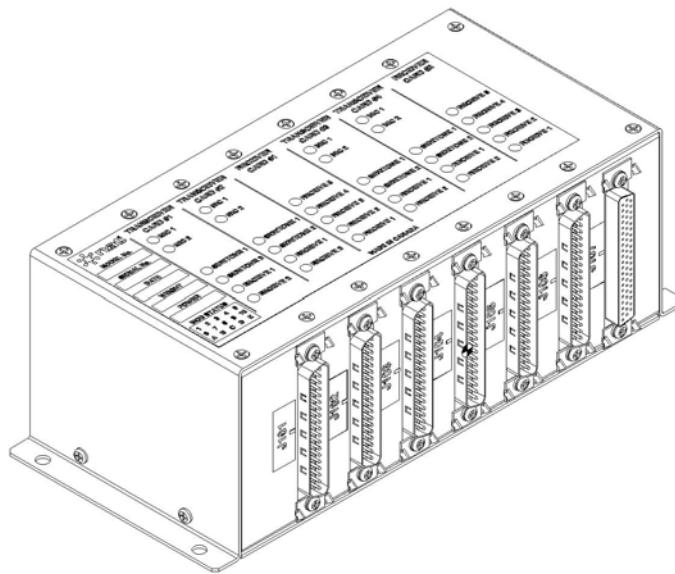




# Installation and Operation Manual

## MB01-001 Matching Box



**SM72**

**ISSUE 4.01**

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# MB01-001 Matching Box SM72 Installation and Operation Manual

## Section 1 Description

### 1.1 Introduction

Information in this section consists of product description, design features and specifications for the MB01-001 Matching Box. All derivative product information shall be contained in the applicable manual supplement, which may be obtained from NAT as required.

Review all notes, warnings and cautions.

### 1.2 Product Description

The MB01-001 is a remote mounted audio level matching unit for 8 transceivers and 10 receivers. It provides 8 floating key signals and is capable of providing unamplified artificial sidetone. The unit also provides a diode OR'ed DF Mute signal when any of the transceivers are keyed.

### 1.3 Design Features

The MB01-001 is made up of 8 subassemblies: 2 'Receiver' subassemblies, 4 'Transceiver' subassemblies, one Test subassembly and one Backplane subassembly. Each 'Receiver' subassembly supports 5 receivers and each 'Transceiver' subassembly supports two transceivers. The Test subassembly connector provides the installing agency access to all microphone and receive signals while all the equipment is connected. This allows proper level adjustments to be made while all inputs and outputs are loaded. The MB01-001 supports real sidetone, dedicated sidetone inputs (with 6dB of attenuation) and can generate unamplified artificial sidetone. All connectors are labeled to assist with proper connection to the airframe wiring.

### 1.4 Specifications

#### 1.4.1 Electrical Specifications

##### Input Signals

Quantity	18 Receive inputs 8 Microphone inputs 8 Sidetone inputs
Audio Level	4.9 Vrms nominal for receive inputs 4.9 Vrms nominal for sidetone inputs 1 Vrms nominal for microphone inputs
Impedance	350 $\Omega$ $\pm$ 10% max for microphone inputs 600 $\Omega$ $\pm$ 10% for receive inputs 1000 $\Omega$ $\pm$ 10% for sidetone inputs
Circuitry Type	All are balanced inputs
Keylines	PTT <30 mA input current



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### Output Signals

Quantity	18 Receive outputs 8 Microphone outputs
Audio level	2 Vrms nominal for receive outputs 2 Vrms nominal for sidetone outputs 0.5 Vrms nominal for microphone outputs
Impedance	600 $\Omega$ $\pm$ 10% for microphone outputs 375 $\Omega$ $\pm$ 10% for receive outputs
Distortion	<10% THD @ Rated power output
Circuitry Type	All are balanced outputs
Keylines	Floating or direct PTT $\leq$ 0.5 A at 30 Vdc Resistive handling current $\leq$ 0.1 A at 30 Vdc Inductive handling current
DF Mute	Keylines are diode OR'ed and produce a summed output on each of the receiver cards

### 1.4.2 Physical Specifications

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Height	3.15" (80.1mm)
Depth	4.00" (101.6 mm)
Width	8.11" (206.0 mm)
Weight	2.5 lbs
Mounting	Bulkhead mount with four 10-32 screws
Material/Finish	Chassis & cover are 5052-H32 brushed aluminum with chromate conversion finish
Connectors	Six male 37-pin D-submin connectors with Positronics V5 locking tabs, and one female 62 pin high density D-submin connector with Positronics V5 locking tabs

### 1.4.3 Environmental Specifications

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#### Temperature

Operating	-40° C to +70° C	DO-160C Cat. B4
Survival	-55° C to +85° C	
Altitude	25,000 ft. Max.	



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Shock	DO-160C Cat N Operational Shock only
Qualification	DO-160C as contracted

**Section 1 ends**

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**Section 2 Installation**

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**2.1 Introduction**

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Information in this section consists of unpacking and inspection procedures, installation procedures, post-installation checks and installation drawings for the MB01-001 Matching Box.

