Non-Linear Systems

PC-40 4-Digit Up/Down Event Counter

INTRODUCTION

The PC-40 Digital Panel Counter is a solid-state, 4 digit, up/down event counter or totalizer. It is designed to provide totalizing capability from either contact closures or logic-level signals. The count, reset and latch inputs are conditioned to provide high noise immunity. It is a highly reliable component which can be used to replace electromechanical types.

The PC-40 is designed to operate with a +5VDC ±5% power supply. See Figure 1 for a typical +5V power supply circuit for operation from 120VAC.

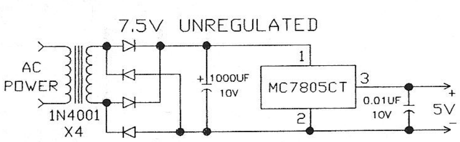


Figure 1. Typical Power Supply

SPECIFICATIONS

COUNT RATE:
Logic Level: * 0 to 1,000,000/sec
Contact Closure: 0 to 50/sec

**This speed is achieved by removal of internal capacitors which normally provide filtering of contact bounce.*

INPUT SIGNAL AMPLITUDE:
Logic Level: +3.0V to +15V
Contact Closure: Ground for count

DISPLAY: 0.3" high LED, 4 Digits

OVERFLOW INDICATION:
Blinking Decimals (up only)

POWER: +5VDC ±5% @ 0.75W

OPERATING TEMP.: 0° to 50°C

WEIGHT: 4oz (113 g)

DECIMAL LOCATION: Positioned by jumper on connector to any one of 4 locations.

BCD OUTPUT: Multiplexed, bit parallel character serial at approximately a 600 Hz rate.

DECIMAL POINT OUTPUT:
Multiplexed, pulse occurs on decimal point common at the same time as the pulse for the digit to the right of the decimal occurs.

ZERO SUPPRESSION: Ground to inhibit

BLANKING/DISPLAY INHIBIT: For on or off intensity control, connect to +5VDC through a potentiometer (0-1KΩ) and switch (if desired) maximum current is 150mA.

RESET: Negative going to low (GND) from logic level source on switch closure to GND.

CARRY: At 9999 count, an output is provided which goes positive (true). The output goes to zero (low) at the next pulse input to the counter. This occurs once each 10,000 pulses at the input. Designed for use when cascading counters.

LATCH ENABLE: (For counts to 9999) Open holds reading on counter at the time of opening. Ground returns display to count at the time of grounding (total since last reset).

OPERATING PRINCIPLES

INPUT CIRCUIT: The input circuit contains an amplifier-filter to permit a contact closure to be counted as a pulse input even if contact bounce is present. If high speed operation (above 50 per second) is desired, up to 1,000,000 per second, internal filter capacitors must be removed.

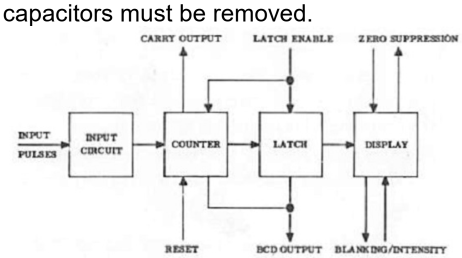


Figure 2. Simplified Block Diagram

COUNTER: The counter is a single integrated circuit which is capable of counting at a 1 MHz rate to a total of 9999. The counter provides a carry output for cascading counter for greater range. The counter can be reset by a logic-level signal or a contact-closure.

LATCH: The latch is externally controlled to hold and display the total count when the latches are enabled. This count will continue to be displayed until the latch enable is removed. Release of the latch enable results in the latches and display being updated to the then total count on the counter. From the latch circuits, multiplexed BCD data is available for the four decimal digits and the decimal point. The multiplex rate is approximately 600 HZ. Four strobe lines are sequentially energized to tell which decimal digit is being output on the four BCD data lines. The sequence begins with the most significant digit and proceeds to the least significant digit. This sequence is repeated at a rate of approximately 150Hz. The data output is the same as that presented in the display.

