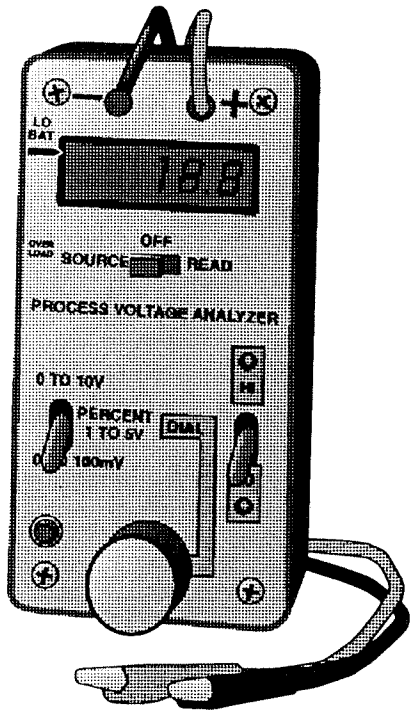
CE

CL-305

Process Voltage Analyzer



OMEGA®

An OMEGA Technologies Company

Operator's Manual

omega.com™

ΩOMEGA®

OMEGAnet℠ On-Line Service http://www.omega.com	Internet e-mail info@omega.com

Servicing North America:

USA:
ISO 9001 Certified
One Omega Drive, Box 4047
Stamford, CT 06907-0047
Tel: (203) 359-1660
FAX: (203) 359-7700

Canada:
976 Bergar
Laval (Quebec) H7L 5A1
Tel: (514) 856-6928
FAX: (514) 856-6886

For immediate technical or application assistance:

USA and Canada:
Sales Service: 1-800-826-6342 /
1-800-TC-OMEGA℠
Customer Service: 1-800-622-2378 /
1-800-622-BEST℠
Engineering Service: 1-800-872-9436 /
1-800-USA-WHEN℠ TELEX: 996404
EASYLINK: 62968934 CABLE: OMEGA

Mexico:
Tel: (95) 800-TC-OMEGA℠
FAX: (95) 203-359-7807

TABLE OF CONTENTS
CL-305 PROCESS VOLTAGE ANALYZER

TABLE OF CONTENTS
CL-305 PROCESS VOLTAGE ANALYZER

SECTION 1 GENERAL DESCRIPTION

The OMEGA® Model CL-305 Process Voltage Analyzer combines a self-contained voltage source, a voltage sink and a large LCD digital readout in a pocket-sized instrument. Three ranges provide 0.1% resolution from 0 to 100% (of 1 to 5). 100% overrange capability allows signals up to 200 mV or 20 V to be sourced or read.

Source mode uses built-in batteries to calibrate high or low impedance voltage or millivolt instruments.

The user adjustable quick check switch provides instant HI and LO settings in source mode. Dial position selects a continuously adjustable potentiometer.

Sink mode operates automatically in source position to allow calibration of live circuits without disconnecting wires.

Read mode provides precise indication of both positive and negative voltages in the 100 mV and 10 V ranges. 0 to 100% is displayed in the 1 to 5 volt range for checkout of process control instruments.

SECTION 2 UNPACKING

Remove the packing list and verify that all equipment has been received. If there are any questions about the shipment, please call OMEGA Customer Service Department.

Upon receipt of the shipment, inspect the container and equipment for any signs of damage. Take particular note of any evidence of rough handling in transit. Immediately report any damage to the shipping agent.

NOTE

The carrier will not honor any claim unless all shipping material is saved for their examination. After examining and removing contents, save packing material and carton in the event reshipment is necessary.

SECTION 3 OPERATION

3.1 SOURCE MODE

Disconnect one or both input wires from the device to be checked or calibrated. Attach the red (+) lead of the CL-305 to the plus input of the device to be calibrated, connect the black (−) lead to the minus terminal. Select the desired range and turn the SOURCE/OFF/READ mode selector switch to the SOURCE position. Actual voltage sent to the receiving device is shown on the LCD.

Output voltage is continuously adjustable with the QUICK-CHECK switch in the DIAL position. The source voltage can be set to any exact value from 0 to 200 mV, 0 to 20 V or −25 to 125% of 1 to 5 V. HI and LO values are user adjustable and can be instantly selected by the QUICK-CHECK switch.

