MODEL 729A REGULATED DC POWER SUPPLY

INSTRUCTION MANUAL

The Model 729A is a compact, tube-type, series-regulated, power supply designed for use in various experiments of tube circuits, and delivers following regulated DC outputs.

(1) 0 to 300 volts continuously variable, 150 mA max. ($+B_1$)

(2) 0 to 300 volts continuously variable, 150 mA max. ($+B_2$)

(3) 0 to -130 volts continuously variable, for C bias (-C)

The Model 729A delivers following unregulated AC output for tube heaters or filaments and has following meters.

(1) 5 volts, 2A max.

(2) 12.6 volts, 1A max, with center tap

(3) 6.3 volts, 2A max.

(1) voltmeter 300V max. ($+B_1$, $+B_2$)

(2) voltmeter 150V max. (-C)

(3) amperemeter 150mA max.

Kikusui Electronics Corporation

S P E C I F I C A T I O N S

Power Supply	[ ] volts 50/60 c/s. Approx. 260 VA *
Dimensions	520 (W) x 200 (H) x 255 (D) mm
(Max.)	550 (W) x 220 (H) x 290 (D) mm
Weight	Approx. 15 kg

Items Supplied with Equipment
1 - Instruction Manual
1 - Test Data

+ B_1 and + B_2 Outputs

Output Voltage	0 to 300 volts, continuously variable.
**Maximum Current Rating	At 300 volts 150 mA
	At 250 volts 120 mA
	At 200 volts 100 mA
	At 150 volts 85 mA
	At 100 volts 70 mA
	At 50 volts 65 mA
	Less than 50 volts 60 mA
Regulation	For ± 10% change in line voltage ± (1% + 0.5 volts)
	For 100% change in load current ± (1% + 0.5 volts)
Ripple	50 mVp-p

- C Output

Output Voltage	0 to -130 volts, continuously variable.
Regulation	For ± 10% change in line voltage ± (1% + 0.5 volts)
Ripple	50 mVp-p

Unregulated AC Output

Output	5 volts, 2A max.
	12.6 volts, 1A max. with center tap.
	6.3 volts, 2A max.
Voltmeter	***300 V (full scale 1 mA) class 2.5
	150 V (full scale 200 µA) class 2.5
Amperemeter	***150 mA (full-scale 50 mV) class 2.5
Withstand Voltage	Between Terminals and Chassis DC ± 500 V

Note : * When AC outputs are fully loaded and-+B_1 is loaded at 300 volts 150 mA and +B_2 is loaded at 300 volts 100 mA.
** Total of +B_1 and +B_2 output currents is not to exceed 250 mA
*** When toggle switch is turned to +B_1 or +B_2 Output, meters indicate current or voltage of +B_1 and +B_2 Output.

