******
18.00	3.34	2.96	1.77	******	******
19.00	2.84	2.45	1.35	******	******
20.00	2.37	1.96	0.96	******	******
21.00	2.29	1.92	0.93	******	******
22.00	2.20	1.87	0.90	******	******
23.00	2.12	1.82	0.87	******	******
24.00	2.03	1.78	0.83	******	******
25.00	1.94	1.73	0.80	******	******
26.00	1.85	1.68	0.77	******	******
27.00	1.76	1.63	0.73	******	******
28.00	1.67	1.58	0.70	******	******
29.00	1.58	1.53	0.67	******	******
30.00	1.48	1.48	0.63	******	******

DELTA EPNL = 5.0 FAN HARMONIC = 30.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/C, WITH TONE,5. JET ATT, NO TURB, EPNL = 102.22, RUN-13A.

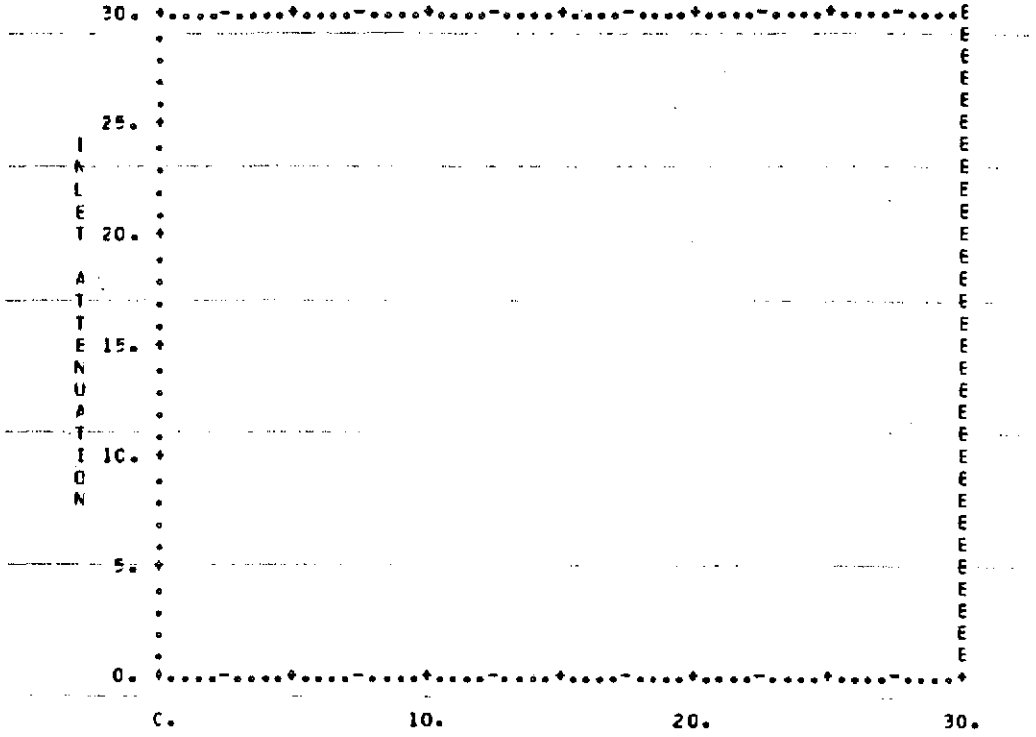


FAN DUCT ATTENUATION

FAN HARMONIC = 30.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	5.74	5.66
2.00	******	******	******	5.51	5.41
3.00	******	******	******	5.28	5.17
4.00	******	******	******	5.07	4.81
5.00	******	******	******	4.63	4.15
6.00	******	******	16.25	4.13	3.31
7.00	17.14	17.28	11.89	3.65	2.54
8.00	13.25	12.86	9.36	3.18	1.81
9.00	9.99	9.69	8.11	2.73	1.14
10.00	8.78	8.35	6.57	2.30	0.51
11.00	8.20	7.82	6.52	2.05	0.39
12.00	7.68	7.33	6.11	1.80	0.27
13.00	7.22	6.89	5.75	1.54	0.14
14.00	6.80	6.47	5.43	1.27	0.03
15.00	6.42	6.09	5.14	1.00	******
16.00	6.07	5.74	4.67	0.72	******
17.00	5.75	5.41	4.03	0.44	******
18.00	5.45	5.10	3.40	0.15	******
19.00	5.18	4.52	2.80	******	******
20.00	4.80	3.82	2.22	******	******
21.00	4.56	3.67	2.08	******	******
22.00	4.33	3.53	1.94	******	******
23.00	4.10	3.38	1.80	******	******
24.00	3.87	3.24	1.65	******	******
25.00	3.64	3.09	1.49	******	******
26.00	3.42	2.95	1.32	******	******
27.00	3.19	2.80	1.15	******	******
28.00	2.97	2.66	0.96	******	******
29.00	2.75	2.51	0.77	******	******
30.00	2.53	2.37	0.56	******	******

DELTA EPNL = 10.0 FAN HARMONIC = 0.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE,5. JET ATT, NO TURB, EPNL = 102.22, RUN-13A

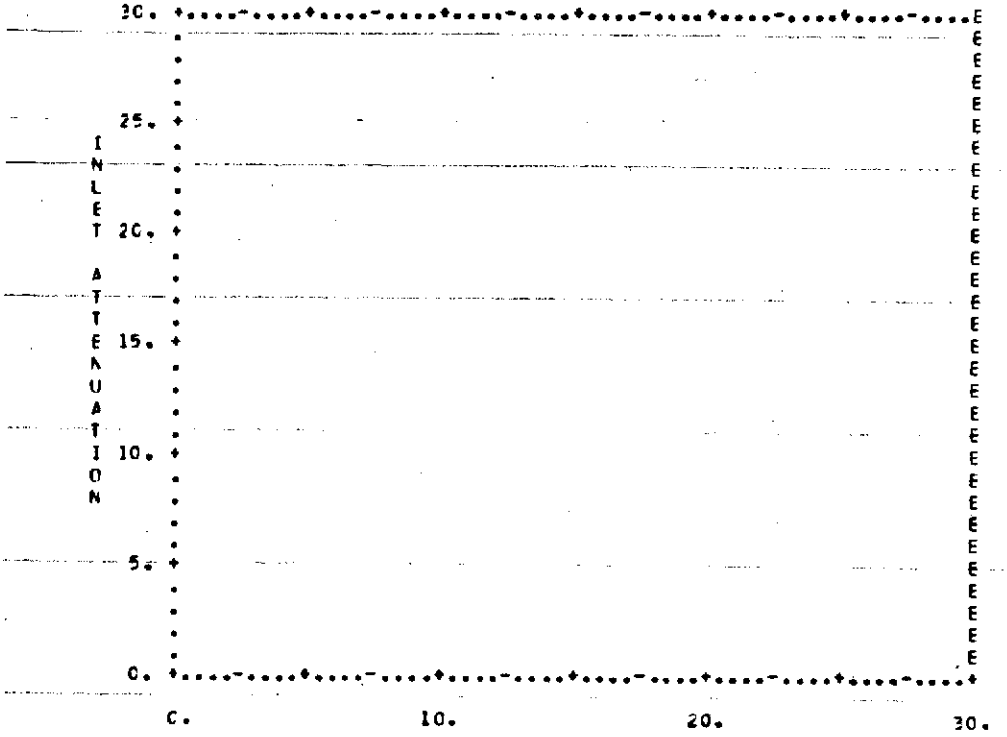


FAN DUCT ATTENUATION

FAN HARMONIC = 0.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	******
8.00	******	******	******	******	******
9.00	******	******	******	******	******
10.00	******	******	******	******	******
11.00	******	******	******	******	******
12.00	******	******	******	******	******
13.00	******	******	******	******	******
14.00	******	******	******	******	******
15.00	******	******	******	******	******
16.00	******	******	******	******	******
17.00	******	******	******	******	******
18.00	******	******	******	******	******
19.00	******	******	******	******	******
20.00	******	******	******	******	******
21.00	******	******	******	******	******
22.00	******	******	******	******	******
23.00	******	******	******	******	******
24.00	******	******	******	******	******
25.00	******	******	******	******	******
26.00	******	******	******	******	******
27.00	******	******	******	******	******
28.00	******	******	******	******	******
29.00	******	******	******	******	******
30.00	******	******	******	******	******

