

Drive-Thru Sound Levels

Some municipalities have adopted regulations aimed at controlling the acoustic noise levels in residential and (or) commercial areas. These regulations are of particular importance to drive-thru operators because the drive-thru is viewed as a source of noise. The noise originates both from the vehicles themselves and from the drive-thru communications system. This white paper addresses common questions related to sound from the communications system.

Note: Because every site is different and each municipality has its own regulations, HME is unable to make specific recommendations for compliance or give any assurance that any particular system configuration will comply with any given regulations. Statements made in this paper should be taken as general guidelines, but to ensure compliance, the site planner should retain the services of a qualified acoustic consultant equipped to make the necessary measurements.

In the drive-thru, the primary source of sound other than the vehicles is often the drive-thru communications system. Outbound audio includes the order taker's voice and any sound provided by the message repeater. The outbound audio is delivered by the speaker and must be loud enough to be clearly heard by the customer over the noise of the customer's vehicle, any local traffic and other ambient background noises in the area. However, if it is too loud, the sound can be objectionable to neighbors or even violate specific regulations.

HME base stations are equipped with a feature known as Automatic Volume Control or "AVC" which can be used to reduce the outbound sound pressure level based on ambient noise. When AVC is active, the outbound level is reduced to a level that is 15 dB above the ambient noise level at the speaker post microphone, but it **never** increases the level above what would be heard with AVC turned off. This feature can considerably reduce the SPL during quiet periods and may help in satisfying local requirements.

Sound levels are measured in units of dB SPL and usually include a frequency variable weight referred to as "A Weighting". For this reason, the units are frequently written as "dBA SPL" and that notation will be used throughout this paper. The sound pressure level from a speaker decreases as the distance away increases. However, it can be difficult to predict how much reduction will actually occur. For a single point sound source like an alarm bell hanging in air, the SPL drops approximately 6 dB every time the distance from the source doubles. Thus if one starts one foot away, the level will be 36 dB lower when one is 64 feet away. Unfortunately, speakers are neither single point sources nor are they hanging in air. Rather, speakers are mounted in a variety of different type enclosures. Further, the building, the ground and even other cars in proximity all effect the sound's direction and decay rate. All of this tends to make the sound more directional and the decay rate less predictable.

This paper provides some "typical" measurements taken outdoors under specific circumstances. These measurements can be used as a guide for what levels might occur in a drive-through installation. These measurements were taken using "pink noise", a type of noise frequently used for acoustic testing, at levels simulating the loudest speech expected from an order taker.

All typical measurements provided here were taken using the following equipment:

- Base station: HME ION IQ set to factory default levels
- Communicator: HME COM6000
- Speaker: HME SP10
- Speaker post: Texas Digital model 107150

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Speaker box is approximately 50' from the northeast corner of the site plus, unlike the calculation underlined below, there will be a car and a masonry wall between the speaker box and the residential property.

The measurement environment was as follows:

- Asphalt parking lot 50 ft from any building
- Ambient background noise level: ~47 dBA SPL
- Nearest vehicle not part of measurement: 15 ft

Initial measurements were taken with AVC off, no vehicle in front of the speaker post, and no other obstructions within at least 100 ft of the speaker. These are not "normal" conditions for a drive-thru, but they do yield one worst-case measurement. Under these conditions, the sound pressure level 1 foot in front of the speaker is 90 dBA SPL. At 17 feet, it drops down to a normal conversational level of 66 dBA SPL, but does not drop to 60 dBA until a distance of 55 feet. Figure 1 shows the loudness contours for both 60 dBA and 66 dBA levels. Since the primary concern is noise abatement at a distance, higher level contours are not shown.

