Installation and Operation Manual

CC450-0V2
Communications Controller

SM16

ISSUE 1.11

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ISSUE/REVISION RECORD

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Table of Contents

Installation and Operation

Section 1 Description

1.1 Introduction

This manual contains information on the CC450-0V2 Communications Controllers. All derivative product information shall be contained in the applicable manual supplement, which may be obtained from NAT as required.

Information in this section consists of purpose of equipment, features and specifications. Review all notes, warnings and cautions.

1.2 General Information

The CC450-0V2 is a compact, easy to install communications controller. It is designed to provide **RELAY** and/or **SIMULCAST** operation for up to 4 transceivers. With these functions, the aircraft can become an airborne repeater or a multi-frequency transmitting platform. When used to its potential, the CC450-0V2 provides increased efficiency and reduced workload for communication operations.

The CC450-0V2 Communications Controllers were designed to meet the requirement for expanded operation of aircraft communications systems. Its modes of operation are: **RELAY, SIMULCAST** or **BOTH**. All controllers are available with a Voice Store and Retransmit (VSR) option to increase single radio capability.

RELAY operation is used when transmissions from one party must be re-transmitted from the aircraft to reach groups on different frequencies or frequency bands, and when line-of-sight transmissions are not possible.

SIMULCAST operation is used when a single transmission must reach groups operating on different frequencies or frequency bands.

BOTH operation includes both **RELAY** and **SIMULCAST** functions, with priority given to the **SIMULCAST** mode.

Voice Store and Retransmit operation is used when two parties are unable to communicate directly due to obstacles or distances that affect the transmission path. The transmission from one party is stored and then retransmitted on the same channel to the other party.

1.3 Design Features

The CC450-0V2 requires only 0.75" of panel space and is available with +5 or +28Vdc panel lighting.

All audio inputs and outputs are transformer-coupled to provide full isolation from the existing audio system. Bi-coloured annunciators on the front panel illuminate to indicate a RX or TX condition for each radio. The Controller generates alert tones at the beginning and end of each transmission to indicate to the operator that the CC450-0V2 is active.

In-band Voice Store and Retransmit option allows **RELAY** operation on one transceiver. This is accomplished by storing RX audio (up to 16 seconds for the -xx1, or 60 seconds for the -xx2) in the controller and then retransmitting the message out on the same radio.

Voice Activated Squelch Disable (squelch VOX) is provided for interfacing transceivers without a Squelch Disable Output (only available on RT1 and RT2 for –xx1 models).

1.4 Specifications

1.4.1 Electrical Specifications

Input power	+28 Vdc
Supply Current	600 mAdc (Max)
Lights Current	80 mAdc (Max) @ +28 Vdc 400 mAdc (Max) @ +5 Vdc
Inputs (Each RT)	MIC HI, MIC LO, PTT, RX AUDIO HI and LO, SQUELCH DISABLE
Outputs (Each RT)	MIC HI, MIC LO, PTT
Serial Ports	One Serial Port (RS232)
Annunciators:	Power On - Green RT1 to RT4 Status - Green (TX) / Orange (RX)

1.4.2 Physical Specifications

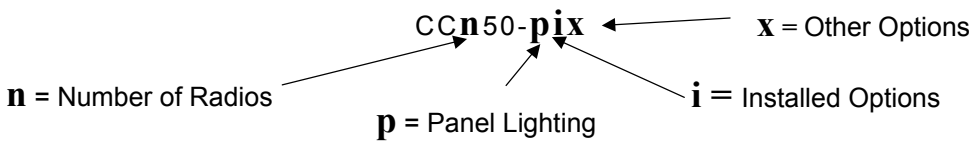
Height	0.74" (18.8 mm)
Depth behind panel	6.24" (158.5 mm) excluding connectors
Width	5.75" (146.1 mm)
Weight	1.1lb (500 g)
Connectors	One Male 37-Pin Dmin One Male 15-Pin Dmin
Dummy Plug (Included in install kit)	One Male 37-Pin Dmin
Mounting	Panel Mount using 2 Dzus Fasteners

1.4.3 Environmental Specifications

Operating Temperature	-40°C to + 70°C
Storage Temperature	-55°C to + 85°C
Altitude	25,000 feet
Humidity	95% Non-condensing

1.5 Unit Nomenclature

Variants of the CC450 series Communications Controller are identified as follows:



1.5.1 Number of Radios (n)

The digit immediately after the CC identifier indicates the number of radios that can be controlled by the unit.

2	=	Two-Transceiver Model (No longer in production)
4	=	Four-Transceiver Model

1.5.2 Panel Lighting (p)

The digit in the first position of the unit suffix indicates the panel lighting voltage.

0	=	+28 Vdc Lights
5	=	+5 Vdc Lights
7	=	+28 Vdc NVG Compatible Lights

Note: NVG compatible lighting may be available. Contact NAT for more information.

1.5.3 Installed Options (i)

The digit in the second position of the unit suffix indicates any installed options.

0	=	No Options
V	=	With Voice Storage Option

1.5.4 Model Number (x)

The digit in the third position of the unit suffix indicates the model number.

1	=	16 seconds of RX Audio stored
2	=	60 seconds of RX Audio stored

1.5.5 Models Available

Some of the models currently available are as follows:

CC450-001	Four-transceiver model, 16 seconds Voice Storage, +28 Vdc panel lighting
CC450-0V1	Four-transceiver model, 16 seconds Voice Storage, +28 Vdc panel lighting
CC450-0V2	**Standard** Four-transceiver model, 60 seconds Voice Storage, +28 Vdc panel lighting
CC450-5V2N	Four-transceiver model, 60 seconds Voice Storage, +5 Vdc NVG suitable panel lighting
CC450-7V2	Four-transceiver model, 60 seconds Voice Storage, +28 Vdc NVG compatible panel lighting

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. Review all notes, warnings and cautions before installation.

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
- Operators Manual
- Certificate of Conformity or Release Certification

2.2.1 Warranty

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

Note: An appropriately rated facility, e.g. Certified Aircraft Repair Station, shall install this equipment in accordance with applicable regulations. NAT Ltd's. warranty is not valid unless an authorized NAT Ltd. Dealer installs the equipment. Failure to follow any of the installation instructions, or installation by a non-certified individual or agency will void the warranty, and may result in a non-airworthy installation.

2.3 Continued Airworthiness

Maintenance of the CC450-0V2 Communications Controller is 'on condition' only. Periodic maintenance of this product is not required.

2.4 Installation Procedures

2.4.1 Warnings

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

2.4.2 Cautions

CAUTION:
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, or significant audio interference will result**. In all installations, use shielded cable exactly as shown and ground as indicated. Significant problems may result from not following these guidelines.

CAUTION:
Microphone signals run through the CC450-0V2 unit. If the controller is removed, a Dummy Plug (included with the Installation kit) must be installed on the harness plug P101. **Failure to install the Dummy Plug will prevent transmitting from all transceivers connected to the CC450.**

CAUTION:
Ensure proper antenna ground plane and sufficient antenna spacing between transceivers that will be used in RELAY operation. If enough power is transmitted from an adjacent antenna to the receiving transceiver's antenna, the receiver may stop functioning. Spurious receiver responses from transceivers with weak front ends, such as handheld units, will also be minimized with proper ground plane and antenna spacing.

2.4.3 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.

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 (Equivalent 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 22 AWG, except power and ground lines, which shall be a minimum of 20 AWG. 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 AC41.13-1B Change 1, Paragraphs 11-47 through 11-51 and 11-66 through 11-69.

Microphone signals run through the CC450-0V2 unit. If the controller is removed, a Dummy Plug (included with the Installation kit) must be installed on the harness plug P101. **Failure to install the Dummy Plug will prevent transmitting from all transceivers connected to the CC450.**

Ensure proper antenna ground plane and sufficient antenna spacing between transceivers that will be used in RELAY operation. If enough power is transmitted from an adjacent antenna to the receiving transceiver's antenna, the receiver may stop functioning. Spurious receiver responses from transceivers with weak front ends, such as handheld units, will also be minimized with proper ground plane and antenna spacing.

2.4.4 Post-Installation Checks

2.4.4.1 Voltage/Resistance Checks

Do not attach the CC450-0V2 until the following conditions are met.

Check the following:

a) P101 pin **<18>** for appropriate lights voltage.

b) P101 pin **<19>** for +28 Vdc relative to ground.

b) P101 pins **<4>, <8>, <12>, <23>, <27>,** and **<31>** for shield ground (below 0.5 Ω).

c) P101 pins **<35>**, **<36>** and **<37>** for continuity to ground (less than 0.5 Ω).

d) P102 pin **<14>** for chassis ground (less than 0.5 Ω).

2.4.4.2 Power On Checks

Power up the aircraft's systems and confirm normal operation of all functions of the CC450. Refer to Section 3 (Operation) for specific operational details.

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

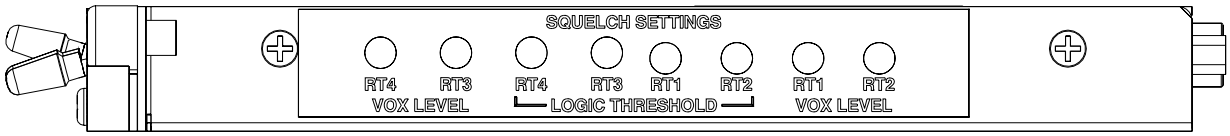
Upon satisfactory completion of all performance checks, make all required log book entries, electrical load, weight and balance amendments and other documentation as required by your local regulatory agency before releasing the aircraft for service.

