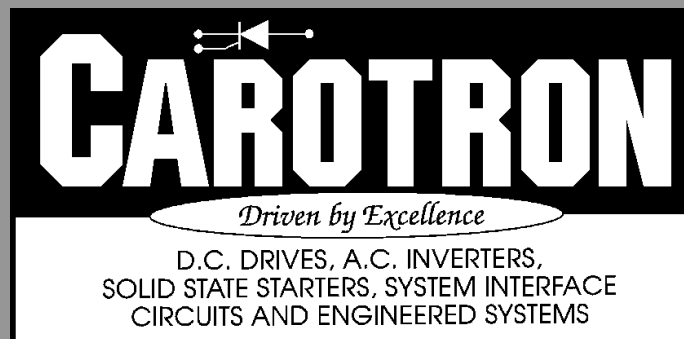


Load Cell Amplifier Module

**Instruction Manual
LCA210-000**



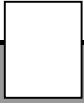


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1

General Description

Model LCA210-000 Load Cell Amplifier Module is designed for applications where signal conditioning of a single channel is required, while maintaining electrical isolation between the input and output signals. Designed for a wide variety of input signals, the LCA210-000 can accept the following types of inputs:

- Potentiometer
- D.C. Voltage
- Load Cell (Strain Gauge & LVDT type)

The LCA210-000 also provides an adjustable excitation voltage source when using load cells. The input signal is conditioned by scaling circuits which can be modified via multi-turn OFFSET, BIAS, and GAIN potentiometer adjustments. Terminal strip connections are provided for an optional external TRIM pot. The output circuit can be configured to source either a voltage or current. Typical output ranges are 0 to ± 10 VDC, 0 to 20 mADC, or 4 to 20 mADC.

2

Specifications

2.1 Electrical

D.C. Power Input

24 VDC $\pm 10\%$, 400mA max, internally fused

Isolation Voltage

500V (DC or AC Peak)

Linearity

$\pm 0.5\%$ of 10 VDC span

Excitation Voltage

Voltage adjustable via Volt. Adjust potentiometer from 5 to 12 VDC, 100mA max

Signal Input

6 selectable gain ranges (via J1) with

Input Range	J1 Gain
± 12 VDC	1
± 1.2 VDC	10
± 250 mVDC	50
± 125 mVDC	100
± 25 mVDC	500
± 12.5 mVDC	1000

Table 1

- **Trim Potentiometer Input**

Allows connection of an external 10,000 Ohm pot. to trim the output.

Signal Outputs

- **Voltage Output**

Selected by position V on J2. This circuit allows the output to source a voltage level of up to ± 12 VDC into a minimum resistance of 600 Ohms. If resistance is too low, output linearity may be affected.

- **Current Output**

Selected by position I on J2. This circuit allows the output to source a regulated current of up to ± 20 mA into a maximum resistance of 500 Ohms. Using the BIAS pot, the output can source a 4 to 20mA signal.

