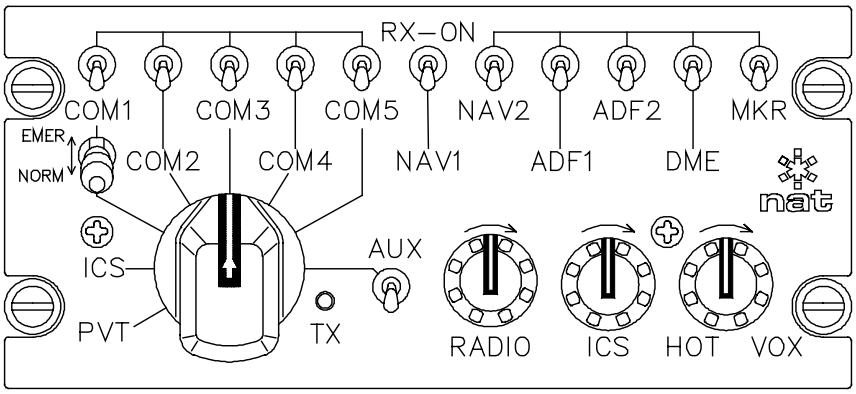
SM45

N301A-000
Single User Audio Controller



INSTALLATION AND OPERATION MANUAL

REV 4.00 July 12, 2004

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Periodically NAT will release manual amendments. In order to maintain the most accurate and up to date manual these amendments should be carried out immediately upon receipt and recorded on the following amendment record.

AMENDMENT RECORD

Amendment Number	Amendment Date	Section(s) Changed	Date Entered	Entered By
1	Jan 18\05	Page iii,1,2		**Performed at factory**
2	May 9\06	1		**Performed at factory**

Insert any Amendment Instruction sheets after this page.

INSTALL_OPS
MANUAL AMENDMENT

Manual: SM45 (N301A)	**Amendment #: 2**
Document # SM45\Install_Ops\809-0002	**Amendment Date:** May 9, 2006

The purpose of this amendment is to add a reference to the Environmental Qualification Form (521-0) to Section 1.4.3.

Amendment Instructions:

1

Remove Pages	Replace With Pages
1-3 and 1-4 Rev 4.00 Amendment #1	1-3 and 1-4 Rev 4.00 Amendment # 2

2 Update the Amendment Record sheet at the front of the manual.

3 Insert this page into the manual after the Amendment Record sheet (page ii).

Manual Amendment ends after the following amended pages

Table of Contents

Section 1 Description

1.1 Introduction

Information in this section consists of: purpose of equipment, features, and specifications.

1.2 Purpose of Equipment

The N301A is a single user audio controller that is compatible with military and civil aviation headsets. The N301A controls the audio from multiple receivers, and allows transmission of mic audio to a selected transmitter. Intercom operation is also provided, with two proprietary tie lines for system expansion. Three modes of ICS are available: HOT; PTT; and VOX.

The N301A is a Dzus mounted audio panel with built in intercom. It provides full headset transmit and receive functions for the user. The front panel level controls permit user adjustment of selected audio, such as radio, ICS and VOX squelch.

The user has control of six transceiver positions, six receiver inputs, four direct audio alerts and two different ICS tie lines.

The N301A is a drop-in replacement for the Andrea A301-6 audio panel.

1.3 Features

The N301A system employs NAT's unique audio processing which reduces noise and tailors the frequency response to produce clean, crisp intercom audio. Its high output power and low distortion results in better on-board communication. The unit is designed to meet the requirements of TSO-C50c.

All inputs are fully floating including dedicated alerting inputs, except for the 150 Ω Mic and ICS tie lines. Independent RX and ICS volume controls are provided, and intercom mode can be varied from HOT MIC through VOX to PTT (push to talk). In installations configured for the ‘Andrea’ tie lines, the ‘Private’ tie line can also be used to provide secondary ICS for selected users. The NAT ICS tie line is fully compatible with other NAT audio systems.

1.4 Specifications

1.4.1 Electrical Specifications

Power Supply:

Operating Voltage

Nominal:	27.5 Vdc, with reverse and over voltage protection.
Maximum	30.3 Vdc
Minimum	24.8 Vdc
Emergency	20.0 Vdc

Input current: 0.5 Amps Max.

Lighting: 200 mA @ 27.5 Vdc

Input Signals

Quantity: 12 Receive channels.
2 Mic channels
4 Direct channels

Audio level: 4.5 Vrms for receiver inputs.
0.25 Vrms for 150 Ω mic input.
0.25 mVrms for 5 Ω mic input.
4.5 Vrms for direct audio inputs.

Impedance: 10 kΩ ±10% for receive inputs.
150 Ω ± 10% for 150 Ω mic input.
5 Ω ± 2 Ω for 5 Ω mic input.
10 kΩ ± 10% for Direct audio inputs.

Circuitry Type: All are balanced inputs except for the 150 Ω mic (single ended).

Coupling: < -60 dB input-to-input Crosstalk.

Keylines: Transmit PTT – active low.
ICS PTT – active low

Output Signals:

Quantity: 2 Headset outputs.
6 Transmitter mic outputs.
6 Transmitter keyline outputs.
1 mode of CVR output (Models -103 & -105 have 2 modes).

Rated level:	Hi imped. headset output >12.3 Vrms or 250 mW into 600 Ω Low imped. headset output >1.42 V ms or 250 mW into 8 Ω RX input CVR level - 1.4 Vrms ± 10% into 5k Ω Mic input CVR level - 0.45 Vrms ± 50mV into 5k Ω Mic output – 250 mVrms nominal into 150 Ω Keyline outputs ≤ 1 A max. sink for mic keys	
Circuitry Type:	Headsets and CVR are balanced outputs Microphone outputs are single ended	
Freq. Resp.	Receive inputs	< 3 dB from 350 Hz to 6000 Hz
	Direct inputs	< 3 dB from 350 Hz to 6000 Hz
	Intercom	< 3 dB from 350 Hz to 3000 Hz
	CVR output	< 3 dB from 350 Hz to 6000 Hz
Distortion:	< 10% THD @ rated power output	
Audio Noise Level:	Without Signal: > 50 dB down from rated output	
Coupling:	< -55 dB input-to-output Crosstalk	
Output Regulation	< 10% distortion / Δ3 dB max. of rated output power at 400% and 75% of rated load	

Bi-directional Signals:

Quantity:	3 ICS tie channels
Audio level:	0.34 Vrms for NAT ICS tie 2.8 Vrms for Interphone tie 2.8 Vrms for PVT ICS tie
Impedance:	1.6 kΩ +/- 10% for NAT ICS tie input 19 kΩ +/- 10% for Interphone ICS tie input 19 kΩ +/- 10% for PVT ICS tie input
Circuitry Type:	Single ended

Annunciators: Green LED illuminates for transmit operation

1.4.2 Physical Specifications

Height	2.64 inches (67.2 mm) max
Depth	3.40 inches (86.5 mm) max behind panel, excluding connector
Width	4.97 inches (126.3 mm) max behind panel
Weight	1.75 lbs (0.8 Kg) max excluding harness and mating connectors
Mounting	Unit fits standard Dzus rails
Connectors	Male 50-pin & 15-pin D-subminiature filtered connectors with Jackpost locks
Material/ Finish	Chassis and cover are 5052-H32 brushed aluminum with chromate conversion finish
Faceplate	Engraved acrylic edge-lit panel

1.4.3 Environmental Specifications

Temperature		
	Operating	-20° C to +70° C
	Survival	-55° C to + 85° C
Altitude		25,000 feet max
Humidity		95%
Vibration/Shock		DO-160C Cat. MNY

DO-160C Env. Cat. B4-BA[MNY]XXXXXXABABAZAXXX
(B)

TSO Compliance **TSO-C50c, RTCA DO-170 Class 1b**
(Only applicable to units Serial # 3000 and up)

Note: Refer to Environmental Qualification Form in Section 2.6 of this Manual for complete details of the environmental categories.

