HAM TIPS from RCA

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NEW RCA-866-A/866 HAS RADICALLY DIFFERENT FILAMENT

"SWEEPSTAKES" WINNERS AGAIN USE RCA TRANSMITTING TUBES

W2IOP Clinches Prize with 814; W6ITH Does it with 806's

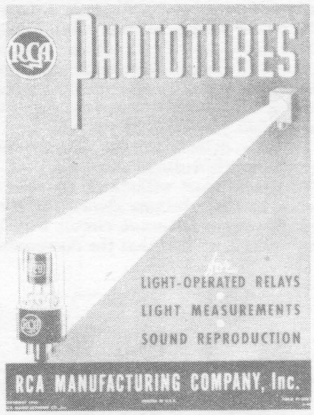
We are mighty proud to remind you that the winners and the high-scoring stations of the Tenth A.R.R.L. Sweepstakes again used RCA Transmitting Tubes. Topping even the Ninth SS scores, when W3BES won hands down with a pair of RCA-809's, comes Mr. Larry LeKashman, of W2IOP, who worked 646 stations in 63 sections on c.w. and knocked off the terrific high score of 101,115. Then, there is Mr. D. Reginald Tibbetts, of famous W6ITH, who broke all records on phone by working 449 stations in 62 sections. We doff our toppers to you, gentlemen. You have done a swell job.

What They Used

W2IOP's layout consisted of a Meissner Signal Shifter driving one RCA-814 Beam Power Amplifier. This tube, as you know, has an input rating of 225 watts, ICAS. With 7.5 watts output from the Signal Shifter, the greatest problem was to avoid over-exciting the 814. Larry says—"and as a driver, the 814 is capable of over-driving a one k-w amplifier 250%!" In W2IOP's latest rig Signal Shifter-814 arrangement is being employed to run a pair of RCA-813's in push-pull with 750 watts input.

W6ITH uses four separate push-pull RCA-806 finals—one amplifier for each of the four phone bands from 10 to 160 meters. Except for tank-circuit constants, the finals are all identical in construction. The all-band exciter for these finals uses a 6C5-6L6G-807 line-up. On 10 meters, this exciter drives an intermediate buffer using an RCA-808 triode. The 808 in turn kicks the push-pull 806 stage. On 20, 75, and 160 meters the exciter drives an RCA-828 Beam Power Amplifier which in turn pushes the p-p 806's. All four finals are modulated by a pair of RCA-810's in class B. The three power supplies employ RCA-866's and RCA-866-A's. The bias supply uses an RCA-83v.

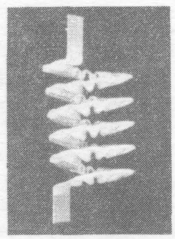
LAST WORD ON PHOTOTUBES



In sound-film reproduction, color discriminating devices, light-measuring indicators, automatic counters, displays, etc., Phototubes play paramount roles. The new RCA Phototube 16-page booklet covers these applications, describes RCA's complete line of light-sensitive tubes. See your Transmitting Tube Distributor or write the Commercial Engineering Section, RCA Manufacturing Company, Inc., Harrison, N. J. for your copy.

IMPROVED MERCURY-VAPOR RECTIFIER SUPERSEDES FORMER 866-A AND 866

New Rectifier Has High Ratings, Greater Life, and Tremendous Reserve of Filament Emission



866-A/866 Filament

Here is news that IS news! RCA engineers have just completed the design of a low-cost deluxe type half-wave, mercury-vapor rectifier tube known as the RCA-866-A/866 that bids fair to making rectifier history. Strikingly different in construction, this tube has exceptional life and a tremendous reserve of emission that beats anything in the 866 and the 866-A class.

The RCA-866-A/866 supersedes types 866-A and 866 and may be used in equipment designed for the former types. It combines the ability of the 866-A to withstand high peak inverse voltages with the ability of the 866 to conduct at low plate voltage . . . at a plus performance beyond any RCA rectifier type ever offered. Thus, at the maximum peak inverse voltage rating of 10,000 volts and a maximum peak plate current rating of 1 ampere per tube, two 866-A/866's operating in a full-wave rectifier circuit are capable of delivering to the input of a choke-input type filter a rectified voltage of 3,180 volts at 500 milliamperes with good regulation and with exceptional life.

