



Date: February 18, 2017

## **PROPOSAL FOR SOUND SYSTEM UPGRADE**

### **PAINT BRANCH UNITARIAN UNIVERSALIST CHURCH Silver Spring, MD**

#### **Introduction**

Thank you for the opportunity to serve your church in upgrading your sound system. ATS Communications has a 40+ year history of professional experience designing and installing audio communications systems for many different types of clients, including broadcast production facilities, corporate board rooms, commercial businesses, and houses of worship. We adhere to a level of design and performance requirement that insures long life-cycle times, long term customer satisfaction and low incidences of repair and maintenance calls. I approach every project from a systematic perspective, meaning that the proposed equipment is specifically selected and designed to work together, with complimentary features and functions, in your particular space and for your program requirements.

After meeting with PBUUC representatives Lowell Owens and Van Summers, and assessing the current sound system equipment and room acoustics (I have also attended a number of events in this space), and reviewing the responses to our survey, I am pleased to offer this proposal as requested. Note the modular nature of the categories below. While it would be theoretically possible to present options ABCD, etc, the range of choices available today make it prohibitive. I am proposing and recommending what I feel provides the best cost/benefit ratio in each category. We can work from here to refine the choices to fit the budget.

## Proposal Explanations

A “Sound System” includes everything from a presenter’s mouth or instrument to a listener’s ears. Everything in between, from microphone to room acoustics, interacts with each other in a chain-like fashion resulting in the listener’s perception of what was presented.

### ❖ Input Sources

#### ➤ Wireless Microphones

- Wireless microphones are considered essential for those who move about and for quick-change, temporary microphone positions for performances
- Hand-held as well as head- worn microphones are recommended. I do not generally recommend lavalier /lapel microphones for use with an open loudspeaker system due to their increased opportunity for feedback.
- Antennae on each receiver inside the equipment rack reduces their efficiency. Some receivers enable the use of a single set of external antennae.
- Freedom from stage wiring generally equates to convenience and improved stage safety, provided they work when they’re needed, and wireless are never guaranteed. Wireless microphones have three technical uncertainties –
  - Legal frequency operation,
    - ◆ In 2010, the FCC banned the operation of wireless microphones in the then popular 700MHz band, causing many users to have to replace their expensive equipment.
    - ◆ In 2017, the FCC will conclude an auction for the 600 MHz band, resulting in a ban from another popular wireless microphone band, likely leaving users again to burden the expense of repurchasing their transmitters and receivers.
    - ◆ In anticipation, manufacturers have been working on improving their technologies and experimenting with alternative frequencies. The 2.4GHz band has become popular, which is shared with WiFi, Bluetooth, microwave ovens, and many other devices.
  - frequency interference,
    - ◆ The loss of so much available frequency spectrum results in as many wireless microphone transmitters operating within a very confined and congested range of frequencies. The likelihood of interference, even in the most ideal situation, can never truly be eliminated. However some very new units utilize frequency hopping technologies to automatically switch frequencies when a problem is detected.
  - battery reliability / life
    - ◆ A battery going dead in a transmitter is always a risk, however manageable. Today’s rechargeable cells virtually remove them from the waste stream, and are quite reliable.
- Current Inventory
  - PBUUC currently has two hand held and one body pack transmitters of relatively low cost models. Their frequencies will probably not be in jeopardy, so they could remain in operation.
  - It also has a mix of better quality but old /discontinued models.
  - I found one system in the illegal 700MHz band.
- **RECOMMENDATIONS**
  - Based on the type of programming, I recommend a minimum of four channels, with at least two hand held and two body packs with headworn mics.

