

Master Format Specifications

Guide Specification

Wireless FM Hearing Assistance System

**SECTION 27 32 43 (Portable)**

**SECTION 27 41 16.xx (Fixed)**

**RADIO COMMUNICATION SYSTEM & EQUIPMENT**

**WIRELESS FM HEARING ASSISTANCE SYSTEM**

This document is intended to aid the specifier in developing a specification section for a Williams Sound FM Listening System for use in churches, schools, auditoriums, conference rooms, and theaters.

Edit this master specification to suit your project requirements. Modify or add items as necessary. Delete items, which are not applicable. Words and sentences within brackets [ ] reflect a choice to be made regarding inclusion or exclusion of a particular item or statement.

This guide specification is based on the Construction Specifications Institute (CSI), Section Format standards. References to section names and numbers are based on MasterFormat 2004.

For specification questions, assistance with systems integration and specific product options contact:

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SPECIFICATIONs

PART 1 GENERAL

* 1. **SUMMARY**
1. Section Includes: Equipment for amplifying, transmitting and receiving sound signals for the hard of hearing, using FM signal technology.
	1. **SUBMITTALS**
2. General: Submit in accordance with Section 01330.
3. Product Data: For each specific piece of equipment.
4. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, required clearances, method of field assembly, components, and location of each field connection.
5. Closeout Submittals: Submit following in accordance with Section 01780.
	1. Operation and Maintenance Data: For equipment.
	2. **QUALITY ASSURANCE**
6. Installer Qualifications: Experienced installer who is authorized representative of equipment manufacturer for both installation and maintenance of equipment required for this Section.
7. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.
8. Comply with NFPA 70.
9. Comply with UL 50.
	1. **WARRANTY**
10. Warrant products in system to be free of defects in operation for: 2-Year warranty for FM T55 and FM T55 D Systems, and a Lifetime PLUS Limited Warranty for older products. Warranty for cords, antennas, power supply, and accessories is 90 days.

**PART 2 PRODUCTS**

* 1. **MANUFACTURERS**
1. Acceptable Manufacturers:
	1. Williams AV, Eden Prairie, MN.
	2. **ACCEPTABLE PRODUCTS**
2. Transmitters:
	1. FM T55
	2. FM T55NET D
	3. PPA T46
	4. PPA T27
3. Receivers:
	1. PPA R38
	2. PPA R37
	3. PPA R37-8
4. Accessories:
	1. Earphones
5. EAR 008
6. EAR 013
7. EAR 014
8. EAR 022
9. EAR 042
	1. Headphones
10. HED 021
11. HED 026
12. HED 027
13. HED 040
	1. Neckloops
14. NKL 001
	1. Batteries
		1. BAT 001-2
		2. BAT 026-2
	2. Carry Cases
		1. CCS 029
		2. CCS 030 35
	3. Rack Mount Kits
		1. RPK 005
		2. RPK 006
	4. Antennas
		1. ANT 005
		2. ANT 021
		3. ANT 024
		4. ANT 025
		5. ANT 028
	5. Chargers
		1. CHG 3512
	6. **COMPONENT PERFORMANCE CRITERIA**
15. Stationary Transmitter (FM T55): [*select as needed*]
	1. Dimensions: 8.45” W x 8.25” D x 1.72”H (21.5 cm x 21 cm x 4.4 cm)
	2. Weight: 3.2 lbs (1.45 kg)
	3. Mounting: One EIA rack space high; ½ rack space chassis wide.
	4. Power Input: 100-240 VAC, 60 Hz.
	5. Power Output: 24 VAC, 750 mA, 18W.
	6. Operating Temperature: +32° F to +104° F (0° C to 40° C)
	7. Operating Frequencies: 72.1 – 75.9 MHz, 17 wide band channels (selectable)
	8. Frequency Accuracy: ±2 ppm stability, 0-50˚ C.
	9. Deviation: +/- 75 kHz maximum.
	10. Pre-Emphasis: 75 µsec
	11. RF Field Strength: Max 80 mV/m at 3 m.
	12. Nominal Range: Up to 1000 feet (using ANT 005 coaxial antenna).
	13. Frequency Response: 31 Hz – 16 kHz ±3 dB (re: 1kHz±3 dB) (“Music” Audio Preset)
	14. Signal to Noise Ratio: 67 (typical) dB Transmitted RF
	15. Total Harmonic Distortion: Less than 0.25% @ 1 kHz (RF output)
	16. Common Mode Rejection: >57 dB @ 1 kHz, Mic or Line
	17. Audio Inputs: (1x) Combination 3-pin XLR, 1/4” TRS jack for Mic or Line Level Analog Audio.  Balanced or Unbalanced Line Level, or Microphone with Selectable Phantom Power.
	18. Audio Input Gain Adjust: In menu, adjustable to 0 to -50 dB, in 1dB steps
	19. Phantom power: 14.4 VDC applied through 2.2 kΩ resistors to analog combo jack: Pin 2 and Pin 3 on XLR jack, or tip and ring on 1/4” TRS jack.
	20. Audio Level Indicators: 10-LED array that reads -18 to +9 dB at 3 dB intervals. 7 Green, 2 Amber, and 1 red LED.  Green LEDS indicate normal operating audio level peaks, Amber LEDS indicate close to overload peaks, Red LED indicates overload peaks.
	21. Audio Level Warning Lights: Mic 55dBV, -15dBV, +20dBV; Line -25dBV, +16dBV, +20dBV.
	22. Headphone Output: 1/4” TRS stereo jack, mono signal, 14.85 mW at +9dB, maximum in 33 Ω (level adjustable in menu 0 to -40 dB in 2 dB steps)
	23. Line Output: RCA jack (black), -10 dBV (.32 VRMS).  Output impedance 100 Ω at +9 dB.
	24. Ethernet: RJ-45 on back of unit supports Cat5e or Cat6 cable lengths up to 328 ft (100 m). 10/100 Base-T IEEE 802.3 compliant, unique MAC address, Cat5e or Cat6 ***shielded*** cable must be used to meet FCC requirements.
	25. WiFi: Required. Not included with system.
	26. Approvals: FCC, RoHS3, WEEE, Industry Canada
	27. Warranty: 2-year Warranty

