

(Diesel)

UNITED STATES DEPARTMENT OF LABOR  
MINE SAFETY AND HEALTH ADMINISTRATIONMuffler underground

## TECHNICAL SUPPORT

## NOISE CONTROL ASSISTANCE ON AN EIMCO 980-T27 TRUCK

Escalante Silver Mine (ID 42-01613)  
REDCO Silver, Inc.  
Enterprise, Iron County, Utah

June 26, 1984

by

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## INTRODUCTION

At the request of Mr. Richard Nielsen, Health Specialist, Mine Safety and Health Administration (MSHA), Salt Lake City Subdistrict Office, noise control assistance was provided to the Escalante Silver Mine on June 26, 1984. In a previous survey (Report No. D4528 - P321) it was recommended that a muffler be tested on an Eimco<sup>1/</sup> 980-T27 (27-ton) truck. This report describes this testing and evaluates the effectiveness of two types of earmuffs.

## METHODOLOGY

The Eimco 980-T27 truck was powered by an air-cooled 277-hp Deutz Model F12L413FW diesel engine. An oxidation catalyst (PTX) was installed on the exhaust. Noise measurements were taken underground prior to and after installation of the muffler. A Cowl spiral silencer (Model TS60PL) was used. This size was recommended by the manufacturer. The PTX was left connected at all times. All tests were conducted underground on the same section of a decline with the truck loaded and tramping uphill. Concurrent tape recordings were taken inside and outside earmuffs worn by the operator. Earmuffs tested were Glendale Optical Quiet Line Series GN900 and American Optical Model 1720. These measurements were made to evaluate the effectiveness of the muffler in reducing noise levels outside and inside hearing protectors. Because of the possibility of overheating problems, the muffler was left on the truck for a testing period of 2 weeks. During this time, the truck was run during the day shift.

## MUFFLER RESULTS

The average noise levels outside the earmuffs were 102.7 dBA without the muffler and 100.5 dBA with the muffler, a 2.2 dBA reduction. The frequency spectra in figure B1 reveal that the muffler was most effective below the 1.25 KHz frequency band. Reductions in these lower frequencies are important because hearing protectors are less effective in this range.

No engine overheating problems occurred during the 2-week muffler testing period.

## EARMUFF RESULTS

The performance of the ear muffs is summarized in table 1. The two models of earmuffs provided approximately the same reduction. The greatest protection for the operator occurred when the operator wore the earmuffs and the muffler was installed. The additional reduction under the earmuffs due to the muffler was approximately 8 dBA. This occurred because of the low frequency noise reduction provided by the muffler. These frequency reductions are illustrated in figures B2-B5.

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<sup>1/</sup> References to specific brand names is made only for purpose of identification and does not imply endorsement by MSHA.

Table 1. - Summary of average noise levels inside and outside earmuffs, dBA

Earmuff	No muffler		Cowl muffler	
	inside/outside	reduction	inside/outside	reduction
Glendale Optical	85.6/102.4	16.8	76.8/100.7	23.9
American Optical	83.3/103.1	19.8	76.1/100.2	24.1

## CONCLUSIONS

Installation of a Cowl muffler on an Eimco 980-T27 truck resulted in a 2.2 dBA reduction outside the earmuff under fully-loaded underground tramming conditions. Concurrent measurements inside earmuffs showed reduction of approximately 8 dBA due to the muffler installation. This occurred because earmuffs are not effective at reducing the low frequency noise that the muffler reduces. The greatest noise protection for the truck operator was with the use of hearing protection and installation of a muffler. Testing of the muffler on the truck for a period of 2 weeks revealed no overheating problems.

Based on these results, it is recommended that suitable mufflers be installed on all the Eimco 980-T27 trucks at the Escalante Silver Mine and the use of hearing protectors be continued.

## ACKNOWLEDGEMENTS

The assistance and cooperation of the Escalante Silver Mine personnel and Mr. Richard Nielsen is greatly appreciated.

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Approved:

Date 11-2-84

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A P P E N D I X A

Truck Illustrations

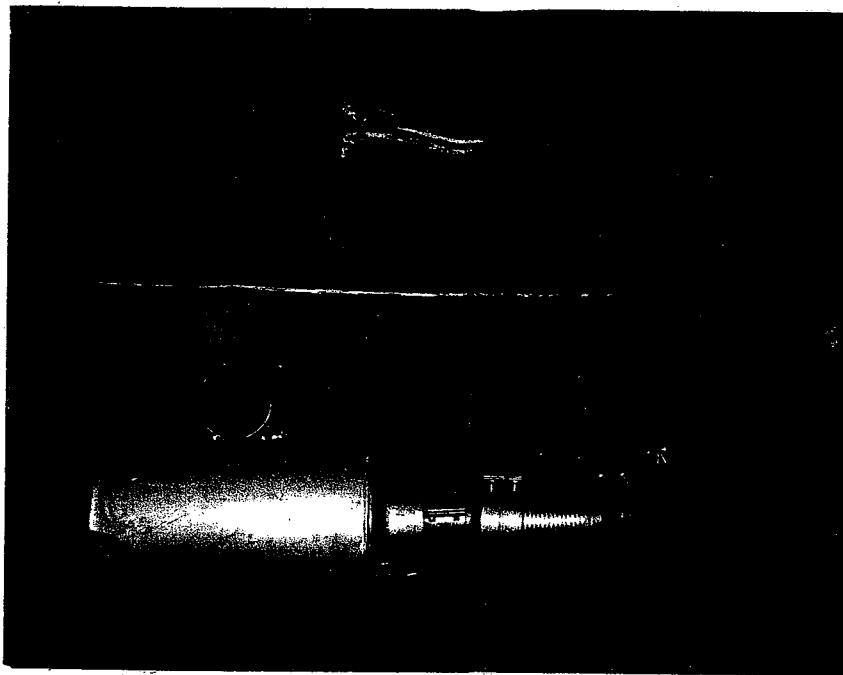


FIGURE A1. Installation of PTX and Cowl muffler.

