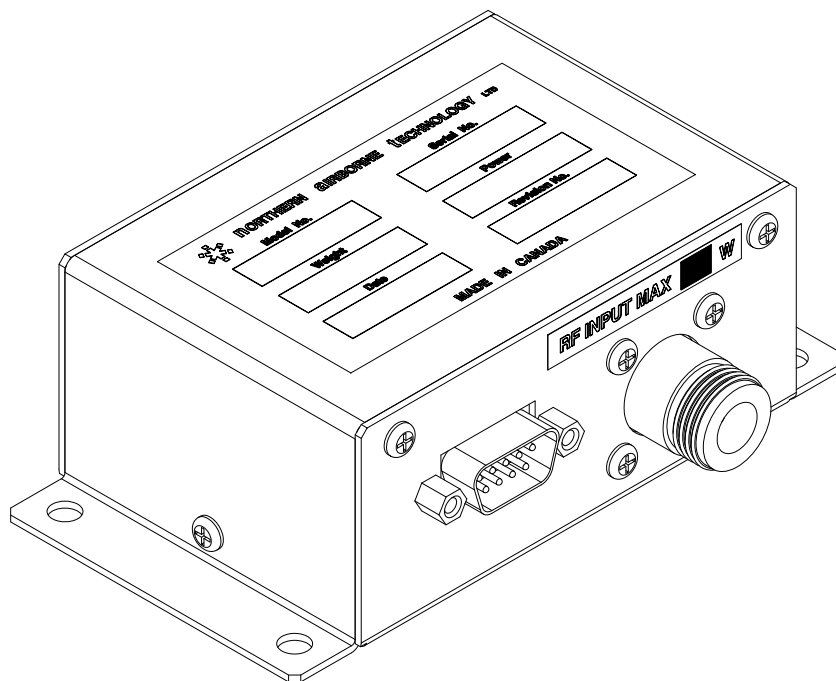




Installation and Operation Manual

RA Series Remote Attenuator



SM30

ISSUE 4.01

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RA Series Remote Attenuator
SM30 Installation and Operation Manual

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RA Series Remote Attenuator SM30 Installation and Operation Manual

Section 1 Description

1.1 Introduction

Information in this section consists of product description, design features and specifications for the RA Series Remote Attenuator. 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 RA-series of remote attenuators reduce the RF transmit power from a transceiver under logic control from a Tac/Com control head or a switch. The attenuator may also be enabled and perform the same function during receive operations. The attenuator is normally enabled when the control line is unactuated (not grounded). A ground (<1 Vdc) on the control line will bypass the attenuator and allow RF to pass at full power. When enabled, the remote attenuator will reduce the incoming signal by a factor of 10 (RA10-xxx) to 1000 (RA30-xxx). There is a remote attenuator model that can handle up to 1 W continuous power (RAxx-001) and another model that can handle up to 20 W continuous (RAxx-020).

The RA series Remote Attenuators are bulkhead mounted units specifically designed to allow attenuation of aircraft radio transmissions. This is desirable under some conditions where the radio exceeds output power limits of altitude. If the radios were simply adjusted to output the lower level, they may become unstable and difficult to control tightly to the output tolerances. By installing a RA series Remote Attenuator, radio operation is not impaired and the required output power is achieved.

RA units also normally attenuate the receive signals to reduce some channel interference from nearby stations when at altitude.

1.3 Design Features

RA series Remote Attenuators are easy to install with an uncomplicated interconnect.

They are powered from a +28 Vdc aircraft supply and available in a variety of configurations.

A ground seeking keying circuit enables RF signals to pass either attenuated or unattenuated.

All interconnect and relay contacts are gold plated. The relays are sealed, high vibration rated (50g shock), dry nitrogen filled.

The circuit boards are constructed of G10-FR (flame retardant) material, with solder masks reflowed tin plating and environmentally post-coated.



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1.4 Specifications

1.4.1 Electrical Specifications

Input Power	+20 to +33 Vdc at 160 mA max. Case is internally grounded
Logic	Ground seeking input for keyline capable of sinking 5 mA.

1.4.2 RF Signal Specifications

Frequency	DC to 600 Mhz.
Insertion Loss	0.5 dB typical.
Attenuation	
Keyed	Less than 0.3 dB.
Unkeyed	10 – 30 dB nominal.
RF Power Input	
-001	1 Watt continuous max.
-020	20 Watts continuous max.

