

# BOSE<sup>®</sup> PRODUCT IMPROVED COMBAT VEHICLE CREWMAN (PICVC) ACTIVE NOISE REDUCTION HEADSET USE AND MAINTENANCE MANUAL



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### 1 SCOPE -

This manual provides instructions for use and maintenance of the Bose® Product Improved Combat Vehicle Crewman (PICVC) Active Noise Reduction (ANR) Headset.

### 2 DESCRIPTION -

The Bose® PICVC Headset is a high performance communications headset and boom microphone intended for use with compatible military communications systems or intercoms. Its use and maintenance are critical to achieving its performance potential. The Bose® PICVC headset comes in medium and large sizes in two variations; with or without boom microphone installed.

As shown in the picture below, the headset includes Left and Right earcups. Foam ear cushions in the earcups seal them to a user's head. A boom microphone is mounted on the Right earcup. A vehicle cable connected to the Left earcup is used to connect the headset to an intercom. The earcups are connected by an earcup cable which is not visible in the picture. The earcups are mounted in an impact liner for mounting on a user's head.



The Left and Right earcups deliver communication signals from the intercom to the user's ears. In addition, through the use of the ear cushions and proprietary electronic circuitry, they provide





passive and active noise reduction (or attenuation). The boom microphone delivers the user's speech to the intercom. There is also a talk-thru microphone mounted on each earcup to permit communication while disconnected from the intercom.





#### 3 FIT AND OPERATION -

The Bose® PICVC Headset provides high-intelligibility communication and high passive and active noise reduction (or attenuation) when properly fitted and adjusted. Proper fit and adjustment are described in this section, as is operation of the headset.

3.1 Fit and Adjustment. Consult Figure 3-1 – Figure 3-5. The headset should fit snugly on the head and be adjusted for maximum passive noise reduction.

# <u>NOTE</u>

The Bose<sup>®</sup> PICVC Headset depends on proper fit and ear cushion seal to achieve its full communication capability and passive and active noise reduction. The ear cushions must be seated securely on the head without folds or leaks of any kind. The liner must be strapped snugly enough to ensure a good seal between the ear cushions and the head.

- 3.1.1 If this is the initial fitting of the headset, release the Velcro straps on the impact liner above each earcup and across the back at your neck (nape adjustment). Place the impact liner on your head with each ear entirely within the corresponding ear cushion.
- 3.1.2 Rotate the earcups, as required, to provide as much comfort as possible with the ear cushions tight against your head.
- 3.1.3 Take up slack in the Velcro straps at the back of your neck and then the straps above the earcups, Figure 3-1. Adjust tension so that the ear cushions are tight against your head with each ear totally enclosed within the ear cushion.





Figure 3-1







Figure 3-2

- 3.1.4 Place the outer shell over the impact liner so the rubber edging of the forehead portion of the outer shell is even with the edge of the browpad on the impact liner.
- 3.1.5 Push down on the outer shell to engage the Velcro patch on the top of the impact liner and the Velcro patch inside the outer shell.
- 3.1.6 Attach the snap fastener at the rear of the impact liner to the fastener at the rear of the outer shell, Figure 3-3.



Figure 3-3

3.1.7 Place the chinstrap under your chin and attach the chinstrap snap fasteners to each side of the impact liner. Adjust tension of the chinstrap to keep the ear cushions tight against your head.





To increase tension, pull on the webbing attached to the buckle; to release tension, pull the leather tab attached to the buckle, Figure 3-4



Figure 3-4

3.1.8 Adjust the boom microphone to place the microphone directly in front of the mouth, 1/4 inch from lips, Figure 3-5.

# <u>NOTE</u>

The Microphone must be close to your lips for effective communication.







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- 3.1.9 If this has been the initial fitting of the headset, feel the strap attaching the strap fastener at the rear of the shell. If there is slack in the strap, remove the helmet and liner and adjust the strap to eliminate slack, Figure 3-4.
- 3.2 Operation
- 3.2.1 Communication is enabled by a Push-to-Talk (PTT) switch in the Left earcup, Figure 3-6 This switch turns the boom microphone on and off and connects separate PTT control lines to activate communication separately through the intercom and to the radio. The PTT switch operates as follows.

Center (latching) position:	boom microphone and both PTT lines disconnected
Rear (latching) position:	boom microphone and PTT Intercom line connected to intercom
Forward (momentary) position:	boom microphone and PTT Radio line connected to intercom

3.2.2 Active noise reduction is provided by circuitry in the earcups that generates counterwaves to external noise. Active noise reduction is enabled by an ANR switch in the Right earcup. Figure 3-6. The ANR switch operates as follows.

Rear position:	ANR enabled
Center position:	ANR disabled
Forward position:	Talk-thru enabled

3.2.3 Passive noise reduction is provided by the earcups and ear cushions and the seal between the ear cushions and the head.







### 4 PERIODIC INSPECTION AND MAINTENANCE. –

To ensure proper operation of the Bose<sup>®</sup> PICVC Headset, it is necessary to inspect it periodically and replace damaged or worn components, and verify proper functioning after any replacement. To inspect the inner earcup, it is necessary to remove the ear cushion and front foam.

4.1 Tools Required for Periodic Inspection and Maintenance. It may be necessary to remove and replace some part of a headset to perform maintenance. See the list of required tools in Table 4-1 below.

EQUIPMENT	FUNCTION	
Bit, screwdriver, crossed tip,	Attach boom mic hardware	
hex drive	Tighten screws on PCB	
	Attach sealing screws to outer cup	
Boom Stud Installation Tool	Removal/Replacement of boom stud	
	Bose <sup>®</sup> FP179500	
Bit, screwdriver, flat tip, hex	Attach vehicle cable	
drive	Removal/Replacement of Microphone Element	
	Removal/Replacement of Battery Door	
Screwdriver, Torque, zero to 10 inch-pounds	Used with crossed and flat tip screwdriver bits	
Socket, 5/16 inch	Removal/Replacement of hex nut for switch assemblies	
Wrench, Socket, Torque, zero to 12 inch-pounds	Used with socket	
EMI Screen Insertion Tool	Removal/Replacement of EMI screen	
	Bose <sup>®</sup> FP173908	
Tweezers and Nonmetallic Positioning Tool	Used for positioning wires and small parts during removal and replacement procedures	

#### Table 4-1 - Equipment Required for Periodic Inspection and Maintenance

4.2 Removal and Replacement of Headset Components for Periodic Inspection and Maintenance.

# CAUTION

Proper removal and replacement of headset components is vital to its proper functioning. If it is necessary to remove and replace a component for maintenance or any other purpose, follow the instructions found in the following sections of Appendix II.





Appendix II, Section 1: Liner and Earcup Assembly Removal and Replacement
Appendix II, Section 2: Ear Cushion and Front Foam Removal and Replacement
Appendix II, Section 3: Driver Screen Removal and Replacement
Appendix II, Section 4: Microphone Boom Assembly Removal and Replacement
Appendix II, Section 5: PTT or ANR/TT Switch Removal and Replacement
Appendix II, Section 6: Vehicle Cable Removal and Replacement
Appendix II, Section 7: Outer Earcup Assembly Removal and Replacement
Appendix II, Section 8: Earcup to Earcup Cable Removal and Replacement
Appendix II, Section 9: Inner Earcup Assembly Removal and Replacement

- 4.3 Verification of Replaced Components. Correct functioning of components replaced during maintenance may be verified using the equipment, setup, and procedure for Performance Verification.
- 4.4 Periodic Inspection and Maintenance. Follow the steps in the table below.