- Note that with four receivers, you can have up to 4 of each transmitter available, with any mix up to 4 operating concurrently.
  - I am including the addition of two wireless channels with one hand-held and one body pack with a headworn mic and one additional headworn mic for the existing body pack.
  - The system I am including presents a new low price point for higher quality wireless systems.
- **Wired Microphones**
- For reliability, sound quality, the ability to select the best “tool” for a job, and for cost, wired microphones are always preferred over wireless.
  - There are currently two small floor pockets for connecting wired microphones, but I am told that they require repair. This is because they were not securely installed.
  - The existing Audix choir microphones were a good choice, though more than two might be recommended. Assuming that the choir stands immediately in front of the curved window (could be left, center or right depending on the number of people and performance), I would recommend hanging a number of them overhead to cover the entire area. However, I have NOT included that option in this proposal
  - **RECOMMENDATIONS**
    - I recommend a wired microphone for the Pulpit /Podium, it being a constant during services, and in a fairly consistent position. It can be disconnected and moved at any time.
    - Additional wired microphones should be available for soloists and instruments.
    - No new wired mics are included in this proposal, though we can certainly discuss any needs.
- **Input / Output Connection Panels**
- To connect wired mics and floor monitors I am including one and recommend two portable 8 Input x 4 Output stage boxes that would be located stage center (or left and right) under the window behind the risers. These would connect to the mixer using a single Cat5e cable run along under the window and neatly through the wall.
  - An alternative would be to install proper stage floor pockets in strategic locations, ie: near the typical locations for the podium, piano, solo positions, and choir. These would be recessed into the floor to maintain a flat floor and would reduce wiring on the floor for the various wired mics and floor monitors. However due to the nature of the floor joist construction they would be custom manufactured. The installed cost would be significantly higher than the stage boxes proposed. A quote can be prepared upon request.
- **Music Playback**
- I recommend (and am including the capability for) file-based music playback, with the ability to easily connect a portable music player /phone /iPod, etc, as well as from a laptop or desktop PC (See sections on Mixing /Recording)
  - I am including the ability to connect portable devices either by headphone jack or by Bluetooth.
- ❖ **Mixing**
- I am proposing a small-format digital mixer.
  - The sound mixer is the central control point of every sound system, and is therefore critically important.
  - The digital mixers available today provide many features and capabilities, and much more control over the sound than ever possible with analog mixers, and for a very reasonable price.

- One valuable feature is the ability to remotely control the mixer from a portable tablet. This allows the mixer to be located outside the sanctuary, and allow the operator to be inside the sanctuary in order to hear and see what everyone else is, which is essential. See the section “On Live Sound Mixing and Recording”
- Another valuable feature is the ability to preset “scenes” which are specific mixer configurations for different types of events or as starting points for an operator to build on.
- Another valuable feature is the ability for me to remotely connect to the mixer and computer to quickly support an operator without having to travel to the church.
  - Note that this requires an internet connection and configuration of the network router.

## ❖ Output Destinations

### ➤ Loudspeakers

#### ▪ Main Loudspeakers

- Loudspeakers are needed that send more sound to where the congregation is seated, and not to the walls and ceiling where destructive reflections happen. This preserves the sound quality and coverage, as well as speech intelligibility.
- Designing speaker coverage for this unusual room was a particular challenge. The glass walls in the front and the back of the room, and the empty space with round walls above the left and right partitions require careful attention to speaker selection and directivity.
- Generally speaking we do not promote stereo for sound reinforcement because very few people will be seated in “the sweet spot”. All others will hear primarily either left or right and miss the sound from the opposite side.
- For these and other good reasons, I am proposing a single, center loudspeaker, hung from the apex of the front arch. Specifically selected for its directivity, I have modeled this speaker in software to show that it will cover the entire seating area and not reflect destructive sound off the back or upper side walls.
- A power amplifier will be housed in the equipment rack.
- OPTIONS
  - ◆ I have included two options, purely for budgetary purposes. While I believe they will provide adequate coverage, They may be more prone to feedback and reflections off the rear wall. Therefore I consider them as secondary and tertiary choices. They would site on the floor at the base of the two front arch pillars.
    - Option 1 is a floor standing speaker made of a thin column 4” x 3.5”, mounted on a subwoofer base 16.5”W x 19.7D” The total height is 81” It has twice the output power of Option 2
    - Option 2 is a floor standing speaker made of a thin column 4” x 3.5”, mounted on a subwoofer base 10.3W x 14.6D” The total height is 77” It has half the output power of Option 1

#### ▪ Monitor Speakers

- Monitor speakers are aimed at performers to help them hear any instruments important to their performance so that they everyone can play or sing in tempo, in time, on pitch, and on melody. Monitors do not have the same audio mix than the audience hears.
- Choir Monitor
  - ◆ Choir monitors also allow them to enjoy the service when they are not singing