1.4.3 Physical Specifications

	<u>RA10-001/RA30-001</u>	<u>RA10-020</u>
Height	1.60" (41.0 mm)	1.60" (41.0 mm)
Length	4.60" (117.0 mm)	9.50" (241.0 mm)
Width	2.50" (64.0 mm)	2.50" (64.0 mm)
Weight	7.0 ounces (210.0 g)	19.0 ounces (530.0 g)
Mounting	Bulkhead	Bulkhead

1.4.4 Environmental Specifications

Temperature	-40 to +70° C
Altitude	16,500 feet max.
Humidity	95% Non-condensing
Shock	12g (any axis)
Vibration	Conforms to DO-160B category 'P'



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1.5 Unit Nomenclature

The Remote Attenuators are defined by two groups of numbers. The first set identifies the degree of attenuation and the second identifies the maximum RF input power.

RA10-001 ← Identifies maximum RF Input Power
↑
Identifies attenuation in dB

The models currently available are as follows:

RA10-001	10 dB attenuation with 1 W RF input power max.
RA10-020	10 dB attenuation with 20 W RF input power max.
RA30-001	30 dB attenuation with 1 W RF input power max.

Section 1 ends



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Section 2 Installation

2.1 Introduction

Information in this section consists of unpacking and inspection procedures, installation procedures, post-installation checks and installation drawings for the RA Series Remote Attenuator.

Review all notes, warnings and cautions.

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. 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

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

Maintenance of the RA Series Remote Attenuator is 'on condition' only. Periodic maintenance of this product is not required.

2.4 Installation Procedures

2.4.1 Cabling and Wiring

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 2.7 as required.



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Coaxial cable shall be selected in accordance with MIL-C-17 unless otherwise specified. Do not use coax cable with PVC insulation. Teflon dielectric cable is encouraged at or above VHF frequencies or where cable runs exceed 8 feet. Note that at VHF frequencies, cables losses due to long cable runs and tight bends may reduce the ERP (Effective Radiated Power) by greater than 50%.

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 2.7 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 lowered 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. Coaxial cables shall be routed separately from existing wire bundles in the aircraft to minimize electromagnetic coupling effects.

Unless otherwise noted, all wiring shall be a minimum of 24 AWG, except power and ground lines, which shall be a minimum of 22 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.

2.4.2 Post-Installation Checks

2.4.2.1 Voltage/Resistance Checks

Do not attach the RA Series Remote Attenuator until the following conditions are met.

Check the following:

- a) Check J103 pin 2, 6 and 7 for continuity to ground (less than 0.5Ω).
- b) Check J103 pin 1 for +28 Vdc relative to ground.

2.4.2.2 Power On Checks

Power up the aircraft's systems and confirm normal operation of all functions of the RA Series Remote Attenuator. Refer to Section 3 (Operation) for specific operational details.

- a) Confirm correct radio operation, both receive and transmit.

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

There are no adjustments for this product.



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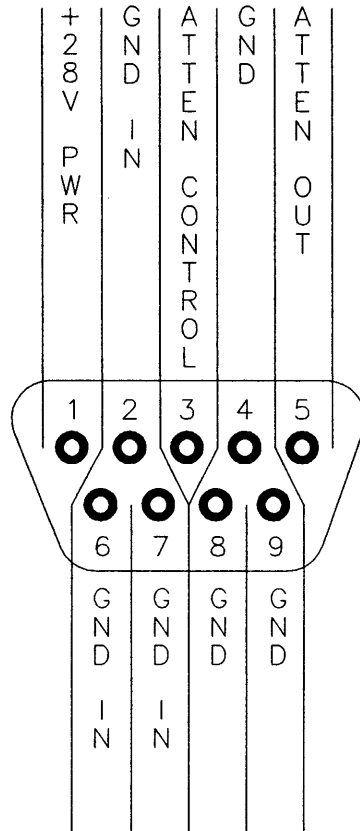
2.6 Accessories Required But Not Supplied

There are no accessories for this product.