Temperature Range

- 0-45°C

2.2 Physical

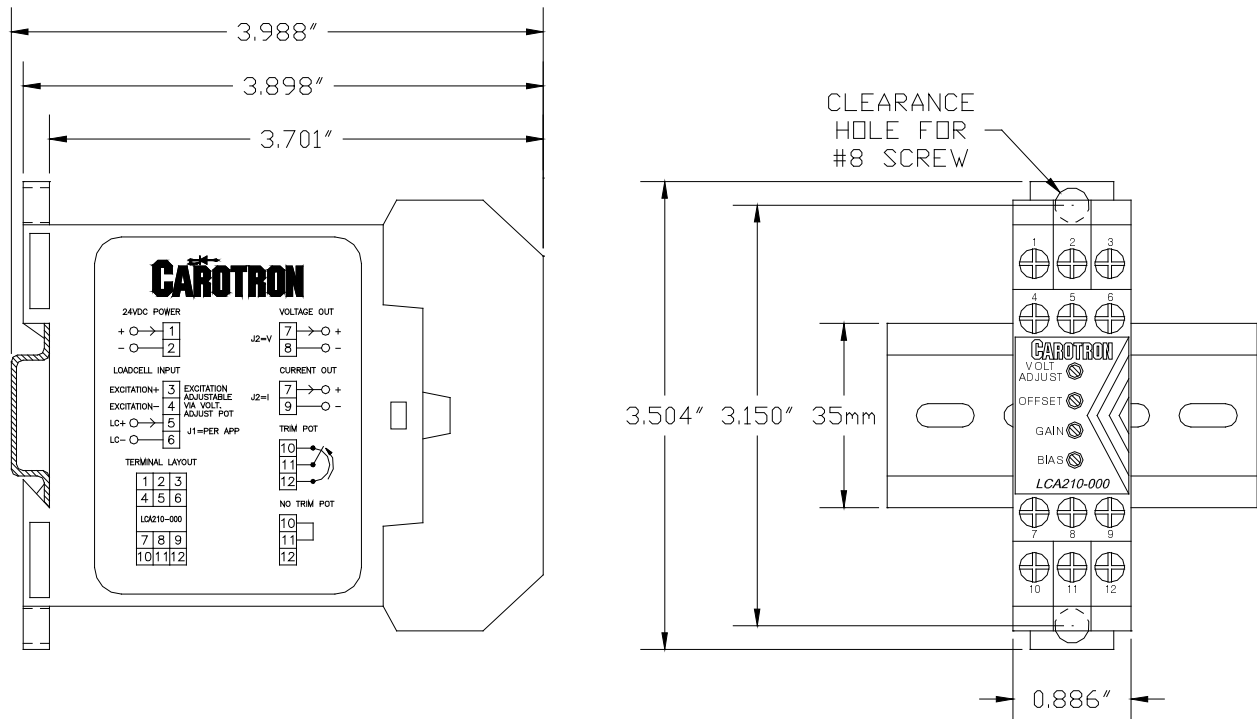


Figure 1: Physical Dimensions

3

Installation

3.1 Wiring Guidelines

To prevent electrical interference and to minimize start-up problems, adhere to the following guidelines:

Use fully insulated and shielded cable for all signal wiring. The shield should be connected to circuit common at one end only. The other end of the shield should be clipped and insulated to prevent the possibility of accidental grounding.

Here are two examples:

- If a potentiometer is used to provide an input reference to the Loadcell Amplifier Module, the shield should be tied to terminal 4.
- If the output from this card is used as the reference signal for a motor control, then the shield should be connected to the common terminal of the motor control.

Signal level wiring such as listed above should be routed separately from high level wiring such as armature, field, operator control and relay control wiring. When these two types of wire must cross, they should cross at right angles to each other.

Any relay, contactor, starter, solenoid or other electro-mechanical device located in close proximity to or on the same line supply as the LCA210-000 should have a transient

suppression device such as an MOV or R-C snubber connected in parallel with its coil. The suppressor should have short leads and be connected as close to the coil as possible.

3.2 Signal Connections

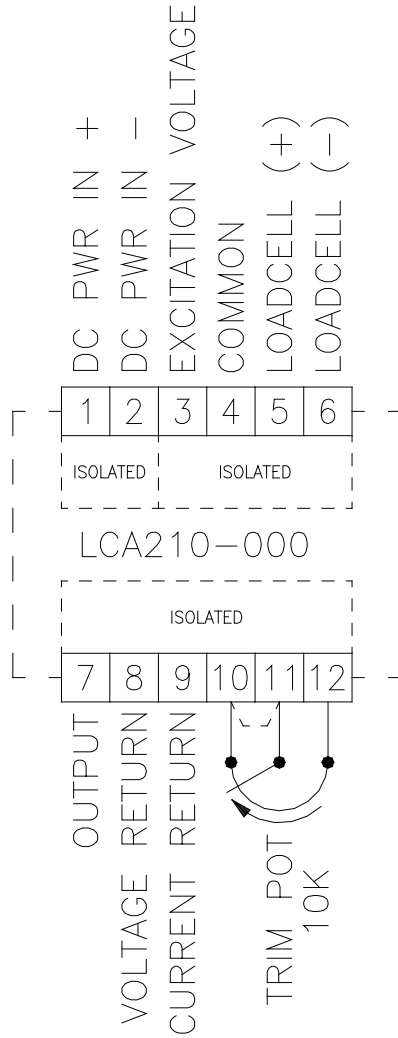


Figure 2: General Connections

4

Description of Jumpers & Adjustments

Jumpers are accessible by removing the cover assembly from the base. Squeeze the enclosure top on both sides and pull up to remove the base.