COMPONENT CONDITION		CORRECTIVE ACTION
Liner (Medium or Large)	Cuts, tears, or other visible damage.	Replace liner or pads. (Appendix II, Section 1)
Ear cushion	Cuts, tears, or fraying in outer skin or inner foam.	Replace ear cushion. (Appendix II, Section 2)
(removed from earcup)	Cracks or visible damage to plastic rim.	Replace ear cushion. (Appendix II, Section 2)
	O-ring cut, torn, or abraded.	Replace O-ring.
	Outer surface dirty or dusty.	Clean with water and damp cloth.
Front Foam	Tears, deterioration, separation of layers, excessive dirt.	Replace front foam. (Appendix II, Section 2)
(removed from earcup)	Wet.	Allow to air dry and then reinstall.
		<u>CAUTION</u>
		Do not squeeze dry. Squeezing may degrade performance.
Inner Earcup Assembly	Cracks or other visible damage to housing.	Replace inner earcup assembly. (Appendix II, Section 8)
(ear cushion and front foam removed)	EMI screen crushed or collapsed. (see Figure 4-1)	Replace EMI screen. (Appendix II, Section 3)
	Inner port screen dirty. (see Figure 4-2)	Clean inner port screen with fine brush.
	Outer surface dirty or dusty.	Clean with water and damp

 Table 4-2
 Periodic Inspection and Maintenance



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COMPONENT	CONDITION	CORRECTIVE ACTION cloth.
Outer Earcup	Cracks or other visible damage to housing.	Replace outer earcup assembly. (Appendix II, Section 7)
	Pressure equalization port dirty. (See Figure 4-2)	Clear pressure equalization port with a small wire or a paper clip.
		CAUTION
		Do not insert wire deeper than 1/2 inch (12.7 mm).
	Outer surface dirty or dusty.	Clean with water and damp cloth.
Switch Assembly	Bent or broken shaft, lack of latching, or momentary action.	Replace switch assembly. (Appendix II, Section 5)
	Paddle broken or missing.	Replace paddle.
Earcup Cable	Cuts, kinks, or fraying.	Replace earcup cable assembly. (Appendix II, Section 8)
Vehicle Cable	Cuts, kinks, fraying or damage or corrosion to connector.	Replace vehicle cable assembly. (Appendix II, Section 6)
boom microphone Assembly	Cuts, kinks, or fraying of cable or damage to connectors.	Replace boom microphone assembly. (Appendix II, Section 4)





Inner Port Screen

Ensure screen is free from debris



EMI Screen

Ensure screen is not crushed or collapsed





Figure 4-2





### 5 PERFORMANCE VERIFICATION -

Performance of the Bose<sup>®</sup> PICVC Headset may be verified using the equipment, setup, and procedures below.

- 5.1 Definitions: The following definitions apply.
  - Background noise Hiss, crackle, hum, whine or buzz caused by internal or external source.
  - Instability Loud rumble or squeal caused by ANR system malfunction.
  - Overload Loud click, thump, or pop caused by buckling of driver diaphragm or saturation of electronics.
  - Pump Press the earcup quickly against the head, compressing the ear cushion to approximately half its uncompressed height.
- 5.2 Initial Performance Verification

This procedure is to be used as an initial verification of the functionality of the headset. This initial performance verification should help to identify the problem area, if there is a fault, or confirm that the headset is functioning at an acceptable level.

- 5.2.1 Initial Verification Procedure: (To troubleshoot a symptom, reference section 6: FAULT ISOLATION AND REPAIR)
  - 5.2.1.1 Inspect headset for any obvious damaged or worn parts. Replace any damaged or work parts before proceeding.
  - 5.2.1.2 Plug headset into a functioning intercom. With headset OFF your head, turn ANR on. Listen for any loud squeal or other unexpected noise from the headset. If unexpected noises are present, troubleshoot Single Earcup: Instability. To check ANR is functioning, remove ear cushions and foams. Place your hand over the exposed earcup cavity, covering it completely. If ANR is functioning, you will hear a squeal. If no squeal, ANR is likely not functioning. Troubleshoot Both Earcups; Faulty ANR, or Single Earcup; Faulty Communication or ANR, as appropriate.
  - 5.2.1.3 Verify you have side-tone. You should hear yourself through both earcups as you speak into the microphone. If no side-tone, troubleshoot Both Earcups: Faulty Communication, Powered or Un-powered or Single Earcup: Faulty Communication or ANR.

Turn ANR on. Listen for ANR to be functional in both earcups. If no ANR troubleshoot Both Earcups; Faulty ANR, or Single Earcup; Faulty Communication or ANR as appropriate.

Turn on Talk-Through and verify you can hear outside conversation in both the left and right earcup. Cover the left then right side talk-through microphone to perform the test. If no Talk-Through, troubleshoot Talk-Through.

5.2.1.4 If the Initial Performance Verification does not identify a performance problem, proceed to section 5.2 and perform a complete Performance Verification.





5.3 Equipment Required for Performance Verification. The equipment required for performance verification consists of the following or equivalents.

#### Table 5-1 Equipment Required for Performance Verification

EQUIPMENT	CHARACTERISTICS	SOURCE	MODEL
1 DC Power Supply	0-30 Vdc, 0-200 mAdc	Hewlett-Packard	6216A
1 Digital Multimeter			
1 VIS Intercom	N/A		
Troubleshooting Box	N/A	Bose	
Interconnecting cables	N/A	as required	as required

#### 5.4 Check Operating Voltage

- 5.4.1 Connect the HUT to the test box and connect the test box to a functioning intercom.
- 5.4.2 Check for 24VDC between TP7 and TP3 on the test box. If no 24VDC, verify operation of the intercom.
- 5.4.3 Else, proceed to Section 6 and troubleshoot Both Earcups; Faulty Communication or ANR.
- 5.5 Operating Current Verification. Operating current must be verified before performance verification to ensure that power connections in the headset are correct.
- 5.5.1 Set the power supply voltage to 24 +0/-1 Vdc and power supply current limit to 200mA.
- 5.5.2 Connect the Headset Under Test (HUT) as shown in Figure 5.3.2-1.



Figure 5.3.2-1 Equipment Setup for Testing









PIN0U1			
PIN	тір јаск	TEST POINT	
1	BLACK	DRAIN	
2	WHITE	PTT	
3	BLACK	GND	
4	GREEN	MIC GND	
5	BLVE	L & R AUDIO	
6	RED	MICSIG	
7	YELLOW	POWER	
R	YELLOW	CURRENT	

Figure 5.3.2-1 Headset Test Cable 1

FUNCTION	VEHICLE CONNECTOR	PCB CONNECTOR	
	(Same as TP on Test Box)		
Shield	Pin 1	Shield wire	
PTT	Pin 2	pin 2	
Ground	Pin 3	pin 6	
Mic Ground	Pin 4	pin 4	
Audio Signal	Pin 5	pin 3	
Mic Signal	Pin 6	pin 5	
Power	Pin 7	pin 7	

Table 5.3.2-2 Vehicle Cable Connections









- 5.5.3 Verify that power supply current is in the appropriate range. Change the switch on the troubleshooting box to "I" (current) and connect DVM between pins 7 and R on the troubleshooting box. Set the DVM to read mVdc. Allowable readings are 45 to 65 mVdc. This corresponds to a current reading of 45 65 mAdc. This is also the range with the boom microphone disconnected. If power supply current is not in the appropriate range, proceed to the section on Fault Isolation and Repair, Operating Current, section 6.7. Otherwise continue with the Verification Procedure below. Verification Procedure. Follow the steps below with the HUT fitted snugly on your head. The order of the steps is not critical and may be changed if desired.
- 5.5.4 Communication, ANR On.
- 5.5.5 Place the ANR switch in the ANR On (rear latched) position and the PTT switch in the rear, latched, position. Speak into the boom microphone.
- 5.5.6 Verify that communication signal is clear and free from unusual or abnormal background noise and instability at all times.
- 5.5.7 Communication, ANR Off.
  - 5.5.7.1 Place the ANR switch in the ANR Off (center) position and the PTT switch in the rear, latched, position. Speak into the boom microphone.
  - 5.5.7.2 Verify that communication signal is clear and free from background noise and instability at all times.
- 5.5.8 Communication, Switch Operation.
  - 5.5.8.1 Place the PTT switch in the rear, latched, position. Speak into the boom microphone while switching the ANR switch on and off.
  - 5.5.8.2 Verify that communication signal is clear and free from background noise and instability at all times.
  - 5.5.8.3 Speak into the boom microphone while switching the PTT switch from the center, OFF, position to the forward, momentary and rear, latched, position.
  - 5.5.8.4 Verify that the boom microphone signal is off with the PTT switch in the center position and on with the switch in either the forward or the rear position.
- 5.5.9 ANR Operation in Quiet Environment. If possible, perform this test in ambient noise of 55 dB(A)SPL or lower to establish a noise level reference
  - 5.5.9.1 Place the ANR switch in the rear latched, ANR ON position and the PTT switch in the center, OFF, position. Shake your head, move your jaw and pump the earcups several times. Repeat this step with PTT in rear, ON, position.
  - 5.5.9.2 Verify that there is no instability or overload at any time.
  - 5.5.9.3 Place the ANR switch in the ANR on position and the PTT switch in the center, OFF, position. Lift the edge of one earcup and then the other, to cause a leak between the ear cushion and the head.
  - 5.5.9.4 Verify that there is no instability at any time.
  - 5.5.9.5 Place the ANR switch in the rear latched, ANR ON position and the PTT switch in the center, OFF, position.
  - 5.5.9.6 Verify that background noise is reduced and there is no instability at any time





ANR Operation in Noise. If possible, perform this test in ambient noise of 95 dB(A)SPL or higher. Place the ANR switch in the rear latched, ANR ON position and the PTT switch in the center, OFF, position. Shake your head, move your jaw and pump the earcups.

