Mic Memo

Crown's Quarterly Microphone Newsletter Summer 2002 Bruce Bartlett, Editor

Mid-Side Miking with CM-700s

The Mid-Side stereo mic array is a popular stereo miking method. It provides sharp imaging, and also lets you adjust the stereo spread or stage width at your mixer. A Mid-Side array is made of a forward-aiming Mid microphone (of any polar pattern) and a bidirectional Side microphone aiming to the sides. By summing and differencing the Mid and Side signals, you create a virtual left and right pair of microphones. You can vary their stereo spread by adjusting the Mid-to-Side ratio at your mixer.

If you mount three CM-700 cardioid microphones in the following fashion, you can simulate a Mid-Side stereo microphone: Mount a CM-700 facing forward toward the sound source. We'll call this the Mid microphone. Mount two CM-700s directly under the Mid microphone, pointing 180 degrees away from each other (perpendicular to the forward mic). If you mix those two side-facing mics in opposite polarity, you create a bidirectional mic aiming to the sides.

Then, using your mixer or digital editing software, you can set up the mic signals to simulate a mid-side stereo mic. You can vary the stereo spread by adjusting the mid-to-side ratio, either with your mixer or in the digital editing software.

Before giving the details of this procedure, let's explain how Mid-Side works.

In the equations below,
M = Mid mic signal,
L = Left-aiming mic signal, and
R = Right-aiming mic signal.
S = Side mic signal, which is the derived side-aiming bidirectional mic signal. S = L–R.

Virtual left mic signal = M + S = M +L -R, where -R is the right mic signal with inverted polarity.

Virtual right-mic signal = M - S = M +R -L, where -L is the left mic signal with inverted polarity.

Based on those equations, here is a procedure to simulate a Mid-Side array using three CM-700 cardioid mics:

Figure 1. Top view of two opposed CM-700 mics.

1. Mount the two side-facing CM-700 cardioid mics one above the other, aiming left and right (180 degrees apart), with grilles touching. Their diaphragms should be aligned vertically (Figure 1). We'll call this array the Side microphone. Ideally the two mics are matched, as in the Crown CM-700MP matched pair.

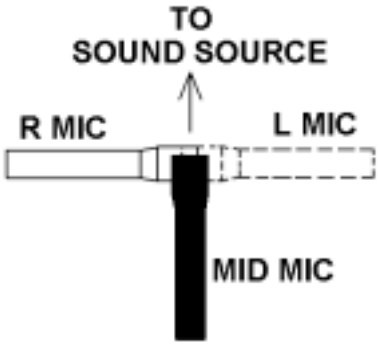

Figure 2. Top view of three-mic array.

2. Mount another CM-700 aiming forward toward the sound source. We'll call this the Mid microphone. Put the front-aiming CM-700 directly above the two side-aiming mics, so that all three diaphragms are aligned vertically (Figure 2). If the mics will be raised high on a mic stand (as for recording an orchestra), angle the Mid mic down slightly so that it will aim at the musical ensemble when raised.

3. Plug a mic cable into each microphone, and run the three mic cables to your mixer.

At this point, you can set up the Mid-Side signals either with your mixer, or with a Digital Audio Workstation (DAW).

(Continued on page 2)

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To set up a Mid-Side array with your mixer, do the following (Figure 3):

1. Plug the Mid, left and right mic signals into inputs 1, 2 and 3 respectively. Invert the polarity of the right-mic signal, either by a polarity-reversing adapter or by a polarity switch in your mixer.

