Airman 750 / 760 Headset and Headphone

Maintenance & Overhaul Manual for Airman 750/760 Headset & Headphone

Record of Revisions

Rev No.	Revision Date	Change Description
A	12/1988	See previous revisions of 38108-965 for affected changes
B	06/1989	
C	01/1990	
D	11/1993	
E	03/1995	
F	04/1996	
G	06/2000	
7	07/2017	This document was completely rewritten and a Bosch part number (F.01U.311.532) was assigned.
8	09/2017	• Updated revision on front cover • Removed the Insertion Date column from this table. • Technical Support Contact information updated • In the models covered table, updated part number type-o
9	08/2018	• Minor formatting and parts list updates

Purpose of Manual

This manual, Bosch part number F.01U.311.532, contains information for the overhaul and servicing of the Airman 750/760 headsets.

Technical Support

A liaison between the customer and factory is provided by the Bosch Product Support Department. Consultation and assistance on technical problems, part information, and availability of local and factory repair facilities is available. When writing, include all information concerning problem and mail to:

Bosch Communications, Inc.

8601 Cornhusker Hwy
Lincoln, NE 68507 U.S.A.

Attn: **Aircraft Product Support Mgr.**

Telephone: 800-898-6723 OPT 4, 3, 1, 1

Email: telexdispatchtechsupport@us.bosch.com

Parts Ordering

Replacement parts may be ordered from our parts department. When ordering, please include the following information:

- Headset Model Number
- Part Description
- Part Number
- Quantity

Contact Information:

Bosch Communications, Inc.

8601 Cornhusker Hwy. Dock B
Lincoln, NE 68507 U.S.A.

Attn: **Parts Department**

Telephone: 800.289.0096 option 5
E-mail: repair@us.bosch.com

Repairs

In order to maintain the FAA certification, all repairs to the headset must be made only by persons authorized under Part 43 of the Federal Aviation Agency regulations or the local regulations for your location. Bosch offers full support, repair, and certification.

Table of Contents

CHAPTER 1

Description & Specifications

1.1 Description/Specifications

1.1.1 General Description

The Telex Airman 750 Headset and the Airman 760 Headphone are designed and engineered for high-quality aircraft communications. The Airman 750 is approved for aircraft use under the Federal Aviation Agency TSO C57a and C58a. The Airman 760 is approved for aircraft use under the Federal Aviation Agency TSO C57a.

The Airman 750 Headset features a miniature, noise-canceling electret microphone element which provides superior hum rejection. The microphone is mounted upon a boom which pivots 310 degrees for use on either side of the user's head. The headset amplifier has an adjustable gain control and provides output levels equivalent to carbon microphone levels. Several variations of the 750 headset exist; each model has a different connector and a unique wiring diagram.

The Airman 760 Headphone is designed for users who operate hand-held microphones. The 760 is virtually identical to the 750 headset, without the boom microphone.

1.1.2 Models Covered

TABLE 1. Airman 750/760 Models and Connector

Model Number	Description	Connector
Airman 750		
64300-200	Double side headset, 2x PJ, 150Ω	PJ-068/PJ-055 (or equivalent)
64300-205	Double side headset, 2x A5M, 150Ω	XLR 5-pin Male
64300-208	Double side headset, 2x A5M, 150Ω, 7ft	XLR 5-pin Male
64300-210	Double side headset, 2x A5M, 600Ω	XLR 5-pin Male
64300-212	Double side headset, 2x PJ, 600Ω	PJ-068/PJ-055 (or equivalent)
64300-218	Double side headset, 2x PJ, 150Ω, 8ft	PJ-068 (or equivalent)
64300-219	Double side headset, XLR A4F, 150Ω	XLR 4-pin Female
64300-220	Double side headset, 2x PJ, 150Ω	PJ-068/PJ-055 (or equivalent)
64300-300	Single side headset, 2x PJ, 300Ω	PJ-068/PJ-055 (or equivalent)
Airman 760		
64400-200	Double side headphone, PJ, 150Ω	PJ-055 (or equivalent)

IMPORTANT: Model 64400-000, -203 and Models 64300-000, -005, -105, -008, -108, -010, -110, -012, -112, -016, -116, -018, -118, -019, -119, -020, -120, -021, -121, -022, -122, -201, -216 are no longer supported and are not covered in this CMM.

1.1.3 Specifications

Receivers

Type: Dynamic

Impedance:

150 Ω

64300-200, -205, -208, -218, -219, -220;

64400-200

300 Ω

64300-300

600 Ω

64300-210, -212,

Frequency Response: 100-3000 Hz

Sensitivity: 90dB SPL ±5dB at 1kHz, 1mW input

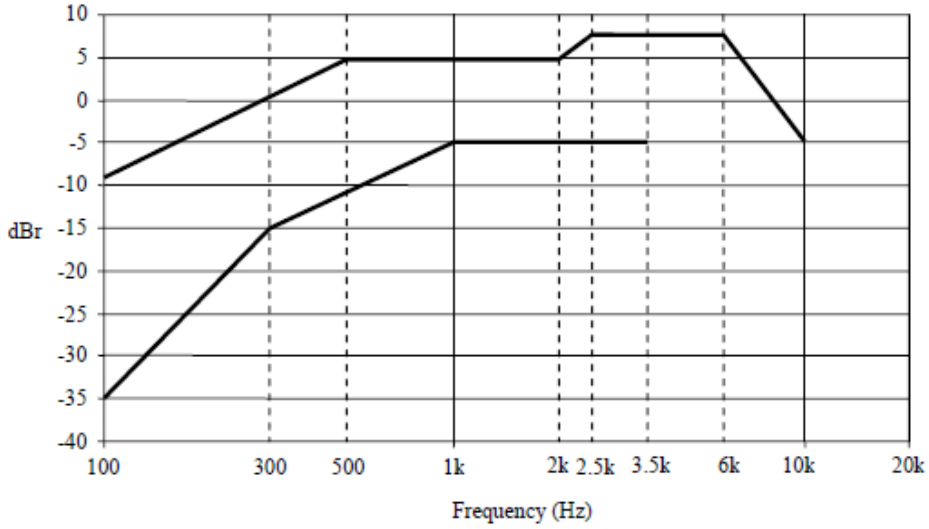
Microphone (Airman 750 only)

Type: Noise-canceling amplified electret

Matching Impedance: 50-600 Ω

Frequency Response:

Model 750 – 300-5000Hz within limits shown below



MICROPHONE FREQUENCY RESPONSE

Sensitivity:

ref. 1V/µbar @1kHz, 12VDC
-51 +3/-3dB (All versions except -220)
-44 +2/-1dB (-220)

Operating Voltage: 8-16 Vdc (470 Ohm load)

Approximate Gross Weight:

750

Single-Sided	4oz. (113g)
Double-Sided	4.8oz. (136g)
760	3oz. (85g)

Approximate Wearing Weight:

750

Single-Sided	2.3oz. (65g)
Double-Sided	3.2oz. (91g)
760	2.2 oz. (62g)

Plug Type:

Varies by model. Refer to Table 1 on page 8

Cord Length:

Varies by model. Refer to parts list

CHAPTER 2

Parts List and Disassembly/Assembly

2.1 Parts List

2.1.1 General

When replacing parts, consult Figure 1 on page 16 and the parts list. Using the model number located on the headband assembly, select the correct part number from Figure 2.1.3, “Airman 750, Catalog Number 64300-200, -205, -208, -210, -212, -218, -219, -220, -300,” on page 12 or “Airman 750, Catalog Number 64300-200, -205, -208, -210, -212, -218, -219, -220, -300” on page 12.