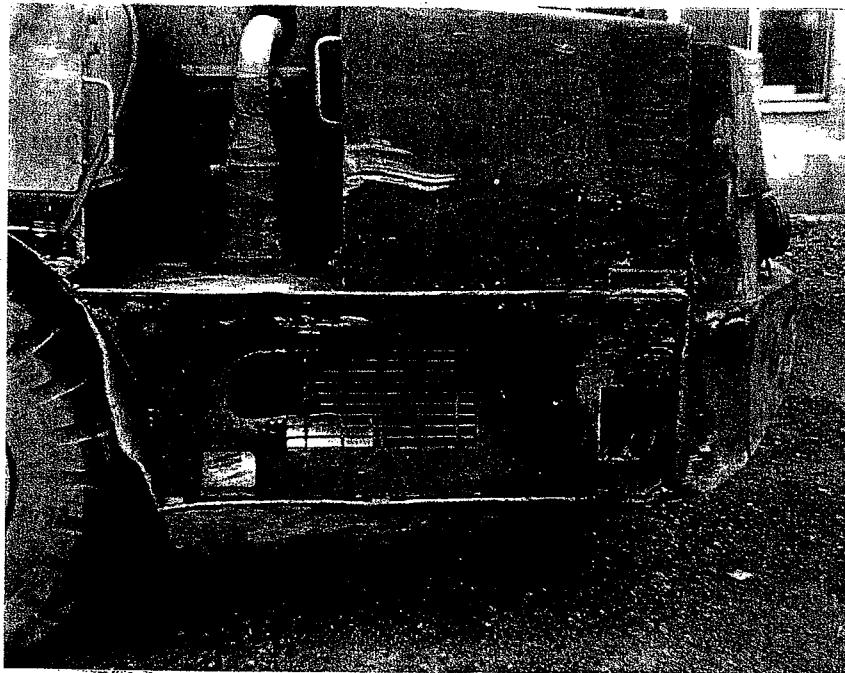


FIGURE A2. Installation of muffler with grate cover in place.

A P P E N D I X B

Frequency Spectra Illustrations

FIGURE B1.— COMPARISON OF EIMCO TRUCK  
WITHOUT AND WITH COWL MUFFLER.

