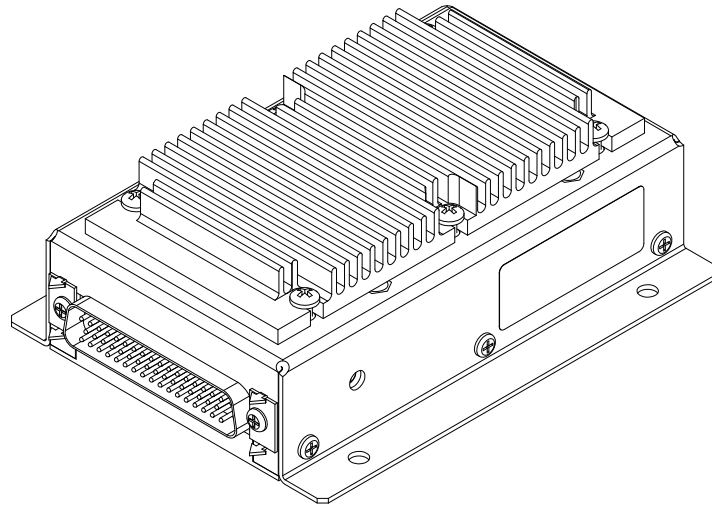




Installation and Operation Manual

LD12-002 LED Dimmer



SM85

ISSUE 1.00

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LD12-002 LED Dimmer
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Section 1 Description

1.1 Introduction

Information in this section consists of product description, design features and specifications for the LD12-002 LED Dimmer. All derivative product information will be contained in the applicable manual supplement, which may be obtained from Northern Airborne Technology Ltd. as required.

Review all notes, warnings and cautions.

1.2 Purpose of Equipment

The LD12-002 is a remote mounted light dimmer module, designed for complicated annunciator requirements in Loran / GPS systems. The unit is capable of controlling 12 independent LEDs with full test function. In its basic mode of operation, the LD12-002 can be used as a bulk LED dimmer, outputting up to 1 amp of current. The LD12-002 unit can be easily interfaced with all NAT RS-series remote switch products used in Loran / GPS installations.

1.3 Features

Internal logic is provided to interface to both the floating LED connections of the PB08, and annunciators triggered by a ground output. An adjustable LED dimmer is provided to drive twelve separate 28 Vdc/50 mA LED lines.

The dimmer may be operated in the preset mode (typically set in the 12-24 V range), or as an adjustable dimmer via an external control. A single switch can be used to select day, night, and LED test functions.

The day operation mode also provides regulated 24 Vdc for all LEDs, to prevent early LED failure and internal LED blackening from excessive voltage.

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

Circuit boards are constructed of G10-FR (flame retardant) material, with solder masks, reflowed tin plating, and environmental post-coating.

1.4 Specifications

1.4.1 Electrical Specifications

Input Power	+24.8 Vdc to +30 Vdc, +27.5 Vdc nominal (reverse and over voltage protection)
Input Current	50 mA idle (2 A max.)
Inputs	
Test Keyline	Active low input. Grounding this pin will cause all LEDs to illuminate at full brightness.



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Dimmer	Active low input. Grounding this pin will cause the internal preset dimmer voltage to be supplied to all LEDs.
Dimmer Ground	Provides a convenient ground return for the dimmer controls.
LED Power In	Direct connection to internal LED bus.
LED Keys	Active low keyline. Grounding this pin will cause the selected LED to illuminate. Current drawn will depend on type of LED used in circuit. Pin should be left open when unused.
Outputs	
LED Outputs	0 mA to 50 mA of current to 2 floating LED circuits and 10 ground keyed circuits for system annunciators.
Dimmer Out	Direct connection to dimmer circuit output. Provides up to 1 A of current.

1.4.2 Physical Specifications

Height	1.78 inches (45.1 mm) max
Length	5.29 inches (134.4 mm) max
Width	3.99 inches (101.3 mm) max including flanges
Weight	0.84 lbs (380 g) max
Mounting	Bulkhead attachment (4 x 10-32 screws)

1.4.3 Environmental Specifications

Temperature	-15° C to +70° C (ambient) -55° C to +85° C (survival)
Altitude	50,000 feet max
Humidity	95% Non-condensing Cat. A
Vibration	Conforms to DO-160C, Cat. B, M, N

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 LD12-002 LED Dimmer.