End of section 1

Section 2 Installation

2.1 Introduction

Information in this section consists of: unpacking and inspection procedures, installation procedures, post-installation checks, and installation drawings.

2.2 Unpacking and Inspection

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. Note that each unit should have the following:

- N301A-000 Single User Audio Controller
- Warranty Card
- Operator's Manual
- Release certification

Verify that all items are present before proceeding and report any shortage immediately to your supplier.

Complete the warranty card information and send it to NAT when the installation is complete. If you fail to complete the warranty card, the warranty will be activated on date of shipment from NAT.

2.3 Installation Procedures

2.3.1 Warnings

Do not bundle ***any lines from this unit*** with transmitter coax lines. Do not bundle any logic, audio, or DC power lines from this unit with 400 Hz synchro wiring or AC power lines. Do not position this unit next to any device with a strong alternating magnetic field such as an inverter, motor or blower, or significant audio interference will result.

IMPORTANT:

The length and routing of the mic wire is very critical. Unwanted signal coupling will result from the mic wiring being bundled with high level audio lines (i.e. phones or radio audio lines). The longer the wire, the greater the level of coupling of unwanted audio onto the mic wires.

2.3.2 Cautions

In all installations, use shielded cable exactly as shown, and ***ground as indicated***. Significant problems may result from not following these guidelines.

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.

2.3.3 Cable and Wiring

All unshielded wire shall be selected in accordance with AC43.13-1B Change 1, Paragraphs 11-76 through 11-78. Wire types should be 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 wiring diagrams in Section 2.5 as required.

Allow 3 inches from the end of the wire to the shield termination to allow the hood to be easily installed. Note that the hood is a 'clamshell' hood, and is installed after the wiring is complete. Aircraft harnessing should permit the unit to be lowered from the panel for easy access to all side adjustments. Do NOT mount the unit until all adjustments have been carried out.

All wiring should be at least 22 AWG, except power and ground lines, which should be at least 20 AWG. Ensure that all ground connections are 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 breaker (1A) or fuse (1A fast), and not attached to any other existing breaker without additional protection.

2.3.4 Installation Notes

Follow instructions on installation drawings in section 2.5. If the receivers have very high output impedance (great than 1000 ohms), they should be terminated with the internal load resistors. Four 600 Ω and two 150 Ω resistors are provided in each N301A-000 controller; only use one load resistor per radio in the system.

The intercom tie lines and PVT tie lines should be also properly terminated with a load resistor.

Connect only one interphone load per aircraft system when used in installations that are configured with Andrea interphone tie line connections. Connect the interphone loads on all units when used in installations that are configured with the NAT ICS tie line connections.

The PVT ICS function only provides true 'private' communications when used in installations that are configured with the Andrea interphone tie line connections. Installations configured with the NAT ICS tie line will not provide 'private' intercom functions. Connect only PVT intercom load per aircraft system when used in installations that are configured with the Andrea interphone tie line connections.

Only one ICS tie line configuration, either Andrea or NAT, can be connected per aircraft system.

NOTE: All AA95/AMS4X Audio Controllers with S/N: 1918 or before used with the N301A-000 must have the ICS Tie and Gain Modifications installed, or impaired intercom audio between units will result.

2.3.5 Mechanical Mounting

The N301A-000 can be mounted vertically or horizontally in standard Dzus rails.

Before the unit is mounted, make all functional tests, and trimpot adjustments. Be sure the harness has enough clearance to permit the unit to be pulled out for re-adjustment, if needed later. Make sure unit is securely fastened to the Dzus rail, and that the connector locks are tightened **before any flight is attempted**.

2.3.6 Post-Installation Checks

2.3.6.1 Voltage/Resistance Checks

Do not attach the N301A-000 until the following conditions are met.

Check the following:

a) J101 pin **<12>** for +28 Vdc relative to ground.

b) J101 pin **<11>** for 0.5 Ω to ground.

2.3.6.2 Power On Checks

a) Install the N301A-000 and power up the ship's systems. Turn on the radios and accessories required for the system.

b) Check for correct radio audio and adjust for acceptable level.

c) Run through all installed functions, and check the ICS and TX functions for all users. Refer to Section 3 for specific operation details.

Notes:

1) Significantly different headsets may have different mic characteristics

2) The David Clark M-7 mic is much more active than their M-4 or M-1 microphones, and may aggravate headset imbalance if used in a mixed system.

d) If any preset requires adjustment, be sure this is carried out before the aircraft leaves, and that the unit and its mating connector are secured before departure. Make all required log book entries, electrical load, weight and balance amendments and other paperwork as required by your local regulatory agency.

2.3.7 Tie Line Mode Options

The tie line options can be selected using the right side adjustments - see section 2.3.7.2.
Note: The PVT ICS selection is not supported by the NAT tie line options - See section 3.6.4.

2.3.7.1 Andrea Tie line

The Andrea tie line option permits the use of up to ten individual boxes, but can support only one active user at a time because of loading considerations. If all users are in 'live' mode there will be a significant decrease in ICS audio level. See also section 3.6.3.

2.3.7.2 One NAT ICS Line

This option should be selected when two NAT audio controllers are tied together.

2.3.7.3 Two NAT ICS Lines

This option should be selected when three or more controllers are to be tied together. After three boxes are connected together, the audio ICS level will degrade. NAT do not recommend that more than four NAT boxes be tied together using the ICS tie line.

2.3.8 Adjustments

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 that can be varied are located along the sides of the unit (refer to drawing N301A\000\922-0) and are as follows:

2.3.8.1 Left side Adjustments

CVR OUT LEVEL Adjusts level of the summed received audio, direct audio, and intercom audio fed to the cockpit voice recorder. Fully CCW (minimum) and fully CW (maximum).

TRANSMIT MIC LEVEL Six controls (COM1-5, AUX) which adjust the mic output level to the respective radios. Fully CCW (minimum) and fully CW (maximum).

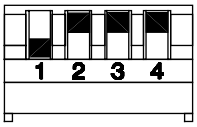
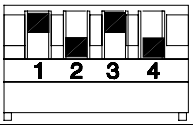
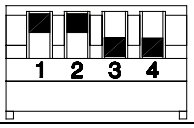
MODEL (103/105) A slide switch allows selection of the required variant. With this switch at position 103, the unit simulates the Andrea A301-103, and at 105 it simulates the A301-105. (See N301A-000\403-0 interconnect for more details.)

