

***Evaluation of the
Revolabs Fusion
Wireless Microphone
System***

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Executive Summary

In December, 2008 Wainhouse Research (WR) was retained by Revolabs to conduct a third-party evaluation of the Revolabs Fusion Wireless Microphone System. 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 and usability of the Fusion system, and would recommend it for use in almost any professional conferencing or audio-visual environment.

To facilitate the testing, Revolabs provided WR with a four (4) microphone Fusion Wireless Microphone System for use in WR's Atlanta test lab. For several weeks, WR used the Revolabs Fusion Wireless Microphone System as the primary microphone source during videoconferencing calls on videoconferencing systems from LifeSize, Polycom, and Tandberg.

Throughout the testing, WR was extremely pleased with the performance and usability of the Fusion system. After conducting dozens of video calls, including several client briefings, WR would recommend the Revolabs product for use in almost any professional conferencing / AV environment.

Revolabs Fusion

Product Introduction

Revolabs Fusion is a high performance, professional wireless microphone system designed for use in small to medium-sized meeting rooms. Available in 4-channel and 8-channel versions, the system includes everything necessary to add wireless, multi-channel microphone audio to almost any videoconferencing system or audio-visual installation. It also includes integrated audio conferencing capabilities. In addition, the system's plug and play design (there is no software to install / configure) makes installation fast and easy.

The primary benefit of the Fusion offering is that it removes the need for cables between microphones and other devices (mic mixers, videoconferencing systems, etc.). This seemingly basic capability provides an added degree of flexibility in terms of room design, seating layout, and user mobility during videoconferences, audio conferences, and general meetings.

Key benefits / features include:

- > Eliminates the need to trench floors / pull cables / drill tables for microphone installation
- > Improves room aesthetics and safety by eliminating microphone cables on tables / across floors
- > Maximizes room utility by enabling on-the-fly room layout changes without losing mic coverage
- > Improves audio quality by allowing microphones to be positioned closer to participants
- > Enables participants to move around naturally without impacting audio quality
- > Provides integrated audio conferencing without the need for additional hardware

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

System Components

The Revolabs Fusion system includes the following components; the Base Station, the Charger Base, the IR Remote Control, 4 or 8 Revolabs Wireless Microphones, and an optional Tabletop Dialer.



Figure 1: Revolabs Fusion System

The Fusion Base Station - The center-piece of the Fusion system, the Base Station receives the wireless, encrypted audio signal from each of the system microphones, decrypts and processes the audio as appropriate, and hands off the audio signals to the videoconferencing system or integrated AV system. The unit can be mounted horizontally or vertically (using the included vertical stand), and LED indicators on the front of the device display power, audio level, and microphone mute status information. The rear of the unit provides numerous audio out connections (RCA, XLR, etc.), telephone in/out connections, and two banks of dip switches used to adjust the operation of the system (transmission power, wireless frequencies used, etc.) if necessary.



Figure 2: Fusion Base Station (Rear View)

The Fusion Charger Base – The sleek charger base acts as the storage and charging station for the wireless microphones. According to the manufacturer, the wireless microphones recharge to 80% capacity in approximately 45 minutes sitting in the charger base.

The Fusion IR Remote Control – Small and simple to use, the Fusion IR remote provides easy access to the most common system functions including standard telephony functions (dial, redial, answer, hang-up phone calls, and flash), the ability to mute and un-mute the entire system, and volume adjustment.

Revolabs Wireless Microphones – Available in four types (wearable, omni-directional tabletop, uni-directional tabletop, and as an attachment to an existing XLR 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 marrying) 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

Two different flavors of microphones are available; the “standard” version and the “EX” version which includes Revolabs’ RF Armor technology that blocks GSM interference from cell phones.

Fusion Tabletop Dialer (Optional) – The system also includes an optional, RF wireless tabletop dialer that provides convenient access to the same basic functions offered on the IR remote control. The two-line backlit LCD display provides users with easy access to key system information (mute status, number dialed, incoming caller ID, volume level, etc.) and speed dial control.

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

Cost Information

The Revolabs Fusion Wireless Microphone System starts at US \$4,995 (MSRP) for the 4-channel version and US \$6,995 for the 8-channel. All prices include four or eight wireless microphones (users can specify how many of each microphone type they require). The optional Fusion Tabletop Dialer is available for an MSRP of US \$495. Additional microphones can be purchased for \$299 (EX version) or \$199 (standard version).