2.7 Installation Drawings

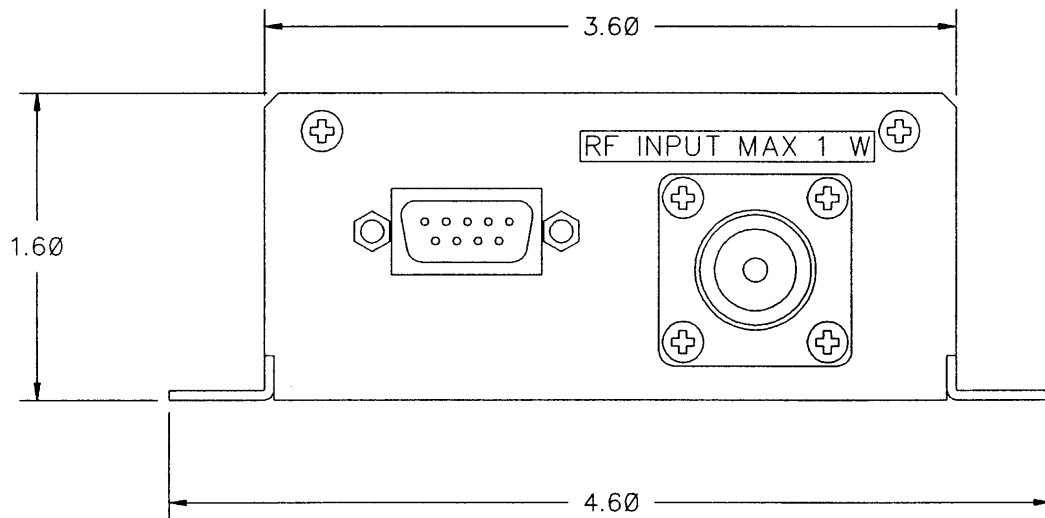
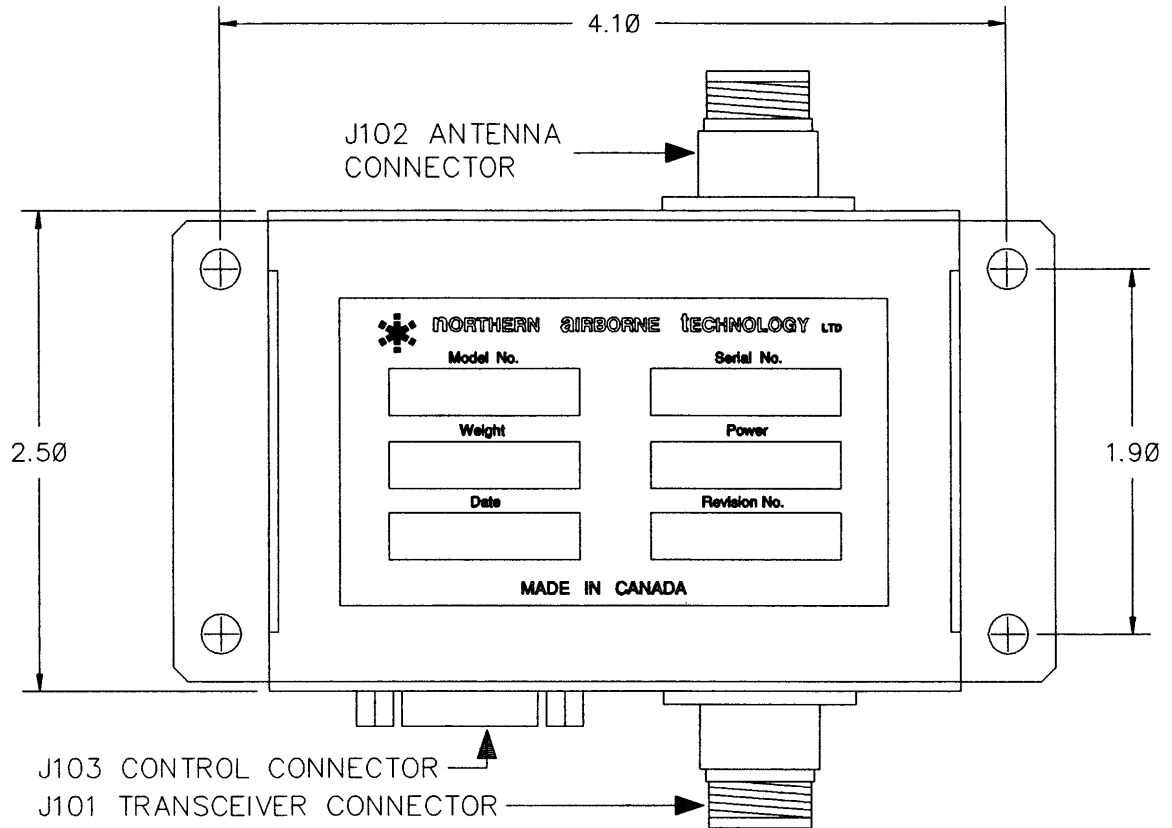
DOCUMENT	REV.	DESCRIPTION	TYPE
RA10 RA10\405-0	1.00	Remote Attenuator	Connector Map
RA10-001 001\922-0	1.00	Remote Attenuator	Mechanical Installation
RA10-020 020\403-0	1.00	Remote Attenuator	Interconnect
020\922-0	1.00	Remote Attenuator	Mechanical Installation
NT136-PAS NT136-PAS\403-0	1.21	RA10-020 with NT136-PAS Transceiver Installation.	Interconnect
NT450-EUR NT450-EUR\403-0	1.11	RA10-001 with NT450-EUR Transceiver Installation.	Interconnect

