

Sound32 Reference Sheet

Overview of Sound32

Sound32 is a FORTRAN program for use in PC DOS. To run Sound32 a data input file is created. Sound32 calculates results from the data input file and creates an output file containing the results. A “front-end” was created for the program to facilitate the preparation of the input file. The input data file is automatically created from input data that is entered into text and numeric fields of the front end.

Starting Sound32

You can start Sound32 from the DOS command prompt by executing S32.BAT (i.e. type S32) or from Windows using File Manager or My Computer to execute the S32.BAT file. When S32.BAT is executed the program opens up in the Sound32 “front end”. The front end facilitates entry of input data. Data is entered by selecting menu items from the Menu Bar. Menu items can be selected by using the **Arrow** keys or by hitting the first letter of the menu item.

FILES (Main Menu Bar)

Read - Use this to open or read Sound32 files that you have already created. The DOS directory and filename convention is used to identify the location and name of the file you want to read.

Save - Use this to save the file that you are currently working on. The DOS directory and filename convention is used to identify where the file is to be saved and the name of the file. It is suggested that you use a consistent file name extension such as S32 for all of your Sound32 files (e.g. FILENAME.S32)

New - Use this to start a new Sound32 setup and the clear the active data set in the memory. You will be prompted to ensure that you really want to erase the current active data.

View - Use this to view any ASCII file. This includes SOUND32 input and output files. The DOS directory and filename convention is used to identify the location and name of the file you want to view.

Print - Use this to print any ASCII file. This includes SOUND32 input and output files. The DOS directory and filename convention is used to identify the location and name of the file you want to view.

DOS - Use this to go to the DOS command prompt. Type exit to go from the DOS command prompt back to Sound32.

EDIT (Main Menu Bar)

Lane - This opens a window with a series of text and numeric fields to be completed to describe and quantify traffic conditions. Step through these fields by using TAB, arrow keys or RETURN. The following is a description of each field:

Traffic Description - Enter a description of the traffic such as “existing maximum noise hour traffic”

Auto, Medium-Duty Truck, Medium-Duty Truck Volume - Enter the hourly volume and speed of each vehicle type. Use miles per hour for speed.

Lane Description - Enter a description of the lane such as “westbound mainline”.

Grade - Enter Y if you would like the grade correction to be applied or N if you do not want it applied.

X,Y,Z, Description - Enter the X, Y, and Z (typically east-west, north-south, and vertical) coordinates in feet of the roadway endpoints and describe the end points with text or by station.

After you have completed entering data for one lane, you may enter data for subsequent lanes by hitting **PageDown**. You can scroll through lane pages that you have created by using **PageUp** and **PageDown**. Up to 30 lanes with up to 15 segments each may be entered.

When you have completed entering data hit **ESC**. This gives you access to the **Exit**, **Lanes**, and **Segments** menu items which are selected with the left and right **Arrow** keys. The items can be used to do the following:

Exit - From the **Exit** menu you will be given a choice of **Accept** or **Abort**. If you hit **Accept** the data will be saved in Read Only Memory (RAM) and you will return to the main menu. If you hit **Abort** none of the data entered will be saved and you will return to the main menu.

Lanes - From the **Lanes** menu you can move to the next or previous lane input field and you can insert or delete a lane input field.

Segments - From the **Segments** menu you can insert or delete lane segments from the segment fields (i.e. the Grade Cor, X, Y, Z, or Description fields). You cursor must be in one of these fields before you can access this menu.

Barrier - This opens a window with a series of text and numeric fields to be completed to

describe and quantify barriers. Step through these fields by using TAB, arrow keys, or RETURN. The following is a description of each field:

Barrier Description - Enter a description of the barrier such as “ existing sound wall, design sound wall, edge of cut.”

Material - Indicate the type material that the barrier is made of. Tab to the applicable material and hit ENTER to place the X within the brackets.

Structure Barrier - Enter Y if the barrier is a structure barrier or N if it is not. If Y is entered a field will appear at the bottom of the window into which the lanes affected by the structure barrier are entered. Enter the lane numbers separated by commas.

DELTA Z - This is “Delta Z” or the increment in feet to be used in the sound wall perturbation analysis. Typically 1 to 2 feet is used.

Max. P - This is the maximum number of perturbations up or down from the specified sound wall height. For example, if Max. P is 3, 3 barrier heights above and below the specified barrier height will be evaluated. Max. P must be 0, 1,2, or 3.

X,Y,Z0, Z - Enter the X and Y (typically east-west and north-south coordinates in feet of the barrier endpoints. Z0 is the elevation of the base of the barrier (typically the ground elevation) and Z is the height of barrier above Z0.

After you have completed entering data for one barrier, you may enter data for subsequent barrier by hitting **PageDown**. You can scroll through barrier pages that you have created by using **PageUp** and **PageDown**. Up to 200 lanes with up 10 segments each may be entered.

