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MODEL 4161

Instruction Manual



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Model 4161

BCD to Seven Segment Display

Instruction Guide

Cincinnati Electrosystems, Inc.
502 TechneCenter Dr., Suite A
Milford, Ohio 45150

Cincinnati Electrosystems' products are designed to be easy to use and simple to wire. This manual is designed to improve the understanding of the model 4161 BCD to Seven Segment Display and to make the installation and operation as simple as possible.

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Cincinnati Electrosystems, Inc.
502 TechneCenter Dr.
Milford, Ohio 45150

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Table of Contents

Model 4161

Receiving Inspection 1
Packing List 1
What to do if something is missing or in error. 1

Description 2

Programming 3
Data Level 3
Strobe Level 4
Digits Strobed 6

Switch Setting Selections 7

Cross Reference Chart 11
Allen-Bradley 11
General Electric 11
Gould/Modicon 12
Square D 13
Texas Instruments 13
Westinghouse 13

Connections 14
Power 14
Connector Pinouts 16

Dimensions 17

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Specifications 18

Special Configurations 19

Operation Examples 20
- **Non-Multiplex** 20
- **Multiplex** 21
- **Operating in Multiplex Mode** 22

Wiring Diagrams 23

Adapter Applications 26

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Receiving Inspection

Packing List

After receiving your 4161 BCD to 7 Segment Display you should immediately check to see that you received the following items:

- 4161 Display Panel
- 4161 Instruction Manual (this manual)
- Customer Registration Card

What to do if something is missing or in error.

If you find that there has been a packing error contact customer service at:

(513) 831-6800 Customer Service

(513) 831-4866 FAX

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Description

Cincinnati Electrosystems' Model 4161 BCD (Binary Coded Decimal) to Seven Segment Panel Display is an instrument which converts the BCD information from the D.C. output ports of a programmable controller to seven segment digital displays. There are three basic models, a 5 volt, a 15 volt and a 24 volt model, any of these models can be ordered with 2 to 8 digits. Switches mounted on the printed circuit board allow the display to interface with the majority of the programmable controllers. These switches allow the selection of "0" true or "1" true data levels, "0" true or "1" true strobe levels, and strobing of all or individual digits. The decimal point can be selected on the rear connector and can be latched with the D.P. strobe line. A lamp test can be performed by applying a "0" logic level to the Lamp Test input. Digits can be blanked by calling up a BCD number over 9.

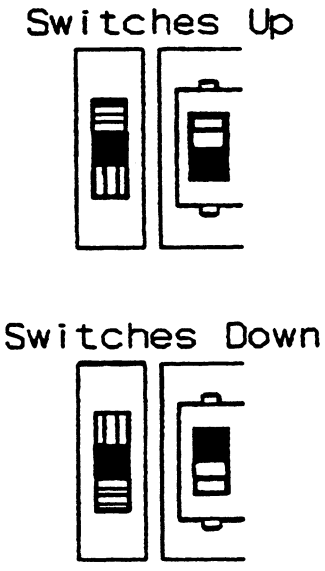
Two through six digit models have .43 inch high digits, seven and eight digit models have .40 inch high digits. The model 4161 is interchangeable with Models 416, 417 and 876.

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Programming

There are three voltage models of the 4161 BCD to Seven Segment Panel Display, the 5, the 15 and the 24 volt model. All models have the same basic CMOS logic circuitry although the 24 volt model has an additional regulator circuit. Data level, strobe level and digits strobed are programmed on the printed circuit board with switches. The programming switches are accessed by removing the 4 screws on the rear of the panel display, then removing the cover plate.

