THE SATELLITE-IA

OPERATION MANUAL

MILLER & KREISEL SOUND CORPORATION
10391 Jefferson Boulevard, Culver City, CA 90230 USA · 213/204-2854

TABLE OF CONTENTS

DIAGRAMS

BASIC WIRING OF THE S-1

The back plate of the Satellite-1 contains four speaker terminals rather than the usual two. There are two Positive (+) RED terminals and two Negative (–) BLACK terminals on each speaker. The extra set of terminals is provided to give you a great degree of flexibility and choice when setting up your speakers. Section B, Variations of Sound describes the different sound characteristics.

To wire the S-1 to your amplifier, choose 1 RED terminal and 1 BLACK terminal following the guidelines below. Connect the Positive lead from your amplifier (or from the Volkswoofer To Speakers terminal) to the RED (+) terminal and connect the Negative lead to the BLACK (–) terminal.

NEVER CONNECT THE AMPLIFIER LEADS TO BOTH RED TERMINALS OR TO BOTH BLACK TERMINALS AT THE SAME TIME. YOU MAY DAMAGE YOUR AMPLIFIER AND SPEAKERS. THIS DAMAGE WILL NOT BE COVERED UNDER WARRANTY.

All instructions below are for the use of the High Tweeter. This is the normal mode of operation for the S-1. If you wish to use the Low Tweeter position (see Section 6), merely move the Positive (+) lead from the Left RED terminal (labeled HI) to the Right RED terminal (labeled LO). See page 10 for diagram.

GERMAN SOUND

For the German sound, connect the Positive (+) lead from the amplifier or Volkswoofer to the Left RED (HI) terminal. Connect the Negative (–) lead to the Left BLACK (LO) terminal.

ENGLISH SOUND

For the English sound, connect the Positive (+) lead from the amplifier or Volkswoofer to the Left RED (HI) terminal. Connect the Negative (–) lead to the Right BLACK (LO) terminal.

AMERICAN SOUND

For the American sound, connect the Positive (+) lead from the amplifier or Volkswoofer to the Left RED (HI) terminal. Connect the Negative (–) lead to either of the BLACK terminals. Connect the BLACK terminals together using the jumper wire supplied.

USE OF RESISTORS

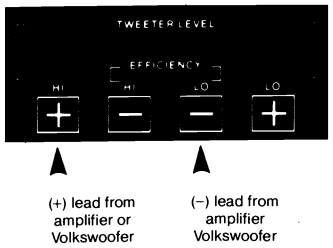
You will find packed with your speakers a kit containing 8 resistors and two jumper wires. Please check to see that you have:

2 jumper wires
2 2 ohm resistors
2 3 ohm resistors
2 6 ohm resistors
2 15 ohm resistors

If any are missing, contact your dealer or M & K.

These resistors provide four very highly useful variations of sound. We strongly recommend that you compare the resultant sound from each of these resistors to find the sound that best matches your room and personal preference. Please see Section 3 for a detailed description of the sound with each resistor.

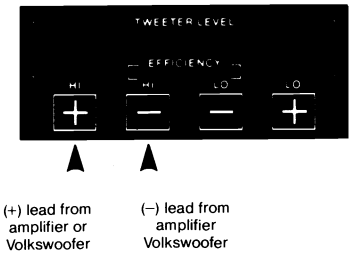
FIGURE 1 BASIC WIRING



(+) lead from amplifier or Volkswoofer

(−) lead from amplifier Volkswoofer

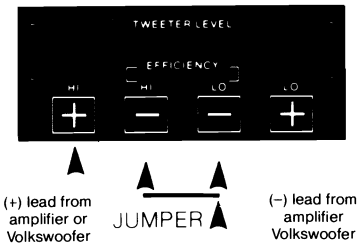
ENGLISH



(+) lead from amplifier or Volkswoofer

(−) lead from amplifier Volkswoofer

GERMAN



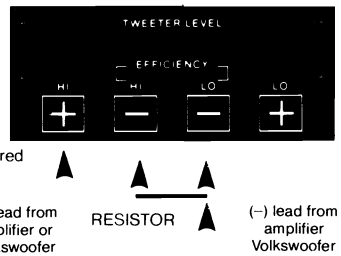
(+) lead from amplifier or Volkswoofer

JUMPER

(−) lead from amplifier Volkswoofer

AMERICAN

FIGURE 2 WIRING RESISTORS



may go to Low Tweeter if desired

(+) lead from amplifier or Volkswoofer

RESISTOR

(−) lead from amplifier Volkswoofer

IN ORDER TO USE A RESISTOR, YOU MUST WIRE THE LEADS FROM YOUR AMPLIFIER OR VOLKSWOOFER TO THE ENGLISH VARIATION (Either High or Low Tweeter may be used). Each resistor has two leads. Insert one into each BLACK terminal on the back of the S-1 according to the diagram below. Take care to see that you do not short out any wires when inserting or removing the resistor leads from the speaker terminals.