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 Northern Airborne Technology Ltd. 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 Northern Airborne Technology Ltd. or its designated warranty repair center, or any labour to remove or re-install the defective unit in the aircraft. Contact Northern Airborne Technology Ltd. for any questions regarding this warranty, its applicability to your units and/or for return authorization. Northern Airborne Technology Ltd. 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 NORTHERN AIRBORNE TECHNOLOGY LTD. DEALER.** Product for which a warranty card is not returned shall be warranted from date of manufacture.

2.3 Continued Airworthiness

Maintenance of the LD12-002 LED Dimmer is 'on condition' only. Periodic maintenance of this product is not required.

2.4 Installation Procedures

Installation Notice

This product must be installed in accordance with the installation instructions provided in the latest issue of this Installation and Operation Manual. Check the Publication Index at www.northernairborne.com for the issue status of the manual. The latest issue of the manual may be downloaded from the same website. All risk associated with installation of this product contrary to these instructions shall be the responsibility of the installing agency.



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2.4.1 Warnings

N/A

2.4.2 Cautions

CAUTION:

Do not bundle **any lines from this unit** with transmitter coax lines. Do not bundle any logic 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.

CAUTION:

Do not install the LD12-002 without making a suitable amendment to the flight manual indicating how the NAV annunciation and dimming/ test functions have been implemented in the aircraft.

CAUTION:

Ensure that no press-to test lamp holders with incandescent lamps have been used in the aircraft. These can cause the line(s) to be shorted to ground, which may damage the internal circuitry of the LD12-002.

2.4.3 Cabling and Wiring

Note: In order to minimize wiring, the unit should be located close to the annunciators it will be dimming. It should not be mounted near hot air paths, as substantial heat dissipation is required.

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 interconnect drawing in Section 2.7 as required.

Allow 3" from the end of the shielded wiring to the shield termination to allow the connector hood to be easily installed. Refer to 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.

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

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



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2.4.4 Lighting Mode Switch

The normal installation of the LD12-002 assumes the installation of a remote momentary SPDT centre-off toggle switch, used to select from the following modes:

MODE SWITCH POSITION	FUNCTION
DIM	Selects night flying LED levels. See section 2.5
NORM	Selects day flying LED levels (full brightness).
TEST	Tests functionality of all LEDs. All LEDs ON (full brightness).

The centre-off position of the switch should correspond to the **NORM** position.

The mode switch should be spring loaded in the **TEST** position so that it will return to the **NORM** position when released. Alternatively, the **DIM** function can be selected by a separate switch, or tied into another switch function, and the LED test can be activated by a momentary pushbutton switch.

The **DIM** position can also have a level control connected in series with the switch, to permit local adjustment of the night flying LED level. The switch may also be integral with the level control to conserve panel space.

2.4.5 Optional Dimmer Adjustment

Inserting a 10 k Ω , 1/2 W linear taper potentiometer between the dimmer input and ground will allow external adjustment of the dimming voltage. If using an external adjustment, ensure that the internal trimpot is set for minimum voltage output (rotated fully ccw).

2.4.6 Optional Emergency Bypass Switch

An optional external single-pole single-throw toggle switch can be installed to route an external voltage to the LEDs if the dimmer should fail.

2.4.7 Post-Installation Checks

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.

2.4.7.1 Voltage/Resistance Checks

Do not attach the LD12-002 until the following conditions are met.

Check the following:

- Check P1 pin <1> for +28 Vdc relative to ground.
- Check P1 pin <34> for continuity to ground (less than 0.5 Ω).
- Check J1 pin<2> for 28 Vdc LED power from lighting bus.
- Ensure that no short circuits exist on any line (Lamp HI to lamp LO or to ground).