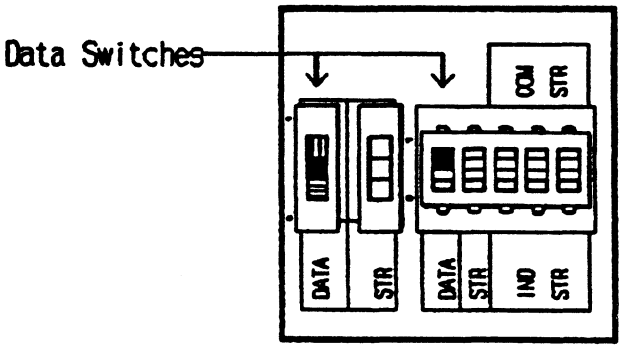
Switch Positions



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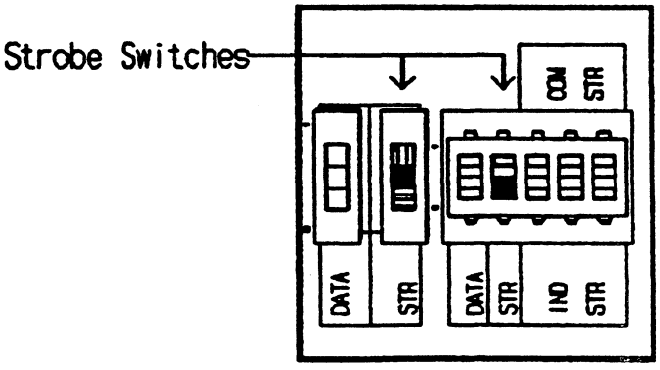
Data Level

Both of the data set switches must be set at the same level. For "0" true data the switches are in the down position, as shown below. For "1" true data the switches are in the up position.



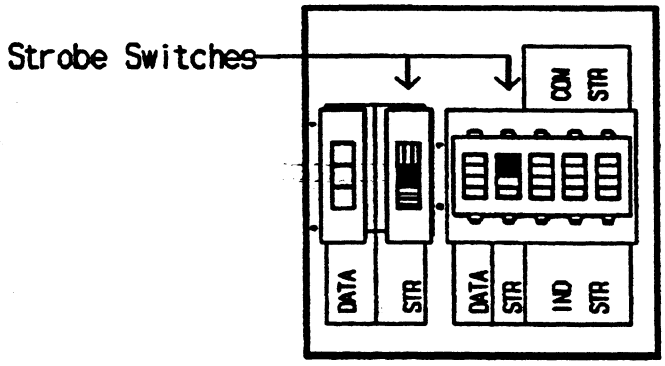
Strobe Level

Non Multiplex Operation If the display is used in Non Multiplex mode the strobe is disabled and the seven segment displays are transparent to the inputs at any time. For this type of operation the strobe level switches must be set in opposite positions, as shown below.



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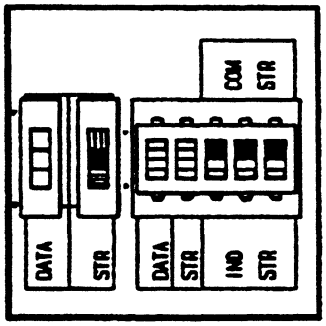
Multiplex Operation Both of the strobe switches must be set at the same level for multiplex operation. For "0" true strobe level the switches are in the down position (as shown). For "1" true strobe level the switches are in the up position. See figure below.



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Digits Strobed

Three switches, labeled IND STR (Independent Strobes) and COM STR (Common Strobes), allow all digits or individual digits to be strobed. With the three switches up, a signal to any strobe input will strobe all digits. With the three switches down, (as shown below) a strobe signal is required for each digit.



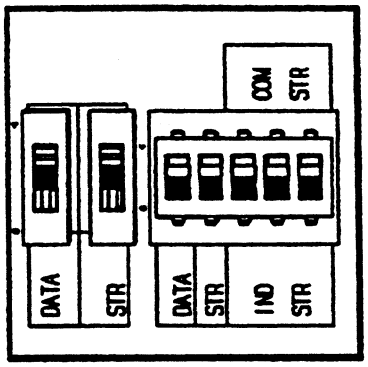
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Switch Setting Selections

The following 8 switch settings give all the logic and strobe configurations for the multiplex operations. The references (A,B,C etc.) and (416-x-x-x-11) allow selection of switch positions for I/O mating and interchangeability with Models 416, 417 and 876 (for 876 use 417 settings). Page 9 gives a list of programmable controller output modules and the normal switches set up (A,B etc.) to mate with the modules. For non-multiplex operation set the strobe switches in opposite positions, eg: one switch "0" one switch "1". There is no logic level selection for the decimal point input, if the decimal point is required the logic level to call up the decimal point will be "1".

