

## CAT 855 DETAILED SPECIFICATIONS

### CLASSROOM AUDIO SYSTEM

#### PART 1. GENERAL

##### 1.1 SUMMARY

- A. Classroom Audio Systems include all components required to amplify voice and other audio sources; an audio amplifier, infrared sensor/receiver with plenum-rated cable, wall or ceiling speaker(s) with mounting brackets and plenum speaker wire, Redmike® classroom microphone, NiMH rechargeable AA batteries, and power cords.
- B. The following are well-documented results from the use of Classroom Audio:
  - 1. The effects of high ambient noise levels are overcome
  - 2. 30% of children will hear their teacher significantly better
  - 3. Attention and on-task times improve
  - 4. Class interaction and participation increases
  - 5. Classroom stress is lowered
  - 6. Behavior problems are reduced
  - 7. Teacher absenteeism is reduced
  - 8. Academic achievement and test scores improve
  - 9. English Language Learners (ELL) score higher
  - 10. Children with learning disabilities benefit
  - 11. Reduced vocal strain on teacher

##### 1.2 APPLICATION

- A. Classroom Audio should be installed in new schools (public and private, pre-school through high school), schools scheduled for renovation, and for special needs (comprehensive needs) projects in all classrooms, learning spaces, resource rooms, media centers, and labs.
- B. Multiple speaker options shall be available for rooms of varying shapes and sizes, including ceiling and wall-mounted types. Speakers should be placed near the instruction area so the maximum benefits of the sound amplification are achieved for all students. All speakers shall be provided with proper mounting hardware, including tile support bridges for in-ceiling speakers. Plenum-rated wire will be provided with all speakers as standard.
- C. The amplifier should be able to be located anywhere in the classroom without degradation of signal or sound quality, including cabinets, audio racks, wall mounted shelves, and countertops.
- D. The Infrared sensor/receiver shall be capable of mounting on the ceiling or wall. The sensor/receiver is connected to and powered from the amplifier via plenum-rated Cat 5e cable. Ideal location of the Infrared sensor is on the ceiling in or near the center of the classroom. The sensor shall come with a mounting clip that will attach directly to the ceiling tile grid. Should a sensor require wall mounting, it should be placed in the center of a long wall with the supplied mounting clip, near the ceiling, and away from potential obstructions.

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### 1.3 DESCRIPTION

- A. The Classroom Audio System shall include but not limited to the following components:
1. Audio amplifier with 4 stereo audio inputs, 4-band equalizer, and optional PageFirst emergency page mute (855).
  2. UL Listed 24V / 2.5A Power Supply (PS-24V-2.5)
  3. Choice of pendant-style teacher microphone with rechargeable batteries from the following: Redmike (RMT) or Redmike VC (RMV).
  4. Optional second microphone with rechargeable batteries for student pass-around use or team teaching: Redmike, Redmike VC, or Redmike Share handheld microphone (RMS)
  5. Infrared sensor/receiver with plenum-rated Cat 5e cable (ISR)
  6. Speaker(s) with mounting hardware and plenum-rated wire (see specifications)

### 1.4 REGULATORY REQUIREMENTS

- A. Conform to local building code for requirements applicable to work specified herein.
- B. Conform to appropriate sections of regulatory documents with regard to applicable requirements.

### 1.5 QUALITY ASSURANCE

- A. Qualifications
1. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
    - a. Certificate: when requested, submit certificate indicating qualification.
  2. Manufacturer Qualifications: Manufacturer capable of providing field service representation during construction, approving acceptable installer and approving application method.
- B. Acceptable Manufacturers
1. Basis of Design: Lightspeed Technologies, 11509 SW Herman Road, Tualatin, OR 97062, PH 800-732-8999, FAX 503-684-3197
  2. Substitutions must be in full compliance to specifications as written
- C. Manufacturer Testing: Manufacturer to provide quality assurance certification for each system and all of its components. A report for each system will be available upon request. Report will include serial numbers and pertinent testing data for all of the system functions.
- D. Successful third party installation (when needed) will be supplied with necessary training to allow for product installation certification by Manufacturer and will be installed according to Lightspeed recommendations.