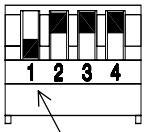
CAUTION

The **MODEL (103/105)** switch determines the internal configuration for the CVR output, and is installation specific. This switch must be set to the appropriate position to match the wiring configuration in the aircraft. Failure to set the switch to the correct position will result in no audio being delivered to the respective recording input on the CVR. Refer to the N301A\000\403 interconnect diagram located in Section 2.5 for more information.

2.3.8.2 Right Side Adjustments

TIE LINE MODE Selects the tie line option. (see figure 1 below).

TIE LINE MODE Selection	Switch Positions
ANDREA Tie Lines	
1 NAT ICS	
2 NAT ICS	



Tie Line Mode Switch Configurations - figure 1

a) ANDREA Tie Lines: TIE LINE MODE switch 1 DOWN, switches 2, 3 and 4 UP
b) 1 NAT ICS Tie Line: TIE LINE MODE switches 2 and 4 DOWN, switches 1 and 3 UP
c) 2 NAT ICS Tie Lines: TIE LINE MODE switches 3 and 4 DOWN, switches 1 and 2 UP

2.4 Continued Airworthiness

Maintenance of the N301A-000 Single User Audio Controller is 'on condition' only. Periodic maintenance of this product is not required.

2.5 Accessories Required but not Supplied

Installation kit p/n N301A-IKC (crimp) is required to complete the installation. The kit consists of the following:

N301A-IKC Crimp Kit (NAT Part No. D50S15SL-IKC)

Quantity	Description		NAT Part #
1	50 Pin D-min Female Crimp Kit		D50SL-IKC
	Comprising:		
	1	D-min 50 Socket Housing	20-21-050
	50	MS Crimp Socket	20-26-901
	1*	Jack Screw Set	20-27-002
	1*	Lock Clip Set	20-27-004
	1	50 Pin Connector Hood	20-29-051
1	15 Pin D-min Female Crimp Kit		D15SL-IKC
	Comprising:		
	1	D-min 15 Socket Housing	20-21-015
	15	MS Crimp Socket	20-26-901
	1*	Jack Screw Set	20-27-002
	1*	Lock Clip Set	20-27-004
	1	15 Pin Connector Hood	20-29-015

* Use as required.

2.6 Installation Drawings

DRAWING	REV.	DESCRIPTION	TYPE	SERIAL #'s
N301A\000\403-0	1.04	N301A Single User Audio Controller	Interconnect	All
N301A\000\403-1	1.04	N301A Single User Audio Controller	Interconnect	All
N301A\000\405-0	1.01	N301A Single User Audio Controller	Connector Map	All
N301A\000\521-0	1.10	N301A Single User Audio Controller	Environmental Qual Form	3000 and up
N301A\000\905-0	1.10	N301A Single User Audio Controller	Faceplate	All
N301A\000\922-0	1.01	N301A Single User Audio Controller	Mech Installation	2000 to 2129
N301A\000\922-0	1.10	N301A Single User Audio Controller	Mech Installation	2130 to 2999
N301A\000\922-0	1.20	N301A Single User Audio Controller	Mech Installation	3000 and up

Section 2 ends after these Drawings

REVISIONS			
REV	DESCRIPTION	DATE	BY
1.01	ECR #1084 ADDED NOTES 13, 14 & 15, ICS TIE LINE SHIELD GROUNDED, FORMAT CHANGES.	AUG 25/98	MWS
1.02	ECR #898 NOTE 2 WORDING CHANGED, "N/C" DEFINITION ADDED, FORMAT CHANGES	MAY 3/99	TAT
1.03	ECR #1906 – CORRECTED SHIELDING, UPDATED NOTE 1, FORMAT CHANGES.	APR 26/01	TAT
1.04	ECR #2391 – CHANGED NOTES 8, 9 AND 14, ADDED NOTE 8 TO J102 PIN 5.	JUN 3/03	TAT

N301A–000 INSTALLATION NOTES

NOTES:

1. ALL WIRES SHOULD BE 22 AWG UNLESS OTHERWISE SPECIFIED. ALL WIRE SHOULD BE IN ACCORDANCE WITH MIL–W–22759. ALL SHIELDED WIRE/CABLE SHOULD BE IN ACCORDANCE WITH MIL–C–27500.

△2 RECEIVERS WITH OUTPUT IMPEDANCE GREATER THAN 1000 OHMS MUST BE TERMINATED WITH A 600 OHM LOAD. "600 OHM LOAD" PINS ARE PROVIDED ON THE N301A FOR THIS PURPOSE.

△3 MODEL SWITCH MUST BE IN THE –103 POSITION FOR CVR OUTPUT.

△4 MODEL SWITCH MUST BE IN THE –105 POSITION FOR CVR OUTPUT.

△5 NAT TIE LINE MUST BE ACTIVATED WITH THE NAT TIE LINE SWITCH ON SIDE OF UNIT.

△6 LOCAL GND NOT MORE THAN 12" FROM RADIO.

△7 USE ONLY ONE (600 ohm OR 8 ohm) HEADSET AT A TIME. UNIT CANNOT DRIVE TWO HEADSETS.

△8 CONNECT ONLY ONE INTERPHONE LOAD PER AIRCRAFT SYSTEM WHEN USED IN INSTALLATIONS THAT ARE CONFIGURED WITH THE ANDREA INTERPHONE TIE LINE CONNECTIONS. CONNECT THE INTERPHONE LOADS ON ALL UNITS WHEN USED IN INSTALLATIONS THAT ARE CONFIGURED WITH THE NAT ICS TIE LINE CONNECTIONS.

△9 THE PVT ICS FUNCTION ONLY PROVIDES TRUE "PRIVATE" COMMUNICATIONS WHEN USED IN INSTALLATIONS THAT ARE CONFIGURED WITH THE ANDREA INTERPHONE TIE LINE CONNECTIONS. INSTALLATIONS CONFIGURED WITH THE N.A.T. ICS TIE LINE WILL NOT PROVIDE "PRIVATE" INTERCOM FUNCTIONS. CONNECT ONLY ONE PVT INTERCOM LOAD PER AIRCRAFT SYSTEM WHEN USED IN INSTALLATIONS THAT ARE CONFIGURED WITH THE ANDREA INTERPHONE TIE LINE CONNECTIONS.

△10 DO NOT GROUND MICROPHONE OR HEADSET LO CONNECTIONS TO AIRFRAME.

△11 ADJUSTABLE LEVEL WITH RX VOL DIRECT AUDIO INPUT, AMPLIFIED.

△12 FIXED LEVEL DIRECT AUDIO INPUT. NO ADJUSTMENT.

△13 GROUND TO PWR GND IN ONE LOCATION ONLY.