Review all notes, warnings and cautions.

**2.2 Unpacking and Inspection**

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Unpack the equipment carefully and locate the warranty card. Inspect the unit visually for damage due to shipping and report all such claims immediately to the carrier involved. Check that all items listed below are present before proceeding and report any shortage immediately to your supplier:

- Warranty Card
- Certificate of Conformity or Release Certification

**2.2.1 Warranty**

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All Northern Airborne Technology Ltd. products are warranted for 2 years from date of installation by an authorized NAT dealer, to be free of defects in workmanship or performance. This warranty covers all materials and labour, but is exclusive of any transport to deliver the defective unit to and from NAT or its designated warranty repair center, or any labour to remove or re-install the defective unit in the aircraft. Contact NAT for any questions regarding this warranty, its applicability to your units and/or for return authorization. NAT is the final arbitrator concerning warranty administration. Units which have been physically damaged, burned, immersed in water or otherwise abused beyond the scope of normal use will not be considered for warranty. **WARRANTY IS VOID UNLESS THE PRODUCT IS INSTALLED BY AN AUTHORIZED NAT DEALER.** Product for which a warranty card is not returned shall be warranted from date of manufacture.

**2.3 Continued Airworthiness**

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Maintenance of the MB01-001 Matching Box is 'on condition' only. Periodic maintenance of this product is not required.

**2.4 Installation Procedures**

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**2.4.1 Warnings**

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**WARNING:**  
**High volume settings can cause hearing damage.  
Set the headset volume control to the minimum volume setting prior to  
conducting tests, and slowly increase the headset volume to a  
comfortable listening level.**



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### 2.4.2 Cautions

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**CAUTION:**

All audio installations can be seriously degraded by incorrect wiring and shielding, and may result in abnormal cross-talk, hum and ground-loop noise. Be especially careful with all microphone wiring and tie line wiring, as these lines carry the lowest level signals in the aircraft.

### 2.4.3 Cabling and Wiring

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All wire shall be selected in accordance with the original aircraft manufacturer's Maintenance Instructions or AC43.13-1B Change 1, Paragraphs 11-76 through 11-78. Unshielded wire types shall qualify to MIL-W-22759 as specified in AC43.13-1B Change 1, Paragraphs 11-85, 11-86, and listed in Table 11-11. For shielded wire applications, use Tefzel MIL-C-27500 shielded wire with solder sleeves (for shield terminations) to make the most compact and easily terminated interconnect. Follow the connector map in Section 2.6 as required.

Allow 3" from the end of the shielded wiring to the shield termination to allow the connector hood to be easily installed. Reference the interconnect drawing in Section 2.6 for shield termination details. Note that the hood is a "clamshell" hood, and is installed after the wiring is complete. Aircraft harnessing shall permit the unit to be removed from the panel for easy access to all side adjustments. Do NOT mount the unit until all adjustments have been performed.

Maintain wire segregation and route wiring in accordance with the original aircraft manufacturers Maintenance Instructions.

Unless otherwise noted, all wiring shall be a minimum of 22 AWG, except power and ground lines, which shall be a minimum of 20 AWG. Reference the Interconnect drawing for additional specifications. Check that the ground connection is clean and well secured, and that it shares no path with any electrically noisy aircraft accessories such as blowers, turn and bank instruments or similar loads. Power to this unit must be supplied from a separate circuit breaker or fuse (fast blow), and not attached to any other circuit breaker without additional protection. Verify that the selected circuit breaker size and wire gauge are adequate for the installation using the techniques specified in AC43.13-1B Change 1, Paragraphs 11-47 through 11-51 and 11-66 through 11-69.

### 2.4.4 Post-Installation Checks

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#### 2.4.4.1 Voltage/Resistance Checks

**Do not attach the MB01-001 until the following conditions are met.**

Check the following for Transceiver Subassemblies:

- a) Check P101, pin <10> for continuity to ground (less than 0.5Ω).
- b) Check P102, pin <10> for continuity to ground (less than 0.5Ω).
- c) Check P104, pin <10> for continuity to ground (less than 0.5Ω).
- d) Check P105, pin <10> for continuity to ground (less than 0.5Ω).



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Check the following for Receiver Subassemblies:

- a) Check P103, pin <4> for continuity to ground (less than 0.5Ω).
- b) Check P106, pin <4> for continuity to ground (less than 0.5Ω).

Check the following for Test Subassembly:

- a) Check P107, pin <1> for continuity to ground (less than 0.5Ω).

### 2.4.4.2 Power On Checks

Power up the aircraft's systems and confirm normal operation of all functions of the MB01-001. Refer to Section 3 (Operation) for specific operational details.

- a) Check preset adjustments are completed before aircraft departure.

Upon satisfactory completion of all performance checks, make all required log book entries, electrical load, weight and balance amendments and other documentation as required by your local regulatory agency before releasing the aircraft for service.

## 2.5 Adjustments and Connections

The unit is shipped from the factory with all internal adjustments set to the normal test levels. Once installed in the aircraft, it may be desirable to change some of these settings to best suit the local operating environment. The internal adjustments are located through the top cover. See Figure 1.

