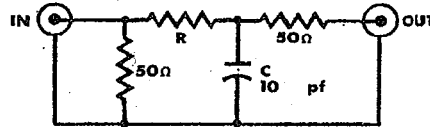


**PRODYN PASSIVE INTEGRATORS**  
**MODELS PI-.05, 1, 5, 10 & 100**

DESCRIPTION

The PI-.05, 1, 5, 10, & 100 series integrators are passive resistor-capacitor integrators with standard RC time constants of .05, -1, 5, 10, & 100 microseconds. They are available with standard connector types such as "N" (shown) or other styles can be specified. The unit and its idealized circuit (which is based on the AFWL RCI-1B integrator) are shown below:



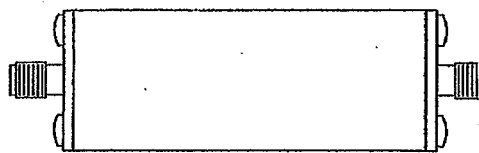
The transfer function of the integrator is implicit in the differential equation:

$$R \frac{dq}{dt} + \frac{q}{C} = V_{in}(t)$$

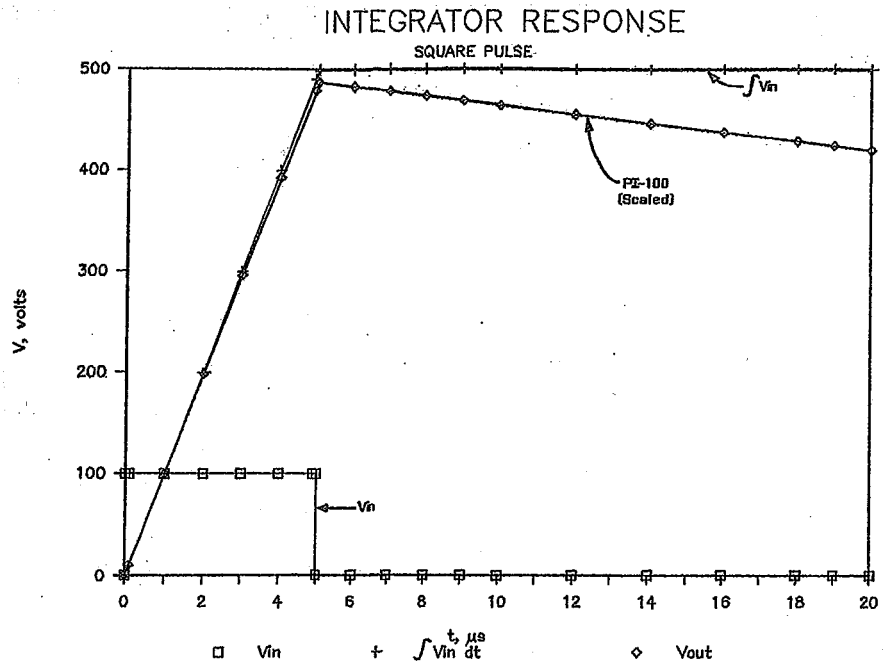
Where q is the charge on capacitor. The integrator is designed to drive a >1 megaohm, <10 pf load impedance. The voltage out is essentially the voltage across the capacitor, q/C, which is calculated by solving (integrating) the differential equation for q(t). This is most conveniently done by Laplace transforms, which yield the transfer function in frequency domain:

$$\frac{V_{out}(s)}{V_{in}(s)} = \frac{1}{sRC + 1}$$

Where s = jω = Laplace operator. The function is an integrator for sinusoidal inputs with frequencies large compared to  $\frac{1}{2\mu RC}$ ; or transient inputs for times small compared to RC. Typical performance of the PI-100 integrating 5μs square pulses shown at the right. This pulse is integrated with an error of 2.5% over the 5μs duration.



SMA TYPE CONNECTORS SHOWN  
(OTHER TYPES ARE AVAILABLE)



**SPECIFICATIONS**

Input Impedance  
 Load Impedance  
 Maximum V<sub>in</sub>  
 Maximum CW Pin  
 RC (Time Constant)  
 CW Accuracy (5%) (est.)  
 CW Accuracy (3 db) (est.)  
 Connectors  
 Size  
 Mass

	<u>PI-.05</u>	<u>PI-1</u>	<u>PI-5</u>	<u>PI-10</u>	<u>PI-100</u>
Input Impedance	50 ohms				
Load Impedance	>1 megaohm, <10 pf				
Maximum V <sub>in</sub>	Dependent on Connector Type				
Maximum CW Pin	1 watt				
RC (Time Constant)	.05μs	1μs	5μs	10μs	100μs
CW Accuracy (5%) (est.)	150MHz	100MHz	75MHz	63MHz	20MHz
CW Accuracy (3 db) (est.)	300MHz	200MHz	150MHz	126MHz	40MHz
Connectors	SMA, TNC, BNC, N, GR (others on Special Order)				
Size	1.00 (2.5 CM) x 1.00 (2.5 CM) x 2.0 (5.0 CM) Body Length Only				
Mass	4 Oz (100g)				