

American LED-gible®

Reducing Downtime Across the Nation!

The 2600 Series Counter Timers

AF-2645-314 AF-2640-314

AF-2625-314 AF-2620-314

AF-2615-314 AF-2610-314

Single Board Counter Timers with Firmware PP-2110-333B



American LED-gible® Inc.

1776 Lone Eagle St.

Columbus, OH 43228

(614) 851-1100 Phone

(614) 851-1121 Fax

www.ledgible.com www

ledgible@ledgible.com e-mail

PB-2149-363

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1.0 Getting Started

Thank you for your confidence in AMERICAN LED-gible®. You have selected one of the best-built, high-quality, precision-engineered products available today. Our products are designed to give you years of trouble-free enjoyment. We appreciate your support, and we will do everything we can to keep you happy with your purchase for many years to come. After all, you are the reason we are in business!

1.1 Product Description

The AF-2600 series of counters and timers provide an economical visual counting and timing solution to improve plant floor communications. All 2600 units may easily be configured to perform up counter, up hours and minutes timer, up minutes and seconds timer, down counter, down hours and minutes timer, or down minutes and seconds timer functions simply by moving jumpers. A relay with a normally open and a normally closed contact can be configured to energize when the displayed count or time is zero, or the displayed count or time equals the dip-switch preset value. The relay contacts are rated for 3A of current.

AF-2600 series counters and timers have a RESET input to zero the count or time, a PRESET input to preset the count or time to a value set by dip-switch, and a CNT/RUN input to make counters count and timers run. The logic level for each of the inputs is independently selectable between 120VAC or 24VDC by moving a jumper.

The 2600 series electronics are fully integrated into a single circuit board combining LED displays, microprocessor, optically isolated input conditioning circuitry, preset dip-switch, output relay, and linear power supply into a single compact unit. Power for 2600 series counter timers is 120VAC, 60Hz, at less than ½ amp. 50Hz power is acceptable.

NEMA-12 (Dust Tight) units are enclosed in a painted 16 gauge steel box. The display window is constructed from 1/4" red or smoked acrylic and is gasketed with foam tape meeting NEMA-12 specifications. The enclosure may be mounted via wall mount tabs and is suitable for use in most industrial and factory environments. The enclosure can be upgraded to NEMA-4 (Water Tight) specifications simply by changing the window gasket. NEMA-4X (Stainless Steel) enclosures are also available for food processing applications.

The AF-264X counter timer units are constructed using four 4.0 inch tall 7-segment modules providing data visibility up to 200 feet away. The AF-262X counter timer units are constructed using four 2.3 inch tall 7-segment modules providing data visibility up to 125 feet away. The AF-261X counter timer units are constructed using 1.0 inch tall 7-segment modules providing data visibility up to 50 feet away. 36mcd high efficiency red LED modules are standard, however the unit can be upgraded to 48mcd green, or 150mcd super red LED modules. The 7-segment modules can optionally be replaced with super outdoor red LED modules for outdoor applications as well.

An RS-485 serial port allows interfacing the counter timer to a central computer system for data collection.

1.2 Unpacking the Unit

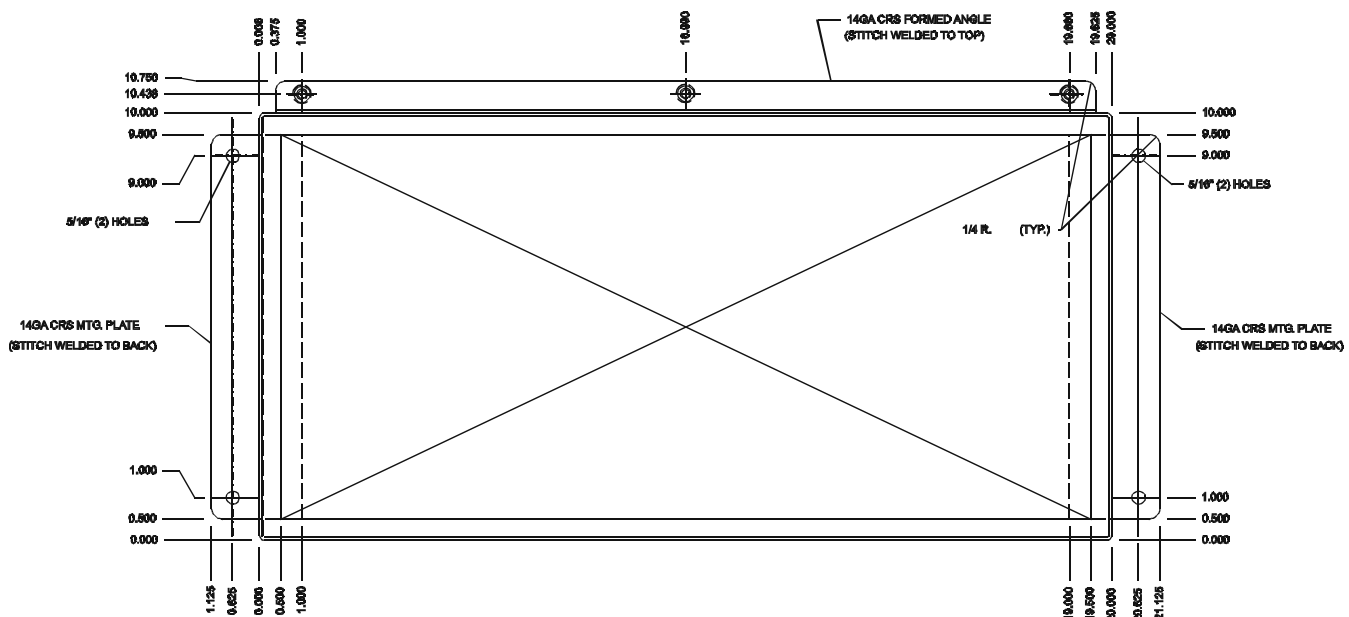
Carefully remove the counter timer from the shipping carton. Every 2600 is carefully tested, both mechanically and electrically, before shipment. Inspect the unit for damage, which may have occurred in transit. If there is evidence of damage or the unit fails to operate, file a claim with the shipper and notify American LED-gible®. Save the shipping materials for inspection.

1.3 Mechanical Installation

The counter timer should be moved to its operating position and mounted to the wall using the four screw holes in the wall mount tabs of the enclosure.

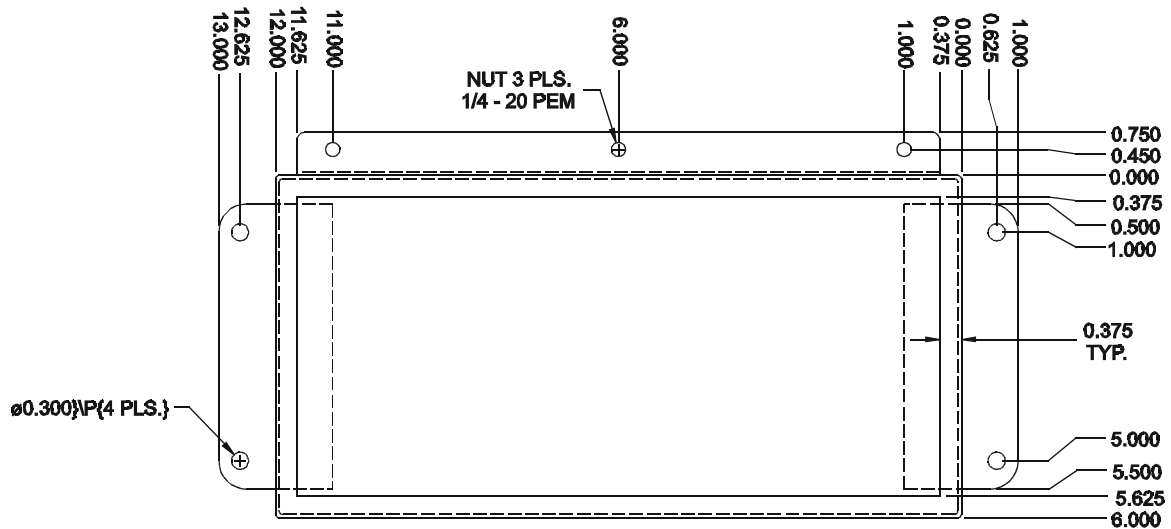
A drawing of the box section of the standard AF-264X-314 4.0" counter timer enclosure is shown below. The 5/16" mounting holes are spaced 21.25" horizontally and 8.00" vertically.

4.0" Counter Timer Enclosure



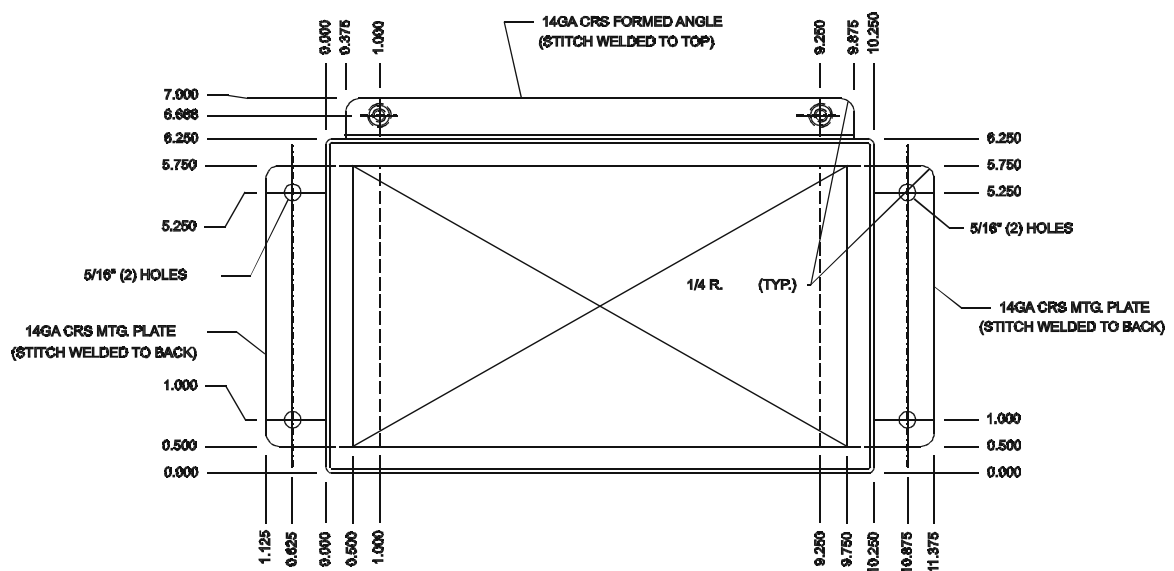
A drawing of the box section of the standard AF-262X-314 2.3" counter timer enclosure is shown below. The 5/16" mounting holes are spaced 13.25" horizontally and 4.00" vertically.