Verify ANR is each earcup and that there is no instability or overload at any time.

- 5.5.10 Verify PTT Switch, PTT Lines. Turn off power for this step.
  - 5.5.10.1 Disconnect HUT from intercom.
  - 5.5.10.2 Connect the ohmmeter between pin 2 (PTT) and pin 3 (GND) of the Troubleshooting box.
  - 5.5.10.3 Set the PTT Switch to the Center, Off position and verify that the ohmmeter reading is greater than 1.36K $\Omega$ ).
  - 5.5.10.4 Set the PTT Switch to the Rear, Latched, ON Position and verify that the ohmmeter reading is  $475\Omega + -5\%$ .
  - 5.5.10.5 Set the PTT Switch to the Forward, Momentary, ON Position and verify that the ohmmeter reading is less than 10  $\Omega$ .
- 5.5.11 Communication, Talk-Thru.
  - 5.5.11.1 Install known good battery in left earcup.
  - 5.5.11.2 Set ANR/TT switch to the forward, latched, position and verify that ambient sounds can be clearly heard in both earcups
- 5.6 DC MEASUREMENTS. Measurements may be made of boom microphone bias voltage, of resistances at the vehicle cable connector of a headset, and of continuity and isolation in individual cables in the Bose® PICVC Headset.
- 5.6.1 Resistances at Vehicle Cable Connector. DC resistances at the vehicle cable connector may point to a section of the table on Fault Isolation and Repair. Measurements should be made with a digital multimeter like a Fluke 8060A. The following resistances may be measured in a properly connected cable, headset, and boom microphone.

MEASUREMENT and ITEM(S) MEASURED	CABLE PINS	EXPECTED VALUE	IF SHORTED, SEE THIS SECTION:	IF OPEN, SEE THIS SECTION:
Power supply input: power circuit and diode	pin 3 to pin 7	Open circuit (>100 KΩ)	Operating Current: Headset Current	n/a
Audio input resistance: transformer primary	pin 3 to pins 5 and 1	500 Ω +/-10%	Both Earcups: Audio Short	Both Earcups: Faulty Communication
Ground to Mic Ground: ground wires	pin 3 to pin 4	Open circuit (>100 KΩ)	Ground Short	n/a
Ground to Shield: ground wire and shield	pin 3 to pin 1	Open circuit (>100 KΩ)	Ground Short	n/a
Mic Ground to Shield: ground wire and shield	pin 4 to pin 1	Open circuit (>100 KΩ)	Ground Short	n/a

Table 5-2 Vehicle Cable, Headset, and boom microphone Measurements





MEASUREMENT and ITEM(S) MEASURED	CABLE	EXPECTED	IF SHORTED, SEE	IF OPEN, SEE
	PINS	VALUE	THIS SECTION:	THIS SECTION:
Boom Mic, PTT center:	pin 4 to	Open circuit	boom microphone:	n/a
switch open circuit	pin 6	(>100 KΩ)	Signal Short	
Boom Mic, PTT rear:	pin 4 to	Open circuit	boom microphone:	n/a
mic element resistance	pin 6	(>100 KΩ)	Signal Short	

#### 5.7 Cable Measurements.

- 5.7.1 Vehicle cable Measure continuity from each vehicle connector pin to the connector pin at the other end. (ref Figure 5.3.2-2) Measure isolation between any 2 conductors.
- 5.7.2 Earcup cable Measure continuity from each connector pin at one end of the cable to the corresponding pin at the other end and from the Shield wire ring terminal at one end of the cable to the Shield wire ring terminal at the other end. Measure isolation between any 2 conductors.





#### 6 FAULT ISOLATION AND REPAIR -

If a headset malfunctions and visual inspection does not identify the cause of the malfunction, fault isolation and repair are necessary. This section provides direction for fault isolation and repair. It is organized as follows.

- 6.1 Definitions and Guiding Philosophy
- 6.2 Operating Current Verification
- 6.3 Fault Verification
- 6.4 Tools Required for Fault Isolation and Repair
- 6.5 Removal and Replacement of Headset Components for Fault Isolation and Repair
- 6.6 Symptom / Fault Troubleshooting Tree Diagram
- 6.7 Fault Isolation and Repair: Table of Faults and Corrective Actions
- 6.8 Symptom / Fault Troubleshooting Tree Diagram
- 6.9 Fault Isolation Diagram

Operating Current:	
Headset Current	pg: 24
boom microphone Reinstallation	pg: 24
Earcup Reconnection	pg: 25
Right Earcup Current	pg: 31
Both Earcups:	
Faulty Communication, Powered or Un-powered	pg: 34
boom microphone Reconnection	pg: 34
Audio Short	pg: 36
Earcup Reconnection	pg: 40
Right Earcup Short	pg: 43
Faulty ANR	pg: 47
Single (Left or Right) Earcup:	
Faulty Communication or ANR	pg: 49
Background Noise or Overload	pg: 51
Instability: High Frequency Noise or Squeal	pg: 53
Instability: Rumble	pg: 55
Low Passive Attenuation	pg: 57
Boom microphone:	
Signal Short	pg: 60
Earcup Reconnection	pg: 65
Right Earcup Short	pg: 67
PTT Switch:	
Faulty Communication/Incorrect PTT Line Resistance	pg: 71
Ground Short:	
Headset Short	pg: 73
Earcup Reconnection	pg: 75
Right Earcup Short	pg: 77
Talk-Thru:	
One Side No Talk-Thru	pg: 79
Both Sides No Talk-Thru	pg: 79
No Talk-Thru On Battery Power	pg: 79
Talk-Thru: Battery Not Charging	pg: 79
Talk-Thru: Battery Discharging	pg: 79







- 6.1 Definitions and Guiding Philosophy
- 6.1.1 Faults in headset operation are defined as follows.

**Operating Current Fault.** Quiescent operating current above or below normal range, or power input shorted or open.

**Faulty Communication**. No communication; or communication level wrong; or intermittent communication; or muddy or boomy communication; or noise, distortion, overload, or instability in communication, either in the headset earcups or through the boom mic.

**Faulty ANR**. No ANR; or ANR level wrong; or intermittent ANR; or noise, distortion, overload, or instability in ANR operation.

Faulty Passive Noise Reduction. Passive noise reduction below normal level.

Faulty PTT Operation. Failure to activate the boom mic with the PTT switch.

Faulty TT Operation. Failure of the Talk-Thru mic system.





- 6.1.2 Background noise, instability, and overload are defined in the section on Performance Verification.
- 6.1.3 Generally, fault isolation and repair will be accomplished by replacing faulty components with known good components. In several cases, however, measurements with a digital multimeter are specified to make the procedure more efficient.
- 6.1.4 It is expected that no more than one component is likely to fail at any one time without visible cause. Accordingly, when replacement of a component does not eliminate a fault, Fault Isolation and Repair dictates that the component shall be reinstalled and checked for elimination of the fault. This process avoids waste of good components.
- 6.2 Operating Current Verification. Operating current must be verified before repair is attempted to ensure that power connections in the headset are correct. Operating current may be verified using the Operating Current Verification equipment, setup and procedure described in the section on Performance Verification.
- 6.3 Fault Verification. A fault must be verified before repair is attempted. Faults may be verified using the procedure for Performance Verification (Section 5).
  - 6.3.1.1 Equipment Required for Fault Verification and Isolation. Use the equipment and setup required for Performance Verification.
- 6.4 Tools Required for Fault Isolation and Repair. It may be necessary to remove and replace some part of a headset to perform fault isolation or repair. Fault isolation and repair may use the tools required for Periodic Inspection and Maintenance.
- 6.5 Removal and replacement of the Headset Components for Fault Isolation and Repair
- 6.6 Symptom / Fault Troubleshooting Tree. This tool is intended identify the likely faulty components for the major symptom categories. This chart, used in conjunction with the Fault Isolation and Repair procedures will make the troubleshooting experience more efficient.
- 6.7 Fault Isolation and Repair. Follow the steps in the section that relates to the fault in question. If this results in partial but not complete solution of a problem, proceed to the next applicable section to continue fault isolation and repair. If it is not possible to complete fault isolation and repair by following the steps, refer to equipment protocols for disposition of products.