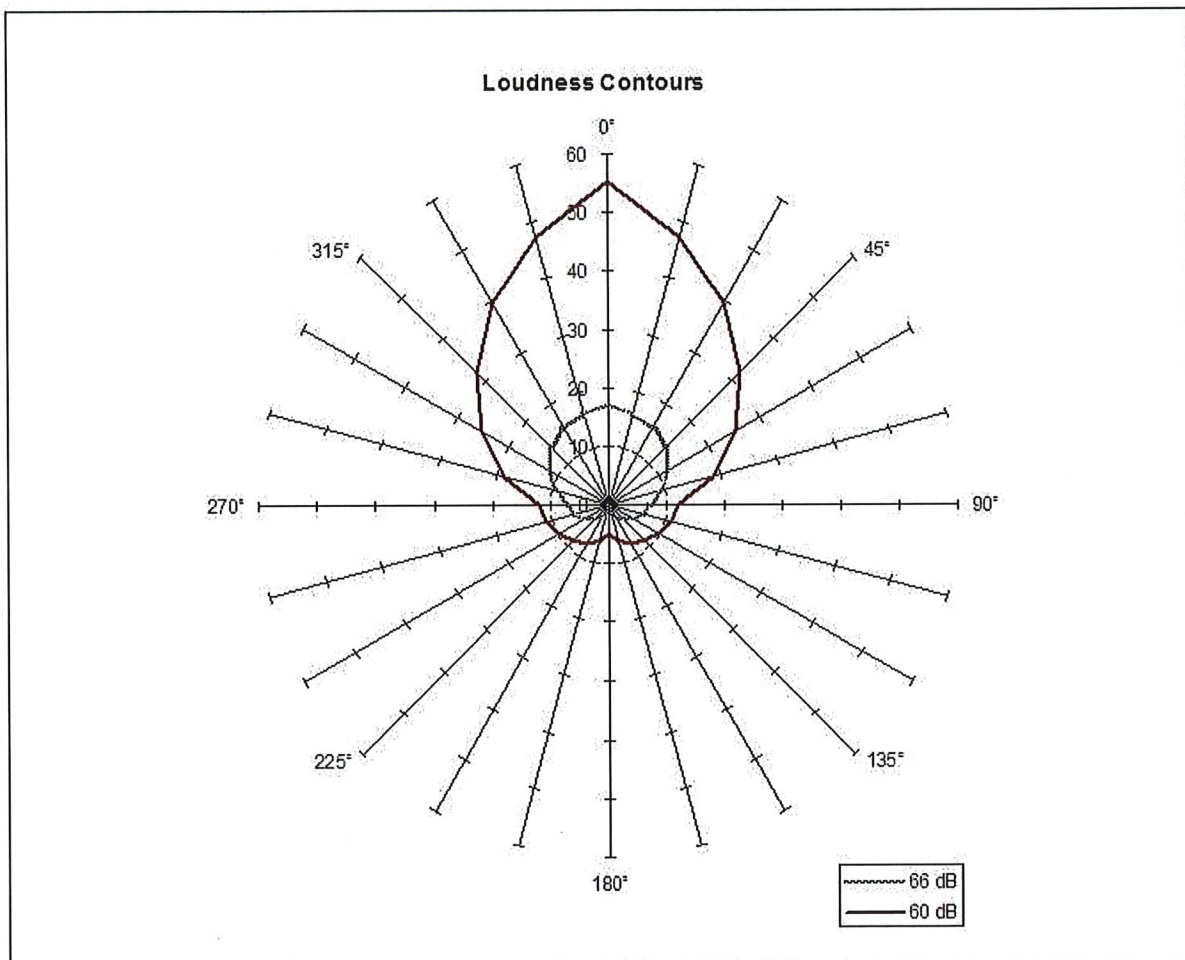


Figure 1 – SP10 SPL Contours

With a vehicle parked in front of the speaker, the shape of the contour changes dramatically and depends on many factors including the height, size, shape, and angle of the vehicle. Because of the tremendous differences in vehicles, positioning, and lane construction, HME cannot predict with any certainty the shape of the resulting SPL contours. However, generally, the shape flattens and the loudest sounds are found at angles to the front and rear of the vehicle with the front being louder.