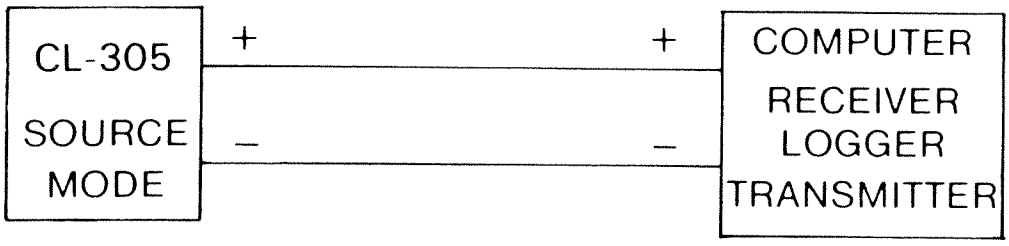


Figure 3-1 Source Mode

3.2 READ MODE

Place the leads of the CL-305 across the voltage signal to be measured. Place the MODE Switch in the READ position and select the range to be measured. Choose the 100 mV position for signals from −199.9 mV to +199.9 mV. Signals from −19.99 V to +19.99 V can be measured with the 10 V range. 1 to 5 V signals can be displayed in units of 0 to 100% to monitor live process signals.

When measuring voltages from high impedance sources, the source resistance effect is 0.1% per 2000 Ohms. All ranges are fully protected to 120 Vac against misconnection.

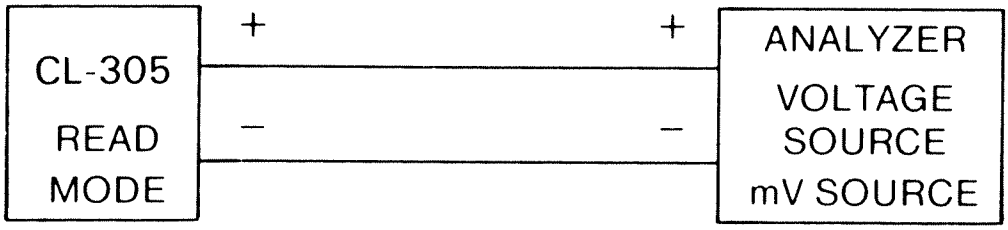


Figure 3-2 Read Mode

3.3 SINK MODE(OPERATES AUTOMATICALLY IN SOURCE MODE)

Any 1 to 5 V device in a 4 to 20 mA loop can be calibrated without breaking the loop or turning off the signal current. Clip the red lead to the positive input terminal and the black lead to the negative of the device to be checked or calibrated. It is not necessary to disconnect any associated 250 Ohm resistor. Make certain that changing the signal input will not disturb the process or cause unexpected alarms when checking on-line instruments.

It is important to remember the CL-305 drives only the device to which it is connected. It has no effect on other devices in the 4 to 20 mA loop.

Set the RANGE switch to the 1 to 5 volt range and the MODE switch to SOURCE. The LCD will display 0 to 100% corresponding to 1 to 5 volts required by the device being calibrated. The voltage is set to any exact value by the 10 turn dial. Adjust HI and LO trimmers to desired values for fastest repetitive calibration through the QUICK-CHECK switch.

Additionally, SINK MODE will clamp the selected value in the 100 mV and 10 V ranges to the maximum sink current of 20 mA. For example, receivers requiring 0.25 to 1.25 V may be calibrated in the 10 volt range. Connect the Model CL-305 across the 62.5 Ohm resistor and set the LO and HI QUICK-CHECKS for 0.25 and 1.25 V.