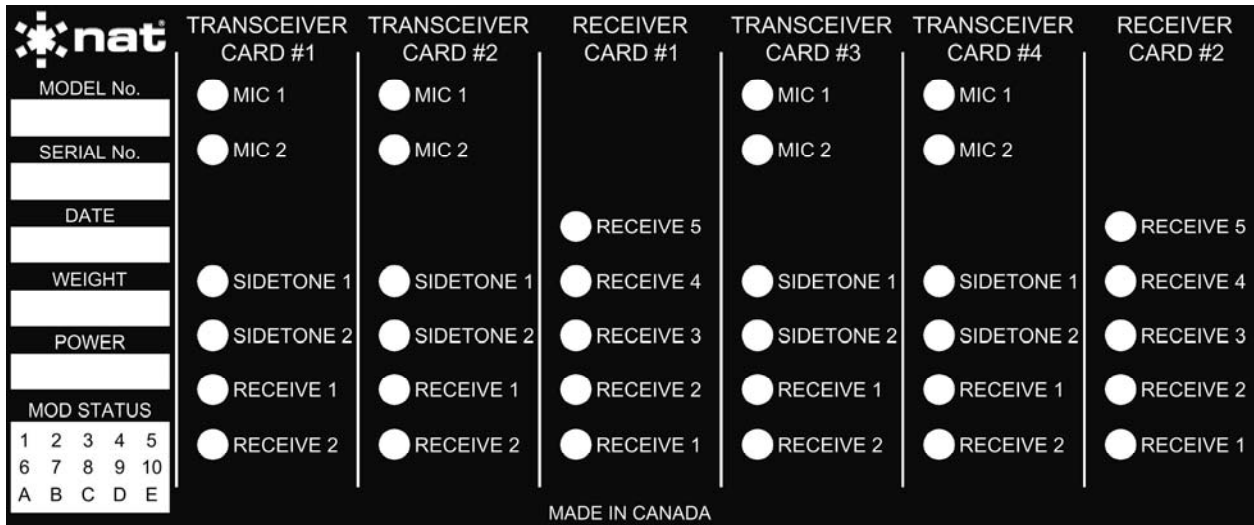


Figure 1: Internal Adjustments

All microphone, receive and artificial sidetone adjustments are 10-turn trim pots. The dedicated sidetone inputs are not adjustable.



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**2.6 Installation Drawings**