2.4.5 Mechanical Mounting

The CC450-0V2 requires a standard Dzus rail assembly with an opening width of 5.0" and a front clearance width of 5.75". The height requirement is 0.75". Be sure that adequate clearance is allowed for the cable connections at the rear of the unit.

Note: Ensure that proper mechanical support is provided under the chassis. Due to the shallow profile of the unit, the Dzus fasteners should not be relied upon for complete mechanical support. NAT Ltd recommends that it should be mounted above another unit, such as a control head, to provide better mechanical support.

2.5 Adjustments and Connections



CAUTION
Incorrect setting of these adjustments may cause improper operation of the CC450-0V2 during relay operations.

These adjustments have been factory set to operate correctly with NAT NT-Series, NTX-Series, NPX-Series and NCT-Series, Wulfsberg Flexcomm, and Wulfsberg RT9600/7200 transceivers. For any other manufacturer's radios, consult NAT Ltd.

2.5.1 Squelch Logic Threshold Adjustments

The Squelch Logic Threshold settings control the voltage at which the CC450-0V2 recognizes that the Squelch Disable line has gone active (the transceiver is receiving). It is normally set to 1.0 Vdc Active Lo or grounded signal.

2.5.1.1 'Active Lo' Squelch Disable

a) Put all the CC450-0V2 Transceiver Select switches in the down (inactive) position.

b) Power up the CC450-0V2 by putting the Power switch in the up (ON) position

c) Turn the Squelch Logic Threshold Adjustment fully counterclockwise (ccw).

d) Slowly turn the adjustment clockwise (cw) until the stops are reached or the RX/TX annunciator on the CC450-0V2 lights ORANGE.

e) Take note of the adjustment position

f) While depressing the Squelch Test button for the respective transceiver, rotate the adjustment ccw until the stops are reached or the RX/TX annunciator goes out.

g) Take note of the adjustment position

h) Release the Squelch Test button.

i) Position the adjustment half way between the positions reached in steps e) and g).

j) Ensure proper Squelch Disable operation by pushing the squelch test button for the transceiver. The RX/TX annunciator on the CC450-0V2 should light ORANGE.

k) Repeat the above procedure for all active low disable transceivers connected to the CC450.

2.5.1.2 'Active Hi' Squelch Disable Signal (Wulfsberg FF40)

a) Put all the CC450-0V2 Transceiver Select switches in the down (inactive) position.

b) Power up the CC450-0V2 by putting the Power switch in the up (ON) position.

c) Turn the Squelch Logic Threshold Adjustment fully cw.

d) Slowly turn the adjustment ccw until the stops are reached or the RX/TX annunciator on the CC450-0V2 lights ORANGE.

e) Take note of the adjustment position

f) While depressing the Squelch Test button for the respective transceiver, rotate the adjustment cw until the stops are reached or the RX/TX annunciator goes out.

g) Take note of the adjustment position.

h) Release the squelch test button.

i) Position the adjustment half way between the two positions reached in steps e) and g).

j) Ensure proper Squelch Disable operation by pushing the squelch test button for the transceiver. The RX/TX annunciator on the CC450-0V2 should light ORANGE.

k) Repeat the above procedure for all active high disable transceivers connected to the CC450.

2.5.2 Squelch VOX level Adjustments

The Squelch VOX circuitry must be enabled for use with transceivers that do not have a squelch disable signal (such as a handheld or portable). See Section 2.5 for further details on enabling the Squelch VOX circuitry.

The Squelch VOX adjustment is used to set the audio level required for the CC450-0V2 to recognize that the transceiver is receiving. Normally this adjustment is set to the fully cw position, and the Squelch VOX is disabled internally. The adjustment is rotated ccw to make the Squelch VOX trip on smaller signals, and cw to trip on larger audio signals. (This feature is only available for the RT1 and RT2 positions of the -xV1 models.)

If the Squelch VOX is enabled internally, then setting the Squelch VOX Level (SVL) can be performed by the following procedure:

a) Connect a communications monitor, or use another radio to transmit audio to the transceiver that is connected to the VOX circuit of the CC450.

b) Put all the CC450-0V2 Transceiver Select switches in the down (inactive) position.

c) Power up the CC450-0V2 by putting the Power switch in the up (ON) position

d) Transmit to the CC450-0V2 RT, and adjust the receive audio volume to a comfortable level that would be used during flight.

e) Adjust the setting of the SVL pot so that when there is an audio signal on the receive audio line, the TX/RX annunciator on the CC450-0V2 will light ORANGE. When there is no audio being received the TX/RX annunciator should not be lit.

2.6 Squelch VOX Circuitry and Jumper Settings

CAUTION:
The Squelch VOX circuitry adjustments are only accessible by removing the top cover of the unit. As this unit contains electrostatic discharge sensitive components, this should only be undertaken by a certified technician at a static protected workstation.

2.6.1 Cover Removal

Refer to **Exploded View** CC450\904-1 for enclosure removal.

a) Remove the four jackposts from the back of the unit using a 3/16" driver or socket.

b) Remove the two Phillips countersunk screws from each side of the unit.

c) Carefully slide the cover back (to clear the connectors) and upwards. It may be difficult to grip the cover and gentle prying from behind the front plate may be required.

2.6.2 Squelch Disable Logic Polarity Jumpers

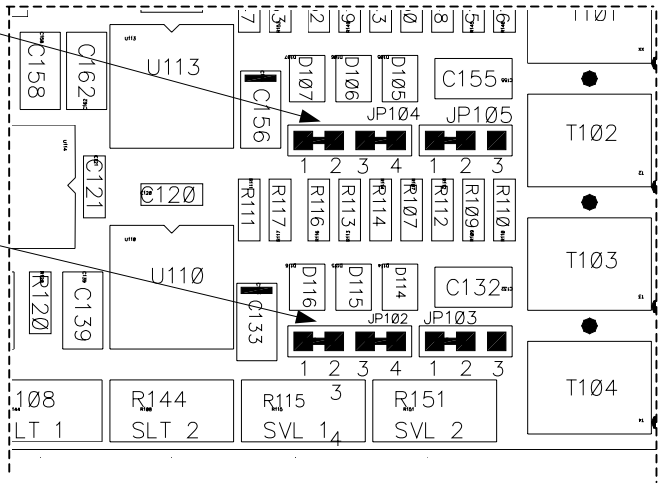
These jumpers determine if the Squelch Disable line will be active low (grounded = on) or active high (voltage = on) logic polarity. Normally this jumper is set to the active low position for all transceivers. The only exception is the Wulfsberg FF40 series transceivers, which use the active high position.

2.6.2.1 Main Board

The diagram below shows the applicable section of the main board.

Jumper JP104 (RT2)	
Position	Squelch Disable Logic Polarity
1-2, 3-4	Active Low (Normal Position)
1-3, 2-4	Active High

Jumper JP102 (RT1)	
Position	Squelch Disable Logic Polarity
1-2, 3-4	Active Low (Normal Position)
1-3, 2-4	Active High



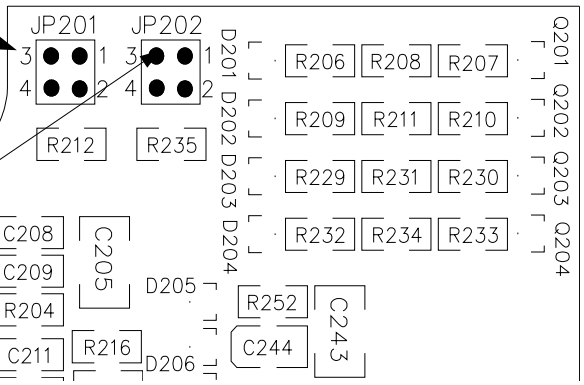
2.6.2.2 Auxiliary Board

The diagram below shows the applicable section of the auxiliary board.

Jumper JP201 (RT3)	
Position	Squelch Disable Logic Polarity
1-3, 2-4	Active Low (Normal Position)
1-2, 3-4	Active High

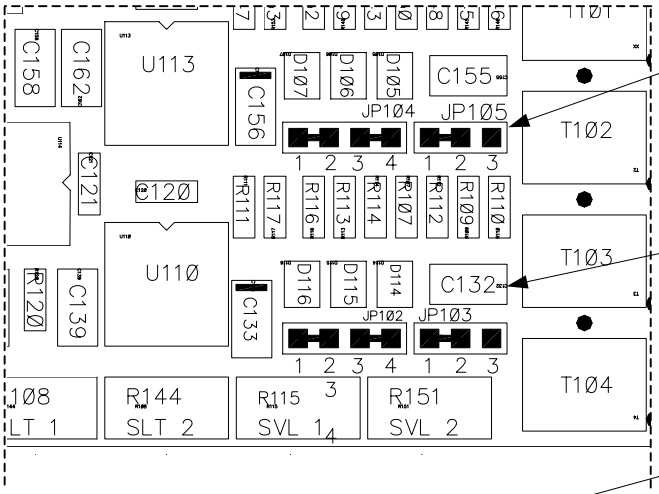
Jumper JP202 (RT4)	
Position	Squelch Disable Logic Polarity
1-3, 2-4	Active Low (Normal Position)
1-2, 3-4	Active High

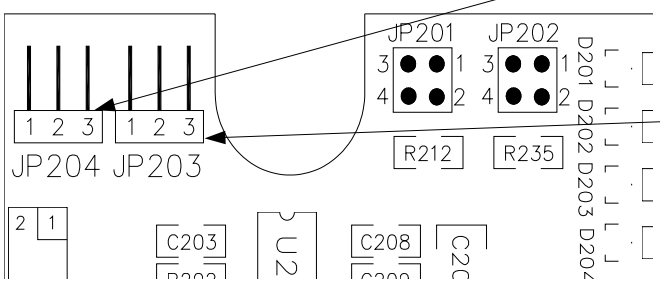
CC450-xV2



2.6.3 Receive Audio VOX Squelch Circuit Jumpers

These jumpers enable or disable the Receive Audio VOX Squelch circuitry for the RT1, RT2, RT3 and RT4 channels. Refer to Section 5.6.2 of this manual if any of these jumpers are enabled.





