Product Review
The KAB Preamp

Reviewed by Gary Galo

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K-A-B Souvenir EQS MK12 Disc Remastering Preamplifier. K-A-B Electro-Acoustics, PO Box 2922, Plainfield, NJ 07062. 908-754-1479, FAX 908-222-3442, info@kabusa.com, www.kabusa.com. EQS MK12—$945. Warranty: One year.

K-A-B are the initials of Kevin A. Barrett, proprietor of K-A-B Electro-Acoustics, a small audio company based in New Jersey specializing in analog disc playback. K-A-B carries a full line of products for playing disc records of practically every type, including turntables, custom stylii, signal-processing devices, preamplifiers, and a wide variety of accessories. Their website is a "must visit" for anyone who collects 78s and other types of historical recordings. The EQS MK12, K-A-B's top-of-the-line stereo phono preamplifier, has been designed to provide user-selectable playback equalization for records pre-dating the RIAA standard, including 78-rpm discs, early LPs, and program transcriptions (*Photos 1* and *2*).

PHOTO 1: The K-A-B EQS MK12. Twelve equalization curves accommodate records from early acoustics through RIAA stereophonic discs. Adjustable cartridge loading, lateral-vertical switching, and a processor loop add to the unit's flexibility.

PHOTO 2: Rear panel of the EQS MK12. The ¼″ jacks on the left are fully-balanced, tip-ring-sleeve outputs. RCA connectors are gold-plated and Teflon®-insulated. The jacks marked "Return 1" are actually the line inputs, which are placed ahead of the equalization circuits.

FEATURES

The EQS MK12 has two phono inputs, selectable at the front panel. Many collectors will have separate turntables dedicated to 78-rpm records and LPs—the EQS MK12 allows both to be connected. You can adjust cartridge loading at the front panel with trimmer capacitors that are continuously variable between 20pF and 200pF. A 12-position rotary switch selects the resistive loading, adjustable between 100Ω and 100k.

Twelve equalization curves are supplied to accommodate the myriad recording curves used throughout the history of the disc record. K-A-B calls this a "Chronologic Equalizer" since the push buttons are arranged as a record equalization timeline, advancing through the history of equalization curves from left to right. The transition points for the curves are shown in *Table 1*.

Barrett has based his selection of the various turnover points on practical experience, as well as data supplied in the *Radiotron Designer's Handbook* (CD-ROM and printed versions are available from Old Colony; Chapter 17 is required reading for those interested in these matters). Stanley Lipshitz's landmark Audio Engineering Society paper was used to calculate the filter designs (another required reading).[1] A discussion of the nature of disc recording equalization is beyond the scope of this review. For an overview, I suggest my paper "Disc Recording Equalization Demystified," reprinted in *The LP is Back!*.[2]

In *Table 1*, f_3, f_4, and f_5 refer to the three transition points, as labeled by Lipshitz. The low-bass turnover is f_3, the bass turnover is f_4, and the treble transition frequency is f_5. The AC curve is for acoustic records, and AE is for very early electrical discs (such as Victor electrics from 1925 that still bear the wing-style acoustic labels). Curves E3, E5, and E7 are for the bulk of electrically-recorded 78-rpm discs made from the mid-1920s through the late 1940s.

For these three curves, K-A-B uses their unique "Fine Slope" high-frequency attenuation, rolling off at 3dB-per-octave above a corner frequency of 2120Hz, and shelving at –10dB. Some collectors and transfer engineers prefer to think in terms of the attenuation at 10kHz, rather than the actual treble transition frequency. *Table 2* is a conversion chart which should prove helpful.

A special CO curve complements the late Columbia 78-rpm record. The NAB curve (for National Association of Broadcasters) is the standard for 16″ lacquer transcription discs (often incorrectly called "acetates") used in the broadcast industry. Four 33 1/3-rpm curves cover the original Columbia LP, AES (Audio Engineering Society), the early Decca/London FFRR ("Full Frequency Range Recording"), and RIAA (the Recording Industry Association of America).[3]

The twelfth and last curve on the EQS MK12 is *flat*, which means that it's not really a curve at all. The flat position is useful for a couple of reasons. Acousti-

cal recordings approximate a constant-velocity characteristic throughout their limited frequency range. A constant-velocity recording will yield a flat frequency response when played with a magnetic cartridge (for further details, see my previously mentioned paper).

Therefore, those inclined toward a strictly scientific approach to playback equalization often prefer a flat (i.e., non-equalized) playback. Many collectors, myself included, prefer adding a bit of upper-bass/lower-midrange warmth to acoustic records. If the *flat* position is used, the warmth can be added with an equalizer, preferably a parametric.

