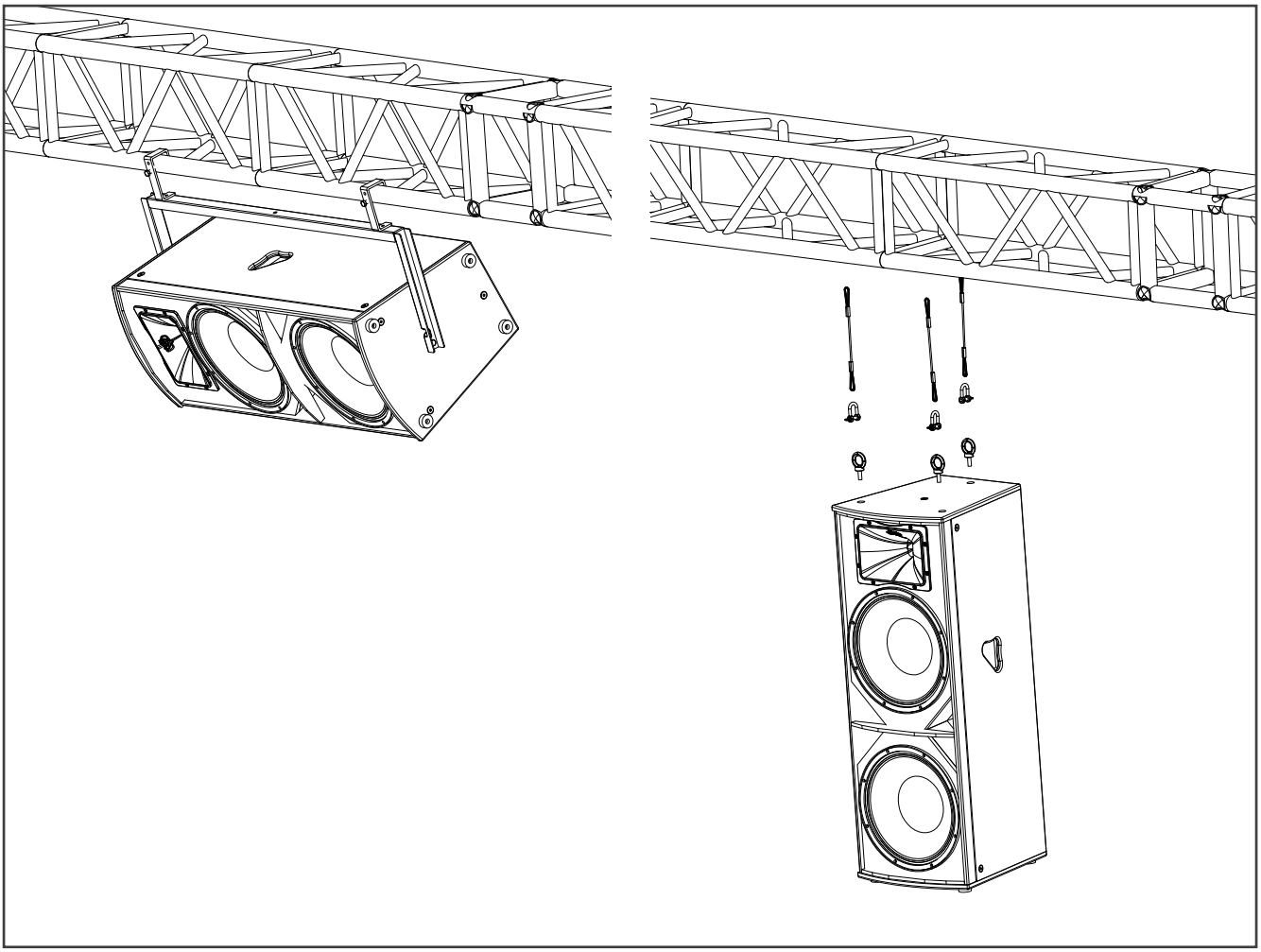
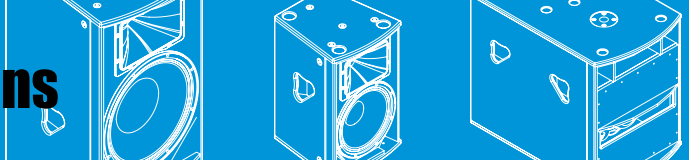
FORTY

