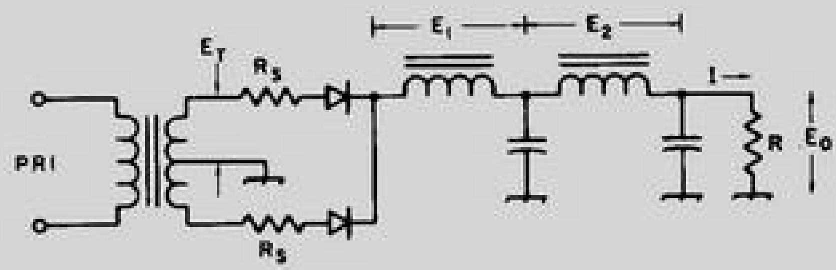

Fig. 12-11—Diagram showing various voltage drops that must be taken into consideration in determining the required transformer voltage to deliver the desired output voltage.

will drop to 5 h. The critical inductance for 200 ma. at 1000 volts is 1000/200 = 5 h. Therefore the 5/25-h. choke maintains the critical inductance at the full current rating of 200 ma. At all load currents between 40 ma. and 200 ma., the choke will adjust its inductance to the approximate critical value.

Table 12-I shows the maximum supply output voltage that can be used with commonly-available swinging chokes to maintain critical inductance at the maximum current rating of the choke. These chokes will also maintain critical inductance for any lower values of voltage, or current down to the required minimum drawn by a proper bleeder as discussed above.

In the case of supplies for higher voltages in particular, the limitation on maximum load resistance may result in the wasting of an appreciable portion of the transformer power capacity in the bleeder resistance. Two input chokes in series will permit the use of a bleeder of twice the resistance, cutting the wasted current in half. Another alternative that can be used in a c.w. transmitter is to use a very high-resistance bleeder for protective purposes and only sufficient fixed bias on the tubes operating from the supply to bring the total current drawn from the supply, when the key is open, to the value of current that the required bleeder resistance should draw from the supply. Operating bias is brought back up to normal by increasing the grid-leak resistance. Thus the entire current capacity of the supply (with the exception of the small drain of the protective bleeder) can be used in operating the transmitter stages. With this system, it is advisable to operate the tubes at phone, rather than c.w., ratings, since the average dissipation is increased.

TABLE 12-I

L_h	*Max. ma.*	*Max. volts*	*Max. R^1*	*Min. ma.²*
3.5/13.5	150	525	13.5K	39
2/12	200	400	12K	33
5/25	200	1000	25K	40
2/12	250	500	12K	42
4/20	300	1200	20K	60
5/25	300	1500	25K	60
4/20	400	1600	20K	80
5/25	500	2500	25K	100

¹ Maximum bleeder resistance for critical inductance.
² Minimum current (bleeder) for critical inductance.

Output Voltage

Provided the input-choke inductance is at least the critical value, the output voltage may be calculated quite closely by the following equation:

$$E_o = 0.9E_t - (I_B + I_L)\ (R_1 + R_2) - E_r$$

where E_o is the output voltage; E_t is the r.m.s. voltage applied to the rectifier (r.m.s. voltage between center-tap and one end of the secondary in the case of the center-tap rectifier); I_B and I_L are the bleeder and load currents, respectively, in amperes; R_1 and R_2 are the resistances of the first and second filter chokes; and E_r is the voltage drop across the rectifier. The various voltage drops are shown in Fig. 12-11. At no load I_L is zero, hence the no-load voltage may be calculated on the basis of bleeder current only. The voltage regulation may be determined from the no-load and full-load voltages using the formula previously given.

Ripple with Choke Input

The percentage ripple output from a single-section filter may be determined to a close approximation from Fig. 12-12.

Example: $L = 5$ h., $C = 4\ \mu$f., $LC = 20$. From Fig. 12-12, percentage ripple = 7 per cent.

Example: $L = 5$ h. What capacitance is needed to reduce the ripple to 1 per cent? Following the 1-per-cent line to its intersection with the diagonal, thence down to the LC scale, read $LC = 120$. $120/5 = 24\mu$f.

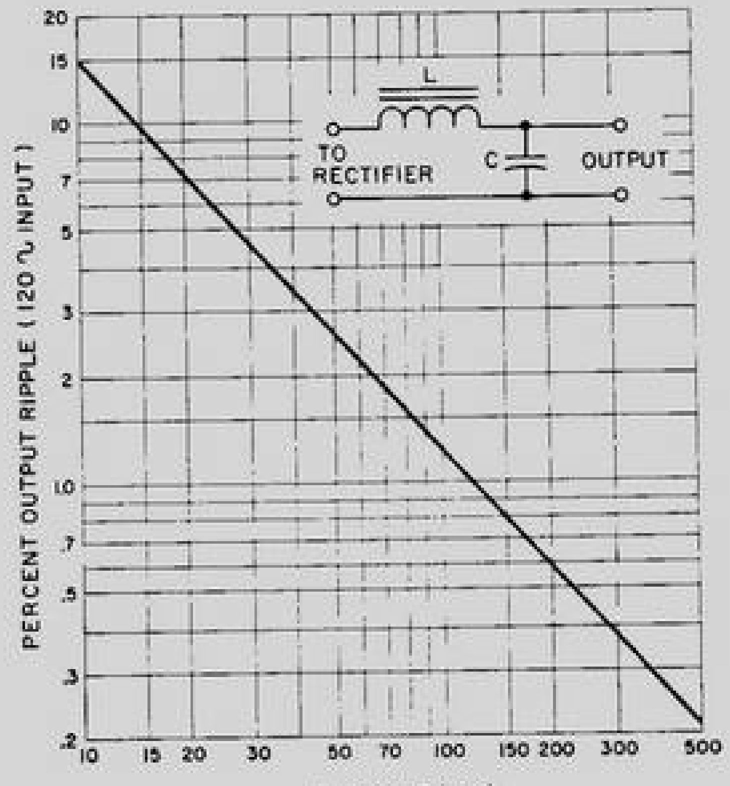

Fig. 12-12—Graph showing combinations of inductance and capacitance that may be used to reduce 120-cycle ripple with a single-section choke-input filter.