2.1.2 Airman 760, Catalog Number 64400-200

			Model
Item	**Ordering Part Number**	**Description**	**200**
1	590404360	SCREW PT, PAN HEAD, K15 X 6MM, BLK ZINC	4
2	590402002	EAR CUSHION (1 per pkg.)	2
	800456005 or 64301000	EAR CUSHION (2 per pkg.)	1
3	701335000	CUSHION PAD	2
4	63988002	CORD Length: 5.5 ± 0.5 ft. (1.68 ± 0.15m)	1
5	590637000	CLOTHING CLIP	1
8	64308100	HOUSING (Receiver) ASSY PACKAGED, left side	1
9	64308110	HOUSING (Receiver) ASSY PACKAGED, right side	1
10	64404018	HOUSING REAR, right side no printing	1
	800504000 or ESP-F01U323856	HOUSING REAR, right side printed	1
11	S-64318081	HEADBAND ASSEMBLY	1
12	64310000	GLIDER ASSEMBLY	2
13	64330500	GLIDER SPRING	
	S-F01U327240	GLIDER SPRING(10-pack)	2
14	Not Available as a replaceable part	CIRCUIT BOARD	1
19	F01U327242	HOUSING REAR, LEFT SIDE	1

2.1.3 Airman 750, Catalog Number 64300-200, -205, -208, -210, -212, -218, -219, -220, -300

			MODEL								
Item	**Ordering Part Number**	**Description**	**200**	**205**	**208**	**210**	**212**	**218**	**219**	**220**	**300**
1	590404360	SCREW, PT, PAN HEAD, K15 X 6MM, BLK ZINC	4	4	4	4	4	4	4	4	2
2	590402002	EAR CUSHION (1 per pkg.)	2	2	2	2	2	2	2	2	1
	800456005 or 64301000	EAR CUSHION (2 per pkg.)	1	1	1	1	1	1	1	1	
3	701335000	CUSHION PAD	2	2	2	2	2	2	2	2	1

			MODEL								
Item	**Ordering Part Number**	**Description**	**200**	**205**	**208**	**210**	**212**	**218**	**219**	**220**	**300**
4	70413002	CORD Approximate Length: 5.5 ft (1.67 m)	1								1
	63988018	CORD Approximate Length: 5.8 ft (1.76m)		1							
	63988025	CORD Approximate Length: 7 ft. (2.13 m)			1						
	63988031	CORD Approximate Length: 6 ft. (1.82 m)				1					
	70413002	CORD Approximate Length: 5.5 ft. (1.67 m)					1				
	63988043	CORD Length: 8 ft. (2.4 m)						1			
	S-F01U327247	CORD							1		
	70413006	CORD Approximate Length: 5.5 ft. (1.67 m)								1	
5	590637000	CLOTHING CLIP	1	1	2	1	1	1	1	1	1
8	64308100	HOUSING (Receiver) ASSY PACKAGED, left side		1	1				1		
	64308108	HOUSING (Receiver) ASSY PACKAGED, left side				1					
	64308115	HOUSING (Receiver) ASSY PACKAGED, left side	1					1		1	1
	64308117	HOUSING (Receiver) ASSY PACKAGED, left side					1				
9	64308110	HOUSING (Receiver) ASSY PACKAGED, right side	1	1	1	1	1	1	1	1	
10	64404018	HOUSING REAR, right side	1	1	1	1	1	1	1	1	
	ESP-F01U323856	HOUSING REAR, right side (printed)									
11	64318069	HEADBAND ASSEMBLY	1								
	64318070	HEADBAND ASSEMBLY		1							
	63993010	HEADBAND ASSEMBLY			1						
	64318071	HEADBAND ASSEMBLY				1					
	S-64318072	HEADBAND ASSEMBLY					1				
	64318074	HEADBAND ASSEMBLY						1			
	S-F01U327241	HEADBAND ASSEMBLY							1		
	S-64318075	HEADBAND ASSEMBLY								1	
	64318085	HEADBAND ASSEMBLY									1

			MODEL								
Item	**Ordering Part Number**	**Description**	**200**	**205**	**208**	**210**	**212**	**218**	**219**	**220**	**300**
12	64310000	GLIDER ASSEMBLY	2	2	2	2	2	2	2	2	1
13	64305000	GLIDER SPRING 1-piece	2	2	2	2	2	2	2	2	2
	S-F01U327240	GLIDER SPRING 10-piece									
14	600578000	PCBA	1	1	1	1	1	1	1	1	1
15	64307008	BOOM ASSEMBLY		1	1	1			1		
	64307013	BOOM ASSEMBLY	1				1	1		1	1
16	59688000	WINDSCREEN	1	1	1	1	1	1	1	1	1
	800456001	WINDSCREEN + O-RING	1	1	1	1	1	1	1	1	1
17[a]	580001003	OPTIONAL O-RING	1	1	1	1	1	1	1	1	1
18	70531004	TEMPLE PLATE									1
20	70533000	TEMPLE PLATE FOAM PAD									1
21[b]	701246000	BOOM ROTATOR CAP	1	1	1	1	1	1	1	1	1
22	S-F01U322242	OVERHEAD CORD	1	1	1	1	1	1	1	1	1

a. Windscreen (59688000) is standard equipment. Optionally, windscreen + o-ring (800456001) can be used.

b. Not shown. Included as part of item 15 (Boom Assembly) or can be purchased separately.

2.2 Disassembly/Assembly

The following procedure allows for complete disassembly of the Airman 750 and Airman 760. See Figure 1, Figure 2, and the "Parts List" on page 13 for reference.

NOTE:

- Assembly is the reversal of the disassembly procedure. Please take care when disassembling to note details that may be required in the assembly process, such as the locations of disconnected wires.
- When soldering, be careful not to touch the plastic housing of the headset/headphone with the soldering iron.

2.2.1 Disassembly

2.2.1.1 Removal of the Receiver Assembly

To **remove the receiver assembly**, do the following:

1. Gently remove the **foam ear cushion (2)** (and ear cushion pad if present).
2. Using a Torx-5 screwdriver, remove the **two screws (1)** from the receiver assembly (8, 9).
   The rear housing separates from the receiver assembly and the headband.

NOTE: Do not pull the receiver assembly more than 12mm away from the rear housing at this time.

3. For the cord side, using a soldering iron, carefully disconnect the **red and white internal wires** from either the circuit board or the receiver assembly.
   OR
   For the non-cord side, continue to the **next step**.
4. Using a soldering iron, carefully disconnect the **overhead cord wires** from the receiver assembly, see Figure 2.

NOTE: Airman 750 model -300 does not have overhead cord wires.

2.2.1.2 Removal of the Cord Assembly

To **remove the cord assembly**, do the following:

1. Gently remove the **foam ear cushion (2)** (and ear cushion pad if present).
2. Using a Torx-5 screwdriver, remove the **two screws (1)** from the receiver assembly (8, 9).
   The rear housing separates from the receiver assembly and the headband.

NOTE: Do not pull the receiver assembly more than 12mm away from the rear housing at this time.

3. For the cord side, using a soldering iron, carefully disconnect the **red and white internal wires** from either the circuit board or the receiver assembly.
   OR
   For the non-cord side, continue to the **next step**.
4. Using a soldering iron, on the circuit board carefully disconnect the **four wires from the cord assembly** (4).

