

UHF

**SYNTHESIZED
TRUE DIVERSITY
WIRELESS
SYSTEM**



UR-5 RECEIVER

UR-5D RECEIVER

UT-5 BELT PACK TRANSMITTER

UH-5 HAND-HELD MICROPHONE TRANSMITTER

DA-5L UHF ANTENNA DISTRIBUTION AMPLIFIER

•dbx® Noise Reduction

SAMSON®

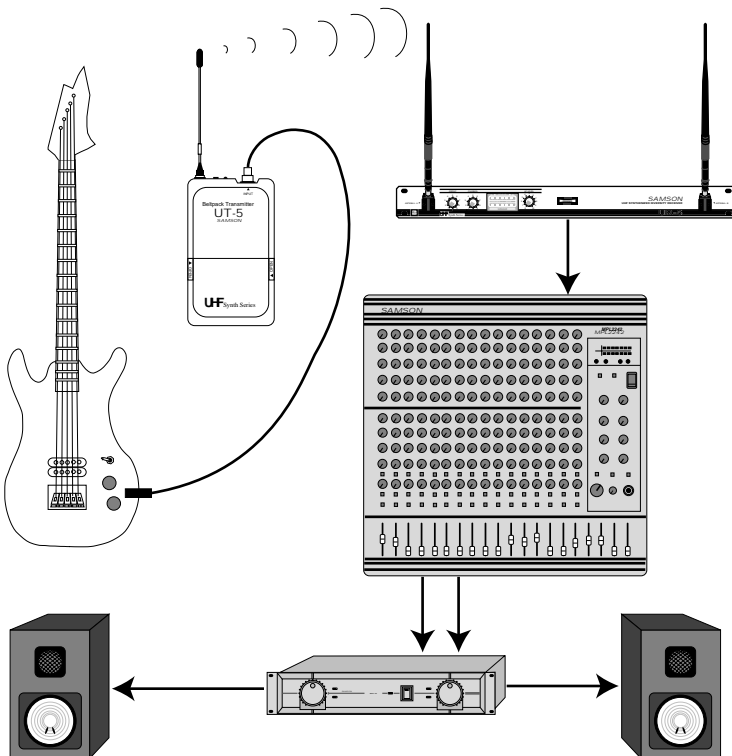
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Introduction

Congratulations on purchasing the Samson UHF Synthesized True Diversity Wireless System! Although this product is designed for easy operation, we suggest you take some time out first to go through these pages so you can fully understand how we've implemented a number of unique features.

Every wireless system consists of at least two components—a transmitter and a receiver. The Samson UHF Synth System you have purchased contains either our UT-5 belt-pack transmitter (for lavalier microphone, headset microphone, and guitar applications) or our UH-5 hand-held microphone transmitter. The matching receiver is either our UR-5 single diversity model (for reception of a single monophonic signal), or our UR-5D dual diversity model (for reception of two monophonic signals or a stereo signal). Here's an illustration that shows an overview of our system design:



Introduction

The concept behind a “true diversity” wireless system is that a single chassis houses two discrete receivers (called “channel A” and “channel B”) instead of one, with both tuned to the same frequency but with each using an independent antenna. A built-in computer chip then continuously scans the two receivers and determines which one has the clearest and strongest reception, automatically (and silently) switching to that channel. This allows you to maintain the wireless communication link over a much broader area range than would be allowed by a single receiver and also virtually eliminates interference and phase cancellation problems. In addition, our special circuitry, which utilizes the UHF (Ultra High Frequency) band, delivers the highest-quality sound available in any wireless system. Finally, the provision of dbx® noise reduction* produces crystal-clear sound with minimized background noise and hiss. Your UHF Synthesized True Diversity System may also optionally include a DA-5L UHF Antenna Distribution Amplifier. For more information on this device, see pages 28 - 33.

In this manual, you’ll find a more detailed description of the features of this system, as well as a guided tour through all components, step-by-step instructions for setting up your system, trouble-shooting tips, wiring diagrams and tables, a glossary of terms, and full specifications. You’ll also find a warranty card enclosed—don’t forget to fill it out and mail it! This will enable you to receive online technical support and will allow us to send you updated information about these and other Samson products in the future.

SPECIAL NOTE: Should any component of your UHF Synthesized True Diversity Wireless System ever require servicing, a *Return Authorization* number (RA) is necessary. Without this number, the unit will not be accepted. Please call Samson at 1-800-372-6766 for a Return Authorization number prior to shipping your unit. Please retain the original packing material and, if possible, return the unit in its original carton and packing materials.

* *dbx* is a registered trademark of Carillon Industries.

System Features

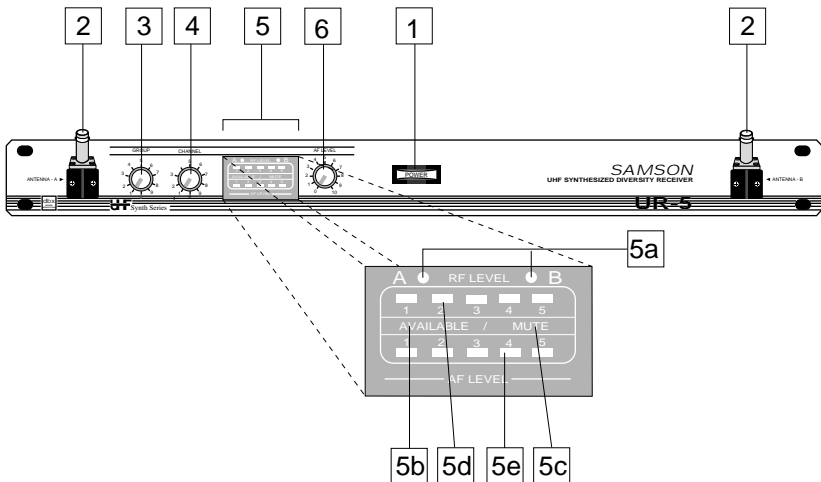
The Samson UHF Synthesized True Diversity System utilizes state-of-the-art technology in wireless communications. Here are some of its main features:

- 74 available channels organized in 10 different groups in both the receiver and transmitter, with up to 11 channels available for simultaneous use. This makes our UHF Synth System the ideal choice in multi-user environments such as stage productions and live band performance. It is also specifically suited for systems that travel into “hostile” RF environments (such as highly populated urban areas, where large numbers of radio transmissions occur simultaneously over broad bandwidth areas).
- The use of the UHF (Ultra High Frequency) band as opposed to VHF (Very High Frequency), which yields better signal-to-noise ratio and improved frequency response—in plain English, superior sound quality. The UHF band is also considerably less crowded than VHF, thus minimizing potential interference problems. In addition, our special *dielectric filtering* circuitry (which, incidentally, is based upon cellular phone technology) provides extra narrow bandwidths, thus further reducing interference.
- True Diversity technology, which greatly extends the effective range of the system and also virtually eliminates interference and phase cancellation problems.
- Built-in dbx® noise reduction circuitry in both the transmitter and receiver. This ensures clear, transparent sound with an absolute minimum of background noise and hiss.
- A clear, easy-to-read visual display that shows continuous RF (Radio Frequency) level (indicating the strength of the received signal) as well as AF (Audio Frequency) level. The RF level display also shows the clearest frequency to use in crowded wireless environments.
- Balanced and unbalanced audio outputs on both the UR-5 and UR-5D receivers, making them compatible with all types of external audio mixers and amplifiers.

