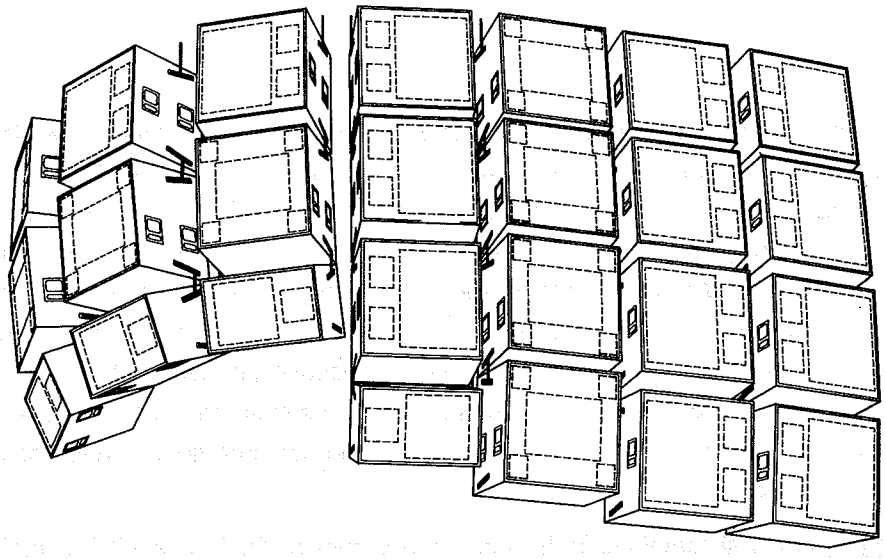
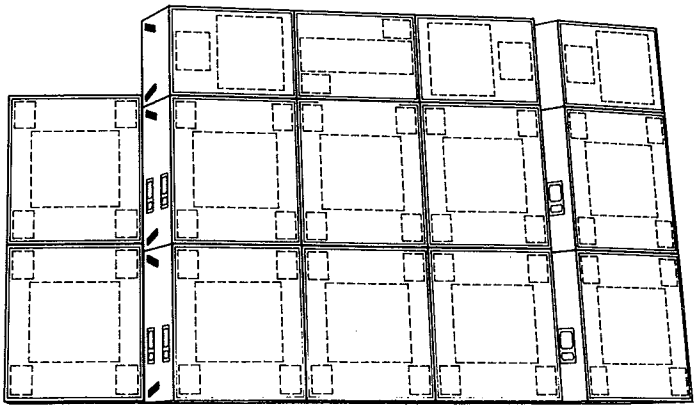
Electro-Voice®
a MARK IV company

Rigging: Dave Carlson.
Questons:

The MT Flying Manual





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MTH-2/94. The primary differences are the change in the nominal impedance of the MTH-2/94A high-frequency section from 4 ohms to 8 ohms and the increased strength of the rigging hardware in the flying versions of both systems. The MTH-2/64 is a new addition to the MTH-2A series.

The MTL-2ACF, MTH-2/94ACF, MTL-4AF-series and MTH-4AF-series loudspeaker systems are identical to the original MTL-2CF, MTH-2/94CF, MTL-4F-series and MTH-4 F-series versions in size, weight, center of gravity, and rigging hardware type and placement. With the exception of the strength-rating differences, the newer and older models may be mixed without any special considerations.

All of the flying MT-2, MT-2A, MT-4 and MT-4A loudspeaker systems utilize the same rigging-strap accessories. The GS-1A grid straps and LS-1A linking straps are improved versions that replace the older GS-1 and LS-1. The LS-2A is a new linking strap that is longer than the LS-1A.

THE BASIC MT RIGGING PRIMER

Anatomy of the MT Flying System

A basic four-cabinet flying system is shown in Figure 2, illustrating the integral components that make up a typical MT system. The top cabinets are the starting points for constructing the array. These cabinets are first secured to a grid through the use of two grid straps per cabinet (the Electro-Voice GS-1A grid straps are recommended).

The MT-4 cabinets are equipped with two pieces of track to which the grid straps attach. The linear positioning of the attachment points determine the vertical angling of the cabinet. The remaining ends of the grid straps are then secured to the cross members of the grid. The relative positioning of the straps along the cross members determine the relative horizontal angle between the two cabinets. A second row of cabinets may be added below the original two by utilizing linking straps (the Electro-Voice LS-1A and LS-2A linking straps are recommended) that attach from the two lower track pieces of the first cabinets to the two upper track pieces of the second cabinets. Additional