The company also offers the Executive Series microphone systems for installed room applications and two single microphone products; the Solo Single Channel (MSRP \$500) is a one mic version of Fusion with an accessory USB port, and the xTag (MSRP \$249) is a USB-only version of the product.

Installation and Configuration

The setup of the Fusion system was extremely straight-forward and involved the following:

- 1) Removal of the items from the box
- 2) Connecting the Base Station
 - a. Connecting power
 - b. Connecting three audio cables
 - i. From the Conf Out of the Base Station to the audio input of the VC system
 - ii. From the audio out of the VC system to the Conf In of the Base Station
 - iii. From the Room Out of the Base Station to the audio inputs of our display
 - c. Connecting the included phone line cable to the telephone wall jack
- 3) Connecting the Charging Station
 - a. Connecting power to the unit
 - b. Placing the mics in the unit to start charging

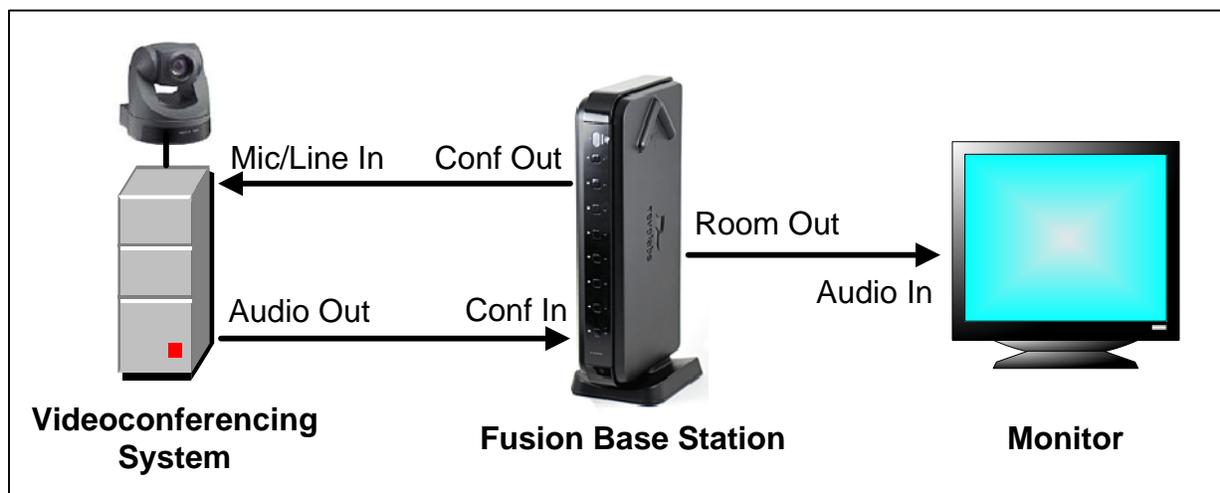


Figure 4: Revolabs Fusion Connection Diagram

- 4) Configuring the videoconferencing system's settings including the following:
 - a. Enabling the appropriate input (line input for LifeSize and Polycom, mic input for Sony and Tandberg)
 - b. Disabling the internal echo canceller
 - c. Other adjustments as required (disabling AGC, disabling noise reduction, etc.)

The setup guide included in the box provides detailed instructions for connecting and using the Fusion system with videoconferencing systems from LifeSize, Polycom, Sony, and Tandberg.

As a part of this project, WR tested the Revolabs system with the following videoconferencing systems:

- LifeSize Room
- Polycom HDX 9004
- Tandberg 6000MXP

From start to finish, WR required less than 15 minutes to install and configure the system. Shifting between video systems, including all cabling and video system setting changes, took less than 10 minutes.

WR was able to complete this project using only the included cables and adaptors. In today's cost cutting world, vendors often skimp on included cables and adaptors. This was not the case with Revolabs.

User Experience

To assess the performance and usability of the Revolabs Fusion system, WR conducted a series of formal video and audio test calls and also used the system during our routine video meetings for several weeks. In all cases, the Fusion system performed flawlessly.

Usability / Ease of Use

Fusion was 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.

Placing / receiving phone calls using the integrated audio conferencing system is also straight forward. To place a call, one simply dials the phone using the keypad on the Tabletop Dialer and presses the green "dial / pickup" button. The same button is used to answer an incoming call (the LCD display shows the caller-ID of the caller when a call comes in). To hang-up the call, the red "hang-up / disconnect" button is used.

