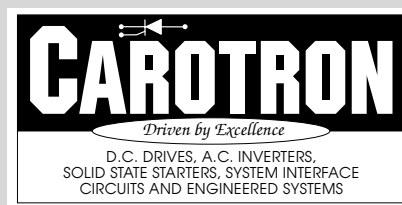
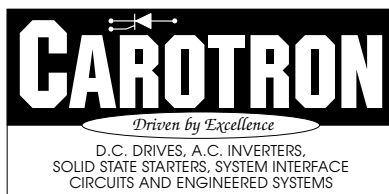


Master Reference Unit

Instruction Manual
Model D10096-000





3204 Rocky River Road
Heath Springs, SC 29058
Phone: (803) 286-8614
FAX: (803) 286-6063



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1 General Description

Model D10096-000 Master Reference Unit is designed to handle a variety of applications in which signal conditioning and multiple outputs are required while maintaining input to output circuit isolation. Each Model D10096-000 can supply four separate outputs that are each isolated from the master reference signal and also from each of the other outputs. If more than four outputs are required, two or more units may be ganged together.

A variety of outputs are acceptable as sources for the master reference signal. A +10 VDC voltage is available to allow the master signal to be sourced from a 2,000 to 10,000 Ohm, 2 Watt potentiometer. The potentiometer signal is supplied through a linear acceleration/deceleration circuit with two selectable ranges. A customer-supplied contact closure enables the acceleration/deceleration circuit and allows the reference to accelerate to a level set by the input potentiometer. The deceleration circuit operates whenever the reference is lowered. When the enable contact opens, the reference is zeroed immediately.

Four selectable voltage ranges may also be used as master signals. The input impedance is

greater than 1,000,000 Ohms for each voltage range. The available input ranges are 0 to 25 VDC, 0 to 50 VDC, 0 to 100 VDC and 0 to 200 VDC.

Three selectable current ranges are available to handle various process control signals. The approximate input impedance for each range is listed in the chart below.

<u>Input Range</u>	<u>Impedance</u>
1 to 5 mA	1,000 Ohms
4 to 40 mA	270 Ohms
10 to 50 mA	100 Ohms

The final input is for a sine or square wave with a frequency range from 0 to 2,000 Hz. A buffer circuit with an input impedance of approximately 100,000 Ohms is supplied to limit loading on the frequency source. The circuit switches at a threshold level of approximately 0.5 VDC.

Four identical output circuits are sourced from the master signal. Each output has separate OFFSET, GAIN, and BIAS adjustments to tailor the output signal. An optional Trim potentiometer input is also provided to allow the output to be remotely ratioed.

2 Specifications & Technical Data

A.C. Input

115 VAC $\pm 10\%$, 50/60 Hz, internally fused at 1 Amp

Reference Inputs

- Pot. Input
+10 VDC, $\pm 10\%$ available to source
2,000 to 10,000 Ohm, 2 Watt pot.
- Voltage Input
4 selectable ranges, greater than 1,000,000 Ohms input impedance, max. output voltage approximately 12 VDC.

Input Range	Vout/ Vin Range
0 to 25 VDC	0.2 to 1.0
0 to 50 VDC	0.1 to 0.5
0 to 100 VDC	0.05 to 0.25
0 to 200 VDC	0.025 to 0.125

• Current Input

3 selectable ranges, typical output range is adjustable at 5 to 10 VDC with maximum input.

Input Range	Input Impedance
1 to 5 mA	1000 Ohms
4 to 20 mA	270 Ohms
10 to 50 mA	100 Ohms

• Frequency Input

Accepts a sine or square wave with a peak of 1 to 20 volts, input impedance=100,000 Ohms, Vout/Fin Range=.0028 to .014, max. output approx. 12 VDC. Max. input frequency = 2,000 Hz.

NOTE: Jumpers JA, JB, JC, and JD select the filtering for each of the output sections. The Slow position is recommended for the Frequency

Input mode to limit the output ripple voltage when operating below 300 Hz input. The Fast position may be used for the Frequency mode if system tracking is more critical than ripple content.

Accel/Decel Range

Independently adjustable, linear operation, 2 selectable ranges: 1 to 5 sec. or 4 to 40 sec.

Note: The Accel/Decel circuit only functions with the potentiometer input.

Accel Output

A maximum +10 VDC @ 1 mA signal is available from the Accel/Decel circuit to allow multiple

Master Reference Units to be ganged together.

Output

4 independent sections with a typical range of 0 to +12 VDC @ 5 mA max.

Trim Pot.