2.3" Counter Timer Enclosure

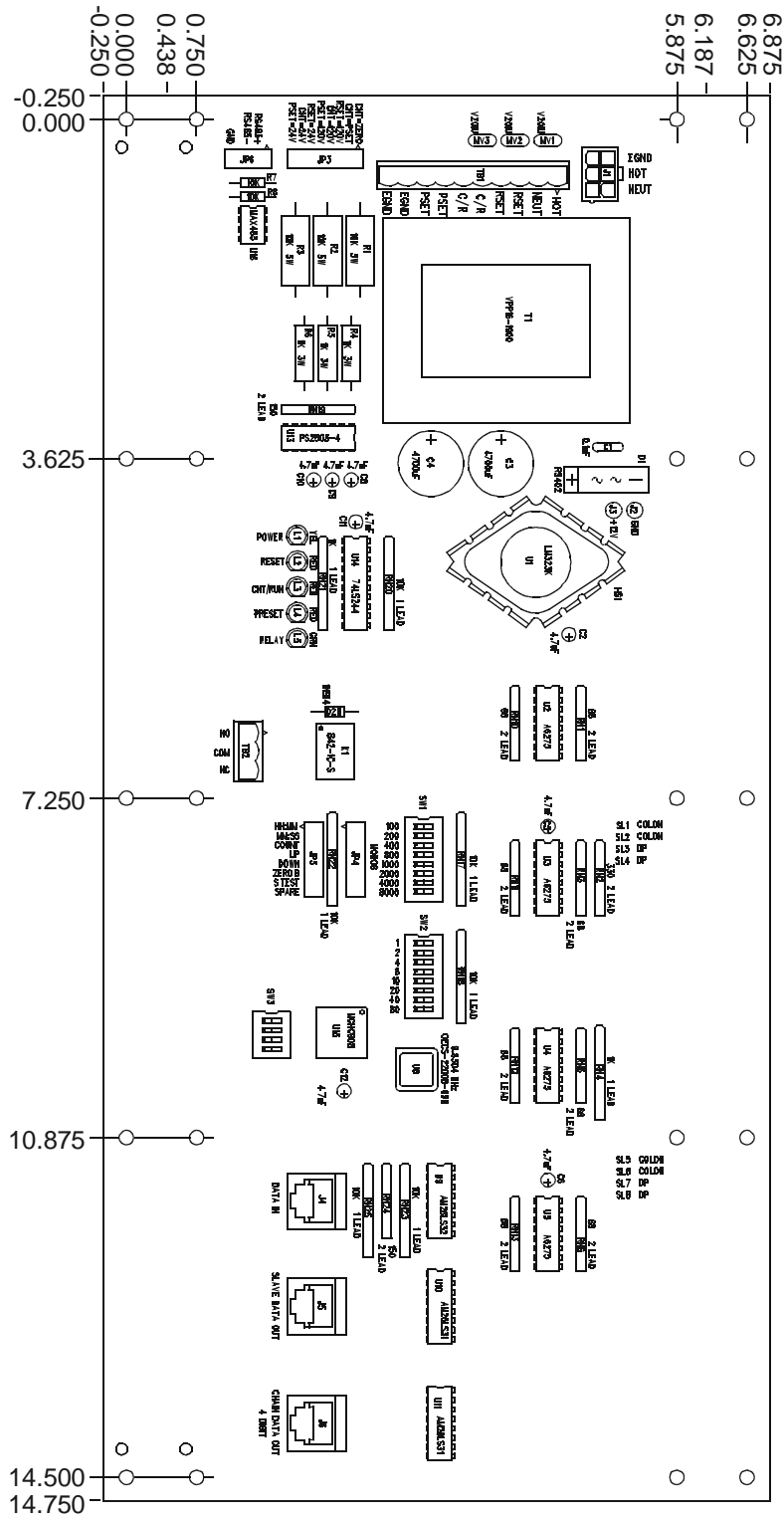


A drawing of the box section of the standard AF-261X-314 1.0" counter timer enclosure is shown below. The 5/16" mounting holes are spaced 11.50" horizontally and 4.25" vertically.

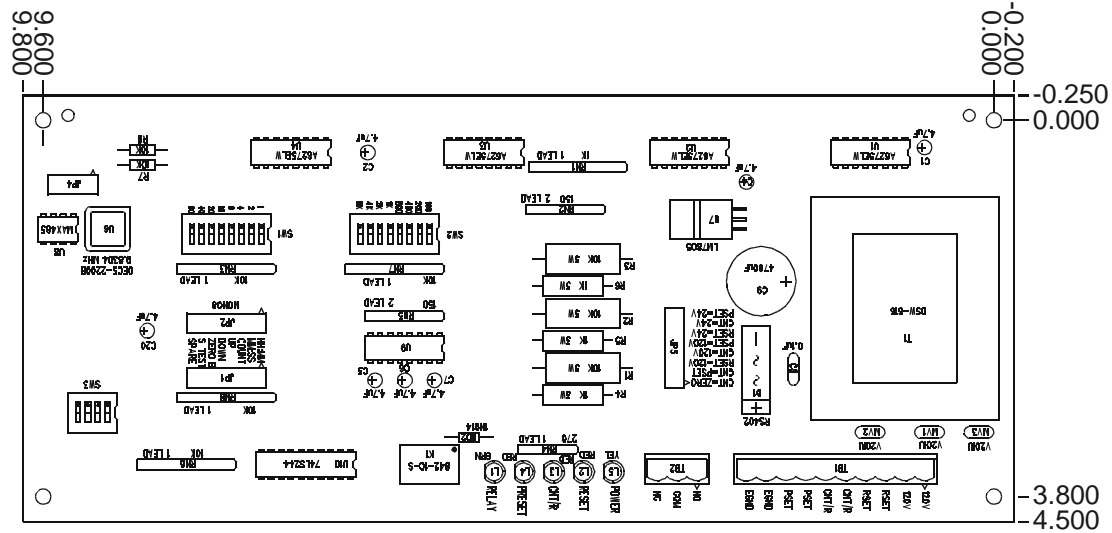
1.0" Counter Timer Enclosure



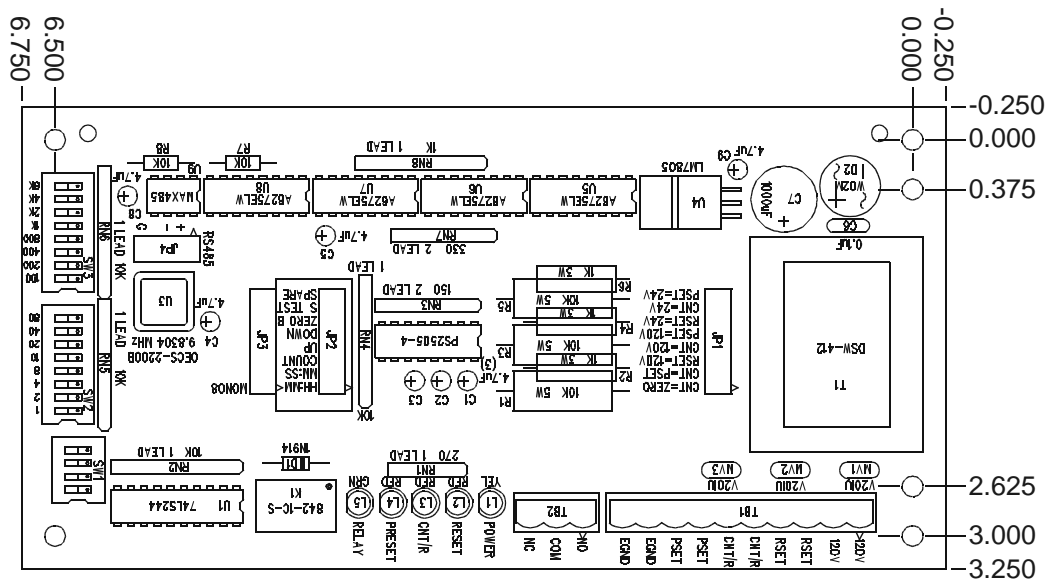
4.0" Counter Timer Circuit Board



2.3" Counter Timer Circuit Board



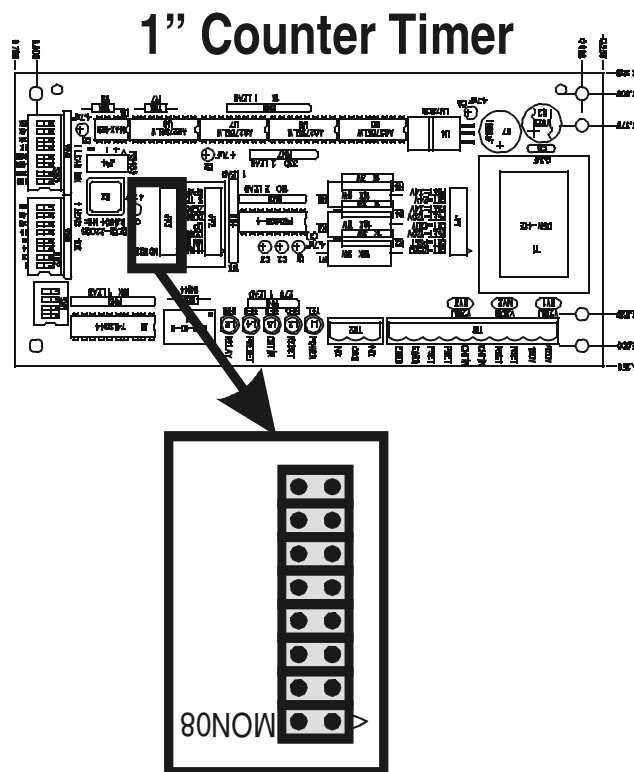
1.0" Counter Timer Circuit Board



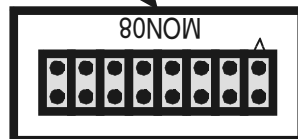
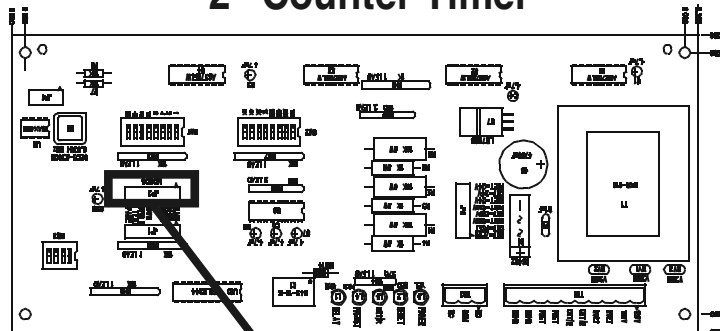
1.4 The Factory Programming Connector

All counter timer units have a jumper strip line labeled MON08. This connector is used by the factory to program the counter timer microcontroller during unit production.

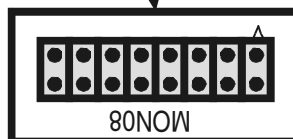
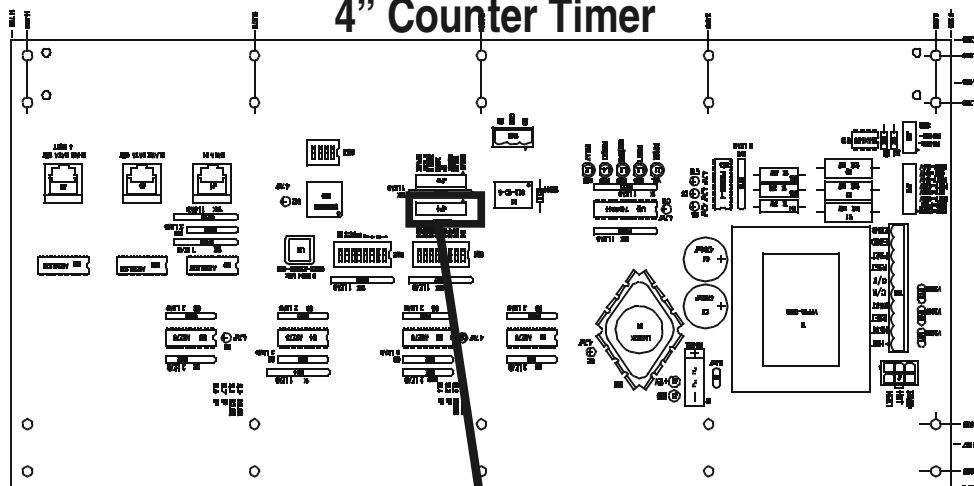
This connector must be fully populated with eight shorting jumpers or the counter timer board will fail to operate properly. These jumpers are not used to configure the counter timer in any way.