F L Y I N G
INSTRUCTIONS



peecker sound®



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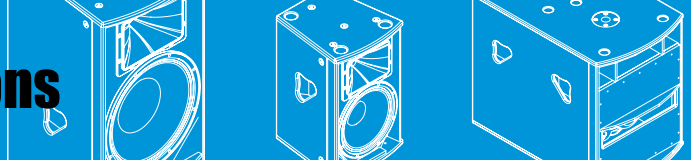

1. INSTALLING SPEAKERS INDOORS

The need to place loudspeaker systems in the best position in ordinary concert halls, theatres, dancing halls or any other indoor venue where live or recorded music is played is still the subject of many sound engineering studies, and the amount of related predictive software on the market is on the increase. The purpose of this manual is to offer a few useful tips on how to correctly install a sound system for the *Installed and Club Sound* segment, without carrying out hundreds of tests and trials on location. These suggestions stem from the experience of Sound Corporation, a group with over 40 years of experience in fixed installations.

To understand what our ear really perceives while listening to a stereo sound system in medium-to-large indoor venues like modern performance halls, we first need to examine the *sound power* (or *sound power level* Lw = 10 log W/Wo [dB] with Wo = 10-12 Watt = 1 pW) that is actually irradiated in the venue by the sound system itself.
Secondly, we need to analyse how the environment "handles" this sound power as the resonances of the environment itself tend to boost certain frequencies at the expense of others. We will not go into the numerous theories expounded in the literature on the advantages of having indoor venues that are not square and have the right proportions to reduce the occurrence of stationary waves, and since in 99% of cases we will never have the opportunity of building a customized listening venue but have to work within the existing architectural constraints, we will examine how to get the most out of the venue in hand in terms of timbre and the homogeneity of the *Sound Pressure Level* (SPL). Our aim as installers is to achieve the best possible alignment in speaker performance in indoor venues using just two tools: our experience and our ears.

1.1 The impact of the listening environment and reverberation

Firstly, it should be pointed out that while speakers are generally designed and studied in an environment that is totally absorbent and free of reflections (anechoic chamber), they are normally used in venues whose walls are highly reflective (listening venues) and deeply alter the sound power emitted by the transducers at various frequencies. If we compare the response curve measured in an anechoic chamber with the curve of an ordinary speaker measured in a normal listening venue (with the same speaker placement), we will notice a major difference between the two responses. The level of the curve recorded in the listening venue will in fact be higher and more uneven than the first. This is because the microphone located in the reverberating area picks up the sound coming directly from the sound sources (*direct sound*) as well as the sound reflected, once or several times, from the walls (*reverberant sound*).

1.2 Tone components and frequency analysis

The absorption capacity of the interior furnishing materials usually found in ordinary concert halls (draperies, carpets, seating, and so on) – starting from around 500Hz and gradually increasing – together with the well-known principle stating that a sound wave interferes with obstacles of a size similar to that of its wavelength (note that low-frequency sounds are much more easily diffracted than high-frequency sounds), means that the position of ordinary speakers should be selected according to frequencies below 500Hz, where the main differences in response are caused by the walls (sofas and furnishings, too, can influence these frequencies, but to a lesser extent than the walls of the room).

It can therefore be argued that, at low frequencies, the reflections of a wall increase the sound power generated by a speaker because, at short distances from the walls, the reflected wave "returns" to the speaker's acoustic centre of gravity with a delay that is less than the woofer's semi-cycle of compression-rarefaction, thereby considerably boosting direct sound. This theoretical approach is particularly crucial when using Forty Series satellite units since the typical dimensions of venues using this application – piano bars, café lounges, dine&dance clubs, and so on – in most cases, leave installers with no other choice than to position the speakers next to the walls.

The most comprehensive in-depth analysis of the acoustic characteristics of performance venues to this day, is the one carried out by *Leo Beranek* in his seminal book *Music Acoustics and Architecture* (1962), now considered a classic textbook on the subject, and largely reproduced in his more recent *Concert and Opera Halls* (1996). His original contribution is to have been the first to identify, define and quantify a series of qualitative attributes of the acoustics of a good concert hall/listening venue, based on detailed interviews with the most eminent orchestra directors and music critics on the scene at the time. Based on the underlying premise that the venue plays a major role in terms of the intensification, spread and structure of the musical message, his findings provide a definition of the essential prerequisites of a musical venue.

