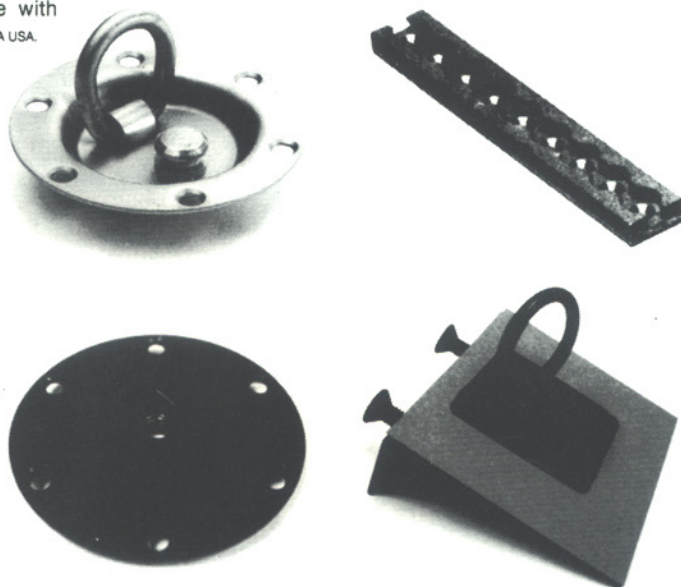


FIG 1: L-R; Kinedyne Ring and Stud pan fitting. Brownline Seat Track (AKA L-Track), Nut-Plate fitting, ATM Fly-Ware OSRIBI Internal Brace with OSRVI-3/8" fitting. Photo courtesy ATM Fly-Ware, carson, CA USA.



the rental company, and this hardware and equipment must be kept in excellent condition. While the venue riggers are charged with the task of safely suspending the loudspeaker arrays from the building structure, it is a very good idea for the individual in charge of the sound system to keep an eye on the riggers performance. Do not make the mistake of assuming that a rigger knows what he/she is doing just because he/she is doing it: many riggers have a lot of experience at doing the wrong things. To learn more about rigging, one can contact entertainment rigging supply vendors and inquire about rigging books and instructional courses. Also, one could partake in the ticketing program available in Australia, although this program is designed more for the construction industry. *(Still worth doing according to some I know. -Ed)* It is worth noting that only ticketed riggers are allowed to perform rigging tasks in Australia, although non-ticketed individuals can give instruction and guidance.

Some of the equipment that is of particular importance to the safe and reliable rigging of loudspeaker arrays includes; wire rope assemblies, shackles, locking steel carabiners, synthetic rigging slings, sling links, chain motors (hoists), motor distribution and control, safety harnesses, belay ropes and fittings, and pulleys. As a general rule, the lower cost items should be routinely inspected and discarded when they look worn or no longer perform their task properly. The higher cost items, such as the chain motors and motor control, should be routinely inspected and re-worked to bring them back up to specification. Some common areas of damage include; kinked, rusted, or stretched wire rope assemblies, shackles with widened jaws or pins that do not turn, carabiners without locking gates, synthetic rigging slings with holes worn in the cover or stiff sections within the sling, ropes with fibers torn or cut, and pulleys that wobble or rub.

As a result of continued market demand, rigging systems have become a necessity for the professional sound reinforcement company. The benefits of rigging loudspeaker systems is clear for the promoter of an event when one considers sight lines and seating availability. However, the practice of flying the loudspeaker system can be equally beneficial to the sound company if the rigging hardware system is thought through and performs well in many situations. Loudspeaker rigging system flexibility and ease of installation is of extreme importance. In many instances, a little extra funding to purchase the right flying hardware system up front will save a tremendous amount of aggravation and additional expense in the future.

SUSPENSION SYSTEMS

One of the more important user features of a loudspeaker flying hardware system is the ability for the system to control the loudspeaker within the array. While there are many variations of loudspeaker array suspension hardware systems, there are two basic types of suspension systems; the grid truss, and the modular truss.

The grid truss system is often found in the large scale touring production marketplace (see Figure 2). This type of system works well for large concert work since it is quick to set up and reasonably cost effective for large loudspeaker arrays. However, it does not work well for smaller venues or productions which require sound system modification from venue to venue. The grid truss system usually incorporates some type of adjustable pull strap in order to tilt the loudspeakers column by column in the vertical plane, hence the grid truss system is termed a vertically configured system. The horizontal splay angle between columns can be varied by moving the grid truss suspension points around, or in some instances the grid truss will have a swiveling bar for each column of loudspeakers. It is important to note that grid truss systems are usually not utilized when severe tilt angles are necessary from the loudspeaker array since the grid truss becomes very large in order to accommodate the space the loudspeaker enclosures need to occupy. The modular grid truss system is a variation of the traditional grid truss. With modular grid truss systems, the user is able to add as many columns of loudspeakers as the venue may require, and the splay angle becomes fixed between each column of loudspeakers. Modular grid truss systems are usually a great deal smaller than conventional grid truss systems.

The modular truss system is the most recent advancement in loudspeaker rigging hardware systems (see Figure 3 on next page). The modular truss system is designed to hold a group of loudspeakers together rigidly in the horizontal plane, hence the modular truss sys-

tem is termed a horizontally configured system or planer system. Each loudspeaker in a modular system is treated as an individual module which can be assembled to the whole array in any position. Since each loudspeaker module is identical, the removal or addition of a module is simple and predictable. Each of the loudspeaker modules is held together in the horizontal plane with the use of connecting bars which can be a fixed splay angle or variable, depending on the design. Once a group of loudspeakers is held together in the horizontal plane, the entire group can be tilted without the use of additional adjustable pull straps. This is achieved by manipulating the center of gravity with the suspension points for the row of loudspeakers. By moving the suspension points toward the rear of the loudspeakers, the entire row of loudspeaker will tilt downward, and vice versa. Another feature of the modular truss system is the inherent wavefront coherency. Since the loudspeakers are held together in the horizontal plane at a fixed distance in space, the wavefront across the horizontal plane is coherent. Also, the modular truss system will allow adjustment of the vertical acoustic wavefronts when multiple rows of loudspeakers are arrayed.

LIABILITIES

A loudspeaker rigging hardware system that works well and looks good is a very beneficial asset to the sound reinforcement rental company and installer. However, there are many liability issues that are attached to the process of rigging loudspeaker systems. Firstly, there is a legal responsibility for the owner and user of the loudspeaker flying hardware system to ensure that the system is insured, safely designed and constructed, and that the system is used safely and appropriately. Insurance for a rigging system can be expensive, but it is a necessity for both the owner's and client's protection. The safe design and construction of the rigging hardware system is also critical.

(continues over)