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Evaluation: Revolabs HD Wireless Microphone Systems

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Executive Summary

In November 2009, Wainhouse Research (WR) was retained by Revolabs to conduct a third-party evaluation of the Revolabs HD and Executive HD Wireless Microphone Systems (referred to collectively as the Revolabs HD systems within this document). Specific areas of focus during the evaluation included:

- Ease of Installation
- System Usability
- Audio Performance
- Compatibility with leading videoconferencing systems
- Overall Value / User Experience

WR was extremely pleased with the performance, usability, overall experience, and specifically the 20 kHz wide-band audio support provided by the Revolabs HD Wireless Microphone Systems.

To facilitate the testing, Revolabs provided WR with two HD Wireless Microphone Systems; an Executive HD 8-Channel System, and an HD Dual Channel System. For several weeks, WR used these Revolabs Wireless Microphone Systems during video calls on a variety of current generation videoconferencing systems.

As was the case with the previously evaluated Revolabs Fusion product, WR was extremely pleased with the performance, usability, and overall experience provided by the Revolabs HD Wireless Microphone Systems. We especially appreciated the wide-band audio support; a new Revolabs capability that allows these systems to support the wireless microphone requirements of even the most discerning users in the most demanding environments.

Revolabs HD Wireless Microphone Systems

Product Introduction

The Revolabs HD systems are high performance, professional wireless microphone systems designed for use in a variety of venues ranging from small conference rooms to large auditoriums to conference centers. The HD System is available in 1 and 2 channel versions (dubbed the HD Single and HD Dual Systems), and the Executive HD System is available in 4 and 8 channel versions. Both offerings include everything necessary to add wireless, multi-channel microphone audio to almost any videoconferencing, audio conferencing, or general AV application.

An important new Revolabs feature is support for higher quality audio. Earlier generations of Revolabs products supported only 7 kHz audio (compared to 14 kHz or higher audio supported by many videoconferencing systems). As a result, the wireless benefit came at the cost of audio quality. The new HD systems, however, support a new audio mode dubbed “HD audio.” This operating mode provides support for wide-band audio from 50 Hz to 20 kHz. The addition of HD audio support means that the new systems now compete (in terms of audio quality / performance) with wired microphones.

As shown in the table below, several Executive HD systems can be linked together to up to 24 microphones operating in HD mode or 40 microphones operating in non-HD (max density) mode. The difference between the maximum configurations possible in the US and Europe relates to the RF bandwidth available at the 1.9 GHz frequency range used by Revolabs.

	US	Europe
HD Mode		
Max # of Systems that can be linked	2	3
Max # of Mics per Audio System	16	24
Non-HD Mode (a.k.a. Max Density Mode)		
Max # of Systems that can be linked	4	5
Max # of Mics per Audio System	32	40

Figure 1: Executive HD System - Max Microphones per Audio System

Additional features of the HD solutions include the use of 128-bit encryption in all wireless transmissions (maximizes security and privacy), the use of rechargeable batteries, and the ability to adjust the coverage area for each system; a feature ideal for conference centers where several systems may be used in adjacent rooms.

System Benefits

The primary benefit of these offerings is that they remove the need for cables between microphones and other devices (mic mixers, videoconferencing systems, etc.). This seemingly basic capability provides a number of flexibility and performance benefits including:

Simplified Installation – the use of wireless microphones eliminates the need to trench floors, pull cables, and drill tables for microphone installation. This saves installation time, decreases installation cost, and protects expensive furniture.

Room Configuration Flexibility – the use of wireless microphones allows one to reconfigure the meeting room as required without having to worry about microphone cables. For example, a room could be used as a meeting room in the morning and as a training room in the afternoon – all without loss of mic coverage.

Mic Location Flexibility – the wireless mics can be positioned close to the meeting participants without forcing people to sit in specific locations. This results in improved mic coverage within the room, improved audio quality, decreased background noise, and the ability to adjust the mic coverage within the space "on the fly" as people enter / leave the room.

Participant Mobility – the ability to wear the wireless microphone on your person allows meeting participants to move about the space without concern for stepping out of microphone coverage.

