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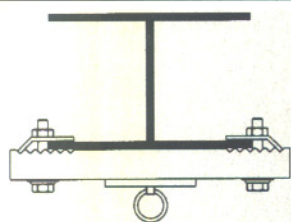


# Attaching To Structures

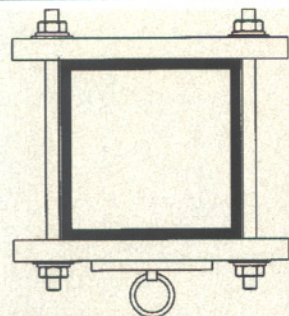
## NO ROOM FOR ERROR

Similar to searchlights, loudspeakers must be aimed to be effective. And, in order to cover an audience area effectively while keeping the speakers' coverage pattern away from reflective surfaces (such as walls and ceilings), it is usually best to raise speakers above the audience members' heads. Though placing speakers on poles or risers may provide adequate elevation in some situations, many others call for the speakers to be "flown," or suspended from the building structure.

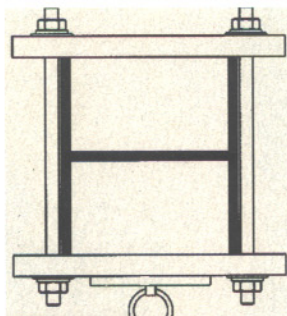
by Andrew T. Martin



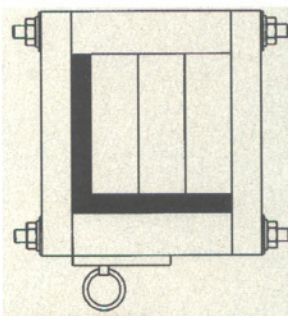
I-Beam



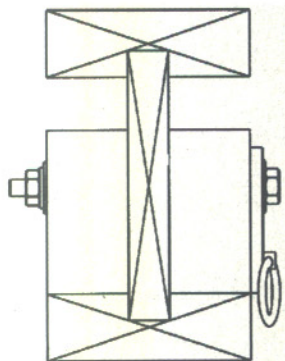
H-Beam



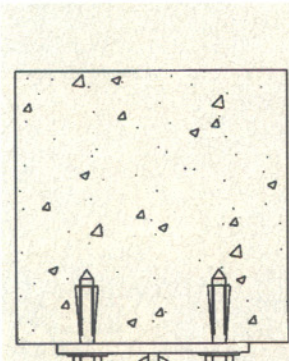
Box-Beam



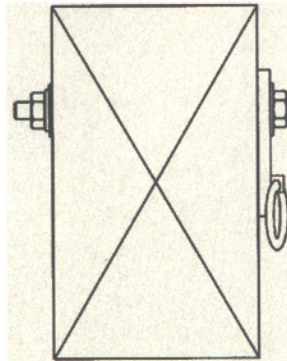
Angle-Beam



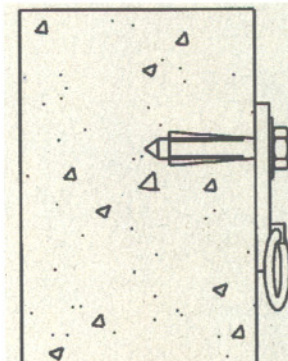
Wood-Truss



Concrete-Ceiling

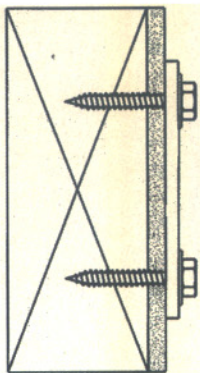


Wood-Beam

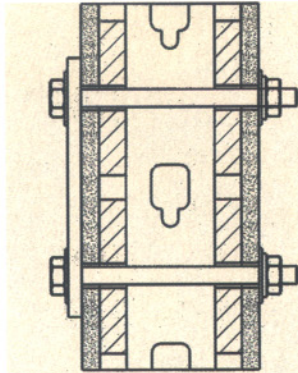


Concrete-Beam

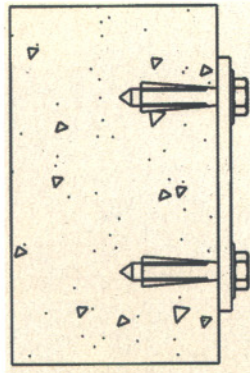
The most common methods of attaching to structures for the purposes of suspending an object.



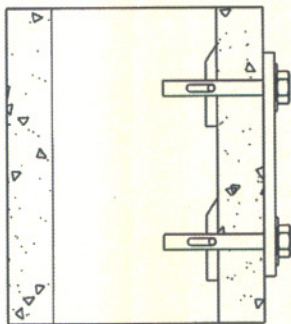
Wood Stud



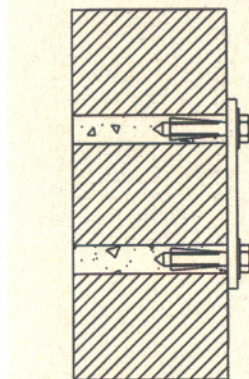
Metal Stud



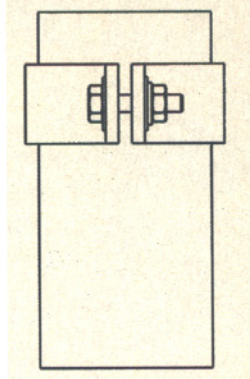
Concrete Wall



Concrete Block



Brick



Round Pole

Common methods of attaching to structures for mounting an object, such as the base plate of a manufactured speaker mount.

