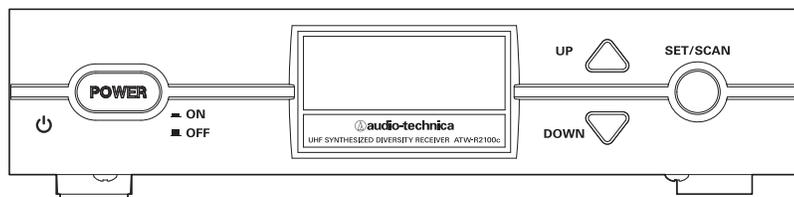


## 2000 Series

### Frequency-agile True Diversity UHF Wireless System *Installation and Operation*



## 2000 Series Installation and Operation

### Important information

#### Warning:

To prevent fire or shock hazard, do not expose this apparatus to rain or moisture.

#### Caution:

- Do not expose this apparatus to drips or splashes.
- To avoid electric shock, do not open the cabinet.
- Refer servicing to qualified personnel only.
- Do not expose this apparatus to excessive heat such as sunshine, fire or the like.
- Do not subject this apparatus to strong impact.
- This apparatus should be located close enough to the AC outlet so that you can easily grasp the AC adapter at any time.
- In case of emergency, disconnect the AC adapter quickly.
- Do not place any objects filled with liquids, such as vases, on this apparatus.
- To prevent fire, do not place any naked flame sources (such as lighted candles) on this apparatus.
- Do not install this apparatus in a confined space such as a bookcase or similar unit.
- Install this apparatus only in the place where ventilation is good.
- The rating label is put on the bottom of this apparatus.

#### Battery caution:

- Keep batteries out of the reach of children.
- Observe correct polarity as marked.
- Do not expose the battery to excessive heat such as sunshine, fire or the like.
- Always consider the environmental issues and follow local regulations when disposing of batteries.
- Remove depleted battery immediately.
- Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type.
- Use only disposable LR06 (AA) alkaline or Ni-MH batteries.
- Do not use new and old batteries at the same time.
- Do not use different battery types or models.
- Do not use a leaking battery. If battery leakage occurs, avoid contact with skin. If contact occurs, immediately wash thoroughly with soap and water.
- If battery leakage comes into contact with your eyes, immediately flush with water and seek medical attention.

### For customers in the USA

#### FCC Notice

##### Warning

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

##### Caution

You are cautioned that any changes or modifications not expressly approved in this manual could void your authority to operate this equipment.

**Note:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

#### RF Exposure Statement

This device complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines. This equipment has very low levels of RF energy that is deemed to comply without testing of specific absorption rate (SAR).

#### Contact:

Responsible Company: Audio-Technica U.S., Inc.  
Address: 1221 Commerce Drive, Stow, Ohio 44224, USA  
Tel: 330-686-2600

### For customers in Canada

#### ISED statement

CAN ICES-003(B)/NMB-003(B)

CAN RSS-Gen/CNR-Gen

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

This device complies with RSS-102 radiation exposure limits set forth for an uncontrolled environment.

#### Notice to individuals with implanted cardiac pacemakers or AICD devices:

Any source of RF (radio frequency) energy may interfere with normal functioning of the implanted device. All wireless microphones have low-power transmitters (less than 0.05 watts output) which are unlikely to cause difficulty, especially if they are at least a few inches away. However, since a "body-pack" mic transmitter typically is placed against the body, we suggest attaching it at the belt, rather than in a shirt pocket where it may be immediately adjacent to the medical device. Note also that any medical-device disruption will cease when the RF transmitting source is turned off. Please contact your physician or medical-device provider if you have any questions, or experience any problems with the use of this or any other RF equipment.

#### RF Interference

Please note that wireless frequencies are shared with other radio services. According to Federal Communications Commission regulations, "Wireless microphone operations are unprotected from interference from other licensed operations in the band. If any interference is received by any Government or non-Government operation, the wireless microphone must cease operation..." If you need assistance with operation or frequency selection, please contact your dealer or Audio-Technica. Extensive wireless information also is available at [www.audio-technica.com](http://www.audio-technica.com).

Thank you for choosing an Audio-Technica professional wireless system. You have joined thousands of other satisfied customers who have chosen our products because of their quality, performance and reliability. This Audio-Technica wireless microphone system is the successful result of years of design and manufacturing experience.

Each 2000 Series wireless system provides a choice of 10 PLL synthesized UHF frequencies in one of five UHF frequency ranges, available for flexible performance in a wide variety of regions worldwide:

	<i>Frequency Range</i>
Band D	656.125 – 678.500 MHz
Band I	487.125 – 506.500 MHz
Band U	606.500 – 629.900 MHz

The band letter reference at the end of 2000 Series Stock Numbers indicates what band system/component operates in. For simplicity, model numbers used throughout this manual will reference only the basic model number without the band indications.

