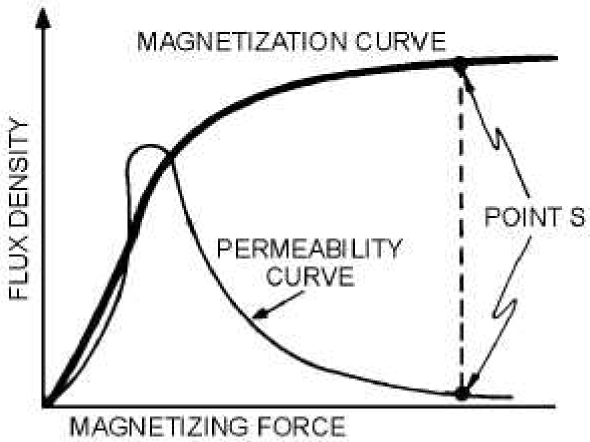
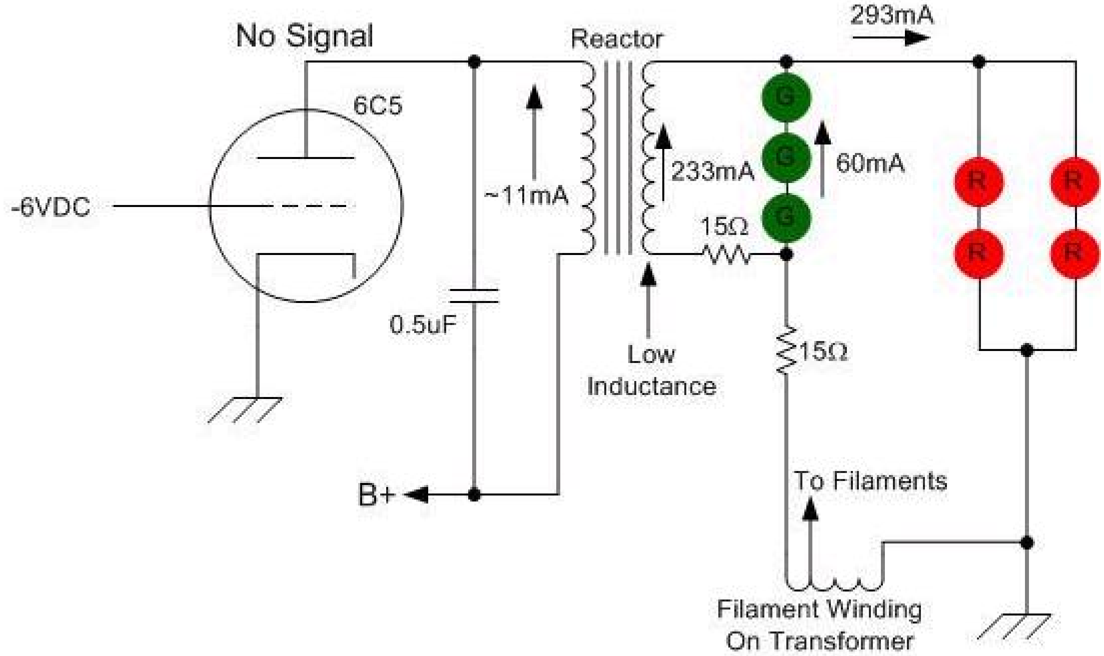
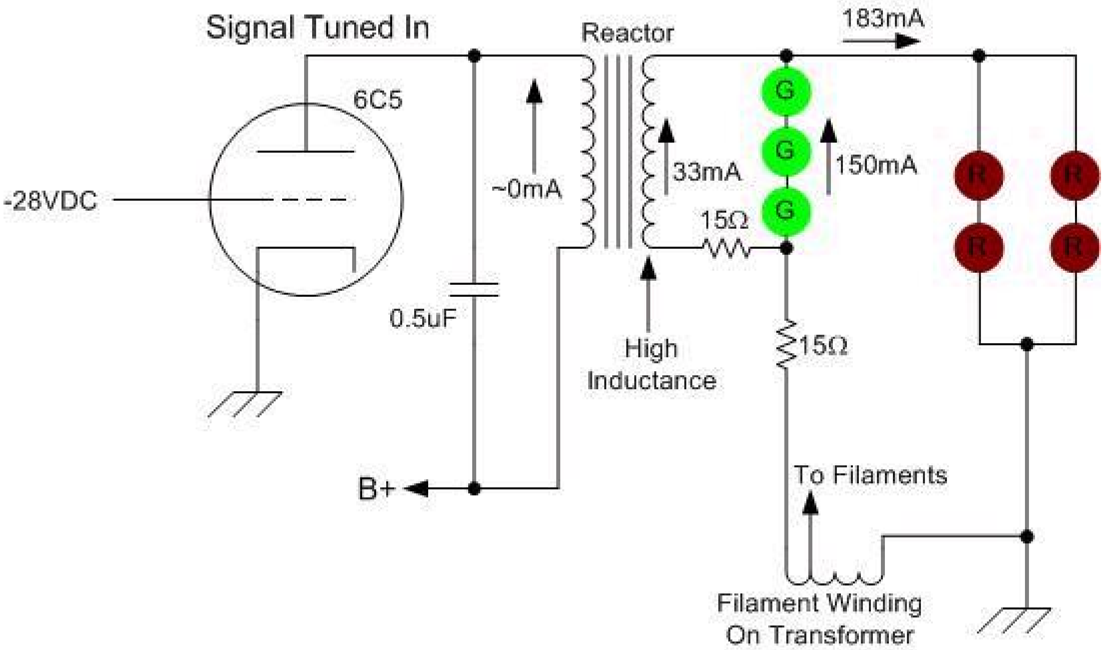