System Features

- The UT-5 and UH-5 transmitters both accept standard 9-volt alkaline batteries, and the UR-5 and UR-5D receivers can accept any AC power voltage from 100 - 250 volts, without the need to change a voltage selector switch (our special current and voltage sensing circuitry does the job automatically for you).
- Tuned coaxial antennas are included, with options for rear-mounting or remoting if extended range is required.
- The UR-5D dual receiver actually contains *two* separate true diversity receivers in a single chassis for the reception of two discrete monophonic signals or a stereo signal. It also provides an option for output mixing, which combines the received signals from both inputs into a single monophonic output—critical when using audio mixers with limited numbers of channels.
- All components utilize an automatic *tone squelch* feature that prevents the reception of unwanted signals.
- The UT-5 belt-pack transmitter is extremely light-weight (less than 4 ounces with a 9-volt battery installed) and is suited for a wide range of lavalier and headset mics and instruments such as electric guitar and bass. It also provides phantom powering, making it compatible with professional condenser lavalier and headset microphones.
- The UH-5 hand-held microphone transmitter features an all-brass housing painted with a durable epoxy base. A selection of mic capsules are available, including:
 - Electro Voice **757** N/DYM Dynamic
 - Electro Voice **857** N/DYM Dynamic
 - Sennheiser **MKE-4032** Condenser
 - Shure **SM58** Dynamic
 - Shure **SM87** Condenser
 - Shure **SM85** Condenser
- Both the UT-5 and UH-5 transmitters provide “popless” muting, which turns off the audio signal while leaving the carrier signal on.
- All components have rugged construction that ensures reliable operation in even the most demanding performance environments.

Guided Tour - UR-5/UR-5D Front Panel



1: Power switch - Use this to turn the main power on and off. When the receiver is on, the display section (see #5 on the next page) is lit.

2: Antenna A and B mountings - Connect the supplied antennas to these mountings. Third-party receiver antennas should *not* be substituted—use only the antennas provided with your receiver.

3: Group knob - Allows you to select any of ten frequency Groups (numbered from 0 - 9). When using the Samson UHF Synth System in a multiuser environment (that is, when there are two or more transmitters and receivers in use at one location), all receivers *must* be set to the same Group in order to avoid intermodulation distortion. Each individual performer is then assigned an individual Channel within that Group (up to eleven channels are available simultaneously*).

4: Channel knob - Allows you to select any of ten frequency Channels (numbered 0 - 9) within the selected Group.* When a new channel is selected, it takes approximately five seconds for audio signal to be passed through to the receiver outputs.

* Only group 9 has more than seven available channels; all other groups use channels 0 - 6. Refer to the UHF Frequency Chart on page 24 for more details.

Guided Tour - UR-5/UR-5D

Front Panel

5: Display section - Shows you information about the current status of your receiver.

5a: "A"/"B" LEDs - When signal is being received, one of these LEDs (which shows you whether the "A" or "B" channel is currently being used) will be lit. A computer chip inside the receiver constantly scans the two and automatically selects whichever is receiving the strongest, clearest signal. This "true diversity" switching is completely inaudible, but it effectively increases overall range while virtually eliminating potential interference and phase cancellation problems.

5b: "Available" LED - When lit, the selected Group and Channel (as determined by the Group and Channel knobs) is available for use. When off, the selected Group and Channel is unavailable and cannot be used. See the reference chart on page 24 for more information.

5c: "Mute" LED - Lights to indicate the absence of carrier signal. As described on page 20 of this manual, setting the UT-5 or UH-5 Audio switch to the "on" position operates a tone squelch feature by causing a 38.4 kHz signal to be added to the carrier. The illuminated word "MUTE" in the UR-5 and UR-5D display is a visual representation of the absence of this 38.4 kHz signal. When "MUTE" is lit, either the transmitter Audio switch is in the "off" position or the currently selected Group and Channel do not match that of the transmitter.

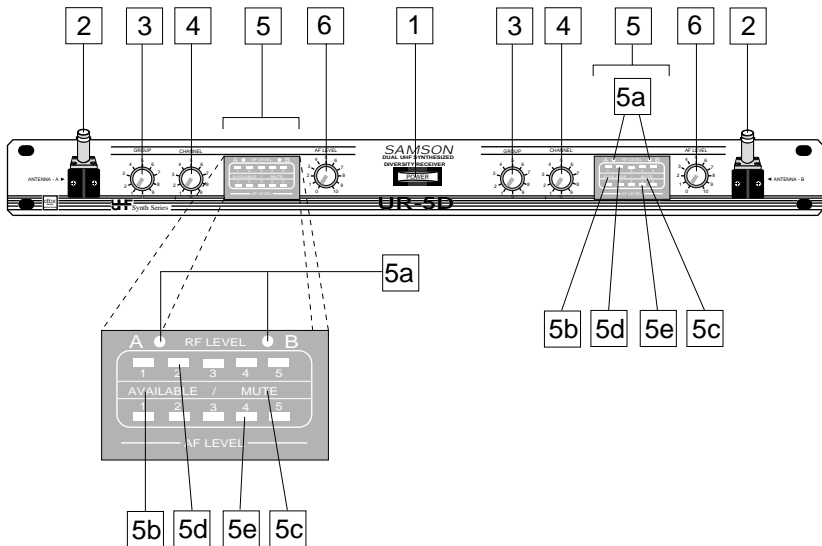
5d: RF (Radio Frequency) Level display - This "ladder" display (similar to the VU bar meter used on audio devices) indicates the strength of the UHF signal being received. When all five segments are lit, the incoming signal is at maximum strength; when only the left-most segment is lit, the incoming signal is at minimum strength. If no segments are lit, no signal is being received; check to ensure that the transmitter and receiver are set to the same Group and Channel (see the "Troubleshooting" section on page 21 for more details).

Guided Tour - UR-5/UR-5D Front Panel

5e: AF (Audio Frequency) Level display - This “ladder” display (similar to the VU bar meter used on audio devices) indicates the presence of audio signal. When all five segments are lit, the outgoing signal is at maximum strength; when only the left-most segment is lit, the outgoing signal is at minimum strength. If no segments are lit, little or no signal is being output; see the “Trouble-shooting” section on page 21 for more details.

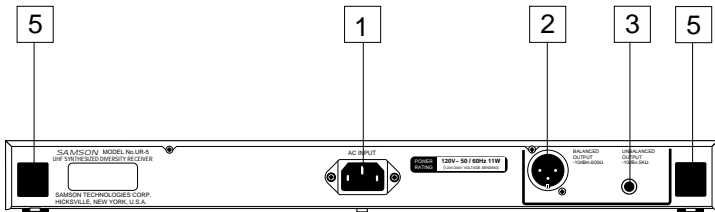
6: AF (Audio Frequency) Level - This knob determines the level of the audio signal being output through both the balanced and unbalanced output jacks on the rear panel.

NOTE: The UR-5D front panel (as shown below) is identical to that of the UR-5 except that it provides two display sections and two group, channel, and AF level knobs—one for each of its two True Diversity receivers.



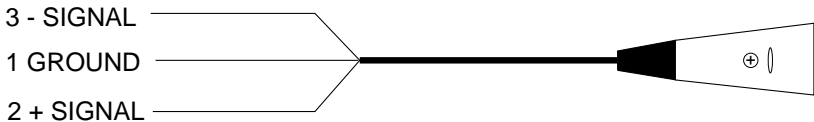
Guided Tour - UR-5/UR-5D

Rear Panel



1: AC input - Connect the supplied standard 3-pin “EEC” plug here. The UR-5 and UR-5D both contain automatic current and voltage sensing circuitry and so can accept any mains current from 100 - 250 volts without the need to set a selector switch.