Each output section accepts an external 10,000 Ohm, 2 W pot. which allows the master signal to be trimmed from 0 to 100%.

Linearity

±0.5% of 10 VDC span with 100K load.

3 Adjustments

Select the type of input signal to be used and use the appropriate procedure listed below.

3.1 Potentiometer Input

- Connect per drawing D10098 for the Potentiometer Input Mode. Select either the 1 to 5 or 4 to 40 second Accel/Decel range using jumper J1. Select the Pot. Mode with jumper J2. Select the V/I Mode with jumper J5. The position of jumpers J3 and J4 are not important for this mode of operation. Set JA, JB, JC, and JD to the FAST position.
- Apply A.C. power to the unit. Close the enable contact to allow the Accel/ Decel circuit to function.
- Begin with the master pot. full counter-clockwise (ccw), and make the following adjustments to Output Sections A through D. Make voltage readings with respect to COMMON of each output section (terminal 4).
 - Adjust the Gain pot. full clockwise (approximately 20 turns).
 - Adjust the external Trim pot. full clockwise if used.
 - Adjust the Offset pot. for 0.0 VDC at the Trim Pot. CW terminal (terminal 3).
 - Adjust the Bias pot. for 0.0 VDC or the minimum output level desired at the OUTPUT terminal (terminal 5).
 - Adjust the Gain pot. full ccw (approximately 20 turns). Turn the master pot. to full clockwise. After allowing time for the Accel circuit to settle, adjust the Gain pot. for the maximum output level desired.

- If the Trim pot. is connected, it can be turned counter-clockwise to trim the output to a smaller percentage of the input.
- Monitor the voltage at one of the OUTPUT terminals (terminal 5) and cycle the Master pot. clockwise and counter-clockwise several times. Adjust the Accel pot. for the desired accel time and the Decel pot. for the desired decel time. Clockwise rotation of each pot. increases time.

3.2 Voltage Input

- Connect per drawing D10098 for the Voltage Input Mode. Select the Voltage Mode with jumper J2. Select the input voltage range desired with jumper J3. Select the V/I Mode with jumper J5. The position of jumpers J1 and J4 are not important for this mode of operation. Set JA, JB, JC, and JD to the FAST position.
- Apply A.C. power to the unit. The Enable contact has no effect in this mode. Also the Accel and Decel pots. are not functional.
- Begin with the input voltage at 0.0 VDC and make the following adjustments to Output Sections A through D. Make voltage readings with respect to COMMON of each output section (terminal 4).
 - Adjust the Gain pot. full clockwise (approximately 20 turns).
 - Adjust the external Trim pot. full clockwise if used.
 - Adjust the Offset pot. for 0.0 VDC at the Trim Pot. CW terminal (terminal 3).
 - Adjust the Bias pot. for 0.0 VDC or the minimum output level desired at the OUTPUT terminal (terminal 5).

- Adjust the Gain pot. full ccw (approximately 20 turns). Apply the maximum voltage input and adjust the Gain pot. for the maximum output level desired.
- If the Trim pot. is connected, it can be turned counter clockwise to trim the output to a smaller percentage of the input.