Each wireless system includes a receiver and either a body-pack or handheld transmitter. UniPak® body-pack transmitter systems include accessory microphones for particular applications. All A-T Wireless Essentials® microphones and cables, available separately, are pre-terminated for use with any Audio-Technica 2000 Series wireless system.

The ATW-R2100c receiver features true diversity reception. Two antennas feed two completely independent RF sections on the same frequency; automatic logic circuitry continuously compares and selects the superior received signal, providing better sound quality and reducing the possibility of interference and dropouts. The receiver also offers a switchable output attenuator to reduce the level of the output signal by 12 dB for flexible use with a variety of system configurations. Switchable antenna power is also provided. Soft-touch controls provide convenient access to selection of operating frequency and automatic scanning, while an LCD information display provides constant monitoring of system operation. The receiver is half-width for a standard 1U 19" rack mount; rack-mount adapters are included. Two receivers can be mounted side by side, using an optional AT8630 joining-plate kit.

The versatile ATW-T210c UniPak® body-pack transmitter has both low- and high-impedance inputs plus a bias connection, for use with dynamic and electret condenser microphones, as well as Hi-Z instrument pickups. The UniPak® transmitter also offers separate trim controls for instrument and microphone, plus switchable high/low RF power.

The ATW-T220c handheld dynamic microphone/transmitter features the same element used in the PRO 41 dynamic handheld microphone created for professional live-sound venues. It also offers switchable high/low RF power. Both the ATW-T210c UniPak® and ATW-T220c handheld transmitters also offer charging contacts so the units can be placed in an optional recharging station for multi-transmitter charging.

For economical operation and wide availability, transmitters in the 2000 Series use two 1.5V AA alkaline batteries or rechargeable two AA NiMH batteries for use with Audio-Technica's ATW-CHG2 Recharging Station. Both transmitters have battery condition indicators. 2000 Series receivers feature a sophisticated Tone Lock™ tone squelch system that opens the receiver's audio output only when a 2000 Series transmitter is detected, reducing the possibility of interference. As a result, 2000 Series transmitters and receivers must be used together and should not be used with components from other Audio-Technica wireless systems, or with those of other manufacturers.

Please note that in multiple-system applications there must be a transmitter-receiver combination set to a separate channel (frequency) for each input desired (only one transmitter for each receiver).

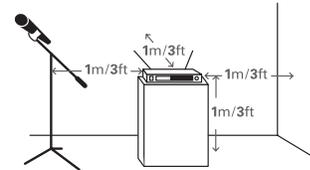
Because the wireless frequencies are within UHF TV frequency bands, only certain channels (operating frequencies) may be useable in a particular geographic area. The 10 channels (operating frequencies) per band that are used in the 2000 Series have been selected for multi-channel compatibility. Subject to frequency availability in a particular geographic area, any of these 10 channels may be used together. The operating frequencies that correspond to each of the 10 channels are listed on page 10.

## Receiver Installation

### Location

For best operation the receiver should be at least 3 ft. (1 m) above the ground and at least 3 ft. away from a wall or metal surface to minimize reflections. The transmitter should be at least 3 ft. from the receiver, as shown in *Figure A*. Keep antennas away from noise sources such as digital equipment, motors, automobiles and neon lights, as well as away from large metal objects.

*Fig. A*



### Output Connections

There are two audio outputs on the back panel: balanced and unbalanced. Use shielded audio cable for the connection between the receiver and the mixer. If the input of the mixer is a 1/4" jack, connect a cable from the 1/4" unbalanced audio output on the back of the receiver housing to the mixer. If the input of the mixer is an XLR-type input, connect a cable from the balanced XLR-type audio output on the back panel to the mixer. The two isolated audio outputs permit simultaneous feeds to both unbalanced and balanced inputs. For example, both a guitar amp and a mixer can be driven by the receiver.

### Antennas

Attach the included pair of UHF antennas to the antenna input jacks. The antennas are normally positioned in the shape of a "V" (both 45° from vertical) for best reception.

Accessory antennas can be remotely located from the receiver. However, due to signal loss in cables at UHF frequencies, use the lowest-loss RF cables practical for any cable runs over 25 feet. RG8-type is a good choice. Use only copper-shielded cable, not CATV-type foil-shielded wire. Audio-Technica offers quality RF cables in four lengths, as well as remote antennas; see [audio-technica.com](http://audio-technica.com) for a wide selection of wireless system accessories.