2: Balanced output* - Use this electronically balanced low impedance (600 Ohm) XLR jack when connecting the UR-5 or UR-5D to professional (+4) audio equipment. Pin wiring is as follows:

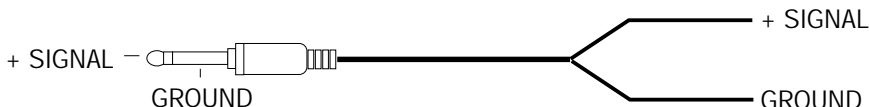


** If required, both the balanced and unbalanced outputs can be used simultaneously.*

Guided Tour - UR-5/UR-5D

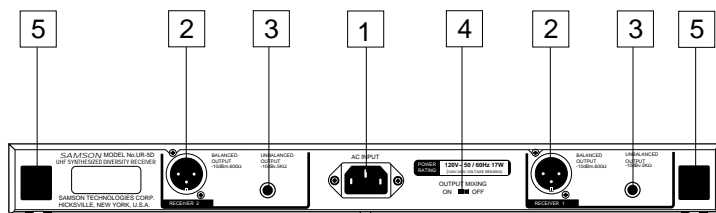
Rear Panel

3: Unbalanced output* - Use this unbalanced high impedance (5K Ohm) 1/4" jack when connecting the UR-5 or UR-5D to consumer (-10) audio equipment. Wiring is as follows:



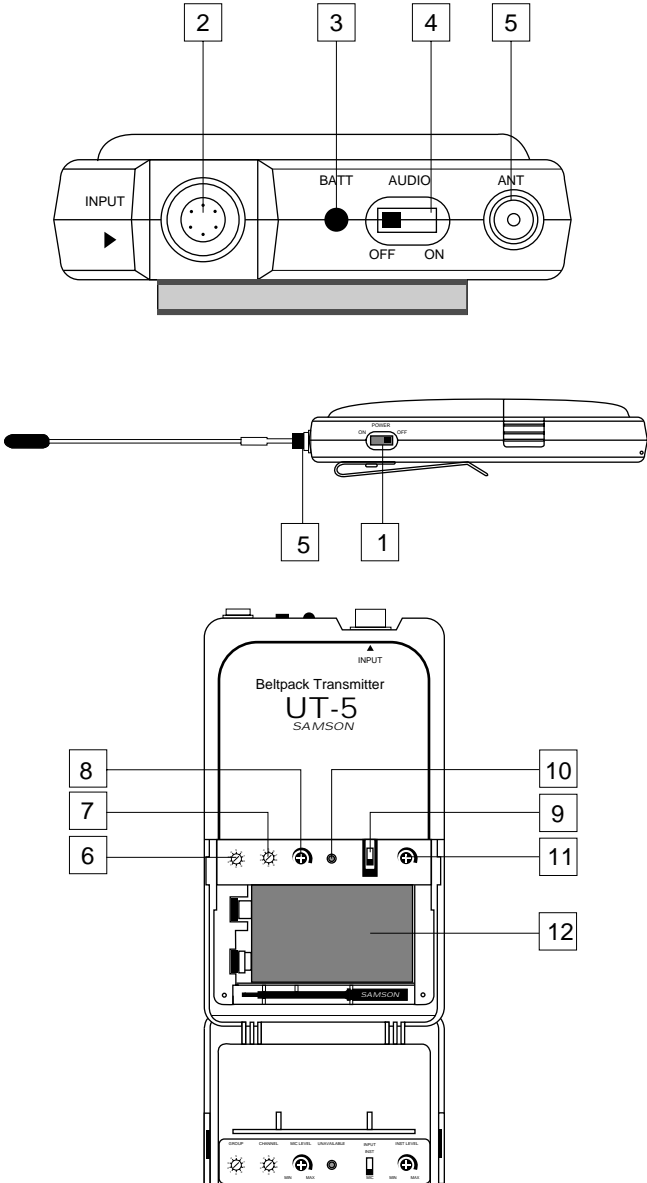
4: Output Mixing switch (UR-5D receiver only) - When on, the outputs from both receivers are mixed together equally into a single monophonic signal which appears at both sets of balanced and unbalanced outputs.

5: Rear-mount antenna knockouts - The receiver antennas can optionally be mounted at these areas of the rear panel. Contact Samson Technologies for information about our rear-panel antenna mounting kit.



** If required, both the balanced and unbalanced outputs can be used simultaneously.*

Guided Tour - UT-5



Guided Tour - UT-5

1: Power on-off switch* - Use this to turn the UT-5 on or off (to conserve battery power, be sure to leave it off when not in use).

2: Six-pin input connector - Connect your input device (lavalier mic, headset mic or instrument cable) here, using the supplied six-pin connector. A wiring diagram and chart (showing connections for many popular lavalier and headset mics) is presented on pages 25 - 27.

3: Battery LED - This LED is an indicator of battery strength. If the battery is sufficiently strong, when the UT-5 is first powered on, this LED will light for about two-tenths of a second and then go off.** When battery voltage is low, this LED lights steadily, indicating that the battery needs to be replaced.

4: Audio on-off switch - When set to the “on” position, audio signal is transmitted. When set to the “off” position, the audio signal is muted. Because the carrier signal remains during muting, no “pop” or “thud” will be heard. Note that turning this off does *not* turn off the transmitter power—it is simply a way to temporarily mute the transmission of audio signal. If you don’t plan on using the transmitter for extended periods, turn off the transmitter power by using the power on-off switch (see #1 above). As described on page 20 of this manual, setting the UT-5 Audio switch to the “on” position operates a tone squelch feature by causing a 38.4 kHz signal to be added to the carrier. The illuminated word “MUTE” in the UR-5 and UR-5D display is a visual representation of the absence of this 38.4 kHz signal. When “MUTE” is lit, either the transmitter Audio switch is in the “off” position or the currently selected Group and Channel do not match that of the transmitter.

5: Antenna - Connect the supplied transmitter antenna to this mounting. Replacement antennas are available from Samson Technologies if required.

** Be sure to mute the audio signal at your external mixer or amplifier before turning transmitter power on or off, or an audible pop may result.*

*** However, if you turn on the UT-5 within five seconds of turning it off, the Battery LED will not light. We recommend that you always leave at least five seconds between turning off and turning on the UT-5.*

Guided Tour - UT-5

6: Group selector - Use the supplied plastic screwdriver to set this to the desired Group (this must match the Group setting of the receiver—see the “Setting Up and Using the UHF Synth System” section on page 16 for more information).

7: Channel selector - Use the supplied plastic screwdriver to set this to the desired Channel (this must match the Channel setting of the receiver—see the “Setting Up and Using the UHF Synth System” section on page 16 for more information).

8: Mic level control (trimpot) - If you are using the UT-5 with a lavalier or headset microphone, use the supplied plastic screwdriver to set this input sensitivity control to the optimum level. See the “Setting Up and Using the UHF Synth System” section on page 16 for more information.

9: Input switch - Set this to either the “INST” position (if you are using the UT-5 with an instrument such as an electric guitar or bass) or to the “MIC” position (if you are using it with a lavalier or headset microphone).