#### CAUTION

Proper removal and replacement of headset components is vital to its proper functioning. If it is necessary to remove and for fault isolation, repair or any other purpose, follow the instructions found in Appendix II.





### 6.8 Symptom / Fault Troubleshooting Tree Diagram:







### 6.9 Table 6-1 Fault Isolation and Repair

FAULT	CORRECTIVE ACTION
Operating Current:	Verify fault.
Headset Current	If fault verified, replace boom microphone assembly.
	If current correct (45mA to 65mA), end repair; verify headset performance.
	Otherwise, open Left earcup and verify operating current.
	NOTE: It is not necessary to reassemble earcups before operating current fault is corrected, as long as they are handled gently to avoid stressing any of the headset wiring.
	If current correct, suspect pinched wire in Left earcup; locate pinched wire, repair wire or replace corresponding cable or switch assembly, and reassemble Left earcup.
	If mic was not the cause and current is correct, proceed to <u>Operating</u> <u>Current: boom microphone Reinstallation</u> to reinstall the original mic.
	Otherwise, open Left earcup and disconnect earcup cable (J1) and 2 shield wires(purple wires) Attached to earcup PCB at ring terminal near J1.
	If operating current is in the range 23.5 to 38.5 mA, Left earcup current is normal; proceed to <u>Operating Current: Right Earcup Current</u> .
	Otherwise, replace earcup assembly.
	If operating current is in the range 23.5 to 38.5 mA, Left earcup current is normal; proceed to <u>Operating Current: Earcup Reconnection</u> .
	Otherwise, reinstall original Left inner earcup assembly and replace vehicle cable.
	If operating current is in the range 23.5 to 38.5 mA, Left earcup current is normal; proceed to <u>Operating Current: Earcup Reconnection</u> .
	Otherwise, replace earcup assembly.
	If operating current is in the range 23.5 to 38.5 mA, Left earcup current is normal; proceed to <u>Operating Current: Earcup Reconnection</u> .
Operating Current: boom microphone Reinstallation	Reinstall original boom microphone assembly.
	If current correct, end repair; verify headset performance.
	Otherwise, replace boom microphone assembly.
	If current correct, end repair; verify headset performance.

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Operating Current: Earcup	Reconnect earcup cable and shield to J1 and shield return of PCB assembly of Left inner earcup assembly.
Reconnection	If current correct, reassemble Left earcup.
	Otherwise, proceed to Operating Current: Right Earcup Current.
	If current still correct after reassembly, proceed to <u>Operating Current:</u> <u>boom microphone Reinstallation</u> .



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Operating Current: Right Earcup Current	Reconnect earcup cable and shield to J1 and shield return (purple wire) of PCB assembly of Left inner earcup assembly. Then open Right earcup and verify operating current.
	NOTE: It is not necessary to reassemble earcups before this fault is corrected, as long as they are handled gently enough to avoid stressing any of the headset wiring.
	If current correct, suspect pinched wire in Right earcup; locate pinched wire, repair wire or replace corresponding cable or switch assembly, and reassemble Right earcup.
	If current correct, proceed to Operating Current: Earcup Reconnection.
	Otherwise, open Right earcup if closed and disconnect Boom Mic connector from J2 (ref: Apx II, pg-13) of PCB assembly of Right inner earcup assembly.
	If current is in the range 45 to 62 mA, replace earcup assembly.
	If current correct, reassemble Right earcup and proceed to <u>Operating</u> <u>Current: Earcup Reconnection</u> .
	Otherwise replace earcup assembly.
	If current correct, reassemble Right earcup and proceed to <u>Operating</u> <u>Current: Earcup Reconnection</u> .
	Otherwise, reinstall original Right inner earcup assembly and replace earcup cable.
	If current correct, reassemble Right earcup and proceed to <u>Operating</u> <u>Current: Earcup Reconnection</u> .
	Otherwise, replace earcup assembly.
	If current correct, reassemble Right earcup and proceed to <u>Operating</u> <u>Current: Earcup Reconnection</u> .





# **OPERATING CURRENT: RIGHT EARCUP CURRENT**









Both Earcups:	Verify fault.
Faulty Communication, Powered or Unpowered	Replace Boom Mic
	If communication is restored, proceed to <u>boom microphone</u> . End repair and verify headset performance.
	Otherwise, measure for audio short: NOTE: Disconnect test box from intercom. On the test box, jumper test points 1 and 5 together. Jumper test points 2,3,4. Measure resistance between TP 1 and TP 2.
	Normal DC resistance should be 500 ohms +/ If measured DC resistance is a short, proceed to <u>Both Earcups: Audio Short (pg. 36)</u> .
	NOTE: If communication is restored in Left earcup <u>ONLY</u> at any point in the following sequence, proceed to <u>Single Earcup: Faulty</u> <u>Communication or ANR</u> . Then reassemble Left earcup if open, verify communication, and proceed to <u>Both Earcups: boom</u> <u>microphone Reconnection</u> .
	Otherwise, replace vehicle cable. Continue to use external boom microphone until instructed otherwise.
	NOTE: It may not be necessary to reassemble earcups before this fault is corrected, as long as they are handled gently enough to avoid stressing any of the headset wiring.
	If communication restored, reassemble Left earcup if open, verify communication, and proceed to <u>Both Earcups: boom microphone</u> <u>Reconnection</u> .
	Otherwise, replace earcup assembly.
	If communication restored, reassemble Left earcup if open, verify communication, and proceed to <u>Both Earcups: boom microphone</u> <u>Reconnection</u> .
	Otherwise, replace vehicle cable.
	If communication restored, reassemble Left earcup if open, verify communication, and proceed to <u>Both Earcups: boom microphone</u> <u>Reconnection</u> .
Both Earcups: boom microphone Reconnection	Reconnect boom microphone wires from the headset connector to the input of the Microphone Amplifier in the equipment setup.
	If communication remains restored, end repair; verify headset performance.
	Otherwise, proceed to boom microphone.





# BOTH EARCUPS: FAULTY COMMUNICATIONS, POWERED OR UNPOWERED




Both Earcups:	Verify fault.
Audio Short	If fault verified, open Left earcup and measure for audio short.
	NOTE: It may not be necessary to reassemble earcups before this fault is corrected, as long as they are handled gently enough to avoid stressing any of the headset wiring.
	If short eliminated, suspect pinched wire in Left earcup; locate pinched wire, repair wire, or replace corresponding cable or switch assembly, and reassemble Left earcup.
	If short eliminated, end repair; verify headset performance.
	Otherwise, open Left earcup if closed and disconnect earcup cable and shield (purple wires) from J1 and shield return of PCB assembly.
	If short eliminated, proceed to <u>Both Earcups: Right Earcup Short (pg. 43)</u> .
	Otherwise, replace vehicle cable.
	If short eliminated, proceed to <u>Both Earcups: Earcup Reconnection (pg. 40)</u> .
	Otherwise, replace cup-to-cup cable, or earcup assembly.
	If short eliminated, proceed to <u>Both Earcups: Earcup Reconnection (pg. 40)</u> .























Both Earcups: Earcup	Reconnect earcup cable and shield to J1 and shield return of PCB assembly of Left inner earcup assembly.
Reconnection	If short eliminated, reassemble Left earcup.
	Otherwise proceed to Both Earcups: Right Earcup Short.
	If short still eliminated after reassembly, proceed to <u>Both Earcups: boom</u> <u>microphone Reconnection</u> .