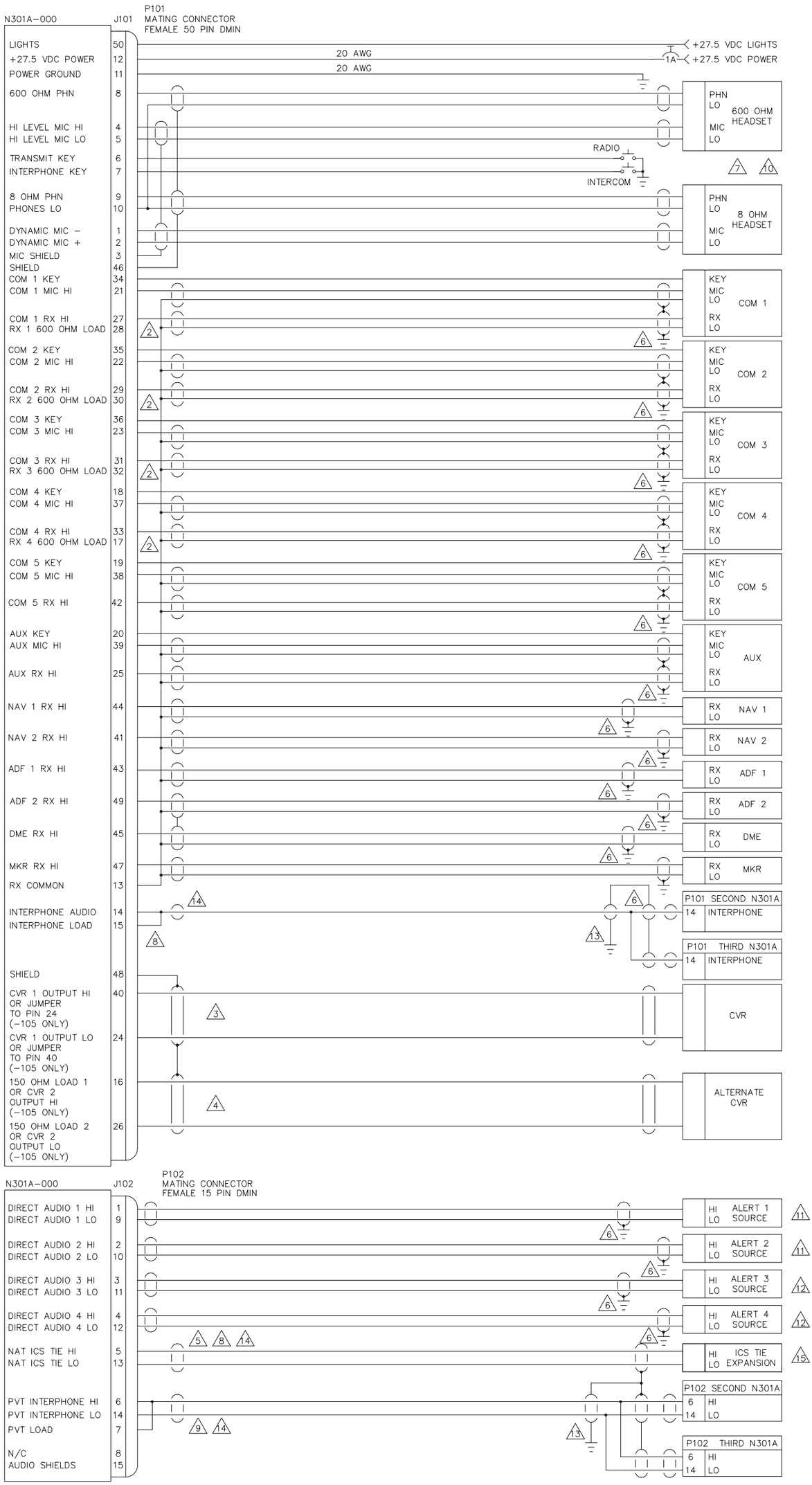
△14 ONLY ONE ICS TIE LINE CONFIGURATION, EITHER ANDREA OR NAT, CAN BE CONNECTED PER AIRCRAFT SYSTEM.

△15 TO BE USED FOR EXPANSION OF INTERCOM SYSTEM ONLY. REFER TO INSTALLATION MANUAL FOR DETAILS.

DEFINITION:

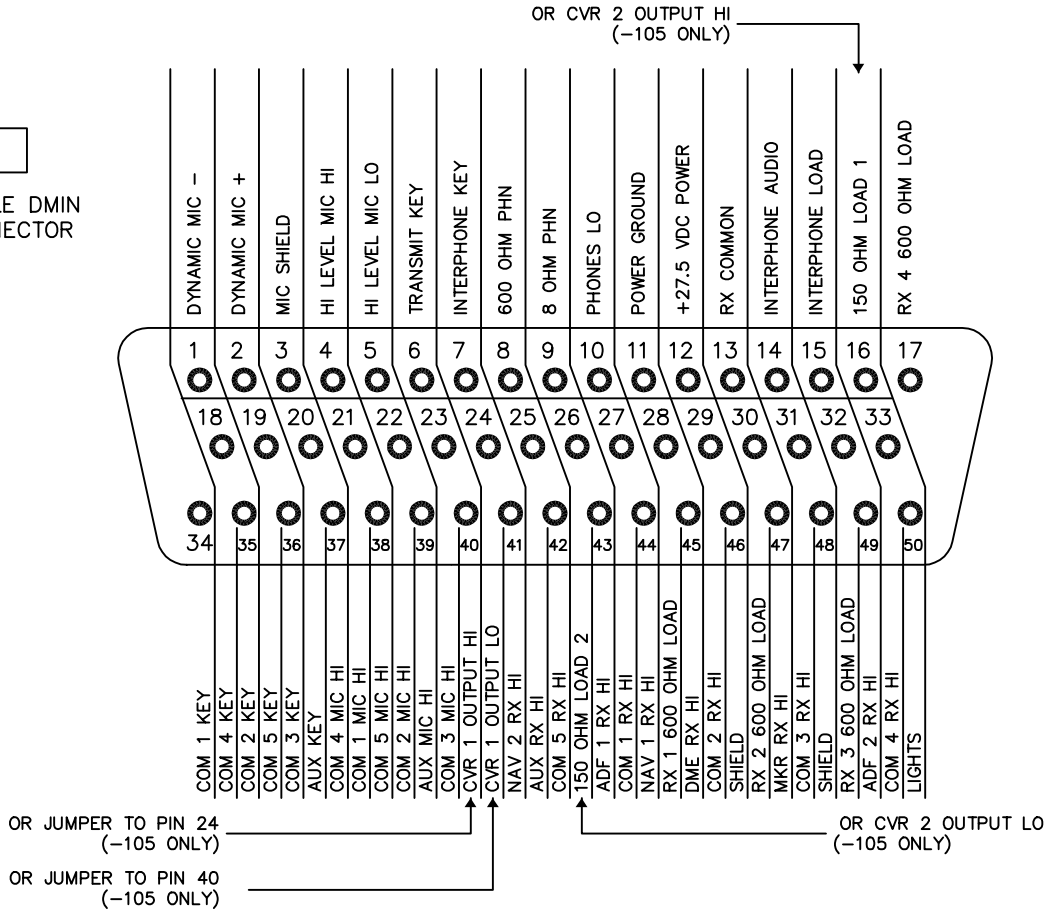
N/C: NO CONNECTION. THE PIN IS NOT CONNECTED TO ANYTHING INTERNALLY, AND THEREFORE SHALL HAVE NO CONNECTION EXTERNALLY.