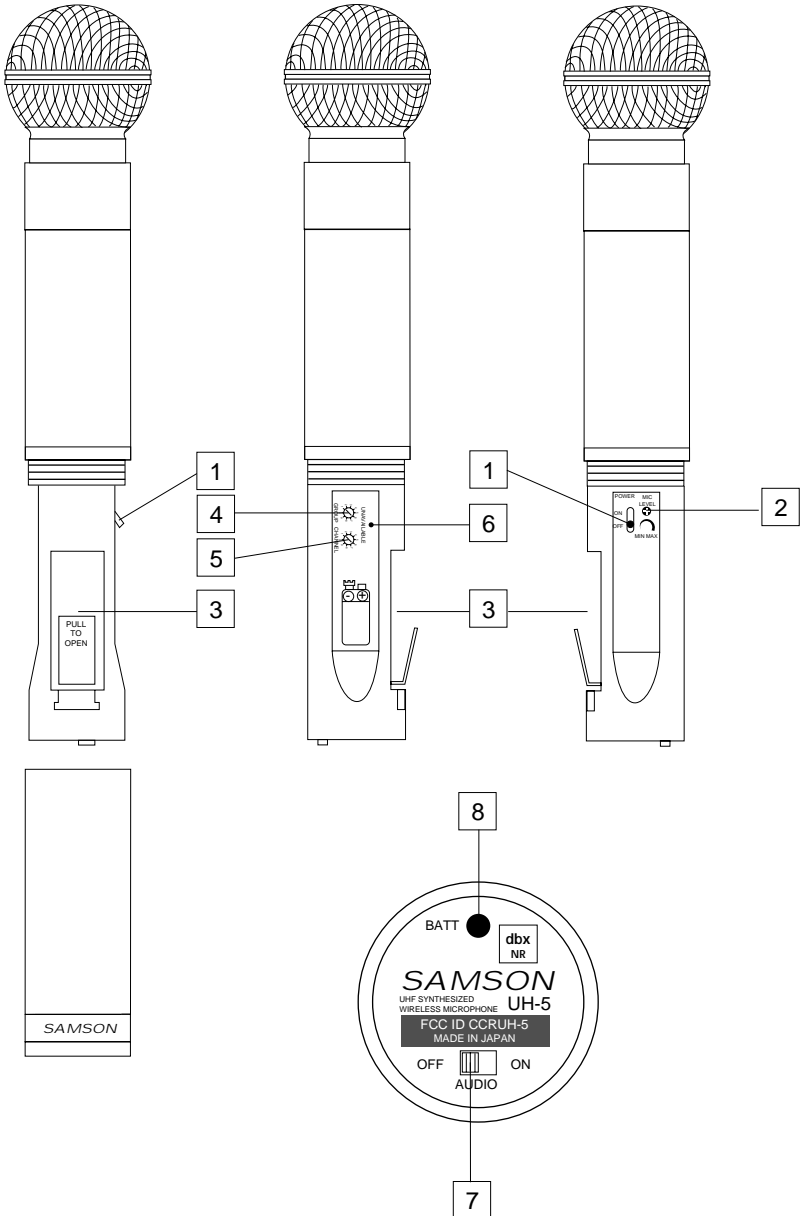
10: Unavailable LED - This LED lights when the selected transmitter Group and Channel (as determined by the Group and Channel controls) is unavailable (see the reference chart on page 24). If this lights, it is an indication that you must choose a different Group and/or Channel for both the UT-5 and the receiver. NOTE: It takes approximately two seconds for this to light if an unavailable channel is selected.

11: Instrument level control (trimpot) - If you are using the UT-5 with an instrument such as an electric guitar or bass, use the supplied plastic screwdriver to set this input sensitivity control to the optimum level. See the “Setting Up and Using the UHF Synth System” section on page 16 for more information.

12: Battery holder - Insert a standard 9-volt alkaline battery here, being sure to observe the plus and minus polarity markings shown.

13: Plastic screwdriver - Specially designed for use in setting the Group and Channel selectors (see #6 and #7 above) and for adjusting the Mic and Instrument level trimpots (see #8 and #11 above). See the “Setting Up and Using the UHF Synth System” section on page 16 for more information.

Guided Tour - UH-5



Guided Tour - UH-5

1: Power on-off switch* - Use this to turn the UH-5 on or off (to conserve battery power, be sure to leave it off when not in use).

2: Mic level control (trimpot) - Use the supplied plastic screwdriver to set this to the optimum microphone output level. See the “Setting Up and Using the UHF Synth System” section on page 16 for more information.

3: Battery holder - Insert a standard 9-volt alkaline battery here, being sure to observe the plus and minus polarity markings shown.

4: Group selector - Use the supplied plastic screwdriver to set this to the desired Group (this must match the Group setting of the receiver—see the “Setting Up and Using the UHF Synth System” section on page 16 for more information).

5: Channel selector - Use the supplied plastic screwdriver to set this to the desired Channel (this must match the Channel setting of the receiver—see the “Setting Up and Using the UHF Synth System” section on page 16 for more information).

6: Unavailable LED - This LED lights when the selected transmitter Group and Channel (as determined by the Group and Channel controls) is unavailable (see the reference chart on page 24). If this lights, it is an indication that you must choose a different Group and/or Channel for both the UH-5 and the receiver. **NOTE:** It takes approximately two seconds for this to light if an unavailable channel is selected.

** Be sure to mute the audio signal at your external mixer or amplifier before turning transmitter power on or off, or an audible pop may result.*

Guided Tour - UH-5

7: Audio off-on switch - When set to the “on” position, audio signal is transmitted. When set to the “off” position, the audio signal is muted. Because the carrier signal remains during muting, no “pop” or “thud” will be heard. Note that turning this off does *not* turn off the transmitter power—it is simply a way to temporarily mute the transmission of audio signal. If you don’t plan on using the transmitter for extended periods, turn off the transmitter power by using the power on-off switch (see #1 on the previous page). As described on page 20 of this manual, setting the UT-5 Audio switch to the “on” position operates a tone squelch feature by causing a 38.4 kHz signal to be added to the carrier. The illuminated word “MUTE” in the UR-5 and UR-5D display is a visual representation of the absence of this 38.4 kHz signal. When “MUTE” is lit, either the transmitter Audio switch is in the “off” position or the currently selected Group and Channel do not match that of the transmitter.

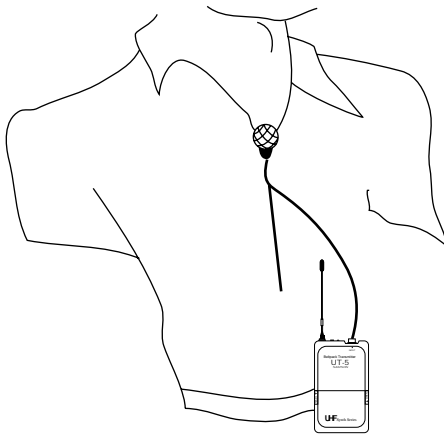
8: Battery LED - This LED is an indicator of battery strength. If the battery is sufficiently strong, when the UH-5 is first powered on, this LED will light for about two-tenths of a second and then go off.* When battery voltage is low, this LED lights steadily, indicating that the battery needs to be replaced.

** However, if you turn on the UH-5 within five seconds of turning it off, the Battery LED will not light. We recommend that you always leave at least five seconds between turning off and turning on the UH-5.*

Setting Up and Using the UHF Synth System

The general procedure for setting up and using your UHF Synth System is basically the same regardless of the particular components you are using (i.e. UT-5 or UH-5; UR-5 or UR-5D):

1. Remove all packing materials (save them in case of need for future service) and mount the supplied “A” and “B” antennas to your receiver by inserting the BNC connector and twisting clockwise until snug.



1a. If you are using the UT-5 beltpack transmitter, connect its antenna by inserting the wire and turning it clockwise until snug and then make the physical connection between its 6-pin plug and the lavalier microphone, headset microphone or instrument cable you are using (**be sure to correctly set the “Mic/Instrument” switch**). Because the 6-pin plug is “keyed,” you’ll need to rotate it a certain way to get it to “mate” with the connector mounted on the UT-5; then push straight down until you hear a click. To remove the 6-pin connector, lift up the outer sleeve and pull straight out (do not use force!). We recommend that you never pull on the wire, only the plug itself (with the outer sleeve lifted). If you are using a lavalier microphone, correct placement is critical to sound quality. We recommend that you place it as shown in the illustration above—as close to your mouth as possible but off to one side (to minimize nasality) and unobstructed by clothing. Bear in mind also that *omni-directional* microphones (mics which pick up signal from all direc-

Setting Up and Using the UHF Synth System

tions) are more prone to feedback problems than *unidirectional* (*cardioid* or *supercardioid*) ones; in general, you can avoid feedback by taking care not to use any microphone directly in front of a PA speaker (if this is unavoidable, you can try using an equalizer to attenuate those high frequencies which are causing the feedback “squealing”).

2. Place a fresh 9-volt alkaline battery (not supplied) into your UT-5 or UH-5 transmitter, taking care to observe the polarity markings. We recommend the Duracell MN 1604 type or equivalent. We do not recommend the use of rechargeable Ni-Cad batteries because they do not supply adequate current for any significant time period. For the moment, leave the transmitter turned off.

3. Make the physical cable connections between the output of your UR-5 or UR-5D receiver (using either the balanced or unbalanced jacks)* and the input of your amplifier or mixer. If you are using professional (+4) equipment, the balanced jack is preferable since it will deliver an electromagnetically cleaner signal. Leave the amplifier (and/or mixer) off at this time.