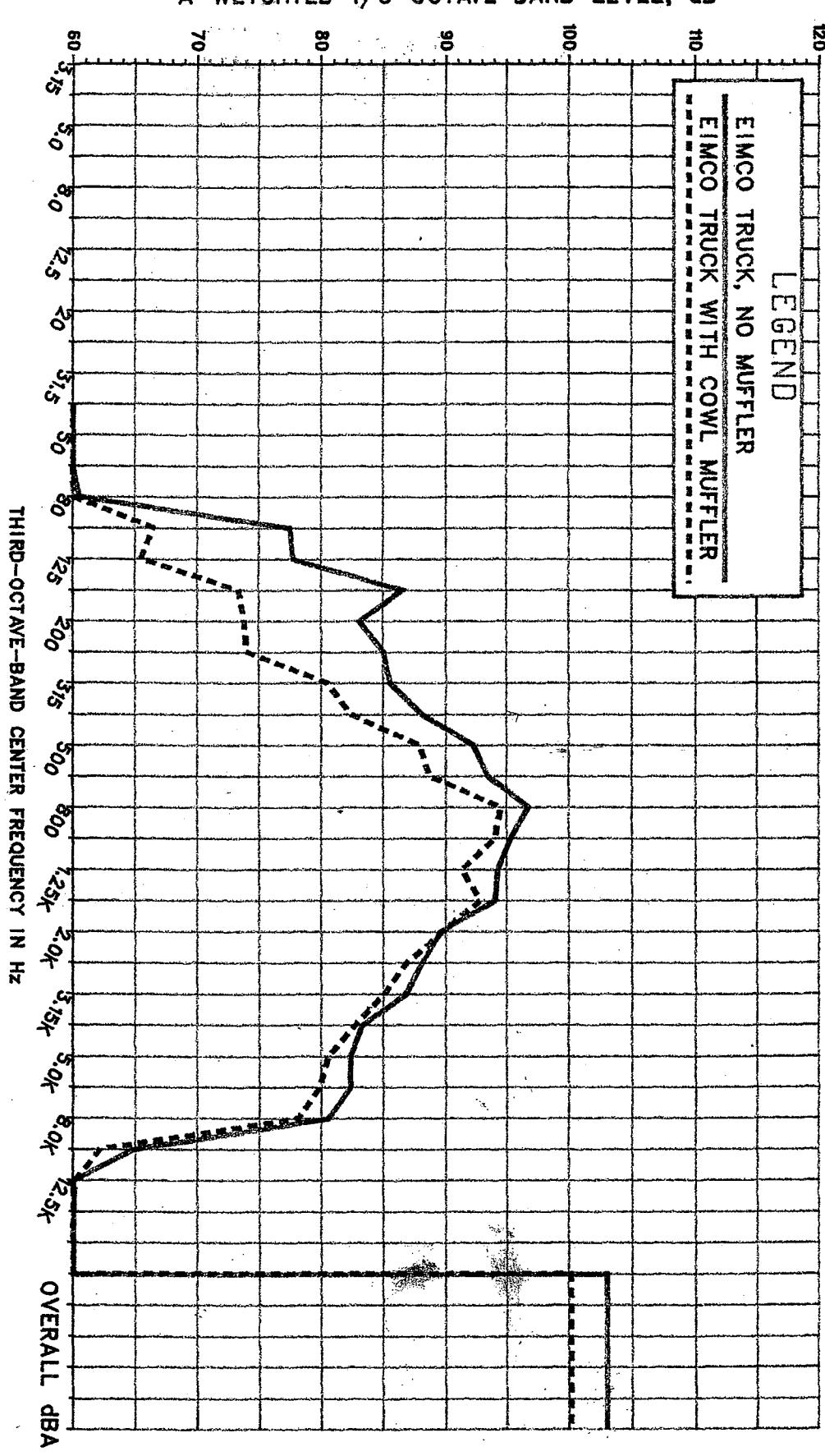


FIGURE B2.— COMPARISON OF INSIDE AND OUTSIDE  
GLENDALE MUFFS, NO MUFFLER.

