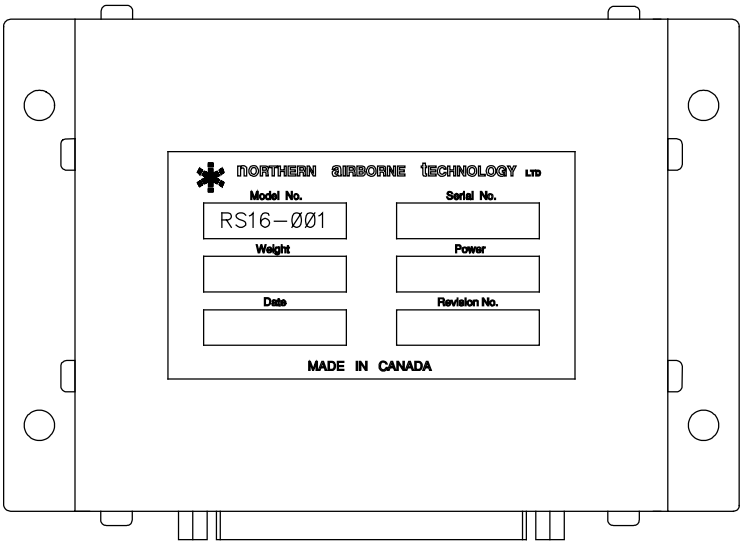
Part of
SM15

RS16 SERIES
REMOTE SWITCH



INSTALLATION AND OPERATION MANUAL

REV 4.00 November 24, 2003

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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

Insert any Amendment Instruction sheets after this page.

Table of Contents

Section 1.0 Description

1.1 Introduction

This manual contains information on the RS16 Series Remote Switch.

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

1.2 Purpose of Equipment

The RS16 is a bulkhead mounted, user definable, remote switch used to switch sixteen signals as one group or as individual groups of four. Dry nitrogen filled, gold contact, sealed relays provide dry-circuit switching to 0.5A. It is suitable for use up to 35,000 feet.

1.3 Features

The RS16 is designed to switch up to sixteen navigational and/or audio signals. Each four-pole relay has its own status annunciation for fault monitoring. Each relay can be activated by either voltage or ground keying, and has an independent ILS reversion logic switch.

Circuit boards are constructed of G10-FR (flame retardant) material, with solder masks and reflowed tin plating; they are environmentally protected with conformal coating.

1.4 Specifications

1.4.1 Electrical Specifications

Operating voltages:	+28 Vdc for each relay.
Current consumption:	20 mA / relay, 100 mA max for all (@ 28 Vdc).
Relay contacts:	0.5 A / contact max.
ILS source current:	0.1 A max.

1.4.2 Physical Specifications

Maximum dimensions, including flanges:

Height	1.20 inches (30.5 mm)
Depth	3.46 inches (87.9 mm)
Width	5.15 inches (130.8 mm)
Weight	0.44 lbs. (200g.)
Mounting	Bulkhead
Activity annunciator:	GREEN (RS16-101) or RED (RS16-102)

1.4.3 Environmental Specifications

Operating Temperature	-40°C to +70°C
Altitude	35,000 ft. max.
Humidity	95 % Non-Condensing
Shock	12 g. (any axis)

1.5 Unit Nomenclature

NOTE: The RS128 and RS192 families are derivative products that simply contain multiple RS16 cards in a single enclosure. All performance characteristics and test procedures are the same as those for the RS16.

Model	Description / Distinction
RS16-001	16P2T data switch, GREEN annunciation. Can be mapped for voltage or ground keying. ILS reversion relay.
RS16-101	16P2T data switch, card only (does NOT include enclosure), GREEN annunciation. Can be mapped for voltage or ground keying. ILS reversion relay.
RS16-102	16P2T data switch, card only (does NOT include enclosure), RED annunciation. Can be mapped for voltage or ground keying. ILS reversion relay.
RS128-000	Empty enclosure, allocated space for 8 RS16 cards. User may choose combinations of RS16 cards.
RS128-008	Pre-filled with 8 RS16-101 cards for 128P2T operation. Each RS16 card has an ILS reversion relay.
RS128-999	Pre-filled with 8 RS16-101 cards. Each RS16 card is hard-wire jumpered to the normally closed position for each of the 16 contacts (relays removed). Used to permit flight with the RS128-008 removed.
RS192-000	Empty enclosure, allocated space for 12 RS16 cards. User may choose combinations of RS16 cards.
RS192-012	Pre-filled with 12 RS16-101 cards for 192P2T operation. Each RS16 card has an ILS reversion relay.
RS192-999	Pre-filled with 12 RS16-101 cards. Each RS16 card is hard-wire jumpered to the normally closed position for each of the 16 contacts (relays removed). Used to permit flight with the RS192-008 removed.

End of section 1.0

Section 2.0 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:

- RS16 Series Remote Switch
- Warranty Card
- Release Certificate

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

2.3.2 Cautions

Do not install the RS16 without making a suitable amendment to the flight manual indicating how information transfer has been implemented in the aircraft.

2.3.3 Cabling and Wiring

For shielded wire applications, use Tefzel Mil-M-27500 or Mil-M-81044 shielded wire with solder sleeves (for shield terminations) to make the most compact and easy to terminate 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 the hood is a 'clamshell' type, and is installed **after** the wiring is complete.

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.

All wiring should be at least 24 AWG, except power and ground lines which should be at least 22 AWG. Ensure that all ground connections are clean and well secured.

Note that the maximum wire size accepted by the high density D-Subminiature connector is 22 AWG.