4. Connect the supplied 3-pin “EEC” plug into the UR-5 or UR-5D rear panel AC connector and plug the other end into any grounded AC socket.

5. Turn the AF Level knob on the UR-5 receiver (or both AF Level knobs on the UR-5D receiver) completely counterclockwise (to the “0” position) and depress the power switch to turn the unit on. The display section will light up.

6. Before utilizing the UR-5 or UR-5D Group and Channel knobs to select a frequency, determine how many transmitters and receivers you will be using in one location. As shown in the chart on page 24, Groups 0 through 8 provide seven available Channels each (0 through 6), while Group 9 provides eleven available Channels (0 through 9, plus Group 7, Channel 5). When two or more transmitters and receivers are being

** If required, both the balanced and unbalanced outputs can be used simultaneously.*

Setting Up and Using the UHF Synth System

used at the same location, *all devices must be set to the same Group* (though each will use its own Channel) or intermodulation noise may occur. If you are using the UR-5D receiver for the reception of a stereo signal (or for the reception of two simultaneous monophonic signals), both sides (Receiver 1 and Receiver 2) must be set to the same Group. If you are only using a single transmitter and receiver, you can select any Group and available Channel with a sufficiently strong signal (see #6 below). Start with Group 0 and scan through all available Channels while observing the *RF Level display* in the receiver. If any segments glow with the transmitter off, the selected Channel may be receiving interference and is probably unsuitable for use (one segment glowing is insignificant). Select a Group that has the greatest number of suitable Channels (that is, Channels where no segments light or glow with the transmitter off).* When you have decided which Group and Channel you wish to utilize, use the supplied plastic screwdriver to set the same Group and Channel on the appropriate UT-5 or UH-5 transmitter.

7. Turn on the power to the UT-5 or UH-5 transmitter (using its Power on-off switch) and observe the RF Level display in the UR-5 or UR-5D receiver; all segments should light up. When first setting up the UHF Synth System in a new environment, it's always a good idea to do a walkaround while experimenting with different Group and Channel settings—you may find that some cause more RF Level segments to light up than others (the more segments light, the stronger the signal). Always pick the Group that has the greatest number of clear Channels and the Channel providing the strongest signal. Note that whenever a new channel is selected, it takes approximately five seconds for audio signal to be passed through to the receiver outputs.

8. Once you've settled on your Group and Channel assignments, it's time to set the audio levels. If you are using the UH-5 transmitter or the UT-5 transmitter with a connected lavalier or headset microphone, speak or sing into the mic at a normal performance level while slowly raising the equivalent AF Level knob on the receiver to a level of approximately "8.". Observe the receiver's AF level display as you do so; one or more

* *If your installation requires more than seven simultaneous Channels, you'll have to use Group 9.*

Setting Up and Using the UHF Synth System

segments should light up. If you are using the UT-5 transmitter with a connected instrument, play the instrument at normal performance level while slowly raising the equivalent AF Level knob on the receiver to a level of approximately "8"; again, one or more segments in the AF Level display should light up as you do so.

9. Temporarily mute the audio signal by placing the UT-5 or UH-5 Audio switch to the "off" position. Then turn on your connected amplifier and/or mixer but keep its volume all the way down. Next, unmute the audio signal (by placing the UT-5 or UH-5 Audio switch to the "on" position) and speak into the microphone (or play the instrument) at a normal performance level. Slowly raise the volume of your amplifier/mixer until the desired level is reached. If you hear distortion, use the supplied plastic screwdriver to turn the Mic or Instrument control (trimpot) on the transmitter slowly counterclockwise until the distortion disappears. If you hear a weak, noisy signal, do the reverse: use the supplied plastic screwdriver to turn the Mic or Instrument control (trimpot) on the transmitter slowly clockwise until the signal reaches a good level.

10. If you are using the UR-5D receiver and you wish to keep the two output signals separate, make sure the Output Mixing switch on the rear panel is in the "Off" position. If you wish to mix the two signals together, set the switch to the "On" position; the two output signals will then be mixed together and routed to all four output jacks.

The basic rule of thumb for wireless audio systems is to always try to minimize the distance between transmitter and receiver as much as possible and also to try to maintain "line of sight" between the two (that is, the person using the transmitter should be able to see the receiver antennas). In fixed installations such as A/V or corporate conference rooms or for extended range applications (where the transmitter and receiver are more than 150 feet apart), it may be desirable to remote the receiver antennas so that the strongest possible signal is received from the planned transmission points. This can be accomplished by using standard BNC connections and 50 ohm coaxial cabling that is suitable for up to 1 gigaHertz bandwidth usage. For more information, see the "Trouble-shooting" section on page 21.

About dbx® Noise Reduction and Tone Squelch

About dbx® Noise Reduction:

All the components in the Samson UHF Synth System utilize dbx® noise reduction so as to ensure the highest fidelity sound with an absolute minimum of background noise and hiss. dbx® is a *companding* system; that is, the signal being transmitted has its dynamic range *compressed* and its high frequencies boosted (this process is known as *pre-emphasis encoding*), and the signal being received has its dynamic range *expanded* and high frequencies attenuated in an exactly opposite way (this process is known as *de-emphasis decoding*). The pre-emphasis encoding process is automatically carried out by the UT-5 and UH-5 transmitters and the de-emphasis decoding process is automatically carried out by the UR-5 and UR-5D receivers. For this reason, you must use these matched components in order for the noise reduction to work as intended.

Note also that the headroom available from using the dbx noise reduction system typically exceeds the peak limit of the UR-5 and UR-5D Audio Level meter by approximately 20 dB. Therefore, you should experiment (by listening or other method) in order to find the proper signal level. In many cases, the meter will be well beyond its peaked or pinned reading without incurring any distortion of signal.

About Tone Squelch:

The Samson UHF Synth System also provides an automatic *tone squelch* feature that effectively prevents the UR-5 and UR-5D receivers from passing unwanted audio signal generated by outside sources. Here's how it works: Both the UT-5 and UH-5 transmitters add a supersonic 38.4 kHz tone to all audio signals they transmit. The UR-5 and UR-5D receivers will refuse to pass through any received audio signal that does **not** contain this tone (for example, radio conversation between passing taxicab drivers).

Trouble-shooting

Problem: No sound

Solution: When working correctly, both the RF Level and AF Level meter displays in the UR-5 or UR-5D receiver should be lit when signal is present. If they aren't, follow these step-by-step troubleshooting suggestions to identify the problem. If the answer to any of these questions is "no," you've probably located the difficulty. If both the RF Level and AF Level displays *are* lit, you can skip ahead to questions 9, 10 and 11.

1. Are your transmitter and receiver both powered on? When first powered on, the "Battery" LED in the UT-5 and UH-5 will light for two-tenths of a second and then go off, and one or more segments of the UR-5 or UR-5D RF Level display will be continuously lit, indicating carrier transmission.
2. Is the battery in your transmitter fresh? (If not, the "Battery" LED will be lit bright red).
3. If you're using the UT-5 belt-pack transmitter, is the "INST/MIC" input switch set correctly? If so, is the physical lavalier, headset or instrument cable connection correctly wired and secure? If you're using the UT-5 for electric guitar or bass, check to see that the instrument's settings are correct (i.e. master volume up, etc.).
4. Is the "MUTE" LED on the receiver off and is the "Audio" switch on the transmitter set to "On"?
5. If you are using the UH-5 or the UT-5 with a lavalier or headset microphone, is the Mic level control (trimpot) on the transmitter set to a value greater than 0? If you are using the UT-5 with an instrument, is the Instrument level control (trimpot) on the transmitter set to a value greater than 0?
6. Is the AF Level knob on the receiver set to a value greater than 0?
7. Are your transmitter and receiver both set to the same Group and Channel number? (If so, one or more LEDs in the "RF Level" display will be lit.)