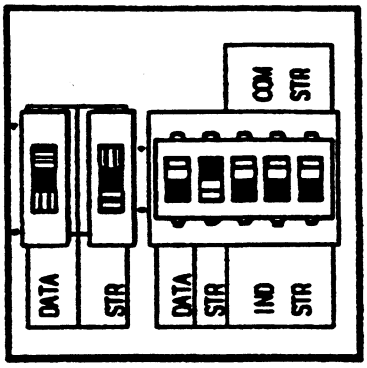
NOTE: *5-8 digit units must have the switches set on the top and the bottom boards.*

A 416-x-x-x-11

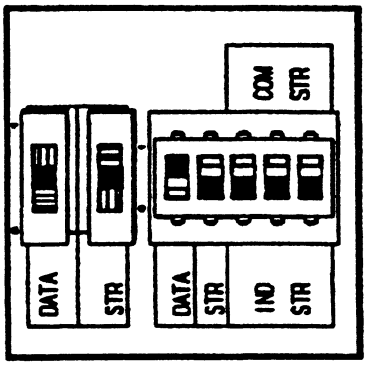


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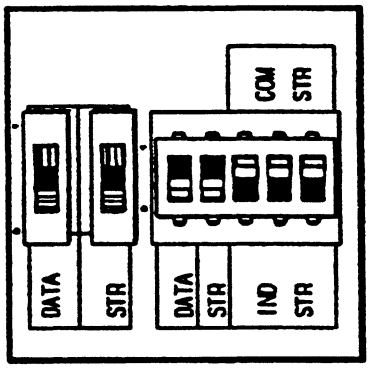
B **416-x-x-x-10**



C **416-x-x-x-01**

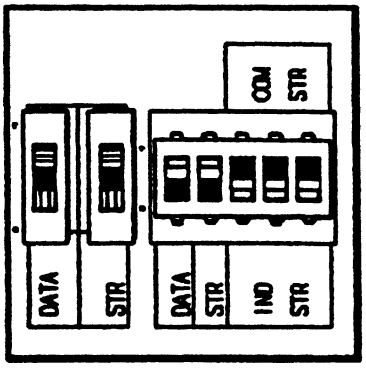


D **416-x-x-x-00**

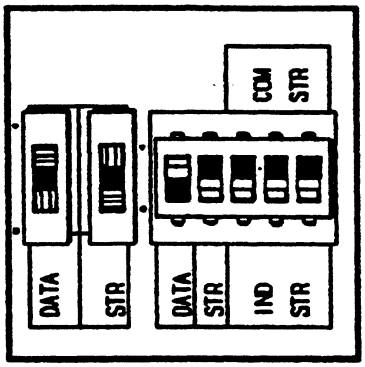


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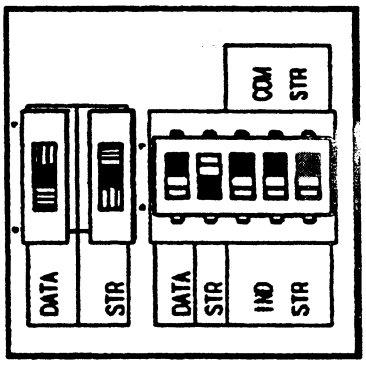
E 417-x-x-x-11* (876)



F 417-x-x-x-10* (876)

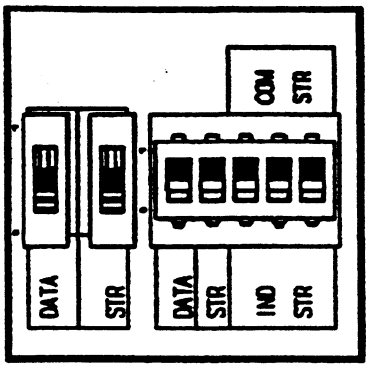


G 417-x-x-x-01* (876)



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H 417-x-x-x-00* (876)



***Indicates Individual Digit Strobes**

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Cross Reference Chart

The following table will give the switch settings for interfacing with different manufacturer's I/Os. When two model voltages are given for a module, that module has a range of operating voltages (eg: 10 to 60 volts DC). If two switch configurations are given, normally it will be either all outputs strobed or groups of four outputs strobed. When more than two configurations are given the module has selector switches or jumpers to select the data level and strobe level.