DELTA EPNL = 10.0 FAN HARMONIC = 5.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/C, WITH TONE,5. JET ATT, NO TURB, EPNL = 102.22, RUN-13A

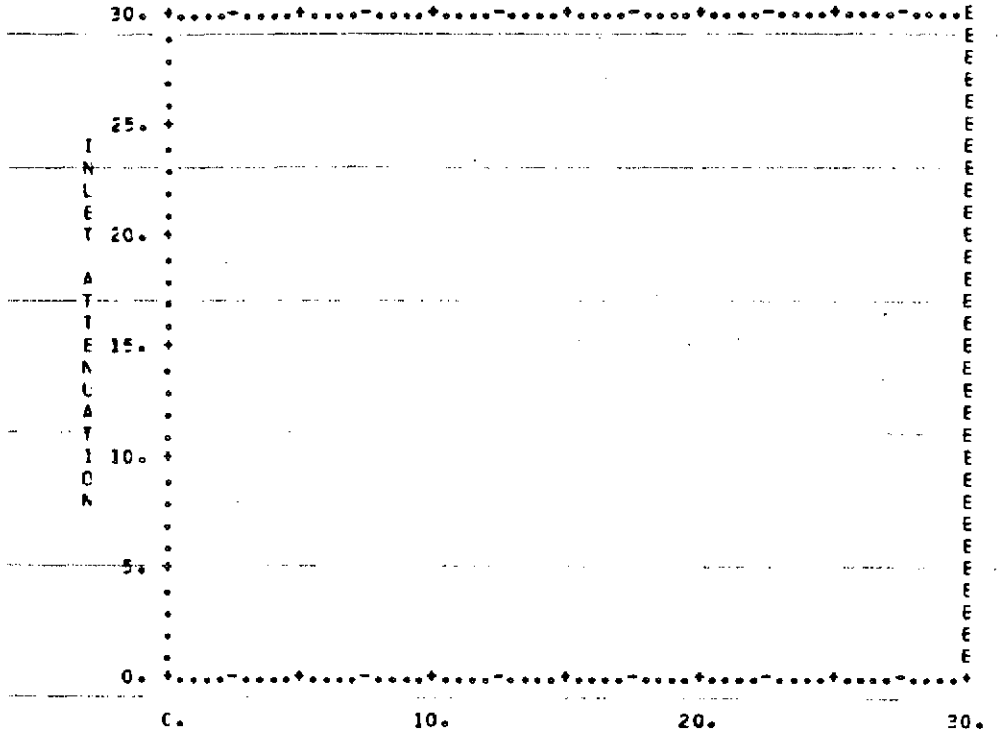


FAN DUCT ATTENUATION

FAN HARMONIC = 5.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	******
8.00	******	******	******	******	******
9.00	******	******	******	******	******
10.00	******	******	******	******	******
11.00	******	******	******	******	******
12.00	******	******	******	******	******
13.00	******	******	******	******	******
14.00	******	******	******	******	******
15.00	******	******	******	******	******
16.00	******	******	******	******	******
17.00	******	******	******	******	******
18.00	******	******	******	******	******
19.00	******	******	******	******	******
20.00	******	******	******	******	******
21.00	******	******	******	******	******
22.00	******	******	******	******	******
23.00	******	******	******	******	******
24.00	******	******	******	******	******
25.00	******	******	******	******	******
26.00	******	******	******	******	******
27.00	******	******	******	******	******
28.00	******	******	******	******	******
29.00	******	******	******	******	******
30.00	******	******	******	******	******

DELTA EPNL = 10.0 FAN HARMONIC = 10.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/C; WITH TONE,5. JET ATT, NO TURB, EPNL = 102.22, RUN-13A

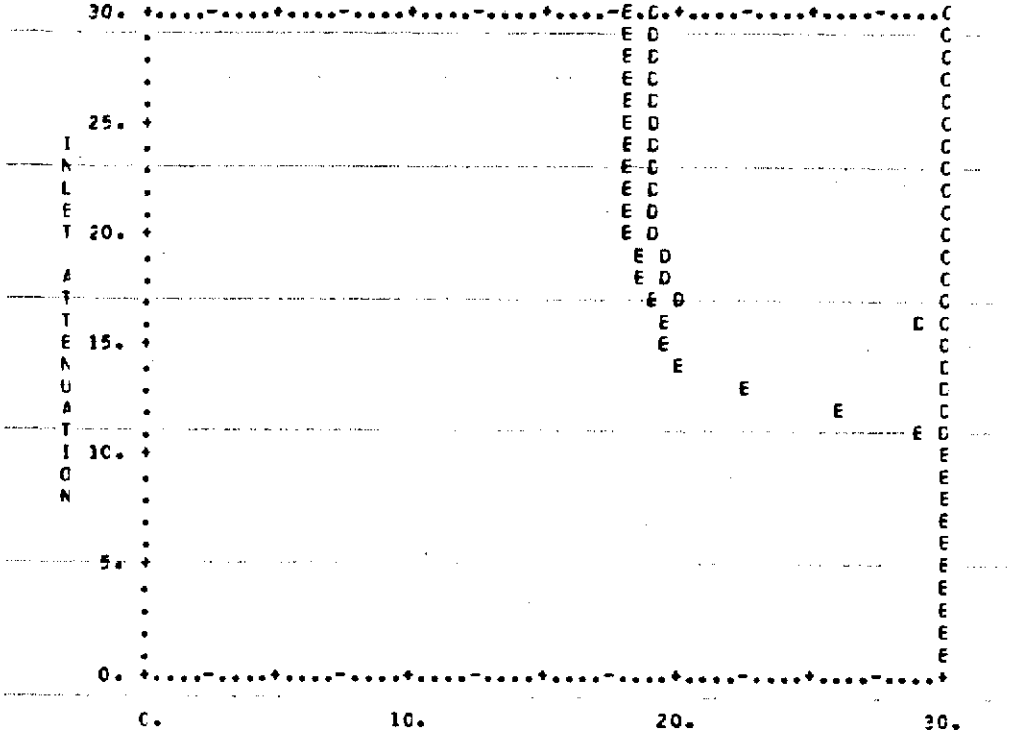


FAN DUCT ATTENUATION

FAN HARMONIC = 10.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	******
8.00	******	******	******	******	******
9.00	******	******	******	******	******
10.00	******	******	******	******	******
11.00	******	******	******	******	******
12.00	******	******	******	******	******
13.00	******	******	******	******	******
14.00	******	******	******	******	******
15.00	******	******	******	******	******
16.00	******	******	******	******	******
17.00	******	******	******	******	******
18.00	******	******	******	******	******
19.00	******	******	******	******	******
20.00	******	******	******	******	******
21.00	******	******	******	******	******
22.00	******	******	******	******	******
23.00	******	******	******	******	******
24.00	******	******	******	******	******
25.00	******	******	******	******	******
26.00	******	******	******	******	******
27.00	******	******	******	******	******
28.00	******	******	******	******	******
29.00	******	******	******	******	******
30.00	******	******	******	******	******