### Antenna Power

The antenna input jacks also can provide +12V DC output on their center pins to power inline RF devices. A maximum of 60 mA can be drawn from each of the jacks. While an accidental short-circuit will not harm the internal 12V supply, make certain that an antenna cable shield does not contact the center conductor. Antenna Power is selected by a switch on the back of the ATW-R2100c Receiver. The unit is shipped with the switch in the "off" position.

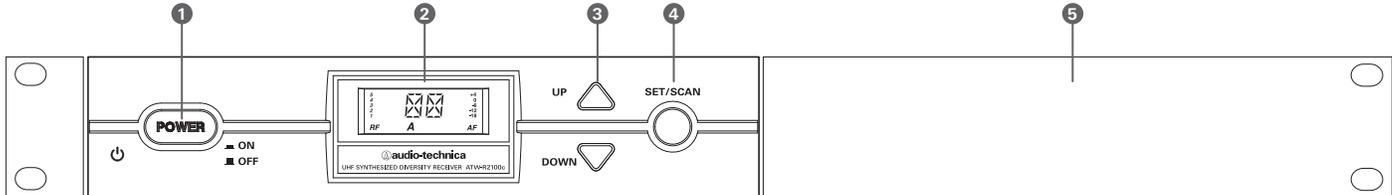
**Note: the antennas included with the ATW-R2100c Receiver do not require power.** If you have an antenna system that requires power (such as powered antennas or active combiners or splitters) switch the Antenna Power switch to the "on" position.

### Power Connections

Connect the included AC adapter to the DC power input on the back of the receiver. Loop the small cord from the DC plug over the cord hook above the jack, to keep the plug from being detached by an accidental tug on the cord. Operation of the receiver is controlled by the front-panel Power switch.

## Receiver Controls and Functions

**Fig. B – Front Panel Controls and Functions**



- 1. POWER SWITCH:** Press the Power switch in to turn the receiver on. The LCD window will light, and the operating channel number will be displayed in the window. To turn the receiver off, press the Power switch again.
- 2. LCD WINDOW:** Liquid Crystal Display indicates channel setting and operational readings. See Fig. C for examples.
- 3. UP/DOWN BUTTONS:** Press Up or Down arrow buttons to arrive at desired channel. The selected number will flash on and off. Press and hold Set/Scan button to set the channel (operating frequency).

- 4. SET/SCAN BUTTON:** Two distinct operations are associated with this button:

Touch: A momentary press of the Set/Scan button.  
Hold: A press and hold (about two seconds) of the Set/Scan button.

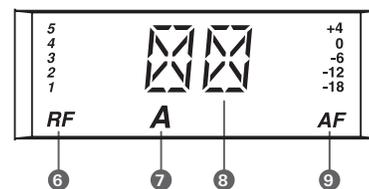
The Set/Scan button can be used in two ways: Manual Set Mode, to permit selection of an operating channel; and Automatic Scan/Set Mode, to initiate the automatic channel scan and selection, as follows:

**Manual Set Mode:** After using the Up or Down arrow button to arrive at desired channel, hold the Set/Scan button to set the channel. NOTE: Before the channel has been set, a touch of the Set/Scan button will revert the channel to its previous setting.

**Automatic Scan/Set Mode:** Hold the Set/Scan button. The Automatic Scan/Set Mode will automatically scan for and set the next open channel.

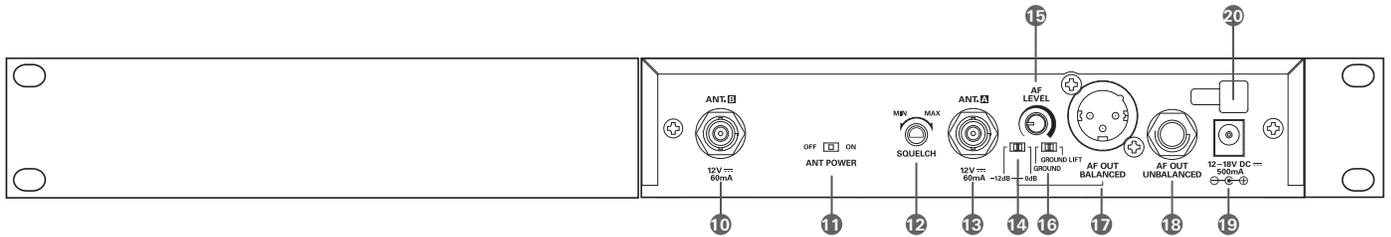
- 5. MOUNTING ADAPTERS:** For mounting the receiver in any standard 19" rack. Attach adapters to the receiver with the screws supplied and remove the four receiver feet. (Use optional AT8630 joining-plate kit to mount two ATW-R2100c receivers side-by-side.)

