The Stenode.—

frequencies changed to that of the crystal, just as in an ordinary superheterodyne receiver. After passing through the crystal the signals are rectified, and are then passed through a low-frequency amplifier which is designed to amplify in proportion to frequency.

Interference.

According to the general conception of the sideband theory, interference should result when the interference is on a frequency less than 10 kc. from the desired station, and we shall now consider the interference obtained from the carrier wave of a neighbouring station. Such a carrier wave will produce an effect in the selective circuit, although this effect is small. In most of the experiments up to date, it is found that such an interfering carrier does produce a small interference; and although this does not form part of the present paper, means can be employed to remove this interference.

By making a receiver of the highest possible selectivity, the modulation response of a transmission whose frequency is less than 5,000 cycles away from resonance can be made negligible.

This result appears to be a contradiction of the sideband theory. It is, however, very significant that there are certain phases of radio analysis where it is customary to employ the actual modulated waves instead of the Fourier components, such as in the problems of rectification. It is open to question, therefore, whether the sideband theory gives a complete statement of the case.

Still another factor which must be taken into account, in the case of the Stenode, is that we must consider free oscillations which are given by the exponential term in the solution to the basic differential equation for oscillating circuits. This exponential term is not easy to subject to mathematical computation.

When attempts to apply the sideband theory to the Stenode are made, the question arises as to the vectorial addition of the various sideband effects. Such additions can be made, provided that each term is entirely independent of the other terms. When the exponential term is of large importance, however, the sideband effects are not independent of each other, and thus simple addition cannot be applied.

APPENDIX.

If the depth of modulation of the incoming wave be m, then the depth of modulation m_1 after passing through the selective circuit is given by:

$$m_1 = \frac{\delta n m}{2\pi f}$$

where δ = circuit decrement $= \frac{R}{2fL}$

n = carrier frequency.
f = modulation frequency.
R = series resistance of circuit in ohms.
L = inductance in henrys.

PHILIPS DE LUXE ELECTRIC GRAMOPHONE.

Three-stage Amplifier with an Output of 15 watts.

DESIGNED for high-quality reproduction of gramophone records in hotels, restaurants, and dance halls, this 190-guinea A.C. model is housed in a massive cabinet of dignified design which is available either in walnut or mahogany. The lid hinge is fitted wtih a pneumatic stop which prevents the lid from being accidentally slammed.

A super-power moving-coil loud speaker is fitted, and the amplifier is designed to deliver the full 15 watts of undistorted power which it is capable of handling. There are three stages, and the output valve is a Type M.C.1/50 working at 1,000 volts and 50 mA. The H.T. rectifier is a Type 2,769, and the loud speaker field is supplied from a Type 506A. valve. Although intended primarily as a gramophone reproducer, provision is made for feeding the amplifier from a radio receiver or local microphone.

Philips Senior Reproducer.

The pick-up is a special design originally evolved for talkie installations. It is oil-damped, and has a dog clutch for clamping the needle; thus, the long needle set screw is detached from the vibrating system during the playing of a record.

Another interesting feature is the delayed-action pilot lamp. This is connected across the loud speaker field, and does not light until the gas-filled rectifier strikes. The short time interval which elapses after switching on allows the A.C. heaters of the amplifier valve filaments to reach their working temperature, so that the equipment is all ready for use immediately the pilot light appears.

The makers are Philips Lamps, Ltd., 135, Charing Cross Road, London, W.C.2.