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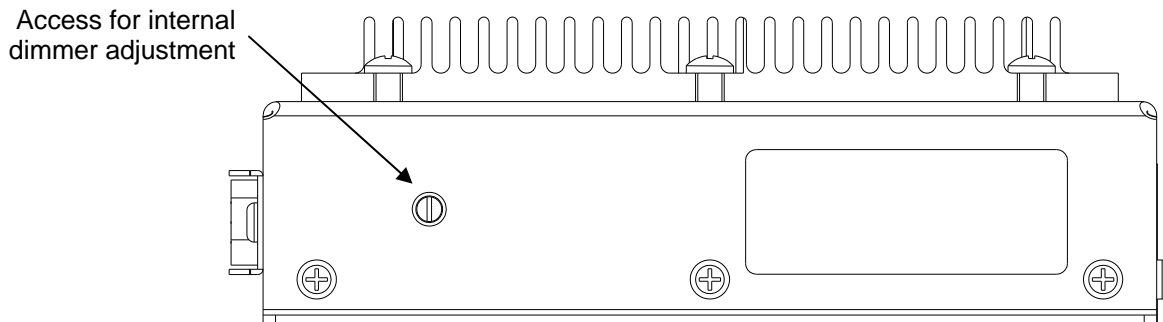
2.4.7.2 Power On Checks

Power up the aircraft's systems and confirm normal operation of all functions of the LD12-002.

- Select the **TEST** position on the mode switch and check that all LEDs are functioning.
- Select the **NORM** position on the mode switch; LEDs that are activated should be fully illuminated.
- Select the **DIM** position on the mode switch and adjust the dimmer pot; the active LEDs should track the dimmer pot.
- Make sure unit is securely fastened and that the connector locks are correctly mated before any flight is attempted.

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

2.5 Adjustments and Connections



The dimming voltage (and therefore the dimming level) of the LD12-002 may be adjusted by rotating an internal trimpot, which can be accessed through an opening in the cover. To select minimum voltage output, the trimpot is rotated fully counterclockwise (ccw), and for maximum voltage output the trimpot is rotated fully clockwise (cw).

See section 2.4.4 for lighting mode switch information.

2.6 Accessories Required But Not Supplied

Installation kit p/n **D50SV-IKC** (crimp) is required to complete the installation. The kit consists of the following:

Quantity	Description	NAT Part No.
1	D-min 50 Socket Housing	20-21-050
50	MS Crimp Socket	20-26-901
1	50 Pin JVL Hood/Locklever	20-29-500