As is well known, sound energy is transmitted from the source point (orchestra) to the receiving point of the hall (audience) by acoustic waves reaching the listener both directly and through reflection off the surfaces of the venue. The listening point will therefore receive a mix of direct and reflected sound waves that determine the quality of the music. As far as the audience is concerned, to say that the acoustics of a venue is good means that the reproduced music provides good listening quality, where subjective qualities (of a psycho-acoustic nature) combine with acoustics-related physical phenomena based on the properties of the sound field at the listening point.

The venue influences the music produced by an orchestra and/or a sound amplification system in the following different ways:
- by attenuating the energy itself through air propagation
- by altering the emission spectrum of the sound wave after it has been reflected off the walls and ceiling
- by adding the effect of reverberation to the sound
- by altering the magnitude/timing relationships of sound energy ratings affecting overall the sound received at a particular point.

In the audience area, the effect of the environment of the venue (due to its particular shape and features) is perceived subjectively by the listeners through the combined mechanism of binaural reception and signal processing at the cerebral level. These perceptive processes underpin the wide variety of subjective impressions, all of which contribute to the creation of a high quality sound image for the listener. It thus seems clear that, from the point of view of the audience, the acoustic qualities of a venue – notwithstanding recent studies by a number of scholars (*Ando*, *Marshall*, *Meyer* et. al), who have attempted to evaluate listening venues using analytical expressions – can only be expressed in qualitative terms describing specific perceptive requirements. The acoustics designer then has to translate these subjective attributes – such as clarity, tone quality, intimacy or presence, texture, absence of echoes and background noise, and so on (Beranek identified as many as 18!) – into technical and construction related factors in order to produce a system that satisfies these requirements.

In-depth studies of the psycho-physical correlates of musical perception in a music venue have led to the identification of several necessary but not sufficient conditions for good listening quality in an auditorium. These conditions are listed below:
1. The listener has to receive the direct sound, accompanied by first-reflection sound energy.
2. The time distribution of first-reflection sound energy must be relatively balanced across the whole auditorium.
3. The first-reflection sound must be strongly directed along the lateral directions with respect to the listeners.
4. Direct sound and first-reflection energy must be broadband.
5. There must be adequate reverberation at mid frequencies, and the frequency curve during reverberation must be constant or with a slightly downward slope.

By getting the factors defined above in the right balance, it is thus possible for public performance venues to provide optimum response for the whole range of music genres, from baroque music to rock concerts with electronic instruments amplified by walls covered in speakers and/or line array modules, delivering tens of thousands of electric watts and, consequently, dozens of acoustic watts.

2. SAFETY INSTRUCTIONS

2.1 Warnings

The prime concern in the design and use of loudspeakers in flying installation systems is safety. **Forty Series** speakers should be installed exclusively by qualified technicians using the accessories described in this manual, following the specific mounting instructions and in full compliance with the safety regulations and standards in force in the country where installation is taking place.
Due to the different health and safety requirements of individual countries, it is impossible to provide universal safety guidelines. It is therefore essential that users check the local provisions and related specific operating guidelines on the subject.

2.2 General precautions for installation

We strongly advise users to apply the basic precautions outlined below to avoid possible accidents to themselves or to others, as well as to prevent damaging the speakers and/or associated flying accessories or third party property.
Please note: The following precautions should not be considered exhaustive.
• When suspending Forty Series speakers use exclusively original accessories certified according to UNI-ISO safety standards.
• For permanent installations, always plan and carry out specific inspections to check that the parts responsible for the long-term safety of the system are in good condition (brackets, hooks and eyebolts).
• Anyone involved in the installation of a flying speaker system on site has a duty to guarantee that it safely installed, correctly adjusted and properly secured.
• The flying accessories described below are manufactured exclusively for use with Forty systems and have not been designed or conceived for use in conjunction with any other speaker or device.
• Every part of the masonry, floor or wall on which a speaker is installed or suspended must be capable of supporting the load in complete safety.
• The flying accessories used must be fixed and secured to both the speaker and the walls, floors or ceilings. When mounting components on walls, floors or ceilings, always make sure that all the rigging and fixing systems are of the appropriate size and load-bearing capacity.

2.3 Additional general warnings

• Always check that the maximum electric current requirement does not exceed the maximum allowable current of powerCON connectors. If you are in any doubt, contact your nearest Peecker Sound service centre.
• Do not use speakers at high or uncomfortable volumes for long periods of time, which cause permanent hearing loss. Should your experience any hearing problems or buzzing in your ears, consult a specialist immediately.

Sound Corporation is not liable for any damage or injury caused by insufficiently strong supports or incorrect installation.