EQUALIZATION

Transfer engineers who use digital processing (such as CEDAR) for removing noise on 78-rpm recordings sometimes find that a flat initial playback allows the digital noise removal to work better, before the recording curve is applied. The *flat* position can be extremely useful here. The disc is played without equalization, then fed to the digital processor.

The EQS MK12 also has a line input, just ahead of the equalization circuitry, which allows you to apply the recording curve at line level, after the digital processing has been done. Some engineers will tell you that you can apply the playback curve in the digital domain, and

TABLE 1
MANUFACTURER'S SPECIFICATIONS

Input Section:
Input capacitance: 20–200pF continuously variable
Input resistance: 100Ω–100k in 12 steps
Input sensitivity: 11mV @ 1kHz, RIAA, for 1V output
Input overload: 66mV @ 1kHz, RIAA, for 5.9V output
Fixed front-end gain: 40dB @ 1kHz, RIAA, gain set to "0"

Chronologic Equalizer:

Curve	f_3	f_4	f_5	LF Gain Stop
AC	50	500	5000	Yes (+10dB)†
AE	20	200	2120	No
E3	30	300	2120*	No
E5	50	500	2120*	No
E7	70	700	2120*	No
CO	30	300	1590	No
NAB	40	400	1590	Yes (+17dB)†
LP	50	500	1590	Yes (+13.5dB)†
AES	40	400	2500	No
FFRR	30	300	2120	Yes (+17.5dB)†
RIAA	50	500	2122	No
FLAT	0	0	0	No (Gain fixed)

*K-A-B "fine slope" high-frequency rolloff, 3dB/octave shelving at –10dB.
†Low-frequency gain stops limit the total bass boost to the figure stated; ref. 0dB @ 1kHz.

Rumble Filter:
Corner frequency: 30Hz
Attenuation: 24dB/octave

Output Stage:
Active balanced tip-ring-sleeve: 12V RMS maximum
RCA single-ended: 6V RMS maximum

Distortion and Noise (Ref. 1V out):
THD: <0.05%
IMD: <0.05%
S/N: >–75dB

Physical Specifications:
Dimensions (W × H × D): 19″ × 1.75″ × 8.25″
Weight: 5 lbs
Shipping weight: 8 lbs

TABLE 2
TREBLE ROLL-OFF CHART

10kHz Attenuation	Transition Frequency (and Time Constant)
–5dB	6800Hz (23.41µs)
–8.5dB	4056Hz (39.24µs)
–10dB	3333Hz (47.75µs)
–10.5	3128Hz (50.88µs)
–12dB (AES)	2595Hz (61.33µs)
–13.73dB (RIAA)	2122Hz (75µs)
–14dB	2036Hz (78.17µs)
–15dB	1807Hz (88.08µs)
–16dB (NAB and Columbia LP)	1591.55Hz (100.0µs)
–20dB	1005Hz (158.36µs)

*The formula for converting –dB at 10kHz to the –3dB frequency was generously provided by *aX* regular contributor G.R. Koonce.

the equalization capabilities of many computer-based digital processors and editors will allow you to do this.

There's a flaw in this approach, however. Among the virtues of digital equalization is the lack of nasty phase shifts inherent in analog filters. In the case of playback curves, the lack of frequency-dependent phase shifts presents a problem.

Most readers know that the playback curves provide proper frequency equalization for the record. What is generally ignored—probably because it happens automatically—is the fact that the playback curves also provide correct phase equalization. The filters used to produce the recording curves in the first place caused phase shifts.

When complementary analog playback equalization takes place, the phase response of the record is also corrected. Ideally, a properly equalized record will have flat frequency and phase response (the fact that we can get a credible square wave off an LP test record is proof that we can come pretty close when everything is working properly). To achieve this, old-fashioned analog playback equalization is the only way to go; digital filtering won't accomplish this task. It should certainly be possible to design digital filters to mimic both the phase and frequency characteristics of analog filters, but no one has yet done this commercially for playback equalization of disc records, as far as I know.

The line input on the EQS MK12 is applied directly to the passive equalization circuits, bypassing the first gain block. The equalization circuits apply a low impedance load—around 2000Ω—to the source, which should not be a problem for most professional gear with very low-Z outputs. If it is a problem, K-A-B offers a version of the preamp with a high-impedance line input board—this model is the EQS MK12L, which sells for $1045.