### 1.6 SUBMITTALS

- A. General: Submit listed submittals in accordance with "Conditions of the Contract".
- B. Manufacturer's data on all products including but not limited to:
1. Catalog cut sheets
  2. Installation instructions

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3. Typical wiring diagrams
4. Drawings showing speaker locations
5. Operation and maintenance manuals
6. Manufacturer's warranty documents
7. Manufacturer's parts lists
8. Product serial numbers

### 1.7 WARRANTY

- A. Warranty: Refer to "Conditions of the Contract" for warranty and repair provisions.
- B. Repair: Manufacturer shall offer repair service on all Classroom Audio components. Manufacturer shall pre-pay shipping for all items returned to manufacturer for repair. The Manufacturer shall repair or replace system components as specified under warranty. Manufacturer shall ship repaired components within five (5) working days of receipt. Items returned to Owner are shipped via the same method in which they were received.
- C. Manufacturer's Warranty: All the major system components (transmitters, amplifier, sensor, and speakers) must be warranted for five years against defects occurring while used in normal classroom instruction. The warranty shall be equivalent to a Lightspeed Technologies' Five-Year Warranty.
  1. Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under the Contract Documents.
  2. Warranty Period: Five years commencing on Date of Substantial Completion.

### 1.8 OWNER INSTRUCTION

- A. Owner's Instruction: user-training will be performed by the manufacturer's local representative. The training will include a video on the research and benefits of classroom Audio, system operation, simple troubleshooting guidelines, and incorporating the classroom Audio into teaching styles. The manufacturer will also provide additional training in trouble-shooting techniques and product return procedures to one specified person per campus.
- B. Instruction materials and detailed Owner's manual shall be provided to cover operational and basic maintenance procedures.

## PART 2. PRODUCTS

### 2.1 OVERALL SYSTEM DESCRIPTION

- A. The system must have specifications and features that are equivalent to the Lightspeed Cat 855 Infrared Classroom Audio System, including amplifier with the following:
  1. Two IR channels with independent volume controls
  2. Four stereo audio inputs with independent volume controls
  3. Page mute input with sensitivity adjust
  4. Two audio outputs with level controls
  5. Two speaker outputs to power a total of 1-4 speakers
  6. 4-band equalizer
  7. Infrared sensor/receiver input

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- B. The infrared sensor/receiver must connect to the Cat 855 amplifier via plenum-rated Cat 5e cabling. It must have the ability to cover a classroom up to 1600 square feet with the capability to add up to 3 additional infrared sensors for larger or odd-shaped rooms.
- C. The amplifier must contain a Page mute function (PageFirst™) that passively detects the audio signal of a page coming through the PA system without compromising system performance or voiding warranties. As an audio signal is sent to the PA speaker, the PageFirst™ detects that signal and immediately mutes the Cat 855 audio amplifier.
- D. The system shall be available with an alternative group of 2 frequencies to allow for a total of 4 compatible channels in a single room or common area.
- E. The system shall carry a “No Audio Dropout Guarantee” for enclosed classrooms up to 1600 square feet with ceiling heights of 12 feet or less. Should any audio dropout occur, the manufacturer will correct it at no additional charge.

### 2.2 AMPLIFIER SPECIFICATIONS

- A. Power output: 24 Watts Total (12 W / Channel)
- B. Frequency response: 60 Hz to 20 kHz
- C. Power supply (UL Listed): 24V/2.5A
- D. Signal-to-noise: >73 dB
- E. Image and Spurious Rejection: >70 dB
- F. Total Harmonic Distortion: <1% @ 20 Watts (10W / Channel)
- G. Speaker load impedance: 4Ω / Output
- H. Dimensions (W x D x H): 8.6” x 6.8” x 2.2”
- I. Controls:
  - 1. (1) Power switch with LED
  - 2. (2) IR microphone volume controls
  - 3. (4) Auxiliary audio input volume controls
  - 4. (2) Mixed audio output level controls
  - 5. Page mute (PageFirst™) sensitivity level control
  - 6. 4-band equalizer
- J. Connections:
  - 1. (2) Speaker outputs (4-pin euro-block connector) – powers 4 speakers
  - 2. (2) Mixed audio outputs (3.5mm)
  - 3. (1) DC Power input
  - 4. (2) Transmitter charging inputs (for RMS)
  - 5. (4) Stereo audio inputs (Dual RCA x2, 3.5mm x2)
  - 6. Page mute (PageFirst™) input (Euro-block)
  - 7. (1) IR sensor/receiver inputs (RJ-45) with short indicator LED
- K. The amplifier shall be manufactured using lead-free processes and free of other materials harmful to the environment (RoHS compliant).
- L. The amplifier shall be CE certified.