2.2.1.3 Removal of the Circuit Board and Boom Assembly (Airman 750)

To **remove the circuit board**, do the following:

1. Follow **steps 1-2 in the procedure for removing the cord assembly** (2.1.2).
2. If disassembling an Airman 750, use a soldering iron on the circuit board to carefully disconnect the **two boom wires from J10 and J11**.
   OR
   If disassembling an Airman 760, continue to **next step**.
3. Pull back **the black clasps on the side of the circuit board** to release it for removal.

NOTE: The 750 boom assembly is now free of all headset components.

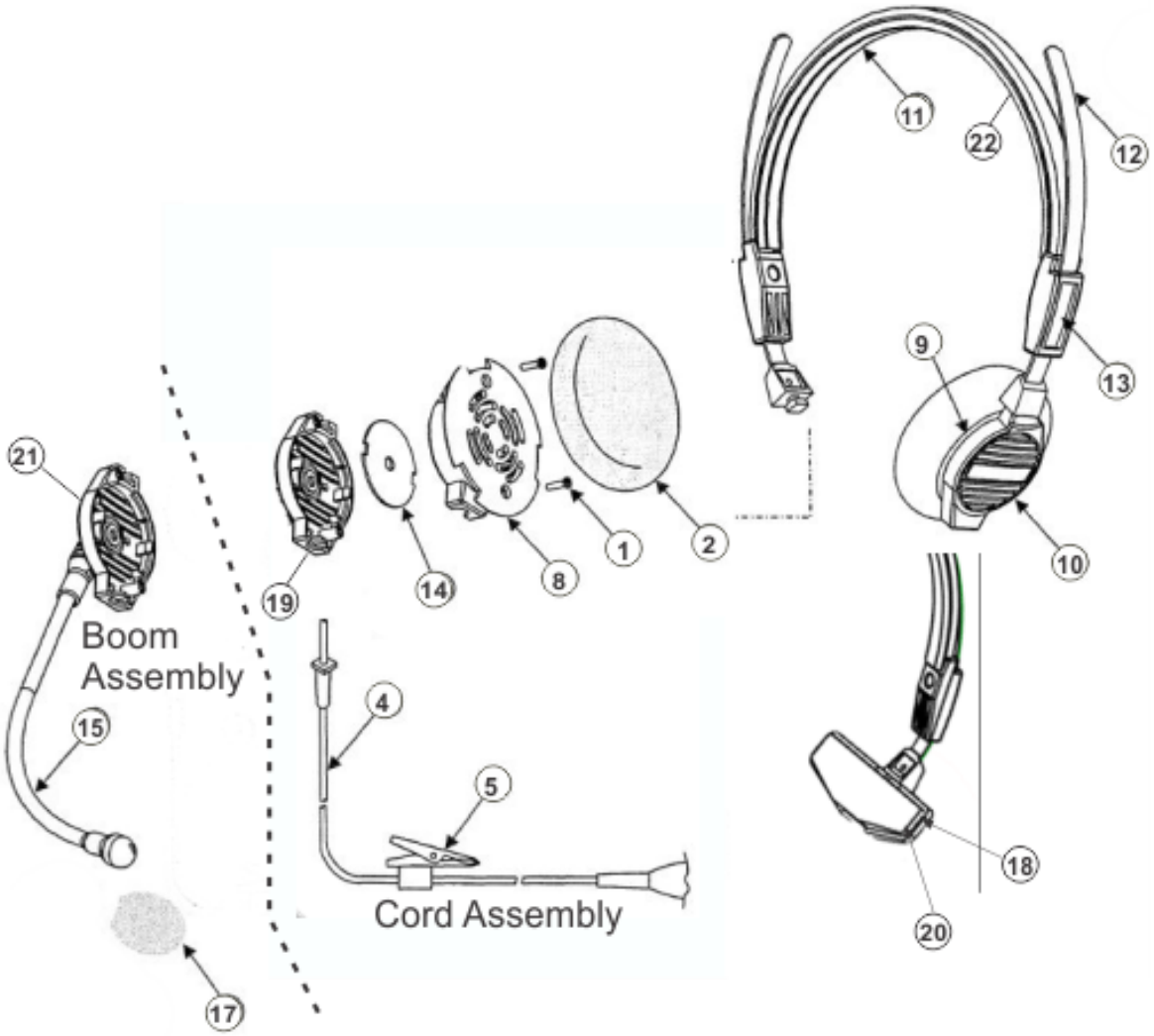


FIGURE 1. Airman 750/760 Series-200/300 Exploded View

NOTE:

- Appearances vary slightly for some versions.
- See the “Parts List” on page 13 for part number descriptions and ordering number.

2.2.1.4 Removal of a Glider

To **remove a glider from the headset**, do the following:

1. Using a pair of needle nose pliers, straighten the crimp at the end of the glider.
2. Once the crimp is straightened, gently slide the slider through the glider stabilizer.

NOTE: Take care not to lose the glider spring (a small curved rectangular piece of plastic). The glider spring provides tension to hold the glider in place when mounted in the headset. The outward facing arc should be touching the glider providing some tension.

3. Repeat steps 1 and 2 for dual-sided headset models.

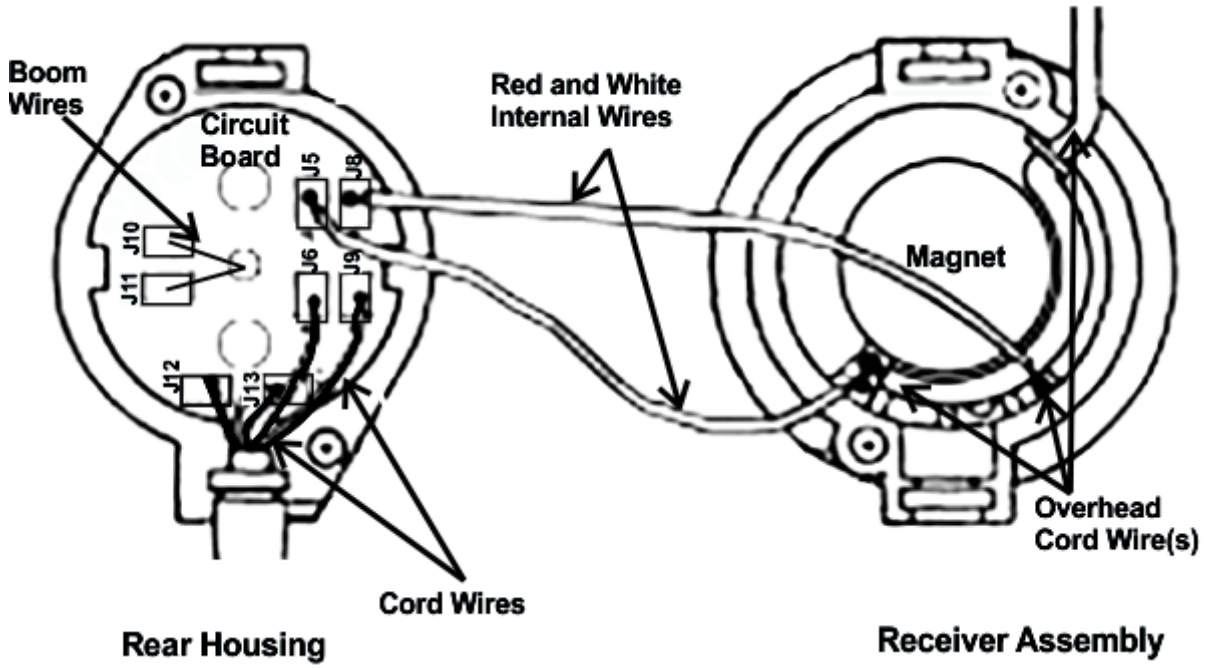


FIGURE 2. Circuit Board/Receiver/Cord Wiring

NOTE: For a complete list of wiring diagram information, see “Wiring / Connectors” on page 19.

