



Voltage Regulators & Paraformer

PARAFORMER—A NEW CONCEPT IN A.C. POWER CONDITIONING

Provides voltage regulation and noise attenuation of over 50DB over a frequency range of 0 to 1 MHz. As shown by Equation #1, electromotive force, and hence the transfer of electrical energy can be achieved in two ways: (1) by flux coupling, or (2) by parametric coupling. Existing passive devices such as transformers and ferroresonant transformers depend almost exclusively on the flux coupling term of Equation #1. However, Wanless Electric has now invented a new component, the Paraformer™, which operates exclusively on the basis of parametric coupling and consequently is a device in which the flux coupling or mutual inductance is zero. (Thus, all energy is passed by the $i \frac{dL}{dt}$ term of Equation #1.)

Having noted the outstanding advantages of the Paraformer™, it is perhaps appropriate to note the simplicity of the device.

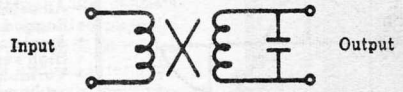


FIGURE 1

As shown in Figure 1, the Paraformer consists only of a primary winding, a secondary winding, a magnetic core and an AC capacitor. No other components are used. After reviewing the symbol, it is perhaps important to restate that the Paraformer™ is not a ferroresonant transformer. The mechanism for energy transfer is entirely different and most of the basic characteristics are entirely different.

$$E = \frac{d}{dt} (Li) = \underbrace{L \frac{di}{dt}}_{\text{Flux Coupling Term}} + \underbrace{i \frac{dL}{dt}}_{\text{Parametric Coupling Term}}$$

The advantages are listed below in Table 1.

TABLE I

	Transformer	Ferroresonant Transformer	Paraformer
Line voltage regulation	None	±1%	±1/2%
Line filtering (noise)	No	Slight	Over 50 db
Load filtering (noise)	No	Slight	Over 50 db
Overload protection	No	Partial	Yes
Low line protection	None	None	Yes

As noted from Table 1, the Paraformer™ is inherently a line voltage regulator and line power filter. In fact, the Paraformer's most useful property appears to be its ability to prevent line voltage fluctuations from reaching the load. As will be noted from the above table, such fluctuations (noise, distortions, etc.) are attenuated by over 50 db for frequencies from a few cycles per second up to 1 megacycle per second.

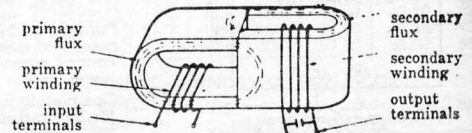
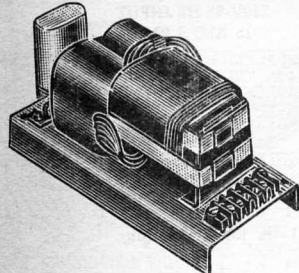


FIGURE 2

Note that the geometry is such that the primary flux does not link the secondary winding and that the secondary flux does not link the primary winding. (Accordingly, the classical flux coupling is zero). However, note that the primary flux does modulate the reluctance associated with the secondary flux and hence the primary does modulate the inductance of the secondary. This modulation can be achieved only by transferring electrical power from the primary to the secondary. This power in turn sustains the secondary oscillations and delivers power to the load. It is this unique parametric power transfer mechanism that makes the Paraformer™ a revolutionary new component.

	60Hz	400Hz
A.C. Input:	115VAC ±10% (Nominal), 10, 60Hz (50-150VAC)	115VAC ±10% (Nominal), 10, 400Hz (50-150VAC)
A.C. Output:	117VAC, 60Hz, 1 Phase	117VAC, 400Hz, 1 Phase
Regulation:	±0.5% Line; ±2.0% Load	±1% Line; ±2.5% Load



PEC-60

60Hz. UNITS

Stock No.	Type	Power Rating	Dimensions H. x W. x L.	Wt. Lbs.	1-9	10-24	25-49	50-99
99F1354	PEC-60	60-VA	3 1/2 x 4 x 6 1/2"	10	95.00	90.25	85.50	80.75
99F1365	PEC-150	150VA	5 1/2 x 4 7/8 x 1 4/8"	21	150.00	142.50	135.00	127.50
99F1366	PEC-500	5000VA	7 x 5 7/8 x 17"	50	225.00	213.75	202.50	191.25
99F1367	PEC-1000	1000VA	7 x 8 x 20"	85	425.00	403.75	382.50	361.35