2.3.4 External Switches and Lamps

Switches and or annunciators must be selected to suit the application. If all lines are picked at once, a single pushbutton (alternate action) or toggle switch may be used to supply the ALL KEY line. Note that a single switch/lamp assembly can replace the transfer switch and annunciators. This should be a lighted pushbutton switch (SPST/SPDT), with positive action (i.e., push on, push off), and two legends to match the desired NAV functions.

If serving as audio key relays (for boom microphones, etc.), the unit can be triggered by in-line drop cords or other methods that supply an input to the appropriate key line.

If serving as NAV selector, annunciator lights should be connected through one or more relay contacts to ensure indication of actual relay positions.

Fuses or breakers should be 0.5 Amp max for all applications. See the installation drawings in Section 2.5.

2.3.5 Post-Installation Checks

Before connecting the RS16, check for 28 Vdc and ground on each of the respective lines in the harness (depending on your particular configuration). Refer to the applicable installation drawing in Section 2.5.

2.4 Continued Airworthiness

Maintenance of this product is on condition only. Periodic maintenance of this product is not required.

2.5 Installation Drawings

DRAWING	REV.	DESCRIPTION	TYPE
RS16001\403	-	Generic Installation Diagram	Installation (Interconnect)
RS16001\403-2	A	Active Voltage Keying Mode	Installation (Interconnect)
RS16001\403-3	A	Active Gnd Keying, ILS Reversion Function	Installation (Interconnect)
RS16001\403-4	A	Active Ground Keying Mode	Installation (Interconnect)
RS16001\405	B	RS16-001\ RS16-101\ RS16-102 Remote Switch	Connector Map
RS192\900-0	1.00	Assembled Massive Array Switch	Orthographic
RS16001\901-1	1.01	RS16-001	Assembled View
RS128\922-0	1.00	RS128 Massive Array Switch Chassis	Mech. Installation

Section 2.0 ends after these drawings

GENERIC INSTALLATION DIAGRAM FOR THE RS16-001

RS16-001 REMOTE SWITCH			
P101 DC62S			
44	WIPER 1 RELAY 1	N.C. #1 N.O. #1	23 1
45	WIPER 2	N.C. #2 N.O. #2	24 2
46	WIPER 3	N.C. #3 N.O. #3	25 3
47	WIPER 4	N.C. #4 N.O. #4	26 4
17	+V KEY #1		
39	GND KEY #1		
48	WIPER 5 RELAY 2	N.C. #5 N.O. #5	27 5
49	WIPER 6	N.C. #6 N.O. #6	28 6
50	WIPER 7	N.C. #7 N.O. #7	29 7
51	WIPER 8	N.C. #8 N.O. #8	30 8
18	+V KEY #2		
40	GND KEY #2		
52	WIPER 9 RELAY 3	N.C. #9 N.O. #9	31 9
53	WIPER 10	N.C. #10 N.O. #10	32 10
54	WIPER 11	N.C. #11 N.O. #11	33 11
55	WIPER 12	N.C. #12 N.O. #12	34 12
19	+V KEY #3		
41	GND KEY #3		
56	WIPER 13 RELAY 4	N.C. #13 N.O. #13	35 13
57	WIPER 14	N.C. #14 N.O. #14	36 14
58	WIPER 15	N.C. #15 N.O. #15	37 15
59	WIPER 16	N.C. #16 N.O. #16	38 16
20	+V KEY #4		
42	GND KEY #4		
21	+V GROUP KEY RELAYS 1-4 ONLY		
43	GND GROUP KEY RELAYS 1-4 ONLY		
22	+28VDC IN RELAY 5	ILS N.C.	62 — +28VDC OUT NORMALLY ON
60	$\overline{\text{ILS}}$ GND KEY	ILS N.O.	61 — +28VDC OUT NORMALLY OFF

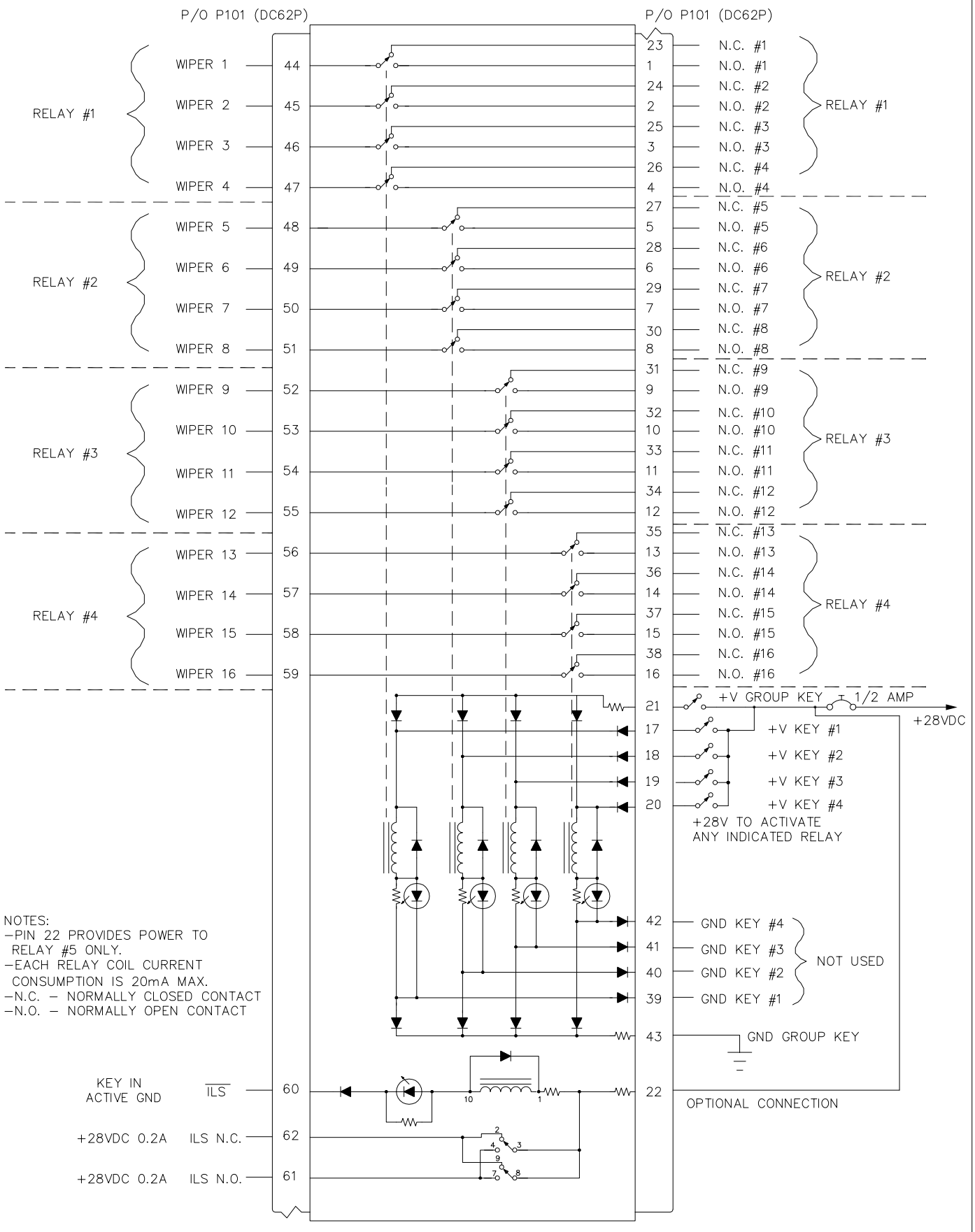
N.C. – NORMALLY CLOSED CONTACT
N.O. – NORMALLY OPEN CONTACT

