

Hearing Enhancement and Modern Square Dancing

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2024-02-03

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Overview

There was a time where having hearing enhancement at modern square dances was optional. This is no longer true.

In the United States, the Americans with Disabilities Act of 1990 (the ADA) prohibits discrimination against individuals with disabilities in all areas of public life. It mandates certain accommodations in facilities that are open to the public.

Personal amplification devices such as hearing aids, cochlear implants, and bone anchored hearing aids (BAHA) can make sounds more audible for deaf individuals with residual hearing. *Residual hearing* is the ability to experience some sounds even with hearing loss.

It is important to note that not everyone will experience the same benefit from these types of personal listening devices. Also, not everyone with hearing loss uses personal amplification devices.

Relying on residual hearing or personal amplification devices—such as hearing aids—is insufficient in difficult listening situations like square dancing. One remedy is to use an assistive listening system (hearing enhancement) such as those sold by Williams AV products.

Assistive listening systems can offer support for dancers that are deaf or hard of hearing by removing or limiting interference from the music, background noise in the hall, side conversations, and HVAC systems.

The Williams AV assistive listening system operates like a small radio station. An FM transmitter, directly connected to an amplifier, broadcasts a radio signal on a pre-set frequency. This signal is received by individual radio receivers designed for these reserved frequencies. Some newer receivers have ways to interface with hearing aids. Dancers with hearing aids or other personal amplification devices should consult with their audiologist to determine the best option.

Transmitter Setup

The most common assistive listening transmitters in the US are from Williams AV and are branded “Williams Sound.” If purchasing brand new transmitters (PPA-T27), the cost ranges between \$700 and \$900. However, older/used systems can be found on auction sites like eBay in the \$100-200 range. (Search for “PPA-T17” or “T17.”)

ADA Reserved Frequencies

In the United States, ADA systems operate at FCC-designated frequency bands in two separate ranges. For indoor use, the range is 72 to 76 MHz and, for outdoor systems, 216 to 217 MHz.

The indoor use 72 to 76 MHz band has 17 available frequencies:

72.1, 72.2, 72.3, 72.4, 72.5, 72.6, 72.7, 72.8, 72.9, 74.7, 75.3, 75.4, 75.5, 75.6, 75.7, 75.8, and 75.9 MHz

Choosing an ADA Transmitter Frequency

The de facto standard frequency for square dancing in most of the US is 72.9 MHz. (This is also the default setting from Williams Sound transmitters and receivers.)

Note: Please check with local caller/club associations to determine the frequency needed.

Also, be aware that some festivals/weekends/conventions with multiple dance halls have rules that govern frequency distribution to prevent overlap. Learning this information—in advance—will help save time and effort.

Hilton Amplifiers and Turntables

In general, if the Hilton has a voice-only output available, this is the connection to use.

Hilton turntables from the Micro 75A series and newer have voice-only outputs. The MA-150 and MA-220 both have voice-only output as well. The MA-220 has a dedicated output but the MA-150 has a selector switch that must be moved to the “voice” position.

There are dance leaders that insist that both the music and voice signals be connected to listening assistance devices. The problem with this is that, for some people, music acts as interference.

Dancing is moving to music and hearing the music is important to the experience. However, for modern square dancing, the caller’s commands are more important than hearing the intricacies of the music.

The goal of the assistive listening equipment is to limit audio interference as much as possible to ensure the calls can be heard and understood.

The music heard for dancing from the speakers is good enough for dancing purposes. Musical cues are also available from the vibrations of the floor and viewing other dancers.

Only send the voice signal to assistive listening transmitters.

Hilton MA-150

To get the vocal channel from the MA-150, use the monitor feature located on the front panel.

Looking at the top and front of the MA-150, there’s a switch at the bottom-left corner that says “Music” on the top and “Voice” on the bottom. This controls what signal is sent to the monitor output jack on the front of the amplifier.

Ensure the switch is in the down/voice position.



Figure 1: Hilton MA-150 Monitor Control Panel

Below the switch is a volume knob that controls the amount of signal sent to the monitor output. As a rule, start with it pointing towards the selector switch. (The halfway point.) This might need to be turned up or down depending on the individual amplifier and the transmitter.

The front of the MA-150 has a mono RCA female connector.



Figure 2: MA-150 Monitor Output Jack

Use an RCA male-to-male cable to send the audio from the monitor output to the transmitter. Both the Williams Sound PPA-17 and PPA-27 have RCA female connectors for their inputs.



Figure 3: RCA Male-to-Male Patch Cable

Hilton MA-220

Like the MA-150, the MA-220 has controls for voice and music output on the top of the unit in the bottom left-hand corner. Instead of labeled as a monitor, the MA-220 labels them as auxiliary outputs.