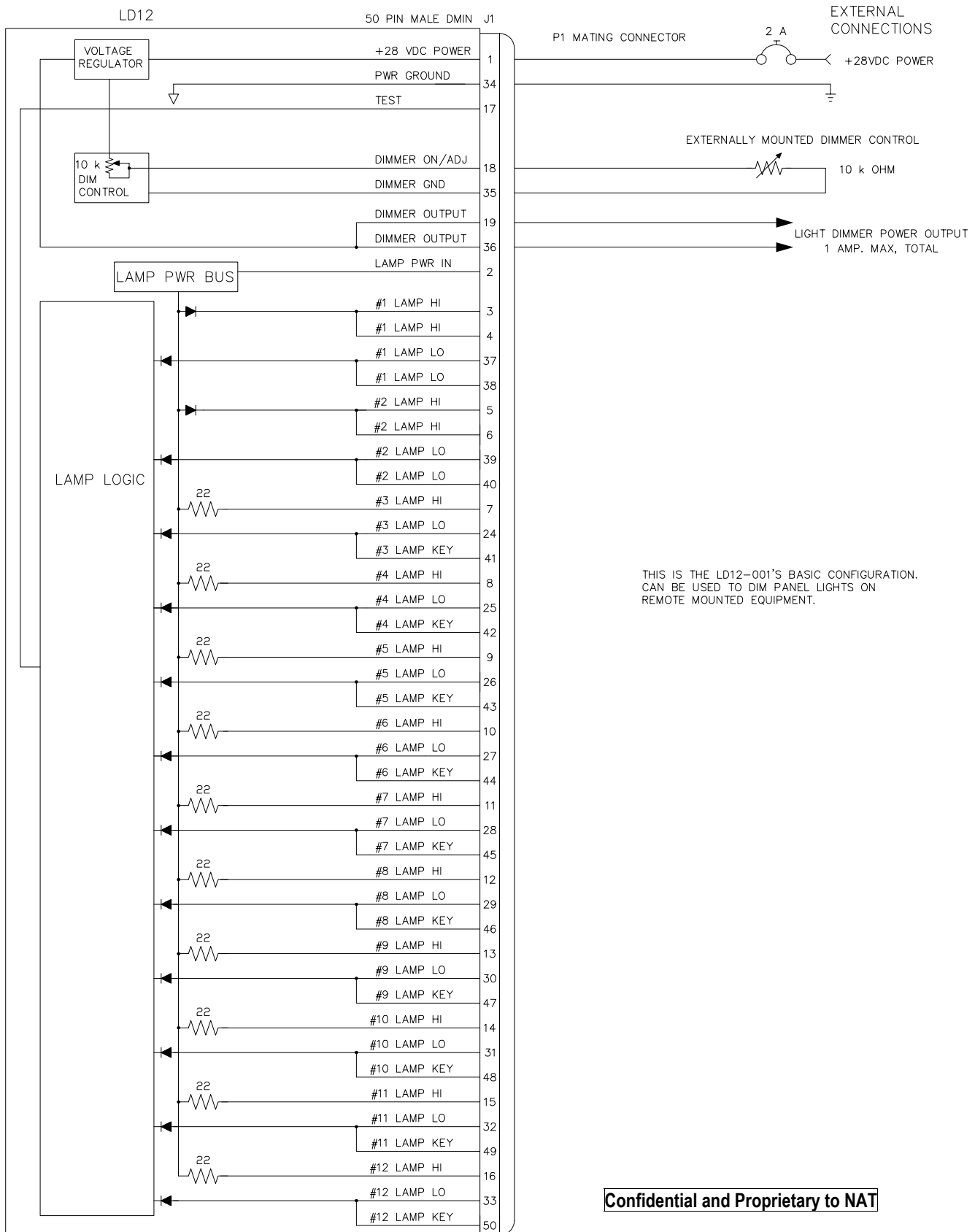
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2.7 Installation Drawings

Note: The LD12-002 LED Dimmer uses some installation drawings from the LD12-001 Lamp Dimmer.

DOCUMENT	REV.	DESCRIPTION	TYPE
LD12\001\403-0	1.00	Lamp Dimmer - External Dimming	Interconnect
LD12\001\403-1	1.00	Lamp Dimmer with RS08 - External Dimming	Interconnect
LD12\001\405-0	1.00	Lamp Dimmer	Connector Map
LD12\002\922-0	1.00	LED Dimmer	Mechanical Installation