2" Counter Timer



4" Counter Timer

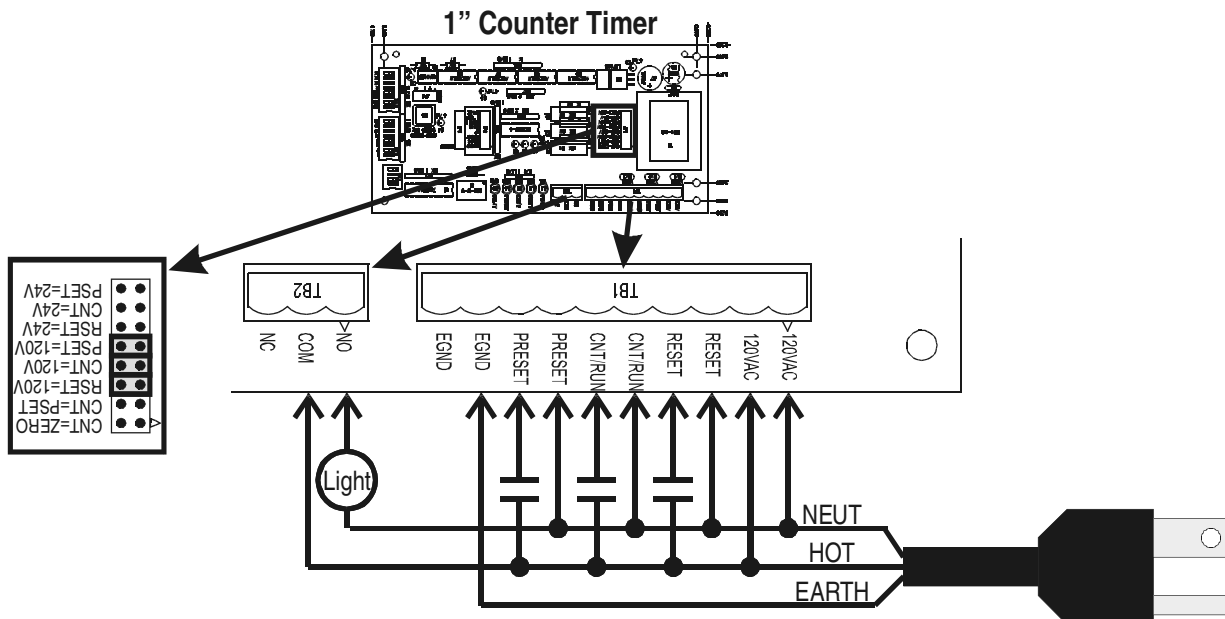


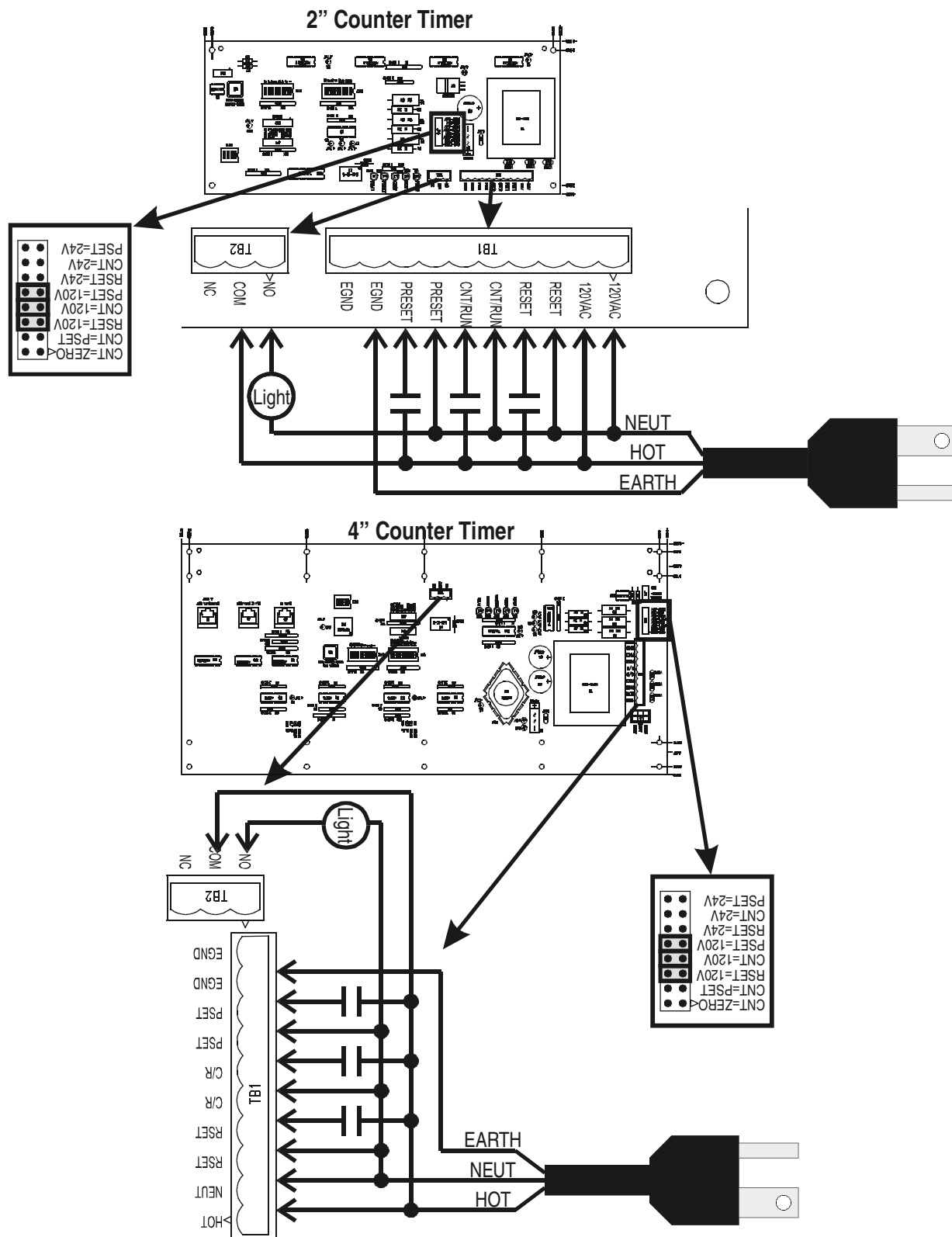
1.5 120VAC Power, 120VAC Logic Installation

The counter timer is powered by 120VAC only, and the logic inputs may be operated by applying a voltage of either 120VAC or 24VDC as selected by shorting jumpers. The inputs are not sensitive to voltage polarity, only the presence or absence of current, about 15 to 30mA.

First, select 120VAC logic levels by installing shorting jumpers in RSET=120V, CNT=120V, and PSET=120V. Make sure that shorting jumpers are not installed in RSET=24V, CNT=24V and PSET=24V.

Next bring the power and logic wiring to the counter timer **separately** through conduit, to avoid noise problems. Connect the 120VAC power and logic wiring to the screw terminal connector on the circuit board as shown in the diagram below. Power wires should be American Wire Gauge #16 with a 600 volt insulation rating.



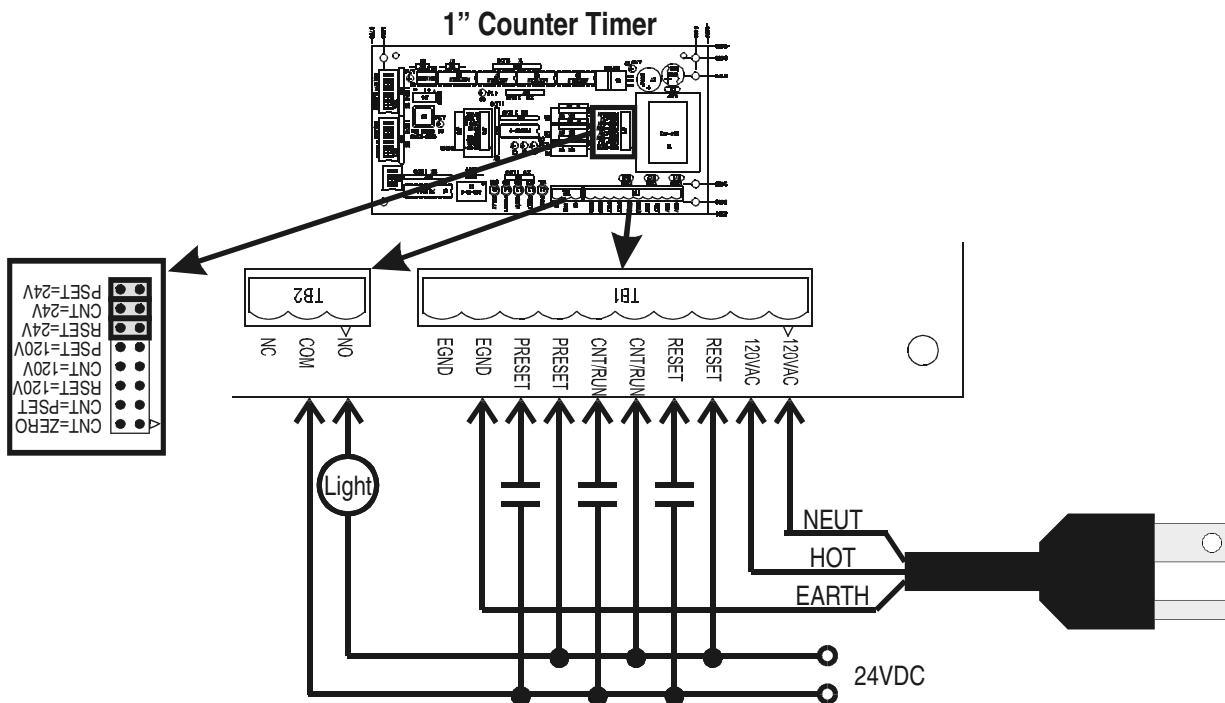


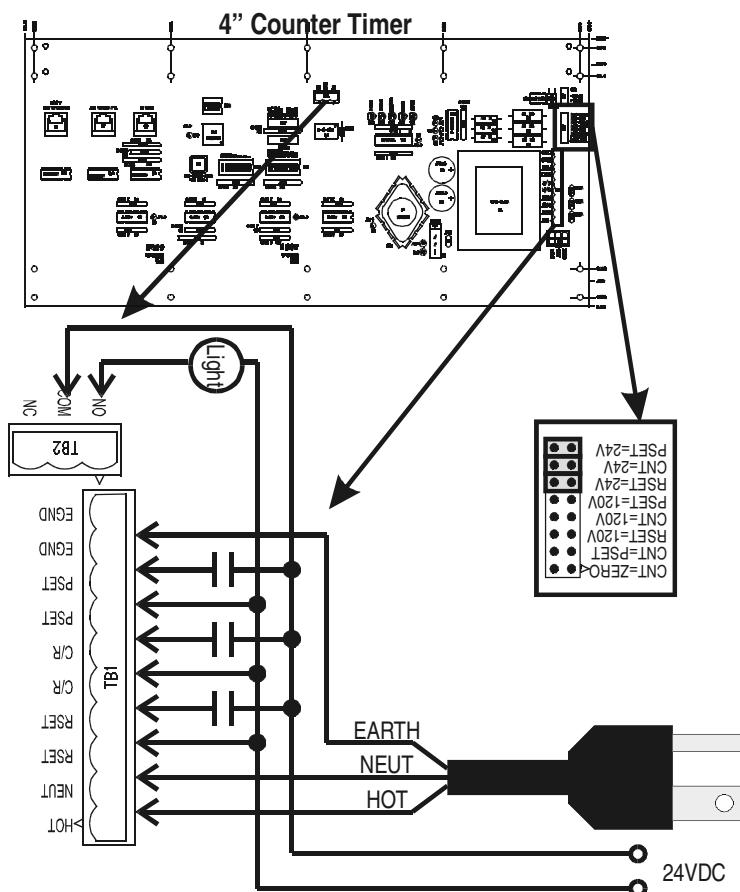
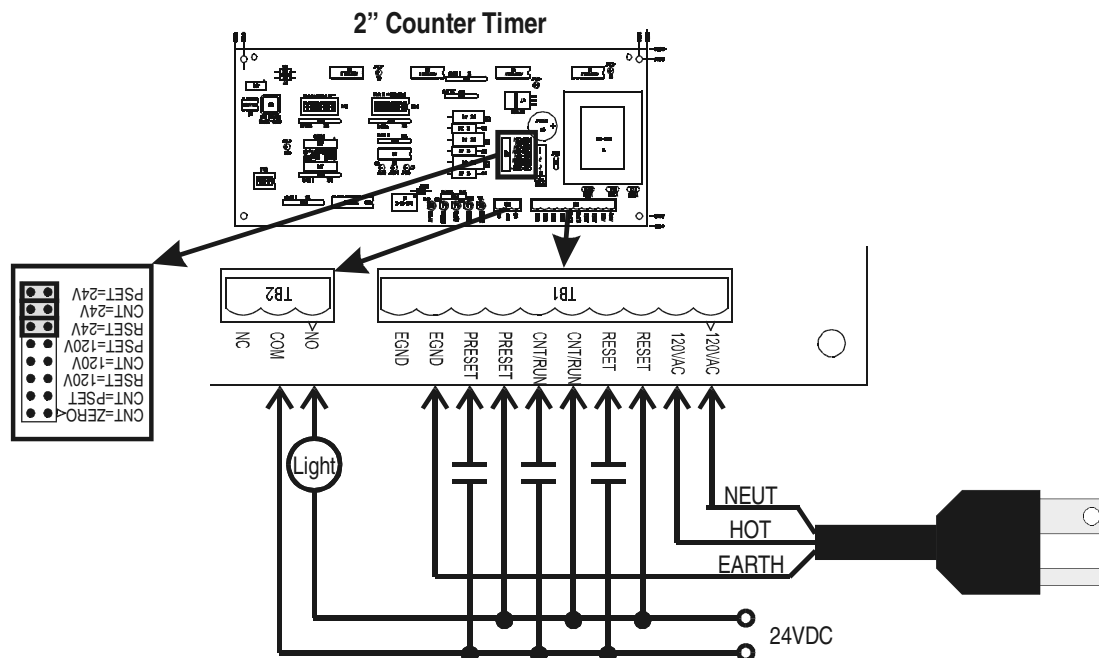
1.6 120VAC Power, 24VDC Logic Installation

The counter timer is powered by 120VAC only, and the logic inputs may be operated by applying a voltage of either 120VAC or 24VDC as selected by the shorting jumpers. The inputs are not sensitive to voltage polarity, only the presence or absence of current, about 15 to 30mA.

First, select 24VDC logic levels by installing shorting jumpers in RSET=24V, CNT=24V, and PSET=24V. Make sure that shorting jumpers are not installed in RSET=120V, CNT=120V and PSET=120V.

Next bring the power and logic wiring to the counter timer **separately** through conduit, to avoid noise problems. Connect the 120VAC power and 24VDC logic wiring to the screw terminal connector on the circuit board as shown in the diagram below. Power wires should be American Wire Gauge #16 with a 600 volt insulation rating.