Manufacturers Output Module	Model Voltage	Switch Configuration
Allen-Bradley		
1771-OB	15,24	A,E
1771-OBD	15,24	A,E
1771-OG	5	A,B,C,D,E,F,G,H
General Electric		
IC 600 BF 902	24	D,H
IC 600 BF 906	15	D,H
IC 600 BF 907	15	A,E
IC 600 BF 908	24	A,E
IC 600 BF 911	5	A,B,C,D,E,F,G,H
IC 600 BF 913	15,24	D,H
IC 610 MDL 103	5,24	D,H
IC 610 MDL 151	5,24	D,H
IC 610 MDL 152	5,24	D,H
IC 610 MDL 153	5,24	D,H
IC 610 MDL 154	5,24	A,B,C,D,E,F,G,H
IC 610 MDL 155	24	A,E
IC 610 MDL 156	5,24	D,H
IC 610 MDL 157	5,24	D,H

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IC 610 MDL 158	24	A,E
IC 630 MDL 304	24	D,H
IC 630 MDL 351	24	D,H
IC 630 MDL 352	24	D,H
IC 630 MDL 353	24	D,H
IC 630 MDL 354	5	D,H
IC 630 MDL 902B	24	D,H
IC 630 MDL 906B	5	D,H
IC 630 MDL 907B	5	A,E
IC 630 MDL 908B	24	A,E
IC 630 MDL 911A	5	D,H
IC 630 MDL 913C	15,24	D,H
IC 630 MDL 919A	15,24	A,E
IC 630 MDL 921A	5	D,H
IC 630 MDL 923A	15,24	D,H
IC 630 MDL 929A	15,24	A,E
Gould/Modicon		
B224	24	A,E
B232	24	A,E
B236	5	A,E
B238	24	D,H
B248	24	D,H
B352	24	D,H
B356	24	A,E
B552	24	A,E
B556	5	A,E
B558	24	D,H
B570	5	B,F
B820	15,24	A,E
B824	24	A,E
B826	24	A,E
B828	5	A,E
B832	24	D,H
B838	24	A,E
B862	5	A,B,C,D,E,F,G,H

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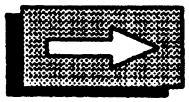
Square D		
ROM-141	5	B,F
HOM-241	15,24	B,F
HOM-261	5	A,E
COM 241	15,24	A,E
COM 261	5	A,E
DOM-241	15,24	A,E
Texas Instruments		
5MT 14-30CL	15,24	A,E
7MT-400	5,15	A,E
500-5013	15,24	A,E
500-5019	5	A,E
Westinghouse		
NL-723	5	A,E
NL-724	15,24	D,H
NL-725	15,24	A,E
NL-732H	15,24	A,E
NL-735H	15,24	A,E
NL-744	5	D,H
NL-753	5,24	A,E
NL-754	5	B,F
NL-1025	5	A,E
NL-1026	24	A,E

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Connections

Power

For 5 or 15 volt models connect power to pins 11 and 13 only. For 24 volt models connect power to pins 15 and 13 only.



WARNING! Failure to use the correct pins will damage the unit and will void the warranty.

Digit Strobes

The strobes are connected to pins S, 10, 8 and 7 for individual digit strobes and to any one of these pins for common strobe.

Decimal Point

Non Multiplex Operation Connect the desired D.P.(Decimal Point) input and the D.P. strobe input to +VDC on the rear connector. The strobe switches must be set as shown on page 4 under strobe level Non Multiplex Operation to operate the decimal points in the Non Multiplex mode.

Multiplex Operation The D.P. inputs are always "1" true logic. The D.P. Strobe logic level is set by the strobe switches and will be at the same logic level as the Digit Strobes.

NOTE: *Tie the D.P. Strobe to +VDC to turn off all of the decimal points.*

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Solderless Field Adapters

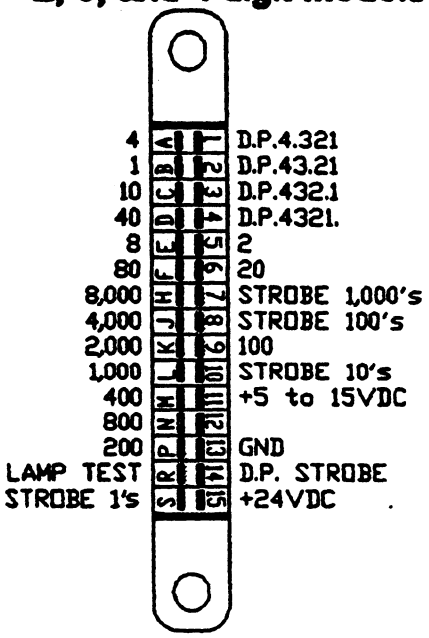
The following adapters are available to simplify the wiring installation of the Model 4161.