3.3 Current input

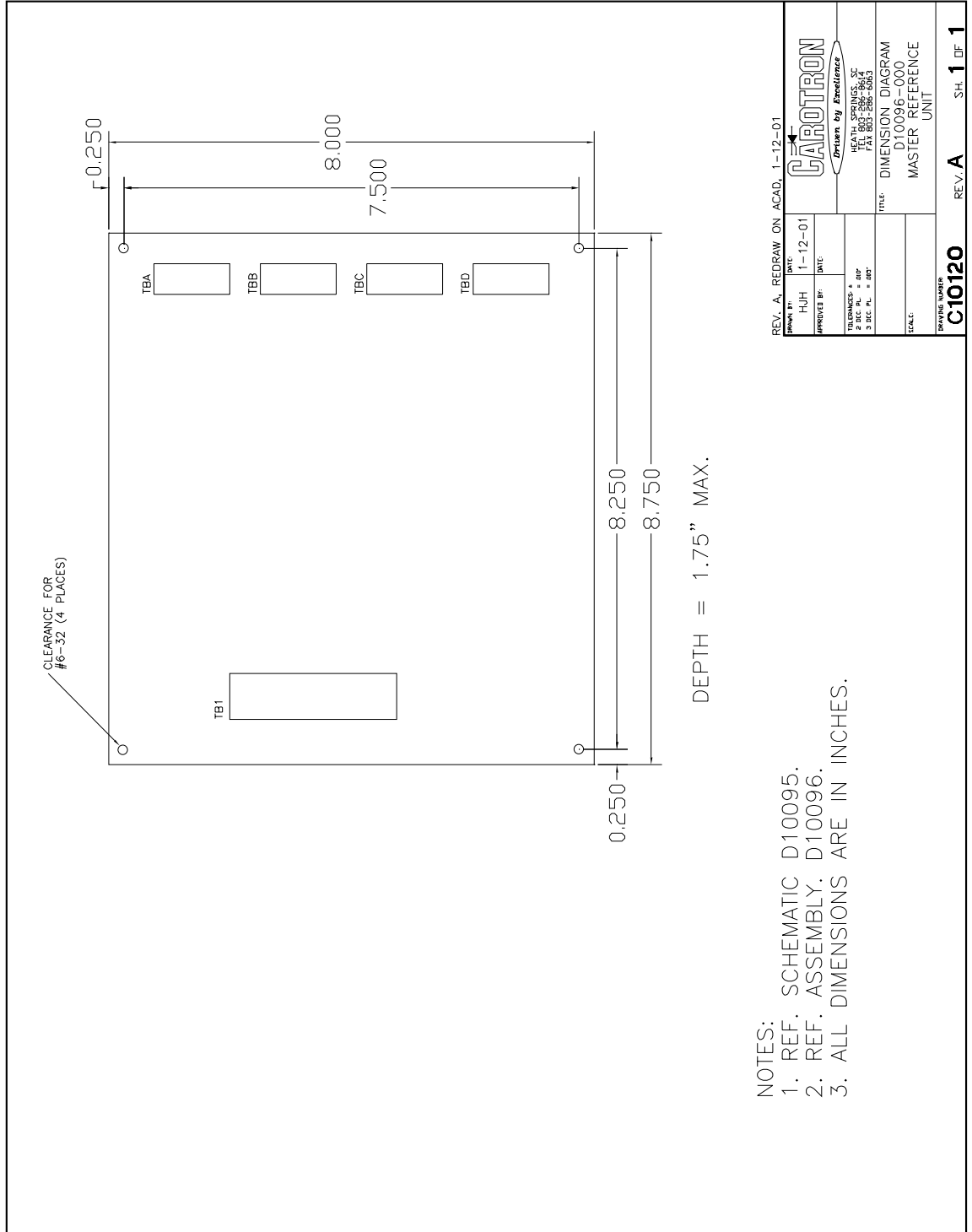
- Connect per drawing D10098 for the Current Input Mode. Select the Current Mode with jumper J2. Select the input current range desired with jumper J4. Select the V/I Mode with jumper J5. The position of jumpers J1 and J3 are not important for this mode of operation. Set JA, JB, JC, and JD to the FAST position.
- Apply A.C. power to the unit. The Enable contact has no effect in this mode. Also the Accel and Decel pots. are not functional.
- Begin with the input current at minimum for the range selected and make the following adjustments to Output Sections A through D. Make voltage readings with respect to COMMON of each output section (terminal 4).
 - Adjust the Gain pot. full clockwise (approximately 20 turns).
 - Adjust the external Trim pot. full clockwise if used.
 - Adjust the Offset pot. for 0.0 VDC at the Trim Pot. CW terminal (terminal 3).
 - Adjust the Bias pot. for 0.0 VDC or the minimum output level desired at the OUTPUT terminal (terminal 5).
 - Adjust the Gain pot. full ccw (approximately 20 turns). Apply the maximum current input and adjust the Gain pot. for the maximum output level desired.
- If the Trim pot. is connected, it can be turned counter-clockwise to trim the output to a smaller percentage of the input.

3.4 Frequency input

- Connect per drawing D10098 for the Frequency Input Mode. Select the Frequency Mode with jumper J5. The position of jumpers J1, J2, J3, and J4 are not important for this mode of operation. Set JA, JB, JC, and JD to the SLOW position for best performance. The FAST position can be used, but an increase in ripple voltage will result in the output.
- Apply A.C. power to the unit. The Enable contact has no effect in this mode. Also the Accel and Decel pots. are not functional.
- Begin with the input frequency at zero or minimum and make the following adjustments to Output Sections A through D. Make voltage readings with respect to COMMON of each output section (terminal 4).
- Adjust the Gain pot. full clockwise (approximately 20 turns).
- Adjust the external Trim pot. full clockwise if used.
- Adjust the Offset pot. for 0.0 VDC at the Trim pot. clockwise terminal (terminal 3).
- Adjust the Bias pot. for 0.0 VDC or the minimum output level desired at the OUTPUT terminal (terminal 5).
- Adjust the Gain pot. full ccw (approximately 20 turns). Apply the maximum frequency input and adjust the Gain pot. for the maximum output level desired.
- If the Trim pot. is connected, it can be turned counter clockwise to trim the output to a smaller percentage of the input.

