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AIRCRAFT NOISE SOURCE AND CONTOUR COMPUTER PROGRAMS USER'S GUIDE

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16. Abstract

This report describes the usage of the computer programs for predicting the noise-time histories and noise contours (footprints) of the five basic types of aircraft (turbojet, turbofan, turboprop, V/STOL and helicopter) discussed in the companion report: NASA CR114649, "Aircraft Noise Source and Contour Estimation."

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1.0 SUMMARY

This addendum to report CR114649 is the user's guide for the computer programs developed to fulfill the Phase B requirements of NASA contract NAS2-6969. Two programs were developed. The first incorporates the engineering methods for aircraft source noise prediction presented in the main report. Source noise prediction for five basic types of aircraft are included; turbojet, turbofan, turboprop, V/STOL and helicopter. This program was written to operate on the IBM 360 computer system.

The second program is designed to use the results of the first to calculate contours of equal noise levels (footprints) as described in section 5.3 of reference 1. This program has two versions; one is compatible with the NASA-Ames flight simulator (SIGMA VII and VIII computers) for "real-time" processing and the second functions as a "stand-alone" on the IBM 360.

2.0 INTRODUCTION

This report provides a description of the computer programs developed from the engineering document (reference 1) for fulfilling the requirements in Phase B of Contract NAS2-6969. The computer requirements of Phase B stipulated the development of procedures for 1/3 octave band noise estimates for advanced technology quiet engines, lift fans, lift/cruise fans, propellers and helicopters in addition to conventional jet engines, plus the capability of computing noise contours (footprints) in "real-time" operation with the NASA Ames flight simulator. These requirements necessitated the development of two computer programs; one for providing source noise estimates for an aircraft operating at a prescribed set of conditions and the second, which uses the results of the first program, to compute noise contours for an aircraft during takeoff or landing operations.

Three principle considerations were incorporated in the design of the source noise prediction program: core effectiveness, limited input, and variable output reporting. Core effectiveness was achieved by structuring the program into a two level overlay comprised of an executive level which controls input, output, and linkage to the second level which contains the flight geometry, extrapolation corrections and various noise modules (see Figures 1 thru 3). Since the order of using the noise modules is random until the

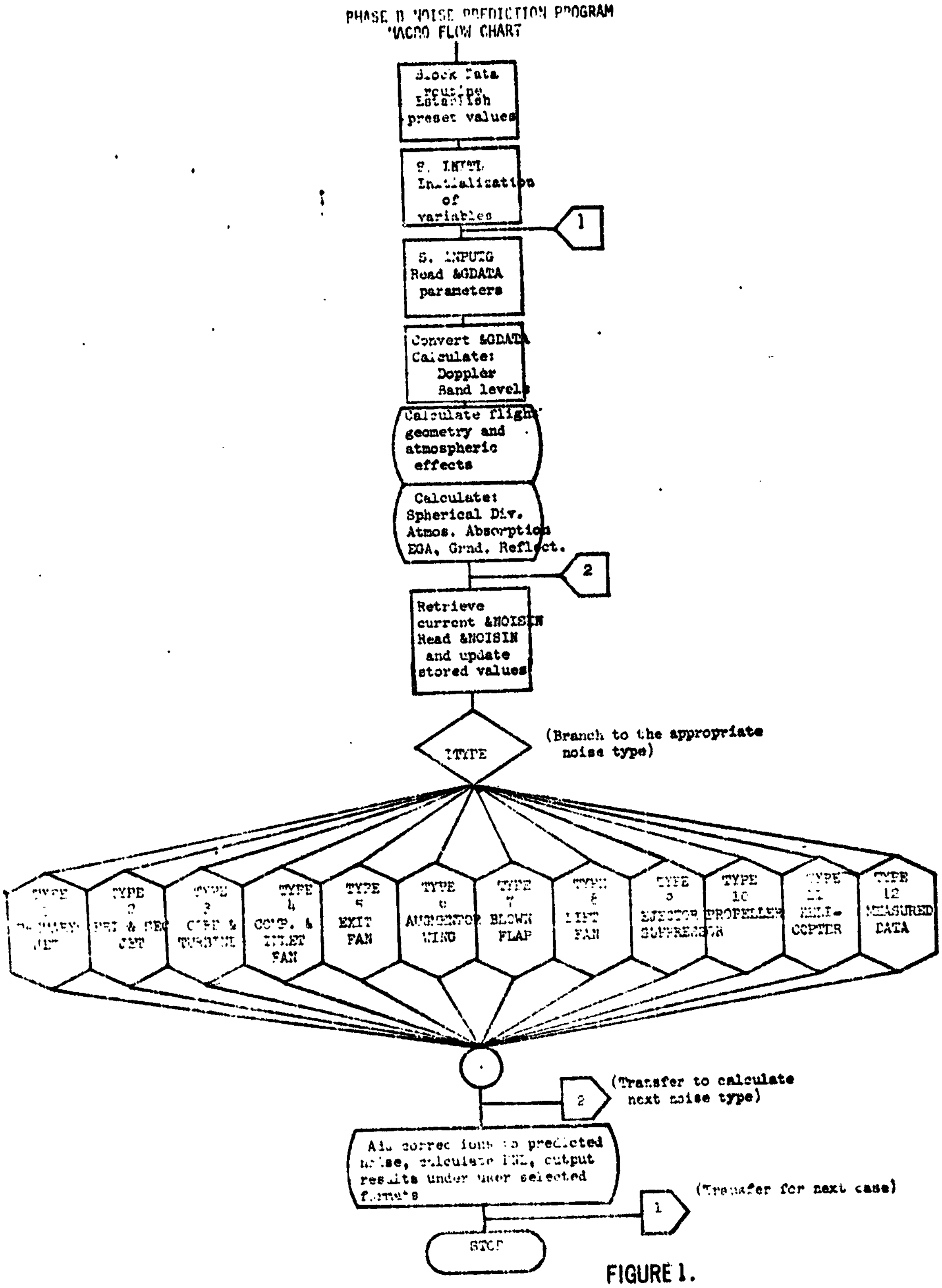
PHASE II NOISE PREDICTION PROGRAM
MACRO FLOW CHART
Establish preset values
Initialization of variables
1
Read &GDATA parameters
Convert &GDATA
Calculate:
Doppler
Band levels
Calculate flight geometry and atmospheric effects
Calculate:
Spherical Div.
Atmos. Absorption
EGA, Grnd. Reflect.
2
Retrieve current &NOISIN
Read &NOISIN and update stored values
ITYPE
(Branch to the appropriate noise type)
TYPE 4 COMP. & INLET FAN
TYPE 5 EXIT FAN
TYPE 7 BLOWN FLAP
TYPE 10 PROPELLER
TYPE 12 MEASURED DATA
(Transfer to calculate next noise type)
2
(Transfer for next case)
1

FIGURE 1.

SCHEMATIC DIAGRAM FOR NOISE COMPONENT CALCULATIONS

(SHOWS GENERAL LOGIC FLOW)

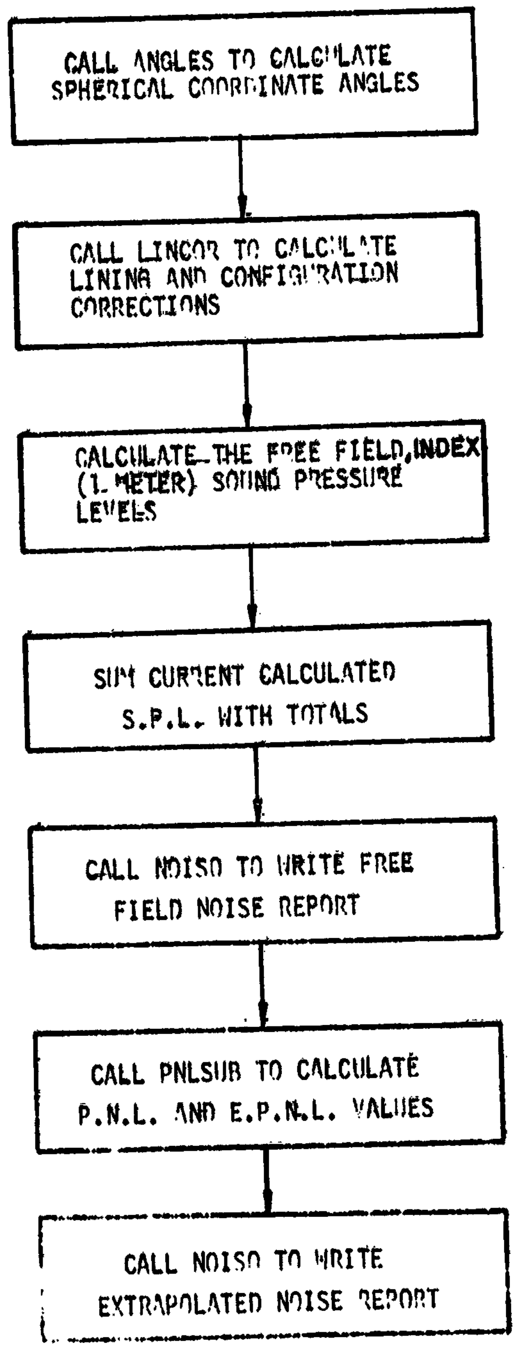

FIGURE 2.

GENERAL OVERLAY STRUCTURE
(for links below the main link)

Overlay (1)

Subroutine FLTGEO
calculates flight geometry
and calls ATMOSP for
atmospheric effects.
Subroutine NEXTCR
calculates (1)Spherical divergence
(2)Atmospheric absorption (Sub.AVGALF)
(3)Extra ground attenuation (Sub.EGACAL)
(4)Ground reflection (Sub.GRDRFX)

Overlay (2)

Subroutine JET calculates Jet noise

ABSORP	NOISO
ANGLES	PNLSUB
ESHLDG	PWRSUM
JETPED	TBLU1
JETNOS	UNIT
LINCOR	

Subroutine INLET

ABSORP	NOISO
ANGLES	PNLSUB
BUZSAW	PWRSUM
ESHLDG	RESCAL
FANNOS	TBLU1
FANPED	UNIT
LINCOR	ZERO

Subrout AFT

ABSORP	NOISO
ANGLES	PNLSUB
BUZSAW	PWRSUM
ESHLDG	RESCAL
FANNOS	TBLU1
FANPED	UNIT
LINCOR	ZERO

Subroutine LIFTFN

ABSORP	NOISO
ANGLES	PNLSUB
BUZSAW	PWRSUM
ESHLDG	RESCAL
FANNOS	TBLU1
FANPED	UNIT
	ZERO

Subroutine EJECT

ANGLES	PNLSUB
ESHLDG	PWRSUM
LINCOR	TBLU2
MENOZZ	TBLU1
NOISO	ZERO

Overlay (3)

Subroutine COREN

ANGLES	NOISO
ESHLDG	PNLSUB
LINCOR	PWRSUM

Subroutine SPECAN

ANGLES	PWRSUM
LINCOR	TBLU1
NOISO	TBLU2
PNLSUB	

Subroutine BLWFLP

ANGLES	PWRSUM
ESHLDG	TBLU1
LINCOR	TBLU2
NOISO	TBLU3
PNLSUB	

Overlay (4)

Subroutine PROP

ANGLES	PNLSUB
ERROR	PWRSUM
LINCOR	NOISO
TBLU1	TBLU2

Subroutine COPTER

ANGLES	LINCOR
ERROR	NOISO
BESJ	PNLSUB
JBES	PWRSUM
	TBLU1

Overlay (5)

Subroutine MEASRD

ANGLES
LINCOR
NOISO
PNLSUB
PWRSUM
TBLU3

FIGURE 3.

first case of a run is complete, this structure appeared to give the least impaction on both core and disc, with the length of the program fixed as the combined length of the executive link and that of the longest subordinate link. During execution as each noise source is considered, if the noise source differs from the previous source and is not in the particular overlay occupying core at that time, the source module under consideration is automatically read from disc to the area of core occupied by the previous overlay.

The second consideration, that of limiting the amount of input needed to run the program, has been achieved by using the NAMELIST input convention which allows any or all variables in the NAMELIST data set to be input at a given time. This provides the user with a convenient method of progressively updating the input to the program from one case to the next simply by carrying forward the input values established in the preceeding case and specifying only the variables which need to be changed with new values whether these be single valued variables or arrayed variables. The NAMELIST convention has the characteristic of allowing the user a more visual description of what the particular inputs to various parts of the program are by equating the variable name with its value. This in effect conditions the user to make fewer input errors.

Program output is printed on a per case basis (i.e., each new set of conditions for the aircraft) with options on the degree of details desired (7 different output reports are available)plus a default report. In addition to the printed output, if data is to be generated for the Noise Contour program, a file consisting of the EPNL or maximum PNL, Engine Performance parameter, elevation angle, and $\log_{10}$ of the range at the closest point of approach is written to file TAPE 20(Section 5.1.7 of Ref. 1).

The structure of the program determines the order of inputs. When this is kept in mind, it will aid the user in avoiding input errors. The first input expected by the executive routine is processed as the first part of any case. These inputs describe to the program the aircraft altitude, speed, and position, and the observer positions. In addition, this set contains information about atmospheric conditions, types of extrapolation corrections, type of output desired, and other information pertinent to this case.

The executive routine subsequently calls the flight path/observer geometry and extrapolation corrections overlay. The flight path/observer geometry routine calculates the position of the aircraft with respect to the initial input conditions, the distance of sound propagation, and the time of sound transmission for each sideline observer position for a set of 17 angles (10°, 20°, ..., 170°) between the flight path and a line to the observer.

The extrapolation corrections routine is called by the executive program to calculate the sound attenuation due to spherical divergence, atmospheric absorption, extra-ground attenuation and ground reflection, based on the distance of propagation between the noise source and the observer. This information is stored in an array based on the number of spectra bands (8 or 24), the 17 positions of the aircraft, and the number of observer positions. The array is used throughout the case for extrapolating the index spectra of each noise component and for extrapolation of the total index spectra.

From this point, until the next case, all inputs pertain to individual noise component data. This is subdivided into configuration data sets comprised of a title card followed by discrete noise component data sets, the sum of which describe that particular source configuration (engine). Each case is allowed a maximum of 3 different source configurations which must be maintained both <u>in order</u> and <u>number</u> throughout the job (assuming more than one case is to be input). After each component data set is processed by the program, the executive module links the appropriate overlay for the type of noise prediction specified by the input data.

Each noise module was designed to follow approximately the same programming steps. First the spherical coordinate angles relative to the noise source reference axis are calculated if the related reference axis has changed from the previous noise component. Next, the free-field index (1/3 or 1/1) octave band spectra are calculated for each sideline position for each of the 17 angular positions between aircraft and observer. Lining, multiple engine, flight, and configuration correction effects are incorporated into the calculations, if applicable. The index spectra, for each noise component, is available as part of the optional reports. The total free-field index noise radiating towards the observer positions for each of the 17 aircraft positions is accumulated in an array by logarithmic summing. These spectra are also available as part of the optional reports.

The extrapolation corrections described in the main report, section 5.1.3, are subtracted from the noise component free-field index spectra. The human response measures, i.e., perceived noise level (PNL), tone corrected PNL (TCPNL), and effective PNL (EPNL) are calculated as the final step in each noise component module. The extrapolated noise, in conjunction with the response measures, are available as part of the output report.

After all noise component data sets describing the aircraft noise for the case have been processed, the total free-field index spectra are extrapolated in the same manner as the individual components. In addition the human response measures will be calculated based on the total extrapolated spectra. Both the total free-field index spectra and the total extrapolated spectra are available as part of the output reports.

The source noise prediction program has been designed to process discrete aircraft-observer positions and aircraft propulsion system operating conditions, rather than a complete operation, e.g., takeoff or approach. This method provides greater flexibility and ease in using the program. The program will continue to process input data on a per case basis until an end of file (no more data cases) is encountered. Each case normally would represent a different set of aircraft conditions such as altitude, speed, engine operating conditions, etc. Presumably most of the input data will remain constant between cases (e.g., sideline observer distances, doppler option, atmospheric conditions, output options, etc.). This will allow noise studies for takeoff and landing of aircraft with a minimal amount of input.

The noise contour estimation program is designed to use the results of the source noise prediction program, or measured noise data. A post-processor program (Ref.2) has been included with the noise source estimation program to convert the acoustic data (file: TAPE20) into a data subroutine satisfying the requirements of the contour program. Results of the contour program are contours of equal noise levels, the area within the contours, and noise level estimates on up-to-three sidelines.

3.0 SOURCE NOISE PREDICTION PROGRAM

In order to facilitate the use of this program, many of the data inputs have pre-stored default values in the program and are defined in the appropriate parameter description section. An examination of the following sections will indicate the necessary input data needed for the various options built into the program; e.g., establishing different atmospheric conditions; using calculated ground reflection corrections or a 3 dB default value; using measured data to define a noise configuration instead of that obtained by a prediction method. Table 1 presents a cross reference of engineering and programming documents by noise type and section number.

The program will process one or more cases of data in a single run. A case consists of from one to three different types of propulsion systems. The noise from each propulsion system is described in terms of a subset of noise components. The order of input for each case remains fixed; however inputs which remain constant throughout the run, need not be redefined for succeeding cases.

The first input per case consists of an 80 column alphanumeric title record which will be output as part of the heading describing the case. If the same heading is desired throughout the run only blank records need be entered in succeeding cases. The title record is followed by one or more records describing the general conditions which apply throughout the case. These cards are coded in a FORTRAN NAMELIST format. The NAMELIST format requires that the first record start in column 2 with an initiator name &GDATA on General Data Parameters. The order of the parameters is independent but must have the variable name, followed by an equals mark, followed by the assigned value. The parameters must be separated by commas - blanks are ignored. Any succeeding records must start in or after column 2 and may go through column 80. A terminator &END must follow the last parameter in each data set.

A variable-name can be followed by a single value, or a series of values in the case of variables which require an array of data. The general input format is as follows:

<u>Variables having single values</u>

Example: integer type — decimal type

NENG=3 — SLØPE=.25

NOISE MODULES

ITYPE	MODULE	ENG. DOC. (Ref. 1)	PROG. DOC.
1	Primary Jet	5.2.2.1	3.2.2
2	Primary & Sec Jet	5.2.2.2	3.2.2
3	*Core & Turbine	5.2.3.2	3.2.3
4	*Compressor & Fan Inlet	5.2.4.2	3.2.4
5	*Fan Exit	5.2.4.3	3.2.4
6	*Augmenter Wing	5.2.2.4	3.2.5
7	Blown Flap	5.2.2.5	3.2.6
8	*Lift Fan	5.2.4.4	3.2.7
9	*Ejector-Suppressor	5.2.2.3	3.2.8
10	Propeller	5.2.5.2	3.2.9
11	Helicopter, Prop & Tilt Rotor	5.2.5	3.2.10
12	Measured Data	5.2.1	3.2.11

* Lining Attenuation Option

GDATA (general computer program data)	5.1.2	3.1
LINING Options	5.1.4	3.2.1
CONFIG. CORR. Options	5.1.5	3.2.1

Notes

1. NTYPE appears in first NØISIN record and specifies the number of NØISIN records in the case.

2. Each NØISIN record specifies an ITYPE module and all arguments in the record are for that module (lining and configuration options are included in the record as required).

TABLE 1 ENGINEERING/PROGRAMMING DOCUMENT CROSS REFERENCE

Variables which have multiple values

Example: Filling the complete array for a 10 element array

SLDIST(1) or SLDIST=100.,200.,150.,175.,500.,750.,1000.,1200.,1500.,2000.,

Filling part of the aray

SLDIST(3)=300.,400.,

Example of NAMELIST GDATA:

&GDATA ALTØG=100.,ALTPG=200.,SLØPE=.1,AMACH=.15,N...S=2,
SLDIST(1)=100.,500.,ISPTRM=1,NTENG=2 &END

Several sample cases with input data and ... reports ... presented in the Sample Cases section.

Following the GDATA data set is an 80 column alphanumeric title record describing the first noise source configuration. Separate data sets using the NAMELIST initiator &NØISIN describe each noise component in a configuration. If more than one configuration is to be included, the preceeding type of input is included for each additional configuration starting with the title record and terminating with the &END NAMELIST terminator for the last noise component in the &NØISIN data set. As mentioned previously, there is a maximum of 3 different types of powerplants per run; therefore a case may be processed having different engine configurations using any or all of the 12 different noise modules depending on the nature of the particular configuration. Each noise component data set is described in the following sections. A terminator is not required to end the run since an end of file check is repeatedly made on the input data file at the end of each case.

When using the program for multiple noise source configurations, an input value for NTENG=2, or 3 is required in the &GDATA set. When more than one type of noise component is used in a configuration, an input NTYPE=m (where m is the total noise components for the configuration) is needed in the first &NØISIN data set for that configuration. The section covering the sample cases section should assist in clarifying the input data.

The program allows the user to specify one of two unit systems for input/output variables. The unit system considered are the MKS and English system. The user must be consistent with the choice made for the unit system because once he has specified his choice, the program considers all inputs are in that system. The input variable IUNIT specifies the unit system desired, the default option corresponds to the MKS units.

3.1 General Data Parameters (&GDATA input data set)

This section describes those inputs which must be defined by the user for the first case of a computer run. Succeeding cases need only the appropriate values changed reflecting a change in the prediction conditions. Unless otherwise indicated, each variable is to be defined by input or by the default value(s). In order to fascilitate finding the description of a parameter, the list(s) of inputs within each of the following sections have been alphabetized with respect to the names of the variables.

Variable Name	Units	Default	Description
AALT	m.(ft.)	0.	Airport altitude.
ALTPG	m.(ft.)	0.	Aircraft height above ground at Y=0. (Fig. 6 of Ref.1)
ALTØG	m.(ft.)	0.	Observer height above the ground.
AMACH			Aircraft Mach number.
BCG	PNdB	10.	Number of decibels down from maximum, used to determine the integration interval for the EPNL calculations.
CPRES	Atm(psia)		Pressure of homogeneous atmosphere defined by user. (Note: Used only if IATMØS=4).
CRHUMD	%RH		Relative humidity of homogenous atmosphere defined by user. (Note: Used only if IATMØS=4).
CTEMP	°K(°R)		Temperature of homogeneous atmosphere defined by user. (Note: Used only if IATMØS=4).
DHUMID	%RH	0.	Constant % relative humidity delta that is added to ISA. (Note: Used only if IATMØS=1).
DPRES	Atm(psia)	0.	Constant pressure delta that is added to ISA. (Note: Used only if IATMØS=1).
DTEMP	°K(°R)	0.	Constant temperature delta that is added to ISA. (Note: Used only if IATMØS=1).

Variable Name	Units	Default	Description
EPP			Engine performance parameter used to correlate data output for the Noise Contour Program or to specify operating condition when using the "measured data" module.
FLD(1) ... FLD(25)	Hz		Data frequencies for the ground impedance data curve used in the ground reflection calculation. The number of values to be specified is ND. (Note: Used only if IGDR=0.)
FLR	PNdB	90.	Noise floor for EPNL calculations. Values less than FLR are not included when computing the duration for EPNL.
IAIR		0	Specifies whether the air absorption coefficients are calculated by the program or defined by the user. Set equal to: 0 if program calculates 1 if user defines (see UAIRAB) -1 if program retains coefficients from previous case
IATMØS		0	Specifies the type of atmospheric conditions used by program. Set equal to: 0 for nonhomogeneous international standard atmosphere (ISA). 1 for nonhomogeneous ISA plus user defined constants for relative humidity, pressure, and temperature added to ISA. (Note: See DHUMID, DPRES,DTEMP). 2 for nonhomogeneous atmospheric conditions that are defined by the user. (Note: See NTEMP,TALT, TEMP,NPRES,PALT,PRES,NHUMID,RALT, RHUMID). 3 homogeneous atmosphere of 1 ATM = 14.696 psia; 288.16°K(15°C) = 518.688°R(59°F); 70% R.H. 4 homogeneous atmosphere defined by user. (Note: See CPRES, CRHUMD, CTEMP).
IDØP		0	Doppler shift switch 0 for no doppler shift factor 1 doppler shift factor included (Note: For fan noise the correction is for frequency only) 2 doppler shift factor included (Note: For fan noise a correction is made for both the frequency and the noise levels).

Variable Name	Units	Default	Description
IEGA		0	Specifies whether corrections for extra-ground-attenuation are to be applied while extrapolating the noise level from the airplane to the observer. Set equal to: 0 if EGA desired 1 if EGA is not wanted
IGDR		1	Specifies whether corrections for ground reflection based on + [illegible] dB delta, or calculated corrections (Appendix A of Ref.1) are to be applied while extrapolating the noise level from the airplane to the observer. Set equal to: 0 if calculated corrections are made (Note: See XKN,ND,FLD,ZNR,ZNI). 1 if a delta of + 3 dB is to be used.
IØUT(1) ... (7)		0 ... 0	An array to allow up to 7 different output reports or a default report which gives a heading, PNL, TCPNL, time array, EPNL and a 1 page summary of assumptions under which the run was made. Order of input is immaterial, e.g., IØUT(1) = 5,4,3,2 IØUT(1) = 1,2,3,4,5
(Note: Section 3.3, Sample Cases, illustrates the various output reports described by this input.)			= 1 Type 1 report; total SPL at the observer for each of the 17 angles (10°,20°,30°,...170°) for each of the frequency bands and observer positions. = 2 Type 2 report; summary of options/assumptions under which the case was made. = 3 Type 3 report; SPL, for each component, at the observer in the same manner as type 1. = 4 Type 4 report; flight path/observer geometry. = 5 Type 5 report; extrapolation corrections. = 6 Type 6 report; total free-field, index (radius of 1 meter) SPL's for all angles, frequencies and observer positions. = 7 Type 7 report; free-field index spectra for each component.

Variable Name	Units	Default	Description
ISPTRM		0	Specifies the type of frequency bands to be used in the calculations. Set equal to: 0 for 24 preferred 1/3 octave bands 1 for 8 preferred 1/1 octave bands
IUNIT		0	Specifies whether input parameters and output reports are in MKS or English units. 0 = MKS, 1 = English units
ND		3	Number of data points for the ground normalized complex impedance curve. (3≤ND≤25) (Note: Use only if IGDR=0, see XKN,FLD,ZNR,ZNI).
NHUMID			Specifies the number of entries in each of the % relative humidity (RHUMID vs. RALT) tables that are defined by the user for nonhomogeneous atmospheric conditions. (2≤NHUMID≤50) (Note: Use only if IATMØS=2).
NLØPT		0	Specifies table output for noise contour estimation on file TAPE20. 0 = no output 1 = EPNL vs EPP, elevation angle, $\log_{10}$ of the range at CPA 2 = same except peak PNL (Note: Output reporting must be set to TYPE1 or default-see IØUT. If NLØPT≠0 each case will have a noise level, an engine performance parameter, an elevation angle and the $\log_{10}$ of the off-axis range written to file TAPE20.)
NØBS		1	Number of observers defined in SLDIST table. (1≤NØBS≤10).
NPRES			Specifies the number of entries in each of the pressure (PRES) vs altitude (PALT) tables that the user defines for non-homogeneous atmospheric conditions. (2≤NPRES≤50) (Note: Used if IATMØS=2).
NTENG		1	Specifies the number of distinct types of engine configurations to be considered (NTENG≤3). Noise component parameters must be defined for each different source.

Variable Name	Units	Default	Description
NTEMP			Specifies the number of entries in each of the temperature (Temp) vs altitude (TALT) tables that have been defined by the user for nonhomogeneous atmospheric conditions. (2≤NTEMP≤50) (Note: Used only if IATMØS=2).
PALT(1) ... PALT(50)	m.(ft.) ... m.(ft.)		Each entry in this table defines the altitude for the pressure defined by the corresponding entry in the PRES table. Note: Used only if IATMØS=2, see NPRES).
PRES(1) ... PRES(50)	Atm(psia) ... Atm(psia)		Each entry in this table defines the pressure for the altitude defined by the corresponding entry in the PALT table. (Note: Used only if IATMØS=2, see NPRES).
RALT(1) ... RALT(50)	m.(ft.) ... m.(ft.)		Each entry in this table defines the altitude for the relative humidity defined by the corresponding entry in the RHUMID table. (Note: Used only if IATMØS=2, see NHUMID).
RHUMID(1) ... RHUMID(50)	% RH ... % RH		Each entry in the table defines the % relative humidity for the altitude defined by the corresponding entry in the RALT table. (Note: Used only if IATMØS=2, see NHUMID).
SLDIST(1) ... SLDIST(N)	m.(ft.) ... m.(ft.)		Sideline position of 1st observer. (see NØBS) ... N = NØBS Sideline position of N[th] observer.
SLØPE		0	Aircraft climb gradient. (Tangent of climb angle).
TALT(1) ... TALT(50)	m.(ft.) ... m.(ft.)		Each entry in this table defines the altitude for the temperature defined by the corresponding entry in the TEMP table. (Note: Used only if IATMØS=2, see NTEMP).
TEMP(1) ... TEMP(50)	°K(°R) ... °K(°R)		Each entry in this table defines the temperature for the altitude defined by the corresponding entry in the TALT table. (Note: Used only if IATMØS=2, see NTEMP).
TCG	sec.	10.	Normalizing time constant in seconds used in the EPNL calculations (Note: See BCG, FLR).

Variable Name	Units	Default	Description
UAIRAB(1) ... UAIRAB(N)	dB/KM(dB/1000 ft.) ... dB/KM(dB/1000 ft.)		User defined air absorption coefficient for the frequency bands. (Note: Used only if IAIR=1), N=8 for 1/1 O.B.; N=24 for 1/3 O.B.
XKN			Wave number ratio, XKN=K/Ko ~ Co/C, where Co = speed of sound in air, C = speed of sound in ground. (Note: used only if IGDR=0, see FLD, ND, ZNI, ZRN). RESTRICTION. XKN > 0.
ZNR(1) ... ZNR(25)	See Appendix A of Ref. 1		Real part of (Z_1/Z_0) for normalized ground impedance data curve. (Note: ZNR>0., see FLD, ND, XKN, ZNI; used only if IGDR=0).
ZNI(1) ... ZNI(25)			Imaginary part of $-Z_1/Z_0$ for normalized ground impedance data curve. (Note: See FLD, ND, XKN, ZNR; used only if IGDR=0).
			(Note: The reactance of the ground is usually capacitive, hence negative. The option here permits the user to specify positive values which are treated as capacitive reactances.)

3.2 Noise Component Parameters
(&NØISIN input data sets)

As mentioned previously the program predicts noise for aircraft equipped with one to three different types of propulsion systems. Each configuration is treated as a set of noise components, each of which will have a separate &NØISIN data set. Each configuration is treated independently and may consider any subset of the following 12 noise component modules:

1. Primary Jet
2. Primary and Secondary Jet
3. Core and Turbine
4. Compressor and Fan Inlet
5. Fan Exit
6. Augmenter Wing
7. Blown-Flap
8. Lift-Fan
9. Ejector-Suppressor
10. Propeller
11. Helicopter, Propeller, and Tilt Rotor
12. Measured Data

The order of the above components has meaning only in respect to the internal order of the computer program and a means of identifying the data inputs per noise component (e.g., if augmenter wing noise is to be predicted, the input, an ITYPE=6 in the &NØISIN data set indicates to the program that this data set applies to augmenter-wing noise; also TT6, GAMA6, DELT6, etc. are inputs unique to the data set when ITYPE=6). Once the order is selected for the first case, it must be maintained for all subsequent cases.