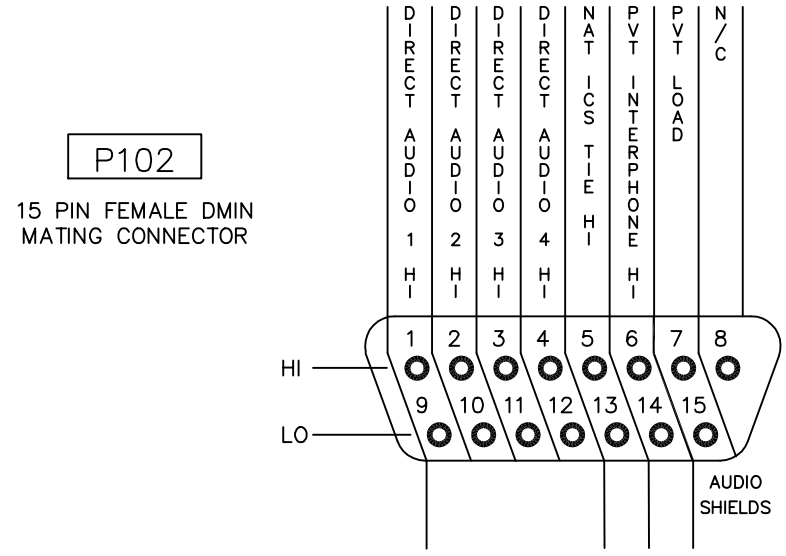
DESIGNED	KV	nat NORTHERN AIRBORNE TECHNOLOGY LTD.				
DRAWN	MWS					
DATE	MAY 13/97	TITLE	AUDIO CONTROLLER			
CHECKED	NAT 249					
APPROVED	NAT 113	SIZE A	CAGE CODE 3AB01	PART NO. N301A–000	REV. 1.04	SHEET 1/2
FILE 403–0.DWG		DWG. TYPE INTERCONNECT		DWG. NO. N301A\000\403–0		



DESIGNED	KV	nat NORTHERN AIRBORNE TECHNOLOGY LTD.				
DRAWN	MWS					
DATE	MAY 13/97	TITLE	AUDIO CONTROLLER			
CHECKED	NAT 249					
APPROVED	NAT 113	SIZE B	CAGE CODE 3AB01	PART NO. N301A-000	REV. 1.04	SHEET 2/2
FILE 403-0.DWG		DWG. TYPE INTERCONNECT		DWG. NO. N301A\000\403-1		

REVISIONS			
REV	DESCRIPTION	DATE	BY
1.01	ECR #898 – FORMAT CHANGES.	MAY 3/99	TAT





NOTE: VIEW IS FROM REAR OF AIRFRAME CONNECTOR

DESIGNED	KV	NORTHERN AIRBORNE TECHNOLOGY LTD.				
DRAWN	MWS					
DATE	MAY 13/97	TITLE	AUDIO CONTROLLER			
CHECKED	NAT 200 / NAT 214					
APPROVED	NAT 107	SIZE A	CAGE CODE 3AB01	PART NO. N301A–000	REV. 1.01	SHEET 1/1
FILE 405–0101.DWG		DWG. TYPE CONNECTOR MAP		DWG. NO. N301A\000\405–0		

ENVIRONMENTAL QUALIFICATION FORM

Description: **Single Use Audio Controller** Document #: **N301A\000\521-0**

NAT Part #: **N301A-000** TSO #: **C50c**

Manufacturer's Specification and/or Other Applicable Specification:

RTCA DO-160C, DO-160A

Manufacturer: **Northern Airborne Technology Ltd.**

Address: **#14 - 1925 Kirschner Rd., Kelowna, BC, Canada. V1Y 4N7**

Prepared By:	NAT 243	Checked By:	NAT 200	Approved By:	DE 01	NAT 107

Conditions	DO-160C Section	Description of Conducted Tests
Temperature and Altitude	4.0	Equipment tested to Category B2, but declared to Category B4:
Low Temperature High Temperature	4.5.1 4.5.2 & 4.5.3	-20C Operating Low Temperature +70C Operating High Temperature
Altitude	4.6.1	
Temperature Variation	5.0	Equipment tested to Category B
Humidity	6.0	Equipment tested to Category A
Shock	7.0	Equipment tested to performance requirements subsequent to Operational Shock test.
Operational Crash Safety	7.2 7.3	Test Procedure 1, Alternate Test Procedure (Impulse) Test Procedure 2 (Sustained), Unknown or Random orientation in aircraft.
Vibration	8.0	Equipment tested to categories M, N and Y
Explosion Proofness	9.0	Equipment identified as Category X no test required
Waterproofness	10.0	Equipment identified as Category X no test required

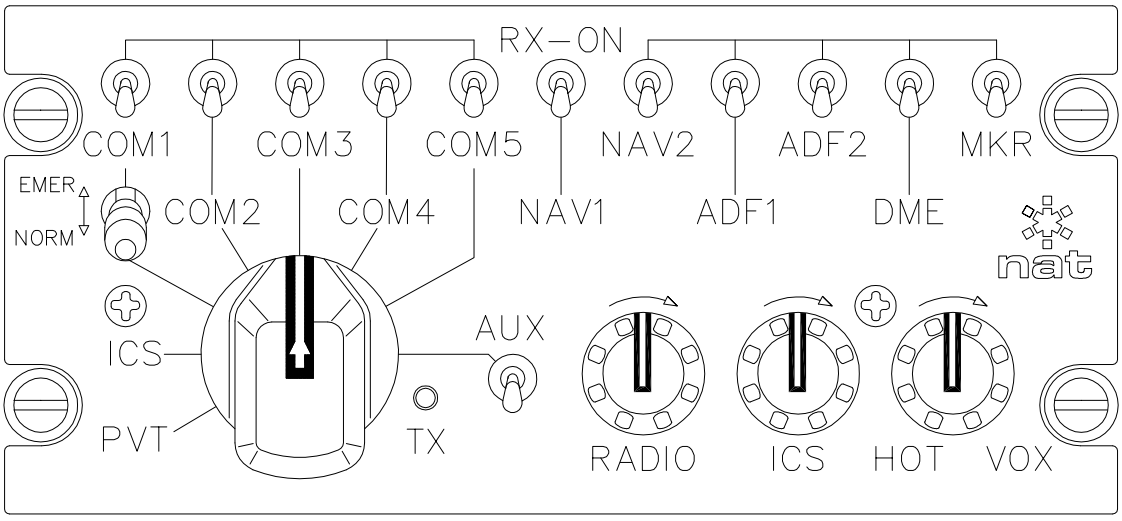
Conditions	DO-160C Section	Description of Conducted Tests
Fluids Susceptibility	11.0	Equipment identified as Category X no test required
Sand and Dust	12.0	Equipment identified as Category X no test required
Fungus Resistance	13.0	Equipment identified as Category X no test required
Salt Spray	14.0	Equipment identified as Category X no test required
Magnetic Effect	15.0	Equipment is Class A
Power input	16.0	Equipment tested to Category B
Voltage Spike	17.0	Equipment tested to Category A
Audio Frequency Susceptibility	18.0	Equipment tested to Category B
Induced Signal Susceptibility	19.0	Equipment tested to Category A, except as noted: CVR Output tested to DO-160A Category B
Radio Frequency Susceptibility	20.0	Equipment tested to DO-160A, Category Z
Radio Frequency Emission	21.0	Equipment tested to Category A
Lightning Induced Transient Susceptibility	22.0	Equipment identified as Category X no test required
Lightning Direct Effects test	23.0	Equipment identified as Category X no test required
Icing	24.0	Equipment identified as Category X no test required

REMARKS

- Tests were conducted at Northern Airborne Technology Ltd.
- Short-Time Operating High Temperature test not conducted, as this temperature is the same as Operating High Temperature
- Testing was performed on the High Level (150ς) microphone inputs and the 600ς headset outputs. The Low Level Dynamic (5ς) microphone inputs and 8ς headset outputs are not qualified to TSO-C50c.