2.2.2 Assembly

IMPORTANT: Assembly is a reversal of the disassembly procedure. Steps need to be done exactly the reverse order of the disassembly procedure to ensure proper headset fit and operation. Please take care to properly align parts and wires to ensure proper operation. See disassembly procedure, parts lists, assembly diagrams, and wiring diagrams for reference.

NOTE:

- Speaker wires and overhead cord must be routed around the perimeter of the magnet in the receiver assembly to insure they do not get pinched between the circuit board and the speaker.

3.1 Wiring/Connectors

3.1.1 Airman 750 Wiring Diagrams

NOTE: On the speaker, the positive terminal is usually indicate with a dot.

3.1.1.1 Catalog Numbers 64300 -200, -220, -300

*with model -300, omit overhead cordage

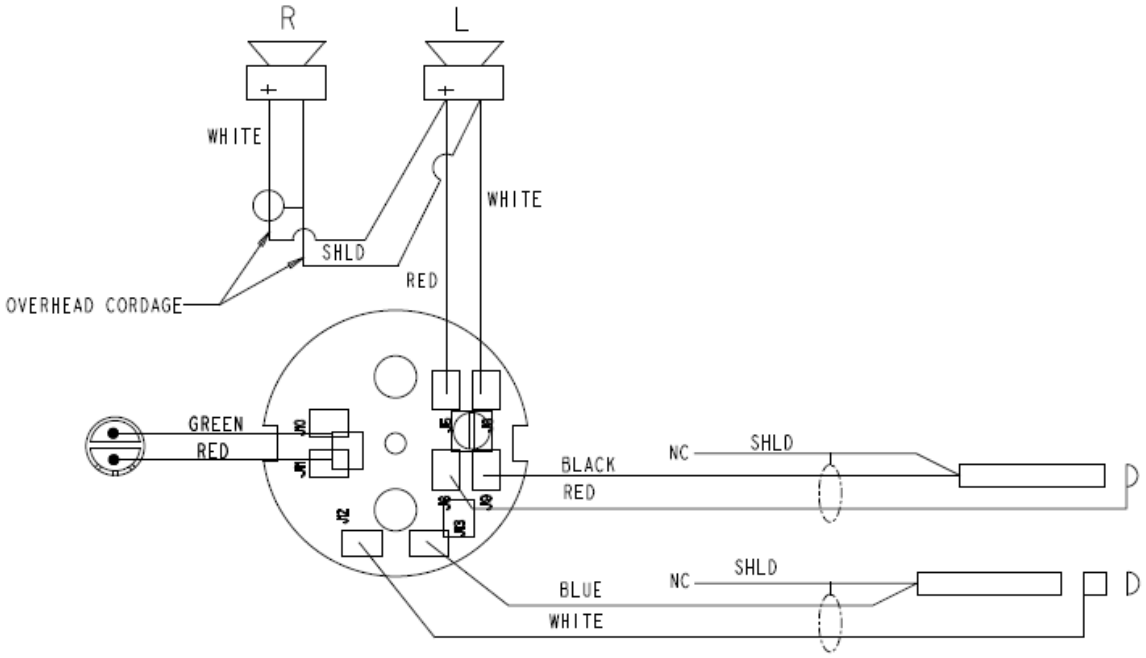


FIGURE 1. Airman 750 Headset Model -200, -220, -300 Wiring Diagram

3.1.1.2 Catalog Number 64300 -210

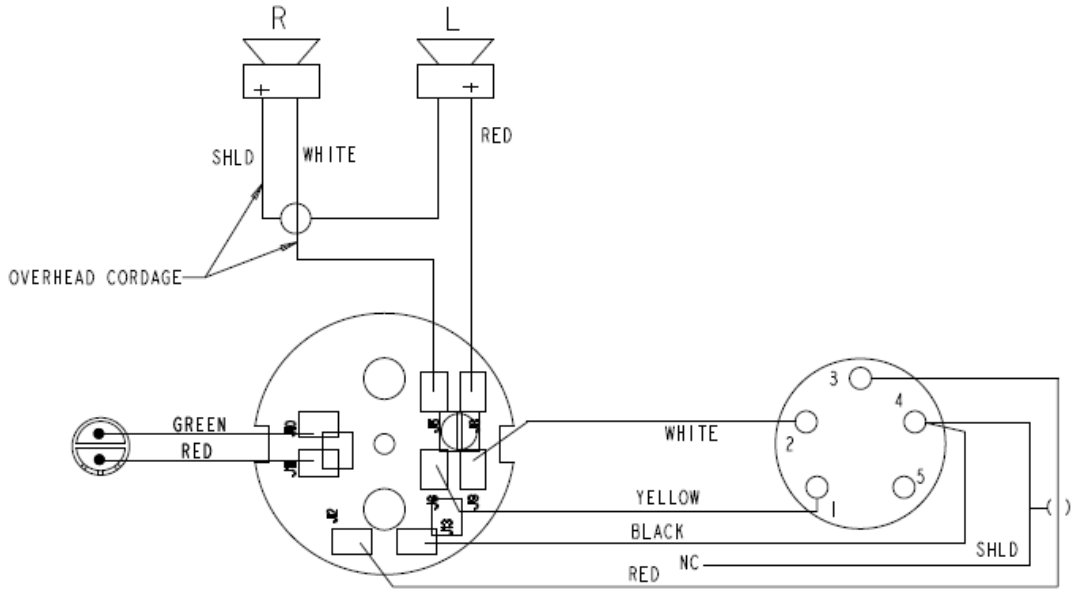


FIGURE 2. Airman 750 Headset Model -210 Wiring Diagram