An additional use of the identifying number allows the lining attenuation and configuration correction inputs to be described in a separate section which is referred to by the various noise component sections rather than repeated descriptions in each section. This can be done in this manner since, for any noise component, if there is a lining correction or if configuration corrections are desired, the input data set variable names are different by the appended identifying number on the end of the variable name [e.g. LIN3=1 (core and turbine lining attenuation), LIN6=1 (augmenter wing lining attenuation); ICØR1=1 (primary jet configuration corrections) ICØR11=1 (helicopter configuration corrections) etc.].

Two data inputs for each distinct source noise configuration have a special place in each configuration data set. (i.e., they must be defined in the first &NØISIN data-set in each configuration.) These inputs are:

NTYPE which specifies the total number of noise components (&NØISIN data sets) in a configuration. It informs the program to accept data for NTYPE noise components.

NENG which specifies the number of identical powerplants on the aircraft.

3.2.1 Lining Attenuation and Configuration Corrections

The following section describes the data inputs for noise components (including the separate component for measured data) when configuration corrections are desired in the prediction process for a particular noise component. For lining attenuation corrections this section applies only to the core and turbine, compressor and inlet fan, exit fan, augmenter wing, lift fan, and ejector-suppressor noise modules. The input variable names described below differ between noise components only by the appended number described in the introduction of the Noise Component Parameters, i.e., ICØRm, where m=1,2,3,4... 12 for the particular noise component (&NØISIN data set).

Variable Name	Unit	Default	Description
ICØRm*		0	= 0 indicates no configuration corrections = 1 ΔdB corrections are a function of directivity angle only = 2 ΔdB corrections as a function of frequency (1/3 or 1/1 octave) and directivity angle.
LINm		0	= 0 indicates no lining attenuation in corrections = 1 lining attenuation corrections are calculated by program

<u>Lining Attenuation Parameters:</u> LINm≠0

CFm	m/sec(ft/sec)	speed of sound in the flow.

* Changing from 1 to 2 or vice-versa is not permitted for the same noise component of an engine configuration. Each engine configuration is treated independently of the other

Variable Name	Unit	Default	Description
EDHm	m(ft)		effective duct height for lining. (Note: used only if LGMm=0)
ELØHm			ratio of effective lining treatment length to duct height. (Note: used only if LGMm=0)
FMm *			Mach number of the flow.
IDPm		2	lining design point option. = 1 for single design point = 2 for multiple design point
ILAYm		1	= 1 for single layer lining = 2 for double layer lining
IMAm		0	specifies whether program calculates or user defines the peak attenuation for each target frequency. = 0 program calculates = 1 user defines PLAm values
LGMm		0	specifies whether program calculates peak attenuation using lining geometry or user-defined effective duct height and ratio of treatment length to effective duct height. = 0 user inputs EDHm and ELØHm = 1 user inputs lining geometry (see: RIWm and TLm) (Note: use only if IMAm=0)
NTFm		0	number of target frequencies in lining (Maximum is 10). If NTFm is set = 0 the computer program will set the target frequency, TFm, to the current calculated characteristic frequency for a particular noise component. The characteristic frequency is that frequency where the spectrum level is at a maximum. After the default target frequency is set, NTFm is set to 1.
NWLm		0	number of walls in lining. (Maximum is 10)
PCTAm(1)	%	100%	percent treated for 1st target frequency
...	...	...	
PCTAm(N)	%	0	percent treated for N^{th} target frequency N = NTFm

* FMm is negative for inlet lining

Variable Name	Unit	Default	Description
PLAm(1)	dB		peak attenuation for 1^{st} target frequency (Note: used only if IMAm=1)
...	...		
PLAm(N)	dB		peak attenuation for N^{th} target frequency N = NTFm
R1Wm(1)	m(ft)		radius of 1^{st} wall of lining.
...	...		
R1Wm(N)	m(ft)		radius of N^{th} wall of lining (Note: used only if LGMm=1, N = NWLm).
TLm(1)	m(ft)		treatment length of 1^{st} wall of lining. N = NWLm
TLm(N)	m(ft)		treatment length of N^{th} wall.
TFm(1)	H_z	Characteristic peak noise frequency	first target frequency (Note: if NTFm=0, TFm(1) will be reset to the current calculated characteristic frequency)
...	...		
TFm(N)	Hz	0	N^{th} target frequency N = NTFm

Configuration Corrections:

			ICØRm≠0
DØB(1)	dB		Table of ΔdB corrections as a function of directivity angles only. (Note: ICØRm=1)
...	...		
DØB(N)	dB		N = NPSCR
DPB(1)	dB		Table of ΔdB corrections as a function of frequency band number, and the directivity angles. This table is input as a single array whose indices correspond to a two dimensional array: DPM(m)≃ X(i,j) where m = i + K (j-1), and (i,j) correspond to the pass band number and directivity angle index, respectively. Note that K = 8 for full octaves or 24 for 1/3 octaves. Applys only if ICØR m=2.
...	...		
DPB(M)			
PSCR(1)	degrees		Table of directivity angles corresponding to either DØB array or DPB array depending on ICØRm setting.
...	...		
PSCR(N)	degrees		N = NPSCR
NPSCR			Number of directivity angles on which the configuration correction table is based ($2 \leqslant$ NPSCR $\leqslant 17$)

3.2.2 Primary Jet and Primary Plus Secondary Jet Noise

This section describes the subset of the &NØISIN parameters used in predicting either primary jet noise or combined primary and secondary jet noise. These inputs are needed in addition to the appropriate &GDATA parameters described previously. (Note: For ΔdB corrections, see the section 3.2.1 on lining attenuation and configuration corrections).

Variable	Unit	Default	Description
ITYPE			Indicator for primary or combined primary and secondary jet noise. ITYPE = 1 for primary jet ITYPE = 2 for primary & secondary jet This variable must be specified in the first case for each noise component for each different noise source configuration.
NENG		1	Number of engines. If other than one, NENG must be specified for the first component for each type of propulsion system.
NTYPE		1	Number of noise components in a configuration (Note: NTYPE must be specified only in the first &NØISIN data set of each configuration in the first case of a run.)
Primary Jet Parameters:			
AP1	$m^2(ft^2)$		cross-sectional area of the nozzle exit.
ANGJT1	degrees	0	engine inclination angle.
DIAMT1	m(ft)		diameter of nozzle if zero or negative, the diameter will be calculated based on nozzle area (AP1)
NJET1			code for type of input data NJET1 = 1 user defines AP1,PR1,TT1 NJET1 = 2 user defines WP1,PR1,TT1 NJET1 = 3 user defines AP1,WP1,VP1, plus AS2,VS2,WS2 if secondary jet noise is to be considered.
MCØDE1		1	code for Strouhal curve MCØDE1 = 1 for flight spectrum curve MCØDE1 = 2 for ground spectrum curve
PR1			nozzle pressure ratio, i.e., total pressure divided by free-stream static pressure.
TT1	°K(°R)		jet total temperature

Variable	Unit	Default	Description
VP1	m/sec(ft/sec)		velocity of jet exhaust relative to nozzle
WP1	kg/sec(lbm/sec)		primary mass flow

<u>Secondary Jet Parameters</u>

The following three parameters are needed in addition to the above for combined primary and secondary jet noise. (ITYPE = 2)

AS2	$m^2(ft^2)$		secondary jet nozzle area
VS2	m/sec(ft/sec)		secondary jet velocity relative to nozzle
WS2	kg/sec(lbm/sec)		secondary mass flow

3.2.3 Core and Turbine Noise

This section describes the subset of the &NØISIN parameters used to predict core and turbine noise. These inputs are specified in addition to the &GDATA data set described previously. (Note: for ΔdB corrections, see the section 3.2.1 on lining attenuation and configuration corrections).

Variable	Units	Default	Description
DELT3	degrees	0	Engine attitude angle.
ISW3		0	Specifies noise type to be predicted ISW3 = 0 for core & turbine noise ISW3 = 2 for core noise only ISW3 = 3 for turbine noise only
ITYPE			ITYPE = 3 for core and turbine noise prediction This variable must be specified in the first case for each noise component for each configuration.

Variable	Units	Default	Description
NENG		1	Number of engines. If other than 1, must be specified for the first noise component of each type of propulsion system.
NTYPE		1	Number of noise types in a configuration. (Note: NTYPE must be specified only in the first &NØISIN data set of each configuration for the first case of a run)
Core Noise Parameters			
CMF3	kg/sec(lbm/sec)		Combustor corrected mass flow. Corrected to sea level, static conditions (1 ATM, 15°C).
EK3			Specific engine correction (see Table 10 in Ref. 1).
JB3			Indicator for type of burner. JB3 = 1 for annular type burner JB3 = 2 for can type burner
PP3			Turbine total pressure ratio, i.e., turbine inlet total pressure divided by turbine exit total pressure.
TT3	°K(°R)		Combustor exit total temperature.
Turbine Parameters			
BN3			Number of blades for turbine last stage.
CLS3	m/sec(ft/sec)		Speed of sound at last turbine stage. If CLS3 is not set it will be estimated internally by program.
CS3			Stator/rotor spacing (See Figure 55 in Ref. 1).
DT3	m(ft.)		Tip diameter for turbine last stage rotor. Required only if VTR3 is unknown.
IC3			Indicator for nozzle configuration type. IC3 = 0 for dual flow nozzles of turbofans or turbojets IC3 ≠ 0 for engines with retracted primary flow nozzle (e.g., JT8D).
PMF3	kg/sec(lbm/sec)		Primary mass flow.
SS3	RPM		Shaft speed.

Variable	Units	Default	Description
TU3	°K(°R)		Turbine outlet total temperature required only if CLS3 is unknown.
VTR3	m/sec(ft/sec)		Relative tip speed of turbine last stage rotor.

3.2.4 Compressor, Fan Inlet and Fan Exit Noise

This section describes the subset of the &NØISIN parameters used to predict the compressor, fan inlet and fan exit noise. These inputs are needed in addition to the appropriate &GDATA parameters. (Note: For ΔdB corrections, see the section 3.2.1 on lining attenuation and configuration corrections).

Variable	Units	Default	Description
DELT45	degrees	0	Engine attitude angle.
FPR45(I)			Fan or compressor pressure ratio. 1≤I≤NSTG45
ITYPE			ITYPE = 4 for compressor or fan inlet noise ITYPE = 5 for fan exit noise This variable must be specified in the first case for each noise component for each configuration.
NB45(I)			Number of compressor or fan blades for each stage 1≤I≤NSTG45
NENG		1	Number of engines. If other than 1, must be specified for the first noise component of each type of propulsion system.
NTYPE		1	Number of noise components in the configuration. (Note: NTYPE must be specified only in the first &NØISIN data set of each configuration for the first case of a run.)
NSTG45		0	Number of fan stages 1≤NSTG45≤3
RN145	RPM		Rotor rotational speed.
RSS45(I)	percent		Minimum rotor/stator spacing 1≤I≤NSTG45

Variable	Units	Default	Description
RTS45		0	Relative tip Mach number of the first stage without inlet guide vanes (I.G.V.). If less than or equal to 0, IGV will be assumed for the first stage. If RTS45 is less than one but greater than zero, there is no buzzsaw component.
<u>Fan Inlet Parameters</u>			(In addition to the inputs above for inlet fan noise, i.e., ITYPE=4.)
CFPR4			Fan pressure ratio when the relative tip Mach number equals 1.025.
DIAM4(I)	m(ft)		Compressor or inlet fan diameter. ($1 \le I \le$ NSTG45).
<u>Fan Exit Parameters:</u>			(In addition to the first set of inputs for fan exit noise, i.e., ITYPE=5.)
AREA5(I)	$m^2(ft^2)$		Fan discharge area $1 \le I \le$ NSTG45
BPR5			Engine bypass ratio... $\dot{m}_2/\dot{m}_1$ where $\dot{m}_1$...primary mass flow $\dot{m}_2$...secondary mass flow
NI5			Indicator for duct type =0 for short fan ducts =1 for long fan ducts with retracted primary nozzle, i.e., the JT8D engine. =2 for long fan ducts with approximate coplanar primary/secondary nozzle exits. =3 for approximate 3/4 length fan ducts.

3.2.5 Augmentor Wing Noise

This section describes the subset of the &NØISIN parameters used to predict the augmenter wing noise. These inputs are needed in addition to the appropriate &GDATA parameters described previously. (Note: For ΔdB corrections, see the section 3.2.1 on lining attenuation and configuration corrections).

Variable	Unit	Default	Description
AD6	$m^2(ft^2)$		Nozzle discharge area.
DE6	m (ft)		Effective diameter (hydraulic diameter) $DE = \frac{4*AD6}{\text{perimeter}}$ $= 2H/(1+H/L)$ H is slot height, L is slot length.

Variable	Unit	Default	Description
DELT6	degrees	0	Flap angle relative to the horizon.
GAMA6		1.4	Ratio of specific heats for exhaust flow.
ITYPE			ITYPE = 6 for augmenter wing noise. This variable must be specified in the first case for each noise component for each configuration.
XNPR6			Nozzle pressure ratio - the total pressure at the nozzle exit divided by the free stream static pressure.
NENG		1	Number of engines. If other than 1, must be specified for the first noise component of each type of propulsion system.
NTYPE		1	Number of noise components in a configuration. (Note: NTYPE must be specified only in the first &NØISIN data set of each configuration for the first case of a run.)
TT6	°K(°R)		Total temperature at the nozzle exit.

3.2.6 Blown Flap Noise

This section describes the subset of the &NØISIN parameters used to predict the blown flap noise. These inputs are supplied in addition to the &GDATA parameters. (Note: For ΔdB corrections, see section 3.2.1 on lining attenuation and configuration corrections).

Variable	Units	Default	Description
AN7	$m^2(ft^2)$		Nozzle discharge area.
DELT7	degrees	0	Engine attitude angle.
DL7			Dimensionless distance between nozzle exit and target point on the flap(s) when the nominal flap angle is 45°, i.e., L/D in reference1, sec. 5.2.2.5
DN7	m(ft)		Nozzle exit diameter or hydraulic diameter.
FANG7	degrees	0	Nominal flap angle.

Variable	Units	Default	Description
HD7			Dimensionless distance between nozzle centerline and mean wing chord, i.e., H/D in reference 1, sec. 3.2.2.5
ITYPE			ITYPE = 7 for blown flap noise. This variable must be specified in the first case for each noise type for each configuration.
NENG		1	Number of identical noise sources. If other than 1, must be specified for the first case for each configuration.
NTYPE		1	Number of noise types in a configuration. (Note: NTYPE must be specified only in the first &NØISIN data set of each configuration for the first case of a run.)
PR7			Nozzle pressure ratio, i.e., total pressure divided by free-stream static pressure.
TT7	°K(°R)		Total Temperature of exhaust at nozzle exit.

3.2.7 Lift Fan Noise

This section describes the subset of the &NØISIN parameters used to predict lift fan noise. These inputs are supplied in addition to the appropriate &GDATA parameters described previously. (Note: for ΔdB corrections, see section 3.2.1 on lining attenuation and configuration corrections).

Variable	Units	Default	Description
AREA8	$m^2(ft^2)$		Fan discharge area. IF = 0. No aft fan noise is calculated.
CRFPR8			Fan pressure ratio for the relative tip Mach number of 1.025.
DELTA8	degrees	0	Engine attitude angle.
DIAM8	m(ft)		Fan inlet diameter. IF = 0. No inlet fan noise calculated.
FPR8			Fan pressure ratio, i.e., total pressure aft of a fan stage divided by total pressure just forward of the fan stage.
ITYPE			ITYPE = 8 for lift fan noise. This variable must be specified in the first case for each noise type for each configuration.
NB8			Number of fan blades.

Variable	Units	Default	Description
NENG		1	Number of lift fans being considered. If other than 1, must be specified for the first case for each configuration.
NTYPE		1	Number of noise types in a configuration. (Note: Must be specified only in the first &NØISIN data set of each configuration for the first case of a run.)
RN18	RPM		Rotor rotational speed.
RSS8	percent		Minimum rotor/stator spacing.
RTS8		0	Relative tip Mach number of the fan without inlet guide vanes. If RTS8 is less than or equal to zero inlet guide vanes are assumed. If less than one but greater than zero there is no buzzsaw.

3.2.8 Ejector-Suppressor Noise

This section describes the subset of the &NØISIN data set used to predict ejector-suppressor noise. These inputs are supplied in addition to the &GDATA parameters described previously. (Note: For ΔdB corrections, see the section 3.2.1 on lining attenuation and configuration.)

Variable	Units	Default	Description
AR9			Area ratio of suppressor nozzle, i.e., primary plus secondary flow area divided by primary flow area.
AREA9	$m^2 (ft^2)$		Discharge area of suppressor nozzle.
CV9			Velocity coefficient for nozzle.
DELT9	degrees	0	Angle between thrust vector & horizon.
EMACH9			Exhaust Mach number for ejector (only needed if IEJ9≠0)
EXNM9			Exhaust Mach number for nozzle.
ITYPE			ITYPE=9 for ejector-suppressor noise. This variable must be specified in the first case for each noise type for each configuration.
IEJ9		0	Switch for ejector and/or suppressor IEJ9=0 - bare suppressor IEJ9≠0 - ejector/suppressor

Variable	Units	Default	Description
NENG		1	Number of engines. If other than 1 must be specified for the first case for each configuration.
NTYPE		1	Number of noise types in a configuration. (Note: NTYPE must be specified only in the first &NØISIN data set of each configuration for the first case of a run.)
NUM9			Number of discharge elements of suppressor nozzle.
PA9	$m^2(ft^2)$		Discharge area of ejector (required only if IEJ9≠0).
PCV9			Velocity coefficient for ejector (required only if IEJ9 ≠0)
PS9	ATM(psia)		Static pressure in exhaust at nozzle (required only if IEJ9≠0)
PTS9	°K(°R)		Static temperature of exhaust at ejector exit. (required only if IEJ9≠0)
SMACH9			Mach number of induced secondary air
ST9	°K(°R)		Static temperature at nozzle exit.

3.2.9 Propeller Noise

This section describes the subset of the &NØISIN parameters used to predict propeller noise using the empirical procedure defined in the reference. The next section describes inputs for the theoretical rotor procedure which may be used in lieu of this module. These inputs are needed in addition to the appropriate &GDATA parameters described previously. (Note: for ΔdB corrections see section 3.2.1 on lining attenuation and configuration corrections.)

Variable	Units	Default	Description
ASUB10	sq.m(sq.ft.)		Total blade area for one side of propeller.
B10			Number of propeller blades
D10	m(ft)		Propeller diameter.
DELT10	degrees	0	Angle between gross thrust vector and horizon.
DSUB10	m(ft)		Characteristic dimension for the blade geometry at 0.7 span, i.e. the axial projected chord.
ITYPE			ITYPE = 10 for propeller noise. This variable must be specified in the first case for each noise type for each configuration.
NENG		1	Number of engines. If other than one must be specified for the first case for each configuration.
NTYPE		1	Number of noise types in a given configuration. (Note: NTYPE must be specified only in the first &NØISIN data set of each configuration for the first case of a run.)
RPM10	RPM		Propeller rotational speed.
T10	N(lbf)		Propeller thrust.
W10	KW(HP)		Propeller shaft power.

3.2.10 Helicopter, Propeller and Tilt Rotor Noise

This section describes the subset of the &NØISIN parameters used to predict helicopter, propeller and tilt rotor noise based on the theoretical procedures defined in the reference. These inputs are needed in addition to the appropriate &GDATA parameters described previously. (Note: For ΔdB corrections, see section 3.2.1 on lining attenuation and configuration corrections, section 3.2.1.)

Variable	Units	Default	Description
AB11	$m^2(ft^2)$		Total blade area of one side of rotor.
B11			Number of blades per rotor($2. \leq$ B11 $\leq 6.$)
CEE11		24.4	Constant (c) in loading law Eq. 51 when [redacted] (see XMM11 and XLMC11). LLF11 = 6
DELT11	degrees	0	Angle between gross thrust vector and horizon. (Applys only to the main rotor.)
DE11	m(ft)		Characteristic dimension for the blade geometry at 0.7 span, i.e., the mean axial projected chord.
DT11	m(ft)		Tip diameter.
ITYPE			ITYPE = 11 for helicopter noise. This variable must be specified in the first case for each noise type for each configuration.
IRR11		0	Indicator for specifying if the rotor being considered is the main rotor or tail rotor IRR11=0 for main rotor $\neq$0 for tail rotor (Note: If the tail rotor is being considered the thrust axis is assumed horizontal and perpendicular to the helicopters flight path.)
LLF11		2	Loading law indicator (see Ref. 1 for equations). LLF11=1 applying to hovering helicopter (Eq. 50A). =2 applying to helicopters and tilt rotors (Eq. 50B). =3 applying to low speed propellers (Eq. 50C). =4 applying to low speed propellers (Eq. 50D). =5 applying to medium speed propellers (Eq. 50E). =6 user inputs loading law parameters (Eq. 51).
NENG		1	Number of engines, i.e., rotors. If other than 1, this must be specified for the first noise component of each typ of propulsion system.
NTYPE		1	Number of noise types in the configuration. (Note: NTYPE must be specified only in the first ANØISIN data set of each configuration for the first case of a run.)
Q11	N-M (ft-lbf)		Shaft torque.
RN11		0.8	Dimensionless centroid for equivalent point load on a rotor blade.
RPM11	RPM		Rotor rotational speed.
SI11		5.0	Lift curve slope for a single blade (applies if LLF11=2).

Variable	Units	Default	Description
T11	N(lbf)		Thrust per rotor.
XMM11		2.0	Constants(m & λ_c) in loading law Eq. 51.
XLMC11		30.0	Applies when LLF11=6.

3.2.11 Measured Data Input

This section describes the subset of the &NØISIN parameters required for inclusion of measured data. The SPL variable described in this section is an array of sound pressure levels in dB re 20 $\mu N/m^2$ as a function of frequency (preferred 1/1 octave bands or 1/3 octave bands), a prescribed engine performance parameter, directivity angle, and elevation angle. In order to minimize core size, this array is assigned to local storage in the measured data overlay and the input is read in an 8 field, 10 column per field decimal format rather than the Namelist &NØISIN format. The measured data discussed in this section is limited to one power plant and can be specified only once during a computer run. The only variables which can change in succeeding cases is the &GDATA parameters, ~~(Note: for ΔdB corrections, refer to the lining attenuation and configuation corrections, section 3.2.1)~~. DELT12, and the configuration corrections discussed in section 3.2.1.

Refer to section 3.3.2 for sample input data which includes measured data.

Variable	Unit	Default	Description
BETA12(1) .... BETA12(N)	degrees .... degrees		Independent variable array of elevation angles used to correlate the measured SPL's. Axial symmetric sound sources will have no BETA12 entries indicated by NBTA12 = 0. N = NBTA12
DELT12	degrees	0	Engine inclination angle.
EP12(1) .... EP12(N)			Independent variable array of engine performance parameters needed to correlate the measured SPL's. N = NEP12
ITYPE			ITYPE = 12 for measured data. This variable must be specified in the first case for each noise type for each configuration.
NBTA12		0	Number of entries in the BETA12 data array. (NBTA12 = 0 or 2 $\leq$ NBTA12 $\leq$ 5)
NEP12			Number of entries in the EP12 data array. (2 $\leq$ NEP12 $\leq$ 5)
NPSI12			Number of entries in the PSI12 data array. (2 $\leq$ NPSI12 $\leq$ 17)

Variable	Unit	Default	Description
NTYPE		1	Number of noise types in a configuration. (Note: NTYPE must be specified only in the first &NØISIN data set of each configuration for the first case.)
PSI12(1) . . . PSI12(N)	degrees . . . degrees		Independent variable array of directivity angles used to correlate the measured SPL's. N = NPSI12

NOTE: SPL array is input with (8F10.0) format directly following the &NØISIN data set.

Variable	Unit	Default	Description
SPL(1) . . . SPL(N)	dB . . . dB		Dependent data array of SPL's in dB for noise versus (f, PSI12, EP12, BETA12). Where f is the frequency (eight preferred 1/1 octave bands or twenty-four 1/3 octave bands defined in Table 4 of Ref. 1.) Inputs are for free-field noise conditions at R = 1 m.

Note:

$SPL(n) = F(I, J, K, L)$ where

$n = I + k_1 (J-1 + k_2 (K-1 + k_3)(L-1)))$

k_1 = 24 for 1/3 octave band analysis
= 8 for full octave band analysis

k_2 = NPSI12

k_3 = NEP12

(I, J, K, L) are indices corresponding to (f, PSI12, EP12, BETA12) where frequency is varied first, then the directivity angle, then the engine performance parameter, and finally the elevation angle if applicable.

3.3 Sample Cases

The following section is divided into three sections: Control Cards; Sample Input Data; and Sample Output Reports.

3.3.1 Control Cards

IBM job control language instructions are listed below to run the noise source estimation on an IBM 360/370 machine under the ØS operating system.

```
CØl.
1

//JØBNAME      (format per installation)
//EXEC        PGM = IEBGENER
//SYSPRINT         DD    SYSØUT=A
//SYSIN            DD    DUMMY
//SYSUT2           DD    UNIT=SYSDA, DSN=&CARDS, SPACE=(TRK,(5,1)),
//DCB = (LRECL = 80, RECFM=FB, BLKSIZE=400), DISP=(NEW, PASS)
//SYSUT1           DD    *

         { input DATA for noise estimation }
         { see:  Section 3.3.2             }

/*
//EXEC        PGM = IEBGENER                 this step prints out the
//SYSPRINT         DD    SYSØUT=A            above input DATA
//SYSIN            DD    DUMMY
//SYSUT2           DD    SYSØUT=A, DCB=BLKSIZE=400
//SYSUT1           DD    DSN=&CARDS, DISP=(ØLD,PASS)
//EXEC   FØRTGLG,  TIME=4, REGIØN=330K
//LKED. SYSIN  DD *

          { Binary  Approx 3 card boxes              }
          { Deck    for noise estimation program     }


/*
//GØ . FT08F001      DD   UNIT=SYSDA, SPACE=(CYL,(1,1)),DCB=(LRECL=136,
//                   BLKSIZE=644,RECFM=FB)
//GØ . FT09F001
//GØ . FT10F001           { Same JCL format as for }
//GØ . FT11F001           {        FT08F001        }
//GØ . FT12F001
```

```
CØ1.
1

//GØ . FT13F001    DD   UNIT=SYSDA, SPACE=(CYL,(1,1))
//GØ . FT20F001    DD   UNIT=SYSDA, SPACE=(CYL,(1,1)),DCB=LRECL=80,
//                      BLKSIZE=800, RECFM=FB)
```

{ The above JCL cards for FT20F001 are used only if the optional noise data for noise contour estimation is desired(see section 2.0 & NLØPT in section 3.1. }

```
//GØ . SYSIN        DD   DSN=&CARDS,DISP=(ØLD,DELETE)
/*
```

(The following control cards are needed only if the optional noise data has been written to file 20. This data is read as input to the precompiler program which generates a data subroutine for the contour program (section 4.0). This routine is then punched, printed and compiled.)

```
//EXEC    FØRTGLG, TIME=1, REGIØN=110K
//LKED.  SYSIN  DD  *
```

{ Binary Deck   Phase A pre-compiler   ref. 2 }

```
/*
//GØ . FT20F001    DD   DSN=&&TAPE20,DISP=(ØLD,DELETE)
//GØ . FT21F001    DD   UNIT=SYSDA,DSN=&&TAPE21,DISP=(, DELETE),
//SPACE=(400,(80,80)), DCB=(LRECL=80,BLKSIZE=400,RECFM=FB)
//GØ . FT22F001    DD   UNIT=SYSDA,DSN=&&TAPE22,DISP=(NEW,PASS),
//SPACE=(400,(80,80)),DCB=(LRECL=80,BLKSIZE=400,RECFM=FB)
//EXEC    PGM=IEBGENER (Punches the data routine for the real time contour program)
//SYSPRINT    DD    SYSØUT=A
//SYSIN       DD    DUMMY
//SYSUT2      DD    SYSØUT=B,DCB=(LRECL=90,BLKSIZE=400,RECFM=FB)
//SYSUT1      DD    UNIT=SYSDA,DSN=&&TAPE22,DISP=(ØLD,PASS)
//EXEC    PGM=IEBGENER (Listing of the data routine)
//SYSPRINT    DD    SYSØUT=A
//SYSIN       DD    DUMMY
//SYSUT2      DD    SYSØUT=A,DCB=(LRECL=80,BLKSIZE=400,RECFM=FB)
//SYSUT1      DD    UNIT=SYSDA,DSN=&&TAPE22,DISP=(ØLD,PASS)
//EXEC    FØRTGC,PRAM.FØRT= MAP,DECK, TIME=1,REGIØN=110K
//FØRT.SYSIN    DD  DSN=&&TAPE22,DISP=(ØLD,DELETE)
/*
```

{ the last job step produces a binary data subroutine for the 360 version of the contour program. }

3.3.2 Sample Input Data

The following set of input data reflects the flexability of the program in making studies of various lining effects upon the overall fan noise. For each of the seven cases both Inlet and Aft fan noise were predicted. Different output report options were used for each case so that the user may more easily use this feature (see IØUT, section 3.1).

The cases listed are affected by the following lining characteristics:

Case 1	Single design point, single layer, user defines peak attenuation for target frequencies.
Case 2	Same except program calculates peak attenuation.
Case 3	Multiple design point.
Case 4	Double layer lining.
Case 5	Single design point, single layer lining, user inputs lining geometry.
Case 6	Same as 5 except multiple design point.
Case 7	Same as 6 except double layer.

For a full explanation of the lining inputs see section 3.2.1 and section 5.1.4 in the engineering analysis report.