After the Chronologic Equalizer comes the processor section, which has a fourth-order (24dB/octave) rumble filter with a –3dB point of 30Hz, plus a processor loop for connection of an equalizer or other signal-processing device. The stereo/mono switch is used in conjunction with the lateral/vertical switch and the mono mix controls. Most monaural recordings are laterally cut. Vertically-cut recordings include all cylinders, Edison Diamond Discs, most Pathé discs, and some others.

When a stereo cartridge is used to play a laterally-cut monaural record, the left and right channels are summed to mono "in phase." The vertical component of a monaural recording, which is almost entirely noise, is cancelled. When the same cartridge is used to play a vertically-cut recording, the polarity of one channel must be reversed before the two channels are summed to mono. In this case, it is the lateral component (again, mostly

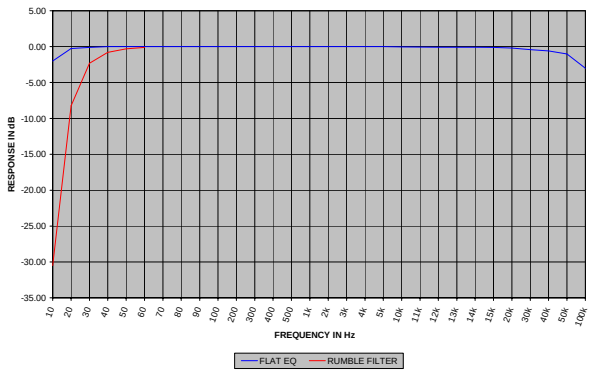

FIGURE 1: Frequency response of the *flat* position, and the rumble filter. The –3dB points of the wideband circuitry extend from below 10Hz to 100kHz.

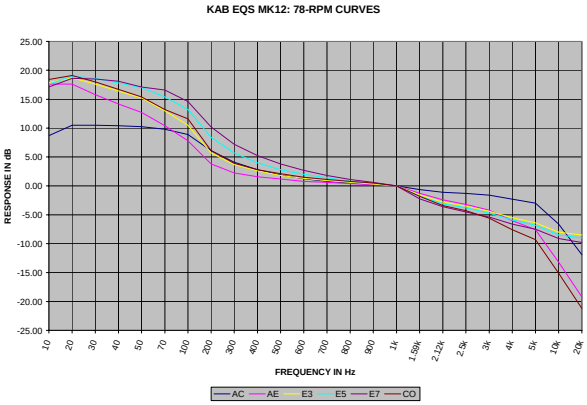

FIGURE 3: Measured response of the six 78-rpm curves. The curves have been intelligently chosen, and will provide musically satisfying listening for most pre-LP recordings.

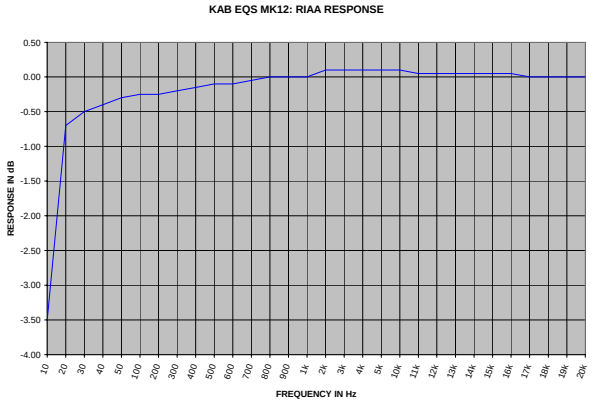

FIGURE 2: RIAA accuracy. The infrasonic rolloff pulls the bass region down slightly, but the response is within ±0.1dB from 500Hz to 20kHz, and ±0.25dB down to 40Hz.

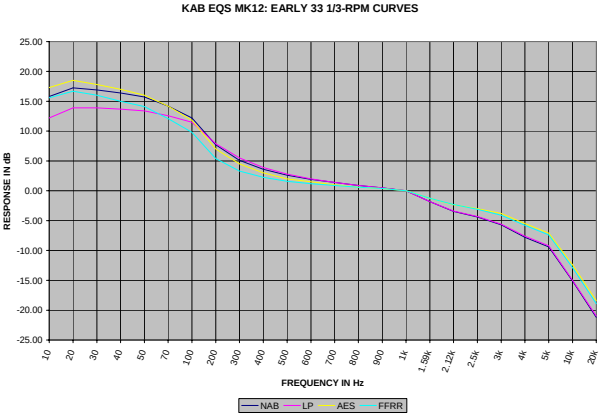

FIGURE 4: Measured response of the four early 33 1/3-rpm curves. These curves accommodate 16″ transcriptions, original Columbia LPs, records made with the AES curve, and early Decca/London FFRR discs.

noise) that is cancelled.