When using resistors with high powered amplifiers at high S.P.L., there is a tendency for the resistors to heat up. If you operate the system at a high volume level, the resistors may get hot to the touch. This is a normal condition of high volume operation.

OPERATING THE S-1 FULL RANGE WITH A SUBWOOFER

When using the S-1A with the Volkswoofer and a high quality amplifier or receiver, we recommend operating the S-1A full range, bypassing the Volkswoofer crossover. This will give you an increase in dynamics and clarity, sharper imaging, and a fuller and tighter midbass with more punch. Full range operation will not affect dynamic range with most amplifiers. You may encounter limitations if running over 200 watts per channel to play very deep bass very loud, and you may prefer the sound through the Volkswoofer crossover with some low powered amplifiers and receivers. If you have questions regarding specific components, contact your dealer or M&K.

The simplest method of running the Satellites full range is to run cables directly from your main amp or receiver, bypassing the Volkswoofer crossover. If you wish to use less cable, there are two alternatives. You can connect the ground leads feeding each Satellite to the "From Amplifier" ground terminals of the same channel on the Volkswoofer. The "To Speakers" ground terminals on the Volkswoofer are not used. The other method is to put jumper wires from the "From Amplifier" ground terminals to the "To Speakers" ground terminals on the Volkswoofer. One jumper should be used for each channel.

When comparing the full range operation, take special care to insure that the phase relationships are correct. See Section 5.

VARIATIONS OF SOUND

The S-1 is designed to reproduce sound with high transient accuracy and very wide dynamic range. Because of its high efficiency and high power handling capacity, it will give outstanding results with virtually any high fidelity amplifier or receiver in a wide variety of listening environments.

To let you achieve the ideal tonal balance, seven different variations of sound can be chosen. Each variation shifts the balance between different portions of the audible spectrum. These variations are offered because we have found that one fixed balance will not yield the optimum sound after accounting for the variables of listening rooms, different types of music and recordings, associated components, and individual preference.

The three major variations of sound are called American, German, and English. These titles were chosen because the sound of each of these variations is similar to a recognized family of sound that is generally (but not exclusively) associated with loudspeakers manufactured in these countries. We have captured the best characteristics of these sound families in each variation. If you are not an audiophile who has auditioned a wide variety of speakers, you may not be familiar with the salient characteristics of these families of sound. Therefore, we have included a description of the sound of each variation at the end of this section.

We highly recommend experimenting with the variations to find the best sound in your listening room. You will find that changing the variations will also change the efficiency of the speaker. Certain positions, when fed with the same amplifier power, will sound louder than others. This is no indication of quality of sound; unless you are trying to achieve the maximum volume or S.P.L., or play back material with a very wide dynamic range through a small amplifier, you will probably find this change insignificant. When you are comparing one variation to another, make sure that you turn the amplifier volume down before switching. After you make the switch, turn the volume up to a level that is subjectively as loud. This will avoid any confusion due to the ear's tendency to prefer the louder of two compared sounds.

We have found that most listeners prefer either the German or the English variations. Because many people want to further fine tune the sound of their system, we have provided a kit containing four pairs of resistors. When a resistor is inserted between the black terminals on the back of the Satellite, it provides an additional variation that shares characteristics of the German and English sounds. These resistors give you the maximum flexibility within the range of the two most popular variations so that you can find the precise tonal balance that suits your requirements.

TO USE RESISTORS, YOU MUST WIRE THE S-1 IN THE ENGLISH VARIATION. Place the chosen resistor between the two black terminals according to Section 1, Basic Wiring. We again recommend that you experiment with the resistors, as we have found them to be extremely useful in getting the maximum performance from the system. Remember to compensate for the differences in efficiency as described above.