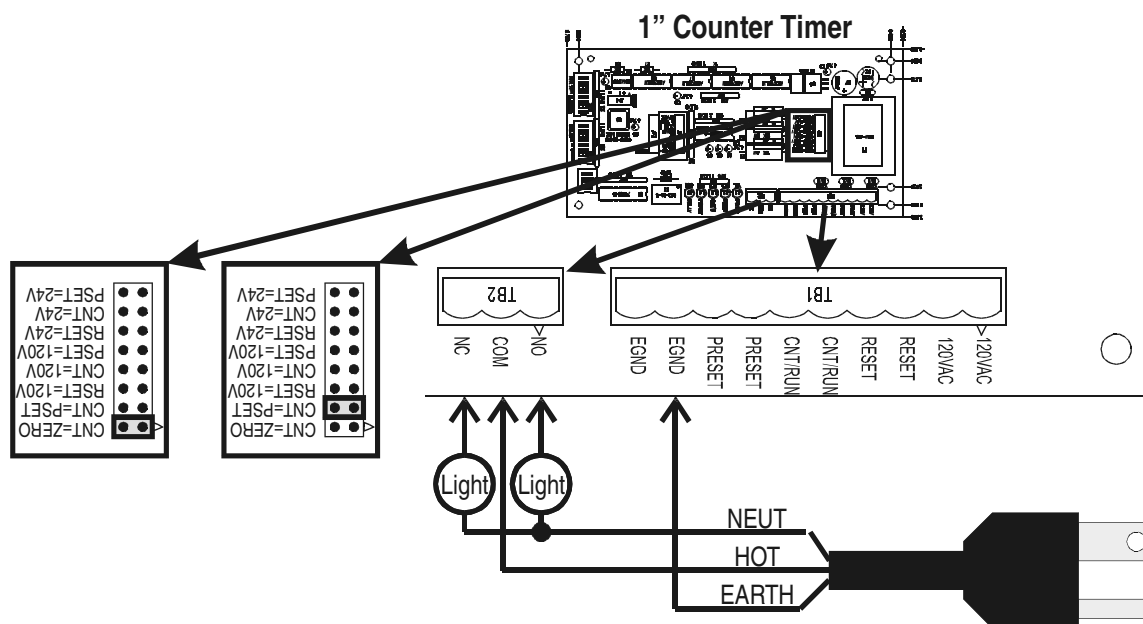
1.7 Using the Relay

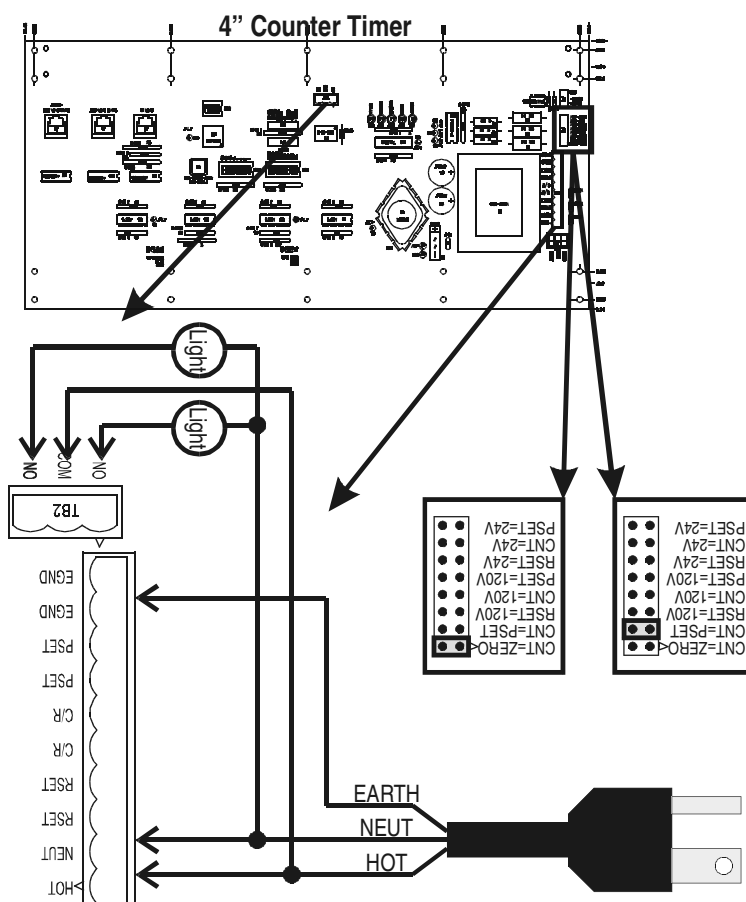
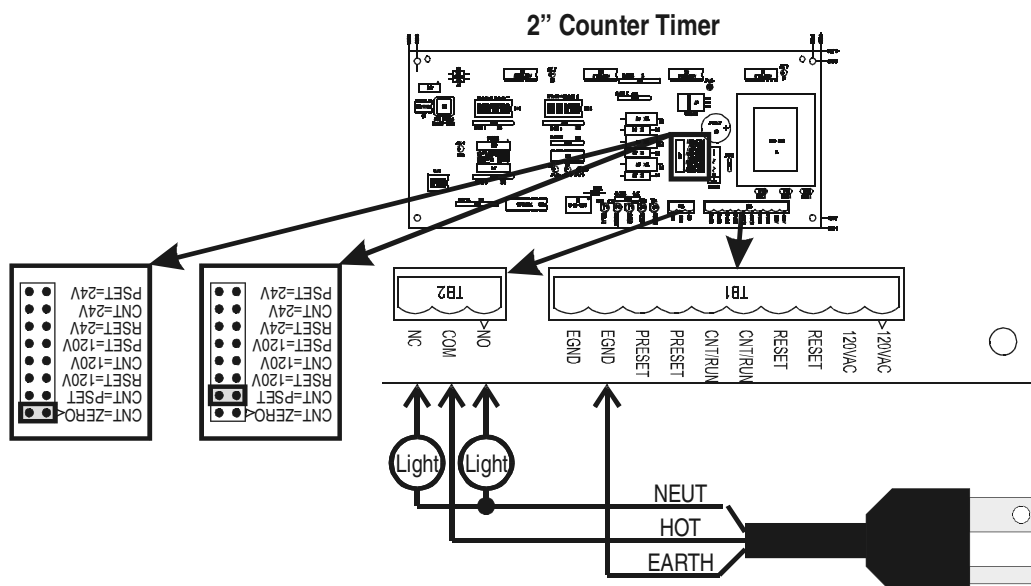
The counter timer provides an output relay with one normally open and one normally closed contact. The NO and NC contacts share the COM pin and are rated for 120VAC 3A or 30VDC 3A operation.

To energize the relay when the displayed count or time is zero, install a shorting jumper in CNT=ZERO and make sure a jumper is not installed in CNT=PSET.

To energize the relay when the displayed count or time is equal to the dip-switch preset value, install a shorting jumper in CNT=PSET and make sure a jumper is not installed in CNT=ZERO.

The relay output does not effect the operation of the counter timer in any way unless the relay contacts are used to operate the RESET, PRESET, or CNT/RUN inputs. For example, to make a counter timer automatically reset itself when a certain count value has been reached, the relay would be jumpered for CNT=PSET, the critical value set on the dip-switch, and the NO contact used to activate the RESET input of the counter timer. The RELAY Indicator lamp lights when the output relay is energized.





1.8 485 Communications Installation

Use of the counter timer serial port is an optional advanced feature. Most installations will not use the serial port, rendering serial port wiring and configuration unnecessary. However, if use of the serial port is desired, it is still advisable to first complete and test a basic installation, and then add use of the serial port later. For this reason, wiring and configuration of the serial port is covered in the manual sections that discuss operation of the counter timer serial port instead of the installation sections.

A central computer system can issue commands to the counter timer to read and write registers. Counter timers are addressable allowing up to 16 units to be managed from a single computer system via one serial port. For more information about using the counter timer serial port, including suggested wiring and configuration see section 3.0 Advanced Operation.

1.9 Selecting Counter or Timer Operation

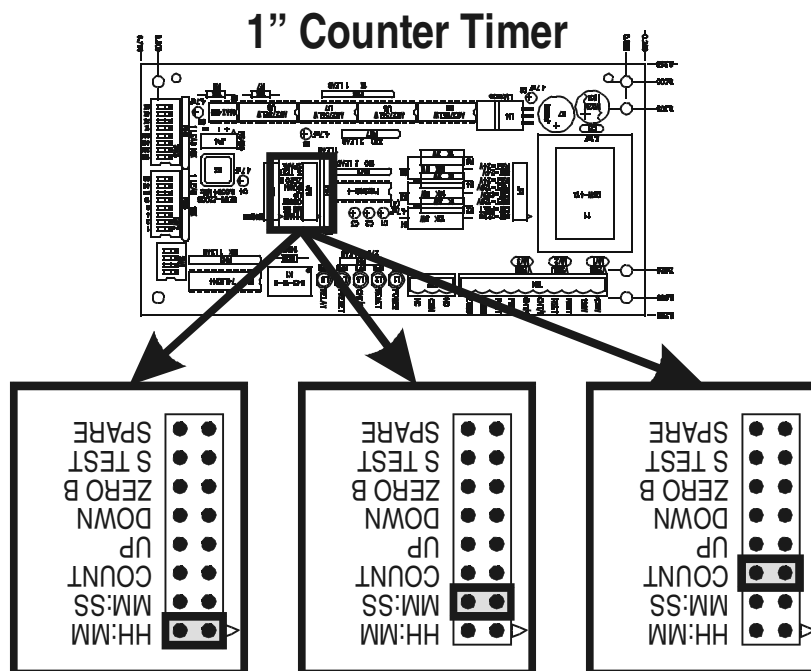
The AF-26X5 counter and AF-26X0 timer are actually the same unit. The only difference is the factory default jumper settings, which may easily be modified in the field.

To configure the counter timer as a hours and minutes timer, install a shorting jumper in HH:MM and make sure that jumpers are not installed in MM:SS and COUNT.

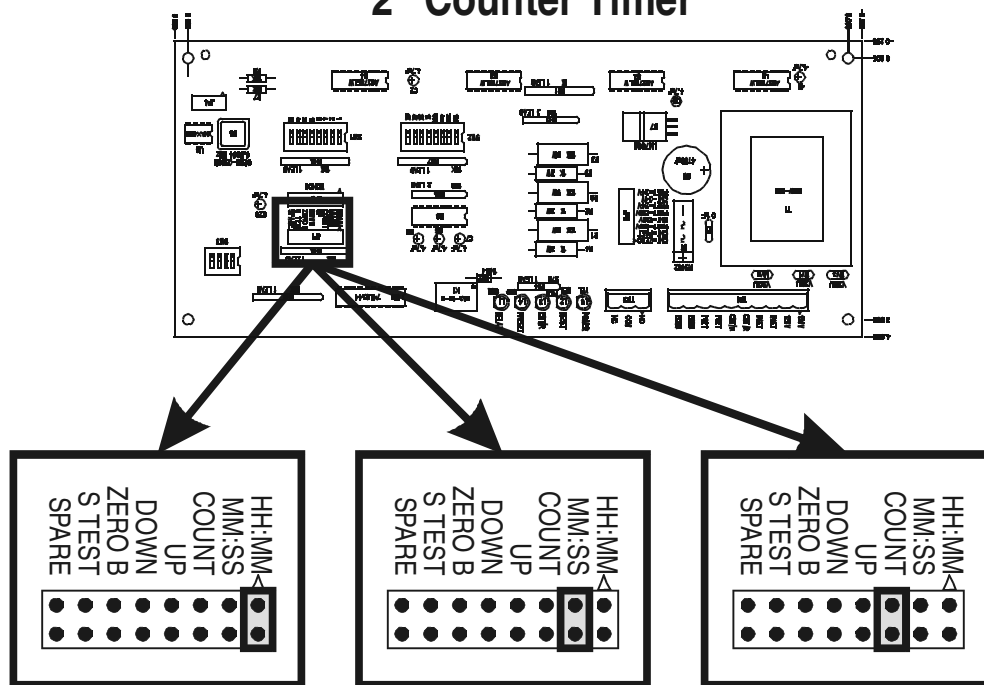
To configure the counter timer as a minutes and seconds timer, install a shorting jumper in MM:SS, and make sure that jumpers are not installed in HH:MM and COUNT.

To configure the counter timer as counter, install a shorting jumper in COUNT and make sure that jumpers are not installed in HH:MM and MM:SS.