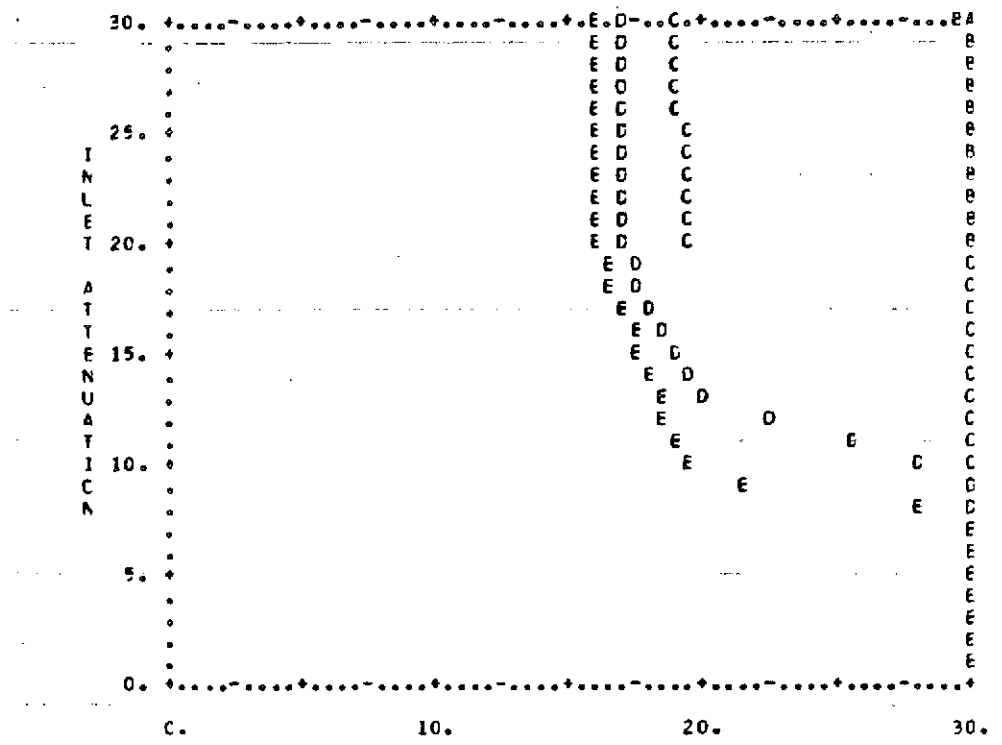
DELTA EPNL = 10.0 FAN HARMONIC = 20.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE,S. JET ATT, NO TURB, EPNL = 102.22, RUN-134



FAN HARMONIC = 20.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	******
8.00	******	******	******	******	******
9.00	******	******	******	******	******
10.00	******	******	******	******	******
11.00	******	******	******	******	29.18
12.00	******	******	******	******	26.16
13.00	******	******	******	******	22.42
14.00	******	******	******	******	19.86
15.00	******	******	******	******	19.57
16.00	******	******	******	26.93	19.28
17.00	******	******	******	20.00	19.00
18.00	******	******	******	19.62	18.72
19.00	******	******	******	19.25	18.46
20.00	******	******	******	18.90	18.20
21.00	******	******	******	18.89	18.20
22.00	******	******	******	18.88	18.20
23.00	******	******	******	18.88	18.20
24.00	******	******	******	18.87	18.20
25.00	******	******	******	18.86	18.20
26.00	******	******	******	18.85	18.20
27.00	******	******	******	18.85	18.20
28.00	******	******	******	18.84	18.20
29.00	******	******	******	18.83	18.19
30.00	******	******	******	18.82	18.19

DELTA EPNL = 10.0 FAN HARMONIC = 30.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE,S. JET ATT, NO TURB, EPNL = 102.22, RUN-138

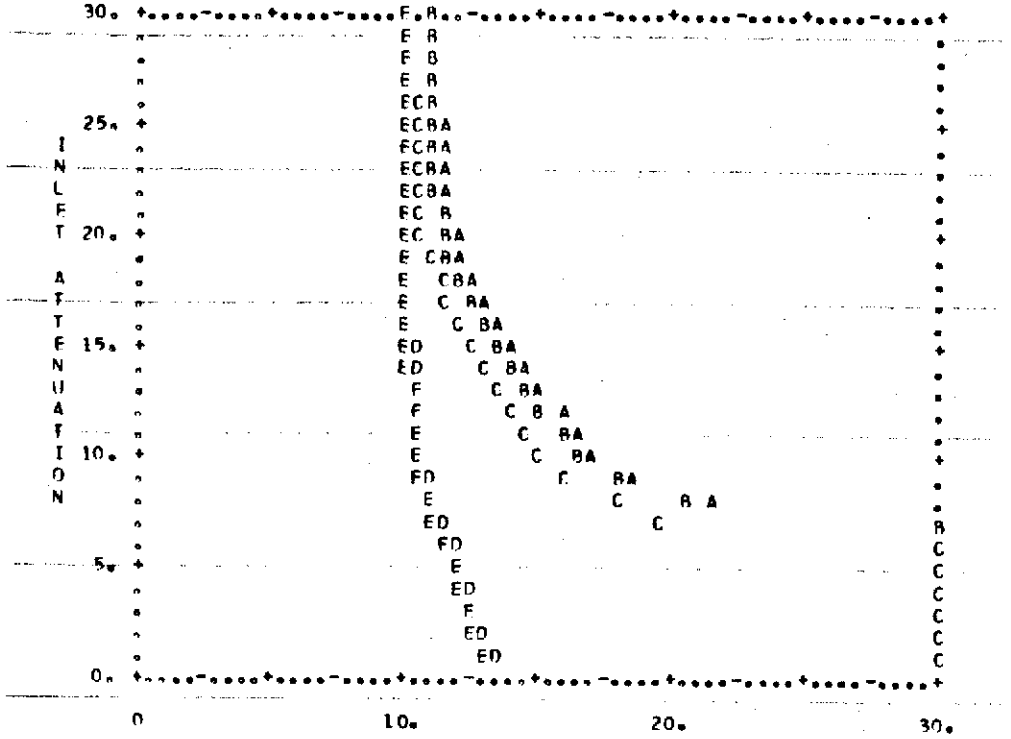


FAN DUCT ATTENUATION

FAN HARMONIC = 30.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	******
8.00	******	******	******	******	27.77
9.00	******	******	******	******	21.47
10.00	******	******	******	27.95	19.26
11.00	******	******	******	25.42	18.92
12.00	******	******	******	22.53	18.59
13.00	******	******	******	19.89	18.26
14.00	******	******	******	19.40	17.94
15.00	******	******	******	18.94	17.62
16.00	******	******	******	18.50	17.31
17.00	******	******	******	18.07	17.01
18.00	******	******	******	17.66	16.71
19.00	******	******	******	17.27	16.42
20.00	******	******	19.63	16.88	16.13
21.00	******	******	19.56	16.88	16.13
22.00	******	******	19.50	16.88	16.13
23.00	******	******	19.43	16.88	16.13
24.00	******	******	19.37	16.88	16.13
25.00	******	******	19.30	16.88	16.13
26.00	******	******	19.24	16.88	16.13
27.00	******	******	19.18	16.88	16.13
28.00	******	******	19.11	16.88	16.13
29.00	******	******	19.05	16.88	16.13
30.00	******	29.52	18.99	16.88	16.13