**Fig. C – Receiver LCD Window Display**



- 6. RF SIGNAL LEVEL INDICATOR:** Shows the strength of the RF signal received from the transmitter.
- 7. TUNER OPERATION INDICATOR:** Indicates which Tuner (A or B) has the better reception and is in operation.
- 8. CHANNEL DISPLAY:** Shows which channel is selected.
- 9. AF LEVEL INDICATOR:** Shows the audio modulation level of the received signal.

Fig. D – Rear Panel Controls and Functions



10. ANTENNA INPUT JACK: BNC-type antenna connector for Tuner "B." Attach the antenna directly, or extend it with a low-loss antenna cable. See the "Antennas" section on page 3 for more details.
11. ANTENNA POWER SWITCH: Two-position switch turns on/off the 12V DC antenna power for use with powered antennas or accessories. Factory setting is off. See the "Antennas" section on page 3 for more details.
12. SQUELCH CONTROL: Adjusts level of noise-muting circuit (preset at factory but can be adjusted as circumstances warrant). Factory setting is full counterclockwise (minimum).
13. ANTENNA INPUT JACK: Input for Tuner "A." Attach the supplied antenna directly, or extend it to an accessory antenna with a low-loss antenna cable.
14. AF OUTPUT ATTENUATOR: Two-position switch adjusts audio output level of the balanced (XLR) audio output jack with attenuation of 0 dB or -12 dB. Factory setting is 0 dB.
15. AF LEVEL CONTROL: Adjusts audio output level of both AF output jacks. Factory setting maximum output—fully clockwise.
16. GROUND LIFT SWITCH: Disconnects the ground pin of the balanced output jack (15) from ground. Normally, the switch should be to the left (ground connected). If hum caused by a ground loop occurs, slide switch to the right (ground lifted). Factory setting is ground connected.
17. BALANCED AUDIO OUTPUT JACK: XLRM-type connector. A standard 2-conductor shielded cable can be used to connect the receiver output to a balanced microphone-level input on a mixer or integrated amplifier.
18. UNBALANCED AUDIO OUTPUT JACK: 1/4" phone jack. Can be connected to an unbalanced aux-level input of a mixer, guitar amp or tape recorder.
19. POWER INPUT JACK: Connect the DC plug from the included in-line AC adapter.
20. CORD HOOK: Loop the small DC cord around the cord hook to keep the DC plug from pulling out accidentally.

## Transmitter Controls and Functions

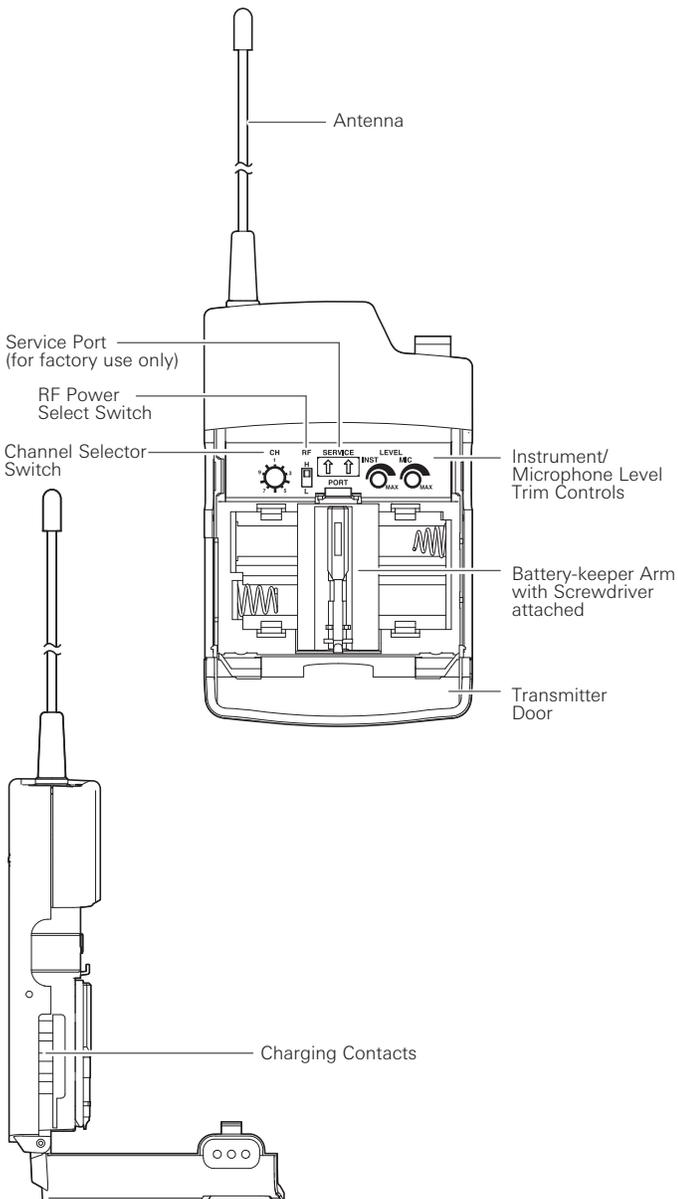
### Battery Selection

Two 1.5V AA alkaline batteries or rechargeable AA NiMH batteries for use with Audio-Technica's ATW-CHG2 Recharging Station are recommended.