Jumper J1

Selects between the 6 multiplier ranges: 1, 10, 50, 100, 500, or 1000.

Jumper J2

Selects the Output Mode between Voltage or Current. Position V on J2 selects the Voltage Mode and the output is sourced from terminals 7 & 8. Position I on J2 selects the Current Mode and the output is sourced on terminals 7 & 9.

VOLTAGE ADJUST Potentiometer

Used to set the desired excitation voltage level on terminal 3.

OFFSET Potentiometer

Used to null the first stage amplifier section to 0.0 VDC with minimum reference input.

GAIN Potentiometer

Used to set the maximum input level with maximum reference input.

BIAS Potentiometer

Used to set the desired output level with the minimum reference input.

5

Adjustment Procedure

5.1 Select Output Type

- Select the type of output desired using Jumper J2. If a Voltage output is desired, select V on J2 and use output terminals 7 (OUTPUT) and 8 (VOLTAGE RETURN). If a Current output is desired, select I on J2 and use output terminals 7 (OUTPUT) and 9 (CURRENT RETURN).
- **If a TRIM potentiometer is not used, jumper terminals 10 to 11.** Otherwise, turn the external trim potentiometer to the full clockwise position.
- Proceed to section 5.2 if using a potentiometer input, 5.3 for a voltage input, or 5.4 for a load cell input.

5.2 Potentiometer Input

- Select position 1 on Jumper J1. Connect the potentiometer per drawing D13676.
- Apply power to the Loadcell Amplifier Module. Turn the input potentiometer fully counter-clockwise. Adjust the VOLTAGE ADJUST potentiometer for 10VDC between terminals 3 and 4.
- Turn the GAIN potentiometer fully clockwise (approximately 20 turns). Adjust the OFFSET potentiometer for 0.0 VDC between terminals 10 and 8. Turn the GAIN potentiometer fully counter clockwise (approximately 20 turns).

- Adjust the BIAS potentiometer for the minimum output level desired (at terminal 7) with minimum reference input. Turn the input potentiometer full clockwise. Adjust the GAIN potentiometer for the maximum desired output (at terminal 7).
- The unit is now calibrated for operation. Refer to Section 5.5 for optional TRIM adjustment.

5.3 Voltage Input

- Select the proper multiplier on Jumper J1 by using the following procedure:
 - a) Determine the maximum input (V_{in}).
 - b) Select the highest multiplier that will result in a voltage which is less than or equal to $\pm 12\text{VDC}$.
 - c) For example, with a maximum V_{in} of 1.0VDC , the highest multiplier that can be selected and the resulting signal remain less than or equal to $\pm 12\text{VDC}$ is 10 ($1.0\text{VDC} \times 10 = 10\text{VDC}$).
- Connect the voltage reference input per drawing D13676.
- With the reference input at minimum, apply power to the Loadcell Amplifier Module. Turn the GAIN potentiometer fully clockwise (approximately 20 turns). Adjust the OFFSET potentiometer for 0.0VDC between terminals 10 and 8. Turn the GAIN potentiometer fully counter clockwise (approximately 20 turns). Adjust the BIAS potentiometer for the minimum output level desired (at terminal 7) with minimum reference input. Apply full reference input voltage. Adjust the GAIN potentiometer for the maximum desired output (at terminal 7).
- The unit is now calibrated for operation. Refer to Section 5.5 for optional TRIM adjustment.

5.4 Load Cell Input

Two different types of load cells can be used with this product (strain gauge and LVDT). The output of strain gauge cells typically require larger amplification than LVDT outputs. The OFFSET pot is used for the "TARE" function for both types of load cells.