Section 2 ends following the above documents



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REVISION	DATE	*nat NORTHERN AIRBORNE TECHNOLOGY LTD.			
1.00	DEC 2/94	DESIGNED BY	DESCRIPTION		
		K. HORIE	REMOTE ATTENUATOR		
		DRAWN BY	PART NUMBER	DRAWING TYPE	SHEET
		T. MASTERS	RA10/30	CONNECTOR MAP	1/1
		APPROVED BY	DRAWING NUMBER	FILE NUMBER	
		NAT R&D	RA10\405-0	RA10\405-0100	



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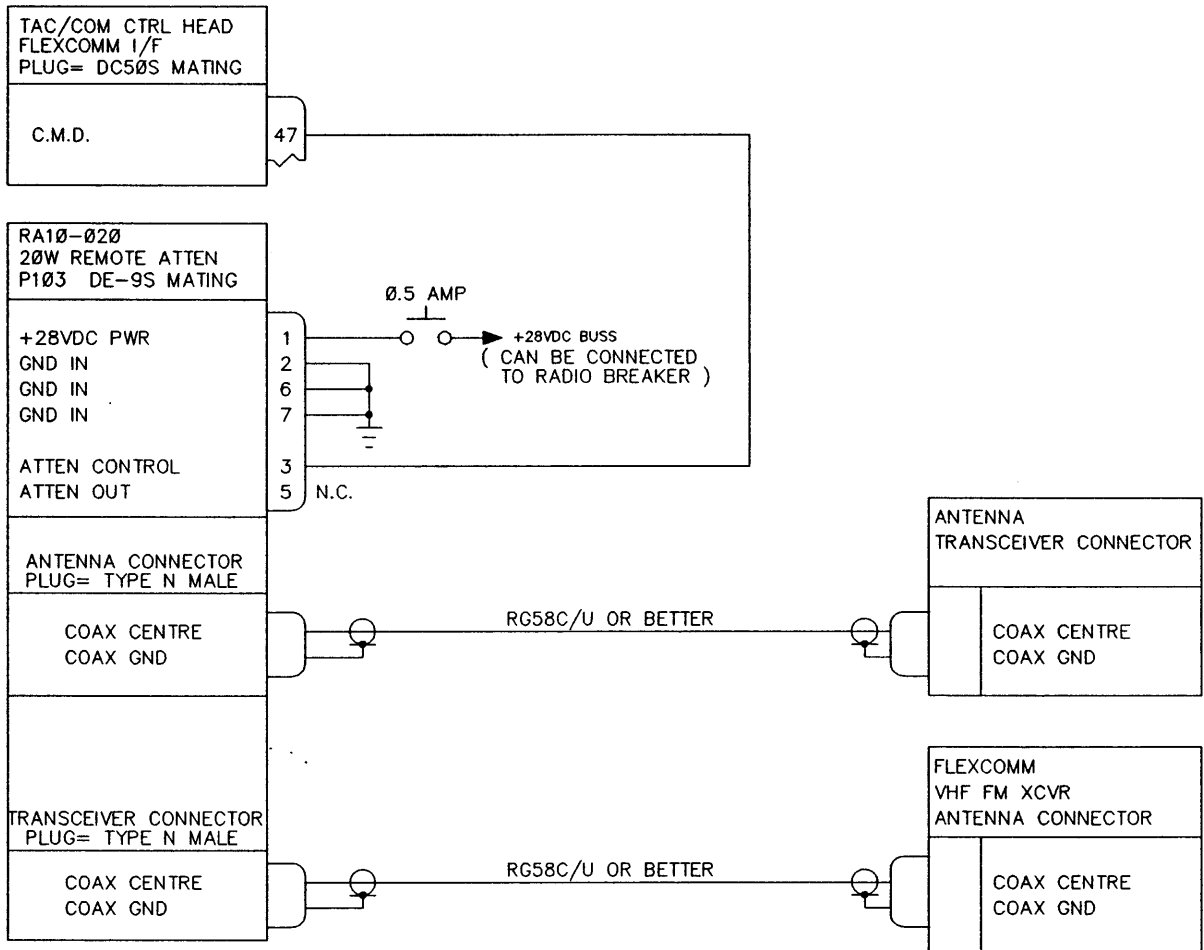
REVISION	DATE	TOLERANCES UNLESS STATED OTHERWISE	*nat NORTHERN AIRBORNE TECHNOLOGY LTD.		
1.00	DEC 13/94	0.X=+/-0.030 DIM. IN INCHES 0.XX=+/-0.010 0.XXX=+/-0.005 0.XXXX=+/-0.002 ANGLE=+/- 0.5 DEG.	DESIGNED BY	DESCRIPTION	
			K. HORIE	REMOTE ATTENUATOR	
			DRAWN BY	PART NUMBER	DRAWING TYPE
			T. MASTERS	RA10/30	INSTALLATION
			APPROVED BY	DRAWING NUMBER	FILE NUMBER
			NAT R&D	RA10\001\922-0	RA10\001\922-0100
THIRD ANGLE PROJECTION		MATERIAL/FINISH			

INTERCONNECT DRAWING FOR CONNECTING A NAT RA10-020 REMOTE ATTENUATOR TO A NAT TAC/COM CONTROL HEAD FLEXCOMM TRANSCEIVER INTERFACE BOARD AND A FLEXCOMM TRANSCEIVER.