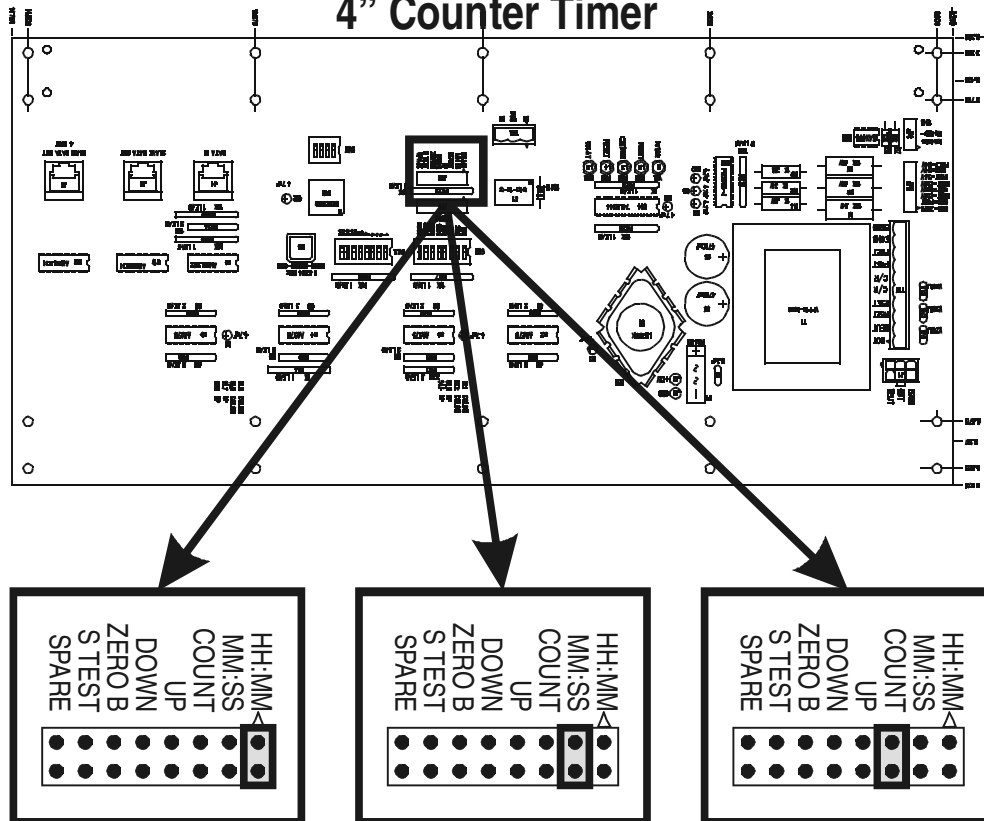
All three settings HH:MM, MM:SS, and COUNT support both UP and DOWN operation, which is covered in the next section.



2" Counter Timer



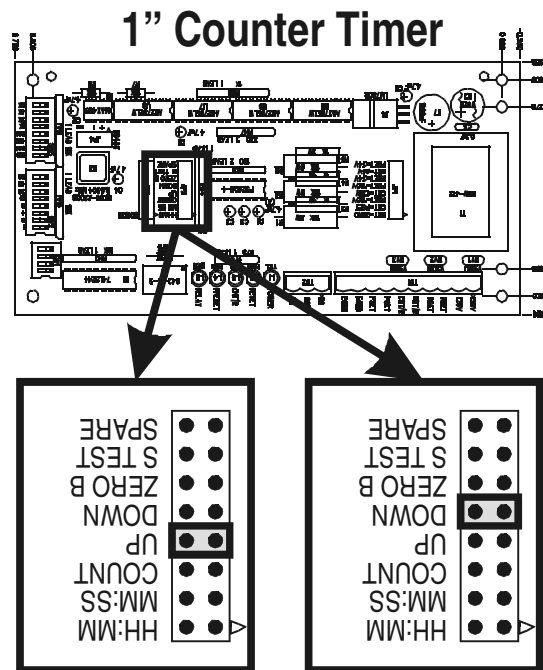
4" Counter Timer



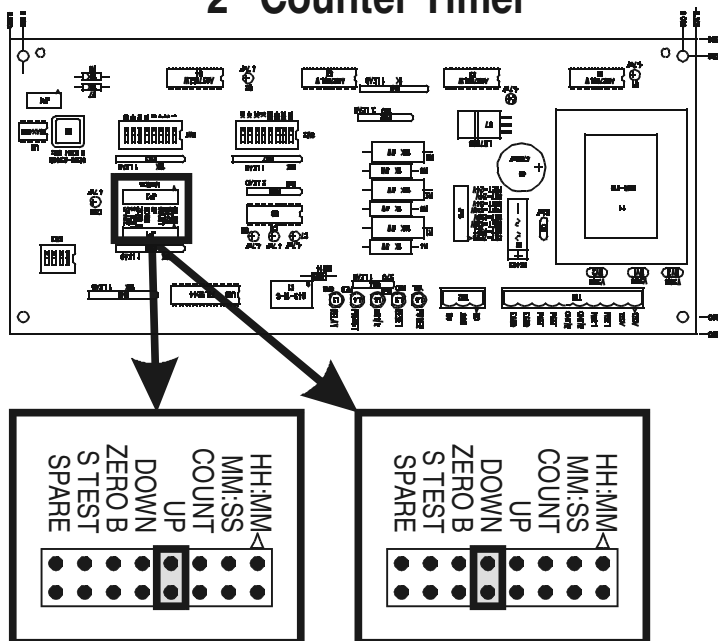
1.10 Configuring Up or Down Operation

To configure the counter timer as an up timer or up counter, install a shorting jumper in UP and make sure that a jumper is not installed in DOWN.

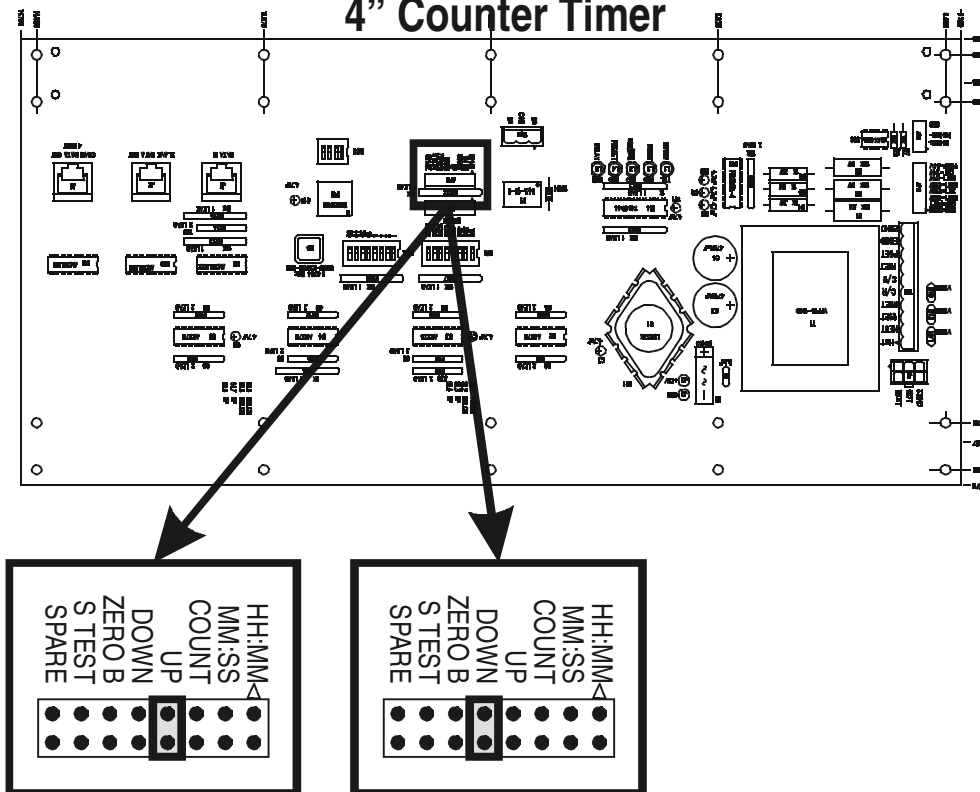
To configure the counter timer as a down timer or down counter, install a shorting jumper in DOWN and make sure that a jumper is not installed in UP.



2" Counter Timer

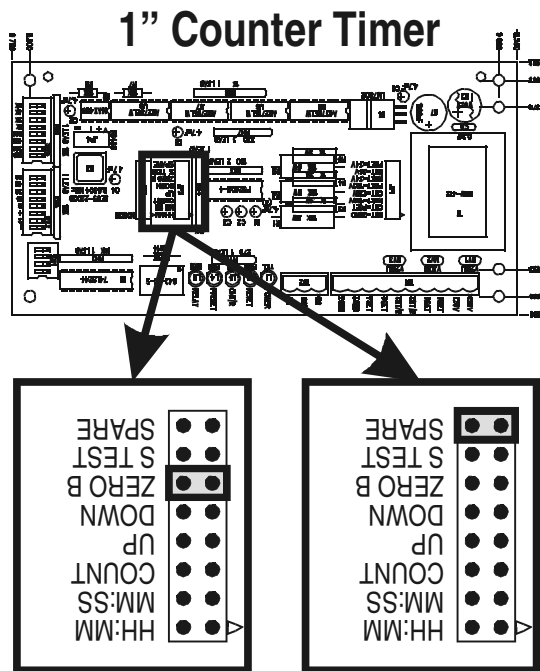


4" Counter Timer

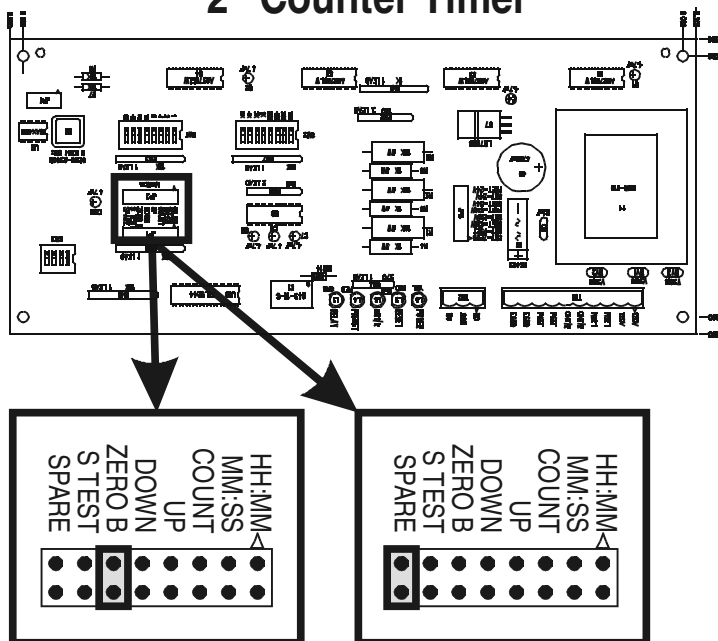


1.11 Configuring Leading Zero Blanking

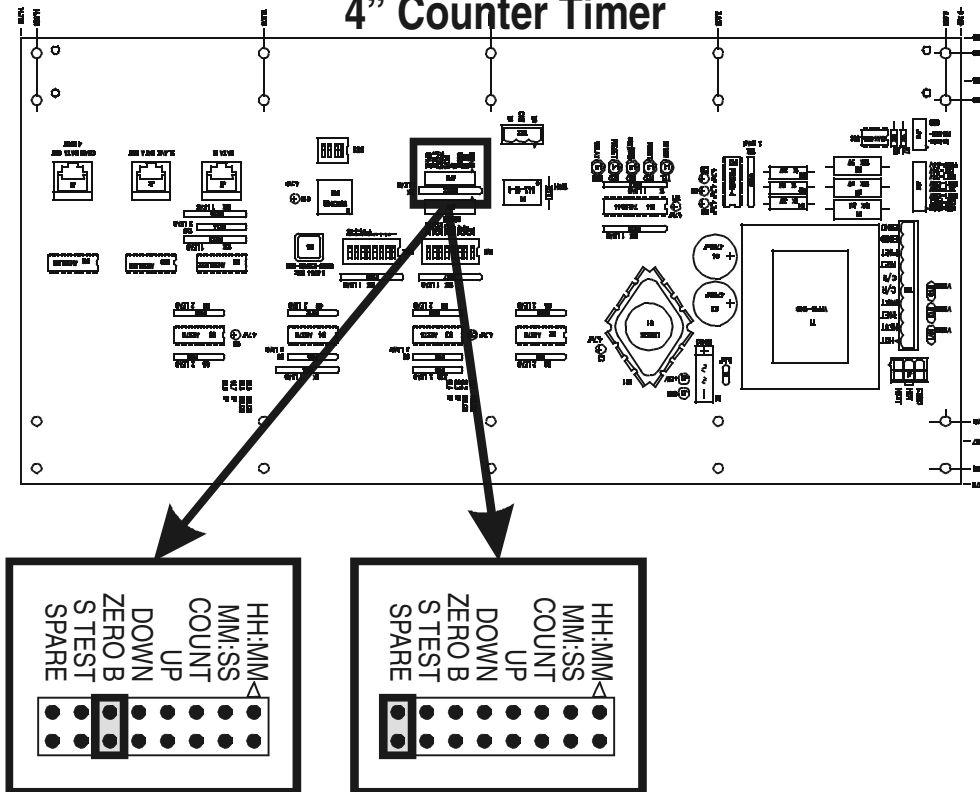
To enable leading zero blanking of the displayed count or time, install a shorting jumper in ZERO_B. To disable leading zero blanking, remove the jumper from ZERO_B. The jumper may be stored in the SPARE position. If leading zero blanking is disabled, all four digits will always be lit, i.e. zero is displayed as "0000" instead of " 0"



2" Counter Timer



4" Counter Timer



1.12 Configuring the Dip-Switch Preset Value

For some applications such as down counters, down timers, and applications using the output relay in CNT=PSET mode, configuring the preset value may be desirable. Dip-switch blocks are provided to configure the preset value in BCD (Binary Coded Decimal).