### 2.3 INFRARED SENSOR/RECEIVER

- A. Standard sub-carrier frequencies: 2.06/2.54 MHz

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Alternative sub-carrier frequencies: 3.20/3.70 MHz

- B. Receiver Sensitivity: 6  $\mu$ V for 60 dB S/N
- C. Reception Selectivity:  $\pm$ 40 kHz
- D. Power: from amplifier
- E. Reception coverage: 360 degrees
- F. Cable: plenum-rated Cat 5e cable
- G. Mounting: ceiling or wall mount (bracket included)
- H. Diodes: 32
- I. IR Sensor Expansion: f-connector to power up to 3 additional IR sensors
- J. The infrared sensor/receiver shall be manufactured using lead-free processes and free of other materials harmful to the environment (RoHS compliant).
- K. The infrared sensor/receiver shall be CE certified.

### 2.4 REDMIKE PENDANT-STYLE IR MICROPHONE / TRANSMITTER

- A. Description: the pendant-style Redmike transmitter shall be capable of being worn around a teacher's neck as a hands-free microphone via the lavalier cord or to be used as a handheld student pass-around microphone. The Redmike must be rechargeable via cradle charger and must have alkaline charge protection.
- B. Standard sub-carrier frequencies: 2.06/2.54 MHz  
Alternative sub-carrier frequencies: 3.20/3.70 MHz
- C. Audio distortion: <1%
- D. Integrated microphone type: uni-directional electret
- E. Input jack for audio source or optional external microphone: 3.5mm
- F. Microphone input impedance: 2.2k  $\Omega$
- G. Alkaline Charge Protection: Yes
- H. Battery Charger: cradle charger (charges two REDMIKE transmitters)
- I. Cradle Charger input: mini DC jack
- J. Cradle Charger Output Jack: 3.5mm DC output jack for Redmike Share transmitters
- K. Battery Power: One (1) AA NiMH Lightspeed rechargeable battery (Part# BA-NH2A27)
- L. Dimensions: 3.5" (h) x 0.9" (w) x 1.0" (d)
- M. Weight (with battery): 2.1 oz.
- N. The Redmike pendant-style transmitter shall be manufactured using lead-free processes and free of other materials harmful to the environment (RoHS compliant).
- O. The Redmike pendant-style transmitter shall be CE certified.

### 2.5 OPTIONAL REDMIKE VC INFRARED MICROPHONE WITH VOLUME CONTROL

- A. Description: the pendant-style Redmike VC infrared microphone/transmitter shall contain microphone volume control on the unit allowing teachers to adjust volume level from

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anywhere in the classroom. The microphone must be capable of being worn around a teacher's neck as a hands-free microphone via the lavalier cord or to be used as a handheld student pass-around microphone. The Redmike VC must be rechargeable via cradle charger and must have alkaline charge protection.

- B. Standard sub-carrier frequencies: 2.06/2.54 MHz  
Alternative sub-carrier frequencies: 3.20/3.70 MHz
- C. Audio distortion: <1%
- D. Integrated microphone type: uni-directional electret
- E. Input jack for audio source or optional external microphone: 3.5mm
- F. Microphone input impedance: 2.2k  $\Omega$
- G. Volume control range:  $\pm 8$  dB (total range = 16 dB)
- H. Volume control level: 9 levels (2 dB change per level)
- I. Alkaline Charge Protection: Yes
- J. Battery Charger: cradle charger (charges two Redmike or Redmike VC transmitters)
- K. Cradle Charger input: mini DC jack
- L. Cradle Charger Output Jack: 3.5mm DC output jack Redmike Share transmitters
- M. Battery Power: One (1) AA NiMH Lightspeed rechargeable battery (Part# BA-NH2A27)
- N. Dimensions: 3.5" (h) x 0.9" (w) x 1.0" (d)
- O. Weight (with battery): 2.1 oz.
- P. The Redmike VC shall be manufactured using lead-free processes and free of other materials harmful to the environment (RoHS compliant).
- Q. The Redmike VC shall be CE certified.