(CH400-8 REV A, CH400-81 REV A) (INTERFACE CARD TYPE: "F")

This drawing applies to all TH-Series Control Heads.

For installations with CH-Series Control Heads contact NAT.

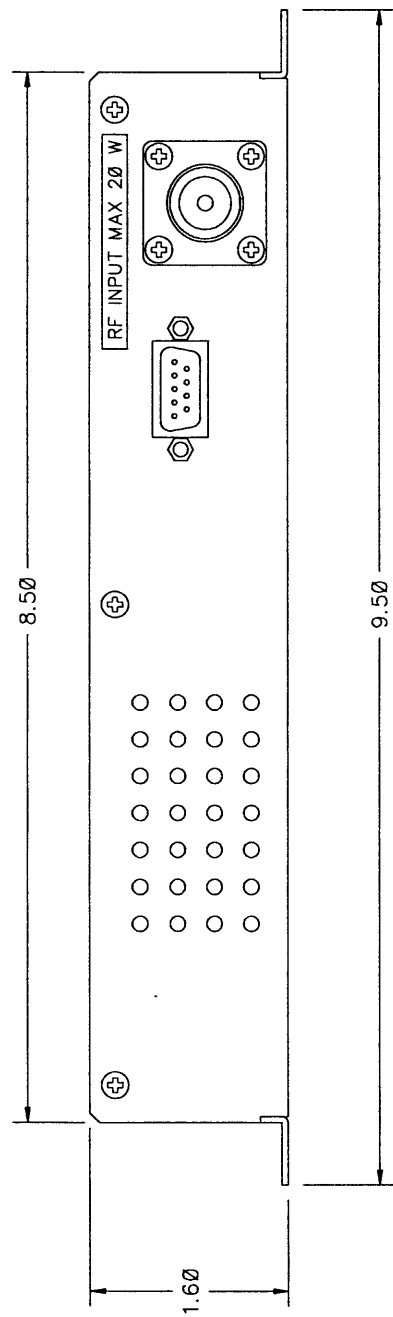
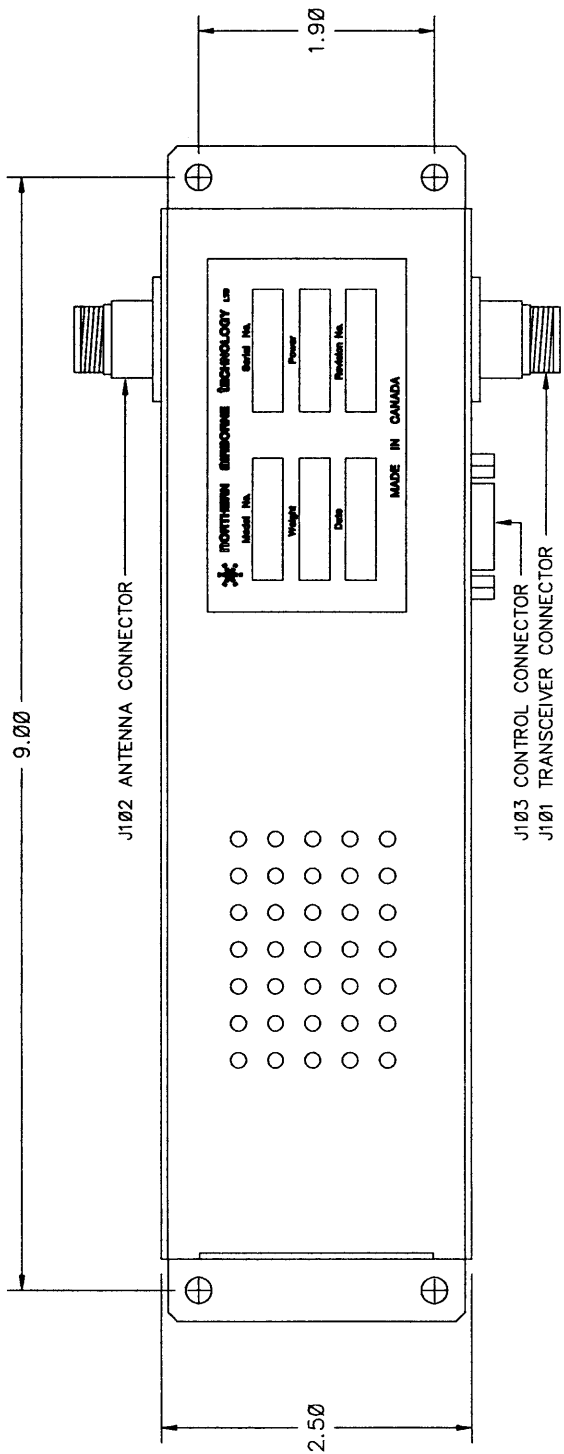


Use TEFZEL M27500 or RAYCHEM SPEC44 (mB1044) shielded wire with RAYCHEM solder sleeves.