- Determine the maximum output of the loadcell and select the highest multiplier at J1 which will result in the highest voltage level that is less than or equal to $\pm 12\text{VDC}$. For example, if using a load cell with a maximum output of 20mV , J1 should be set to 500. This provides a full scale signal of 10V ($.020\text{VDC} \times 500 = 10\text{VDC}$).
- Connect the Load Cell/Cells per drawing D13676.
- Set the VOLTAGE ADJUST potentiometer fully counter clockwise.
- Apply Power to the Load Cell Amplifier Module. Determine the required load cell excitation voltage. Adjust the VOLTAGE ADJUST potentiometer to obtain the desired load cell excitation voltage between terminals 3 and 4.
- With minimum force applied to the load cell(s), turn the Gain potentiometer fully clockwise (approximately 20 turns). Adjust the OFFSET potentiometer for 0.0VDC between terminals 10 and 8. Turn the Gain potentiometer fully counter clockwise (approximately 20 turns).
- Adjust the BIAS potentiometer for the minimum output level desired (at terminal 7) with minimum reference input. Apply the maximum force to the load cell(s). Adjust the GAIN potentiometer for maximum desired output (at terminal 7).
- The unit is now calibrated for operation. Refer to Section 5.5 for optional TRIM adjustment.

5.5 Trim Adjustment (Optional)

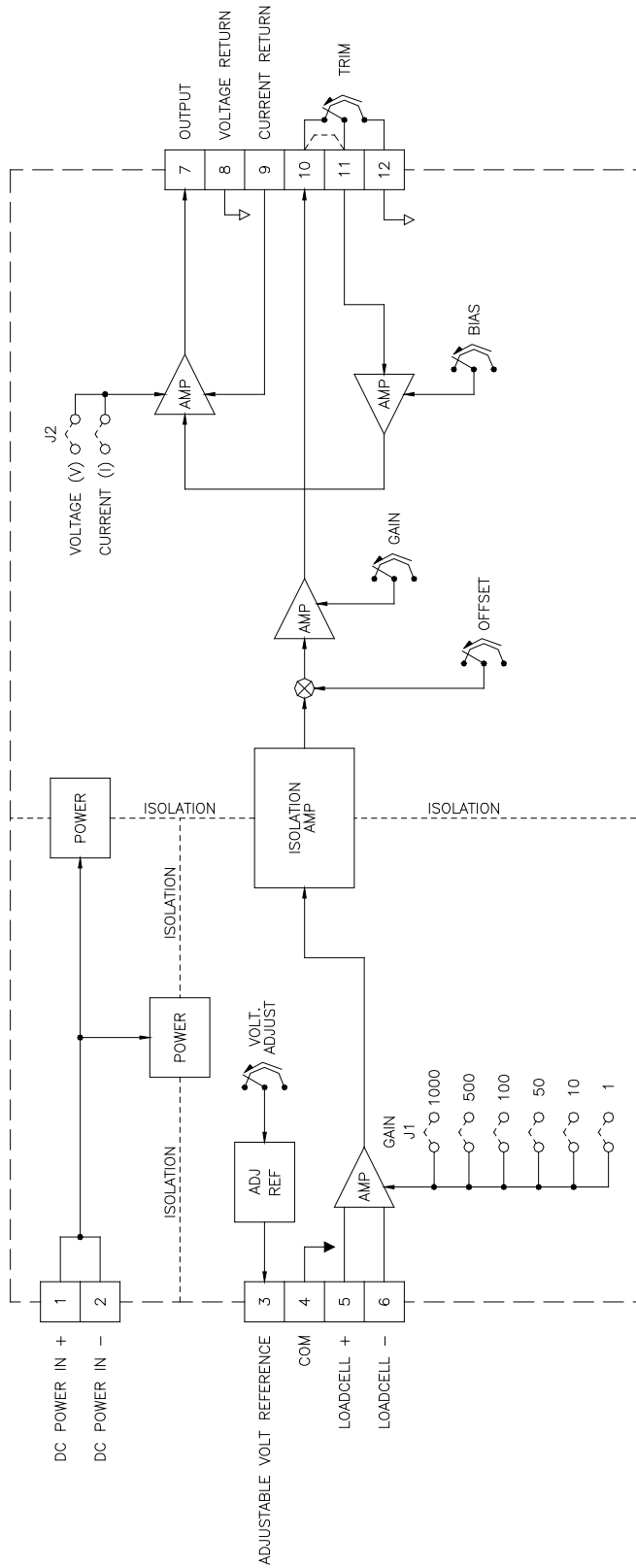
If desired, the output level relative to the input signal may now be trimmed by an optional external 10K TRIM potentiometer connected at terminals 10, 11, & 12. (If the trim function is not needed, place a jumper from terminal 10 to 11.) This external TRIM potentiometer will have a full trim range of 0 to 100%. In order to provide a smaller range, an external 50K TRIM RANGE potentiometer can be connected as shown in C13660. The external TRIM RANGE potentiometer can be used to limit the range of the external TRIM potentiometer. A TRIM RANGE setting of fully counter-clockwise gives the external TRIM potentiometer a full range of 0 to 100%. A TRIM RANGE setting of fully clockwise gives an external 10K trim potentiometer a range of approximately 80 to 100%.