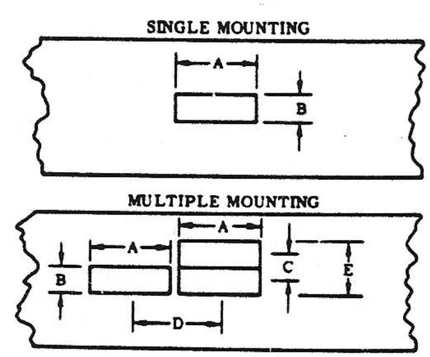
DISPLAY: The display may be used on or off as desired. Further, it permits control of the intensity of the display by using an external potentiometer.

The leading zeros may be suppressed by means of a special input; the counter will not suppress to the decimal point selected. At all zeros (0000), the display is blank.

INSTALLATION

Mount the PC-40 as follows:

1. Cut a hole in panel (figures 3 and 4).
2. Slide trim plate over PC-40 housing, facing beveled edge of trim plate forward.
3. Insert PC-40 through the cutout in the panel from the front of the panel.
4. Fit mounting clips (2) into the slots at the sides of the meter. The foot of the clip should face forward.
5. Thread the screws (2) into clips and tighten the screws against the rear surface of the panel.



	Panel Cutout w/Trim Plate	Center Line without Trim Plate	Center Line w/Trim Plate	Cutout For Multiple Mounting without Trim Plate
A	2 17/32			
B	31/32			
C		15/16	1 3/16 min	
D		3 1/8 min	3 1/8 min	
E				Number of units x 15/16

Figure 3. Mounting Data

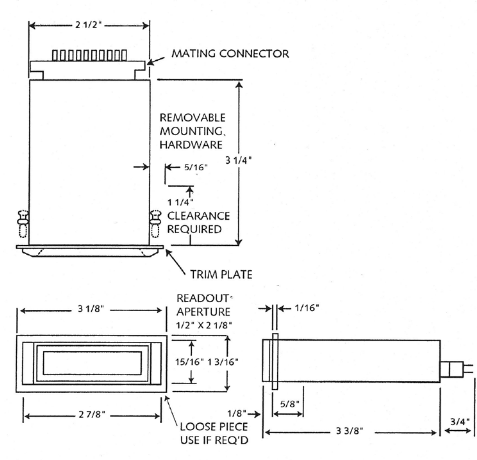


Figure 4. Outline Drawing

CONNECTOR PIN WIRING

The mating connector, if purchased, should be NLS part # N39-282. Connection to PC-40 is as follows:

Lower Contacts A		Upper Contacts B	
Carry Output	**1**	**1**	10^0 Dec Pt.
Zero Suppress	**2**	**2**	10^1 Select
Reset	**3**	**3**	10^2 & Data
N/C	**4**	**4**	10^3 Strobe
N/C	**5**	**5**	Latch Enable
MUX "1"	**6**	**6**	N/C
BCD "2"	**7**	**7**	N/C
Data "4"	**8**	**8**	Up/Down
Out "8"	**9**	**9**	N/C
Count Input	**10**	**10**	Up/Down
Blank/Intensity	**11**	**11**	N/C
Overflow Out	**12**	**12**	N/C
Decimal Com.	**13**	**13**	N/C
SIG LO &	**14**	**14**	+5VDC
COMMON	**15**	**15**	POWER

OPERATION

POWER SUPPLY: Connect negative side of power supply (Gnd) to pins A14 and A15 of connector and the positive side (+5VDC ± 5%) to pins B14 and B15. Even though the current requirements of the PC-40 are low (150 mA maximum @ 5VDC), redundant contacts are used to enhance the reliability of the connection.

COUNT INPUT: Connect signal input to pins A10 and A14 or A15. Signal LO should go to A14 or A15 and Signal HI should go to pin A10. Input impedance is 100 KΩ.

