# 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 "SMA" (shown) or other types can be specified. The unit and its idealized circuit (which is based on the AFWL RCI-1B integrator) is shown below:
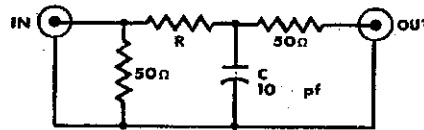
The transfer function of the integrator is implicit in the differential equation:

$$R \frac{dq}{dt} + \frac{q}{C} = \text{Vin}(t)$$

Where q is the charge on capacitor. The integrator is designed to drive a >1 megohm, <10 pf load impendence. 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:

$$\frac{Vout(s)}{Vin\ (s)} = \frac{1}{sRC + 1}$$

Where s= jω= Laplace operator. The function is an integrator for sinusoidal inputs with frequencies large compared to $1/2\pi RC$; of transient inputs for times small compared to RC. Typical performance of the PI-100 integrating 5µs square pluses 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 AVAILBLE)
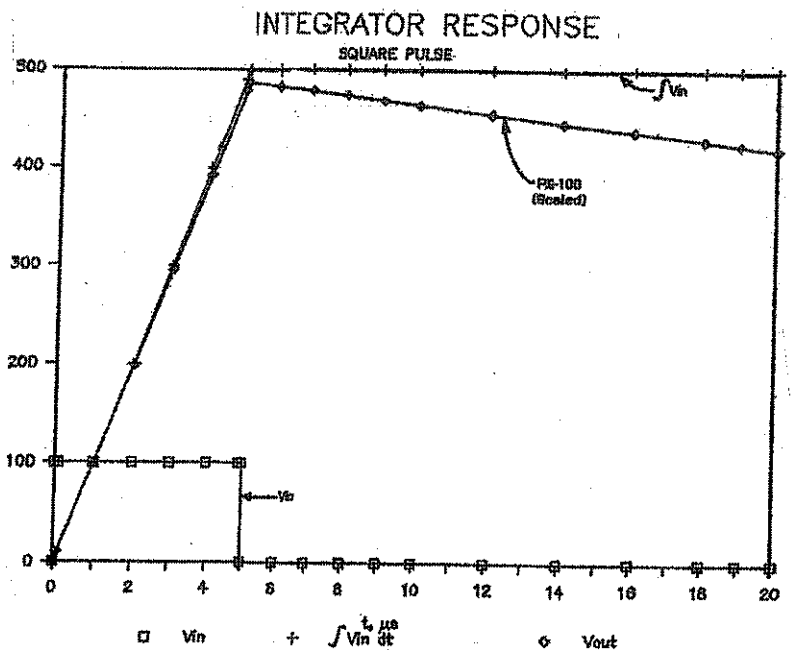
SPECIFICATIONS	PI-.05	PI-1	PI-5	PI-10	PI-100
Input Impedance			50 ohms		
Load Impedance			> 1 Megaohm,< 10pf		
Maximum Vin			Dependent on Connector Type		
Maximum CW Pin			1 Watt		
RC (Time Constant)	.05µs	1µs	5µs	10µs	100µs
CW Accuracy (5%) (est.)	150MHz	100MHz	75MHz	75MHz	20MHz
CW Accuracy (3db) (est.)	300MHz	200MHz	150MHz	150MHz	40MHz
Connectors			SMA, TNC, BNC, N, GR, (others available on special order)		
Size			1.00 (2.5CM) x 1.00 (2.5CM) x 2.0 (5.0CM) Body Length Only		
Mass			4 Oz (100g)		