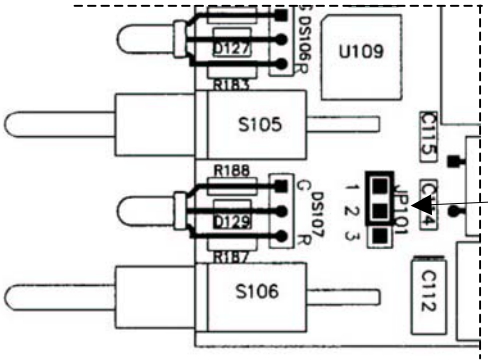
Jumper JP105 (RT2)	
Position	**Receive Audio VOX Circuit**
1-2	Disabled (Normal Position)
2-3	Enabled

Jumper JP103 (RT1)	
Position	**Receive Audio VOX Circuit**
1-2	Disabled (Normal Position)
2-3	Enabled

Jumper JP204 (RT4)	
Position	**Squelch VOX Circuit**
1-2	Disabled (Normal Position)
2-3	Enabled

Jumper JP203 (RT3)	
Position	**Squelch VOX Circuit**
1-2	Disabled (Normal Position)
2-3	Enabled

2.6.4 Jumper JP101



For correct operation, this jumper must be in the 1-2 position. This diagram is included to ensure that the installer can replace the jumper if it is accidentally dislodged.

Jumper JP101	
Position	
1-2	Normal Position

2.6.5 Final Checks

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.

2.7 Accessories Required But Not Supplied

The CC450-IKC kit consists of one D15SL-IKC, one D37SL-IKC, and one CC450-DMY. The contents of each of these kits are listed below.

NAT Part #: **D15SL-IKC** consists of:

Quantity	Description	NAT Part #
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

NAT Part #: **D37SL-IKC** consists of:

Quantity	Description	NAT Part #
1	D-min 37 Socket Housing	20-21-037
37	MS Crimp Socket	20-26-901
1*	Jack Screw Set	20-27-002
1*	Lock Clip Set	20-27-004
1	37 Pin Connector Hood	20-29-038

NAT Part #: **CC450-DMY** is a fully assembled Dummy Load that allows operation to continue if the CC450-0V2 is removed for service. It consists of:

Quantity	Description	NAT Part #
1	D-sub plug, Solder cup	20-10-037
1	Hood, D-sub, plastic	20-29-038
1*	Jack Screw Set	20-27-002

* Use as required.

2.8 Installation Drawings

DRAWING	REV.	DESCRIPTION	TYPE
CC450\403-0	1.20	Communications Controller	Interconnect
CC450\403-1	-	CC250/450 to NT Series RT and to Control Head	Interconnect
CC450\403-2	1.01	Communication Controller	Interconnect
CC450\403-3	-	CC250/450 to Wulfsberg RT7200/9600	Interconnect
CC450\403-4	-	CC250/450 to Wulfsberg Flexcomm RT	Interconnect
CC450\405-0	-	CC250/450 Connector Maps	Connector Map
CC450\405-1	-	CC250/450 Dummy Plug Connector Map	Connector Map
CC450\905-0	1.20	Communications Controller (Sheet 1 of 3)	Faceplate
CC450\0V2\922-0	1.10	Communications Controller	Mech. Installation

Section 2 ends following the above documents

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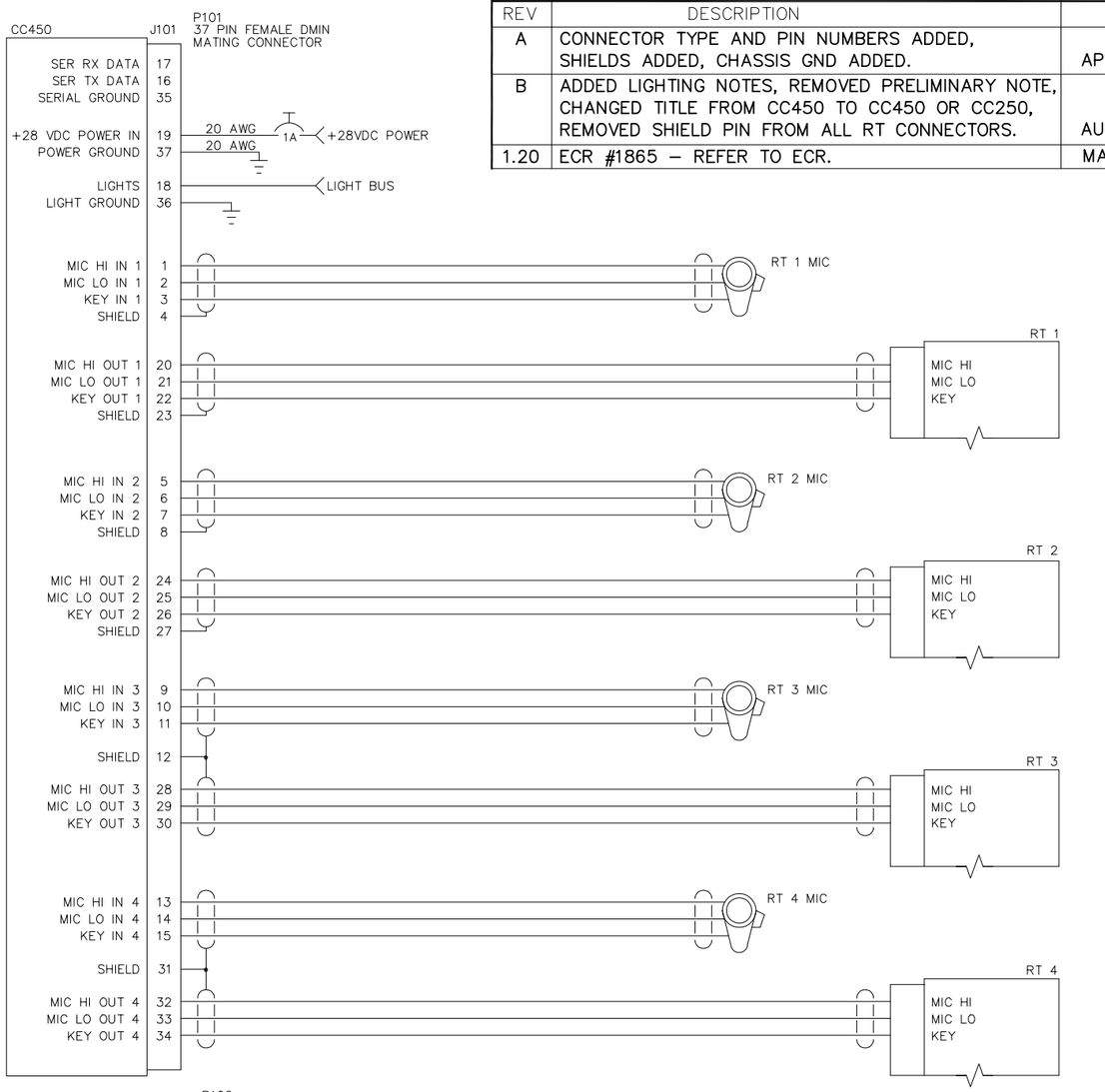
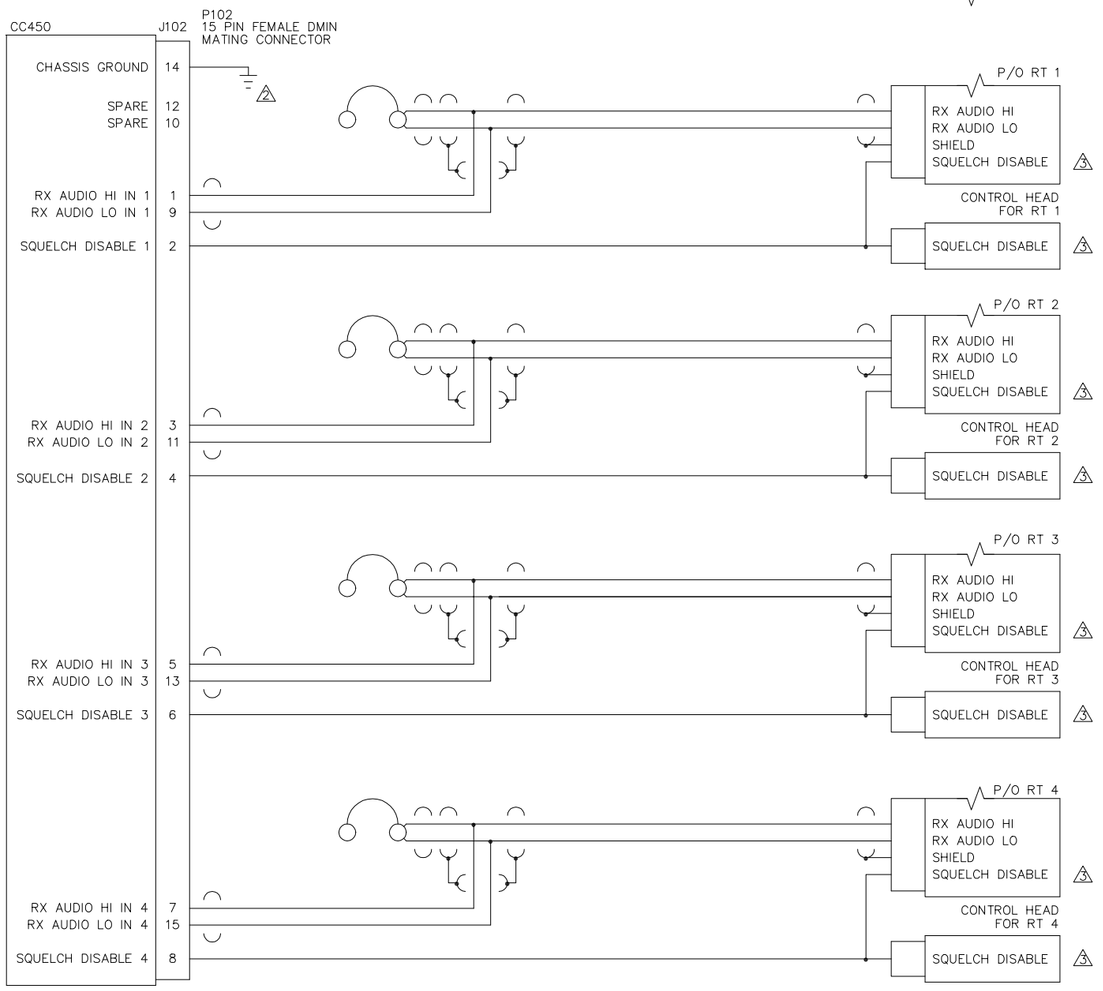
REVISIONS			
REV	DESCRIPTION	DATE	BY
A	CONNECTOR TYPE AND PIN NUMBERS ADDED, SHIELDS ADDED, CHASSIS GND ADDED.	APR 29/92	SRM
B	ADDED LIGHTING NOTES, REMOVED PRELIMINARY NOTE, CHANGED TITLE FROM CC450 TO CC450 OR CC250, REMOVED SHIELD PIN FROM ALL RT CONNECTORS.	AUG 25/92	SRM
1.20	ECR #1865 – REFER TO ECR.	MAY 24/01	TAT





