

With Auto Stop/Reset/Preset Functions

FEATURES

- Presetable/Six Full Decades
- Built-in Comparator
- Multiplexed BCD
- Tristate Parallel Buffered BCD Latched
- Leading Zero Blanking
- Zero Detection — Display Hold
- Schmitt Trigger Input
- External/Internal Decimal Point
- Synchronous Up/Down Operation
- Cascade Carry out
- Automatic Stop

• CMOS

DESCRIPTION

The 400 is used as the main frame for a number of instruments (see pages 18 & 19). It offers six full decades for bidirectional counting; its Schmitt Trigger input eliminates problems encountered with slow rising signals; its built-in comparator can be easily programmed by means of multiplexed BCD Switches with diodes such as IMC's 44-0210/44-0211 Series. In addition, the counter can be preset to any number with the same ease as the limit. Both counter and limit presets are of the latching type meaning that only one pulse is required to enter the switches data into the registers preventing unauthorized personnel from changing data. An optional reed relay enables the 400 to interface to the real world. *Automatic Stop/Preset/Reset/Hold/Reverse* is easily done by external jumpers, if desired. The 400's Inputs/Outputs gives him great versatility in any industrial application. See *Connections* Section for detailed explanation.

DISPLAY

Standard display is 6 digits 0.33" high. For applications requiring larger displays, a 5 Digit 0.5" high is available, in this case; the MSD is omitted. Colors other than Red are also available.

POWER SUPPLY

The 400 operates from 12Vdc  $\pm$  10% @ 180mA; an optional internal 115/230 VAC 50-60Hz Module is available. When "3T" BCD is selected, the Power Supply must be 12Vdc or external VAC (see ordering information).



APPLICATIONS

- Batching Control
- Wire Reeling Coil Winding
- Cutting Control
- Linear/Rotational Measurements
- Food Processing Metering
- Coorinatographs
- Automatic Plotting Machine
- Automatic Positioners
- Totalizers Level Control
- Ratio Measurements
- Motor Speed Control
- Time Controller
- Automatic Slow Down-Stop

SPECIFICATION AT 25°C

Input Frequency	..... 1MHz Maximum
Count Pulse Width	..... 400ns. Minimum
Hold Pulse Width	..... 3 $\mu$ s Minimum
Up/Down Set-up Time	..... 1 $\mu$ s Minimum
Reset Pulse Width	..... 3 $\mu$ s Minimum
Zero Pulse Width	..... 5 $\mu$ s Min. Note 1
Carry Pulse Width	..... 5 $\mu$ s Min. Note 1
Equal Pulse Width	..... 5 $\mu$ s Min. Note 1
Preset Pulse Width	..... 500 $\mu$ s Min.
Power Supply	..... 12 $\pm$ 10% Vdc
Power Consumption	..... 2 watts Maximum
Operating Temperature	..... 0 to +60°C
Storage Temperature	..... -20 to +85°C

Note 1: Maximum Input Frequency: 200 KHz

TERMINAL DESCRIPTION

Note: ( ) Denotes Edge Connector Pin Number

- Decimal Point (2B): When left open, no decimal point should light up; when connected to the appropriate digit select line (Pins 8 or 9 or 10. A or B, the corresponding decimal point should light up.
- Counter Preset BCD (3-6B): The counter is loaded with BCD data, digit by digit corresponding to the digit strobe outputs. BCD Thumbwheel Switches with four diodes per decade connected between the digit strobe outputs and the BCD Inputs will load the counter when the counter load (14B) input is taken high. Counter input is inhibited while the counter load input is high. The counter load input must remain high a minimum of six digit strobe output periods. (500 $\mu$ s)
- Digit Select (8-10 A & B): Digit strobes are decoded internally by a divide by six Johnson Counter. This counter scans from MSD to LSD and are used for three functions, Counter Preset, Limit Preset and Mux BCD Output.
- Limit Preset (11-13B & 12A): The register is loaded with BCD data digit corresponding to the digit strobe outputs. BCD Thumbwheel Switches with four diodes per decade connected between the digit strobe outputs and the BCD Inputs will load the register when the load register input is taken high. The load register input must remain high a minimum of six digit strobe output periods. (500 $\mu$ s). This register is a static register and will not be cleared by the clear input.
- Counter Load (14B): Connecting this Pin to Vcc or leaving it open (for at least 500 $\mu$ s) will preset the counter as per b. above. Grounding this Pin will disable the counter preset and allow the 400 to perform its counting function.
- Carry Output (15B): The carry output goes high with the leading edge of the count input at the count of 000000 when counting up or at 999999 when counting down and goes down with the negative going edge of the same count input.