The mono mix control is like a balance control, and determines the amounts of left and right information that are summed. Under ideal circumstances, the left and right signals will be identical in level and phase. Old records are far from perfect, and many do not have identical characteristics in the two groove walls, even though they were recorded with a monaural cutter.

The best way to adjust the mono mix control is to put the lateral/vertical switch in the position just the opposite of the way the record was cut. Put in the vertical position for a lateral recording, and adjust the mono mix control for a null in the signal. A "perfect" record will yield complete cancellation, and only noise will remain. Then put the switch back in the lateral position for playback.

Most laterally-cut records have some vertical component, and vice-versa, so complete cancellation won't always occur—you simply adjust for the lowest signal level. Often old records have different levels of wear on the two groove walls. The mono mix control allows you to select either groove wall, or any mix of the two.

The EQS MK12 also has a 12-position gain control, allowing the preamp to be interfaced with a variety of consumer and professional equipment. K-A-B points out that this switch should not be used as a volume control. The EQS MK12 is intended to be used with a preamplifier, integrated amplifier, or other control center. Both unbalanced RCA and electronically-balanced ¼" phone (tip-ring-sleeve) outputs are provided. The RCA jacks are high-end gold-plated, Teflon™-insulated types.

DESIGN PARTICULARS

Although schematics were not supplied with my review sample, a look inside revealed the general nature of the circuit topology (*Photo 3*). Each channel of the phono preamplifier uses switchable, passive equalization networks, situated between two gain modules, which are discrete and consist of five transistors each. One percent-metal-film resistors, plus Wima and Panasonic polypropylene capacitors, are used in the filter networks, and throughout the preamp.

The stereo fourth-order rumble filter is built around a National Semiconductor LF347BN quad J-FET op-amp. The line stage uses a pair of National LM837N low-noise, high-output-current, bipolar quad op amps—one of these is used for polarity inversion for the lateral/vertical switching, and the other is configured as a differential-output buffer amplifier. The output gain switch is not an attenuator—the ten-position switch is configured to change the gain of one of the line stage op-amp sections, by switching parallel feedback resistors. K-A-B also switches parallel capacitance, in order to maintain the same bandwidth at the different gain settings.

In a rather radical departure from today's norm in solid-state audio design, K-A-B has employed a single-ended power-supply topology. The supplied "wall-wart"-type power transformer is rated at 24V DC at 400mA, but even under the load of the preamp the transformer output actually measures 28V DC. Inside the preamp, this raw DC supply is fed to an L/C choke-input filter, and the filter output feeds an

LM317 pre-regulator with the output voltage set at +22V. The line stage and rumble filter op amps have their own regulators, a pair of 7818 three-terminal types. Each of the discrete gain modules in the phono preamplifier—four total for the two channels—has its own on-board 7818 regulator.

K-A-B uses the term "Polar Stable" to describe their single-ended approach. In an answer to an e-mail inquiry I posed, Barrett noted that "The polar design dictates that along the signal path there will always be a bias voltage present. I have come to regard this bias as having a stabilizing influence on the circuitry and components. I believe it plays an important role in the sound of my designs. Tube designs tend to share this similarity also."

In a single-polarity power-supply topology the signal path will, ideally, be at a potential equal to exactly half of the supply rail. For a variety of reasons, this is not always the case. If the signal path deviates from this ideal, asymmetrical clipping will occur causing a reduction in headroom (one side of the waveform will clip prematurely).

K-A-B has solved this problem by adding a fixed 9V bias, supplied by a 78L09 IC regulator. The bias holds the

TABLE 3
RECORDINGS USED FOR THIS REVIEW

RIAA STEREO LPS:

Wagner: *Die Walküre*—Ride of the Valkyries. Los Angeles Philharmonic Orchestra conducted by Erich Leinsdorf. Sheffield Labs Direct-to-Disc LAB-7 (Pressed in the US).

Rimsky-Korsakov: *Scheherazade*, Op. 35. Chicago Symphony Orchestra conducted by Fritz Reiner. Chesky RC4.

Wagner: *Der Ring des Nibelungen*, especially "Siegfried's Death and Funeral March" from *Götterdämmerung* (Side 11), and the "Forging Scene" from *Siegfried* (Side 3). Birgit Nilsson, Wolfgang Windgassen, et al. Vienna Philharmonic Orchestra conducted by Georg Solti. Decca 6.35500 (Mastered and pressed in Germany by Teldec).