When you have completed entering data hit **ESC**. This gives you access to the **Exit, Barriers, and Segments** menu items which are selected with the left and right **Arrow** keys. The items can be used to do the following:

Exit - From the **Exit** menu you will be given a choice of **Accept** or **Abort**. If you hit **Accept** the data will be saved in Read Only Memory (RAM) and you will return to the main menu. If you hit **Abort** none of the data entered will be saved and you will return to the main menu.

Barriers - From the **Barriers** menu you can move to the next or previous barrier input field and you can insert or delete a barrier input field.

Segments - From the **Segments** menu you can insert or delete barrier segments from the segment fields (i.e. the X, Y, Z0, Z, or Description fields). You cursor must be in one of these fields before you can access this menu.

Receiver - This opens a window with a series of numeric and data fields to be completed to

describe and quantify receiver. Step through these fields by using TAB, arrow keys, or RETURN. The following is a description of each field:

X,Y,Z, Description - Enter the X, Y, and Z (typically east-west, north-south, and vertical) coordinates in feet of the receiver and describe receiver with text (i.e. R1, R2, etc.). The Z coordinate should typically be 5 feet above the ground at the receiver location. Ignore the DNL and People fields.

Drop-off - This opens a window with a series of text and numeric fields to be completed to describe the rate of attenuation between specified lane/receiver combinations. Step through these fields by using TAB. The following is a description of each field:

dBa - Enter the rate of attenuation (i.e. 3 dB for hard sites and 4.5 dB for soft sites). If nothing is entered 3 dB is automatically used.

Lane No. or All - Enter the lane number to which the attenuation rate applies. If it applies to all lanes then enter "ALL".

Receiver No.'s or All - Enter the receiver number or numbers to which the attenuation rate applies. If it applies to all receivers then enter "ALL." Separate multiple receiver numbers by commas.

K-Factor Constants - This opens a window with a series of text and numeric fields to be completed to describe K-Factor Constants (i.e. adjustment or calibration factors) between specified lane/receiver combinations. Step through these fields by using TAB. The following is a description of each field:

dBa - Enter the K factors (use "-" to specify a negative factor).

Lane No. or All - Enter the lane number to which the K factor applies. If it applies to all lanes then enter "ALL".

Receiver No.'s or All - Enter the receiver number or numbers to which the K factor applies. If it applies to all receivers then enter "ALL." Separate multiple receiver numbers by commas.

Options - This opens a window with a series of numeric and selection fields to be completed to specify an analysis scenario title and output and emissions options. Step through these fields by using TAB. The following is a description of each field:

Title - Enter the title of the analysis scenario you are currently evaluating such as "Route 98 Auxiliary Lanes - Existing Conditions."

Emission Levels - Specify whether Calveno (Caltrans) or National (FHWA) emission rates are to be used in the analysis. Calveno emission rates are always used in California TAB to the applicable category and hit ENTER to place the X within the brackets.

Print Formatted Input - Hit ENTER to place an X within the brackets. This will cause a formatted summary of input data to be printed.

Send Formatted Input to File - Hit ENTER to place an X within the brackets. This will cause a formatted summary of the input data to be printed to an ASCII file. When an X is placed within the brackets a new field will appear to specify the directory and file name for the file.

RUN (Main Menu Bar)

Sound32 - This causes the program to calculate results. If there are errors in the input file an error message will appear. Otherwise, the program will calculate and display the sound level and barrier cost results. An output file in ASCII format called Sound32.out is also created at this time. You will be prompted to press return to continue and this will lead you to the results post-processing menu. This is discussed in detail below.

LOS - This starts the line of sight (LOS) subroutine. This is discussed in detail below.

PLOT - This starts the plotting subroutine. A graphic display of your input showing a plan view of lanes, barriers, and receptors will appear. Several keystroke commands allow you to manipulate the screen:

- L** shows lanes only
- B** shows barriers only
- R** shows receptors only
- A** shows all elements (lanes, barriers, and receptors)
- +** zooms the image in
- zoom the image out
- arrow keys** move the image within the screen
- *** toggles lane, barrier, and receptors labels on and off
- ESC** returns you to the RUN menu.

SETTINGS (Main Menu Bar)

Sound - This toggles tones that play when you step through the menu choices

Barrier Height	0 feet	7 feet	8 feet	9 feet	10 feet	11 feet	12 feet	13 feet
BHI	0	1	2	3	4	5	6	7

To look at the results for alternative barrier heights (i.e. change the BHI) Press 1. You will then be prompted to enter the BHI corresponding to the height you wish to evaluate. A BHI must be entered for each element of the barrier. With 4 barrier element four separate BHI values separated by commas must be entered. To see the results for a 9 foot barrier enter 3,3,3,3 and press return. To see the results press 5 (RECOMPUTE AND DISPLAY LEQS). The sound level and cost results for the 9 foot barrier will then be displayed. Each time the BHI is changed the results for the changed height are appended to the output file.