End of Environmental Qualification Form

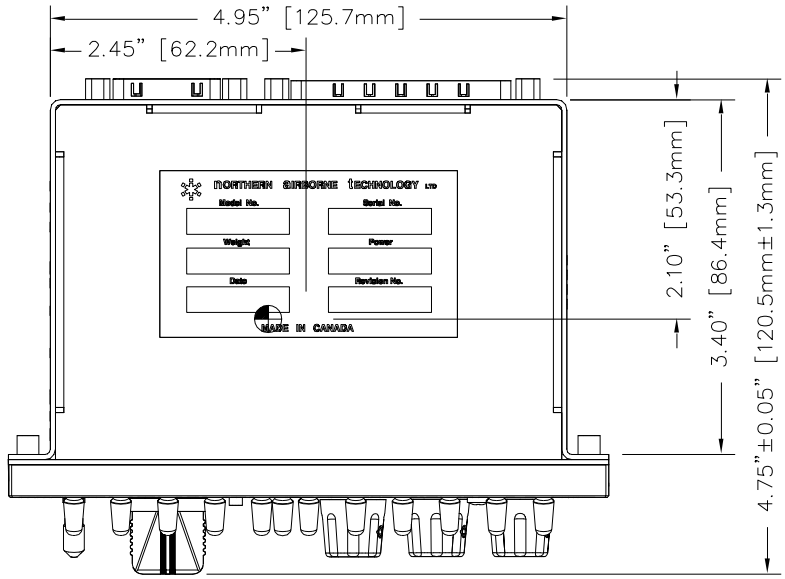
REVISIONS			
REV	DESCRIPTION	DATE	BY
1.10	ECR #745 – MINOR ENGRAVE LAYER CHANGES.	MAY 9/97	TGM

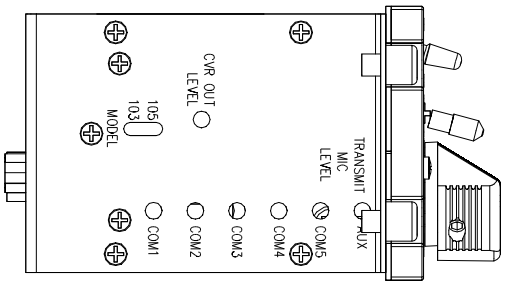


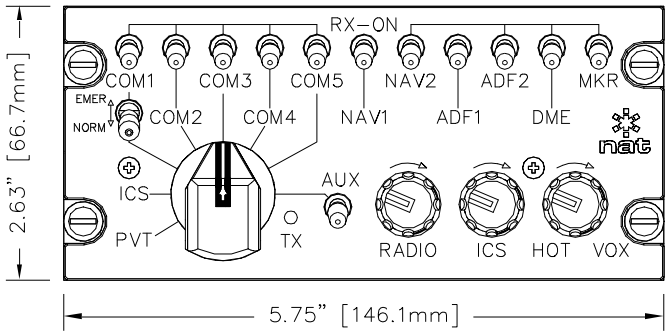
DESIGNED	KV	nat NORTHERN AIRBORNE TECHNOLOGY LTD.				
DRAWN	MWS					
DATE	FEB 24/97	TITLE AUDIO CONTROLLER				
CHECKED	NAT 200					
APPROVED	NAT 107	SIZE A	CAGE CODE 3AB01	PART NO. N301A–000	REV. 1.10	SHEET 1/2
FILE 905–0110.DWG		DWG. TYPE FACEPLATE		DWG. NO. N301A\000\905–0		

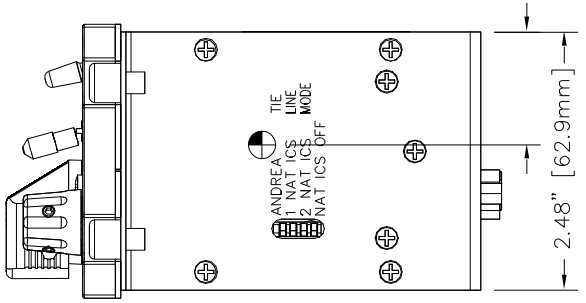
REVISIONS			
REV	DESCRIPTION	DATE	BY
1.01	ECR #898 – WEIGHT AND DIMENSIONS CORRECTIONS.	MAY 3/99	TAT

CENTER OF GRAVITY
WEIGHT 1.75 lbs. (0.8 kg)









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	KV
		DRAWN	MWS
		DATE	MAY 7/97
		CHECKED	NAT 200 / NAT 214
MATERIAL		APPROVED	NAT
FINISH		FILE	922–0101.DWG

nat NORTHERN AIRBORNE TECHNOLOGY LTD.

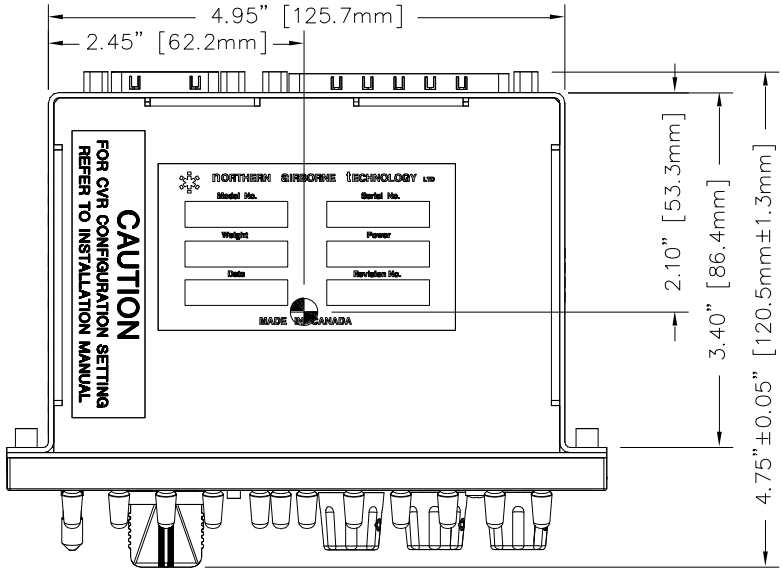
TITLE: AUDIO CONTROLLER

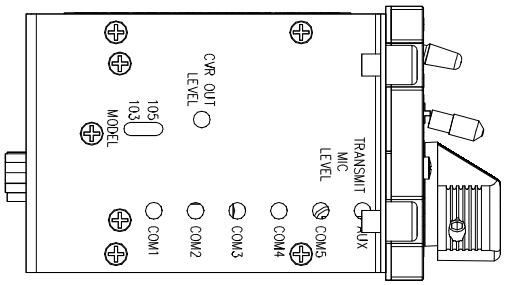
SIZE	CAGE CODE	PART NO.	REV.	SHEET
A	3AB01	N301A	1.01	1/1