Strauss: *Salome*, especially "Wird dir nicht bange, Tochter der Herodias" through Jokanaan's descent into the cistern (Side 2). Birgit Nilsson, Eberhard Wächter, et al. Vienna Philharmonic Orchestra conducted by Georg Solti. London OSA-1218 (Mastered and pressed in England by Decca).

Stravinsky: *Le Sacre du Printimps*. Cleveland Orchestra conducted by Lorin Maazel. Telarc DG 10054.

PRE-RIAA HISTORICAL RECORDINGS:

Schoenberg: *Gurrelieder*—"Lied der Waldtaube." Martha Lipton, mezzo-soprano. Philharmonic-Symphony Orchestra of New York conducted by Leopold Stokowski. Columbia ML-2140 (10″ LP; Rec. 1949).

Leoncavallo: *Pagliacci*—"Vesti la giubba." Giovanni Martinelli, tenor. Vitaphone Orchestra conducted by Hermann Heller. Vitaphone Soundtrack Disc, Matrix No. 300107 (33 1/3-rpm; vinyl pressing from the original metal part; Rec. 1926).

Cohan: *Over There*. Enrico Caruso, tenor. Victor 87294 (Acoustic; 78-rpm; "Wing" label; Rec. 1917).

Wagner: *Lohengrin*—"Mein lieber schwan!" Jacques Urlus, tenor. Edison Diamond Disc 83017-R (Acoustic; 80-rpm; vertically-cut; Rec. 1915).

Weber: *Oberon*—Overture. Berlin Philharmonic Orchestra conducted by Arthur Nikisch. HMV 1040 (78-rpm; acoustic; vinyl pressing from original G&T metal part issued by Symposium).

Beethoven: Symphony No. 7 in A Major. Philadelphia Symphony Orchestra conducted by Leopold Stokowski. Victor Set M-17 (78-rpm; "Scroll" label; Rec. 1927).

Strauss: *Also Sprach Zarathustra*. Boston Symphony Orchestra conducted by Serge Koussevitzky. Victor Set M-257 (78-rpm; "Scroll" Label; Rec. 1935).

Verdi: *Otello*—"Dio! mi potevi scagliar" (sung in German). Lauritz Melchior, tenor. New Symphony Orchestra conducted by John Barbirolli. HMV D2037 (78-rpm; British pressing; Rec. 1930).

Wagner: *Die Meistersinger von Nürnberg*—Act III Quintet. Elizabeth Schumann, Lauritz Melchior, Friedrich Schorr, Ben Williams, and Gladys Parr. London Symphony Orchestra conducted by John Barbirolli. Victor 7682 (78-rpm; "Scroll" label; Rec. 1931).

Beethoven: *Fidelio*—"Gott, welch' dunkel hier." Helge Roswaenge, tenor. Berlin State Opera Orchestra conducted by Bruno Seidler-Winkler. HMV D.B.4522 (78-rpm; British pressing; Rec. 1938).

Chopin: Ballade No. 4 in F-minor. Alfred Cortot, pianist. HMV D.B.7589-7590 (78-rpm; British pressing; Rec. 1933).

Wagner: *Lohengrin*—Prelude to Act I. Philharmonic-Symphony Orchestra of New York conducted by Arturo Toscanini. Victor Set M-308 (78-rpm; Rec. 1936).

signal path—specifically the outputs of the various amplification stages—exactly mid-way between ground and the supply rail at all times, ensuring symmetrical clipping and maximum headroom.

The EQS MK12 is capacitor-coupled, typically with Panasonic HFS electrolytics bypassed with polypropylene film capacitors. The main output coupling capacitors appear to have a triple-film bypass. The switching in a preamp with a single-ended power supply can produce clicks and pops if care is not taken to keep the outputs of coupling capacitors at 0V potential with resistive loading. All switches in the EQS MK12 are completely silent in their operation, including the much-used equalization selectors. The construction quality is excellent.

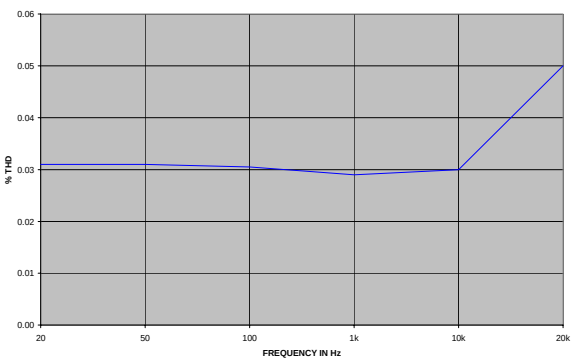

FIGURE 5: Total harmonic distortion, measured in the flat position. THD remained around 0.03% across most of the spectrum.