SAMPLE CASE 1-ILLUSTRATES OUTPUT OPTIONS
(OUTPUT SHOWN IN SECTION [redacted]3.9.3.

```
Col.2                              BUZZSAW
      &GDATA ALTPG=800., AMACH=0.292, IGDR=1, IØUT(1)=1,2,3,4,5,6,7,IUNIT=1,
      SLDIST(1)=1., IDOP=0 &END
                                   747 FLYOVER T/O
      &NØISIN NSTG45=1,NB45(1)=46,FPR45(1)=1.486,DIAM4(1)=7.68,RSS45(1)=300.,
      ELØH4=1.95,EDH4=0.279,RN145=3300.,RTS45=1.273,CFPR4=1.29,DELT45=0.,
      NENG=4,ITYPE=4,NTYPE=2,IDP4=1,ILAY4=1,LIN4=1,NTF4=2,IMA4=1,
      TF4(1)=2000.,TF4(2)=4000.,PCTA4(1)=50.,PCTA4(2)=50.,PLA4(1)=28.25,
      PLA4(2)=18.5,FM4=-0.4,CF4=1116. &END
      &NOISIN ITYPE=5,ELØH5=1.95,EDH5=0.279,IDP5=1,ILAY5=1,LIN5=1,NTF5=2,
      IMA5=1,TF5(1)=2000.,TF5(2)=4000.,PCTA5(1)=50.,PCTA5(2)=50.,
      PLA5(1)=11.4,PLA5(2)=13.4,FM5=0.4,CF5=1116.,AREA5(1)=20. &END
                                   CASE TWO
      &GDATA IØUT(1)=1,6*0 &END
               (blank card)
      &NØISIN ITYPE=4,NTYPE=2,IMA4=0, PLA4(1)=0.,PLA4(2)=0., &END
      &NØISIN ITYPE=5, IMA5=0, PLA5(1)=0., PLA5(2)=0. &END
                                   CASE THREE
      &GDATA IØUT(1)=2,6*0 &END
               (blank card)
      &NØISIN ITYPE=4,NTYPE=2,IDP4=2 &END
      &NØISIN ITYPE=5,IDP5=2 &END
                                   CASE FOUR
      &GDATA IØUT(1)=3,6*0 &END
               (blank card)
      &NØISIN ILAY4=2,ITYPE=4,NTYPE=2 &END
      &NØISIN ILAY5=2,ITYPE=5 &END
                                   CASE FIVE
      &GDATA IØUT(1)=4,6*0 &END
               (blank card)
      &NØISIN ITYPE=4,NTYPE=2,IDP4=1,ILAY4=1,LGM4=1,ELØH4=0.,
      EDH4=0.,R1W4(1)=1.,R1W4(2)=1.279,TL4(1)=0.858,0.858,
      NWL4=2 &END
      &NØISIN ITYPE=5,IDP5=1,ILAY5=1,LGM5=1,ELOH5=0.,R1W5(1)=1.,
      R1W5(2)=1.279,TL5(1)=0.858,0.858,NWL5=2,EDH5=0. &END
                                   CASE SIX
      &GDATA IØUT(1)=5,6*0 &END
               (blank card)
      &NØISIN ITYPE=4,NTYPE=2,IDP4=2 &END
      &NØISIN ITYPE=5,IDP5=2 &END
                                   CASE SEVEN
      &GDATA IØUT(1)=7*0 &END
               (blank card)
      &NØISIN ITYPE=4,NTYPE=2,ILAY4=2 &END
      &NØISIN ITYPE=5,ILAY5=2 &END
```

SAMPLE INPUT CASE 2 - ILLUSTRATES USE OF
MULTIPLE PROPULSION SYSTEMS WITH CONFIGURATION CORRECTIONS
(OUTPUT NOT SHOWN)

```
        THIS IS  A MULTIPLE CONFIGURATION CASE NO. 1
&GDATA SLØPE=0., ALTPG=10.,ALTØG=6.,NØBS=2,SLDIST(1)=500.,600.,NTENG=2,
IUNIT=1,IEGA=0,ISPTRM=0,IGDR=1,AMACH=.1,IØUT(1)=1,2,3,4,5,6,7 &END
        FIRST CONFIGURATION --AUGMENTER AND PROP
&NØISIN NENG=1,ITYPE=6,GAMA6=1.4,TT6=760.,XNPR6=2.,
DELT6=35.,AD6=5.32,DE6=.456,NTYPE=2 &END
&NØISIN ITYPE=10,NENG=1,T10=6300.,W10=1300.,
RPM10=790.,D10=15.97,DSUB10=.5,ASUB10=56.,B10=4.,DELT10=0. &END
        SECØND CØNFIGURATION --PRØP ONLY
&NØISIN NTYPE=1,ITYPE=10,NENG=1,T10=188.,W10=21.3,
RPM10=1720.,D10=5.0,DSUB10=0.12,ASUB10=5.14,B10=4.,DELT10=0.,
ICØR10=2,NPSCR=5,PSCR(1)=10.,50.,90.,130.,170.,
DPB(1)=12*10.,12*20.,12*25.,12*30.,24*40.,12*35.,
12*30.,12*20.,12*10. &END
        MULTIPLE CØNFIGURATION CASE NO. 2
&GDATA SLØPE=0.,ALTP=10.,ALTR=6.,NØBS=2,SLDIST(1)=500.,600.,
IUNIT=1,IEGA=0,ISPTRM=1,IGDR=1,AMACH=.1,IØUT(1)=1,2,3,4,5,6,7 &END
        SECØND CASE --FIRST CØNFIGURATIØN
&NØISIN NENG=1,ITYPE=6,GAMA6=1.4,TT6=760.,XNPR6=2.,
DELT6=35.,AD6=5.32,DE6=.456,NTYPE=2 &END
&NØISIN ITYPE=10,NENG=1,T10=6300.,W10=1300.,
RPM10=790.,D10=15.97,DSUB10=.5,ASUB10=56.,B10=4.,DELT10=0. &END
        SECØND CASE --SECØND CØNFIGURATIØN --
&NØISIN NTYPE=1,ITYPE=10,NENG=1,T10=188.,W10=21.3,
RPM10=1720.,D10=5.0,DSUB10=0.12,ASUB10=5.14,B10=4.,DELT10=0.,
ICØR10=2,PSCR(3)=110.,DPB(1)=40.,DPB(2)=42.,
DPB(3)=35.,DPB(4)=30.,DPB(5)=25.,DPB(6)=21.,DPB(7)=19.,DPB(8)=16.,
DPB(9)=20.,DPB(10)=20. &END
```

SAMPLE INPUT CASE FOR MEASURED DATA

```
CØL. 2
↓
                 CASE NUMBER ØNE
&GDATA   IGDR=1, IØUT(1)=1,2,3,4,5,6,7,EPP=1. ,ISPTRM=1 &END
     CØNFIGURATIØN FØR MEASURED DATA AND PRØPELLER NØISE
&NØISIN  NENG=1, NTYPE=2, ITYPE=2, NBTA12=2, NEP12=2,
NPSI12=5, EP12(1)=1.2, EP12(2)=1.6, BETA12(1)=15., 45.,
PSI12(1)=10., 40., 90., 120., 150.  &END
```

CØL. 1	11	21	31	41	51	61	71
81.	82.	82.	83.	83.	82.	82.	82.
83.	83.	83.	84.	84.	83.	83.	83.
84.	84.	84.	85.	85.	84.	84.	84.
85.	85.	85.	86.	86.	85.	85.	85.
84.	84.	84.	85.	85.	84.	94.	84.
93.	93.	93.	94.	94.	93.	93.	93.
94.	94.	94.	95.	95.	94.	94.	94.
95.	95.	95.	96.	96.	95.	95.	95.
96.	96.	96.	97.	97.	96.	96.	96.
95.	95.	95.	96.	96.	95.	95.	95.
81.	81.	81.	82.	82.	81.	81.	81.
82.	82.	82.	83.	83.	82.	82.	82.
83.	83.	83.	84.	84.	83.	83.	83.
84.	84.	84.	85.	85.	84.	84.	84.
83.	83.	83.	84.	84.	83.	83.	83.
92.	92.	92.	93.	93.	92.	92.	92.
93.	93.	93.	94.	94.	93.	93.	93.
94.	94.	94.	95.	95.	94.	94.	94.
95.	95.	95.	96.	96.	95.	95.	95.
94.	94.	94.	95.	95.	94.	94.	94.

```
&NØISIN   ITYPE=10, T10=188., W10=21.3, RPM10=1720., D10=5.0,
DSUB10=0.12, ASUB10=5.14, B10=4., DELT10=0.  &END
                 CASE NUMBER TWØ
&GDATA    EPP=2.0, ALTPG=500., SLDIST(1)=500., AMACH=.1,
SLØPE =  .2  &END
          (blank card)
&NØISIN     ITYPE=12  &END
&NØISIN     ITYPE=10  &END
```

NOTE

The SPL input above corresponds to 8 full-octave band levels versus five values of a directivity angle, two values of an engine performance parameter, and two values of an elevation angle, i.e., SPL(n) = F(I, J, K, L) where $n = I + 8(J - 1 + 5(K - 1 + 2(L - 1)))$ and the indices (I, J, K, L) correspond frequency (f), directivity angle (ψ), engine performance (EPP), and elevation angle (β_o) respectively.

3.3.3 Sample Output Reports

CASE NO. 1

PROGRAM TEE231
AIRCRAFT NOISE PREDICTION

BUZZSAW COMPARISON

DATE 09/12/73 MO/DA/YR

TOTAL NOISE (ALL COMPONENTS)
OBSERVED SPECTRA AT SIDELINE DISTANCE= 1.000E+03 FT

SOUND PRESSURE LEVELS
(DB RE. 200 PICOPAR)

FREQUENCY (KHZ)																	
5.012E-02	53.1	59.1	62.8	65.3	67.2	69.1	71.3	71.2	72.5	73.2	73.8	73.1	73.1	66.5	61.1	52.4	41.2
6.310E-02	53.5	59.9	63.7	66.3	68.4	70.2	71.4	72.2	73.9	74.2	74.7	74.6	71.6	67.5	62.0	53.2	41.8
7.943E-02	54.0	60.7	64.6	67.4	69.8	71.6	72.7	73.3	74.6	75.1	75.6	75.0	72.8	68.4	62.9	54.0	42.2
1.000E-01	54.5	61.6	65.7	68.8	71.7	73.4	74.4	74.7	75.4	76.0	76.5	75.9	72.9	69.3	63.8	54.8	42.7
1.259E-01	55.0	62.5	67.3	70.8	74.5	75.9	76.8	76.6	76.4	76.9	77.4	76.7	73.8	70.2	64.6	55.6	43.1
1.585E-01	55.6	63.8	69.0	73.6	78.0	79.2	80.0	79.2	77.8	77.8	78.3	77.6	74.7	71.1	65.5	56.3	43.4
1.995E-01	56.4	65.6	71.7	77.1	82.1	83.2	83.9	82.6	79.2	78.7	79.1	78.5	75.6	72.0	66.3	57.0	43.7
2.512E-01	57.7	68.1	75.1	81.2	86.5	87.5	88.1	86.6	81.4	79.8	79.9	79.2	76.4	72.8	67.0	57.7	43.9
3.162E-01	59.7	71.5	79.1	85.6	91.0	91.9	92.5	90.8	84.3	81.1	80.6	80.3	77.2	73.6	67.8	58.2	44.0
3.981E-01	58.3	72.6	77.4	83.7	89.0	89.9	90.4	88.8	83.2	81.5	81.2	80.6	77.9	74.3	68.4	58.8	44.0
5.012E-01	58.3	72.3	77.8	84.[illegible]	89.3	90.2	90.6	89.0	83.5	81.7	81.7	81.1	78.5	75.0	69.0	59.2	43.6
6.310E-01	58.9	72.4	86.4	86.8	92.1	92.8	93.2	91.4	85.0	82.3	82.8	81.5	79.0	75.5	69.5	59.5	43.1
7.943E-01	55.6	68.7	75.9	81.8	86.8	87.4	87.8	86.2	82.3	81.7	82.1	81.6	79.3	75.9	69.8	59.6	42.3
1.000E+00	53.4	66.5	72.9	78.2	82.7	83.3	83.7	82.6	81.0	81.2	81.7	81.4	79.3	76.0	73.0	59.5	41.1
1.259E+00	51.7	65.4	71.6	76.6	80.9	81.3	81.8	80.9	80.6	80.4	81.6	80.7	79.1	76.0	69.9	59.1	39.6
1.585E+00	48.9	62.9	68.2	72.2	75.7	76.5	77.6	77.9	78.7	79.3	79.9	79.7	78.5	75.6	69.5	58.4	37.4
1.995E+00	45.7	61.8	65.7	68.9	71.6	73.2	75.2	76.2	77.5	78.2	78.8	78.8	77.9	75.1	68.9	57.3	34.5
2.512E+00	45.5	62.9	68.1	71.1	72.8	77.8	79.9	81.5	83.1	84.6	85.1	85.1	85.1	81.4	74.8	63.3	38.9
3.162E+00	35.9	56.8	63.4	66.8	69.1	71.5	74.0	75.4	76.9	77.6	78.1	77.9	77.0	73.8	66.8	53.3	24.5
3.981E+00	26.4	53.1	64.6	65.9	66.5	71.2	73.7	75.1	76.7	77.3	77.7	77.4	76.0	72.4	64.4	49.2	15.0
5.012E+00	22.1	52.8	62.8	68.3	71.3	74.8	77.2	78.8	80.5	81.6	81.9	81.3	79.9	75.1	66.4	53.4	13.2
6.310E+00	3.2	41.1	54.8	61.9	66.0	69.4	72.0	73.6	75.3	75.8	75.9	74.8	71.9	66.4	55.9	36.1	-11.4
7.943E+00	-28.3	27.5	46.2	55.9	61.7	66.5	69.4	71.6	73.5	74.5	74.3	72.6	69.0	61.3	48.4	24.3	-37.1
1.000E+01	-7[illegible].9	5.8	31.6	44.8	52.5	58.3	61.9	64.3	66.3	67.1	66.6	64.1	59.0	49.3	33.0	2.1	-80.0
XI (DEG)	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0	150.0	160.0	170.0
PNL (PNDB)	72.9	87.0	94.3	100.0	104.7	106.0	106.9	106.2	105.8	106.3	106.7	106.3	105.2	101.4	94.5	82.9	60.6
TCPNL (PNDB)	74.9	88.4	95.9	101.4	106.1	107.8	108.6	108.1	107.7	108.5	108.9	108.6	107.7	103.7	97.0	85.6	63.7
T (SEC)	-9.8	-4.7	-2.8	-1.8	-1.1	-0.6	-0.1	0.3	0.7	1.2	1.7	2.3	3.9	4.1	5.7	9.0	19.1

EPNL* (EPNDB) = 133.4 BASED ON MIN/MAX PNL = 96.9, 106.9 PNDB AND TIME LIMITS = -2.4, 5.2 SEC
EPNL (EPNDB) = 105.5 BASED ON MIN/MAX TCPNL = 98.9, 1[illegible].9 PNDB AND TIME LIMITS = -2.3, 5.2 SEC

ENG.PERF.PARM.= 0.E+03 , RANGE AT CPA = 8.660E+02 FT, ELEV.ANGLE = 8.993E+01 DEG.

DATE

PROGRAM TEE231
AIRCRAFT NOISE PREDICTION

09/12/73
MO/DA/YR

BU175AW COMPARISON

CASE NO. 1

ASSUMPTIONS FOR NOISE PREDICTION

```
1) GEOMETRIC-MEAN PASSBAND FREQUENCIES (KHZ)
     5.012E-02 6.310E-02 7.943E-02 1.000E-01 1.259E-01 1.585E-01 1.995E-01 2.512E-01 3.162E-01 3.981E-01 5.012E-01 6.310E-01
     7.943E-01 1.000E+00 1.259E+00 1.585E+00 1.995E+00 2.512E+00 3.162E+00 3.981E+00 5.012E+00 6.310E+00 7.943E+00 1.000E+01

2) ATMOSPHERIC ABSORPTION COEFFICIENTS (DB /1000 FT)
        0.07     0.09     0.11     0.14     0.18     0.23     0.29     0.36     0.45     0.57     0.72     0.91
        1.15     1.46     1.85     2.36     3.14     4.23     5.79     8.15     9.72    14.00    20.37    29.44

3) ATMOSPHERIC CONDITIONS
      INTERNATIONAL STANDARD ATMOSPHERE

4) ITEMS CONSIDERED IN NOISE EXTRAPOLATION
   A) SPHERICAL DIVERGENCE  ................  YES
   B) ATMOSPHERIC ABSORPTION ...............  YES
   C) EXTRA-GROUND ATTENUATION .............  YES
      SOUND PROPAGATION IS DOWNWIND (10  MPH).
   D) GROUND REFLECTION ....................  NO
      3 DB ADDED TO FREE FIELD SPECTRA INSTEAD.

                                                        NO. OF TIMES
5) NOISE COMPONENTS CONSIDERED
   A) COMPRESSOR AND INLET FAN       MODULE                  1
   B) EXIT FAN                       MODULE                  1
```

PROGRAM TEE231
AIRCRAFT NOISE PREDICTION

DATE 09/12/73
MO/DA/YR

CASE NO. 1

BUZZSAW COMPARISON
747 FLYOVER T/O

COMPRESSOR AND INLET FAN NOISE
OBSERVED SPECTRA AT SIDELINE DISTANCE= 1.000E+00 FT

SOUND PRESSURE LEVELS
(DB RE. 200 PICOBAR)

FREQUENCY (KHZ)																	
5.012E-02	53.3	59.1	62.8	65.2	66.9	67.9	66.7	64.1	59.8	52.8	-39.9	-40.6	-41.5	-43.0	-45.4	-49.1	-55.3
6.310E-02	53.5	59.9	63.7	66.2	68.0	69.1	68.0	65.5	60.2	53.9	-40.1	-40.7	-41.6	-43.1	-45.5	-49.3	-55.7
7.943E-02	54.0	60.7	64.6	67.3	69.5	70.5	69.7	67.3	61.6	55.1	-40.2	-40.8	-41.7	-43.2	-45.6	-49.5	-56.2
1.000E-01	54.5	61.6	65.7	68.8	71.5	72.5	72.0	69.9	63.6	56.7	-40.4	-41.0	-41.8	-43.3	-45.8	-49.7	-56.8
1.259E-01	55.0	62.5	67.0	70.7	74.3	75.3	75.3	73.3	66.3	59.0	-40.6	-41.2	-42.0	-43.4	-46.0	-50.0	-57.4
1.585E-01	55.6	63.8	69.0	73.5	77.9	78.9	79.2	77.4	69.9	62.2	-40.8	-41.4	-42.1	-43.6	-46.2	-50.3	-58.1
1.995E-01	56.4	65.6	71.7	77.1	82.1	83.0	83.5	81.[illegible]	74.0	66.0	-41.2	-41.7	-42.4	-43.8	-46.4	-50.6	-58.9
2.512E-01	57.7	68.1	75.1	81.2	86.5	87.4	87.9	86.1	78.3	70.2	-41.6	-42.1	-42.7	-44.1	-46.7	-51.0	-59.7
3.162E-01	59.7	71.5	79.1	85.5	91.0	91.9	92.4	90.6	82.7	74.6	-42.1	-42.5	-43.0	-44.4	-47.0	-51.5	-60.7
3.981E-01	58.3	72.0	77.4	83.7	89.0	89.9	90.3	88.5	80.6	72.4	-42.8	-43.2	-43.5	-44.9	-47.5	-52.0	-61.8
5.012E-01	58.[illegible]	70.3	77.8	84.[illegible]	89.3	90.1	96.5	88.6	80.6	72.5	-43.8	-44.2	-44.2	-45.4	-48.1	-52.7	-63.2
6.310E-01	58.9	72.4	80.4	86.8	92.1	92.8	93.1	91.1	83.1	74.9	-45.2	-45.4	-45.2	-46.1	-48.8	-53.6	-64.9
7.943E-01	55.6	68.7	75.9	81.8	86.8	87.3	87.5	85.4	77.3	69.2	-47.1	-47.2	-46.5	-47.2	-49.8	-54.7	-67.0
1.000E+00	53.4	66.5	72.9	78.1	82.6	83.0	82.9	80.6	72.5	64.5	-49.8	-49.7	-48.3	-48.6	-51.1	-56.1	-69.4
1.259E+00	51.7	65.4	71.6	76.6	80.8	80.9	80.5	78.[illegible]	69.8	61.7	-53.3	-52.9	-50.7	-50.5	-52.7	-57.9	-72.3
1.585E+00	48.[illegible]	62.9	68.2	72.1	75.4	75.2	74.4	71.6	63.5	55.5	-57.3	-56.6	-53.5	-52.7	-54.7	-61.1	-75.8
1.995E+00	45.7	60.8	65.7	58.7	71.6	70.5	69.3	66.1	58.4	50.9	-60.7	-59.8	-56.3	-54.8	-56.8	-62.6	-80.1
2.512E+00	45.5	62.9	68.1	73.4	71.3	70.6	68.6	65.1	58.6	51.6	-61.9	-61.0	-57.3	-56.3	-58.6	-65.2	-85.1
3.162E+00	35.[illegible]	56.8	63.4	66.6	68.1	68.1	66.1	62.7	58.4	49.6	-62.3	-61.6	-58.3	-57.8	-56.8	-68.6	-92.2
3.981E+00	26.4	53.1	61.6	65.7	67.6	68.0	66.1	62.7	56.9	50.3	-62.7	-62.4	-59.8	-60.1	-64.1	-73.8	-102.7
5.012E+00	22.1	52.8	62.8	67.7	70.3	70.7	69.1	65.9	60.4	53.8	-61.2	-61.3	-59.7	-60.5	-65.8	-75.9	-109.5
6.310E+00	0.2	41.1	54.8	61.7	65.3	67.1	66.0	63.2	57.9	51.4	-61.7	-62.4	-62.2	-64.8	-71.8	-86.2	-128.0
7.943E+00	-28.3	27.5	46.2	55.7	60.7	63.2	62.8	60.4	55.4	48.8	-64.4	-65.8	-67.2	-71.6	-81.2	-103.6	-157.5
1.000E+01	-70.9	5.8	31.6	44.6	51.7	55.5	55.9	54.1	49.2	42.6	-70.2	-72.4	-75.4	-82.1	-95.1	-121.4	-198.9
XI (DEG)	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0	150.0	160.0	170.0
PNL (PNDB)	72.9	87.0	94.3	99.9	104.5	105.1	105.1	102.9	95.2	87.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TCPNL (PNDB)	74.9	88.4	95.9	101.3	105.8	106.5	106.5	104.3	96.6	88.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
T (SEC)	-9.8	-4.7	-2.8	-1.8	-1.1	-0.6	-0.1	0.3	0.7	1.2	1.7	2.3	3.8	4.1	5.7	8.9	10.1

EPNL*(EPNDB) = 99.0 BASED ON MIN/MAX PNL = 95.1, 105.1 PNDB AND TIME LIMITS = -2.7, 0.7 SEC
EPNL (EPNDB) = 99.4 BASED ON MIN/MAX TCPNL = 96.5, 106.5 PNDB AND TIME LIMITS = -2.7, 0.7 SEC

ENG.PERF.PARM.= 0.E+00 , RANGE AT CPA = 8.000E+02 FT, ELEV.ANGLE = 9.0[illegible]E+01 DEG.

PROGRAM TEE231
AIRCRAFT NOISE PREDICTION

DATE
09/12/73
MO/DA/YR

BUZZSAW COMPARISON 747 FLYOVER T/O

CASE NO. 1

EXIT FAN NOISE
OBSERVED SPECTRA AT SIDELINE DISTANCE= 1.000E+00 FT

SOUND PRESSURE LEVELS
(DB RE. 200 PICOBAR)

FREQUENCY (KHZ)																	
5.012E-02	-55.2	-49.6	-45.3	48.5	56.1	63.1	67.8	70.2	72.3	73.2	73.8	73.1	70.1	66.5	61.1	52.4	41.2
6.310E-02	-55.6	-49.2	-45.4	49.4	57.0	64.1	68.8	71.1	73.3	74.1	74.7	74.0	71.8	67.5	62.0	53.2	41.8
7.943E-02	-56.1	-49.4	-45.6	50.3	58.0	65.0	69.7	72.1	74.2	75.0	75.6	75.0	72.0	68.4	62.9	54.0	42.2
1.000E-01	-56.7	-49.7	-45.7	51.2	58.9	65.9	70.6	73.0	75.1	75.9	76.5	75.9	72.9	69.3	63.8	54.8	42.7
1.259E-01	-57.3	-49.3	-45.9	52.1	59.8	66.8	71.5	73.9	76.0	76.8	77.4	76.7	73.8	70.2	64.6	55.6	43.1
1.585E-01	-58.1	-50.2	-46.1	53.0	60.7	67.7	72.4	74.7	76.8	77.7	78.3	77.6	74.7	71.1	65.5	56.3	43.4
1.995E-01	-59.7	-50.5	-46.3	53.8	61.5	68.5	73.2	75.6	77.7	78.5	79.1	78.5	75.6	72.0	66.3	57.0	43.7
2.512E-01	-59.5	-50.3	-46.6	54.6	62.3	69.3	74.0	76.3	78.4	79.3	79.9	79.2	76.4	72.8	67.0	57.7	43.9
3.162E-01	-60.4	-51.3	-46.9	55.4	63.1	70.1	74.8	77.1	79.2	80.0	80.6	80.0	77.2	73.6	67.8	58.2	44.0
3.981E-01	-61.4	-51.8	-47.3	56.1	63.8	70.8	75.4	77.7	79.8	80.6	81.2	80.6	77.9	74.3	68.4	58.8	44.0
5.012E-01	-62.8	-52.5	-47.8	56.7	64.4	71.3	75.9	78.2	80.3	81.1	81.7	81.1	78.5	75.0	69.0	59.2	43.6
6.310E-01	-64.3	-53.3	-48.4	57.1	64.9	71.8	76.3	78.6	80.6	81.5	82.0	81.5	79.0	75.5	69.5	59.5	43.1
7.943E-01	-66.1	-54.2	-49.2	57.4	65.1	71.9	76.5	78.7	80.7	81.5	82.1	81.6	79.3	75.9	69.8	59.6	42.3
1.000E+00	-68.7	-55.5	-50.3	57.3	65.0	71.8	76.3	78.4	80.3	81.1	81.7	81.4	79.3	76.0	70.0	59.5	41.1
1.259E+00	-70.8	-57.1	-51.8	57.0	64.6	71.3	75.7	77.7	79.6	80.4	81.0	80.7	79.1	76.6	69.8	59.1	39.6
1.585E+00	-73.9	-59.0	-53.5	56.4	63.9	70.5	74.8	76.7	78.5	79.2	79.9	79.7	78.5	75.6	[illegible]	59.4	37.4
1.995E+00	-77.9	-61.3	-55.4	55.6	63.1	69.7	73.9	75.7	77.5	78.2	78.8	78.8	77.9	75.1	8.9	57.3	34.5
2.512E+00	-83.0	-64.1	-57.5	62.6	70.3	76.9	79.5	81.4	83.1	84.5	85.1	85.1	85.1	81.4	4.8	63.3	38.9
3.162E+00	-90.2	-67.8	-61.1	54.2	62.2	69.6	73.3	75.2	76.9	77.5	78.1	77.9	77.0	73.8	66.8	53.3	24.5
3.981E+00	-101.0	-73.2	-63.7	52.8	61.3	68.4	72.9	74.9	76.7	77.3	77.7	77.4	76.0	72.4	64.4	49.2	15.0
5.012E+00	-108.1	-76.5	-65.5	56.3	65.2	72.7	76.4	78.6	80.5	81.6	81.9	81.3	79.9	75.1	66.4	52.4	13.2
6.310E+00	-127.6	-85.9	-71.6	47.3	57.4	65.5	70.7	73.2	75.2	75.8	75.9	74.8	71.9	65.4	55.9	36.1	11.4
7.943E+00	-156.7	-110.3	-81.0	43.1	54.6	63.7	68.4	71.2	73.4	74.5	74.3	72.6	69.0	61.3	48.4	24.7	-37.1
1.000E+01	-199.3	-121.2	-95.0	31.3	44.7	55.0	60.6	63.9	66.2	67.1	66.6	64.1	59.0	49.3	33.0	2.1	-80.0
XI (DEG)	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0	150.0	160.0	170.0
PNL (PNDB)	0.0	0.0	0.0	82.4	90.4	97.4	101.1	103.2	105.1	106.1	106.7	106.3	105.2	101.4	94.6	82.9	69.6
TCPNL (PNDB)	0.0	0.0	0.0	85.6	93.0	99.9	103.1	105.2	107.6	108.4	108.9	108.5	107.7	103.7	97.0	85.6	63.7
T (SEC)	-5.9	-4.7	-2.8	-1.8	-1.1	-0.6	-0.1	0.3	0.7	1.2	1.7	2.3	3.0	4.1	5.7	8.9	18.1

EPNL*(EPNDB) = 111.7 BASED ON MIN/MAX PNL = 96.7, 106.7 PNDB AND TIME LIMITS = -3.7, 5.2 SEC
EPNL (EPNDB) = 104.0 BASED ON MIN/MAX TCPNL = 98.9, 108.9 PNDB AND TIME LIMITS = -3.7, 5.2 SEC

ENG.PERF.PARM.= 0.E+00 , RANGE AT CPA = 8.000E+02 FT, ELEV.ANGLE = 8.993E+01 DEG.

CASE NO. 1

PROGRAM TEE231
AIRCRAFT NOISE PREDICTION

BUZZSAW COMPARISON

DATE
39/12/73
MO/DA/YR

FLIGHT PATH / OBSERVER GEOMETRY

AIRPORT ALTITUDE = 0.E+00 FT

AIRCRAFT MACH NUMBER = 2.920E-01 , CLIMB GRADIENT = 0.E+00 FOR (Z .GT. ZR)
AIRCRAFT HEIGHT (ZO) = 8.000E+02 FT AT T = 0, OBSERVER HEIGHT (ZR) = 0.E+00 FT
SPEED OF SOUND = 1.112E+03 FPS AT (ZO) , SPEED OF SOUND = 1.116E+03 FPS AT (ZR)
AVERAGE SPEED OF SOUND = 1.114E+03 FPS FOR SOUND PROPAGATION OVER RANGE (P)

SIDELINE DISTANCE (Y) = 1.000E+00 FT

TIME (SEC) SOUND REC.	SOUND XMIT.	ANGLE XI (DEG.)	A/C COORDINATES Y (FT)	Z (FT)	PROPAGATION DISTANCE R (FT)	DR/R FOR GRD.REFLX.	ANGLES FOR NOISE EXTRAPOLATION BETA 1 (DEG.)	BETA 2 (DEG.)
-9.8	-14.0	10.	-4.537E+03	8.000E+02	4.607E+03	0.E+00	1.000E+01	1.000E+01
-4.7	-6.8	20.	-2.198E+03	8.000E+02	2.339E+03	0.E+00	2.000E+01	2.000E+01
-2.8	-4.3	30.	-1.386E+03	8.000E+02	1.600E+03	0.E+00	3.000E+01	3.000E+01
-1.8	-2.9	40.	-9.534E+02	8.000E+02	1.249E+03	0.E+00	4.000E+01	4.000E+01
-1.1	-2.1	50.	-6.713E+02	8.000E+02	1.044E+03	0.E+00	5.000E+01	5.000E+01
-0.6	-1.4	60.	-4.619E+02	8.000E+02	9.238E+02	0.E+00	6.000E+01	6.000E+01
-0.1	-0.9	70.	-2.912E+02	8.000E+02	8.513E+02	0.E+00	7.000E+01	7.000E+01
0.3	-0.4	80.	-1.411E+02	8.000E+02	8.123E+02	0.E+00	8.000E+01	8.000E+01
0.7	0.0	90.	-0.E+03	8.000E+02	8.000E+02	0.E+00	8.993E+01	8.993E+01
1.2	0.4	100.	1.411E+02	8.000E+02	8.123E+02	0.E+00	8.000E+01	8.000E+01
1.7	0.9	110.	2.912E+02	8.000E+02	8.513E+02	0.E+00	7.000E+01	7.000E+01
2.3	1.4	120.	4.619E+02	8.000E+02	9.238E+02	0.E+00	6.000E+01	6.000E+01
3.0	2.1	130.	6.713E+02	8.000E+02	1.044E+03	0.E+00	5.000E+01	5.000E+01
4.1	2.9	140.	9.534E+02	8.000E+02	1.245E+03	0.E+00	4.000E+01	4.000E+01
5.7	4.3	150.	1.386E+03	8.000E+02	1.600E+03	0.E+00	3.000E+01	3.000E+01
8.9	6.8	160.	2.198E+03	8.000E+02	2.339E+03	0.E+00	2.000E+01	2.000E+01
18.1	14.0	170.	4.537E+03	8.000E+02	4.607E+03	0.E+00	1.000E+01	1.000E+01

DATE
09/12/73
MD/DA/YR

PROGRAM TEE231
AIRCRAFT NOISE PREDICTION

BUZZSAW COMPARISON

CASE NO. 1

NOISE EXTRAPOLATION CORRECTIONS

SPHERICAL DIVERGENCE (APPLYS TO ALL PASSBANDS)

SOUND PRESSURE LEVEL ATTENUATION
(DB)

X (FT)																	
1.000E+03	62.9	57.1	53.8	51.6	50.1	49.4	48.3	47.9	47.7	47.9	48.3	49.4	50.1	51.6	53.8	57.1	62.9
ANGLE XI (DEG)	10.	20.	30.	40.	50.	60.	70.	80.	90.	100.	110.	120.	130.	140.	150.	160.	170.