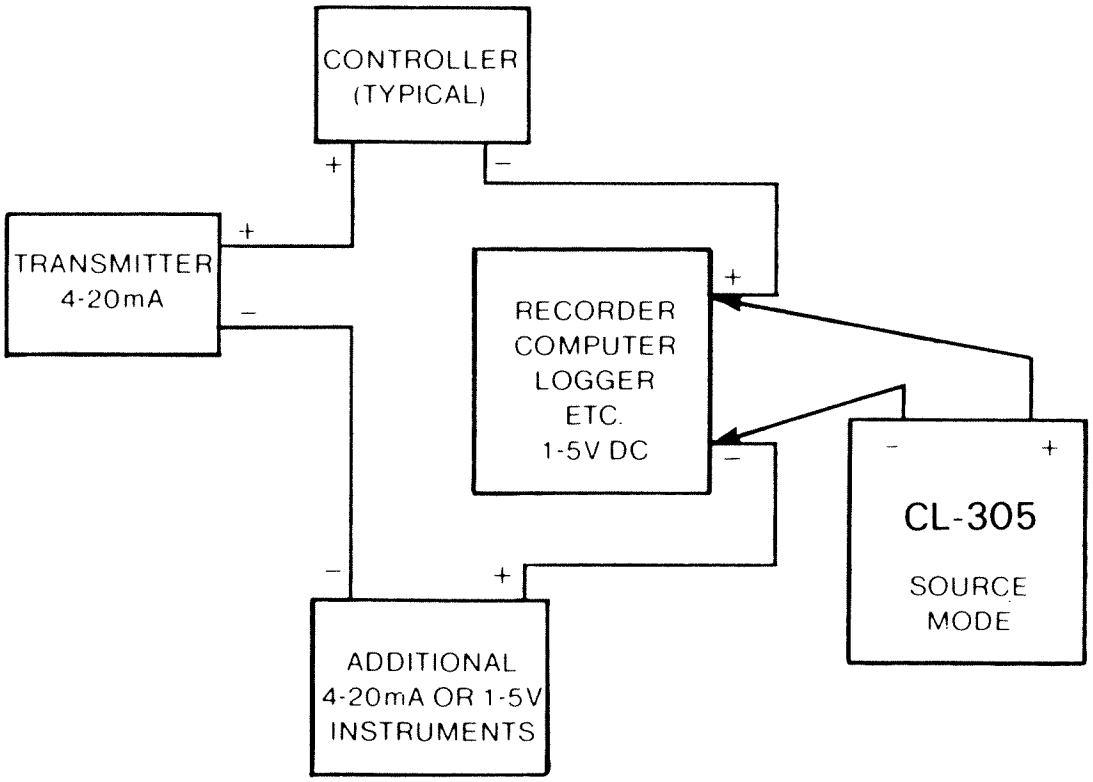


Figure 3-3 Sink Mode

SECTION 4 CALIBRATION

4.1 SUGGESTED EQUIPMENT

1. 4½ digit voltmeter (±0.025% of reading or better)
2. Voltage source, 0 to 20 Vdc. Before any adjustments to the CL-305 are made, fresh batteries (Alkaline, Duracell MN1604 are recommended) should be placed in the unit. Connect the voltmeter to the output leads of the unit being calibrated.

4.2 SOURCE MODE

4.2.1 Millivolt Range

1. Set POWER switch to SOURCE.
2. Set RANGE switch to 0-100 mV.
3. Set QUICK-CHECK switch to DIAL.
4. Set the output voltage using the large 10 turn knob to produce a voltmeter reading of 160.00 mV to ±0.02 mV.
5. Using the Millivolt Range pot (pot 1 on Figure 4-1) adjust the CL-305 to read 160.0.

4.2.2 Percent Range

1. Set RANGE switch to Percent (%)
2. Set the output voltage using the large 10 turn knob to produce a voltmeter reading of 1.000 V ±0.001 V.
3. Using the 0% pot (pot 2 on Figure 4-1) adjust the CL-305 to read 00.0.