MEASUREMENTS

I made all measurements on my Sound Technology 1700B analyzer. *Figure 1* shows the frequency response in the *flat* position. The EQS MK12 circuitry has been designed for wide bandwidth, with the response at –2dB at 10Hz and –3dB at 100kHz. My measurement showed the –3dB point for the rumble filter to be at 28Hz, rolling off at 24dB/octave below that frequency.

I used the Jung/Lipshitz Inverse RIAA Network (*TAA* 1/80) to measure the RIAA accuracy, with 1V output at 1kHz as my 0dB reference. K-A-B does not specify the RIAA response—my measured results are shown in *Fig. 2*. K-A-B has built some infrasonic rolloff into the RIAA circuit, so the low end is at –0.7dB at 20Hz. This is a more conservative infrasonic rolloff than the IEC amendment to the RIAA specification. I have never liked the IEC call for a –3dB point of 20Hz (corresponding to a time constant of 7950µs). I have tried this in my own preamp and found that the degradation of the bass was quite audible.

K-A-B's solution is more sensible, putting the –3dB point nearly an octave lower than IEC. The RIAA performance is ideal throughout the critical midrange, measuring ±0.1dB from 500Hz to 20kHz, and ±0.25dB from 40Hz to 20kHz.

There are no inverse networks for the ten remaining curves included in the EQS MK12, so I simply measured the actual response of each one. I set my 0dB reference at 1kHz, with the preamp output driven to 0.5V out (corresponding to a phono input level of 5.3mV; the 1kHz gain of the preamp

measures 39.5dB). I carefully monitored the preamp's output on an oscilloscope to make certain that the preamp was not clipping in the low frequencies.

The six 78-rpm curves are shown in *Fig. 3*, and the four 33 1/3-rpm curves are shown in *Fig. 4*. All measurements showed that the EQS MK12 performs as specified. When examining *Figs. 3* and *4*, bear in mind that I used 1kHz as a convenient reference for all ten curves. In *Fig. 3*, the E3, E5, and E7 curves show the K-A-B Fine Slope technique in the treble region, shelving at 10kHz.

K-A-B specifies f_3 for the LP curve as 50Hz, which made me initially suspicious. The original Columbia LP curve put the low-bass turnover at 100Hz. But, the low-frequency gain stop incorporated by K-A-B for the LP curve, combined with f_3 of 50Hz, produces the proper result, as *Fig. 4* shows. All frequency response measurements were essentially identical in both channels—any differences were beyond the resolving capability of my test equipment.

I measured total harmonic distortion in the *flat* position, with an input level of 11mV, which produced an output level of 1V. *Figure 5* shows THD to be around 0.03% across most of the spectrum, rising to 0.05% at 20kHz. Noise dominated the distortion products at lower frequencies, with some second harmonic introduced at 10kHz and 20kHz. There were no higher-order distortion components.

Changing to RIAA equalization lowered the THD to 0.01% at 1kHz, 10kHz, and 20kHz, with the distortion products consisting entirely of noise. Two-tone SMPTE IM distortion measured 0.011%. All distortion measurements were the same in both channels.

In the *flat* position, the output before clipping was 5.1V unbalanced, and 10.2V balanced. In the *flat* and RIAA positions, the maximum input level just before clipping was 62mV. Noise measured 71dB below 1V in the *flat* position with the input shorted; the high-frequency rolloff of the RIAA curve reduced the noise to 78dB below 1V.

THE SOUND

To evaluate the basic sonic quality of the EQS MK12, I used several of my reference stereo LPs (*Table 3*), all cut with RIAA equalization. My reference LP playback system is my own belt-driven, AR/Merrill-based turntable fitted with a Grado Signature tonearm and an Adcom XC-MRII high-output moving-coil cartridge. The turntable is powered by an electronic speed control of my own design (*Photo 4*).[4]

The EQS MK12 proved to be a fine-sounding performer offering a warm and detailed sonic presentation. The treble region is silky and smooth, lending itself to fatigue-free long-term listening. Overall, I found the warmth and liquidity in the sound to be somewhat tube-like, though not over-ripe. The preamp offers a hint of the euphonic qualities of a good tube preamp, but it is not overly colored.