There are four switches for each digit of the preset value. The 1, 2, 4, and 8 switches set the ones digit of the preset value. The 10, 20, 40, and 80 switches set the tens digit of the preset value. The 100, 200, 400, and 800 switches set the one hundreds digit of the preset value. The 1000, 2000, 4000, and 8000 switches set the one thousands digit of the preset value. Each digit of the preset value is set to the sum of four switches.

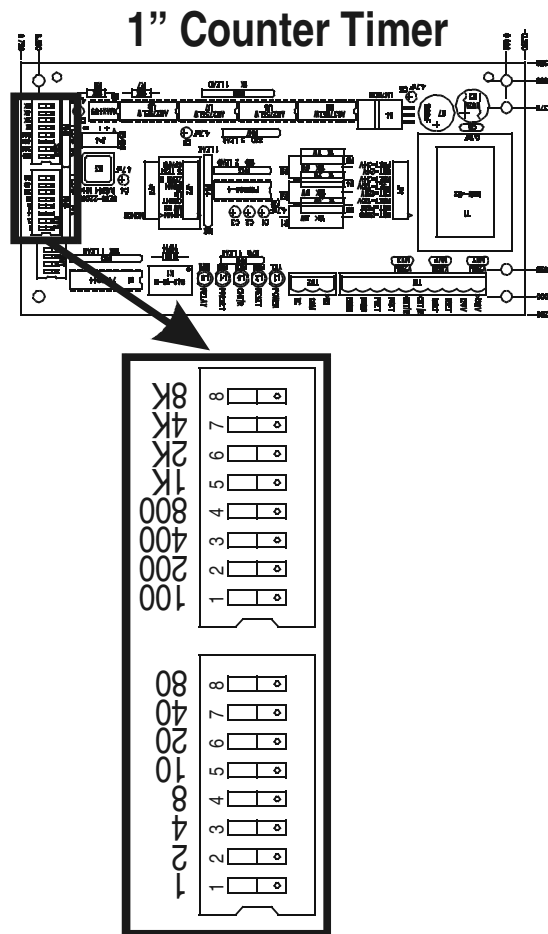
Example: To configure the counter timer for a preset value of "1239":

The one thousands digit of the preset value is one. Turn the 1000 switch ON, and turn the 2000, 4000, and 8000 switches OFF.

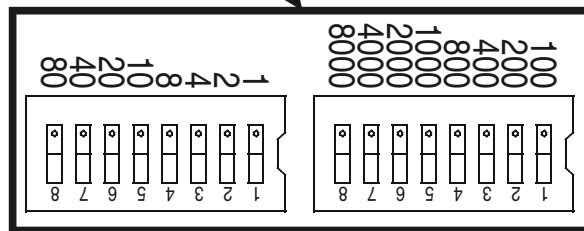
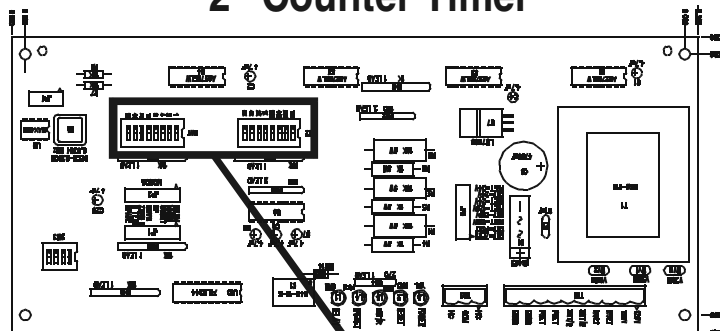
The one hundreds digit of the preset value is two. Turn the 200 switch ON, and turn the 100, 400, and 800 switches OFF.

The tens digit of the preset value is three. Turn the 10, and 20 switches ON, and turn the 40, and 80 switches OFF.

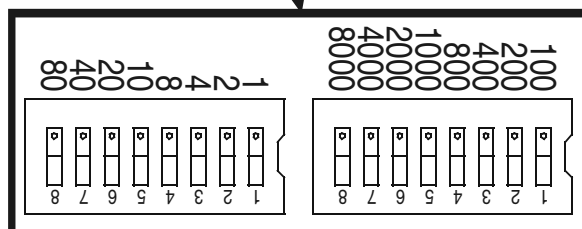
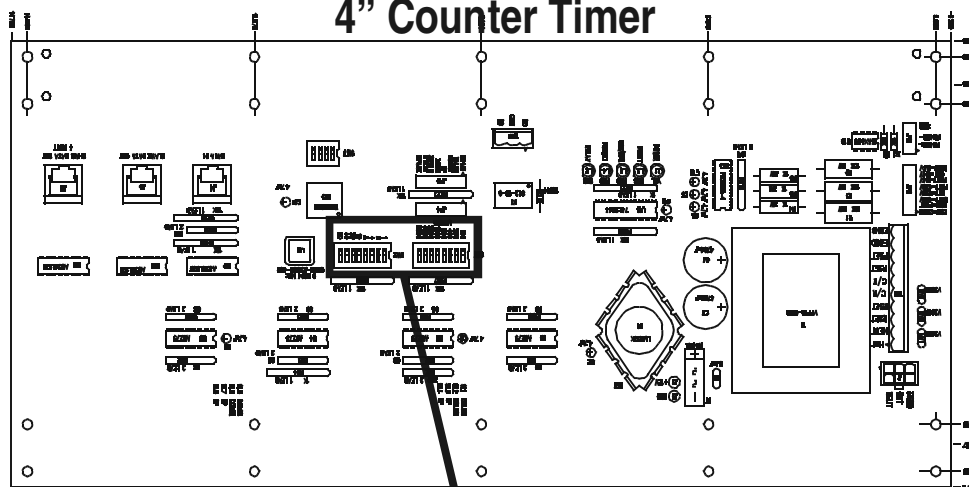
The ones digit of the preset value is nine. Turn the 1, and 8 switches ON, and turn the 2, and 4 switches OFF.



2" Counter Timer



4" Counter Timer



2.0 Using the Counter Timer

If the S_TEST jumper is installed when 120VAC power is first applied, the counter timer will first exercise the LED display with a lamp test pattern that takes several seconds to complete. After the self test has completed, the counter timer will reset itself to zero and await input. The factory temporarily installs the S_TEST jumper and power cycles the counter ten times per minute for twenty four hours to “burn in” the unit before final testing and shipment.

If the S_TEST jumper is not installed the counter timer will power up and reset itself to zero in less than 100mS.

The POWER indicator lamp will light for as long as 120VAC power is applied to the counter timer.

2.1 Basic Counter Operation

To count, pulse the CNT/RUN input by momentarily applying a voltage across the CNT/RUN screw terminals. The CNT/RUN indicator lamp will light and the counter will increment or decrement by one for each input pulse. The maximum count rate is 10Hz with a 50% duty cycle waveform. Up counters wrap from 9999 to 0, and down counters wrap from 0 to 9999.

To reset the counter, apply a voltage across the RESET screw terminals. The RESET indicator lamp will light and the counter will reset to zero. The minimum reset pulse width is 50mS. RESET is an asynchronous input, which means that pulsing the CNT/RUN input while the RESET input is held on will not make the counter count.

To preset the counter to the value set on the dip-switch, apply a voltage across the PRESET screw terminals. The PRESET indicator lamp will light and the counter will preset to the dip-switch preset value. The minimum preset pulse width is 50mS. PRESET is an asynchronous input, which means that pulsing the CNT/RUN input while the PRESET input is held on will not make the counter count.

2.2 Basic Timer Operation

To time, apply a voltage across the CNT/RUN screw terminals. The CNT/RUN indicator lamp will light and the timer will run for as long as the CNT/RUN input is held on. Time is accumulated in one second increments even if hours and minutes timing is selected. Up timers wrap from 99:59 to 0:00, and down timers wrap from 0:00 to 99:59.

To reset the timer, apply a voltage across the RESET screw terminals. The RESET indicator lamp will light and the timer will reset to zero. The minimum reset pulse width is 50mS. RESET is an asynchronous input, which means that activating the CNT/RUN input while the RESET input is held on will not make the timer run.

To preset the timer to the value set on the dip-switch, apply a voltage across the PRESET screw terminals. The PRESET indicator lamp will light and the timer will preset to the dip-switch preset value. The minimum preset pulse width is 50mS. PRESET is an asynchronous input, which means that activating the CNT/RUN input while the PRESET input is held on will not make the timer run.

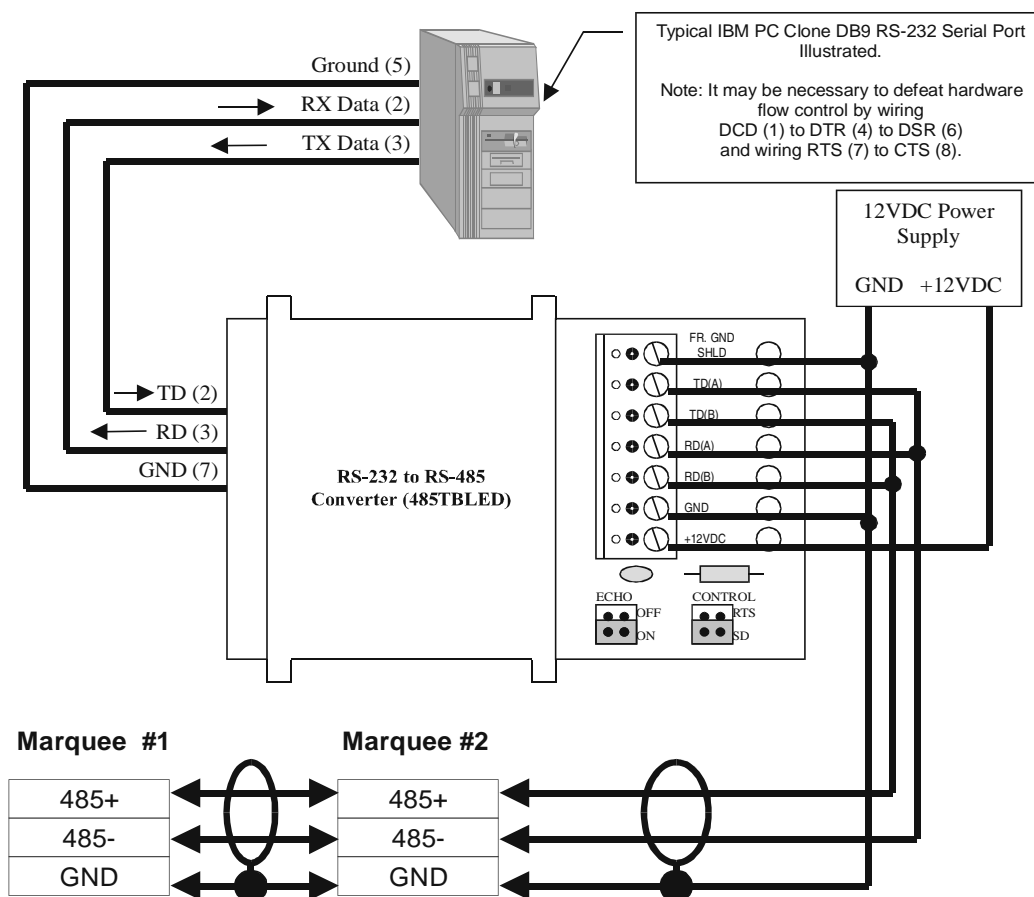
3.0 Advanced Operation

The counter timer RS-485 serial port can be used to interface the unit to a central computer system. The central computer system can issue commands to the counter timer to read and write registers. Counter timers are addressable allowing up to 16 units to be connected to a single RS-485 network and managed from a central computer system.

3.1 RS-485 Wiring

A three-conductor cable designed for serial communications will be needed. American LED-gible suggests using Belden 9463 "Blue Hose" cable.