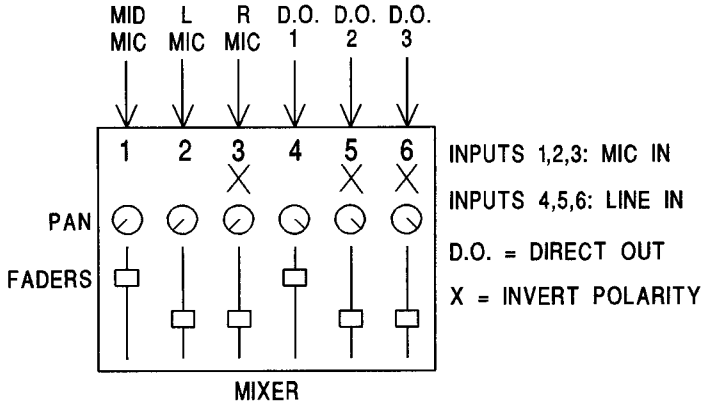


Figure 3. Mixer setup for Mid-Side technique

2. Pan the mid, left and right mic signals hard left. That creates a M+R-L (virtual left) signal coming out of your mixer's left output bus.

3. Connect patch cords to direct outputs of the Mid, left and right channels.

4. Plug the Mid patch cord into line input 4, left patch cord into 5, right patch cord into 6. Invert the polarity of channels 5 and 6. Note that the channel-6 signal has been inverted twice: once at input 3, and again at input 6, so that channel 6 is actually in-polarity.

5. Pan channels 4, 5 and 6 hard right. That creates a M-L+R (virtual right) signal coming out of your mixer's right output bus.

6. The left and right outputs of the mixer are the derived or virtual stereo signals. Match the signal levels of Mid inputs 1 and 4.

7. Monitor the stereo mix of all the inputs. To adjust the stereo spread, move the Side faders (channels 2, 3, 5, 6) up or down as a group.

To set up a Mid-Side array with a DAW, do the following:
1. Plug the Mid, left and right mic signals into mixer inputs 1, 2 and 3 respectively (or into mic preamps).

2. Record their amplified signals to tracks 1, 2 and 3 in your DAW.

3. Copy track 1 (Mid) to track 4. Copy track 2 (Left) to track 5. Copy track 3 (Right) to track 6. Make sure that all tracks are aligned in time.

4. Pan tracks 1, 2 and 3 hard left. Invert the polarity of track 3.

5. Pan tracks 4, 5 and 6 hard right. Invert the polarity of track 5.

6. The left and right outputs of the DAW mixer are the derived or virtual stereo signals.

7. Monitor the stereo mix of all the tracks. Tracks 1 and 4 faders control the Mid signal level; tracks 2, 3, 5 and 6 faders control the Side signal level. To adjust the stereo spread, move the Side faders (tracks 2, 3, 5, 6) up or down as a group.

If you wish, EQ all mics according to the inverse of their frequency response. In other words, boost 50 Hz 3 to 5 dB, and cut 6 kHz about 2 dB, in all channels.

Thanks to recordist Jim Gorin for suggesting this idea.

Phantom-Powering an LED

In an email to the *Syn Aud Con* mail list on April 2, 2002, Doug Dodge of Dodge Electronics asked the following question:

"Is it possible to drive an LED off of phantom voltage? We have a push-to-talk circuit for a condenser mic we use. Up till now we have been using a separate power supply."

(Continued on page 3)

(Continued from page 2)

“The power supply drives the LED to show ON. It would be nice to eliminate this extra part if possible."

Our answer: You can power an LED off phantom voltage. The LED should be an ultrabright type drawing 2 mA or less. Typically a 1000 ohm resistor goes in series with the LED lead if it is driven off B+ in the microphone. Alternatively, the voltage to drive the LED can be taken from the center tap of two equal resistors in series across XLR pins 2 and 3. Those resistor values should be as high as possible to avoid loading down the microphone. Start with two 4.7K resistors, check LED brightness, reduce the resistor value if needed, and re-check.