788	**Terminal strip connections 2-4 digit models**
888	**Terminal strip connections 5-8 digit models**
815	**Ribbon cable connections 2-4 digit models**
8152	**Ribbon cable connections 5-8 digit models**
840	**Ribbon cable to terminal strip adapter**

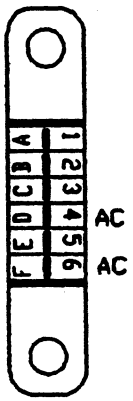
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Connector Pinouts

2, 3, and 4 digit Models

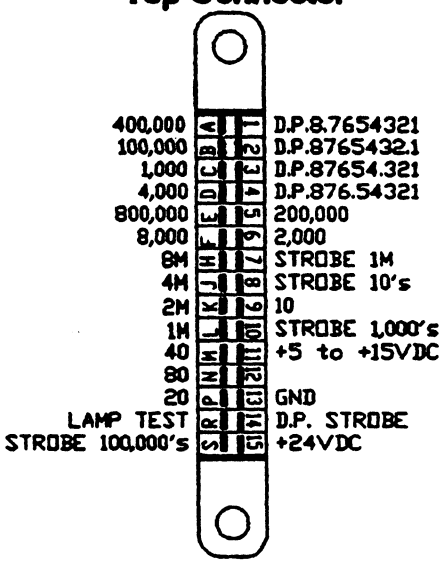


115 VAC Power Model

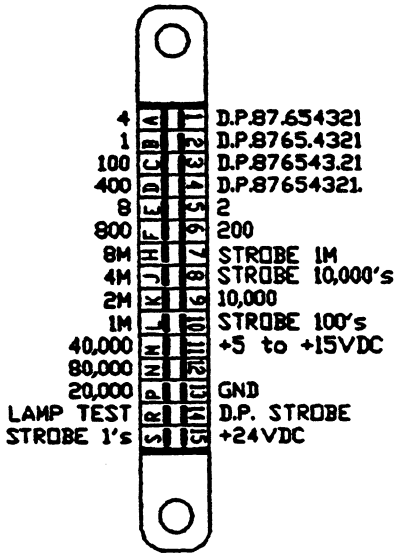


5, 6, 7, and 8 digit Models

Top Connector



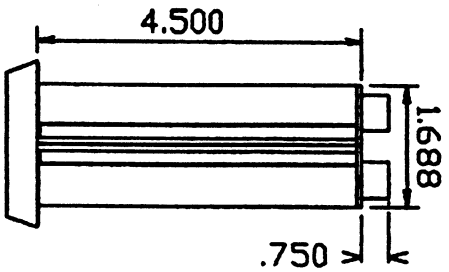
Bottom Connector



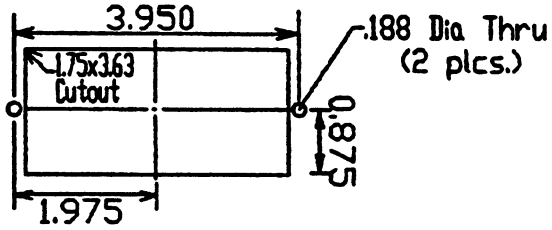
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Dimensions

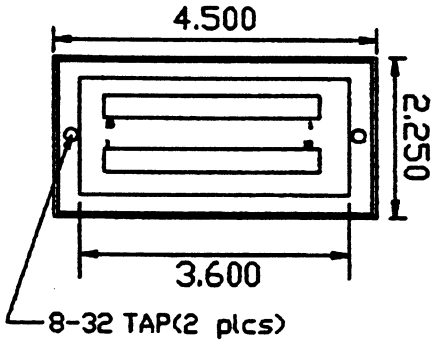
Side View



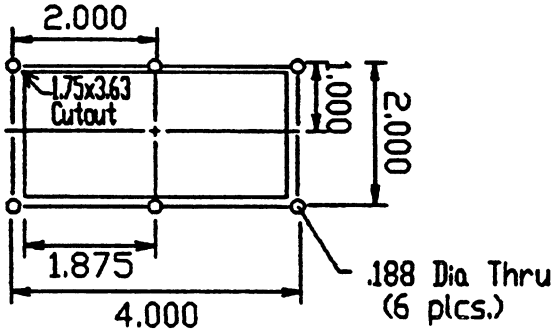
NEMA 1 and 12 Panel Cutout



Rear View



NEMA 4 Panel Cutout



NOTE: *8-32 screw must not be more than ¼" longer than the thickness of the panel.*

