

D 2 —

The ^{you requested on the integrator} quote is enclosed on the ~~integrator~~. We have formed a small lab here to produce electro-medical devices and ~~th~~ have a number of more or less stock ~~it~~ computing elements including integrators, differentiators, etc.

Insert
*
here → The computer integrator ^{it} is housed in a 6" x 8" x 8" cabinet with a completely self contained with its regulated power supply - The unit has extremely low drift, on the The unit is supplies output voltages of up to ± 100 volts at an impedance of 50×10^3 ohms however the impedance may be decreased until the unit can supply up to $\pm 2 \frac{1}{2}$ ~~ma.~~ ma. at correspondingly lower voltages. Input impedance is greater than 1 megohm 10^6 ohms. Integration time is several

microseconds so that for all biological measurements the integration can ~~be~~ effectively considered to be zero. Accuracy of integration is less than 1%, in fact beyond the capability of normal instruments to measure. The operational amplifier used in this instrument is chopper stabilized and has ~~no~~ ^{and} essentially drift free; Over a period of several hours on the order of less than $\frac{1}{10}\%$ of full scale.

As normally supplied the integration there are a selection of 4 integration times (K), ~~of 1, 1/2, 1 and 2 seconds~~ $\frac{1}{4}, \frac{1}{2}, 1$ and 2 seconds. ~~Other values~~ at an accuracy of $< 2\%$.

^{Any} ~~of the~~ ^{4 to 6} reasonable values may be specified at no extra cost. There is a zero reset switch allows instantaneous zeroing of the output. Input and output ^{jack} are led out by way are G.R. type binding posts.

In a typical application we

~~took~~ integrated the output of an ~~offner~~
~~or~~ type M recorder in conjunction with
a Statham differential gauge and screen
manometer flow meter to measure ~~the~~ gas
flow rates. ~~The~~ drift of the total
system is centered essentially the drift
~~of~~ or rather ability to zero the transducer
output. By careful manipulation of setting
the periods of many minutes could be
recorded with ~~total~~ absolute volume measured.

A more satisfactory method was insertion
of a capacitor between amplifier output and
integrator ~~or~~ which eliminated any zero
errors. ~~The~~ Long term measurements of absolute
volume could be in error with this method but
short term measurements, still retained
from breath to breath, still maintained their
accuracy. This unit has been used in several
such arrangements and has proven simple and
satisfactory accurate and quite satisfactory.

If you are interested in this

unit and could give us ~~the~~ ^{list of} equipment
it will be used with we could possibly
offer suggestions to make the unit even more
valuable. In addition we ~~have a number~~
would be interested in hearing of any
problems in which we might be of assistance
through development of equipment. ~~We~~ At
present we ^{have} a number of projects just in
prototype stage ~~some of which are~~ including
a ^{reliable} ~~an~~ electromagnetic flowmeter and a tiny ^{physiologic} telemetry
system for remote monitoring of which might be
of interest to anesthesiology.

Respectfully

* The integrator performs the mathematical
operation of $E_{out} = K \int_{T_1}^{T_2} E_{in}$ on any applied
voltage.

MK I Ingerater

24-9-58

Parts List — Print of 18-9-58

A-1	Amplifier, operational Philbrick U.S.A. - 3	\$95.00
	complete $\bar{c}$ tubes	.15
C-1	dual 40 μ fd 450 V. electrolytic	2.03
2	Mallory FP 238	
3	.01 μ fd 600 V ceramic	.15
4	40 μ 450 W.V. tubular electrolytic	1.06
5	" " " "	1.06
6	.01 μ fd 600 V ceramic	.15
7	.47 μ fd 100 V. paper	.35
8	.47 μ fd C.D. mylar tubular	\$1.00
D-1	Sarkes Tarzian 150 ma silicon Rect	1.06
2	"	1.06
3	"	1.06
4	"	1.06
5	"	1.06
6	"	1.06
7	"	1.06
8	"	1.06
Ne-2	— neon bulb	.15
R-1	1.2 K 5W.W.W.	.47
2	2.5 K 10W	.53
3	1.2 K 5W.W.W.	.47
4	2.5 K 10W	.53
5	1 M $\frac{1}{2}$ W 10%	composition .06
6	" " "	" "
7	15 K $\frac{1}{2}$ W 10%	" "
8	" " "	" "
9	10 K screwdriver pot.	" "
10	6.8 M $\frac{1}{2}$ W 10%	" "
11	.33 M " "	" "
12	.33 M " "	" "
13	.1 " " "	" "
14	4 M $\frac{1}{2}$ W 1% deposited carbon	.39
15	" " "	.39
16	" " "	.39
17	" " "	.39
18	47K $\frac{1}{2}$ W 10% comp.	.06

MKI /

24-9-58

Parts List - Print

R-19	50K $\frac{1}{2}$ W 1% Deposited Carbon	
S-1	d.p.s.t. switch	.76
2	" "	.76
3	s.p.s.t. N. off telephone switch	1.15
T-1	Triad R9A Trans - 600V.C.T. 75ma.	
	6.3V 2A 5V 2A	7.14
PL-1	Line cord 8' $\bar{a}$ plug	1.00
S-4	S.P. 4 P deck switch	.82
4 ea	binding posts, Superior #40	1.60
1 ea	chassis	2.00
1-ea	cabinet	4.24
	Misc. screws standoffs etc	2.00

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4 .24

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