Miking a Piano with the GLM-100

In a letter to the Feb. 6 2002 *Syn Aud Con* mail list, audio engineer/producer Johanthan Digby wrote the following about miking pianos:

"I've had excellent results using a little Crown GLM-100 omni condenser mic. It's very small, and if you mount it face down, which gives it a small gap of 0.5mm, it has PZM properties. If you mount it at the meeting of two or -- even better -- three boundaries (i.e. tight into the inside top corner of an upright) you get a great accurate tone with good signal/noise ratio."

Drum Miking Technique

Recording engineer Mark Darnell wrote to us saying,

"What a great sounding mix I got on a drum set with Crown mics!”

Top: Side view of drum set. Bottom: Front view of drum set, showing SASS-PMKII overhead.

Mark supplied the photos above, which show how he miked the kit. In all he used nine Crown microphones to create the drum sound on his last recording project.

Mark continues:

“I used these microphones:

CM-700's on all five toms
CM-310A on snare (modified with extra low-end rolled out)
SASS-PMK2 overhead for ride & crash cymbals
CM-700 on hi-hat
CM-700 with 2-stage windscreen on kick."

"I did the kick drum EQ (80Hz boost, 400Hz cut, 4.5 kHz boost) added compression & gate. Sounds phat!!!!! No overload."

GLM-100 vs GLM-200 for Acoustic Guitar

Musician Ken Laberteaux writes:

"I have a professional music friend who has a fair amount of experience using GLM mics. He insists that for in-guitar use, the GLM-100 is far superior to the GLM-200. I note that Fishman uses the GLM-200, not the GLM-100 when it seems clear they could have had their pick."

"Do you have any insight as to why Fishman picked the 200 over the 100?"

Our reply: Fishman used the GLM-200 mic capsule without any bass-boosting electronics.

(Continued on page 4)

(Continued from page 3)

The mic capsule has a bass rolloff, so when the mic is mounted in a guitar sound hole (which has a bassy resonance), the combination sounds natural. The GLM-100 is flat down to nearly 20 Hz, so it sounds bassy when mounted in a sound hole.

Also, the hypercardioid GLM-200 has better gain before feedback than the omni GLM-100, although the GLM-100 is not bad in this regard when placed in the sound hole or taped to the inside of the guitar against the side facing the performer.

Ken continues:

"Advantages in my mind of the GLM-200 (mere speculation, as I've never tried the 100):

- Less prone to feedback if pointed away from the sound hole (Fishman recommends pointing towards the back of the guitar).

- More adjustment in coloration by turning the mic."

Crown: Yes on both. The GLM-200 (with bass boost disabled in its electronics) in the sound hole less boomy than the GLM-100 in the sound hole. However, you could try the GLM-100 in the sound hole and roll off the excess bass with your mixer's EQ. The GLM-100 has a flatter response overall, especially in the high frequencies, so it should sound a little smoother than the GLM-200.

Ken: "If I wanted to add volume control to my set-up, perhaps with a footpedal, how is this done with a balanced signal? Simply using a stereo pot and getting the same amount of series resistance? Any suggested ranges for resistance value ranges of the pot?"

Crown: The schematic below shows a mic volume control which goes between the phantom supply and mixer mic input.

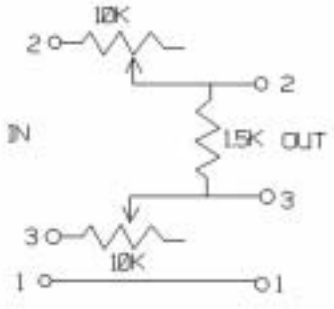


Figure 4. A mic volume control.

Ken: "Is there a point where this resistance begins to change the sound of the mic?"

Crown: No. But watch out for pot wiper noise in a mic-level signal. A series resistance of about 15K would provide up to 20 dB attenuation or so. The 1.5K resistor could be provided by your mixer input impedance so that you might not need to actually put one in the volume control. Try it with and without the 1.5K resistor. Values aren't too critical.

Ken: "Can you recommend a location for a pot for the GLM-200 electronics to allow variable bass boost?"