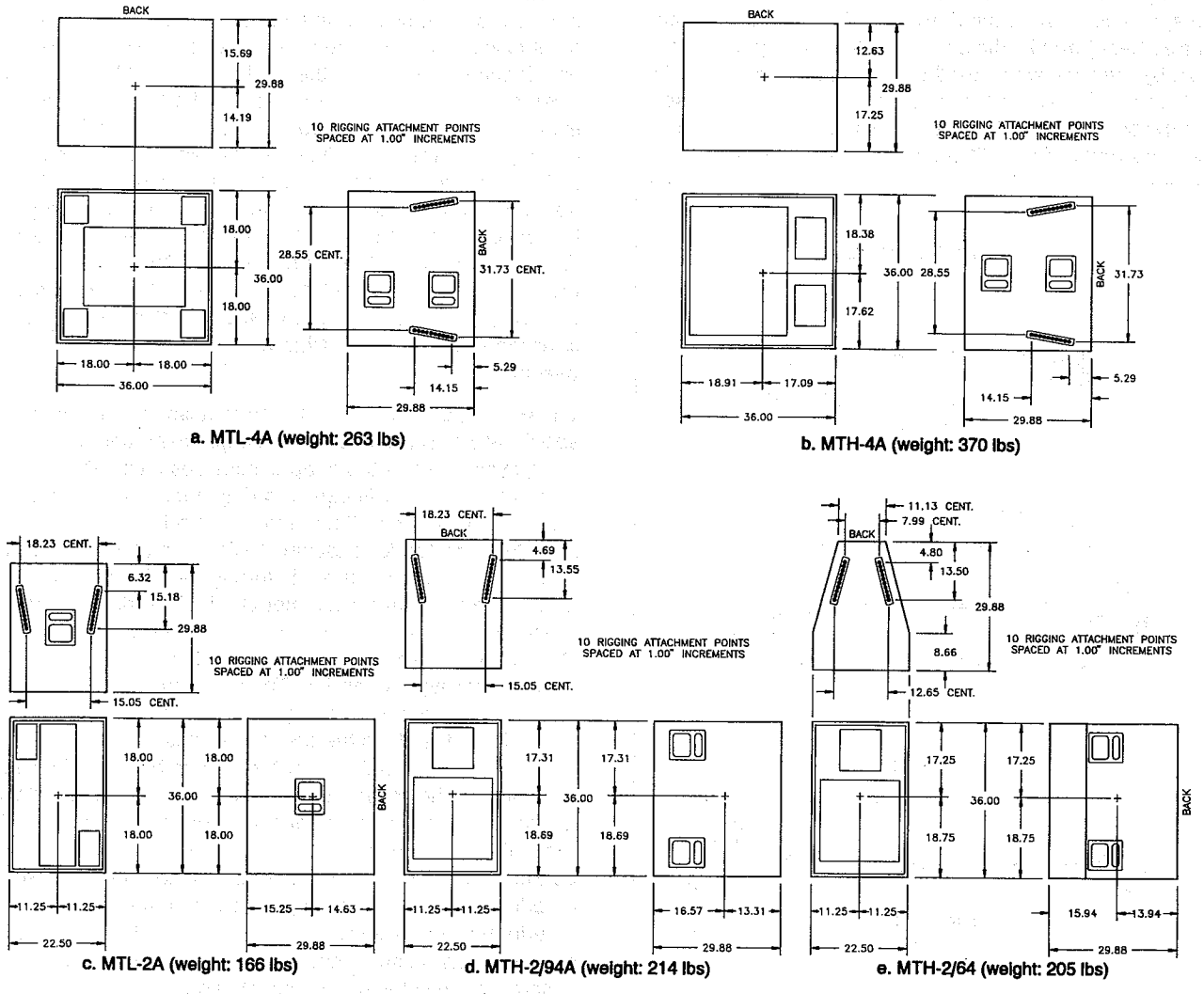


FIGURE 3 — MT Systems Center of Gravity and Rigging-Track Location

ultimate-break-strength rating of the system to the actual applied load. In other words, the ultimate-break strength of each of the mechanical components in the system must be at least five times greater than the actual force applied to those components. The weakest component of an MT flying system determines the strength of the entire system. This includes the MT enclosures, the rigging-strap assemblies, the grid, the hoist and all other mechanical components and hardware.

All mechanical components used with an MT flying system (shackles, chains, hoists, wire-rope slings, nylon and/or polyester slings, etc.) should be load rated. All load-rated hardware will typically have its load rating displayed on each piece in a visible location. Typical ratings are denoted as the static-working load (SWL), or the working-load limit (WLL). These ratings generally assume a safety factor of 5:1 (this would result in a component with a working-load rating of 1,000 pounds having an ultimate-break-strength rating of 5,000 pounds); however, the user should consult the manufacturer to confirm the rating. Occasionally, the load rating is given as the ultimate-break strength. This allows the user to calculate the safety factor directly for a given load. Both the ultimate-break strength *and* the working-load limit for a 5:1 safety factor will be presented in this manual for the strength of the Electro-Voice MT enclosures and rigging hardware, as well as the Electro-Voice GS-1A, LS-1A and LS-2A rigging-strap accessories.

The MTL-2ACF, MTH-2/94ACF, MTL-4AF-series and MTH-4A F-series loudspeaker systems are identical to the original MTL-2CF, MTH-2/94CF, MTL-4F-series and MTH-4 F-series versions in size, weight, center of gravity, and rigging hardware type and placement. However, the newer models have slightly increased strength ratings. With the exception of the strength-rating differences, the newer and older models may be mixed without any special considerations. The user is cautioned that there were errors in the strength ratings given in the original printing of the "MT-4 FLYING OPTION USER'S GUIDE" (EV Part No. 530761) and the "ADDENDUM TO THE MT-4 FLYING OPTION USER'S GUIDE - FLYING THE MT-2" (EV Part No. 531470). Complete strength-rating specifications for both the newer and older versions are presented in this manual. Hence, the user should use the specifications given in the "Strength Ratings, Safety Factors and Special Considerations" section in this manual when designing arrays for any of the MT-2, MT-4, MT-2A and MT-4A loudspeaker systems.

CONSTRUCTING ARRAYS

Coverage Patterns

The MTH-4A has a square-front enclosure (36-inch x 36-inch x 29.9-inch-deep) and exhibits a 60° x 40° constant-directivity coverage pattern. Although the horns are not rotatable in the MTH-4A, the coverage pattern may be rotated by simply turning the enclosure on its side, as shown in Figure 6. When oriented for a 60°H x 40°V coverage pattern, the rigging track is located on the sides of the enclosure. When oriented for a 40°H x 60°V pattern, the track then appears at the top and bottom of the enclosure. Additionally, the MTH-4A may be turned upside down from the configurations shown in Figure 6 for the creation of mirror-image arrays. The MTL-4A enclosure has the same dimensions and rigging-track orientation and may be rotated to match the MTH-4A. (Due to the non-directionality of low frequencies, the coverage pattern of the MTL-4A systems is affected more by the array configuration than the orientation of the individual enclosures. Hence, the affect of rotating low-frequency enclosures can be considered negligible.) Because the MT-4A enclosures have a square front, the appearance of the array is not disrupted by rotating the enclosures. Furthermore, the EV logo on the front of the MT-4A enclosures may be rotated, if desired, to match the orientation of the enclosure.

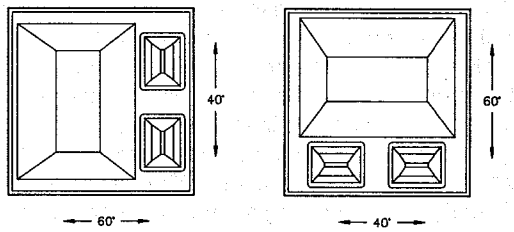
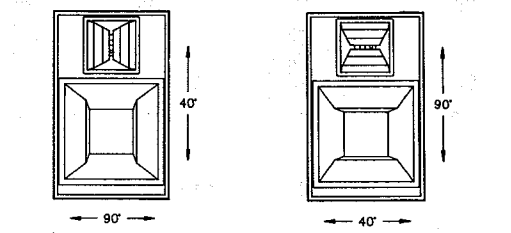
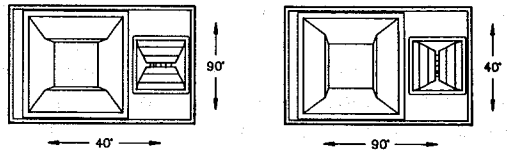