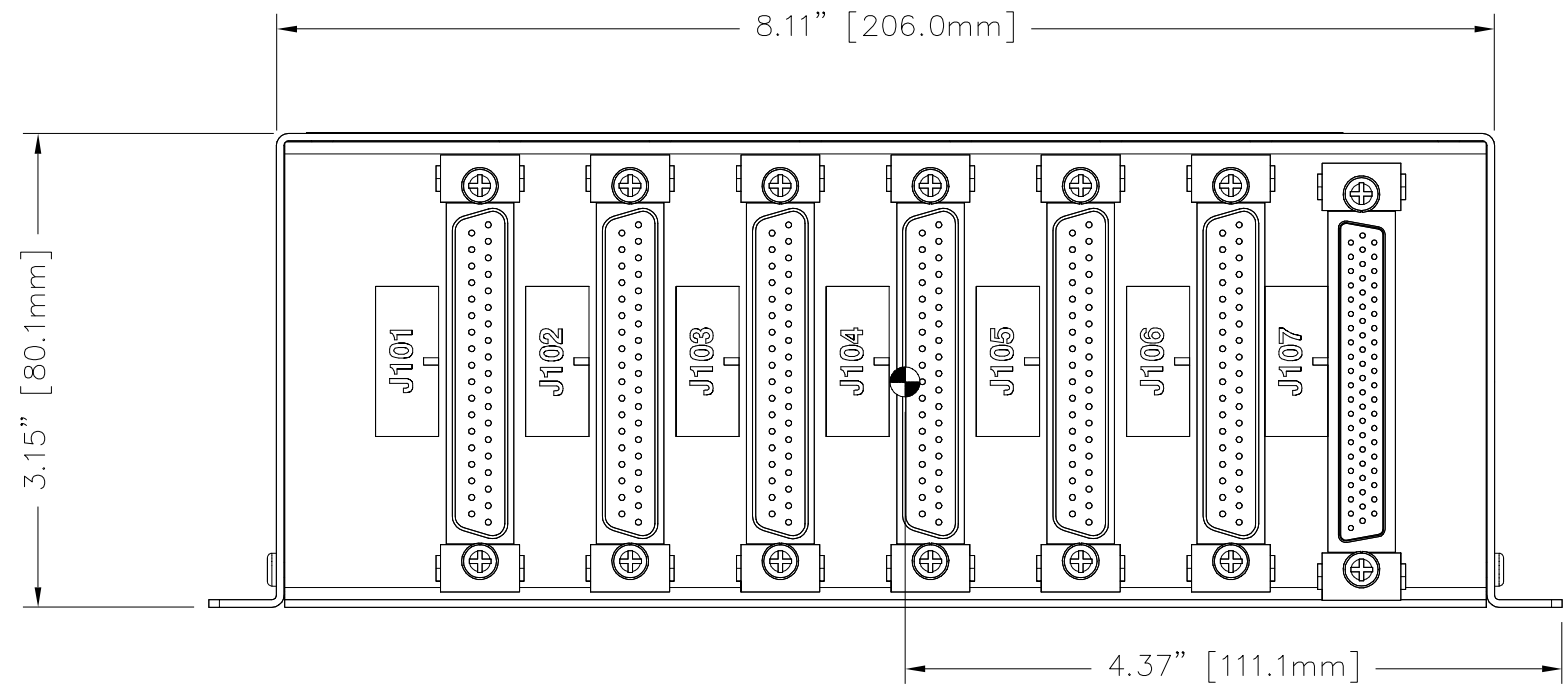
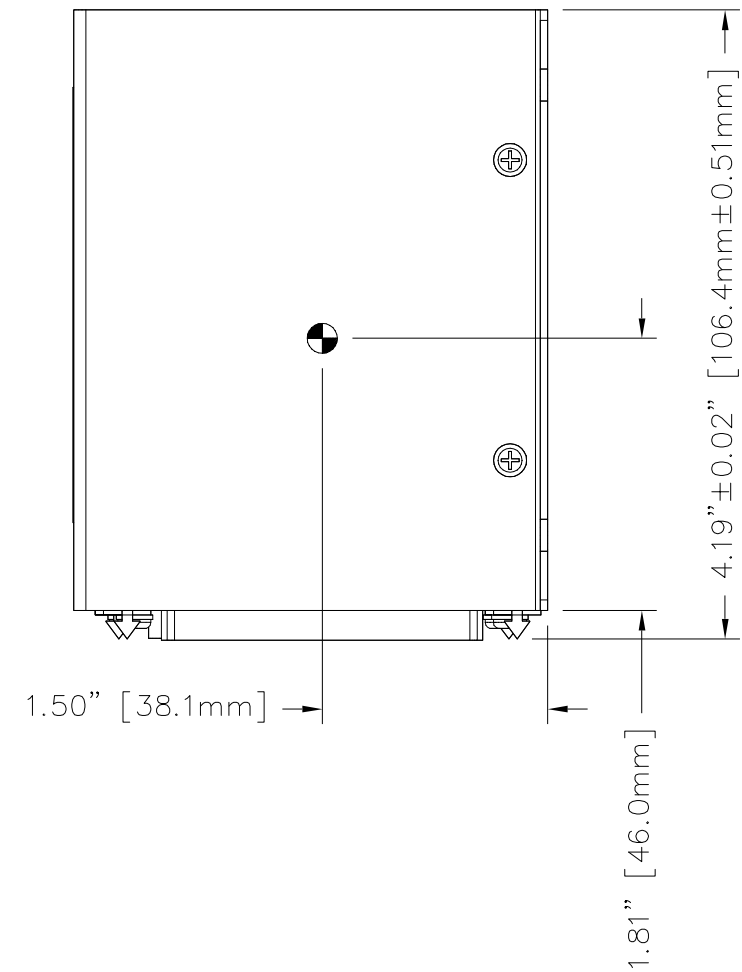
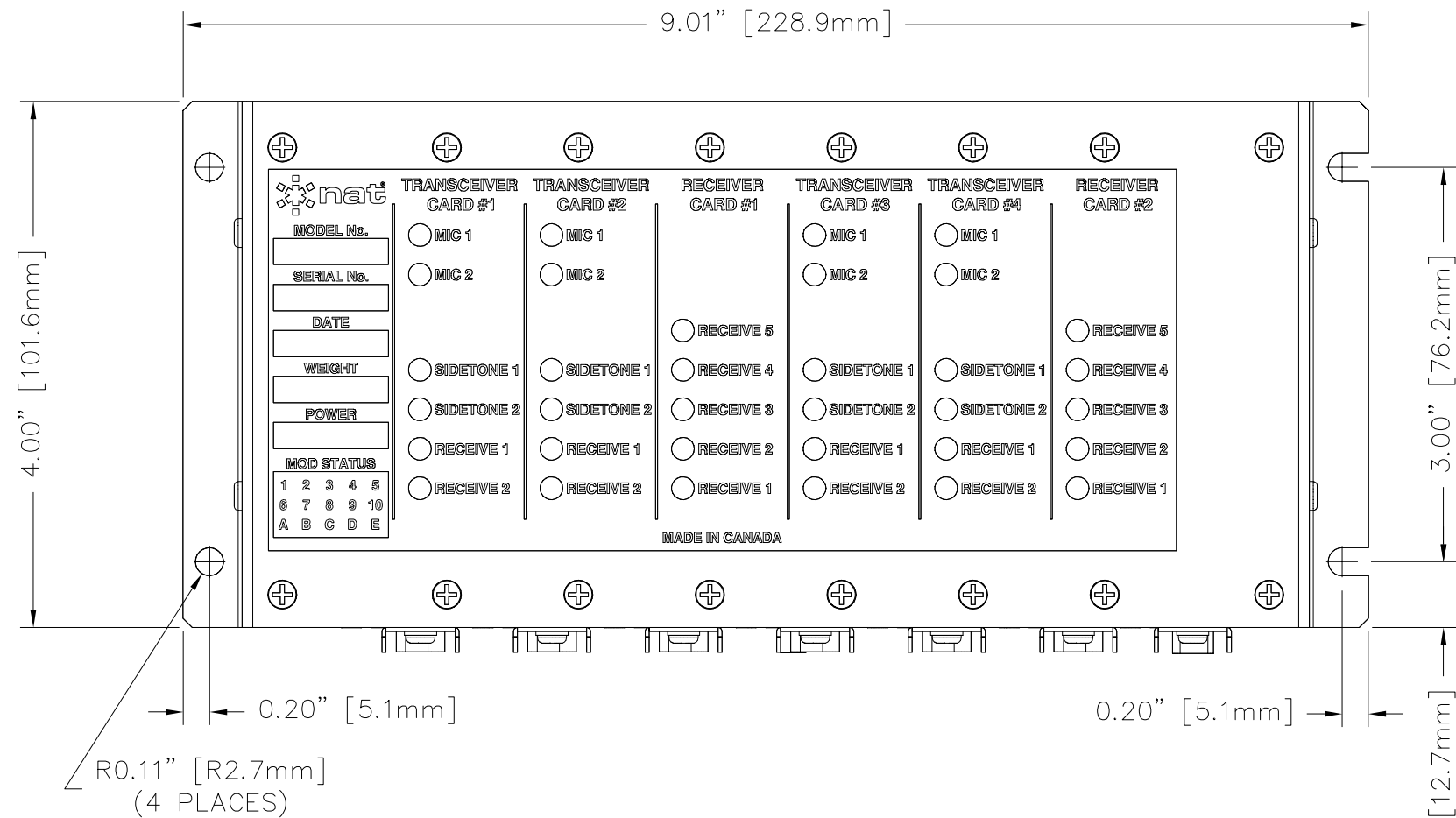
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<b>DOCUMENT</b>	<b>REV.</b>	<b>DESCRIPTION</b>	<b>TYPE</b>	<b>SERIAL NO.</b>
<b>MB01-001</b>				
MB01\001\922-0	1.00	Matching Box	Mechanical Installation	1011 and up
<b>MB01-1</b>				
MB01-1\403-0	1.00	Transceiver Subassembly	Interconnect	1011 and up
MB01-1\405-0	1.00	Transceiver Subassembly	Connector Map	1011 and up
<b>MB01-2</b>				
MB01-2\403-0	1.00	Receiver Subassembly	Interconnect	1011 and up
MB01-2\405-0	1.00	Receiver Subassembly	Connector Map	1011 and up
<b>MB01-3</b>				
MB01-3\405-0	1.00	Test Subassembly	Connector Map	1011 and up