Try starting with the 6 ohm. This resistor gives a sound that is virtually midway between the German and English sounds. Listen to a familiar record and acquaint yourself with the sound. Next try either the 15 ohm or the 3 ohm resistor. The 3 ohm resistor will give you a more efficient, dynamic sound with slightly more prominent midrange while the 15 ohm resistor will lower the efficiency slightly while giving a fuller sound in the midbass. For even greater efficiency and a tonal balance shift toward the middle frequencies, try the 2 ohm resistor or run the S-1 in the German variation. If you want a still warmer, fuller bass sound, remove the resistor and use the English variation.

Seven additional variations are available through the use of the Low Tweeter in conjunction with each of the above. See Section 6, Use of the Low Tweeter Position.

ENGLISH	Gives a very warm mid-bass sound with subdued midrange brightness and a very wide dynamic range. Akin to the sound of the best British Monitor speakers.
15 OHM RESISTOR	Gives a warm mid-bass sound very similar to the English position with a brighter sound in the upper midrange and slightly greater efficiency.
6 OHM RESISTOR	Gives still greater efficiency with sound virtually intermediate between the English and German characteristics. In comparison to the 15 ohm, it gives additional brightness through the lower and upper midrange while retaining a warm mid-bass.
GERMAN	Gives a bright, forward sound with great efficiency and very wide dynamic range. Particularly useful for low powered amplifiers required to produce high sound power levels. Similar to the sound of the best wide-range German-manufactured speakers.
2 OHM RESISTOR	Gives a sound very similar to the German position with slightly less midrange brightness and efficiency.
3 OHM RESISTOR	Gives a "fuller" sound than the German position. In comparison to the 2 ohm, it gives a warmer mid-bass and less upper midrange brightness.
AMERICAN	Gives the greatest possible efficiency with a very bright midrange and very forward sound. Useful for producing the maximum sound power level with any amplifier.

PLACEMENT OF THE S-1

Proper placement of the S-1 is essential if you want to realize its best performance. There are four basic factors:

A. The S-1 must be at the proper height.

B. The S-1 must be located away from walls and other reflecting surfaces.

C. The S-1 cabinet must be in a vertical position (woofers and tweeters in a vertical array).

D. The S-1s must be separated by the proper distance.

A. PROPER HEIGHT

Because of the proper phase and group delay alignment of the S-1 cabinet and crossover, it is capable of very fast and accurate transient response. In order to hear transients reproduced with maximum fidelity, your ear must be at the same height as the intersection of the upper and lower cabinet sections (between the midranges and tweeters). If your ear is above or below this plane, you will still hear very high quality sound, but upon entering the proper plane, you will hear an unmistakeable "focus" of imaging and transients, much as a fine microscope resolves a sharp image at its point of optimum focus.

Therefore, the speaker should be located so that the intersection of the two cabinet sections is at the same height as your ear when you are in your primary listening position. We highly recommend the M & K Satellite Speaker Stands for this purpose as they are designed to put the S-1 at the correct height and to fulfill other replacement requirements.

In order to get the speaker cabinet in the same plane as your ear, it is acceptable to angle the speaker cabinet if your ear is above or below the speaker. The M & K stands have a provision for accomplishing this tilting of the speaker.

B. LOCATION AWAY FROM ROOM SURFACES

The S-1 should be located away from room walls, the floor, furniture, and other reflecting surfaces. These surfaces will act as baffles, reflecting sound from the speaker to your ear with a slight time delay. This time delay will blur the sound and interfere with transient performance. Avoid using the speaker on a shelf that protrudes directly in front of the speaker. If you must use the speaker on a shelf, place it so that the front edge of the speaker is parallel or slightly in front of the edge of the shelf. In the ideal set-up, the speaker will be several feet away from the nearest surface, but in most listening rooms some compromise cannot be avoided. Follow the above suggestions as completely as you can.

C. VERTICAL LOCATION

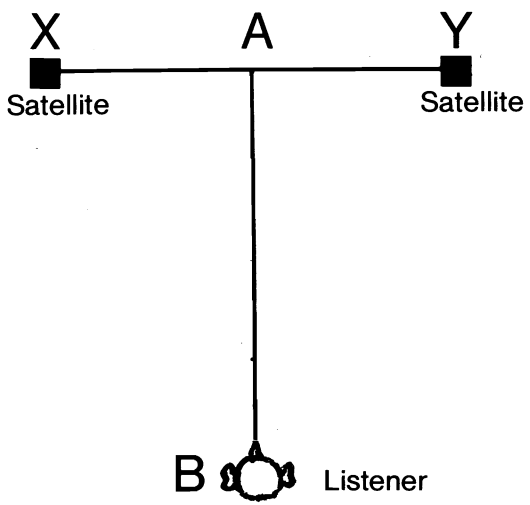
If you turn the Satellite-1 on its side, you will destroy its sharp imaging capability, in addition to severely limiting its horizontal dispersion. The S-1 is designed to be used only in a vertical position.