Soundstaging is a bit narrower and shallower than my reference preamplifier (my extensively modified Adcom GFP-565), but localization is generally very good. I had no difficulty following the subtle stage movements of the singers in the Culshaw-produced Wagner and Strauss recordings conducted by Georg Solti. The bass region is a bit reticent, lacking the weight and impact of my reference preamp, but it is clean and well-defined. Overall, the EQS MK12 is a solid performer with stereophonic/high-fidelity material, offering satisfying musical performance.

Over the course of several months of listening, I played literally dozens of pre-RIAA recordings, mostly 78-rpm discs, but also including early 33 1/3-rpm material. My 78-rpm playback system includes a Technics SP-15 turntable and an SME 3012R tonearm mounted on a custom base with isolation feet, plus a Stanton 500A-series cartridge with a variety of truncated stylii (*Photo 4*). I also use this turntable for some 33 1/3-rpm recordings, including 16″ transcriptions, Vitaphone soundtracks, and early-1930s Victor LPs.

Table 3 contains favorite recordings that I found especially useful, but it is only a partial list. The EQS MK12 did an excellent job with the discs I auditioned. Overall, the EQS MK12 easily outperformed my modified McIntosh C-8, which has been my reference 78-rpm preamp for over 15 years.[5] The EQS MK12 offers a cleaner and more detailed sound than the C-8, with a more open and transparent treble region.

I found the EQS MK12's curves to be

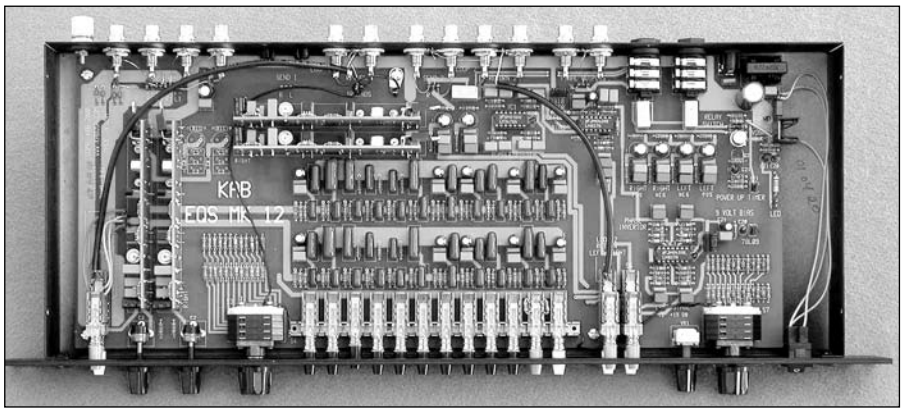

PHOTO 3: Inside the EQS MK12. The vertical PC boards are the discrete gain blocks. In the center are the passive equalization circuits.

PHOTO 4: Putting the EQS MK12 through its paces, with 78s (left) and LPs (right).

intelligently chosen, with the AC curve offering just the right amount of warmth for most well-recorded acoustic discs. The moderate high-frequency rolloff reduces surface noise without cutting into the limited treble region on acoustical recordings. It is rare to find an electrically-recorded disc that won't offer musically satisfying performance with one of the supplied curves. If you've never heard 78s played with proper equalization, the EQS MK12 is likely to be a revelation.

The lateral/vertical switching and mono mix controls worked superbly. A proper mix can make a great difference in the sound of 78s, and I consider this control essential for optimum playback. There were times when I wished that the rumble filter began at a higher frequency. Many 78s have audible rumblings in the 40-60Hz region, including the Meistersinger Quintet recording on my list. A higher corner frequency would admittedly compromise many recordings, so I really can't fault the designer's choice. Serious collectors will probably find a parametric equalizer an essential accessory.

It is often desirable to put the processor loop after the lateral/vertical switching and mono mix. If a stereo equalizer is used ahead of these controls, you can't get a proper null with the mono mix controls unless the two channels of the equalizer are precisely matched.

A better solution is to put the equalizer at the output of the EQS MK12. In this case, you need only a mono equalizer, which can then feed your control preamp. I suggest the Behringer Ultra-Q® Pro PEQ2200 as a cost-effective solution, or the Symetrix 551E for greater flexibility (K-A-B sells the Symetrix, and most pro-audio dealers carry both).