All wire should be 22ga except PWR and GND, which should be 18ga.

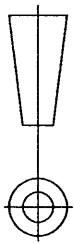
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REVISION		DATE	*nat NORTHERN AIRBORNE TECHNOLOGY LTD.			
1.00	DEC 14/93	DESIGNED BY	DESCRIPTION			
		KH, SM	REMOTE ATTENUATOR			
		DRAWN BY	PART NUMBER	DRAWING TYPE	SHEET	
		SCOTT MOORE	RA10-020	INTERCONNECT	1/1	
		APPROVED BY	DRAWING NUMBER	FILE NUMBER		
		NAT R&D	RA10020\403-0	RA10020\403-0100		



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REVISION	DATE	TOLERANCES UNLESS STATED OTHERWISE	DIM. IN INCHES	DESCRIPTION			
1.00	DEC 13/94	0.X=+/-0.030 0.XX=+/-0.010 0.XXX=+/-0.005 0.XXXX=+/-0.002 ANGLE=+/-0.5 DEG.		DESIGNED BY	REMOTE ATTENUATOR		
				K. HORIE	PART NUMBER	DRAWING TYPE	SHEET
				DRAWN BY	RA10-020	INSTALLATION	1/1
				T. MASTERS	DRAWING NUMBER	FILE NUMBER	
				APPROVED BY	RA10\020\922-0	RA10\020\922-0100	
THIRD ANGLE PROJECTION		MATERIAL/FINISH		NAT R&D			



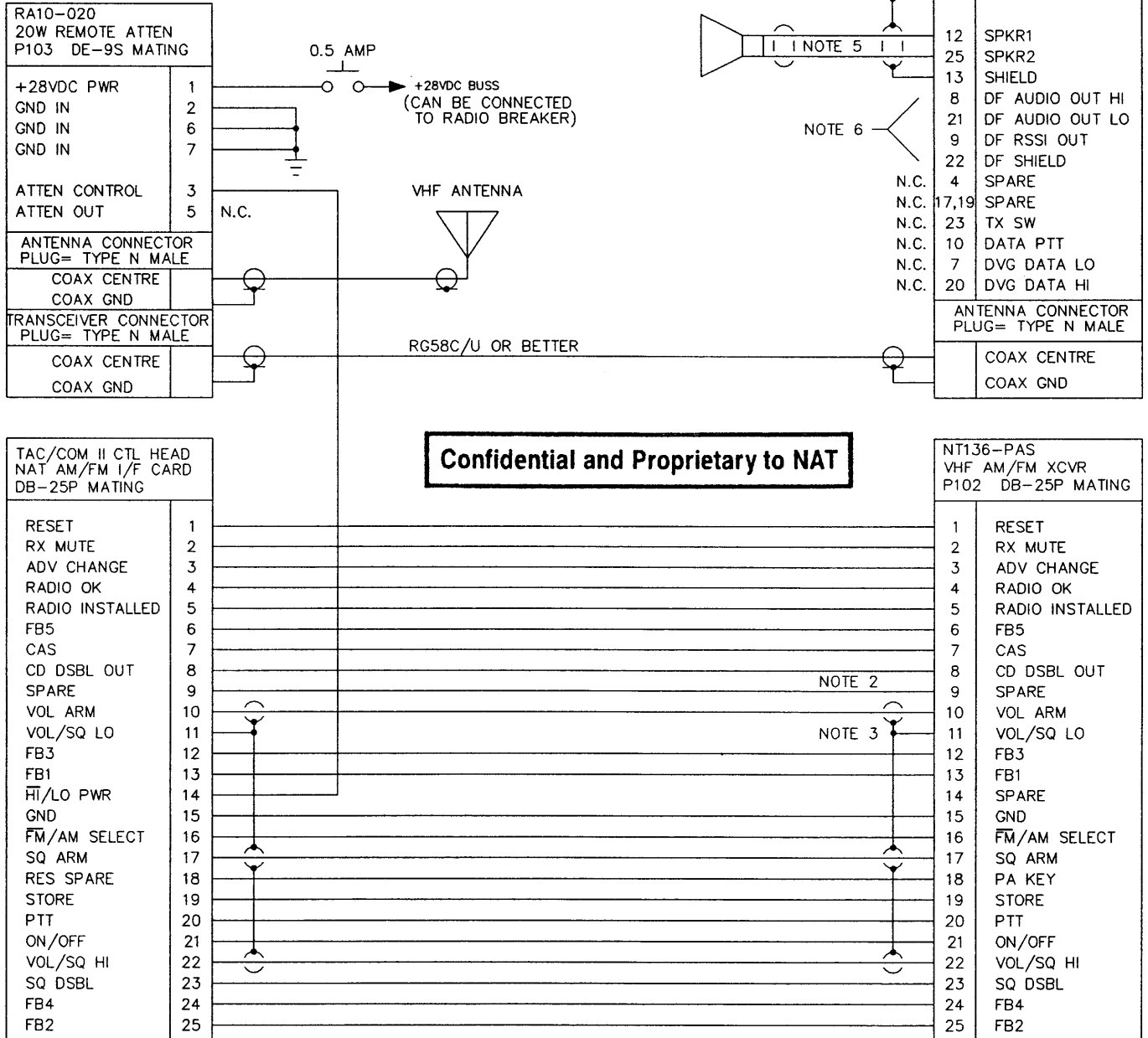
***nat** NORTHERN AIRBORNE TECHNOLOGY LTD.