FIGURE 6 — Coverage Pattern Options for the MTH-4A

The MTH-2/94A has a rectangular-front enclosure (36-inch x 22.5-inch x 29.9-inch-deep) and exhibits a 90° x 40° constant-directivity coverage pattern. Both the midbass- and high-frequency horns are rotatable in the MTH-2/94A, allowing a 90°H x 40°V or a 40°H x 90°V pattern to be achieved with the enclosure oriented in either the "tall" or "wide" configuration as shown in Figure 7. When oriented in the "tall" configurations, the rigging track is located on the top and bottom of the enclosure. When oriented in the "wide" configuration, the rigging track appears on the sides of the enclosure. Additionally, the MTH-2/94A may be turned upside down from the configurations shown in Figure 7 for the creation of mirror-image arrays. The MTL-2A enclosure has the same dimensions and rigging-track configuration and may be oriented to match the MTH-2/94A. (Like the MTL-4A systems, the coverage pattern of the



a. Tall Configuration



b. Wide Configuration

FIGURE 7 — Coverage Pattern Options for the MTH-2/94A

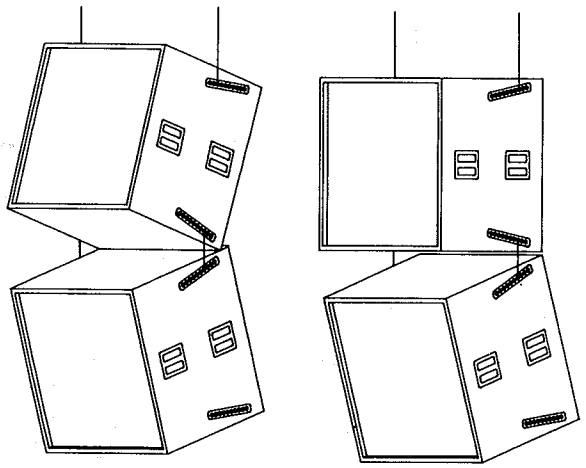


FIGURE 10 — Interaction Between Flown Cabinets

cabinet back, as shown in Figure 10b, counteracts the additional load and results in the upper cabinet pointing straight ahead again. Note that this change has no affect on the angle of the lower cabinet. Additional MT enclosures may be hung in succession in this fashion, creating a vertical line array, as long as a sufficient safety factor is maintained.

Array Building Blocks and Configurations

In this section, a variety of array building blocks and configurations are presented that are useful for many commonly encountered sound reinforcement situations. The system designer should not consider these examples to be the limit of possibilities, but rather an introduction to the MT array-design concept. These examples might serve as a starting point from which modifications may be made to tailor an array to meet exact requirements.

Array Building Blocks: A variety of array building blocks are presented in Figures 11 through 18. Included in these figures are notations indicating the positions of the rigging-attachment points on the cabinets, the downward angle of each cabinet and the rigging straps used for suspending the cabinets. There are 10 rigging-attachment positions on the rigging track mounted on each of the MT-2A and MT-4A enclosures. The convention used in this manual is as follows: Position #1 is at the extreme end of the track closest to the back of the enclosure, while position #10 is at the extreme end of the track closest to the front of the enclosure

A very basic building block would be a full-range array made up of a single MTL-4A low-frequency system and MTH-4A mid/high-frequency system. A full-range MT-4A building block having a 60°H x 40°V pattern is shown in Figure 11. The MTH-4A is hung below the MTL-4A, allowing maximum flexibility of aiming the mid and high frequencies. Due to the non-directionality of low frequencies from a

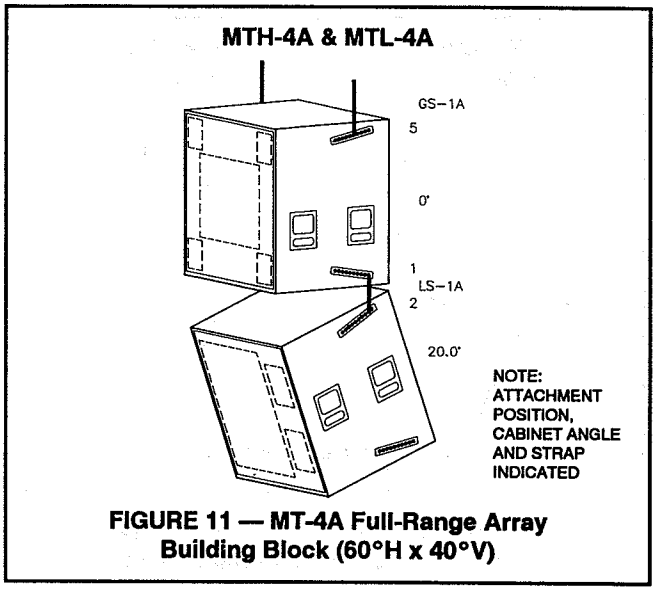


FIGURE 11 — MT-4A Full-Range Array Building Block (60°H x 40°V)

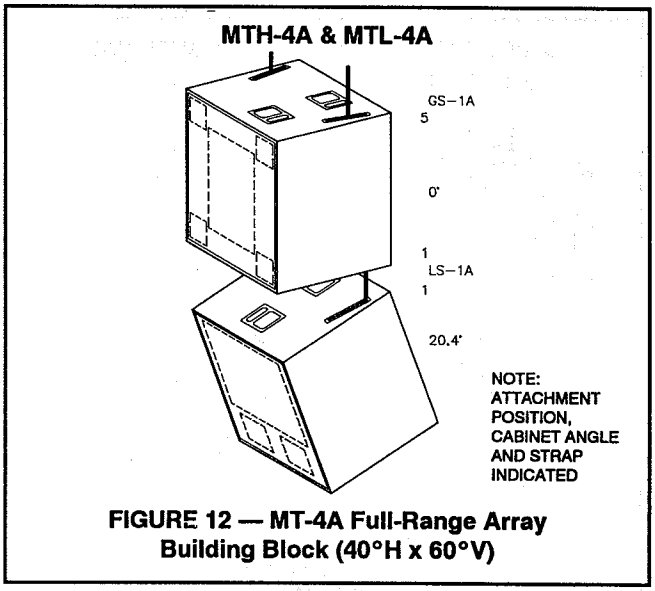


FIGURE 12 — MT-4A Full-Range Array Building Block (40°H x 60°V)

single enclosure, the MTL-4A does not necessarily need to be aimed down to match the MTH-4A. The same cabinets utilized in a 40°H x 60°V configuration are shown in Figure 12. Again, the MTH-4A is on the bottom, but this time with the high-frequency horns down, allowing the closest possible spacing between the midbass- and low-frequency sections.

Where lesser acoustic output is required, a full-range-array building block made up of a single MTL-2A low-frequency system and MTH-2A mid/high-frequency system might be used. Full-range building blocks using the MT-2A systems in the "wide" configuration are shown in Figure 13. The MTH-2/94A would be used when a 90° x 40° pattern was required, while the MTH-2/64 would be used for a 60° x 40° pattern. The midbass- and high-frequency horns may be oriented in either direction as required. Full-range building blocks using the MT-2A systems in the "tall" configuration are shown in Figure 14. As with the MT-4A examples, the MTL-2A systems do not necessarily need to be aimed down to match the MTH-2A systems, because of the non-directionality of the low frequencies from a single enclosure. Additionally, the midbass- and high-frequency horns may be oriented as the situation requires.