5.6 Outputs Greater Than 12VDC up to 24VDC

When the BIAS and OFFSET potentiometers are both set at 0, the voltage at terminal 10 is opposite in polarity, but equal in magnitude to terminal 7. This can be used to achieve up to 24 VDC output signal as long as the load is no more than 5 mA. Refer to drawing D13676, 24 VDC OUTPUT. This is achieved by using terminal 11 as the common (instead of terminal 8) and using terminal 7 as the output.

6

Prints



DRAWN BY: BKP APPROVED BY:	DATE: 3/10/10 DATE:
REFERENCES: 1. MIL-STD-883C 2. MIL-STD-883C-206 3. DEC. PL. = 100P	
TITLE: LCA210-000 BLOCK DIAGRAM	
DRAWING NUMBER: C13677 REV. A SH. 1 OF 1	

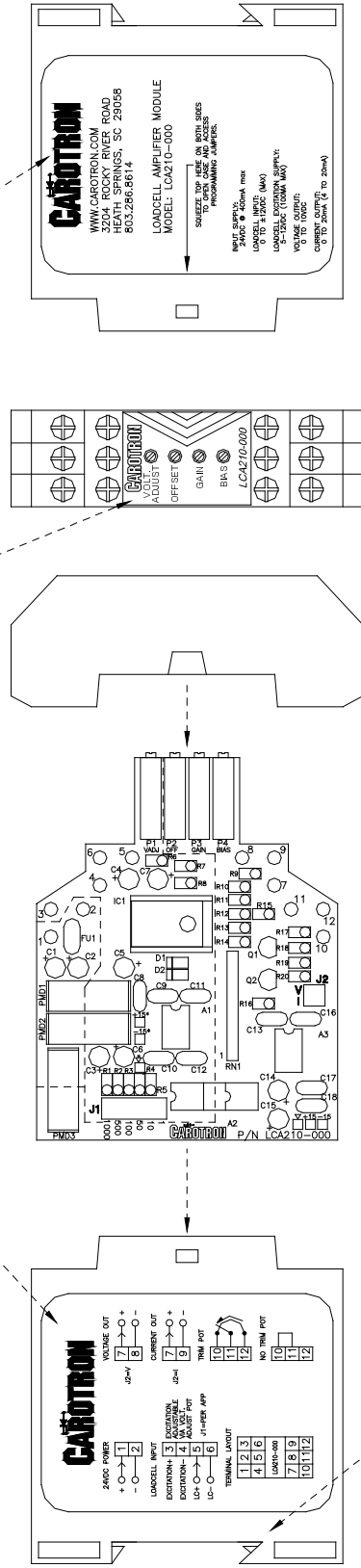


HEATH SPRINGS, SC
 FAX: 803-285-2663
 TEL: 803-285-2663

APPLY TOP LABEL. ENSURE POTENTIOMETER HOLES LINE UP.