Trouble-shooting

8. Is the “Available” LED on the receiver lit and is the “Unavailable” LED on the transmitter off?
9. Is the cable connection between the receiver output and your mixer/amplifier input secure?
10. Is your mixer/amplifier system powered on and is its level control or fader up and unmuted?
11. If you’re using a mixer, are all channels out of solo mode?

If the answer to all these questions is “yes” and you still hear no sound, call Samson Technical Support at 1-800-372-6766. Bear in mind also that both the receiver and transmitter in the UHF Synth System contain delicate components called *crystals*. As their name implies, these are subject to damage when the unit is subjected to extreme stress (such as being dropped from a significant height), so treat your receiver and transmitter with the kind of TLC you normally reserve for loved ones!

Problem: Distorted sound (Cross-modulation interference)

Solution: Try using a different Group and/or Channel. If two or more users are connected to the system (using multiple transmitters and receivers at the same location), they must all be transmitting and receiving on the same Group, with different channels selected for each user.

Also, if the UR-5 or UR-5D receiver is mounted in a rack near equipment such as computers, hard drives, or electronic keyboards or tone generators, intermodulation noise can occur. Try moving the receiver 5 or 6 feet away from such equipment—if the noise disappears, you’ve located (and solved) the problem.

Trouble-shooting

Problem: Sound fades as performer moves around (sound dropout)

Solution: Try relocating the transmitter and/or receiver. In general, it's best to minimize the distance between the two and also to try to keep a clear "line of sight," so that the person wearing or using the transmitter can always see the receiver. If necessary, try relocating the receiver antennas to either the rear panel (contact Samson Technologies for details about our rear panel mounting kit) or remote them some distance from the receiver, using 50 ohm coaxial cable suitable for up to 1 gigaHertz bandwidth (the lower the capacitance of the cable, the further you can remote the antennas).

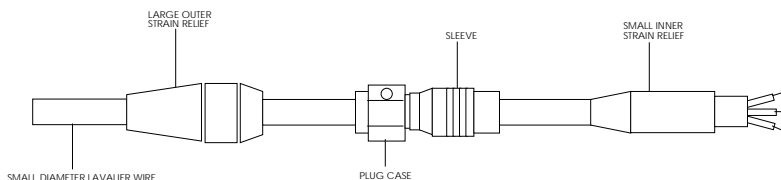
UHF Synthesized Frequency Chart

SAMSON UHF SYNTHESIZED FREQUENCY CHART												
C H A N N E L												
	0	1	2	3	4	5	6	7	8	9	*	
G R O U P	0	805.875	804.750	802.375	800.500	799.500	798.000	797.750	NA	NA	NA	NA
	1	805.750	804.625	802.250	800.375	799.375	797.875	797.625	NA	NA	NA	NA
	2	805.125	804.000	801.625	799.750	798.750	797.250	797.000	NA	NA	NA	NA
	3	805.000	803.875	801.500	799.625	798.625	797.125	796.875	NA	NA	NA	NA
	4	804.500	804.250	803.250	800.875	799.125	796.625	796.250	NA	NA	NA	NA
	5	804.375	804.125	803.125	800.750	799.000	796.500	796.125	NA	NA	NA	NA
	6	803.000	802.625	800.125	798.375	796.000	795.000	794.750	NA	NA	NA	NA
	7	802.875	802.500	800.000	798.250	795.875	794.875	794.625	NA	NA	NA	NA
	8	805.375	802.125	799.875	797.500	795.750	794.500	794.125	NA	NA	NA	NA
	9	805.500	805.250	804.875	804.000	802.250	801.750	800.125	799.375	797.375	796.000	*G7CH5

Note that Group 9 supports up to eleven simultaneous channels. This is accomplished by making all ten channel locations (0 through 9) available plus the use of Group 7, Channel 5 as a compatible “eleventh” channel.

UT-5 Multi-pin Lavalier Wiring Guide

The UT-5 transmitter can be used with a wide range of lavalier microphones, headset microphones and instruments (such as electric guitar or bass). The illustration below shows the wiring connections for its multi-pin input connector:



Samson Technologies offers the following pre-wired input accessory cables for the UT-5:

Part Number	Description
GC-1	Instrument cable, suitable for use with electric guitar or bass, etc. Terminates at standard 1/4" phone plug.
MC-1	Low-impedance microphone cable, suitable for use with most dynamic and condenser microphones. Terminates at standard 3-pin XLR plug.

We offer the following lavalier microphones, available pre-wired for use with the UT-5: Sony **ECM-44**, **ECM-55**, **ECM-77**; Sennheiser **MKE-2**; Audio Technica **831C**.

We also offer the following headsets, available pre-wired for use with the UT-5: AKG **C-410**; Audio-Technica **AT-71B**; and Countryman **IsoMax**.

For information about connecting other lavalier microphones and headsets to the UT-5, refer to the chart on the following two pages.

UT-5 Multi-Pin Wiring Chart

Manufacturer	Model No.	Pin 1	Pin 2
AKG	C409 Horn Mic	Shield	White/Clear
AKG	C410 Headset	Shield	White/Clear
Audio Technica	AT-831	Red (2x)	Yellow (2x)
Audio Technica	ATM-71	Red (2x)	Yellow (2x)
Audio Technica	ATM-75 Headset	Red (2x)	Yellow (2x)
Audio Technica	PRO8 Headset	N/C	Red (2x)
Audio Technica	MT-350	15K Ω Resistor to pin 2	White/Clear
Countryman	Isomax Headset	Red	Green
PSC	PSC/P6	Red	White
Samson	ECM-40	15K Ω Resistor to pin 2	White/Clear
Sanken	COS-11PT	Black	White/Clear
Sennheiser	MKE-2	Red	Blue
Sennheiser	MKE-2R (Red Dot)	Red	8.2 K Ω Resistor to pin 1
Sennheiser	MKE-40	Red	Blue
Shure	SM10A	N/C	Red
Sony	ECM-44	Red	White/Clear
Sony	ECM-55	Red	White/Clear
Sony	ECM-77	Red	White/Clear
Sony	ECM-144	15K Ω Resistor to pin 2	White/Clear
High Impedance Guitar	GC-1/P6	N/C	N/C
Low Impedance Guitar	MC-1/P6	N/C	N/C
Keyboards	GC-1/P6	N/C	N/C
Pin Information		+9 VDC	Audio

UT-5 Multi-Pin Wiring Chart

Pin 3	Pin 4	Pin 5	Pin 6
N/C	N/C	N/C	Red
N/C	N/C	N/C	Red
15K Ω Resistor to pin 2	N/C	N/C	Shield
15K Ω Resistor to pin 2	N/C	N/C	Shield
15K Ω Resistor to pin 2	N/C	N/C	Shield
N/C	N/C	N/C	Yellow (2x) Shield
N/C	N/C	N/C	Shield
Jumper-to-pin 2	N/C	Jumper-to-pin 6	Shield
N/C	N/C	Jumper-to-pin 2	Shield
N/C	N/C	N/C	Shield
Jumper-to-pin 2	N/C	Jumper-to-pin 6	Shield
Jumper-to-pin 2	N/C	Jumper-to-pin 6	Shield
N/C	N/C	N/C	Blue & Shield
Jumper-to-pin 2	N/C	Jumper-to-pin 6	Shield
N/C	N/C	N/C	Black & Shield
Jumper-to-pin 2	N/C	N/C	Shield
Jumper-to-pin 2	N/C	N/C	Shield
Jumper-to-pin 2	N/C	N/C	Shield
N/C	N/C	N/C	Shield
N/C	Audio	N/C	Shield
Jumper-to-pin 2	N/C	XLR-2 (Audio)	XLR-1 & 3 (GND)
N/C	Audio	N/C	Shield
Ground Bipolar	Hi-Z Audio	Mic Lo-Z	Ground Unipolar

NOTES:

- Resistors in plugs should be SMD (Surface Mount Device) or miniature type.
- Users of Sennheiser MKE-40: Add a 100pF capacitor between pin 2 and pin 5 only if necessary.