200mA LOAD MAX FOR ILS N.C. PIN 62 AND ILS N.O. PIN 61

NOTE: PIN 22 PROVIDES POWER TO RELAY 5 ONLY
EACH RELAY COIL CURRENT CONSUMPTION IS 20mA MAX.

REVISION	DATE	NORTHERN AIRBORNE TECHNOLOGY LTD. 1925 KIRSCHNER RD. KELOWNA, B.C.		
		PART NUMBER	DRAWING NUMBER	FILE NUMBER
		RS16-001	RS16001\403	RS16001\403
		DESCRIPTION	SHEET	DATE
		REMOTE SWITCH	1/1	JULY 12/93
		DESIGNED BY	DRAWN BY	APPROVED BY
		K VEITCH	T BLACKSTOCK	NAT PROD

RS16-001 INSTALLATION DIAGRAM ACTIVE VOLTAGE KEYING MODE

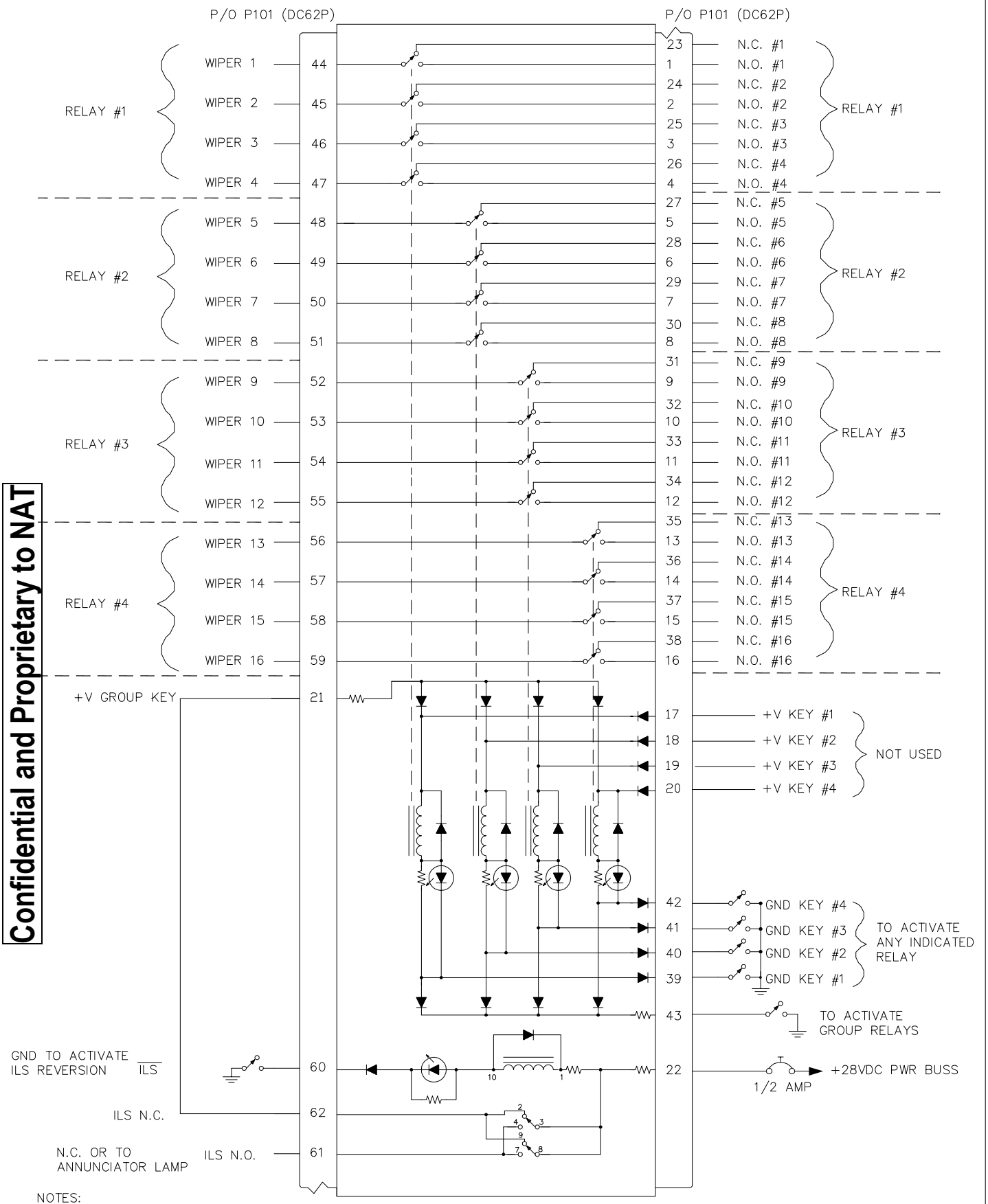


REVISION	DATE
A	AUG 16/93

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

PART NUMBER	DRAWING NUMBER	FILE NUMBER
RS16-001	RS16001\403-2	RS16001\403-2A
DESCRIPTION	SHEET	DATE