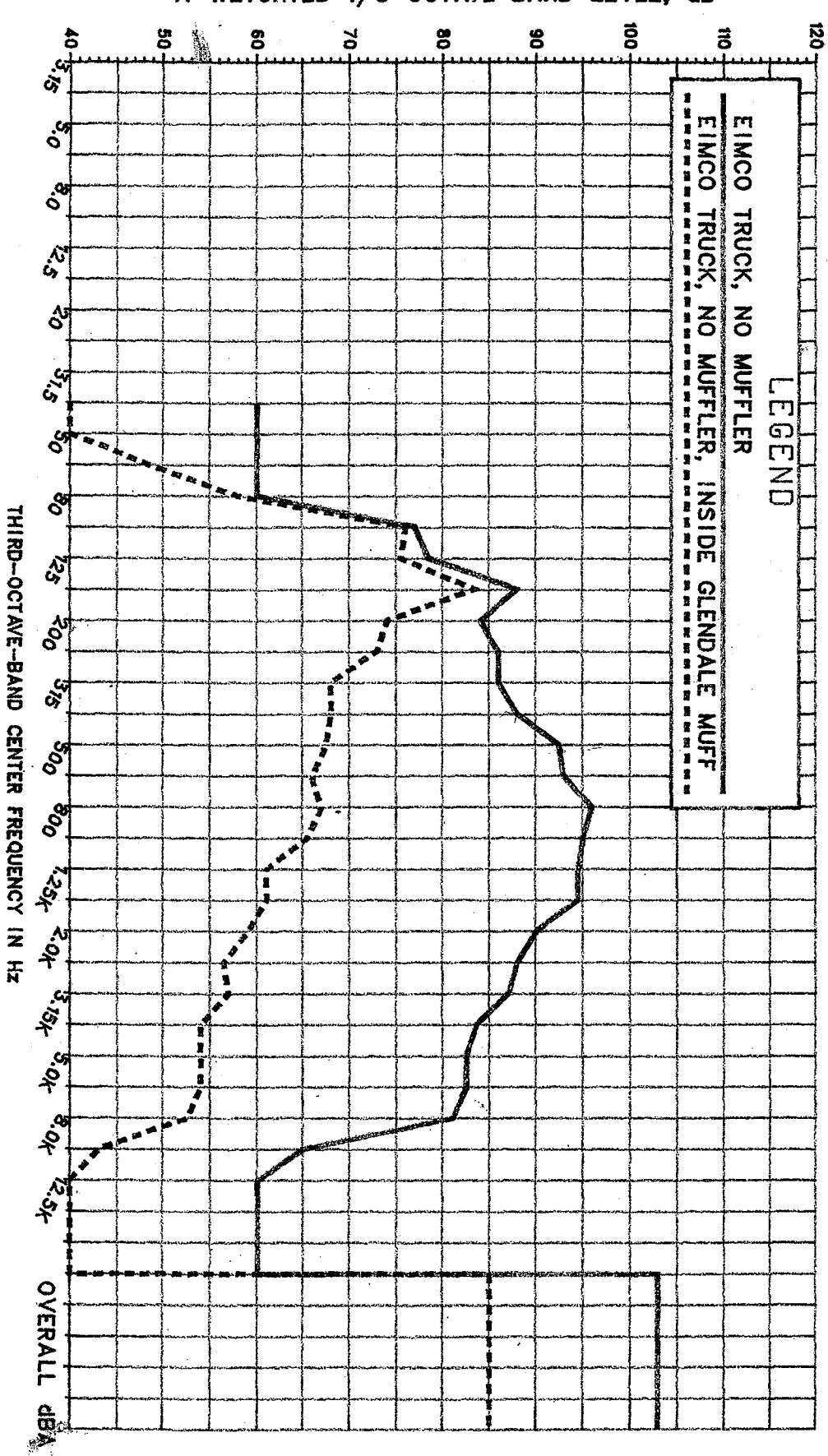


FIGURE B3.— COMPARISON OF INSIDE AND OUTSIDE

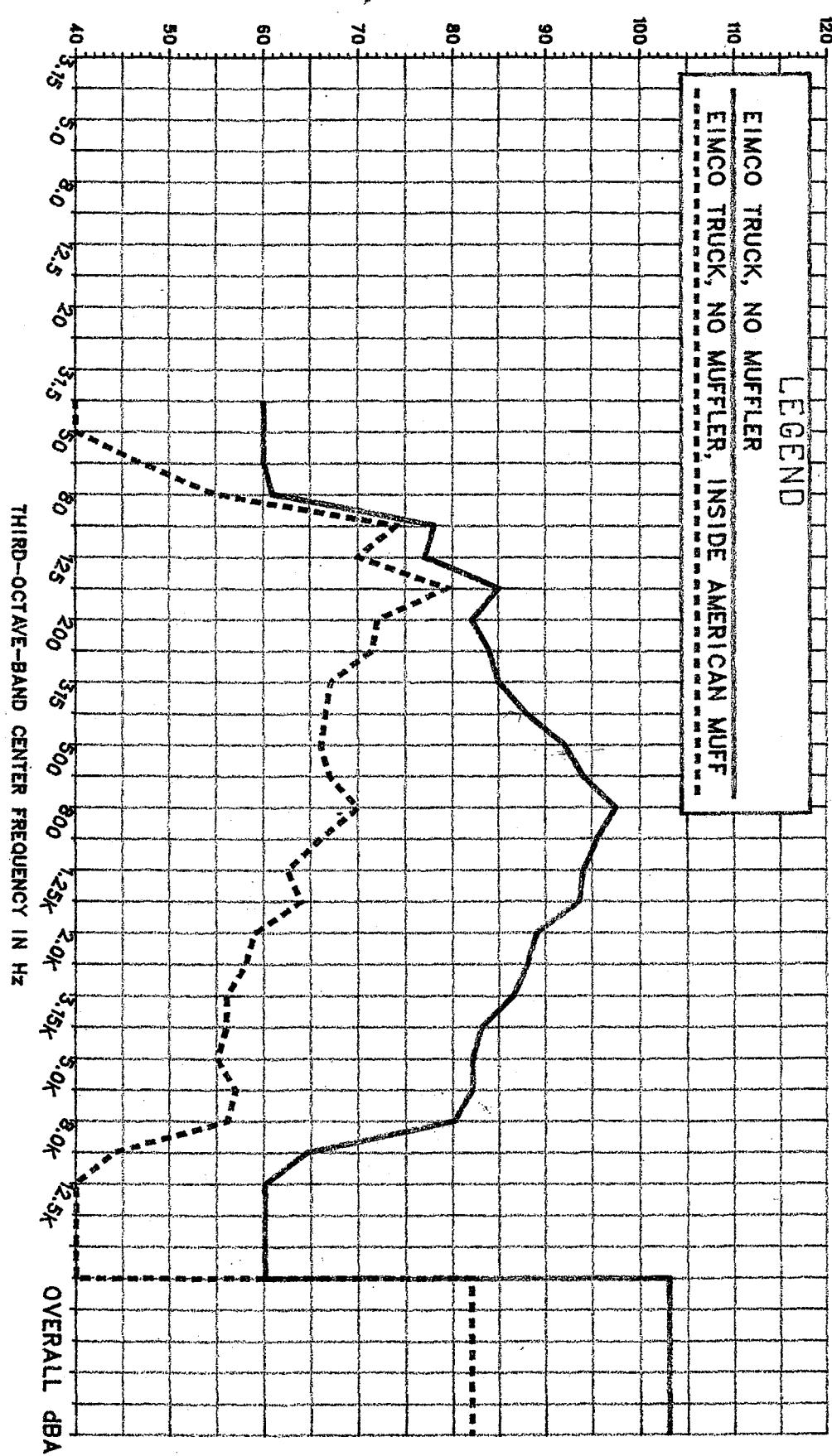


FIGURE B4.— COMPARISON OF INSIDE AND OUTSIDE  