For more information, call Samson Technical Support at 1-800-372-6766.

About The DA-5L UHF Antenna Distribution Amplifier

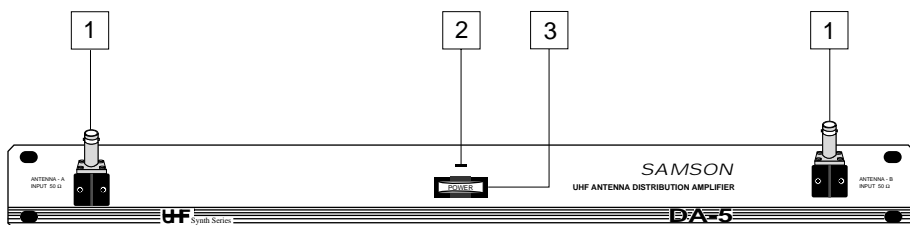
The Samson DA-5L UHF Antenna Distribution Amplifier is an optional component of the UHF Synthesized System. The DA-5L allows up to four UR-5 or UR-5D UHF receivers to share the same pair of antennas.* It facilitates faster, more compact setups by reducing the number of antennas from eight to two while increasing the transmission range by adding 6 dB of RF gain for a stronger, quieter signal.

DA-5L features include:

- Two phantom powered front-panel antenna inputs (one for channel A and one for channel B).
- Eight rear-panel antenna outputs (four for channel A and four for channel B) which can be connected to up to four pairs of receiver antenna inputs using the supplied BNC connector kit.
- The addition of 6 dB of RF signal gain in order to provide a stronger, quieter signal and increase the effective transmission range.
- A front-panel power switch and power indicator LED.
- The DA-5L can accept any AC power voltage from 100 - 250 volts, without the need to change a voltage selector switch (our special current and voltage sensing circuitry does the job automatically for you).
- Rack-mountable in any standard 19" rack (taking only a single space), the DA-5L can easily be integrated into any traveling or fixed installation audio system.
- Rugged construction that ensures reliable operation in even the most demanding performance environments.

** Note that, even though the DA-5L allows multiple receiver antenna inputs to be shared, each receiver (and accompanying transmitter) in your UHF Synthesized True Diversity wireless system must still be tuned to a discrete channel for multi-user operation.*

Guided Tour - DA-5L Front Panel

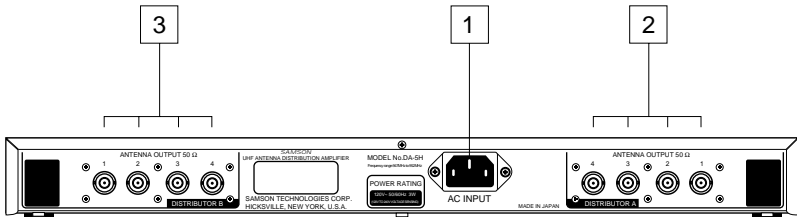


1: Antenna A and B mountings - Connect a pair of tuned coaxial antennas to these mountings. Use the antennas provided with your Samson UHF receiver, or, if unavailable, substitute the following antennas only: Samson Part Number **ANT 800**. Third-party antennas should *not* be substituted. These antenna mountings are phantom powered; take care not to short them. See the section in this manual entitled “Setting Up and Using the DA-5L” (on page 31) for information about antenna installation and positioning.

2: “Power” LED - This is lit whenever the DA-5L is powered on.

3: Power switch - Use this to turn the main power on and off. When the DA-5L is on, the “Power” LED (see #2 above) will be lit.

Guided Tour - DA-5L Rear Panel



1: AC input - Connect the supplied standard 3-pin “EEC” plug here. The DA-5L contains an automatic current and voltage sensing circuitry and so can accept any mains current from 100 - 250 volts without the need to set a selector switch. The AC outlet used for powering the DA-5L *must* be grounded. See the “DA-5L Grounding Techniques” section on page 33 of this manual for more information.

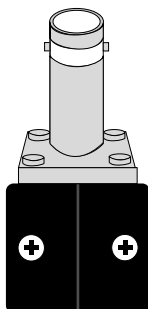
2: Antenna Output (Distributor A) - Use the supplied BNC connectors to connect each of these antenna outputs to the “Antenna A” inputs of your receivers. For more information, see the section in this manual entitled “Setting Up and Using the DA-5L” (on page 31).

3: Antenna Output (Distributor B) - Use the supplied BNC connectors to connect each of these antenna outputs to the “Antenna B” inputs of your receivers. For more information, see the section in this manual entitled “Setting Up and Using the DA-5L” (on page 31).

Setting Up and Using the DA-5L

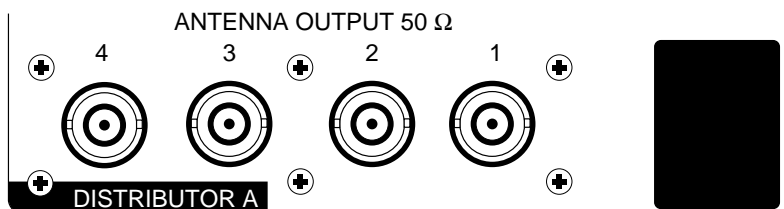
The basic procedure for setting up and using your DA-5L UHF Antenna Distribution Amplifier takes only a few minutes:

1. Remove all packing materials (save them in case of need for future service) and mount the DA-5L into your rack. Turn off the power to your audio system and all wireless components.



2. Mount a tuned coaxial antenna from your UHF receiver* into the DA-5L front-panel “Antenna-A” input by inserting it into the BNC connector (this connector is “keyed” so that you may have to rotate the antenna slightly until it drops all the way down into the seating). Then twist the outer ring of the antenna clockwise until it clicks into place. Repeat the same procedure in order to mount the other antenna into the front-panel “Antenna-B” input. Note that both antenna inputs are phantom powered; take care not to short them.

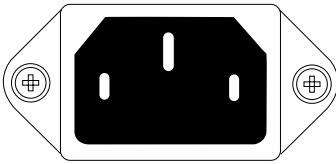
3. Using the supplied BNC connectors, make a connection between the rear-panel Antenna Output 1 (Distributor A) and the “Antenna A” input of the first UHF receiver in your system. Then make a connection between the rear-panel Antenna Output 1 (Distributor B) and the “Antenna B” input of the first UHF receiver in your system. Repeat this procedure as necessary to connect the other DA-5L Antenna Outputs to the “Antenna A” and “Antenna B” inputs of up to three additional receivers.



* *Third-party antennas should not be substituted.*

Setting Up and Using the DA-5L

If necessary, longer runs of standard low-capacitance (50-ohm) coaxial cabling with BNC connectors can be substituted for the supplied cables. **Note that, even though the DA-5L allows receiver antenna inputs to be shared, each receiver (and accompanying transmitter) in your system must still be tuned to a discrete channel for multi-user operation.**



4. Connect the supplied 3-pin “EEC” plug to the rear panel AC connector and plug the other end into any grounded AC socket (see the “DA-5L Grounding Techniques” section on page 33). Then depress the front-panel power switch to turn the unit on. The “Power” LED will light up.

5. Turn on the power first to all connected wireless components and then to your audio system. Now we recommend you do a walkaround in order to make sure that coverage is provided for your entire performance area. With all transmitters unmuted, and the level of your audio system set as before, have an assistant walk through the entire area that will need to be covered while speaking, singing, or playing into each transmitter at a normal performance level. The presence of the DA-5L should serve to increase the effective transmission range within your system—if you do find that any new “dead spots” result instead, try changing the angle of the DA-5L antennas. The basic rule of thumb for all wireless audio systems is to always try to minimize the distance between transmitter and receiver as much as possible and also to try to maintain “line of sight” between the two (that is, the person using the transmitter should be able to see the receiver antennas). The idea is to ensure that the strongest possible signal is received from all planned transmission points. In fixed installations such as A/V or corporate conference rooms or for extended range applications (where the transmitters and receivers are more than 150 feet apart), it may be desirable to remote the DA-5L antennas altogether by using standard BNC connectors and 50 ohm coaxial cabling that is suitable for up to 1 gigaHertz bandwidth usage.