- ◆ I am proposing a single choir monitor speaker, hung from the apex of the arch, behind the main speaker. I have modeled this highly directive speaker to show that it will cover the choir line in front of the window while minimizing spill at the front of the chancel area (to avoid feedback from the podium and solo mics), and not reflect undesirable sound off the front window.
- A power amplifier will be housed in the equipment rack.
- Solo /Instrument (Floor) Monitors
  - ◆ Floor monitors are for musicians other than the choir. I am recommending two small self-powered floor wedge speakers (amplifiers are built into the speakers, so they require two wires – audio and power)
  - ◆ These Self-Powered monitors can also be used on stands to act as main speakers in other rooms when needed.
- Kitchen & Foyer Speakers
  - Use of the existing loudspeakers is anticipated at this time.
  - It is unknown at this time whether these require a new amp. I have included one in the proposal, which may be eliminated if not required.
- Listening Assistance
  - An Induction Loop system is proposed for installation under the floor joists below.
  - Two belt pack receivers are required (by ADA law) according to the seating capacity. Belt packs have rechargeable batteries and include a dual charger stand and earbuds.
    - However, use of the existing (radio) listening assistance system can be continued, in which case no additional belt pack receivers will be required. THIS WOULD RESULT IN A SAVINGS OF \$355.00
- Audio Recording
  - Since Compact Disks have only a few years life expectancy, have a recurring cost to use, have a fairly high error rate, and are not generally recyclable, they are not recommended as a master recording medium.
  - The Digital Mixer proposed includes a direct audio connection to a computer disk via software. Our proposed Sound Mixer will feature a USB computer connection for this purpose.
  - Recording direct to disk enables sound files to be easily edited, burned to optical disk, moved to another computer over the network for archiving, uploaded to a web site or cloud storage, or streamed over the internet.
  - We will provide basic one or two track recording capabilities, which are a mix of all sources. Optionally, advanced recording software allows every mixer input to be recorded on separate tracks. This enables the user to re-mix the event after the fact to correct errors such as a mic turned on late or a presenter or musician being too loud or soft during the performance.
  - Sound Editing (included) will allow isolating and exporting a part of a service, such as the sermon, as a separate file from the entire recording.
  - Mixing for recording is often misunderstood as simply recording what is being played over the loudspeakers. In fact, a recording mix is entirely different than a sound reinforcement mix. See the section “ON LIVE SOUND MIXING AND RECORDING”
  - **While this is an important category, I can ONLY ESTIMATE** the cost for a computer, tablet, and networking gear in this proposal. Products and prices change very quickly. We can review pricing when the time comes to make the purchase.

- ❖ Video
  - Currently, a portable projection screen and a projector are set up whenever they are needed. This is labor intensive and adds wear and tear on the equipment. The screen is undersized for the room, making text and visual details difficult to read from the back of the room.
  - Ambient light from the windows tends to wash out the image.
  - **RECOMMENDATIONS**
    - Permanently installing a motorized projection screen that rejects ambient light
    - Permanently installing a projector to produce an appropriate image size and brightness.
    - Provide the means to connect a laptop computer located within the sanctuary
    - Provide a desktop computer with a permanent connection to the projector, sound system, and internet, with the ability to remote control a presentation from a hand-held device.
    - A projector, screen, computer, and installation are NOT included here, and will be detailed in a subsequent proposal.
- ❖ Power Conditioning
  - A 1500VA UPS battery backup with surge protection is included to help prevent failure in case of a brief power outage.
- ❖ Installation
  - Installation is estimated to take 4 days, and will involve
    - mounting and securing the two loudspeakers from the arch
    - emptying and reconfiguring the equipment rack
    - installing new wall boxes and connector panels for the equipment rack
    - Installing the induction loop from the lower floor and a connector wall panel behind the equipment rack
    - Installing the stage boxes
    - testing the system
    - certifying the induction loop to international standards for performance
- ❖ Training & Support
  - I include two days of training in the proposal, including one for Sunday services.
  - Answering questions by phone is always free.
  - Warranty service calls are included for one year from the installation date
    - Warranty service is for equipment and wiring failure. Correcting operator errors is not warranty service.
  - Up to two minor programming changes are included within the warranty period.
  - Remote login service fee for non-warranty service is \$15.00/quarter hour.

## ON LIVE SOUND MIXING AND RECORDING

While decision makers are often not the sound system operators, it can be helpful to have a brief appreciation for the requirements.

In a room intended for presentations before groups of people, Intelligibility and comfort are paramount requirements. Without them, the space cannot fulfill its intended purpose. From a systematic perspective, a “Sound System” includes everything from a presenter’s mouth or instrument to a listener’s ears. Everything in between, from microphone to room acoustics, interacts with each other in a chain-like fashion resulting in the listener’s perception of what was presented.