ATMOSPHERIC ABSORPTION FOR X = 1.000E+03 FT

SOUND PRESSURE LEVEL ATTENUATION
(DB)

FREQUENCY (KHZ)																	
5.012E-02	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3
6.310E-02	0.4	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.4
7.943E-02	0.5	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.5
1.000E-01	0.7	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.7
1.259E-01	0.8	0.4	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.4	0.8
1.585E-01	1.0	0.5	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.5	1.0
1.995E-01	1.3	0.7	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.5	0.7	1.3
2.512E-01	1.7	0.8	0.6	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.6	0.8	1.7
3.162E-01	2.1	1.1	0.7	0.6	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.6	0.7	1.1	2.1
3.981E-01	2.6	1.3	0.9	0.7	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.7	0.9	1.3	2.6
5.012E-01	3.3	1.7	1.2	0.9	0.8	0.7	0.6	0.6	0.5	0.6	0.6	0.7	0.8	0.9	1.2	1.7	3.3
6.310E-01	4.2	2.1	1.5	1.1	1.0	0.8	0.8	0.7	0.7	0.7	0.8	0.8	1.0	1.1	1.5	2.1	4.2
7.943E-01	5.3	2.7	1.8	1.4	1.2	1.1	1.0	0.9	0.9	0.9	1.0	1.1	1.2	1.4	1.8	2.7	5.3
1.000E+00	6.7	3.4	2.3	1.8	1.5	1.3	1.2	1.2	1.2	1.2	1.2	1.3	1.5	1.8	2.3	3.4	6.7
1.259E+00	8.5	4.3	3.0	2.3	1.9	1.7	1.6	1.5	1.5	1.5	1.6	1.7	1.9	2.3	3.0	4.3	8.5
1.585E+00	10.9	5.5	3.8	2.9	2.5	2.2	2.0	1.9	1.9	1.9	2.0	2.2	2.5	2.9	3.8	5.5	10.9
1.995E+00	14.4	7.3	5.0	3.9	3.3	2.9	2.7	2.5	2.5	2.5	2.7	2.9	3.3	3.9	5.0	7.3	14.4
2.512E+00	19.5	9.9	6.8	5.3	4.4	3.9	3.6	3.4	3.4	3.4	3.6	3.9	4.4	5.3	6.8	9.9	19.5
3.162E+00	26.7	13.5	9.3	7.2	6.0	5.3	4.9	4.7	4.6	4.7	4.9	5.3	6.0	7.2	9.3	13.5	26.7
3.981E+00	37.5	19.1	13.0	10.1	8.5	7.5	6.9	6.6	6.5	6.6	6.9	7.5	8.5	10.1	13.0	19.1	37.5
5.012E+00	44.8	22.7	15.6	12.1	10.2	9.0	8.3	7.9	7.8	7.9	8.3	9.1	10.2	12.1	15.6	22.7	44.8
6.310E+00	64.5	32.7	22.4	17.4	14.6	12.9	11.9	11.4	11.2	11.4	11.9	12.9	14.6	17.4	22.4	32.7	64.5
7.943E+00	93.8	47.6	32.6	25.3	21.3	18.8	17.3	16.5	16.3	16.5	17.3	18.8	21.3	25.3	32.6	47.6	93.8
1.000E+01	135.6	68.9	47.1	36.6	30.7	27.2	25.1	23.9	23.6	23.9	25.1	27.2	30.7	36.5	47.1	68.9	135.6
ANGLE (DEG)	10.	20.	30.	40.	50.	60.	70.	80.	90.	100.	110.	120.	130.	140.	150.	160.	170.

CASE NO. 1

PROGRAM TEE231
AIRCRAFT NOISE PREDICTION

BUZZSAW COMPARISON

NOISE EXTRAPOLATION CORRECTIONS

DATE
09/12/73
MO/DA/YR

EXTRA-GROUND-ATTENUATION FOR X = 1.000E+00 FT

SOUND PRESSURE LEVEL ATTENUATION (DB)

FREQUENCY (KHZ)	10.	20.	30.	40.	50.	60.	70.	80.	90.	100.	110.	120.	130.	140.	150.	160.	170.
5.012E-02	0.9	0.7	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.7	0.9
6.310E-02	1.2	0.9	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.9	1.2
7.943E-02	1.6	1.0	0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	1.0	1.6
1.000E-01	2.0	1.1	0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	1.1	2.0
1.259E-01	2.5	1.3	0.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.6	1.3	2.5
1.585E-01	2.9	1.4	0.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.6	1.4	2.9
1.995E-01	3.3	1.5	0.7	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.7	1.5	3.3
2.512E-01	3.8	1.7	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.8	1.7	3.8
3.162E-01	4.2	1.9	0.9	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.9	1.9	4.2
3.981E-01	4.7	2.0	0.9	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.9	2.0	4.7
5.012E-01	5.3	2.2	1.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.0	2.2	5.3
6.310E-01	5.9	2.4	1.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.1	2.4	5.9
7.943E-01	6.5	2.5	1.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.2	2.5	6.5
1.000E+00	7.1	2.7	1.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.3	2.7	7.1
1.259E+00	7.6	3.0	1.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.4	3.0	7.6
1.585E+00	8.1	3.2	1.5	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.5	3.2	8.1
1.995E+00	8.3	3.2	1.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.6	3.2	8.3
2.512E+00	8.3	3.2	1.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.6	3.2	8.3
3.162E+00	8.3	3.2	1.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.6	3.2	8.3
3.981E+00	8.3	3.2	1.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.6	3.2	8.3
5.012E+00	8.3	3.2	1.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.6	3.2	8.3
6.310E+00	8.3	3.2	1.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.6	3.2	8.3
7.943E+00	8.3	3.2	1.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.6	3.2	8.3
1.000E+01	8.3	3.2	1.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.6	3.2	8.3

ANGLE XI (DEG): 10. 20. 30. 40. 50. 60. 70. 80. 90. 100. 110. 120. 130. 140. 150. 160. 170.

GROUND REFLECTION FOR X = 1.000E+00 FT

GROUND REFLECTION = -3 DB ATTENUATION OR +3 DB CORRECTION FOR ALL PASSBANDS.

CASE NO. 1

PROGRAM TEE231
AIRCRAFT NOISE PREDICTION

BUZZSAW COMPARISON

TOTAL NOISE (ALL COMPONENTS)
INDEX, FREE-FIELD SPECTRA (R = 1 M)

DATE
09/12/73
MO/DA/YR

SOUND PRESSURE LEVELS
(DB RE. 20C PICOBAR)

FREQUENCY (KHZ)																	
5.012E-02	114.1	114.6	114.0	114.3	114.4	115.2	115.6	116.1	117.3	118.7	119.1	119.2	117.2	115.3	112.3	107.4	102.4
6.310E-02	115.1	115.0	115.3	115.1	115.5	116.3	116.7	117.1	118.3	119.1	120.1	120.1	118.2	116.3	113.3	108.3	103.4
7.943E-02	116.1	116.0	116.3	116.3	117.0	117.7	118.1	118.3	119.2	120.5	121.0	121.0	119.2	117.2	114.3	109.3	104.3
1.000E-01	117.2	117.1	117.2	117.7	119.0	119.5	119.8	119.7	120.2	121.0	121.9	122.3	120.1	118.2	115.3	110.3	105.3
1.259E-01	118.2	118.3	118.7	119.7	121.7	122.0	122.2	121.6	121.3	121.9	122.8	122.9	121.1	119.2	116.3	111.3	106.3
1.585E-01	119.5	119.8	120.7	122.6	125.3	125.4	125.5	124.3	122.6	122.9	123.7	123.8	122.0	120.2	117.2	112.3	107.3
1.995E-01	121.1	121.8	123.6	126.2	129.5	129.4	129.4	127.8	124.2	123.9	124.6	124.7	122.9	121.1	118.2	113.3	108.3
2.512E-01	123.1	124.7	127.2	130.4	133.9	133.8	132.7	131.7	126.4	124.9	125.5	125.6	123.9	122.0	119.7	114.2	109.3
3.162E-01	126.3	128.4	131.5	134.9	138.5	138.3	138.1	136.1	129.4	126.4	126.3	126.4	124.7	123.0	120.1	115.2	110.3
3.981E-01	125.5	127.4	131.0	133.2	136.7	136.4	136.2	134.2	128.4	126.6	127.0	127.2	125.6	123.9	121.1	115.2	111.2
5.012E-01	126.6	128.2	130.7	133.8	137.2	136.3	136.5	134.5	128.8	127.1	127.6	127.8	126.3	124.7	122.0	117.1	112.2
6.310E-01	129.3	131.0	133.7	136.9	140.1	139.6	139.2	137.0	130.5	127.9	128.1	128.3	127.8	125.5	122.8	118.5	113.1
7.943E-01	127.3	128.0	129.7	132.1	135.1	134.5	134.1	132.0	128.0	127.5	128.3	129.7	127.6	126.2	123.6	118.9	114.8
1.000E+00	127.2	126.7	127.3	128.9	131.3	130.6	130.2	128.7	126.9	127.3	128.3	128.7	127.9	126.8	124.4	119.7	114.8
1.259E+00	127.8	126.7	126.8	127.9	129.9	129.0	128.6	127.3	126.3	126.8	127.8	128.4	128.0	127.2	125.0	120.5	115.6
1.585E+00	127.8	125.6	124.3	124.2	125.2	124.7	124.9	124.7	125.3	126.0	127.2	127.9	128.3	127.6	125.5	121.2	116.4
1.995E+00	128.4	125.4	123.1	121.8	122.3	122.1	123.1	123.6	124.8	125.6	126.7	127.7	128.2	128.0	126.2	121.9	117.2
2.512E+00	133.3	130.1	127.2	125.4	125.3	127.7	128.8	129.8	131.3	132.9	134.0	135.3	136.5	135.7	133.9	130.5	126.7
3.162E+00	133.7	127.7	125.0	123.0	122.2	122.9	124.2	125.0	126.3	127.1	128.3	129.3	130.1	130.1	128.3	124.1	119.4
3.981E+00	132.2	129.4	127.0	125.3	124.3	124.7	125.9	126.6	128.0	128.8	129.9	130.9	131.6	131.5	129.0	125.5	122.8
5.012E+00	135.1	132.8	130.7	129.1	128.5	129.8	130.7	131.6	133.1	134.3	135.5	136.3	137.1	136.2	134.3	130.4	126.3
6.310E+00	132.9	131.1	129.6	128.3	127.7	128.3	129.2	129.8	131.2	132.1	133.1	133.8	133.5	132.3	133.6	125.1	121.3
7.943E+00	133.7	132.4	131.2	130.3	130.0	131.3	132.1	133.0	134.5	135.9	136.9	137.4	137.3	135.7	133.3	129.2	125.0
1.000E+01	133.3	132.0	131.1	130.4	130.3	131.5	132.2	133.1	134.6	135.9	137.0	137.3	136.8	135.0	132.4	124.2	123.9
ANGLE XI (DEG)	10.	20.	30.	40.	50.	60.	70.	80.	90.	100.	110.	120.	130.	140.	150.	160.	170.

SIDELINE DISTANCE = 1.000E+00 FT

PROGRAM TFE231
AIRCRAFT NOISE PREDICTION

DATE

09/12/73
MO/DA/YR

BUZZSAW COMPARISON

CASE NO. 1

747 FLYOVER T/O

COMPRESSOR AND INLET FAN NOISE
INDEX, FREE-FIELD SPECTRA (R = 1 M)

SOUND PRESSURE LEVELS
(DB RE. 200 PICOBAR)

FREQUENCY (KHZ)																	
5.012E-02	114.1	114.6	114.3	[illegible]	114.3	[illegible]	112.0	109.1	107.8	97.7	5.4	5.5	5.7	5.8	5.8	5.9	5.9
6.310E-02	115.1	115.0	115.3	115.0	115.2	115.1	113.3	110.4	105.0	98.8	5.3	5.4	5.6	5.7	5.8	5.9	5.9
7.943E-02	116.1	116.0	116.0	116.2	116.7	116.6	115.0	112.3	106.4	100.1	5.2	5.3	5.5	5.7	5.8	5.9	5.9
1.000E-01	117.2	117.1	117.2	117.7	118.7	118.6	117.4	114.9	108.4	101.7	5.0	5.1	5.4	5.6	5.7	5.8	5.8
1.259E-01	118.2	118.3	118.7	119.7	121.6	121.5	120.7	118.7	111.2	104.1	4.8	5.0	5.3	5.5	5.7	5.8	5.8
1.585E-01	119.5	119.8	120.7	122.5	125.2	125.1	124.6	122.4	114.8	107.3	4.6	4.8	5.2	5.4	5.6	5.7	5.8
1.995E-01	121.1	121.8	123.6	126.2	129.4	129.3	129.0	126.8	118.9	111.1	4.4	4.5	5.0	5.3	5.5	5.7	5.7
2.512E-01	123.1	124.7	127.2	130.4	133.9	133.7	133.5	131.3	123.3	115.4	4.0	4.2	4.8	5.2	5.4	5.6	5.7
3.162E-01	126.0	128.4	131.5	134.9	138.5	138.3	138.1	135.9	127.8	119.8	3.5	3.8	4.5	5.0	5.3	5.5	5.6
3.981E-01	125.6	127.4	130.0	133.2	136.7	136.4	136.1	133.8	125.8	117.8	3.0	3.3	4.1	4.7	5.1	5.4	5.5
5.012E-01	126.5	128.2	130.7	133.8	137.1	136.8	136.4	134.1	125.6	118.0	2.1	2.5	3.6	4.4	4.9	5.2	5.3
6.310E-01	129.0	131.0	133.7	136.8	140.1	139.6	139.1	136.7	128.6	120.5	0.9	1.4	2.8	3.9	4.5	4.9	5.1
7.943E-01	127.3	128.6	129.7	132.1	135.0	134.4	133.7	131.2	123.6	115.0	-0.8	-0.1	1.8	3.1	4.0	4.6	4.8
1.000E+00	127.2	126.7	127.3	128.9	131.2	130.3	129.4	126.6	118.4	110.5	-3.3	-2.3	0.7	2.1	3.3	4.1	4.3
1.259E+00	127.8	126.7	126.8	127.9	129.8	128.6	127.4	124.4	115.1	109.1	-6.4	-5.2	-1.7	0.8	2.4	3.4	3.8
1.585E+00	127.8	125.6	124.3	[illegible]	125.8	123.4	121.7	118.4	110.1	102.4	-10.0	-8.4	-3.9	-0.7	1.4	2.6	3.1
1.995E+00	128.4	125.4	123.1	121.6	121.3	119.5	117.2	113.5	105.7	98.3	-12.8	-10.9	-5.6	-1.9	0.6	2.1	2.6
2.512E+00	133.7	130.1	127.2	124.7	122.8	120.5	117.5	113.4	106.7	99.9	-13.0	-11.1	-5.8	-2.0	0.5	2.0	2.6
3.162E+00	133.7	127.7	125.0	122.8	121.2	119.4	116.3	112.3	105.7	99.2	-12.1	-10.3	-5.2	-1.6	0.8	2.2	2.8
3.981E+00	132.2	129.4	127.0	124.8	123.1	121.5	118.3	114.2	108.2	101.8	-10.5	-8.9	-4.2	-0.9	1.2	2.5	3.1
5.012E+00	135.1	132.8	130.7	128.8	127.2	125.7	122.6	118.6	112.9	106.6	-7.7	-6.3	-2.5	0.3	2.1	3.1	3.6
6.310E+00	132.9	131.1	129.6	128.2	127.0	[illegible]	123.2	119.4	113.9	107.7	-4.5	-3.4	-0.5	1.6	3.0	3.8	4.1
7.943E+00	133.7	132.4	131.2	[illegible]	129.0	128.0	125.4	121.9	116.4	110.3	-1.8	-1.0	1.2	2.7	3.7	4.4	4.6
1.000E+01	133.9	132.0	[illegible]	130.2	129.5	128.7	126.3	122.9	117.5	111.4	0.2	0.8	2.4	3.6	4.3	4.8	5.1

ANGLES
(DEG)

PSI	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0	150.0	160.0	170.0
BETA	89.9	89.9	89.9	89.9	89.9	89.9	89.9	89.9	89.9	89.9	89.9	89.9	89.9	89.9	89.9	89.9	89.9
XI	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0	150.0	160.0	170.0
DELTA	0.0																

SIDELINE DISTANCE = 1.000E+03 FT

PROGRAM TFE231
AIRCRAFT NOISE PREDICTION

DATE
09/12/73
MO/DA/YR

CASE NO. 1

BUZZSAW COMPARISON
747 FLYOVER T/O

COMPRESSOR AND INLET FAN NOISE
PREDICTED CONFIGURATION CORRECTIONS

SOUND PRESSURE LEVEL ATTENUATION (DB)

FREQUENCY (KHZ)																	
5.012E-02	0.1	0.2	0.3	0.3	0.4	0.5	0.5	0.6	0.6	0.6	0.6	0.5	0.4	0.3	0.2	0.1	0.1
6.310E-02	0.1	0.2	0.3	0.4	0.5	0.6	0.6	0.7	0.7	0.7	0.7	0.6	0.4	0.3	0.2	0.1	0.1
7.943E-02	0.1	0.3	0.4	0.5	0.6	0.7	0.7	0.8	0.8	0.9	0.8	0.8	0.5	0.4	0.2	0.2	0.2
1.000E-01	0.1	0.3	0.5	0.6	0.7	0.8	0.9	1.0	1.0	1.0	1.0	0.9	0.6	0.4	0.3	0.2	0.2
1.259E-01	0.2	0.4	0.5	0.7	0.8	0.9	1.0	1.1	1.2	1.2	1.2	1.1	0.7	0.5	0.3	0.2	0.2
1.585E-01	0.2	0.4	0.6	0.8	1.0	1.1	1.2	1.3	1.4	1.4	1.4	1.3	0.9	0.5	0.4	0.3	0.3
1.995E-01	0.2	0.5	0.8	1.0	1.2	1.3	1.5	1.6	1.7	1.7	1.7	1.5	1.0	0.7	0.5	0.4	0.3
2.512E-01	0.3	0.6	0.9	1.2	1.4	1.6	1.8	2.0	2.0	2.1	2.0	1.8	1.3	0.9	0.6	0.4	0.4
3.162E-01	0.3	0.7	1.1	1.4	1.7	1.9	2.1	2.3	2.4	2.5	2.4	2.2	1.5	1.0	0.7	0.5	0.4
3.981E-01	0.4	0.9	1.4	1.8	2.1	2.4	2.7	2.9	3.0	3.1	3.0	2.7	1.9	1.3	0.9	0.6	0.5
5.012E-01	0.5	1.2	1.8	2.3	2.8	3.1	3.5	3.8	3.9	4.0	3.9	3.6	2.4	1.7	1.1	0.8	0.7
6.310E-01	0.7	1.5	2.3	3.0	3.6	4.1	4.5	4.9	5.1	5.2	5.1	4.6	3.2	2.2	1.5	1.1	0.9
7.943E-01	0.9	2.0	3.1	4.0	4.8	5.5	6.0	6.5	6.9	7.0	6.9	6.2	4.2	2.9	2.0	1.4	1.2
1.000E+00	1.2	2.8	4.2	5.4	6.5	7.4	8.2	8.9	9.3	9.4	9.3	8.4	5.4	3.9	2.7	2.0	1.7
1.259E+00	1.6	3.7	5.6	7.3	8.7	9.9	11.0	11.9	12.5	12.7	12.5	11.2	7.7	5.2	3.6	2.6	2.2
1.585E+00	2.1	4.8	7.2	9.4	11.2	12.8	14.1	15.3	16.1	16.7	16.1	14.5	10.0	6.7	4.7	3.4	2.9
1.995E+00	2.4	5.6	8.5	11.0	13.1	15.0	16.5	17.9	18.8	19.1	18.8	16.9	11.6	7.9	5.4	3.9	3.4
2.512E+00	2.5	5.7	8.6	11.1	13.3	15.2	16.8	18.2	19.1	19.4	19.1	17.1	11.8	8.0	5.5	4.0	3.4
3.162E+00	2.4	5.4	8.2	10.6	12.7	14.5	16.0	17.3	18.1	18.4	18.1	16.3	11.2	7.6	5.3	3.8	3.3
3.981E+00	2.2	4.9	7.4	9.7	11.6	13.2	14.6	15.8	16.5	16.8	16.5	14.9	10.3	7.0	4.8	3.5	3.0
5.012E+00	1.9	4.1	6.2	8.0	9.6	10.9	12.0	13.1	13.7	13.9	13.7	12.3	8.5	5.7	4.0	2.9	2.5
6.310E+00	1.4	3.1	4.7	6.1	7.4	8.4	9.2	10.0	10.5	10.7	10.5	9.5	6.5	4.4	3.0	2.2	1.9
7.943E+00	1.0	2.3	3.5	4.6	5.5	6.3	6.9	7.5	7.9	8.0	7.8	7.1	4.9	3.3	2.3	1.6	1.4
1.000E+01	0.8	1.7	2.6	3.4	4.1	4.7	5.1	5.6	5.8	5.9	5.8	5.3	3.6	2.5	1.7	1.2	1.1

ANGLES (DEG)																	
PSI	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0	150.0	160.0	170.0
XI	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0	150.0	160.0	170.0
DELTA	0.0																

SIDELINE DISTANCE = 1.000E+00 FT

PROGRAM TEE231

AIRCRAFT NOISE PREDICTION

DATE

09/12/73

CASE NO. 1

BUZZSAW COMPARISON

747 FLYOVER T/O

EXIT FAN NOISE

INDEX, FREE-FIELD SPECTRA (R = 1 M)

SOUND PRESSURE LEVELS
(DB RE. 20C MICROBAR)

FREQUENCY (KHZ)																	
5.012E-02	6.1	5.9	5.9	97.2	103.2	109.2	113.2	115.1	117.1	118.1	119.1	119.2	117.2	115.3	112.3	107.4	102.4
6.310E-02	6.1	5.9	5.9	98.2	104.2	110.1	114.1	116.1	118.1	119.1	120.1	120.1	118.2	116.3	113.3	108.3	103.4
7.943E-02	6.0	5.9	5.8	99.2	105.1	111.1	115.1	117.1	119.0	120.0	121.0	121.0	119.2	117.2	114.3	109.3	104.3
1.000E-01	6.0	5.9	5.8	100.1	106.1	112.0	116.0	118.0	119.9	120.9	121.9	122.0	120.1	118.2	115.3	110.3	105.3
1.259E-01	5.9	5.8	5.8	101.1	107.0	113.0	116.9	118.9	120.9	121.8	122.8	122.9	121.1	119.2	116.3	111.3	106.3
1.585E-01	5.9	5.8	5.7	102.0	108.0	113.9	117.8	119.8	121.7	122.7	123.7	123.8	122.0	120.2	117.2	112.3	107.3
1.995E-01	5.9	5.8	5.6	103.0	108.9	114.8	118.7	120.7	122.6	123.6	124.6	124.7	122.9	121.1	118.2	113.3	108.3
2.512E-01	5.9	5.7	5.6	103.9	109.8	115.7	119.6	121.5	123.5	124.4	125.5	125.6	123.8	122.0	119.2	114.2	109.3
3.162E-01	5.9	5.7	5.5	104.8	110.6	116.5	120.4	122.7	124.3	125.3	126.3	126.4	124.7	123.9	120.1	115.2	110.3
3.981E-01	5.8	5.6	5.4	105.6	111.5	117.3	121.2	123.1	125.0	126.0	127.0	127.2	125.6	123.9	121.1	116.2	111.2
5.012E-01	5.8	5.5	5.2	106.4	112.2	118.0	121.8	123.7	125.6	126.6	127.6	127.8	126.3	124.7	122.0	117.1	112.2
6.310E-01	5.7	5.3	4.9	107.1	112.8	118.6	122.4	124.2	126.1	127.1	128.1	128.3	127.0	125.5	[illegible]	118.1	113.1
7.943E-01	5.6	5.1	4.6	107.7	113.3	119.0	122.7	124.5	126.3	127.3	128.3	128.7	127.6	126.2	[illegible]	118.9	114.0
1.000E+00	5.5	4.7	4.1	108.1	113.6	119.1	122.8	124.5	126.3	127.2	128.3	128.7	127.9	126.8	124.4	119.7	114.8
1.259E+00	5.3	4.3	3.4	108.3	113.6	119.0	122.5	124.1	125.8	126.7	127.8	128.4	128.0	127.2	125.0	120.5	115.6
1.585E+00	5.1	3.7	2.6	108.3	113.4	118.7	122.1	123.5	125.2	126.7	127.2	127.9	128.9	127.6	125.6	121.2	116.4
1.995E+00	4.9	3.3	1.9	108.5	113.5	118.6	121.8	123.2	124.7	125.6	126.7	127.7	129.2	129.0	126.2	121.9	117.2
2.512E+00	4.8	3.1	1.6	115.9	121.7	126.8	128.4	129.7	131.2	132.9	134.0	135.0	135.5	135.7	133.9	130.5	126.7
3.162E+00	4.7	3.0	1.5	110.4	115.3	120.3	123.5	124.7	126.7	127.1	128.3	129.3	130.1	130.1	128.3	124.1	119.4
3.981E+00	4.8	3.1	1.7	111.9	116.8	121.9	125.1	126.4	127.9	128.8	129.9	130.9	131.6	131.5	129.8	125.5	120.8
5.012E+00	5.0	3.6	2.3	117.4	122.4	127.6	130.0	131.4	133.0	134.3	135.5	136.3	137.1	136.2	134.3	130.4	125.3
6.310E+00	5.2	4.1	3.2	113.8	119.0	124.4	127.9	129.4	131.1	132.0	133.1	133.8	133.5	132.8	130.6	125.1	121.3
7.943E+00	5.4	4.6	3.9	117.5	122.9	128.5	131.0	132.7	134.6	135.9	136.9	137.4	137.3	135.7	133.7	129.2	125.1
1.000E+01	5.6	5.0	4.4	116.9	122.5	128.2	130.9	132.7	134.5	135.9	137.0	137.3	135.8	135.0	132.4	123.2	123.9

ANGLES
(DEG)

PSI	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0	150.0	160.0	170.0
BETA	89.9	89.9	89.9	89.9	89.9	89.9	89.9	89.9	89.9	89.9	89.9	89.9	89.9	89.9	89.9	89.9	89.9
XI	10.0	20.0	31.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0	150.0	160.4	170.1
DELTA	0.0																

SIDELINE DISTANCE = 1.550E+03 FT

PROGRAM TEE231
AIRCRAFT NOISE PREDICTION

BUZZSAW COMPARISON

747 FLYOVER T/O

EXIT FAN NOISE
PREDICTED CONFIGURATION CORRECTIONS

DATE
09/12/73

CASE NO. 1

SOUND PRESSURE LEVEL ATTENUATION (DB)

FREQUENCY (KHZ)																	
5.312E-02	[illegible]	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.1	0.1	0.1	0.1
6.310E-02	0.0	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.3	0.2	0.1	0.1	0.1	0.1
7.943E-02	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.2	0.1	0.1	0.1
1.000E-01	0.1	0.1	0.2	0.3	0.3	0.4	0.4	0.5	0.5	0.5	0.5	0.4	0.3	0.2	0.1	0.1	0.1
1.259E-01	0.1	0.2	0.3	0.3	0.4	0.5	0.5	0.6	0.6	0.6	0.6	0.5	0.4	0.2	0.2	0.1	0.1
1.585E-01	0.1	0.2	0.3	0.4	0.5	0.6	0.6	0.7	0.7	0.7	0.7	0.6	0.4	0.3	0.2	0.1	0.1
1.995E-01	0.1	0.2	0.4	0.5	0.6	0.7	0.7	0.8	0.8	0.8	0.8	0.7	0.5	0.3	0.2	0.2	0.1
2.512E-01	0.1	0.3	0.5	0.6	0.7	0.8	0.9	1.0	1.0	1.0	1.0	0.9	0.6	0.4	0.3	0.2	0.2
3.162E-01	0.2	0.4	1.5	0.7	0.8	0.9	1.0	1.1	1.2	1.2	1.2	1.1	0.7	0.5	0.3	0.2	0.2
3.981E-01	0.2	0.4	0.7	0.9	1.0	1.2	1.3	1.4	1.5	1.5	1.5	1.3	0.9	0.6	0.4	0.3	0.3
5.012E-01	0.2	0.6	0.9	1.1	1.3	1.5	1.7	1.8	1.9	1.9	1.9	1.7	1.2	0.8	0.6	0.4	0.3
6.310E-01	0.3	0.7	1.1	1.4	1.7	1.9	2.1	2.3	2.4	2.5	2.4	2.2	1.5	1.0	0.7	0.5	0.4
7.943E-01	0.4	1.0	1.5	1.9	2.3	2.6	2.9	3.1	3.2	3.3	3.2	2.9	2.0	1.4	0.9	0.7	0.6
1.000E+00	0.5	1.3	2.0	2.6	3.1	3.5	3.8	4.2	4.4	4.4	4.4	3.9	2.7	1.8	1.3	0.9	0.8
1.259E+00	0.9	1.8	2.6	3.4	4.1	4.7	5.2	5.6	5.9	6.0	5.9	5.3	3.6	2.5	1.7	1.2	1.1
1.585E+00	1.0	2.3	3.4	4.4	5.3	6.1	6.7	7.3	7.6	7.7	7.6	6.9	4.7	3.2	2.2	1.6	1.4
1.995E+00	1.2	2.7	4.1	5.3	6.4	7.3	8.0	8.7	9.1	9.3	9.1	8.2	5.7	3.8	2.6	1.9	1.6
2.512E+00	1.3	2.9	4.4	5.7	6.8	7.8	8.6	9.3	9.8	9.9	9.8	[illegible]	6.1	4.1	2.8	2.0	1.8
3.162E+00	1.3	3.0	4.5	5.8	7.0	7.9	8.8	9.5	10.0	10.1	10.0	[illegible]	6.2	4.2	2.3	2.1	1.8
3.981E+00	1.2	2.9	4.3	5.6	6.7	7.7	8.5	9.2	9.6	9.8	9.6	8.7	6.3	4.3	2.8	2.1	1.7
5.012E+00	1.1	2.4	3.7	4.8	5.7	6.5	7.2	7.8	8.2	8.3	8.2	7.4	5.1	3.4	2.4	1.7	1.5
6.310E+00	0.8	1.9	2.8	3.7	4.4	5.1	5.6	6.0	6.3	6.4	6.3	5.7	3.9	2.7	1.8	1.3	1.1
7.943E+00	0.6	1.4	2.1	2.8	3.3	3.8	4.2	4.5	4.7	4.8	4.7	4.3	2.9	2.2	1.4	1.1	0.9
1.000E+01	0.5	1.6	1.6	2.0	2.4	2.8	3.1	3.3	3.5	3.5	3.5	3.1	2.2	1.5	1.0	0.7	0.6
ANGLES (DEG)																	
PSI	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0	150.0	160.0	170.0
XI	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0	150.0	160.0	170.0
DELTA	0.0																