DELTA EPNL = 5.0 FAN HARMONIC = 0.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/D, WITH TONE,7.5 JET ATT, NO TURB, EPNL = 101.98, RUN-14A

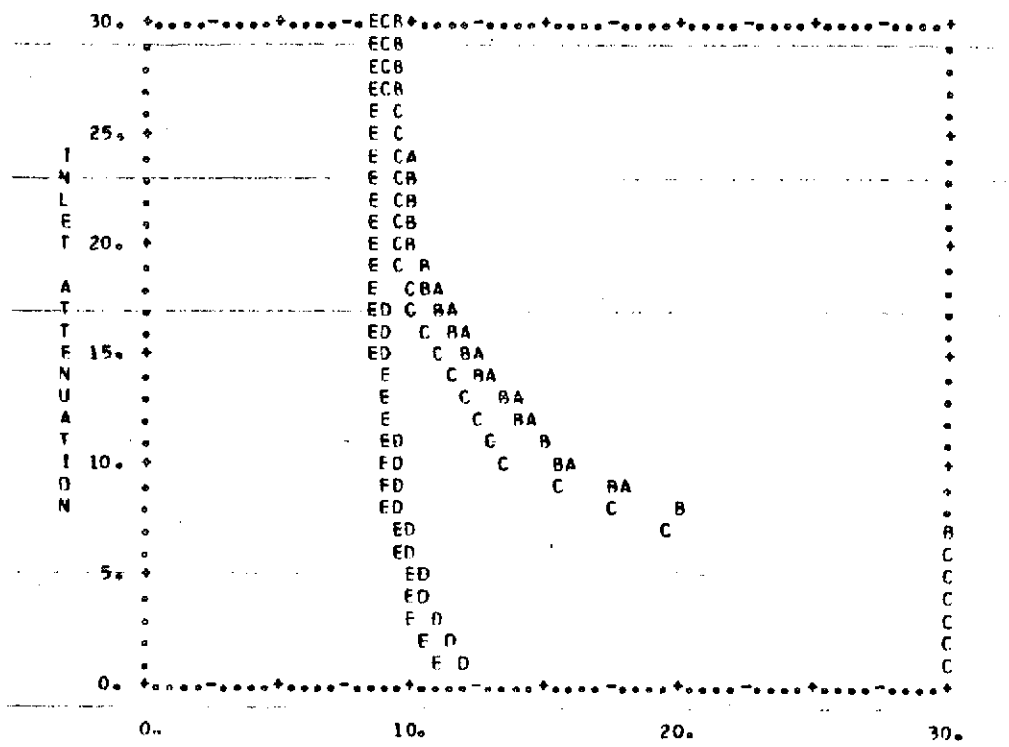


FAN DUCT ATTENUATION

FAN HARMONIC = 0.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	13.31	12.88
2.00	******	******	******	12.98	12.57
3.00	******	******	******	12.66	12.28
4.00	******	******	******	12.37	12.01
5.00	******	******	******	12.09	11.76
6.00	******	******	******	11.79	11.47
7.00	30.30	******	19.55	11.48	11.19
8.00	21.59	20.43	17.79	11.19	10.92
9.00	18.68	18.13	16.24	10.91	10.68
10.00	17.17	16.49	14.88	10.63	10.44
11.00	16.46	15.81	14.31	10.56	10.39
12.00	15.80	15.18	13.79	10.49	10.34
13.00	15.19	14.59	13.31	10.43	10.29
14.00	14.61	14.04	12.86	10.36	10.24
15.00	14.07	13.52	12.45	10.30	10.18
16.00	13.57	13.04	12.06	10.23	10.14
17.00	13.09	12.58	11.70	10.17	10.09
18.00	12.64	12.15	11.36	10.11	10.04
19.00	12.21	11.74	11.04	10.06	9.99
20.00	11.81	11.36	10.74	10.00	9.94
21.00	11.71	11.30	10.67	9.99	9.94
22.00	11.61	11.24	10.60	9.98	9.93
23.00	11.51	11.18	10.53	9.97	9.92
24.00	11.42	11.13	10.46	9.97	9.92
25.00	11.32	11.07	10.39	9.96	9.91
26.00	11.24	11.02	10.32	9.95	9.91
27.00	11.15	10.96	10.25	9.94	9.90
28.00	11.06	10.91	10.17	9.93	9.90
29.00	10.98	10.86	10.10	9.92	9.89
30.00	10.90	10.81	10.03	9.91	9.88

DELTA EPNL = 5.0 FAN HARMONIC = 5.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/D, WITH TONE,7.5 JET ATT, NO TURB, EPNL = 101.98, RUN-14A