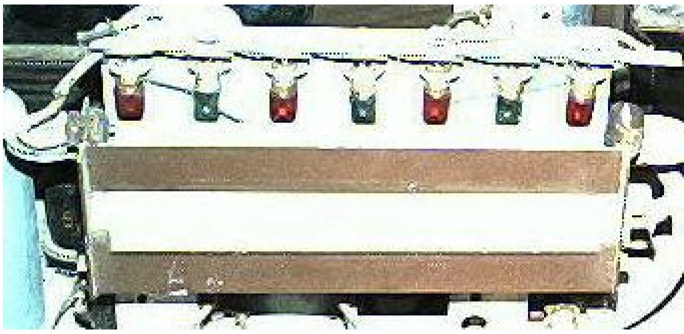
3-47 **Figure 3-31.—Magnetization and permeability curves.** You have now seen how a change in the magnetizing force causes a change in permeability. The next question is, how do you change the magnetizing force? Magnetizing force is a function of AMPERE-TURNS. (An ampere-turn is the magnetomotive force developed by 1 ampere of current flowing in a coil of one turn.) If you increase the ampere-turns of a coil, the magnetizing force increases. Since it is not practical to increase the number of turns, the easiest way to accomplish this is to increase the current through the coil. If you increase the current through a coil, you increase the ampere-turns. By increasing the ampere- turns you increase the magnetizing force. At some point, this causes a decrease in the permeability of the core. With the permeability of the core decreased, the inductance of the coil decreases. As said before, a decrease in the inductance causes an increase in power through the load. A device that uses this arrangement is called a SATURABLE-CORE REACTOR or SATURABLE REACTOR. **SATURABLE-CORE REACTOR** A saturable-core reactor is a magnetic-core reactor (coil) whose reactance is controlled by changing the permeability of the core. The permeability of the core is changed by varying a unidirectional flux (flux in one direction) through the core. Figure 3-32 shows a saturable-core reactor that is used to control the intensity of a lamp. Notice that two coils are wound around a single core. The coil on the left is connected to a rheostat and a battery. This coil is called the control coil because it is part of the control circuit. The coil on the right is connected to a lamp (the load) and an a.c. source. This coil is called the load coil because it is part of the load circuit. As the wiper (the movable connection) of the rheostat is moved toward the right, there is less resistance in the control circuit. With less resistance, the control-circuit current increases. This causes the amount of magnetism in the core to increase and the inductance of the coil in the load circuit to decrease (because the core is common to both coils). With less inductance in the load circuit, load current increases and the lamp gets brighter.

Colorama was a method of visual tuning used by General Electric for one year: 1936. The heart of the system is a saturable-core reactor. The reactor is driven by a 6C5 triode with its grid connected to the AVC line. At zero signal, the grid of the 6C5 is less negative (about -6V). A maximum amount of current flows through the 6C5 and the primary of the reactor, decreasing the inductance of the secondary winding. The decreased inductance allows more of the current to be passed through the secondary than through the green lights, making the red lights brighter.



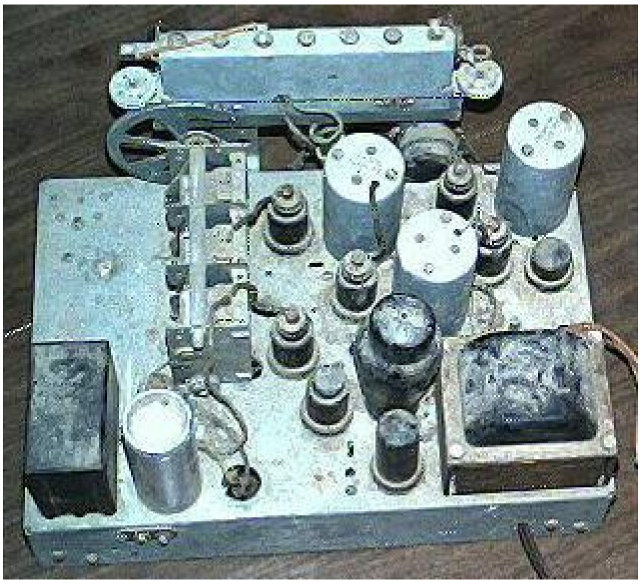
As a station is tuned in, the grid of the 6C5 goes even more negative (about -28V) cutting off the tube and nearly zero current flows through the primary winding. The inductance of the secondary increases, shunting current through the green lights making them brighter.



 Here is the dial light assembly.

Other manufacturers had previously used saturable core reactors as tuning indicators. One of them was Majestic who used it in sets such as the model 320. That set used the plate current of the IF amplifier as the control current to brighten and dim the dial light. The 320 dates from 1933 so the use of saturable reactors was not a new idea by the time of the colorama sets, it was just a slightly different use.

Back to the restoration. I pulled the chassis out of the cabinet and found a hole where a filter capacitor once was mounted and an adjustable core mounted on the top of the chassis. Flipping the chassis over showed that one of the antenna coils was missing and discoloration on the shielding around where it should be indicates that it had gotten fried.



The reactor is housed in the black rectangular box on the left side of the chassis in the above photo.