### UniPak® Transmitter Battery Installation

1. Open the transmitter door by pressing gently on the side-cover indentations and pulling back the hinged cover.
2. Lift the battery-keeper arm, and carefully insert two fresh 1.5V AA alkaline batteries or rechargeable AA NiMH batteries, observing correct polarity as marked inside the battery compartment.
3. Close the battery-keeper arm.
4. Close the transmitter door.

Fig. E – UniPak® Transmitter Open

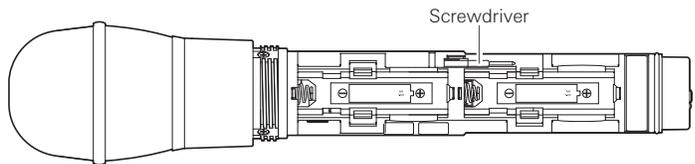


### Handheld Transmitter Battery Installation

1. While holding the upper part of the transmitter body below the ball-screen, unscrew the lower body cover, slide it downward, and remove it to expose the battery compartment.
2. Observe correct polarity as marked inside the battery compartment and carefully insert two fresh 1.5V AA alkaline batteries or rechargeable AA NiMH batteries. Make certain the batteries are fully seated in the battery compartment. (Fig. F)
3. Slide the lower body cover back up the body, then screw the housing together. Do not overtighten.

**Note:** Remove batteries from the handheld transmitter starting at the bottom end, where finger indents in the battery housing are provided for easy grip.

Fig. F – Handheld Transmitter Battery Compartment

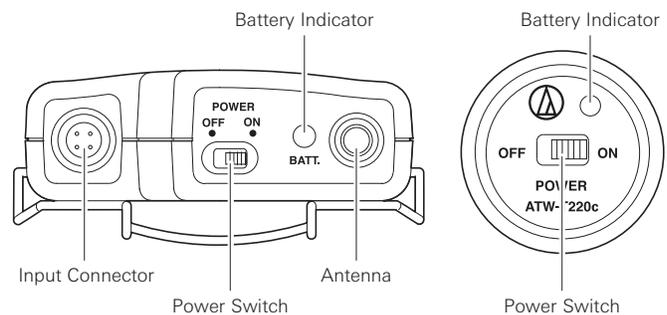


### Battery Indicator

After the battery is installed, turn on the power switch (located on the bottom of the handheld transmitter and on the top of the UniPak transmitter). The battery indicator LED (Fig. G/H) should turn red. If it does not, the batteries are installed incorrectly or they are dead.

Fig. G – UniPak Transmitter Top View

Fig. H – Handheld Transmitter Bottom View



### UniPak® Transmitter Input Connection

Connect an audio input device (microphone or guitar cable) to the audio input connector on the top of the transmitter. A number of Audio-Technica professional microphones and cables are available separately, pre-terminated with a UniPak input connector.

### UniPak® Transmitter Antenna

The ATW-T210c UHF UniPak® body-pack transmitter includes one field-replaceable antenna mounted on the transmitter. The antenna simply screws into the transmitter's antenna fitting. Check the installed antenna occasionally to make certain it is snugly attached (only finger-tight). If the received signal is marginal, experiment with different transmitter positions on your body or instrument or try repositioning the receiver. *Do not attempt to modify the transmitting antenna. Replace it only with the same parts, available from the Audio-Technica Service Department.*

## System Operation

Switch on the receiver. Do not switch on the transmitter yet.

### Receiver On...

The LCD display will light up. If two or more of the RF LCD segments light up at this point, there may be RF interference in the area. If this occurs, change operating channels (select another frequency).

### How to Make Operating Channel Changes

Operating channel changes (frequency changes) may be made in two ways: manually and automatically.

#### To change channel manually

1. Use the Up/Down arrow buttons to reach the desired channel number.
2. Hold the Set/Scan button until the channel number stops flashing to set the receiver to the channel indicated. NOTE: Before the channel has been set, a touch (momentary press) of the Set/Scan (rather than a hold) will revert the channel to its previous setting.

#### To change channel automatically

1. Hold the Set/Scan button. The Automatic Scan/Set Mode will automatically scan for and set the next open channel. LCD screen will flash "FS" four times to indicate start of scan. "E1" will show on the receiver display when no further usable frequencies remain in the 10 channel frequency list.