NT136-PAS AM/FM TRANSCEIVER INSTALLATION WITH RA10-020 REMOTE ATTENUATOR

(INTERFACE CARD CH400-9 REV A, CH400-91 REV A)
(INTERFACE CARD TYPE: "N")

Use TEFZEL M27500 or RAYCHEM SPEC44 (mB1044)
shielded wire with RAYCHEM solder sleeves.

All wire should be 22ga except PWR and GND,
which should be 18ga.



NOTES:

1. USE 18ga OR TWO 20ga WIRES.
2. INSTALL SPARE WIRES.
3. USE 3-CONDUCTOR SHIELDED WIRE.
4. RECEIVE AUDIO IS A FLOATING OUTPUT.
5. OPTIONAL SPEAKER CONNECTION IS A BRIDGED OUTPUT. DO NOT
6. GROUND EITHER LINE. RESERVED FOR DF SYSTEM.

REVISION	DATE	*nat NORTHERN AIRBORNE TECHNOLOGY LTD.			
-	JUNE 19/91	DESIGNED BY	DESCRIPTION		
A	JUNE 25/91	K. HORIE	TRANSCEIVER, REMOTE ATTENUATOR, CONTROL HEAD		
B	AUG 23/93	DRAWN BY	PART NUMBER	DRAWING TYPE	SHEET
1.21	DEC 6/94	KH/TM	NT136-PAS	INTERCONNECT	1/1
		APPROVED BY	DRAWING NUMBER		FILE NUMBER
		NAT R&D	NT136\PAS\403-0		NT136\PAS\403-0121

NT450-000/EUR TRANSCEIVER

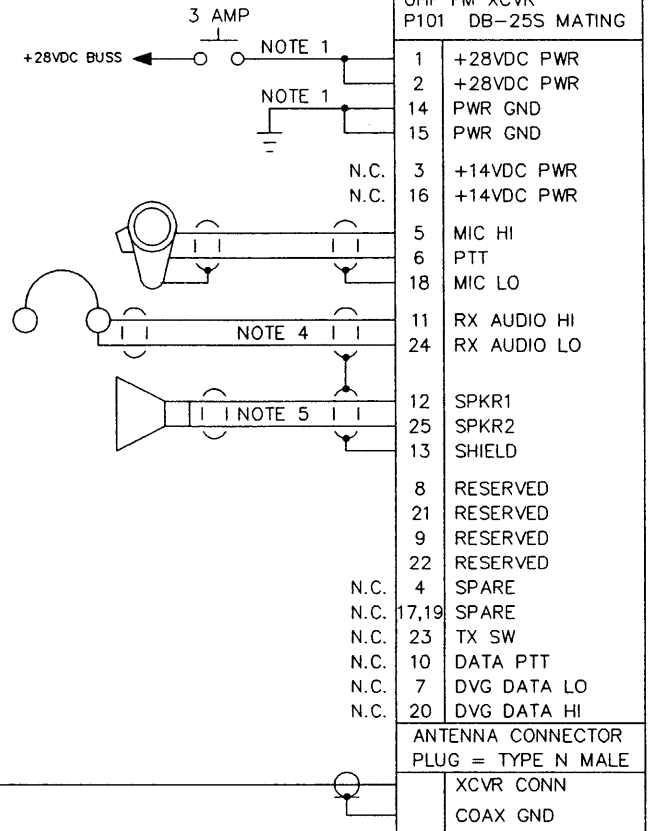
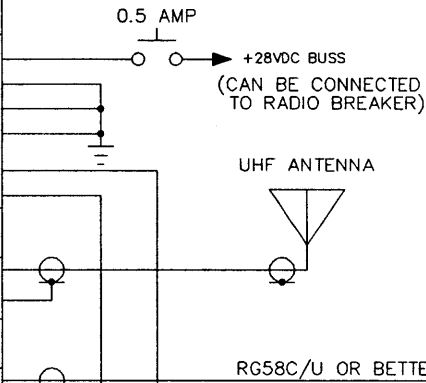
INSTALLATION WITH RA10-001 REMOTE ATTENUATOR