Room Aesthetics and Safety – the elimination of microphone cables improves the tidiness of the space and keeps meeting participants from tripping over the wires.

System Components

The Revolabs HD solutions include the following components; a Base Station, a Charger Base, and the appropriate number of wireless microphones (1 for the Single, 2 for the Dual, and up to 8 for the Executive).

The Base Stations - The center-piece of the wireless microphone systems, the Base Stations receive the wireless, encrypted audio signals from each of the system microphones, decrypt the audio, and hand off the audio signals to the appropriate device (videoconferencing system, audio conferencing system, mic mixer, audio reinforcement / PA / voice-lift system, integrated AV system, etc.).

Unlike the Revolabs Fusion solution (previously evaluated by WR), the HD and Executive HD Base Stations do not include integrated echo cancellation or audio conferencing capabilities. They simply act as a gateway between the wireless microphones and the next device in the audio path.

Figure 2: Revolabs HD and Executive HD Systems

The Revolabs HD Single and Dual Wireless Microphone Systems include a table-top / wall mountable base station (see picture of HD Dual Channel system above). System configuration (if necessary) is accomplished via dip switches or via a USB port on the back of the device.

The Revolabs Executive HD Wireless Microphone Systems include a rack-mountable base station. System configuration (if necessary – the device is basically plug and play) is accomplished in one of three ways; 1) via the front panel controls, 2) via the Ethernet port, or 3) via a small bank of dip switches. In addition, the system includes an RS-232 port for controlling external devices (e.g. audio conferencing / telephone hybrids) and a BUS connection that allows the unit to be combined with up to 3 other Executive HD Base Stations to create a single system supporting up to 32 microphones.

The Charger Bases – The charger bases act as the storage and charging stations for the wireless microphones. According to the manufacturer, the wireless microphones recharge to 80% capacity in approximately 45 minutes sitting in the charger base. Note that the mics are not operational while sitting in the charger base.

Revolabs Wireless Microphones – Available in five types (wearable, omni-directional tabletop, uni-directional tabletop, as an attachment to any XLR microphone, and as an attachment to a Countryman microphone), the wireless microphones provide up to eight hours of talk time on a single charge.

Each microphone has a single button used for pairing (or connecting) the mic to the base station during system setup (may not be necessary if the mics were purchased together with the base station) or for toggling the mute status. An LED on each microphone displays the pairing, mute, and power / charging status of the device at all times.

Figure 3: Revolabs Wireless Microphones

As with the company's prior generation of microphones, the new Revolabs mics are extremely small (see the image above with the US 25 cent piece inserted for size reference) and lightweight. All of the wireless microphones include Revolabs' RF Armor technology that blocks GSM interference from cell phones.

User guides, setup guides and various cables / adapters were also included in the box.

Cost Information

All prices below include the appropriate number of wireless microphones (users can specify how many of each microphone or mic adapter they require).

Model	# of Channels	List Price (US$)
HD Single Channel	1	$750
HD Dual Channel	2	$1,300
Executive HD – 4 Channel	4	$5,495
Executive HD – 8 Channel	8	$7,995

Figure 4: Revolabs HD and Executive HD - List Pricing

Installation and Configuration

As was the case with the Revolabs Fusion system evaluated by WR in 2008, the new Revolabs solutions are basically plug and play, offering full functionality right out of the box, although some advanced configuration settings are available as described below.

Installation - Revolabs HD Dual Wireless Microphone System

The setup of the Revolabs HD Dual Wireless Microphone system used in our testing was extremely quick and easy (under 5 minutes), requiring the following steps:

1. Connecting the Base Station
    a. Supplying power
    b. Connecting one audio cable from the audio out on the Base Station to the audio in on the VC system (adapters may be required depending upon the VC system in use)
2. Connecting the Charger Base
    a. Supplying power
    b. Placing the wireless microphones in the unit to charge
3. Pairing the wireless microphones to the Base Station
    a. Pressing and holding the channel 1 button on the Base Station until the LED turns red
    b. Pressing and holding down the mute button on the microphone to be paired to channel 1 until the LED on the microphone turns solid red
    c. Repeat steps above for additional microphones
4. Configuring the VC system
    a. Activating the audio input on the VC system connected to the Base Station
    b. Disabling the VC system's standard microphone (an optional step we chose to implement)

Installation - Revolabs Executive HD 8 Channel Wireless Microphone System

The installation method for the Executive HD system depends upon the product version in use (4-channel or 8-channel) and the number of microphone inputs available on the videoconferencing system.