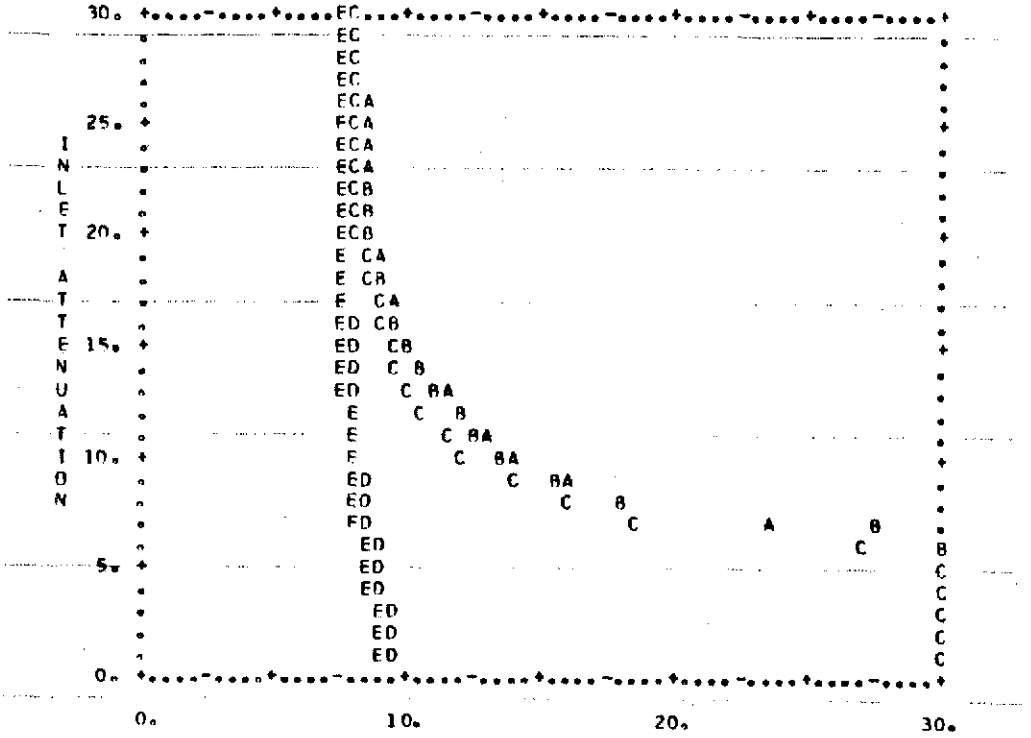


FAN DUCT ATTENUATION

FAN HARMONIC = 5.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	11.77	10.81
2.00	******	******	******	11.37	10.48
3.00	******	******	******	10.99	10.19
4.00	******	******	******	10.64	9.95
5.00	******	******	******	10.32	9.79
6.00	******	******	******	10.07	9.60
7.00	******	******	19.48	9.89	9.41
8.00	19.93	19.89	17.33	9.74	9.24
9.00	17.90	17.58	15.43	9.58	9.08
10.00	16.08	15.60	13.74	9.43	8.93
11.00	15.25	14.78	13.08	9.33	8.89
12.00	14.48	14.03	12.48	9.24	8.85
13.00	13.76	13.35	11.94	9.15	8.81
14.00	13.10	12.73	11.45	9.06	8.77
15.00	12.48	12.15	11.01	8.97	8.73
16.00	11.90	11.62	10.60	8.89	8.69
17.00	11.36	11.13	10.22	8.80	8.65
18.00	10.85	10.68	9.90	8.73	8.61
19.00	10.37	10.26	9.65	8.65	8.58
20.00	9.95	9.90	9.40	8.57	8.54
21.00	9.90	9.85	9.37	8.57	8.53
22.00	9.86	9.80	9.35	8.56	8.53
23.00	9.81	9.76	9.33	8.56	8.53
24.00	9.76	9.71	9.30	8.55	8.52
25.00	9.71	9.66	9.28	8.55	8.52
26.00	9.66	9.61	9.26	8.54	8.51
27.00	9.61	9.56	9.23	8.53	8.51
28.00	9.56	9.51	9.21	8.53	8.50
29.00	9.51	9.46	9.19	8.52	8.50
30.00	9.46	9.41	9.17	8.52	8.50

DELTA EPNL = 5.0 FAN HARMONIC = 10.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE, 7.5 JET ATT, NO TURB, EPNL = 101.98, RUN-14A

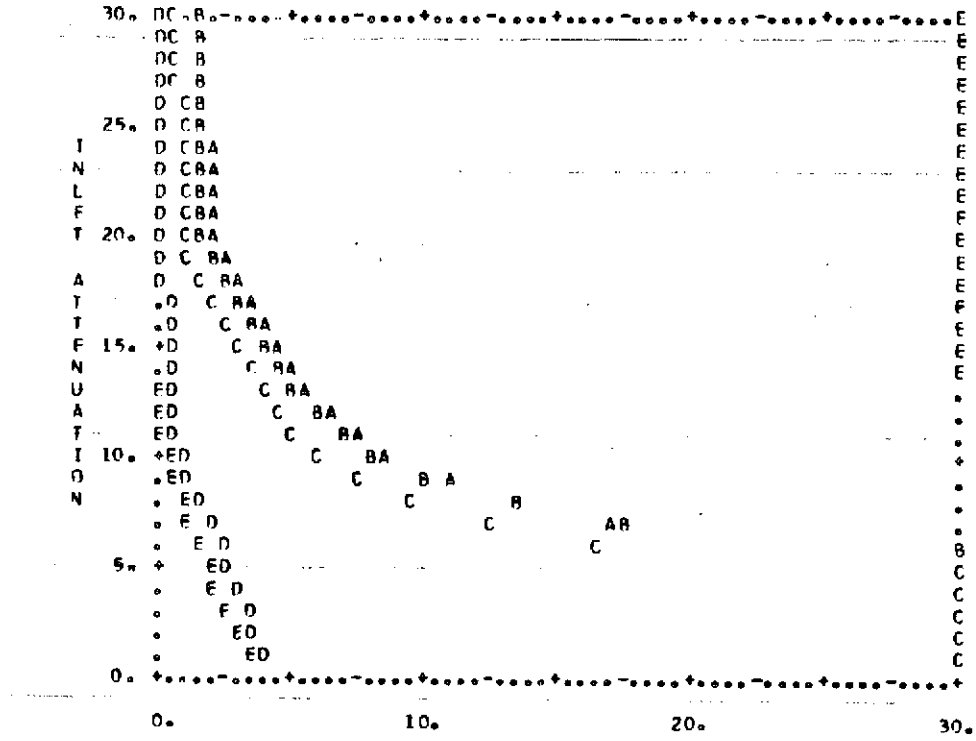


FAN DUCT ATTENUATION

FAN HARMONIC = 10.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	9.59	9.19
2.00	******	******	******	9.43	9.01
3.00	******	******	******	9.28	8.82
4.00	******	******	******	9.14	8.64
5.00	******	******	******	9.00	8.45
6.00	******	******	26.91	8.83	8.33
7.00	23.50	27.36	18.40	8.66	8.22
8.00	18.10	18.12	15.94	8.49	8.12
9.00	15.84	15.58	13.90	8.31	8.01
10.00	13.83	13.41	12.19	8.14	7.91
11.00	12.91	12.54	11.41	8.08	7.85
12.00	12.09	11.76	10.73	8.01	7.79
13.00	11.35	11.06	10.13	7.96	7.73
14.00	10.69	10.43	9.75	7.90	7.67
15.00	10.09	9.91	9.43	7.84	7.61
16.00	9.72	9.57	9.13	7.79	7.55
17.00	9.42	9.25	8.84	7.73	7.50
18.00	9.13	8.93	8.56	7.68	7.45
19.00	8.86	8.63	8.29	7.63	7.39
20.00	8.60	8.33	8.03	7.57	7.34
21.00	8.55	8.30	8.00	7.57	7.34
22.00	8.49	8.27	7.98	7.57	7.34
23.00	8.43	8.24	7.96	7.56	7.34
24.00	8.38	8.20	7.94	7.56	7.34
25.00	8.32	8.17	7.92	7.55	7.34
26.00	8.27	8.14	7.89	7.55	7.34
27.00	8.21	8.11	7.87	7.54	7.33
28.00	8.15	8.08	7.85	7.54	7.33
29.00	8.09	8.05	7.83	7.54	7.33
30.00	8.04	8.02	7.81	7.53	7.33

DELTA EPNL = 5.0 FAN HARMONIC = 20.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE,7.5 JET ATT, NO TURB, EPNL = 101.98, RUN-14A