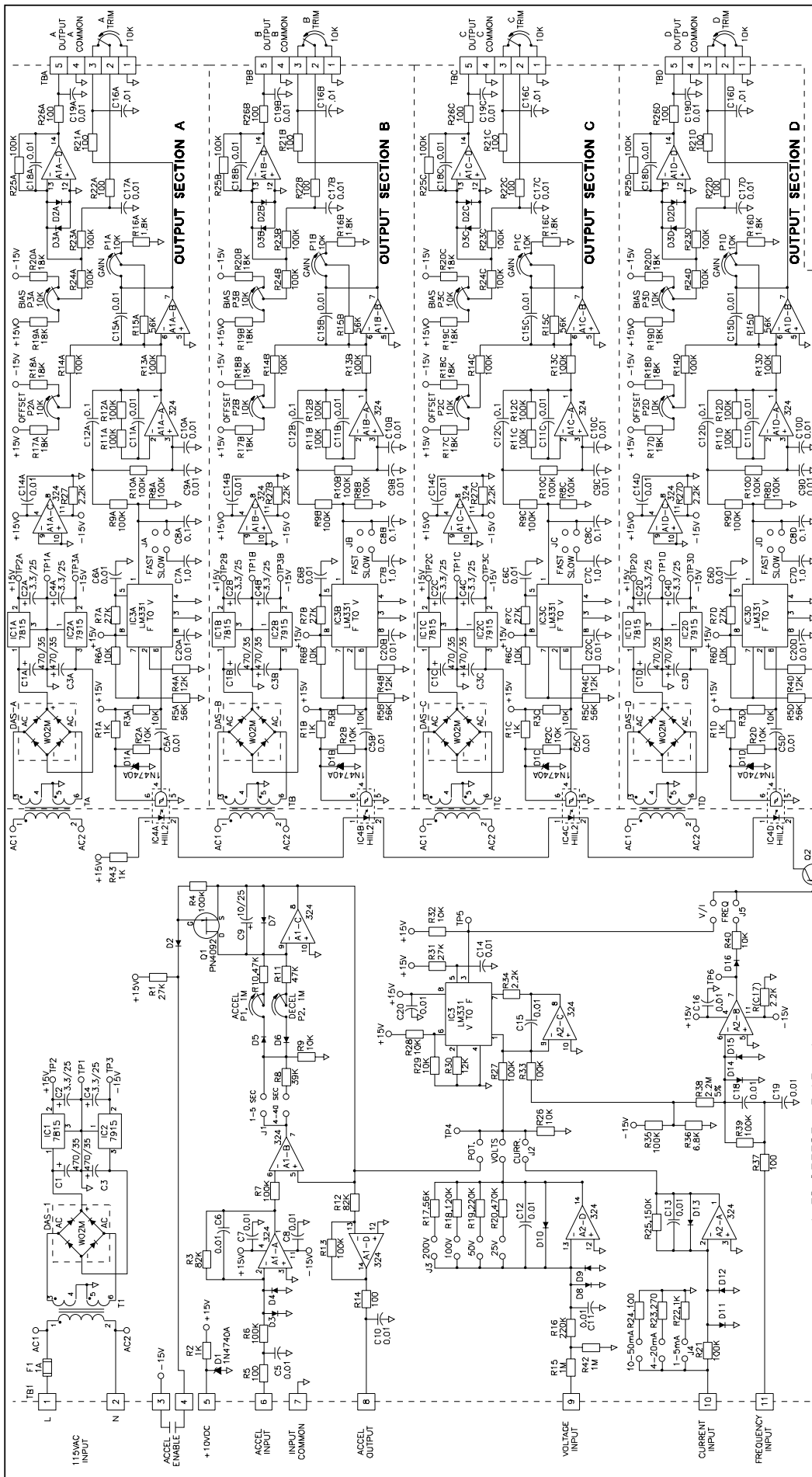
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Prints



- NOTES:
1. REF. SCHEMATIC D10095.
 2. REF. ASSEMBLY. D10096.
 3. ALL DIMENSIONS ARE IN INCHES.