There are probably a gazillion different ways to securely attach loudspeakers to structures, and there is probably an equivalent number of structure types to be attached to. This article outlines the most common attachment methods and structure types I am familiar with, based on my experience in the contracting and service industries.

Perhaps the most important message in this article is that there are a multitude of suspending and mounting methods, and that no one method is correct for all applications. I recommend that any and all structural attachments are reviewed by a professional engineer to ensure that the attachment method is correct and will perform as designed, with an adequate design factor.

## STRUCTURAL INTEGRITY

### DON'T FORGET THE SPEAKER CABINETS

By Chris Michie

As the accompanying article stresses, any installation plan that includes speaker cabinets suspended above an audience area should be reviewed by a qualified engineer. However, ensuring that the stationary mechanical attachment is properly designed is not enough—the loudspeaker cabinets themselves must be capable of supporting their own weight, plus any additional load suspended from them. Not surprisingly, manufacturers are keenly aware of liability issues, and take care to test and document the structural integrity of any speaker designed to be hung or mounted.

"Safety is always one of the first things we think about when building a cabinet," says Larry Howard, business and product development manager for Tannoy distributor TGI North America. "Understanding the particular niche market that each of these products is going into is paramount as well." Howard notes that, for products aimed at the lower end of the installation market, "you really have to build in every safety issue that you can because of the level of installer that's going to be putting the product in." Tannoy tests all of its loudspeaker cabinets to destruction, and that data is passed on to the customer. "We're very clear in our manu-

als and instructions what not to do," Howard concludes.

In addition to club and installation speakers, EAW manufactures loudspeaker systems for touring applications, but the company pays rigorous attention to safety issues, regardless of the eventual application. "Anything that we build is pull-tested," says EAW's manager of touring systems, Paul Carelli. "The structural integrity of the box is taken into account during the design stage. If we know that this model is going to be flown over people's heads, we take that into account." EAW's design specifications include a 7:1 safety capacity, which means that the integral rigging points in each cabinet will hold at least seven times the weight of the box. In the case of the larger cabinets, this is accomplished through the use of an integrated steel frame, so that all rigging connections are steel-to-steel. "We also include in the instructions that, if you are going to hang it, use a qualified rigger," notes Carelli. "We steer our customers to qualified professionals."

In general, any professional loudspeaker manufacturer will design each of its products with an eye to its likely use. However, users intending to suspend or wall-mount speakers should always check the manufacturer's literature or Website to ensure that the cabinet has been approved for use in the intended application. ■

Seismic concerns can be problematic when attaching to structures. It has been my experience that the local building authorities within seismic territories are very reasonable when it comes to approving solutions for the task at hand. When designing the attachment method in a seismic activity zone, it is important to remember that the primary concern for the building authority is that a dynamic load, such as a shocking movement or a rolling movement, will not overload the attachment method. It is not uncommon for dynamic loads to exceed two or three

times the static load of the object being suspended or mounted, so load dynamics are a valid concern. Another concern relates to the materials being attached to; some materials have excellent structural properties in compression but not in tension, and vice versa. In any case, I strongly recommend consulting a professional engineer if you suspect any seismic activity.

The hardware used in attaching to structures should only be of a type that is manufactured for overhead use and is fully traceable product. Traceability ensures quality products and is a critical

part of a risk-management program that can protect designers, installers and end-users from product liability risk. More information on risk-management systems can be found at [www.marshalriskmanagement.com](http://www.marshalriskmanagement.com).

#### COMMON SENSE RULES

For someone who is not accustomed to the task, the idea of attaching to a structure to suspend a heavy object can be worrisome. In my opinion, someone who is not comfortable with the task should not attempt this without a professional's assistance (someone who is in the business of attaching to structures). The stakes are simply too high should the attachment method fail. Here are a few tested, common sense rules that should ensure a safe and durable installation:

- Purchase only traceable products intended for overhead suspension.
- Get assistance and guidance from product manufacturers prior to installation.
- Have the design reviewed and/or approved by a professional engineer.
- Install the attachment hardware in a methodical way, paying attention to every structural detail along the way.
- Install the hardware exactly as the manufacturer and professional engineer recommend.
- If there is a question about anything, stop and get the answer before proceeding.
- If you are suspicious or uncomfortable with the structural attachment at any point, stop and then find a solution or another way; do not install anything you feel may be unsafe.

Readers who wish to expand their knowledge of attaching to structures and suspending or mounting objects overhead should contact contractor trade organizations and manufacturers of overhead suspension hardware for relevant seminars and training opportunities. ■

*Andrew T. Martin is president and CEO of ATM Group Inc., which operates three business units in Carson, Calif. ATM Fly-Ware designs, manufactures and distributes loudspeaker rigging hardware and video wall suspension hardware. BendiForm metalworks designs and manufactures structural sheet-metal products and architectural elements. Marshal Risk Management Systems is a risk-management consultant to the high-risk entertainment industry. For more information, visit [www.atmflyware.com](http://www.atmflyware.com) or call 888/RIG-MORE.*

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