GLENDALE MUFFS, WITH COWL MUFFLER

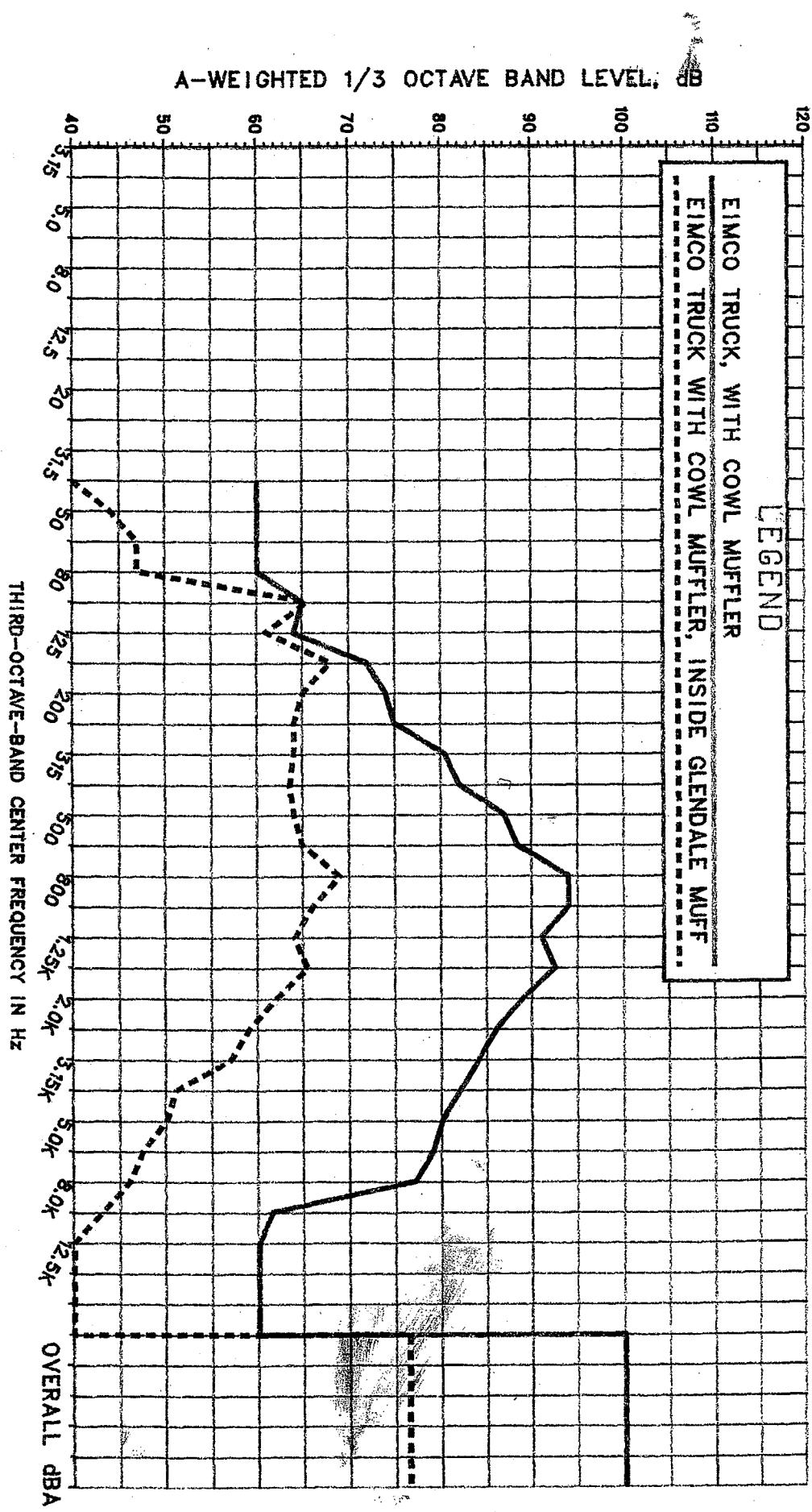


FIGURE B5.— COMPARISON OF INSIDE AND OUTSIDE  
