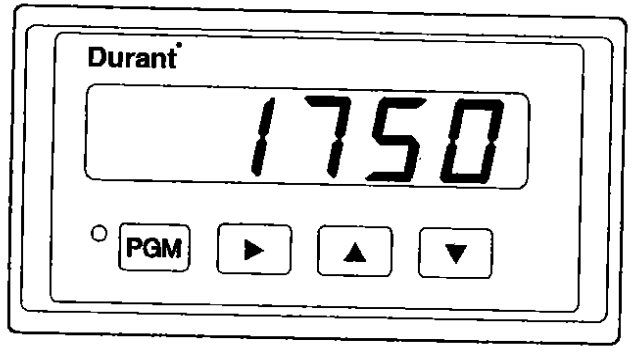
Durant®

Installation and Operation
Manual Number 57700-970-04

Eclipse Series Ratemeter/Process Timers

Models: 5770X-47X

CE



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INTRODUCTION / DESCRIPTION

This manual describes the installation of Durant Eclipse series digital ratemeter/ process timer models 5770X-47X. It begins with a description of the base unit and the plug-in option boards. That is followed by mounting information, wiring diagrams, and programming instructions. This manual concludes with diagnostic test and calibration information and specifications. This device provides a rate or time readout for the operator. Although the unit may be doing other functions as well, the only thing the operator has to do with it is to observe the display.

DESCRIPTION

Base Unit

The Eclipse accepts a digital, pulsed signal from a sensor (that may be on an encoder, proximity or photo sensor, magnetic pickup, flowmeter, limit switch, etc.). It calculates a rate or time, based upon the frequency of the input signal, to be displayed to the observer. The display can read in units of rate such as RPM, feet per minute, barrels per hour, etc., or in units of time such as baking time or mold machine cycle time. In either case, the Eclipse employes the fiendishly clever Tau method of calculation, which means that it very accurately times the period of the pulse (Tau). Once Tau is known, the unit determines rate by the formula:

$$\textbf{Rate} = \frac{1}{\textbf{Tau}} \textbf{ X Scaler}$$

If the Eclipse is programmed to display process time, Tau is plugged into a slightly different formula:

$$\textbf{Process Time} = \textbf{Tau X Scaler}$$

Either calculation requires that the installer program the unit with a scaler. The scaler is a conversion factor that accounts for three conditions that are specific to the application:

1. The units of time to be displayed, generally seconds, minutes, or hours.
2. The weight of each input pulse.
3. The resolution (decimal point location) of the display.

The installer calculates the scaler by using the appropriate formula below, depending upon whether the Eclipse should display rate or process time.

To display rate:

$$\textbf{Scaler} = \frac{\textbf{NOS x DPF}}{\textbf{PPI}} ,$$

where NOS = number of seconds in time unit (1 = seconds, 60 = minutes, 3600 = hours, etc.).

DESCRIPTION cont.

When the displayed value is between the output offset and output full scale value:

1. The output voltage = 10 $\frac{\text{(displayed rate - offset value)}}{\text{(Full scale value - offset value)}}$ V,

2. The output current = 16 $\frac{\text{(displayed rate - offset value)}}{\text{(Full scale value - offset value)}}$ mA + 4 mA

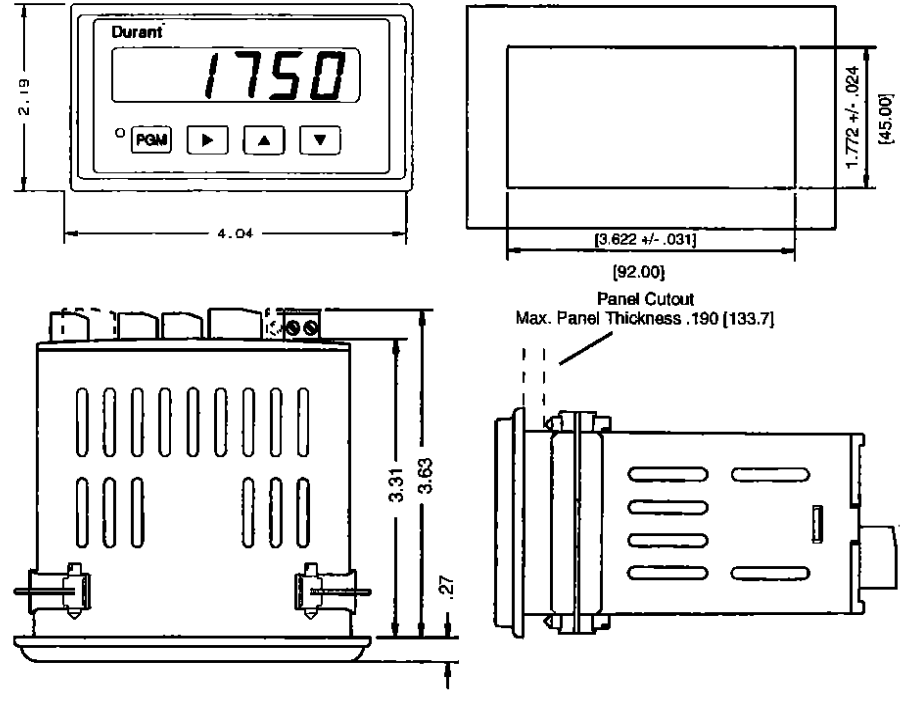
RS 485 Serial Communications Option Board

The optional serial communication board allows a host device to download and read programming parameters and to read status information from the rate meter, such as display value, relay status, etc.