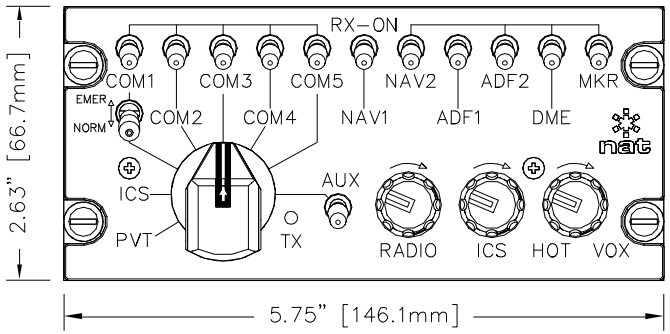
DWG. TYPE: MECH. INSTALLATION | DWG. NO. N301A\000\922–0

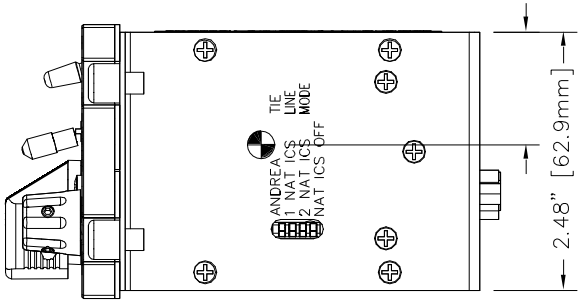
REVISIONS			
REV	DESCRIPTION	DATE	BY
1.01	ECR #898 – WEIGHT AND DIMENSIONS CORRECTIONS.	MAY 3/99	TAT
1.10	ECR #1713 – ADDED CAUTION LABEL.	AUG 3/00	TAT

CENTER OF GRAVITY
WEIGHT 1.75 lbs. (0.8 kg)









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	KV
		DRAWN	MWS
		DATE	MAY 7/97
		CHECKED	NAT 200 / NAT 113
MATERIAL		APPROVED	NAT 447
FINISH		FILE	922–0110.DWG

nat NORTHERN AIRBORNE TECHNOLOGY LTD.

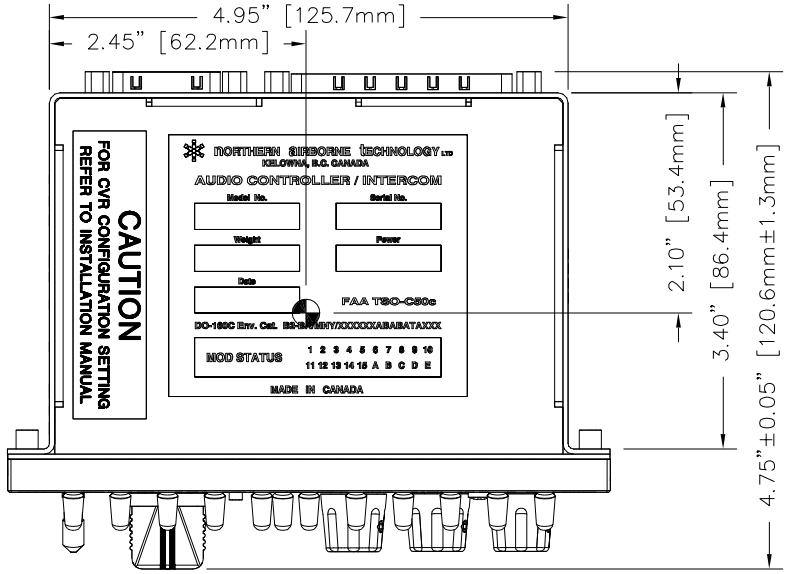
TITLE: AUDIO CONTROLLER

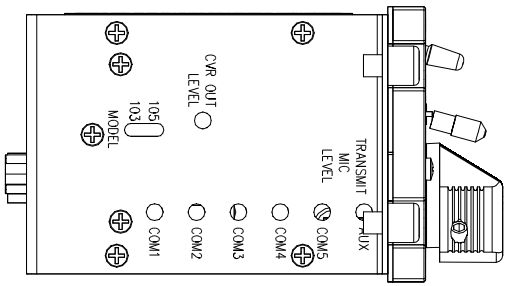
SIZE	CAGE CODE	PART NO.	REV.	SHEET
A	3AB01	N301A	1.10	1/1

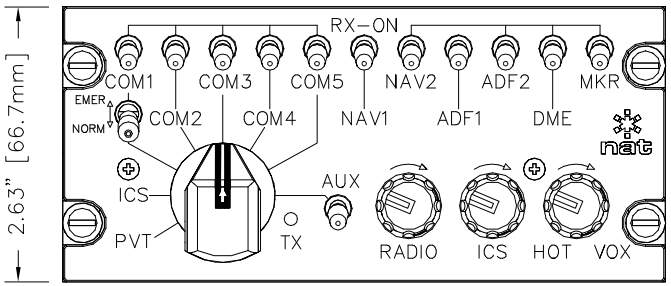
DWG. TYPE: MECH. INSTALLATION | DWG. NO. N301A\000\922–0

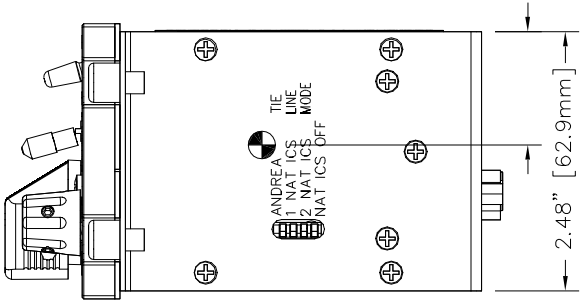
REVISIONS			
REV	DESCRIPTION	DATE	BY
1.01	ECR #898 – WEIGHT AND DIMENSIONS CORRECTIONS.	MAY 3/99	TAT
1.10	ECR #1713 – ADDED CAUTION LABEL.	AUG 3/00	TAT
1.20	ECR #1815 – PRODUCT LABEL WAS 43-30-001.	DEC 13/00	TAT

CENTER OF GRAVITY
WEIGHT 1.75 lbs. (0.8 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: KV DRAWN: MWS DATE: MAY 7/97 CHECKED: NAT 104 / NAT 223 APPROVED: NAT 117	nat NORTHERN AIRBORNE TECHNOLOGY LTD. TITLE: AUDIO CONTROLLER
MATERIAL FINISH		FILE 922-0120.DWG	SIZE A | CAGE CODE 3AB01 | PART NO. N301A | REV. 1.20 | SHEET 1/1 DWG. TYPE MECH. INSTALLATION | DWG. NO. N301A\000\922-0

Section 3 Operation

3.1 Introduction

Information in this section consists of the functional and operational procedures for the N301A-000 Single User Audio Controller.