AMERICAN MUFFS, WITH COWL MUFFLER

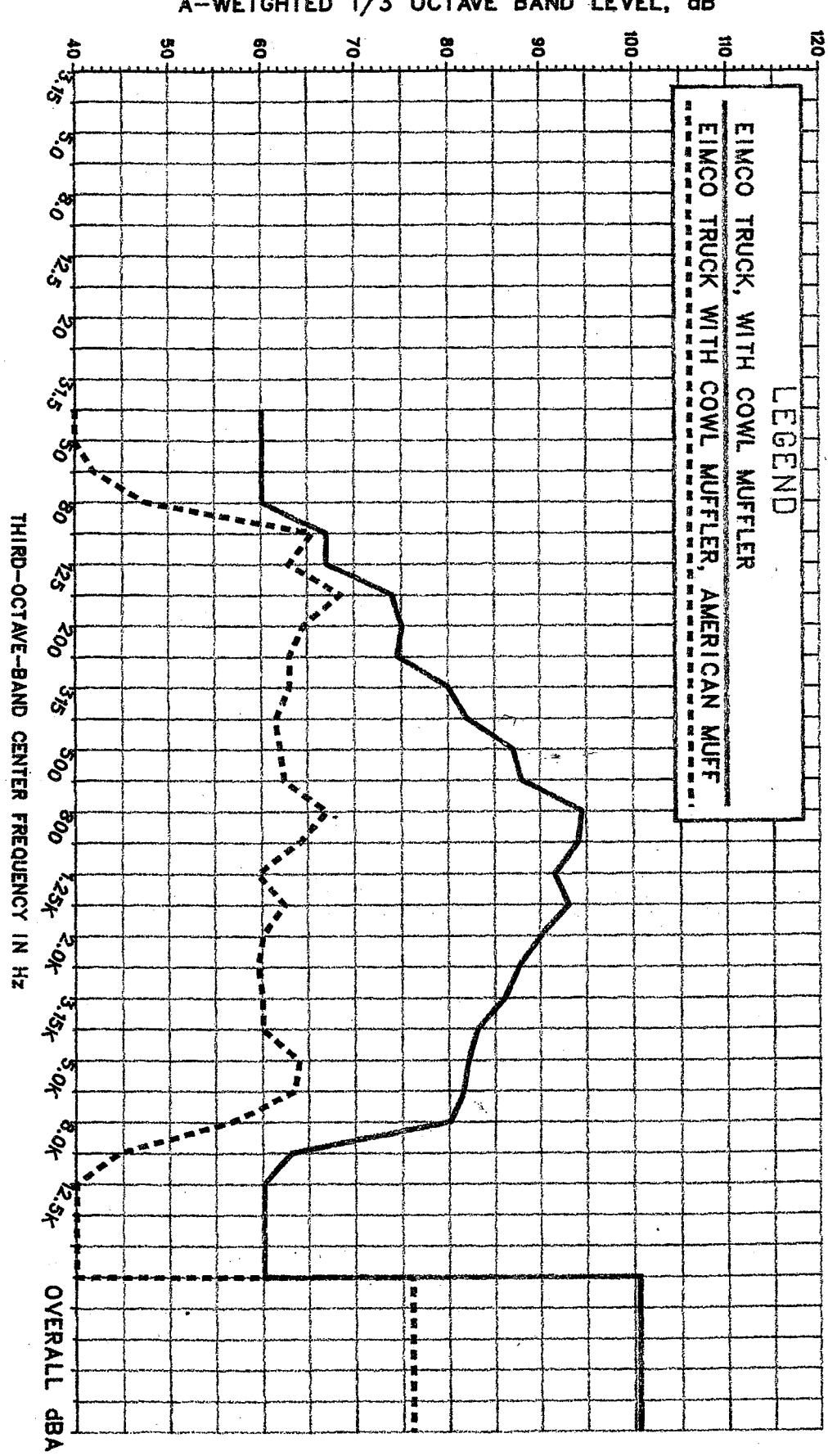


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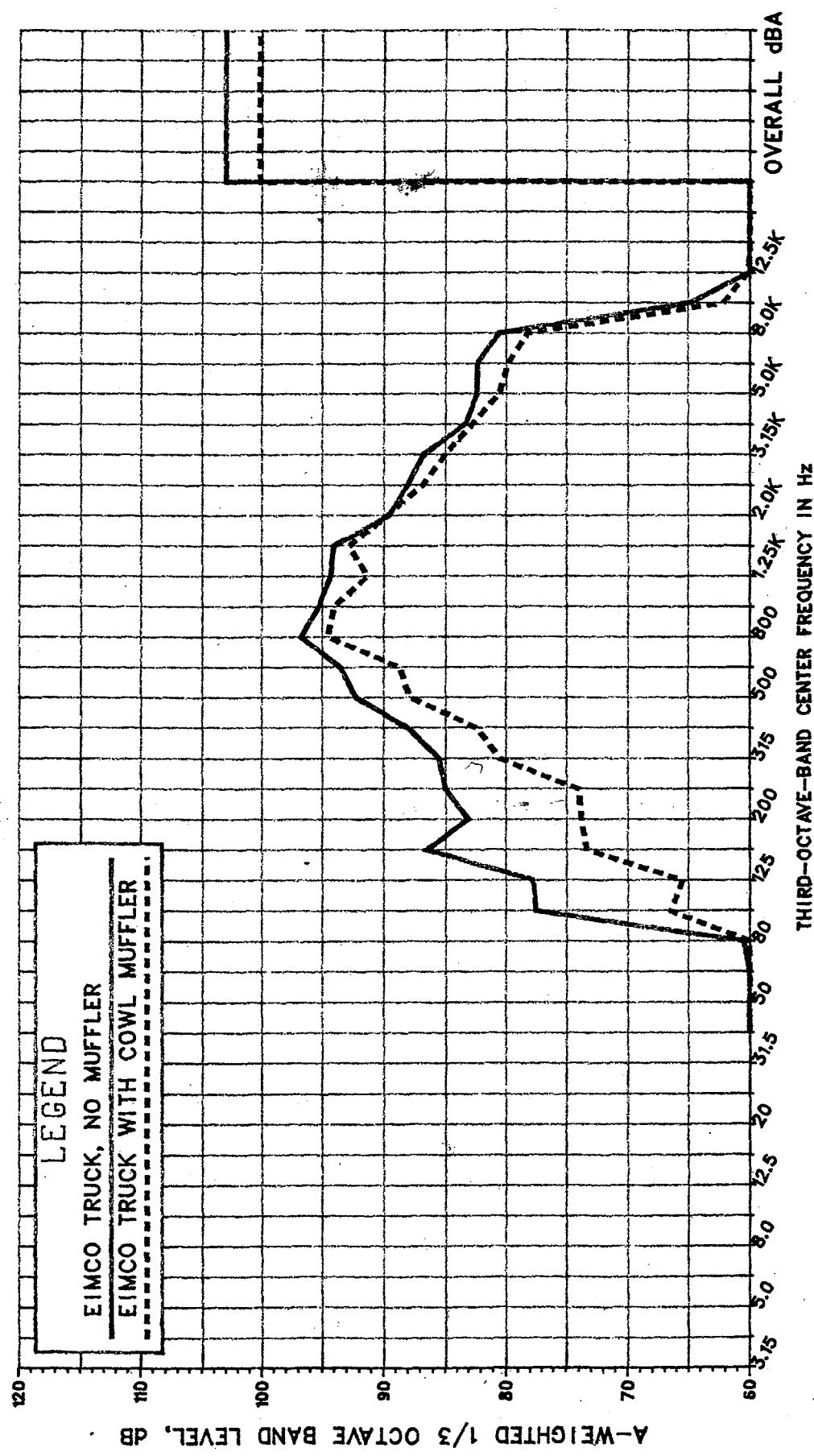