Figure 4: Hilton MA-220 Music Controls

There is no selector switch—like the one on the MA-150—because the music and voice are sent to the front panel independently.



Figure 5: Hilton MA-220 Auxiliary Output Panel

Like the MA-150, connect one end of an RCA male-to-male cable to the “voice out” on the MA-220 and the other end to the transmitter.

If it helps, think: “Red is right.”

Hilton AC-205/Micro-100 Turntables

The Hilton AC-205 and Micro-100 have outputs like the ones on the MA-220. The music and voice outputs have knobs to control the signal levels and female RCA connectors for output.

Connect the voice out to the Williams Sound assistive listening transmitter.



Figure 6: Hilton AC-201 Monitor Output Panel

Hilton AC-201 Turntable

The Hilton AC-201 turntable has tape-in and tape-out connectors on the bottom right-hand corner of the control panel. The location and connectors are different than the ones found on the AC-205. The 205 uses 1/8th inch connectors for input and RCA connectors for output.

There are four RCA connectors in the section labelled “tape.”

The voice-only output is on the bottom left.

There is no knob/control for adjusting the signal output.



Figure 7: Hilton AC-201 Microphone and Tape Control Panels

Hilton Micro-75 Series

Micro-75

The original Hilton Micro-75 does **not** have separate music and voice input/output connectors.

There is a “Tape Output” on the back of the unit. However, this output is **not** line-level. It’s microphone level because it was designed to send signal to a cassette recorder’s microphone input jack.

The tape output signal will **NOT** work with assistive listening transmitters.

Original Micro-75s that were modified by Hilton (or others) over time might have an output that was added to provide line-level. If so, this could be used with an assistive listening transmitter. When has both music and voice, it mirrors what is going to the speakers. Since music can interfere with the voice, adjust the volume to use more voice signal that usual.

The only thing that should ever be plugged into the speaker jacks are speakers.

Never—as in ever—plug an assistive listening transmitter into a speaker jack.

Micro-75A/B/C

Hilton Micro-75A/B/C turntables have RCA jacks on the front panel labeled “Tape Music” and “Tape Voice.” They are located on the far-left and far-right sides of the control panel.

According to the Hilton documentation, “These jacks may be used with a stereo recorder to make a two-track tape recording, with voice on one track and music on the other.”

This is different than the AC-201 and AC-205 turntables because these, on the 75A/B/C, the music and voice jacks are used as both inputs and outputs.

TAPE MUSIC AND TAPE VOICE JACKS

These jacks may be used with a stereo recorder to make a two track tape recording, with voice on one track and music on the other. They are also used to playback a two track tape through the Micro-75B. See the sections titled MAKING TAPE RECORDINGS and PLAYING BACK TAPE RECORDINGS.

Figure 8: Image of the Micro 75B manual

The “Tape Voice” control is on the bottom right-hand side of the control panel.



Figure 9: Hilton Micro 75B Microphone inputs

As with the other Hilton turntables and amplifiers, use an RCA male-to-male cable to connect the “Tape Voice” output with the assistive listening transmitter.

Williams Sound Assistive Listening Devices

The two most common assistive listening transmitters used in the US are sold by Williams Sound. They are the PPA-17 (discontinued) and the PPA-27.

Williams Sound PPA-T17

The Williams Sound PPA-T17 is an older unit and, while not currently available to buy new, is often available through online auction sites like eBay.com.



Figure 10: Williams Sound PPA-T17

PPA-T17 Front Panel

The front panel of the PPA-T17 has four sections. There is a microphone input, a level control, an audio indicator light, and a light to indicate when the unit has power. (There is no on/off switch. The T17 is designed to be on continuously.)

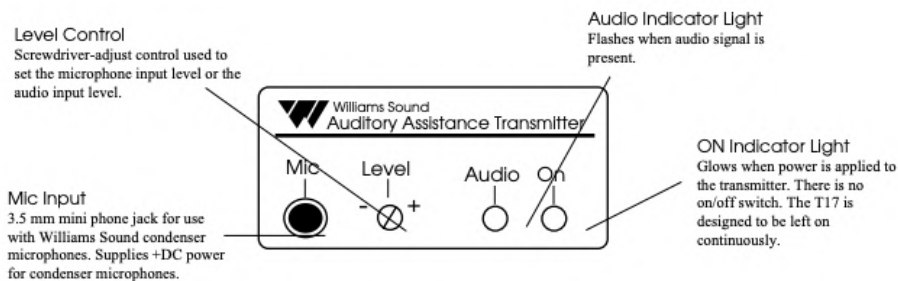


Figure 11: PPA-17 Front Panel Diagram

Mic: The Mic input is for condenser microphones. **Do NOT use it.** Use the Line-Input RCA connector on the **back** of the transmitter.