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Specifications

Power Requirements

5V-50mA per digit
15V-50mA per digit
24V-50mA per digit

Input Impedance

Data Inputs-220K ohms
D.P. Inputs-220K ohms
D.P. Strobes-22K ohms
Lamp Test-22K ohms

Strobe Inputs

IND Strobe-220K ohms
COM Strobe-220K÷# of digits

Character Height

2,3 and 4 digit models .43" or .8"
5 and 6 digit models .43"
7 and 8 digit models .40"

Input Levels

Logic Levels	5VDC	15VDC	24VDC	Units
0	1.5	4	4	Volts
1	3.5	11	11	Volts

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Special Configurations

This section provides the information required for hookup and operation of special display configurations. All units are modification of Model 4161.

+/- Display

In this display a plus or minus sign is placed in the most significant digit (left most) location. The minus is always present, when the 8's number is called up for that digit location the plus will appear (eg: +888 the 8000 would be activated for a plus sign).

Hexadecimal to Seven Segment Digit

This display operates the same as the BCD Model 4161 except there is no display blanking. The number set is 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, b, C, d, E, F. (no Lamp Test)

.8 Inch High Display

The .8" high display is limited to 4 digits; current requirements are 100mA per digit.

NEMA 4 and 12

The NEMA 4 unit has a special bezel which requires additional mounting screws to make an effective seal. The NEMA 12 model requires the mounting screws to come from the inside of the panel. The #8 mounting screw should not be more than 1/4"longer than the thickness of the panel.

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Operation Examples

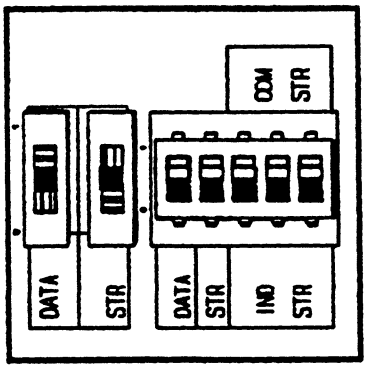
The BCD to Seven Segment Display used in the following examples will be a 4161-4-24, four digit 24 volt unit. We will also assume a "1" true logic level. These examples apply to any number of digits with only the number of I/O points changing. Seven internal dip-switches determine the method and logic of operation.

One of the following 3 methods of operation can be used:

- Non-multiplex
- Multiplex *with one strobe line per unit*
- Multiplex *with four strobe line per unit*

Non-Multiplex

The example below shows the correct switch settings. Note that the STR switches are at opposite logic levels and the logic level for this example is "1" true (high logic).

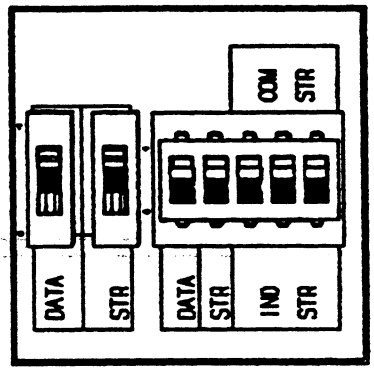


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Multiplex

One strobe line per unit

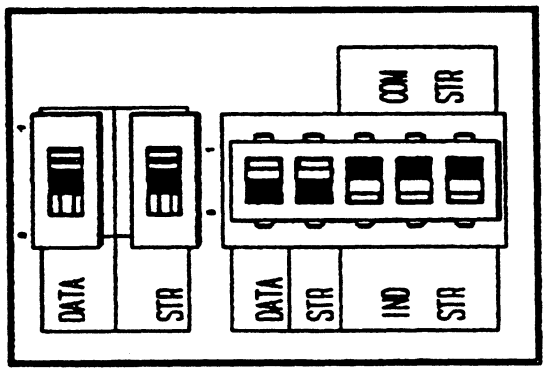
The example below shows the strobe IND-/COM switches are in the up position. This ties all the strobe lines together allowing one strobe signal to update all four digits of the display. Note that both the data and strobe are set to "1" true (high logic) level.