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Per our Technical Noise Report, the ambient noise level in this area of the site is 61 dBA meaning the speaker would go to 76 dBA. As in the case below, the SPL would be below the ambient noise level less than 20' away from the speaker.

AVC Operation

AVC measures the ambient noise level in the drive-thru and adjusts the outbound level down so that it is never more than 15 dB above the ambient noise level. This is particularly useful at night when there is less traffic on surrounding streets and fewer cars in the drive-thru. It may also be useful in situations where the regulations do not specify specific sound pressure levels, but use terms like "reasonable" or "sufficient". Because AVC adjusts continuously, it ensures that the outbound level is high enough to be heard by the customer whatever the conditions may be.

As an example, if the ambient noise level is 47 dBA, AVC will adjust the outbound level to approximately 62 dBA at a position about 1 ft from the speaker. Given this condition, the SPL will be below the ambient noise level less than 20 ft away from the post.

Since AVC adjusts based on the noise level measured at the speaker post, a noisy vehicle will drive the outbound level up. Thus, the use of AVC will not guarantee that the SPL is below any particular level for all vehicles or conditions. However, it will keep the outbound level from becoming excessively loud.

Guidelines

HME cannot make specific recommendations, but here are some general things that can be done to minimize issues:

Do

- Place the speaker post where vehicles can get close to it. This allows the outbound level to be kept to a minimum.
- Use brick or concrete walls to isolate the installation from adjacent residences. These walls make good barriers, but must be high enough that sounds do not easily go over them.
- Adjust the outbound level to the minimum necessary to be clearly heard by customers
- Use AVC in situations where noise abatement is an issue to further reduce outbound levels during quiet periods.

Don't

- Face the speaker post toward busy streets. This increases the ambient noise level and makes it necessary to use higher outbound levels.
- Place the speaker post on a curve in the lane. Curves force vehicles to be further away from the post, which results in higher outbound level requirements and makes it difficult for order takers to hear customers.
- Face the speaker post or the drive-thru lane at adjacent residences. Remember that the highest sound levels are likely to be directly opposite the post and off the front of vehicles.
- Turn the outbound level up higher than necessary.
- Rely on vegetation to reduce sounds. Plants have rather limited impact on sound levels.

Memo**Re: Drive-Thru Sound Pressure Levels From the Menu Board or Speaker Post**

The sound pressure levels from the menu board or speaker post are as follows:

1. Sound pressure level (SPL) contours (A weighted) were measured on a typical HME SPP2 speaker post. The test condition was for pink noise set to 84 dBA at 1 foot in front of the speaker. All measurements were conducted outside with the speaker post placed 8 feet from a non-absorbing building wall and at an oblique angle to the wall. These measurements should not be construed to guarantee performance with any particular speaker post in any particular environment. They are typical results obtained under the conditions described above.
2. The SPL levels are presented for different distances from the speaker post:

Distance from the Speaker (Feet)	SPL (dBA)
1 foot	84 dBA
2 feet	78 dBA
4 feet	72 dBA
8 feet	66 dBA
16 feet	60 dBA
32 feet	54 dBA

3. The above levels are based on factory recommended operating levels, which are preset for HME components and represent the optimum level for drive-thru operations in the majority of the installations.