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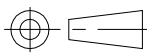



**Section 2 ends following the above documents**

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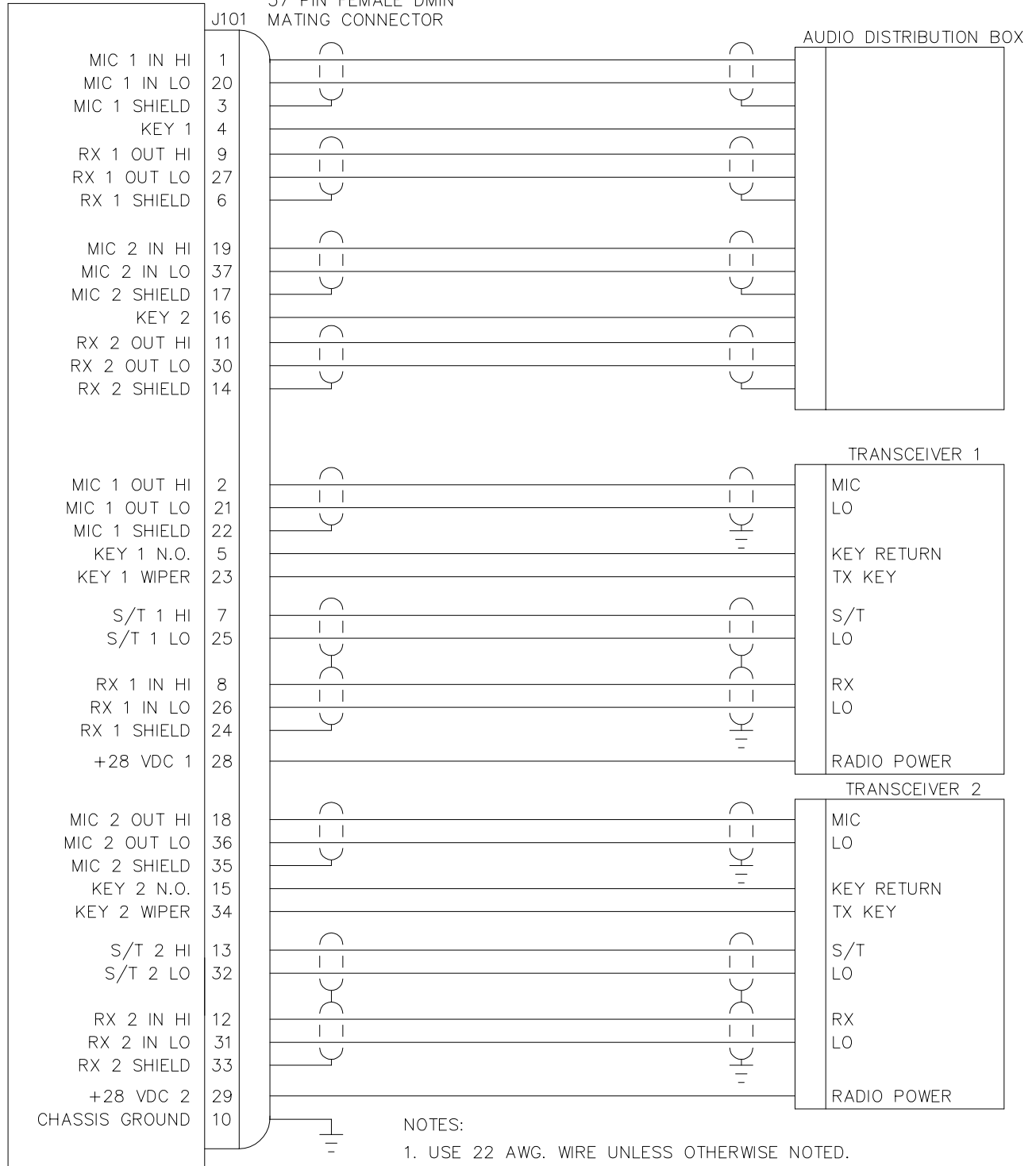
 CENTER OF GRAVITY  
 WEIGHT: 2.50 lbs. (1.14 kg)