SIDELINE DISTANCE = 1.000E+03 FT

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                                   PROGRAM TFE231                                          DATE
                              AIRCRAFT NOISE PREDICTION                                  09/12/73
                                                                                         MO/DA/YR
                                  BUZZSAW COMPARISON
CASE NO.  2
                            ASSUMPTIONS FOR NOISE PREDICTION

1) GEOMETRIC-MEAN PASSBAND FREQUENCIES (KHZ)
     5.012E-02 6.310E-02 7.943E-02 1.000E-01 1.259E-01 1.585E-01 1.995E-01 2.512E-01 3.162E-01 3.981E-01 5.012E-01 6.310E-01
     7.943E-01 1.000E+00 1.259E+00 1.585E+00 1.995E+00 2.512E+00 3.162E+00 3.981E+00 5.012E+00 6.310E+00 7.943E+00 1.000E+01

2) ATMOSPHERIC ABSORPTION COEFFICIENTS (DB /1000 FT)
        0.07      0.09      0.11      0.14      0.18      0.23      0.29      0.36      0.45      0.57      0.72      0.91
        1.15      1.46      1.85      2.36      3.14      4.23      5.79      8.15      9.72     14.00     20.37     29.44

3) ATMOSPHERIC CONDITIONS
      INTERNATIONAL STANDARD ATMOSPHERE

4) ITEMS CONSIDERED IN NOISE EXTRAPOLATION
    A) SPHERICAL DIVERGENCE  .................  YES
    B) ATMOSPHERIC ABSORPTION ................  YES
    C) EXTRA-GROUND ATTENUATION ..............  YES
       SOUND PROPAGATION IS DOWNWIND (10  MPH).
    D) GROUND REFLECTION  ....................  NO
       3 DB ADDED TO FREE FIELD SPECTRA INSTEAD.
                                                              NO. OF TIMES
5) NOISE COMPONENTS CONSIDERED                                     1
    A) COMPRESSOR AND INLET FAN          MODULE                    1
    B) EXIT FAN                          MODULE
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PROGRAM TEE231
AIRCRAFT NOISE PREDICTION

DATE
09/12/73
MO/DA/YR

BUZZSAW COMPARISON

CASE NO. 3

747 FLYOVER T/O

COMPRESSOR AND INLET FAN NOISE
OBSERVED SPECTRA AT SIDELINE DISTANCE= 1.000E+00 FT

SOUND PRESSURE LEVELS
(DB RE. 20C PICOBARS)

FREQUENCY (KHZ)																	
5.012E-02	52.9	59.6	62.7	65.1	66.7	67.7	66.5	63.9	58.9	52.6	-40.1	-40.8	-41.6	-43.1	-45.4	-49.1	-55.3
6.310E-02	53.5	59.8	63.6	66.1	67.9	68.9	67.8	65.3	60.0	53.6	-40.3	-40.9	-41.7	-43.2	-45.5	-49.3	-55.7
7.943E-02	54.0	60.7	64.5	67.2	69.4	70.3	69.5	67.1	61.4	54.9	-40.4	-41.3	-41.8	-43.3	-45.7	-49.5	-56.3
1.000E-01	54.5	61.5	65.6	68.6	71.4	72.3	71.9	69.7	63.3	56.5	-40.6	-41.2	-41.9	-43.4	-45.8	-49.8	-56.8
1.259E-01	55.0	62.5	66.9	70.6	74.2	75.1	75.1	73.1	66.1	58.8	-40.8	-41.4	-42.1	-43.5	-46.0	-50.0	-57.5
1.585E-01	55.5	63.7	68.8	73.3	77.7	78.7	78.9	77.1	69.6	61.9	-41.1	-41.7	-42.3	-43.7	-46.2	-50.3	-58.2
1.995E-01	56.4	65.5	71.5	76.9	81.9	82.8	83.2	81.4	73.7	65.8	-41.4	-42.0	-42.5	-43.9	-46.5	-50.7	-58.9
2.512E-01	57.7	68.0	75.0	81.0	86.3	87.2	87.7	85.9	78.0	69.9	-41.9	-42.4	-42.8	-44.2	-46.8	-51.1	-59.8
3.162E-01	59.7	71.3	79.0	85.3	90.7	91.6	92.0	90.2	82.3	74.1	-42.5	-42.9	-43.3	-44.5	-47.2	-51.6	-50.8
3.981E-01	58.3	69.[illegible]	77.2	83.4	88.7	89.5	89.9	88.1	80.1	72.0	-43.3	-43.7	-43.8	-45.0	-47.6	-52.1	-61.9
5.012E-01	58.[illegible]	70.1	77.6	83.8	89.0	89.7	90.1	88.2	80.2	72.0	-44.3	-44.6	-44.5	-45.6	-48.2	-52.8	-63.3
6.310E-01	58.9	72.3	80.1	86.5	91.7	92.3	92.6	96.6	82.6	74.4	-45.7	-45.9	-45.5	-46.4	-48.9	-53.7	-65.0
7.943E-01	55.5	68.6	75.7	81.5	86.5	87.[illegible]	87.1	84.9	76.9	68.7	-47.6	-47.6	-46.8	-47.4	-49.9	-54.8	-67.0
1.000E+00	53.4	66.5	72.8	78.[illegible]	82.5	82.8	82.7	80.4	72.3	64.2	-50.0	-49.9	-48.4	-48.7	-51.1	-56.2	-69.4
1.259E+00	51.8	65.5	71.8	76.8	81.1	81.2	80.9	78.4	70.2	62.1	-52.9	-52.6	-50.5	-50.3	-52.6	-57.9	-72.2
1.585E+00	49.0	63.3	68.8	72.9	76.3	76.2	75.5	72.8	64.8	56.9	-56.1	-55.5	-52.7	-52.1	-54.3	-59.8	-75.6
1.995E+00	45.9	61.4	66.6	69.8	72.3	72.1	71.0	68.0	60.4	52.9	-58.8	-58.0	-54.7	-54.0	-56.2	-62.1	-79.7
2.512E+00	45.8	63.5	68.9	71.5	72.6	72.1	70.3	66.9	60.4	53.5	-60.0	-59.3	-56.1	-55.5	-58.1	-64.8	-84.8
3.162E+00	36.0	57.3	64.2	67.6	69.3	69.4	67.6	64.3	58.1	51.3	-60.6	-60.1	-57.3	-57.1	-60.3	-69.3	-91.8
3.981E+00	26.6	53.5	62.3	66.5	68.6	69.2	67.4	64.1	58.4	51.8	-61.3	-61.1	-58.9	-59.5	-63.7	-73.5	-102.5
5.012E+00	22.2	53.1	63.2	68.2	70.6	71.4	69.8	66.7	61.3	54.7	-60.3	-60.5	-59.1	-60.5	-65.6	-76.7	-109.3
6.310E+00	0.2	41.2	54.9	61.9	65.5	67.3	66.2	63.4	58.2	51.6	-61.5	-62.2	-62.6	-64.7	-71.7	-86.2	-128.6
7.943E+00	-28.4	27.4	46.2	55.6	60.6	63.1	62.6	60.3	55.2	48.6	-64.6	-66.0	-67.3	-71.7	-81.2	-100.6	-157.5
1.000E+01	-70.9	5.7	31.5	44.4	51.4	55.2	55.6	53.7	48.8	42.2	-70.6	-72.8	-75.7	-82.7	-95.2	-121.5	-199.0
XI (DEG)	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0	150.0	160.0	170.0
PNL (PNDB)	72.9	87.3	94.3	99.9	104.4	105.0	105.0	102.8	95.1	87.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TCPNL (PNDB)	74.9	88.7	95.9	101.3	105.7	106.4	106.3	104.2	96.4	88.4	0.0	0.8	0.0	0.0	0.0	0.0	0.0
T (SEC)	-9.9	-4.7	-2.8	-1.8	-1.1	-0.6	-0.1	0.3	0.7	1.2	1.7	2.3	3.0	4.1	5.7	8.9	18.1

EPNL* (EPNDB) = 97.9 BASED ON MIN/MAX PNL = 95.0, 105.0 PNDB AND TIME LIMITS = -2.7, 0.7 SEC
EPNL (EPNDB) = 99.3 BASED ON MIN/MAX TCPNL = 96.4, 106.4 PNDB AND TIME LIMITS = -2.7, 0.7 SEC

ENG.PERF.PARM.= 0.E+00 , RANGE AT CPA = 8.000E+02 FT, ELEV,ANGLE = 8.993E+01 DEG.

CASE NO. 3

PROGRAM TEE231
AIRCRAFT NOISE PREDICTION

BUZZSAW COMPARISON

747 FLYOVER T/O

DATE

39/12/73
MO/DA/YR

EXIT FAN NOISE
OBSERVED SPECTRA AT SIDELINE DISTANCE= 1.000E+00 FT

SOUND PRESSURE LEVELS
(DB RE. 200 PICOBAR)

FREQUENCY (KHZ)																	
5.012E-02	-55.2	-49.0	-45.3	48.5	56.1	63.1	67.8	70.2	72.3	73.1	73.7	73.1	70.1	66.5	61.1	52.4	41.2
6.310E-02	-55.6	-49.2	-45.5	49.4	57.0	64.0	68.7	71.1	73.2	74.1	74.7	74.8	71.0	67.5	62.0	53.2	41.8
7.943E-02	-56.1	-49.4	-45.6	50.3	57.9	65.0	69.6	72.0	74.1	75.0	75.6	74.9	72.0	68.4	62.9	54.0	42.2
1.000E-01	-56.7	-49.7	-45.7	51.2	58.8	65.9	70.5	72.9	75.0	75.9	76.5	75.8	72.9	69.3	63.8	54.8	42.7
1.259E-01	-57.3	-49.9	-45.9	52.1	59.7	66.8	71.4	73.8	75.9	76.8	77.4	76.7	73.8	70.2	64.6	55.5	43.1
1.585E-01	-58.0	-50.2	-46.1	53.0	60.6	67.6	72.3	74.7	76.8	77.6	78.2	77.6	74.7	71.1	65.5	56.3	43.4
1.995E-01	-58.7	-50.5	-46.3	53.8	61.5	68.5	73.1	75.5	77.6	78.4	79.0	78.4	75.5	72.0	66.3	57.0	43.7
2.512E-01	-59.5	-50.9	-46.6	54.6	62.3	69.3	74.0	76.3	78.4	79.2	79.8	79.2	76.4	72.8	67.0	57.6	43.9
3.162E-01	-60.4	-51.3	-46.9	55.4	63.1	70.1	74.7	77.0	79.1	80.0	80.5	79.9	77.2	73.6	67.8	58.2	44.0
3.981E-01	-61.5	-51.9	-47.3	56.0	63.7	70.7	75.3	77.6	79.7	80.5	81.1	80.5	77.9	74.3	68.4	58.7	43.9
5.012E-01	-62.8	-52.5	-47.8	56.6	64.3	71.3	75.9	78.2	80.2	81.0	81.6	81.1	78.5	74.9	69.0	59.2	43.6
6.310E-01	-64.3	-53.3	-48.5	57.0	64.7	71.7	76.2	78.5	80.5	81.3	81.9	81.4	79.0	75.5	69.5	59.5	43.1
7.943E-01	-66.2	-54.3	-49.3	57.3	65.0	71.8	76.4	78.6	80.5	81.3	81.9	81.5	79.2	75.8	69.8	59.6	42.2
1.000E+00	-68.3	-55.5	-50.4	57.3	64.9	71.7	76.2	78.3	80.2	81.0	81.6	81.3	79.3	76.0	69.9	59.5	41.1
1.259E+00	-70.8	-57.1	-51.8	57.0	64.6	71.3	75.6	77.7	79.5	80.3	80.9	80.7	79.0	75.9	69.8	59.1	39.6
1.585E+00	-73.9	-59.0	-53.5	56.4	63.9	70.6	74.8	76.7	78.6	79.3	79.9	79.8	78.6	75.6	69.5	58.4	37.4
1.995E+00	-77.8	-61.3	-55.4	55.7	63.3	69.8	74.0	75.9	77.6	78.3	78.9	78.9	78.0	75.2	68.9	57.3	34.6
2.512E+00	-83.0	-64.0	-57.4	62.7	70.4	77.0	79.7	81.6	83.3	84.7	85.3	85.3	85.2	81.5	74.9	63.4	39.0
3.162E+00	-90.1	-67.7	-59.9	54.4	62.3	69.2	73.5	75.4	77.2	77.8	78.3	78.2	77.1	73.9	66.8	53.4	24.6
3.981E+00	-101.0	-73.1	-63.6	53.0	61.4	68.6	73.1	75.1	76.9	77.6	78.0	77.6	76.2	72.5	64.5	49.2	15.1
5.012E+00	-108.0	-76.4	-65.5	56.4	65.3	72.8	76.6	78.8	80.7	81.7	82.1	81.5	80.0	75.2	66.4	53.4	13.3
6.310E+00	-127.5	-85.9	-71.5	47.4	57.4	65.5	70.7	73.2	75.2	75.8	76.0	74.9	71.9	66.4	55.9	36.1	-11.4
7.943E+00	-156.7	-111.3	-81.1	43.1	54.6	63.6	68.3	71.2	73.4	74.4	74.3	72.6	68.9	61.3	48.4	24.3	-37.1
1.000E+01	-198.3	-121.2	-95.0	31.2	44.6	54.9	60.5	63.8	66.1	67.0	66.5	64.0	58.9	49.3	33.0	2.0	-80.0
XI (DEG)	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0	150.0	160.0	170.0
PNL (PNDB)	0.0	0.0	0.0	82.5	90.5	97.5	101.2	103.3	105.2	106.2	106.8	106.4	105.2	101.5	94.7	82.9	60.5
TCPNL (PNDB)	0.0	0.0	0.0	85.0	93.1	100.0	103.2	105.2	107.1	108.5	109.0	108.7	107.8	103.8	97.0	85.6	63.7
T (SEC)	-9.9	-4.7	-2.8	-1.8	-1.1	-0.6	-0.1	0.3	0.7	1.2	1.7	2.3	3.0	4.1	5.7	8.9	18.1

EPNL*(EPNDB) = 101.8 BASED ON MIN/MAX PNL = 96.8, 106.8 PNDB AND TIME LIMITS = -0.7, 5.2 SEC
EPNL (EPNDB) = 104.0 BASED ON MIN/MAX TCPNL = 99.0, 109.0 PNDB AND TIME LIMITS = -0.7, 5.2 SEC

ENG.PERF.PARM.= 0.E+00 , RANGE AT CPA = 8.000E+02 FT, ELEV.ANGLE = 8.993E+01 DEG.

CASE NO. 4

PROGRAM TEE231
AIRCRAFT NOISE PREDICTION

BUZZSAW COMPARISON

DATE 09/12/73

F L I G H T   P A T H / O B S E R V E R   G E O M E T R Y

AIRPORT ALTITUDE = 0.E+00 FT

AIRCRAFT MACH NUMBER = 2.928E-01 , CLIMB GRADIENT = 0.E+00 FOR (Z .GT. ZR)
AIRCRAFT HEIGHT (Z0) = 8.000E+02 FT AT T = 0. OBSERVER HEIGHT (ZR) = 0.E+00 FT
SPEED OF SOUND = 1.112E+03 FPS AT (Z0) , SPEED OF SOUND = 1.114E+03 FPS AT (ZR)
AVERAGE SPEED OF SOUND = 1.114E+03 FPS FOR SOUND PROPAGATION OVER RANGE (P)

SIDELINE DISTANCE (X) = 1.000E+00 FT

TIME (SEC) SOUND REC.	TIME (SEC) SOUND EMIT.	ANGLE XI (DEG.)	A/C COORDINATES Y (FT)	A/C COORDINATES Z (FT)	PROPAGATION DISTANCE P (FT)	DP/P FOR GRD.REFLX.	ANGLES FOR NOISE EXTRAPOLATION BETA 1 (DEG.)	BETA 2 (DEG.)
-9.8	-14.6	10.	-4.537E+03	8.000E+02	4.607E+03	0.E+00	1.000E+01	1.000E+01
-4.7	-6.8	20.	-2.190E+03	8.000E+02	2.339E+03	0.E+00	2.000E+01	2.000E+01
-2.8	-4.3	30.	-1.386E+03	8.000E+02	1.600E+03	0.E+00	3.000E+01	3.000E+01
-1.8	-2.9	40.	-9.534E+02	8.000E+02	1.245E+03	0.E+00	4.000E+01	4.000E+01
-1.1	-2.1	50.	-6.713E+02	8.000E+02	1.044E+03	0.E+00	5.000E+01	5.000E+01
-0.6	-1.4	60.	-4.619E+02	8.000E+02	9.238E+02	0.E+00	6.000E+01	6.000E+01
-0.1	-0.9	70.	-2.912E+02	8.000E+02	8.513E+02	0.E+00	7.000E+01	7.000E+01
0.3	-0.4	80.	-1.411E+02	8.000E+02	8.123E+02	0.E+00	8.000E+01	8.000E+01
0.7	0.0	90.	-0.E+00	8.000E+02	8.000E+02	0.E+00	8.997E+01	8.997E+01
1.2	0.4	100.	1.411E+02	8.000E+02	8.123E+02	0.E+00	8.000E+01	8.000E+01
1.7	0.9	110.	2.912E+02	8.000E+02	8.513E+02	0.E+00	7.000E+01	7.000E+01
2.3	1.4	120.	4.619E+02	8.000E+02	9.238E+02	0.E+00	6.000E+01	6.000E+01
3.0	2.1	130.	6.713E+02	8.000E+02	1.044E+03	0.E+00	5.000E+01	5.000E+01
4.1	2.9	140.	9.534E+02	8.000E+02	1.245E+03	0.E+00	4.000E+01	4.000E+01
5.7	4.3	150.	1.386E+03	8.000E+02	1.600E+03	0.E+00	3.000E+01	3.000E+01
8.9	6.8	160.	2.190E+03	8.000E+02	2.339E+03	0.E+00	2.000E+01	2.000E+01
18.1	14.6	170.	4.537E+03	8.000E+02	4.607E+03	0.E+00	1.000E+01	1.000E+01

CAS NO. 5

PROGRAM TFE231
AIRCRAFT NOISE PREDICTION

BUZZSAW COMPARISON

NOISE EXTRAPOLATION CORRECTIONS

DATE
09/12/73
MO/DA/YR

SPHERICAL DIVERGENCE (APPLYS TO ALL PASSBANDS)

SOUND PRESSURE LEVEL ATTENUATION (DB)

X (FT)																	
1.000E+00	62.9	57.1	53.8	51.6	50.1	49.0	48.3	47.9	47.7	47.9	48.3	49.0	50.1	51.6	53.8	57.1	62.9
ANGLE XI (DEG)	10.	20.	30.	40.	50.	60.	70.	80.	90.	100.	110.	120.	130.	140.	150.	160.	170.

ATMOSPHERIC ABSORPTION FOR X = 1.000E+00 FT

SOUND PRESSURE LEVEL ATTENUATION (DB)

FREQUENCY (KHZ)																	
5.012E-02	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3
6.310E-02	0.4	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.4
7.943E-02	0.5	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.5
1.000E-01	0.7	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.7
1.259E-01	0.8	0.4	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	[illegible]	0.8
1.585E-01	1.0	0.5	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.5	1.0
1.995E-01	1.3	0.7	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.6	0.5	0.7	1.3
2.512E-01	1.7	0.8	0.6	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.6	0.9	1.7
3.162E-01	2.1	1.1	0.7	0.6	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.6	0.7	1.1	2.1
3.981E-01	2.6	1.3	0.9	0.7	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.7	0.9	1.3	2.6
5.012E-01	3.3	1.7	1.2	0.9	0.8	0.7	0.6	0.6	0.6	0.6	0.6	0.7	0.8	0.9	1.2	1.7	3.3
6.310E-01	4.2	2.1	1.5	1.1	1.0	0.8	0.8	0.7	0.7	0.7	0.8	0.8	1.0	1.1	1.5	2.1	4.2
7.943E-01	5.3	2.7	1.8	1.4	1.2	1.1	1.0	0.9	0.9	0.9	1.0	1.1	1.2	1.4	1.8	2.7	5.3
1.000E+00	6.7	3.4	2.3	1.8	1.5	1.3	1.2	1.2	1.2	1.2	1.2	1.3	1.5	1.8	2.3	3.4	6.7
1.259E+00	8.5	4.3	3.0	2.3	1.9	1.7	1.6	1.5	1.5	1.5	1.6	1.7	1.9	2.3	3.0	4.3	8.5
1.585E+00	10.9	5.5	3.8	2.9	2.5	2.2	2.0	1.9	1.9	1.9	2.0	2.2	2.5	2.9	3.8	5.5	10.9
1.995E+00	14.4	7.3	5.0	3.9	3.3	2.9	2.7	2.5	2.5	2.5	2.7	2.9	3.3	3.9	5.0	7.3	14.4
2.512E+00	19.5	9.9	6.8	5.3	4.4	3.9	3.6	3.4	3.4	3.4	3.6	3.9	4.4	5.3	6.8	9.9	19.5
3.162E+00	26.7	13.5	9.3	7.2	6.0	5.3	4.9	4.7	4.6	4.7	4.9	5.3	6.0	7.2	9.3	13.5	26.7
3.981E+00	37.5	19.1	13.0	10.1	8.5	7.5	6.9	6.6	6.5	6.6	6.9	7.5	8.5	10.1	13.0	19.1	37.5
5.012E+00	44.8	22.7	15.6	12.1	10.2	9.0	8.3	7.9	7.8	7.9	8.3	9.0	10.2	12.1	15.5	22.7	44.8
6.310E+00	64.5	32.7	22.4	17.4	14.5	12.9	11.9	11.4	11.2	11.4	11.9	12.9	14.6	17.4	22.4	32.7	64.5
7.943E+00	93.8	47.6	32.6	25.3	21.3	18.8	17.3	16.5	16.7	16.5	17.3	18.8	21.3	25.3	32.6	47.6	93.8
1.000E+01	135.6	68.9	47.1	36.6	30.7	27.2	25.1	23.9	23.6	23.9	25.1	27.2	30.7	36.5	47.1	68.9	135.6
ANGLE XI (DEG)	10.	20.	30.	40.	50.	60.	70.	80.	90.	100.	110.	120.	130.	140.	150.	160.	170.

PROGRAM TEE231
AIRCRAFT NOISE PREDICTION

BUZZSAW COMPARISON

NOISE EXTRAPOLATION CORRECTIONS

DATE 30/12/73 MO/DA/YR

CASE NO. 5

EXTRA-GROUND-ATTENUATION FOR X = 1.000E+03 FT

SOUND PRESSURE LEVEL ATTENUATION (DB)

FREQUENCY (KHZ) \ ANGLE XI (DEG)	10.	20.	30.	40.	50.	60.	70.	80.	90.	100.	110.	120.	130.	140.	150.	160.	170.
5.012E-02	0.9	0.7	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.7	0.9
6.310E-02	1.2	0.9	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.9	1.2
7.943E-02	1.6	1.0	0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	1.0	1.6
1.000E-01	2.0	1.1	0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	1.1	2.0
1.259E-01	2.5	1.3	0.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.6	1.3	2.5
1.585E-01	2.9	1.4	0.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.6	1.4	2.9
1.995E-01	3.3	1.5	0.7	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.7	1.5	3.3
2.512E-01	3.8	1.7	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.8	1.7	3.8
3.162E-01	4.2	1.9	0.9	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.9	1.9	4.2
3.981E-01	4.7	2.0	0.9	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.9	2.0	4.7
5.012E-01	5.3	2.2	1.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.0	2.2	5.3
6.310E-01	5.9	2.4	1.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.1	2.4	5.9
7.943E-01	6.5	2.5	1.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.2	2.5	6.5
1.000E+00	7.1	2.7	1.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.3	2.7	7.1
1.259E+00	7.6	3.0	1.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.4	3.0	7.6
1.585E+00	8.1	3.2	1.5	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.5	3.2	8.1
1.995E+00	8.3	3.2	1.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.6	3.2	8.3
2.512E+00	8.3	3.2	1.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.6	3.2	8.3
3.162E+00	8.3	3.2	1.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.6	3.2	8.3
3.981E+00	8.3	3.2	1.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.6	3.2	8.3
5.012E+00	8.3	3.2	1.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.6	3.2	8.3
6.310E+00	8.3	3.2	1.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.6	3.2	8.3
7.943E+00	8.3	3.2	1.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.6	3.2	8.3
1.000E+01	8.3	3.2	1.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.6	3.2	8.3

GROUND REFLECTION FOR X = 1.000E+00 FT

GROUND REFLECTION = -3 DB ATTENUATION OR +3 DB CORRECTION FOR ALL PASSBANDS.

PROGRAM TEE231
AIRCRAFT NOISE PREDICTION

DATE
09/12/73
MO/DA/YR

CASE NO. 6

BUZZSAW COMPARISON

TOTAL NOISE (ALL COMPONENTS)
INDEX, FREE-FIELD SPECTRA (R = 1 M)

SOUND PRESSURE LEVELS
(DB RE. 20E PICOPAR)

FREQUENCY (KHZ)																	
5.012E-02	114.1	114.6	113.9	113.9	114.2	115.1	115.5	116.0	117.3	118.1	119.1	119.1	117.2	115.3	112.3	107.3	112.4
6.310E-02	115.1	115.0	114.9	115.0	115.4	116.2	116.6	117.1	118.2	119.1	120.0	120.1	118.2	115.3	113.3	108.3	113.3
7.943E-02	116.1	116.0	115.9	116.1	116.8	117.5	117.9	118.2	119.2	120.0	121.0	121.0	119.1	117.2	114.3	109.3	114.3
1.000E-01	117.1	117.6	117.1	117.6	118.8	119.3	119.7	119.6	120.2	120.9	121.9	121.9	120.1	118.2	115.3	110.3	115.3
1.259E-01	118.2	118.2	118.6	119.6	121.5	121.8	122.0	121.5	121.2	121.9	122.8	122.9	121.0	119.2	116.2	111.3	116.3
1.585E-01	119.4	119.7	120.6	122.4	125.1	125.2	125.2	124.1	122.4	122.8	123.7	123.8	122.0	120.1	117.2	112.3	117.3
1.995E-01	121.0	121.8	123.4	126.1	129.3	129.2	129.1	127.5	124.0	123.8	124.5	124.6	122.9	121.1	118.2	113.3	118.3
2.512E-01	123.0	124.6	127.1	130.2	133.7	133.5	133.4	131.5	126.2	124.9	125.4	125.5	123.8	122.0	119.2	114.2	119.3
3.162E-01	126.0	128.3	131.3	134.6	138.2	138.0	137.7	135.6	129.1	126.2	126.2	126.3	124.7	122.9	120.1	115.2	110.2
3.981E-01	125.5	127.3	129.8	132.9	136.3	136.0	135.8	133.7	129.1	126.4	126.3	127.0	125.5	123.9	121.0	115.2	111.2
5.012E-01	126.5	128.1	130.5	133.5	136.8	136.4	136.1	134.0	128.5	127.0	127.5	127.7	126.3	124.7	121.9	117.1	112.2
6.310E-01	128.9	130.8	133.4	136.4	139.7	139.1	138.7	136.4	130.1	127.7	127.9	128.2	126.9	125.5	122.8	118.0	113.1
7.943E-01	127.3	127.8	129.4	131.8	134.7	134.0	133.6	131.5	127.7	127.3	128.1	128.5	127.5	126.1	123.6	118.9	114.1
1.000E+00	127.1	126.6	127.1	128.7	131.0	130.3	129.9	128.4	126.7	127.1	128.1	128.5	127.8	126.7	124.3	119.7	114.8
1.259E+00	127.8	126.8	126.8	128.0	130.0	129.1	128.7	127.2	126.1	126.6	127.7	128.3	127.9	127.2	124.9	123.4	115.6
1.585E+00	128.3	125.9	124.7	124.7	125.9	125.2	125.3	124.8	125.2	126.0	127.1	127.8	128.0	127.5	125.5	121.1	116.4
1.995E+00	128.5	125.9	123.8	122.7	123.0	122.8	123.5	123.8	124.8	125.6	126.7	127.6	128.2	128.0	126.2	121.9	117.2
2.512E+00	133.5	130.5	127.9	126.2	126.0	128.0	128.9	129.8	131.3	132.9	134.0	135.0	136.5	135.7	133.9	130.5	125.7
3.162E+00	131.9	128.1	125.7	123.8	123.0	123.5	124.5	125.1	126.4	127.2	128.4	129.3	130.1	133.1	123.4	124.2	119.5
3.981E+00	132.4	129.8	127.5	125.7	124.7	125.2	126.2	126.8	128.1	128.9	130.0	131.8	131.7	131.6	123.8	125.5	120.8
5.012E+00	135.2	133.8	131.0	129.5	128.8	130.0	130.8	131.7	133.1	134.4	135.5	136.3	137.1	136.2	134.3	130.4	125.2
6.310E+00	132.9	131.1	129.6	128.4	127.7	128.3	129.1	129.8	131.2	132.0	133.1	133.7	133.5	132.8	133.6	126.1	121.3
7.943E+00	133.7	132.3	131.0	130.1	129.8	131.1	131.9	132.9	134.4	135.7	136.8	137.3	137.2	135.6	133.3	129.2	125.0
1.000E+01	132.9	131.9	130.8	130.1	130.0	131.2	132.8	132.9	134.4	135.8	136.8	137.2	136.7	134.9	132.4	128.2	123.5
ANGLE XI (DEG)	10.	20.	30.	40.	50.	60.	70.	80.	90.	100.	110.	120.	130.	140.	150.	160.	170.