Also, HME incorporates automatic volume control (AVC) into many of our Systems. AVC will adjust the outbound volume based on the outdoor, ambient noise level. When ambient noise levels naturally decrease at night, AVC will reduce the outbound volume on the system. See below for example:

Distance from Outside Speaker	Decibel Level of standard system with 45 dB of outside noise <u>without</u> AVC	Decibel level of standard system with 45 dB of outside noise <u>with</u> AVC active
1 foot	84 dBA	60 dBA
2 feet	78 dBA	54 dBA
4 feet	72 dBA	48 dBA
8 feet	66 dBA	42 dBA
16 feet	60 dBA	36 dBA

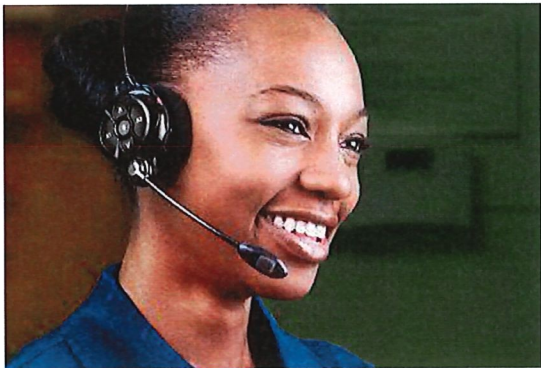
If there are any further questions regarding this issue please contact HME customer service at 1-800-848-4468.

Thank you for your interest in HME's products.

HDAUDIO

HEAR WHAT YOU'VE BEEN MISSING

HME[®]
HOSPITALITY & SPECIALTY
COMMUNICATIONS



EOS | HD[®]
with Wideband Technology

HD Audio Drive-Thru Headset System

Actual size headset



20% INCREASE IN INTELLIGIBILITY

for improved speed of service and profitability

2X THE AUDIO BANDWIDTH

for improved order accuracy and customer experience

EOS | HD with Wideband Technology



If It's Not Wideband, It's Not HD

EOS | HD is the industry's only HD Audio drive-thru headset system with wideband technology. The greatest advancement in drive-thru sound clarity, HD Audio with wideband provides clearer, more intelligible speech. EOS | HD delivers true voice clarity by filtering the human voice from background noise, and combining wideband technology with cutting-edge noise reduction.

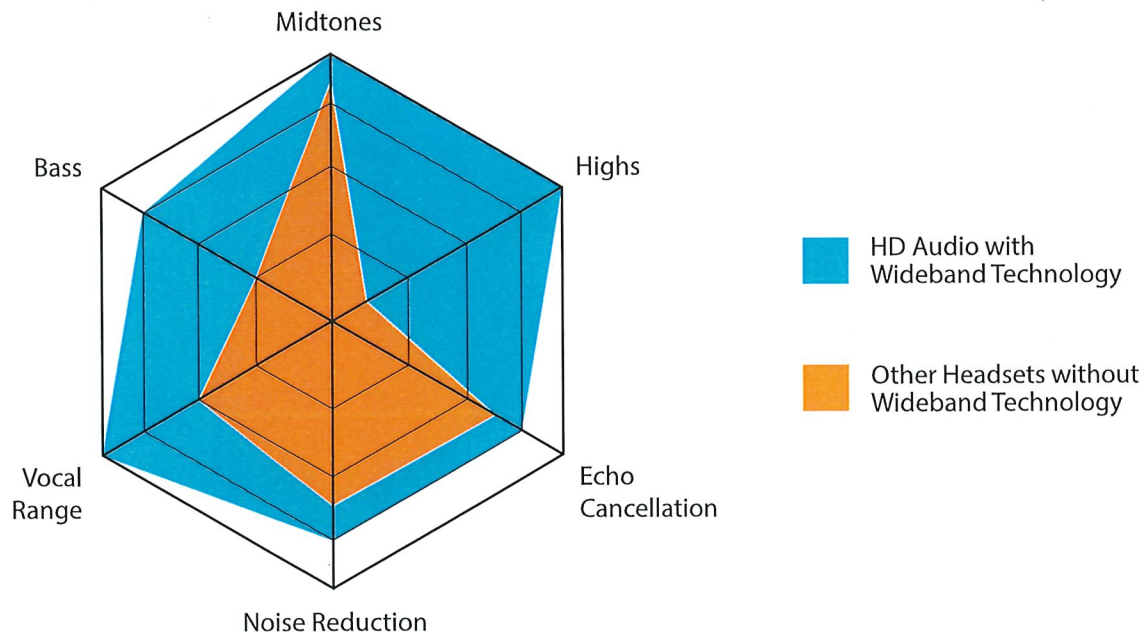
With EOS | HD, customers and order takers can both hear the whole drive-thru conversation—like they were talking face-to-face—for improved order accuracy, increased profitability, and a better customer experience.