3. ACCESSORIES FOR FLYING SYSTEMS

The Forty series has a comprehensive range of suspension and support accessories for easy and versatile installation.

Figure 1. STD-4008, STD-4010, STD-4012, STD-4015
Horizontal flying brackets for Forty speakers + 10MA flange

Figure 2. PS-GN
Truss or rigging system suspension hook

Figure 3. PS-OCS6
Three-10MA eyebolt kit for vertical suspension of Forty Series speakers (except for 4008 model)

Figure 4. STD-WALL
Wall mounting bracket for vertical support of Forty Series speaker (except for 4030MH model)

4. OTHER ACCESSORIES

Figure 5. PS-ST100
Adjustable-height stand holder
for subwoofer-satellite unit connection

Figure 6. PS-ST125
Adjustable-height tripod

5. METHODS OF INSTALLATION

Forty Series 2- and 3-way satellite units can be installed in the following ways:
1) ***vertical suspension with three anchor points***, with the possibility of linking one additional speaker (except for model 4008);
2) ***vertical suspension using a wall bracket*** (except for model 4030MH);
3) ***horizontal suspension with two anchor points***, with the possibility of linking one additional speaker (except for model 4008);
4) ***installation on a stand***, tripod or connected to the corresponding subwoofer (except for model 4030MH);
5) ***simple stacking*** (subwoofer on the floor and corresponding satellite unit on top of it, see Fig. 7 below).

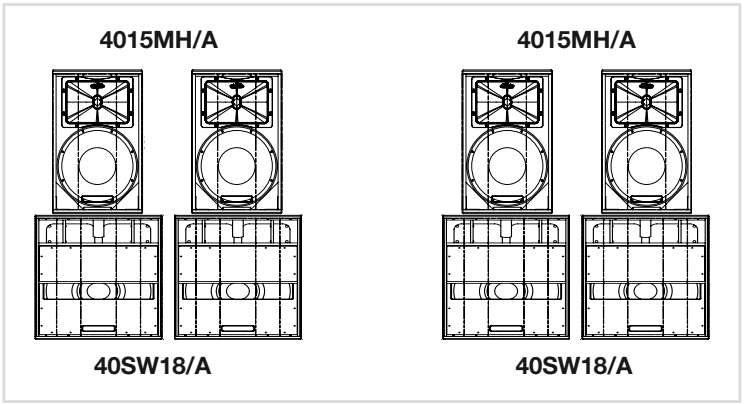

Figure 7. Floor stacked 4015MH/A speakers on top of related subwoofers

5.1 Vertical suspension with eyebolts

Follow the steps below for correct vertical suspension of Forty Series speakers with the appropriate eyebolts:
1. Calculate the tilt angle for the speakers and the number of speakers to hang (a maximum of two in cascade configuration).
2. Position the first speaker to hang so that the top side is facing upwards.
3. Insert the three threaded eyebolts (PS-OC6) into the corresponding grooves on the top side.
4. Insert a steel cable of the appropriate section into the corresponding eyebolt and, once you have fitted the special oval anti-chafing protector to prevent cable wear, tighten the cable using the U-shaped threaded thimbles firmly and permanently. Secure the metal cable around each anchor point with at least three U-shaped thimbles.
5. Once you have calculated the optimal length of the steel cable according to the required vertical coverage angle, secure the other end of the cable to the fixed structure (truss, rigging system, ceiling, etc.) using the threaded U-shaped thimbles as in step 4.

To link a single additional speaker (2-unit cluster):
6. Repeat step 3 on the underside of the suspended speaker.
7. Position the additional speaker on the floor and repeat step 3 to fit the eyebolts into the corresponding grooves.
8. Use the steel cable to join the matching eyebolts or Omega sailing shackles.

Figure 8. Securing the steel cable
to the threaded Omega eyebolt

5.2 Vertical suspension with wall brackets

Follow the steps below to install an individual satellite unit with the STD-WALL bracket:

1. Calculate the vertical tilt angle of the speaker and the position of the four support holes to be drilled into the wall.
2. Insert the screw anchors or self-locking screws into the wall – the choice will depend on the type of wall – and secure the bracket.
3. Adjust the vertical tilt of the bracket by unscrewing the four 6MA nuts down the sides of the pivot of the wall bracket itself.
4. Adjust the horizontal coverage angle by loosening the Allen screw of the bracket located between the rear plate and the vertical pivot.
5. Insert the appropriate slide along the horizontal arm of the bracket; it has an L-shaped lock to prevent speaker rotation.
6. Place the speaker on the STD-WALL bracket using the (37mm diameter) "cup" located on the underside of the unit.