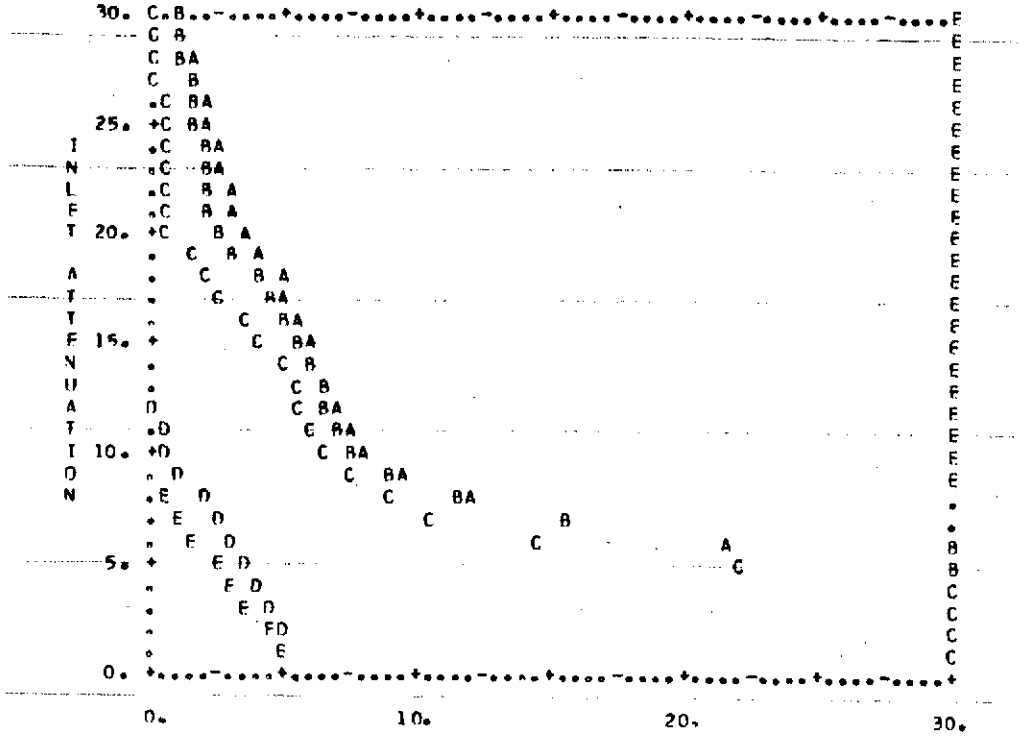


FAN DUCT ATTENUATION

FAN HARMONIC = 20.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	4.00	3.29
2.00	******	******	******	3.65	2.86
3.00	******	******	******	3.32	2.47
4.00	******	******	******	2.99	2.11
5.00	******	******	******	2.68	1.77
6.00	******	******	16.72	2.27	1.47
7.00	17.02	17.51	12.60	1.88	1.18
8.00	13.63	13.46	9.53	1.51	0.89
9.00	10.79	10.17	7.51	1.15	0.60
10.00	8.49	7.76	5.77	0.80	0.31
11.00	7.45	6.81	5.03	0.73	0.27
12.00	6.51	5.96	4.41	0.66	0.14
13.00	5.67	5.19	3.84	0.58	0.06
14.00	4.92	4.57	3.32	0.51	******
15.00	4.38	4.03	2.84	0.44	******
16.00	3.86	3.52	2.39	0.37	******
17.00	3.38	3.03	1.98	0.30	******
18.00	2.93	2.57	1.60	0.24	******
19.00	2.51	2.14	1.25	0.17	******
20.00	2.11	1.73	0.92	0.10	******
21.00	2.03	1.69	0.89	0.10	******
22.00	1.96	1.65	0.87	0.10	******
23.00	1.88	1.61	0.84	0.10	******
24.00	1.81	1.57	0.82	0.10	******
25.00	1.73	1.53	0.79	0.10	******
26.00	1.66	1.49	0.76	0.10	******
27.00	1.58	1.45	0.74	0.10	******
28.00	1.50	1.41	0.71	0.10	******
29.00	1.42	1.37	0.68	0.10	******
30.00	1.34	1.33	0.65	0.10	******

DELTA EPNL = 5.0 FAN HARMONIC = 30.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE,7.5 JET ATT, NO TURB, EPNL = 101.98, RUN-14A

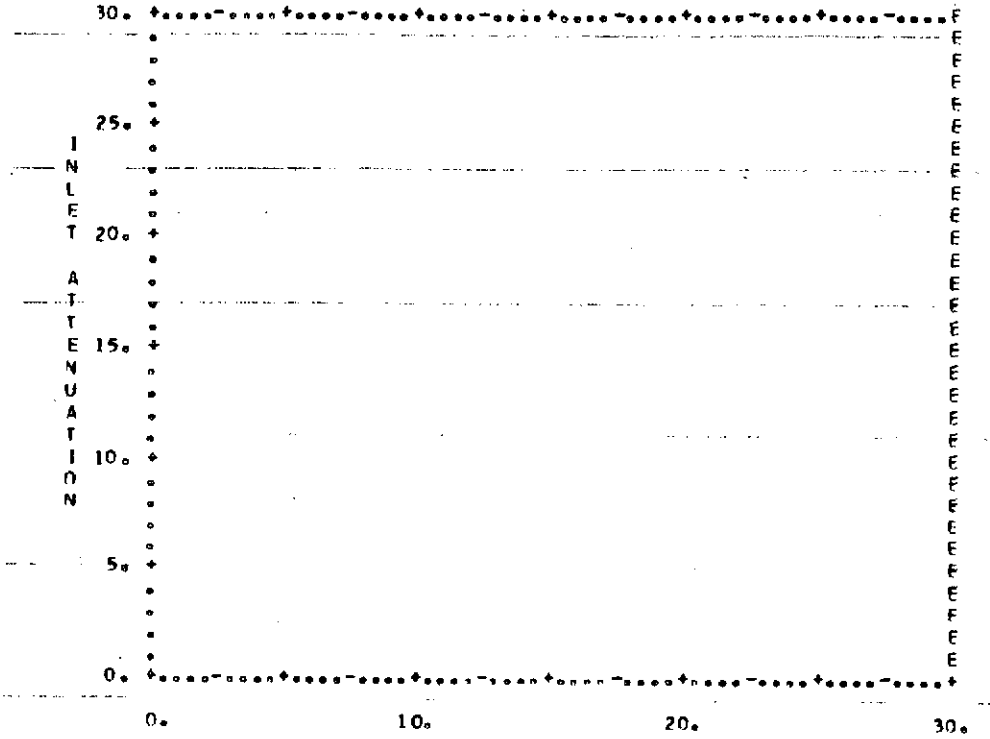


FAN DUCT ATTENUATION

FAN HARMONIC = 30.0 DELTA EPNL = 5.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	5.21	5.02
2.00	******	******	******	5.01	4.32
3.00	******	******	******	4.45	3.64
4.00	******	******	******	3.92	3.01
5.00	******	******	22.00	3.43	2.43
6.00	21.46	******	14.63	2.85	1.75
7.00	15.60	15.66	10.66	2.29	1.06
8.00	11.84	11.43	8.89	1.75	0.37
9.00	9.41	9.09	7.64	1.23	******
10.00	8.17	7.73	6.51	0.72	******
11.00	7.60	7.20	6.04	0.45	******
12.00	7.09	6.72	5.63	0.17	******
13.00	6.64	6.28	5.26	******	******
14.00	6.23	5.87	4.83	******	******
15.00	5.86	5.50	4.06	******	******
16.00	5.53	5.16	3.32	******	******
17.00	5.22	4.60	2.63	******	******
18.00	4.85	3.83	1.97	******	******
19.00	4.13	3.09	1.34	******	******
20.00	3.42	2.37	0.74	******	******
21.00	3.17	2.22	0.67	******	******
22.00	2.92	2.06	0.59	******	******
23.00	2.68	1.91	0.52	******	******
24.00	2.44	1.76	0.44	******	******
25.00	2.19	1.60	0.37	******	******
26.00	1.95	1.45	0.29	******	******
27.00	1.72	1.29	0.22	******	******
28.00	1.48	1.14	0.15	******	******
29.00	1.25	0.99	0.07	******	******
30.00	1.01	0.83	0.00	******	******