Important note: When a barrier of zero height is modeled in Sound32, noise reduction will typically be indicated. When a barrier height index of 0 is entered from the calculation post-processing menu the results are for the no barrier condition, not a zero height barrier.

2. Change barrier type

This menu item allows the cost of different barrier materials to be evaluated. A barrier cannot be changed from or to a berm. Structure barriers cannot be changed to non-structure barriers and visa versa. For preliminary barrier design Caltrans currently uses \$14.00 per square foot (1998 dollars) and does not differentiate between barrier types. Accordingly, this item is not typically used. Use the following barrier type indexes to change the barrier type:

Barrier Type	berm	masonry	masonry on jersey	concrete
Barrier Index	1	2	3	4

To look at the results for alternative barrier types Press 2. You will then be prompted to enter the barrier type index corresponding to the barrier type you wish to evaluate. A barrier type index must be entered for each element of the barrier. With 4 barrier element four separate barrier type indexes values separated by commas must be entered. To see the results for a concrete barrier for the example above enter 4,4,4,4 and press return. To see the results press 5 (RECOMPUTE AND DISPLAY LEQS). The sound level and cost results for the concrete barrier will then be displayed. Each time the barrier type index is changed the results for the changed barrier type are appended to the output file. Note that Leq values do NOT change with a change in barrier type.

3. Change people per receiver (no longer used)

This item allows you to change the number of people per receiver which effects the effectiveness/cost ratio (E/C). E/C is no longer used by Caltrans in sound barrier design.

4. Change design noise levels (no longer used)

This menu item allows you to change the design noise level which effects the effectiveness/cost ratio (E/C). E/C is no longer used by Caltrans in sound barrier design.

5. Recompute and display Leqs

When this menu item is selected Leq values and cost results will be recomputed. This item must be selected to see the changes in results that occur when the barrier height or type is changed (Menu Items 1 and 2).

6. Recompute and display barrier segment contributions

When this menu item is selected the Leq contribution over each barrier segment (i.e. element) is calculated and displayed.. To look at the barrier segment contribution Press 6. You will then be prompted to enter the receiver number for which you wish to view the barrier contributions. The Leq contribution over each barrier segment for the selected receiver will then be displayed along with the barrier length and type. NBAR is the Leq contribution resulting from the direct line of sight between the lane and the receiver. NBAR is shown for each barrier height index along with sum of the barrier and NBAR contributions (i.e. total sound level).

7. Recompute and display E/C matrix (no longer used)

This menu item recomputes and displays the effectiveness/cost (E/C) ratio based on changes specified in Menu Items 1,2,3, and 4. E/C is no longer used by Caltrans in sound barrier design.

8. Browse output file

This menu item allows you to browse the output file. Enter 8 and sections of the output file will be displayed. You will be prompted to step through file by pressing ENTER. The output ASCII file (Sound32.out) can be viewed by any text reader or word processing program.

9. Stop

This menu item closes the post-processing menu and opens the Sound32 Results Menu.

SOUND32 RESULTS MENU

View - This menu item allows you to view the output file directly. You can scroll up and down through the file using the up and down or PageUp or PageDown arrows. Hit ESC to return to the Sound32 Results Menu.

Print - This menu item prints the output file (Sound32.out).

Exit Results Menu - This menu item will return you to the Sound32 front end menu bar.

LINE OF SIGHT (LOS) ANALYSIS

The line of sight (LOS) subroutine is activated from the RUN menu item in the front end Menu Bar. The program evaluates the line of sight between a specified lane and specified receivers and determines the height of a barrier at a specified location between the lane and the receivers needed to just block the line of sight between an 11.5 foot high truck stack on the lane and the receivers.

Set Parameters - This item opens a window with a series of numeric fields to be completed to identify the lanes, barriers, and receivers to be evaluated.

LANE No. to USE - Enter the number of the lane to be evaluated.

BARRIER No. USE - Enter the number of the barriers to be evaluated.

RECEIVERS to USE - Enter an X corresponding to the receivers that you wish to include in the analysis. Step through the receiver numbers using TAB, RETURN, or the arrow keys.

DISTANCE TO TRUCK - This is the largest distance between the any receiver and a truck on the specified lane that you wish to have the line of sight evaluated. 500 feet is typically used.

Calculate - This item initiates the LOS calculation. Two ASCII files one with the results in barrier order (IBO.DAT) and the other with results in receiver order (IRO.DAT) are created. These files can be viewed by any text reader or word processing program.

View Results - This item allows you to view the results of the analysis in barrier order or receiver order.

Print Results - This item allows to print the results in barrier order or receiver order.

DOS Shell - This item allows to go to the DOS shell.

Return to Sound32 - This item returns you to Sound32.