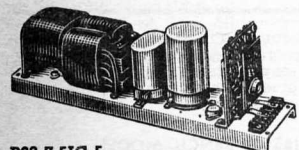
400Hz. UNITS

Stock No.	Type	Power Rating	Dimensions H. x W. x L.	Wt. Lbs.	1-9	10-24	25-49	50-99
99F1368	PEC4-75	75VA	6 x 4 7/8 x 9"	7	105.00	99.75	94.50	89.25
99F1369	PEC4-500	500VA	6 1/4 x 4 7/8 x 13"	30	275.00	261.25	247.50	233.75
99F1370	PEC4-1000	1000VA	7 x 7 x 17"	58	475.00	451.25	427.50	403.75

"PIC" & "PHPIC" LINE — PARAFORMER DC POWER SUPPLIES

OVER 100 DB TRANSIENT SUPPRESSION

Designed with newly invented parametric power transfer principle Wanless P-IC power supplies operate from an AC input of 105 to 125 volts single phase, 60 cycle and provide DC outputs as shown in the table below. Regulation for line is ±0.02% and for load ±2 mV; ripple is less than 300 microvolts rms and voltage is adjustable ±5%. Units have automatic overload and short circuit protection and overvoltage crowbar is available as an option at \$20.00 additional. The "HP" versions of the "PIC" line have specifications identical to the "PIC" units except that line regulation is ±0.01%, load regulation is less than 1 millivolt and ripple is less than 100 microvolts rms. Size: P60C units 17" L. x 4.5" W. x 5.88" H. P120C units 17" L. x 5" W. x 9.7" H. Shipping weights: P60C units 16 lbs. P120C units 27 lbs.



P60-7.5IC-5

Stock No.	Model No.	Rating	1-9	10-24	25-49	50-99
99F1378	P60-7.5IC-5	5V @ 7.5A	195.00	185.25	175.50	165.75
99F1379	P60-5IC-12	12V @ 5A	195.00	185.25	175.50	165.75
99F1380	P60-2.5IC-24	24V @ 2.5A	195.00	185.25	175.50	165.75
99F1381	P120-15IC-5	5V @ 15A	240.00	228.00	216.00	204.00
99F1382	P120-10IC-12	12V @ 10A	240.00	228.00	216.00	204.00
99F1383	P120-5IC-24	24V @ 5A	240.00	228.00	216.00	204.00

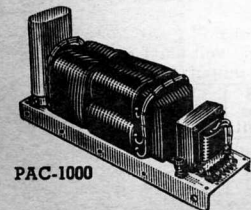
Stock No.	Model No.	Rating	1-9	10-24	25-49	50-99
99F1384	P60HP-7.5IC-5	5V @ 7.5A	220.00	209.00	198.00	187.00
99F1385	P60HP-5IC-12	12V @ 5A	220.00	209.00	198.00	187.00
99F1386	P60HP-2.5IC-24	24V @ 2.5A	220.00	209.00	198.00	187.00
99F1387	P120HP-15IC-5	5V @ 15A	265.00	251.75	238.50	225.25
99F1388	P120HP-10IC-12	12V @ 12A	265.00	251.75	238.50	225.25
99F1389	P120HP-5IC-24	24V @ 5A	265.00	251.75	238.50	225.25

PHASAC™ SINGLE TO THREE PHASE CONVERTER

Model PAC-1000 and PAC4-1000 is a 1 KVA static single to three phase converter with all passive Parax components utilizing Paraformer inherent phase shift phenomenon. For use in applications where static conversion from single to three phase is neces-

sary, use PAC-1000 for 60 Hz and PAC4-1000 for 400 Hz Input. 105-125 Vac, 60 Hz, 1-phase and output is 3-phase, 120 Vac line to neutral, 208 Vac line to line and 240 Vac at 1 KVA (333 Va per phase). Output connection is 4 wire wye or 3 wire delta. Size is 7" H. x 5 7/8" W. x 17" L. maximum and weight is 50 lbs.

Stk. No.	Type	1-9	10-24	25-49	50-99
99F1390	PAC-1000	365.00	346.75	328.50	310.25
99F1391	PAC4-1000	375.00	356.25	337.50	318.75



PAC-1000