The amount of electrical current for audio line levels are much greater than microphone levels and can damage the transmitter. Also, the PPA-T17 has, by default, added power to the mic input for Williams Sound branded condenser microphones. **Using the Mic input with line-level outputs could damage the transmitter.**

Level: The input level can be adjusted as needed depending on the signal coming from the Hilton amplifier. Start with the level at the halfway point and adjust as necessary.

Since some of the Hilton turntable and amplifiers can adjust their output signals, it might take some experimentation to find the correct settings.

Audio: The audio level indicator LED has three possible states.

1. **Off/Dark:** The audio signal is TOO LOW
2. **Blinking occasionally:** The audio signal is OPTIMAL
3. **Always on:** The audio signal is TOO HIGH

While talking/calling into a microphone connected to the Hilton amplifier, use a small screwdriver to rotate the level control on the front of the T17.

Rotate it clockwise/right to increase the audio level and counterclockwise/left to decrease it.

PPA-T17 Rear Panel

The T17 has three sections on the rear panel. There's an adapter for a remote antenna, a power connector, and an RCA jack for line-level (unbalanced audio) input.

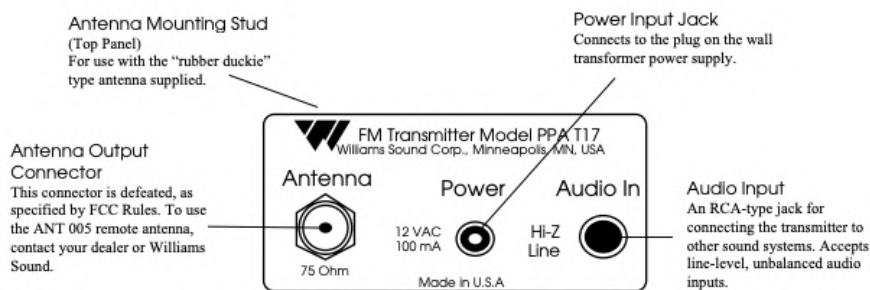


Figure 12: PPA-T17 Rear Panel

Antenna: The antenna output connector on the rear panel is disabled by default. (This is also an FCC requirement.) It is designed for locations where a permanent antenna has been installed. Contact Williams Sound to enable it.

Instead, there is an antenna connector on the top of the unit. This type of antenna is often called a "rubber duckie" or a "stubby." It can be easily removed for storage and/or transport.

Be careful when installing the top-mounted antenna. It only needs to be "finger tight."

Power: There is no power switch. The T17 is designed to be on all the time when connected to power.

IMPORTANT: Only use power supplies/transformers designed for the T17. Most consumer-grade transformers for electrical devices like these convert AC (Alternating Current) to DC (Direct

Current). However, the T17 uses **12 Volts of AC** to run. A 12 Volt DC transformer will **NOT** work with Williams Sound transmitters.

Read the above paragraph again.

Audio In: The audio input uses an RCA connector for mono, line-level input. Connect the voice output from the Hilton turntable/amplifier to this input.

Changing the PPA-T17 Transmission Frequency

Normally, the PPA-T17's frequency is pre-set at the factory to 72.9 MHz. For square dancing—in most areas of the United States—this means it requires no change.

Changing the transmission frequency is a fairly easy process. However, it does require taking the unit apart to do it.

- Unplug the power cord from the Transmitter and remove the antenna
- Use a Phillips-type screwdriver to remove the two screws on the rear of the Transmitter
- Remove the cover
- Slide the circuit board out of the case
- Use the diagram below to locate the frequency selector switches on the circuit board

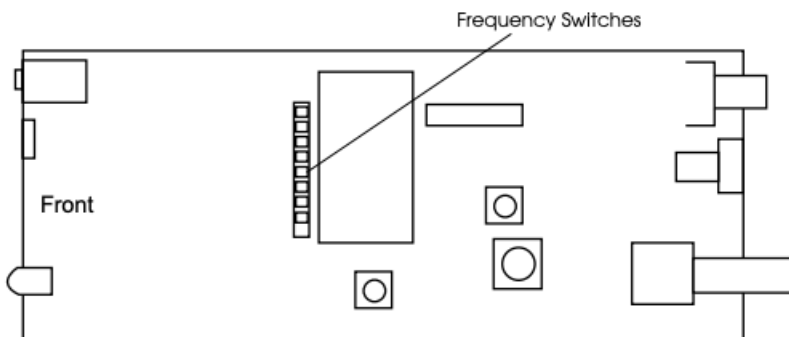


Figure 13: PPA-T17 Circuit Board Diagram

The above diagram is *not* to scale. Here's a photo of the circuit board.