(INTERFACE CARD CH400-9 REV A, CH400-91 REV A)
(INTERFACE CARD TYPE: "N")

Use TEFZEL M27500 or RAYCHEM SPEC44 (mB1044) shielded wire with RAYCHEM solder sleeves.

All wire should be 22ga except PWR and GND, which should be 18ga.

RA10-001 1W REMOTE ATTEN P103 DE-9S MATING	
+28VDC PWR	1
GND IN	2
GND IN	6
GND IN	7
ATTEN OUT	5
ATTEN CONTROL	3
ANTENNA CONNECTOR PLUG = TYPE N MALE	
COAX CENTRE	
COAX GND	
TRANSCEIVER CONN PLUG = TYPE N MALE	
COAX CENTRE	
COAX GND	



TAC/COM II CTL HEAD NAT FM I/F CARD DB-25P MATING	
RESET	1
RX MUTE	2
ADV CHANGE	3
RADIO OK	4
RADIO INSTALLED	5
FB5	6
CAS	7
CD DSBL OUT	8
SPARE	9
VOL ARM	10
VOL/SQ LO	11
FB3	12
FB1	13
HI/LO PWR	14
GND	15
RESEVED SPARE	16
SQ ARM	17
RESEVED SPARE	18
STORE	19
PTT	20
ON/OFF	21
VOL/SQ HI	22
SQ DSBL	23
FB4	24
FB2	25

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NT450-000/EUR UHF FM XCVR P102 DB-25P MATING	
RESET	1
RX MUTE	2
ADV CHANGE	3
RADIO OK	4
RADIO INSTALLED	5
FB5	6
CAS	7
CD DSBL OUT	8
SPARE	9
VOL ARM	10
VOL/SQ LO	11
FB3	12
FB1	13
HI/LO PWR	14
GND	15
RX PA	16
SQ ARM	17
PA KEY	18
STORE	19
PTT	20
ON/OFF	21
VOL/SQ HI	22
SQ DSBL	23
FB4	24
FB2	25

NOTES:

- USE 18ga OR TWO 20ga WIRES.
- INSTALL SPARE WIRE.
- USE 3-CONDUCTOR SHIELDED WIRE.
- RECEIVE AUDIO IS A FLOATING OUTPUT.
- OPTIONAL SPEAKER CONNECTION IS A BRIDGED OUTPUT. DO NOT GROUND EITHER LINE.

REVISION	DATE	*nat NORTHERN AIRBORNE TECHNOLOGY LTD.			
-	MAR 28/90	DESIGNED BY	DESCRIPTION		
A	JUNE 25/91	K. HORIE	TRANSCEIVER, REMOTE ATTENUATOR, CONTROL HEAD		
1.11	DEC 14/94	DRAWN BY	PART NUMBER	DRAWING TYPE	SHEET
		KH/TM	NT450-000/EUR	INTERCONNECT	1/1
		APPROVED BY	DRAWING NUMBER	FILE NUMBER	
		NAT R&D	NT450\EUR\403-0	NT450\EUR\403-0111	



RA Series Remote Attenuator SM30 Installation and Operation Manual

Section 3 Operation

3.1 Introduction

Information in this section consists of functional and operational procedures for the RA Series Remote Attenuator.

3.2 General Information

The operation of the RA Series Remote Attenuator is generally as part of a NAT system including a Tac/Com control head and aircraft radio. In normal use, the only operational considerations involve correctly installing the unit and ensuring the attenuator control line is correctly installed to a compatible operating system. After that is completed, the operation is completely transparent to the user.

3.3 Controls and Indicators

The RA Series Remote Attenuator is controlled by grounding the antenna control line. When the antenna control line is grounded, the RF signal is not attenuated. When the antenna control line is floating, the RF signal is attenuated. There are no indicators for this product.

3.4 Optional Features

There are no optional features for this product.

3.5 Emergency Operation

There is no emergency mode of operation for this product.

Section 3 ends