ORDERING INFORMATION

MODEL 400 X X X

SWITCHES/RELAY

- 0 . . . . None
- 1 . . . . 1 Set Front
- 2 . . . . 2 Sets Front
- 3 . . . . 1 Set Rear
- 4 . . . . 2 Sets Rear
- 5 Relay Only
- 6 Relay & 1 Set Front
- 7 Relay & 2 Sets Front
- 8 Relay & 1 Set Rear
- 9 Relay & 2 Sets Rear

POWER SUPPLY/BCD

- \*0 . . . . None (12 Vdc Operation)
  - 1 . . . . 115/230 VAC
  - 2 . . . . 3T BCD (12Vdc Operation)
  - 3 . . . . 3T BCD With External Power
- Pack see page 29.

DISPLAY TYPE

- 0 . . . . 0.33" Red
- 1 . . . . 0.50" 5 Digit Only

THUMBWHEEL SWITCHES (Optional)

44-0210 are for Front Mounting. 44-0211 are for Rear Mounting. See page 29.

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g. Leading Zero Blanking (16B): Both the segment outputs and digit strobes are blanked during the interdigit blanking time. Leading zero blanking affects only the Segment Outputs. This option is disabled by bringing the LZB Input high.

h. Counter Clear (17B): The clear input is asynchronous and will reset all decades to zero when brought high, but does not affect the six digit latch or the scan counter.

i. Display Hold (18B) (Store): As long as this input is low, data is continuously transferred from the counter to the display. Data in the counter will be latched and displayed when this input is high. Display Hold can be changed in coincidence with the positive transition of the count input.

j. BCD Output (4-7A): This data corresponds to the numerical data presented by each individual digit; since, it is multiplexed, only one decade's BCD Data will be present at a given time. BCD Output Data Changes at the beginning of the interdigit blanking time. These outputs are CMOS compatible.

k. Equal Output (11A): Equal output goes high for one count period when the contents of the counter and compare register are equal. The equal output is inhibited by a counter load or limit load operation.

l. Count Input (13A): The six decade counter is synchronously incremented or decremented on the positive edge of the count input signal. A Schmitt Trigger on this input provides hysteresis for protection against both a noisy environment and double triggering due to a slow rising edge at the count input. *at 7.2 volts*

m. Limit Load (14A): When left open or connected to Vcc, the digital limit (register) will be loaded as per "d" above. To load the limit properly, this pin must remain high for at least 500µs and returned to Ground (2A).

n. Counter Hold (15A) (Inhibit): The count inhibit can be changed in coincidence with the positive transition of the count input; the count input is inhibited when the count input is high.

o. Zero Detect Output (16A): Zero output goes high for one count period when all decades contain zero. During a load counter operation, the zero output is inhibited.

p. Up/Down Control (17A): The counter will increment when up/down input is high (Vcc) and will decrement when up/down input is low. The up/down input can be changed .75µs prior to the positive transition of the count input.

**RELAY/LATCH (Automatic Stop/Reset/Preset/Hold)**

This feature is designed to automatically perform the functions described below. It uses an Internal Latch whose CMOS Input is at 7B and triggers on the leading edge of a pulse. Its output is at 3A and is also CMOS Compatible. To Clear the Latch, apply a positive pulse at 16B which is the LZB Input.