SIDELINE DISTANCE = 1.000E+00 FT

PROGRAM TEE231
AIRCRAFT NOISE PREDICTION

DATE
39/12/73
MO/DA/YR

CASE NO. 7

CASE SEVEN

TOTAL NOISE (ALL COMPONENTS)

XI (DEG)	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0	150.0	160.0	170.0
PNL (PNDB)	72.7	86.6	93.7	99.1	103.7	104.9	105.8	105.3	105.1	105.6	106.1	105.8	104.9	101.2	94.5	82.8	63.5
TCPNL (PNDB)	74.7	88.0	95.2	100.5	105.1	106.8	107.6	107.2	107.0	107.8	108.3	108.9	107.3	103.5	96.9	85.4	63.6
T (SEC)	-9.9	-4.7	-2.8	-1.8	-1.1	-0.6	-0.1	0.3	0.7	1.2	1.7	2.3	3.0	4.1	5.7	8.9	19.1

EPNL*(EPNDB) = 102.7 BASED ON MIN/MAX PNL = 96.1, 106.1 PNDB AND TIME LIMITS = -2.4, 5.3 SEC
EPNL (EPNDB) = 104.8 BASED ON MIN/MAX TCPNL = 98.3, 108.3 PNDB AND TIME LIMITS = -2.2, 5.3 SEC

ENG.PERF.PARM.= 0.E+00 , RANGE AT CPA = 8.000E+02 FT, ELEV.ANGLE = 8.993E+01 DEG.

```
                                        PROGRAM TEE231                                              DATE
                                   AIRCRAFT NOISE PREDICTION
                                                                                                    09/12/73
                                                                                                    MO/DA/YR
CASE NO.   7                      CASE SEVEN

                                  ASSUMPTIONS FOR NOISE PREDICTION

1) GEOMETRIC-MEAN PASSBAND FREQUENCIES (KHZ)
   5.012E-02 6.310E-02 7.943E-02 1.000E-01 1.259E-01 1.585E-01 1.995E-01 2.512E-01 3.162E-01 3.981E-01 5.012E-01 6.310E-01
   7.943E-01 1.000E+00 1.259E+00 1.585E+00 1.995E+00 2.512E+00 3.162E+00 3.981E+00 5.012E+00 6.310E+00 7.943E+00 1.000E+01

2) ATMOSPHERIC ABSORPTION COEFFICIENTS (DB /1000 FT)
         0.07      0.09      0.11      0.14      0.18      0.23      0.29      0.36      0.45      0.57      0.72      0.91
         1.15      1.46      1.85      2.36      3.14      4.22      5.79      8.15      9.72     14.00     20.37     29.44

3) ATMOSPHERIC CONDITIONS
     INTERNATIONAL STANDARD ATMOSPHERE

4) ITEMS CONSIDERED IN NOISE EXTRAPOLATION
   A) SPHERICAL DIVERGENCE  ................  YES
   B) ATMOSPHERIC ABSORPTION  ...............  YES
   C) EXTRA-GROUND ATTENUATION  .............  YES
      SOUND PROPAGATION IS DOWNWIND (10  MPH).
   D) GROUND REFLECTION  ....................  NO
      3 DB ADDED TO FREE FIELD SPECTRA INSTEAD.
                                                        NO. OF TIMES
5) NOISE COMPONENTS CONSIDERED
   A) COMPRESSOR AND INLET FAN      MODULE                   1
   B) EXIT FAN                      MODULE                   1
```

3.4 Machine Requirements

This program is designed to operate on the IBM System 360 or 370. Approximately 230K decimal bytes are required for operation. Data input is through cards, tape or disc card image records. Output is to a line printer. Should the optional file of noise data versus a prescribed engine performance parameter, elevation angle and $\log_{10}$ of the range at CPA be desired, files (TAPE20, TAPE21) must be available as scratch files and file (TAPE22) which contains the data subroutine is used for card output.

3.5 Operating System

The program has been checked out under the MVT operating system on the IBM370-155H and the TSS system on the IBM 360/67.

3.6 Resource Estimates

The central processor (CP) time required to process a job depends upon which program options are used. The major factors influencing the time per case are:

1. The number of noise components included in the description of the noise source.
2. 1/1 or 1/3 octave bands for predicted noise spectra (the 1/3 octave band option uses approximately twice as much CP time).
3. Number of sideline observer positions.
4. Lining attenuation and configuration corrections.
5. Optional output reports.

Several runs were made during the final checkout stages of the program. The following times are average estimates of the CP time per noise component for a single sideline position with no lining attenuation or configuration corrections, but with all the optional reports written.

Noise Type	CP Time - Sec.
Jet	8.0
Core and Turbine	7.0
Inlet Fan	4.5
Aft Fan	4.5
Augmentor Wing	5.0
Blown Flap	6.0
Lift Fan	5.0
Ejector-Suppressor	5.0
Propeller	7.0
Helicopter	7.0

Lining attenuation and configuration corrections add approximately 10% to these figures.

3.7 Diagnostics

The following is a list of the diagnostic messages which are printed when various error conditions are detected by the program.

1. TØØ MANY ENTRIES IN ALTITUDE VS TEMPERATURE TABLE. MAXIMUM ALLØWED IS FIFTY. ISA ATMØSPHERE IS ASSUMED.

2. TØØ MANY ENTRIES IN ALTITUDE VS PRESSURE TABLE. MAXIMUM ALLØWED IS FIFTY. ISA ATMØSPHERE IS ASSUMED.

3. TØØ MANY ENTRIES IN ALTITUDE VS RELATIVE HUMIDITY TABLE. MAXIMUM ALLØWED IS FIFTY. ISA ATMØSPHERE IS ASSUMED.

4. ALTITUDE VS TEMPERATURE TABLE IS UNDEFINED. MUST HAVE AT LEAST TWØ ENTRIES. ISA ATMØSPHERE IS ASSUMED.

5. ALTITUDE VS PRESSURE TABLE IS UNDEFINED. MUST HAVE AT LEAST TWØ ENTRIES. ISA ATMØSPHERE IS ASSUMED.

6. ALTITUDE VS RELATIVE HUMIDITY TABLE IS UNDEFINED. MUST HAVE AT LEAST TWØ ENTRIES. ISA ATMØSPHERE IS ASSUMED.

7. EFFECTIVE TIP MACH NUMBER ØUT ØF RANGE (GT 0.93 ØR LT 0.) ØR BAD INPUTS.

8. TØØ MANY TARGET FREQUENCIES SPECIFIED FØR LINING. ØNLY FIRST TEN ARE USED.

9. TØØ MANY WALLS SPECIFIED IN FAN LINING. ØNLY FIRST TEN ARE USED.

10. NØ WALLS HAVE BEEN DEFINED FØR FAN LINING.

11. ERRØR WRITING RANDØM FILE JØB ABØRT.

12. ERRØR READING RANDØM FILE JØB ABØRT.

13. ***FATAL ERRØR***BAD GEØMETRY.

4.0 NOISE CONTOUR COMPUTER PROGRAMS

Two Fortran IV programs are provided to compute noise contours based on the procedures defined in section 5.3 of Reference 1: an IBM 360 version for "batch" processing and a SIGMA VII version for "real time" processing with the NASA-Ames flight simulator. The computation procedures for the two programs are the same-only the input-output controls differ. The SIGMA VII version has been written to conform to the flight simulator requirements and is used by means of a subroutine call. During the initialization stage of the flight simulator, the program needs no input other than the acoustic data routine generated by the noise prediction computer program or an equivalent set of data. In this stage, tables for the acoustic data functions are generated in the core of the SIGMA VII computer. During the flight simulation stage, input to and output from the program is by a list of arguments in the subroutine call. Printing or plotting of input/output variables is handled by the calling program.

The IBM 360 version has been written to function in a stand-alone manner. The acoustic data is input in the same manner as the SIGMA VII version via a data routine. Additional input variables for initializing and defining aero/propulsion parameters during an aircraft's flight are specified on cards. The output from the program is a printed listing of the results and optional magnetic tape(s) for CALCOMP plotting. Sample cases are given in sections 4.7 and 4.8.

4.1 Usage of the SIGMA VII Noise Contour Program

The use of the program is made by a subroutine call as shown below. The acoustic data routine generated by the noise source computer program or its equivalent must be included as part of the contour program during compilation and loading into the SIGMA VII system. For best results these data should correspond to the conditions outlined in Table 11 of reference 1.

```
CALL VALUES(IMØDE,NLS,NLF,XF,YF,Z,SCI,DE,EPP,SD,X1,X2,Y1,Y2,SUM,SLNL,IEC)
```

The input arguments are:

IMØDE	Indicator to denote the state of the simulator IMØDE = -1 for initialization state = 0 for hold state = 1 for flight simulation processing state.
NLS,NLF	Indices denoting the noise levels for the first and last noise contour. The user has the option of selecting up to five noise levels: 85, 90, 95, 100, and 105. These levels are set internally in the program through a DATA statement in subroutine DATAIN for the variable array ANS. The variables NLS and NLF act as pointers in the ANS array, and the output arrays(X1,X2,Y1,Y2,SUM, IEC). For example, if NLS = 2, and NLF = 4, the noise contours having values of 90, 95 and 100 will be computed. RESTRICTION: 1 ≤ NLS ≤ NLF ≤ 5.
XF,YF,Z	Aircraft coordinates(X,Y,Z) in figure 77 in Ref. 1. The units for distance must be the same as those used to form the acoustic data in the noise source computer program.
SCI	Directivity angle in degrees for maximum passby noise (see ψ in Figure 77 of Ref. 1).
DE	Engine attitude angle in degrees relative to horizon. (see δ_E in Figure 77 of Ref. 1).
EPP	Engine performance parameter.
SD	Sideline[2] distances for U in Figure 77 in Ref. 1 for maximum passby noise estimates. The number of values for SD is counted by the contour program with the restriction: 1 ≤ SD ≤ 10 000.

The output arguments are:

X1,Y1	Coordinates[1] for each contour on the positive side of the flight track.
X2,Y2	Coordinates[1] for each contour on the negative side of the flight track.
SUM	Accumulated area[1] inside each contour.
SLNL	Maximum[2] passby noise level estimates at the sideline distances U = SD (see above and Figure 77 in Ref. 1).
IEC	Error Code[1] Array = -1 indicates no error = 0 indicates present contour has closed = 1 indicates directivity cone does not intersect ground plane at predicted distance, hence no solution possible.

1 These variables must be dimensioned(length=5) in the calling routine. The results are stored consecutively from the NLS element to the NLF element of each array.

2 These arrays must be dimensioned(length=3) in the calling routine.

4.2 USAGE OF THE IBM 360 NOISE CONTOUR PROGRAM

The deck stacking instructions for using the IBM 360 noise contour program are listed below. The acoustic data routine generated by the noise source computer program's post processor (Ref. 2) or its equivalent must be included as part of the contour program during compilation and loading into the IBM 360 system.

4.2.1 Initialization Parameters

Card No. 1 — Normally the first 3 columns of this card are blank; the remainder may be used for comment. However, if the user wishes to check his output before using the CALCØMP plotter, he should run his job with the program option IPLØT = -1. This option directs the program to save the output on a data tape, file TAPE 2, to be used later in preparing a plot tape. The user may then check his printout and resubmit the job to the IBM 360 with a "-1" punched in columns 2 and 3 of this card. The only additional input needed will be the three cards (No. A, B, and C) defining the plotting options (see page 48).

If the first 3 columns of card No. 1 are blank, the following Namelist &DIGINT parameters are required for initialization of the program variables. The same procedure for Fortran Namelist as specified in section 3.0 is to be used except the Namelist name is a &DIGINT instead of &GDATA or &NØISIN.

Variable Name	Units	Default Value	Description
NL		5	The maximum number of noise contours to be calculated for each flight path. RESTRICTION: $1 \le NL \le 5$.
ANL(1)	EPNdB (PNdB)	85	The noise levels applying to each contour.
ANL(2)	" "	90	
ANL(3)	" "	95	
ANL(4)	" "	100	
ANL(5)	EPNdB (PNdB)	105	
IUNIT		0	Specifies the units for distance input and output IUNIT = 0 for MKS units = 1 for English units.
IPNDB		0	Specifies the units for noise levels input and output IPNDB = 0 for EPNdB = 1 for PNdB.

Variable Name	Units	Default Value	Description
IPLØT	—	0	Specifies if tapes are to be prepared for CALCØMP plotting. IPLØT = -1 for preparing contour point data tape = 0 for printout only. = 1 for preparing complete plot tape.

4.2.2 Aero/Propulsion Parameters

If the first 3 columns of card No. 1 are blank, the following set of data cards are required immediately after the Namelist &DIGINT parameters. For multiple flight paths, this data set is to be repeated.

Title Card	Format (18A4)
Variable Name	Description
TITLE	Title card for each flight path case. NOTE: The maximum number of characters is 72.

After the title card, the following Namelist &DIGSIM parameters are to be specified. The same procedure for Fortran Namelist as shown in section 3.0 is to be used except the Namelist name is &DIGSIM instead of &GDATA.

Variable Name	Units	Default Value	Description
DSCI	degrees	110	Directivity angle for maximum passby noise.
SD(1) SD(2) SD(3)	m(ft) m(ft) m(ft)	1.0 152.4 463.3	Sideline distance U in figure 77 in Ref. 1 passby noise estimate. RESTRICTION: 1 ≤ SD ≤ 10 000.
NSL		3	Number of sideline distance values. RESTRICTION: 1 ≤ NSL ≤ 3

If the user does not wish to have all (NL) contours specified in section 4.2.1 calculated for this flight path, he is able to specify the subset of the ANL array to be used:

Variable Name	Default Value	Description
NLS NLF	1 NL	Indices denoting the noise levels for the first and last noise contour to be calculated for this flight path. The variables (NLS, NLF) act as pointers in the ANS array specified in section 4.2.1. RESTRICTION: $1 \leq NLS \leq NLF \leq NL$ EXAMPLE: Suppose the values for ANL are 80, 90, 100, 110 with NL = 4, and we want only the 90, 100 EPNdB contours for this flight path. Then the values to be specified for NLS and NLF are NLS = 2, NLF = 3.

The program permits the user to specify the aero/propulsion parameters in two ways. The first method lets the user define the parameters in a tabular function form and the increment at which noise levels are to be computed. The second lets the user define the discrete points along the flight path where contour points are to be calculated.

Method 1

Variable Name	Units	Default Value	Description
NFPP		25	Number of points along the flight track where noise contour points are to be calculated. RESTRICTION: $2 \leq NFPP \leq 100$.
DS	m (ft)		Step size along flight track for computing contour points, i.e., distance between flight path points (X_i, Y_i) and (X_{i+1}, Y_{i+1}) shown in figure 77. These coordinates are obtained by linear interpolation on the prescribed flight path.
ND			Number of points defining the flight path. RESTRICTION: $2 \leq ND \leq 20$.
DDX(1)	m (ft)		Array of X coordinates (figure 77 in Ref.1) for flight path.
...	...		
DDX(ND)	m (ft)		
DDY(1)	m (ft)		Array of Y coordinates (figure 77 in Ref. 1) for flight path corresponding to DDX values.
...	...		

Variable Name	Units	Default Value	Description
DDY(ND)	m (ft)		
DDZ(1) ... DDZ(ND)	m (ft) ... m (ft)		Array of Z coordinates (figure 77 in Ref. 1 for flight path, corresponding to DDX, DDY values.
DDDE(1) ... DDDE(ND)	degrees ... degrees		Array of engine attitude angles for defined positions along flight path.
DDEPR(1) ... DDEPR(ND)			Array of engine performance parameters for defined positions along flight path.
Method 2			
NFPP			Number of points along the flight track where noise contour points are to be calculated. RESTRICTION: 2 ≤ NFPP ≤ 100.
DX(1) ... DX(NFPP)	m (ft) ... m (ft)		Array of X coordinates (figure 77 in Ref. 1 for flight path.
DY(1) ... DY(NFPP)	m (ft) ... m (ft)		Array of Y coordinates (figure 77 in Ref. 1 for flight path.
DZ(1) ... DZ(NFPP)	m (ft) ... m (ft)		Array of Z coordinates (figure 77 in Ref. 1 for flight path.
DDE(1) ... DDE(NFPP)	degrees ... degrees		Array of engine attitude angles for points along flight path.
DEPR(1) ... DEPR(NFPP)			Array of engine performance parameters points along flight path.
ISTØP		0	An indicator to denote if this is the last flight path to be considered. ISTØP = 0 denotes to do another case; = 1 denotes that this is the last case.

NOTE: This completes the list of &DIGSIM parameters. For multiple flight paths, the title card and the &DIGSIM parameter input are to be repeated.

Optional Cards A,B,C

These cards are used to describe the plot output if desired. Two means are provided. First, the recommended way will be discussed. The user submits a job to the computer with IPLØT=-1 and cards A, B, C described below are omitted from the data deck. The printout is checked for errors. If no errors are found, a second job is submitted to the computer with card No. 1 having a "-1" punched in columns 2 and 3, and cards A, B, C are included in the data deck (only four cards). In this way, the number of plot tapes or bad plots can be reduced. The second method assumes that the user's data deck contains no errors. Only one job is submitted to the computer with IPLØT=+1 and cards A,B,C inserted after the last set of &DIGSIM cards. If errors are present in the data deck, bad plot tapes or plots result. This last option is provided to handle "rush" jobs when computer "turnaround" time is considered excessive to run two separate jobs.

Card A Format (3F10.0,3X,A2,5X,A4,5X,2A4)

Variable Name	Column No.	Description
SCALV	1-10	Desired scale in units of distance per centimeter. If omitted, the scale will be computed to plot contours within the specified plot dimensions below.
XLENM	11-20	Maximum size of the plot along the width(shortest side) of the paper. NOTE: The units for XLENM are specified by the variable DUNITS and the size of the plot must be less than or equal to the width of the plotter. The X direction shown in figure 77 of Ref. 1 corresponds to this dimension.
YLENM	21-30	Same as XLENM except along the length (longest side) of the paper. NOTE: This dimension must be less than or equal to the length of the plotter. The Y direction shown in figure 77 of Ref. 1 corresponds to this dimension.
DUNITS	34-35	Units used to specify XLENM and YLENM. Input "IN" for inches or "CM" for centimeters.
AXUNIT	41-44	A four-character lable for the units of the plotted distances X and Y.
NLABEL	50-57	An eight-character label for the units of noise level. The character string should be left-adjusted in the eight-character positions.

Card B Format (10A4)

LABELX	Label for the X axis of the contour plot. The character string should be left-adjusted in the 40-character positions.

Card C Format (10A4)

LABELY	Same as LABELX on card B, except it applies to the Y axis.

4.3 MACHINE REQUIREMENTS

The IBM 360 version of the noise contour program requires 110 K decimal bytes for field length. Program input is done by the card reader. The output is a listing done by the printer. If the plot option IPLØT = ±1, a file TAPE 2 is written containing the noise contour data. If IPLØT = 1, a complete plot file TAPE is prepared for offline processing on the CALCØMP plotter.

The SIGMA VII version of the noise contour program requires approximately 8 K decimal (32 bit) computer words for field length. Input/output is done through a list of arguments in the subroutine calling sequence. Any printing, plotting, or display of results is to be done by the NASA-Ames flight simulator.

4.4 OPERATING SYSTEM(S)

One version of the noise contour program is designed to operate on the IBM 360/67 or IBM 360-75W computer systems. A second version of the program has been prepared to operate on the SIGMA VII computer system of the NASA-Ames flight simulator.

4.5 RESOURCE ESTIMATES

4.5.1 IBM 360 System.

The control processor time required to process a job depends upon the following:

1. Number of flight paths on which to calculate contours.
2. Number of points along each flight path.
3. Number of noise levels per point on which to calculate contours.

4.5.2 SIGMA VII System

Since the "real time" system is concerned with only one aircraft position at a time, the critical time path is the time needed to calculate the contour points for up to 5 noise levels for a given aircraft position. Approximate measurements running in a non-real-time background mode indicate a 0.06 sec per noise level contour point.

4.6 PROGRAM RESTRICTIONS

There is only one additional restriction to be added to those mentioned in sections 4.2.1 and 4.2.2 for program usage. The maximum number of acoustic data points generated by the noise source computer program is 324. See reference 1, section 5.3 and Table 11 of that report for further details.

4.7 CONTROL CARDS

ØS Job Control Language Instructions for IBM System 360.

```
//JOBNAME    (per installation)
//EXEC       PGM = IEBGENER
//SYSPRINT   DD SYSØUT = A
//SYSIN      DD DUMMY
//SYSUTZ     DD UNIT = SYSDA, DSN = & CARDS, SPACE = TRK, (5,1)),
//DCB = (LRECL = 80, RECEM = FB, BLKSIZE = 400), DISP = (NEW, PASS)
//SYSUTI     DD *
      input DATA
      to Noise Contour Program

/*
//EXEC       PGM = IEBGENER
//SYSPRINT   DD SYSØUT = A
//SYSIN      DD DUMMY
//SYSUTZ     DD SYSØUT = A, DCB = BLKSIZE = 400
//SYSUTI     DD DSN = & CARDS, DISP = (ØLD, PASS)
//EXEC FØRTGLG, TIME = 4, REGIØN = 110K
//LKED.SYSLIB DD
//           DD
//           DD
//           DD.DSNAME = SYS1.NPS, DISP = SHR
//LKED.SYSIN DD *
      Binary deck of Noise Contour program which must include a new subroutine TEE227
      generated by the Noise Source Program for each new engine configuration.

/*
//GØ.SYSIN   DD DSN = & CARDS, DISP = (ØLD, DELETE)
//GØ.FT15F001 DD UNIT = SYSDA, SPACE = (1729, (7))
//GØ.CALCØMP DD DSN = DNAME, UNIT = 2400-2,
//LABEL = (,SL), DISP = (,KEEP), VØL = SER = XXXXXX
//GØ.FT02F001 DD UNIT = SYSDA, DSN = &&.TAPE02, DISP = (DELETE),
//SPACE = (400, (80,80)), DCB = (LRECL = 80, BLKSIZE = 400, RECFM = FB)
//
```

4.7.1 Sample TSS Input Data for the IBM 360/67 Computer

Sample No. 1 -

```
*****   TO PLOT FROM DATA PREVIOUSLY SAVED ON FILE   *****

..RJSTART RMTOS
  LOGON FSAEJJOB,PLOTCASE,  ...
GETNEWS *UPDATE
DEFAULT  RUNFREE=Y
AMES CCPLOT
DDEF FT02F001,VS,DSNAME=JJTAPE02
CALL TEX2275S
 -1      PROGRAM NEEDS  THIS CARD  TO PLOT A SAVED TAPE PUT -1 IN COL 2&3.

        0      10.      15.   IN     M          EPNOB
LATERAL DISTANCE FROM RUNWAY (M)
DISTANCE ALONG RUNWAY (M)
%END
  LOGOFF
..CONTINUE.
```

Sample No. 2

```
*****   TO COMPUTE AND SAVE ON FILE, BUT NOT PLOT    *****

..RJSTART RMTOS
  LOGON FSAE JJOB,TESTCASE, ...
GETNEWS *UPDATE
DEFAULT  RUNFREE=Y
AMES CCPLOT
DDEF FT02F001,VS,DSNAME=JJTAPE02
CALL TEX2275S
 . STARTING IN COLUMN 4, THIS CAN BE USED AS DECK IDENTIFICATION, ETC...........
 &DIGINT NL=3,ANL=80.,90.,100.,IPNDB=0,        IPLOT=-1 &END
          THIS IS CASE 1  TAKEOFF
 &DIGSIM DSCI=120.,NFPP=36,DS=500.,NG=12,DDX=5*0.,75.,200.,640.,1220.,
   1900.,2700.,3520.,DDY= 0.,1400., 1600.,6000.,7000.,7500.,7980.,8880.,9700.,
   10400.,11010.,11560.,DDZ=0.,0.,10.,450.,500.,517.,533.,567.,600.,633.,
   667.,700.,DDDE=2*0.,2*20.,8*10.,DDEPR=4*2.0,1.5,7*1.4,
 NLS=1,NLF=3, &END
      THIS IS CASE 2   APPROACH
 &DIGSIM  ND=8,DDX=8*0.0,DDY=-15000.,-10000.,-6500.,-1800.,0.,150.,300.,600.,
 DDZ=1250.,728.,360.,113.,15.,3*0.0,DDDE=7.,8.,10.,2*10.,5.,0.,0.,DDEPR=2*1.4,
 3*1.25,1.1,2*1.0,&END
             THIS IS CASE THREE    TOUCH AND GO
 &DIGSIM  NFPP=72,ND=13,DDX=13*0.0,DDY(8)=1400.,1600.,6000.,7000.,10000.,13000.,
 DDZ(9)=10.,450.,500.,600.,700.,DDDE(9)=2*20.,3*10.,DDEPR(8)=3*2.0,1.5,2*1.4,
  ISTOP=1,  &END
%END
PUNCH JJTAPE02, ERASE=N
  LOGOFF
..CONTINUE
```

Sample No. 3

```
*****   TO COMPUTE, WRITE ON FILE, AND PLOT.    *****

..RJSTART RMTOS
  LOGON FSAEJJOB,TESTPLOT.  ...
GETNEWS *UPDATE
DEFAULT  RUNFREE=Y
AMES CCPLOT
DDEF FT02F001,VS,DSNAME=JJTAPE02
CALL  TEX2275S
   STARTING IN COLUMN 4, THIS CAN BE USED AS DECK IDENTIFICATION, ETC...........
 &DIGINT NL=3,ANL=80.,90.,100.,IPNDB=0,        IPLOT= 1 &END
          THIS IS CASE 1  TAKEOFF
 &DIGSIM DSCI=120.,NFPP=36,DS=500.,NG=12,DDX=5*0.,75.,200.,640.,1220.,
   1900.,2700.,3520.,DDY= 0.,1400., 1600.,6000.,7000.,7500.,7980.,8880.,9700.,
   10400.,11010.,11560.,DDZ=0.,0.,10.,450.,500.,517.,533.,567.,600.,633.,
   667.,700.,DDDE=2*0.,2*10.,8*10.,DDEPR=4*2.0,1.5,2*1.4,
  NLS=1,NLF=3, &END
      THIS IS CASE 2   APPROACH
 &DIGSIM  NG=8,DDX=8*0.0,DDY=-15000.,-10000.,-6500.,-1800.,0.,150.,300.,600.,
 DDZ=1250.,728.,360.,113.,15.,3 0.0,DDDE=7.,3.,10.,2 10.,5.,0.,0.,DDEPR=2 1.4,
 3*1.25,1.1,2*1.0,&END
             THIS IS CASE THREE    TOUCH AND GO
 &DIGSIM  NFPP=72,ND=13,DDX=13 0.0,DDY(3)=1400.,1600.,6000.,7000.,10000.,13000.,
 DDZ(9)=10.,450.,500.,600.,700.,DDDE(9)=2 20.,3 10.,DDEPR(8)=3 2.0,1.5,2 1.4,
  ISTOP=1,  &END
        0      10.      15.   IN     M          EPNOB
LATERAL DISTANCE FROM RUNWAY (M)
DISTANCE ALONG RUNWAY (M)
&END
  LOGOFF
..CONTINUE
```

4.8 IBM 360 SAMPLE INPUT DATA

```
          PROGRAM NEEDS THIS CARD  TO PLOT A SAVED TAPE PUT =1 IN COL 2+3
&DLINE NL=3,ANL=80.,94.,100.,IPNDB=0,         IPLOT=1, &END
            THIS IS CASE 1  TAKEOFF.
&DISSIM DSCT=120.,NPPR=36,DS=500.,ND=12,DDX=5*0.,75.,200.,640.,1220.,
   1900.,2700.,3520.,DDY= 0.,1400.,  1600.,6000.,7000.,7500.,7980.,8880.,9700.,
   10400.,11010.,11560.,DDZ=0.,0.,10.,490.,500.,517.,533.,567.,600.,633.,
   667.,700.,DDF=2*0.,2920.,9*10.,DDEPR=4*2.0,1.5,7*1.4,
  NLS=1,NLF=3,ISTOP=1,&END
      1000          10.          15.   1%      M             EPNDB
LATERAL DISTANCE FROM RUNWAY (M)
DISTANCE ALONG RUNWAY (M)
```

ACOUSTIC DATA FUNCTION
NOISE LEVEL VALUES

AT ENGINE PERFORMANCE PARAMETER = 1.000E 00

LOG10 (OFF AXIS RANGE)

ELEVATION ANGLE (DEGREES)	1.699E 00	2.000E 00	2.301E 00	2.602E 00	2.903E 00	3.204E 00	3.505E 00	3.806E 00	4.107E 00
0.0	7.503E 01	7.299E 01	6.901E 01	6.370E 01	5.767E 01	5.190E 01	4.580E 01	3.589E 01	3.386E 01
7.131E 00	7.367E 01	7.453E 01	7.255E 01	6.723E 01	6.141E 01	5.544E 01	4.943E 01	4.341E 01	3.739E 01
1.443E 01	8.003E 01	7.779E 01	7.401E 01	6.870E 01	6.287E 01	5.690E 01	5.089E 01	4.488E 01	3.886E 01
3.001E 01	8.210E 01	8.304E 01	7.609E 01	7.077E 01	6.494E 01	5.897E 01	5.296E 01	4.695E 01	4.093E 01
4.500E 01	8.344E 01	8.140E 01	7.742E 01	7.210E 01	6.624E 01	6.031E 01	5.430E 01	4.829E 01	4.226E 01
6.000E 01	8.508E 01	8.299E 01	7.901E 01	7.370E 01	6.787E 01	6.190E 01	5.589E 01	4.989E 01	4.386E 01

ACOUSTIC DATA FUNCTION
NOISE LEVEL VALUES

AT ENGINE PERFORMANCE PARAMETER = 1.200E 00

LOG10 (OFF AXIS RANGE)

ELEVATION ANGLE (DEGREES)	1.597E 00	2.000E 00	2.301E 00	2.602E 00	2.903E 00	3.204E 00	3.505E 00	3.806E 00	4.107E 00
0.0	[illegible]	8.739E 01	8.341E 01	7.810E 01	7.227E 01	6.630E 01	6.029E 01	5.428E 01	4.826E 01
7.181E 00	9.297E 01	9.093E 01	8.595E 01	8.163E 01	7.551E 01	6.984E 01	6.383E 01	5.781E 01	5.179E 01
1.448E 01	9.443E 01	9.239E 01	8.941E 01	8.310E 01	7.727E 01	7.130E 01	6.529E 01	5.928E 01	5.326E 01
3.000E 01	9.650E 01	9.446E 01	9.049E 01	8.517E 01	7.934E 01	7.337E 01	6.736E 01	6.135E 01	5.533E 01
4.500E 01	9.786E 01	9.530E 01	9.132E 01	8.650E 01	8.068E 01	7.471E 01	6.871E 01	6.269E 01	5.666E 01
9.000E 01	9.942E 01	9.739E 01	9.341E 01	8.910E 01	8.227E 01	7.630E 01	7.029E 01	6.428E 01	5.826E 01

ACOUSTIC DATA FUNCTION
NOISE LEVEL VALUES

AT ENGINE PERFORMANCE PARAMETER = 1.400E 00

LOG10 (OFF AXIS RANGE)

ELEVATION ANGLE (DEGREES)	1.699E 00	2.000E 00	2.301E 00	2.602E 00	2.903E 00	3.204E 00	3.505E 00	3.806E 00	4.107E 00
0.0	1.004E 02	9.358E 01	9.461E 01	8.930E 01	8.347E 01	7.750E 01	7.149E 01	6.549E 01	5.946E 01
7.181E 00	1.042E 02	1.021E 02	9.915E 01	9.293E 01	8.701E 01	8.104E 01	7.503E 01	6.901E 01	6.299E 01
1.449E 01	1.056E 02	1.036E 02	9.961E 01	9.430E 01	8.947E 01	8.250E 01	7.647E 01	7.049E 01	6.446E 01
2.000E 01	1.077E 02	1.057E 02	1.017E 02	9.637E 01	9.054E 01	8.457E 01	7.956E 01	7.255E 01	6.653E 01
4.500E 01	1.092E 02	1.071E 02	1.030E 02	9.770E 01	9.158E 01	8.591E 01	7.999E 01	7.399E 01	6.726E 01
9.000E 01	1.104E 02	1.084E 02	1.046E 02	9.930E 01	9.347E 01	8.750E 01	8.149E 01	7.549E 01	6.946E 01