Figure 14: Williams Sound PPA-T17 Circuit Board

The frequency selector switches are near the Motorola chip near the front of the circuit board.

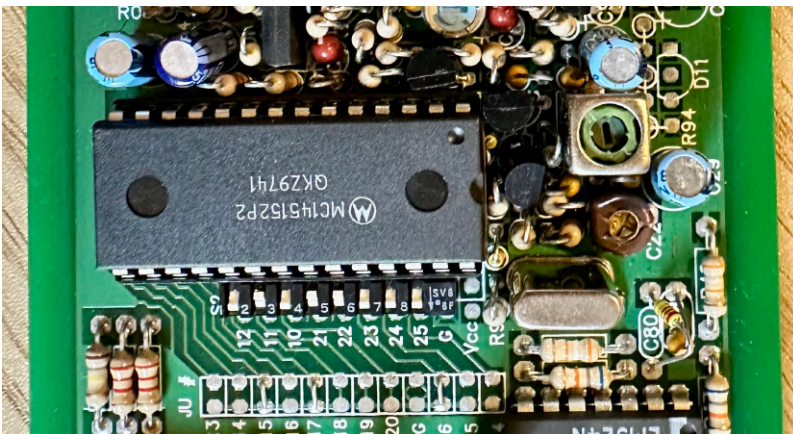
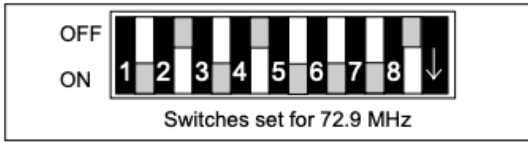


Figure 15: T17 Frequency Selector Switches

There is a frequency programming chart on the bottom of the T17 transmitter.

For the frequency 72.9 MHz, the switches are set: Down, Up, Down, Up, Down, Down, Down, Up



FREQUENCY (MHz)	1	2	3	4	5	6	7	8
72.1	DN	UP	DN	UP	DN	DN	DN	DN
72.3	DN	UP	DN	UP	UP	DN	DN	DN
72.5	DN	UP	DN	UP	DN	DN	UP	DN
72.7	DN	UP	DN	UP	UP	DN	UP	DN
72.9	DN	UP	DN	UP	DN	DN	DN	UP
75.5	UP	UP	DN	UP	UP	DN	DN	DN
75.7	UP	UP	DN	UP	DN	DN	UP	DN
75.9	UP	UP	DN	UP	UP	DN	UP	DN
74.7	UP	DN	DN	UP	UP	DN	DN	UP
75.3	UP	UP	DN	UP	DN	DN	DN	DN

Figure 16: T17 Frequency Programming Chart

ONLY use a paper clip or small screwdriver to set the switches.

DO NOT USE A PEN OR PENCIL TIP TO CHANGE THE SWITCHES!

After changing the frequency, re-assemble the transmitter, plug it in, and test it with a compatible receiver.

Williams Sound PPA-T27

When the PPA-T17 was discontinued it was replaced with the PPA-T27.



Figure 17: Williams Sound PPA-T27

It is more user friendly as the frequency can be changed using the front panel.

It also has a power supply that has a distinct size/shape that avoids confusion with other consumer-grade transformers.

PPA-T27 Front Panel

There are 5 sections on the front panel. There's a condenser microphone input, an audio level indicator, and audio level control, the frequency display, and a pair of buttons used to change the frequency.

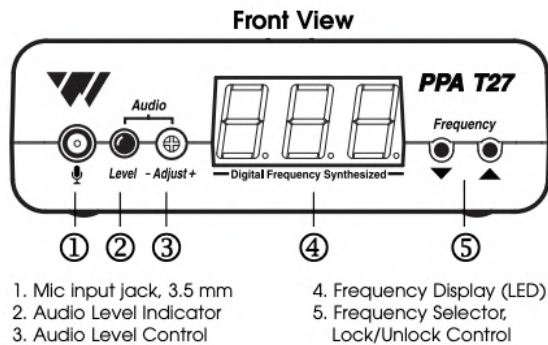


Figure 18: PPA-T27 Front Panel

The Mic Input Jack: As with the T17, do not use the microphone input. The electrical current for audio line-level is much higher than the current used for condenser microphones. **Using a line level input with the microphone jack could damage the transmitter.**

The Audio Level Indicator: The audio level indicator LED has three possible states.