I know a number of professionals involved in commercial transfer of historical recordings, and many insist on separate control of the bass turnover and treble rolloff frequencies, which the K-A-B doesn't offer. There are many electrically-recorded 78s with 6dB/octave high-frequency preemphasis curves that are not exactly complemented by the "Fine Slope" rolloff in the EQS MK12, though I found that the "Fine Slope" curve worked well with most of the 78s I played. With the addition of a parametric equalizer, however, you can make sufficient adjustment to accommodate a variety of 78-rpm records. The AES curve, with its 6dB/octave slope, is also useful on many 78-rpm discs.

CONCLUSION

The K-A-B EQS MK12 is an excellent solution to the problems facing collectors of historical recordings. A high-quality preamplifier with a variety of equalization curves will breathe new life into old recordings, and the EQS MK12 is probably the best all-around product of its kind currently available.[6] Complemented with a good turntable, cartridge, and stylii, the EQS MK12 makes a fine playback system for 78-rpm and other vintage material. The AC and FLAT settings should also work well with cylinders.[7]

The EQS MK12 comes with a helpful instruction booklet and a chart offering recommended equalizer settings for a wide variety of recordings. If you are a serious collector, the EQS MK12 deserves serious consideration.

Manufacturer's response:

Thank you for allowing me to comment on this review. I was hesitant at first to consent to this review until Mr. Galo informed me of his experience with historic recordings. His reputation in the audiophile world is well known. His knowledge of historic recordings and playback requirements make this review all the more complete and informative. This review should be required for all hi-fi equipment reviewers.

I am particularly pleased with the measurements. The other audiophile magazines have ceased to measure phono stages. All of our EQ networks are mathematically derived. The measurements show the accuracy of this technique. Measuring each EQ component to a tighter tolerance would produce more accuracy in the curves. However, it is not likely to be an audible improvement.

One of several measurements we make on the individual transistors that make up the gain stage is very low frequency noise. The output devices used in the gain stage can exhibit "popcorn" noise. This is a noise burst of very short duration. I discard devices that exhibit this phenomenon. Feedback loops should not have to deal with this type of noise. Even though in a feedback design the noise would be effectively "hidden" by the very action of the feedback loop. It is a variable I can stabilize by screening out the noisy devices.

To maintain the lowest possible output impedance the EQS MK12 features a relay switch that "short circuits" the outputs for about 15 seconds at power up. This does two things: It prevents turn on thumps and it forces a very complete charging of the output capacitors. This reduces the capacitor ESR (Equivalent Series Resistance) to its lowest level. It also minimizes leakage currents.

The reason for placing the process loop before the mono mix is to have an output just off of the second class A gain stage. The Send #2 output can be used for hi end stereo playback and the entire process stage is precluded from the signal path. Though the gain is fixed at 36dB, it is a very pure signal path.

One change we have made to current production units is to decrease the overall gain by 3dB. This increases the overload margin from 62mV to about 91mV.

The EQS MK12 can be found in countless college libraries and sound archives around the country including the US Library of Congress.

An RIAA only version is also available as the EQS MK2.

Kevin A. Barrett

REFERENCES

1. Lipshitz, Stanley, "On RIAA Equalization Networks," *Journal* of the Audio Engineering Society, June 1979.

2. Galo, Gary, "Disc Recording Equalization Demystified," *The LP is Back!*, Peterborough, NH, Audio Amateur Press, 1999 (available from Old Colony). The article is based on a paper given at the Association for Recorded Sound Collections conference in 1996, originally published in the Fall 1996 issue of the ARSC Journal.

3. RIAA has a website, www.riaa.org, but you won't find the RIAA LP curve here, just a link to National Semiconductor's datasheet and audio application note for the LM833 opamp.

4. Galo, Gary, "AR System Drives New Turntable," *Audio Amateur* 3/85; "An Electronic Speed Control," *Audio Amateur* 1/86; and "The Belt-Driven Turntable Revisited," *Audio Amateur* 3/88. These articles have been reprinted in *The LP is Back!*.

5. Galo, Gary, "A Preamp for Vintage 78s," *Audio Amateur* 1/85. Reprinted in *The LP is Back!*. My C-8 has been modified beyond what was described in this article.

6. The FM Acoustics Resolution 222 features separate control of bass- and treble-turnover frequencies, but the lack of a flat position and mono mix control makes it less useful for 78-rpm discs, and its $18,500 price tag puts it out of the reach of all but the affluent.

7. There's very little equipment available for electronic playback of cylinders. A couple of interesting products can be found on the website of Nauck's Vintage Records at www.78rpm.com. Their Advanced Cylinder Technology Reproducer houses a Stanton 500 cartridge and can be fitted to a number of original Edison cylinder phonographs.