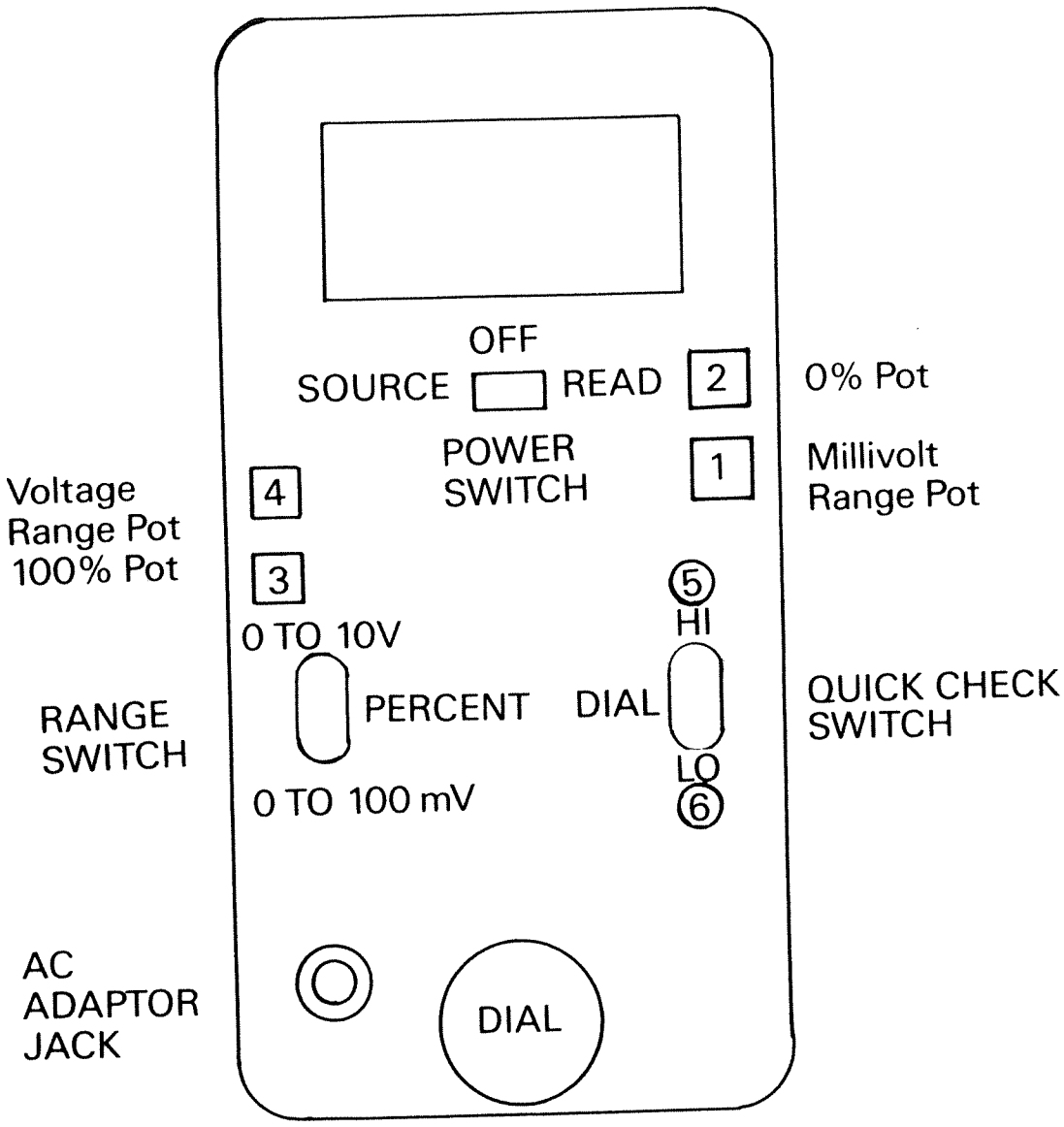


Figure 4-1 Front Panel

4. Set the output voltage using the large 10 turn knob to produce a voltmeter reading of 5.000 V ±0.001 V.
5. Using the 100% pot (pot 3 on Figure 4-1) adjust the CL-305 to read 100.0.
6. Check and readjust the 0% and 100% adjustment pots as necessary to obtain desired accuracy.

4.2.3 Voltage Range

1. Set RANGE switch to 0 to 10 V.
2. Set the output voltage using the large 10 turn knob to produce a voltmeter reading of 16.000 V to ±0.002 V.
3. Using the Voltage Range pot (pot 4 on Figure 4-1) adjust the CL-305 to read 16.00.

4.2.4 Quick-Checks

Both the HI and LO Quick Checks should be adjusted to ensure proper operation. At this time the HI and LO (pots 5 and 6 on Figure 4-1) may be set to any required values (factory settings are 1.000 V (0.0%), and 5000 V (100%).

4.3 READ MODE

Connect a voltage source in parallel with the voltmeter and the CL-305 being tested; see Figure 4-2.

4.3.1 Millivolt Range

1. Set POWER switch to READ.
2. Set RANGE switch to 0-100 mV.

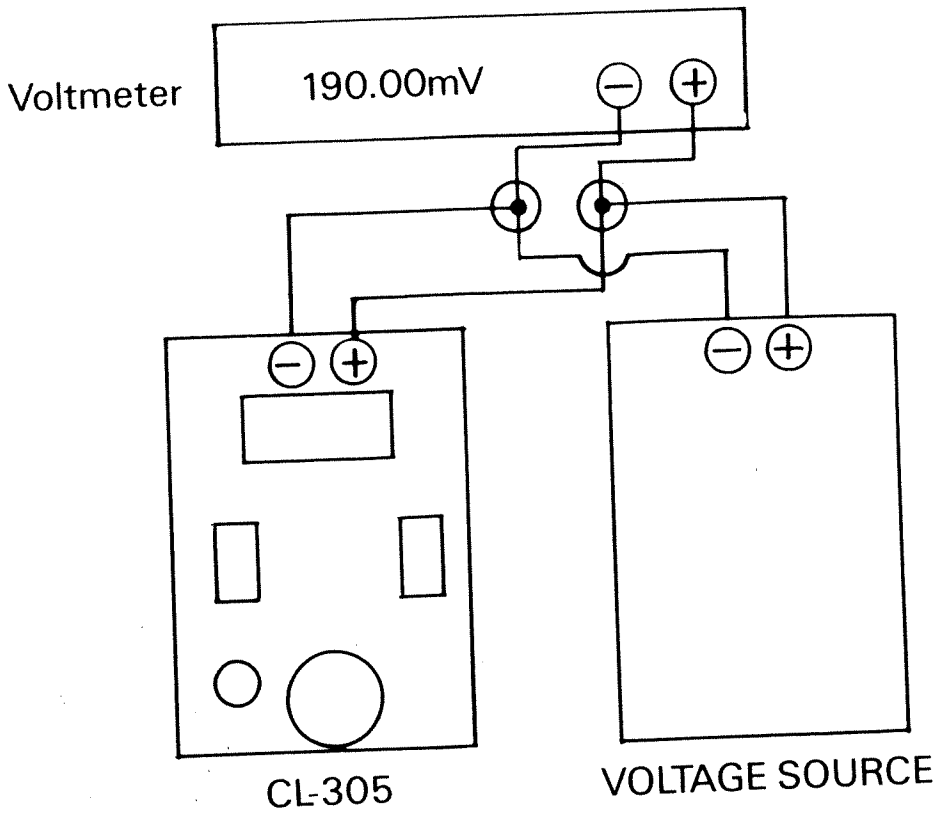


Figure 4-2 Calibration Set-up

3. Adjust the voltage source to obtain a value of 190.00 mV (±0.02 mV) on the voltmeter. The CL-305 MUST display 190.0 ±0.1.