1. **Off/Dark:** The audio signal is TOO LOW
2. **Blinking occasionally:** The audio signal is OPTIMAL
3. **Always on:** The audio signal is TOO HIGH

Audio Level Control: The input level can be adjusted as needed to match the signal coming from the Hilton amplifier. Start with the level at the halfway point and adjust as necessary.

While talking/calling into a microphone connected to the Hilton amplifier, use a small screwdriver to rotate the level control on the front of the T27.

Since some of the Hilton turntable and amplifiers can adjust their output signals, it might take some trial and error to find the correct levels for both the Hilton amplifier and the Williams Sound transmitter.

Frequency Display: When first powered on, the number 8 will scroll across the T27 display. After the system initializes, the display shows the transmitter's frequency.

Frequency Selector: Like the T17, the T27 has 17 available channels in the ADA 72-76 MHz band.

The factory default of the T27 frequency is 72.9 MHz. When powered on, the T27 automatically returns to the frequency from the previous use.

To change the frequency on the T27, press and release the down (▼) or up (▲) frequency selector button until the desired frequency is displayed on the LED.

After 3 seconds, the frequency selection is set.

NOTE: It is possible to LOCK the frequency selection to prevent accidental changes.

To **LOCK** the desired frequency, press and hold both the down (▼) and up (▲) frequency selector buttons for 3 seconds until the word “Loc” appears on the display.

If a frequency selector button is pressed while in lock mode, the word “Loc” displays for 2 seconds.

To **UNLOCK** the frequency selector, press and hold both the down (▼) and up (▲) frequency selector buttons for 3 seconds. In the LED panel, “Un” then “Loc” will appear on the display.

PPA-T27 Rear Panel

The rear panel has three connectors. There is a power input jack, a connector for an external antenna, and an RCA connector for audio line-in levels.

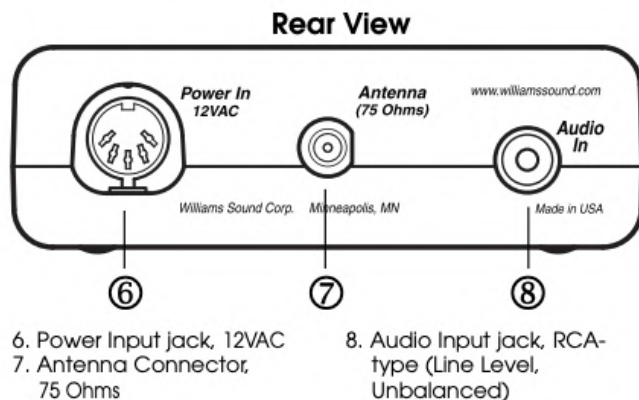


Figure 19: PPT-T27 Rear Panel

Power: The power supply has 5-pin DIN connector that converts 120 Volts AC to 12 Volts AC.

Antenna: The antenna output connector on the rear panel is off by default. (This is also an FCC requirement.) It is used for locations where a permanent antenna has been installed. Contact Williams Sound to enable it.

Instead, there is an antenna connector on the top of the unit. This type of antenna is often called a “rubber duckie” or a “stubby.” It can be easily removed for storage and/or transport.

Be careful when installing the top-mounted antenna. It only needs to be “finger tight.”

Audio In: The audio input uses an RCA connector for mono, line-level input. Connect the voice output from the Hilton turntable/amplifier to this input.

Summary

When using assistive listening transmitters (commonly called hearing enhancement), send only the voice signal. *If this is not possible and both music and voice have to be sent to the transmitter, adjust the voice/music mix to have more voice signal.*

The default frequency for most square dance clubs in the US is 72.9 MHz. This is also the factory default setting from Williams Sound.

Verify with local caller/clubs what frequency (or frequencies) are used in an area.

Use an RCA male-to-male cable to connect the amplifier to the transmitter. Take the voice output from the Hilton and send it to the Audio In (line-level) on the back of the Williams Sound transmitters.

If there’s interference in the audio signal, consider using a shielded RCA cable or move the transmitter a couple of feet away from other equipment/power.

ADA transmitters have a relatively short range; about 1,000 feet. (300 meters.)

It is always helpful to have a spare receiver, headphone, and battery on hand. It can be used to test the transmitter’s signal **and** be available for a dancer in need of accommodation. Auction sites like eBay regularly have used receivers for sale. *Often, they come from church groups and museums and have suffered much abuse.* Even if one or two are unusable, buying in bulk can save money.

Receivers have mono outputs. Plugging stereo headphones into a receiver—especially older ones—might only have sound in one channel because of this. This is expected behavior.