### Transmitter On...

Before turning on the transmitter, use the provided screwdriver to set the transmitter channel selector switches (*Fig. E/I*) to the same numbers as those displayed on the receiver. Always turn the transmitter off when changing channels (frequencies).

The transmitters have a two-position, on-off power switch. When the switch is "On," the transmitter produces both RF and audio.

The transmitters have a two-position RF power select switch, offering low/high transmission modes to conserve battery life/maximize power. Factory setting is high.

There is about a half-second delay after the transmitter is switched to the "On" position before the receiver's Tone Lock squelch unmutes the receiver.

When the transmitter is switched on and in normal operation, the receiver's RF signal level indicators will display as dark segments (signal strength indicators) from bottom to top at the left side of the LCD display.

### Setting Levels

Correct adjustment of transmitter audio input, receiver audio output, and mixer/amplifier input and output levels is important for optimum system performance.

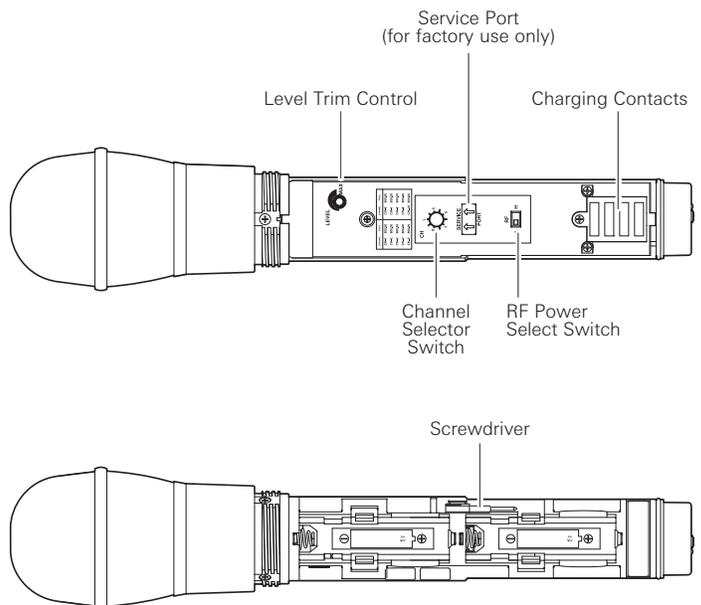
#### ATW-T220c Handheld Transmitter

The 2000 Series handheld transmitter has factory pre-set audio input levels. Factory setting is full clockwise, maximum gain.

1. While speaking/singing into the microphone at typically loud levels, check the AF meter levels on the receiver. If all five AF meter bars are consistently illuminated and distortion is heard through the system, it may be necessary to adjust the transmitter audio input level.
2. To adjust the transmitter audio input level, unscrew the lower body cover and slide it downwards, exposing the screwdriver and level trim control (*Fig. I*). Remove the screwdriver and gently turn the level trim control counterclockwise until the topmost receiver AF level meter bar is illuminated only on audio peaks.
3. Return the screwdriver to its clip and close and secure the lower body. No further transmitter gain adjustments should be needed, as long as the acoustic input does not change significantly.

**CAUTION!** The small trimmer controls are delicate; use only the supplied screwdriver. Do not force the trimmers beyond their normal 180° range of rotation. Return the screwdriver to its storage clip when not in use.

*Fig. I – Handheld Transmitter Interior View*



## 2000 Series Installation and Operation

### Setting Levels (Continued)

#### ATW-T210c UniPak® Transmitter

Trimmer adjustments in the UniPak® transmitter (*Fig. E*) will enable you to use microphones or instruments with different output levels.

1. For MIC: Set microphone level trim control fully clockwise (maximum) and instrument level trim control fully counterclockwise (minimum). Factory setting is fully clockwise (maximum).

For INSTRUMENT: Set instrument level trim control fully clockwise (maximum) and microphone level trim control fully counterclockwise (minimum). Factory setting is fully clockwise (maximum).

2. Set the receiver's AF Level control to its full clockwise position (maximum). See *Figure D* on page 5.
3. Plug the mic or instrument into the transmitter and power up the system.
4. For MIC: Make an initial adjustment of the mixer's level controls that will allow audio through the system.

For INSTRUMENT: Make an initial adjustment of the instrument amplifier input level control that will allow audio through the system.

5. For MIC: While speaking/singing into the microphone at typically loud levels, check the AF meter levels on the receiver. If all five meter bars are consistently illuminated and distortion is heard through the system, it may be necessary to adjust the UniPak transmitter audio input level. To adjust the transmitter audio input level, gently turn the microphone level trim control counterclockwise until the topmost receiver AF level meter bar is illuminated only on audio peaks.