4.3.2 Percent Range

1. Set RANGE switch to Percent (%).
2. Adjust the voltage source to obtain a value of 4.800 V (±0.002 V) on the voltmeter. The CL-305 MUST display 95.0 ±0.1.

4.3.3 Voltage Range

1. Set RANGE switch to 0 to 10 V.
2. Adjust the voltage source to obtain a value of 19.000 V (±0.002 V) on the voltmeter. The CL-305 MUST display 19.00 ±0.01.

4.3.4 AUTO-ZERO

Disconnect the voltmeter and short the leads of the CL-305 being tested. The CL-305 will display as follows:

0 to 100 mV Range:	00.0 (±0.1)
Percent 1 to 5 Range:	−25.0 (±0.1) 0 to 10 V
Range:	0.00 (±0.01)

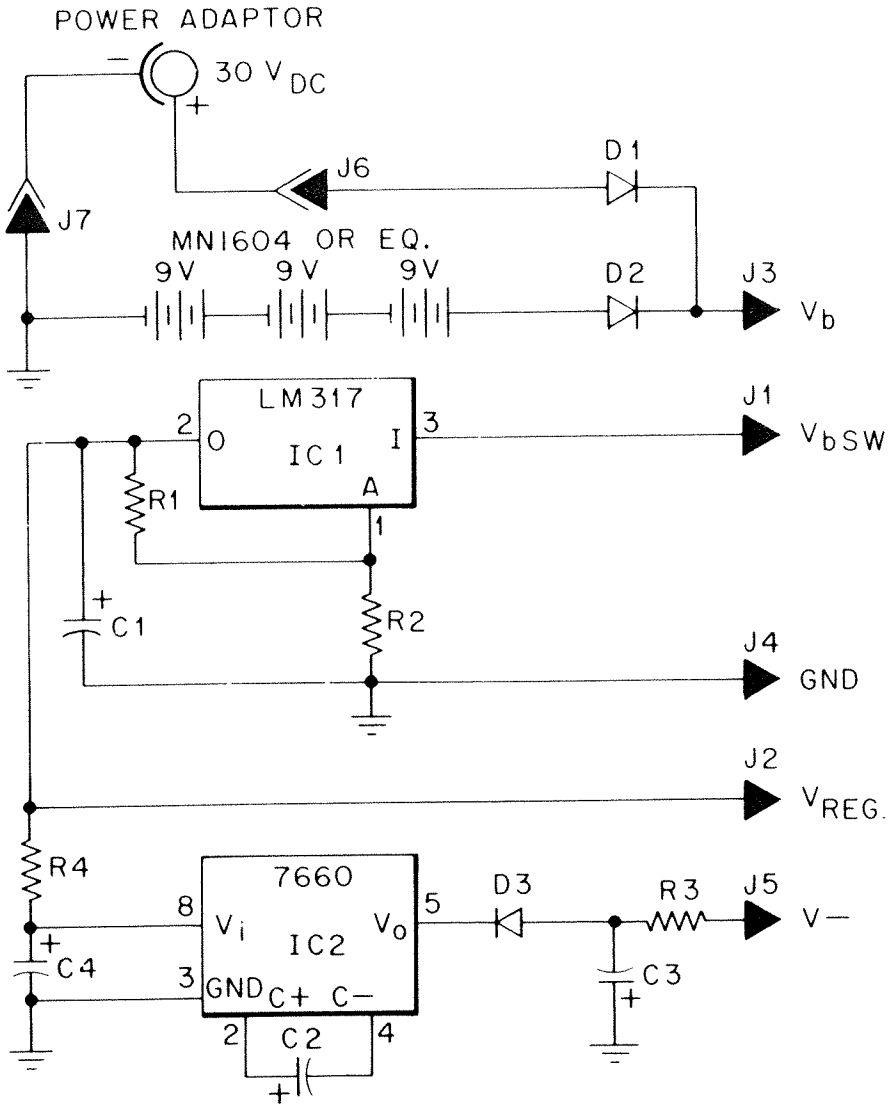
If component replacement is required, save and replace the insulating material on the underside of the printed circuit board. If the unit fails to meet any of its stated specifications after recalibration, call OMEGA Customer Service .