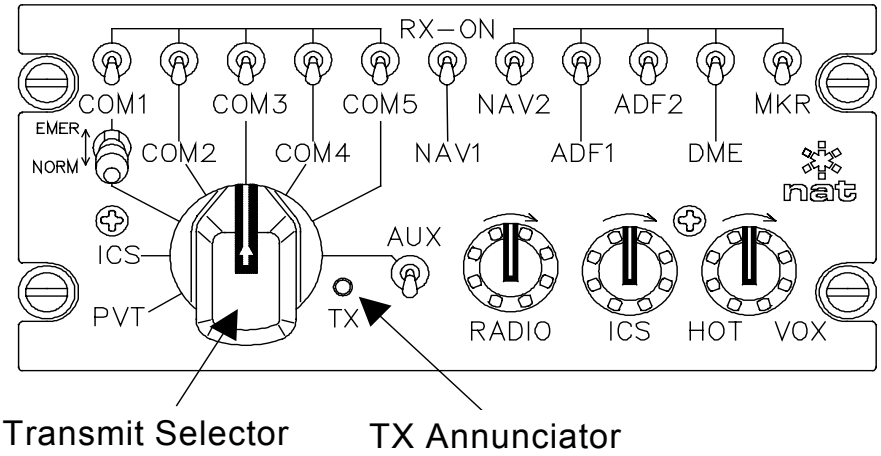
3.2 General

The N301A-000 audio controllers provide central adjustment for all the aircraft audio. They allow selection of transmit and receive audio, and HOT, VOX or PTT intercom.

The ICS operation ensures that after external radio transmission, the user's microphone automatically reverts back to intercom mode.

Four direct inputs are provided to allow warning/alerting audio to pass unmuted to the pilot's headset. Two of the inputs are adjustable, through the RADIO volume control, located on the front of the unit.

3.3 Transmit Selection

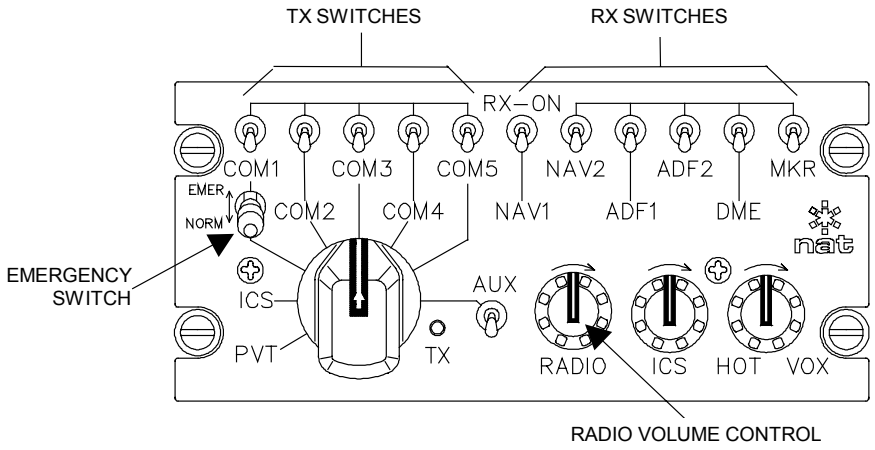


The eight-position rotary transmit selector switch in the lower left of the panel selects the transmit function desired. When the cyclic transmit switch is activated, the microphone will be coupled to the radio or intercom channel selected.

Receive audio is automatically selected with the transmit selection, and no additional switching is needed to establish outside communication.

During radio transmit operations, the green LED TX annunciator on the front panel will light, except for PVT or ICS selections.

3.4 Receive Audio



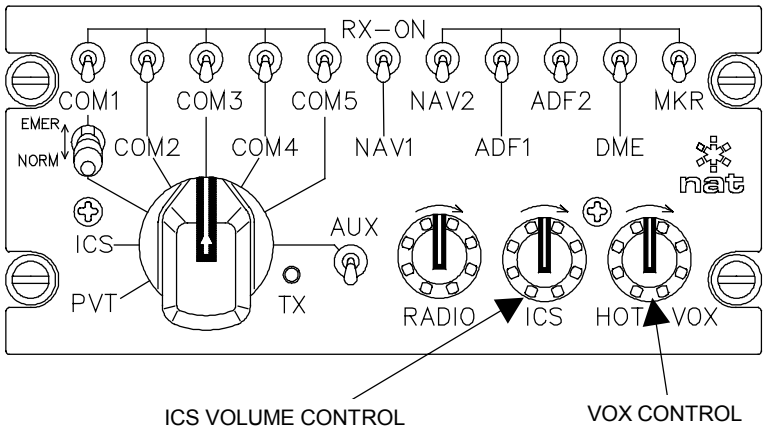
Receive audio is selected by switching any of the RX or TX switches upwards to connect the indicated radio to the headphones. All radio audio is controlled by the front panel RADIO volume control, and may be varied to suit conditions.

The six receiver switch bats (NAV1, NAV2, ADF1, ADF2, DME, and MKR) are colour-coded blue. The six transceiver switch bats (COM1 thru Com5, and AUX) are white.

3.5 Emergency Switch (EMER/NORM)

The red emergency switch can be used to route the headset (either high or low impedance) directly to the COM1 receive audio, allowing passive operation. In units s/n 2000-2052, Direct Audio 1 is also switched to the headset. In units s/n 2053 and above, Direct Audio 3 is also switched to the headset. The transmit PTT requires no special switching in the emergency mode and operates as it does in the normal mode. No intercom operation is possible in EMER mode.

3.6 ICS Functions



3.6.1 ICS Volume Control

All ICS audio is controlled by the front panel ICS volume control, and may be varied to suit conditions. The ICS volume control adjusts the level of the user's local ICS audio and the incoming summed tie-line audio. The user's outgoing ICS audio is unaffected.

3.6.2 VOX Control

The VOX Control selects the mode of operation of the intercom mic. When the control is in the centre of its range, the intercom is in the VOX mode (voice activated). As the control is rotated counterclockwise, the system becomes more sensitive, until in the fully counterclockwise position it is in HOT mode (on constantly). As the control is rotated clockwise, the sensitivity decreases, until at the fully clockwise position it is in PTT mode (activated by cyclic or foot switch closure). Activation of the ICS PTT switch will override the VOX setting.

VOX control will provide detection of mic signals up to 250m Vrms on the 150 ohm mic input or 0.25 mV on the 5 ohm mic input.

3.6.3 HOT MIC mode Caution

If the Andrea Tie Line option has been selected at installation, the loading effect that occurs when multiple mic's are active at the same time will cause the intercom level to drop, resulting in lower intercom audio at all stations. To minimise the loading effect, intercom operation should be restricted to one active microphone at any time.

This problem will not occur if NAT tie lines have been selected at the time of installation.

3.6.4 Private ICS (PVT) - Andrea Tie Lines only

The N301A has a secondary ICS channel, configured at the time of installation, that provides PVT intercom operation between selected stations. PVT intercom is selected by rotating the TX selector switch to the PVT position and activating the radio PTT switch. Only stations selected to PVT will hear this audio.

3.7 Direct Audio Inputs

The N301A provides four inputs for connection of warning/alerting signals; two are controlled by radio volume, and two are fixed inputs. Only input DIRECT 3 will be audible in EMER mode.

3.8 Cockpit Voice Recorder

The N301A series of audio controllers provide an output to an external Cockpit Voice Recorder. This allows all audio signals passed through the Audio controller to be recorded for later playback.

End of section 3