The sound mixer is the heart of any sound system and the unit that the operator will use most often. It is the most complex component, the place where the sound can either be improved or destroyed by varying degrees.

The Sound Mixer is the component that first combines and blends all the sources in the proper proportion, makes subtle adjustments to highs, lows, mids, and other sound properties, and then distributes the final mix to a number of destinations such as multiple loudspeakers, recorders, hearing assistance systems, streaming, etc..

Sometimes, different destinations have different mixing requirements.

The choir and other performers listening to stage monitors, have even different mixing needs.

### FOR THE SANCTUARY

The sole task of a sound mixer operator is to make critical judgments and adjustments to insure that the congregation hears intelligible, well balanced sound at an appropriate level; that the correct mics are turned on and off at the correct times; and more. In order to do that the operator must be within the congregations’ environment, hearing what they hear, and being able to visually observe the “stage” to follow presenter and performer’s movements. For these reasons, the operator cannot effectively fulfill their task from a different room.

The mixing station would therefore be optimally located in the sanctuary, and this should always be seriously considered as, in this case, function should take precedence over aesthetic resistance. However this is often not feasible based on a lack of suitable space.

However, today’s technology offers us a viable alternative when absolutely necessary. We can control many functions of a digital mixer from a wireless tablet such as an Android or iPad. While not a complete substitute it can be very effective, allowing the operator to be inconspicuously seated anywhere in the room without permanently installed equipment. This option is included in this proposal.

FOR EVERYONE ELSE (RECORDING, OVERFLOW, AND LISTENING ASSISTANCE)

I refer to these as your “Remote” or “Broadcast” audience, those not in the room at the time.

Think in terms of two separate audiences –people in the sanctuary, and people listening to a recording at a later time and in a different space. A soft spoken person at the pulpit might need quite a bit more volume gain to the loudspeakers to be heard well in the sanctuary. Someone with a strong speaking voice might need very little. Drums, or a powerful singer accompanied by an energetic piano player may need no amplification at all for the sanctuary, and might not even require microphones. However these would result in recordings with wildly unbalanced levels and missing instruments and voices.

The folks at home do not have the benefit of hearing the acoustic sound coming directly from the musicians. They can only hear what was recorded. Therefore a good quality recording mix is often completely different than a room mix, and requires that every voice and instrument to be mic’d and recorded whether they are amplified or not. Because one person can only do one mix at a time, this task then ideally requires two operators- One in and for the sanctuary, and one listening to and controlling only what is being recorded.

There are different ways to accomplish this and warrants further discussion, but the capability is included as proposed.

Let me note that the resources devoted to the quality of a recording is dependent on its importance to the ministry and the church. If the event will be streamed, or the recordings distributed on CD, or posted on a web site, then a good quality mix should be deemed very important and resources should be allocated. If a recording will simply document the event, with no intention for regular playback, it can be deemed low in importance and a reduced quality mix could be acceptable.

Thank you,

Marty Atias, Owner

ATS Communications

## PRICING

Category	Price	Speaker Option 1	Speaker Option 2
Speakers	\$ 3,174.00	-\$1,300.00	-\$1,470.00
Amps	\$ 555.00	-\$80.00	-\$80.00
Mixers /Processors	\$ 1,900.00		
Bluetooth Interfaces	\$ 49.00		
Wired Microphones	\$ -		
Wireless Microphones, Batteries	\$ 731.00		
Wire & Cable	\$ 328.00		
Wall Plates	\$ 122.00		
Computer / Network (Estimated)	\$ 1,345.00		
Power Protection	\$ 200.00		
Misc	\$ 500.00		
Labor	\$ 4,480.00	-\$320.00	-\$320.00
Assisted Listening Total	\$ 2,554.00		
Freight	\$ 100.00		
<b>GRAND TOTAL</b>	<b>\$ 16,038.00</b>	<b>-\$1,700.00</b>	<b>-\$1,870.00</b>

## Terms & Conditions

- Pricing quoted above is based on available information, certain assumptions, and estimates of cost. It is not a fixed, firm price.
- This proposal is negotiable. Certain feature and equipment categories can be delayed or eliminated.
- Upon final acceptance and signing, contract is non-cancellable
- Payment schedule shall be:
  - 50% with contract
  - 40% at final testing
  - 10% within 30 days of completion