SECTION 5 SPECIFICATIONS

ACCURACY:	±(0.1% + 1 least significant digit)	
DISPLAY:	Liquid Crystal; 3½ digit, 0.35'' (9.0 mm)high	
NEGATIVE VOLTAGES:	Measured on 100 mV and 10 V ranges	
QUICK-CHECK:	Preset at 0% and 100% (1 and 5 V)	
ADJUSTMENT RANGE	LO	HI
10V	−0.1V to +1.5V	0.75V to 11V
0−100%	−25% to +12%	−10% to 199%
100mV	−4mV to +25mV	10mV to 199mV
BUILT-IN BATTERIES:	3 X 9 V Alkaline, Duracell MN 1604 are included	
BATTERY LIFE:	100 Hours, Sourcing into high impedance loads. 20 Hours at 20 mA Drain	
SOURCE CURRENT:	30 mA Maximum	
SINK CURRENT:	20 mA Maximum	
OUTPUT IMPEDANCE:	< 0.3 Ohm	
INPUT RESISTANCE (READ MODE):	> 2 Megohms	
SOURCE RESISTANCE EFFECT (READ MODE):	0.1% error per 2000 ohms	

SPECIFICATIONS (Cont.)

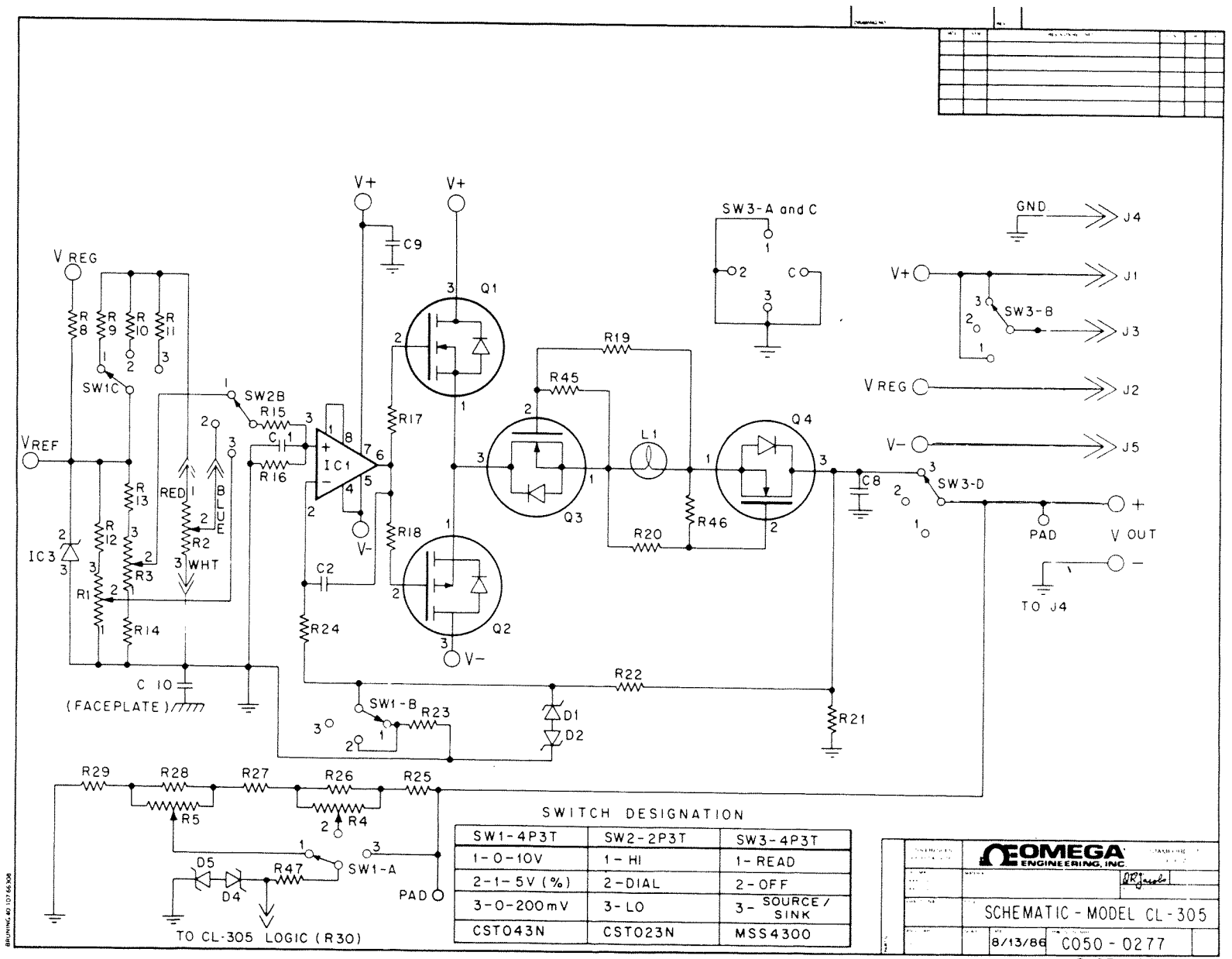
OVERLOAD PROTECTION:	Protected to 120 Vac or dc
OVERLOAD INDICATOR:	Lamp indicates high current or misconnection
SHORT CIRCUIT DURATION:	Continuous
LOW VOLTAGE INDICATOR:	LO BAT ARROW < – – – – –turns on at 18 V (approximately 10 operating hours remain)
TEMPERATURE EFFECT:	±0.01/°C (Based on 25°C ±25°C Recommended Range)
RECOMMENDED OPERATING TEMPERATURE:	32° to 122°F (0° to 50°C)
OPERATING AMBIENT TEMPERATURE:	−5° to + 140°F (−20° to +60°C)
STORAGE TEMPERATURE:	−22° to + 175°F (−30° to +80°C)
RELATIVE HUMIDITY:	10 to 90%, non-condensing
WARM-UP TIME:	3 Seconds to rated accuracy
OVER-ALL SIZE:	2½ x 2⅝ x 5⅛ inches (63.5 x 66.7 x 130 mm)
WEIGHT:	12.5 oz (0.35 kg)