Once the call is over, you simply place the mic(s) back in the charger. This automatically mutes each microphone to ensure privacy. There is nothing else to do. Kudos to Revolabs for avoiding the temptation to make simple things overly complicated.

On a minor note, the tactile feel of the buttons on both the Tabletop Dialer and IR remote could use some improvement.

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.).

Throughout the testing, WR was impressed by the audio quality delivered by the Revolabs system. The microphone coverage / pickup area was strong, and the digital audio system eliminated the artifacts commonly associated with traditional, analog wireless systems. In addition, the usable transmission range was beyond the 100 feet specified in the user manual.

The system audio is transmitted at 1.9 GHz, which yields the following benefits:

- a) Fusion is not impacted by, and does not interfere with, the other wireless devices (cordless phones, wireless headsets, wireless routers, etc.) used in a typical office environment.
- b) Revolabs microphones are not affected by the FCC's recent decision to clear some UHF frequency bands, many of which are heavily used by other wireless microphone systems.

Furthermore, the system's RF Armor technology successfully blocked interference from 3G cell phones, Blackberries and PDAs. We only wish more conferencing systems included this capability.

All in all, the audio quality was basically indistinguishable from that delivered by a typical integrated wired microphone system. Even during our testing in which WR used the Fusion wireless system for production video calls with clients and video-savvy WR staff, not a single far-end person realized that we were not using the vendor-provided wired microphone. That is the true test of a wireless microphone system, and Revolabs passed with flying colors.

Although the audio quality was exceptional, we were disappointed by the lack of wide-band (14 kHz) audio support. While not required for standard telephony applications, wide-band audio improves the user experience and is quickly becoming the de facto standard in the videoconferencing arena.

In addition, the system supports only a single audio channel. This is not necessarily a problem today, but stereo and/or directional audio is already available from some leading conferencing systems. Granted this may be difficult to implement in a wireless / free seating environment.

Finally, the system does not include even a basic equalizer / audio frequency adjustment capability. While this supports the plug-and-play design of the product, we believe that the ability to boost the lows, mids, or highs via dip switches would be of interest to some users.

Conclusion

In the last 15 years, the WR test team has installed, configured, and used many wired and wireless microphone systems in the field. After six weeks using the Revolabs Fusion Wireless Microphone System, we can honestly say that this is the way we've always wanted a wireless microphone system to behave. Fusion let's you eliminate microphone wires without impacting audio quality.

One of the key benefits of Fusion is that it allows a customer to place the mics very close to the meeting participants – even when the seating layout changes or the participants move around the room. Imagine a professor being able to move around the room from the podium, to the whiteboard, and even among the students in the auditorium without any change in mic coverage or audio quality. This not only provides a better overall experience (better audio quality, decreased room noise, consistent audio levels, etc.), but provides a degree of mobility and flexibility not typically associated with audio and videoconferencing solutions.

In short, the Revolabs Fusion Wireless Microphone System offers a compelling combination of ease of use and audio performance. At roughly \$5k (list price) for a 4-channel system, Fusion represents a relatively cost-effective option for those seeking to add high performance wireless microphone capabilities to a new or existing meeting space.

About Wainhouse Research

Wainhouse Research (www.wainhouse.com) is an independent market research firm that focuses on critical issues in rich media communications and conferencing. The company conducts multi-client and custom research studies, consults with end users on key implementation issues, publishes white papers and market statistics, and delivers public and private seminars as well as speaker presentations at industry group meetings. Wainhouse Research publishes Conferencing Markets & Strategies, a three-volume study that details the current market trends and major vendor strategies in the multimedia networking infrastructure, endpoints, and services markets, as well as a variety of segment reports, the free newsletter The Wainhouse Research Bulletin, and the PLATINUM (www.wrplatinum.com) content website.

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About Revolabs

(Copy provided by Revolabs)

Revolabs, Inc. is a wireless audio solutions company whose products are used throughout the world and across a wide range of industries such as education, financial services, healthcare, legal services and more. Revolabs products facilitate natural mobility while providing superior audio performance for specific collaborative situations, such as video- and audio-conferencing, distance learning, and podcasting. The company is headquartered in Maynard, Mass. and can be reached at 800.326.1088 or on the web at (www.revolabs.com).