### 2.6 OPTIONAL REDMIKE SHARE HANDHELD IR MICROPHONE / TRANSMITTER

- A. Standard sub-carrier frequencies: 2.06/2.54 MHz  
Alternative sub-carrier frequencies: 3.20/3.70 MHz
- B. Audio distortion: <1%
- C. Integrated microphone type: uni-directional dynamic
- D. Auxiliary Input: 3.5mm
- E. Battery Charger input: 3.5mm DC jack
- F. Battery Power: 2 AA NiMH rechargeable battery pack
- G. Alkaline Charge Protection: Yes
- H. Dimensions: 8.25" (l) x 1.3" (w) x 1.3" (d)
- I. Weight (with batteries): 7.9 oz
- J. The Redmike Share shall be manufactured using lead-free processes and free of other materials harmful to the environment (RoHS compliant).
- K. The Redmike Share transmitter shall be CE certified.

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### 2.7 SPEAKERS

Lightspeed has multiple speaker packages available to fit the varying characteristics of different classrooms. Please select one speaker choice from below:

- A. DRQ Ceiling Speaker (four speakers for rooms of 1600 sq. ft. or less)
  - 1. Description: two-way speaker system
  - 2. Driver Size: 6.5" driver; 1" tweeter
  - 3. Frequency Response: 40 Hz – 20 kHz  $\pm$  6dB
  - 4. Impedance: 8  $\Omega$
  - 5. Power Handling: 30 W
  - 6. Enclosure: white ABS ceiling-mount housing with metal grille; ABS back-enclosure
  - 7. Tile Support: 20-gauge metal tile bridge
- B. 4JCS Plenum-Rated Ceiling Speaker (four speakers for rooms of 1600 sq. ft. or less)
  - 1. Description: Coaxial speaker system
  - 2. Driver Size: 8" driver
  - 3. Frequency Response: 30 Hz – 19 kHz
  - 4. Impedance: 8  $\Omega$
  - 5. Power Handling: 25 W
  - 6. Enclosure: white powder coat finish with metal grill; UL Listed categories UEAY and UUMV enclosure assembly. Complies with safety standards UL1480 and UL2043
  - 7. Tile Support: 20-gauge metal tile bridge
- C. WMQ Wall-mount Speaker (four speakers for rooms of 1600 sq. ft. or less)
  - 1. Description: two-way speaker system
  - 2. Driver Size: 4" with 1" tweeter
  - 3. Frequency Response: 60 Hz – 20 kHz  $\pm$  6dB
  - 4. Impedance: 8  $\Omega$
  - 5. Power Handling: 30 W
  - 6. Enclosure: white ABS enclosure with steel mesh grille



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### **PART 3. EXECUTION**

#### **3.1 SYSTEM PERFORMANCE**

- A. Install in accordance with Manufacturer's installation instructions.
- B. Final adjustment: Upon completion, the system shall be clean, adjusted and left in perfect operating condition. Transmitters shall be plugged in and charging and user manual should be left in a conspicuous place.
- C. Provisions: There shall be no audible components of hum, noise, or distortion.

#### **3.2 ADDITIONAL AS-BUILT DATA REQUIRED**

- A. Provide as-built conditions with final locations of ceiling-mounted speakers, remote infrared sensor and audio amplifier; to include serial number for the equipment in each location.

#### **3.3 INSTALLATION HARDWARE**

- A. Amplifier: The Cat 855 amplifier may be placed in any convenient location within the classroom.
  - 1. Tabletop: unit comes standard with rubber feet to conveniently sit on any tabletop, cabinet, bookshelf, etc.
  - 2. Wall-mounted: the unit comes standard with a wall-mount bracket to be hung on the wall anywhere in the room.
- B. IR sensor/receiver: The IR sensor/receiver is designed to clamp onto the suspended ceiling grid. Plenum-rated Cat 5e cable is routed back and connected at the amplifier. Sensor may also be mounted on a wall above seven feet with included mounting clip.
- C. Speakers: Various speaker options require specific installation methods. See specification sheet and installation instructions for specific speakers. Mounting: brackets shall be mounted, square and plumb, at the height and location recommended by the Manufacturer and in accordance with local building and electrical codes.

#### **3.4 CLEAN-UP**

- A. Remove unused materials and debris from the work and storage areas. Leave areas in an undamaged and acceptable condition.
- B. Save the shipping boxes for the school to return product for service.