APPLY MODEL NUM LABEL TO RIGHT SIDE

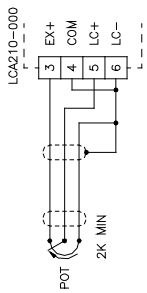
APPLY CONNECTION LABEL TO LEFT SIDE



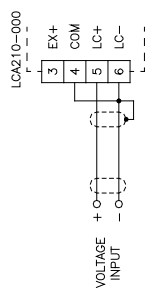
NOTE ORIENTATION OF ENCLOSURE BASE

DESIGN BY	DATE	3/8/10
APPROVED BY	DATE	
CAROTTRON <i>Driven by Excellence</i>		
HEATH, SPRINGS, SC TEL: 803-286-8614 FAX: 803-286-8615		
TOLERANCES	UNLESS OTHERWISE SPECIFIED	
1	FRACTIONS	
2	DECIMALS	
3	HOLE DIA. = .005	
TITLE: LOADCELL AMPLIFIER MODULE ASSEMBLY		
SCALE:		
DRAWING NUMBER: C13671 REV. A SH. 1 OF 1		

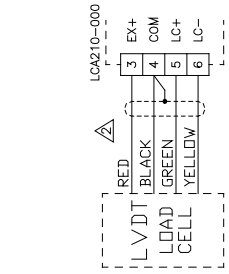
POTENTIOMETER INPUT



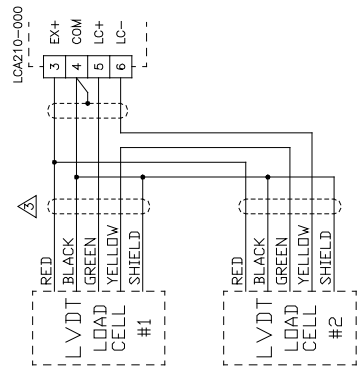
VOLTAGE INPUT



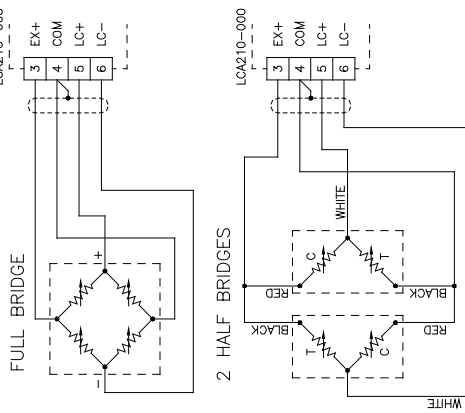
SINGLE LVDT LOAD CELL INPUT



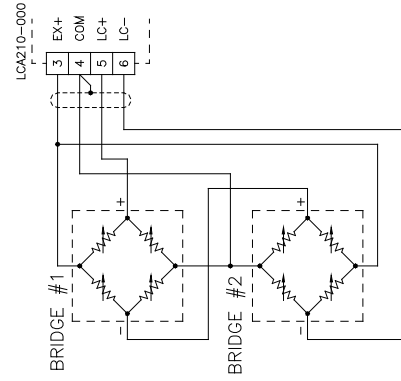
DUAL LVDT LOAD CELL INPUT



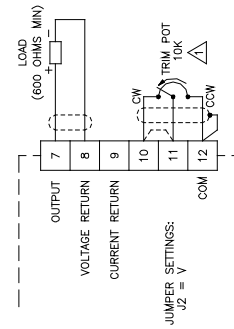
SINGLE STRAIN GAUGE BRIDGE LOAD CELL INPUT



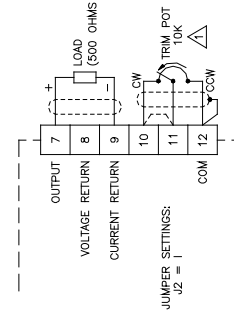
DUAL STRAIN GAUGE BRIDGE LOAD CELL INPUT