3.1.1.3 Catalog Numbers 64300 -205, -208

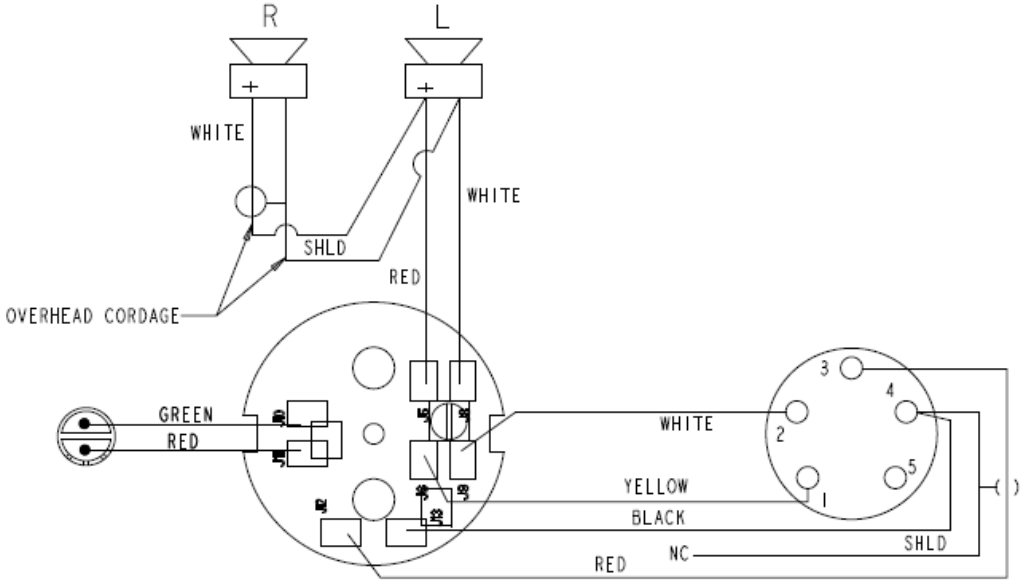


FIGURE 3. Airman 750 Headset Models -205, -208 Wiring Diagram

3.1.1.4 Catalog Number 64300 -212

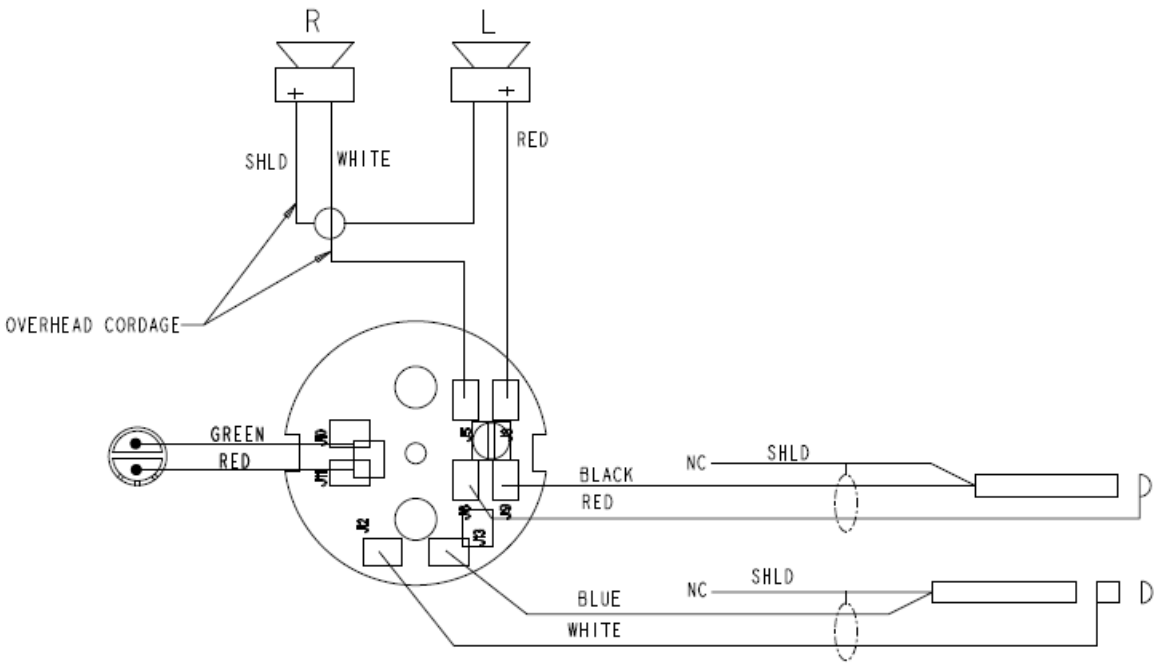


FIGURE 4. Airman 750 Headset Model -212 Wiring Diagram

3.1.1.5 Catalog Number 64300 -218

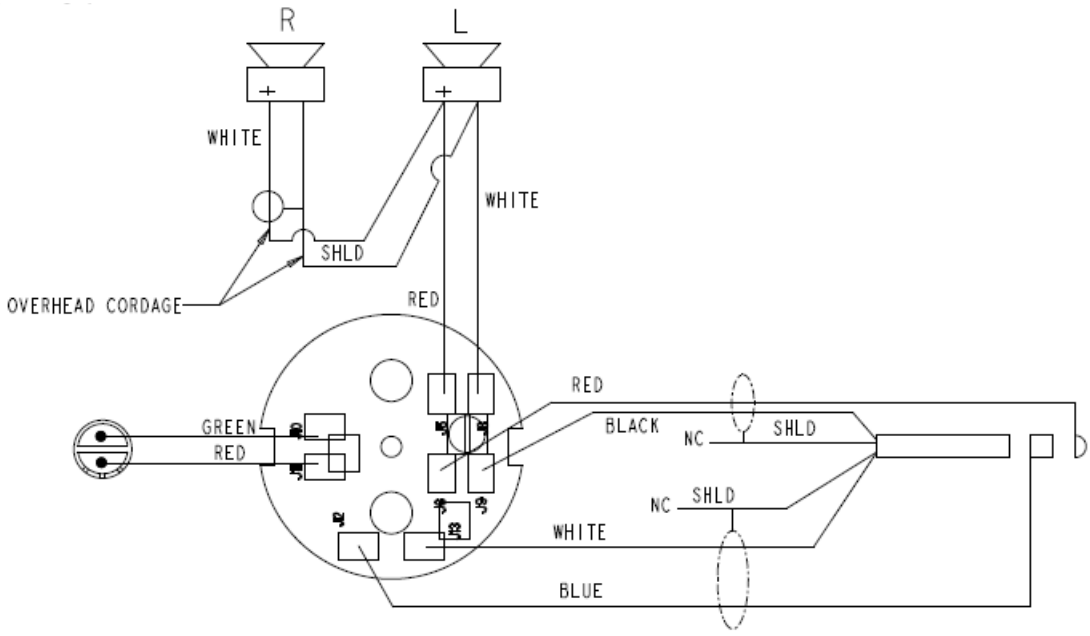


FIGURE 5. Airman 750 Headset Model -218 Wiring Diagram

3.1.1.6 Catalog Number 64300 -219

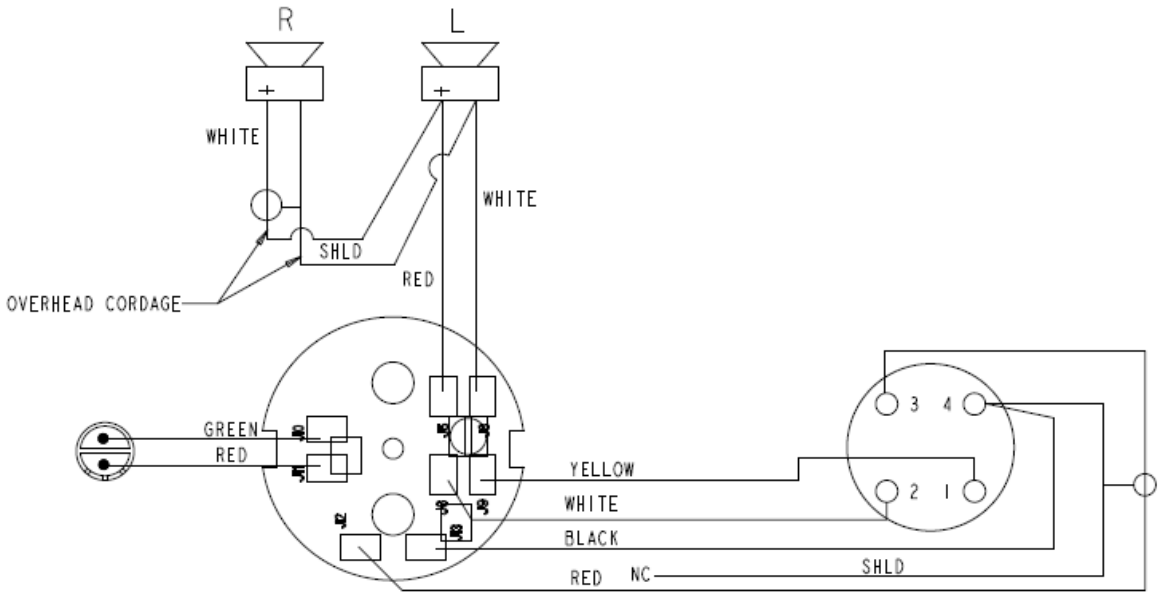


FIGURE 6. Airman 750 Headset Model 219 -Wiring Diagram

3.1.2 Airman 760 Wiring Diagrams

3.1.2.1 Catalog Number 64400-200

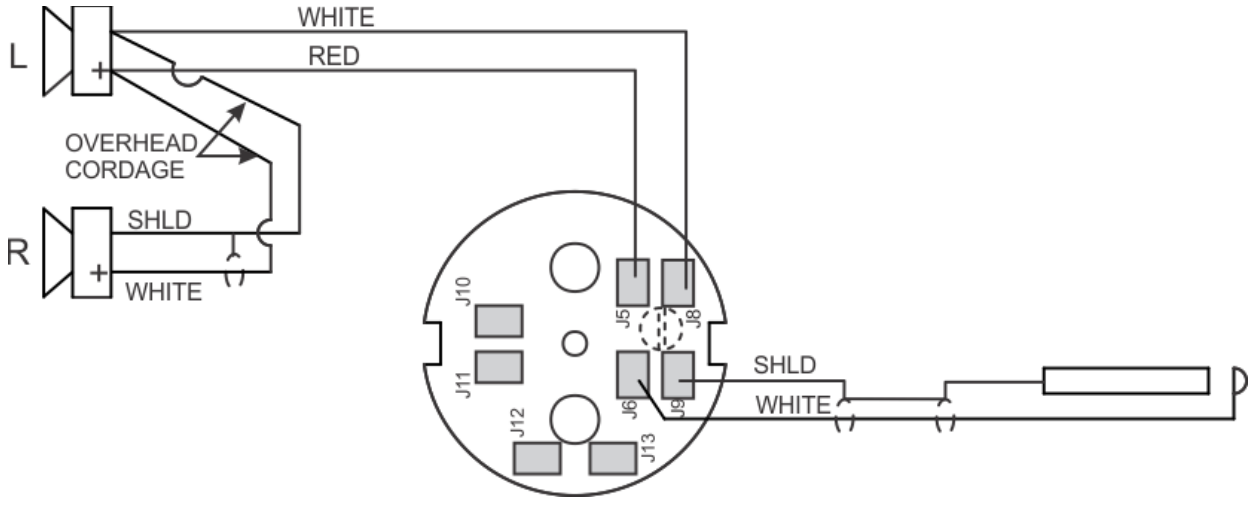


FIGURE 7. Airman 760 Headphone Model -200 Wiring Diagram

3.1.3 Airman 750 Connectors

3.1.3.1 Connector View for Catalog Numbers 64300-200, -212, -300

Microphone: .206 in. (5.2mm) DIA.

Receiver: .250 in. (6.4mm) DIA.

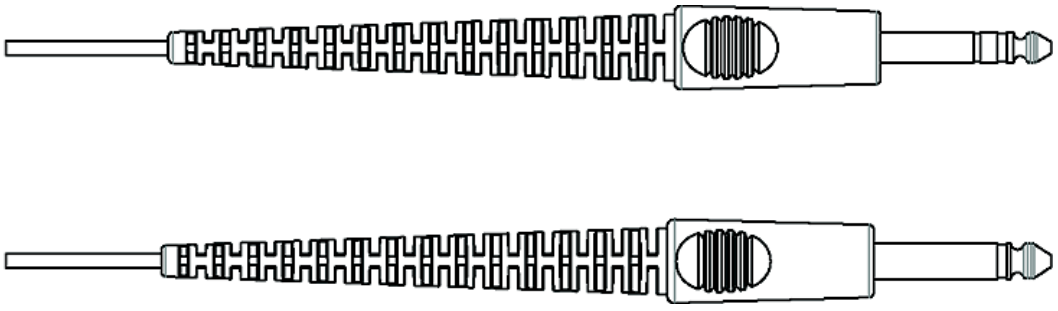


FIGURE 8. PJ068 and PJ055 Connector, 750 Model -200, -212, -300

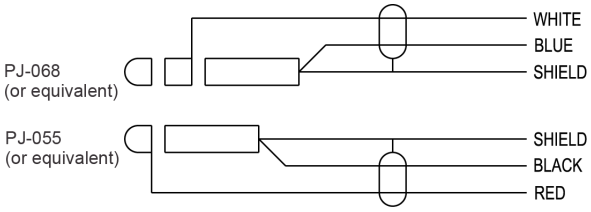