LAST USED

D3
R4
C4
IC2

SCHEMATIC - BATTERY BOARD
MODEL CL-304 / 305



SWITCH DESIGNATION

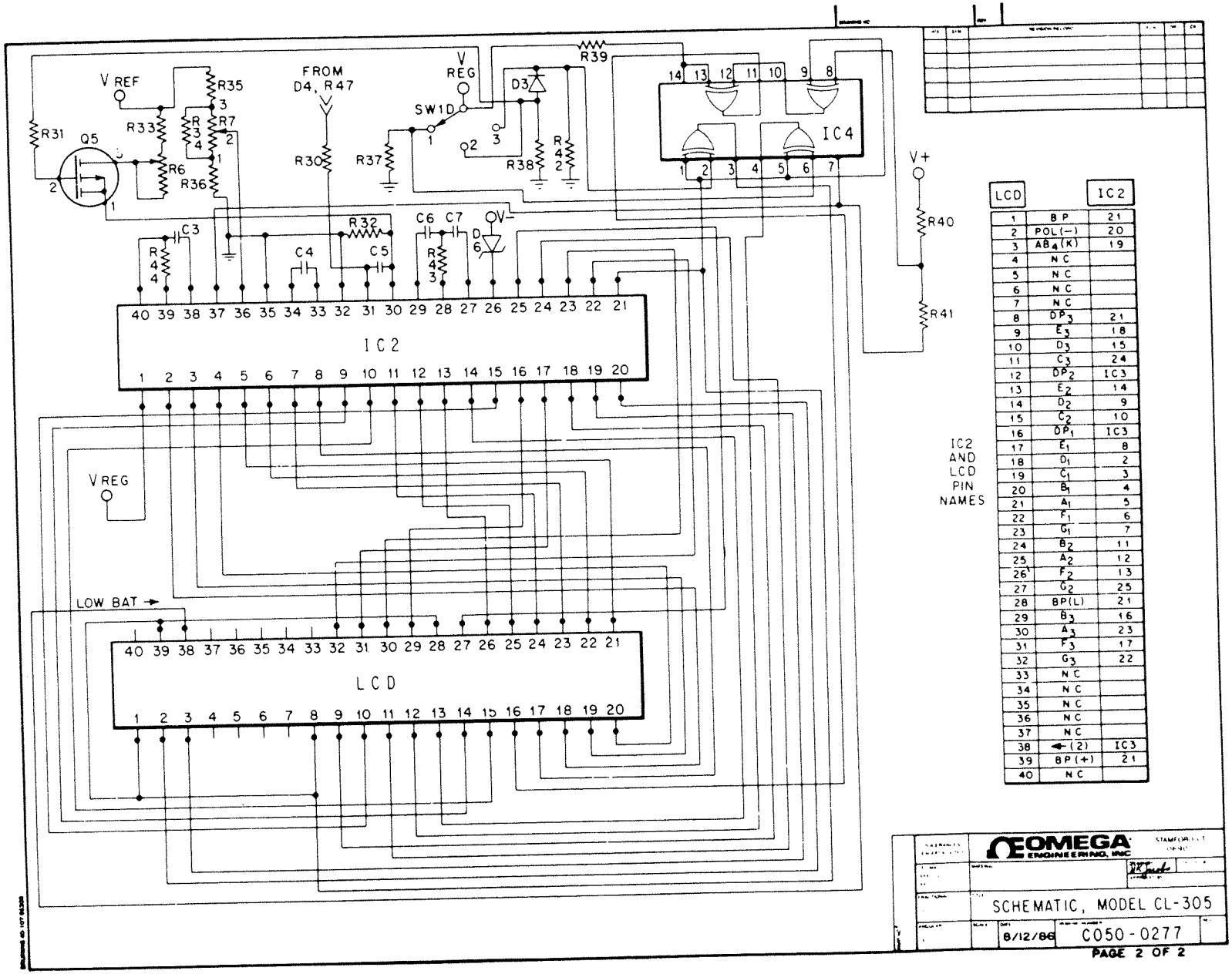
SW1-4P3T	SW2-2P3T	SW3-4P3T
1-0-10V	1-HI	1-READ
2-1-5V (%)	2-DIAL	2-OFF
3-0-200mV	3-LO	3-SOURCE/SINK
CST043N	CST023N	MSS4300

OMEGA ENGINEERING, INC.