NOTES: UNLESS OTHERWISE SPECIFIED

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.

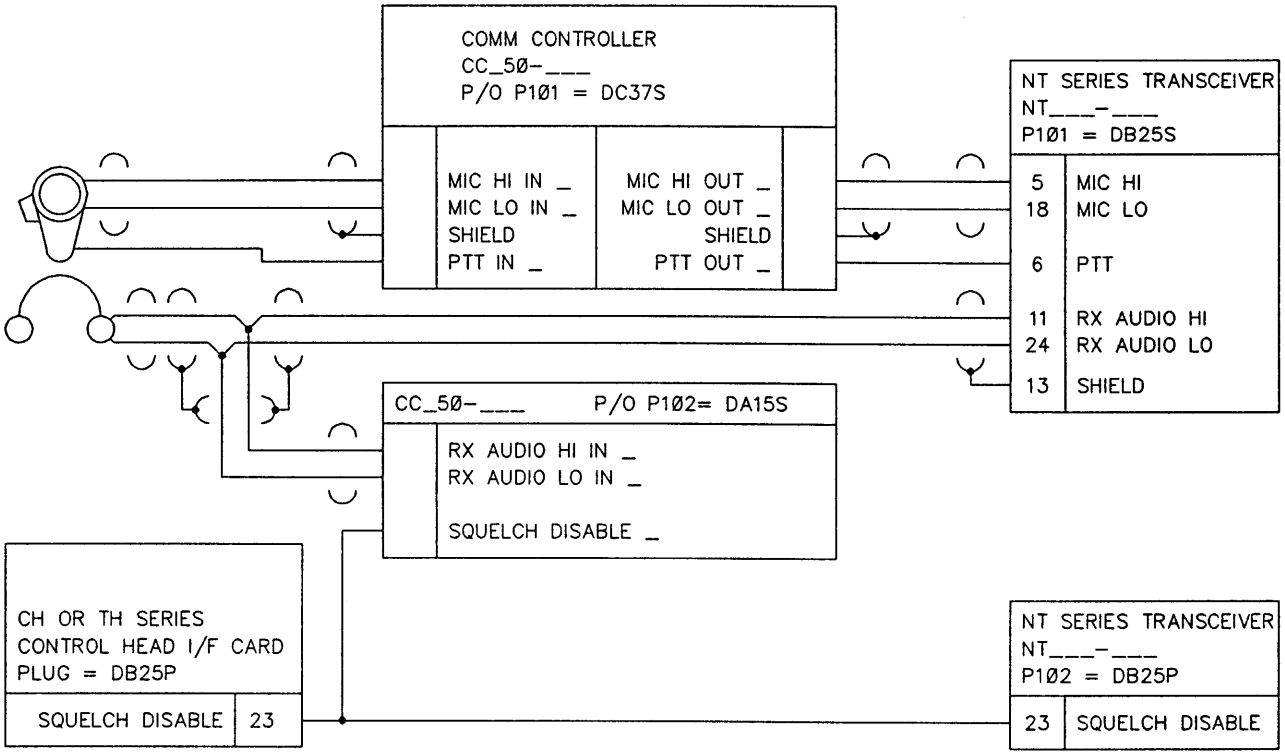
2. CONNECT CHASSIS GROUND TO CLOSEST POINT ON AIRFRAME GROUND.

3. SQUELCH DISABLE IS OPTIONAL.

4. THIS DWG APPLIES TO THE FOLLOWING: CC450-001, CC450-0V1, CC450-0V2, CC450-5V1 AND CC450-7V2.

DESIGNED	SRM	nat NORTHERN AIRBORNE TECHNOLOGY LTD.				
DRAWN	SRM					
DATE	MAR 13/92	TITLE	COMMUNICATIONS CONTROLLER			
CHECKED	NAT 114 / NAT 223					
APPROVED	NAT 113	SIZE B	CAGE CODE 3AB01	PART NO. CC450	REV. 1.20	SHEET 1/1
FILE 403-0120.DWG		DWG. TYPE INTERCONNECT		DWG. NO. CC450\403-0		

INTERCONNECT DRAWING FOR CONNECTING A NAT CC450 OR CC250 COMMUNICATION CONTROLLER TO A NAT NT SERIES TRANSCEIVER AND CONTROL HEAD.

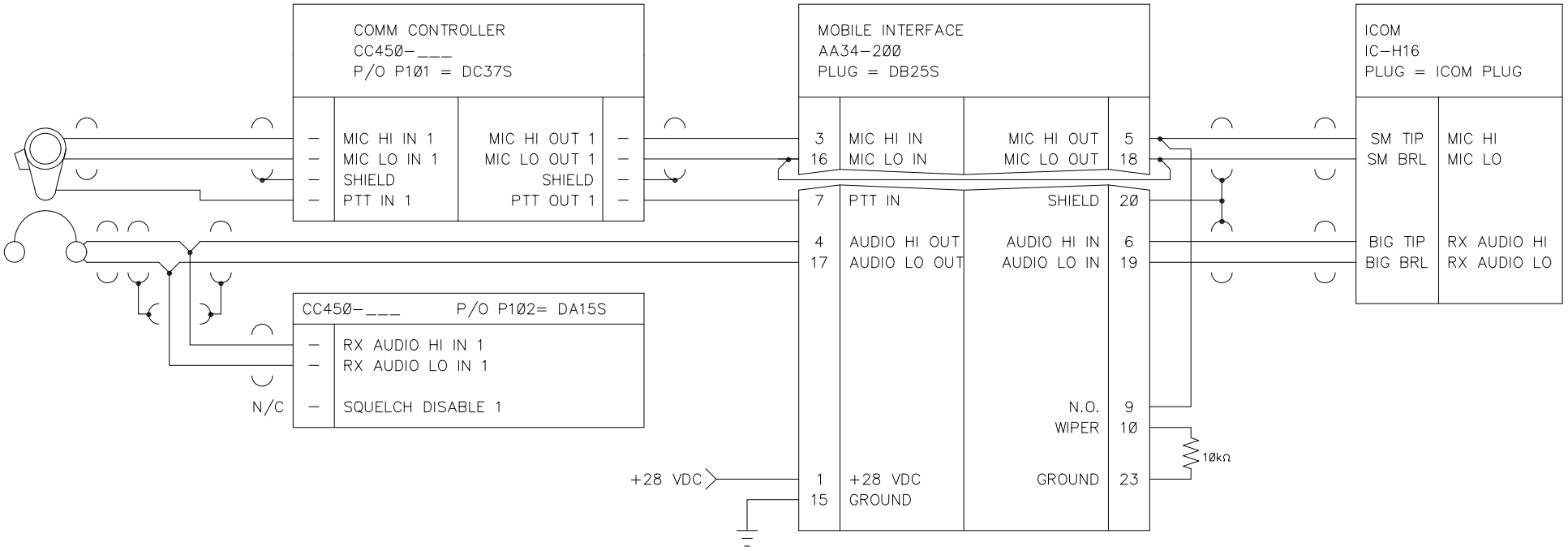


REVISION	DATE

NORTHERN AIRBORNE TECHNOLOGY LTD.
1925 KIRSCHNER RD. KELOWNA, B.C.