HD AUDIO

Hear What You've Been Missing

The greatest advancement in sound since digital, HD Audio is the drive-thru like you've never heard it before. HD Audio combines industry-changing wideband technology with groundbreaking new noise reduction and echo cancellation to deliver unparalleled clarity and intelligibility to your store.

WIDEBAND



2X THE AUDIO BANDWIDTH

for improved order accuracy and customer experience

20% INCREASE IN INTELLIGIBILITY

for improved speed of service and profitability

Wideband Technology: Hear the Whole Conversation

The only drive-thru headset with wideband technology, EOS | HD provides a whole new way of delivering drive-thru conversation. You and your customers have never heard each other this clearly. This wideband technology encompasses an expanded audio range to include higher and lower voice frequencies—providing a more accurate representation of the human voice. Covering a vastly larger vocal range than previous digital systems, EOS | HD brings increased intelligibility and clarity to your drive-thru.



INBOUND NOISE REDUCTION

44% IMPROVEMENT

in inbound noise reduction delivers improved order accuracy and reduced employee fatigue



Cars



Trucks



Traffic

OUTBOUND NOISE REDUCTION

88% IMPROVEMENT

in outbound noise reduction delivers a better customer experience



Blenders



Ice Machines



Kitchen Timers

Inbound Noise Reduction: Hear Your Customers Clearly

An incredible 44% improvement over previous systems, EOS | HD's new inbound noise reduction provides a clearer, more understandable drive-thru conversation. And with 17 times the echo cancellation, crew members can have total focus on the customer.

These highly advanced noise reduction enhancements remove engine and traffic sounds from the drive-thru. Drastically improving order comprehension, EOS | HD reduces employee fatigue and allows them to better understand the customer and get the order right the first time.

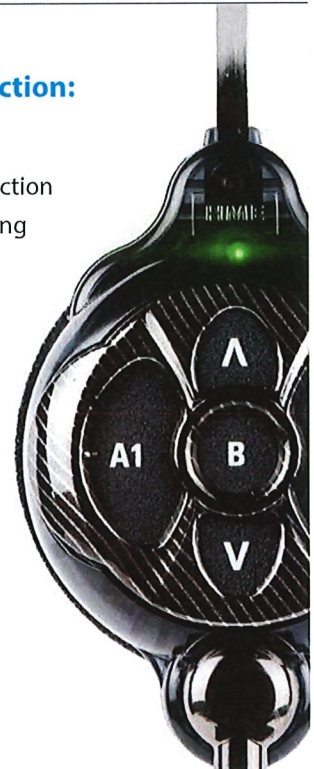
Brand New Outbound Noise Reduction: Let Your Customers Hear You

EOS | HD's innovative outbound noise reduction removes background kitchen noise, including blenders, so that customers can hear and understand crew members better.

This astonishing 88% improvement in outbound noise reduction means customers leave happier than ever before.

Listen for Yourself

www.hme.com/eos-demo



Unmatched Comfort



Lighter Weight, Balanced Design

EOS | HD delivers all day comfort to users. It's compact, lightweight design provides a more comfortable fit for your employees. EOS | HD is balanced to stay on the user's head without adding extra pressure—so your employees can concentrate on the customer and not their headset.

Unparalleled Message Center

Manage Your Drive-Thru Like Never Before

The EOS | HD drive-thru headset system offers a convenient message center that allows managers to customize greetings and send important reminders and alerts to crew members. The Message Center helps managers to run their restaurants with greater efficiency and profitability.