INSTALLATION	1/1	JULY 14/93
DESIGNED BY	DRAWN BY	APPROVED BY
K VEITCH	T BLACKSTOCK	NAT PROD.

RS16-001 INSTALLATION. ACTIVE GROUND KEYING, WITH ILS REVERSION FUNCTION



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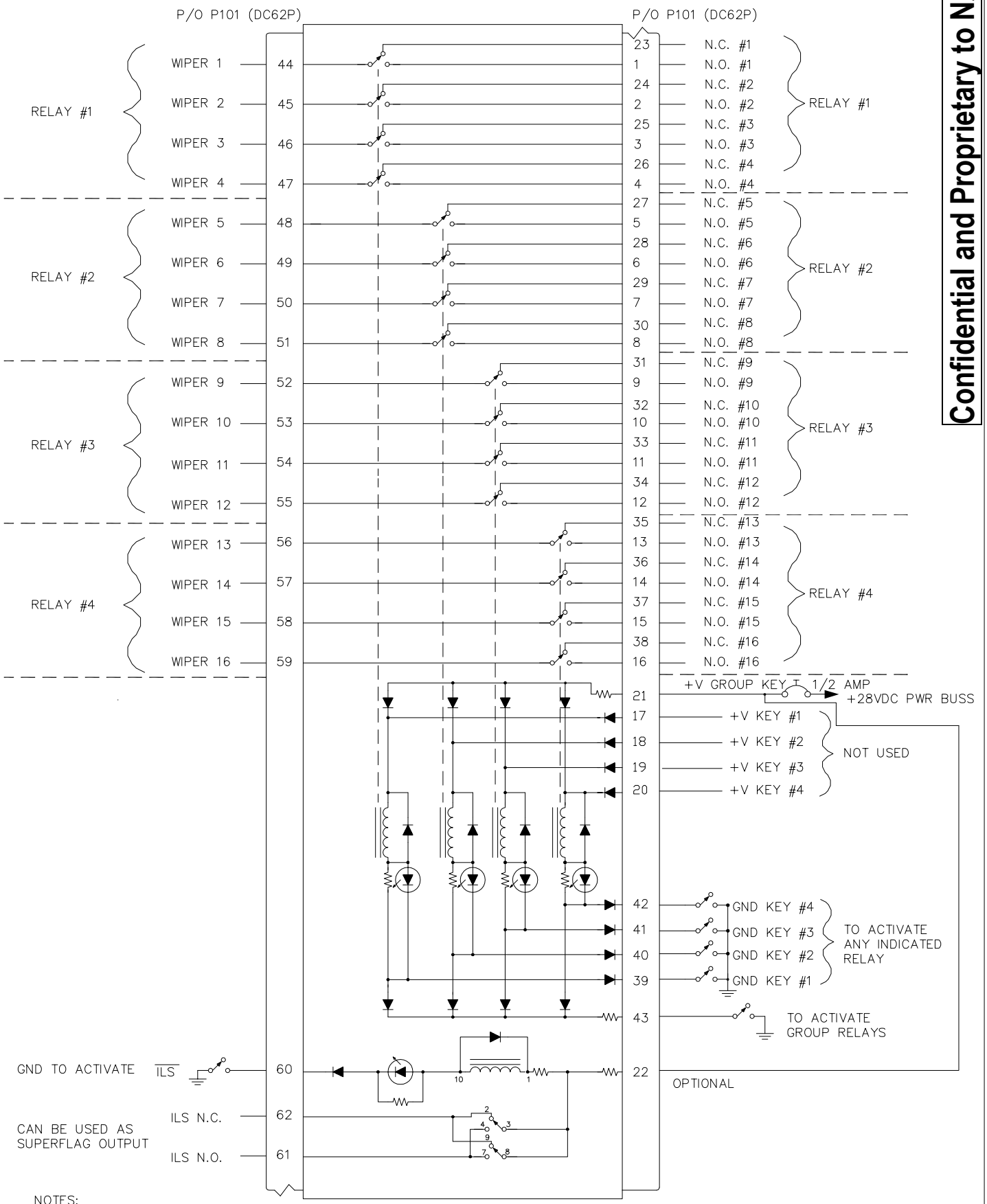
NOTES:
- PIN 22 PROVIDES POWER TO RELAY #5 ONLY.
- EACH RELAY COIL CURRENT CONSUMPTION IS 20mA MAX.
- N.C. – NORMALLY CLOSED CONTACT
- N.O. – NORMALLY OPEN CONTACT

REVISION	DATE
A	AUG 16/93

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

PART NUMBER	DRAWING NUMBER	FILE NUMBER
RS16-001	RS16001\403-3	RS16001\403-3A
DESCRIPTION	SHEET	DATE
INSTALLATION	1/1	JULY 14/93
DESIGNED BY	DRAWN BY	APPROVED BY
K VEITCH	T BLACKSTOCK	NAT PROD.