Filament is Key to Long Life

Secret of the 866-A/866 is its improved edgewise-wound coated ribbon filament which is helical in shape and crimped. This design has great mechanical strength and provides more cathode area for the same filament power rating. And above all,

(Continued on page 2, column 1)

DID YOU KNOW THAT . . .

more RCA-807's and RCA-809's were used by the top flight Tenth National Sweepstakes Contestants last year than any other transmitting tube type?

HAM GUIDE, HAM GUIDE! WHO HAS THE HAM GUIDE?

W3IEM Solves the Problem

Dear Sirs:

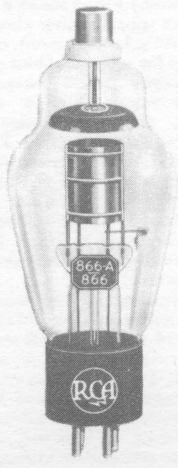
Attention: "Ham Tips" Editor.

Several months ago I purchased from you an RCA Ham Guide, with which I was well pleased. Notice that I say "*was*" well pleased. That is because I have seen very, very little of it since I first showed it to my friends. As a matter of fact, I have not seen it for several weeks and believe me, I really miss it! It keeps me so busy loaning it out that I have decided to buy another one for myself and let the other fellows fight over the one that formerly belonged to me.

Seriously, though, I have found the RCA Ham Guide very useful around the shack in more ways than one. I particularly like the useful diagrams shown with each tube description.

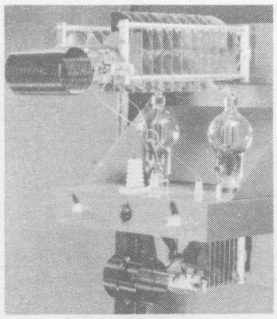
Sincerely,
JOHN E. CANN,
W3IEM.

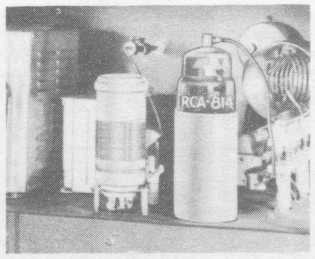
STANDS THE GAFF



Long life, enormous reserve of filament emission, ability to withstand a peak inverse voltage of 10,000 volts, 1000 ma. peak plate-current rating, conductivity at low plate voltage . . . RCA-866-A/866 has these all.

FINALS IN THE HALL OF FAME





LEFT: W6ITH, top voice man, has a power amplifier that is a symbol of symmetry. Note that corresponding plate and grid leads are identical in length and as short as is mechanically possible.
RIGHT: W2IOP's layout, using a single 814, pulled in the biggest score for a single operator in history. 95% of W2IOP's 40 tubes are RCA!

New RCA-866-A/866 has Radically Different Filament

(*Continued from page 1, column 4*)

the filament is made of a new alloy material that, in combination with the active surface coating, possesses great electron-emitting capabilities and has improved life characteristics head and shoulders above ordinary 866 and 866-A types. The filament of the 866-A/866 is contained within a shield which permits more efficient utilization of filament heating energy, thus allowing more filament area for a given number of watts. The shield enables the tube to start on much lower voltage than with the former 866-A.

Important among the features of the new RCA-866-A/866 is its new dome type bulb with its added mechanical strength feature, and the large external ceramic insulator positioned under the plate cap. This construction greatly minimizes corona discharge emanating from the edge of the metal cap, which in turn alleviates the danger of bulb cracks caused by electrolysis of the glass.