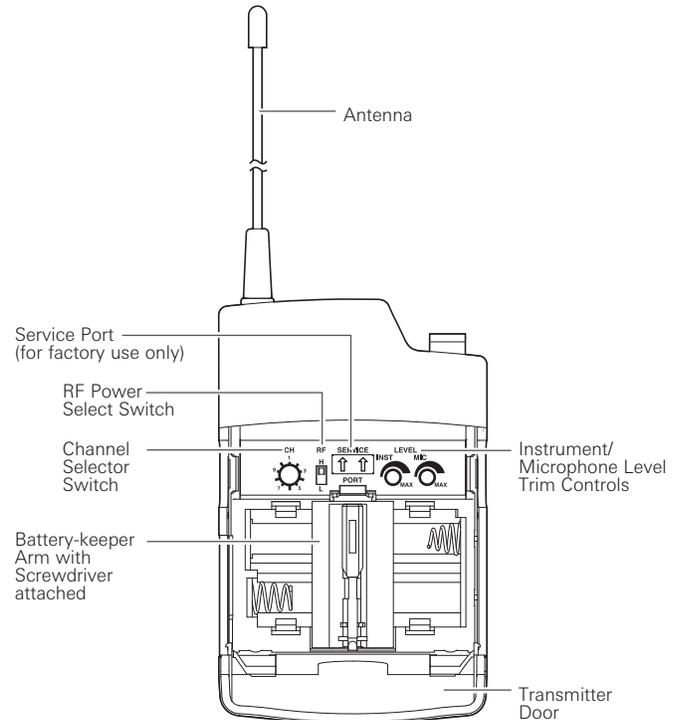
For INSTRUMENT: While playing the instrument at typically loud levels, check the AF meter levels on the receiver. If all five meter bars are consistently illuminated and distortion is heard through the system, it may be necessary to adjust the UniPak transmitter audio input level. To adjust the transmitter audio input level, gently turn the instrument level trim control counterclockwise until the topmost receiver AF level meter bar is illuminated only on audio peaks.

6. For MIC: While again speaking/singing into the microphone at typically loud levels, adjust the mixer's input trim control so the highest sound pressure level going into the microphone causes no input overload in the mixer, and yet permits the mixer's channel and output level controls to operate in their "normal" range (not set too high or too low).

For INSTRUMENT: While again playing the instrument at typically loud levels, adjust the receiver's AF Level control so the highest signal level causes no input overload in the instrument amplifier and yet permits the amplifier's input level controls to operate in their "normal" range (not set too high or too low).

Note: If the mixer cannot be adjusted to operate in its normal range without distortion, adjust the receiver's AF Level Control (turn counterclockwise) until the mixer/ amplifier is no longer overloaded.

*Fig. E – UniPak® Transmitter Open*



### Receiver Squelch

The squelch control on the back panel of the receiver is preset at the factory for best system performance (factory setting is full counterclockwise), but can be adjusted if you must use the system in an area with considerable RF interference. If there is interference in the audio, and changing the channel is not an option, adjust the squelch control so the system will receive the signal from your transmitter but will "squelch" or eliminate the unwanted background RF noise. This adjustment can cause a reduction in useable range of the wireless transmitter, so set the control to the lowest position that reliably mutes the unwanted RF signals.

## Specifications†

### Overall System

UHF Operating Frequencies		
	Frequency Range	Number of Channels
Band D:	656.125 to 678.500 MHz	10
Band I:	487.125 to 506.500 MHz	10
Band U (A):	606.500 to 613.300 MHz	10
Band U (B):	614.300 to 629.900 MHz	10

*Not all frequencies are available in all areas. Please check with local regulations.*

Modulation Mode	FM
Maximum Deviation	±40 kHz
Dynamic Range	> 110 dB (A-weighted), typical
Total Harmonic Distortion	< 1% (at 1 kHz, ±20 kHz deviation)
Operating Range	100 m (300'), typical

*Open range environment with no interfering signals.*

Operating Temperature Range	5° C to +45° C 41° F to 113° F
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*Battery and LCD performance may be reduced at very low temperatures.*

Frequency Response	100 Hz to 15 kHz (+1 dB, -3 dB)
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### ATW-R2100c Receiver

Receiving System	True diversity
Image Rejection	60 dB nominal, 55 dB minimum
RF Sensitivity	20 dBuV at 60 dB S/N ratio (50 ohms termination)
Maximum Output Level	
XLR, balanced:	+9 dBV
¼" (6.3 mm), unbalanced:	+4 dBV
Balanced Audio Output Attenuator	Two position switch: 0 / -12 dB
Antenna Input	BNC-type, 50 ohms Bias voltage 12V DC, 60 mA, each
Power Requirements	12-18V DC, 500 mA
Dimensions	210.0 mm (8.27") W x 162.2 mm (6.39") D x 44.0 mm (1.73") H