RS16-001 INSTALLATION DIAGRAM ACTIVE GROUND KEYING MODE



NOTES:
- PIN 22 PROVIDES POWER TO RELAY #5 ONLY.
- EACH RELAY COIL CURRENT CONSUMPTION IS 20mA MAX.
- N.C. – NORMALLY CLOSED CONTACT
- N.O. – NORMALLY OPEN CONTACT

REVISION	DATE
A	AUG 16/93

NORTHERN AIRBORNE TECHNOLOGY LTD.
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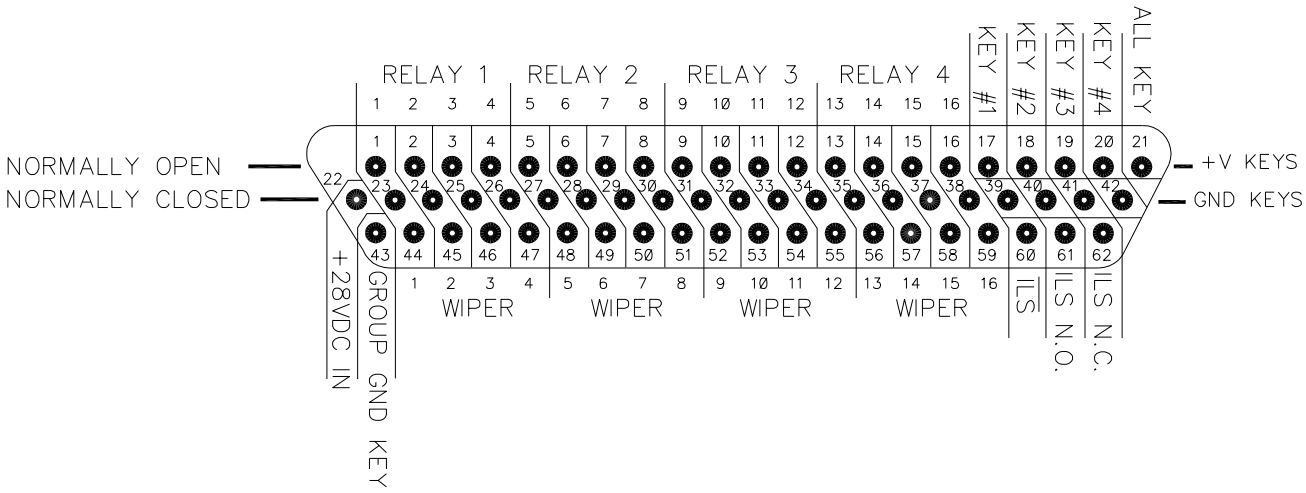
PART NUMBER	DRAWING NUMBER	FILE NUMBER
RS16-001	RS16001\403-4	RS16001\403-4A
DESCRIPTION	SHEET	DATE
INSTALLATION	1/1	JULY 14/93
DESIGNED BY	DRAWN BY	APPROVED BY
K VEITCH	T BLACKSTOCK	NAT PROD.

RS16-001\RS16-101\RS16-102
CONNECTOR MAP



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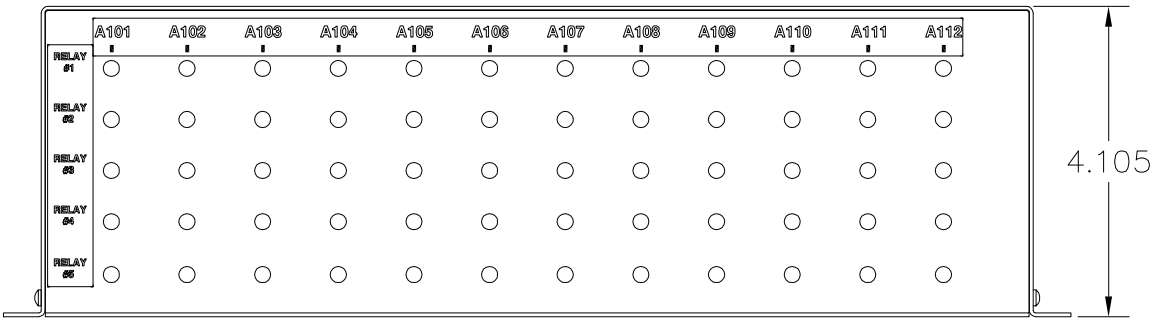
NOTE: VIEW IS THE REAR OF THE HARNESS CONNECTOR