PART NUMBER	DRAWING NUMBER	FILE NUMBER
CC450	CC450\403-1	CC450\403-1
DESCRIPTION	SHEET	DATE
INTERCONNECT	1 OF 1	25 AUG 92
DESIGNED BY	DRAWN BY	APPROVED BY
SCOTT MOORE	SCOTT MOORE	NAT QA

INTERCONNECT DRAWING FOR CONNECTING A NAT CC450 COMMUNICATION CONTROLLER
TO AN NAT MOBILE INTERFACE AA34-200 AND AN ICOM HANDHELD IC-H16.



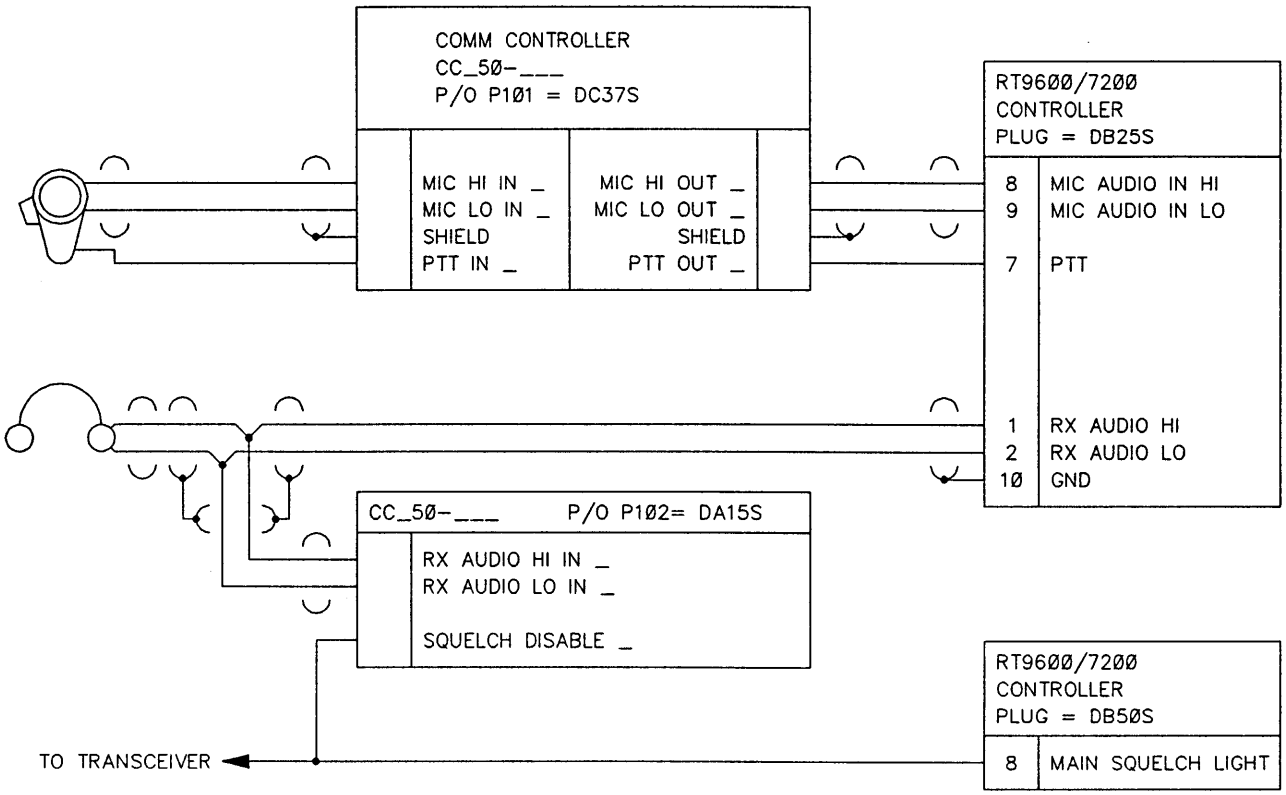
Confidential and Proprietary to NAT

REVISION	DATE
1.00	AUG 25/92
1.01	JAN 10/96

NORTHERN AIRBORNE TECHNOLOGY LTD.

DESIGNED BY	DESCRIPTION		
SM	COMMUNICATION CONTROLLER		
DRAWN BY	PART NUMBER	DRAWING TYPE	SHEET
SM/MS	CC450	INTERCONNECT	1/1
APPROVED BY	DRAWING NUMBER	FILE NUMBER	
NAT 107	CC450\403-2	CC450\403-2101	

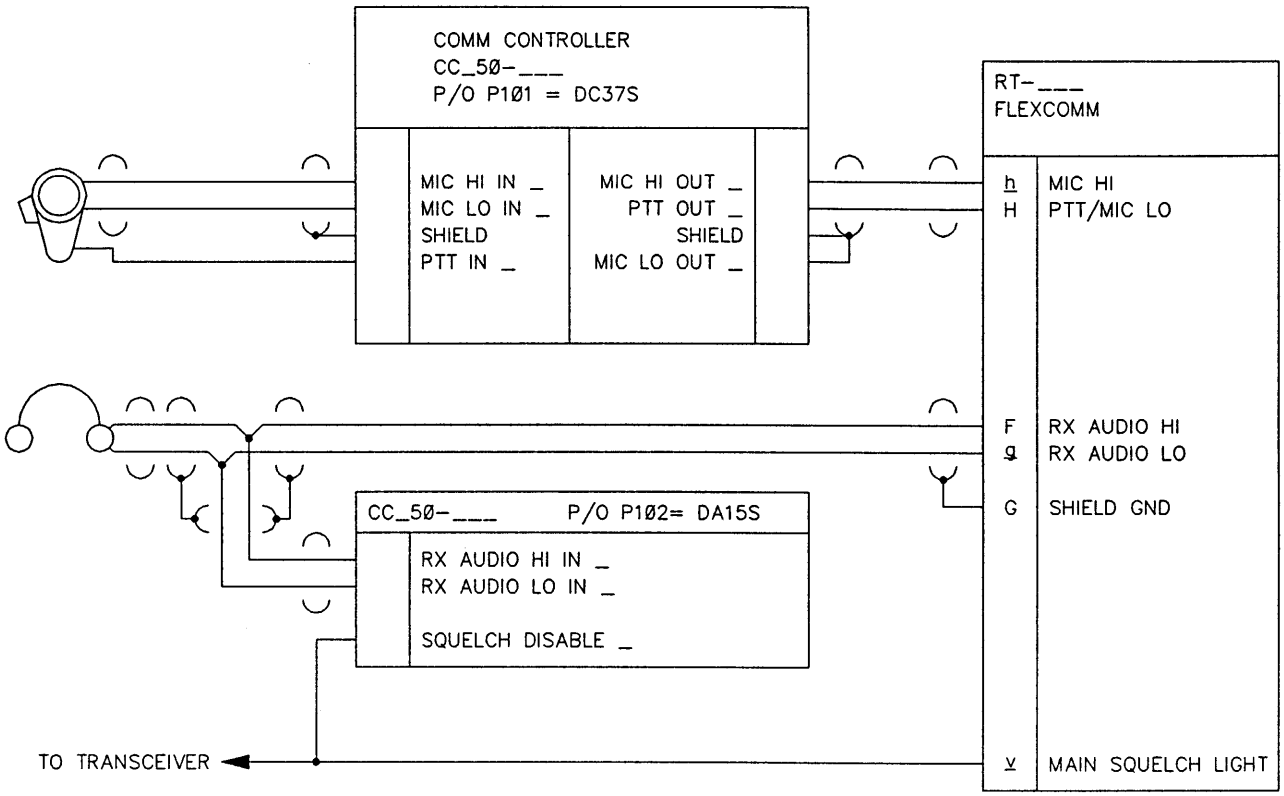
INTERCONNECT DRAWING FOR CONECTING A NAT CC450 OR CC250 COMMUNICATION CONTROLLER TO A WULFSBERG RT7200/9600 TRANSCEIVER.