Count Up: To count up connect pin
B10 to +5VDC
& B8 to A1

Count Down: To count down connect pin
B10 to Ground
& B8 to Ground

The PC-40 counts a pulse during the positive-going part of the pulse or when a contact made to ground is closed. Using pulse or contact-closure inputs, the maximum input rate is 50 per second. The input signal may vary from zero to +3 - +15 volts in amplitude. When using voltage level input with no contact bounce, the PC-40 will operate at speeds up to 1,000,000 per second. To achieve this speed, capacitors C1, C2 and C3 must be removed from the main board assembly.

To remove the capacitors, perform the following steps:

1. Insert the blade of a small screwdriver or pen knife between case and rear cover, midway on case above printed circuit connector, and pry gently outward. Remove Cover.
2. Slide counter assembly from case. Observe that red filter is now a loose piece and will be required for reassembly.
3. C1, C2 and C3 are the rear most three capacitors on the main board assembly. Unsolder leads and remove capacitors.
4. Reassemble meter.

RESET: A negative going pulse or a contact closure to ground will cause a reset of the counter. If a pulse is used the duration must be at least 20 mSec, or with filter removed at least 1 µSec.

DECIMAL POINT AND DATA STROBE: If a decimal point is desired, jumper between pin A13 and pins B1, B2, B3 or B4 depending upon which decimal point is to be illuminated. If a decimal point is not desired, jumper pin A13 to pin B14.

Decimal Location	**. X**	**. X**	**. X**	**. X**
Pin Number	**B4**	**B3**	**B2**	**B1**

As a data strobe, the true state is low. When one of the four strobe lines is low, it means that the four multiplexed BCD data output lines are presenting the BCD code as an output for the decade indicated by that strobe line.

BCD OUTPUTS: The outputs of the MUX BCD data output lines, pins A6, A7, A8 and A9, are the 1-2-4-8 BCD bits for the four digits. True is a high state. The decimal point and data strobe lines described above are used to decode the multiplexed data output. The decimal point data output is obtained by connection to the decimal point data is decoded with the data strobe lines. For the decimal point location, data output true is low. An overflow indication is provided at pin A12: true is high.

The MUX BCD outputs are as follows:
(nominal values)

	BCD Data True-High	Decade Strobe True-Low
Frequency	600 Hz	150 Hz
Pulse Width	1500 µS	6000 µS
Voltage	+5V	+5V
Allowable Loading	CMOS	1 T² L (CMOS Preferred)

CARRY OUTPUT: On pin A1, an output is provided which will permit the user to cascade PC-40's. This output goes to +5 volts on the count of 9999. On the next pulse input the voltage goes low. Allowable loading is one CMOS load.

ZERO SUPPRESSION: If desired, the zeros to the left of a significant digit can be suppressed. to do so, leave pin A2 open. To display all numbers, ground pin A2.

BLANKING/INTENSITY CONTROL: It is possible to shut off the display or control its intensity while operating in a count mode. Pin A11 must be connected to +5VDC ±5% for the display to be on. Placing a switch in the line permits display on-off. A variable resistor permits control if intensity. Recommended resistance is 0 to 1 KΩ. Maximum current is 150 mA @ 5 volts.

LATCH ENABLE: Connecting pin B5 to ground causes the display to follow the input. Each input pulse will be counted and displayed. An open or no connection results in the display of the number in the counter at the time of the opening of the line. Reconnection to ground causes an update of the data to the then present number on the counter. This function holds for total counts to 9999.

CALIBRATION: Calibration is not required; there are no adjustments in the counter.

Specifications Subject to Change Without Notice

Thank you for choosing Non-Linear Systems products. Should you have any questions please call, fax or visit our Website at nonlinearsystems.com

NON-LINEAR SYSTEMS
Originator of the Digital Voltmeter

San Diego, CA
Phone: (619) 521-2161
Fax: (619) 521-2169
Email: ***sales@nonlinearsystems.com***

11-18