D. SEPARATION BETWEEN SPEAKERS

In order to get the best right to left imaging with the S-1s, they must be separated by the proper distance. The separation between the speakers should be based on the following formula.

Once you have determined where the S-1s will be located in the room, you can calculate the ideal separation. Imagine a line drawn between the S-1s from the fronts of their cabinets (Line XY). Measure the distance from the center point of this line (Point A) to your main listening position (Point B). The separation between the speakers should be equal to that distance (XY=AB). See the diagram on the next page.

FIGURE 3 SEPARATION OF SPEAKERS



If your room dimensions make this spacing impractical or impossible, follow the formula as closely as you can. You can further fine tune the spacing by playing a record with vocals that are prominently recorded with an image centered directly between the speakers. Move the speakers together or apart in small increments. Listen until you hear the sharpest cohesive image of instruments and voices from right to left. Listen especially to eliminate any sense of a hole in the middle. You also may wish to angle the speakers inwards and point them at your listening position. This may improve the sharpness of the sonic image.

CORRECT PHASE RELATIONSHIPS WITH A SUBWOOFER

Due to variations in room placement, you may find it necessary to reverse the relative electrical phase relationship between the Volkswoofer and your Satellites. In certain cases, the different distances from your ear to the Satellites and the Volkswoofer will cause the signal from the Satellites to arrive out of phase with the signal coming from the Volkswoofer. This will result in cancellation of bass information. In order to determine the proper acoustical phase of your system, it is necessary to reverse the relative phase between the Satellites and the Volkswoofer and compare the sound. The critical distance which determines this effect is the difference in distance from your usual listening position to the Volkswoofer as compared to the Satellites. This distance is important only in range where both speakers are contributing, i.e. about 80 to 120 Hz.

The first step is to listen to some music or test tones containing material in the low to mid-bass region (50 to 150 Hz). Then reverse the positive and negative speaker leads for both channels. This may be done on the backs of your Satellites or at the Volkswoofer "To Speakers" terminals. The positive lead for the left channel should be switched to the negative terminal and the negative lead switched to the positive terminal. The right channel connections should be switched in the same fashion. Again listen to the system, comparing the sound in the mid-bass region. If you hear less bass, your original connections were correct. If you hear more bass, the new connections are correct.

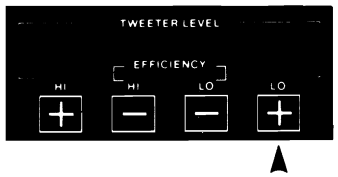
If you wish to realize the smoothest transition between your Satellites and the Volkswoofer, try moving your main speakers closer to and farther away from your listening position in small increments. This will serve to better integrate the output of the separate speakers. This process is similar to focusing a camera lens to get the sharpest image. When the sound seems to "focus" best, with maximum impact in the midbass, you have the best phasing.

USE OF THE LOW TWEETER POSITION

The Low Tweeter position provides a slight rolloff in the range between 10 KHz and 30 KHz. This position is not a tweeter level control. It is, rather, an independent network which provides a controlled and specifically shaped curve to subdue brightness caused by other components in the system without reducing the S-1's ability to reproduce sharp detail. This position is useful, for example, with many phono cartridges (both moving magnet and moving coil) that show a significant rise in their response curves at high frequencies when connected to a preamp.

If you find the sound of your Satellites excessively bright in the very high frequencies (not the upper midrange), using the variation of sound you have chosen, switch the Positive lead to the far right RED terminal (marked LO), according to the diagram below. This position should tame the excess brightness.

FIGURE 4 WIRING OF LOW TWEETER



To use Low Tweeter, the (+) lead from your amplifier or Volkswoofer must be moved from the left RED terminal (HI) to the right RED terminal (LOW).

USING THE SATELLITE-1 AS A FULL RANGE SPEAKER

The S-1 is capable of a very high level of performance as a full range speaker. All but the very deepest bass will be reproduced with the same sharp imaging, transients, and wide dynamic range heard in the complete Satellite-Volkswoofer System. The power handling of the Satellites remains nearly the same when used full range; they may still be used with high powered amplifiers feeding an **unclipped** musical signal.