Confidential and Proprietary to NAT

REVISION	DATE	NORTHERN AIRBORNE TECHNOLOGY LTD. 1925 KIRSCHNER RD. KELOWNA, B.C.		
		PART NUMBER	DRAWING NUMBER	FILE NUMBER
		CC450	CC450\403-3	CC450\403-3
		DESCRIPTION	SHEET	DATE
		INTERCONNECT	1 OF 1	25 AUG 92
		DESIGNED BY	DRAWN BY	APPROVED BY
		SCOTT MOORE	SCOTT MOORE	NAT QA

INTERCONNECT DRAWING FOR CONNECTING A NAT CC450 OR CC250 COMMUNICATION CONTROLLER TO A WULFSBERG FLEXCOMM SERIES TRANSCEIVER.



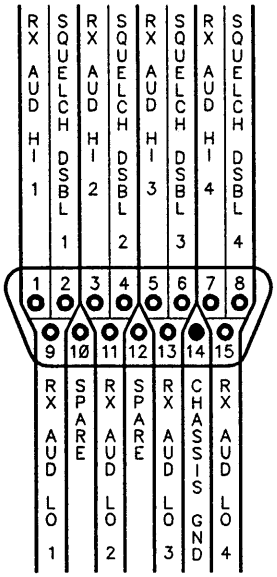
REVISION	DATE

NORTHERN AIRBORNE TECHNOLOGY LTD.
1925 KIRSCHNER RD. KELOWNA, B.C.

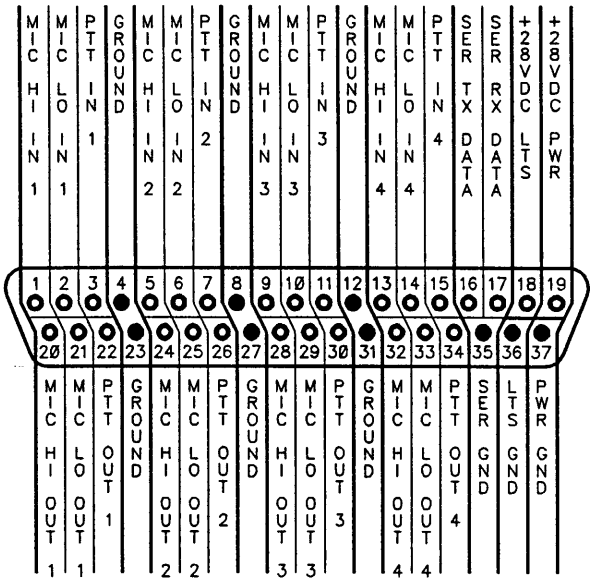
PART NUMBER	DRAWING NUMBER	FILE NUMBER
CC450	CC450\403-4	CC450\403-4
DESCRIPTION	SHEET	DATE
INTERCONNECT	1 OF 1	25 AUG 92
DESIGNED BY	DRAWN BY	APPROVED BY
SCOTT MOORE	SCOTT MOORE	NAT QA

CONNECTOR MAPS FOR THE NAT COMMUNICATION CONTROLLERS

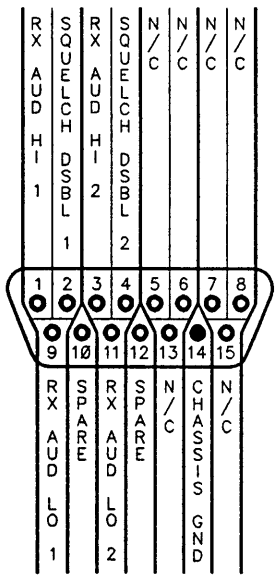
P102 — PLUG: DA15S



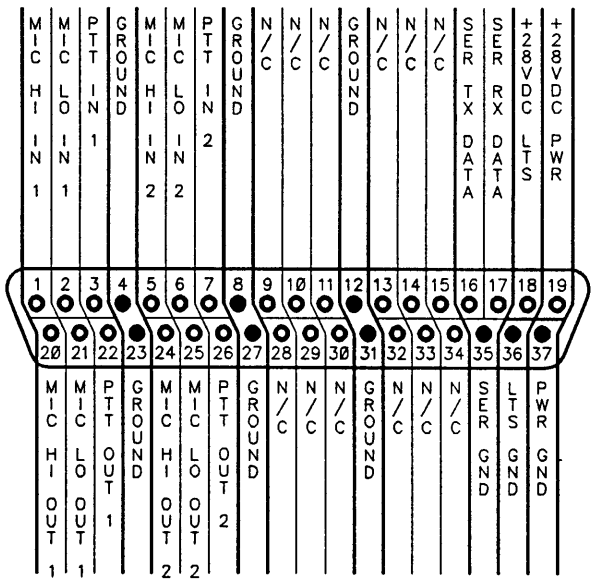
CC450 — P101 — PLUG: DC37S



P102 — PLUG: DA15S

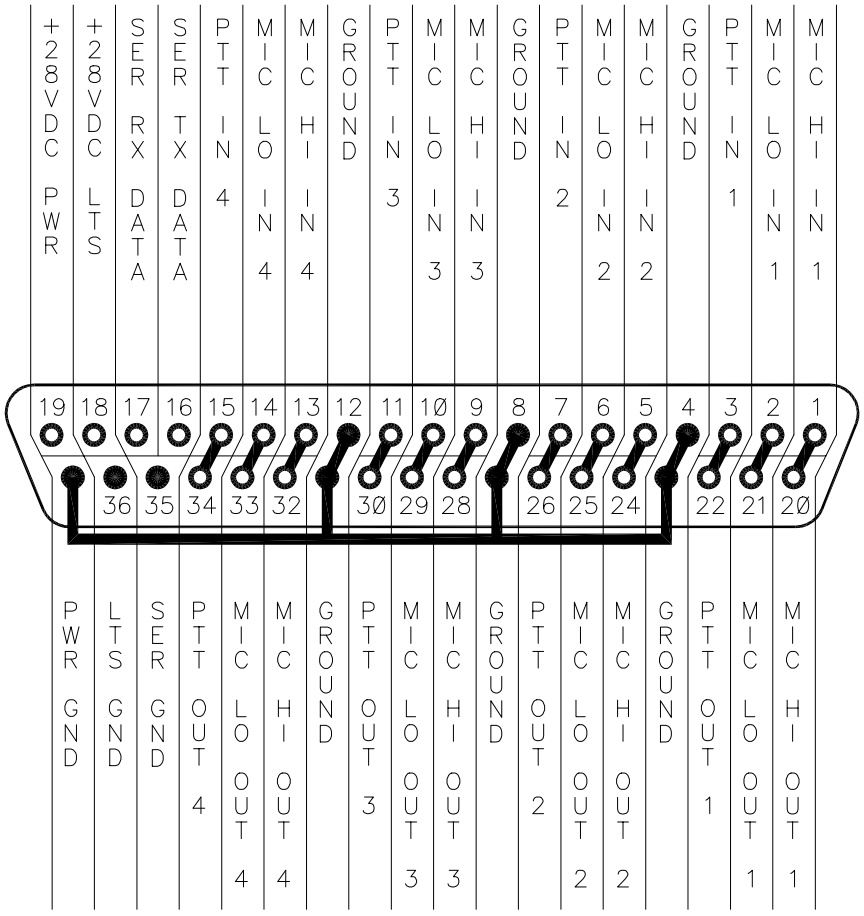


CC250 — P101 — PLUG: DC37S



REVISION	DATE	NORTHERN AIRBORNE TECHNOLOGY LTD. 1925 KIRSCHNER RD. KELOWNA, B.C.		
		PART NUMBER	DRAWING NUMBER	FILE NUMBER
		CC450-???	CC450\405	
		DESCRIPTION	SHEET	DATE
		CONNECTOR MAP	1 OF 1	9 SEPT 1992
		DESIGNED BY	DRAWN BY	APPROVED BY
		SCOTT MOORE	SCOTT MOORE	NAT QA

CONNECTOR MAPS FOR THE NAT
COMMUNICATION CONTROLLER CC450
DUMMY PLUG



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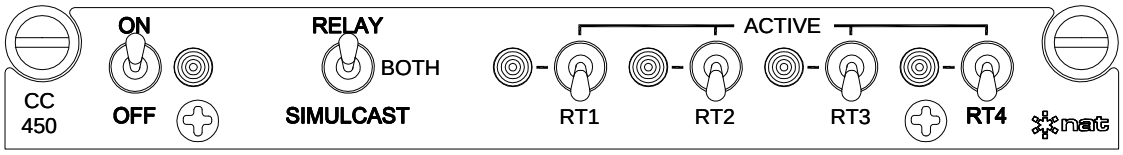
REVISION	DATE	NORTHERN AIRBORNE TECHNOLOGY LTD. 1925 KIRSCHNER RD. KELOWNA, B.C.		
		PART NUMBER	DRAWING NUMBER	FILE NUMBER
		CC450-???	CC450\405-1	
		DESCRIPTION	SHEET	DATE
		CONNECTOR MAP	1 OF 1	8 SEPT 1992
		DESIGNED BY	DRAWN BY	APPROVED BY
		SCOTT MOORE	SCOTT MOORE	NAT 104

REVISIONS			
REV	DESCRIPTION	DATE	BY
1.01	FORMAT CHANGES ONLY	APR 19/96	TGM
1.10	DOCCR00911 – CHANGED FACEPLATE BLANK	AUG 19/04	MWS
1.20	DOCCR01732 – REMOVED LINE, FORMAT CHANGES.	JUL 28/06	MWS



DESIGNED	SRM	nat NORTHERN AIRBORNE TECHNOLOGY LTD.				
DRAWN	SRM					
DATE	AUG 25/92	TITLE	COMMUNICATIONS CONTROLLER FRONT VIEW			
CHECKED	NAT 249					
APPROVED	NAT 131	SIZE A	CAGE CODE 3AB01	PART NO. CC450	REV. 1.20	SHEET 1/3
FILE	905–0.DWG	DWG. TYPE	FACEPLATE	DWG. NO.	CC450\905–0	

NOTES:

1. ALL DIMENSIONS ARE IN INCHES.
2. TOLERANCES: ± 0.01

FRONT VIEW

FACEPLATE PROCEDURE FOR 55-01-028

1.