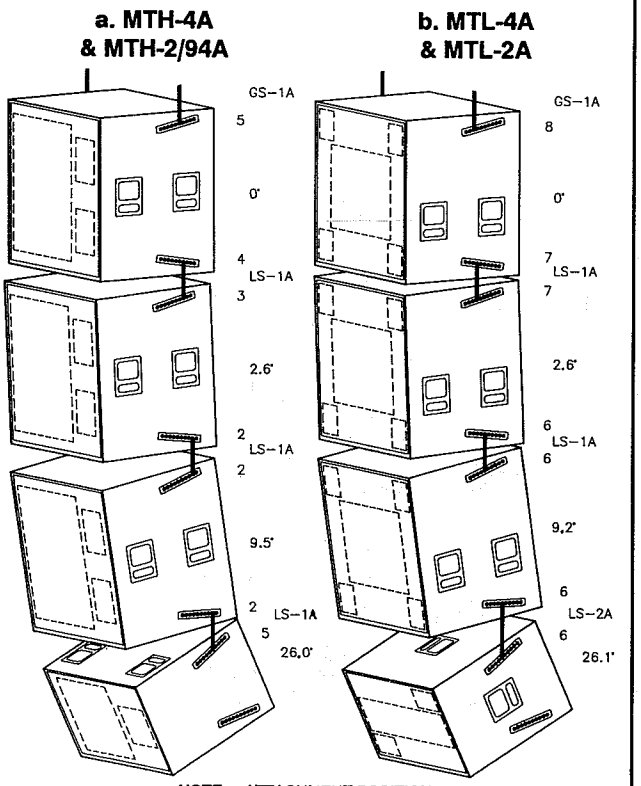


FIGURE 17 — High-Power Long- and Short-Throw Line-Array Building Blocks

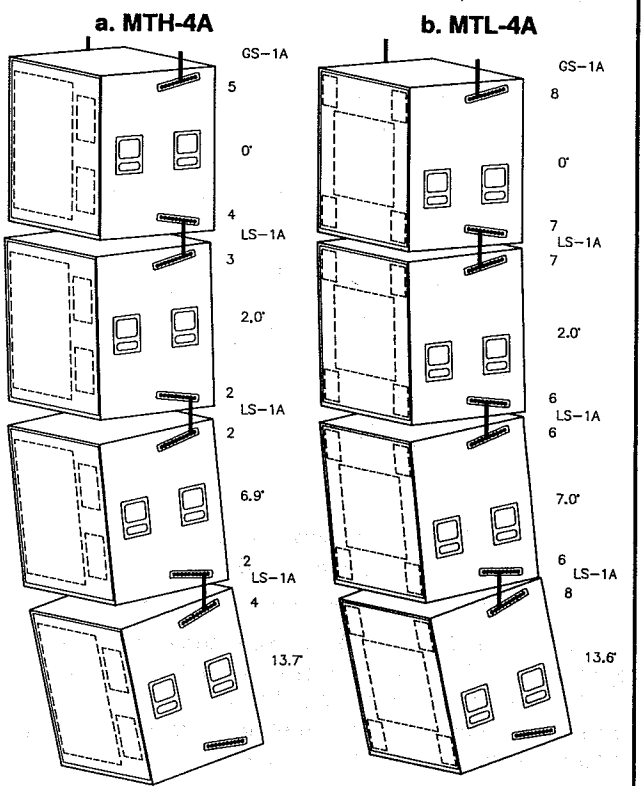


FIGURE 18 — High-Power Long-Throw Line-Array Building Blocks

systems in the 60°H x 40°V pattern configuration at the top for long-throw capability, followed by a single MTH-2/94A at the bottom, in the "wide" configuration with a 90°H x 40°V pattern. A matching column of three MTL-4A systems and a single MTL-2A system is shown in Figure 17b. The MTL-4A and MTL-2A systems have downward angles that match the MTH-2A systems. As in the previous example, angling down the bottom low-frequency cabinets will ensure that the upper-bass coverage of the MTL systems matches the lower-midbass coverage of the MTH systems.

A very-high-power long-throw line array is shown in Figure 18a with four MTH-4A systems in the 60°H x 40°V pattern configuration. A matching column of four MTL-4A systems is shown in Figure 18b. As in the previous examples, the low-frequency cabinets are angled down to ensure that the upper-bass coverage of the MTL-4A systems matches the lower-midbass coverage of the MTH-4A systems.

When tall columns of MT loudspeaker systems are employed, the low-frequency directivity will be increased well beyond that of a single system. Line arrays like those shown in Figures 17 and 18 will maintain vertical directivity down below 200 Hz. At high frequencies, on the other hand, tall columns of MTH loudspeaker systems will maintain their vertical directivity. This is because the Electro-Voice HP horns used in the MTH systems have tightly controlled constant-directivity patterns in both the horizontal and vertical planes, minimizing interaction between horns and reducing beaming and lobing.

Array Configurations: The full-range building blocks in Figure 14 may be used as components of a distributed system or as elements of a clustered array. Figure 19 shows a cluster of three of the MTL-2A/MTH-2/94A combinations from Figure 14a. (The rigging-attachment points, rigging straps and cabinet angles are identical to those shown in Figure 14a.) The midbass- and high-frequency horns in the MTH-2/94A systems may be oriented in either the 90°H x 40°V or 40°H x 90°V configuration, depending on the required vertical coverage and the horizontal splay angle between the cabinets. Figure 20 shows a cluster of three of the MTL-2A/MTH-2/64 combinations from Figure 14b. (The rigging-attachment points, rigging straps and cabinet angles are identical to