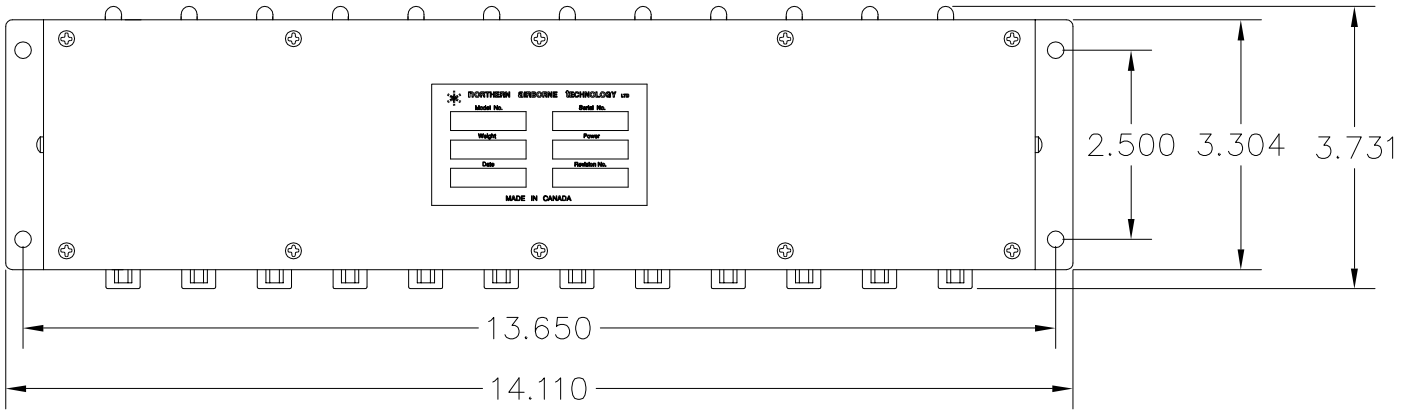
REVISION	DATE
B	AUG 9/93

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

PART NUMBER	DRAWING NUMBER	FILE NUMBER
RS16-001	RS16001\405	RS16001\405B
DESCRIPTION	SHEET	DATE
CONNECTOR MAP	1/1	JULY 13/93
DESIGNED BY	DRAWN BY	APPROVED BY
K VEITCH	K VEITCH	NAT R&D



REAR VIEW



TOP VIEW

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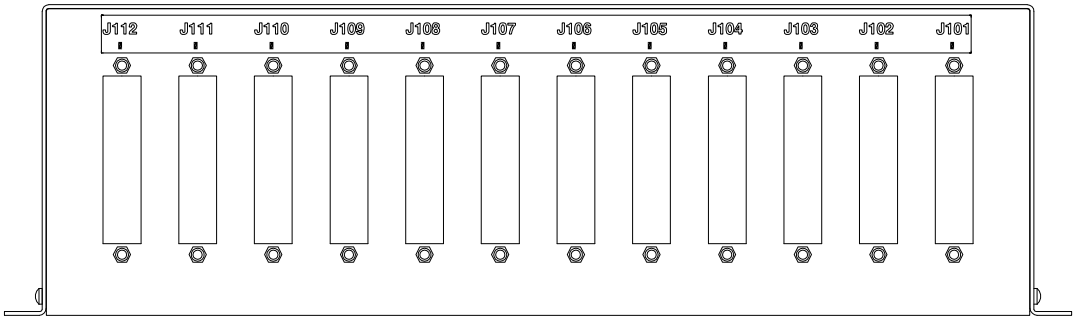


FRONT VIEW

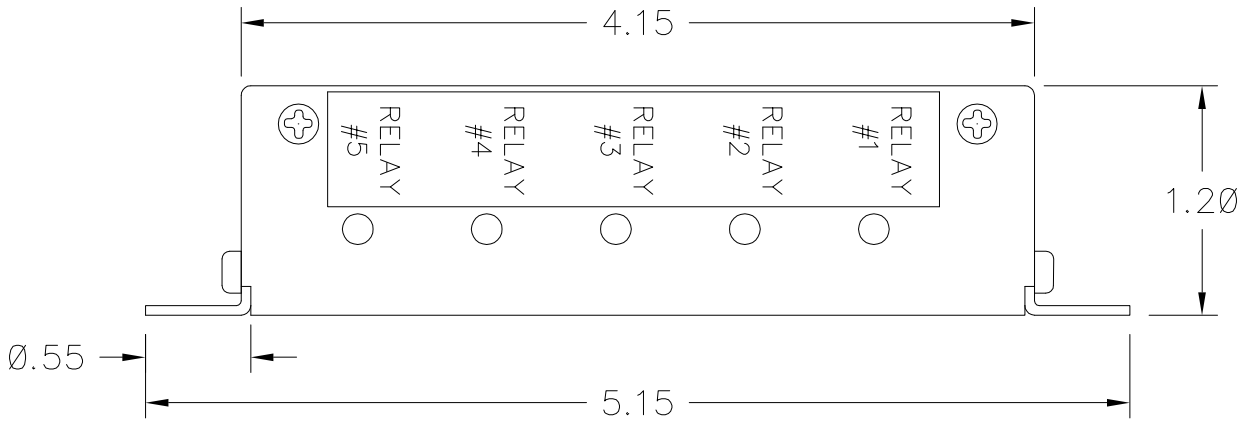
REVISION	DATE	TOLERANCES UNLESS STATED OTHERWISE
1.00	OCT 19/93	0.X=+/−0.030 DIM. IN INCHES 0.XX=+/−0.010 0.XXX=+/−0.005 0.XXXX=+/−0.0005 ANGLE=+/− 0.5 DEG.

MATERIAL/FINISH

*nat NORTHERN AIRBORNE TECHNOLOGY LTD.

DESIGNED BY	DESCRIPTION		
DAVE VEITCH	ASSEMBLED MASSIVE ARRAY SWITCH		
DRAWN BY	PART NUMBER	DRAWING TYPE	SHEET
D. V. / T. B.	RS192	ORTHOGRAPHIC	1/1
APPROVED BY	DRAWING NUMBER	FILE NUMBER	
NAT R&D	RS192\900−0	RS192\900−0100	