SCHEMATIC - MODEL CL-305

8/13/86 C050-0277

PAGE 1 OF 2



IC2 AND LCD PIN NAMES

LCD		IC2
1	BP	21
2	POL(−)	20
3	AB_4(K)	19
4	NC	
5	NC	
6	NC	
7	NC	
8	DP_3	21
9	E_3	18
10	D_3	15
11	C_3	24
12	DP_2	IC3
13	E_2	14
14	D_2	9
15	C_2	10
16	DP_1	IC3
17	E_1	8
18	D_1	2
19	C_1	3
20	B_1	4
21	A_1	5
22	F_1	6
23	G_1	7
24	B_2	11
25	A_2	12
26	F_2	13
27	G_2	25
28	BP(L)	21
29	B_3	16
30	A_3	23
31	F_3	17
32	G_3	22
33	NC	
34	NC	
35	NC	
36	NC	
37	NC	
38	◄(2)	IC3
39	BP(+)	21
40	NC	

OMEGA ENGINEERING, INC

SCHEMATIC, MODEL CL-305

8/12/86 C050-0277

PAGE 2 OF 2

NOTES

Servicing Europe:

Benelux:
Postbus 8034, 1180 LA Amstelveen,
The Netherlands
Tel: (31) 20 6418405 FAX: (31) 20 6434643
Toll Free in Benelux: 06 0993344
e-mail: nl@omega.com

Czech Republic:
Ostravska 767, 733 01 Karvina
Tel: 42 (69) 6311899 FAX: 42 (69) 6311114
e-mail: czech@omega.com

France:
9, rue Denis Papin, 78190 Trappes
Tel: 33 (1) 30.62.14.00 FAX: 33 (1) 30.69.91.20
Toll Free in France: 05-4-OMEGA
e-mail: france@omega.com

Germany/Austria:
Daimlerstrasse 26, D-75392
Deckenpfronn, Germany
Tel: 49 (07056) 3017 FAX: 49 (07056) 8540
Toll Free in Germany: 0130 11 21 66
e-mail: germany@omega.com

United Kingdom:
ISO 9002 Certified
25 Swannington Road, Broughton Astley,
Leicestershire, LE9 6TU, England
Tel: 44 (1455) 285520
FAX: 44 (1455) 283912
Toll Free in England: 0800-488-488
e-mail: uk@omega.com

RETURN REQUESTS / INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. P.O. number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. P.O. number to cover the COST of the repair,
2. Model and serial number of product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

OMEGA is a registered trademark of OMEGA ENGINEERING, INC.

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **37 months** from date of purchase. OMEGA Warranty adds an additional one (1) month grace period to the normal **three (3) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit should malfunction, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of being damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/ DISCLAIMER language, and additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

Where Do I Find Everything I Need for Process Measurement and Control? OMEGA...Of Course!

TEMPERATURE

- Thermocouple, RTD & Thermistor Probes, Connectors, Panels & Assemblies
- Wire: Thermocouple, RTD & Thermistor
- Calibrators & Ice Point References
- Recorders, Controllers & Process Monitors
- Infrared Pyrometers

PRESSURE, STRAIN AND FORCE

- Transducers & Strain Gauges
- Load Cells & Pressure Gauges
- Displacement Transducers
- Instrumentation & Accessories

FLOW/LEVEL

- Rotameters, Gas Mass Flowmeters & Flow Computers
- Air Velocity Indicators
- Turbine/Paddlewheel Systems
- Totalizers & Batch Controllers

pH/CONDUCTIVITY

- pH Electrodes, Testers & Accessories
- Benchtop/Laboratory Meters
- Controllers, Calibrators, Simulators & Pumps
- Industrial pH & Conductivity Equipment

M0525/0696

DATA ACQUISITION

- Data Acquisition & Engineering Software
- Communications-Based Acquisition Systems
- Plug-in Cards for Apple, IBM & Compatibles
- Datalogging Systems
- Recorders, Printers & Plotters

HEATERS

- Heating Cable
- Cartridge & Strip Heaters
- Immersion & Band Heaters
- Flexible Heaters
- Laboratory Heaters

ENVIRONMENTAL MONITORING AND CONTROL

- Metering & Control Instrumentation
- Refractometers
- Pumps & Tubing
- Air, Soil & Water Monitors
- Industrial Water & Wastewater Treatment
- pH, Conductivity & Dissolved Oxygen Instruments