

**SERIES 700, 800, 900, MODULAR**

# **HIGH VOLTAGE POWER SUPPLIES**

**FOR CRT DISPLAY**



- FIXED OUTPUT VOLTAGE – CHOICE OF 10, 12, 15, 18, OR 20KV±5%
- LOAD RANGE FROM ZERO TO TEN WATTS
- REGULATED TO 0.1% OR BETTER
- CHOICE OF THREE INPUTS: 24 VDC, 115VAC, OR 230VAC
- SHORT-CIRCUIT, ARC, AND OVERLOAD PROTECTION
- FULL-LOAD TRANSIENT OF 0.3% PEAK, RECOVERY IN 2MSEC
- SILENT
- UP TO 4 OPTIONAL OUTPUT VOLTAGES AVAILABLE
- ONE YEAR WARRANTY



**KELTRON CORPORATION**

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**NOW AVAILABLE . . . . .  
ANY OUTPUT VOLTAGE  
FROM 10 TO 20KV,  
WITH FINE ADJUSTMENT  
TRIMMER!**

**HIGH VOLTAGE CRT POWER MODULES . . .  
PACKED WITH REASONS TO BUY THE PACKAGE!**

Keltron's 700 - 800 - 900 Series of packaged power sources wipes out all the old reasons for trying to build your own power supplies in house. Why build a possibly unpredictable tiger when you can get an absolutely reliable pussycat?

Optimum performance at truly low cost in tested, fully burned-in, small, totally silent modules is yours promptly from Keltron. They're completely short-circuit and arc-proof, and warranted for full replacement for one year.

Check the specs — then tell us how many you want — off the shelf!

**Specifications:**

**OUTPUT VOLTAGE (Non-adjustable)**

710, 810, 910	10Kv $\pm$ 5% ( 9.5 - 10.5Kv)
712, 812, 912	12Kv $\pm$ 5% (11.4 - 12.6Kv)
715, 815, 915	15Kv $\pm$ 5% (14.25 - 15.75Kv)
718, 818, 918	18Kv $\pm$ 5% (17.1 - 18.9Kv)
720, 820, 920	20Kv $\pm$ 5% (19 - 21Kv)

**OUTPUT CURRENT (10 watt maximum)**

710, 810, 910	0 - 1,000 $\mu$ A
712, 812, 912	0 - 830 $\mu$ A
715, 815, 915	0 - 670 $\mu$ A
718, 818, 918	0 - 560 $\mu$ A
720, 820, 920	0 - 500 $\mu$ A

**LINE REGULATION**

700 Series, 21-27 VDC	
No-Load	0.02% P-P typical; 0.05% P-P max.
Full-Load	0.07% P-P typical; 0.15% P-P max.
800 Series, 105-125 VAC; 900 Series, 210-250 VAC	
No-Load	0.015% P-P typical; 0.04% P-P max.
Full-Load	0.05% P-P typical; 0.11% P-P max.

**LOAD REGULATION**

700 Series @ 24VDC; 800 Series @ 115VAC; 900 Series @ 230VAC	0.05% P-P typical; 0.1% P-P max.
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**RIPPLE AND NOISE (with 500pf CRT capacitance)**

700 Series @ 24VDC with up to 2VP-P 100-120Hz ripple;	
800 Series @ 115VAC; 900 Series @ 230VAC	
No-Load	0.02% P-P typical; 0.04% P-P max.
Full-Load	0.05% P-P typical; 0.1% P-P max.

**LOAD TRANSIENT RESPONSE, Load switched from zero to 10 watts.**

700 Series @ 24VDC; 800 Series @ 115VAC; 900 Series @ 230VAC

Voltage Peak	0.3% peak typical; 0.5% peak max.
Recovery Time	2 milliseconds typical; 4 max.
(to within $\pm$ 5V of static level)	

**INPUT CURRENT AND POWER**

700 Series: +24 VDC unregulated, 21-27 VDC instantaneous limits, including up to 2.0V P-P ripple.

At 24VDC:	No-Load	0.4A typical, at 9.6 watts
	Full-Load	1.0A typical, at 24 watts
	Recom. Fuse	1.6A (Buss AGC or equiv.)

800 Series: 105-125 VAC, 50-400Hz.

At 115VAC:	No-Load	0.21A typical, at 13 watts
	Full-Load	0.37A typical, at 31 watts
	Recom. Fuse	0.6A slow blow (Buss MDL or equiv.)

900 Series: 210-250VAC, 50-400Hz.

At 230VAC:	No-Load	0.105A typical, at 13 watts
	Full-Load	0.185A typical, at 31 watts
	Recom. Fuse	0.3A slow blow (Buss MDL or equiv.)



**OVERLOAD PROTECTION**

All designs fully protected from damage caused by arcing, overload, or short circuit. Automatic recovery upon removal of fault.

**AMBIENT TEMPERATURE**

0-50°C.

**TEMPERATURE COEFFICIENT**

$\leq$ 0.01% (100PPM)/°C typical; 0.02% (200PPM)/°C maximum.

**STABILITY**

$\pm$ 0.1% maximum in 8 hours at constant input, load, and temperature after 30-minute warmup.

**CONNECTIONS:**

Input: By means of a 12-pin gold-plated printed circuit edge connector, Amphenol 143-012-01 or Winchester K-12, keyed at position B.

Outputs: High voltage through 14" cable to anode connector mating Jedec J1-21 CRT cap. Other lengths or connectors available. Optional low-voltage outputs from edge connector.