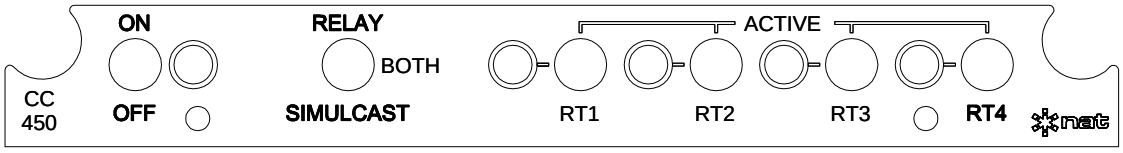
REQUIRED PROCESSES BEFORE PAINT				
IDENT	DRILL DIA	QTY	FRONT SURFACE	REAR SURFACE
A	0.280	0	–	0.39 CBORE X 0.10 DEEP
B	0.297	0	–	–
C	–	2	–	MASK HOLES

2. PAINT FACEPLATE AS PER QPP409-21 PROCEDURE 10.0
   FINISHED COLOR BLACK 37038 PER FED-STD-595.
3. MARK TEXT FROM PAGE 3 OF 905-0.DWG
4. CLEAR COAT FACEPLATE

5.

REQUIRED PROCESSES AFTER CLEAR COAT				
IDENT	DRILL DIA	QTY	FRONT SURFACE	REAR SURFACE
D	0.200	0	REOPEN, INSERT NAT P/N 25-80-007	–

DESIGNED	SRM	NORTHERN AIRBORNE TECHNOLOGY LTD.				
DRAWN	SRM					
DATE	AUG 25/92	TITLE	FACEPLATE MANUFACTURING DATA			
CHECKED	NAT 249					
APPROVED	NAT 131	SIZE A	CAGE CODE 3AB01	PART NO. CC450	REV. 1.20	SHEET 2/3
FILE	905-0.DWG	DWG. TYPE	FACEPLATE	DWG. NO.	CC450\905-1	



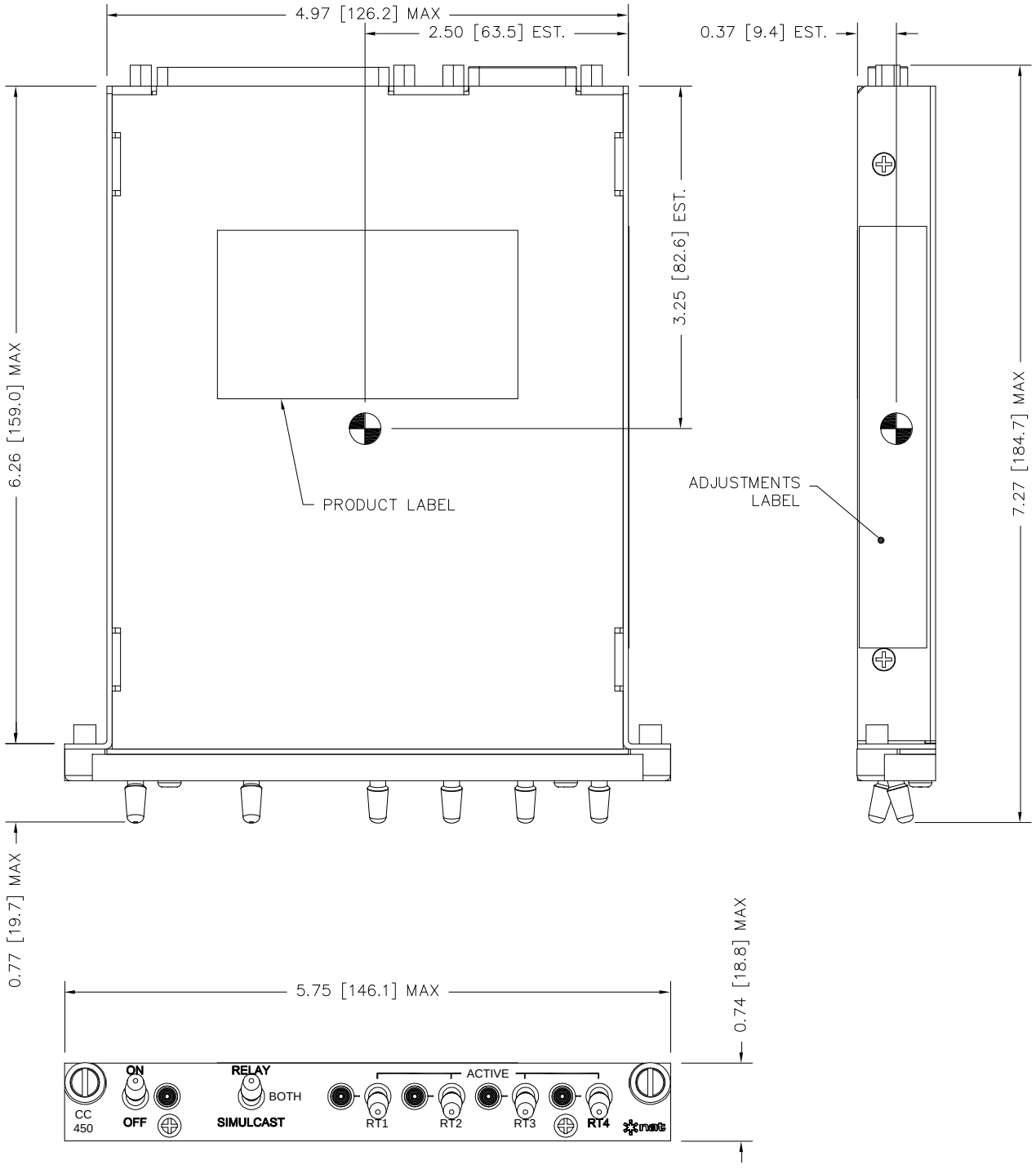
FACEPLATE TEXT
FRONT VIEW

NOTES:

1. ALL LEGENDS ARE TO BE SYMMETRICALLY LOCATED WITH RESPECT TO THE SWITCH HOLE CENTERLINES, WITH ±0.01".
2. USE TEXT FONT ARIAL 0.080" HIGH. (EXCEPT AS NOTED)
3. ALL LINES TO BE 0.015±0.005" THICK.
4. ALL TEXT AND LINES WHITE 37925, PER FED-STD-595, ALL OTHER SURFACES, EDGES AND INSIDE EDGES OF ALL THROUGH HOLES BLACK 37038, PER FED-STD-595.

DESIGNED	SRM	nat NORTHERN AIRBORNE TECHNOLOGY LTD.					
DRAWN	MWS						
DATE	JUL 28/06	TITLE	FACEPLATE TEXT				
CHECKED	NAT 249						
APPROVED	NAT 131	SIZE A	CAGE CODE 3AB01	PART NO. CC450		REV. 1.20	SHEET 3/3
FILE	905-0.DWG	DWG. TYPE	FACEPLATE	DWG. NO.	CC450\905-2		

REVISIONS			
REV	DESCRIPTION	DATE	BY
1.10	DOCCR01732 – UPDATED FACEPLATE, FORMAT CHG'S.	JUL 28/06	MWS



CENTER OF GRAVITY

NOTES:
1. DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ASME Y14.5M–1994

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	SRM
		DRAWN	MWS
		DATE	JUN 4/98
		CHECKED	NAT 249
MASS: 1.2 lbs. (524g) MAX		APPROVED	NAT 131
MATERIAL: –			
FINISH: –		FILE	922–0.DWG

NORTHERN AIRBORNE TECHNOLOGY LTD.

TITLE: COMMUNICATIONS CONTROLLER

SIZE	CAGE CODE	PART NO.	REV.	SHEET
A	3AB01	CC450–0V2	1.10	1/1

DWG. TYPE	MECH. INSTALLATION	DWG. NO.	CC450\0V2\922–0

Section 3 Operation

3.1 Introduction

Information in this section consists of the functional and operational procedures for the CC450-0V2 Communications Controller. All derivative units operate in a similar manner, but may have minor differences such as no transceiver annunciators.