# **BOTH EARCUPS: EARCUP RECONNECT**







Both Earcups:	Verify fault.
Right Earcup Short	If fault verified, reconnect earcup cable and shield to J1 and shield return of PCB assembly of Left inner earcup assembly. Then open Right earcup and measure audio short.
	NOTE: It may not be necessary to reassemble earcups before this fault is corrected, as long as they are handled gently enough to avoid stressing any of the headset wiring.
	If short eliminated, suspect pinched wire in Right earcup; locate pinched wire, repair wire, or replace corresponding cable or switch assembly, and reassemble Right earcup.
	If short eliminated, reassemble Right earcup, verify short still eliminated, and proceed to <u>Both Earcups: Earcup Reconnection</u> .
	Otherwise, replace earcup cable.
	If short eliminated, reassemble Right earcup, verify short still eliminated, and proceed to <u>Both Earcups: Earcup Reconnection</u> .
	Otherwise, replace earcup assembly.
	If short eliminated, reassemble Right earcup, verify short still eliminated, and proceed to <u>Both Earcups: Earcup Reconnection</u> .
	Otherwise, replace earcup cable.
	Else, revisit initial fault determination.











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Both Earcups:	Verify fault.	
Faulty ANR	NOTE: If ANR is restored in Right earcup <u>ONLY</u> at any point in the following sequence, proceed to section on <u>Either Earcup: Faulty</u> <u>Communication or ANR</u> to repair Left earcup.	
	If fault verified, replace ANR switch assembly in Right earcup.	
	NOTE: IT IS NECESSARY to reassemble earcups before checking repair of an ANR fault, because ANR depends on sealed earcups for its operation.	
	Test Set-Up:	
	Connect Headset to Test Box	
	Connect test box to intercom	
	Apply power	
	Check that 24v is present:	
	Check 24v on test box TP1. If not, troubleshoot intercom.	
	Else, Check $24v$ in left earcup, J5 (orange wire). If not, replace vehicle cable.	
	Else, Check 24v in left earcup, J1 pin 6. If not – replace left earcup.	
	Else, Check $24v$ in right earcup, J1, pin 6 (orange wire). If not replace cup-to-cup cable.	
	If 24v and still no ANR, replace ANR switch.	
	Else, replace right earcup assy.	
	When ANR restored, end repair; verify headset performance.	



## **BOTH EARCUPS: FAULTY ANR**









Single (Left or Right) Earcup: Faulty Communication or ANRVerify fault. Test Set-Up: 	3). If ice
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## SINGLE EARCUP: FAULTY COMMUNICATIONS or ANR





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Single Earcup:	Verify fault.
Background Noise or Overload	Test Set-Up: Refer to section 5.3.3
	If fault verified, replace earcup assembly.
	If noise or overload eliminated, end repair; verify headset performance.













Single Earcup:	Verify fault.
Instability: High Frequency Noise or Squeal	If fault verified, replace front foam assembly.
	If instability eliminated, end repair; verify headset performance.
	Otherwise, replace earcup assembly.
	If instability eliminated, end repair; verify headset performance.











Single Earcup:	Verify fault.
Instability: Rumble	If fault verified, replace ear cushion and blue O-ring.
	If instability eliminated, end repair; verify headset performance.
	Otherwise, replace inner earcup O-ring (yellow).
	If instability eliminated, end repair; verify headset performance.
	Check that ports are not clogged (ref: pg. 8, Table 5.4.1)
	Otherwise, replace inner earcup assembly.
	If instability eliminated, end repair; verify headset performance.









Single Earcup:	Verify fault.
Low Passive Attenuation	If fault verified, replace ear cushion.
	If attenuation restored, end repair; verify headset performance.
	Otherwise, replace inner earcup O-ring.
	If attenuation restored, end repair; verify headset performance.
	Otherwise, replace earcup assembly.
	If attenuation restored, end repair; verify headset performance.









boom microphone:	Verify the intercom is worki	ng properly.	
Signal short / Open	Verify audio is working and intercom.	that you can hear commun	ications from the
	If fault verified, replace boo	m microphone assembly.	
	If signal restored, end repai	r; verify headset performar	ice.
	Otherwise, open Left and R rear, latched position and c point in the first column of the the second column. An ope column indicates a fault in t	ight earcups, place the PT heck continuity sequentially he table below and then fro en circuit between any 2 pc he assembly identified in th	T switch in its y from point to om point to point in oints in either ne third column.
	1	2	3
	Check Continuity between Vehicle Cable pin 4 (Mic Ground) and:	Check Continuity between Vehicle Cable pin 6 (Mic Signal) and:	lf open – Likely Failed <u>Component:</u>
	Left earcup J5 pin 4	Left earcup J5 pin 5	Vehicle Cable
	Left earcup J1 pin 3	Left earcup J1 pin 4	Left earcup
	Right earcup J1 pin 3	Right earcup J1 pin 4	Earcup cable
	Right earcup J2 pin 3		Right earcup
	Mic connector pin 3		Mic wire
	If vehicle or earcup cable is	identified as faulty, replace	e it.
	If signal restored, end repai performance.	r; reassemble earcups and	verify headset
	If Mic wire is identified as fa	ulty, replace right outer ea	rcup assembly.
	If signal restored, end repai performance.	r; reassemble earcups and	verify headset
	If Right earcup is identified assembly.	as faulty, replace right inne	er earcup
	If signal restored, end repai performance.	r; reassemble earcups and	verify headset
	If Left earcup is identified as	s faulty, replace left inner e	arcup assembly.
	If signal restored, end repai performance.	r; reassemble earcups and	verify headset
	Otherwise, replace PTT swi earcup assembly.	itch assembly and reinstall	original Left inner
	If signal restored, end repai performance.	r; reassemble earcups and	verify headset
	Otherwise, replace (which c	one?) earcup assembly.	
	If signal restored, end repai performance.	r; reassemble earcups and	verify headset
	Note: Reinstall each of the	original components from t	he sequence





	above, one at a time, to determine which components are at fault.
	If problem is not resolved, verify fault and continue troubleshooting.
boom microphone:	Verify fault.
Signal Short	If fault verified, open Left earcup and measure signal short.
	NOTE: It is not necessary to reassemble earcups before this fault is corrected, as long as they are handled gently enough to avoid stressing any of the headset wiring!
	If short eliminated, suspect pinched wire in Left earcup; locate pinched wire, repair wire, or replace corresponding cable or switch assembly, and reassemble Left earcup.
	If short eliminated, end repair; verify headset performance.
	Otherwise, open Left earcup if closed and disconnect earcup cable and shield from J1 and shield return of PCB assembly.
	If short eliminated, proceed to boom microphone: Right Earcup Short.
	Otherwise, replace vehicle cable.
	If short eliminated, proceed to Reinstallation Sequence below.
	Otherwise, replace PTT switch assembly.
	If short eliminated, proceed to Reinstallation Sequence below.
	Otherwise, replace earcup assembly.
	If short eliminated, proceed to Reinstallation Sequence below.
	Reinstallation Sequence:
	Reinstall each of original items from sequence above <u>except</u> last one replaced, <u>one at a time</u> , and determine if short remains eliminated. If it does not, replace that item; if it does, leave that item installed and proceed to the next item.
	Then proceed to boom microphone: Earcup Reconnection.





















boom microphone: Earcup Reconnection	Reconnect earcup cable and shield to J1 and shield return of PCB assembly of Left inner earcup assembly.
	If short eliminated, reassemble Left earcup (being careful not to damage wires)
	Otherwise proceed to <u>boom microphone: Right Earcup Short/Open (pg. 67</u> .
	If short still eliminated after reassembly, end repair; verify headset performance.





## BOOM MICROPHONE: BOOM MICROPHONE RECONNECTION







boom microphone:	Verify fault.
Right Earcup Short/Open	If fault verified, reconnect earcup cable and shield to J1 and shield return of PCB assembly of Left inner earcup assembly. Then open Right earcup and measure mic signal short. (Ref: Table 7.1.1)
	NOTE: It is not necessary to reassemble earcups before this fault is corrected, as long as they are handled gently enough to avoid stressing any of the headset wiring.
	If short eliminated, suspect pinched wire in Right earcup; locate pinched wire, repair wire, or replace corresponding cable or switch assembly, and reassemble Right earcup.
	If short eliminated, reassemble Right earcup and proceed to <u>boom</u> <u>microphone: Earcup Reconnection</u> .
	Otherwise, replace earcup cable.
	If short eliminated, proceed to Reinstallation Sequence below.
	Otherwise, replace earcup assembly.
	If short eliminated, proceed to Reinstallation Sequence below.
	Otherwise, replace earcup assembly.
	If short eliminated, proceed to Reinstallation Sequence below.
	Reinstallation Sequence:
	Reinstall each of original items from sequence above <u>except</u> last one replaced, <u>one at a time</u> , and determine if short remains eliminated. If it does not, replace that item; if it does, leave that item installed and proceed to the next item.
	Then reassemble Right earcup and proceed to <u>boom microphone:</u> Earcup Reconnection.



