Option 1 – Direct Connection

If the video system has a sufficient number of audio / mic inputs, the connection is similar to that described for the HD system above with the exception that one audio cable between the Base Station and the VC system is required for each audio channel.

Option 2 – Mic Mixer / Echo Canceller Installation

If the video system does not have enough audio / mic inputs (e.g. an 8 channel system is to be used with a VC system supporting only two mic inputs), a mix mixer / echo canceller must be used.

To accommodate our test scenarios, we installed an eight (8) channel Executive HD solution and dedicated four (4) mics to each of two videoconferencing systems. Since neither of the VC systems were able to support four mics, an external mic mixer / echo canceller was used. The system installation took less than 10 minutes to complete and required the following steps:

1. Connecting the Base Station
    a. Supplying power
    b. Connecting eight phoenix audio cables from the audio outputs on the Base Station to the audio inputs on the microphone mixer / echo canceller
2. Connecting the Charger Base
    a. Supplying power
    b. Placing the wireless microphones in the unit to charge
3. Pairing the wireless microphones to the Base Station as described above
4. Configuring the VC system
    a. Connecting two audio cables (one outgoing and one incoming) between the microphone mixer / echo canceller and the VC system
    b. Disabling the VC system's echo canceller
    c. Disabling the VC system's standard microphone (an optional step we chose to implement)

One small nit - with both the HD and Executive HD systems, the wireless microphones must be powered down (by holding down the mute button for 10 seconds) before they can be paired to the Base Station. Although this procedure is highlighted on the handy laminated card provided with the system, the need to power down the mics seems like an unnecessary step.

Configuration

In many situations, the Revolabs HD systems will operate properly right out of the box (a.k.a. plug and play). Advanced users or those installing the systems in certain environments can configure the system's functionality to address a variety of items including:

1. How many Revolabs systems are being used simultaneously within close proximity?
2. What type of 3rd party mute control (if any) is being used?
3. How large is the room?
4. Are line level or mic level signals required by the video system / mic mixer?
5. Should each mic be muted or un-muted when removed from the Charger Base?

The above configuration items (and more) are available via dip switches on the back of the Base Stations. With the Executive HD system, however, additional settings are available via a Revolabs provided software application (requires the Base Station to be connected to an IP network). Although the typical user is not likely to need many of the configuration options within the software app (dubbed the HD Control Panel), it is worthy of additional coverage.