Applications for the 866-A/866

Rectifier circuits for use with the RCA-866-A/866 are shown in Figs. 1

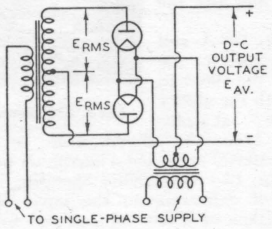


Fig. 1

to 4. Fig. 1 is the widely used single-phase, full-wave rectifier. Fig. 2 shows a single-phase bridge circuit employing two 866-A/866's in series on each side of a single-phase transformer secondary. This circuit is capable of giving twice the d-c output voltage of Fig. 1, for the same total transformer voltage and d-c output current. (Note: When using a bridge circuit, be sure that the load current is not in excess of the power rating of the transformer.) Fig. 3 shows a 3-phase, half-wave circuit using three RCA-866-A/866's. In this circuit, each tube conducts for only one-third cycle and each 60-cycle period contains three rectified waves. Fig. 4 shows a 3-phase, full-wave bridge circuit employing six 866-A/866's. Two tubes are connected in series with each transformer leg. Like the bridge circuit of Fig. 2, this circuit will give twice the d-c output voltage of the half-wave circuit in Fig. 3. In Fig. 4, each 60-cycle period contains six rectified waves.

A summary of the approximate results which can be obtained with the use of the 866-A/866 and similar mercury-vapor types is shown in Table 1. The table is based on sine-wave input and the use of a suitable choke preceding any condenser in the filter circuit. It does not, of course, take into account the voltage drop in the power transformer, the rectifier tubes, nor the filter-choke windings under load.

How the Table Works

Table 1 is a handy reference for rectifier problems. For example, if either one of the three voltages, Peak Inverse Voltage (E_{INV}), D-C Output Voltage to Filter (E_{AV}), or Transformer Secondary Voltage (E_{RMS}) are known, the other two voltages may be calculated by simple multiplication.

Suppose a single-phase transformer secondary measures 2000 volts, E_{RMS}, from center-tap to outside terminal (4000 volts, total). What will be the d-c output from two half-wave mercury-vapor rectifier tubes in a full-wave circuit and what will be the maximum peak inverse voltage impressed on each tube? Table 1 shows that in a single-phase full-wave circuit employing two tubes E_{AV}=0.9 x

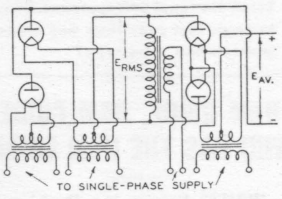


Fig. 2

E_{RMS}, which is 0.9 x 2000, or 1800 volts, d-c. In the same circuit, E_{INV}= 2.83 x E_{RMS}, which is 2.83 x 2000, or 5660 volts.

Let us approach the design of rectifiers from another angle. Suppose we wish to select a pair of rectifier tubes suitable for use in a single-phase full-wave power supply, the complete unit to deliver to the filter a total average current of 500 ma. at a maximum d-c voltage of 3000 volts. What maximum secondary voltage (E_{RMS}) should the transformer be designed to handle in order to deliver 3000 volts to the filter at maximum load current and what tubes will fill the bill?

First, determine the maximum peak inverse voltage which each rectifier tube must withstand. By reference to the relations shown for the single-phase, full-wave circuit Fig. 1 in Table 1, we find that the maximum

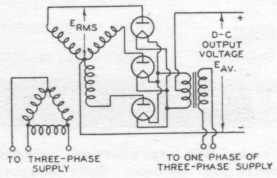


Fig. 3

peak inverse voltage corresponding to a d-c voltage of 3000 volts is 3.14 x 3000, or 9430 volts. Since two half-wave rectifiers are required in this service, each rectifier will only have to deliver 500/2, or 250 milliamperes. The rectifier tube meeting this voltage and current requirement is the 866-A/866, with its peak inverse voltage rating of 10,000 volts and its average plate current rating of 250 milliamperes. In order to deliver 3000 volts to the filter at maximum load, the transformer should be designed so that each half of the secondary will produce an E_{RMS} or 1.11 x 3000, or 3330 volts.

Parallel Connection Ups Power

Two or more 866-A/866's can be connected in parallel to give correspondingly increased output current over that obtainable with a single tube. A stabilizing resistor of 50 to 100 ohms should be connected in series with each plate lead in order that each tube will carry an equal share of the load. The value of the resistor will depend on the value of the plate current that passes through the rectifier. Low plate current requires a high value; high plate current, a low value. When the plates of 866-A/866's (or for that matter any other mercury-vapor rectifier) are connected in parallel, the corresponding filament leads should be similarly connected. Otherwise, the tube voltage drops may be considerably unbalanced and larger stabilizing resistors will be required.