ACOUSTIC DATA FUNCTION
NOISE LEVEL VALUES

AT ENGINE PERFORMANCE PARAMETER = 1.600E 00

LOG10 (OFF AXIS RANGE)

ELEVATION ANGLE (DEGREES)	1.699E 00	2.000E 00	2.301E 00	2.602E 00	2.903E 00	3.204E 00	3.505E 00	3.806E 00	4.107E 00
0.0	1.048E 02	1.066E 02	1.026E 02	9.730E 01	9.147E 01	8.550E 01	7.949E 01	7.349E 01	6.746E 01
7.191E 00	1.122E 02	1.101E 02	1.061E 02	1.008E 02	9.501E 01	8.904E 01	8.303E 01	7.701E 01	7.099E 01
1.448E 01	1.136E 02	1.116E 02	1.076E 02	1.023E 02	9.447E 01	9.050E 01	8.449E 01	7.848E 01	7.246E 01
3.000E 01	1.157E 02	1.137E 02	1.097E 02	1.044E 02	9.854E 01	9.257E 01	8.656E 01	8.055E 01	7.453E 01
4.500E 01	1.170E 02	1.150E 02	1.110E 02	1.057E 02	9.989E 01	9.391E 01	8.790E 01	8.189E 01	7.586E 01
9.000E 01	1.186E 02	1.166E 02	1.126E 02	1.073E 02	1.015E 02	9.550E 01	8.949E 01	8.348E 01	7.746E 01

ACOUSTIC DATA FUNCTION
NOISE LEVEL VALUES

AT ENGINE PERFORMANCE PARAMETER = 1.800E 00

ELEVATION ANGLE (DEGREES)	LOG10 (OFF AXIS RANGE)								
	1.699E 00	2.000E 00	2.301E 00	2.602E 00	2.903E 00	3.204E 00	3.505E 00	3.806E 00	4.107E 00
0.0	1.134E 02	1.114E 02	1.074E 02	1.021E 02	9.627E 01	9.039E 01	8.429E 01	7.828E 01	7.224E 01
7.141E 00	1.173E 02	1.149E 02	1.109E 02	1.056E 02	9.981E 01	9.394E 01	8.783E 01	8.181E 01	7.579E 01
1.444E 01	1.189E 02	1.164E 02	1.124E 02	1.071E 02	1.013E 02	9.530E 01	8.929E 01	8.329E 01	7.726E 01
3.000E 01	1.205E 02	1.195E 02	1.145E 02	1.092E 02	1.033E 02	9.737E 01	9.136E 01	8.535E 01	7.933E 01
4.500E 01	1.219E 02	1.198E 02	1.158E 02	1.105E 02	[illegible]	9.871E 01	9.270E 01	8.669E 01	8.066E 01
9.000E 01	1.234E 02	1.214E 02	1.174E 02	1.121E 02	1.063E 02	1.003E 02	9.429E 01	[illegible]	8.226E 01

ACOUSTIC DATA FUNCTION
NOISE LEVEL VALUES

AT ENGINE PERFORMANCE PARAMETER = 2.000E 00

LOG10 (OFF AXIS RANGE)

ELEVATION ANGLE (DEGREES)	1.699E 00	2.000E 00	2.301E 00	2.602E 00	2.903E 00	3.204E 00	3.505E 00	3.806E 00	4.107E 00
0.0	1.150E 02	1.130E 02	1.090E 02	1.037E 02	9.767E 01	9.170E 01	8.589E 01	7.988E 01	7.388E 01
7.191E 00	1.146E 02	1.165E 02	1.125E 02	1.072E 02	1.014E 02	9.544E 01	8.943E 01	9.341E 01	7.739E 01
1.446E 01	1.200E 02	1.180E 02	1.140E 02	1.087E 02	1.029E 02	9.690E 01	9.089E 01	8.488E 01	7.886E 01
3.000E 01	1.221E 02	1.201E 02	1.161E 02	1.108E 02	1.049E 02	9.897E 01	9.296E 01	8.695E 01	8.093E 01
4.500E 01	1.234E 02	1.214E 02	1.174E 02	1.121E 02	1.063E 02	1.003E 02	9.430E 01	8.828E 01	8.226E 01
6.000E 01	1.250E 02	1.230E 02	1.190E 02	1.137E 02	1.079E 02	1.019E 02	9.589E 01	8.988E 01	8.386E 01

4.9 IBM 360 SAMPLE OUTPUT DATA

TABLE OF DEVELOPED VALUES OF LOG10 OFF AXIS RANGE
BASED ON THE PRECEDING INPUT ACOUSTIC DATA

VALUES FOR NOISE LEVEL OF 90.0 DB

ENGINE PERFORMANCE PARAMETER

ELEVATION ANGLE (DEGREES)	1.000	1.200	1.400	1.600	1.800	2.000
(0.0)	3.057E-01	2.494E 00	3.078E 00	3.479E 00	3.720E 00	3.800E 00
(7.181E 00)	1.488E 00	2.686E 00	3.253E 00	3.656E 00	3.896E 00	3.976E 00
(1.448E 01)	1.703E 00	2.762E 00	3.329E 00	3.730E 00	3.970E 00	4.050E 00
(3.000E 01)	2.005E 00	2.869E 00	3.433E 00	3.833E 00	4.073E 00	4.153E 00
(4.500E 01)	2.104E 00	2.937E 00	3.500E 00	3.900E 00	4.140E 00	4.220E 00
(9.000E 01)	2.226E 00	3.017E 00	3.580E 00	3.980E 00	4.220E 00	4.300E 00

VALUES FOR NOISE LEVEL OF 90.0 DB

ENGINE PERFORMANCE PARAMETER

ELEVATION ANGLE (DEGREES)	1.000	1.200	1.400	1.600	1.800	2.000
(0.0)	-5.098E-01	1.615E 00	2.542E 00	2.977E 00	3.219E 00	3.299E 00
(7.181E 00)	1.250E-02	2.070E 00	2.748E 00	3.156E 00	3.396E 00	3.476E 00
(1.448E 01)	2.279E-01	2.181E 00	2.824E 00	3.229E 00	3.469E 00	3.550E 00
(3.000E 01)	5.334E-01	2.328E 00	2.930E 00	3.333E 00	3.573E 00	3.653E 00
(4.500E 01)	7.311E-01	2.404E 00	2.998E 00	3.400E 00	3.640E 00	3.720E 00
(9.000E 01)	9.657E-01	2.494E 00	3.079E 00	3.479E 00	3.720E 00	3.800E 00

VALUES FOR NOISE LEVEL OF 100.0 DB

ENGINE PERFORMANCE PARAMETER

ELEVATION ANGLE (DEGREES)	1.000	1.200	1.400	1.600	1.800	2.000
(0.0)	-1.985E 00	1.394E-01	1.799E 00	2.449E 00	2.710E 00	2.793E 00
(7.181E 00)	-1.463E 00	6.617E-01	2.160E 00	2.644E 00	2.893E 00	2.974E 00
(1.448E 01)	-1.248E 00	8.771E-01	2.272E 00	2.721E 00	2.968E 00	3.048E 00
(3.000E 01)	-9.421E-01	1.183E 00	2.397E 00	2.828E 00	3.071E 00	3.152E 00
(4.500E 01)	-7.444E-01	1.390E 00	2.471E 00	2.897E 00	3.139E 00	3.219E 00
(9.000E 01)	-5.098E-01	1.615E 00	2.562E 00	2.978E 00	3.219E 00	3.299E 00

THIS IS CASE 1 TAKEOFF

AIRCRAFT COORDINATES(X,Y,Z) IN M. (0.0 , 0.0 , 0.0)

DISTANCE ALONG FLIGHT TRACK = 0.0 M.

ENGINE ATTITUDE ANGLE = 0.0 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 2.00E 00

NOISE LEVEL IN EPNDB = 1.263E 02 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 1.106E 02 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 1.025E 02 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	6.309E 03	-3.643E 03	-6.309E 03	3.643E 03	0.0	-1
9.000E 01	1.991E 03	-1.150E 03	-1.991E 03	1.150E 03	0.0	-1
1.000E 02	6.209E 02	-3.585E 02	-6.209E 02	3.585E 02	0.0	-1

AIRCRAFT COORDINATES(X,Y,Z) IN M. (0.0 , 5.000E 02, 0.0)

DISTANCE ALONG FLIGHT TRACK = 5.000E 02 M.

ENGINE ATTITUDE ANGLE = 0.0 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 2.00E 00

NOISE LEVEL IN EPNDB = 1.263E 02 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 1.106E 02 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 1.025E 02 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	6.309E 03	-3.143E 03	-6.309E 03	-3.143E 03	6.309E 06	-1
9.000E 01	1.991E 03	-5.497E 02	-1.991E 03	-6.497E 02	1.991E 06	-1
1.000E 02	6.209E 02	1.419E 02	-6.209E 02	1.415E 02	6.209E 06	-1

THIS IS CASE 1 TAKEOFF

AIRCRAFT COORDINATES(X,Y,Z) IN M. (0.0 , 1.000E 03, 0.0)

DISTANCE ALONG FLIGHT TRACK = 1.000E 03 M.

ENGINE ATTITUDE ANGLE = 0.0 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 2.00E 00

NOISE LEVEL IN EPNDB = 1.203E 02 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 1.106E 02 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 1.025E 02 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
9.000E 01	6.309E 03	-2.643E 03	-6.309E 03	-2.643E 03	1.262E 07	-1
9.000E 01	1.991E 03	1.497E 02	-1.991E 03	1.497E 02	3.993E 06	-1
1.000E 02	6.209E 02	6.415E 02	-6.209E 02	6.415E 02	1.242E 06	-1

AIRCRAFT COORDINATES(X,Y,Z) IN M. (0.0 , 1.500E 03, 0.000E 00)

DISTANCE ALONG FLIGHT TRACK = 1.500E 03 M.

ENGINE ATTITUDE ANGLE = 1.00E 01 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 2.00E 00

NOISE LEVEL IN EPNDB = 1.312E 02 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 1.115E 02 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 1.024E 02 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	6.326E 03	-2.227E 03	-6.326E 03	-2.227E 03	1.788E 07	-1
9.000E 01	2.008E 03	3.181E 02	-2.008E 03	3.181E 02	5.853E 06	-1
1.000E 02	6.373E 02	1.126E 03	-6.373E 02	1.126E 03	1.851E 06	-1

THIS IS CASE 1 TAKEOFF

AIRCRAFT COORDINATES(X,Y,Z) IN M, (0.0 , 2.000E 03, 5.000E 01)

DISTANCE ALONG FLIGHT TRACK = 2.000E 03 M.

ENGINE ATTITUDE ANGLE = 2.00E 01 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 2.00E 00

NOISE LEVEL IN EPNDB = 1.250E 02 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 1.158E 02 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 1.054E 02 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	6.469E 03	-2.040E 03	-6.469E 03	-2.040E 03	2.027E 07	-1
9.000E 01	2.147E 03	6.756E 02	-2.147E 03	6.756E 02	7.339E 06	-1
1.000E 02	7.673E 02	1.542E 03	-7.674E 02	1.542E 03	2.435E 06	-1

AIRCRAFT COORDINATES(X,Y,Z) IN M, (0.0 , 2.500E 03, 1.000E 02)

DISTANCE ALONG FLIGHT TRACK = 2.500E 03 M.

ENGINE ATTITUDE ANGLE = 2.00E 01 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 2.00E 00

NOISE LEVEL IN EPNDB = 1.230E 02 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 1.169E 02 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 1.068E 02 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	5.624E 03	-1.612E 03	-5.624E 03	-1.612E 03	2.586E 07	-1
9.000E 01	2.291E 03	1.109E 03	-2.291E 03	1.109E 03	9.263E 06	-1
1.000E 02	[illegible]	1.987E 03	-9.898E 02	1.987E 03	3.174E 06	-1

THIS IS CASE 1 TAKEOFF

AIRCRAFT COORDINATES(X,Y,Z) IN M. (0.0 , 3.000E 03, 1.500E 02)

DISTANCE ALONG FLIGHT TRACK = 3.000E 03 M.

ENGINE ATTITUDE ANGLE = 2.00E 01 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 2.00E 00

NOISE LEVEL IN EPNDB = 1.207E 02 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 1.169E 02 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 1.075E 02 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	6.775E 03	-1.183E 03	-6.775E 03	-1.183E 03	3.162E 07	-1
9.000E 01	2.427E 03	1.647E 03	-2.427E 03	1.647E 03	1.133E 07	-1
1.000E 02	9.659E 02	2.461E 03	-9.659E 02	2.461E 03	4.052E 06	-1

AIRCRAFT COORDINATES(X,Y,Z) IN M. (0.0 , 3.500E 03, 2.000E 02)

DISTANCE ALONG FLIGHT TRACK = 3.500E 03 M.

ENGINE ATTITUDE ANGLE = 2.00E 01 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 2.00E 00

NOISE LEVEL IN EPNDB = 1.190E 02 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 1.159E 02 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 1.079E 02 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	6.923E 03	-7.512E 02	-6.923E 03	-7.512E 02	3.753E 07	-1
9.000E 01	2.556E 03	1.989E 03	-2.556E 03	1.989E 03	1.353E 07	-1
1.000E 02	1.013E 03	2.950E 03	-1.013E 03	2.950E 03	5.022E 06	-1

THIS IS CASE 1 TAKEOFF

AIRCRAFT COORDINATES(X,Y,Z) IN M. (0.0 , 4.000E 03, 2.500E 02)

DISTANCE ALONG FLIGHT TRACK = 4.000E 03 M.

ENGINE ATTITUDE ANGLE = 2.00E 01 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 2.00E 00

NOISE LEVEL IN EPNDB = 1.173E 02 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 1.150E 02 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 1.062E 02 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	7.068E 03	-3.179E 02	-7.068E 03	-3.179E 02	4.359E 07	-1
9.000E 01	2.679E 03	2.435E 03	-2.679E 03	2.435E 03	1.586E 07	-1
1.000E 02	1.056E 03	3.441E 03	-1.056E 03	3.441E 03	6.038E 06	-1

AIRCRAFT COORDINATES(X,Y,Z) IN M. (0.0 , 4.500E 03, 3.000E 02)

DISTANCE ALONG FLIGHT TRACK = 4.500E 03 M.

ENGINE ATTITUDE ANGLE = 2.00E 01 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 2.00E 00

NOISE LEVEL IN EPNDB = 1.159E 02 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 1.141E 02 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 1.063E 02 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	7.210E 03	1.169E 02	-7.210E 03	1.169E 02	4.980E 07	-1
9.000E 01	2.797E 03	2.683E 03	-2.797E 03	2.683E 03	1.832E 07	-1
1.000E 02	1.092E 03	3.936E 03	-1.092E 03	3.936E 03	7.101E 06	-1

THIS IS CASE 1 TAKEOFF

AIRCRAFT COORDINATES(X,Y,Z) IN M. (0.0 , 5.000E 03, 3.500E 02)

DISTANCE ALONG FLIGHT TRACK = 5.000E 03 M.

ENGINE ATTITUDE ANGLE = 2.00E 01 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 2.00E 00

NOISE LEVEL IN EPNDB = 1.14[illegible]E 02 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 1.132E 02 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 1.0[illegible]E 02 AT A SIDELINE DISTANCE [illegible].63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	7.349E 03	5.532E 02	-7.349E 03	5.532E 02	5.615E 07	-1
9.000E 01	2.910E 03	3.333E 03	-2.910E 03	3.333E 03	2.089E 07	-1
1.000E 02	1.115E 03	4.437E 03	-1.115E 03	4.437E 03	9.206E 06	-1

AIRCRAFT COORDINATES(X,Y,Z) IN M. (0.0 , 5.500E 03, 4.000E 02)

DISTANCE ALONG FLIGHT TRACK = 5.500E 03 M.

ENGINE ATTITUDE ANGLE = 2.00E 01 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 2.00E 00

NOISE LEVEL IN EPNDB = 1.137E 02 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 1.124E 02 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 1.082E 02 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	7.486E 03	9.909E 02	-7.486E 03	9.909E 02	6.264E 07	-1
9.000E 01	2.996E 03	3.800E 03	-2.996E 03	3.800E 03	2.365E 07	-1
1.000E 02	1.136E 03	4.939E 03	-1.136E 03	4.939E 03	9.335E 06	-1

THIS IS CASE 1 TAKEOFF

AIRCRAFT COORDINATES(X,Y,Z) IN M. (0.0 , 6.000E 03, 4.500E 02)

DISTANCE ALONG FLIGHT TRACK = 6.000E 03 M.

ENGINE ATTITUDE ANGLE = 2.00E 01 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 2.00E 00

NOISE LEVEL IN EPNDB = 1.123E 02 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 1.116E 02 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 1.080E 02 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	7.620E 03	1.430E 03	-7.620E 03	1.430E 03	6.928E 07	-1
9.000E 01	3.046E 03	4.290E 03	-3.046E 03	4.290E 03	2.461E 07	-1
1.000E 02	1.155E 03	5.440E 03	-1.155E 03	5.440E 03	1.048E 07	-1

AIRCRAFT COORDINATES(X,Y,Z) IN M. (0.0 , 6.500E 03, 4.750E 02)

DISTANCE ALONG FLIGHT TRACK = 6.500E 03 M.

ENGINE ATTITUDE ANGLE = 1.60E 01 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 1.79E 00

NOISE LEVEL IN EPNDB = 1.095E 02 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 1.084E 02 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 1.061E 02 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	5.905E 03	3.089E 03	-5.905E 03	3.089E 03	9.171E 07	-1
9.000E 01	2.344E 03	5.224E 03	-2.344E 03	5.224E 03	3.166E 07	-1
1.000E 02	8.724E 02	6.066E 03	-8.724E 02	6.066E 03	1.175E 07	-1

THIS IS CASE 1 TAKEOFF

AIRCRAFT COORDINATES(X,Y,Z) IN M. (0.0 , 7.000E 03, 5.000E 02)

DISTANCE ALONG FLIGHT TRACK = 7.000E 03 M.

ENGINE ATTITUDE ANGLE = 1.00E 01 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 1.50E 00

NOISE LEVEL IN EPNDB = 1.014E 02 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 1.005E 02 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 9.730E 01 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	2.975E 03	5.340E 03	-2.975E 03	5.340E 03	1.117E 08	-1
9.000E 01	1.111E 03	6.395E 03	-1.111E 03	6.395E 03	3.569E 07	-1
1.000E 02	2.142E 02	6.793E 03	-2.142E 02	6.793E 03	1.234E 07	-1

AIRCRAFT COORDINATES(X,Y,Z) IN M. (7.417E 01, 7.494E 03, 5.109E 02)

DISTANCE ALONG FLIGHT TRACK = 7.500E 03 M.

ENGINE ATTITUDE ANGLE = 1.00E 01 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 1.40E 00

NOISE LEVEL IN EPNDB = 9.719E 01 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 9.626E 01 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 9.323E 01 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	1.345E 03	6.072E 03	-2.129E 03	6.593E 03	1.169E 08	-1
9.000E 01	7.557E 02	6.921E 03	-7.118E 02	7.198E 03	3.698E 07	-1
1.000E 02	5.419E 01	7.361E 03	5.419E 01	7.361E 03	1.266E 07	0

THIS IS CASE 1 TAKEOFF

AIRCRAFT COORDINATES(X,Y,Z) IN M, (1.996E 02, 7.973E 03, 5.329E 02)

DISTANCE ALONG FLIGHT TRACK = 8.000E 03 M.

ENGINE ATTITUDE ANGLE = 1.00E 01 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 1.40E 00

NOISE LEVEL IN EPNDB = 9.689E 01 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 9.599E 01 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 9.307E 01 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	1.615E 03	5.364E 03	2.084E 03	7.401E 03	1.185E 05	-1
9.000E 01	8.059E 02	7.397E 03	6.130E 02	7.744E 03	3.771E 07	-1
1.000E 02	1.659E 02	7.848E 03	1.659E 02	7.348E 03	1.266E 07	0

AIRCRAFT COORDINATES(X,Y,Z) IN M, (4.199E 02, 8.423E 03, 5.499E 02)

DISTANCE ALONG FLIGHT TRACK = 8.500E 03 M.

ENGINE ATTITUDE ANGLE = 1.00E 01 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 1.40E 00

NOISE LEVEL IN EPNDB = 9.662E 01 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 9.577E 01 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 9.205E 01 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	1.735E 03	9.497E 03	-1.944E 03	9.317E 03	1.210E 06	-1
9.000E 01	8.949E 02	7.735E 03	-4.190E 02	9.378E 03	3.844E 07	-1
1.000E 02	3.593E 02	8.307E 03	3.559E 02	9.307E 03	1.266E 07	0

THIS IS CASE 1 TAKEOFF

AIRCRAFT COORDINATES(X,Y,Z) IN M. (6.385E 02, 8.677E 03, 5.668E 02)

DISTANCE ALONG FLIGHT TRACK = 9.000E 03 M.

ENGINE ATTITUDE ANGLE = 1.00E 01 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 1.40E 00

NOISE LEVEL IN EPNDB = 9.637E 01 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 9.554E 01 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 9.283E 01 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	2.009E 03	6.939E 03	-1.733E 03	8.768E 03	1.231E 08	-1
9.000E 01	1.112E 03	8.125E 03	-1.981E 02	9.025E 03	3.917E 07	-1
1.000E 02	5.753E 02	8.756E 03	5.793E 02	8.756E 03	1.256E 07	0

AIRCRAFT COORDINATES(X,Y,Z) IN M. (9.268E 02, 9.765E 03, 5.533E 02)

DISTANCE ALONG FLIGHT TRACK = 9.500E 03 M.

ENGINE ATTITUDE ANGLE = 1.00E 01 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 1.40E 00

NOISE LEVEL IN EPNDB = 9.613E 01 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 9.533E 01 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 9.271E 01 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	1.976E 03	7.146E 03	-1.440E 03	8.557E 03	1.251E 08	-1
9.000E 01	1.281E 03	8.527E 03	9.365E 01	9.365E 03	3.990E 07	-1
1.000E 02	4.461E 02	9.175E 03	8.401E 02	9.175E 03	1.266E 07	0

THIS IS CASE 1 TAKEOFF

AIRCRAFT COORDINATES(X,Y,Z) IN M. (1.716E 03, 9.694E 03, 5.997E 02)

DISTANCE ALONG FLIGHT TRACK = 1.000E 04 M.

ENGINE ATTITUDE ANGLE = 1.00E 01 (DEGREES) ; DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 1.40E 00

NOISE LEVEL IN EPNDB = 9.594E 01 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 9.512E 01 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 9.259E 01 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	2.247E 03	7.546E 03	1.140E 03	9.970E 03	1.272E 03	-1
9.000E 01	1.500E 03	9.935E 03	3.639E 02	9.772E 03	4.062E 07	-1
1.000E 02	1.134E 03	9.564E 03	1.139E 03	9.584E 03	1.200E 07	0

AIRCRAFT COORDINATES(X,Y,Z) IN M. (1.253E 03, 1.005E 04, 6.166E 02)

DISTANCE ALONG FLIGHT TRACK = 1.050E 04 M.

ENGINE ATTITUDE ANGLE = 1.00E 01 (DEGREES) ; DIRECTIVITY ANGLE = 1.23E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 1.40E 00

NOISE LEVEL IN EPNDB = 9.556E 01 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 9.492E 01 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 9.247E 01 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	2.279E 03	7.762E 03	-7.595E 02	1.069E 04	1.293E 05	-1
9.000E 01	1.791E 03	9.251E 03	7.543E 02	1.026E 04	4.134E 07	-1
1.000E 02	1.465E 03	9.956E 03	1.467E 03	9.956E 03	1.266E 07	0

THIS IS CASE 1 TAKEOFF

AIRCRAFT COORDINATES(X,Y,Z) IN M. (1.913E 03, 1.041E 04, 5.336E 02)

DISTANCE ALONG FLIGHT TRACK = 1.100E 04 M.

ENGINE ATTITUDE ANGLE = 1.00E 01 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 1.40E 00

NOISE LEVEL IN EPNDB = 9.543E 01 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 9.472E 01 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 9.235E 01 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	2.615E 03	3.100E 03	-4.034E 02	1.107E 04	1.316E 08	-1
9.000E 01	2.132E 03	3.609E 03	1.107E 03	1.061E 04	4.206E 07	-1
1.000E 02	1.419E 03	1.031E 04	1.819E 03	1.031E 04	1.266E 07	0

AIRCRAFT COORDINATES(X,Y,Z) IN M. (2.311E 03, 1.071E 04, 5.504E 02)

DISTANCE ALONG FLIGHT TRACK = 1.150E 04 M.

ENGINE ATTITUDE ANGLE = 1.00E 01 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 1.40E 00

NOISE LEVEL IN EPNDB = 9.521E 01 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 9.452E 01 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 9.223E 01 AT A SIDELINE DISTANCE 4.43E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	2.576E 03	2.324E 03	1.044E 02	1.170E 04	1.335E 08	-1
9.000E 01	2.410E 03	4.593E 03	1.543E 03	1.103E 04	4.277E 07	-1
1.000E 02	2.233E 03	1.043E 04	2.203E 03	1.063E 04	1.266E 07	0

THIS IS CASE 1 TAKEOFF

AIRCRAFT COORDINATES(X,Y,Z) IN M. (2.730E 03, 1.132E 04, 6.673E 02)

DISTANCE ALONG FLIGHT TRACK = 1.200E 04 M.

ENGINE ATTITUDE ANGLE = 1.00E 01 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 1.40E 00

NOISE LEVEL IN EPNDB = 9.499E 01 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 9.433E 01 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 9.211E 01 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	3.075E 03	3.619E 03	-9.64E 02	1.201E 04	1.356E 06	-1
9.000E 01	2.803E 03	1.019E 04	1.942E 03	1.133E 04	4.343E 07	-1
1.000E 02	2.631E 03	1.033E 04	2.601E 03	1.093E 04	1.266E 07	0

AIRCRAFT COORDINATES(X,Y,Z) IN M. (3.124E 03, 1.129E 04, 6.841E 02)

DISTANCE ALONG FLIGHT TRACK = 1.250E 04 M.

ENGINE ATTITUDE ANGLE = 1.00E 01 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 1.40E 00

NOISE LEVEL IN EPNDB = 9.479E 01 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 9.414E 01 AT A SIDELINE DISTANCE 1.[illegible]2E 02 M.
NOISE LEVEL IN EPNDB = 9.199E 01 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	3.341E 03	9.972E 03	5.477E 02	1.242E 04	1.377E 06	-1
9.000E 01	3.156E 03	1.047E 04	2.379E 03	1.165E 04	4.419E 07	-1
1.000E 02	3.012E 03	1.122E 04	3.012E 03	1.122E 04	1.265E 07	0

THIS IS CASE 1 TAKEOFF

AIRCRAFT COORDINATES(X,Y,Z) IN M. (3.636E 03, 1.157E 04, 7.009E 02)

DISTANCE ALONG FLIGHT TRACK = 1.300E 04 M.

ENGINE ATTITUDE ANGLE = 1.000E 01 (DEGREES) DIRECTIVITY ANGLE = 1.23E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 1.40E 00

NOISE LEVEL IN EPNDB = 9.459E 01 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 9.336E 01 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 9.137E 01 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	3.765E 03	9.142E 03	1.376E 03	1.270E 04	1.399E 08	-1
9.000E 01	3.575E 03	1.075E 04	2.794E 03	1.192E 04	4.490E 07	-1
1.000E 02	3.427E 03	1.150E 04	3.427E 03	1.150E 04	1.256E 07	0

AIRCRAFT COORDINATES(X,Y,Z) IN M. (3.654E 03, 1.195E 04, 7.175E 02)

DISTANCE ALONG FLIGHT TRACK = 1.350E 04 M.

ENGINE ATTITUDE ANGLE = 1.000E 01 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 1.40E 00

NOISE LEVEL IN EPNDB = 9.439E 01 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 9.379E 01 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 9.175E 01 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	4.142E 03	9.413E 03	1.795E 03	1.299E 04	1.420E 08	-1
9.000E 01	3.949E 03	1.134E 04	3.215E 03	1.219E 04	4.559E 07	-1
1.000E 02	3.342E 03	1.173E 04	3.842E 03	1.178E 04	1.266E 07	0

C2

C2

THIS IS CASE 1 TAKEOFF

AIRCRAFT COORDINATES(X,Y,Z) IN M, (4.370E 03, 1.213E 04, 7.342E 02)

DISTANCE ALONG FLIGHT TRACK = 1.400E 04 M.

ENGINE ATTITUDE ANGLE = 1.00E 01 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 1.40E 00

NOISE LEVEL IN EPNDB = 9.419E 01 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 9.360E 01 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 9.163E 01 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	4.594E 03	9.684E 03	2.193E 03	1.327E 04	1.441E 09	-1
9.000E 01	4.349E 03	1.133E 04	3.537E 03	1.246E 04	4.629E 07	-1
1.000E 02	4.278E 03	1.205E 04	4.256E 03	1.205E 04	1.266E 07	0

AIRCRAFT COORDINATES(X,Y,Z) IN M, (4.765E 03, 1.241E 04, 7.509E 02)

DISTANCE ALONG FLIGHT TRACK = 1.450E 04 M.

ENGINE ATTITUDE ANGLE = 1.00E 01 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 1.40E 00

NOISE LEVEL IN EPNDB = 9.400E 01 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 9.343E 01 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 9.151E 01 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	4.015E 03	9.955E 03	2.602E 03	1.365E 04	1.463E 09	-1
9.000E 01	4.634E 03	1.161E 04	4.055E 03	1.273E 04	4.697E 07	-1
1.000E 02	4.673E 03	1.233E 04	4.673E 03	1.233E 04	1.266E 07	0

THIS IS CASE 1 TAKEOFF

AIRCRAFT COORDINATES(X,Y,Z) IN M. (5.200E 03, 1.269E 04, 7.676E 02)

DISTANCE ALONG FLIGHT TRACK = 1.500E 04 M.

ENGINE ATTITUDE ANGLE = 1.00E 01 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 1.40E 00

NOISE LEVEL IN EPNDB = 9.382E 01 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 9.326E 01 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 9.139E 01 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	5.431E 03	1.023E 04	3.011E 03	1.383E 04	1.484E 09	-1
9.000E 01	5.213E 03	1.190E 04	4.482E 03	1.300E 04	4.763E 07	-1
1.000E 02	5.068E 03	1.261E 04	5.068E 03	1.261E 04	1.266E 07	0

AIRCRAFT COORDINATES(X,Y,Z) IN M. (5.615E 03, 1.297E 04, 7.743E 02)

DISTANCE ALONG FLIGHT TRACK = 1.550E 04 M.

ENGINE ATTITUDE ANGLE = 1.00E 01 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 1.40E 00

NOISE LEVEL IN EPNDB = 9.364E 01 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 9.309E 01 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 9.127E 01 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	5.944E 03	1.050E 04	3.420E 03	1.412E 04	1.506E 08	-1
9.000E 01	5.527E 03	1.219E 04	4.905E 03	1.327E 04	4.329E 07	-1
1.000E 02	5.503E 03	1.289E 04	5.503E 03	1.289E 04	1.266E 07	0

THIS IS CASE 1 TAKEOFF

AIRCRAFT COORDINATES(X,Y,Z) IN M. (6.031E 03, 1.324E 04, 9.010E 02)

DISTANCE ALONG FLIGHT TRACK = 1.600E 04 M.