We strongly recommend using the English, 15 ohm, 6 ohm, or 3 ohm position when using the S-1 full range (or with an M & K Goliath subwoofer). These four positions give the greatest amount of mid and low bass energy relative to the other frequencies. However, if you wish to achieve very high sound power levels, particularly with a low powered amplifier, you may wish to try one of the other positions to gain efficiency.

CLIPPING AND SPEAKER DAMAGE

One facet of speaker performance rarely discussed is speaker damage. Despite the improved performance of today's loudspeakers, there are certain characteristics of the relationship between the speakers, the amplifier, and the person operating the volume control that make blown speakers a fact of audio life.

The Satellite-1 has unusually high power handling, particularly for a satellite speaker. However, like all speakers, it can be damaged by virtually any audio amplifier on the market. While the number of S-1s returned for service is extremely small, we have found that the vast majority of the S-1s returned as defective failed not because of manufacturing defects, but rather because they have been overdriven, usually by an amplifier driven into clipping distortion. This sort of damage is considered abuse and is not necessarily covered under warranty.

Most returned speakers have blown tweeters. Tweeters are by their nature more prone to damage than midranges and woofers because of the quantity and the thickness of the wire used in their voice coils. When a speaker is overdriven, the resultant high heat generated in the voice coil is more easily dissipated in the heavier voice coil of a midrange or woofer.

Normally this poses no additional risk to tweeters because the energy distribution in music is such that the tweeter is fed significantly less power than the other drivers (typically, only 20 to 25 percent of that fed to the woofer). However, it is possible to alter this balance in such a way as to risk damage to the tweeters. If you boost your tone controls or use the loudness contour switch, you significantly increase the power being fed to the speaker. A small increase in volume level (3 dB) requires a doubling of power. Boosting of tone controls not only pushes the speaker drivers harder but quickly drains the amplifier's available power and advances the onset of amplifier clipping.

Clipping takes place when the playback levels are set so that the demands of the music are greater than the power output capability of the amplifier. When this occurs, the amplifier "clips" off the tops of the signal waveforms. A sine wave fed to the input of a clipping amplifier will resemble a square wave at the amplifier's output. As this takes place, the amplifier adds high frequency distortion signals that are not part of the input. These signals, called odd-order harmonics, are multiples of the original signal. For example, a 1000 Hz signal fed to a clipping amplifier will result in output at 3000, 5000, 7000, and at intervals of every 2000 Hz to well beyond the audible spectrum. Some of these distortion products are nearly as high in level as the original signal. This distortion puts an enormous strain on tweeters, particularly when it occurs above 20 KHz, where the power handling of many tweeters drops off sharply.

This extra strain posed by clipping shows how a small amplifier is more likely to damage a speaker than a large amplifier. Because the small amp clips at a low volume level, its tendency is to clip more often and harder. Small amplifiers are often less stable than larger, more expensive amps, and may produce even more distortion products when driven to clipping. If you are using a relatively small amp, it is important that you carefully listen for the onset of clipping when you are listening at high volume levels. You should listen for a "breaking up" of the sound, particularly in the bass. The sound will take on a harsh, grating quality that is uncomfortable to listen to.

Using common sense is the easiest way to avoid speaker damage through clipping. Boost your tone controls judiciously. Avoid extreme boosts of the treble and bass controls, especially at high volume levels. Switch the loudness contour control out when listening at high volumes. If you are listening to music at loud levels, listen carefully for the distortion described above. At the first sign of distortion, turn the volume down slightly. Following these simple rules should assure you of a long trouble-free life for your Satellites.

FUSING THE S-1

If you wish to add a measure of protection for your S-1s, you can add fuses. In many cases of stress to the loudspeaker, fuses will blow before any damage to the speaker takes place.

The most convenient method for fusing the S-1 is to put the fuse at the input to the speaker. Wire the fuse into the positive lead to the speaker from the Volkswoofer or amplifier. It is acceptable to put the fuse right at the back of the Satellite where the cable makes its connection. We recommend using a fuse between 1 and 2 amps for fusing the speaker.

Please remember that a fuse is not a perfect safety device. It is still possible to damage loudspeakers when using fuses so it is important to follow the common sense rules described in Section 8, Clipping and Speaker Damage. Fuses will provide an extra safety margin, though, and are particularly useful if you are using a large power amplifier and/or operating the system at very high volume levels.