3.2 General Information

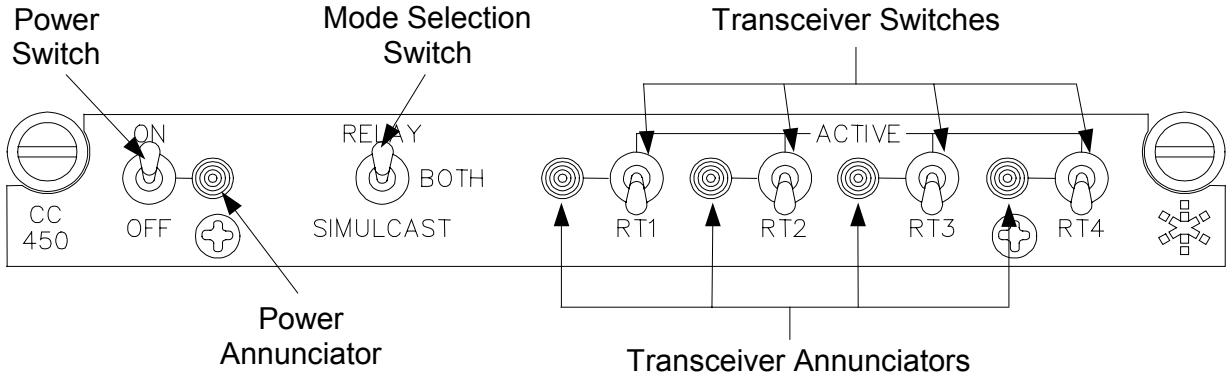
The CC450-0V2 Communications Controller is a compact, easy to install communications controller. It is designed to provide **RELAY** and/or **SIMULCAST** operation for up to 4 transceivers. With these functions, the aircraft can become an airborne repeater or a multi-frequency transmitting platform.

When used to its potential, the CC450-0V2 provides increased efficiency and reduced workload for communication operations.

3.3 Controls and Indicators

Once the function of each switch is understood, the CC450-0V2 Communications Controllers are very simple to operate.

A description of the specific switch function and operation is listed below.



3.3.1 Power Switch

Before powering up the CC450-0V2 put all transceiver switches in the down (inactive) position.

To turn the unit on, move the Power Switch to the up (ON) position. The Power Annunciator should light GREEN and the RT1 and RT2 Transceiver Annunciators should flash alternately for 0.5 seconds.

When the Power Switch is turned OFF, the CC450-0V2 will allow normal transmit and receive operation of all transceivers that are connected to the CC450-0V2.

3.3.2 Transceiver Controls

3.3.2.1 Transceiver Switches

A transceiver is selected for control at the CC450-0V2 by putting the respective Transceiver Switch in the up (ACTIVE) position.

Do not select transceivers that are turned OFF and do not select positions that do not have transceivers connected. Improper operation of all modes will occur if these transceivers are selected.

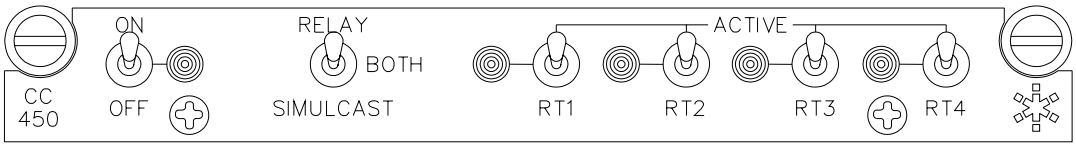
3.3.2.1 Transceiver Annunciators

Each transceiver has one annunciator to indicate the status of the transceiver. When the CC450-0V2 is ON, and the transceiver is transmitting, the annunciator will light GREEN. When the transceiver is receiving a signal, the annunciator will light ORANGE. If the transceiver is turned off, the annunciator may light orange, as the Squelch Disable line from the transceiver will float to an unknown level. The CC450-0V2 will recognize this level as an active Squelch Disable signal.

3.3.3 Mode Selection Switch

There are three operating modes for the CC450-0V2, selected by the Mode Selection switch.

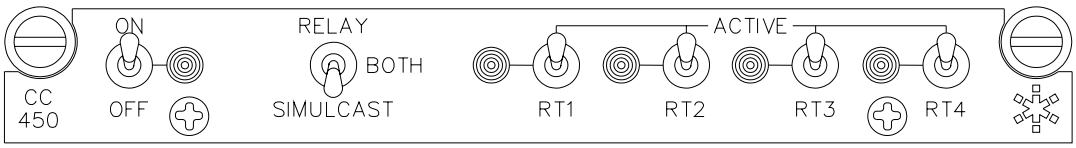
3.3.3.1 RELAY Mode



With the Mode switch in the 'up' position, the CC450-0V2 is in the **RELAY** mode. In this mode, the received audio signal from any selected transceiver is transmitted out on the other selected transceiver(s). Transmission of microphone audio is as selected by the Audio Controller.

If the microphone is keyed (PTT button pressed) for a transceiver that is transmitting a relayed audio signal, then that transceiver is taken out of the relay for the duration of the microphone key. If the microphone is keyed (PTT button pressed) for a transceiver that is receiving an audio signal to be relayed, then the relay is stopped.

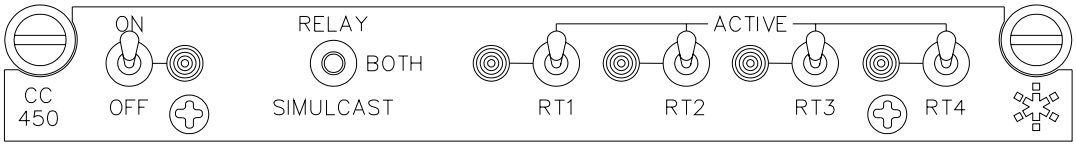
3.3.3.2 SIMULCAST Mode



With the Mode switch in the DOWN position, the CC450-0V2 is in the **SIMULCAST** mode.

In **SIMULCAST** mode, receive audio signals are not transmitted. Microphone audio is transmitted out on the transceiver as selected by the Audio Controller. If the switch on the CC450-0V2 is used to select that transceiver, then the microphone audio is transmitted on all transceivers selected at the CC450-0V2.

3.3.3.3 BOTH Mode



With the Mode switch in the centre position the CC450-0V2 is in the **BOTH** mode

In **BOTH** mode, **RELAY** and **SIMULCAST** modes are combined, with priority given to **SIMULCAST** mode.

The received audio signal from any selected transceiver is transmitted (relayed) out on the other selected transceiver(s).

Microphone audio is transmitted out on the transceiver as selected by the Audio Controller. If that transceiver is selected by the transceiver switches on the CC450-0V2, then the microphone audio is transmitted (simulcast) on all selected transceivers.

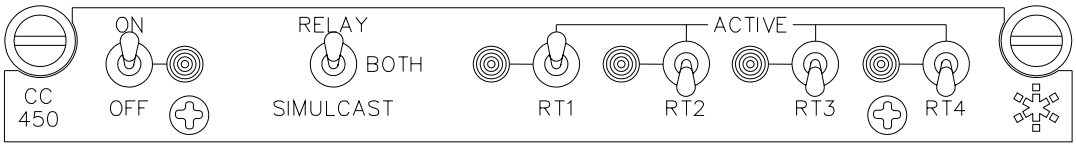
If a microphone is keyed on a selected transceiver and a relay is in progress, the relay is cancelled and the microphone audio is transmitted (simulcast) on all selected transceivers.

3.4 Alert Tones

Alert Tones are generated to indicate that the CC450-0V2 is Relaying or Simulcasting signals. During Simulcast, an alert tone is generated at the beginning of the transmission to notify the operator that his signal will be simulcast. During Relay, an alert tone is produced at the beginning of the transmission to notify receiver operators that they are receiving a relayed transmission. When the relay is over, an alert tone is transmitted out on all selected transceivers to notify the receiver operators of the end of the relayed transmission and the transmitter operator that the transmission was relayed.

3.5 Voice Store and Retransmit (VSR) [OPTIONAL]

The CC450-0V2 has the ability to store up to 60 seconds of receive audio signal from a transceiver and Retransmit that signal on the same transceiver.



To set up the CC450-0V2 for VSR operation, the mode switch must be in the **RELAY** position and only one transceiver selected as active.

Up to 60 seconds of receive audio signal from the selected transceiver will be stored. If the receive audio signal is longer than 60 seconds, then only the first 60 seconds will be stored. When the receive activity is ended, the CC450-0V2 will transmit the stored signal out on the transceiver selected as active.

Note: In earlier versions (CC450-xV1 models) this storage time was 16 seconds.

3.6 System Use

The CC450-0V2 has the ability to greatly increase the communications capability during multi-agency operations. However, care must be exercised with the use of the CC450-0V2 system to keep communications efficient. Ground based users and other parties that will be transmitting to, or receiving from the CC450-0V2, must be knowledgeable about the operating parameters of the system to avoid confusion or misunderstood communications.

Parties using the CC450-0V2 must understand that an alert tone will precede and follow each transmission. The alert tone signifies that the transmission being received is being processed through the CC450-0V2.

Operators of the CC450-0V2 should be aware that a small amount of time is required between pressing the PTT switch on the microphone, and the selected transceivers being able to transmit. During Simulcast, the CC450-0V2 delays up to one fifth of a second after it detects a PTT, then generates the alert tone. The user will hear the alert tone through the sidetone, after which speech may be transmitted.

During **RELAY** operation, a ground user should wait at least one second from pressing the **PTT** switch before speaking into the microphone. This one-second delay is required because of the extra transceivers and the CC450-0V2 in the transmission path. If the user speaks into the microphone immediately upon depressing the **PTT** button, the first few syllables may be omitted from the transmission.

Section 3 ends