*The above applies only for FM broadcasting. The FM T55 D can broadcast over both Wi-Fi and FM. For additional Wi-Fi broadcasting information, see the Wi-Fi Masterformat Specification.*

1. Stationary Transmitter with Network Control and Dante Input (FM T55NET D): [*select as needed*]
	1. Dimensions: 8.45” W x 8.25” D x 1.72”H (21.5 cm x 21 cm x 4.4 cm)
	2. Mounting: One EIA rack space high; ½ rack space chassis wide.
	3. Power Input: 100-240 VAC, 60 Hz.
	4. Power Output: 24 VAC, 750 mA, 18W.
	5. Operating Temperature: +32° F to +104° F (0° C to 40° C)
	6. Operating Frequencies: 72.1 – 75.9 MHz, 17 wide band channels (selectable)
	7. Frequency Accuracy: ±2 ppm stability, 0-50˚ C.
	8. Deviation: +/- 75 kHz maximum.
	9. Pre-Emphasis: 75 µsec
	10. RF Field Strength: Max 80 mV/m at 3 m.
	11. Nominal Range: Up to 1000 feet (using ANT 005 coaxial antenna).
	12. Frequency Response: 31 Hz – 16 kHz ±3 dB (re: 1kHz±3 dB) (“Music” Audio Preset)
	13. Signal to Noise Ratio: ≥74 dB Transmitted RF
	14. Total Harmonic Distortion: Less than 0.25% @ 1 kHz (RF output)
	15. Common Mode Rejection: >57 dB @ 1 kHz, Mic or Line
	16. Audio Inputs: (1x) Combination 3-pin XLR, 1/4” TRS jack for Mic or Line Level Analog Audio.  Balanced or Unbalanced Line Level, or Microphone with Selectable Phantom Power.
	17. Audio Input Gain Adjust: In menu, adjustable to 0 to -50 dB, in 1dB steps
	18. Phantom power: 14.4 VDC applied through 2.2 kΩ resistors to analog combo jack: Pin 2 and Pin 3 on XLR jack, or tip and ring on 1/4” TRS jack.
	19. Audio Level Indicators: 10-LED array that reads -18 to +9 dB at 3 dB intervals. 7 Green, 2 Amber, and 1 red LED.  Green LEDS indicate normal operating audio level peaks, Amber LEDS indicate close to overload peaks, Red LED indicates overload peaks.
	20. Audio Level Warning Lights: Mic 55dBV, -15dBV, +20dBV; Line -25dBV, +16dBV, +20dBV.
	21. Headphone Output: 1/4” TRS stereo jack, mono signal, 14.85 mW at +9dB, maximum in 33 Ω (level adjustable in menu 0 to -40 dB in 2 dB steps)
	22. Line Output: RCA jack (black), -10 dBV (.32 VRMS).  Output impedance 100 Ω at +9 dB.
	23. Ethernet: RJ-45 on back of unit supports Cat5e or Cat6 cable lengths up to 328 ft (100 m). 10/100 Base-T IEEE 802.3 compliant, unique MAC address, Cat5e or Cat6 ***shielded*** cable must be used to meet FCC requirements.
	24. WiFi: Required. Not included with system.
	25. Dante™ Audio Input: RJ-45 on back of unit supports Cat5e cable lengths up to 328 ft (100 m). 10/100 Base-T IEEE 802.3 compliant, unique MAC address, Cat5e ***shielded*** cable must be used to meet FCC requirements.
	26. Approvals: FCC, RoHS2, WEEE, Industry Canada
	27. Warranty: 2-year Warranty