FRONT VIEW



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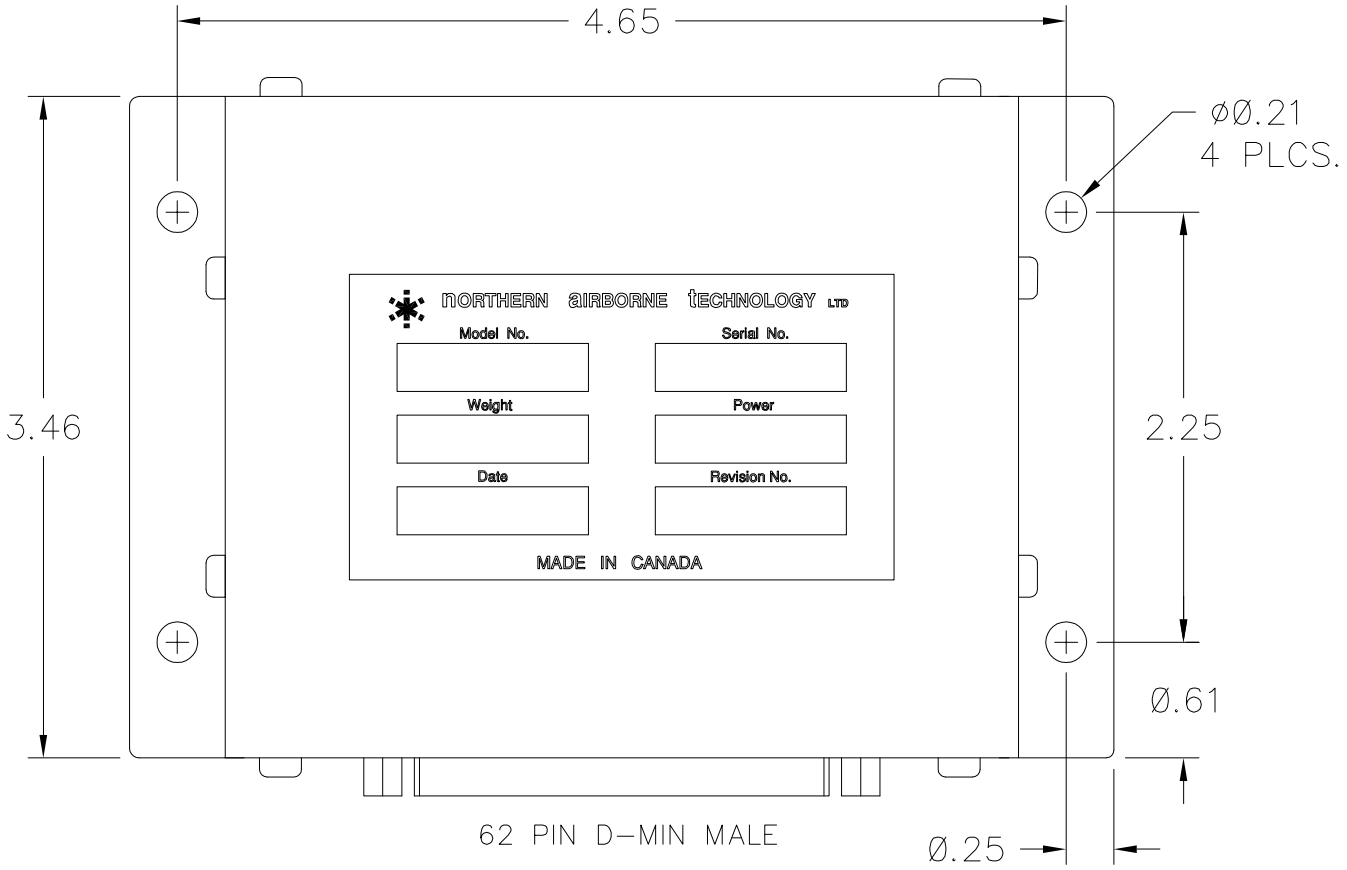
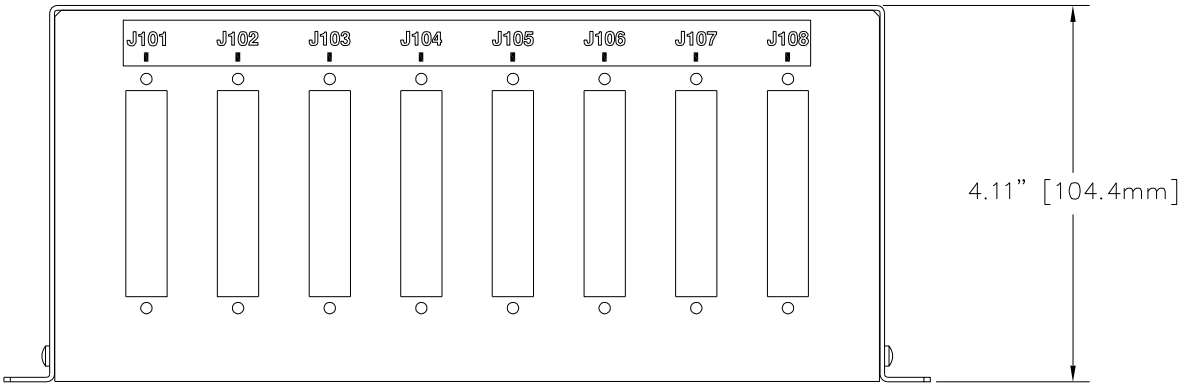
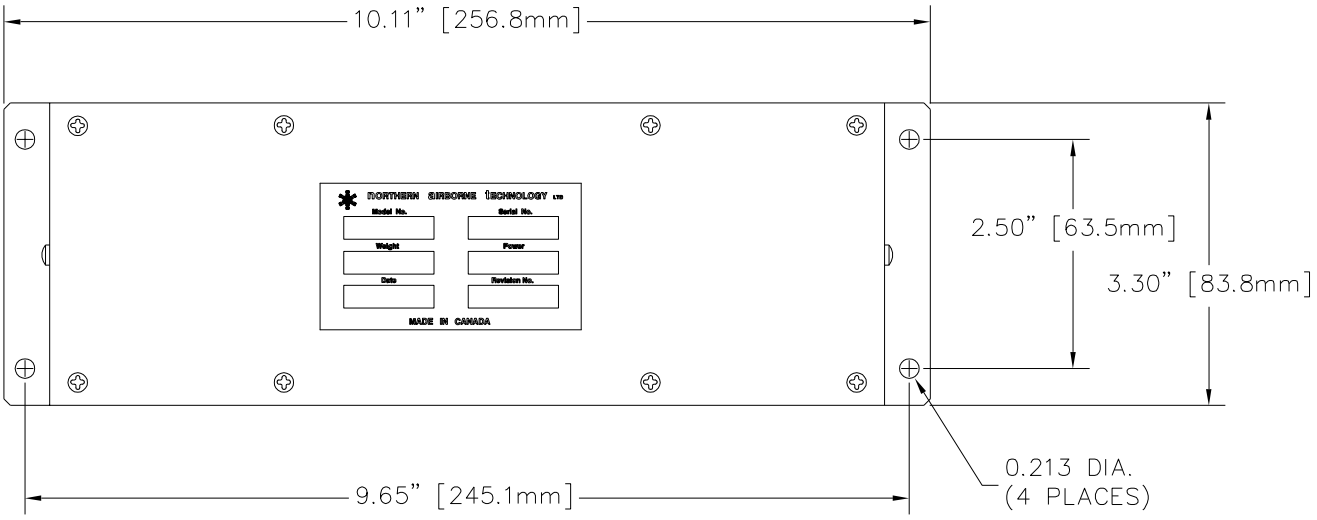
TOP VIEW