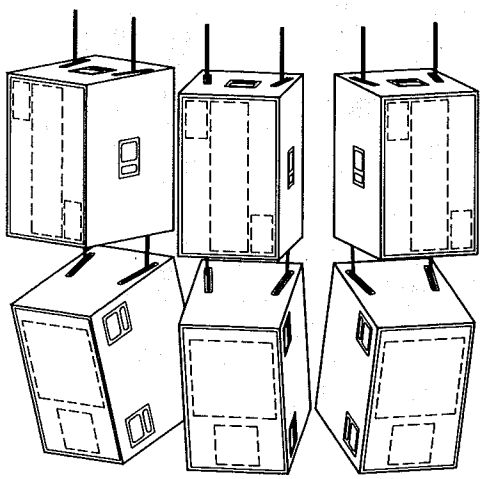


FIGURE 19 — Full-Range Array Using the MTH-2/94A and MTL-2A

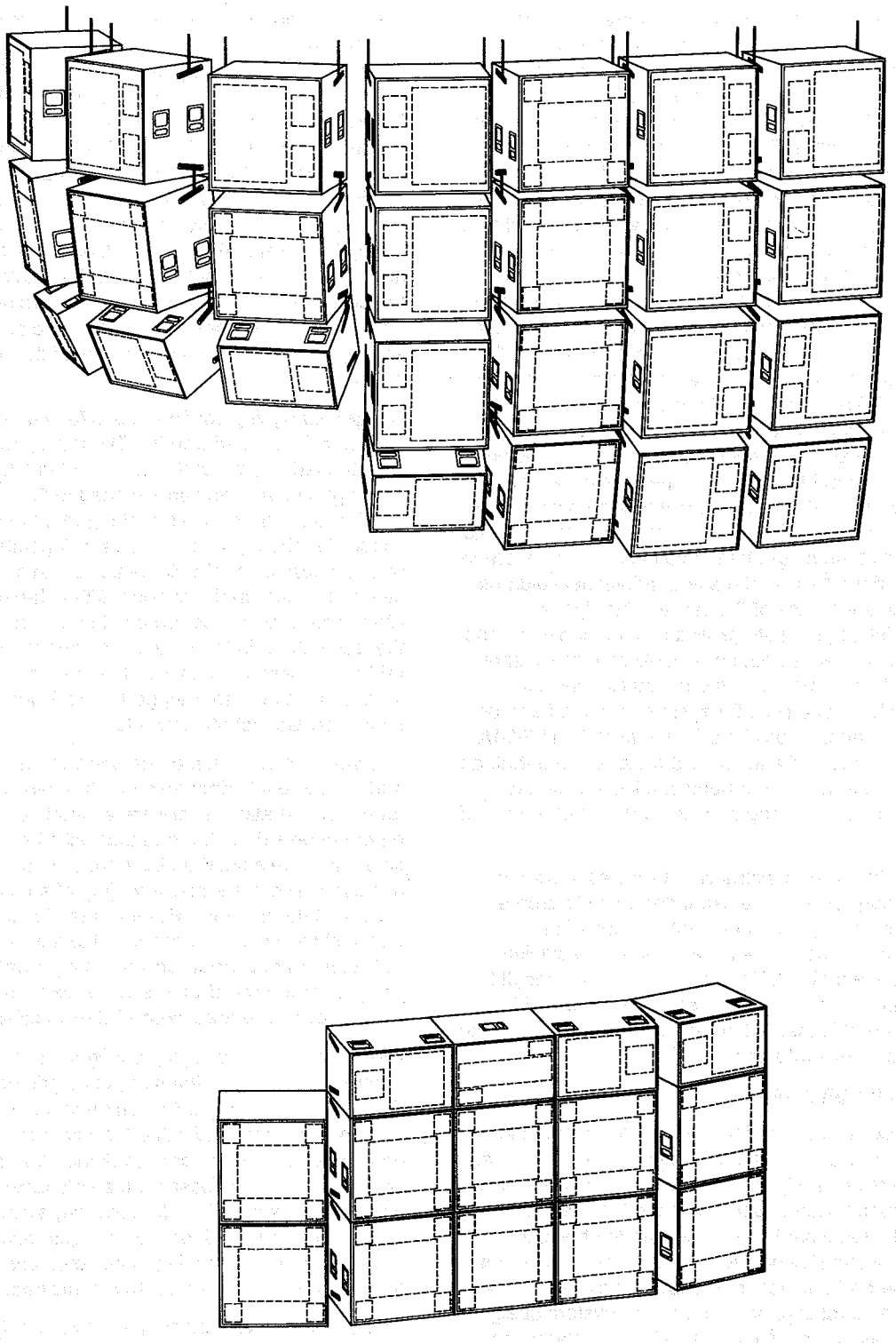
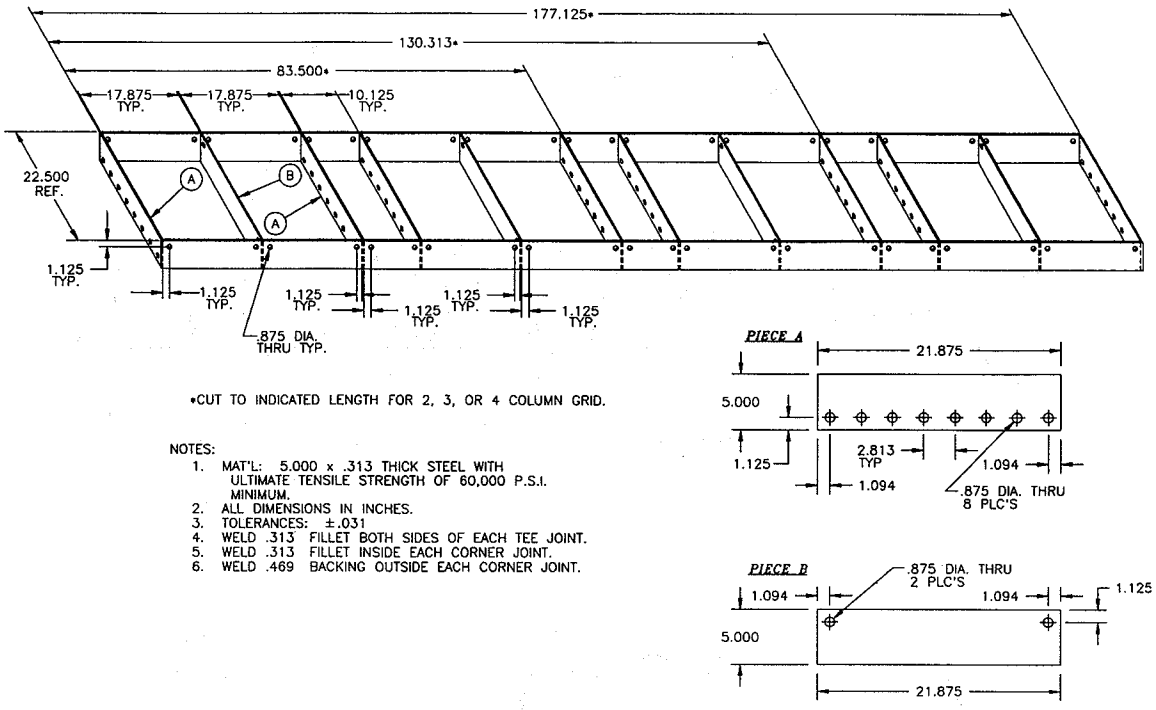


FIGURE 23 — Flown Array With Ground Stack for Very-High-Power Concert Applications Using the MT-4A and MT-2A Systems.

A medium-size concert system is shown in Figure 22. This array uses two columns of the MTH-4A/MTH-2/94A combinations from Figure 17a (one column is hung in mirror image) and one column of MTL-4A systems from Figure 17b (without the MTL-2A on the bottom). (The rigging attachment points, rigging straps and cabinet angles are identical to those shown in Figure 17.) Such an arrangement would be flown on either side of the stage. A ground stack would be added underneath each hang, consisting primarily of MTL-4A systems (on the floor for maximum low-frequency efficiency) with two MTH-2/94A systems to cover the audience near the stage. Flying approximately one-third of the bass is recommended to achieve uniform low-frequency coverage in the upper seating banks along the sides of a long rectangular venue. The top three cabinets are aimed towards the back of the hall with the bottom cabinet angled down to cover the audience area nearer the array. Note that the ground stack is positioned behind the flown array as a continuation of the arc of the flown array.