PTT Switch:	Verify fault.
Faulty Communication/ Incorrect PTT Line Resistance	If fault verified, replace PTT switch assembly.
	If fault eliminated, end repair; verify headset performance.
	Otherwise, replace vehicle cable.
	If fault eliminated, proceed to Reinstallation Sequence below.
	Otherwise, replace earcup assembly.
	If fault eliminated, proceed to Reinstallation Sequence below.
	Reinstallation Sequence:
	Reinstall each of original items from sequence above <u>except</u> last one replaced, <u>one at a time</u> , and determine if symptom remains solved. If it does not, replace that item; if it does, leave that item installed and proceed to the next item.
	After Reinstallation Sequence, end repair; verify headset performance.






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Ground Short:	Verify fault.
Headset Short	If fault verified, open Left earcup.
	NOTE: It is not necessary to reassemble earcups before this fault is corrected, as long as they are handled gently enough to avoid stressing any of the headset wiring.
	If short eliminated, suspect pinched wire in Left earcup; locate pinched wire, repair wire, or replace corresponding cable or switch assembly, and reassemble Left earcup.
	If short eliminated, end repair; verify headset performance.
	Otherwise, open Left earcup if closed and disconnect earcup cable and shield from J1 and shield return of PCB assembly.
	If short eliminated, proceed to Ground Short: Right Earcup Short.
	Otherwise, replace vehicle cable.
	If short eliminated, proceed to Ground Short: Earcup Reconnection.
	Otherwise, replace earcup assembly.
	If short eliminated, proceed to Ground Short: Earcup Reconnection.
	Otherwise, replace vehicle cable.
	If short eliminated, proceed to Ground Short: Earcup Reconnection.













<u>Ground Short</u> : Earcup Reconnection	Reconnect earcup cable and shield to J1 and shield return of PCB assembly of Left inner earcup assembly.
	If short eliminated, reassemble Left earcup.
	Otherwise proceed to Ground Short: Right Earcup Short, pg: 77
	If short still eliminated after reassembly, end repair; verify headset performance.











Ground Short:	: Verify fault.			
Right Earcup Short	If fault verified, reconnect earcup cable and shield to J1 and shield return of PCB assembly of Left inner earcup assembly. Then open Right earcup and measure audio short.			
	NOTE: It is not necessary to reassemble earcups before this fault is corrected, as long as they are handled gently enough to avoid stressing any of the headset wiring.			
	If short eliminated, suspect pinched wire in Right earcup; locate pinched wire, repair wire, or replace corresponding cable or switch assembly, and reassemble Right earcup.			
	If short eliminated, reassemble Right earcup, verify short still eliminated and proceed to <u>Ground Short: Earcup Reconnection (pg. 75</u>			
	Otherwise, replace earcup cable.			
	If short eliminated, reassemble Right earcup, verify short still eliminated and proceed to <u>Ground Short: Earcup Reconnection (pg. 75)</u> .			
	Otherwise, replace earcup assembly.			
	If short eliminated, reassemble Right earcup, verify short still eliminated and proceed to <u>Ground Short: Earcup Reconnection(pg. 75)</u> .			
	Otherwise, replace earcup cable.			
	If short eliminated, reassemble Right earcup, verify short still eliminated and proceed to <u>Ground Short: Earcup Reconnection(pg. 75)</u> .			



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Talk-Thru:	Verify fault with headset connected to functioning intercom.
One Side – No	NOTE: Confirm you have 24v to the headset from the intercom.
Taik-Thru	If fault verified, Replace inner earcup on the side that is failing.
	If fault is on the right side, and still no Talk-Thru on the right side after replacing the right inner earcup, then troubleshoot earcup cable for possible open wire from the TT Switch to the right earcup. Replace earcup cable as needed
	If still no Talk-Thru on the right side, replace left inner earcup.
	If the fault is on the left side and still no Talk-Thru after replacing the left inner earcup, troubleshoot possible wiring problem between TT switch and left earcup PCB. Replace TT switch if needed.
<u>Talk-Thru</u> : Both Sides – No Talk-Thru	Verify fault with headset connected to functioning intercom.
	NOTE: Confirm you have 24v from the intercom to both earcups.
	If fault verified, replace Talk-Thru switch.
	If still no Talk-Thru on both sides, replace earcup cable.
Talk-Thru:	Verify fault.
No Talk-Thru on both sides with battery power	Replace the battery with a known good battery. Be sure to insert the battery in the proper orientation (Positive / Negative and Rechargeable vs. Non-Rechargeable).
	If still not Talk-Thru, open left earcup and check to see that battery power is available to PCB. 1.5V at J (X) P (Y).
	If battery power is OK, replace left outer earcup.
Talk-Thru:	Verify Fault
Battery Not	Verify 24V input from intercom and present at battery when beadset is
1	The second and proceed at ballony when neuroble

	verity Fault.
Battery Not Charging	Verify 24V input from intercom and present at battery when headset is connected to the intercom. If no 24V, troubleshoot intercom.
	Replace battery with new battery.
	If problem not resolved, replace right inner earcup.
	Verify headset performance.

Talk-Thru:	Verify Fault.	
Battery Looses	Replace Battery.	
Quickly	Otherwise, check for shorted battery lead by check resistance on positive terminal to left earcup PCB ground. If short, check for pinched wire from battery. If no short, replace left inner earcup.	
	If problem not resolved, replace right inner earcup.	
	Verify headset performance.	











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# **APPENDIX 1**

## ILLUSTRATED PARTS BREAKDOWN

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Ref #	NATO STOCK NUMBER	BOSE PART NUMBER	DESCRIPTION	QTY/ ASSY
		294677-3,-33		
1	5065 00 174 5504	(Large)	HEADSET, RO/CVC/ANR/B2	DEE
I	5905-99-174-5504	294677-2,-23	SIZE-MEDIUM	REF
		(Medium)		
		279584-3 (Large)		
2	5965-99-665-6497	279584-2	LINER - MEDIUM	1
		(Medium)		
19		254954-1	BOOM MIC ASSY KIT	1
		181409-1	MIC MOUNTING KIT	1
24	530599-684-4076	254957-1	SCREW	1
23	5310-99-665-6473	254947-1	THUMBNUT	1
21	5965-99-250-5361	254949-1	CLAMP	1
31	5965-99-414-1186	254953-1	WINDSCREEN	REF
11	5965-99-799-3894	263273-1	EARCUP CABLE ASSEMBLY	1
16	5965-99-001-9853	287033-001	EAR CUSHION ASSEMBLY	2
26	8315-99-367-1806	263285-1	VELCRO PAD, LOOP	REF
29	6160-99-225-7800	251808-1	COVER, BATTERY COMPARTMENT	1
30	5305-99-238-1513	263303-1	SCREW, SEALING (NOT SHOWN)	6
25	5330-99-861-0133	263280-1	O-RING, INNER EARCUP	2
17	5330-99-878-8219	263282-1	O-RING, EARCUSHION	2
		251789-1	BOOM MOUNT STUD	1
14	5965-99-938-5853	263276-1	INNER CUP ASSEMBLY, RIGHT	1
27	8315-99-665-6477	263286-1	VELCRO PAD, HOOK	8
15	5965-99-001-5894	181406-1	FRONT FOAM ASSEMBLY	2
		268243-1	DRIVER EMI SCREEN	2
13	5965-99-549-4500	263275-1	INNER CUP ASSEMBLY, LEFT	1
4	5965-99-492-8840	280079-001	OUTER CUP ASSEMBLY	1
12	5965-99-597-1303	263274-1	VEHICLE CABLE	1
8	5965-99-290-6020	263272-1	RIGHT HAND OUTER CUP ASSEMBLY	1
9	5930-99-908-7214	263295-1	TTC/ANR SWITCH ASSEMBLY	1
		263299-1	HEX NUT	2
		263298-1	O-RING, SWITCH ASSEMBLY	2
10	5930-99-131-3840	263284-1	TTC/ANR SWITCH HANDLE	1
5	5965-99-241-6066	263271-1	LEFT HAND OUTER CUP ASSEMBLY	1
6	5930-99-146-0167	263277-1	THREE POSITION SWITCH ASSEMBLY	1
7	5930-99-439-6247	263279-1	THREE POSITION SWITCH HANDLE	1







FIND Nos.20 AND 31 ARE ALTERNATIVES CHOSEN AT CUSTOMERS DISCRETION







# **APPENDIX 2**

## METHODS OF ASSEMBLY AND DISASSEMBLY

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#### Appendix 2 - 1



## 1 LINER AND EARCUP ASSEMBLY REMOVAL AND REPLACEMENT

- 1.1 Removal
- 1.1.1 Firmly grasp an earcup in one hand with thumb on the outer shell and fingers on ear cushion.
- 1.1.2 With other hand grasp liner above the earcup with thumb on the outside and finger on the inside of liner.
- 1.1.3 Firmly peel liner up and outward from earcup while at the same time use the thumb placed on outer shell to push earcup, and any attachments through liner opening until free.
- 1.1.4 Repeat steps 1 through 3 above for other earcup.
- 1.1.5 Undo Velcro straps securing earcup cable to the liner and separate earcups and cable assembly from liner.