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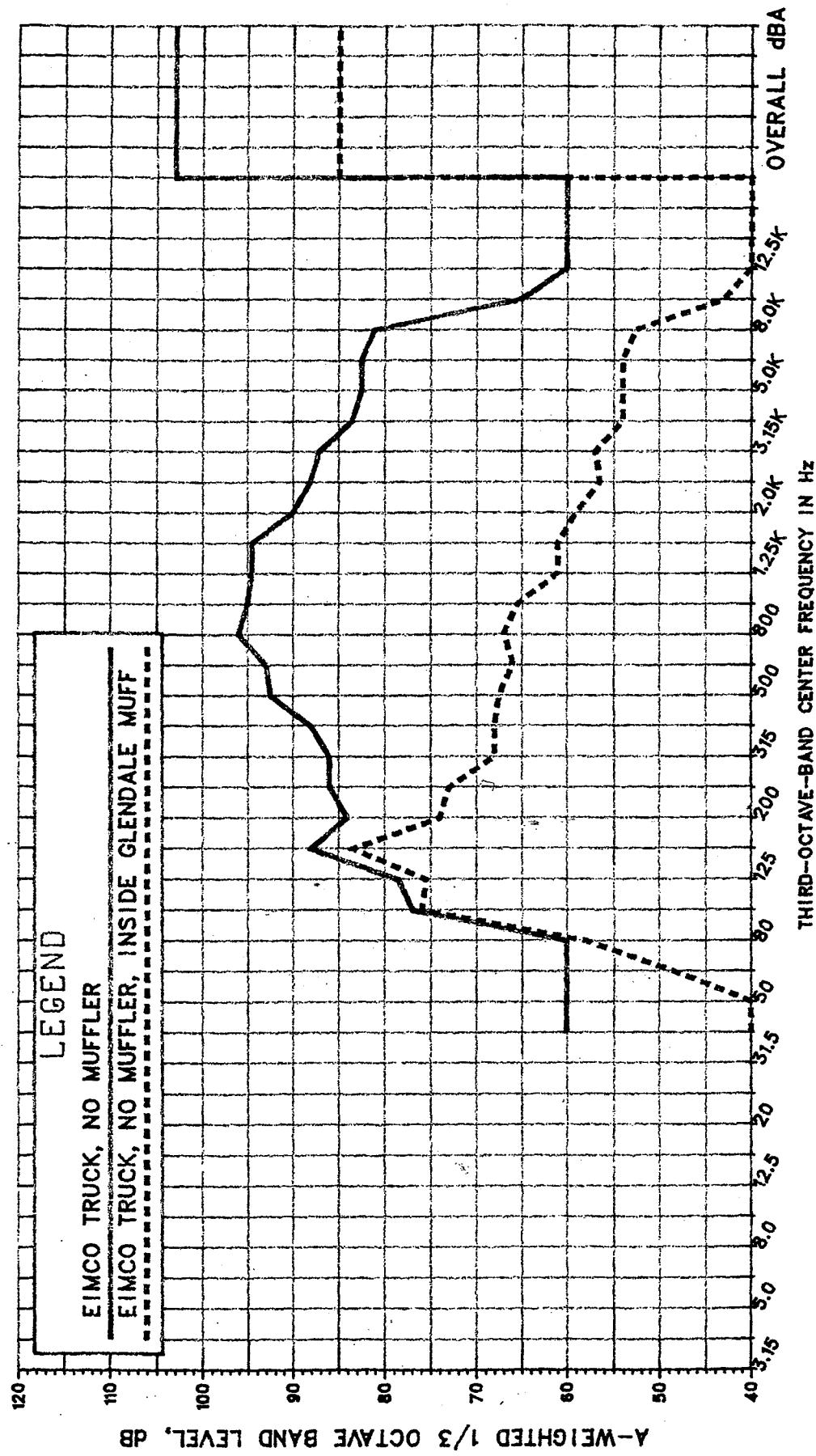


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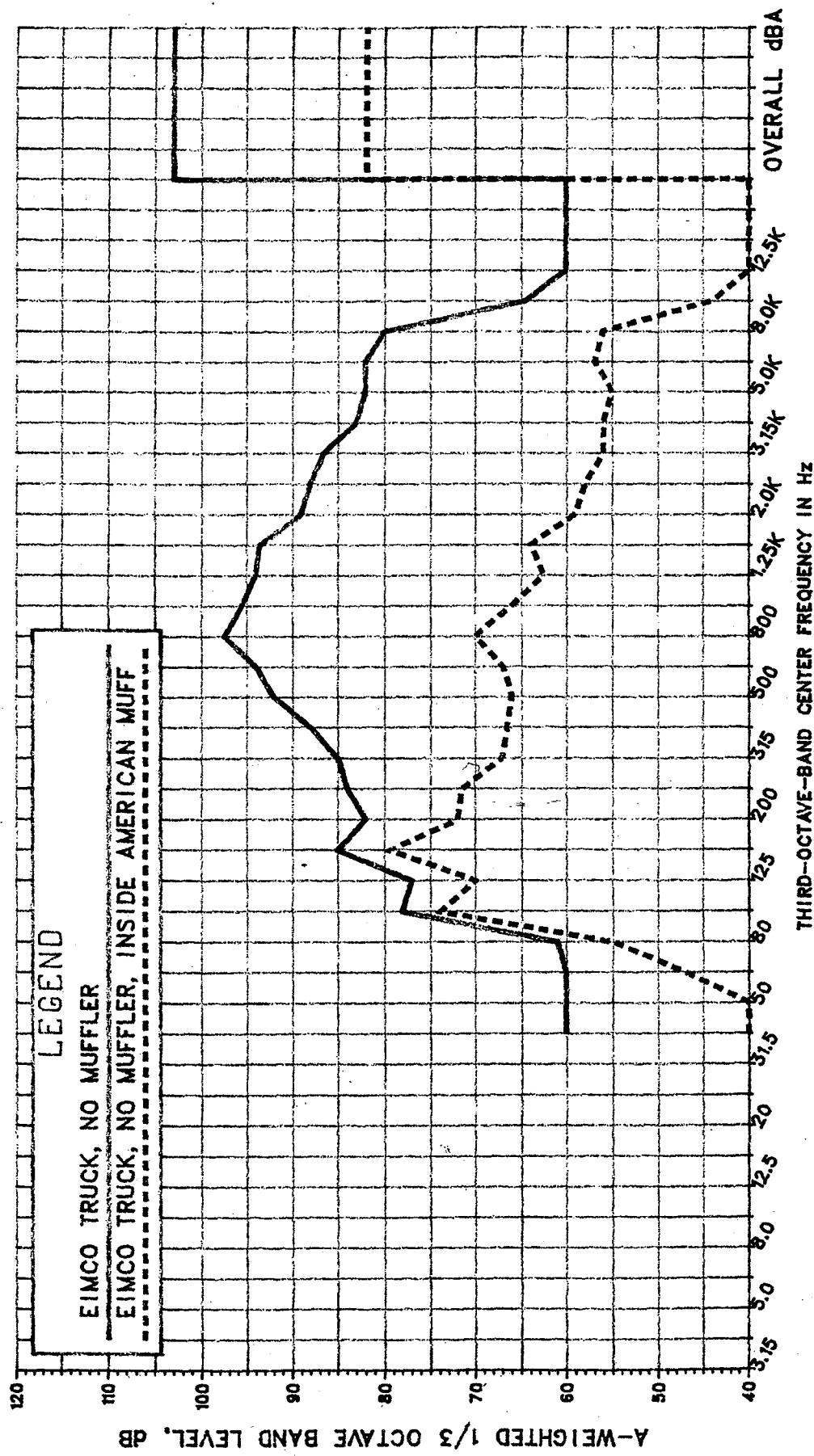