*The above applies only for FM broadcasting. The FM T55 D can broadcast over both Wi-Fi and FM. For additional Wi-Fi broadcasting information, see the Wi-Fi Masterformat Specification.*

1. Stationary Transmitter (PPA T27): [*select as needed*]
2. Dimensions: 4.1” W x 6.1” L x 1.3” H (104.1 mm x 154.9 mm x 33 mm)
3. Weight: 7.8 oz. (221 g)
4. Color: Black
5. Power (U.S./Canada): 105-130 VAC, 50-60 Hz, 3.2 W at 120 VAC
6. Operating Frequencies: 72-76 MHz\*: 72.1 (CH A), 72.2 (CH K), 72.3 (CH B), 72.4 (CH N), 72.5 (CH C), 72.6 (CH O), 72.7 (CH D), 72.8 (CH P), 72.9 (CH E), 74.7 (CH I), 75.3 (CH J), 75.4 (CH R), 75.5 (CH F), 75.6 (CH S), 75.7 (CH G), 75.8 (CH T), 75.9 (CH H)
7. Frequency Selector: External switches, 17 channels (lockable)
8. RF Field Strength: Does not exceed 80mV/m @ 3m
9. Nominal Range: Up to 1000 feet (305 m) w/standard ANT 021 “rubber duckie” antenna or optional ANT 005 coaxial antenna.
10. Modulation: FM, 75 kHz deviation (wide–band) max.
11. Stability: ± .005% over 0-50˚C
12. Pre-Emphasis: 75 µS
13. Frequency Response: 85Hz - 14kHz ±3dB
14. Distortion: 1% Max. THD
15. Signal to Noise Ratio: 65 dB with R35 Receiver
16. Microphone Input: 3.5mm mini phone jack, supplies +DC for electret mics
17. Mic Input Level: 1–10 mV, nominal
18. Line-Level Input: RCA Jack, Hi Z, unbal.
19. Line Input Level: 0.1–1.0 Vrms, nominal
20. Input Attenuator: Pot, screwdriver-adjustable
21. Antenna Outputs: Thread mount for ANT 021 “rubber duckie” antenna or ANT 025 telescoping antenna  RF connector for ANT 024 dipole or ANT 005 coaxial antenna
22. Approvals: FCC, IC, RoHS, WEEE
23. Warranty: Lifetime PLUS Limited Warranty
24. Portable Transmitter (PPA T46): [*select as needed*]
25. Dimensions: 4.1” L x 2.8” W x 1.1” D (104 mm x 71 mm x 28 mm)
26. Weight: 2.6 oz (74 g), no batteries
27. Color: Black/Silver
28. Enclosure Material: Shatter-resistant PC/ABS plastic with textured scratch-resistant aluminum faceplate
29. Battery Type options: Two (2) AA 1.5 V non-rechargeable Alkaline batteries (BAT 001-2), 75 mA nominal current drain, up to 30 hours battery life, or two (2) AA 1.5 V NiMH rechargeable batteries (BAT 026-2), 75 mA nominal current drain, up to 20 hours battery life per charge, recharges in 14–16 hours, uses CHG 3502 or CHG 3512 Charger
30. Operating Frequencies: Selectable, 17 channels, 72.1 – 75.9 MHz\*.  Switchable 8 or 17 Channel Mode.  (8-channel mode setting allows only the 8 non-interfering simultaneous-use channels to be selected)
31. Stability: ± .005%, frequency synthesized, crystal reference, PLL
32. Modulation: Wide-band FM, 75 kHz peak, 75 µS pre-emphasis
33. RF Output: Max 80 mV/m at 3m
34. Freq Response: 180 Hz - 13 kHz, ±3 dB at 1% max. THD
35. SNR: 65 dB (typical) transmitted
36. Transmit Antenna: Integral with mic cord
37. Microphone: Electret type, 3.5 mm mono plug
38. Display: OLED for status and menu info
	1. Status: Ch/Freq, Mic Audio Level, Auxiliary Input Audio Level, Battery Status, Mic Mute, Channel Lock, Dual-Preset mode.
	2. Menu: Ch/Freq display mode select, Volume, Aux Input, Compression,17 or 8-channel mode, screen time out, screen brightness, restore default settings
39. External Controls: Momentary push button: push and hold 3 seconds for power On/Off, push and release for microphone mute On/Off. Left, Right and Menu buttons for accessing and changing transmitter settings.  Battery type switch (Alkaline or NiMH) located behind the battery compartment door.
40. External Indicators: Power LED - Green, flashes when battery is low
41. Mic Input: 3.5 mm mono jack with electret mic bias, adjustable gain with 25 dB range
42. Aux Input: 2.5 mm stereo jack, adjustable gain with 60 dB range
43. Audio Compression: 1:1 (off) or 2:1 (on) selectable in menu
44. Compatible Receivers: PPA R37, PPA R37-8, PPA R38.
45. Approvals/Directives: FCC, IC, RoHS, WEEE
46. Warranty: Lifetime PLUS Limited Warranty
47. Receiver (PPA R38): [*select as needed*]
48. Dimensions:  4.1” x 2.85” x 1.38” (104 x 72 x 35mm)
49. Weight:  4.6oz (130g) with batteries. 2.6oz (73g) without batteries
50. Color:  Black/Silver.  Black ABS Plastic case with Aluminum faceplate.
51. Battery Type:  (2) AA Alkaline or (2) AA NiMH Rechargeable
52. Battery Life:  (2) AA non-rechargeable alkaline batteries (BAT 001-2), approx. 50 hrs.  (2) AA rechargeable NiMH batteries (BAT 026-2), 1500mAh, approx. 32 hrs.
53. Current Consumption:  52mA nominal
54. Operating Temp. Range:  32° – 122°F  (0° to 50°C)
55. Channels:  17 Wideband, accessed via menu
56. Operating Frequencies:

