ENGINEERING NEWS LETTER
Hygrade Sylvania
CORPORATION

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VALUES OF FIXED RESISTORS

One problem confronting the circuit design engineer is that of selecting fixed resistors whose values will fulfill the requirements of the circuit and at the same time be easily obtainable and readily replaceable. The application of Ohm's law, in determining the values of resistance used in vacuum tube circuits, often results in odd values as the currents and voltages are determined largely by the operating characteristics of the tubes. Obviously, it is not feasible to design tube characteristics to suit predetermined values of components such as resistors.

It is the purpose of this Engineering News Letter to bring to the attention of the circuit designer the practicability of the "Preferred Number Values of Fixed Composition Resistors", introduced and standardized by the Engineering Department of the Radio Manufacturers Association, so that problems of fixed resistors might become less involved for initial supply and replacement.

The standardized Preferred Number Values (reproduced on the attached sheet through the courtesy of the RMA Engineering Department) are divided into three tolerance groups, ±5%, ±10%, and ±20%. Where the voltage drops across resistors are somewhat critical, as in bias resistors, the 10% group is the most practical and economical, and only in special cases will the 5% group need to be used. This group furnishes a complete line of resistors which will meet the majority of circuit requirements. Adherence to this standardization eliminates the necessity of maintaining large stocks of resistors whose values are seldom used.

In determining the value of the resistor to be employed from Ohm's law, it frequently occurs that the calculated value is not found on the preferred list. In such cases it is, of course, desirable to choose the resistor of nearest value to it, either larger or smaller according to the characteristics of the circuit. For instance, if the value of a cathode resistor is calculated to be 110 ohms, it is found that the nearest values in the 10% tolerance group are 100 ohms and 120 ohms. In such a case the plate and screen voltages should be taken into consideration. If the plate and screen voltages are high, then it is desirable to use the resistor that will provide more bias (in order to safeguard tube life and operating characteristics) and hence the 120 ohm unit should be used. In cases where the voltages tend to run low, the lower value resistor may be used. The same reasoning applies to screen and plate resistors which are in general not as critical as the cathode bias resistor.

The above reasoning should be applied in the use of the Bias Resistor Chart appearing in the Sylvania Technical Manual on Pages 248 and 254, inclusive.

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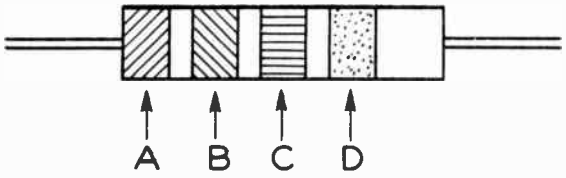
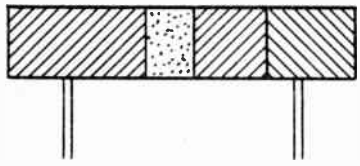
Fixed Composition Resistors—Preferred Number Values





Preferred Values of Resistance (ohms)			Resistance Designation		
± 20% D-No Color	± 10% D-Silver	± 5 % D-Gold	A	B	C
10	10	10	Brown	Black	Black
		11	Brown	Brown	Black
	12	12	Brown	Red	Black
		13	Brown	Orange	Black
15	15	15	Brown	Green	Black
		16	Brown	Blue	Black
	18	18	Brown	Gray	Black
		20	Red	Black	Black
22	22	22	Red	Red	Black
		24	Red	Yellow	Black
	27	27	Red	Violet	Black
		30	Orange	Black	Black
33	33	33	Orange	Orange	Black
		36	Orange	Blue	Black
	39	39	Orange	White	Black
		43	Yellow	Orange	Black
47	47	47	Yellow	Violet	Black
		51	Green	Brown	Black
	56	56	Green	Blue	Black
		62	Blue	Red	Black
68	68	68	Blue	Gray	Black
		75	Violet	Green	Black
	82	82	Gray	Red	Black
		91	White	Brown	Black
100	100	100	Brown	Black	Brown
		110	Brown	Brown	Brown
	120	120	Brown	Red	Brown
		130	Brown	Orange	Brown
150	150	150	Brown	Green	Brown
		160	Brown	Blue	Brown
	180	180	Brown	Gray	Brown
		200	Red	Black	Brown
220	220	220	Red	Red	Brown
		240	Red	Yellow	Brown
	270	270	Red	Violet	Brown
		300	Orange	Black	Brown
330	330	330	Orange	Orange	Brown
		360	Orange	Blue	Brown
	390	390	Orange	White	Brown
		430	Yellow	Orange	Brown
470	470	470	Yellow	Violet	Brown
		510	Green	Brown	Brown
	560	560	Green	Blue	Brown
		620	Blue	Red	Brown
680	680	680	Blue	Gray	Brown
		750	Violet	Green	Brown
	820	820	Gray	Red	Brown
		910	White	Brown	Brown
1000	1000	1000	Brown	Black	Red
		1100	Brown	Brown	Red
	1200	1200	Brown	Red	Red
		1300	Brown	Orange	Red
1500	1500	1500	Brown	Green	Red
		1600	Brown	Blue	Red
	1800	1800	Brown	Gray	Red
		2000	Red	Black	Red
2200	2200	2200	Red	Red	Red
		2400	Red	Yellow	Red
	2700	2700	Red	Violet	Red
		3000	Orange	Black	Red
3300	3300	3300	Orange	Orange	Red
		3600	Orange	Blue	Red
	3900	3900	Orange	White	Red
		4300	Yellow	Orange	Red
4700	4700	4700	Yellow	Violet	Red
		5100	Green	Brown	Red
	5600	5600	Green	Blue	Red
		6200	Blue	Red	Red
6800	6800	6800	Blue	Gray	Red
		7500	Violet	Green	Red
	8200	8200	Gray	Red	Red
		9100	White	Brown	Red