Crown: Try the circuit below. Caution: Making this modification will void your warranty.

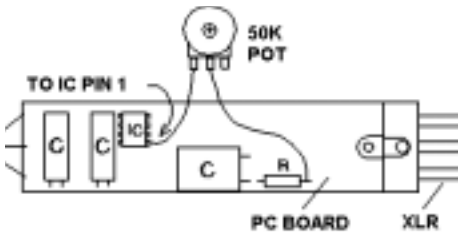


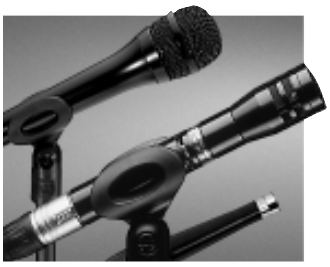
Figure 5. A bass-boost control for the GLM-200 electronics.

Who's Using Crown?

Crown microphones continue to be a popular choice of many top musical acts. The following artists are using Crown mics on tour this summer:

Britney Spears – CM-311A
'N Sync – CM-311A
Ozz Fest – CM-310A, CM-700, SASS-PMKII
Cinderella – CM-311A
Charlie Daniels Band – CM-311A
Janet Jackson – CM-311A
Firehouse – CM-311A
Kathryn Williams – GLM, CM-700, CM-150, CM-200A
Night Ranger – CM-311A
Cary Pierce – CM-311A, CM-700
Elliot Murphy – CM-200A, CM-700

Microphones Available From Crown



CM Series

CM-700 Cardioid condenser, 30 Hz - 20 kHz, for high-quality recording or P.A. **CM-700MP** is matched pair.

CM-200A Handheld cardioid condenser mic for stage vocals/instruments. Warm, smooth, and articulate sound. Very low handling noise and pop. Low-Z balanced.

CM-310A DIFFEROID® Handheld differential condenser mic for stage vocals. Cardioid. Warm, smooth sound. Extremely high gain-before-feedback. Low-Z balanced.

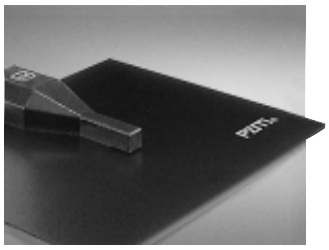
CM-311A DIFFEROID Headworn differential condenser mic for stage vocals and sportscasters. Extremely high gain-before-feedback. Battery belt pack. **CM-311AE** connects directly to 9V wireless microphone transmitter. **CM-311AHS** mounts on Sony MDR-7506 headphones.

CM-312A Headworn hypercardioid mic for stage vocals and sportscasters. Small and light. Good gain-before-feedback. Battery belt pack drives mixer or transmitter. **CM-312AE** connects directly to wireless microphone transmitter. **CM-312AHS** mounts on Sony MDR-7506 headphones.

CM-30 Miniature supercardioid condenser mic for inconspicuous overhead miking of choirs, orchestra sections, theater stages, conference tables, audience reaction. Electronics mount in electrical box.

CM-31 Same as CM-30 but with cylindrical electronics interface and XLR connector.

CM-150 1/2" omni condenser for free-field sound measurements, sound-level meter, and pro recording applications. **CM-150MP** is matched pair.



PZM Series

PZM®-30D Studio PZM with switchable dual frequency response (flat or rising). 5" x 6" boundary plate. XLR connector.

PZM-6D Low-profile PZM for conference or plexiglass panel. Switchable dual frequency response (flat or rising). 2" x 3" boundary plate. XLR connector on 15 foot cable.

PZM-20R Flush-mount PZM fits into a square cutout or 4" x 4" electrical-outlet box for permanent installations. Use one mic for up to eight people. Screw-terminal output.

PZM-185 Tabletop, handheld or adapter-mounted microphone. Built-in power-supply interface, phantom power or internal battery. Fiber-reinforced, high-impact plastic body and boundary. 7" long. XLR connector.