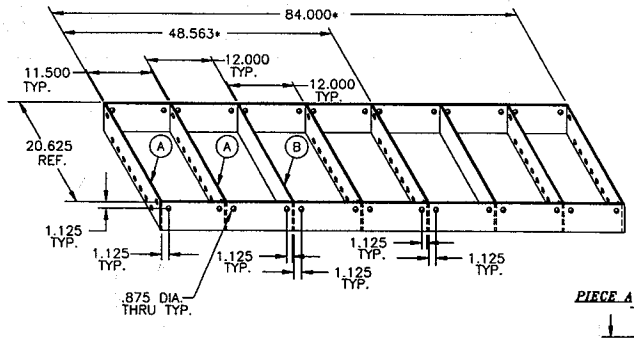
a. MT-4A/MT-2A Grid



*CUT TO INDICATED LENGTH FOR 2, 3, OR 4 COLUMN GRID.

NOTES:
1. MAT'L: 5.000 x .313 THICK STEEL WITH ULTIMATE TENSILE STRENGTH OF 60,000 P.S.I. MINIMUM.
2. ALL DIMENSIONS IN INCHES.
3. TOLERANCES: ±.031
4. WELD .313 FILLET BOTH SIDES OF EACH TEE JOINT.
5. WELD .313 FILLET INSIDE EACH CORNER JOINT.
6. WELD .469 BACKING OUTSIDE EACH CORNER JOINT.

b. MT-2A Grid



*CUT TO INDICATED LENGTH FOR 2, OR 3 COLUMN GRID.

NOTES:
1. MAT'L: 5.000 x .313 THICK STEEL WITH ULTIMATE TENSILE STRENGTH OF 60,000 P.S.I. MINIMUM.
2. ALL DIMENSIONS IN INCHES.
3. TOLERANCES: ±.031
4. WELD .313 FILLET BOTH SIDES OF EACH TEE JOINT.
5. WELD .313 FILLET INSIDE EACH CORNER JOINT.
6. WELD .469 BACKING OUTSIDE EACH CORNER JOINT.

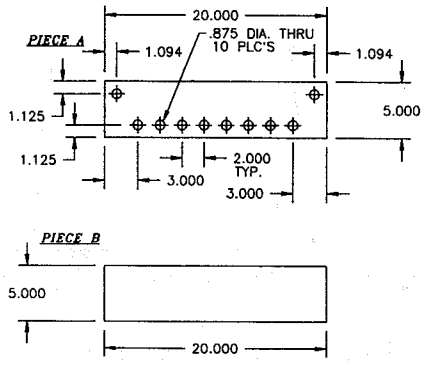
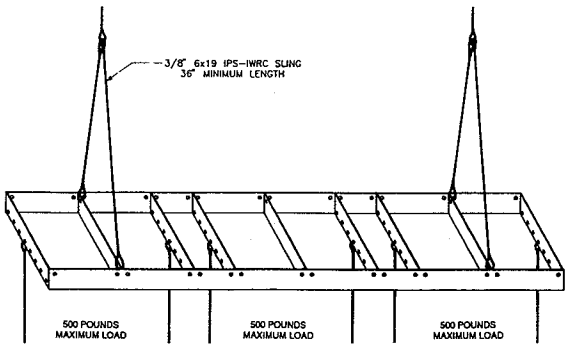
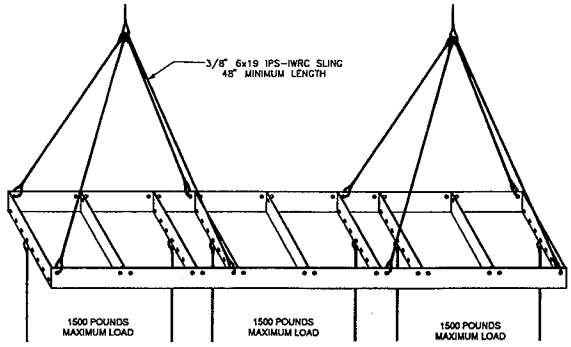


FIGURE 24 — Suggested Grid Designs for the MT-4A and MT-2A Systems.





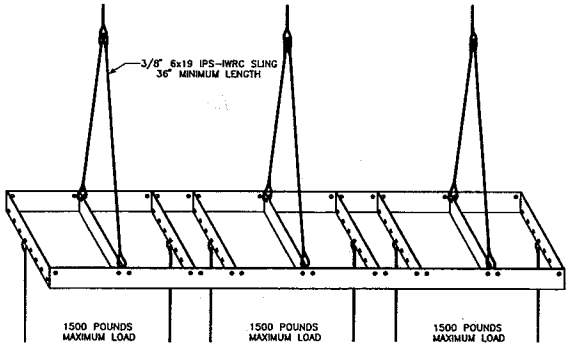
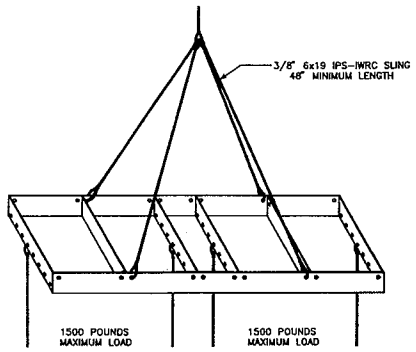


FIGURE 25b — Suggested Rigging Configurations for the Three-Column MT-4A/MT-2A Grid



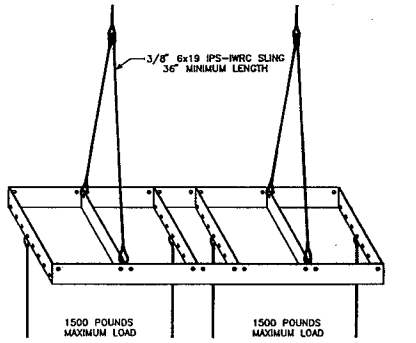


FIGURE 25c — Suggested Rigging Configurations for the Two-Column MT-4A/MT-2A Grid

STRENGTH RATINGS, SAFETY FACTORS AND SPECIAL CONSIDERATIONS

Strength Ratings and Safety Factors

There are two independent strength ratings that, together, give a complete description of the overall structural performance capabilities of any MT loudspeaker system. They are defined as follows:

1. **The strength of each individual rigging point;** which, effectively, is the combined strength of the rigging track mounted on the enclosure and the quick-release rigging-strap assemblies.
2. **The total strength of the enclosure;** which is a function of the combined forces from each of the rigging points acting on the enclosure as a whole.