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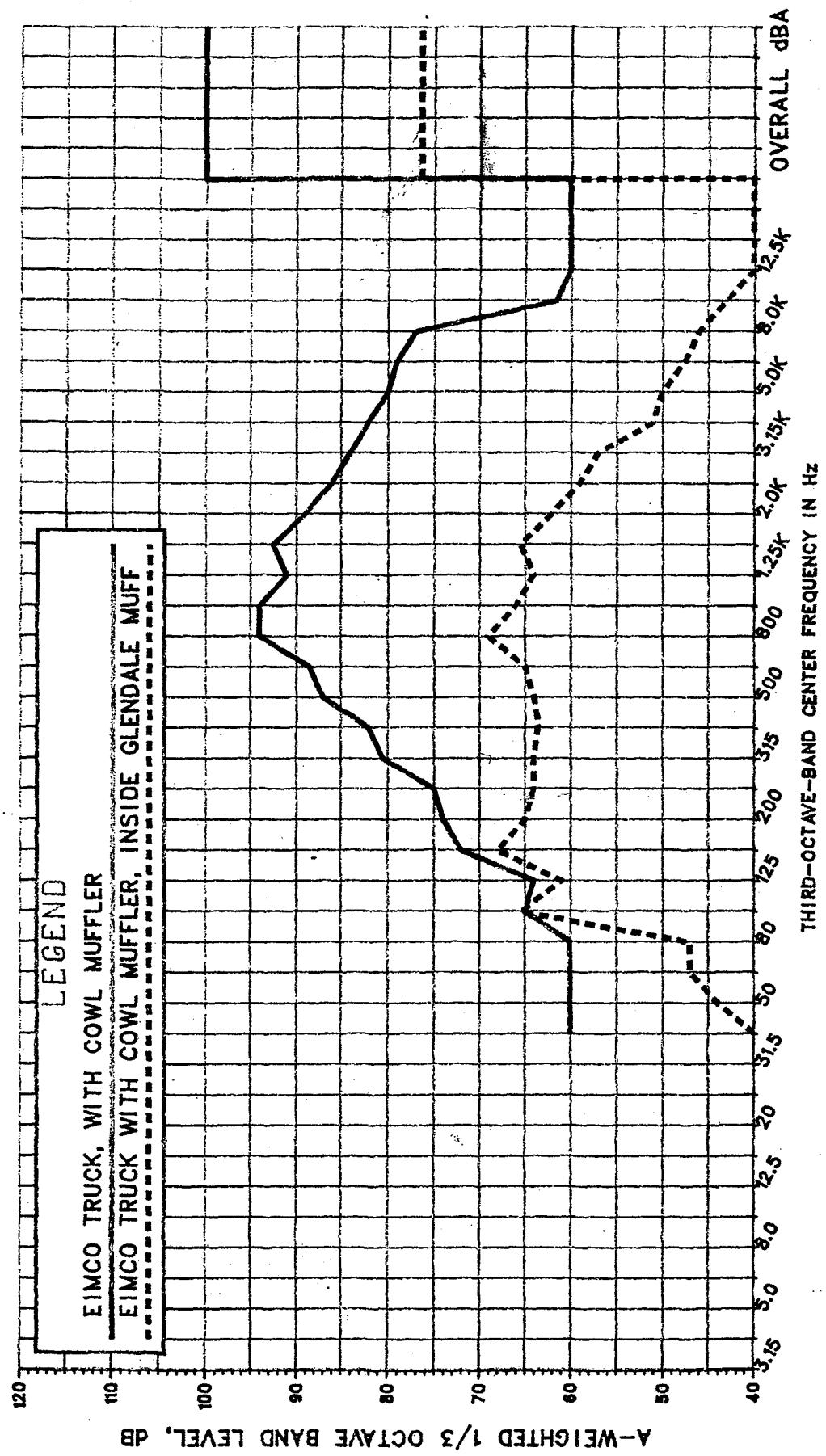


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