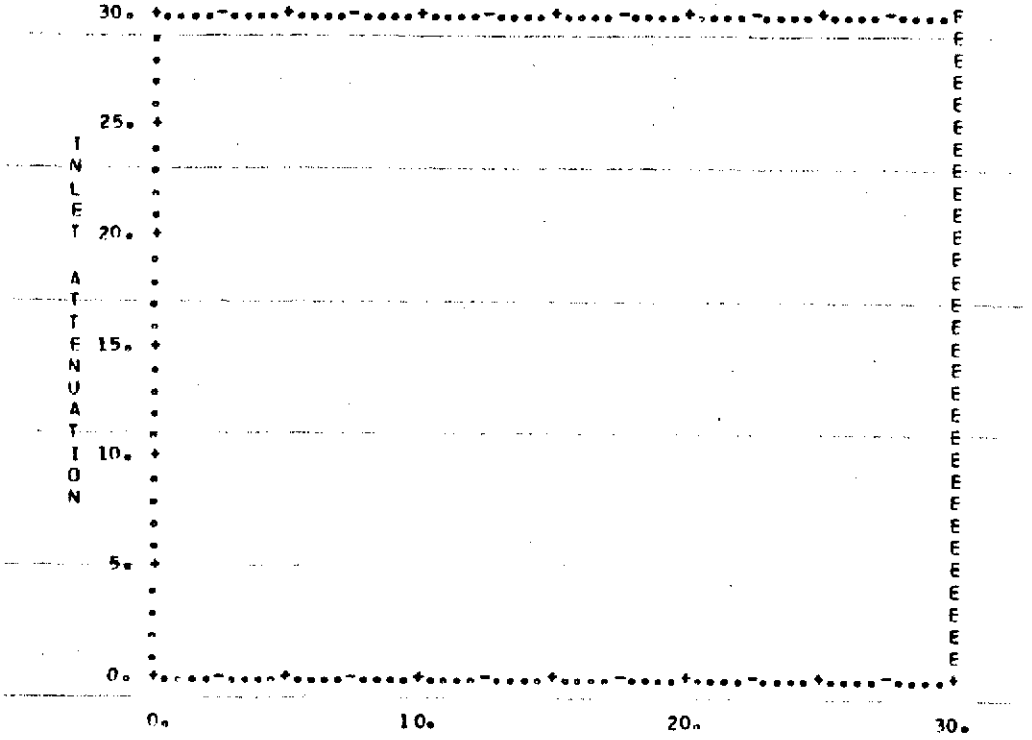
DELTA EPNL = 10.0 FAN HARMONIC = 0.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE,7.5 JET ATT, NO TURB, EPNL = 101.98, RUN-14A



FAN HARMONIC = 0.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	******
8.00	******	******	******	******	******
9.00	******	******	******	******	******
10.00	******	******	******	******	******
11.00	******	******	******	******	******
12.00	******	******	******	******	******
13.00	******	******	******	******	******
14.00	******	******	******	******	******
15.00	******	******	******	******	******
16.00	******	******	******	******	******
17.00	******	******	******	******	******
18.00	******	******	******	******	******
19.00	******	******	******	******	******
20.00	******	******	******	******	******
21.00	******	******	******	******	******
22.00	******	******	******	******	******
23.00	******	******	******	******	******
24.00	******	******	******	******	******
25.00	******	******	******	******	******
26.00	******	******	******	******	******
27.00	******	******	******	******	******
28.00	******	******	******	******	******
29.00	******	******	******	******	******
30.00	******	******	******	******	******

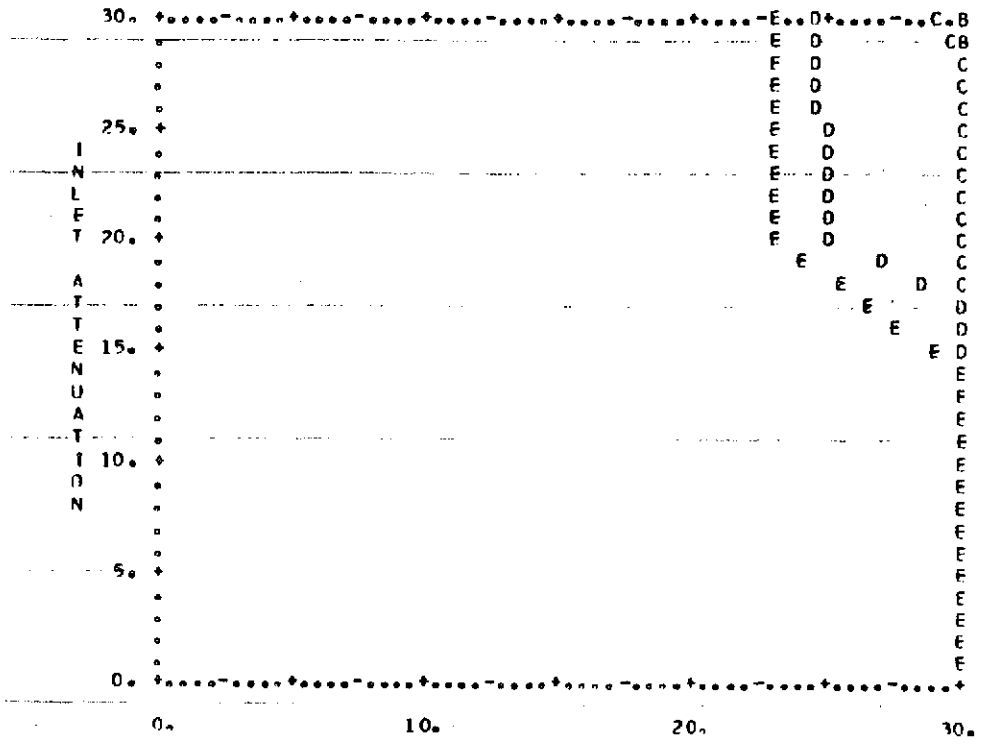
DELTA EPNL = 10.0 FAN HARMONIC = 5.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE,7.5 JET ATT, NO TURB, EPNL = 101.98, RUN-14A



FAN HARMONIC = 5.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	******
8.00	******	******	******	******	******
9.00	******	******	******	******	******
10.00	******	******	******	******	******
11.00	******	******	******	******	******
12.00	******	******	******	******	******
13.00	******	******	******	******	******
14.00	******	******	******	******	******
15.00	******	******	******	******	******
16.00	******	******	******	******	******
17.00	******	******	******	******	******
18.00	******	******	******	******	******
19.00	******	******	******	******	******
20.00	******	******	******	******	******
21.00	******	******	******	******	******
22.00	******	******	******	******	******
23.00	******	******	******	******	******
24.00	******	******	******	******	******
25.00	******	******	******	******	******
26.00	******	******	******	******	******
27.00	******	******	******	******	******
28.00	******	******	******	******	******
29.00	******	******	******	******	******
30.00	******	******	******	******	******

DELTA EPNL = 10.0 FAN HARMONIC = 10.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE,7.5 JET ATT, NO TURB, EPNL = 101.98, RUN-14A