Electro-Voice provides strength ratings for the MT loudspeaker systems in two formats; the "ultimate-break strength" (i.e., the force required to cause structural failure of the loudspeaker enclosure or rigging hardware) and the "working-load limit" based on a 5:1 safety factor (i.e, the actual ultimate-break-strength ratings divided by a factor of 5). The ultimate-break-strength ratings should be used when calculating the actual safety factor of an array (by comparing the actual forces acting on the loudspeaker enclosure and rigging hardware to the ultimate-break strength of the enclosure and hardware). The working-load-limit ratings are useful in those circumstances where there is a given requirement that an MT loudspeaker array must meet or exceed a safety factor of 5:1 (minimum safety-factor requirements of 5:1 are common in local, state and federal regulations). This requirement is met if the actual forces acting on the loudspeaker enclosures and rigging hardware do not exceed the working-load limits. The use of the working-load limit can save time over safety-factor

calculations when it is only necessary to know if the array meets or exceeds minimum requirements of a 5:1 safety factor. If, however, the requirements are for a safety factor other than 5:1, the safety factors must be calculated directly using the ultimate-break-strength ratings.

The ultimate-break strength of each individual rigging point on the MT enclosures is dominated by the strength of the rigging-attachment hardware (the rigging track on the enclosure and the quick-release rigging-strap assemblies) and is independent of the angle of pull. **The ultimate-break-strength rating for each rigging point on the MTL-4AF-series, MTH-4AF-series, MTL-2ACF, MTH-2/94ACF and MTH-2/64CF enclosures is 4,000 pounds when used with the GS-1A, LS-1A or LS-2A rigging accessories (or when used with the Kinedyne #32111-1 or #32102-1 double-stud ring fittings), except at the extreme end positions of the track where the rating is 3,750 pounds.** (Note that the GS-1A, LS-1A or LS-2A rigging accessories use the Kinedyne #32111-1 fittings.)

The actual break strength of an MT-4A or MT-2A enclosure will depend on the combined forces from each of the rigging points acting on the enclosure as a whole and will vary with the array configuration (relative angles of the cabinets, relative angles of the rigging straps, the weight of each loudspeaker system strung together in a vertical array, the weight distribution throughout the array, etc.). **We will define the minimum-ultimate-break strength of the overall MTL-4AF-series, MTH-4AF-series, MTL-2ACF, MTH-2/94ACF and MTH-2/64CF enclosures as 8,000 pounds when used with the GS-1A, LS-1A or LS-2A rigging accessories (or when used with the Kinedyne #32111-1 or #32102-1 double-stud ring fittings).**

The working-load limit for a 5:1 safety factor for each individual rigging point on the MT-4A and MT-2A enclosures is simply the ultimate-break strength previously given for the individual points divided by a factor of 5 and, like the break strength, is independent of the angle of pull. **The working-load limit for each rigging point on the MTL-4AF-series, MTH-4AF-series, MTL-2ACF, MTH-2/94ACF or MTH-2/64CF enclosures is 800 pounds when used with the GS-1A, LS-1A or LS-2A rigging accessories (or when used with the Kinedyne #32111-1 or #32102-1 double-stud ring fittings), except at the extreme end positions of the track where the rating is 750 pounds.**

The working-load limit (for a 5:1 safety factor) of an MT-4A or MT-2A enclosure is simply the ultimate-break strength previously given for the overall enclosure divided by a factor of 5. **The working-load limit of the overall MTL-4AF-series, MTH-4AF-series, MTL-2ACF, MTH-2/94ACF and MTH-2/64CF enclosures is 1,600 pounds when used with the GS-1A, LS-1A or LS-2A rigging accessories (or when used with the Kinedyne #32111-1 or #32102-1 double-stud ring fittings).**

The ultimate-break-strength rating for the individual rigging points on the older MTL-2CF, MTH-2/94CF, MTL-4F-series and MTH-4F-series systems is 4,000 pounds at any angle of pull when used with the GS-1A, LS-1A or LS-2A rigging accessories (or when used with the Kinedyne #32111-1 or #32102-1 double-stud ring fittings), except at the extreme end positions of the track where the rating is 3,000 pounds. The overall enclosure ultimate-break-strength rating for all of the systems is 8,000 pounds. For a 5:1 safety factor, this results in a working-load limit for each individual rigging point of 800 pounds at all mid track positions and 600 pounds at the extreme end positions of the track. The working-load limit for the overall enclosures then becomes 1,600 pounds.

The user is cautioned that there were errors in the strength ratings given in the original printing of the "MT-4 FLYING OPTION USER'S GUIDE" (EV Part No. 530761) and the "ADDENDUM TO THE MT-4 FLYING OPTION USER'S GUIDE - FLYING THE MT-2" (EV Part No. 531470). Complete strength-rating specifications for both the newer and older versions are presented in this manual. Hence, **the user should use the specifications given in this manual when designing arrays for any of the MT-2, MT-4, MT-2A and MT-4A loudspeaker systems.**

Electro-Voice strongly urges that the user maintain a safety factor of at least 5:1 when implementing an MT flying system. Currently in the United States, OSHA (the Occupational Safety and Health Act) requires a minimum of 5:1 for overhead lifting in the workplace, while ANSI (American National Standards Institute) suggests a minimum of 5:1 for mechanical-component and equipment ratings. The safety factor is defined as the ratio of the ultimate-break-strength rating of the system to the actual applied load. In other words, the ultimate-break strength of each of the mechanical components in the system must be at least five times greater than the actual force applied to those components. The weakest component of an MT flying system determines the strength of the entire system. This includes the MT enclosures, the quick-release rigging hardware, the rigging-strap assemblies, the grid, the hoist and all mechanical components and hardware.

Array Considerations

The techniques discussed in the previous sections for constructing arrays, as shown in Figures 19 through 23, may be expanded upon to create different arrays utilizing different combinations of MT-4A and MT-2A loudspeaker systems, as long as a sufficient safety factor is maintained. The user is reminded that the top cabinet in an array supports the weight of all the cabinets hung beneath it and that the weight distribution between the rigging points will depend on the exact configuration. For example, the center of gravity of the MTH-4A system is not perfectly centered, but rather shifted slightly towards the midrange/high-frequency side of the box. As a result, the load on the GS-1A rigging strap at the top of the midrange/high-frequency side of the MTH-4A column in Figure 18a would be slightly greater than the load on the GS-1A strap on the midbass side (777.4 pounds versus 702.6 pounds). On the other hand, the load would be distributed equally (526 pounds each) between the two GS-1A straps at the top of the MTL-4A column in Figure 18b. The weight distribution of any MT array can be calculated with the information presented in Figure 3. Any users unfamiliar with the process of calculating load distributions should consult reference [1] listed at the end of this manual.

In the previous example of the column of MTL-4A systems in Figure 18b, the worst-case load in the array is the 526 pounds on each of the GS-1A rigging straps at the top of the column. The straps are attached at the #8 position on the enclosure. In that position, the 526-pound load is well within the work-load limit of 800 pounds and results in a safety factor of 7.60:1. If the attachment positions were moved to one of the extreme-end positions of the track (positions #1 or #10), the load would still fall under the

any constructed grid and the resulting safety factors for all array designs and rigging configurations.