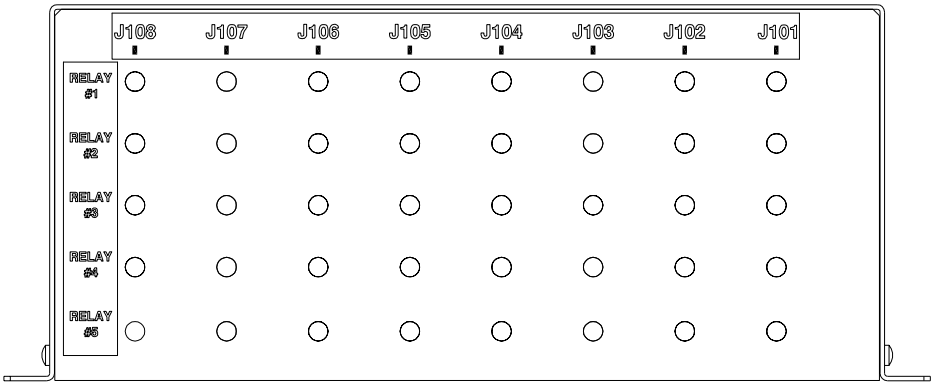
REVISION	DATE	nat NORTHERN AIRBORNE TECHNOLOGY LTD.			
1.00	AUG 18/93	DESIGNED BY	DESCRIPTION		
1.01	APR 21/94	D. VEITCH	RS16001 MECHANICAL VIEW		
		DRAWN BY	PART NUMBER	DRAWING TYPE	SHEET
		DV/TB	RS16001	ASSEMBLED VIEW	1/1
		APPROVED BY	DRAWING NUMBER		FILE NUMBER
		NAT 107	RS16001\900-1		RS16001\901-1101



REAR VIEW



TOP VIEW



FRONT VIEW

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: DV DRAWN: TGM DATE: APR 26/99 CHECKED: NAT 214 NAT PROD. 105	nat NORTHERN AIRBORNE TECHNOLOGY LTD. TITLE: MASSIVE ARRAY SWITCH CHASSIS				
MATERIAL FINISH		APPROVED: NAT 107	SIZE: A	CAGE CODE: 3AB01	PART NO.: RS128	REV.: 1.00	SHEET: 1/1
		FILE: 922−0100.DWG	DWG. TYPE: MECH. INSTALLATION		DWG. NO.: RS128\922−0		

Section 3.0 Operation

3.1 Introduction

Information in this section consists of the functional and operational procedures for the RS16 Remote Switch.

3.2 General

This section only describes the basic operation of the RS16 series of remote switches because the product is user definable in its applications. This section will describe the two available keying methods. Please note that only one keying method can be used on each RS16 board; however if the unit is a RS128 or a RS192 each of the individual RS16 boards within can use a different keying method.

The RS16 has a total of five relays; one ILS reversion relay, and four user relays. The four user relays will be referred to as the *GROUP* relays in the following descriptions.

If used for GPS/LORAN/VLF switching, the unit may have to be wired to return to the VOR/ILS mode when the navigation receiver is channeled to an ILS frequency. Check local aviation regulations regarding this requirement.

NOTE: ILS reversion mode is not applicable in Canada for NAV/GPS installations.

3.2.1 Active Voltage Keying

Refer to installation drawing number RS16001\403-2. In the active voltage keying mode the coils of the *GROUP* relays are all grounded together by grounding pin 43. To key all four relays at once apply 28 VDC to pin 21. To individually key each relay apply 28VDC to pin 17, pin 18, pin 19, and/or pin 20 as required.

3.2.2 Active Ground Keying

Refer to installation drawing numbers RS16001\403-3 and RS16001\403-4. The *GROUP* of relays is powered by providing 28 Vdc to pin 21. To key all four relays at once ground pin 43. To individually key each relay ground pin 39, pin 40, pin 41, and/or pin 42 as required. Drawing number RS16001\403-3 shows the ILS reversion function; If pin 60 is grounded in an ILS reversion action the *GROUP* of relays become de-energized. This returns all the wipers to the N.C. (normally closed) contacts.

3.3 Limitations

The RS16 series remote switch imposes no limitations on the original airframe.

3.4 Emergency Procedures

The RS16 series remote switches do not affect the emergency procedures of the aircraft. Flight personnel should be made aware of the function of the RS16, if it is used to switch navigation signals.

3.5 Performance

The RS16 series remote switches do not affect the performance of the aircraft.

End of Section 3.0