

Study of noise level in railway stations

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To assess the level of noise in stations, a study was conducted in Chennai central, Villupuram and Tiruchirapalli railway junctions of Southern Railway. SVAN 943A (Poland make) instrument was used to record observations at vantage points like important platforms, waiting hall and drivers' rest room. Equivalent continuous sound level (L_{eq}) near waiting hall on different days was found to be in the range of 52 to 56 dB (A). Average sound pressure level (L_p) in the important platforms and drivers' rest room was in the range of 52 to 57 dB (A), which exceeds the noise level category of residential zone prescribed by the Central Pollution Control Board.

Keywords: Noise level, Railway station, Sound

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Introduction

In the past three decades, noise in all areas, especially in urban areas, has been increasing rapidly. It has become a very important stress factor and intrudes into our daily activities. It will become a major threat to the quality of human lives in future. Exposure to noise may result in a variety of biological reflexes and responses such as hearing loss impairment, speech interference, annoyance reaction, sleep interference, health effects, effects on task performance, etc. The sources of noise are industries, commercial establishments, traffic including road, rail and air, and construction activities. Kanakasabai *et al*¹ reported the levels of noise occurring in various trains. This paper reports noise level survey made in some important railway stations².

Materials and Methods

Railway Stations of Chennai Central, Villupuram and Tiruchirapalli of Southern Railway were selected to carryout the noise level survey based on traffic frequency. In Chennai Central Railway Station, 45 express trains and 15 unit trains are arriving and departing in a day. Shunting of trains in this station is a continuous phenomenon with a frequency of 15 min. So continuous noise is produced every day. Apart from this primary noise, secondary noises are

produced due to trolley movements, announcements, audio speakers, passenger conversations, etc. The sound level meter, SVAN 943A (Poland make), was used to measure the noise level in railway stations. The noise level observations were recorded at a distance of 3 m in locations like platforms (6 & 7), rolling point cabin, waiting hall, parcel office, and drivers' rest room.

Results and Discussion

Chennai Central Railway Station

In Chennai Central Railway Station, when no train is arriving or departing, the average sound pressure level (L_p) in the empty platform was found to be 37 dB (A). The noise produced by the horn, the engine and wheels of a train were measured with the help of the instrument on platforms (6 & 7), and near the rolling point cabin for 10 days (Table 1). Based on the observations, the average sound pressure level (L_p) was calculated³ as:

$$L_p = 20 \log \frac{1}{N} \sum_{i=1}^N 10^{(L_i/20)} \quad \dots(1)$$

where N = Number of samples; L_i = Observed values in dB(A). The average sound pressure levels were in the range of 49 to 64 dB (A).

The noise level was recorded continuously near the waiting hall and parcel office for a week with a time interval of 15 min (Table 2). The corresponding

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equivalent continuous sound levels (Leq) were calculated³ as:

$$Leq = 10 \log \sum_{i=1}^N 10^{(Li/10)} ti \quad \dots(2)$$

where N = Number of samples; Li = Observed values in dB (A); ti = Fraction of total sample time.

The calculated Leq near waiting hall [52-56 dB (A)] and near parcel office [59-63 dB (A)] falls in the

category of residential area and commercial area respectively (during day time).

With a view to find out noise level in drivers' rest room (first floor), average sound pressure level calculated was in the range of 52 to 57 dB (A) on different days which exceeded the limit prescribed for residential area (Table 3).

Villupuram and Tiruchirapalli Railway Stations

At Villupuram and Tiruchirapalli stations, about 30 express and passenger trains are arriving and departing daily. The average sound pressure levels (Lp) calculated from observations were found to be in the range of 47 to 61 dB (A) in these railway junctions (Table 4).

Table 1 — Noise level survey in Chennai Central Station

Date of observation	Train noise level, dB (A)					
	Platforms (6 & 7)			Rolling point cabin		
	Horn	Engine	Wheel	Horn	Engine	Wheel
13-09-2002	57	54	49	63	49	45
14-09-2002	58	56	44	62	47	48
15-09-2002	60	58	48	61	51	49
16-09-2002	56	56	51	61	52	50
17-09-2002	50	51	49	63	45	50
18-09-2002	60	60	48	64	50	46
19-09-2002	61	61	43	65	54	52
20-09-2002	60	56	51	65	54	51
21-09-2002	60	56	51	64	52	51
22-09-2002	60	59	49	64	55	50
Average (Lp) Sound Pressure Level	59	57	49	64	51	49

Table 3 — Noise level survey in Chennai Central Station near drivers' rest room (First floor)

Date of observation	Noise level, dB (A)			Average sound pressure level, dB (A)
	Train	Traffic	Other	
16-09-2002	58	49	51	54
17-09-2002	54	51	50	52
18-09-2002	61	56	52	57
19-09-2002	61	53	53	56
20-09-2002	58	53	51	55
21-09-2002	61	52	49	56
22-09-2002	61	57	50	57

Table 2 — Noise level survey in Chennai Central Station with time interval 15 min

Date of observation	Noise level, dB (A)							Leq	Noise level, dB (A)							Leq
	Waiting hall								Parcel office							
	1	2	3	4	5	6	7		1	2	3	4	5	6	7	
13-09-2002	45	48	52	55	60	60	62	55	60	61	58	47	55	62	64	60
14-09-2002	49	50	48	50	62	62	62	55	63	59	58	48	57	58	62	59
15-09-2002	51	53	46	52	55	60	58	52	63	64	60	59	65	64	62	63
16-09-2002	49	52	57	60	62	61	61	56	62	58	61	58	60	62	59	60
17-09-2002	52	49	58	59	56	60	58	54	60	54	57	62	61	57	60	59
18-09-2002	54	55	57	54	55	59	57	53	67	62	59	64	61	57	54	62
19-09-2002	55	56	59	55	59	55	58	54	54	58	54	60	61	57	61	59

Table 4 — Noise level survey in Villupuram and Tiruchirapalli Junctions

Date of Survey: 26-09-2002 & 30-09-2002

SI No	Noise level, dB (A)					
	Villupuram Junction			Tiruchirapalli Junction		
	Horn	Engine	Wheel	Horn	Engine	Wheel
1	65	57	40	62	50	48
2	60	56	45	60	55	45
3	65	55	40	58	52	50
4	55	68	45	62	49	52
5	60	45	40	64	52	51
6	60	55	45	60	49	50
7	62	50	47	63	50	50
8	60	49	48	65	45	47
9	60	50	48	57	46	44
10	50	68	45	60	44	47
11	60	52	45	52	50	48
12	62	50	47	49	54	52
13	61	49	50	—	—	—
14	62	53	47	—	—	—
15	60	58	55	—	—	—
<i>Ave.Lp</i>	61	57	47	61	50	49

Conclusions

During the arrival or departure of trains at the platform, the noise level suddenly increases by 27 dB (A) from the normal level. This sudden increase will have a definite effect on the health of the

passengers on the platform³. The noise levels in the waiting hall and parcel area were in the upper limits of residential and commercial areas, respectively⁴. This level will cause speech interference [above 35 dB (A)] rendering speech incapable of being understood, causing fatigue, irritation, misunderstandings, etc. Average sound pressure level in driver's rest room was higher, which can disturb their rest and sleep and evoke other psychological, physiological and possibly pathological reactions. The rest room may have to be made either sound proof to reduce the inside noise level or room may be planned in location where the noise is low. Noise levels assessed in all three railway junctions were almost same.

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