In permanent installations where a grid is not used, the rigging straps and/or slings securing the MT loudspeaker systems to the building supports may not be hanging at a 0° vertical angle. The resulting forces in the straps and/or slings must be taken into account when evaluating the load on the straps, the rigging-attachment points, the enclosures and the building structural supports, as well as the resulting safety factors. Array details and rigging configurations will affect the load on the building structure. **The user is responsible for determining the strength of all building structural supports and the resulting safety factors for all array designs and rigging configurations.**

Rigging-Strap-Assembly Considerations

The ultimate-break-strength ratings given in this manual for the MT-2, MT-4, MT-2A and MT-4A systems are contingent upon using the Kinedyne #32111-1 or #32102-1 double-stud ring fittings for attachment to the rigging track on the MT enclosures. Other products, no matter how similar in appearance, cannot be construed as acceptable substitutes. If substitutions are made, the user assumes the responsibility of determining the strength rating. When the Electro-Voice GS-1A, LS-1A and LS-2A rigging-strap assemblies are used for suspending MT loudspeakers overhead, Electro-Voice will guarantee that the MT enclosure, the rigging track mounted on the enclosure and the entire rigging-strap assembly will meet the ultimate-break-strength ratings given in this manual. If a rigging strap manufactured by someone other than Electro-Voice utilizing the Kinedyne #32111-1 or #32102-1 double-stud ring fittings is used for suspending MT loudspeakers overhead, Electro-Voice will guarantee that the MT enclosure and the rigging track mounted on the enclosure will meet the ultimate-break-strength ratings given in this manual; however, Electro-Voice will make no guarantees of performance of the rigging-strap assemblies. In these circumstances, the user is responsible for determining the strength rating of the rigging-strap assemblies.

The user should be cautioned that the Kinedyne Corporation recommends the use of only the #32111-1 or #32102-1 double-stud ring fittings for overhead lifting. **Kinedyne warns against using the original #32111 and #32102 fittings for overhead lifting because the fittings can disengage from the track while under load when subjected to certain kinds of vibration.** The #32111-1 and #32102-1 fittings are distinguishable from the #32111 and #32102 fittings in that they have a locking pin as shown in Figure 5.

The original Electro-Voice GS-1 and LS-1 rigging strap assemblies utilized the #32111 and #32102 fittings. The GS-1 and LS-1 assemblies can be further recognized as having blue straps, while the newer GS-1A and LS-1A assemblies have green straps. **If you have any of the original Electro-Voice GS-1 or LS-1 rigging-strap assemblies in your possession, you should immediately contact Electro-Voice to have them exchanged at no cost for new GS-1A and LS-1A assemblies. If you have rigging-strap assemblies manufactured by someone other than Electro-Voice that utilize the #32111 and #32102 fittings, you should immediately contact that manufacturer (or the Kinedyne Corporation directly) to have those assemblies replaced.**

The GS-1A, LS-1A and LS-2A rigging-strap assemblies have an identical ultimate-break-strength rating (for a single strap) of 4,000 pounds for any pull angle when used with the MTL-2ACF, MTH-2/94ACF, MTH-2/64CF, MTL-4AF-series MTH-4AF-series systems, except at the extreme end positions of the track, where the rating is 3,750 pounds. This results in a working-load limit of 800 pounds at all mid-track positions and 750 pounds at the end positions. When used with the MTL-2CF, MTH-2/94CF, MTL-4F-series MTH-4F-series systems, the ultimate-break-strength rating of the GS-1A, LS-1A and LS-2A rigging-strap assemblies is 4,000 pounds for any pull angle at all mid-track positions and 3,000 pounds at the extreme end positions. This results in a working-load limit of 800 pounds at all mid-track positions and 600 pounds at the end positions. **These strength ratings are based on a straight tensile pull as typically encountered in the arrays illustrated throughout this manual. Load directions other than straight may result in a significant reduction of strength. The user is responsible for determining the strength ratings in these circumstances.** As an example, such a condition would exist in the array shown in Figure 11 if the top GS-1A straps were pulled in towards each other so far that the straps bent around the top edges of the top cabinet. This condition would also exist if the MTH-4A system in Figure 11 were rotated so that the rigging track appeared on the top and bottom of that cabinet, with the MTL-4A system left with the track on the sides.

Redundant Rigging Hardware

As an added safety measure, it is recommended that the user install a second set of grid straps from the top rigging points of the top cabinets in an array back to the grid (or building structural supports). These redundant safety straps can be secured to an open section of rigging track next to the primary grid straps. The safety straps should have as little slack as possible (less than one inch is preferable).

MT USER REGISTRATION

All specific material concerning the strength ratings, rigging techniques and safety considerations for the MT loudspeaker systems is based on the best available engineering information concerning the use and limitations of the products. Electro-Voice continually engages in testing, research and development of its loudspeaker products. As a result, the specifications are subject to change without notice. It is the responsibility of the user to ensure that any Electro-Voice loudspeaker system is suspended overhead in accordance with the strength ratings, rigging techniques and safety considerations given in this flying manual and any flying-manual-update notices.

If you own, use or install Electro-Voice MT loudspeaker systems, we would like to have you register with Electro-Voice. If registered, you will automatically receive any future product-update information involving the safety or performance of the MT systems. Please take the time to fill out the "MT/DML Registration" card included along with this manual with the new product literature. If the card has already been removed, fill out the form below and mail it to Electro-Voice, Inc., MT/DML Registration, 600 Cecil Street, Buchanan, MI 49107.

YOUR NAME _____ (Last) _____ (First) _____ (M.I.)

COMPANY NAME _____ (If applicable)

ADDRESS _____ CITY _____

STATE _____ ZIP _____ COUNTRY _____

PHONE _____ FAX _____

1. WHICH ELECTRO-VOICE LOUDSPEAKERS DO YOU OWN, USE OR INSTALL?

   A. ☐ Manifold Technology MT ☐ DeltaMax DML

Model No.'s	Dates Purchased (approximate)	Serial No.'s

2. WHICH ELECTRO-VOICE RIGGING ACCESSORES DO YOU OWN, USE OR INSTALL?

   A. ☐ Manifold Technolgy GS-1A, LS-1A, LS-2A, etc.

   B. ☐ DeltaMax DMS-1, DMS-2, DMS-3, etc.

   C. ☐ None of the Above

3. IN WHICH APPLICATIONS ARE THESE LOUDSPEAKER SYSTEMS USED? (check all that apply)

   A. ☐ Permanent Installations C. ☐ Portable Sound Reinforcement

   B. ☐ Sound System Rentals D. ☐ Concert Touring

COMMENTS/SUGGESTIONS/REQUESTS _____

Thank you for taking time to complete this questionaire and for your recent purchase of this Electro-Voice product.