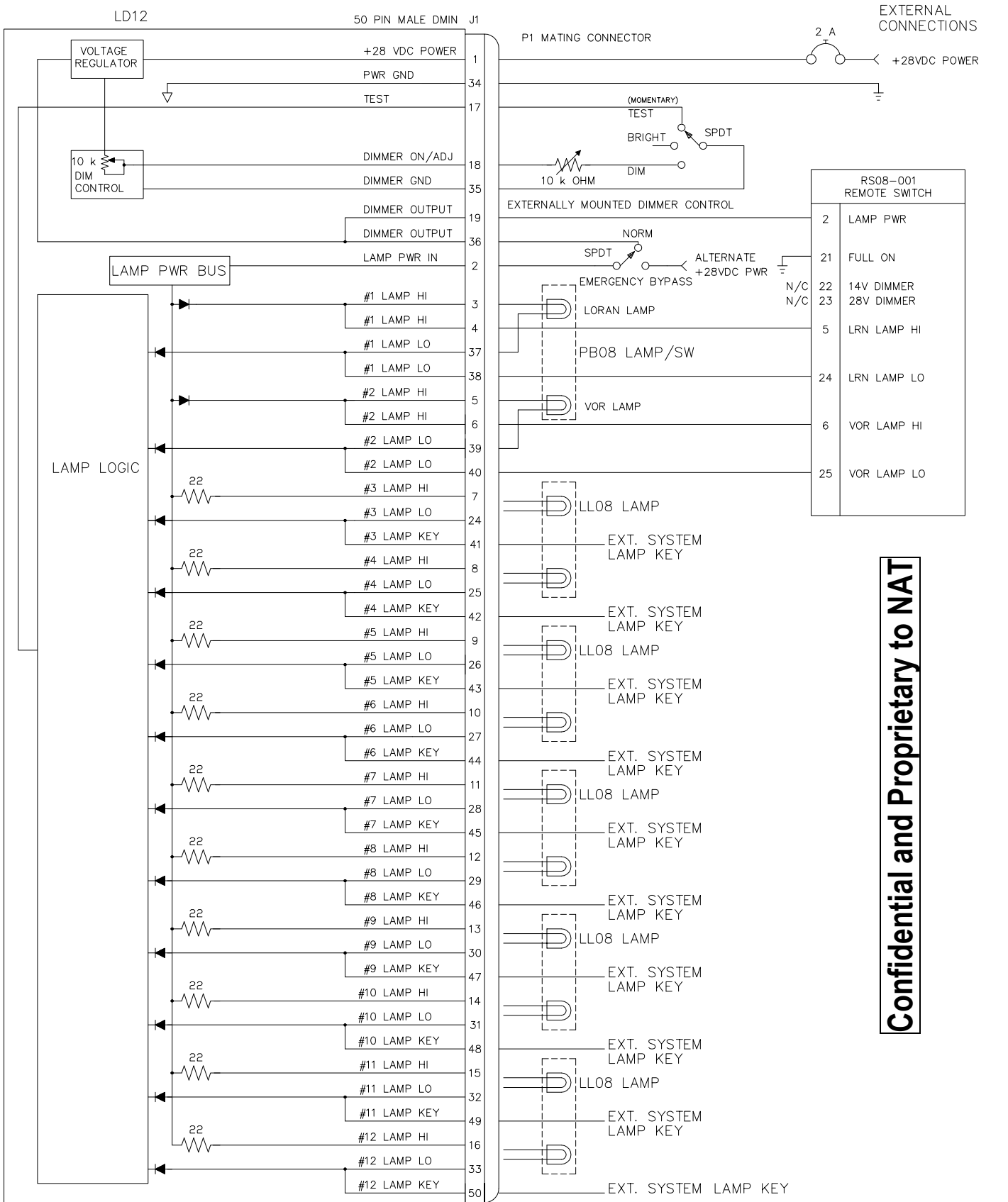
Section 2 ends following the above documents



THIS IS THE LD12-001'S BASIC CONFIGURATION.
CAN BE USED TO DIM PANEL LIGHTS ON
REMOTE MOUNTED EQUIPMENT.

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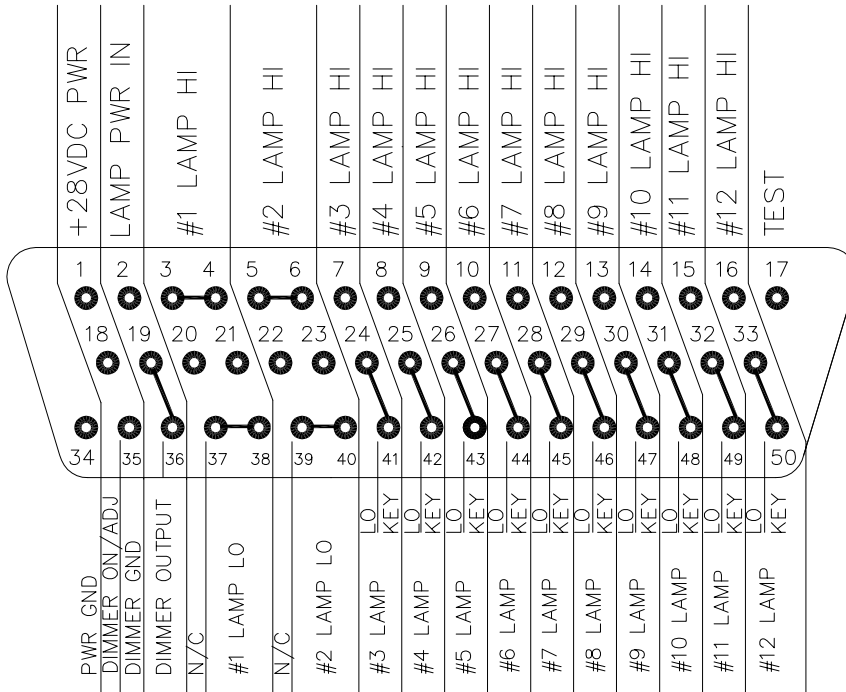
REVISION	DATE	*nat NORTHERN AIRBORNE TECHNOLOGY LTD.			
1.00	DEC 13/95	DESIGNED BY	DESCRIPTION		
		K VEITCH	LAMP DIMMER – EXTERNAL DIMMING		
		DRAWN BY	PART NUMBER	DRAWING TYPE	SHEET
		K VEITCH	LD12-001	INTERCONNECT	1/1
		APPROVED BY	DRAWING NUMBER	FILE NUMBER	
			LD12\001\403-0	LD12\001\403-0100	