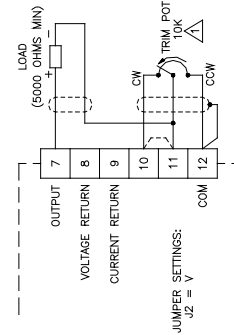
VOLTAGE OUTPUT



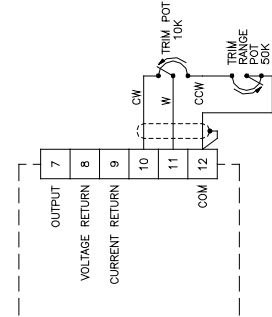
CURRENT OUTPUT



24VDC OUTPUT



EXTERNAL TRIM RANGE POT



- NOTES:
- ▲ JUMPER TERMINALS 10 TO 11 IF TRIM POT IS NOT USED.
 - ▲ EXCHANGE CONNECTION OF GREEN ON LOAD CELL WITH YELLOW ON LOAD CELL #1.
 - ▲ EXCHANGE CONNECTION OF GREEN ON LOAD CELL #1 WITH YELLOW ON LOAD CELL #2 TO REVERSE OUTPUT POLARITY.

REV. B, 1-5-11, ADD POT & VOLTAGE INPUT

BKP 3707D		GAROTRON	
REV. B	REV. B	REV. B	REV. B
DATE	DATE	DATE	DATE
DESIGNED BY	DESIGNED BY	DESIGNED BY	DESIGNED BY
CHECKED BY	CHECKED BY	CHECKED BY	CHECKED BY
APPROVED BY	APPROVED BY	APPROVED BY	APPROVED BY
SCALE	SCALE	SCALE	SCALE
CONNECTION DIAGRAM		CONNECTION DIAGRAM	
LCA210-000		LCA210-000	

Standard Terms & Conditions of Sale

1. General

The Standard Terms and Conditions of Sale of Carotron, Inc. (hereinafter called "Company") are set forth as follows in order to give the Company and the Purchaser a clear understanding thereof. No additional or different terms and conditions of sale by the Company shall be binding upon the Company unless they are expressly consented to by the Company in writing. The acceptance by the Company of any order of the Purchaser is expressly conditioned upon the Purchaser's agreement to said Standard Terms and Conditions. The acceptance or acknowledgement, written, oral, by conduct or otherwise, by the Company of the Purchaser's order shall not constitute written consent by the Company to addition to or change in said Standard Terms and Conditions.

2. Prices

Prices, discounts, allowances, services and commissions are subject to change without notice. Prices shown on any Company published price list and other published literature issued by the Company are not offers to sell and are subject to express confirmation by written quotation and acknowledgement. All orders of the Purchaser are subject to acceptance, which shall not be effective unless made in writing by an authorized Company representative at its office in Heath Springs, S.C. The Company may refuse to accept any order for any reason whatsoever without incurring any liability to the Purchaser. The Company reserves the right to correct clerical and stenographic errors at any time.

3. Shipping dates

Quotation of a shipping date by the Company is based on conditions at the date upon which the quotation is made. Any such shipping date is subject to change occasioned by agreements entered into previous to the Company's acceptance of the Purchaser's order, governmental priorities, strikes, riots, fires, the elements, explosion, war, embargoes, epidemics, quarantines, acts of God, labor troubles, delays of vendors or of transportation, inability to obtain raw materials, containers or transportation or manufacturing facilities or any other cause beyond the reasonable control of the Company. In no event shall the Company be liable for consequential damages for failure to meet any shipping date resulting from any of the above causes or any other cause.

In the event of any delay in the Purchaser's accepting shipment of products or parts in accordance with scheduled shipping dates, which delay has been requested by the Purchaser, or any such delay which has been caused by lack of shipping instructions, the Company shall store all products and parts involved at the Purchaser's risk and expense and shall invoice the Purchaser for the full contract price of such products and parts on the date scheduled for shipment or on the date on which the same is ready for delivery, whichever occurs later.

4. Warranty

The Company warrants to the Purchaser that products manufactured or parts repaired by the Company, will be free, under normal use and maintenance, from defects in material and workmanship for a period of one (1) year after the shipment date from the Company's factory to the Purchaser. The Company makes no warranty concerning products manufactured by other parties.