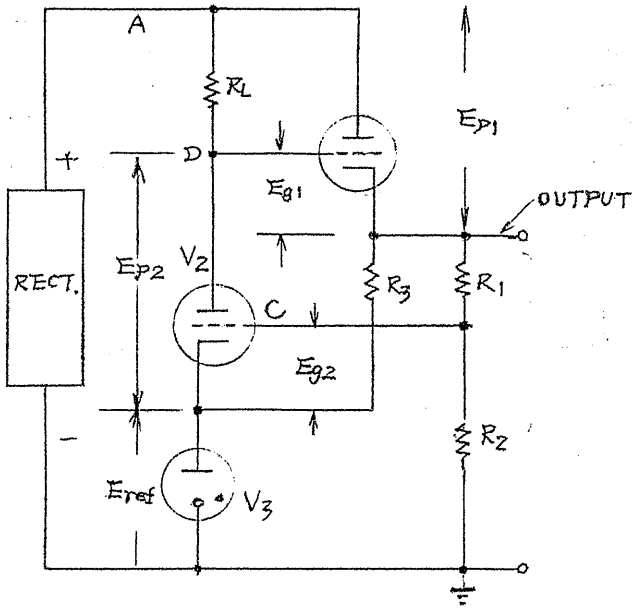
FUNCTIONS OF CONTROLS AND TERMINALS

POWER	Toggle switch for turning power on or off. AC outputs are immediately available upon turning this switch on. DC outputs are available within about 20 seconds of warm-up after turning this switch on.
(FUSE)	A 3A slow blow type fuse is used in the power line.
DC OUTPUT	Toggle switch for turning DC outputs on or off. By this switch, hot sides of $+B_1$, $+B_2$ and -C are simultaenously turned, but common sides are always connected to the chassis. This switch may be used for frequent on-off operation in experimental work. Before turning off POWER switch, this switch should be turned to STAND BY position.
(FUSE)	A 0.3A fast blow type fuse is used in the output circuit. This fuse serves in common for both $+B_1$ and $+B_2$.
DC 0 ~ 300V and (FINE)	Dual control knobs for adjustments of $+B_1$ and $+B_2$ voltages. External black colored knobs are for coarse adjustment, and permit continuous variation of output voltages from 0 to +300 volts. Output voltages are approximately proportionate to rotation angle. Internal red colored knobs are for fine control of output voltages which are roughly set by external knobs, and enable fine adjustment between +30 volts. When these knobs are all turned fully counter clockwise, negative voltage develops at output terminal. This equipment should not be used nor should be kept for long time in such condition.
DC 0 ~ -130V	A knob for adjustment of -C voltage. At its clockwise end, the highest negative voltage is obtained, and as this knob is turned counter-clockwise, negative voltage decreases.
AC Output Terminals	All AC outputs are isolated from chassis and can withstand voltage up to ±500 volts from chassis.
DC Output Terminals	$+B_1$ and $+B_2$ terminals deliver positive outputs and -C terminalsdelivers negative output. GND terminal is connected to the chassis. Note:::Do not connect $+B_1$ and $+B_2$ outputs in series.

DESCRIPTION OF THE CIRCUIT

A figure shown below is to visualize the principle of series-regulated power supply. A decrease in output voltage caused by spontanous drop in line voltage or increase in output current causes a decrease in voltage at point C in the circuit.

Asides, a voltage across regulator tube V_3 remains constant, therefore, voltage drop at point C results in deeper grid bias, Eg_2, for amplifier tube, V_2, and consequently, lower plate current of V_2. As a result, voltage at point D increases and grid bias for regulator tube V_1 decreases, thus, V_1 performs to cancel decrease on output voltage. In this c... circuit, output voltage may be lowered by reducing R_1 or increasing R_2 so as to higher the ratio of voltage divider, however, some limitaton existsin doing so. Because Eg_2 is so small as compared reference voltage, Eref, Ec approximates Eref, and E_{R1} approximates $Ep_2 + Eg_1$.



In this circuit, it is necessary to maintain Ep_2 at least more than 10 volts so as to enable voltage amplification within tube V_2, and Eg_1 should vary down to a voltage to cutoff regulator tube V_1. Therefore, in regulated power supplies with low voltage outputs, voltage at point C is made as low as zero or negative.

In this equipment, in order to realize variation of output voltage down to zero, a sharp cutoff pentode is used in place of V_2, and a voltage reference circuit with a discharge regulator tube is employed,

In this equipment, voltage at point C is made around -100 volts.

ADJUSTMENT

Screw driver adjustments " OV ADJ " and " 300V ADJ " are used in adjusting output voltage range of $+B_1$ and $+B_2$. In adjusting these, Fine control is set at center position, and when 0 ~ +300V is turned fully clockwise, " 300V ADJ " is adjusted to obtain 300 volts at output terminal, and next, when 0 ~ +300V is turned fully counter clockwise, " OV ADJ " is adjusted to obtain zero volt at output terminal. This procedure is repeated several times.