For maximum safety, take the following precautions:

- Check that the surface on which the STD-WALL vertical support bracket is mounted is strong enough to hold the combined weight of the speaker and bracket multiplied by a suitable safety coefficient (5-7).
- Use wall plugs, bolts and washers to fix the bracket firmly to the wall so that the speaker is secured and does not move.
- Before adjusting the tilt angle or direction of the speaker, always loosen the screw.
- Never force the adjustment while the screw is tight.

5.3 Horizontal suspension with iron brackets

Follow the steps below to install an individual satellite unit with the corresponding STD-40XX horizontal bracket:

1. Work out the position of the three support holes (two if installing model 4008) to be drilled in the ceiling.
2. Insert the wall plugs or self-locking screw – the choice will depend on the type of wall – and secure the bracket.
3. Insert the flange in the corresponding groove of the speaker.
4. Adjust the speaker-bracket locking system using the customized flange adapter to obtain the required tilt angle.

For maximum safety, take the following precautions:

- Check that the surface on which the STD-40XX horizontal support bracket is mounted is strong enough to hold the combined weight of the speaker and bracket multiplied by a suitable safety coefficient (5-7).
- Use wall plugs, bolts and washers to fix the bracket firmly to the wall so that the speaker is secured and does not move.
- Before adjusting the tilt angle or direction of the speaker, always loosen the corresponding flange.
- Never force the adjustment while the flange is still locked.

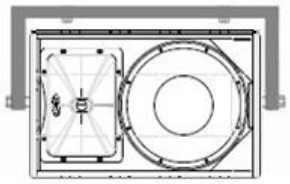

Figure 9. Speaker mount with horizontal bracket

5.4 Installation on support stands

All Forty Series satellite units, excepting the 3-way 4030MH model, are designed for (quick) positioning on floor-stands. The PS-ST125 tripod (adjustable in height thanks to a dual-tilt pole mount, 0° and 10°) allows the units to stand off the floor so that reflection disturbance affects only very high wavelengths not produced by these transducers.

This method has the added advantage of keeping the sources of mid-high notes more aligned with the head height of the audience.
By inserting the stand holder (PS-ST100) in the customized groove, it is possible to mount a Forty series satellite unit on top of a 40SW15 or 40SW18 subwoofer to obtain a "satellite + subwoofer" configuration.

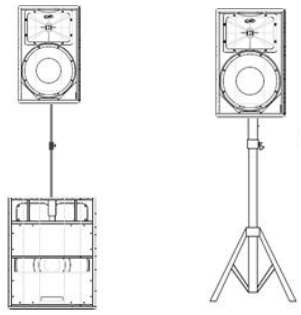

Figure 10. Satellite mount on sub (PS-ST100) and with stand holder (PS-ST125)

5.5 Installation as floor-standing monitors

Thanks to the geometric design of the cabinets, models 4012MH and 4015MH (or their associated active versions) can also be used as floor-standing stage monitors in order to achieve specific directivity. The increased acoustic gain deriving from this can be exploited for directing energy toward the artist to overcome the problem of sound masking generated by the sound level produced by the main sound delivery system.

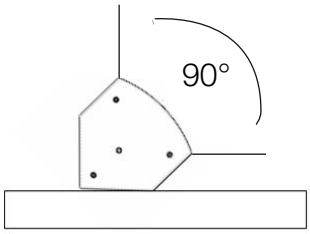

Figure 11. Using 4012MH and 4015MH speakers as stage monitors

6. CARE AND MAINTENANCE

Follow the instructions below to use Forty Series speakers as effectively as possible, to take full advantage of their features and ensure top performance as well as a long working life:

- Never, for any reason, open the products, disassemble internal parts or alter them in any way: none of the internal parts of Forty Series speakers can be serviced by users. If you suspect that the unit is not operating correctly, stop using it immediately and have it checked by qualified staff from the Peecker Sound technical service department.
- Some suspension supports and materials may deteriorate with time, wear and corrosion. As a standard safety measure, we recommend that you check the installation thoroughly at regular intervals.
- Do not operate the speakers if you notice any sound distortion: prolonged use in these conditions may cause overheating and the risk of fire.
- With any sound system, always turn on the amplifiers last to avoid damaging them. For the same reason, always turn them off first.
- When choosing an amplifier to use with your speakers, make sure its output capacity is at least double the speakers' RMS power (refer to the *Technical Specifications*).