Greetings

Sequence multiple messages through all dayparts to promote specials and improve check averages. Record up to 12 customer greetings to play through the day.



Reminders

Schedule automatic reminders to keep employees on task; create your own or choose from pre-recorded options.



Alerts

Automatically informs staff members of critical developments affecting food safety and employee security. Alerts only trigger when certain events occur (i.e. "Back door open.").

Designed for Durability

Fewer Moving Parts | Far Greater Reliability | Lower Cost of Ownership

Advanced engineering has resulted in the smallest, most durable all-in-one (AIO) drive-thru headset ever. EOS | HD's innovative design dramatically improves reliability by eliminating the most frequent repair issues for AIO headsets. With its super-compact and durable design, EOS | HD is the perfect combination of comfort, performance and reliability.

Wire-Free Headband

No wires across the headband to the battery means no wires to break. Wire-free design eliminates the number one repair issue for all-in-one headsets.

Steel Headband

Can be pulled and twisted in various directions without damage. Instantly snaps back to fit any head size. Strong enough to withstand the rigors of the QSR environment.

No Moving Buttons

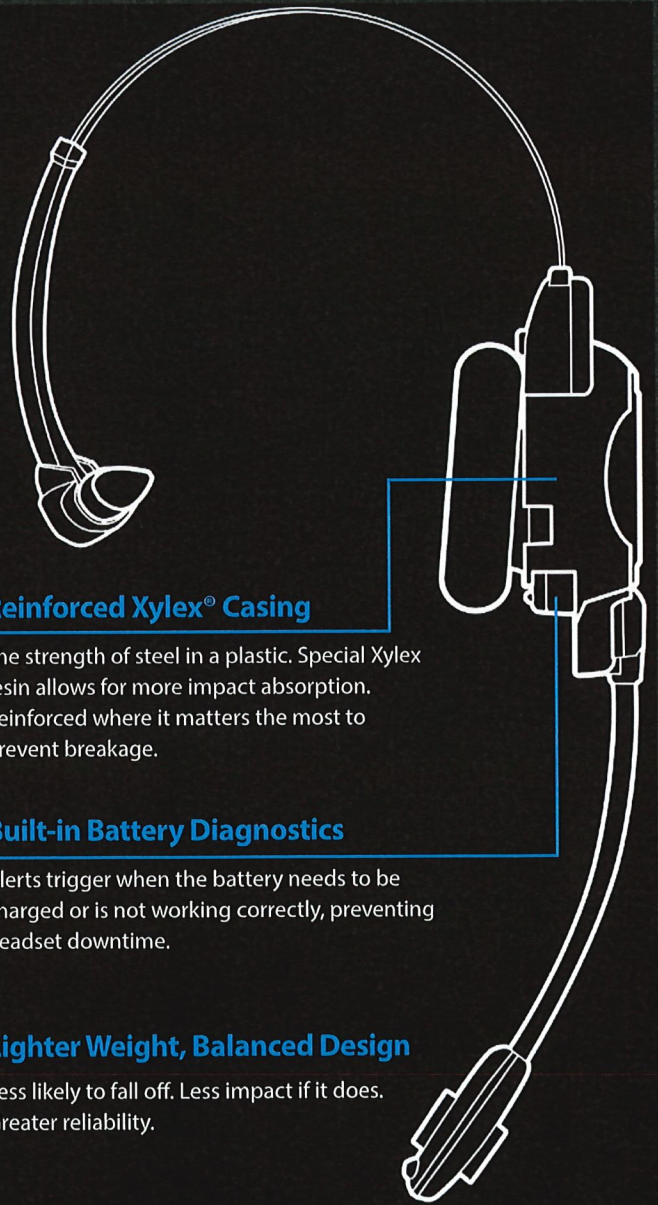
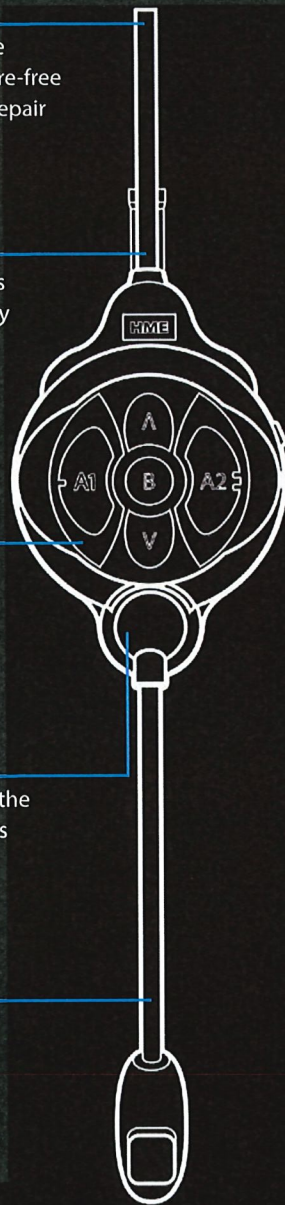
No mechanical switches or springs means nothing moves – for greater reliability.