Typically an RS-485 communications converter will be required to adapt the RS-232 port on the central computer to RS-485 communications. American LED-gible suggests using a model 485TBLED converter manufactured by B&B Electronics. This converter can be ordered by calling B&B at (815) 434-0846.



3.2 RS-485 Configuration

The counter timer serial port is permanently configured for 19200 baud, 8 data bits, no parity, and 1 stop bit. The only user configurable aspect of the counter timer serial port, is the unit address.

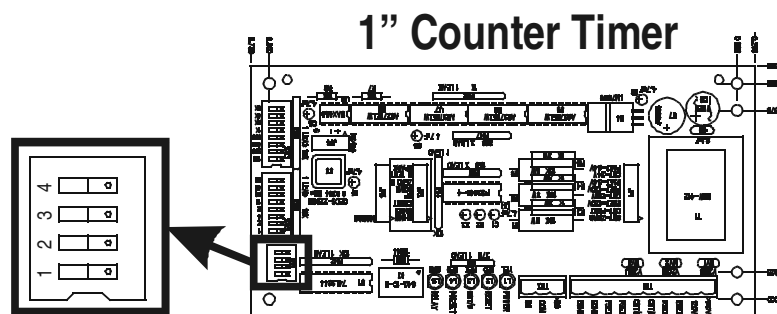
Addressing is an important aspect of using the counter timer serial port. Addressing is a method where more than one counter timer can be connected to a serial data transmission line and commands can be directed to a particular unit for action.

Addressing is accomplished by assigning an ASCII character address to each unit. ASCII characters "A" (41h) through "P" (50h) are valid for addressing.

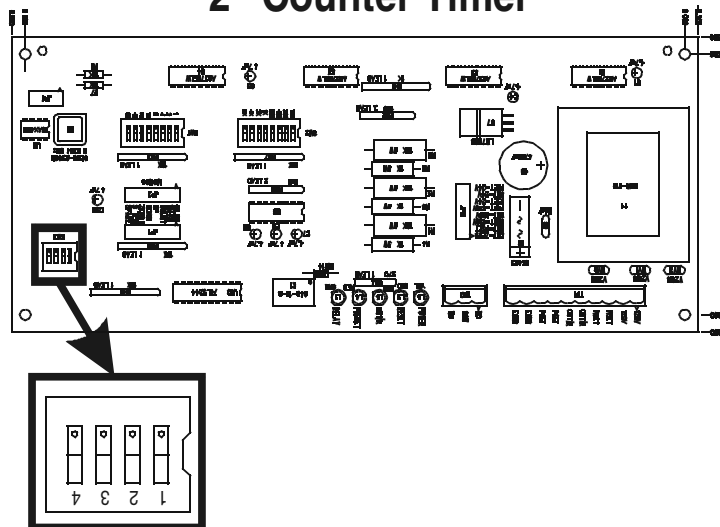
The address of a counter timer is set by the address switch block as detailed in the following table.

Address Switch				
1	2	3	4	Address
OFF	OFF	OFF	OFF	"A" (41h)
ON	OFF	OFF	OFF	"B" (42h)
OFF	ON	OFF	OFF	"C" (43h)
ON	ON	OFF	OFF	"D" (44h)
OFF	OFF	ON	OFF	"E" (45h)
ON	OFF	ON	OFF	"F" (46h)
OFF	ON	ON	OFF	"G" (47h)
ON	ON	ON	OFF	"H" (48h)
OFF	OFF	OFF	ON	"I" (49h)
ON	OFF	OFF	ON	"J" (4Ah)
OFF	ON	OFF	ON	"K" (4Bh)
ON	ON	OFF	ON	"L" (4Ch)
OFF	OFF	ON	ON	"M" (4Dh)
ON	OFF	ON	ON	"N" (4Eh)
OFF	ON	ON	ON	"O" (4Fh)
ON	ON	ON	ON	"P" (50h)

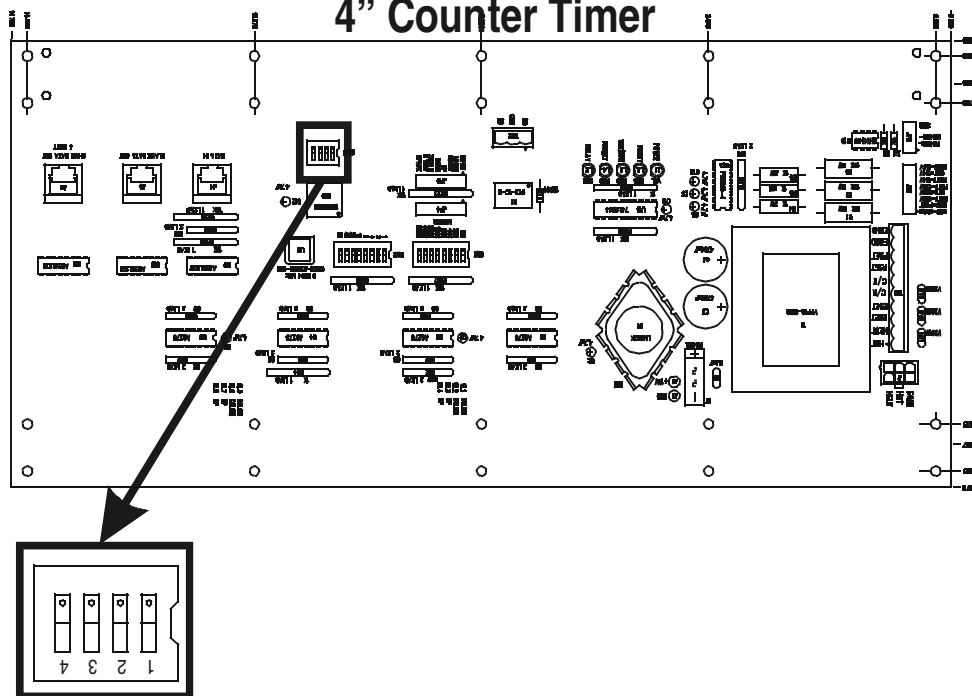
For example, to assign an address of "D" (44h) to the counter timer, turn ON switches 1 and 2. Leave switches 3, and 4 in the OFF or OPEN position.



2" Counter Timer



4" Counter Timer



3.3 RS-485 Command Protocol

The counter timer has only one register, the ACTUAL register. This register contains the displayed count or time, and may be read from, or written to, from the central computer at any time.

Each counter timer has a single character (byte) address ranging from “A” (41h) to “P” (50h), which is set on the address switch block. Each unit’s address in a communications network must be unique or collisions will occur on the network.

All counter timer commands begin with a CTRL-B character followed by the address of the unit the command is directed too. All commands end with a CTRL-C character. The counter timer uses the CTRL-B and CTRL-C characters to find the beginning and the end of command packets within the serial data stream.

The counter timer has the following internal registers:

Register Name	Register Code	Register Description
ACTUAL	AC	4 Digit ACTUAL Value 0000 to 9999. The number currently displayed on the counter timer without leading zeros blanked. Times are expressed without colon.

The above registers can be read or written, in real time. The operation (Read or Write) and the register to access is specified by a 3-character opcode (Operation Code).

The first character in the opcode is an “R” character for a READ operation or a “W” character for a WRITE operation. The second and third characters of the opcode specify which register to access. See the **Register Code** column in the table above for the two character codes that specify registers available in the counter timer.

Write opcodes are followed by numeric data as appropriate for the command. The numeric data must be fixed width, and cannot contain spaces, decimal points, or colons. For example, to write “123” to the ACTUAL register, the data section of the command must be “0123”. If the counter timer is configured as an hours and minutes timer, “0123” is interpreted as one hour and twenty three minutes. If the counter timer is configured as a minutes and seconds timer, “0123” is interpreted as one minute and twenty three seconds. If the counter timer is configured as a counter, “0123” is interpreted as one hundred twenty three.

To write “1234” to the ACTUAL register of unit “A”, use the opcode “WAC” (Write ACTUAL) with data “1234”. The required command is ten characters long, and is diagramed below as characters and the hexadecimal ASCII code for each character. For example a CTRL-B character is also known as ASCII character number 02h.

STX	ADDR	OPCODE			DATA				ETX
CTRL B	A	W	A	C	1	2	3	4	CTRL C
02h	41h	57h	41h	43h	31h	32h	33h	34h	03h

If the command is accepted, the unit will respond with a single ACK character (CTRL-F, 06h).

To read the ACTUAL register of unit “B” use the opcode “RAC” (Read ACTUAL). The required command is six characters long, and is diagramed below as characters and the hexadecimal ASCII code for each character.

STX	ADDR	OPCODE			ETX
CTRL B	B	R	A	C	CTRL C
02h	42h	52h	41h	43h	03h

If the command is accepted, the unit will respond with the requested data followed by an ACK character (CTRL-F, 06h).

DATA				ACK
1	2	3	4	CTRL F
31h	32h	33h	34h	06h

If the unit cannot interpret the command, it will respond with a NAK character (CTRL-U, 15h).

Note: The command protocol is identical to that used in the AF-2720-100 production pace timer (PPT), allowing PPT and counter timer units to be freely mixed on the same RS-485 network. The PPT has many more registers than the counter timer has. For compatibility, the counter timer minimally implements the extra registers found in the PPT. Attempts to read or write the extra registers will succeed, but have no effect on the counter timer operation.

Note: To help our customers develop custom command and control solutions for the counter timer, ALI has prepared a simple but explanatory Visual Basic 5.0 command program. The example retrieves and displays all of the registers in real time from a single PPT or counter timer. The PC user can also manually issue writes to any of the PPT or counter timer registers.

The example source code is free to ALI customers, and may be used as the starting point for the customers application without limitation, however ALI does not warrant the example in any way.

To get a copy of the example command program, contact ALI and request applications note **PB-2150-139**.

4.0 General Specifications

GENERAL:

Line Voltage	120VAC 60Hz, (50Hz is acceptable)
Power Consumption	60 Watts maximum, 30 Watts typical
Operating Temperature	0° F to 135° F (-17° C to +50° C)
Operating Humidity	35% to 80%
Dimensions	14" Wide, 6.25" High, 3.5" Deep
Weight	8 Pounds
Enclosure	NEMA-12 (Dust Tight) 16 gauge painted steel standard
Mounting	Wall mount tabs standard

L.E.D. DISPLAY:

Digit Type	4.0" tall, 2.3" tall or 1.0" tall 7-segment L.E.D. module
Digit Brightness	36mcd typical high efficiency red, 150mcd typical super red
Lamp Life	100,000 Hours (11.4Years)
Viewing Distance	200 Feet for 4.0", 125 Feet for 2.3" Digit, 50 Feet for 1.0" Digit

Operation

Functions	Counter, HH:MM timer, or MM:SS timer, up or down for all three
Maximum Count	9999
Maximum Time	99:59 (HH:MM and MM:SS)

Logic

Inputs	RESET, CNT/RUN, and PRESET
Logic Levels	120VAC or 24VDC jumper selectable
Maximum Count Rate	10Hz, 50% Duty Cycle
Relay Contacts	Normally open and normally closed rated for 120VAC 3A or 30VDC 3A

Communications

Signaling	Three Wire RS-485, Half Duplex
Baud Rate	19200bps
Character Format	Eight Data Bits, No Parity, One Stop Bit

5.0 In Case of Difficulties

Before contacting ALI for technical support, please review the manual sections covering installation and operation.

If the counter timer does not power up, check the POWER indicator lamp. This LED is connected directly to the unit power supply. If the POWER lamp does not light the 120VAC power wiring is probably incorrect.

If the counter timer powers up, but does not respond to the logic inputs, please observe the input indicator lamps RESET, CNT/RUN, and PRESET while attempting to operate the unit. When an input is activated, the corresponding lamp will light. The RESET and PRESET inputs are asynchronous and will prevent unit from counting or timing as long as they are activated. The RELAY indicator lamp lights when the output relay is energized.

The S_TEST self-test jumper can be installed to check the LED display and verify the address selection. When the counter timer starts, if the self test jumper is installed, additional startup code is executed. This code first performs a LAMP TEST, then the address setting is displayed in hexadecimal i.e. Address "A" is displayed as "41h".

If you need technical assistance, contact us by phone or fax and please have the following information available:

- 1) Model number.
- 2) Serial number.
- 3) Description of the problem.

The serial number and model number of the marquee can be located on side of the enclosure, imprinted on a SILVER ID TAG.

American LED-gible Inc.
(614) 851-1100
September 2001
Model # AF-2625-314
Serial # SO-5612-001

American LED-gible technical support may be reached at:

Phone: (614) 851-1100
Fax: (614) 851-1121
E-mail: ledgible@ledgible.com
WWW: www.ledgible.com

6.0 Limited Warranty

We warrant to you that your AMERICAN LED-gible® BRAND MARQUEE, when purchased by you, will be free from defects in material and workmanship, under normal use, for one year from date of delivery. If your LED-GIBLE® BRAND MARQUEE should prove to be defective within the warranty period, we will repair it (or, if we think necessary, replace it) without charge to you.

