Operation

The Tachtrol 3 unit may be configured for measurement of a single speed signal, two unrelated speeds or a speed with direction indication (from an Airpax bi-directional sensor). In addition, a mathematical function may be computed from two related input signals. These computed functions are:

- Speed A
- Speed B
- A/B (Ratio)
- B/A (Inverse Ratio)
- ±A (Speed with direction)
- (A + B)/2 (Average)
- A-B (Difference)
- (A-B)/A x 100 (% Slip)
- (B-A)/A x 100 (% Elongation)

The Tachtrol 3 unit permits independent assignment of any of these functions to any output (display, analog output and 1 or 2 setpoints). Additionally, the serial digital ouput may report on any or all outputs continuously or on setpoint alarm. All forms of relay logic are field selectable.

The Tachtrol 3 unit is supplied with an electrically alterable read only memory (EAROM) which contains all of the constants necessary to define the conversion factors and instrument functions. These constants can be individually displayed and altered by a method similar to the setting of a digital clock.

By utilizing a microcomputer as the heart of the instrument, response time is improved tenfold over the traditional EPUT (events per unit time) tachometry. Further, this fast response time is attained with no sacrifice in digital accuracy.

FIG. 1

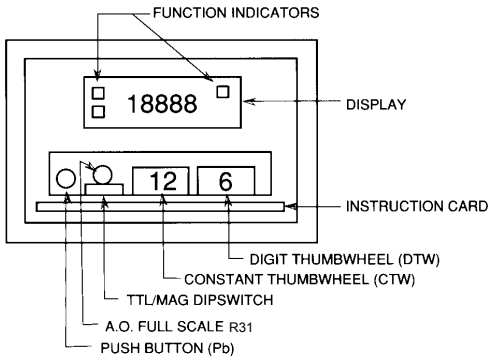

FIG. 1 shows the CTW (constant thumbwheel switch), the DTW (digit thumbwheel switch) and the Pb (pushbutton) by which each digit may be entered or altered and a dip switch for selection of input signal type for channel A or B. A battery is not necessary to retain the programmed constants. During normal operation, the DTW may be used to display Speed A, Speed B or the computed function.

Product Application Guidelines

The part number specifies the hardware. Individual requirements for setpoints, scaling and functions may be set into the instrument during installation. The following is a guide from which data to be entered may be supplied.

Input Frequency

Typically, an input frequency is sensed from rotating gear teeth. Frequency may be obtained from RPM by the formula:

$$f \text{ (in Hz)} = \frac{RPM \times PPR}{60}$$

where PPR = pulses per revolution = no. of gear teeth.

The normalization or scaling factor (SF) to be specified may now be obtained for each input by:

$$SF = \frac{\text{DISPLAY VALUE (RPM,FPM, etc.)}}{\text{INPUT FREQUENCY (Hz)}}$$

The desired form, as an example, is:

Input A: 2000 Hz = 800 FPM
Input B: 1600 Hz = 800 FPM

Outputs

The TACHTROL 3 can transmit any of the 6 computed functions, speed A, or speed B, or speed A with direction to any of the 4 outputs. You may specify one function for each output. Here are the possibilities:

Outputs	Selective Function	Function
Display	- - - - - -	Speed A
Analog	- - - - - -	Speed B
Relay 1	- - - - - -	A - B
Relay 2	- - - - - -	±A (dir.)
		A/B
		B/A
		(A + B)/2
		(A - B)/A x 100
		(B - A)/A x 100

If one of the outputs is not used, a tenth function, coded O, may be specified, turning the specific output off.

Analog Output

The zero and full scale for the analog output can be programmed to normal or expanded scale, such as:

4-20 mA = 0 to 900 FPM or
4-20 mA= 450 - 900 FPM

Serial Digital Output

The serial digital (RS232C) output may transmit the value on the display, the analog output value, the two setpoint deviations or all four of these values. They may be continuously transmitted or transmitted on setpoint alarm.

An example of the outputs specified is:

Display: A/B
Analog output: Speed A
RS232C: Transmit all values.
Setpoint 1: A/B

Relays

Each relay may operate on Input A, Input B or the computed function. They may energize, de-energize, latch or auto-reset at the setpoint. Hysteresis (difference between setpoint value and setpoint reset) is normally 5% but may be specified for any value from 1% to 99% of setpoint.

A typical example for a Tachtrol 3 application is:

Input A: 2000 Hz = 800 FPM
Input B: 1600 Hz = 800 FPM
Display: A/B
Analog output: Speed A=0-900 FPM
=4-20mA
Setpoint 1: Energize at 1.00 ratio & above with 1% hysteresis
Setpoint 2: Not used
Serial output: Transmit all values continuously.

This specific example is intended as a guide. The versatility of the Tachtrol 3 unit permits several approaches to configuration. Unavailable information may be omitted as it could be supplied during installation. More detailed information is available in the Tachtrol 3 Instruction Manual.