Die-Cast Metal Pivot

Innovative metal pivot point keeps the boom in place and helps keep wires from breaking.

Steel Boom

Steel design prevents wire breakage unlike flexible booms. Eliminates the number two repair issue for all-in-one headsets.



Reinforced Xylex® Casing

The strength of steel in a plastic. Special Xylex resin allows for more impact absorption. Reinforced where it matters the most to prevent breakage.

Built-in Battery Diagnostics

Alerts trigger when the battery needs to be charged or is not working correctly, preventing headset downtime.

Lighter Weight, Balanced Design

Less likely to fall off. Less impact if it does. Greater reliability.



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USA
www.hme.com/qsr
Tel: (800) 848.4468



About HME Hospitality & Specialty Communications

HME was the first to develop and introduce the wireless drive-thru headset system for the QSR industry over 35 years ago. In 2014, we revolutionized the industry with our patented Wideband technology used with our high definition drive-thru communications system. Today we continue to lead the industry by supplying more restaurants with communication and timing systems than any other provider worldwide. Every day, quick service restaurants in over 140 countries fulfill more than 30 million orders using HME systems. HME offers a wide range of quality solutions for drive-thru, in-store, and retail operations backed by full services and support.



Visit our online training portal at www.hme.com/training for unlimited access to videos, manuals, and other training materials.

Dial toll-free **(800) 848-4468** or call your local authorized HME dealer for more information.



Drive thru Speaker System - HME EDS
 New technology reduces outbound noise and at 16 ft from speaker 60db noise level

Drive thru Speaker System - HME EDS
 with AVC - turned on 56db noise level at 2' from speaker and at 16' from speaker 38db noise level, 9db less than the ambient noise level 47db.

HME EDS Drive Thru Communication System
 delivers 84db @ 1' from speaker post, sound pressure level (SPL) from the speaker post decreases to 60db at 17' from speaker post, which is 12 feet from the property line and at 32', 3' over the property line at a low 54db noise level, which is just above moderate rain fall of 50db.

The system has AVC (Active Volum Control) and when switched on uses the ambient noise level (est 47db) as a base line. The AVC will adjust the outbound level down so that it's never more than 15db above the ambient noise level but will never exceed the db noise level as if not activated.

Example: if the outside ambient level is 47 dba (a quiet day) AVC will adjust the outbound speaker level to approx 62db at a position 1' from the speaker box and @ 16' from the speaker post the noise level from the speaker will be reduced to 38db which is below the outside ambient noise level (47db) and 12 feet from the property line.

The above noise levels for both scenarios without AVC or with AVC turned on are levels recorded before a fence or landscaping is added into the equation. So additional reductions in noise levels will be achieved.

Audio sound information