Preferred Values of Resistance (ohms)			Resistance Designation		
± 20% D-No Color	± 10% D-Silver	± 5% D-Gold	A	B	C
10000	10000	10000	Brown	Black	Orange
		11000	Brown	Brown	Orange
	12000	12000	Brown	Red	Orange
		13000	Brown	Orange	Orange
15000	15000	15000	Brown	Green	Orange
		16000	Brown	Blue	Orange
	18000	18000	Brown	Gray	Orange
		20000	Red	Black	Orange
22000	22000	22000	Red	Red	Orange
		24000	Red	Yellow	Orange
	27000	27000	Red	Violet	Orange
		30000	Orange	Black	Orange
33000	33000	33000	Orange	Orange	Orange
		36000	Orange	Blue	Orange
	39000	39000	Orange	White	Orange
		43000	Yellow	Orange	Orange
47000	47000	47000	Yellow	Violet	Orange
		51000	Green	Brown	Orange
	56000	56000	Green	Blue	Orange
		62000	Blue	Red	Orange
68000	68000	68000	Blue	Gray	Orange
		75000	Violet	Green	Orange
	82000	82000	Gray	Red	Orange
		91000	White	Brown	Orange
100000	100000	100000	Brown	Black	Yellow
		110000	Brown	Brown	Yellow
	120000	120000	Brown	Red	Yellow
		130000	Brown	Orange	Yellow
150000	150000	150000	Brown	Green	Yellow
		160000	Brown	Blue	Yellow
	180000	180000	Brown	Gray	Yellow
		200000	Red	Black	Yellow
220000	220000	220000	Red	Red	Yellow
		240000	Red	Yellow	Yellow
	270000	270000	Red	Violet	Yellow
		300000	Orange	Black	Yellow
330000	330000	330000	Orange	Orange	Yellow
		360000	Orange	Blue	Yellow
	390000	390000	Orange	White	Yellow
		430000	Yellow	Orange	Yellow
470000	470000	470000	Yellow	Violet	Yellow
		510000	Green	Brown	Yellow
	560000	560000	Green	Blue	Yellow
		620000	Blue	Red	Yellow
680000	680000	680000	Blue	Gray	Yellow
		750000	Violet	Green	Yellow
	820000	820000	Gray	Red	Yellow
		910000	White	Brown	Yellow
1.0 Meg.	1.0 Meg.	1.0 Meg.	Brown	Black	Green
		1.1 Meg.	Brown	Brown	Green
	1.2 Meg.	1.2 Meg.	Brown	Red	Green
		1.3 Meg.	Brown	Orange	Green
1.5 Meg.	1.5 Meg.	1.5 Meg.	Brown	Green	Green
		1.6 Meg.	Brown	Blue	Green
	1.8 Meg.	1.8 Meg.	Brown	Gray	Green
		2.0 Meg.	Red	Black	Green
2.2 Meg.	2.2 Meg.	2.2 Meg.	Red	Red	Green
		2.4 Meg.	Red	Yellow	Green
	2.7 Meg.	2.7 Meg.	Red	Violet	Green
		3.0 Meg.	Orange	Black	Green
3.3 Meg.	3.3 Meg.	3.3 Meg.	Orange	Orange	Green
		3.6 Meg.	Orange	Blue	Green
	3.9 Meg.	3.9 Meg.	Orange	White	Green
		4.3 Meg.	Yellow	Orange	Green
4.7 Meg.	4.7 Meg.	4.7 Meg.	Yellow	Violet	Green
		5.1 Meg.	Green	Brown	Green
	5.6 Meg.	5.6 Meg.	Green	Blue	Green
		6.2 Meg.	Blue	Red	Green
6.8 Meg.	6.8 Meg.	6.8 Meg.	Blue	Gray	Green
		7.5 Meg.	Violet	Green	Green
	8.2 Meg.	8.2 Meg.	Gray	Red	Green
		9.1 Meg.	White	Brown	Green
10.0 Meg.	10.0 Meg.	10.0 Meg.	Brown	Black	Blue

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