FIGURE 9. PJ068 and PJ055 Connector Wiring, 750 Model -200, -212, -300

3.1.3.2 Connector View for Catalog Number 64300-205, 208, 210

XLR Connector: Neutrik 5MC or Equivalent

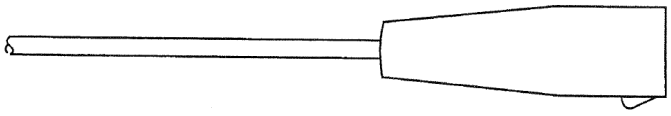


FIGURE 10. XLR Connector, 750 Model -205, -208, -210

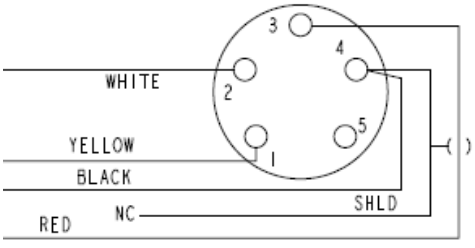


FIGURE 11. XLR Connector Wiring, 750 Model -205, -208, -210

3.1.3.3 Connector View for Catalog Number 64300-218

PJ-068: .206 in. (5.2mm) DIA.

FIGURE 12. PJ-068 Connector, 750 Model -218

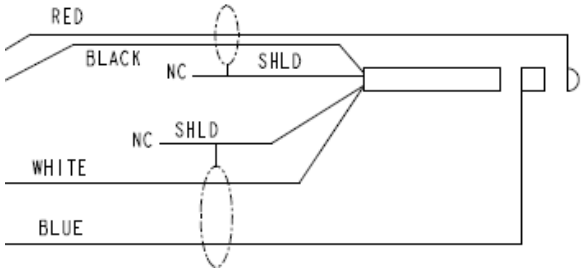


FIGURE 13. PJ-068 Connector Wiring, 750 Model -218

3.1.3.4 Connector View for Catalog Number 64300-219

XLR Connector: Neutrik NC4FX or Equivalent

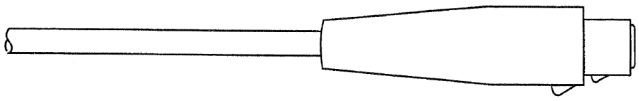


FIGURE 14. XLR Connector, 750 Model -219

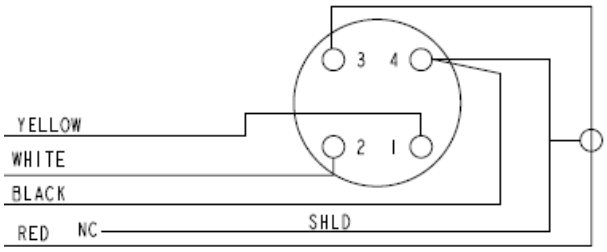


FIGURE 15. XLR Connector Wiring, 750 Model -219

3.1.3.5 Connector View for Catalog Number 64300-220

Microphone: .206 in. (5.2mm) DIA. Right Angle
Receiver: .250 in. (6.4mm) DIA. Right Angle