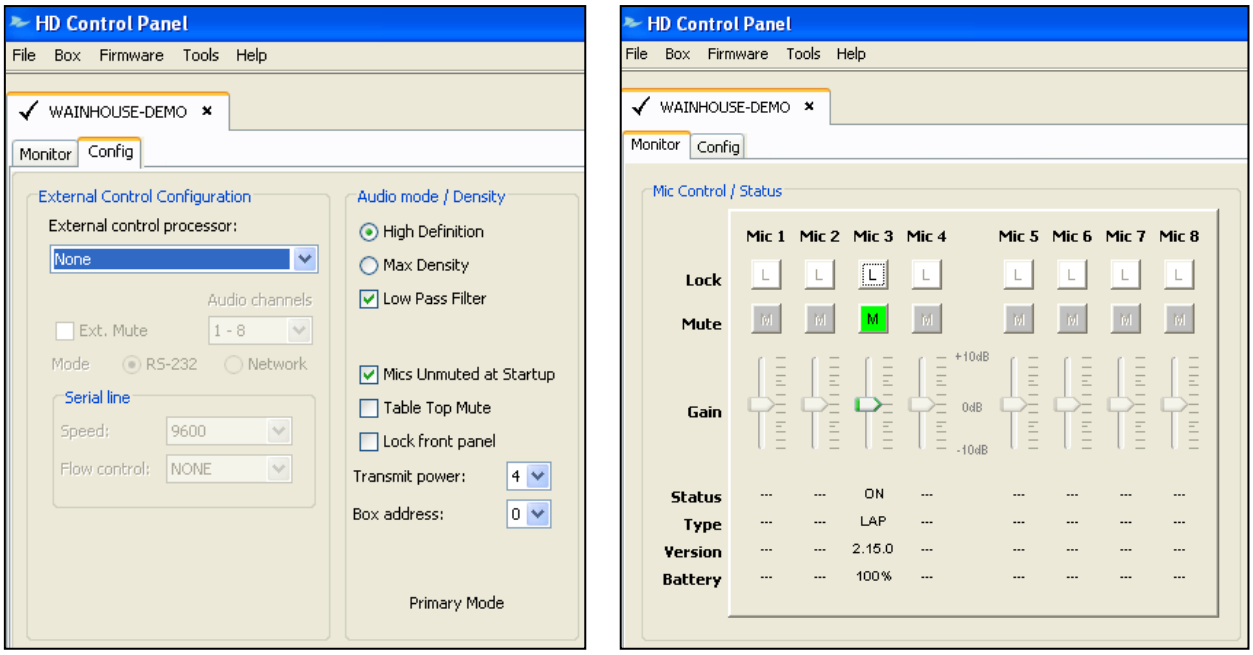

Figure 5: HD Control Panel – Config and Monitor Screens

The left screenshot above shows the configuration window of the HD Control Panel. Although most of these functions were not used during our evaluation, WR did appreciate and use the "Mics Un-muted at Startup" feature. Clicking this checkbox configured the system so that microphones would automatically un-mute whenever they were removed from the Charger Base.

The right screenshot above shows the monitoring window of the HD Control Panel. From this screen, a user can see which microphones are active (out of the charger), mute or un-mute any active microphones, lock any microphones (prevent users from muting or un-muting) and adjust the gain of each mic.

System Evaluation

To assess the performance and usability of the Revolabs HD systems, WR conducted a series of test video calls and then used the systems during routine, "production" video calls for several weeks. In all cases, the systems performed flawlessly.

System Design / Look and Feel

The Revolabs HD systems were designed to be at home in an office or conference room. The shapes, colors, and textures used give the systems a professional, "studio-like" look and feel.

WR noted several minor but important improvements in the system microphones including a new color scheme and shape that provide users with a better indication of the mic type in use (e.g. omni-directional or directional) and an improved mute button offering better tactile response.

Usability / Ease of Use

The Revolabs HD systems were designed with ease of use in mind. The user can simply take the mic(s) out of the charger, press the button on each mic to un-mute the audio, and place audio and/or video calls. Once the call is over, the user simply places the mic(s) back in the charger. This automatically mutes each microphone to ensure privacy. There is nothing else to do. Revolabs avoided the common mistake of making simple things too complicated.

On a minor note, there is a short (approximately 5 seconds) delay between when a microphone is removed from the Charger Base and when it syncs up with the Base Station. During this time, the microphone cannot be used or controlled (e.g. un-muted). This 5 second delay was more of an annoyance than anything else, and apparently the vendor is working on resolving this issue in a future software release.

Audio Performance

The most important aspect of a microphone system is the audio performance. In this case, WR was interested not only in the overall performance, but also whether the wireless aspect of the system would cause any noticeable artifacts (delay, frequency loss, susceptibility to interference, etc.).

WR was impressed by the audio quality provided by the Revolabs HD systems throughout the testing. With both systems, the microphone coverage / pickup area was strong, and the digital audio system eliminated the artifacts commonly associated with traditional, analog wireless systems.

Like the previously evaluated Revolabs Fusion product, the system audio with the Revolabs HD systems is transmitted at 1.9 GHz. The use of this frequency yields the following benefits:

a) The systems will not typically be impacted by or interfere with, the other wireless devices (cordless phones, wireless headsets, wireless routers, etc.) used in a typical office environment. [1]

b) Revolabs microphones are <u>not</u> affected by the FCC's decision to clear some UHF frequency bands, many of which are heavily used by other wireless microphone systems.