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

1. FM Deviation:  75 kHz
2. De-Emphasis:  75 µS
3. Display Screen:  1" OLED
4. Power Indication:  Power button, backlit green.
5. Good battery strength - glows solid.  Low battery - flashes.
6. Sensitivity:  2 µV at 12 dB Sinad with squelch defeated
7. Input Overload:  100 mV
8. 17. Freq Response   200 Hz – 15 kHz, ±3dB
9. Modulation:  FM, +/- 75 kHz peak deviation
10. Signal-to-Noise Ratio:  Min 65 dB @ 1.0V
11. Receive Antenna:  Integral with earphone/headphone cord
12. Audio Output:  35 mW max at 16 Ω
13. Headphone Connector:  3.5 mm stereo jack, mono output for stereo or mono earphones or headphones
14. Supplied Earphone:  Stereo, earbud-type with foam cushion, 3.5 mm plug, 32 Ω
15. Power Save Mode:  Enters sleep mode after approximately 3 minutes of no RF signal
16. Approvals:  FCC, IC, RoHS, WEEE
17. Warranty:  Lifetime PLUS Limited Warranty
18. Receiver (PPA R37): [*select as needed*]
19. Dimensions: 4.1” x 2.85” x 1.38” (104 x 72 x 35mm)
20. Weight: 4.6oz (130g) with batteries; 2.6oz (73g) without batteries
21. Color: Black
22. Battery Type: (2) AA Alkaline or 2 x AA NiMH
23. Battery Life: Two (2) AA non-rechargeable alkaline batteries (BAT 001), approx. 50 hrs; or (2) AA rechargeable NiMH batteries (BAT 026), 1500 mAh, approx. 32 hrs
24. Current Consumption: 52mA nominal
25. Temperature Range: – 0 to 50C
26. Channels: 17, accessed via seek button in battery compartment
27. Operating Freq.: 72.1, 72.2, 72.3, 72.4, 72.5, 72.6, 72.7, 72.8, 72.9, 74.7, 75.3, 75.4, 75.5, 75.6, 75.7, 75.8, 75.9 MHz\*
28. Intermediate Freq.: 75 kHz
29. FM Deviation: 75 kHz
30. De-Emphasis: 75 µS
31. LED Indicator: Power: Green; Low Battery: Flashes Green
32. AFC Range: ± 120 kHz
33. Sensitivity: 2 µV at 12 dB Sinad with squelch defeated
34. Input Overload: 100 mV
35. Frequency Response: 200 – 15 kHz
36. Modulation: FM, +/- 75 kHz peak deviation
37. Signal-to-Noise Ratio: 65 dB min @ 100 uV
38. Receive Antenna: Integral with earphone/headphone cord
39. Audio Output: 35 mW peak into 16 Ω
40. Output Connector: 3.5 mm stereo/mono jack
41. Earphone: Earbud-type with foam cushion, 3.5 mm plug, 32 Ω
42. Auto Shut-off Enters sleep mode after approx 6 mins of no RF signal
43. Approvals: FCC, IC, RoHS, WEEE
44. Warranty: Lifetime PLUS Limited Warranty
45. Receiver (PPA R37-8): [*select as needed*]