PROPRIETARY AND CONFIDENTIAL TO NAT LTD.

TOLERANCES UNLESS STATED OTHERWISE 0.X=+/-0.030 0.XX=+/-0.010 0.XXX=+/-0.005 0.XXXX=+/-0.002 ANGLE=+/- 0.5 DEG.	DIMENSIONS IN INCHES THIRD ANGLE PROJECTION 	DESIGNED	MAD	 <b>NAT</b> NORTHERN AIRBORNE TECHNOLOGY LTD.				
		DRAWN	MWS					
		DATE	MAY 17/99	TITLE				
		CHECKED	 NAT 130 214	MATCHING BOX				
MATERIAL		APPROVED	 NAT 107	SIZE	CAGE CODE	PART NO.	REV.	SHEET
FINISH		FILE 922-0100.DWG		B	3AB01	MB01-001	1.00	1/1
		DWG. TYPE MECH. INSTALLATION		DWG. NO. MB01\001\922-0				

TRANSCIVER CARD



P101, P102, P104 OR P105  
37 PIN FEMALE DMIN  
MATING CONNECTOR



NOTES:

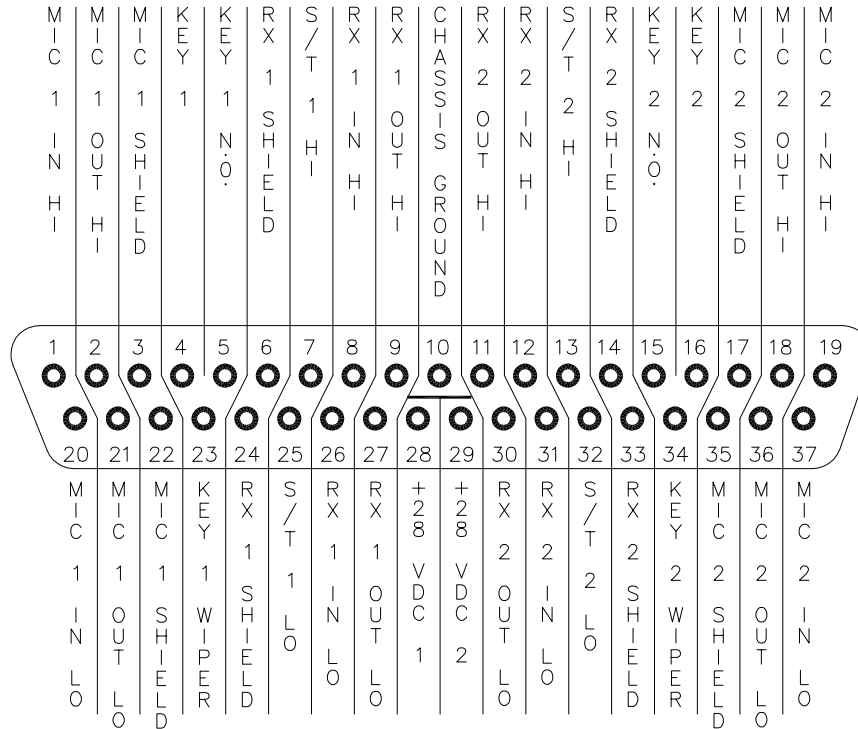
1. USE 22 AWG. WIRE UNLESS OTHERWISE NOTED.
2. DO NOT GROUND MICROPHONE OR HEADPHONE LO CONNECTIONS TO AIRFRAME.