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[1] DECT (Digital Enhanced Cordless Telecommunications) digital portable phones also use the 1.9 GHz frequency range, and in some situations may interfere with Revolabs wireless systems.

Furthermore, the Revolabs RF Armor technology (now standard on all Revolabs microphones) successfully blocked interference from 3G cell phones, Blackberries and PDAs. We only wish more conferencing systems included this capability.

WR was particularly pleased by the introduction of wide-band (20 kHz) audio support; a capability which was not available in previous generations of Revolabs products. While not required for standard telephony applications, wide-band audio improves the user experience and has, over time, become the de facto standard in the videoconferencing arena.

One notable feature is the recently release of a Countryman adapter that enables the use of Countryman microphones with the Revolabs HD systems. These high quality microphones are commonly used in demanding applications such as live concerts and within houses of worship. WR was impressed by the audio quality delivered by the combination of the Countryman mic and the Revolabs wireless system.
In addition, the Revolabs HD systems support a wireless "back-channel" that allows the microphones to act as both an audio transmitter (for outgoing audio) and an audio receiver simultaneously. This allows each user to listen to a separate audio channel using a 2.5 mm earpiece (an inexpensive earpiece is included with each wearable microphone). Applications for this technology include translation, personal hearing assistance, and the ability to participate in private sessions. This function worked quite well during our testing.

All in all, the audio quality provided by the Revolabs HD systems was indistinguishable from that delivered by a typical integrated wired microphone system. Even during production video calls with clients and video-savvy WR staff, not a single person noticed that we were using a wireless microphone system in lieu of the vendor-provided wired mic. This one item speaks volumes for this mic system.

One minor nit is that the system does not include even a basic equalizer / audio frequency adjustment capability. Although hardly a critical item, we believe that the ability to boost the lows, mids, or highs via dip switches or via the HD Control Panel application would be of interest to some users.

Conclusion

Revolabs' latest generation of wireless microphones does not disappoint.

The Revolabs HD Wireless Microphone Systems include the performance and usability features that made the company's prior generation of products successful, plus a handful of new features requested by customers (and appreciated by WR). A key capability of this new platform is support for higher quality audio (up to 20 kHz); a function that serves to enhance the user experience, while allowing the system to be used in almost any audiovisual environment.

At a list price starting at only $750 (for a single-channel system that can be used with virtually any audio conferencing or videoconferencing system), Revolabs has successfully brought high quality, wireless microphone audio within reach of almost any organization.

Overall, the Revolabs HD systems allow organizations to "lose the wires" without losing ease of use or degrading the most coveted item of all … the user experience.

About Wainhouse Research

Wainhouse Research, LLC (WR) provides analysis and consulting on the market trends, technologies/ products, vendors, applications, and services in the collaboration and conferencing fields. Areas of coverage include hardware, software, and services related to audio, video, and web conferencing, unified communications, and enterprise social networking. The Company publishes market intelligence reports, provides customized strategic and tactical consulting and studies, and produces industry events (conferences). Additionally, the Company operates industry-focused and end user-focused Web sites and publishes a weekly sponsored bulletin for news and analysis. For more information on Wainhouse Research, visit www.wainhouse.com.

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About Revolabs

(Copy provided by Revolabs)

Revolabs, Inc. delivers innovative wireless audio products for both enterprise collaboration applications and professional audio applications. The Revolabs products are used throughout the world and across a wide range of industries including houses of worship, corporations, financial services, education, medical, legal and more. Revolabs HD Wireless Microphone Systems provide superior audio performance for broadcasting, live sound, video- and audio-conference calls, distance learning, webcasts, and other audio applications. All of the Revolabs products facilitate natural mobility by allowing participants to move around with no wires to worry about. The Revolabs Wireless Microphones are wireless, secure, rechargeable, and flexible, and most are impervious to GSM noise. Revolabs MaxFlex™ technology allows the microphones to be interchangeable and seamless within the product lines. There is a type of Revolabs Wireless Microphone available for every application: wearable, omni, and directional tabletop form-factors, as well as adapters for handheld or earset microphones. For more information, please visit www.revolabs.com.