As the Purchaser's sole and exclusive remedy under said warranty in regard to such products and parts, including but not limited to remedy for consequential damages, the Company will at its option, repair or replace without charge any product manufactured or part repaired by it, which is found to the Company's satisfaction to be so defective; provided, however, that (a) the product or part involved is returned to the Company at the location designated by the Company, transportation charges prepaid by the Purchaser; or (b) at the Company's option the product or part will be repaired or replaced in the Purchaser's plant; and also provided that (c) the Company is notified of the defect within one (1) year after the shipment date from the Company's factory of the product or part so involved.

The Company warrants to the Purchaser that any system engineered by it and started up under the supervision of an authorized Company representative will, if properly installed, operated and maintained, perform in compliance with such system's written specifications for a period of one (1) year from the date of shipment of such system.

As the Purchaser's sole and exclusive remedy under said warranty in regard to such systems, including but not limited to remedy for consequential damages, the Company will, at its option, cause, without charges any such system to so perform, which system is found to the Company's satisfaction to have failed to so perform, or refund to the Purchaser the purchase price paid by the Purchaser to the Company in regard thereto; provided, however, that (a) Company and its representatives are permitted to inspect and work upon the system involved during

reasonable hours, and (b) the Company is notified of the failure within one (1) year after date of shipment of the system so involved.

The warranties hereunder of the Company specifically exclude and do not apply to the following:

a. Products and parts damaged or abused in shipment without fault of the Company.

b. Defects and failures due to operation, either intentional or otherwise, (1) above or beyond rated capacities, (2) in connection with equipment not recommended by the Company, or (3) in an otherwise improper manner.

c. Defects and failures due to misapplication, abuse, improper installation or abnormal conditions of temperature, humidity, abrasives, dirt or corrosive matter.

d. Products, parts and systems which have been in any way tampered with or altered by any party other than an authorized Company representative.

e. Products, parts and systems designed by the Purchaser.

f. Any party other than the Purchaser.

The Company makes no other warranties or representation, expressed or implied, of merchantability and of fitness for a particular purpose, in regard to products manufactured, parts repaired and systems engineered by it.

5. Terms of payment

Standard terms of payment are net thirty (30) days from date of the Company invoice. For invoice purposed, delivery shall be deemed to be complete at the time the products, parts and systems are shipped from the Company and shall not be conditioned upon the start up thereof. Amounts past due are subject to a service charge of 1.5% per month or fraction thereof.

6. Order cancellation

Any cancellation by the Purchaser of any order or contract between the Company and the Purchaser must be made in writing and receive written approval of an authorized Company representative at its office in Heath Springs, S.C. In the event of any cancellation of an order by either party, the Purchaser shall pay to the Company the reasonable costs, expenses, damages and loss of profit of the Company incurred there by, including but not limited to engineering expenses and expenses caused by commitments to the suppliers of the Company's subcontractors, as determined by the Company.

7. Changes

The Purchaser may, from time to time, but only with the written consent of an authorized Company representative, make a change in specifications to products, parts or systems covered by a purchase order accepted by the company. In the event of any such changes, the Company shall be entitled to revise its price and delivery schedule under such order.

8. Returned material


If the Purchaser desires to return any product or part, written authorization thereof must first be obtained from the Company which will advise the Purchaser of the credit to be allowed and restocking charges to be paid in regard to such return. No product or part shall be returned to the Company without a "RETURN TAG" attached thereon which has been issued by the Company.

9. Packing

Published prices and quotations include the Company's standard packing for domestic shipment. Additional expenses for special packing or overseas shipments shall be paid by the Purchaser. If the Purchaser does not specify packing or accepts parts unpacked, no allowance will be made to the Purchaser in lieu of packing.

10. Standard transportation policy

Unless expressly provided in writing to the contrary, products, parts and systems are sold f.o.b. first point of shipment. Partial shipments shall be permitted, and the Company may invoice each shipment separately. Claims for non-delivery of products, parts and systems, and for damages thereto must be filed with the carrier by the Purchaser. The Company's responsibility therefor shall cease when the carrier signs for and accepts the shipment.



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