Multiplex

Four strobe lines per unit

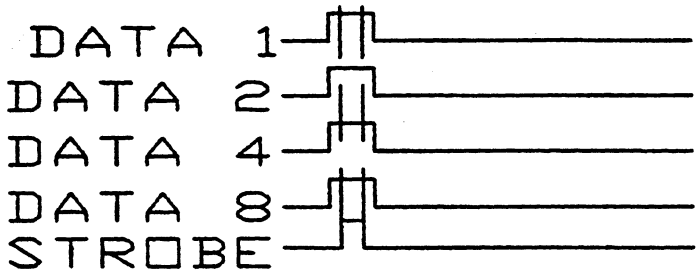
The example below shows the strobe IND-/COM switches in the down position. This allows one strobe signal to control one digit. This method of update will save I/O points when using less than 4, 4 digit displays. Three displays with individual strobes will have 12 strobe lines and 4 data lines, for a total of 16 I/O points. With common strobes 3 displays will use 16 data lines and 3 strobe lines for a total of 19 I/O points.



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Operating in Multiplex Mode

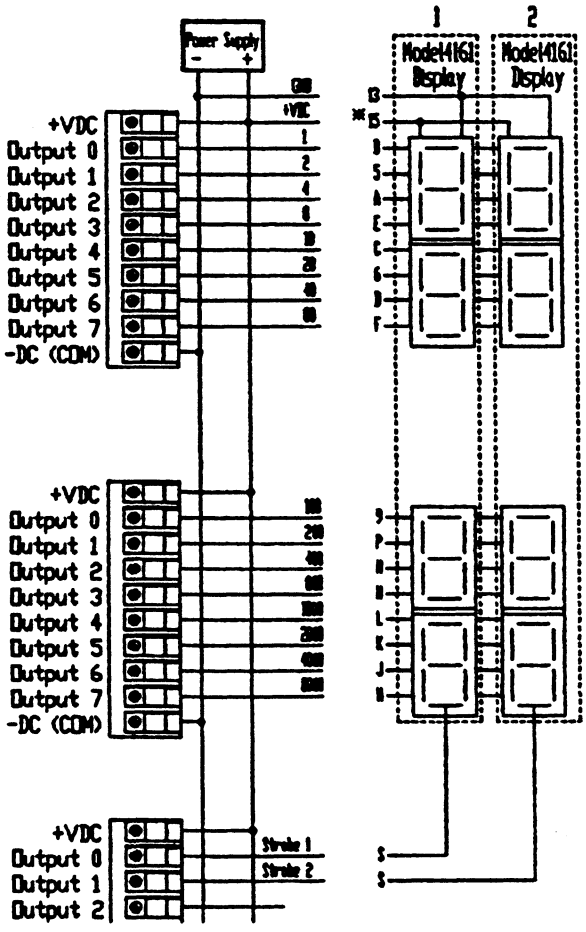
When operating any of Cincinnati Electro-systems' products in the Multiplex mode an understanding of the strobe timing is required. The latching or holding occurs on the trailing edge of the strobe signal. The required timing is shown below. When programming the controller the following sequence should be followed: Move data to output register, turn on strobe, turn off strobe, remove data from output register.



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Wiring Diagrams

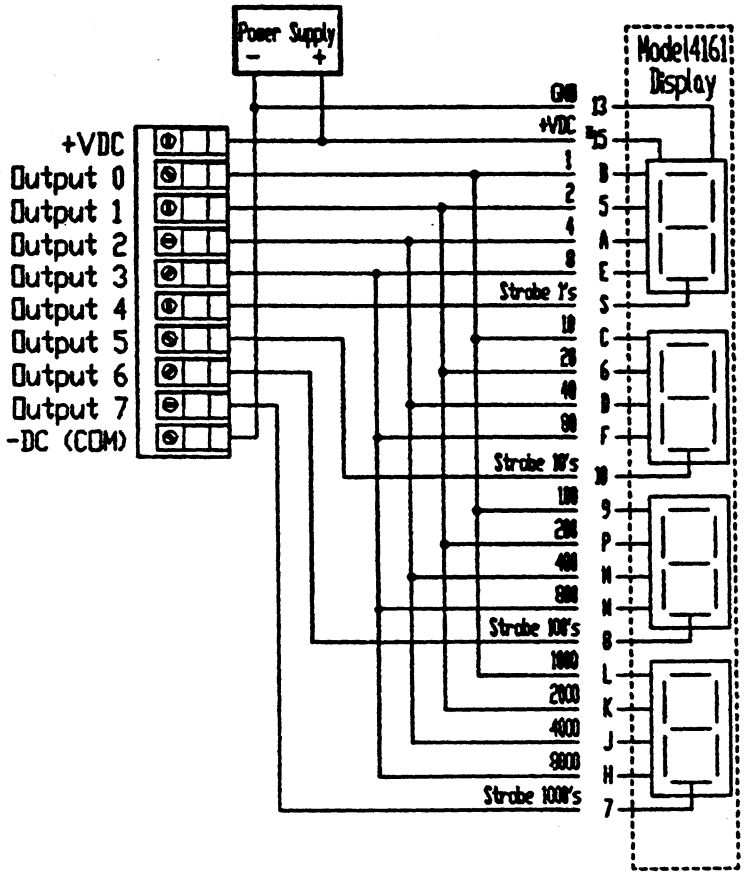
Figure 1 Two displays with common strobe connections. When adding displays only 1 strobe line is required for each additional display. With 200,000 ohm input impedance of the display and 20mA output current from the I/O the maximum number of displays that can be driven is 800.