If you have followed all the steps above and are still experiencing difficulties, call Samson Technical Support (1-800-372-6766) between 9 AM and 5 PM EST.

DA-5L Grounding Techniques

The DA-5L contains a switching power supply that will add an audible hum to your audio signal if the unit is not plugged into a properly grounded three-pin AC socket. Unless you're using a "star ground network" (see below), you must **not** use an adapter to lift the ground from the DA-5L AC cable.

If the DA-5L is correctly connected to a grounded three pin socket and you still experience hum or buzz when using it with other audio devices, there's a simple test to determine the source of the problem: with all devices powered on and connected with audio cabling, physically remove each device, one by one, from the rack. If the hum disappears when a particular device is removed, you'll know that that device is the culprit. If the offending device uses a two-prong plug (or an external two-prong AC/DC adapter), you can try reversing the plug in the socket. If that doesn't work, you may need to physically ground that device's chassis by connecting a wire (called a *strap*) from it to a grounded piece of metal such as rack ears. Some pieces of equipment have a screw-type ground post to which the strap can be connected; if not, you can attach some kind of metallic binding post to the case itself.

In addition, you can minimize possible interference by planning your RF antenna, audio, electrical, and computer cable runs so that they are as far apart from one another as possible and so they don't run parallel to one another. If they have to cross, try to ensure that they do so at a 90° angle (that is, perpendicular to one another). In particular, try to keep audio cabling away from external AC/DC adapters

If you're using the DA-5L in a fixed installation, you may want to invest the time and money into creating a *star ground network* for all your audio devices. This is by far the best technique for avoiding grounding problems. It involves using a formidable ground source such as a cold water pipe or a copper spike driven into the earth. A thick grounding cable is connected to that source and is then brought to a central distribution point; from there, individual cables are connected to each piece of equipment. This setup also requires that you lift the ground plug of all three-prong AC connectors, so there is the possibility of danger if it is done incorrectly. We strongly recommend that you contract with a qualified professional to carry out this or any kind of electrical work.

Glossary of Terms

Audible - A sound that we can hear, generally in the 20 Hz - 20 kHz frequency range.

BNC - Short for "British Naval Connector." A standard RF antenna connector used by many wireless receivers, including the Samson UR-5 and UR-5D.

Carrier - An inaudible high-frequency radio signal that is continuously *modulated* by an audible signal (it therefore is said to "carry" the audible signal).

Channel - In wireless transmission, refers to a particular radio frequency.

Demodulation - In FM transmission, the process of removing the carrier signal and thereby restoring the original audible signal.

Frequency - Refers to the number of wavecycles occurring per second. Audible frequencies are in the range 20 Hz - 20 kHz; radio frequencies are considerably higher.

Frequency Modulation (FM) - A form of radio transmission by which the frequency of a *carrier* signal is continuously *modulated* by the *audible* signal to be transmitted. A receiver then *demodulates* the signal by removing the carrier signal so that the original audible signal is restored.

Group - In wireless transmission, refers to a selected set of radio frequencies.

Headset - A "hands-off" microphone worn with a headband.

Hertz (Hz) - A unit of frequency measurement denoting one wavecycle per second.

Inaudible - A sound that we cannot hear. Radio waves (which have frequencies ranging from the tens of thousands to millions of waves per second) are all inaudible.

KiloHertz (kHz) - A unit of frequency measurement denoting one thousand wavecycles per second.

Ladder - Refers to a multi-segment meter, where the number of segments that light are proportional to the strength of signal.

Lavalier - A "hands-off" clip-on mini-microphone.

MegaHertz (MHz) - A unit of frequency measurement denoting one million wavecycles per second.

Modulation - The process by which one signal is continuously affected by another. The Samson UHF Synth system utilizes *frequency modulation*, whereby the frequency of a carrier signal is continuously modulated by the audible signal to be transmitted.

Glossary of Terms

Noise Reduction - A process by which the level of extraneous noise or hiss in a signal is reduced considerably. The Samson UHF Synth system utilizes the dbx® system of noise reduction.

Receiver - A component that receives a modulated radio signal and restores the original audible signal by utilizing demodulation.

RF - Short for "Radio Frequency."

Transmitter - A component that transmits an audible signal by causing it to modulate a high-frequency inaudible carrier signal.

True Diversity - A wireless reception system by which a single chassis houses two discrete receivers, with both tuned to the same frequency but with each using an independent antenna. A built-in computer chip then continuously scans the two receivers and determines which one has the clearest and strongest reception, automatically (and silently) switching to that channel.

UHF (Ultra High Frequency) - Refers to radio waves in the 300 - 3,000 megaHertz range.

VHF (Very High Frequency) - Refers to radio waves in the 30 - 300 megaHertz range.

VU - Short for "Voltage Unit." A unit of measurement utilized by audio devices that denotes relative signal strength. 0 VU is generally taken to indicate unity gain (no boost or attenuation).

Wave - Refers to the transference of energy in a regular, back-and-forth vibration.

Wavecycle - One single backwards-and-forwards motion of a wave.

Specifications

Transmitter RF:

Type of Emission	110KF3E FM
RF Output Power	Max. 50 mW
Antenna Type	Built-in loop (UH-5) 1/2 λ whip (UT-5)
Gain (Audio)	Less than 2.14 dB
Spurious Emissions	Less than -45 dB from carrier
Carrier Generation	Crystal controlled PLL synthesized oscillator
Stability	50 ppm
Tone Squelch Frequency	38.4 kHz
Battery Life (9-volt alkaline)	Approximately 7 hours
Weight (UH-5, without mic element)	111 g

Transmitter Audio:

Audio Frequency Response	40 Hz to 16 kHz
Frequency Deviation	20 kHz (@ -40 dBV)
Pre-emphasis	50 micro/sec.
Noise Reduction System	dbx type II
Audio Residual Noise	Less than -93 dBm (@ IHF - A Filter Weighted)
Audio Dynamic Range	More than 103 dB (@ IHF - A Filter Weighted)
Total Harmonic Distortion	Less than .5% (400 Hz, deviation @ 10 kHz)

Specifications

Receiver:

Type of Reception	110KF3E FM
Signal Sensitivity	15 dB micro @ s/n 60 dB (Audio @ 1 kHz, deviation 20 kHz)
Internal Oscillators	Crystal controlled PLL synth, 2nd osc. XTAL
Stability	50 ppm
Spurious Rejection	-70 dBm (connected to antenna terminals)
Antenna Terminals	50 Ω , connector BNC, powered 9VDC 25 mA max.
Antenna Type	1/2 λ sleeve (dipole)
Bandwidth (Selectivity)	\pm 150 kHz @ 60 dB
Total Harmonic Distortion	Less than .5% (400 Hz, deviation @ 10 kHz)
Weight	2.5 Kg

DA-5L:

Frequency Range	794 MHz - 806 MHz
Antenna Input	Distributor A x 1, Distributor B x 1 50 ohms, BNC-J connector, Phantom Power DC 9V / 25 mA (Max.)
Antenna Output	Distributor A x 4, Distributor B x 4 50 ohms, BNC-J connector
Gain	0 dB \pm 2.5 dB
NF	Less than 10 dB
Maximum Input	110 dB μ V
Operating Temperature	0° C to +50° C
Power Rating	AC 120 V, 50/60 Hz, 3 W (Voltage Sensing 100 V - 240 V)
Dimensions (W x H x D)	482 x 44 x 146 mm (excluding connector, knob, rubber feet, power cord)
Weight	Approx. 2.0 Kg
Accessories	EEC power cord, BNC connector kit

FCC Rules and Regulations

Samson wireless systems are type accepted under FCC rules parts 90, 74, and 15. Licensing of Samson equipment is the user's responsibility and licensability depends on the user's classification, application and frequency selected.

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