RCA-866-A/866 fills a wide field of applications from low-voltage, medium-current requirements to the super-power requirements of big-time installations. This new rectifier tube is now available to experimenters and amateurs through RCA Transmitting Tube Distributors at the unusual amateur net price of $1.50. For additional technical information on 866-A/866's, write to the Commercial Engineering Section, RCA Manufacturing Company, Inc., Harrison, N. J.

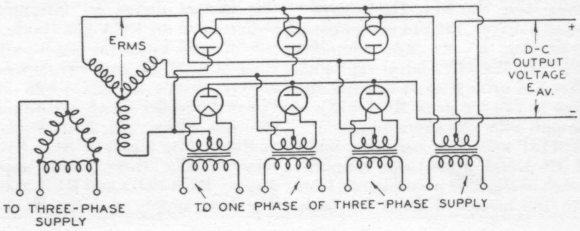
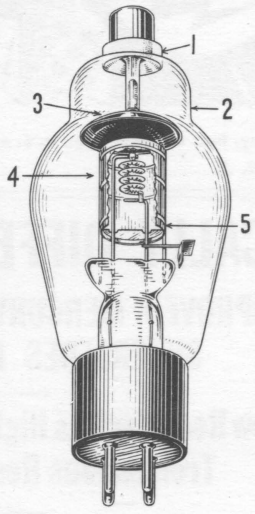


Fig. 4

STRUCTURE OF RCA-866-A/866



(1) Ceramic Insulator to minimize corona discharge, (2) dome bulb and (3) low-hanging anode to minimize ionization in upper section of bulb, (4) edgewise wound filament for great emission, (5) shielded filament construction.

RATINGS FOR RCA-866-A/866

FILAMENT VOLTAGE (A.C.)	2.5	2.5	Volts
FILAMENT CURRENT	5.0	5.0	Amperes
PEAK INVERSE VOLTAGE*:			
(For supply frequencies up to 150 cycles)			
Cond. Mercury Temp. 25° to 60° C.	....	10000 *max.*	Volts
Cond. Mercury Temp. 25° to 70° C.	200 *max.*	....	Volts
(For supply frequencies up to 1000 cycles)			
Cond. Mercury Temp. 25° to 70° C.	....	5000 *max.*	Volts
PEAK PLATE CURRENT	2.0 *max.*	1.0 *max.*	Amperes
AVERAGE PLATE CURRENT	0.5 *max.*	0.25 *max.*	Ampere
TUBE VOLTAGE DROP (Approx.)	15	15	Volts

*Operation of tube at 40° ± 5° C. is recommended.

TABLE 1

Circuit	See Fig.	Transformer Secondary Voltage E_{RMS}	D-C Output Voltage to Filter E_{AV}.	Peak Inverse Voltage E_{INV}.	Max. Average Load Current Permitted
Single-Phase Full-Wave (2 Tubes)	1	(per tube) 0.353 x E_{INV}. or 1.11 x E_{AV}.	0.318 x E_{INV}. or 0.9 x E_{RMS}	3.14 x E_{AV}. or 2.83 x E_{RMS}	2 x {Max. Average Plate-Current Rating per Rectifier Tube
Single-Phase Full-Wave Bridge (4 Tubes)	2	(total) 0.706 x E_{INV}. or 1.11 x E_{AV}.	0.636 x E_{INV}. or 0.9 x E_{RMS}	1.57 x E_{AV}. or 1.41 x E_{RMS}	2 x {Max. Average Plate-Current Rating per Rectifier Tube
Three-Phase Half-Wave (3 Tubes)	3	(per leg) 0.408 x E_{INV}. or 0.855 x E_{AV}.	0.478 x E_{INV}. or 1.17 x E_{RMS}	2.09 x E_{AV}. or 2.45 x E_{RMS}	3 x {Max. Average Plate-Current Rating per Rectifier Tube
Three-Phase Full-Wave (6 Tubes)	4	(per leg) 0.408 x E_{INV}. or 0.428 x E_{AV}.	0.956 x E_{INV}. or 2.34 x E_{RMS}	1.05 x E_{AV}. or 2.45 x E_{RMS}	3 x {Max. Average Plate-Current Rating per Rectifier Tube

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