4 digit example of Model 4161

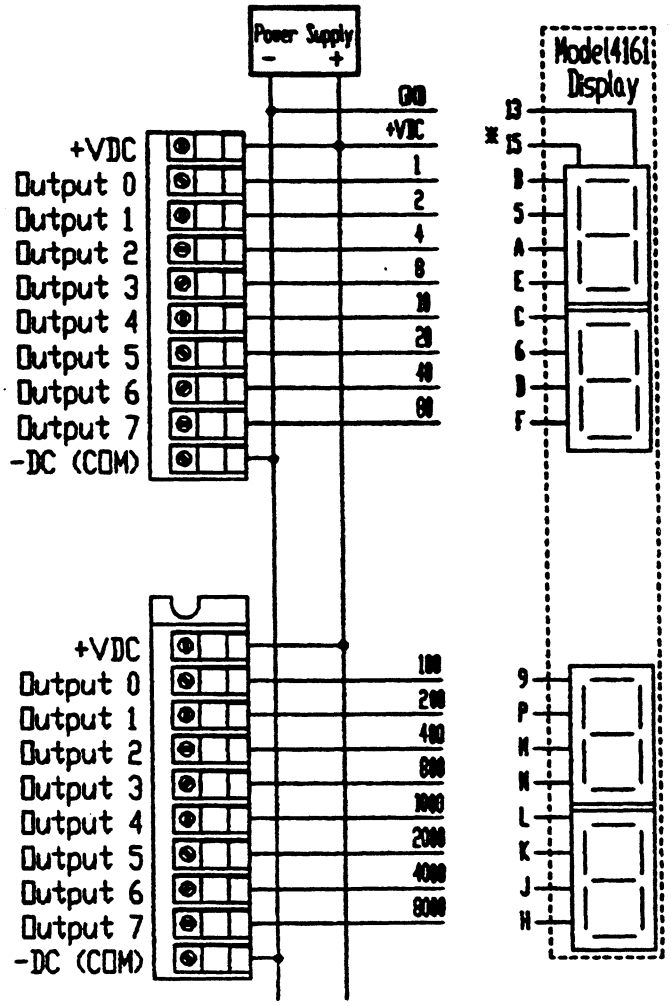
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Figure 2 **Wiring of the individual digit strobe configuration.**



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Figure 3 Wiring for non-multiplex operation.



*For 5V or 15V models connect power to pins 11 and 13 only
For 24V models connect power to pins 15 and 13 only

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Adapter Applications

The 4161 display is supplied with removable solder tail connectors. Optional adapters are available. Unlike the time consuming method of soldering wires to devices, connections are made either by plugging in a ribbon cable or stripping the wire and installing it into a screw terminal. The following is a list of adapters available for the 4161 and the instances in which they're applied.

788 — **Multiplex or Non-Multiplex**
Operation for units with 2 to 4 digits, screw terminal connections

888 — **Multiplex or Non-Multiplex**
Operation for units with 5 to 8 digits, screw terminal connections

856 — **Multiplex**
Operation for 2 to 4 digit units, screw terminal connections

815 — **Multiplex**
Operation using ribbon cable with 2 to 4 digit units

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8152	**Multiplex** **Operation using ribbon cable with 5 to 8 digit units**
840	**Converts 16 wires (4 digits) to ribbon cable format**
840R	**Ribbon cable used in multiplexing**

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