## HV MONITOR

The current flowing in the HV sensing resistor may be diverted through an external microammeter for monitoring the high voltage. This resistance is  $100M\Omega$ ,  $\pm 1\%$ , for 10-15 Kv models, and  $200M\Omega$ ,  $\pm 1\%$  above 15 Kv.

## CONSTRUCTION

All silicon semiconductors, including an integrated circuit. High voltage circuits encapsulated in a superior quality evacuated silicone resin.

## REPAIRABILITY

All components, including high-voltage parts, are replaceable at low cost, a significant saving compared to the "throw-away" philosophy.

## NET WEIGHT

700 Series: 1000 GM (2.2 lbs.); 800 Series: 1960 GM (4.3 lbs.)

## OUTPUT VOLTAGE

The output voltage is determined by fixed resistors to within  $\pm 5\%$  of nominal value. It is possible to program a given supply to output voltages as low as 30% of nominal at a reduced load current rating by means of external resistance. It is also possible to modulate the output voltage. See the diagram for details. Intermediate fixed output voltages are available in quantities of 10 minimum at the cost of the next higher voltage rating.

## OUTPUT CURRENT

This rating is determined by a ten-watt basic output rating and the nominal output voltage. Power taken by optional low voltage outputs is subtracted from the ten-watt rating to set the permissible high-voltage output power.

## LINE REGULATION

The line regulation, or variation in output voltage caused by input voltage variations, is a function of output power. The best performance is at no-load, with the regulation increasing linearly with load.

## LOAD REGULATION

The load regulation, or variation in output voltage caused by load current variations, is measured with the load switched at a 60Hz rate by means of an oscilloscope. Static load changes normally produce a smaller regulation, or smaller variation in output voltage.

## RIPPLE AND NOISE

This is measured with a 500pf load capacitance which represents the minimum capacitance of most cathode ray tubes, many of which reach 2500pf. The inverter frequency component of ripple is reduced substantially as CRT capacitance increases and as load current decreases.

## LOAD TRANSIENT RESPONSE

An unusually high unity-gain frequency in the regulating loop results in a typical full-load step response of only 0.3% peak and recovery to within  $\pm 5V$  of the new static voltage level in 0.7 to 2 milliseconds. The transient voltage peak is directly proportional to the amplitude of the current step.

## OVERLOAD PROTECTION

Current limiting protects the supply from sustained overloads and provides automatic recovery. Surge-limiting resistors protect the semiconductors from damage caused by arcing.

## AMBIENT TEMPERATURE

The aluminum case is an excellent heat sink and holds the temperature rise of the power transistor mounts in still air to only  $17^{\circ}C$  at full ten-watt rated load.

## TEMPERATURE COEFFICIENT

A unique low-TC cermet high-voltage sensing resistor makes possible an excellent temperature coefficient at low cost.

## HV MONITOR

An isolated, floating microammeter connected across edge connector terminals N(+) and M(-) will carry the sensing current. Models between 10 and 15 Kv will deliver a current of  $10\mu A/Kv \pm 1\%$ , while above 15Kv the rate is  $5\mu A/Kv \pm 1\%$ .

## ACOUSTIC OUTPUT

Absolutely silent. The whine or squeal often associated with solid-state high-voltage supplies has been eliminated by the use of an ultrasonic power conversion frequency.

## LOW RFI

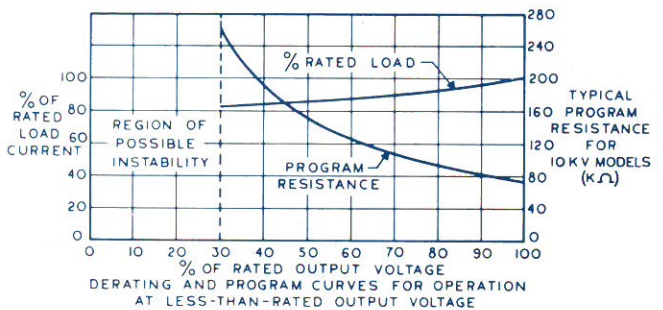
A sinusoidal oscillator waveshape minimizes interference problems.

## WARRANTY

One year on labor and material.

## REDUCED OUTPUT VOLTAGE

The fixed program resistor is easily removed if desired for external voltage control. The output voltage will then be zero. If a resistance, preferably of low temperature coefficient, is connected between terminals M and L it will control the high-voltage output. The graph below shows a typical control curve for a 10Kv supply. The minimum program resistance must never become less than the original fixed program resistance to prevent excessive output voltage. For 10-15Kv units the program resistance  $R = 715/V (\pm 6\%)$ , where V is the output in KV, and R is in  $K\Omega$ . For units above 15Kv,  $R = 1430/V (\pm 6\%)$ . Operation below 30% of rated voltage may be unstable.



## MODULATION

Terminal M is equivalent to the summing point of an operational amplifier floating at about +7.15V. A current fed into this terminal will cause the output voltage to drop at the rate of  $100V/\mu A$  for 10-15 Kv units, and at  $200V/\mu A$  above 15Kv. At no time may the supply be modulated above the rated output voltage.

## OPTIONAL OUTPUTS

As many as 4 optional outputs can be added to any model at a modest increase in cost. The total optional output power must be deducted from the rated high-voltage output power. Each output is derived from a small secondary winding on the inverter transformer, and displays the same line regulation as the high-voltage output. Load regulation is not provided, however, and typically amounts to about 5% at a 2-watt level, and 10% at 4-watts. In addition, an interaction exists, whereby an optional low-voltage output will increase by as much as 5% as the high-voltage output load varies from zero to full load. Ripple can be held to 1% peak-to-peak. Either or both polarities can be provided. If reduced output voltage or modulation is used, the optional outputs will also vary in proportion.