*Not including BNC connectors or feet.*

Net Weight	1.0 kg (35.3 oz), without accessories
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Accessories Included	Two flexible UHF antennas; AC adapter (country dependent); rack-mount adapters
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### ATW-T210c UniPak® Transmitter

RF Power Output (50 ohms)	High: 30 mW, Low: 10 mW (switchable)
Spurious Emissions	Following federal and national regulations
Input Connection	Four-pin Locking Connector Pin 1: GND, Pin 2: INST INPUT, Pin 3: MIC INPUT, Pin 4: DC BIAS +9V
	
Batteries	Two 1.5V AA alkaline (not included) or two 1.2V AA NiMH (not included)
<i>Recharging power for NiMH batteries (with ATW-CHG2)</i>	
<i>U.S./Canada/Latin America: 3.2 V DC --- 230 mA x2</i>	
<i>Other world areas: 3.2 V DC --- 320 mA x2</i>	
Battery Life	High: 7 hours (alkaline) Low: 9 hours (alkaline)
<i>Depending on battery type and use pattern.</i>	
Dimensions	66.0 mm (2.60") W x 22.5 mm (0.89") D x 92.3 mm (3.63") H
Net Weight	81 g (2.9 oz), without batteries

### ATW-T220c Handheld Transmitter

RF Power Output (50 ohms)	High: 30 mW; Low: 10 mW, (switchable)
Spurious Emissions	Following federal and national regulations
Microphone Element	Dynamic cardioid
Batteries	Two 1.5V AA alkaline (not included) or two 1.2V AA NiMH (not included)
<i>Recharging power for NiMH batteries (with ATW-CHG2)</i>	
<i>U.S./Canada/Latin America: 3.2 V DC --- 230 mA x2</i>	
<i>Other world areas: 3.2 V DC --- 320 mA x2</i>	
Battery Life	High: 7 hours (alkaline) Low: 9 hours (alkaline)
<i>Depending on battery type and use pattern.</i>	
Dimensions	232.0 mm (9.13") long, 48.0 mm (1.89") diameter
Net Weight	252 g (8.9 oz), without batteries
Accessory Included	AT8456a Quiet-Flex™ stand clamp

† In the interest of standards development, A.T.U.S. offers full details on its test methods to other industry professionals on request. Specifications are subject to change without notice.

## 2000 Series Installation and Operation

### 2000 Series Frequency Channel Plan

#### Band D

Channel	Frequency-MHz
1	656.125
2	659.375
3	660.000
4	662.125
5	665.125
6	669.750
7	671.500
8	677.000
9	678.125
10	678.500

#### Band I

Channel	Frequency-MHz
1	487.125
2	487.625
3	488.875
4	491.750
5	494.375
6	495.375
7	501.375
8	503.375
9	505.750
10	506.500

#### Band U (A)\*

Channel	Frequency-MHz
1	607.625
2	608.875
3	609.575
4	610.400
5	611.675
6	612.825
7	606.500
8	606.750
9	607.125
10	613.300

\* Please note that the frequency range 608-614 MHz (Plan A) is illegal to use in many countries due to radio astronomy. Please check your local regulations.

#### Band U (B)

Channel	Frequency-MHz
1	614.300
2	615.000
3	616.225
4	616.975
5	620.000
6	626.025
7	626.775
8	628.700
9	629.500
10	629.900

### CAUTION: U.S. Public Safety/Security Restrictions (Private Land Mobile Radio Services)

#### Pertains to Band I Only.

Avoid the frequencies/channels listed below in each of the following U.S. metropolitan areas (as of November 2009). Refer to [www.fcc.gov](http://www.fcc.gov) for updates.

#### Land Mobile Allocation

Metropolitan Areas	2000 Series I Band Channels	TV Channels* to Avoid in Indicated Metropolitan Areas
Boston, MA	1, 2	14, 16
Dallas, TX	1, 2	16
Detroit, MI	1, 2	15, 16
Houston, TX	3, 4	17
Los Angeles, CA	1, 2, 10	14, 16, 20
New York, NY	1, 2	14, 15, 16
Philadelphia, PA	7, 8, 9, 10	19, 20
Pittsburgh, PA	5, 6	14, 18
San Francisco, CA	1, 2, 3, 4	16, 17
Washington, DC	3, 4, 5, 6	17, 18

**Note:** Cleveland and Chicago public safety allocations (TV Channels 14 & 15) and Miami FL public safety allocations (TV Channel 14) are outside of the 2000 Series operating bandwidth.

\* The 2000 Series operates in TV channels 16-20; Channels 14 and 15 are outside the 2000 Series operating bandwidth.