#### NOTE

#### THE SIDE OF THE EARCUP(S) CONTAINING THE CORD ASSEMBLY CONNECTIONS(S) SHOULD BE POINTED TOWARDS THE REAR OF THE LINER WHEN PLACING THE EARCUPS INTO THE LINER OPENING.

- 1.2 Replacement
- 1.2.1 From the inside of the liner place earcup, with any attachments, part way through opening in the liner.
- 1.2.2 Start at the top of the liner opening and insert the liner ribbing into channel on earcup and hold in place.
- 1.2.3 While holding in place, start working liner ribbing into earcup channel on all around until full seated.
- 1.2.4 Repeat steps 1 through 3 for the other earcup.
- 1.2.5 Place earcup cable in Velcro at bottom rear of liner and secure.







## 2 EAR CUSHION AND FRONT FOAM REMOVAL AND REPLACEMENT

#### CAUTION DO NOT ATTEMPT TO REMOVE THE EAR CUSHION BY PULLING ON THE SOFT EAR SEAL MATERIAL.

- 2.1 Removal
- 2.1.1 Grasp ear cushion assembly lengthwise with thumb and fingers hooked under ear cushion assembly lip.
- 2.1.2 Peel ear cushion assembly from earcup by tilting one end until free of earcup.
- 2.1.3 Remove front foam assembly from earcup.

#### 2.2 Replacement

- 2.2.1 Insert front foam assembly into earcup.
- 2.2.2 Align ear cushion assembly on earcup.
- 2.2.3 Press ear cushion assembly firmly until secured in place to Velcro pads.









## 3 DRIVER SCREEN REMOVAL AND REPLACEMENT

- 3.1 Removal
- 3.1.1 Grasp ear cushion assembly lengthwise with thumb and fingers hooked under ear cushion assembly lip.
- 3.1.2 Peel ear cushion assembly from earcup by tilting one end until free of earcup.
- 3.1.3 Remove front foam assembly from earcup to expose driver screen.
- 3.1.4 Pry off the damaged driver screen and discard.
- 3.2 Replacement
- 3.2.1 Position replacement driver screen on inner earcup and push into place using driver screen press fixture.
- 3.2.2 Insert front foam assembly into earcup.
- 3.2.3 Align ear cushion assembly on earcup.
- 3.2.4 Press ear cushion assembly firmly until secured in place to Velcro pads.





Ear Cushion and Front Foam Removal Figure 3-1







Ear Cushion and Front Foam Detail



Driver Screen

Figure 3-2





## 4 MICROPHONE BOOM ASSEMBLY REMOVAL AND REPLACEMENT

- 4.1 Removal
- 4.1.1 Disconnect the boom microphone connector from the earcup.
- 4.1.2 Using a cross-tipped screwdriver, remove screw securing mounting hardware to headset.
- 4.1.3 Unscrew knurled thumbnut.
- 4.1.4 Remove boom clamp and boom assembly by sliding off mounting post.



Figure 4-1

Removal of Boom microphone Hardware

- 4.2 Replacement
- 4.3 Place boom clamp on mounting post so that the serrated edge is flush against the boom mount and hold in place.
- 4.3.1 Place knurled thumbnut on mounting post and run clockwise and tighten until secure.
- 4.3.2 Using a cross-tipped screwdriver place screw in end of mounting post and tighten to 10.0 +/- .5 in-lbs (115 +/- 6 g-m).







#### 5 PTT or ANR/TT SWITCH REMOVAL AND REPLACEMENT

- 5.1 Removal
- 5.1.1 Using a cross-tipped screwdriver, remove the two screws holding the switch guard to the outer cup assembly.
- 5.1.2 Using a cross-tipped screwdriver, remove the three sealing screws holding outer cup to the inner cup assembly.
- 5.1.3 Separate the outer and inner cup assemblies.

#### CAUTION THE HEADSET CONTAINS A CIRCUIT BOARD SENSITIVE TO DAMAGE BY ELECTROSTATIC DISCHARGE (ESD).

- 5.1.4 Using a flat head screwdriver, pry the paddle from the switch assembly.
- 5.1.5 Using a socket, remove the hex nut securing the switch to the outer cup plastic.
- 5.1.6 Remove switch from outer cup plastic and disconnect from circuit board. Cut away the sealant over the switch connector at the circuit board prior to removal.
- 5.2 Replacement
- 5.2.1 Assemble O-ring to switch before installing into earcup.
- 5.2.2 Install new switch into the outer cup plastic aligning the flat on the switch with the flat in the earcup and hold in place.
- 5.2.3 Secure switch to earcup with hex nut and tighten to 12.0 +/- 1 in-lbs. (138 +/- 11 g-m) using 5/16 in. (8mm) socket.
- 5.2.4 Press paddle into place on switch.
- 5.2.5 Plug connector at end of switch assembly into the circuit board and seal connection using sealant.
- 5.2.6 Assemble the inner and outer cup assemblies ensuring no wires are pinched. When assembling the inner and outer cup assemblies, be sure to twist the wiring 1½ to 2 turns such that the cable fits neatly into the earcup when assembled.
- 5.2.7 Secure outer cup in place using three sealing screws. Torque screws to 3.0 +/- .25 in-lbs. (35 +/- 3 g-m)









Sealing Screws Securing Outer and Inner Earcups

Separating Outer and Inner Cup Assemblies





PTT Switch Installed in Earcup



ANR Switch Installed in Earcup







## Appendix 2 - 9





Plug PTT Switch Connector into Circuit Board at J3 and Seal Figure 5-3



Plug ANR Switch Connector into Circuit Board at J3 and Seal





#### 6 VEHICLE CABLE REMOVAL AND REPLACEMENT

- 6.1 Removal
- 6.1.1 Using a cross-tipped screwdriver, remove the two screws holding switch guard to outer earcup assembly.
- 6.1.2 Using a cross-tipped screwdriver, remove the three sealing screws holding outer earcup to the inner earcup assembly.
- 6.1.3 Separate the outer and inner earcup assemblies.