To obtain service, please call our Customer Service Department at 1-614-851-1100 or write to:

AMERICAN LED-gible® Inc.
1776 LONE EAGLE STREET
COLUMBUS, OHIO 43228

We will furnish you with shipping instructions. This warranty covers merchandise returned to American LED-gible® (shipped prepaid) for repair, not in plant repairs. Should you need an in plant repair at your facility, American LED-gible® will schedule a trip. Rates are per diem, plus travel expenses.

ALI shall have the right of final determination as to the existence and cause of the defect. This warranty expressly excludes any defects or damages caused by accessories, replacement parts, or repair service, other than those which have been authorized by ALI. This warranty does not cover any damage caused by accident, misuse, shipment, or other than ordinary use.

This warranty excludes all incidental or consequential damages. Some states do not allow the exclusion of, or limitation of, incidental or consequential damages, so the foregoing exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state. This warranty is in lieu of any other warranty, express, written, implied, or statutory, and no agreement extending or modifying it will be binding upon ALI, unless in writing and signed by duly authorized officer.

If your AMERICAN LED-gible® MARQUEE is outside the warranty period, please call our Customer Service Department as above. After you return the unit to American LED-gible®, we will estimate the repair charges, and contact you so a purchase order can be issued. Again, should you require in-house repair of your marquees, ALI rates are per diem, plus travel expenses. Please make sure to call, so a trip can be scheduled if this option is preferred.

LIMITATION OF LIABILITY:

If this product is not in good working order as warranted above, your sole remedy shall be repair or replacement as provided above. In no event will ALI be liable for special, indirect, or consequential damages, or any damages whatsoever resulting from loss of use, data, or profits arising out of, or in connection with this contract or the use or performance of ALI products, whether in an action of contract or tort, including negligence. ALI's liability for damage to property shall be limited to the cost of the product sold to the buyer.

7.0 ASCII Chart

ASCII CHARACTER	Hexadecimal Code	Decimal Code
CTRL-A	01h	1
CTRL-B	02h	2
CTRL-C	03h	3
CTRL-D	04h	4
CTRL-E	05h	5
CTRL-F	06h	6
CTRL-G	07h	7
CTRL-H	08h	8
CTRL-I	09h	9
CTRL-J	0Ah	10
CTRL-K	0Bh	11
CTRL-L	0Ch	12
CTRL-M	0Dh	13
CTRL-N	0Eh	14
CTRL-O	0Fh	15
CTRL-P	10h	16
CTRL-Q	11h	17
CTRL-R	12h	18
CTRL-S	13h	19
CTRL-T	14h	20
CTRL-U	15h	21
CTRL-V	16h	22
CTRL-W	17h	23
CTRL-X	18h	24
CTRL-Y	19h	25
CTRL-Z	1Ah	26
CTRL-[1Bh	27
CTRL-\	1Ch	28
CTRL-]	1Dh	29
CTRL-^	1Eh	30
CTRL-__	1Fh	31
SPACE	20h	32

ASCII CHARACTER	Hexadecimal Code	Decimal Code
!	21h	33
"	22h	34
#	23h	35
\$	24h	36
%	25h	37
&	26h	38
'	27h	39
(28h	40
)	29h	41
*	2Ah	42
+	2Bh	43
,	2Ch	44
-	2Dh	45
.	2Eh	46
/	2Fh	47
0	30h	48
1	31h	49
2	32h	50
3	33h	51
4	34h	52
5	35h	53
6	36h	54
7	37h	55
8	38h	56
9	39h	57
:	3Ah	58
;	3Bh	59
<	3Ch	60
=	3Dh	61
>	3Eh	62
?	3Fh	63
@	40h	64

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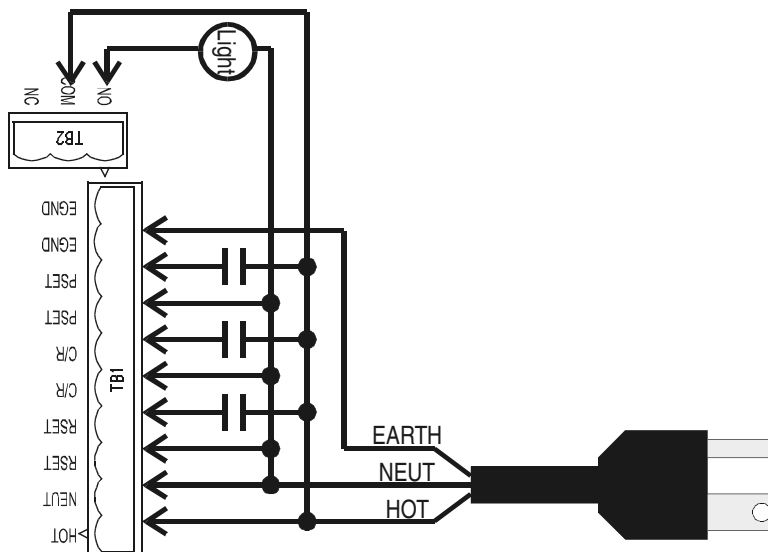
PB-2149-363 Rev B



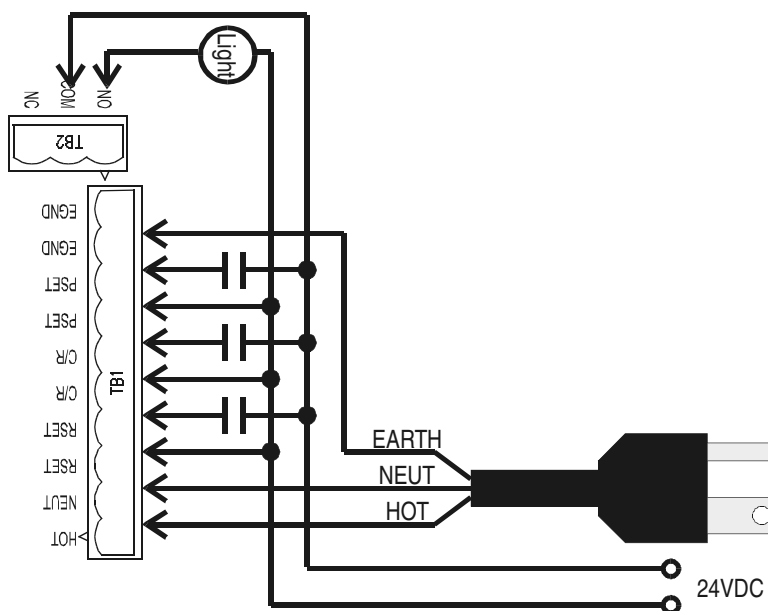
ASCII CHARACTER	Hexadecimal Code	Decimal Code
A	41h	65
B	42h	66
C	43h	67
D	44h	68
E	45h	69
F	46h	70
G	47h	71
H	48h	72
I	49h	73
J	4Ah	74
K	4Bh	75
L	4Ch	76
M	4Dh	77
N	4Eh	78
O	4Fh	79
P	50h	80
Q	51h	81
R	52h	82
S	53h	83
T	54h	84
U	55h	85
V	56h	86
W	57h	87
X	58h	88
Y	59h	89
Z	5Ah	90
[5Bh	91
\	5Ch	92
]	5Dh	93
^	5Eh	94
_	5Fh	95
`	60h	96

ASCII CHARACTER	Hexadecimal Code	Decimal Code
a	61h	97
b	62h	98
c	63h	99
d	64h	100
e	65h	101
f	66h	102
g	67h	103
h	68h	104
i	69h	105
j	6Ah	106
k	6Bh	107
l	6Ch	108
m	6Dh	109
n	6Eh	110
o	6Fh	111
p	70h	112
q	71h	113
r	72h	114
s	73h	115
t	74h	116
u	75h	117
v	76h	118
w	77h	119
x	78h	120
y	79h	121
z	7Ah	122
{	7Bh	123
	7Ch	124
}	7Dh	125
~	7Eh	126
DELETE	7Fh	127

8.0 Connection Labels



Typical Wiring for 120VAC Power and Logic
RSET=120V, CNT=120V, and PSET=120V, jumpers must be installed.
RSET=24V, CNT=24V, and PSET=24V, jumpers must be removed.



Typical Wiring for 120VAC Power and 24VDC Logic
RSET=24V, CNT=24V, and PSET=24V, jumpers must be installed.
RSET=120V, CNT=120V, and PSET=120V, jumpers must be removed.

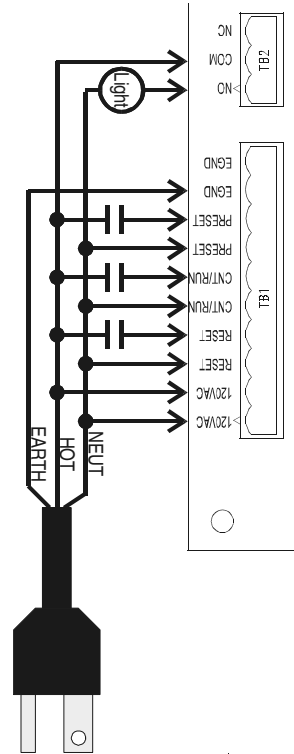
LB-2815-049
Rev -
July 17, 2003
Corel 9

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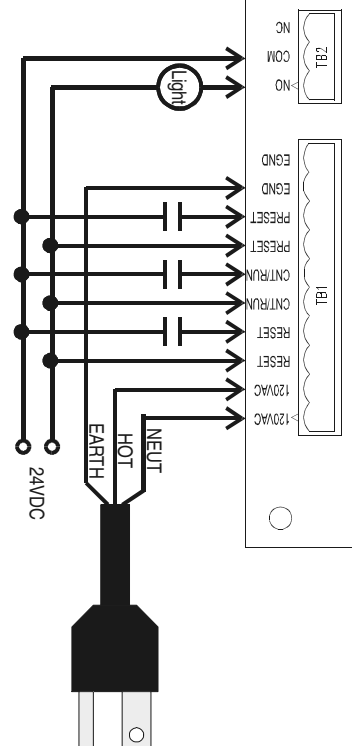
PB-2149-363 Rev B

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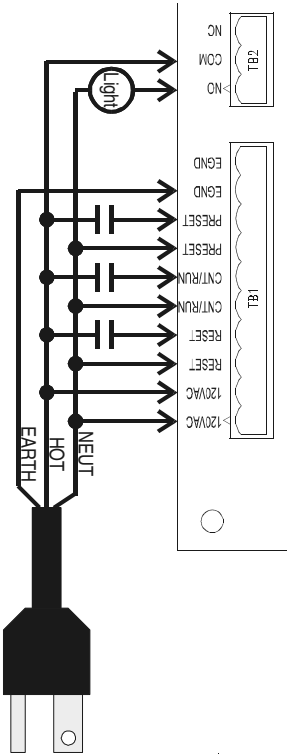
Reducing Downtime Across the Nation!



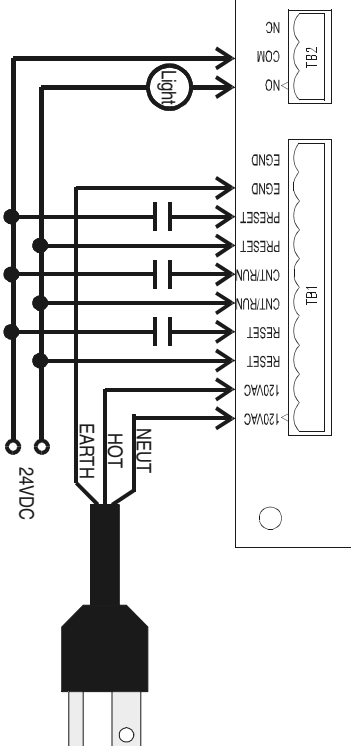
Typical Wiring for 120VAC Power and Logic
RSET=120V, CNT=120V, and PSET=120V, jumpers must be installed.
RSET=24V, CNT=24V, and PSET=24V, jumpers must be removed.



Typical Wiring for 120VAC Power and 24VDC Logic
RSET=24V, CNT=24V, and PSET=24V, jumpers must be installed.
RSET=120V, CNT=120V, and PSET=120V, jumpers must be removed.



Typical Wiring for 120VAC Power and Logic
RSET=120V, CNT=120V, and PSET=120V, jumpers must be installed.
RSET=24V, CNT=24V, and PSET=24V, jumpers must be removed.



Typical Wiring for 120VAC Power and 24VDC Logic
RSET=24V, CNT=24V, and PSET=24V, jumpers must be installed.
RSET=120V, CNT=120V, and PSET=120V, jumpers must be removed.

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January 30, 2002
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