This manual does not contain information on the serial communication protocol or the serial command list. That information is contained in the 57700 serial specification and is obtainable by contacting the Durant Literature Department at 800-540-9242 (U.S. and Canada), or 920-261-4070, or by FAX at 920-261-9097.

MOUNTING

Mounting



Mounting clips and screws shown in installed positions.

Mounting Instructions

1. Slide mounting gasket (not shown) over unit body until adhesive surface makes contact with the front bezel.

2. Slide unit into cutout in panel.

3. Attach mounting clips and screws.

4. Tighten screws until unit is firmly in place. DO NOT OVERTIGHTEN screws, to the point of squeezing the gasket out from behind the bezel.

DESCRIPTION cont.

DPF = decimal point factor. From the table below, select the DPF that matches the display decimal point location:

Displayed Decimal Point	D P F
XXXXX	1
XXXX.X	10
XXX.XX	100
XX.XXX	1000
X.XXXX	10000

And PPI = pulses per item, the number of pulses the unit receives from the sensor per physical unit (revolution, foot, gallon, etc.) on the rate display.

To display process time:

$$\text{Scaler} = \frac{\text{PPI x DPF}}{\text{NOS}} ,$$

where NOS = number of seconds in the process time unit (1 = seconds, 60 = minutes, 3600 = hours, etc.).

DPF = decimal point factor, and is selected from the table above.
PPI = pulses per item, the number of pulses the unit receives from the sensor per process cycle (oven length, mold machine cycle, etc.).

An inherent ability of devices that use the Tau method of calculation is that they can calculate rate or process time and update the display each time an input pulse is received. There is a practical limit to how fast the display should update, however, especially when the process speed is changing and when there may be minor variations in pulse input frequency at a "steady" speed. The Eclipse has a programmable display update time that sets the minimum time between updates. Each time the display updates, the unit waits until the update timer times out and then updates the display when the next pulse comes in. The Eclipse counts the number of pulses received and times the total periods for all pulses received for each update. The calculation averages Tau for all periods in the update effectively "smoothing" out the display. The installer programs an update time in the range of 0.1 to 99.9 seconds to obtain a display that is smooth, yet responsive.

Sooner or later, the process being monitored will be brought to a halt. Pulses will stop coming in from the sensor. What happens once the update timer has timed out and the Eclipse is patiently waiting for the next pulse to come in so that it can update the display, but the next pulse is not coming? Like the bride who has been stood up at the altar, something must tell the Eclipse that it is waiting in vain and it is time to get on with its life. The Eclipse is equipped with a zero timer for this purpose. The zero timer sets the unit's patience between pulses. The installer programs a zero

DESCRIPTION cont.

time in the range of 0.1 to 99.9 seconds. Should the time between pulses ever exceed the zero time, the Eclipse will immediately update the display to zero, whether in rate or process time mode.

Relay Output Option Board

The optional relay board contains two form C (normally open and normally closed contacts) relays. Each relay has an adjustable high and low setpoint. The relays act as alarms by turning ON when the displayed rate or time is greater than the high setpoint OR less than the low setpoint. If the low setpoint is greater than the high setpoint, the relay turns ON when the rate or time meets both conditions; less than the low setpoint AND greater than the high setpoint.

Once a relay turns ON, it stays ON until the rate or time returns back across the setpoint "and then some". The "and then some" is called hysteresis. Hysteresis is a programmable value that is common to both setpoints and both relays. This means that a relay turns OFF when the display is less than or equal to the high setpoint minus the hysteresis value, or when the display is greater than or equal to the low setpoint plus the hysteresis value. Should an overlap occur between ON and OFF conditions, the ON condition overrides the OFF condition.

Example: Relay Output Operation

High Setpoint = 250	Relay ON above 250
Low Setpoint = 220	Relay ON below 220
Hysteresis = 10	Relay OFF between 230 and 240

Analog Retransmission Option Board

The optional analog output board provides linear 0-10 V and 4-20 mA signals proportional to the displayed rate or time. When the displayed value is equal to the programmed output offset value, the output voltage is zero and the output current is 4 mA. When the displayed value is equal to the programmed output full scale value, the output voltage is 10 V and the output current is 20 mA.