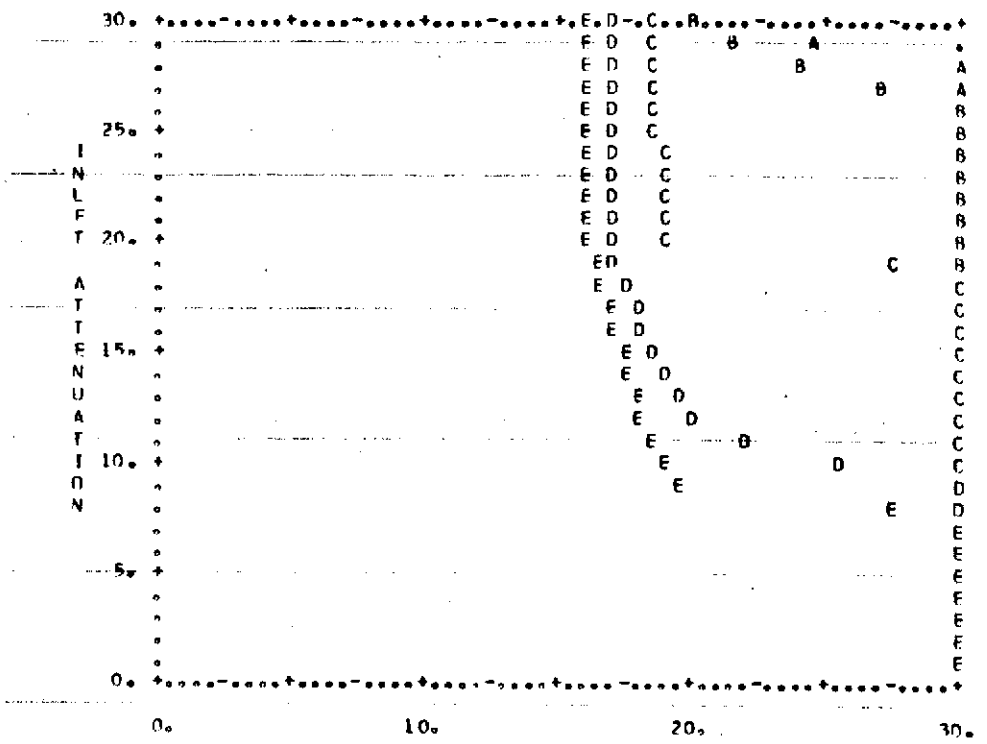


FAN DUCT ATTENUATION

FAN HARMONIC = 10.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	******
8.00	******	******	******	******	******
9.00	******	******	******	******	******
10.00	******	******	******	******	******
11.00	******	******	******	******	******
12.00	******	******	******	******	******
13.00	******	******	******	******	******
14.00	******	******	******	******	30.20
15.00	******	******	******	******	28.94
16.00	******	******	******	******	27.69
17.00	******	******	******	30.02	26.46
18.00	******	******	******	28.37	25.25
19.00	******	******	******	26.78	24.06
20.00	******	******	******	25.22	22.88
21.00	******	******	******	25.14	22.88
22.00	******	******	******	25.06	22.87
23.00	******	******	******	24.98	22.87
24.00	******	******	******	24.90	22.87
25.00	******	******	******	24.81	22.87
26.00	******	******	30.86	24.73	22.87
27.00	******	******	30.36	24.65	22.87
28.00	******	******	29.88	24.57	22.87
29.00	******	******	29.40	24.49	22.86
30.00	******	******	28.92	24.41	22.86

DELTA EPNL = 10.0 FAN HARMONIC = 20.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE,7.5 JET ATT, NO TURB, EPNL = 101.98, RUN-14A

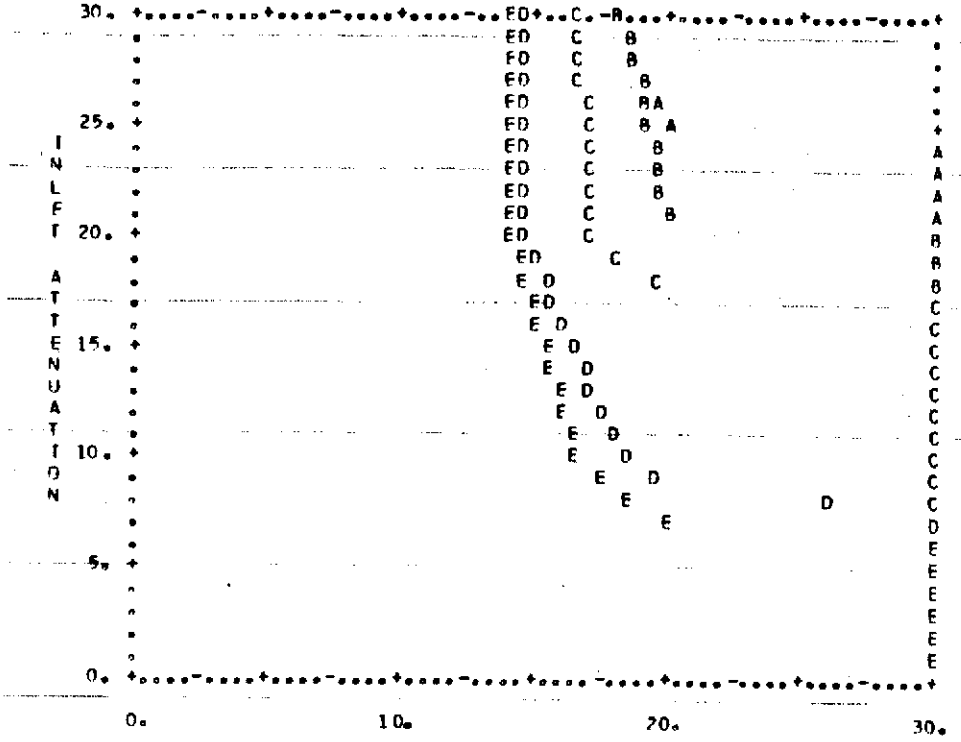


FAN DUCT ATTENUATION

FAN HARMONIC = 20.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	******
8.00	******	******	******	******	27.32
9.00	******	******	******	******	19.66
10.00	******	******	******	25.71	18.76
11.00	******	******	******	21.92	18.45
12.00	******	******	******	19.78	18.15
13.00	******	******	******	19.37	17.86
14.00	******	******	******	18.98	17.58
15.00	******	******	******	18.60	17.31
16.00	******	******	******	18.23	17.04
17.00	******	******	******	17.88	16.79
18.00	******	******	******	17.53	16.54
19.00	******	******	27.44	17.20	16.30
20.00	******	******	19.12	16.88	16.06
21.00	******	******	19.04	16.88	16.06
22.00	******	******	18.95	16.87	16.06
23.00	******	******	18.87	16.87	16.06
24.00	******	******	18.78	16.87	16.06
25.00	******	******	18.70	16.87	16.06
26.00	******	******	18.62	16.87	16.05
27.00	******	27.16	18.54	16.86	16.05
28.00	30.40	23.98	18.45	16.86	16.05
29.00	24.32	21.33	18.37	16.86	16.05
30.00	19.96	19.93	18.29	16.86	16.05

DELTA EPNL = 10.0 FAN HARMONIC = 30.0
INLET HARMONIC (A = 0, B = 5, C = 10, D = 20, E = 30)
T/O, WITH TONE,7.5 JET ATT, NO TURB, EPNL = 101.98, RUN-14A



FAN DUCT ATTENUATION

FAN HARMONIC = 30.0 DELTA EPNL = 10.0

INLET HARMONIC =	A 0	B 5	C 10	D 20	E 30
INLET FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.	FAN FUND.
1.00	******	******	******	******	******
2.00	******	******	******	******	******
3.00	******	******	******	******	******
4.00	******	******	******	******	******
5.00	******	******	******	******	******
6.00	******	******	******	******	******
7.00	******	******	******	******	19.81
8.00	******	******	******	25.96	18.65
9.00	******	******	******	19.56	17.64
10.00	******	******	******	18.58	16.74
11.00	******	******	******	18.09	16.45
12.00	******	******	******	17.63	16.16
13.00	******	******	******	17.19	15.88
14.00	******	******	******	16.78	15.61
15.00	******	******	******	16.40	15.34
16.00	******	******	******	16.03	15.09
17.00	******	******	******	15.69	14.84
18.00	******	******	19.43	15.36	14.59
19.00	******	******	18.20	15.05	14.36
20.00	******	******	17.08	14.75	14.13
21.00	******	19.95	17.03	14.74	14.13
22.00	******	19.74	16.97	14.73	14.13
23.00	******	19.53	16.92	14.72	14.13
24.00	******	19.33	16.87	14.71	14.13
25.00	19.80	19.14	16.82	14.70	14.13
26.00	19.43	18.95	16.76	14.69	14.13
27.00	19.08	18.76	16.71	14.68	14.13
28.00	18.75	18.58	16.66	14.66	14.13
29.00	18.43	18.40	16.62	14.65	14.13
30.00	18.13	18.23	16.57	14.64	14.12