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TESTED BY:	SM
APPROVED BY:	SM
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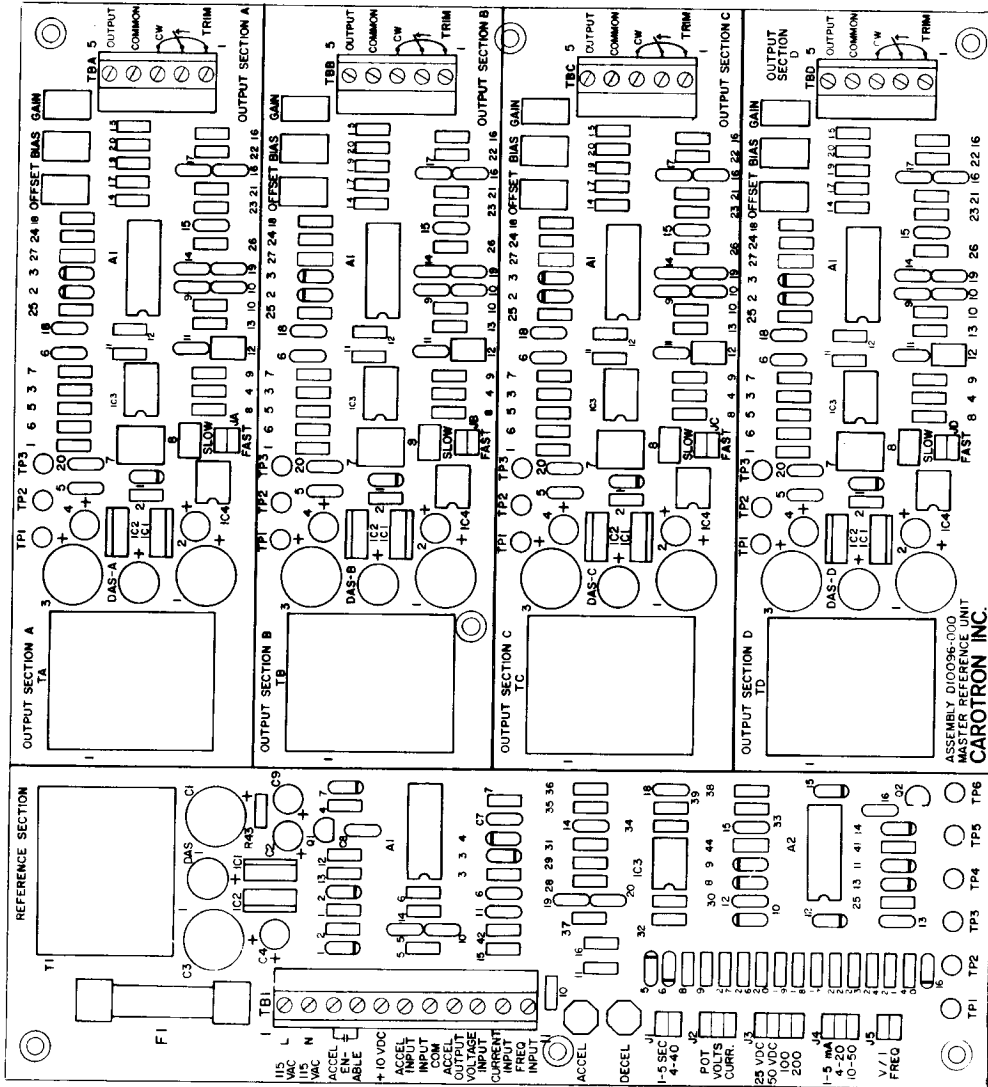
MASTER REFERENCE SECTION

NOTES:

1. ALL RESISTORS 1/4W, 2% UNLESS NOTED.
2. ALL DIODES 1N4148 UNLESS NOTED.
3. ALL CAPACITORS IN MF, 50WVDC UNLESS NOTED.
4. REF. ASST. D10096, BOM# A10096.

REV. B - ECO 15 6-19-87
 REV. D - ECO 23 10-7-87
 REV. E - ECO 131 10-1-88

NOTES:
 1. REFER TO SCHEMATIC D10096 AND B.O.M. A10096.



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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

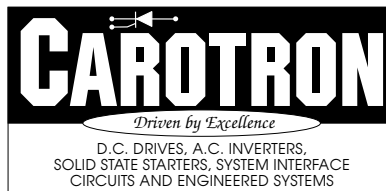
If the Purchaser desires to return any product or part, written authorization thereof must first be obtained from the Company which will advise the Purchaser of the credit to be allowed and restocking charges to be paid in regard to such return. No product or part shall be returned to the Company without 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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