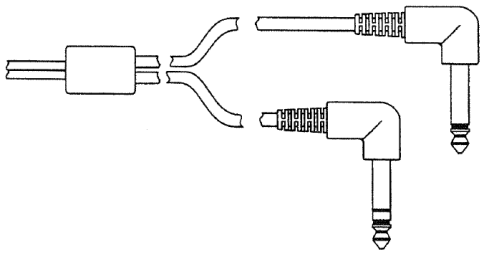


FIGURE 16. PJ068 and PJ055 Connector, 750 Model -220

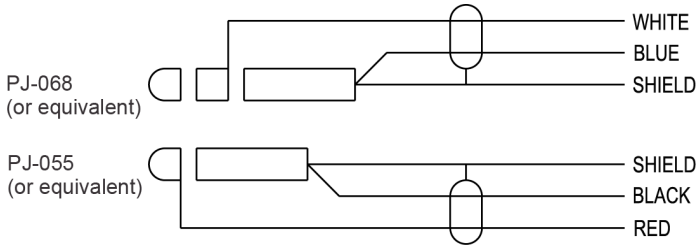


FIGURE 17. PJ055 and PJ068 Connector Wiring, 750 Model -220

3.1.4 Airman 760 Connectors

3.1.4.1 Connector View for Catalog Number 64400-200

PJ-055: .25 in. (6.4mm) DIA.

FIGURE 18. PJ-055 Connector, 760 Model -200

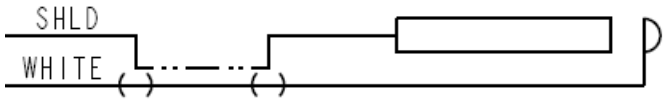


FIGURE 19. PJ-055 Connector Wiring, 760 Model -200

CHAPTER 4

Maintenance

4.1 Microphone Validation and Adjustment

4.1.1 Microphone/Amplifier Sensitivity Check

Headset specifications are designed to comply with FAA TSO C-57a, C-58a, including RTCA DO-170 & DO-160A.

To **test the sensitivity of the microphone**, do the following:

1. Construct a **test circuit**. For more information, see Figure 1.
2. Connect the **test circuit** to the microphone plug of the headset. For more information, see “Airman 750/760 Models and Connector” on page 8.

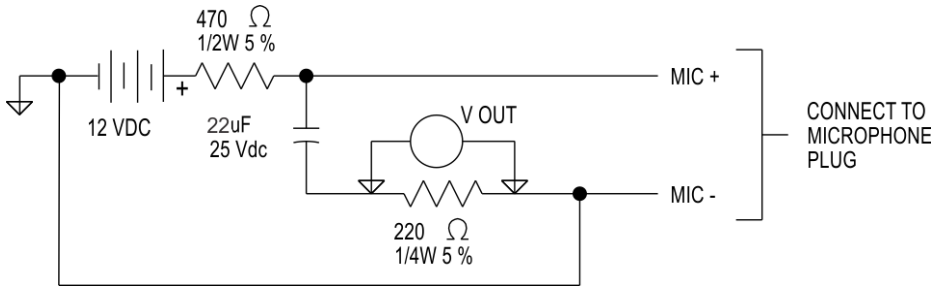


FIGURE 1. Airman 750 Headset Boom Microphone Sensitivity Check Test Circuit

3. Calibrate a **lab microphone**.
4. Place the **calibrated lab microphone** 1/4 inch (6mm) above an artificial mouth (Bruel and Kjaer type 4219).
5. Connect a **signal generator** to the artificial mouth.
6. Adjust for an **output 100 dBspl** or **of 114 dBspl** @ 1/4 inch from the opening to the lab microphone.
7. Remove the **lab microphone**.
8. Position the **headset boom microphone** 1/4-inch (6mm) above the output of the artificial mouth.

NOTE: The acoustic hole in the boom mic should be aligned with the center of the artificial mouth opening. Windscreens should be removed for this test.

9. Measure the **output of the headset microphone** with a digital volt meter.

TABLE 1. Microphone Sensitivity Specifications

	Artificial Mouth Output	Microphone Sensitivity Specification
All versions except -220:		
	@100dB –	63mVrms +16/-7mVrms
	@114dB –	316mVrms +82/-34mVrms
For -220 use:		
	@100dB –	126mVrms +33/-14mVrms
	@114dB –	631mVrms +163/-169mVrms

4.1.2 Microphone Sensitivity Adjustment

Microphone sensitivity is adjusted by turning the gain adjustment control (Figure 2), using a small screwdriver through the opening in the left outer housing assembly. The screwdriver connects with the gain adjustment potentiometer (R11) on the circuit board. Clockwise adjustment increases output level.

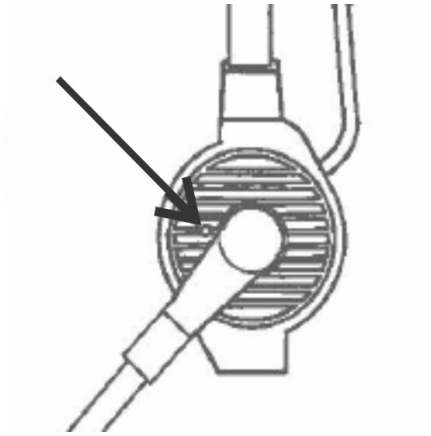


FIGURE 2. Gain Adjustment Control

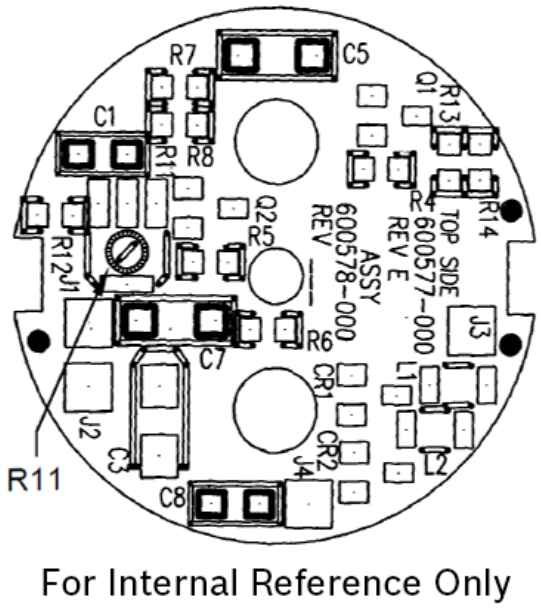


FIGURE 3. Gain Adjustment Potentiometer (R11)

Final sensitivity at 1 kHz shall be set with gain adjust potentiometer R11. See Table 1 on page 28.

4.2 Circuit Board - 200/300 Series Airman 750

The same circuit board is used in all 200 and 300 Series versions of the Airman 750 Headset

Circuit boards may be tested while outside of the headset chassis using the test circuit shown in Figure 4.