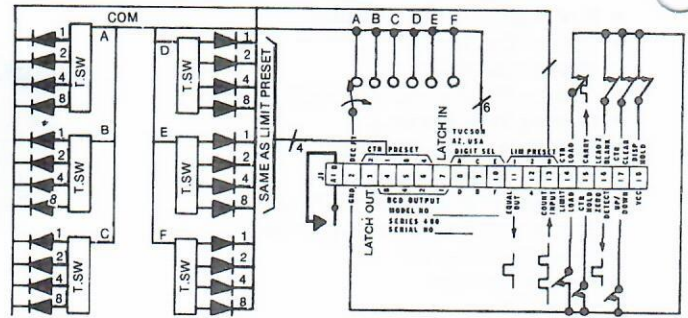
Relay This option is a *FormA* (normally open) Reed Relay Whose contacts terminate at Pins 1A and 1B and is driven by the latch circuit. Do not exceed rating of contacts which is 5 Watts Resistive at 115 VAC or 50mA @ 12Vdc Resistive.

**ACTION**

1. Equal, then stop
2. Equal, then display hold and continue count
3. Equal, then hold count and display
4. Equal, then reset counter and continue counting
5. Count down . . . equal, then count up
6. Equal, then reset to zero and wait for count command
7. Count down . . . zero, then preset and wait for count command
8. Zero, then stop
9. Zero, then display hold and continue count

**JUMPERS (EXTERNAL)**

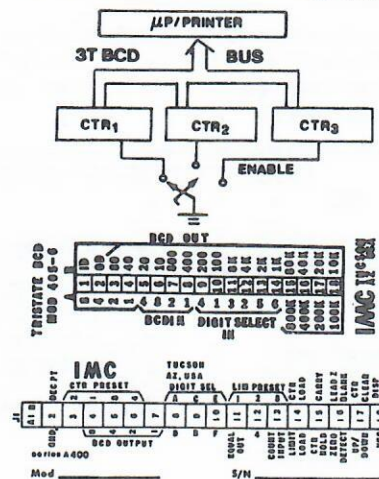
- 11A to 7B, 3A to 15A
- 11A to 7B, 3A to 18B
- 11A to 7B, 3A to 15A & 18B
- 11A to 17B
- 11A to 7B, 3A to 17A
- 11A to 7B, 3A to 17B
- 16A to 7B, 3A to 14B & 15A
- 16A to 7B, 3A to 15A
- 16A to 7B, 3A to 18B



NOTE: ALL INPUTS HAVE A 47K OHMS PULL UP RESISTOR TO + 12V AND ARE "ACTIVE HIGH" TYPE.

**TRISTATE BCD OPTION**

When this option is ordered, it is internally mounted; however, due to pin-out limitations its inputs must be externally connected from the lower connector. Simply connect BCD Output (4-7A) of lower connector to BCD Input (5-8A) of upper connector and digit select D1-D6 (8, 9 & 10 A & B) of lower connector to D1-D6 (9-14A) of upper connector. Since its output is of the "3T" Type with memory, when Pin 2B (Output Disable) of upper connector is grounded (Logic Zero), the outputs will follow the logic state of the input, when this pin is connected to Vcc (not open), the outputs will be forced to Hi Output Impedance (Tristate), *Input Disable* Pin 1B (Memory) when grounded will allow input (BCD) information to be transferred to the outputs. When connected to Vcc (not open) the outputs will retain the last information. To assure complete data transfer Pin 1B can be "AND" gated with D1 (Pin 10A) which is the last in the scanning cycle.



**REED RELAY OUTPUT**

When this is specified a reed relay is added to option 1 allowing the A400 to interface with other solid state relays or electromechanical for Process Control purposes.

**SPECIFICATIONS**

- Form . . . . . SPST (N.O.)
- Contact Rating . . . . . 5 Watts Resistive
- Energize Time . . . . . 1.5ms
- Release Time . . . . . 1.0ms