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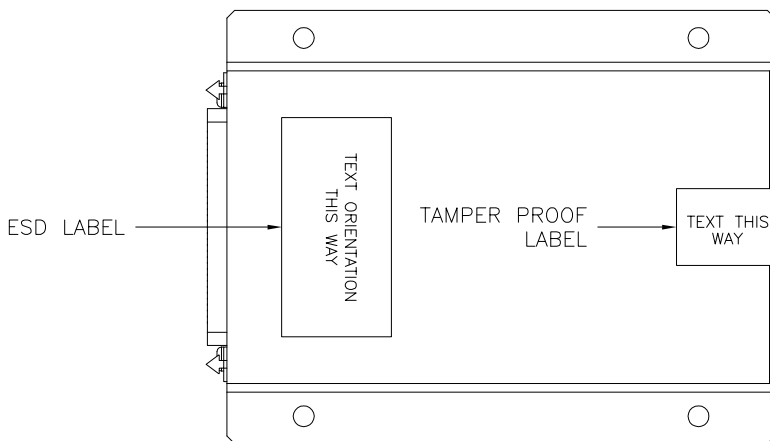
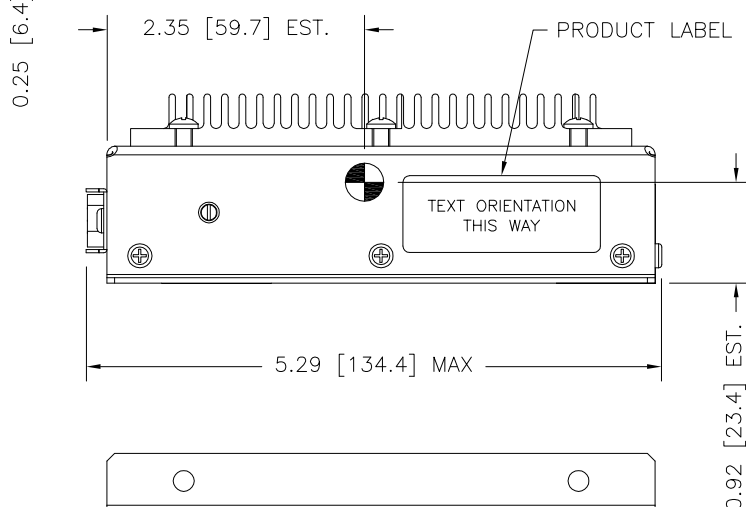
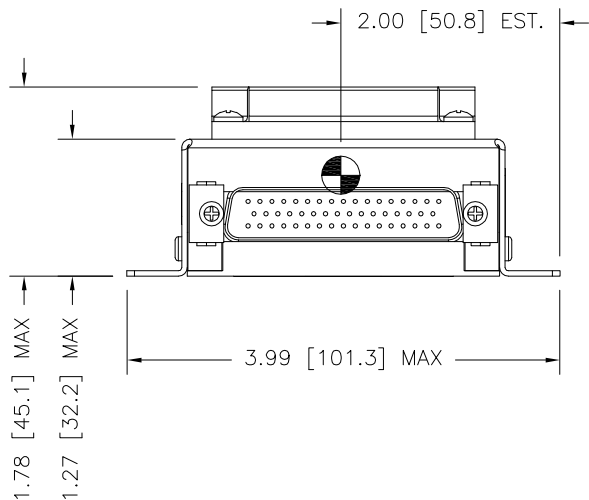
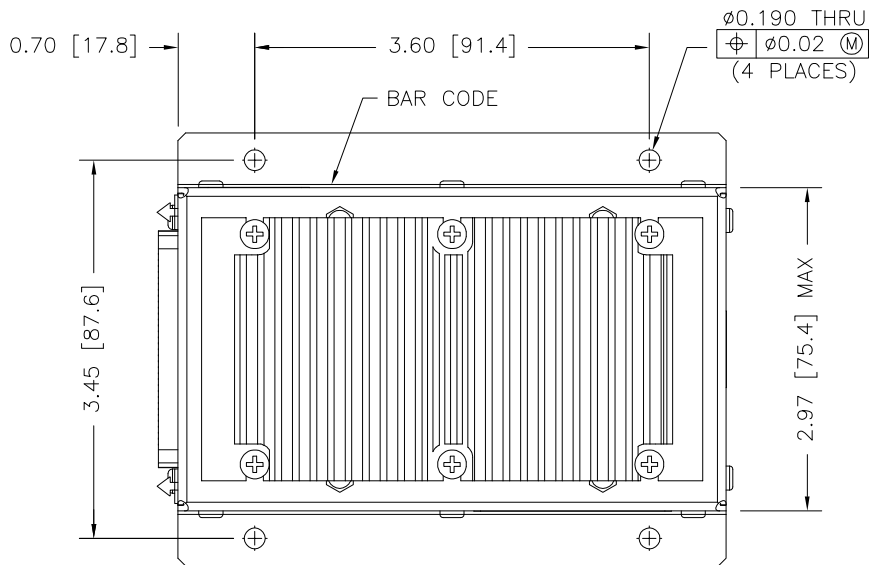
REVISION		DATE		*nat NORTHERN AIRBORNE TECHNOLOGY LTD.			
1.00		DEC 13/95		DESIGNED BY		DESCRIPTION	
				K VEITCH		LAMP DIMMER WITH RS08 - EXTERNAL DIMMING	
				DRAWN BY		PART NUMBER	DRAWING TYPE
				K VEITCH		LD12-001	INTERCONNECT
				APPROVED BY		DRAWING NUMBER	FILE NUMBER
				NAT 107		LD12\001\403-1	LD12\001\403-1100
							1/1