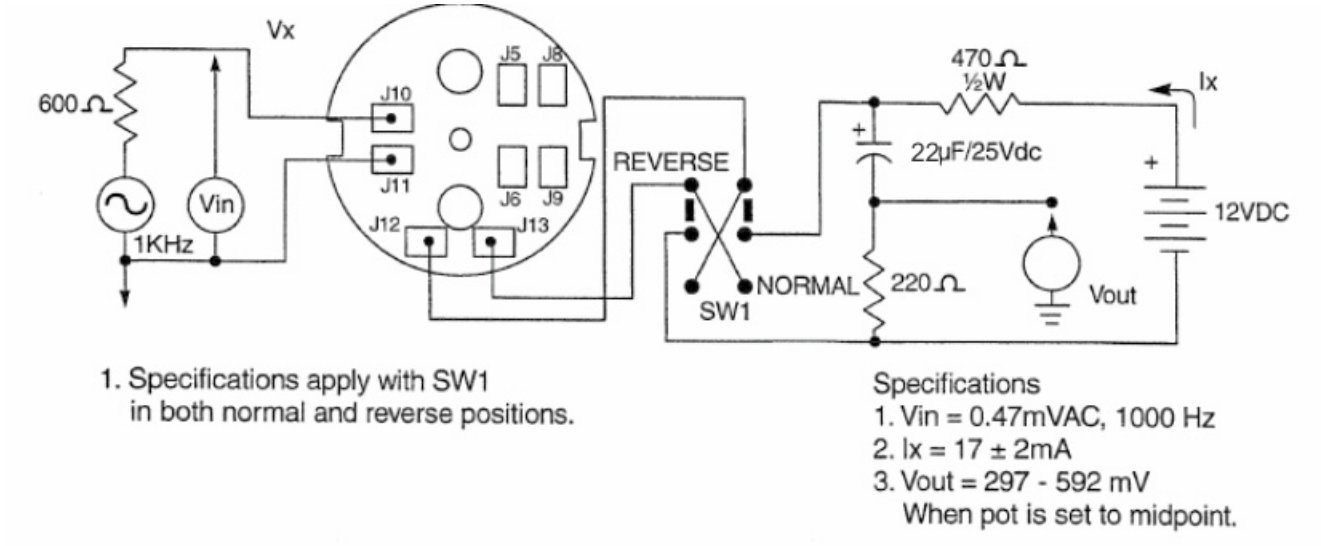


FIGURE 4. Test circuit for Airman 750

4.2.1 Testing the Circuit Board Assembly

To **test the circuit board assembly**, do the following:

1. Construct the test circuit. For more information, see Figure 4.
2. Connect the **circuit board** to the test circuit.
3. Remove the circuit board and wiring completely from the headset.
4. Set Vin to measure 0.47 mVAC, 1Khz, VOUT should read 297-592 mV, when pot is set to midpoint.
   If the output is outside this range, replace the circuit board. Specifications apply with SW1 in both normal and reverse positions.

4.3 Speaker Validation

4.3.1 Speaker Sensitivity and Frequency Response Verification

Transducer Type:	Dynamic
Sensitivity:	(All Models) 104dB SPL ±5dB at 1kHz, 1mW input to headset, at LOW volume control setting. 1mW based on input impedance of headset being tested.
Frequency Response:	Must meet standards outlined in the specifications.

Earphone testing for the Airman 750 and 760 is done on a flat plate coupler. For more information, see Figure 5.

To **measure the speaker**, do the following:

1. Calibrate a **lab microphone**.
2. Connect an **audio analyzer** to the lab microphone.
3. Place the **calibrated lab microphone** under the flat plate coupler and up through the hole, flush to the microphone positioning flange. (Use wire?) See Figure 5.
4. Place the **speaker (without the foam ear cushion or pad)** flush to the top of the flat plate coupler, centered over the hole.
5. Use a **constant voltage sine wave generator** with a 50Ω output impedance to supply the speaker with a 1mW, 1KHz signal to the appropriate connector. For more information, see “Airman 750/760 Models and Connector” on page 8.

NOTE: Once the headset/headphone is connected to the constant voltage sine wave generator, the output voltage can be measured at the sine wave generator or by the audio analyzer connected to the lab microphone.

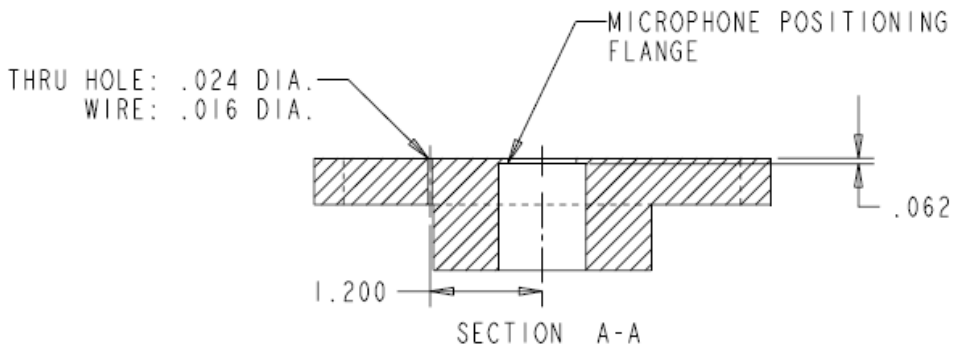


FIGURE 5. Flat Plate Coupler

6. Adjust the **voltage across the headset** per Table 2.

VERSION	VOLTAGE ACROSS HEADSET PLUG	SPEAKER WIRING	IMPEDANCE
64300-200, -205, -208, -218, -219, -220 64400-200	.39 VRMS	Parallel	150 Ω
64300-300	.39 VRMS	Stereo	300 Ω
64300-210, -212,	.77 VRMS	Series	600 Ω

TABLE 2. Headset/Headphone Voltage, Speaker Wiring, and Impedance

7. Measure the **acoustic output of the headset**, using the audio analyzer
   OR
   the constant voltage sine wave generator.

NOTE: Earphone sensitivity @1 kHz should be 104 ±5 dB on the earphone.

8. Measure and record the **acoustic output over the frequency range of 350Hz to 3KHz**.

NOTE: The resultant curve should fit the limits as defined in “Description/Specifications” on page 7.

9. Repeat steps 1 through 8 with the second speaker, if applicable.

4.4 Mechanical Maintenance

4.4.1 Cleaning the Unit

IMPORTANT: Use a mild detergent or isopropyl alcohol wipes to clean the plastic and metal headset parts and ear cushions (not foam windscreen). Do not soak or allow the cleaner to puddle on the unit and sit for long periods of time. The cleaner should wipe off or evaporate quickly. Do not allow alcohol or any liquid to touch the speaker or microphone element.

Cleaning directions here are considered for external surfaces only. Internal surfaces should not require cleaning. The factory uses isopropyl alcohol to clean parts before shipping, if needed.

CHAPTER 5

Troubleshooting

5.1 Troubleshooting Chart

	Check Plug(s)	Check Amplifier	Check Cord	Check Boom Mic Assembly and internal Wiring	Check Speaker(s) and internal wiring	Check Amplifier Gain Adjust
Receiver Inoperative	X		X		X	
Microphone Inoperative	X	X	X	X		
Receiver Intermittent	X		X		X	
Microphone Intermittent	X	X	X	X		
Distorted Receiver Signal					X	
Distorted Microphone Signal		X		X		X
Microphone Level Cannot be Adjusted Properly		X		X		X

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