PROPRIETARY AND CONFIDENTIAL TO NAT LTD.

DESIGNED	MAD		NORTHERN AIRBORNE TECHNOLOGY LTD.			
DRAWN	MWS					
DATE	MAY 17/99	TITLE	TRANSCIVER SUBASSEMBLY			
CHECKED	NAT PROD 130 214					
APPROVED		SIZE	CAGE CODE	PART NO.	REV.	SHEET
		A	3AB01	MB01-1	1.00	1/1
FILE	403-0100.DWG	DWG. TYPE	INTERCONNECT	DWG. NO.	MB01-1\403-0	



P101, P102, P104, P105

37 PIN FEMALE DMIN  
MATING CONNECTOR



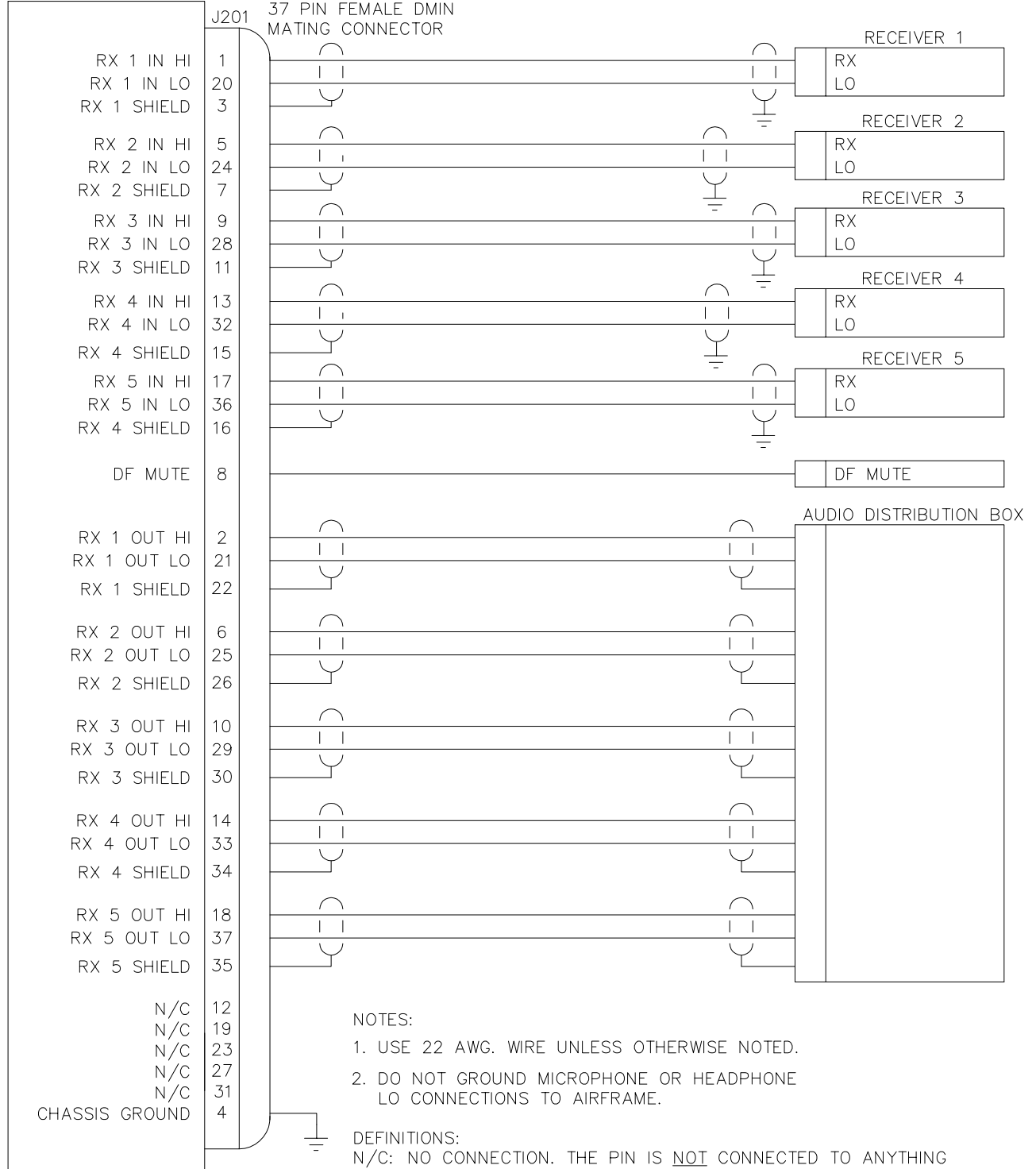
VIEW IS FROM REAR OF AIRFRAME CONNECTOR

PROPRIETARY AND CONFIDENTIAL TO NAT LTD.