J1



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REVISION	DATE	*nat NORTHERN AIRBORNE TECHNOLOGY LTD.			
1.00	DEC 14/95	DESIGNED BY	DESCRIPTION		
		KDV	LAMP DIMMER		
		DRAWN BY	PART NUMBER	DRAWING TYPE	SHEET
		KDV	LD12-001	CONNECTOR MAP	1/1
		APPROVED BY	DRAWING NUMBER	FILE NUMBER	
		NAT 107	LD12\001\405-0	LD12\001\405-0100	



- NOTES:
 1. DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ASME Y14.5M-1994
 2. WEIGHT: 0.84 lbs. (0.38Kg.) MAX
 0.69 lbs. (0.31Kg.) MIN

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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	DESIGNED	KV	NORTHERN AIRBORNE TECHNOLOGY LTD.				
	THIRD ANGLE PROJECTION	DRAWN	MWS					
		DATE	MAR 09/10	TITLE				
		CHECKED	NAT 255	LED DIMMER				
WEIGHT (MASS): SEE NOTE 2.	APPROVED	FILE	922-0.DWG	SIZE	CAGE CODE	PART NO.	REV.	SHEET
MATERIAL: -				NAT 114	A	3AB01	LD12-002	1.00
FINISH: -				DWG. TYPE	MECH. INSTALLATION	DWG. NO.	LD12\002\922-0	



**LD12-002 LED Dimmer
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Section 3 Operation

3.1 Introduction

Information in this section consists of functional and operational procedures for the LD12-002 Lamp Dimmer.

3.2 General Information

The LD12-002 Lamp Dimmer has no operator accessible controls. During installation, it may be determined that internal level adjustments are required. Qualified personnel only shall complete internal level adjustments.

Section 3 ends