#### CAUTION THE HEADSET CONTAINS A CIRCUIT BOARD SENSITIVE TO DAMAGE BY ELECTROSTATIC DISCHARGE (ESD).

- 6.1.4 Disconnect the vehicle cable assembly from the circuit board. Cut away the sealant over the switch connector at the circuit board prior to removal.
- 6.1.5 Using a cross-tipped screwdriver, loosen screw holding ring tongue terminal from vehicle cable to circuit board and remove ring tongue terminal.
- 6.1.6 Using a flat head screwdriver, loosen the two screws securing the vehicle cable to the earcup and remove the vehicle cable.
- 6.2 Replacement
- 6.2.1 Slide the vehicle cable through hole in earcup.
- 6.2.2 Plug connector at end of vehicle cable assembly into circuit board and seal connection using sealant.
- 6.2.3 Secure ring tongue terminal in place using cross-tipped screwdriver and torque screw to 2.0 +/- .2 in-lbs (23 +/- 2 g-m).
- 6.2.4 Push the vehicle cable grommet into tapered hole in earcup and hold in place.
- 6.2.5 Using flat head screwdriver, tighten the two screws on the vehicle cable to the earcup to 3.2 +/- .2 in-lbs. (37 +/- 2 g-m)
- 6.2.6 Assemble the inner and outer earcups ensuring no wires are pinched. When assembling the inner and outer cup assemblies, be sure to twist the wiring 1 ½ to 2 turns such that the cable fits neatly into the earcup when assembled.
- 6.2.7 Secure outer earcup in place using three sealing screws. Torque screws to 3.0 +/- .25 in-lbs. (35 +/- 3 g-m)









Sealing Screws Securing Outer and Inner Earcups Figure 6-1

Separating Outer and Inner Cup Assemblies



Screw on Circuit Board to Securing Ring Tongue Terminal



Screws Securing Vehicle Cable to Earcup

Figure 6-2







Plug Vehicle Cable Connector into Circuit Board at J5 and Seal Connect Ring Tongue Terminal to Screw

Figure 6-3





## 7 OUTER EARCUP ASSEMBLY REMOVAL AND REPLACEMENT

- 7.1 Removal
- 7.1.1 Using a cross-tipped screwdriver, remove the two screws holding switch guards to the outer earcups.
- 7.1.2 Using a cross-tipped screwdriver, remove the three sealing screws holding outer earcup to the inner cup assembly.
- 7.1.3 Separate the outer and inner earcup assemblies.

#### CAUTION THE HEADSET CONTAINS A CIRCUIT BOARD SENSITIVE TO DAMAGE BY ELECTROSTATIC DISCHARGE (ESD).

- 7.1.4 Disconnect all connections between left and right outer earcups to the circuit board. Cut away the sealant over the cable connectors at the circuit board prior to removal.
- 7.1.5 Using a cross-tipped screwdriver, loosen screw holding ring tongue terminal from earcup to earcup cable to circuit board and remove ring tongue terminal.
- 7.2 Replacement
- 7.2.1 Left Earcup Assembly
  - 7.2.1.1 Plug connector at end of earcup to earcup cable assembly into circuit board at J1 and seal connection using sealant.
  - 7.2.1.2 Plug connector at end of vehicle cable assembly into circuit board at J5 and seal connection using sealant.
  - 7.2.1.3 Plug connector at end of battery terminal wires into circuit board at J2 and seal connection using sealant.
  - 7.2.1.4 Plug green and white wires from the talk thru microphone into the connector from the PTT switch. Plug connector at end of PTT switch assembly into circuit board at J3 and seal connection using sealant.
- 7.2.2 Right Earcup Assembly
  - 7.2.2.1 Plug connector at end of earcup to earcup cable assembly into circuit board at J1 and seal connection using sealant.
  - 7.2.2.2 Plug connector at end of boom microphone wires into circuit board at J2 and seal connection using sealant.
  - 7.2.2.3 Plug connector at end of ANR/TT switch assembly into circuit board at J3 and seal connection using sealant.





- 7.2.3 Secure ring tongue terminals from vehicle cable and earcup to earcup cable in place using cross-tipped screwdriver and torque screw to 2.0 +/- .2 in-lbs. (23 +/- 2 g-m)
- 7.2.4 Assemble the inner and outer earcups ensuring no wires are pinched. When assembling the inner and outer cup assemblies, be sure to twist the wiring 1 ½ to 2 turns such that the cable fits neatly into the earcup when assembled.
- 7.2.5 Secure outer earcup in place using three sealing screws. Torque screws to 3.0 +/- .25 in-lbs. (35 +/- 3 g-m)



Sealing Screws Securing Outer and Inner Earcups



Separating Outer and Inner Cup Assemblies



Plug Connectors into Circuit Board at J1,J2, I3 and J5 and Seal Connect Ring Tongue Terminals to Screw



et Plug Connectors into Circuit Board at J1, J2, and J3 and Seal rew Connect Ring Tongue Terminal to Screw Figure 7-2



Figure 7-1



### 8 EARCUP to EARCUP CABLE REMOVAL AND REPLACEMENT

- 8.1 Removal
- 8.1.1 Using a cross-tipped screwdriver, remove the three sealing screws holding outer earcup to the inner cup assembly.
- 8.1.2 Separate the outer and inner earcup assemblies.

#### CAUTION THE HEADSET CONTAINS A CIRCUIT BOARD SENSITIVE TO DAMAGE BY ELECTROSTATIC DISCHARGE (ESD).

- 8.1.3 Disconnect the earcup to earcup cable from the circuit board. Cut away the sealant over the earcup cable connector at the circuit board prior to removal.
- 8.1.4 Using a cross-tipped screwdriver, loosen screw holding ring tongue terminal from earcup to earcup cable to circuit board and remove ring tongue terminal.
- 8.1.5 Pull one end of the earcup to earcup cable assembly towards the inside of the earcup to expose the crimp ring and remove the crimp ring.
- 8.1.6 Remove the cable and grommet from earcup.
- 8.1.7 Repeat steps 1 through 6 for the other earcup.
- 8.2 Replacement
- 8.2.1 Slide the earcup to earcup cable through the hole in the earcup.
- 8.2.2 Push grommet into place in the earcup.
- 8.2.3 Pull one end of the cable towards the inside of the earcup to provide enough room to put crimp ring in place.
- 8.2.4 Place the crimp ring .125 inches (3mm) from end of cable jacket and crimp in place.
- 8.2.5 Pull cable back through grommet until crimp rind is snug against grommet.
- 8.2.6 Plug connector at end of earcup to earcup cable assembly into circuit board and seal connection using sealant.
- 8.2.7 Secure ring tongue terminal in place using cross-tipped screwdriver and torque screw to 2.0 +/- .2 in-lbs. (23 +/- 2 g-m)
- 8.2.8 Assemble the inner and outer earcups ensuring no wires are pinched. When assembling the inner and outer cup assemblies, be sure to twist the wiring 1 ½ to 2 turns such that the cable fits neatly into the earcup when assembled.
- 8.2.9 Secure outer earcup in place using three sealing screws. Torque screws to 3.0 +/- .25 in-lbs. (35 +/- 3 g-m)
- 8.2.10 Repeat steps 1 through 9 for other earcup.



Appendix 2 - 16









Separating Outer and Inner Cup Assemblies



Figure 8-2


Appendix 2 - 17





Plug Earcup Cable Connector into Circuit Board Plug Earcup Cable Connector into Circuit Board at J1 and Seal Connect Ring Tongue Terminal to Screw Figure 8-3



at J1 and Seal Connect Ring Tongue Terminal to Screw





## 9 INNER EARCUP REMOVAL AND REPLACEMENT

- 9.1 Removal
- 9.1.1 Using a cross-tipped screwdriver, remove the three sealing screws holding outer earcup to the inner cup assembly.
- 9.1.2 Separate the outer and inner earcup assemblies

## CAUTION THE HEADSET CONTAINS A CIRCUIT BOARD SENSITIVE TO DAMAGE BY ELECTROSTATIC DISCHARGE (ESD).

- 9.1.3 Remove all connections to the circuit board. Cut away the sealant over all the connectors at the circuit board prior to removal.
- 9.1.4 Using a cross-tipped screwdriver, loosen screw holding ring tongue terminals from the earcup cable and vehicle cable to circuit board and remove ring tongue terminal.
- 9.1.5 Remove the inner cup assembly.
- 9.2 Replacement
- 9.2.1 Holding the system microphone wire flat, position the circuit board on the inner earcup.
- 9.2.2 Using a cross-tipped screwdriver, loosen screw on circuit board to capture the ring tongue terminals from the vehicle and earcup cables under the screw where shown. Torque screw to 2.0 +/- .2 in-lbs. (23 +/- 2 g-m)
- 9.2.3 Plug all of the connectors into the circuit board and seal connections using sealant.
- 9.2.4 Assemble the inner and outer earcups ensuring no wires are pinched. When assembling the inner and outer cup assemblies, be sure to twist the wiring 1½ to 2 turns such that the cable fits neatly into the earcup when assembled.
- 9.2.5 Secure the outer earcup in place using three sealing screws. Torque screws to 3.0 +/- .25 inlbs. (35 +/- 3 g-m)











Separating Outer and Inner Cup Assemblies





Assembly Opened to Separate Inner and Outer Earcups



Assembly Opened to Separate Inner and Outer Earcups





Secure Connection to Circuit Board and Seal Connect Ring Tongue Terminals to Screw

Figure 9-3







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