DESIGNED	MAD		NORTHERN AIRBORNE TECHNOLOGY LTD.			
DRAWN	MWS/TAT					
DATE	MAY 19/99	TITLE	TRANSCIVER SUBASSEMBLY			
CHECKED	<b>NAT PRODAT</b> 130 214					
APPROVED		SIZE	CAGE CODE	PART NO.	REV.	SHEET
FILE	405-0100.DWG	A	3AB01	MB01-1	1.00	1/1
DWG. TYPE		CONNECTOR MAP		DWG. NO. MB01-1\405-0		

RECEIVER CARD

P103 OR P106  
37 PIN FEMALE DMIN  
MATING CONNECTOR



NOTES:

1. USE 22 AWG. WIRE UNLESS OTHERWISE NOTED.
2. DO NOT GROUND MICROPHONE OR HEADPHONE LO CONNECTIONS TO AIRFRAME.

DEFINITIONS:

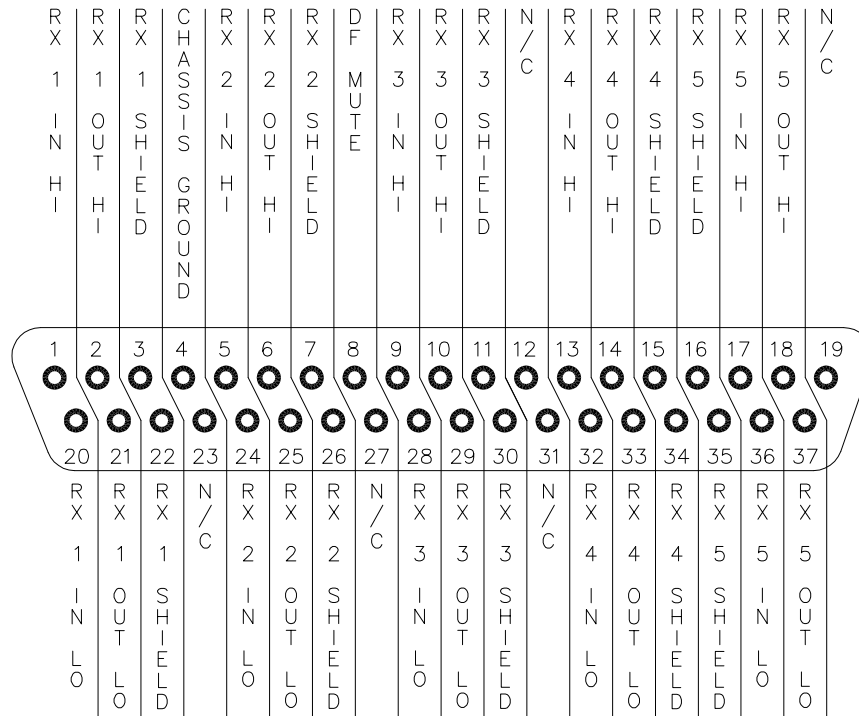
N/C: NO CONNECTION. THE PIN IS NOT CONNECTED TO ANYTHING INTERNALLY, AND THEREFORE SHALL HAVE NO CONNECTION EXTERNALLY.

PROPRIETARY AND CONFIDENTIAL TO NAT LTD.

DESIGNED	MAD	<b>NAT</b> NORTHERN AIRBORNE TECHNOLOGY LTD.				
DRAWN	MWS/TAT					
DATE	MAY 19/99	TITLE	RECEIVER SUBASSEMBLY			
CHECKED	NAT PROBAT 130 214					
APPROVED	NAT 107	SIZE	CAGE CODE	PART NO.	REV.	SHEET
FILE	403-0100.DWG	A	3AB01	MB01-2	1.00	1/1
DWG. TYPE		INTERCONNECT		DWG. NO. MB01-2\403-0		



P103, P106

37 PIN FEMALE DMIN  
MATING CONNECTOR



VIEW IS FROM REAR OF AIRFRAME CONNECTOR

PROPRIETARY AND CONFIDENTIAL TO NAT LTD.

DESIGNED	MAD	 <b>NAT</b> NORTHERN AIRBORNE TECHNOLOGY LTD.
DRAWN	MWS	
DATE	MAY 17/99	TITLE
CHECKED	<b>NAT</b> 130 <b>PRO</b> 214 <b>NAT</b> 214	RECEIVER SUBASSEMBLY
APPROVED		SIZE A
		CAGE CODE 3AB01
		PART NO. MB01-2
FILE	405-0100.DWG	DWG. TYPE CONNECTOR MAP
		DWG. NO. MB01-2\405-0
		REV. 1.00
		SHEET 1/1





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**Section 3 Operation**

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**3.1 Introduction**

---

Information in this section consists of functional and operational procedures for the MB01-001 Matching Box.

**3.2 General Information**

---

The MB01-001 is a remote mounted audio level matching unit for 8 transceivers and 10 receivers. It provides 8 floating key signals and is capable of providing unamplified artificial sidetone. The unit also provides a diode OR'ed DF Mute signal when any of the transceivers are keyed.

**3.3 Controls and Indicators**

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**The MB01-001 has no normal user operational aspects.** During installation, or if the unit has been exchanged, it may be a requirement to change internal adjustments. This should be done **ONLY BY FULLY QUALIFIED PERSONNEL.**

**Section 3 ends**

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