ENGINE ATTITUDE ANGLE = 1.00E 01 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 1.40E 00

NOISE LEVEL IN EPNDB = 9.346E 01 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 9.293E 01 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 9.115E 01 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	6.264E 03	1.077E 04	3.929E 03	1.440E 04	1.528E 05	-1
9.000E 01	6.036E 03	1.248E 04	5.328E 03	1.354E 04	4.9[illegible]3E 06	-1
1.000E 02	5.919E 03	1.317E 04	5.919E 03	1.317E 04	1.266E 07	0

AIRCRAFT COORDINATES(X,Y,Z) IN M. (6.446E 03, 1.352E 04, 3.177E 02)

DISTANCE ALONG FLIGHT TRACK = 1.650E 04 M.

ENGINE ATTITUDE ANGLE = 1.00E 01 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 1.40E 00

NOISE LEVEL IN EPNDB = 9.323E 01 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 9.274E 01 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 9.104E 01 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	6.690E 03	1.134E 04	4.233E 03	1.466E 04	1.549E 05	-1
9.000E 01	6.444E 03	1.277E 04	5.751E 03	1.381E 04	4.956E 06	-1
1.000E 02	6.334E 03	1.345E 04	6.334E 03	1.345E 04	1.266E 07	0

THIS IS CASE 1 TAKEOFF

AIRCRAFT COORDINATES(X,Y,Z) IN M. (6.661E 03, 1.380E 04, 3.345E 02)

DISTANCE ALONG FLIGHT TRACK = 1.700E 04 M.

ENGINE ATTITUDE ANGLE = 1.00E 01 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 1.40E 00

NOISE LEVEL IN EPNDB = 9.311E 01 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 9.260E 01 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 9.092E 01 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	7.094E 03	1.131E 04	4.647E 03	1.446E 04	1.571E 08	-1
9.000E 01	6.952E 03	1.306E 04	6.175E 03	1.407E 04	5.018E 07	-1
1.000E 02	6.749E 03	1.373E 04	6.749E 03	1.373E 04	1.266E 07	0

AIRCRAFT COORDINATES(X,Y,Z) IN M. (7.276E 03, 1.409E 04, 3.512E 02)

DISTANCE ALONG FLIGHT TRACK = 1.750E 04 M.

ENGINE ATTITUDE ANGLE = 1.00E 01 (DEGREES) , DIRECTIVITY ANGLE = 1.20E 02 (DEGREES)

ENGINE PERFORMANCE PARAMETER = 1.40E 00

NOISE LEVEL IN EPNDB = 9.294E 01 AT A SIDELINE DISTANCE 1.00E 00 M.
NOISE LEVEL IN EPNDB = 9.244E 01 AT A SIDELINE DISTANCE 1.52E 02 M.
NOISE LEVEL IN EPNDB = 9.081E 01 AT A SIDELINE DISTANCE 4.63E 02 M.

CONTOUR POINTS

NOISE LEVEL (EPNDB)	LEFT CONTOUR POINT (M.)	(M.)	RIGHT CONTOUR POINT (M.)	(M.)	ACCUMULATED AREA (SQUARE M.)	ERROR CODE
8.000E 01	7.512E 03	1.159E 04	5.056E 03	1.525E 04	1.593E 08	-1
9.000E 01	7.280E 03	1.335E 04	6.599E 03	1.434E 04	5.076E 07	-1
1.000E 02	7.164E 03	1.400E 04	7.164E 03	1.400E 04	1.264E 07	0

THIS IS CASE - TAKEOFF

NOISE FOOTPRINT CONTOUR PLOT

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PLOT DIMENSIONS (CM)           X = 2[illegible] CM
                               Y = 3[illegible] CM

SCALE = 1.[illegible]E+[illegible] M   /CM        COMPUTED      = 3.[illegible]E+[illegible]2 M   /CM
                               USER SELECTED = 1.[illegible]E+[illegible]3 M   /CM

PLOT BOUNDARIES (M   )         X MINIMUM = -8.[illegible]E+[illegible]3
                               X MAXIMUM = 1.2[illegible]E+[illegible]

                               Y MINIMUM = -[illegible]E+[illegible]3
                               Y MAXIMUM = 3.[illegible]E+[illegible]
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THIS IS CASE 1 TAKEOFF

CONTOUR AT 8. EPNDB IN M

LEFT		RIGHT	
6.31943E+03	-3.14275E+02	6.31943E+03	-3.14275E+03
6.31943E+03	-2.64275E+0[illegible]	6.31945E+03	-2.34275E+03
6.32502E+03	-2.22062E+03	6.32502E+03	-2.22602E+03
6.45064E+03	-2.03930E+03	6.46804E+03	-2.13908E+03
6.62305E+03	-1.61233E+03	6.62369E+03	-1.51233E+03
6.77531E+03	-1.10273E+03	6.77541E+03	-1.10273E+03
6.92296E+03	-7.51242E+02	6.92296E+03	-7.51242E+02
7.06706E+03	-3.18314E+02	7.06706E+03	-3.18014E+02
7.21974E+03	1.16814E+02	7.21974E+03	1.10814E+02
7.34996E+03	5.53120E+02	7.34940E+03	5.53120E+02
7.40577E+03	9.90815E+02	7.48577E+03	9.90815E+02
7.62622E+03	1.42379E+03	7.62620E+03	1.42979E+03
5.90512E+03	3.08859E+03	5.96512E+03	3.10059E+03
2.97320E+03	5.53378E+03	2.97520E+03	5.33378E+03
1.94205E+03	6.17182E+03	-2.12949E+03	6.30294E+03
1.91551E+03	6.36300E+03	-2.10497E+03	7.40510E+03
1.70434E+03	6.49705E+03	1.94300E+03	8.31095E+03
2.01936E+03	6.93057E+03	1.73315E+03	8.76804E+03
1.97654E+03	7.14027E+03	1.44440E+03	9.55743E+03
2.20728E+03	7.54049E+03	1.15975E+03	9.37007E+03
2.27083E+03	7.70249E+03	7.35970E+02	1.16911E+04
2.61558E+03	8.44621E+03	4.35807E+02	1.16077E+04
2.67820E+03	8.82438E+03	1.00441E+02	1.16998E+04
3.07514E+03	8.01853E+03	4.96353E+02	1.20093E+04
3.34084E+03	8.87150E+03	9.67080E+02	1.24217E+04
3.70544E+03	9.14222E+03	1.37614E+03	1.27045E+04
4.13190E+03	9.41330E+03	1.78472E+03	1.29871E+04
4.23847E+03	9.08389E+03	2.19337E+03	1.32097E+04
5.04491E+03	9.95487E+03	2.60211E+03	1.35522E+04
5.45113E+03	1.02260E+04	3.01091E+03	1.38345E+04
5.84703E+03	1.04872E+04	3.41979E+03	1.41108E+04
6.20392E+03	1.07085E+04	3.82872E+03	1.43991E+04
6.60815E+03	1.11338E+04	4.23773E+03	1.46812E+04
7.03634E+03	1.19113E+04	4.64600E+03	1.49633E+04
7.51447E+03	1.15029E+04	5.05605E+03	1.52452E+04

TOTAL AREA UNDER CONTOUR =1.593109E+08 SQ. M

THIS IS CASE 1 TAKEOFF

CONTOUR AT 90 EPNDB IN M

LEFT		RIGHT	
1.93144E+03	-6.49734E+02	-1.99144E+03	-6.49734E+02
1.93144E+03	-1.49734E+02	-1.99144E+03	-1.49734E+02
2.0[illegible]761E+03	3.10[illegible]92E+02	-2.[illegible]701E+03	3.18460E+02
2.14713E+03	6.750[illegible]E+02	-2.14713E+03	6.75046E+02
[illegible]	1.1[illegible]9[illegible]8E+03	-2.29151E+03	1.11[illegible]8E+03
2.42748E+03	1.54719E+03	-2.42740E+03	1.54719E+03
2.55[illegible]40E+03	1.98921E+03	-2.55630E+03	1.90[illegible]E+03
2.67931E+03	2.[illegible]34[illegible]9E+03	-2.67931E+03	2.[illegible]3449E+03
2.79712E+03	2.08257E+03	-2.79712E+03	2.08257E+03
2.9[illegible]5E+03	3.3[illegible]7E+03	-2.9[illegible]5E+03	[illegible].333[illegible]7E+03
2.97630E+03	[illegible]	-2.97030E+03	3.3[illegible]2[illegible]E+03
3.04593E+03	4.28971E+03	-3.04593E+03	4.28471E+03
2.34395E+03	5.22415E+03	-2.34395E+03	5.22415E+03
1.1[illegible]778E+03	6.[illegible]9464E+03	-1.11778E+03	6.39464E+03
7.33676E+02	6.[illegible]6[illegible]E+03	-7.11050E+02	7.19010E+03
[illegible]5026E+02	7.[illegible]9[illegible]1E+03	-6.12973E+02	7.7642[illegible]E+03
[illegible]02E+02	7.73638E+03	-4.11899E+02	8.3777[illegible]E+03
1.11107E+03	8.18499E+03	-1.98171E+02	8.3[illegible]535E+03
1.28123E+03	8.52724E+03	9.36348E+01	9.36531E+03
1.59034E+03	8.93547E+03	3.83708E+02	9.77133E+03
1.73[illegible]27E+03	9.[illegible]5135E+03	7.54[illegible]17E+02	1.[illegible]2541E+04
2.15228E+03	9.[illegible]7[illegible]E+03	1.10679E+03	1.36[illegible]37E+04
2.4[illegible]907E+03	9.[illegible]8975E+03	1.54280E+03	1.1[illegible]265E+04
2.[illegible]1327E+03	1.01944E+04	1.94230E+03	1.13204E+04
3.10640E+03	1.04613E+04	2.37840E+03	1.10450E+04
3.57811E+03	1.[illegible]792[illegible]E+04	2.79442E+03	1.19[illegible]4E+04
4.[illegible]8843E+03	1.1[illegible]37[illegible]E+04	3.21440E+03	1.219[illegible]E+04
4.33302E+03	1.13267E+04	3.63065E+03	1.24[illegible]2[illegible]E+04
4.81[illegible]51E+03	1.1[illegible]14[illegible]E+04	4.05[illegible]4E+03	1.27[illegible]16E+04
5.[illegible]179[illegible]E+03	1.1[illegible]931E+04	4.48100E+03	1.3[illegible]E+04
5.62697E+03	1.21924E+04	4.9[illegible]45[illegible]E+03	1.32695E+04
6.03571E+03	1.24821E+04	5.32704E+03	1.[illegible]3377E+04
6.4[illegible]41[illegible]E+03	1.27722E+04	5.791[illegible]E+03	1.3[illegible]25E+04
6.83213E+03	1.30626E+04	6.17467E+03	1.[illegible]4728E+04
7.23[illegible]78E+03	1.33538E+04	6.59861E+03	1.[illegible]3395E+04

TOTAL AREA UNDER CONTOUR =[illegible]27E+07 SQ. M.

THIS IS CASE 1 TAKEOFF

CONTOUR AT 100 EPNDB IN M

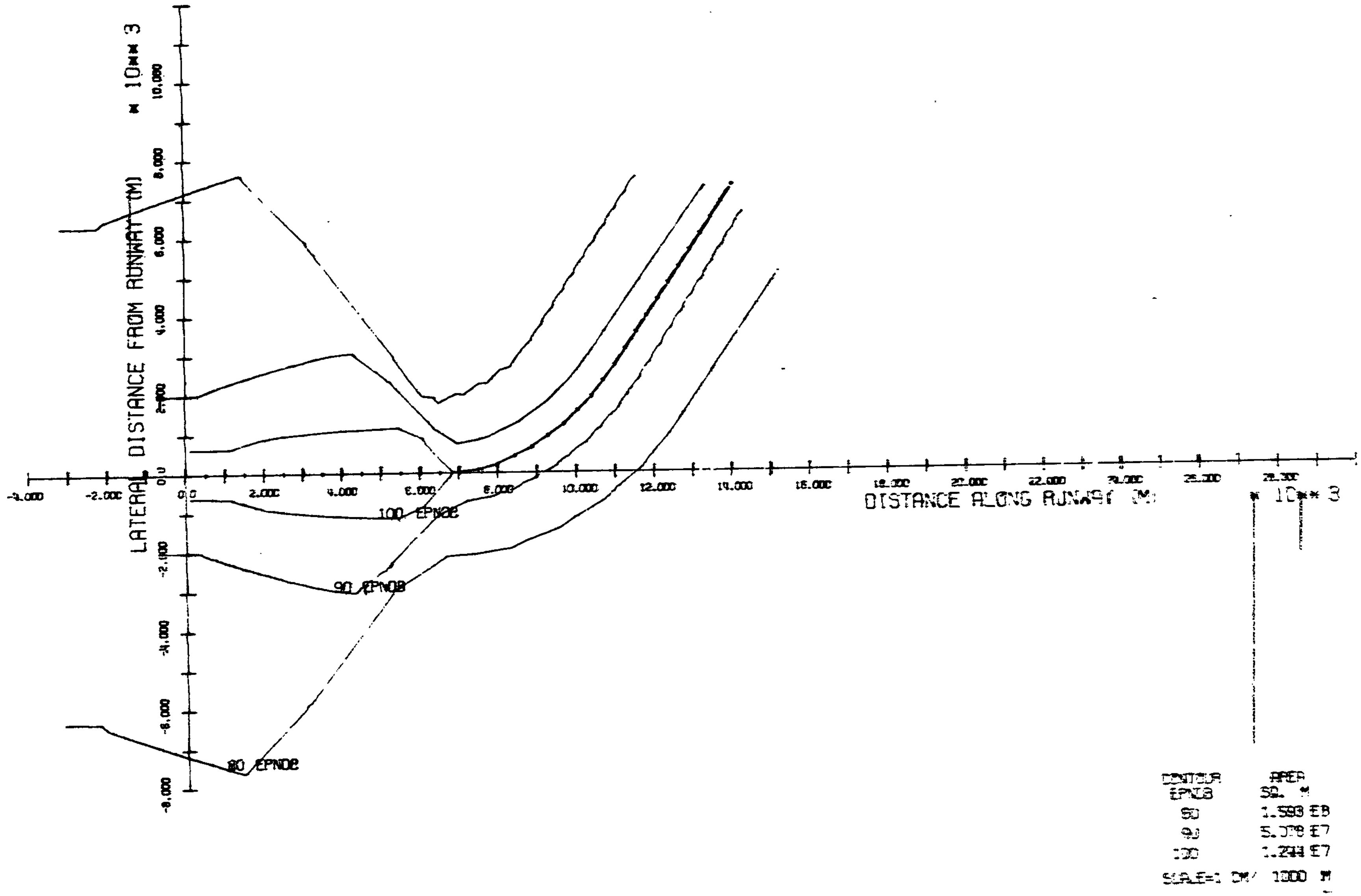
LEFT		RIGHT	
6.29112E+02	1.41517E+02	-6.29112E+02	1.41517E+02
6.29112E+02	6.41517E+02	-6.29112E+02	6.41517E+02
6.37262E+02	1.12503E+03	-6.37292E+02	1.12563E+03
7.67813E+02	1.54166E+03	-7.07810E+02	1.54166E+03
8.03019E+02	1.98742E+03	-8.89019E+02	1.98742E+03
9.05873E+02	2.46156E+03	-9.05873E+02	2.46156E+03
1.01303E+03	2.95030E+03	-1.01303E+03	2.95030E+03
1.05648E+03	3.44139E+03	-1.05648E+03	3.44133E+03
1.09182E+03	3.93015E+03	-1.09182E+03	3.93015E+03
1.11491E+03	4.43726E+03	-1.11491E+03	4.43726E+03
1.13503E+03	4.93064E+03	-1.13503E+03	4.93064E+03
1.15478E+03	5.44118E+03	-1.15478E+03	5.44118E+03
6.72413E+02	6.00019E+03	-6.72413E+02	6.00019E+03
0.	6.85234E+03	0.	6.85234E+03
6.07674E+01	7.40525E+03	6.07674E+01	7.40525E+03
1.77108E+02	7.89160E+03	1.77108E+02	7.89160E+03
3.79546E+02	8.34712E+03	3.79546E+02	8.34712E+03
5.99133E+02	8.79634E+03	5.99133E+02	8.79634E+03
8.75330E+02	9.21222E+03	8.75330E+02	9.21222E+03
1.16369E+03	9.62139E+03	1.16369E+03	9.62139E+03
1.56068E+03	9.98355E+03	1.56069E+03	9.98355E+03
1.85614E+03	1.03456E+04	1.85614E+03	1.03456E+04
2.23922E+03	1.06587E+04	2.23922E+03	1.06587E+04
2.63711E+03	1.09614E+04	2.63711E+03	1.09614E+04
3.04926E+03	1.12443E+04	3.04926E+03	1.12443E+04
3.43545E+03	1.15228E+04	3.43545E+03	1.15228E+04
3.87975E+03	1.18013E+04	3.87975E+03	1.18013E+04
4.23493E+03	1.20798E+04	4.23493E+03	1.20798E+04
4.71024E+03	1.23583E+04	4.71024E+03	1.23583E+04
5.12548E+03	1.26368E+04	5.12548E+03	1.26368E+04
5.54073E+03	1.29154E+04	5.54073E+03	1.29154E+04
5.95597E+03	1.31939E+04	5.95597E+03	1.31939E+04
6.37121E+03	1.34724E+04	6.37121E+03	1.34724E+04
6.78646E+03	1.37509E+04	6.78646E+03	1.37509E+04
7.23170E+03	1.40294E+04	7.20170E+03	1.40294E+04

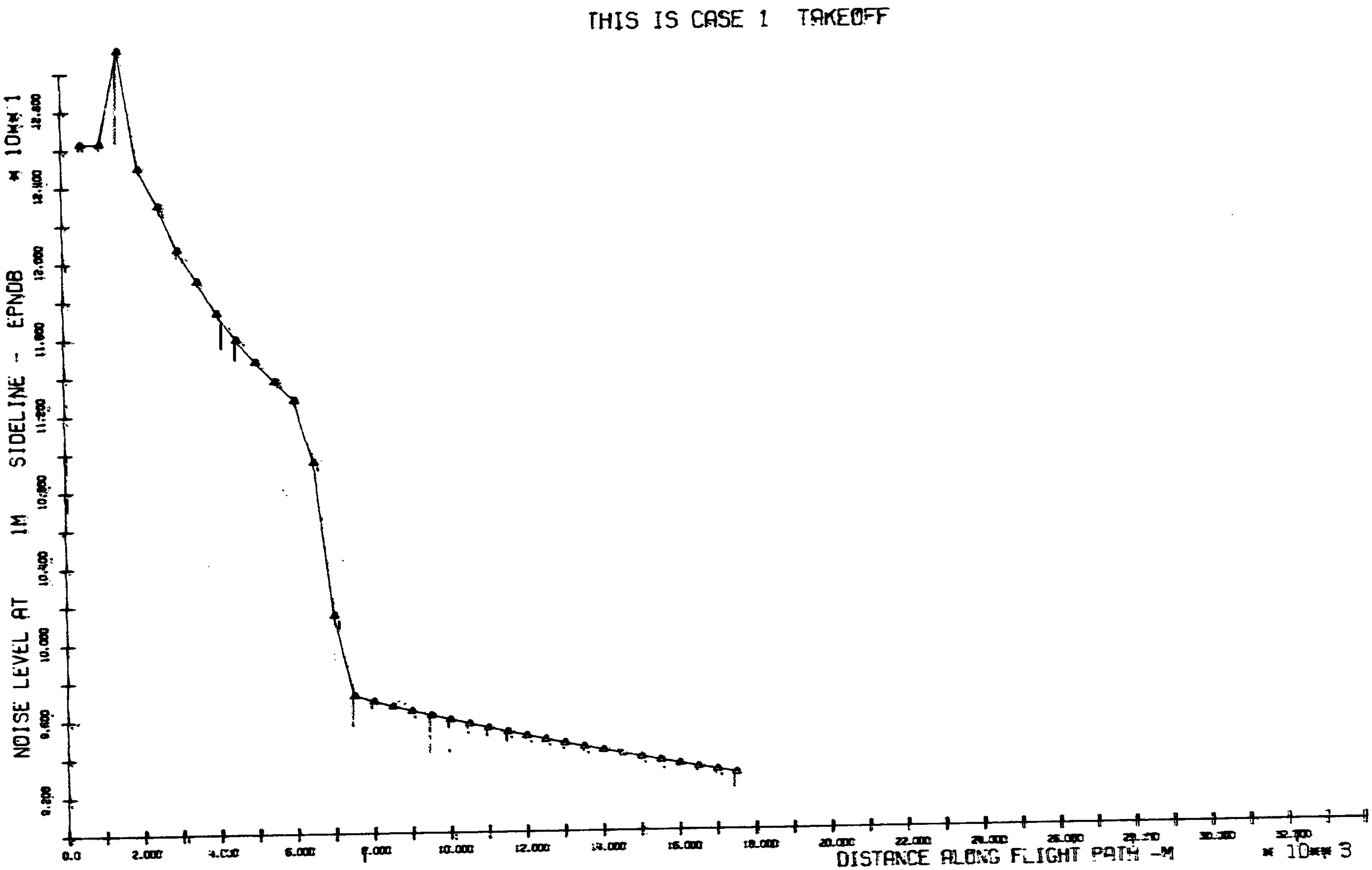
TOTAL AREA UNDER CONTOUR =1.243874E+07 SQ. M

SIDELINE NOISE LEVELS

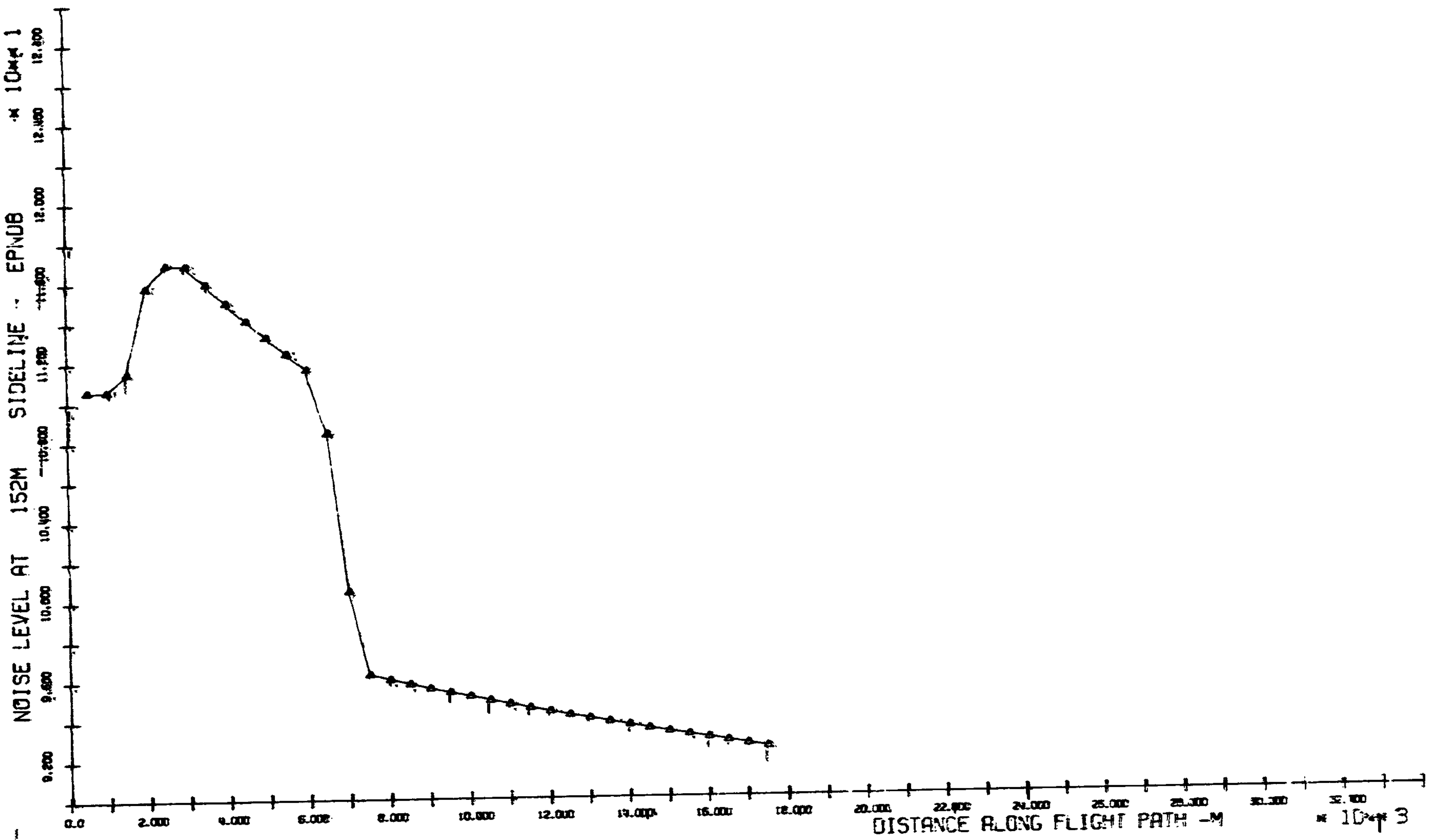
FLIGHT PATH DISTANCE (M.)	NOISE LEVEL (EPNdB) 1(M)	152(M)	463(M)
5.00E+02	120.24	110.57	102.40
1.00E+03	126.24	110.57	106.46
1.50E+03	131.19	111.48	106.70
2.00E+03	124.97	115.76	107.41
2.50E+03	122.55	116.92	106.90
3.00E+03	120.07	116.85	107.94
3.50E+03	119.62	115.94	107.93
4.00E+03	117.32	114.93	106.24
4.50E+03	115.93	114.39	110.36
5.00E+03	114.75	113.25	108.27
5.50E+03	113.73	112.42	108.10
6.00E+03	112.75	111.05	108.46
6.50E+03	109.47	110.43	105.65
7.00E+03	101.43	103.40	97.34
7.50E+03	97.19	98.26	94.23
8.00E+03	96.89	95.99	93.37
8.50E+03	96.62	95.77	92.95
9.00E+03	96.37	95.54	92.83
9.50E+03	96.13	95.33	92.71
1.00E+04	95.89	95.13	92.59
1.05E+04	95.68	94.92	92.47
1.10E+04	95.43	94.72	92.35
1.15E+04	95.21	94.52	92.23
1.20E+04	95.00	94.33	92.11
1.25E+04	94.79	94.14	91.95
1.30E+04	94.56	93.96	91.87
1.35E+04	94.39	93.78	91.75
1.40E+04	94.19	93.60	91.63
1.45E+04	94.00	93.43	91.51
1.50E+04	93.82	93.26	91.39
1.55E+04	93.64	93.09	91.27
1.60E+04	93.46	92.93	91.16
1.65E+04	93.28	92.76	91.04
1.70E+04	93.11	92.60	90.94
1.75E+04	92.94	92.44	90.81

THIS IS CASE 1 TAKEOFF

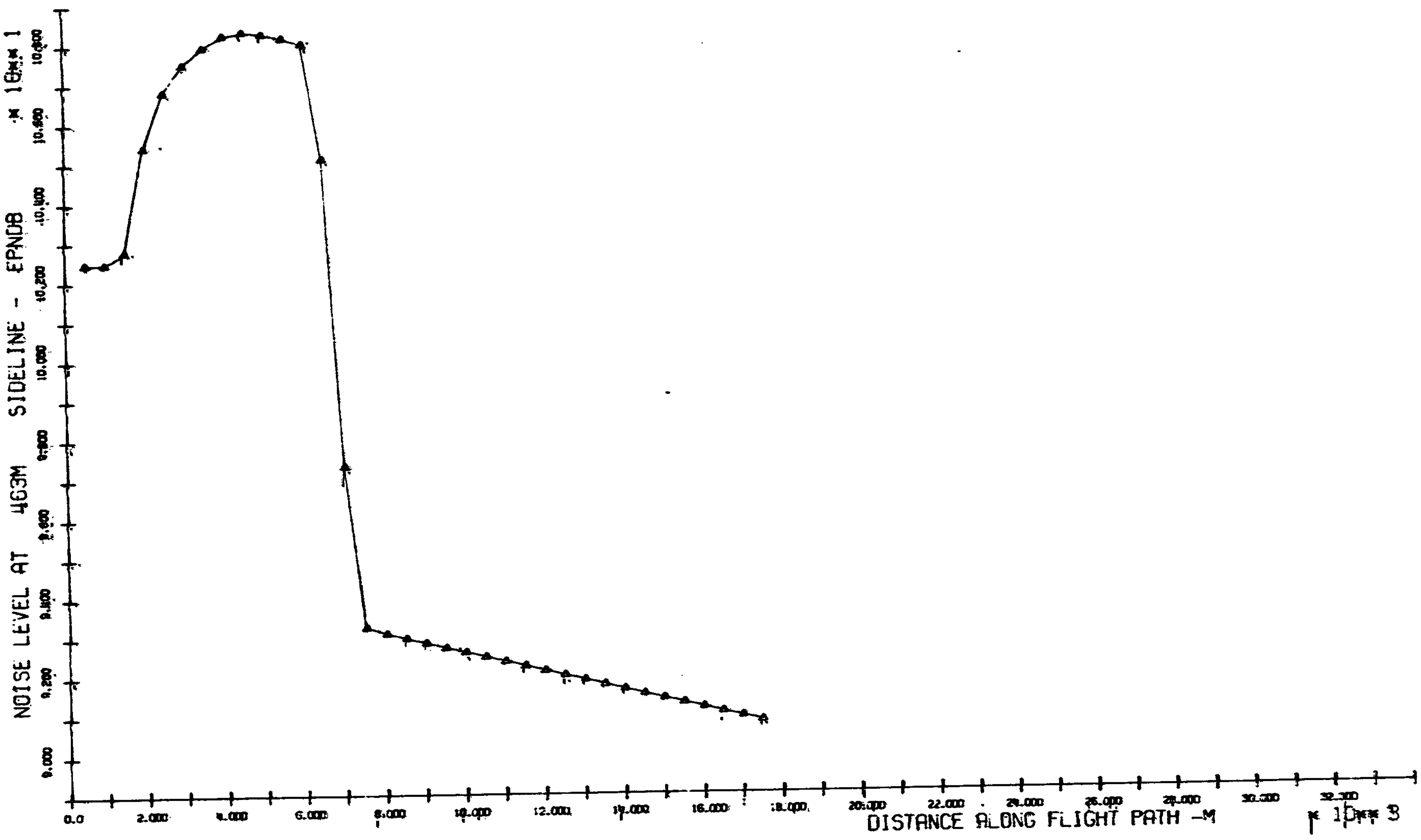



THIS IS CASE 1 TAKEOFF
NOISE LEVEL AT 1M SIDELINE - EPNDB * 10** 1
DISTANCE ALONG FLIGHT PATH -M * 10** 3
0.0
2.000
4.000
6.000
10.000
12.000
16.000
18.000
20.000
22.000

THIS IS CASE 1 TAKEOFF



THIS IS CASE 1 TAKEOFF



REFERENCE

1. D. G. Dunn & N. A. Peart, "Aircraft Noise Source and Contour Estimation," NASA CR114649, July 1973.

2. D. G. Dunn, et al, "Jet Engine Noise Source and Noise Footprint Computer Programs," NASA CR114517, October 1972.