PZM-10 Security and surveillance mic. Inconspicuous. Mounts in drilled hole, XLR output. **PZM-10LL** is line level, 12-24V DC powered.

PZM-11 Security and surveillance microphone. Inconspicuous. Mounts in electrical box. Screw-terminal output. **PZM-11LL** is line level, powered by 24V AC, DC, or phantom.

PZM-11LLWR is water-resistant, line level, powered by 24V AC or 12-24V DC. Mounts in electrical box.

SASS Series

SASS®-P MKII PZM stereo microphone. Wide, smooth frequency response. Sharp and spacious imaging. Mono-compatible. No matrix box required. Battery/phantom powering. Low-cut switches. 20 Hz - 18 kHz. All accessories included.

SASS®-P MKII HC Same but without carrying case or accessories, lower cost.

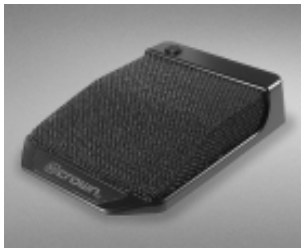
LM Series

LM-201 Supercardioid lectern microphone with swivel mount for noise-free adjustment. Pop filter and shock mount. Low-Z balanced. Powered by phantom or 12-24V DC adapter.

LM-300A Economical and elegant dual gooseneck mic that retains its shape. Supercardioid condenser element. XLR output, low-cut switch. Optional metal-screen grille and LM-300SM Shock Mount.

LM-300AL Same as LM-300A but 5" longer.

LM-301A Same as LM-300A but screws onto a flange. Allows cable to exit downward or out the side.



PCC Series

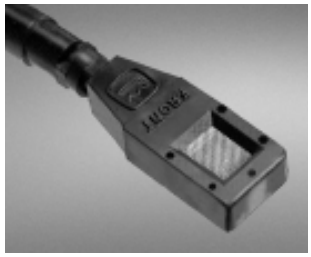
PCC®-160 Supercardioid surface-mounted microphone for stage floors, lecterns, and news desks. Increases gain-before-feedback and rejects sounds to the rear. XLR connector on 15-foot cable. Black or white.

PCC-170 Same as PCC-160 but attractively styled for conference-table use. Mini XLR connector on rear or stereo phone plug on bottom. **PCC-170SW** has on/off membrane switch.

PCC-130 Same as PCC-170 but with cardioid element and smaller. **PCC-130SW** has on/off membrane switch.

MB Series

Five styles of surface-mounted, supercardioid mini mics. Some use MB-100 or MB-200 interface with programmable switching and sensing. Inconspicuous, affordable multi-miking for conference tables, security, distance learning, boardrooms, and courtrooms.



GLM Series

GLM-100 Miniature omnidirectional condenser microphone. High SPL capability. Reduced pickup of handling noise and wind noise. XLR connector on 8' cable. 20Hz - 20kHz. Model **GM-100E** comes without connector for connection to wireless microphone transmitter.

GLM-200 Miniature hypercardioid condenser microphone. Increases gain-before-feedback, reduces pickup of leakage, background noise and room acoustics. XLR connector on 8' cable.

Microphone Warranty

Crown's professional microphones are guaranteed unconditionally against malfunction from any cause for a period of three years (one year for Sound Grabber) from date of original purchase. Should one of our microphones malfunction, it will be replaced or repaired at our expense, including all U.S. round-trip shipping. This warranty does not cover finish, appearance items, cable or cable connectors. This warranty does not cover normal wear and tear, malfunction due to abuse or operation at other than specified conditions. See your Crown dealer or representative for complete warranty details or contact Crown direct at 1-800-342-6939.

Information Exchange

Your ideas on how to use Crown microphones are important to us, and to the readers of Mic Memo. Could you let us know what you are doing with your microphones? Please use this link to send your ideas via email.

INFO EXCHANGE