1. Dimensions: 4.1” x 2.85” x 1.38” (104 x 72 x 35mm)

2. Weight: 4.6oz (130g) with batteries; 2.6oz (73g) without batteries

3. Color: Black

4. Battery Type: (2) AA Alkaline or 2 x AA NiMH

5. Battery Life: Two (2) AA non-rechargeable alkaline batteries (BAT 001), approx. 50 hrs; or (2) AA rechargeable NiMH batteries (BAT 026), 1500 mAh, approx. 32 hrs

6. Current Consumption: 42mA nominal

7. Temperature Range: – 0 to 50C

8. Channels: 8, accessed via rotary knob on top of unit

9. Operating Freq.: 72.1, 72.3, 72.6, 72.8, 75.4, 75.7, 75.9 MHz

10. Modulation: FM, +/- 75 kHz peak deviation

11. De-Emphasis: 75 µS

12. LED Indicator: Power: Green; Low Battery: Flashes Green; Sleep Mode: Fade On, Fade Off

13. Sensitivity: 2 µV at 12 dB Sinad with squelch defeated

14. Input Overload: 100 mV

16. Frequency Response: 200 – 15 kHz

17. Signal-to-Noise Ratio: 65 dB min @ 100 uV

18. Receive Antenna: Integral with earphone/headphone cord

19. Audio Output: 35 mW peak into 16 Ω

20. Output Connector: 3.5 mm stereo/mono jack

21. Earphone: Earbud-type with foam cushion, 3.5 mm plug, 32 Ω

22. Sleep Mode: Enters sleep mode after approx 6 mins of no RF signal, returns to normal operation when a transmitter is re-established on same channel

24. Approvals: FCC, IC, RoHS, WEEE

25. Warranty: Lifetime PLUS Limited Warranty

C. Accessories: [*select as needed*]

* 1. Earphones
	2. [Wide Range Earphone: Model EAR 008]
	3. [Single Mini Earbud: Model EAR 013]
	4. [Dual Mini Earbud: Model EAR 014]
	5. [Surround Earphone: Model EAR 022]
	6. [Dual, in-ear, isolation: Model EAR 042]
	7. Headphones
		1. [Deluxe Folding: Model HED 021]
		2. [Rear-wear, Mono: Model HED 026]
		3. [Heavy-duty, Folding, Mono: Model HED 027]
		4. [Protector, Dual-Earmuff: Model HED 040]
	8. Neckloop
	9. [18in cord, 3.5mm plug): Model NKL 001]
	10. Batteries
	11. [AA Alkaline: Model BAT 001-2]
	12. [AA NiMH: Model BAT 026-2]
	13. Carry Cases
		1. [Small Briefcase for accessories: CCS 029]
		2. [Large 35-slot Case: Model CCS 030 35]
	14. Rack Mounts
	15. [Single Rack Mount Kit for Half Rack Space Products: Model RPK 005]
	16. [Dual Rack Mount Kit for Half Rack Space Products: Model RPK 006]
	17. Antennas
	18. [Remote Coaxial Antenna for 72-76 MHz PPA Transmitters: Model ANT 005]
	19. [Rubber Duckie Antenna: Model ANT 021]
	20. [Dipole wall-mount antenna: Model ANT 024]
	21. [39" Telescoping Antenna: Model ANT 025]
	22. [39" Telescoping Antenna with Swivel Connector: Model ANT 028]
	23. Chargers
		1. [12 Units, R37, R37-8 or R38: Model CHG 3512]

**PART 3 EXECUTION**

1. **INSTALLATION**
	1. Install equipment to comply with manufacturer’s recommendations.
	2. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with typical service loops, no excess. Use lacing bars in cabinets.
2. **GROUNDING**
	1. Ground cable shields and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.
3. **FIELD QUALITY CONTROL**
	1. Operational Test: Perform tests that confirm proper operation of system and proper coverage in area where equipment will be used.
4. **DEMONSTRATION**
	1. Demonstration and Instruction of Owner’s Personnel: Provide in accordance with Section 01800. Engage factory-authorized service representative to train Owner’s maintenance personnel to adjust, operate, and maintain equipment as specified.

**END OF SECTION**

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